



Western Water Constructors, Inc.
Submittal Cover

Job no. 16-05



CONTRACT NAME: Manteca WQCF Digester Improvements
SPEC SECTION: 15116 Plug Valves
SUBMITTAL TITLE: Plug Valves with Pneumatic Operators - O&M
FILE NAME: 295-R0\_15116-04\_Plug Valves with Pneumatic Operators-OM
SUB #: 295
REV #: 0
CODE: 15116-04
DATE: 3/7/2018

WWC REVIEW/COMMENTS: [X] NO EXCEPTIONS [ ] EXCEPTIONS / DEVIATIONS AS NOTED

REVIEWED BY: ST

SIGNED: [Signature]

WWC HAS REVIEWED THIS SUBMITTAL FOR CONFORMANCE WITH THE PROJECT PLANS & SPECIFICATIONS.

OWNER REVIEW:

Table with columns: ITEM, DESCRIPTION, REVIEW STATUS (A, B, C, D, E). Row 1: 1 Plug Valves with Pneumatic Operators - O&M

LEGEND: A = No Exceptions Taken B = Make Correction Noted C = Correct & Resubmit
D = Rejected E = Accepted for Record

OWNER COMMENTS:

REVIEWER'S NAME: \_\_\_\_\_

REVIEWER'S SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

# MILLIKEN VALVE

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## OPERATION AND MAINTENANCE MANUAL

**Submittal Date:** February 22, 2018

**Manufacturer:**

Milliken Valve  
401 S. Highland Ave.  
Aurora, IL 60506  
PH: (877) 655-6858  
Fax: (630) 844-4160

**Name and Address of Local Sales Representative:**

Southwest Valve, LLC.  
402 W. Bedford #111  
Fresno, CA 93711  
Phone: 559-261-2703  
Fax: 559-261-2711

**Project Name: Manteca WWQF Digester Improvements - Manteca, CA**

**Product:** Plug Valves – Actuated

**Milliken SO #:** 2226531 ML

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# Equipment Record

# LIST OF EQUIPMENT

Milliken Order No.: 2226531 ML

ITEM	TAG	QTY	EQUIPMENT DESCRIPTION	DRAWING REFERENCE
16.0	SP-VFPVP	4	4" 601 FLANGE FULL ROUND PORT PLUG VALVE KINETROL MODEL 087 O/C VANE PNEUMATIC ACTUATOR VERSA 4-WAY DUAL COIL SOLENOID VALVE MODEL C5N213 SMC SPEED CONTROL MUFFLER KINETROL 2 SPST LIMIT SWITCHES PARKER HANNIFIN FILTER REGULATOR MODEL P31EB92EGMBN5P KANTLEAK 3-WAY ISOLATION BALL VALVE MODEL 322BVLLXLP1	G.A.: S49801 C.S.: SPEC. SHEET 16.0  A.D.S.: LINE 16.0 A.D.: 128-2088A /A3 A.D.: 087DAS2U0AV-1A E.P.C.: DA ACTUATOR C.C.: MODEL 08  LOCATED IN SECTION 4

**A.D. Assembly Drawing**  
**C.S. Cross Section Drawing**  
**G.A. General Arrangement**

**A.D.S. Actuator Data Sheet**  
**D.D. Dimensional Drawing**

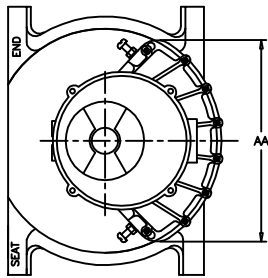
**C.C. Catalog Cuts**  
**E.P.C. Electrical Pneumatic Connections**

ITEM	TAG	QTY	EQUIPMENT DESCRIPTION	DRAWING REFERENCE
21.1	SP-VFPVU	8	6" 601 FLANGE FULL ROUND PORT PLUG VALVE KINETROL MODEL 107 O/C VANE PNEUMATIC ACTUATOR VERSA 4-WAY DUAL COIL SOLENOID VALVE MODEL C5N213 SMC SPEED CONTROL MUFFLER KINETROL 2 SPST LIMIT SWITCHES PARKER HANNIFIN FILTER REGULATOR MODEL P31EB92EGMBN5P KANTLEAK 3-WAY ISOLATION BALL VALVE MODEL 322BVLLXLP1	G.A.: S49801 C.S.: SPEC. SHEET 21.1  A.D.S.: LINE 21.1 A.D.: 128-1795A A3 A.D.: 107DAS2UV0AV-1A E.P.C.: DA ACTUATOR C.C.: MODEL 10  LOCATED IN SECTION 4
24.0	SP-MISC SPAREPARTS	1	SPARE ACTUATOR SAME AS LINE 16.0 KINETROL MODEL 087 O/C VANE PNEUMATIC ACTUATOR WITH ACCESSORIES	SAME AS LINE 16.0
25.0	SP-MISC SPAREPARTS	1	SPARE ACTUATOR SAME AS LINE 21.1 KINETROL MODEL 107 O/C VANE PNEUMATIC ACTUATOR WITH ACCESSORIES	SAME AS LINE 21.1

A.D. Assembly Drawing  
C.S. Cross Section Drawing  
G.A. General Arrangement

A.D.S. Actuator Data Sheet  
D.D. Dimensional Drawing

C.C. Catalog Cuts  
E.P.C. Electrical Pneumatic Connections



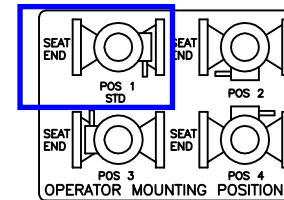
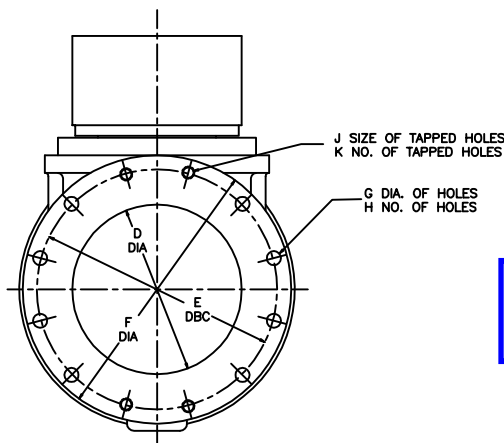
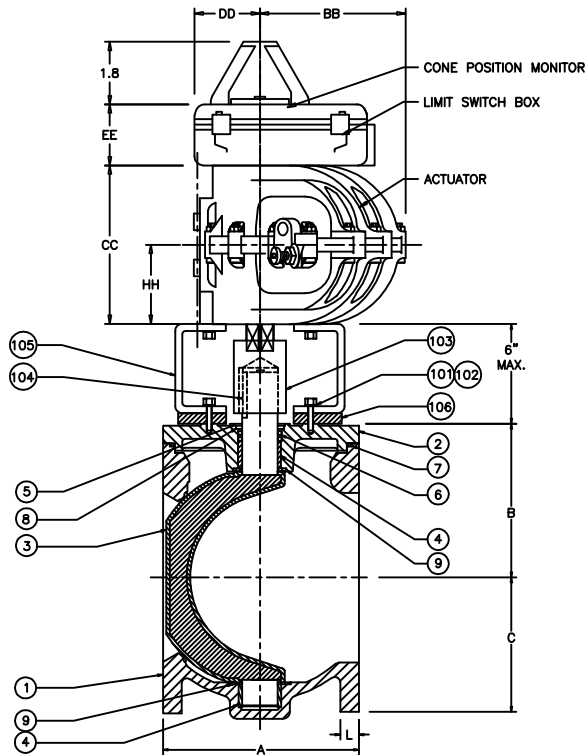
VALVE SIZE	GEAR SIZE	A	B	C	D	E	F	G	H	J	K	L
3	M3	8	3.34	3.75	3	6.00	7.50	0.75	4	--	--	0.75
4	M3	9	4.31	4.50	4	7.50	9	0.75	6	0.63	2	0.94
5	M3	10	5.56	5.75	5	8.50	10	0.88	6	0.75	2	0.94
6	M3	10.50	5.56	5.75	6	9.50	11	0.88	6	0.75	2	1
8	M5	11.50	7.38	7.63	8	11.75	13.50	0.88	6	0.75	2	1.13
10	M8	13	9.13	8.88	10	14.25	16	1	8	0.88	4	1.19
12	M8	14	10.81	10	12	17.00	19	1	8	0.88	4	1.25
14	M8	17	12.75	13	14	18.75	21	1.13	10	1	2	1.38

MODEL	AA	BB	CC	DD	EE	HH
05	5.35	3.09	2.64	1.85	1.73	4.06
07	9.1	5.1	6.9	3.1	1.9	3.5
08	7.05	3.74	3.90	1.85	1.73	3.62
09	8.94	5.22	4.96	1.85	1.73	3.62
10	9.06	5.14	6.89	1.85	1.73	3.62
12	11.57	6.73	6.14	2.80	2.17	3.62
14	15.0	8.7	8.5	3.3	1.9	4.3
16	20.67	11.81	10.79	2.80	6.10	6.85
18	26.77	15.43	14.17	2.80	7.10	--

For 4" plug valve

For 6" plug valve

REFER TO VENDOR ACTUATOR DRAWINGS FOR CERTIFIED DIMENSIONS AND ACCESSORIES



106	1	RISER RING	STEEL
105	1	BRACKET	STEEL
104	AR	KEY	STEEL
103	1	COUPLING	STEEL
102	AR	CAP SCREW	STEEL/ZINC
101	AR	LOCK WASHER	STEEL/ZINC
50	1	OPERATOR	
9	2	WASHER	PTFE
8	1	WASHER	BRONZE
7	1	O RING	ELAS AS SPEC.
6	2	U CUP SEAL	ELAS AS SPEC.
5	1	RETAINING RING	SPRING STEEL
4	2	SLEEVE BEARING	316 STN. STEEL
3	1	PLUG (ELASTOMER AS SPEC.)	DUCTILE IRON
2	1	CAP	A 126 CL B
1	1	BODY	A 126 CL B
ITEM	QTY	DESCRIPTION	MATERIAL
		<b>MILLIKEN</b>	
REV. DATE	REVISIONS	BY CHK'D	DATE SCALE
1 09/23/16	UPDATED ACTUATOR DIMENSIONS, ADDED NOTE	UCL RTF	8/8/6 NONE
		TITLE:	INCHES
		FIG. 601	
		3"-14" MILLICENTRIC PLUG VALVE, FLANGED, W/ KINETROL D.A. ACT.	
		DWG. NO.	S49801

LINES 16.0 AND 21.1

# Plug Valve Data

EQUIPMENT SUMMARY FORM

- 4" 601 FL. PLUG VALVE /
1. EQUIPMENT ITEM KINETROL MODEL 087 O/C VANE PNEU ACTUATOR/ CONTROLS
  2. MANUFACTURER Milliken Valve Co. 401 S. Highland Avenue Aurora, IL 60506 630-844-4000
  3. EQUIPMENT IDENTIFICATION NUMBER(S) SP-VFPVP  
(maps equipment number)
  4. LOCATION OF EQUIPMENT None Provided
  5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) 121#
  6. NAMEPLATE DATA - Horsepower N/A  
 Amperage N/A  
 Voltage N/A  
 Service Factor (S.F.) N/A  
 Speed N/A  
 ENC Type NEMA 4 & 4X. Watertight and Dust Tight  
 Capacity N/A  
 Other Limit Switch 125V / 15A Solenoid Valve 120Vac

MANUFACTURER'S LOCAL REPRESENTATIVE:

Name Southwest Valve, LLC. Address 402 W. Bedford #111 Fresno, CA 93711  
 Telephone Number 559-261-2703

8. MAINTENANCE REQUIREMENTS VALVE - No maintenance required. Cycling the valve from full open to full close on an annual basis will increase the life of the valve and operator components. VANE ACTUATOR - Maintenance is limited to replacement of seals when wear affects actuator performance. Seal life will vary according to application, conditions of cycle frequency, temperature, condition of air supply, etc.
9. LUBRICANT LIST None Required
10. SPARE PARTS (recommendations) None recommended
11. COMMENTS \_\_\_\_\_

EQUIPMENT SUMMARY FORM

6" 601 FL. PLUG VALVE

1. EQUIPMENT ITEM KINETROL MODEL 107 O/C VANE PNEU ACTUATOR / CONTROLS
2. MANUFACTURER Milliken Valve Co. 401 S. Highland Avenue Aurora, IL 60506 630-844-4000
3. EQUIPMENT IDENTIFICATION NUMBER(S) SP-VFPVU  
(maps equipment number)
4. LOCATION OF EQUIPMENT None Provided
5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) 155#
6. NAMEPLATE DATA - Horsepower N/A  
 Amperage N/A  
 Voltage N/A  
 Service Factor (S.F.) N/A  
 Speed N/A  
 ENC Type NEMA 4 & 4X, Watertight and Dust Tight  
 Capacity N/A  
 Other Limit Switch 125V / 15A Solenoid Valve 120Vac

MANUFACTURER'S LOCAL REPRESENTATIVE:

Name Southwest Valve, LLC. Address 402 W. Bedford #111 Fresno, CA 93711  
 Telephone Number 559-261-2703

8. MAINTENANCE REQUIREMENTS VALVE - No maintenance required. Cycling the valve from full open to full close on an annual basis will increase the life of the valve and operator components. VANE ACTUATOR - Maintenance is limited to replacement of seals when wear affects actuator performance. Seal life will vary according to application, conditions of cycle frequency, temperature, condition of air supply, etc.
9. LUBRICANT LIST None Required
10. SPARE PARTS (recommendations) None recommended
11. COMMENTS \_\_\_\_\_

May 2016

**Millcentric Plug Valve  
Operation and Maintenance  
Manual  
Series 600**

**MILLIKEN<sup>®</sup>**

Milliken  
401 S. Highland Avenue  
Aurora, IL 60506  
Phone: (877) 655-6858  
Fax: (630) 844-4160  
Website: [www.millikenv Valve.com](http://www.millikenv Valve.com)

# **Operations & Maintenance**

## **Functional Description**

### **PLUG VALVE**

Plug valves are designed with eccentric rubber disc seating surfaces. The plug rotates 1/4 turn to provide shutoff in pipes. The eccentric seating action provides for tighter shutoff as the actuator is adjusted to provide for more rotation. The valve can be adjusted to a maximum of 10 degrees over travel. The valves can be used to regulate flow rate by positioning the plug between 15 and 90 degrees open.

Manually operated plug valves are powered with levers/2" nuts (valves with torque collars), or gear actuators, which convert multiple handwheel, chainwheel, or nut input turns into 1/4 turn valve operation. The travel of the valve plug is limited by physical stops in the torque collar for wrench operated valves, and in the actuator housing for gear operated valves.

**CAUTION:** Forcing the handwheel, chainwheel, or nut against the stops will not provide tighter shutoff of the valve and may damage the actuator. Only actuator adjustments will affect valve shutoff.

Motor operated valves are powered with gear actuators, which convert multiple motor input turns into 1/4 turn valve operation. The travel of the valve plug is limited by limit switches in the motor housing and physical stop in the actuator housing. Valve shutoff is affected by limit switch and physical stop settings.

**CAUTION:** Improperly set limit switches and/or physical stops may damage the motor and/or actuator.

## **Operations & Maintenance**

### **Safety**

Valves must be de-pressurized before any disassembly procedures are performed.

On gear operated valves, when the gears have the cover removed, extra caution should be taken to make sure hands or fingers are away from the moving parts. Close fitting clothing should be worn so as to avoid getting caught in the moving gears.

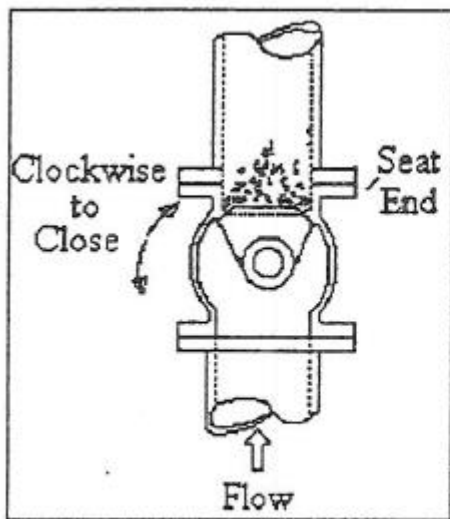
## Operations & Maintenance

### Installation

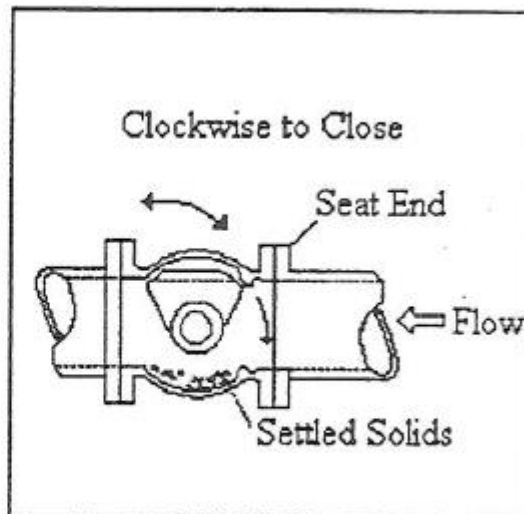
When installing the valves, the seat end should be noted. The seat end of the valve is cast in raised letters on the appropriate flange of the valve. Generally, straightway valves should be installed with the highest pressure applied from the opposite end from the seat. This will tend to push the plug into the seat. On pump discharge installations the seat end should be towards the pump.

In the case where shut-off is required in both directions, the valve should be installed so that the highest differential pressure at shut-off is opposite the seat end.

When the service is of a clogging type, with suspended solids likely to build up in the valve body, it is recommended that the valve be installed with the media entering the seat end first. In extreme cases, the valve should be installed with the plug horizontal and rotating upward into the top portion of the valve body cavity to open.



Vertical Pipeline



Horizontal Pipeline

Class 125 flanged end valves have ANSI B16.1 flat faced 125/150 flanges. Class 250 flanged end valves have ANSI B16.1 raised face 250 flanges. Standard ANSI B16.21 flanges and gaskets should be used to install the valves in the pipeline. Certain size valves utilize tapped holes on the top and bottom of the flange where a backing nut is not possible. Please check specific drawings for detailed information on sizes and quantities of hexagon head screws required on these valves.

Prior to installing valve, especially ones that are buried, they should be cycled open and closed several times to ensure they are in good working order and have not been damaged during shipment or storage.

## Operations & Maintenance

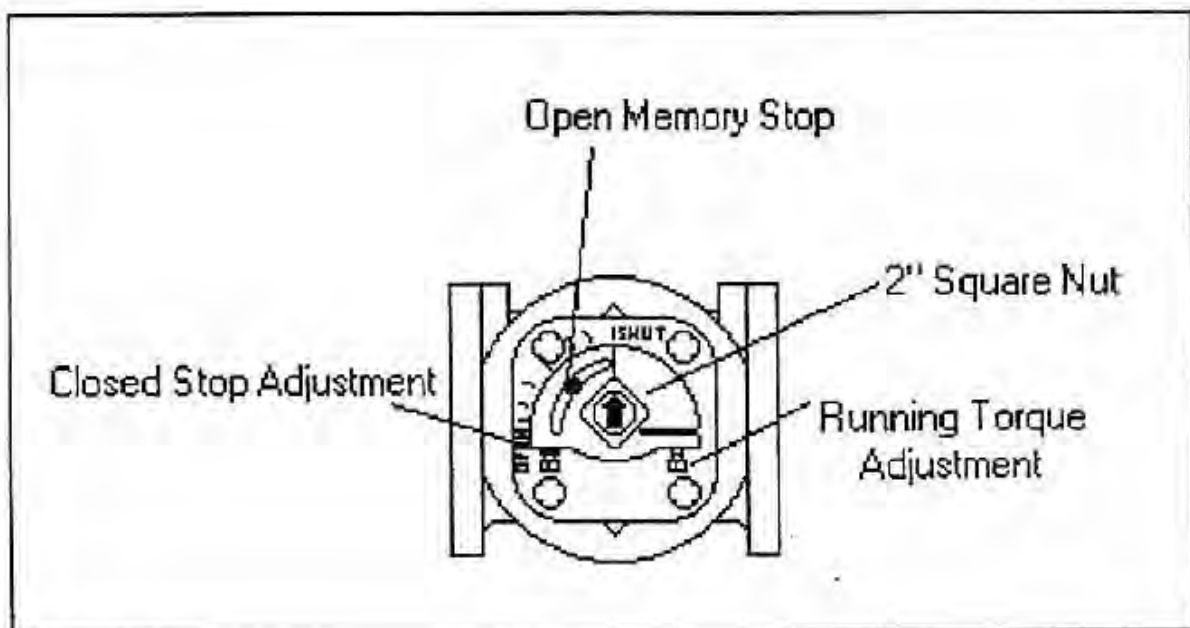
### Operating Instructions

#### Running Torque Adjustment

The nature of the eccentric plug valves "camming" action eliminates the majority of the torque prior to seating. To prevent the plug from creeping open or slamming closed, the torque collar maintains a constant drag on the shoulder of the valve bonnet. This component is factory adjusted. However, once the valve has been installed, it is recommended that the torque adjustment nut be further tightened to assure proper friction exists to prevent unwanted closure.

To prevent the plug from unnecessary movement, rotate the hex head bolt clockwise until there is a substantial drag on the plug but not so much as to prevent the movement of the plug with the supplied wrench.

#### Wrench Operated Valve with Torque Collar



# **Operations & Maintenance**

## **Operating Instructions**

### **PNEUMATIC OPERATED ECCENTRIC PLUG VALVES**

This manual describes the operating instructions for the eccentric plug valve when equipped with a pneumatic actuator. General arrangement drawings are also provided to illustrate the fit up and installation of the valve and pneumatic actuator. As with any plug valve, the plug needs to turn 90 degrees to close, and the actuator will rotate 90 degrees to achieve that task.

### **Pneumatic Actuator Function and Use**

The pneumatic actuator is designed to open and close the valve through its one quarter turn of rotation. It contains pistons that when air pressure is applied it will move the actuator 90 degrees plus or minus 5 degrees. The travel of the pneumatic actuator can be limited by mechanical stops integral to the actuator.

### **Optional Equipment**

The double acting pneumatic actuator can be equipped with a spring, so that on loss of air pressure the valve will either “fail open” or “fail closed” depending on how the springs are set up.

The actuator can also be equipped with solenoid valves which are electrically operated and allow the pneumatic actuator to work through switching the air flow on or off. The actuators can also be fitted with limit switches for end of travel indication or as auxiliary switches for remote indication and/or switching other equipment. The final option would be a positioned either 3-15 psi or 4-20mA which can be used to modulate the flow.

### **Important Safety Notice**

All persons who will install, operate or adjust this equipment must read the instructions and drawings carefully. Injury and property damage may occur from improper use. It is understood that this equipment will be installed by individuals with knowledge and skills in electrical equipment. The manufacturer cannot be responsible for the misuse of this information or equipment, nor can it assume any resultant liability.

## **Operations & Maintenance**

### **Preventative Maintenance**

The Millcentric eccentric plug valves do not require any routine maintenance. They should, however, be cycled from fully open to fully closed once every 6 months, which will increase the life of the valve and operator.

# **Operations & Maintenance**

## **Maintenance Instructions**

### **Pneumatic Actuated Valves**

The Millcentric is designed and manufactured to be a long life valve under normal circumstances. It does not require any routine maintenance. Cycling the valve from full open to full closed on an annual basis will increase the life of the valve and operator components.

However, if maintenance is required, due to unusual wear or service conditions the following procedure should be followed:

### **Disassembly Procedure**

#### **Body**

The Millcentric is a top entry valve therefore the body can remain in line during this operation. Remove the bolts holding the actuator bracket to the valve cap. You can then remove the actuator from the valve. With the valve de-pressurized, remove the hexagonal head cap screws that hold the bonnet to the valve body. Remove the bonnet, leaving the plug in the body. At this point, the plug, PTFE thrust washers, journal bearings and bonnet "O" ring are accessible and can be removed and replaced.

Care should be taken not to damage the plug elastomer or bonnet "O" rings upon reassembly.

Reverse the above process for reassembling the Millcentric.

#### **Stem Seals**

With the valve de-pressurized, using internal snap ring pliers, remove the snap ring and thrust washer. The "U" cup seals can now be pried out of the seal cavity. To replace reverse the above process. After reassembly, cycle valve from open to close approximately five times in order to ensure "U" cups have been properly seated.

# Operations & Maintenance

## Maintenance Instructions

### Actuated Valves To Replace “U” Cup Seals

The Millcentric is designed and manufactured to be a long life valve under normal operating conditions. It does not require any routine maintenance. Cycling the valve from fully open to fully closed on an annual basis will increase the life of the valve and actuator components.

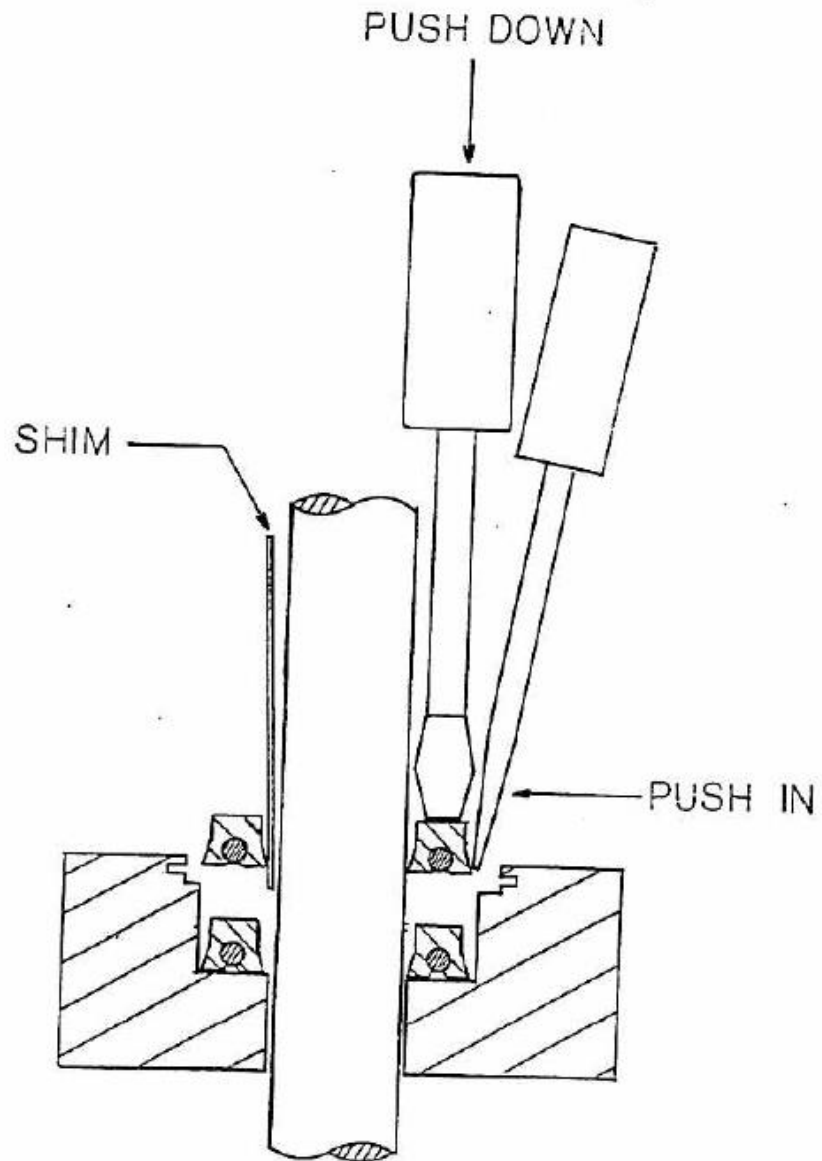
However, if maintenance is required, due to unusual wear or service conditions, the following procedure should be followed:

- Remove the actuator, bracket and coupling from the valve body.
- Remove actuator and set aside.
- Remove the external snap ring and support collar.
- Remove the internal snap ring using snap ring pliers.
- Remove the thrust washer and the “U” cup seals are now visible.
- Using a screwdriver pry out the old seals.
- Apply a small amount of silicone or grease to the new “U” cup seals. This will help them slide in the packing cavity.
- Put a piece of shim stock into the cavity and put the “U” cup over it.
- Slide the “U” cup over the stem with shim stock against the stem. This will let any trapped air out of the packing cavity.
- Using two screwdrivers, coax the outer lip of the “U” cup into the cavity while pressing down on the top of the “U” cup with the other screwdriver. Continue to do this all the way around until the “U” cup is at the bottom of the packing cavity.
- Repeat this procedure with the second “U” cup.
- Replace the thrust washer and snap ring.
- Remount the actuator on the valve-ensure key is inserted in correct keyway.

# Operations & Maintenance

## Maintenance Instructions

### Gear Operated or Actuated Valves To Replace "U" Cup Seals



# Operations & Maintenance

## Trouble Shooting

### Pneumatic Actuated Plug Valves

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>ACTION</u>
<b>Valve will not open/ Valve will not close</b>	-No Power Source or Air Supply	-Check incoming power source/check on air supply
	-Improper Signal	-Check actuating signal Sequence
	-Burned Out or Impaired Component	-Check & repair or replace solenoid or positioner
<b>Valve will not shutoff flow</b>	-Improperly set Limit Switch	-Re-set limit switch
	-Actuator Torques Out	-Check for obstructions In valve
	-Incorrect Mechanical stop Bolt setting	-Re-set mechanical stops

## Operations & Maintenance

### Lubrication Schedule

The Millcentric plug valve is a low maintenance non-lubricated eccentric plug valve. As such there is no required lubrication for the valve itself.

The manual worm gear operators where applicable are also sealed grease lubricated units and should not require any type of periodic lubrication. Should the unit need to have the lubricant replaced, it is recommended that **Shell "Gadus S2 V100"** be used, formally named "Alvania RL".

## **Operations & Maintenance**

### **Storage Procedure**

Milliken valves are shipped with the plugs in the open position. Care should be taken to maintain this position while the valves are in storage prior to installation in the pipeline.

Flanged valve end protectors (if supplied) should be kept on the valves until they are ready for installation. Special care should be given to mechanical joint valves to prevent damage to the internal pipe seating area.

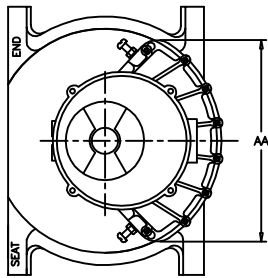
Valves should be stored where internal contamination due to sand and mud can be kept to a minimum. Care should be taken to avoid direct sunlight on the plug elastomer during storage.

Electric, hydraulic and pneumatic valve actuators should be care for in accordance with the storage instructions of the actuator manufacturer.

## **Operations & Maintenance**

### **Spare Parts List**

The Milliken eccentric plug valve is a long life valve and does not require stocking spare parts.



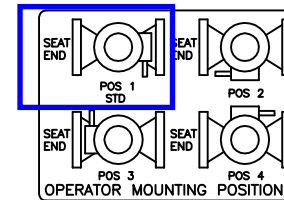
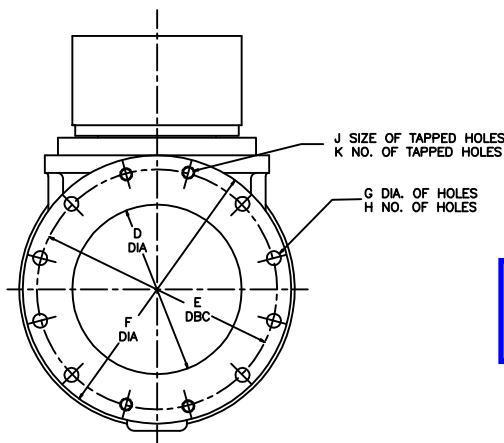
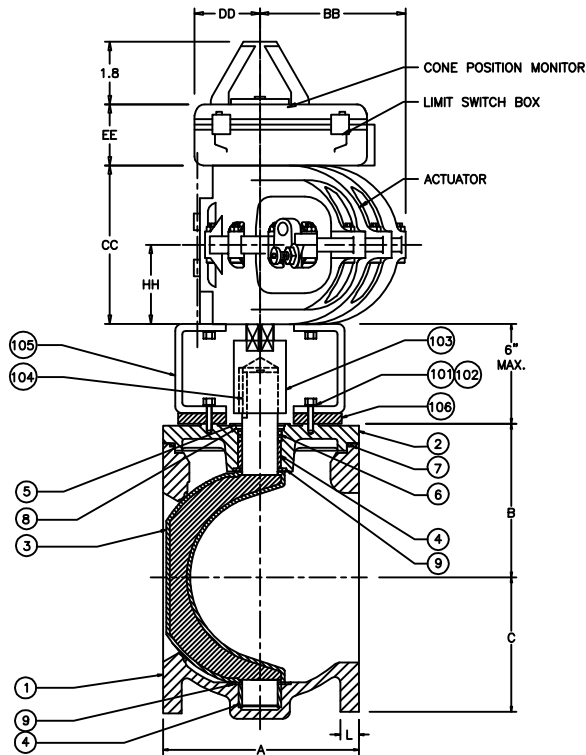
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8	M5	11.50	7.38	7.63	8	11.75	13.50	0.88	6	0.75	2	1.13
10	M8	13	9.13	8.88	10	14.25	16	1	8	0.88	4	1.19
12	M8	14	10.81	10	12	17.00	19	1	8	0.88	4	1.25
14	M8	17	12.75	13	14	18.75	21	1.13	10	1	2	1.38

MODEL	AA	BB	CC	DD	EE	HH
05	5.35	3.09	2.64	1.85	1.73	4.06
07	9.1	5.1	6.9	3.1	1.9	3.5
08	7.05	3.74	3.90	1.85	1.73	3.62
09	8.94	5.22	4.96	1.85	1.73	3.62
10	9.06	5.14	6.89	1.85	1.73	3.62
12	11.57	6.73	6.14	2.80	2.17	3.62
14	15.0	8.7	8.5	3.3	1.9	4.3
16	20.67	11.81	10.79	2.80	6.10	6.85
18	26.77	15.43	14.17	2.80	7.10	--

For 4" plug valve

For 6" plug valve

REFER TO VENDOR ACTUATOR DRAWINGS FOR CERTIFIED DIMENSIONS AND ACCESSORIES



106	1	RISER RING	STEEL
105	1	BRACKET	STEEL
104	AR	KEY	STEEL
103	1	COUPLING	STEEL
102	AR	CAP SCREW	STEEL/ZINC
101	AR	LOCK WASHER	STEEL/ZINC
50	1	OPERATOR	
9	2	WASHER	PTFE
8	1	WASHER	BRONZE
7	1	O RING	ELAS AS SPEC.
6	2	U CUP SEAL	ELAS AS SPEC.
5	1	RETAINING RING	SPRING STEEL
4	2	SLEEVE BEARING	316 STN. STEEL
3	1	PLUG (ELASTOMER AS SPEC.)	DUCTILE IRON
2	1	CAP	A 126 CL B
1	1	BODY	A 126 CL B
ITEM	QTY	DESCRIPTION	MATERIAL
		<b>MILLIKEN</b>	
REV. DATE	REVISIONS	BY CHK'D	DATE SCALE
1 09/23/16	UPDATED ACTUATOR DIMENSIONS, ADDED NOTE	UCL RIF	8/8/6 NONE
		TITLE:	DIMENSIONS INCHES
		FIG. 601	
		3"-14" MILLICENTRIC PLUG VALVE, FLANGED, W/ KINETROL D.A. ACT.	
		DWG. NO.	S49801

LINES 16.0 AND 21.1

# Pneumatic Actuator Data

EQUIPMENT SUMMARY FORM

1. EQUIPMENT ITEM SPARE KINETROL MODEL 087 O/C VANE PNEU ACTUATOR / CONTROLS
2. MANUFACTURER Milliken Valve Co. 401 S. Highland Avenue Aurora, IL 60506 630-844-4000
3. EQUIPMENT IDENTIFICATION NUMBER(S) SP-MISC SPARESPARTS  
(maps equipment number)
4. LOCATION OF EQUIPMENT None Provided
5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) 25#
6. NAMEPLATE DATA - Horsepower N/A  
 Amperage N/A  
 Voltage N/A  
 Service Factor (S.F.) N/A  
 Speed N/A  
 ENC Type NEMA 4 & 4X, Watertight and Dust Tight  
 Capacity N/A  
 Other Limit Switch 125V / 15A Solenoid Valve 120Vac

MANUFACTURER'S LOCAL REPRESENTATIVE:

Name Southwest Valve, LLC. Address 402 W. Bedford #111 Fresno, CA 93711  
 Telephone Number 559-261-2703

8. MAINTENANCE REQUIREMENTS VANE ACTUATOR - Maintenance is limited to replacement of seals when wear affects actuator performance. Seal life will vary according to application, conditions of cycle frequency, temperature, condition of air supply, etc.
9. LUBRICANT LIST None Required
10. SPARE PARTS (recommendations) None recommended
11. COMMENTS \_\_\_\_\_

EQUIPMENT SUMMARY FORM

1. EQUIPMENT ITEM SPARE KINETROL MODEL 107 O/C VANE PNEU ACTUATOR
2. MANUFACTURER Milliken Valve Co. 401 S. Highland Avenue Aurora, IL 60506 630-844-4000
3. EQUIPMENT IDENTIFICATION NUMBER(S) SP-MISC SPARESPARTS  
(maps equipment number)
4. LOCATION OF EQUIPMENT None Provided
5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) 25#
6. NAMEPLATE DATA - Horsepower N/A  
 Amperage N/A  
 Voltage N/A  
 Service Factor (S.F.) N/A  
 Speed N/A  
 ENC Type NEMA 4 & 4X, Watertight and Dust Tight  
 Capacity N/A  
 Other Limit Switch 125V / 15A Solenoid Valve 120Vac

MANUFACTURER'S LOCAL REPRESENTATIVE:

Name Southwest Valve, LLC. Address 402 W. Bedford #111 Fresno, CA 93711  
 Telephone Number 559-261-2703

8. MAINTENANCE REQUIREMENTS VANE ACTUATOR - Maintenance is limited to replacement of seals when wear affects actuator performance. Seal life will vary according to application, conditions of cycle frequency, temperature, condition of air supply, etc.
9. LUBRICANT LIST None Required
10. SPARE PARTS (recommendations) None recommended
11. COMMENTS \_\_\_\_\_



Purchase Order #: LOI-Manteca CA  
 Sales Order #: 2226531ML  
 Proposal/Quote #: Q-017-17005  
 Project Name: WQCF Digester Improvements 20  
 Project Location: Manteca, CA  
 Date: August 8, 2017  
 Revision: 1

401 S. HIGHLAND AVENUE, AURORA, IL 60506  
 TEL: (630) 844-4000 FAX: (630) 844-4160

Line Item #: 16.0

Location: Tag #:

Part Number: 0400-601N08#10100

4" 601 Full Round Port Plug Valve, Flanged Ends, Cast Iron Body, Cast Iron Cap, Nickel Seat, Ductile Iron Plug Coated in EPDM, 10-12 Mils Amerlock 400 Interior and Exterior, Kinetrol Pneumatic Vane Actuator

Unit Weight: 242 lbs

C-017-41598

**VALVE DATA**

**General Information**

**Material Specification**

Product:	Eccentric Plug Valve	Body Material:	Cast Iron ASTM A126 Class B
Valve Size:	4"	Cap Material:	Cast Iron ASTM A126 Class B
Pressure Rating:	175	Plug Material/Rubber:	Ductile Iron ASTM A536 Grade 65-45-12 with EPDM
End Connection:	Flange	Seat Material/Interior Lining:	Nickel
Flange Drilling:	Class 125/150	Bearing Material:	Oil impregnated type 316 Stainless Steel
Port Design:	Standard	Packing Material:	EPDM
Seat Design:	Welded in overlay of 99% nickel alloy	Exterior Hardware:	Carbon Steel Zinc Plated
Packing Design:	Self Adjusting U cup type Replaceable Packing		

**Paint**

Paint:	10-12 Mils Amerlock 400 Interior and Exterior (Standard)
--------	--

Valve is NSF 61, drinking water, approved.

**Testing Requirements**

Leak/Hydro Test:	Per AWWA C517, Latest Version
Cycle/Performance Test:	Per AWWA C517, Latest Version

Actual test reports will be provided at time of shipment, if required.

All Valves are capable of being pigged with a soft pig when required.

See Catalog for additional design details: [http://www.henrypratt.com/products/literature/BallcentricEccentricPlugValveBro\\_v3%20Final.pdf](http://www.henrypratt.com/products/literature/BallcentricEccentricPlugValveBro_v3%20Final.pdf)



401 S. HIGHLAND AVENUE, AURORA, IL 60506  
TEL: (630) 844-4000 FAX: (630) 844-4160

Purchase Order #: LOI-Manteca CA  
Sales Order #: 2226531ML  
Proposal/Quote #: Q-017-17005  
Project Name: WQCF Digester Improvements 20  
Project Location: Manteca, CA  
Date: August 8, 2017  
Revision: 1

## ACTUATOR DATA

### General Information

Buyout Actuator Vendor:	Kinetrol	Position:	Position 1
Buyout Actuator Model:	087-104U005004M	Mounting Pattern:	TBD
Buyout Actuator Type:	Pneumatic Vane	Supply Pressure:	60 psi

### Notes/Customer Specifications

Additional accessories:  
Versa 4-way dual coil solenoid valve Model C5N213  
SMC speed control muffler  
Kinetrol 2 SPST limit switches  
Parker Hannifin Filter regulator Model P31EB92EGMBN5P  
Kantleak 3-way Isolation Ball Valve Model 322BVLLXLP1

# KINETROL USA, Inc

## Spec Sheet

LINE 16.0

<b>CUSTOMER CONTACT INFORMATION</b>	<b>VALVE OR DAMPER SIZE AND TYPE</b>	<b>QUOTE NUMBER</b>
Henry Pratt, Co. 401 S. Highland Ave. Aurora, Illinois 60506	4" PV	20160812PM
Phone _____ Fax _____	<b>TORQUE, MAX REQ./MIN AVAIL (Pounds-Inch)</b>	<b>DATE</b>
	660 / 1012 (Includes 53% Safety Factor)	August 12, 2016
	<b>OPEN/CLOSE OR MODULATING</b>	<b>ITEM NUMBER</b>
	O/C	1 of 2
	<b>SUPPLY AIR MINIMUM &amp; MAXIMUM</b>	<b>UNIT NUMBER/LOCATION/TAG</b>
	60	
<b>PROJECT/PLANT NAME</b>	<b>AMBIENT TEMP. MINIMUM &amp; MAXIMUM</b>	<b>QUANTITY</b>
City of Manteca, CA.	-5° to 175° Fahrenheit	4

**MARK ALL DESIRED ITEMS WITHIN SECTIONS "A" THROUGH "L" BELOW**

<b>A OPERATOR TYPE</b>																		
<table style="width: 100%;"> <tr> <td>0 - None</td> <td>9 - Spring Fire Fail-Safe CW</td> </tr> <tr> <td>X 1 - Pneumatic Double-Acting</td> <td>A - Spring Fire Fail-Safe CCW</td> </tr> <tr> <td>2 - Pneumatic Spring-Return CW</td> <td>B - Electric Double-Acting</td> </tr> <tr> <td>3 - Pneumatic Spring-Return CCW</td> <td>C - Electric Spring-Return CW</td> </tr> <tr> <td>4 - Pneumatic Spring-To-Center</td> <td>D - Electric Spring-Return CCW</td> </tr> <tr> <td>5 - Spring Only CW</td> <td>E - Damper Drive Double-Acting</td> </tr> <tr> <td>6 - Spring Only CCW</td> <td>F - Damper Drive Spring-Return CW</td> </tr> <tr> <td>7 - Spring Manual Fail-Safe CW</td> <td>G - Damper Drive Spring-Return CCW</td> </tr> <tr> <td>8 - Spring Manual Fail-Safe CCW</td> <td></td> </tr> </table>	0 - None	9 - Spring Fire Fail-Safe CW	X 1 - Pneumatic Double-Acting	A - Spring Fire Fail-Safe CCW	2 - Pneumatic Spring-Return CW	B - Electric Double-Acting	3 - Pneumatic Spring-Return CCW	C - Electric Spring-Return CW	4 - Pneumatic Spring-To-Center	D - Electric Spring-Return CCW	5 - Spring Only CW	E - Damper Drive Double-Acting	6 - Spring Only CCW	F - Damper Drive Spring-Return CW	7 - Spring Manual Fail-Safe CW	G - Damper Drive Spring-Return CCW	8 - Spring Manual Fail-Safe CCW	
0 - None	9 - Spring Fire Fail-Safe CW																	
X 1 - Pneumatic Double-Acting	A - Spring Fire Fail-Safe CCW																	
2 - Pneumatic Spring-Return CW	B - Electric Double-Acting																	
3 - Pneumatic Spring-Return CCW	C - Electric Spring-Return CW																	
4 - Pneumatic Spring-To-Center	D - Electric Spring-Return CCW																	
5 - Spring Only CW	E - Damper Drive Double-Acting																	
6 - Spring Only CCW	F - Damper Drive Spring-Return CW																	
7 - Spring Manual Fail-Safe CW	G - Damper Drive Spring-Return CCW																	
8 - Spring Manual Fail-Safe CCW																		
<b>B THREAD STANDARD</b>																		
X 1 - USA ANSI Threads      2 - Metric Threads																		
<b>C ACTUATOR DRIVE SHAFT</b>																		
X 1 - Square Male (Standard)      3 - Splined Female 2 - Square Female      4 - Lever (Damper Drive)																		
<b>D ACTUATOR TOP SHAFT AND MOUNT PAD</b>																		
0 - Not Applicable X 1 - Standard Square Shaft. Models 05-15 Include Drilled, Tapped and Plugged Port Holes for Direct Mounting Kinetrol Direct Mount Positioners to Actuators Without the Need for Tubing and Fittings 2 - Other:																		
<b>E ROTATION DEGREES</b>																		
0 - Not Applicable      2 - 0 To 180 X 1 - 0 To 90      3 - Other																		
<b>F CONTROL DEVICE</b>																		
Rotate CW or CCW On Rising Signal, Specify: <b>CCW</b>																		
0 - None																		
1 - Solenoid Valve, Open/Close, Single Coil, 120Vac, 24Vdc Specify: <b>120Vac</b>																		
2 - Solenoid Valve, Open/Close, Dual Coil, 120Vac, 24Vdc Specify:																		
X 3 - Solenoid Valve, 3-Position, Dual Coil, 120Vac, 24Vdc Specify: <b>120Vac</b>																		
4 - 3-15 PSIG AP Positioner																		
5 - 3-30 PSIG AP Positioner																		
6 - 4-20mAdc Siemens PS2 Positioner																		
7 - 4-20mAdc EL Positioner																		
8 - 4-20mAdc AP Positioner With I/P To Fail-Hold On Loss Of Signal																		
9 - 4-20mAdc HART Positioner																		
A - 4-20mAdc HART Positioner To Fail-Hold On Loss Of Signal																		
B - Fieldbus Positioner, Foundation Fieldbus, Profibus PA Specify:																		
C - Fieldbus Positioner To Fail-Hold On Loss Of Signal, Foundation Fieldbus, Profibus PA Specify:																		
<b>G FAIL POSITION ON LOSS OF AIR</b>																		
X 1 - Free      3 - CCW 2 - CW      4 - Hold (Lock In Position)																		

<b>H LIMIT SWITCH</b>
0 - None X 1 - 2 SPST Mechanical 2 - 2 DPDT Mechanical 3 - 4 SPDT Mechanical 4 - 2 SPST Proximity 5 - 2 SPST Inductive (NO) 6 - Fieldbus, AS-interface, DeviceNet, Foundation Fieldbus, MODBUS, Profibus PA, Specify: 7 - Other, Specify:
Specify Voltage And Amperes: <b>125V / 15A</b>
<b>I POSITION FEEDBACK TRANSMITTER</b>
Signal Rises While Rotating CW or CCW, Specify: X 0 - None 1 - 4-20mAdc 2 - Potentiometer Only 3 - Fieldbus (Specify In "LIMIT SWITCH" Section Above) 4 - Other, Specify:
<b>J MANUAL OVERRIDE</b>
0 - None X 1 - Pneumatic Manual Override 2 - Dec clutchable Gearbox, Right Side Handwheel Orientation (Standard) 3 - Dec clutchable Gearbox, Left Side Handwheel Orientation (Non-Standard)
<b>K ELECTRICAL ENCLOSURE RATING</b>
0 - Not Applicable X 1 - NEMA Types 4 & 4X, Watertight And Dust Tight 2 - NEMA Types 4, 4X, 7 & 9, Watertight, Dust Tight & Explosion Proof 3 - Other, Specify:
<b>L ADDITIONAL OPTIONS AND ACCESSORIES</b>
0 - None 1 - Plastic Tubing And Press Fit Fittings Where Applicable (Standard) 2 - Stainless Steel Tubing And Fittings Where Applicable X 3 - Air Filter Regulator 4 - Special Stroke Time, Specify: X 5 - Other, Specify: <b>3-way Isolation Valve</b>

**QUOTED ITEMS THAT FORM ONE ASSEMBLY:**

1.	1	D/A Actuator + ULS	087-104U005004M		
2.	1	VRSA Solenoid Valve	C5N213		
3.	1	Air Filter / Regulator	P31EB92EGMBN5P		
4.	1	Isolation Valve	3222BVLLXLP1		
5.					
6.					
7.	1	Tubing/Fittings/Labor	LABOR		
8.					
9.					
10.					
11.		Valve mounting bracketry not included.			
12.		"Local Control Stations" not included.			
13.					

Delivery: Approx. 8 working weeks, FOB: Plano, Texas, USA **A**

If delivery improvements are required, and can be achieved, a 25% expedite fee will apply. **I**

**Comments:**

1. The standard materials of construction, performance specifications, dimensions and other information concerning Kinetrol manufactured products can be found in Kinetrol catalog KF-84, which can be downloaded from [www.kinetrol.com](http://www.kinetrol.com).

**KINETROL**

DRG. No.

128-2088A /A3

DR. D.G.W.

DATE 11-11-10

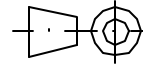
CH.

APP.

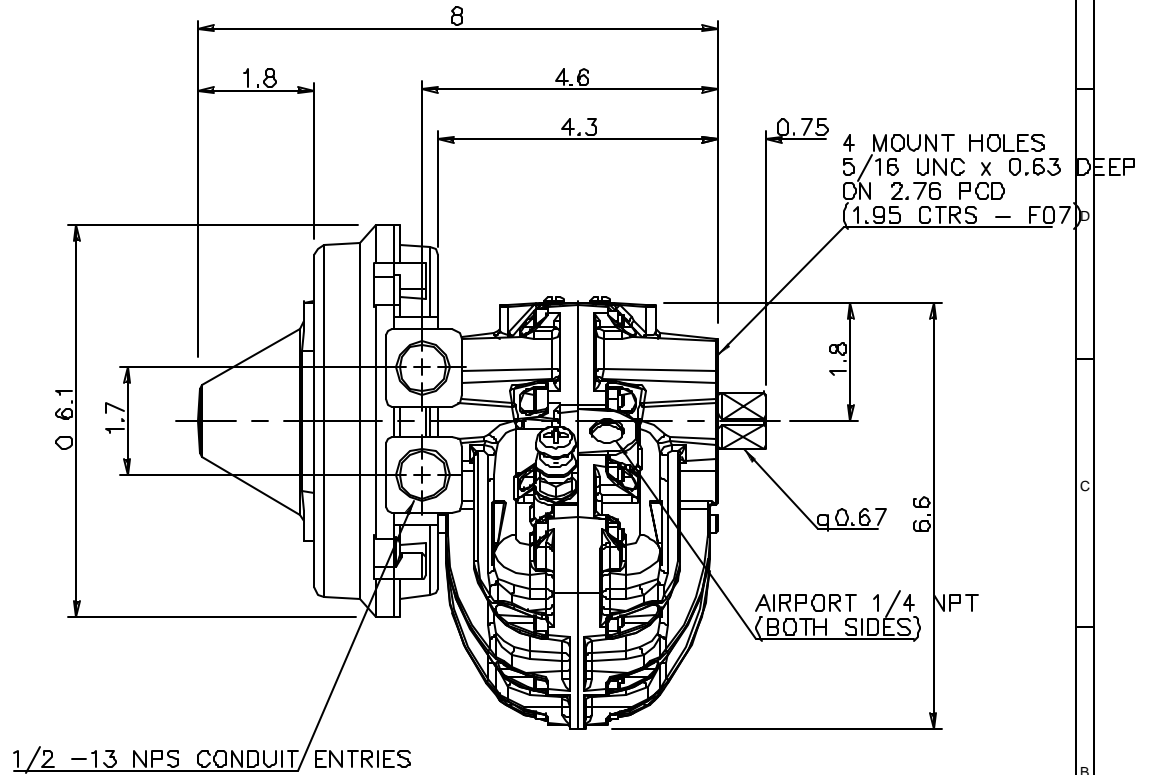
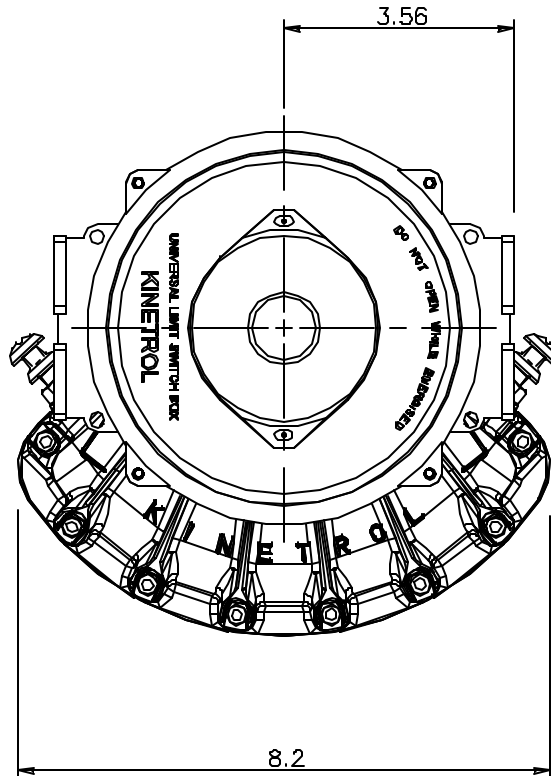
ALTERATIONS

DO NOT SCALE

THIRD ANGLE PROJECTION



IF IN DOUBT - ASK



4" plug valve

ISSUE	
A	

SCALE  
1 : 2

DIMS. IN  
INCHES

KINETROL LTD, OF FARNHAM, SURREY, ENGLAND. OWNS THE COPYRIGHT OF THIS DRAWING WHICH IS SUPPLIED IN CONFIDENCE AND WHICH MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED WITHOUT PERMISSION IN WRITING FROM THE OWNER

MAT'L & SPEC.

FINISH

TITLE OUTLINE DRAWING

087 ACTUATOR + ULS + MONITOR

INDEX No. 3D12810

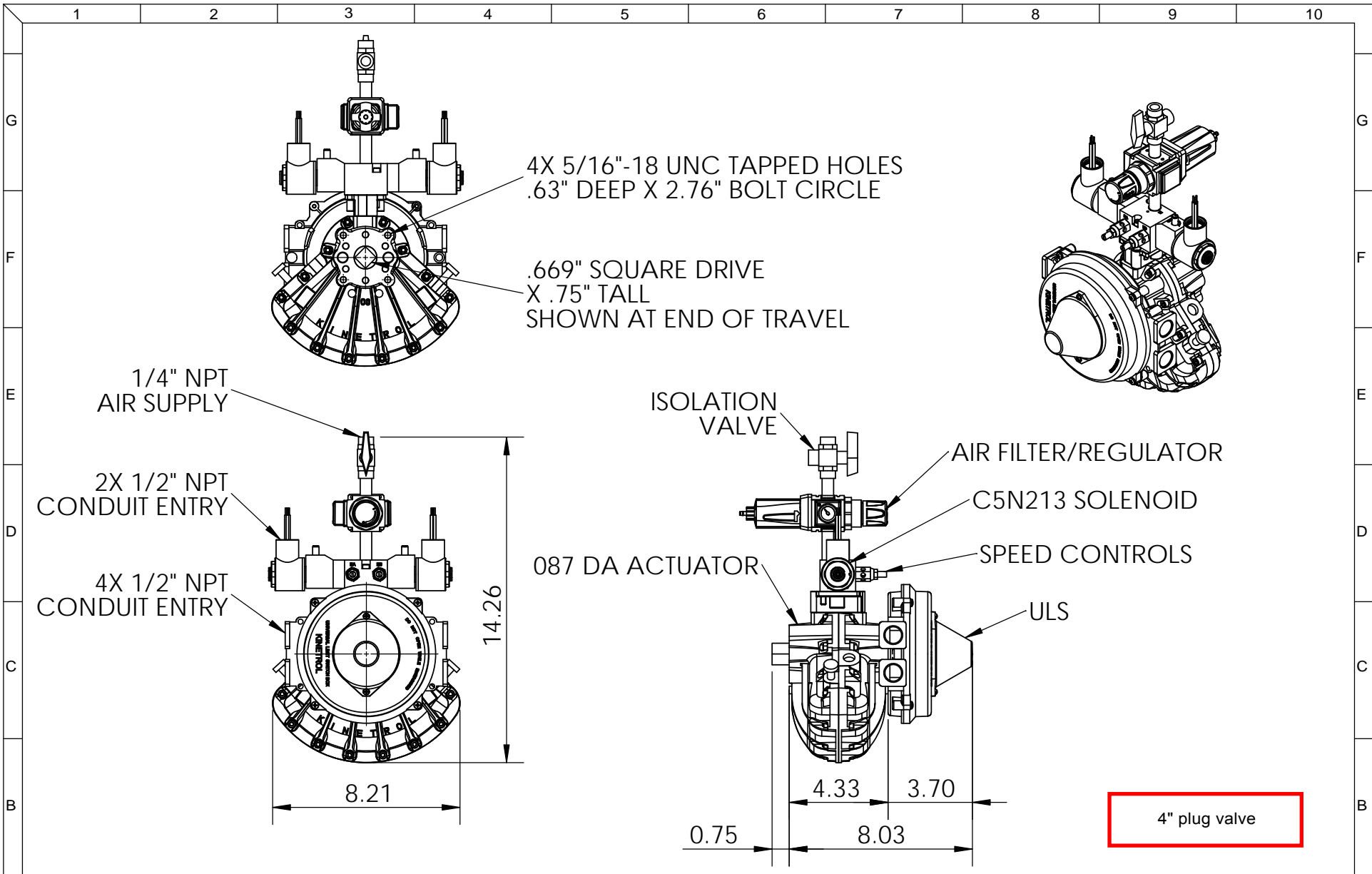
ASSEMBLED ON-

DRG.No.

128-2088A /A3

**KINETROL** TRADINGESTATE FARNHAM, SURREY

OFF PER SET

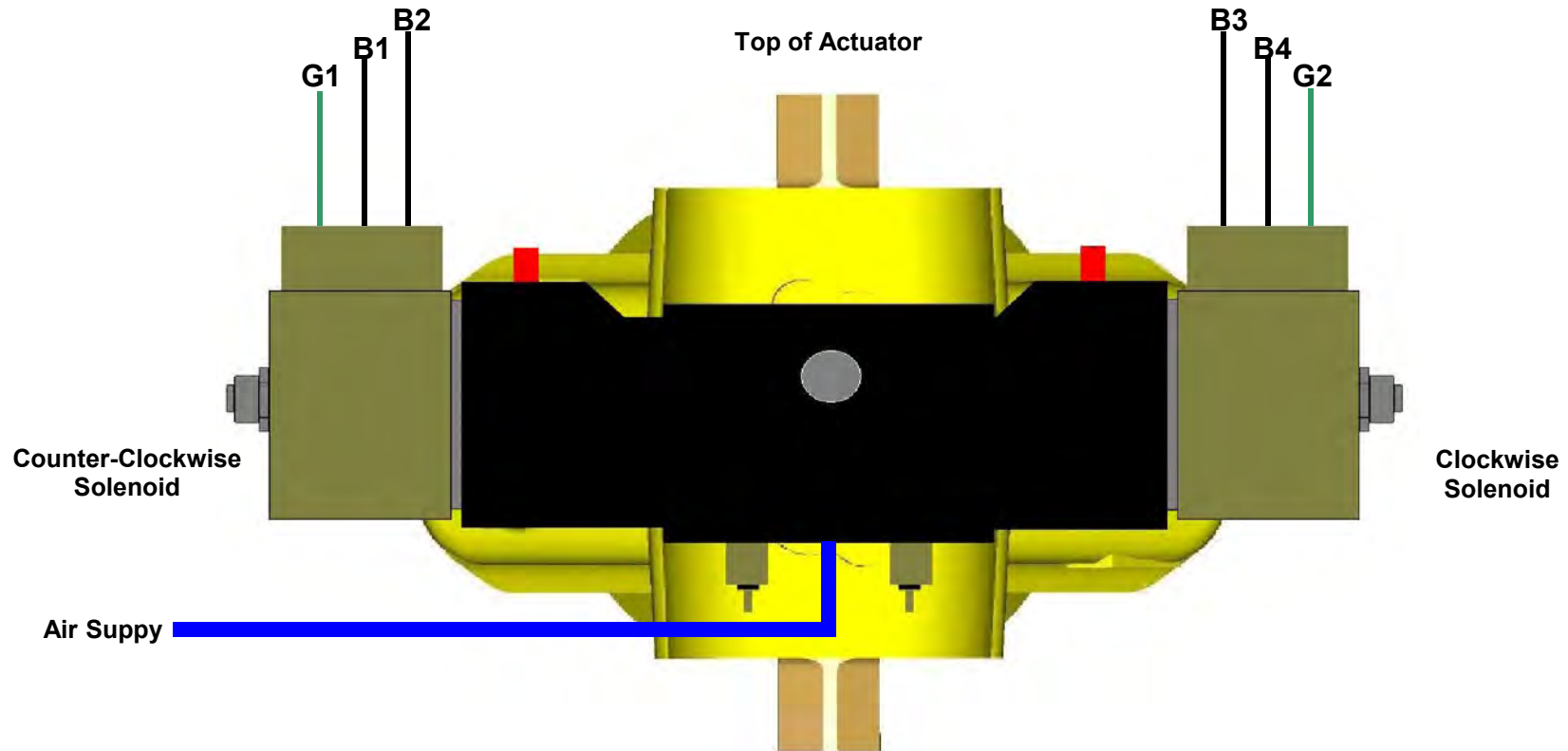


ISSUE		DATE 7/26/2017	SCALE NTS DIMS. IN INCHES	TITLE 087 DA ACTUATOR + ULS + C5N213 SOLENOID + SPEED CONTROLS + AIR FILTER/ REGULATOR + ISOLATION VALVE	"TAG VARIABLE"		SHEET NO.
A		DRAWN BY JPY			DRG.No. <b>087DAS2U0AV-1A</b>	1	
		CHKD BY			of 1		
				KINETROL		1085 Ohio Dr. Plano, Texas 75093	

# KINETROL USA, Inc.

## DA Actuator with 110Vac Dual Coil Solenoid Valve

Electrical / Pneumatic  
Connections



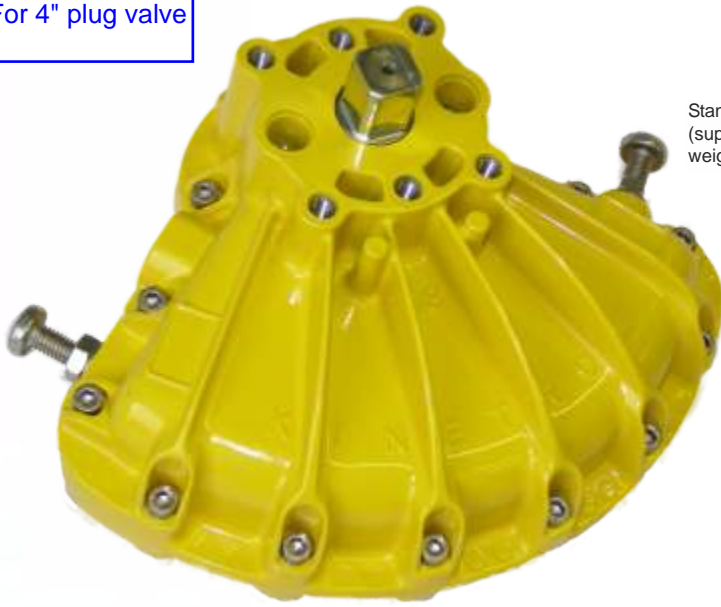
Wire	Function
G1	Ground
B1	Live ( + )
B2	Neutral ( - )
B3	Live ( + )
B4	Neutral ( - )
G2	Ground

### Notes:

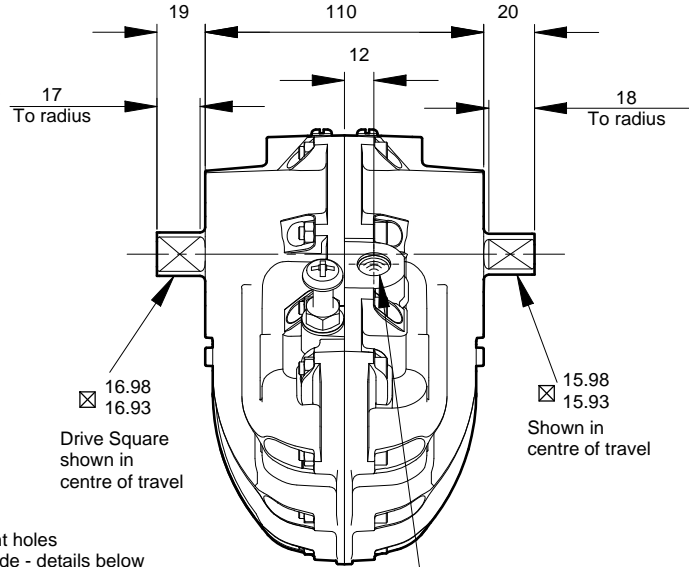
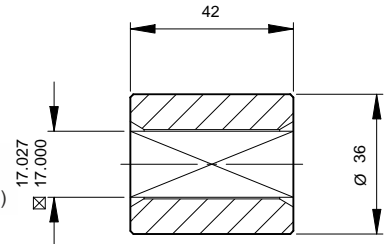
1. Look down on top of actuator to define clockwise and counter-clockwise rotation.
2. Energize only the clockwise solenoid to drive the actuator clockwise.
3. Energize only the counter-clockwise solenoid to drive the actuator counter-clockwise.
4. Do not energize both solenoids simultaneously.
5. There are two black wires on each solenoid. It doesn't matter which is used for live and which is used for neutral.

20070216GMR1

For 4" plug valve



Standard Coupling  
(supplied with actuator  
weight 0.52 lbs/0.24 kg)



**Specification**

**Output Torque**

1740 lbf ins/199 Nm  
at 100 psi/7 bar

**Angle of Travel  
(adjustable)**

80° - 100°  
(restricted travel  
versions available)

**Displaced Volume**

29.6 in<sup>3</sup>/485 cm<sup>3</sup>

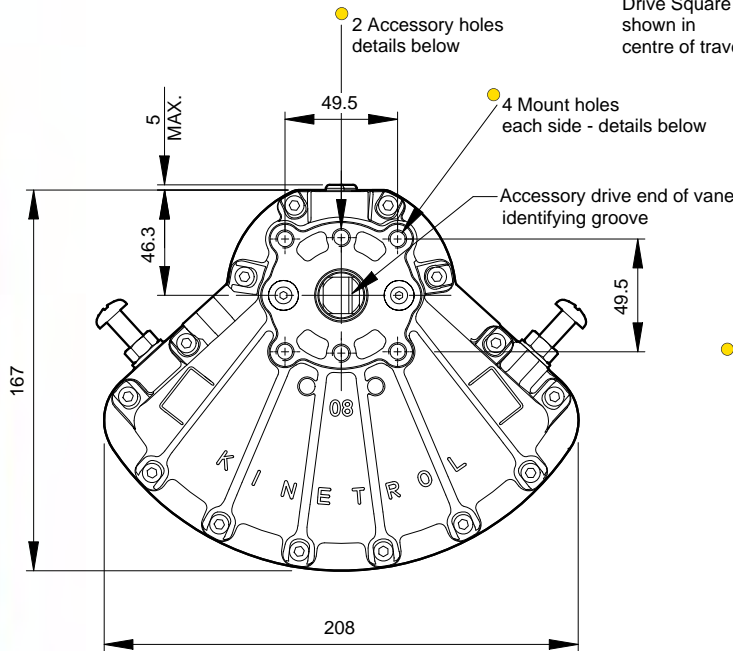
**Finish**

Epoxy stove enamel

**Weight**

5.60 lb/2.54 kg  
(excluding coupling)

For further information  
see General Specification  
on page 50.



**Air Port/Mount Hole Details**

Model	Air Ports	Mount Holes & Accessory Mount Holes
084-100	G <sup>1</sup> / <sub>4</sub>	4 x M8 x 16 deep on 70.0 PCD 2 x M8 x 16 deep on 50.8 PCD
087-100	1/4" NPT	4 x 5/16 -18 UNC x 0.63" deep on 2.76" PCD 2 x 5/16 -18 UNC x 0.63" deep on 2.00" PCD

Visual Red Indicator supplied as standard - see page 3

**Options**

- Fail safe spring return units - clockwise or counter clockwise see pages 5-7
- Limit switch boxes for open/close indication - various switches for hazardous areas see pages 9-12
- Integral solenoid valve see page 20
- AP pneumatic positioner - full range of options see pages 17/18
- EL electropneumatic positioner - full range of options see pages 15/16
- P3 on/off positioner - full range of options including hazardous area see pages 21-23
- Clear Cone position monitor see page 20
- Female drive and mounting details to DIN 3337 and ISO 5211 see page 50
- ISO adaptor see page 8
- G<sup>3</sup>/<sub>8</sub> or 3/8" NPT air port option available - contact Kinetrol
- Geared manual override see page 46
- Code identification see page 62
- Torque outputs see pages 58-60
- See pages 49-52 for English dimensions and dimensions of spring options
- High temperature / Low temperature options see page 50





**Purchase Order #:** LOI-Manteca CA  
**Sales Order #:** 2226531ML  
**Proposal/Quote #:** Q-017-17005  
**Project Name:** WQCF Digester Improvements 20  
**Project Location:** Manteca, CA  
**Date:** August 8, 2017  
**Revision:** 1

401 S. HIGHLAND AVENUE, AURORA, IL 60506  
 TEL: (630) 844-4000 FAX: (630) 844-4160

**Line Item #:**  **LINE 21.1**

**Location: Tag #:**

**Part Number:** 0600-601N18#10101

6" 601 Full Round Port Plug Valve, Flanged Ends, Cast Iron Body, Cast Iron Cap, Nickel Seat, Ductile Iron Plug Coated in EPDM, 10-12 Mils Amerlock 400 Interior and Exterior, Pneumatic Vane, Nema 4/4X

**Unit Weight:** 155 lbs

C-017-41603

**VALVE DATA**

**General Information**

**Material Specification**

Product:	Eccentric Plug Valve	Body Material:	Cast Iron ASTM A126 Class B
Valve Size:	6"	Cap Material:	Cast Iron ASTM A126 Class B
Pressure Rating:	175	Plug Material/Rubber:	Ductile Iron ASTM A536 Grade 65-45-12 with EPDM
End Connection:	Flange	Seat Material/Interior Lining:	Nickel
Flange Drilling:	Class 125/150	Bearing Material:	Oil impregnated type 316 Stainless Steel
Port Design:	Standard	Packing Material:	EPDM
Seat Design:	Welded in overlay of 99% nickel alloy	Exterior Hardware:	Carbon Steel Zinc Plated
Packing Design:	Self Adjusting U cup type Replaceable Packing		

**Paint**

Paint:	10-12 Mils Amerlock 400 Interior and Exterior (Standard)
--------	--

**Valve is NSF 61, drinking water, approved.**

**Testing Requirements**

Leak/Hydro Test:	Per AWWA C517, Latest Version
Cycle/Performance Test:	Per AWWA C517, Latest Version

**Actual test reports will be provided at time of shipment, if required.**

**All Valves are capable of being pigged with a soft pig when required.**

See Catalog for additional design details: [http://www.henrypratt.com/products/literature/BallcentricEccentricPlugValveBro\\_v3%20Final.pdf](http://www.henrypratt.com/products/literature/BallcentricEccentricPlugValveBro_v3%20Final.pdf)



401 S. HIGHLAND AVENUE, AURORA, IL 60506  
TEL: (630) 844-4000 FAX: (630) 844-4160

Purchase Order #: LOI-Manteca CA  
Sales Order #: 2226531ML  
Proposal/Quote #: Q-017-17005  
Project Name: WQCF Digester Improvements 20  
Project Location: Manteca, CA  
Date: August 8, 2017  
Revision: 1

## ACTUATOR DATA

### General Information

Buyout Actuator Vendor:	Kinetrol	Position:	Position 1
Buyout Actuator Model:	107-104U005004M	Mounting Pattern:	TBD
Buyout Actuator Type:	Pneumatic Vane	Supply Pressure:	60 psi

### Notes/Customer Specifications

→ Additional accessories:  
Versa 4-way dual coil solenoid valve Model C5N213  
SMC speed control muffler  
Kinetrol 2 SPST limit switches  
Parker Hannifin Filter regulator Model P31EB92EGMBN5P  
Kantleak 3-way Isolation Ball Valve Model 322BVLLXLP1

## Spec Sheet

<b>CUSTOMER CONTACT INFORMATION</b>	<b>VALVE OR DAMPER SIZE AND TYPE</b>	<b>QUOTE NUMBER</b>
Henry Pratt, Co. 401 S. Highland Ave. Aurora, Illinois 60506	6" PV	20160812PM
Phone _____ Fax _____	<b>TORQUE, MAX REQ./MIN AVAIL (Pounds-Inch)</b>	<b>DATE</b>
	1200 / 2130 (Includes 77% Safety Factor)	August 12, 2016
<b>PROJECT/PLANT NAME</b>	<b>OPEN/CLOSE OR MODULATING</b>	<b>ITEM NUMBER</b>
City of Manteca, CA.	O/C	2 of 2
	<b>SUPPLY AIR MINIMUM &amp; MAXIMUM</b>	<b>UNIT NUMBER/LOCATION/TAG</b>
	60	
	<b>AMBIENT TEMP. MINIMUM &amp; MAXIMUM</b>	<b>QUANTITY</b>
	-5° to 175° Fahrenheit	8

MARK ALL DESIRED ITEMS WITHIN SECTIONS "A" THROUGH "L" BELOW

<b>A OPERATOR TYPE</b>
0 - None X 1 - Pneumatic Double-Acting 2 - Pneumatic Spring-Return CW 3 - Pneumatic Spring-Return CCW 4 - Pneumatic Spring-To-Center 5 - Spring Only CW 6 - Spring Only CCW 7 - Spring Manual Fail-Safe CW 8 - Spring Manual Fail-Safe CCW
9 - Spring Fire Fail-Safe CW A - Spring Fire Fail-Safe CCW B - Electric Double-Acting C - Electric Spring-Return CW D - Electric Spring-Return CCW E - Damper Drive Double-Acting F - Damper Drive Spring-Return CW G - Damper Drive Spring-Return CCW
<b>B THREAD STANDARD</b>
X 1 - USA ANSI Threads 2 - Metric Threads
<b>C ACTUATOR DRIVE SHAFT</b>
1 - Square Male (Standard) X 2 - Square Female
3 - Splined Female 4 - Lever (Damper Drive)
<b>D ACTUATOR TOP SHAFT AND MOUNT PAD</b>
0 - Not Applicable X 1 - Standard Square Shaft. Models 05-15 Include Drilled, Tapped and Plugged Port Holes for Direct Mounting Kinetrol Direct Mount Positioners to Actuators Without the Need for Tubing and Fittings 2 - Other:
<b>E ROTATION DEGREES</b>
0 - Not Applicable X 1 - 0 To 90
2 - 0 To 180 3 - Other
<b>F CONTROL DEVICE</b>
Rotate CW or CCW On Rising Signal, Specify: <b>CCW</b> 0 - None 1 - Solenoid Valve, Open/Close, Single Coil, 120Vac, 24Vdc Specify: <b>120Vac</b> 2 - Solenoid Valve, Open/Close, Dual Coil, 120Vac, 24Vdc Specify: X 3 - Solenoid Valve, 3-Position, Dual Coil, 120Vac, 24Vdc Specify: <b>120Vac</b> 4 - 3-15 PSIG AP Positioner 5 - 3-30 PSIG AP Positioner 6 - 4-20mAdc Siemens PS2 Positioner 7 - 4-20mAdc EL Positioner 8 - 4-20mAdc AP Positioner With I/P To Fail-Hold On Loss Of Signal 9 - 4-20mAdc HART Positioner A - 4-20mAdc HART Positioner To Fail-Hold On Loss Of Signal B - Fieldbus Positioner, Foundation Fieldbus, Profibus PA Specify: C - Fieldbus Positioner To Fail-Hold On Loss Of Signal, Foundation Fieldbus, Profibus PA Specify:
<b>G FAIL POSITION ON LOSS OF AIR</b>
X 1 - Free 2 - CW
3 - CCW 4 - Hold (Lock In Position)

<b>H LIMIT SWITCH</b>
0 - None X 1 - 2 SPST Mechanical 2 - 2 DPDT Mechanical 3 - 4 SPDT Mechanical 4 - 2 SPST Proximity 5 - 2 SPST Inductive (NO) 6 - Fieldbus, AS-interface, DeviceNet, Foundation Fieldbus, MODBUS, Profibus PA, Specify: 7 - Other, Specify:
Specify Voltage And Amperes: <b>125V / 15A</b>
<b>I POSITION FEEDBACK TRANSMITTER</b>
Signal Rises While Rotating CW or CCW, Specify: X 0 - None 1 - 4-20mAdc 2 - Potentiometer Only 3 - Fieldbus (Specify In "LIMIT SWITCH" Section Above) 4 - Other, Specify:
<b>J MANUAL OVERRIDE</b>
0 - None X 1 - Pneumatic Manual Override 2 - Dec clutchable Gearbox, Right Side Handwheel Orientation (Standard) 3 - Dec clutchable Gearbox, Left Side Handwheel Orientation (Non-Standard)
<b>K ELECTRICAL ENCLOSURE RATING</b>
0 - Not Applicable X 1 - NEMA Types 4 & 4X, Watertight And Dust Tight 2 - NEMA Types 4, 4X, 7 & 9, Watertight, Dust Tight & Explosion Proof 3 - Other, Specify:
<b>L ADDITIONAL OPTIONS AND ACCESSORIES</b>
0 - None 1 - Plastic Tubing And Press Fit Fittings Where Applicable (Standard) 2 - Stainless Steel Tubing And Fittings Where Applicable X 3 - Air Filter Regulator 4 - Special Stroke Time, Specify: X 5 - Other, Specify: <b>3-way Isolation Valve</b>

**QUOTED ITEMS THAT FORM ONE ASSEMBLY:**

1.	1	D/A Actuator + ULS	107-104U005004M		
2.	1	VRSA Solenoid Valve	C5N213		
3.	1	Air Filter / Regulator	P31EB92EGMBN5P		
4.	1	Isolation Valve	3222BVLLXLP1		
5.					
6.					
7.	1	Tubing/Fittings/Labor	LABOR		
8.					
9.					
10.					
11.		Valve mounting bracketry not included.			
12.		"Local Control Stations" not included.			
13.					

Delivery: Approx. 8 working weeks, FOB: Plano, Texas, USA

If delivery improvements are required, and can be achieved, a 25% expedite fee will apply.

**Comments:**

1. The standard materials of construction, performance specifications, dimensions and other information concerning Kinetrol manufactured products can be found in Kinetrol catalog KF-84, which can be downloaded from www.kinetrol.com.

**KINETROL**

DRG. No.  
128-1795A3

DR. C.S.

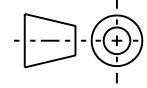
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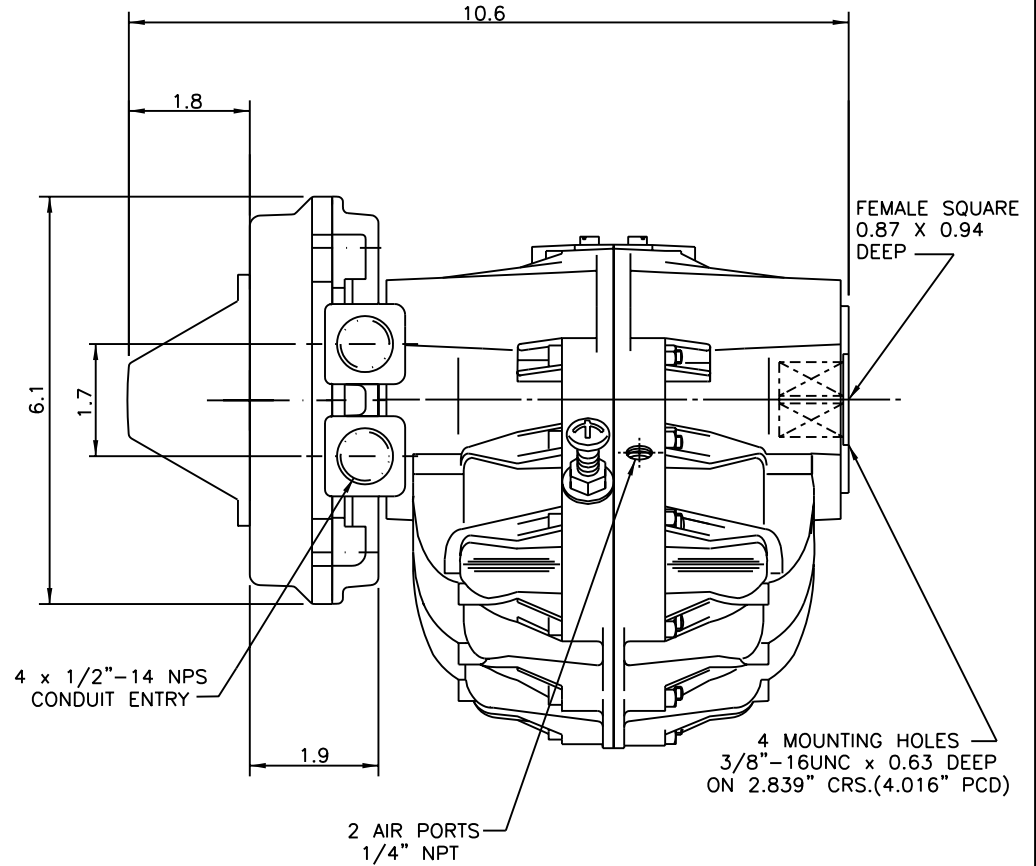
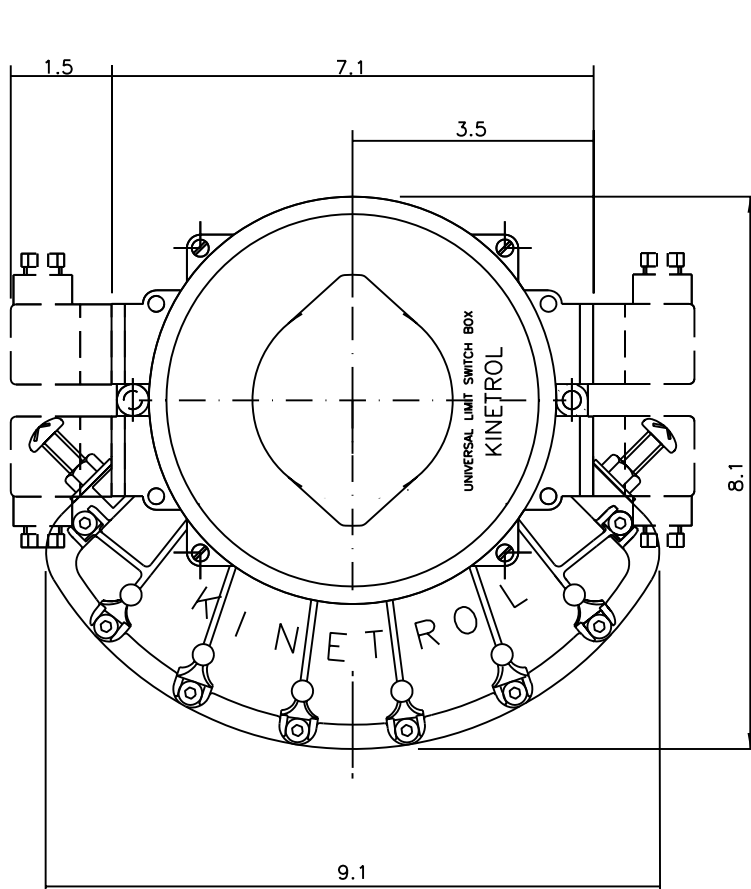
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ALTERATIONS

DO NOT SCALE



THIRD ANGLE PROJECTION IN DOUBT - ASK



For 6" Plug valve

ISSUE

A					

SCALE  
1 : 2

LIMITS NOT STATED

DECIMALS : 0 PLACES

+/- 0.4

1 PLACE

+/- 0.2

2 PLACES

+/- 0.1

ANGLES

+/- 1/2

HOLE SIZES

+ 0.1

- 0

MAT'L & SPEC.

FINISH

TITLE 107-104U005004M

**PRINCIPAL DIMENSIONS**

107 + ULS

INDEX No. 12845

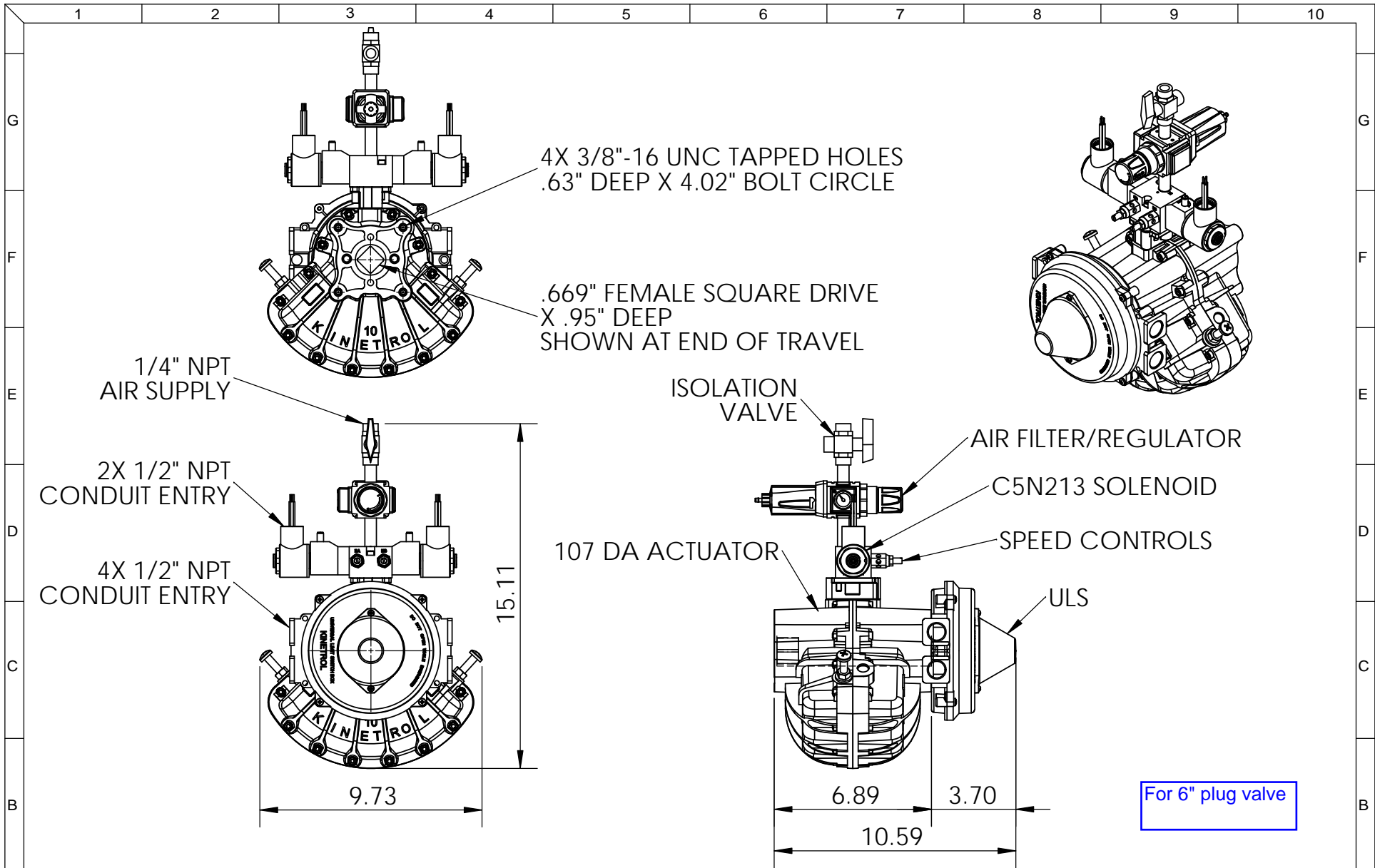
ASSEMBLED ON-

DRG.No.  
128-1795A3

**KINETROL** TRADING ESTATE  
FARNHAM, SURREY

OFF  
PER SET

DIMS. IN  
INCHES

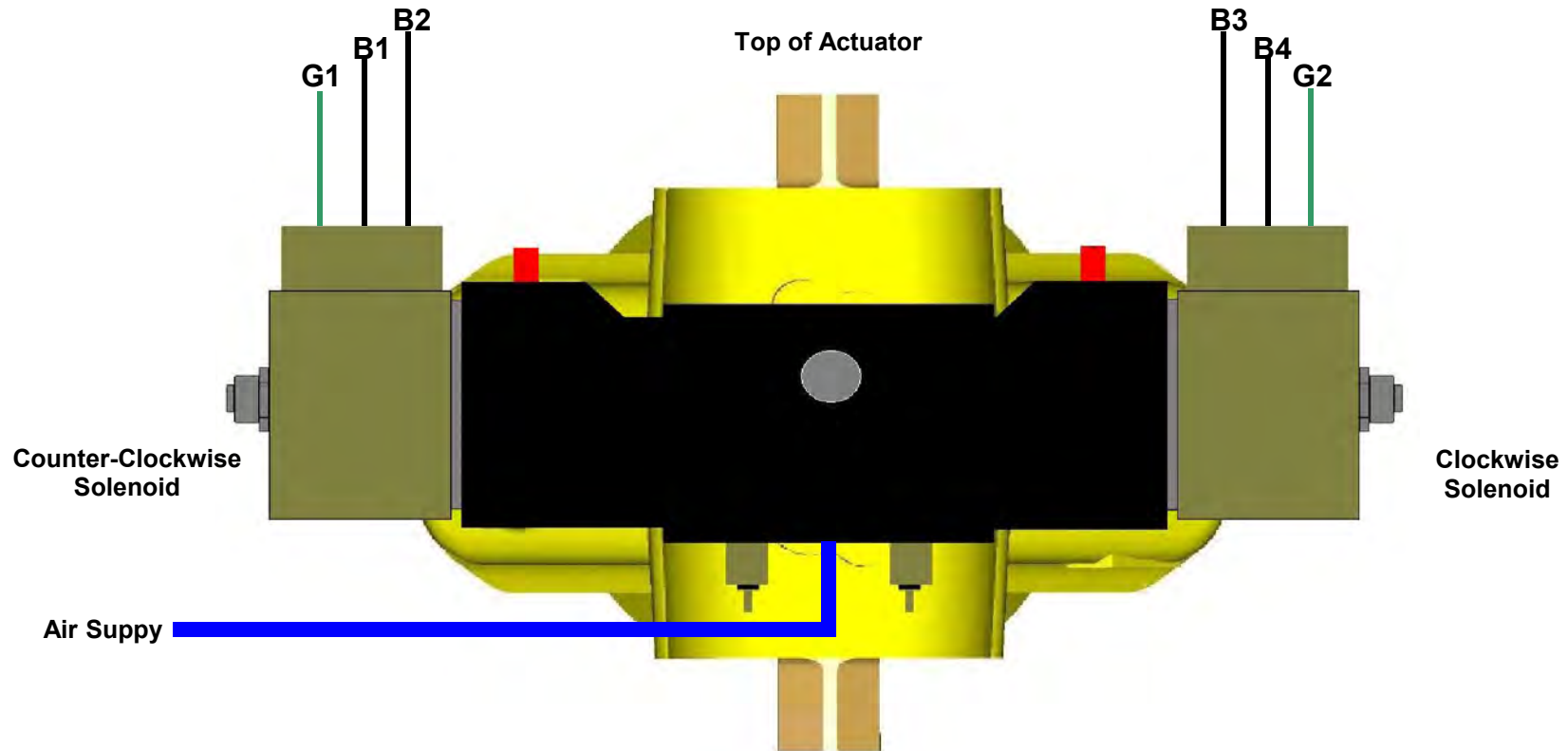


ISSUE		DATE	SCALE	TITLE	"TAG VARIABLE"	SHEET NO.			
A		7/26/2017			NTS		107 DA ACTUATOR + ULS + C5N213 SOLENOID + SPEED CONTROLS + AIR FILTER/ REGULATOR + ISOLATION VALVE	DRG.No. 107DAS2U0AV-1A	1
		DRAWN BY JPY							DIMS. IN INCHES
		CHKD BY			<b>KINETROL</b>	1085 Ohio Dr. Plano, Texas 75093			

# KINETROL USA, Inc.

## DA Actuator with 110Vac Dual Coil Solenoid Valve

Electrical / Pneumatic  
Connections



Wire	Function
G1	Ground
B1	Live ( + )
B2	Neutral ( - )
B3	Live ( + )
B4	Neutral ( - )
G2	Ground

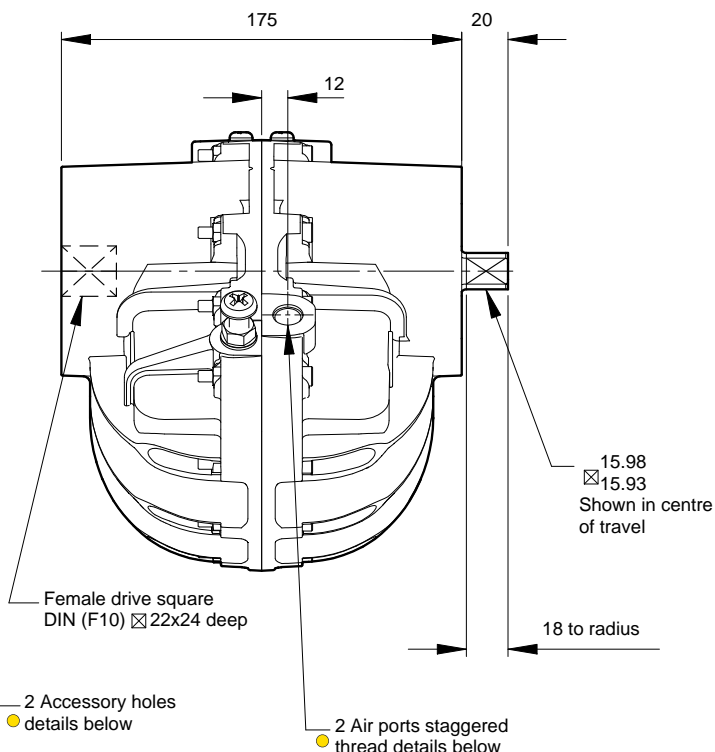
### Notes:

1. Look down on top of actuator to define clockwise and counter-clockwise rotation.
2. Energize only the clockwise solenoid to drive the actuator clockwise.
3. Energize only the counter-clockwise solenoid to drive the actuator counter-clockwise.
4. Do not energize both solenoids simultaneously.
5. There are two black wires on each solenoid. It doesn't matter which is used for live and which is used for neutral.

20070216GMR1

For 6" plug valve

# Model 10



## Specification

### Output Torque

3625 lbf ins/416 Nm  
at 100 psi/7 bar

### Angle of Travel (adjustable)

78° - 100°  
(restricted travel  
versions available)

### Displaced Volume

62.5 in<sup>3</sup>/1025 cm<sup>3</sup>

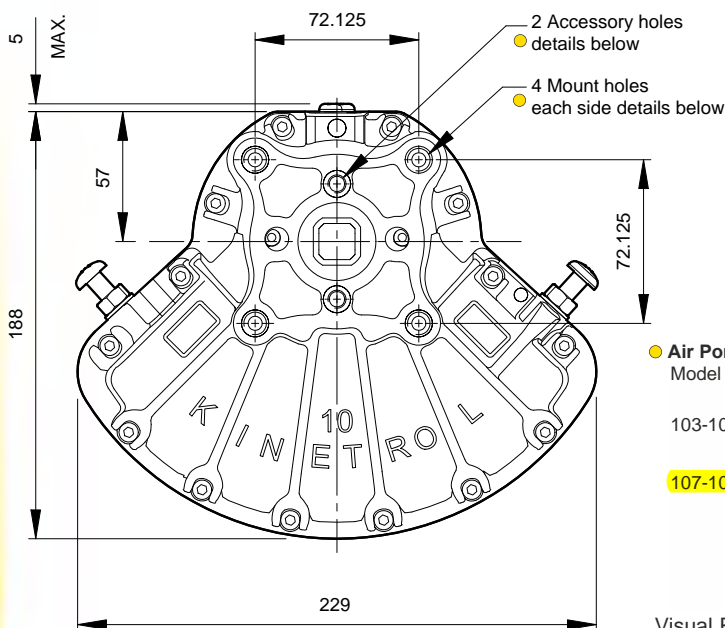
### Finish

Epoxy stove enamel

### Weight

11.9 lb/5.4 kg  
(no coupling)

For further information  
see General Specification  
on page 50.



#### Air Port/Mount Hole Details

Model	Air Ports	Mount Holes & Accessory Mount Holes
103-100	G <sup>1</sup> / <sub>4</sub>	4 x M10 x 16 deep on 102.0 PCD 2 x M8 x 16 deep on 50.8 PCD
107-100	1/4 NPT	4 x 3/8 - 16 UNC x 0.63" deep on 4.02" PCD 2 x 3/8 - 16 UNC x 0.63" deep on 2.00" PCD

Visual Red Indicator supplied as standard - see page 3

## Options

- Fail safe spring return units - clockwise or counter clockwise see pages 5-7
- Limit switch boxes for open/close indication - various switches for hazardous areas see pages 9-12
- Integral solenoid valve see page 20
- AP pneumatic positioner - full range of options see pages 17/18
- EL electropneumatic positioner - full range of options see pages 15/16
- P3 on/off positioner- full range of options including hazardous area see pages 21-23
- Clear Cone position monitor see page 20
- Geared manual override see page 46
- Code identification see page 62
- Torque outputs see pages 58-60
- See pages 49-52 for English dimensions and dimensions of spring options
- High temperature / Low temperature options see page 50



## Pneumatic Operator Sizing Calculations per AWWA C504

### 4" Plug Valve:

VALVE OR DAMPER SIZE AND TYPE
4" PV
TORQUE, MAX REQ./MIN AVAIL (Pounds-Inch)
660 / 1012 (Includes 53% Safety Factor)

#### 4" Plug Valve / Operator Sizing:

4" plug valve max required Operating Torque	= 660 in-lbs
Kinetrol Model 08-100 Double Acting Torque Output @ 60psi air	= 1020 in-lbs
Application Safety Factor (per AWWA shall be 1.25 or greater properly)	= 1.53 (Confirmed sized)

### 6" Plug Valve:

VALVE OR DAMPER SIZE AND TYPE
6" PV
TORQUE, MAX REQ./MIN AVAIL (Pounds-Inch)
1200 / 2130 (Includes 77% Safety Factor)

#### 6" Plug Valve / Operator Sizing:

6" plug valve max required Operating Torque	= 1200 in-lbs
Kinetrol Model 08-100 Double Acting Torque Output @ 60psi air	= 2130 in-lbs
Application Safety Factor (per AWWA shall be 1.25 or greater properly)	= 1.77 (Confirmed sized)

**Double Acting Torque Outputs - Metric Units Nm**

Actuator Model	Pressure (bar)											
	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
0M0-100	0.1	0.2	0.25	0.35	0.4	0.5	0.55	0.6	0.7	0.75	0.85	0.9
01-100	1.1	1.6	2.1	2.6	3.0	3.5	4.0	4.5	5.1	5.6	6.1	6.7
02-100	1.8	2.7	3.6	4.6	5.5	6.4	7.3	8.2	9.2	10.2	11.1	12.1
03-100	3.9	5.8	7.6	9.6	11.5	13.4	15.4	17.4	19.3	21.3	23.2	25.3
05-100	9.0	12.5	16.5	20.0	24.0	27.5	31.5	35.0	39.0	43.0	46.5	50.5
07-100	22.0	30.5	39.5	48.5	57.5	66.5	76.0	85.5	95.0	105.0	114.0	124.0
08-100	38.7	53.2	67.7	82.3	96.8	111.4	125.9	140.5	155.0	169.0	184.1	198.7
09-100	46	64	83	102	121	140	159	179	199	220	241	261
10-100	80	111	141	172	202	232	263	294	325	355	385	416
12-100	103	147	190	232	275	319	360	403	446	490	532	575
14-100	265	360	460	560	660	760	870	975	1080	1180	1280	1375
15-100	435	605	769	937	1109	1287	1457	1632	1808	1982	2153	2337
16-100	640	860	1090	1310	1530	1750	1980	2200	2420	2650	2870	3100
18-100	1250	1750	2250	2750	3250	3750	4300	4850	5400	5950	6400	6900
20-100	2480	3440	4400	5310	6290	7230	8160	9090	10020	10960	11890	12760
30-100	3720	5160	6600	7695	9435	10845	12240	13635	15030	16440	17835	19140

**Double Acting Torque Outputs - English Units lbf ins**

Actuator Model	Pressure (psi)								
	20	30	40	50	60	70	80	90	100
0M0-100	1	2	3	3.5	4.5	5	6	7	8
01-100	9	15	21	26	32	39	45	51	58
02-100	14	25	36	48	59	70	82	93	105
03-100	29	53	77	101	124	148	173	196	220
05-100	70	116	160	205	250	300	346	393	440
07-100	175	280	390	500	610	730	850	960	1080
<b>08-100</b>	311	488	666	826	<b>1012</b>	1208	1367	1563	1740
09-100	360	590	820	1050	1280	1530	1780	2020	2280
<b>10-100</b>	640	1020	1390	1760	<b>2130</b>	2500	2880	3250	3625
12-100	830	1350	1870	2400	2900	3440	3970	4480	5000
14-100	2150	3350	4550	5800	7000	8300	9600	10800	12000
15-100	3558	5602	7593	9700	11753	13895	15991	18125	20337
16-100	5200	7900	10600	13400	16100	18800	21600	24300	27000
18-100	10000	16100	22200	28300	34500	41300	48000	54500	60000
20-100	20000	32000	43000	54500	66000	78000	89000	100500	112000
30-100	30000	48000	64500	81750	99000	117000	133500	150750	168000

For spring return torques see pages 59/60

**Title: ACTUATOR – DISPLACED VOLUMES, DEAD VOLUMES  
AND AIR CONSUMPTION**

Actuator Size	*Displaced Volume	*Dead Volume	Total Volume	Free Air Consumption per Stroke @ 4 Bar	Free Air Consumption per Stroke @ 5.5 Bar	Free Air Consumption per Stroke @ 7 Bar
	cm <sup>3</sup>	cm <sup>3</sup>	cm <sup>3</sup>	litres	litres	litres
OMO	2.4	0.25	2.65	0.013	0.017	0.021
014/014P	16	1.8	17.8	0.087	0.114	0.141
024	31	4	35	0.171	0.224	0.276
034	60	10	70	0.340	0.445	0.550
054	113	13	126	0.617	0.806	0.995
074	300	42	342	1.67	2.18	2.69
084	485	40	525	2.59	3.37	4.16
094	644	79	723	3.54	4.62	5.71
104	1025	135	1160	5.67	7.41	9.15
124	1410	155	1565	7.67	10.0	12.4
144	3294	227	3521	17.38	22.7	27.9
154	5920	680	6600	32.32	42.2	52.1
164	7630	2459	10089	47.99	63.1	78.3
184	17170	5933	23103	109.6	144.2	178.9
204	33350	10150	43500	207.4	272.6	337.9
304	50025	15225	65250	311.0	408.9	506.8

	in <sup>3</sup>	in <sup>3</sup>	in <sup>3</sup>	cu ft	cu ft	cu ft
OMO	0.15	0.02	0.16	0.0005	0.0006	0.0007
017/017P	0.98	0.11	1.09	0.0031	0.0040	0.0050
027	1.89	0.24	2.13	0.0060	0.0079	0.0097
037	3.66	0.61	4.27	0.0120	0.0157	0.0194
057	6.89	0.79	7.68	0.0218	0.0284	0.0351
077	18.3	2.6	20.9	0.059	0.077	0.095
<b>087</b>	29.6	2.4	32.0	<b>0.091</b>	0.119	0.147
097	39.3	4.8	44.1	0.125	0.163	0.201
<b>107</b>	62.5	8.2	70.7	<b>0.200</b>	0.261	0.323
127	86.0	9.5	95.4	0.271	0.353	0.436
147	201	14	215	0.61	0.80	0.99
157	361	41	402	1.14	1.49	1.84
167	465	150	615	1.69	2.23	2.76
187	1047	362	1409	3.87	5.09	6.31
207	2034	619	2652	7.32	9.62	11.92
307	3050	928	3978	10.97	14.43	17.88

\*These values for 90° movement

Issue H	DGW 02-03-16	<b>KINETROL</b> Trading Estate Farnham Surrey England	Doc.No. TD 105 Page 1 of 1
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**Installation, Operation & Maintenance Instructions**  
**ROTARY 1/4 TURN ACTUATOR / DOUBLE ACTING & SPRING RETURN MODELS**  
 Suitable for use in safe area and hazardous gas/dust atmospheres (ATEX)

**GENERAL ACTUATORS & SPRING RETURNS**

**NOTE : FOR APPLICATIONS REQUIRING FUNCTIONAL SAFETY APPLICATION TO IEC 61508, REFER TO PRODUCT SAFETY MANUAL TD170 FOR RELEVANT DETAILS IN ADDITION TO DETAILS GIVEN IN THIS DOCUMENT.**

**1. INSTALLATION**

**Mounting hole sizes – Standard actuator**

Model	Number of Holes	ISO Thread	Depth of Thread	ANSI Thread	Depth of Thread
01	4	M4 x 0.7	6mm	8-32 UNC	15/64"
02	4	M4 x 0.7	8mm	8-32 UNC	5/16"
03	4	M5 x 0.8	10mm	10-24 UNC	3/8"
05	6	M5 x 0.8	10mm	10-32 UNC	3/8"
07	4	M8 x 1.25	16mm	5/16-18 UNC	5/8"
08	4	M8 x 1.25	16mm	5/16-18 UNC	5/8"
09	4	M10 x 1.5	20mm	3/8-16 UNC	25/32"
12	4	M12 x 1.75	24mm	1/2-13 UNC	15/16"
14	4	M16 x 2	28mm	5/8-11 UNC	11/8"
15	4	M16 x 2	28mm	5/8-11 UNC	11/8"
16	4	M24 x 3	38mm	7/8-9 UNC	11/2"
18	4	M30 x 3.5	50mm	11/8-7 UNC	2"
20	8	M30 x 3.5	50mm	11/8-7 UNC	2"
30	8	M30 x 3.5	50mm	11/8-7 UNC	2"

Model 014P has 4 M4 (8-32 UNC) clearance holes.

**Mounting hole sizes – DIN/ISO actuators**

Model suffix 1 is without Namur.  
 Model suffix 2 is with Namur solenoid valve mounting.  
 Model suffix 3 is with ancillary mounting.  
 Model suffix A is with ancillary mounting and Namur solenoid valve mounting.

Model	Number of Holes	ISO Thread	Depth of Thread	PCD
031/3 & 032/A	4	M5 x 0.8	8mm	36mm
051/3 & 052/A	4	M5 x 0.8	8mm	42mm
071/3 & 072/A	4	M6 x 1	10mm	50mm
083 & 08A	4	M8 x 1.25	13mm	70mm
091/3 & 092/A	4	M8 x 1.25	13mm	70mm
101/3 & 102/A	4	M10 x 1.5	16mm	102mm
121/3 & 122/A	4	M10 x 1.5	16mm	102mm
141/3 & 142/A	4	M12 x 1.75	20mm	125mm
151/3 & 152/A	4	M16 x 2	28mm	140mm
161/3	4	M20 x 2.5	32mm	165mm

**Mounting hole sizes for ISO adaptor models** refer to Kinetrol technical data sheet TD124.

**Mounting hole sizes for female spring return assemblies** refer to Kinetrol technical data sheet TD121.

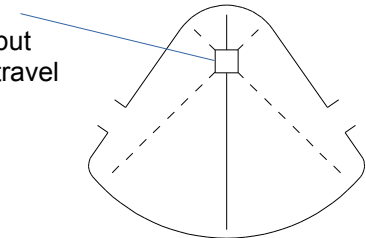
Note: It is essential that full number of bolts are used and all tightened evenly. Refer to TD111.

**CAUTION:**  
 NEVER HAMMER OR USE OTHER UNDUE FORCE ON ACTUATOR DIECAST CASES. DAMAGE TO INTERNAL SEALING FACES WILL RESULT.

**2. Mounting**

2.1 Actuator and driven unit must be correctly aligned, i.e. actuator vane and driven unit must be able to move in same direction from end stop when coupled together.

FIGURE 1.  
 Position of output square in mid-travel position.



Note:

- Position of output shaft when vane at mid-travel position.
- 2.2 Take particular care in aligning model 05. 6-hole mounting means 30° misalignment possible if flange has 60° error and coupling 90° error.
- 2.3 There must be no end load on actuator drive shaft. Check clearance between actuator and driven unit drive shaft, allowing for coupling to be used.
- 2.4 Care must be taken to ensure concentricity between actuator shaft and driven unit shaft.
- 2.5 Actuator can be mounted in any plane.
- 2.6 When side loading of actuator shaft is unavoidable, ensure load does not exceed guide lines given in Kinetrol Technical data sheet TD28.
- 2.7 Ensure the larger of the output square drives (if different) is used to drive the load.

**3. Drive Coupling**

- 3.1 Square hole standard drive coupling supplied in mild steel and may be welded or brazed to coupling part to suit drive on driven unit.  
 NOTE: This is not supplied with ISO/DIN, ISO adaptor or female spring drive models.
- 3.2 When the mounting is tightened down, check there is minimum 0.5mm (0.020") end play of coupling on actuator square drive shaft to avoid end load on actuator shaft.

**4. Air/Gas Supply**

- 4.1 Operating air pressure should not exceed 7 bar (100 psi).
- 4.2 Air/Gas supply must be reasonably clean and dry and to a quality class 4.5.5 (according to ISO standard 8573.1). This implies 25 micron maximum particle size, 7°C dew point maximum (or lower than ambient temperature below 7°C) and 25 mg/cubic metre maximum oil content.
- 4.3 Plastic or other non-conductive tubing should not be used unless it is proven to comply with BS EN ISO 80079-36. Size should be relative to supply/exhaust port size on actuator concerned. Undersize tubing or fittings will restrict actuator performance.
- 4.4 The actuator can be driven by a hazardous gas as long as:
  - 4.4.1 The gas is not corrosive (e.g. natural gas "sweet" and not "sour" gas is used).
  - 4.4.2 The actuator shall not be operated with flammable gas/air mixtures.
- 4.5 Air can be passed to the actuator from three different sets of air port:
  - 1) Through the side holes for fast response, or
  - 2) By unplugging two holes at the rear of the actuator and fitting a Namur adaptor for using a Namur standard valve, or
  - 3) By unplugging two holes in the top flange of the actuator and fitting a Kinetrol positioning product.(Models 05-15).

# Installation, Operation & Maintenance Instructions

## ROTARY 1/4 TURN ACTUATOR / DOUBLE ACTING & SPRING RETURN MODELS

Suitable for use in safe area and hazardous gas/dust atmospheres (ATEX)

### 5. Operation

- 5.1 External stops are strongly recommended when actuator is operating a mechanism with cantilevered load. However, Kinetrol technical data sheet, TD37, can be used to ensure load inertia and travel speed remain within allowable limits.
- 5.2 Second square end of drive shaft may be used for visual position indication, emergency manual operation or driving of add-on units (positioner, limit switch unit, etc.).
- 5.3 If the square sizes are the same both ends spring units can be fitted either end. However, if they are different, always fit the spring to the larger square end and drive through this end only.
- 5.4 Ambient operating temperature range of actuator is -20°C to 80°C. This range may be extended to +100°C with Viton seals. Special care should be taken to ensure that heat conducted from, for example, a hot valve, does not increase the actuator temperature above these limits. Refer to Kinetrol technical data sheet TD69 for guidance. A low temperature version of the actuator, having an 'L' at the end of the type code allows the unit to be used at an ambient temperature range of -40°C to 70°C, such actuators may be labelled with a special ATEX label (see section 8).
- 5.5 Visual position indicators are available. Coloured red, made from Nylon 6, they can be fitted over square shaft at top of actuator or top of add-on unit.
- 5.6 Ensure environmental conditions, such as corrosive environments, are compatible with the materials of construction and protective finishes (Kinetrol technical data sheet TD14 refers). If unsure contact Kinetrol. Excessive corrosion of the actuator may cause it to fail in service.
- 5.7 The maximum rubbing speed of any component within the actuator and spring return unit must not exceed 1m/s for Cat 1 and 4m/s for Cat 2.  
See table below for minimum operating travel times:
- 5.8 Do not allow dust layers to build up on the apparatus.

Model	Category 1 operating time for 90° travel (sec)	Category 2 operating time for 90° travel (sec)
01	0.056	0.014
02	0.067	0.017
03	0.085	0.021
05	0.107	0.027
07	0.143	0.036
08	N/A	0.042
09	N/A	0.046
10	N/A	0.047
12	N/A	0.060
14	N/A	0.081
15	N/A	0.091
16	N/A	0.415
18	N/A	0.545
20/30	N/A	0.540

### 6. Maintenance

Maintenance is limited to replacement of seals when wear affects actuator performance. Seal life will vary according to application, conditions of cycle frequency, temperature, condition of air supply, etc. Detailed seal replacement instructions in next section.

### 7. Recommended Spare Parts (Refer to pages 5 - 8)

Standard seal kits, available for each actuator model, consist of the following:

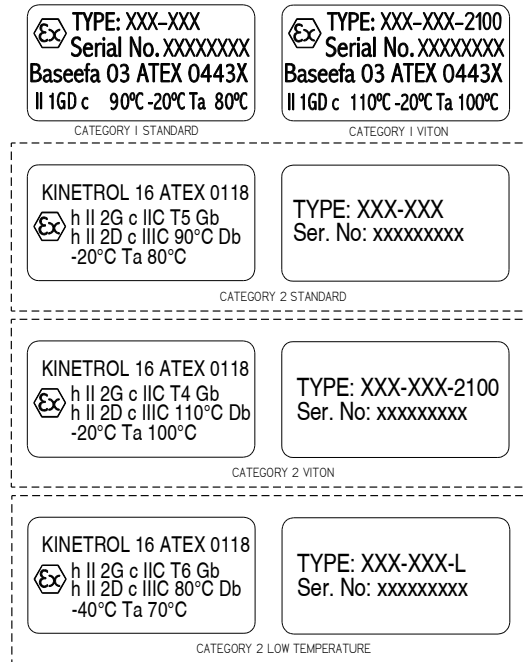
- 2 off vane seal      - 2 off expander      - 2 off shaft seal
- Plus all necessary O-rings, screws, nuts and grease for all sizes up to model 15.

In addition, a tube of sealant will be required to seal case halves. Spring return units are not user servicable and therefore no spare parts are available other than complete units and keeper plates for safe spring removal.

### 8. Labelling (ATEX)

All Kinetrol actuators that are approved for use in areas where explosives, dust & gases are present, are marked with one of the labels shown in figure 2 below.

FIGURE 2



Ensure that the details on the label such as the ambient temperature range is suitable for the application. Also ensure that any other equipment fitted to the actuator (e.g. limit switch box or positioner) does not restrict the use within the parameters shown on the above labels. Certificate of Conformance, TD125, shows the category of approval for different sizes of actuator and spring unit.

### 9. Adjustment

- 9.1 Stroke Adjustment – only applies to models with adjustable stops.

*Table of standard stroke adjustments available*

Models	Adjustment range available Each stop
03/07/08/09/15/16/18/20/30	10°
02/05/14	8°
01A/10/12	11°

Greater adjustment range possible with non-standard stop screws. Contact KINETROL for details.

- 9.2 Speed Adjustment

Slower operation of actuator is possible, without significant torque output reduction, by external fitment of flow regulator valves.

Faster operation can be achieved under certain conditions by fitting quick exhaust valves. For full details contact Kinetrol.

Installation, Operation & Maintenance Instructions  
**ROTARY 1/4 TURN ACTUATOR / DOUBLE ACTING & SPRING RETURN MODELS**  
 Suitable for use in safe area and hazardous gas/dust atmospheres (ATEX)

**ACTUATOR SEAL REPLACEMENT INSTRUCTIONS**

**1. DISMANTLING ACTUATOR (see exploded drawing/parts list)** CAUTION: Before dismantling, check there are no burrs on square drive shafts. If there are, remove to avoid damage to bearings and shaft seals during removal of case halves. In the case of spring return actuators, remove spring unit (according to following section) before opening actuator case. FOR DISMANTLING/RE-ASSEMBLY INSTRUCTIONS FOR 20/30 SIZE ACTUATOR REFER TO KINETROL TECHNICAL DATA SHEET TD104.

- 1.1 All models: loosen, but do not remove, all case screws.
- 1.2 Separate case halves by connecting air line to inlet port and blowing them apart. Procedure is safe although producing a "bang". Pull off one case half.  
CAUTION: Do NOT hammer diecast castings or shaft end. It will damage internal sealing surfaces.
- 1.3 Clean both case halves removing silicone rubber sealant. Clean joint surfaces of case flange with surgical spirit.
- 1.4 Replace and lubricate shaft seals.
- 1.5 Undo vane nuts and bolts (if fitted) and remove old expanders and seals from vane. Take care not to damage side plates. Clean vane. Some later models use nuts on one side of vane with bolts on other side.

**2. REASSEMBLY VANE**

**Vane sub assembly with studs**

- 2.1 Check studs are tight through vane and equal length each side (if studs are fitted). If not, apply Loctite to thread and relocate correctly in vane.
- 2.2 Model 16 & 18: Apply SILASTIC 732 RTV sealant around bottom of studs (to prevent air leakage through seal on vane stud holes).
- 2.3 Fit new seal over studs after checking profile matches vane profile.
- 2.4 Fit seal expander – the hole in it shaped like vane outline shows correct way round – teeth pointing away from vane.
- 2.5 Fit side plate over studs.
- 2.6 Fit new nuts to studs after applying Loctite medium strength sealant to threads.
- 2.7 Tighten nuts to following torques:

01	6 lbf.ins	0.68	Nm
02	6 lbf.ins	0.68	Nm
03	6 lbf.ins	0.68	Nm
05	8 lbf.ins	0.90	Nm
07	8 lbf.ins	0.90	Nm
08	20 lbf.ins	2.26	Nm
09	20 lbf.ins	2.26	Nm
10	20 lbf.ins	2.26	Nm
12	30 lbf.ins	3.39	Nm
14	30 lbf.ins	3.39	Nm
16	60 lbf.ins	6.78	Nm
18	50 lbf.ins	5.65	Nm

**Vane sub assembly with hex head bolts**

- 2.8 Check vane for any obvious defects and make sure it is free of burrs, then place vane in cradle and place face down on a bench or hold in a vice.
- 2.9 Fit Side plate Infill Insert into Side plates (07 only) Push hex headed bolts with plain washer through side plate, expander (teeth facing towards head of bolt) and seal (base of seal away from bolt head).

- 2.10 After checking that expander and seal are right way round - expander has vane shaped hole, seal has shaft centre line marked - thread first few threads of each bolt into vane.
- 2.11 While holding up side plate, expander and seal, apply a low strength anaerobic adhesive to bolt thread.
- 2.12 Screw bolts down and tighten to torques given below.
- 2.13 Turn vane over then fit seal, expander and side plate over end of bolts. Check orientation as before.
- 2.14 Screw nuts down thread.
- 2.15 Position vane assembly in coupling on bench, hold head of bolt with a spanner, torque up nut to torque specified in section 2.7.

Hex Head Bolts

01B	6lbf.ins	0.68 Nm
07	8lbf.ins	0.90 Nm
08	20lbf.ins	2.26 Nm
09	20lbf.ins	2.26 Nm
10	15lbf.ins	1.70 Nm
12	30lbf.ins	3.36 Nm
14	30lbf.ins	3.39Nm
15	30lbf.ins	3.39 Nm
16	40lbf.ins	4.52 Nm

**3. RE-ASSEMBLING ACTUATOR**

- 3.1 Coat bearing bushes and inside both case halves with molybdenum disulphide grease or grease supplied by KINETROL.
- 3.2 Lightly and evenly coat joint face on each case half with INSTANT GASKET sealant available from Kinetrol (SP057) or SILASTIC 732 RTV sealant obtainable from ironmongers, etc. may be used as a substitute. CAUTION: EXCESS SEALANT, if extruded inside case, WILL IMPAIR OPERATION OF SEALS. Remove all excess sealant especially from inside edge.
- 3.3 Insert vane into one case half, turning it to ease square on drive shaft through shaft seal. Watch that lip seals at ends of vane easily work down into case without damage.
- 3.4 Fit remaining case half on top of the other, turning it to ease square through shaft seal.
- 3.5 CAUTION: Check that lip seals are not trapped at case joint face when Viton seals are fitted. Ensure minimal time delay to closing of case once sealant has been applied
- 3.6 Tighten case screws to the following torques:

01	6 lbf.ins.	0.68 Nm
02	10 lbf.ins.	1.13 Nm
03	10 lbf.ins.	1.13 Nm
05	20 lbf.ins.	2.26 Nm
07	20 lbf.ins.	2.24 Nm
08	60 lbf.ins.	6.78 Nm
09	60 lbf.ins.	6.78 Nm
10	80 lbf.ins.	8.96 Nm
12	100 lbf.ins.	11.3 Nm
14	120 lbf.ins.	13.6 Nm
15	225 lbf.ins.	25.4 Nm
16	860 lbf.ins.	97.2 Nm
18	1140 lbf.ins.	128.8 Nm

- 3.7 Rotate vane manually to check movement and wipe away sealant extruded internally.
- 3.8 Allow setting time for sealant before applying test air pressure.

Installation, Operation & Maintenance Instructions  
**ROTARY 1/4 TURN ACTUATOR / DOUBLE ACTING & SPRING RETURN MODELS**  
 Suitable for use in safe area and hazardous gas/dust atmospheres (ATEX)

**SPRING RETURN UNITS**

**NOTE : ALL REFERENCES IN THIS DOCUMENT TO MODEL 08 ASSEMBLIES ARE SPECIFIC TO THE 2010 REDESIGN, AND REFERENCES TO MODEL 05 ASSEMBLIES ARE SPECIFIC TO THE 2014 REDESIGN. FOR PRE 05/2010 08 MODELS AND PRE 02/2014 05 MODELS CONTACT KINETROL.**

**1. REMOVAL OF SPRING RETURN UNIT**

**WARNING** – the wound-up steel springs are storing a large amount of energy which, if suddenly released, can be dangerous.

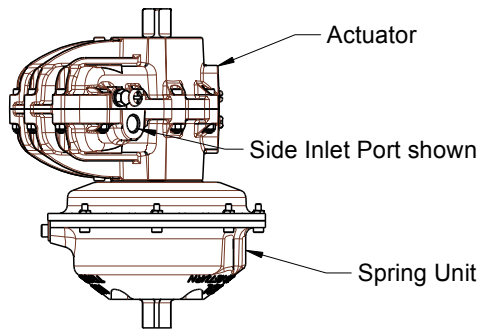


FIGURE 3.

Most assemblies are installed with the actuator on top, as the actuator output square is normally used for operating control accessories only, and output drive is normally through spring return unit. Check product code for clarification.

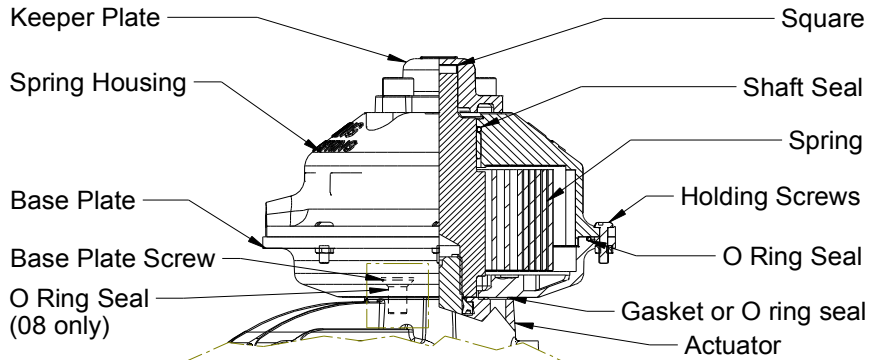


FIGURE 4.

If the assembly is installed as shown in figure 3, it will first be necessary to invert the assembly before removing or refitting the spring unit.

**NOTE:** For size 18 spring removal refer to TD 145.  
 For size 20 & 30 refer to TD 104.

1.1 A keeper plate strong enough to take full spring torque must be fitted in order to remove S/R unit without releasing spring tension.

Note: Keeper plates and screws available from KINETROL. Refer to table on page 5 for spare part order Numbers.

1.2 Connect air line via pressure regulating valve to actuator air inlet.

1.3 Place keeper plate over square shaft protruding from S/R unit. Keeper plates with male squares can be provided for female drive spring packs.

1.4 Increase air pressure slowly until actuator vane turns to mid-travel position. (See sketch at 2 of ACTUATOR section.) Keeper plate holes will then line up with threaded holes in spring housing.

1.5 Insert all screws through keeper plate holes and tighten to lock keeper plate in position. Disconnect air supply.

1.6 Separate spring housing from base plate by removing holding screws. Then remove spring housing.

1.7 If necessary to gain access to actuator screws also remove base plate by removing screws. Take care with gasket/o ring between base plate and actuator. (Service actuator as required per Seal Replacement Instructions).

**NOTE:** When spring is removed, check for visible evidence of any water / dust ingress or mechanical wear between spring coils and static parts. If either of these has occurred it is advisable to replace the spring with a new spring unit.

**2. REASSEMBLY OF SPRING RETURN UNIT**

2.1 If necessary replace base plate after replacing gasket or O-ring as appropriate. Ensure the 4 countersunk base plate fixing screws are all fitted with O-rings (08 models only).

2.2 Ensure actuator vane is in mid-travel position.

2.3 Locate spring housing on shaft, (if the actuator square size is different on one end ensure spring is fitted to correct drive end) rotate it to line up holding screw holes with base plate and replace holding screws.

2.4 Connect air supply (as in 1.2) to actuator inlet port.

22.5 Adjust air pressure until it balances the spring tension.

2.6 Loosen keeper plate screws. If air pressure is correct balancing spring tension will not bind. If binding, adjust air pressure until balanced.

2.7 Remove keeper plate completely.

2.8 Disconnect air supply.

**3. ADJUSTMENT SPRING TENSION**

**WARNING:** The wound-up steel springs are storing a large amount of energy which, if suddenly released, can be dangerous.

3.1 Tension Setting Definitions

3.1.1 Optimum setting is when S/R unit is able to provide as much output torque on the spring return stroke as that produced by the corresponding air stroke at a particular air supply pressure.

3.1.2 Differential setting is when S/R unit produces more or less output torque on spring return stroke as that produced by the corresponding air stroke at a particular air supply pressure.

3.1.3 Operating air pressure in these instructions means the actual air supply pressure at which the actuator will be operated.

3.2 Optimum Spring Setting Test

3.2.1 Detach actuator/spring return from valve or mechanism operated by them.

3.2.2 Attach air supply to actuator through pressure regulating valve and gauge with supply shut off at regulator.

3.2.3 Gradually open regulator to increase air supply to actuator until actuator output shaft just begins to move.

3.2.4 Note actual pressure at which actuator output shaft moved.

3.2.5 If actual pressure noted at 3.2.4 is about half the operating air pressure then spring tension is at optimum.

If actual pressure noted at 3.2.4 is significantly less than half operating air pressure then spring tension is below optimum, i.e. output torque on S/R stroke will be less than that produced on corresponding air stroke at operating air pressure.

# Installation, Operation & Maintenance Instructions

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Conversely if actual pressure at 3.2.4 is significantly greater than half operating pressure then spring tension is above the optimum, i.e. S/R torque will be greater than air stroke torque.

### 3.3 Tension Adjustment Method (Standard S/R units without worm drive)

#### 3.3.1 Equipment/facilities required:

Air supply with pressure regulator valve and gauge in line.  
Keeper plate with bolts and spacers (KINETROL supply).  
Spanner/tools to suit.

Means of securely fixing assembly to a suitable work bench.  
3.3.2 Detach actuator/spring return from valve/mechanism.  
3.3.3 Connect air supply to actuator with regulator shut off.  
3.3.4 Carry out optimum spring setting test as at 2.2 above to determine whether spring tension needs to be increased or decreased.

3.3.5 Gradually open air supply regulator until actuator vane is at centre of travel (45°) position (see sketch at page 1).  
3.3.6 Place keeper plate over S/R square shaft at top of S/R unit.

CAUTION: If keeper plate of flat type, spacer washers at least 3mm (1/8") thick must be used under keeper plate. KINETROL die cast keeper plates do not need spacer washers.

3.3.7 If bolt holes of keeper plate do not line up with corresponding tapped holes in S/R unit, carefully open or close air supply regulator until S/R square shaft turns so that holes do line up.

3.3.8 Insert and tighten keeper plate bolts.

3.3.9 Shut off air supply to actuator.

3.3.10 Undo and remove all spring housing flange bolts.

Leave spring housing resting on base plate.

3.3.11 Turn spring housing in required direction according to:  
a) S/R operating direction, i.e. clockwise or anticlockwise operation of spring force, and  
b) Tension required to be increased or decreased.

NOTE: Larger sizes of actuator/spring return will require spanner and possibly extension bar to turn spring housing through square shaft on S/R unit.

3.3.12 Housings can be adjusted in steps of either 10°, 15°, 30° or 45° depending on the number of bolt holes around the flanges of the housing and base plate which varies with model and age of S/R unit concerned. (Except O14 = 90° steps only). IMPORTANT see paragraph 3.3.20.

3.3.13 As a rough guide 30° adjustment of spring housing relative to base plate will give 8% change of spring torque output providing spring is already tensioned within its operating air pressure range, i.e. standard S/R units between 50 and 80 p.s.i. Low air supply S/R units between 25 and 50 p.s.i. See catalogue for full details.

3.3.14 Maximum adjustment in one step will be 45° controlled by available vane movement in actuator.

3.3.15 After turning spring housing by amount required (or possible) line up bolt holes in spring housing and base plate flanges. Insert flange bolts and tighten nuts.

3.3.16 Carefully open air supply to actuator until side load on keeper plate bolts is relieved.

3.3.17 Remove keeper plate.

3.3.18 Repeat optimum spring setting test as at 4.2 above.

3.3.19 If necessary, repeat operations 4.3.5 to 4.3.17 to further increase or decrease spring tension.

WARNING: Spring tension must not be further increased if air pressure noted at 4.2.4 is 40 p.s.i. or more for standard S/R units or 30 p.s.i. for special low air supply types.

3.3.20 Note: If alignment of mounting holes to square is important, then the spring tension should only be set in 90° increments. This is especially important when the spring unit is fitted between the actuator and the valve, as the mounting angle to the valve will determine correct opening/closing of the valve.

## 4. LABELLING (ATEX)

All spring units that are suitable for use in explosive areas are labelled with one of the labels as shown in 8 in actuator section above.

Ensure that the details on the label such as the ambient temperature range is suitable for the application.

Also ensure that any other equipment fitted to the spring return (e.g. limit switch box or positioner) does not restrict the use within the parameters shown on the above labels. Certificate of Conformance, TD125, shows the category of spring return approval for different sizes of spring units.

For non-standard spring codes please contact Kinetrol.

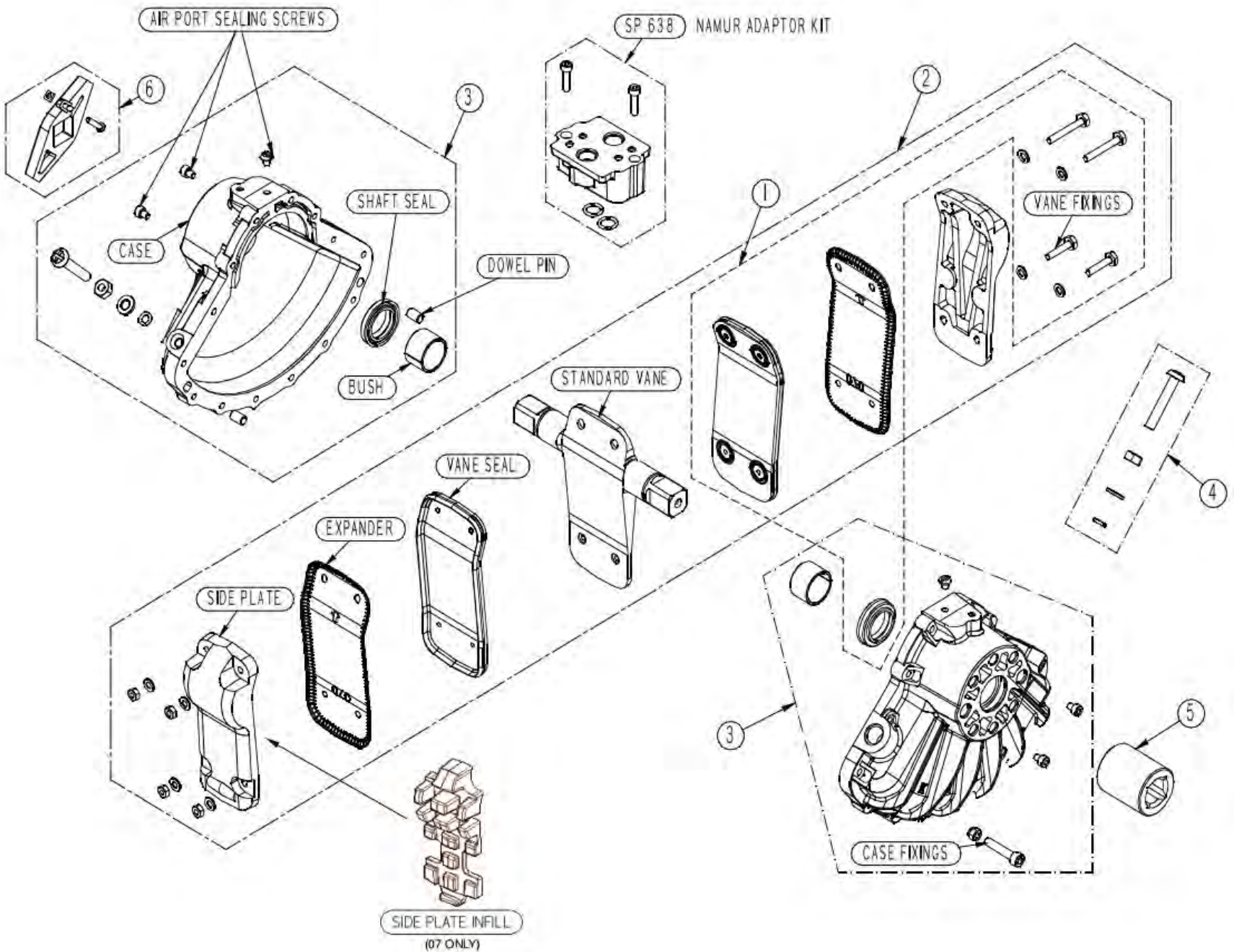
## 5. SPARE PART ORDER CODES – KEEPER PLATES:

SPRING SIZE	MALE DRIVE	FEMALE ISO DRIVE			FEMALE SERRATED DRIVE
		HOLES	SQUARE		
01	SP 350	N/A			N/A
02	SP 351	N/A			N/A
03	SP 352	F05	11	SP1360	N/A
		F04	11	SP1361	
05	SP 353	F05	14	SP1362	SP 1480
		F04	14	SP1363	
07	SP 354	F07	17	SP1364	SP 1481
08	SP 904	F07	17	SP1378	SP 1483
09	SP 356	F07/10	22	SP1365	SP 1482
10	SP 359	F10	22	SP1366	SP 1482
		F10	22	SP1368	
12	SP 357	F10	27	SP1369	N/A
		F12	22	SP1370	
		F12	27	SP1371	
14	SP 358	F12	27	SP1371	N/A
15	SP 919	F14	36	SP1379	N/A
16	SP 360	F14	36	SP1372	N/A
18	SP 361	F16	46	SP1373	N/A
20	SP 362	F25	55	SP1374	N/A
30	SP 362	N/A			N/A

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FIGURE 5.

EXPLODED VIEW OF A TYPICAL STANDARD ACTUATOR



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DATE  
DEC-16

**KINETROL** Trading Estate Farnham Surrey England. GU9 9NU

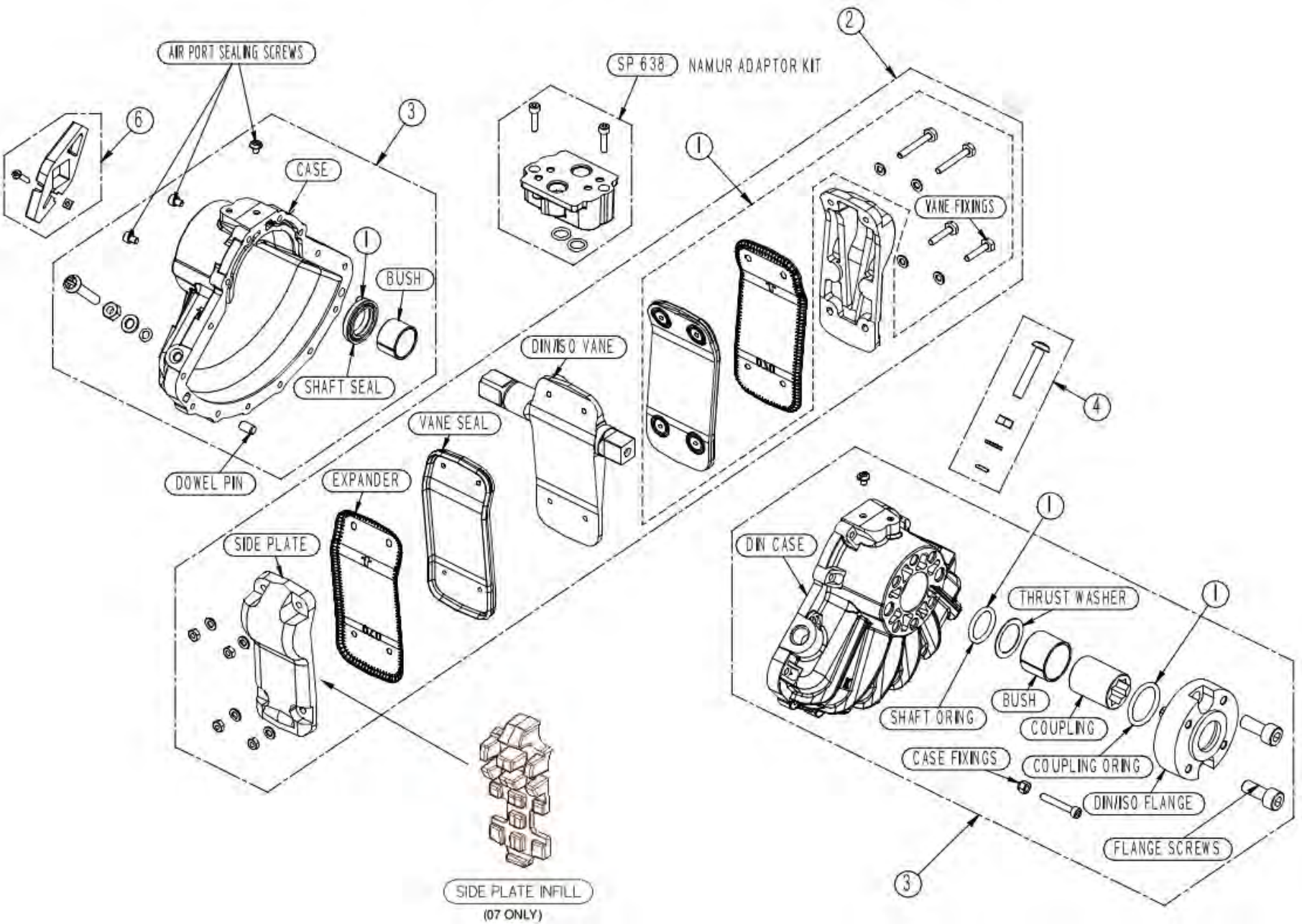
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Page 6 OF 8  
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ISSU - AR 6435 / ISS T - AR 6426 / ISS S - AR 6401 / ISS R - AR 6292 / ISS P - AR 6171 / ISS N - AR6003 / ISS M - AR5959 / ISS L - AR5981 / ISS K - AR 5474 / ISS J - AR 4777 / ISS H - AR 4726

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FIGURE 6.

### EXPLODED VIEW OF A TYPICAL ISO/DIN ACTUATOR



**Installation, Operation & Maintenance Instructions**  
**ROTARY 1/4 TURN ACTUATOR / DOUBLE ACTING & SPRING RETURN MODELS**  
 Suitable for use in safe area and hazardous gas/dust atmospheres (ATEX)

**SPARE PART ORDERING CODES**

**NOTE : ALL REFERENCES IN THIS DOCUMENT TO MODEL 08 ASSEMBLIES ARE SPECIFIC TO THE 2010 REDESIGN. FOR PRE 05/2010 08 MODELS CONTACT KINETROL.**

**SPARE PART ORDERING CODES FOR STANDARD ACTUATOR**

ITEM NO.	DESCRIPTION	QTY	SPARE NO'S FOR ACTUATORS														
			0M0	014	024	034/B	054/B	074/B	084/B	094/B	124/B	144/B	154/B	164	184	204	304
1	Seal Kit	1	SP055	SP871	SP041	SP054	SP042	SP043	SP900	SP045	SP046	SP047	SP917	SP053	SP048	SP051	SP052
2	Vane assembly	1	SP081	SP872	SP091	SP471	SP121	SP151	SP901	SP212	SP262	SP278	SP915	SP371	SP311	SP400	-
3	Case assembly	Matched Pair	SP083	SP873	SP099	SP479	SP129	SP159	SP902	SP221	SP253	SP283	SP916	SP379	SP319	SP399	-
4	Stop assembly	2	-	SP874	SP104	SP485	SP138	SP165	SP905	SP227	SP260	SP292	SP920	SP388*	SP324	SP396	SP396
5	Coupling	1	-	SP074	SP106	SP487	SP140	SP167	SP903	SP229	SP264	SP298	SP918	SP386	SP326	SP406	SP406
6	Indicator assembly	1	-	-	SP108	SP489	SP146	SP171	SP171	SP171	SP171	SP171	SP171	-	-	-	-
	Namur adaptor	1	-	-	-	SP638							-	-	-	-	

\* SP388 for actuators built with M20 stops (post MAY-14), SP384 for actuators built with M16 stops (pre MAY-14)

**VARIATIONS FOR OLD STYLE ACTUATOR PARTS**

ITEM NO.	DESCRIPTION	QTY.	SPARE NO'S FOR ACTUATORS														
			0M0	010	010A	020	030	050	070	080	090	120	140	160	180	200	300
2	Standard Vane assembly	1	SP081	SP061	SP331	SP091	SP471	SP121	SP151	*	SP211	SP241	SP271	SP371	SP311	SP400	-
3	Standard Case assembly	Matched Pair	SP083	SP069	SP338	SP099	SP479	SP129	SP159	*	SP221	SP253	SP283	SP379	SP319	SP399	-
6	Indicator assembly	1	-	-	-	SP108	SP489	SP146	SP171	-	SP231	SP267	SP301	-	-	-	-

\* CONTACT KINETROL

For actuators built to 'ANSI' standard (e.g. 057-100) change spare part number prefix from 'SP' to 'ASP' (e.g. for actuator 057-100 item 2 becomes ASP142 or for 059-100 item 2 becomes ASP121).

**SPARE PART ORDERING CODES FOR ISO/DIN ACTUATOR**

ITEM NO.	DESCRIPTION	QTY.	SPARE NO'S FOR ACTUATORS										
			023/A	033/A	053/A	073/A	083/A	093/A	103/A#	123/A	143/A	153/A	163/A
1	Seal Kit	1	SP041	SP054	DSP042	DSP043	DSP900	DSP045	SP056	SP046	SP047	SP917	SP053
2	Vane assembly	1	SP091	DSP472	DSP142	DSP151	DSP901	DSP212	DSP801	DSP262	DSP283	DSP915	DSP371
3	Case assembly	Matched Pair	SP099	DSP480	DSP130	DSP160	DSP902	DSP222	DSP811	DSP263	DSP294	DSP916	DSP379
4	Stop assembly	2	SP104	SP485	SP138	SP165	SP905	SP227	SP817	SP260	SP292	SP920	SP388*
6	Indicator assembly	1	SP108	SP489	SP146	SP171	SP171	SP171	SP171	SP171	SP171	SP171	-
	Namur adaptor		-	SP638							-		

\* SP388 for actuators built with M20 stops (post MAY-14), SP384 for actuators built with M16 stops (pre MAY-14)

**VARIATIONS FOR OLD STYLE ISO/DIN ACTUATOR PARTS**

ITEM NO.	DESCRIPTION	QTY.	SPARE NO'S FOR ACTUATORS								
			021	031	051	071	091	101	121	141	161
2	Vane assembly	1	SP041	DSP471	DSP121	DSP151	DSP211	DSP800	DSP241	DSP271	DSP371
3	Case assembly	Matched Pair	SP099	DSP479	DSP129	DSP159	DSP221	DSP811	DSP253	DSP283	DSP379
6	Indicator assembly	1	SP108	SP489	SP146	SP171	SP231	DSP820	SP267	SP301	-

NOTE SIZE 10 CASE /VANE CONSTRUCTION IS SIMILAR TO STANDARD ACTUATOR

# Pneumatic Actuator Accessories

# KINETROL

## INSTALLATION INSTRUCTIONS

## TYPE UNIVERSAL LIMIT SWITCH BOX

SUITABLE FOR DIRECT MOUNT TO KINETROL

ACTUATORS SIZE RANGE: 03 TO 14

& DISCRETE MOUNT OPTION

SWITCH TYPE: 004

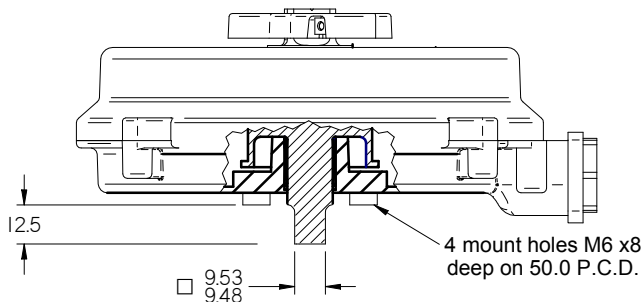
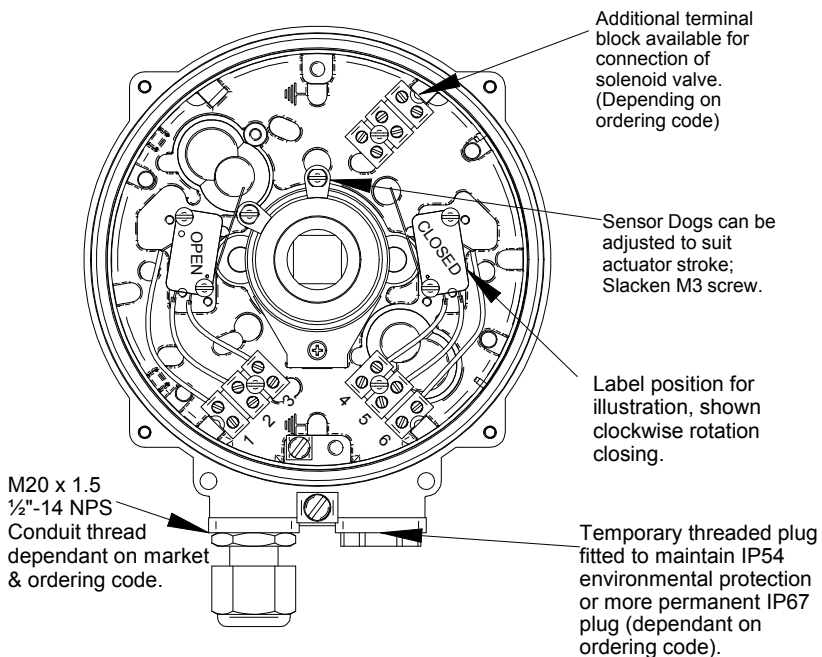
1. Remove temporary threaded plugs.
2. Customer to supply and fit cable glands to maintain IP54 Environmental Protection. Second conduit entry can be plugged using a suitable IP66 plug or ordered from Kinetrol with plug already fitted.
3. Connect cable terminals as required (wiring diagram shown below).
4. Materials of construction:
  - Main body & lid - Zinc alloy (Mazak 3) diecast epoxy painted.
  - Gasket - Cork.
  - Terminal strip - Gemin (KRG).
  - Switch cables - PVC coated copper
  - Rubber seals - NBR. (Other mat'ls available on request)
  - Shaft - Zinc plated mild steel.
  - Switch body & plunger - Glass filled nylon 6.6.
  - Switch contacts - Fine silver
5. Operating conditions:
  - Minimum operating time: 20ms.
  - Maximum angle of travel: 110°
  - Vibrating conditions: 4G @ 100Hz
  - Ambient temperature range: -40°C to +80°C.
  - Ensure operating loads given opposite are not exceeded.

Resistive load ratings for standard microswitches:

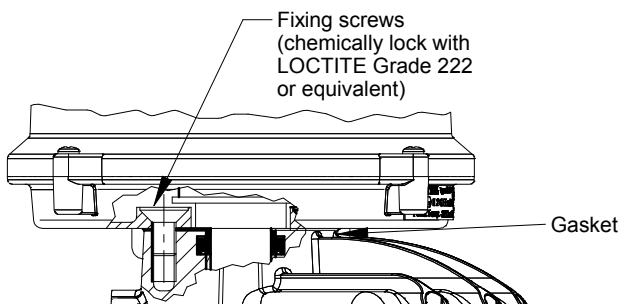
VOLTAGE	RESISTIVE LOAD
125 V ac	15 A
250 V ac	15 A
Up to 12 V dc	15 A
Up to 24 V dc	10 A
Up to 48 V dc	3 A
Up to 250 V dc	0.25 A

Multiplication factors for non-resistive loads:  
 Steady state tungsten lamp load: X 0.1  
 Steady state inductive load: X 0.2  
 Peak inductive load: X 1.0

6. If direct mount units supplied separately this box must be kept sealed in its polythene bag during storage. The box must be assembled correctly to the appropriate Kinetrol actuator. The fixing screws and gasket are provided. Only use replacement parts supplied by Kinetrol. Assemble as shown below.
7. Discrete mount units: Discrete mount units are designed to be bracket mounted to the actuator and are fitted with either a male Kinetrol square or a namur VDI/VDE interface shaft. Ensure mounting arrangement does not apply side or end load to the switch box shaft.
8. Open/Closed label supplied loose - to be fitted by user in desired position.

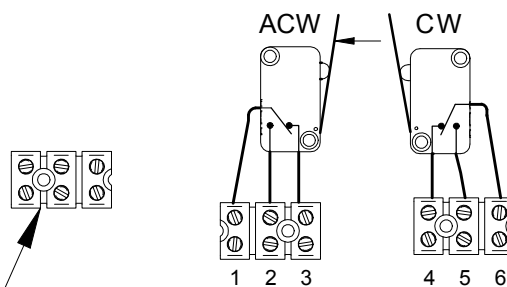


DISCRETE MOUNT BOX OPTION SHOWN WITH KINETROL SQ. IT CAN ALSO BE FITTED WITH DISCRETE SHAFT TO VDI/VDE 3845.



Kinetrol Direct Mount Option

### WIRING DIAGRAM



TERMINAL FOR CONNECTING TO SOLENOID VALVE

CABLE RANGE 0.5mm<sup>2</sup> TO 2.5mm<sup>2</sup>

ENSURE EXTERNAL WIRING INSULATION LIES WITHIN THROAT OF TERMINAL

1: Common      4: NC  
 2: NO            5: NO  
 3: NC            6: Common

# DIRECT MOUNT ACTUATOR VALVES



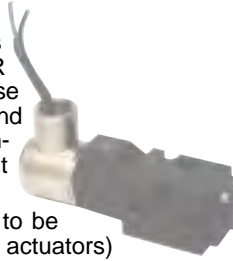
ALUMINUM CONSTRUCTION

## SERIES C5 NAMUR

### 3-Way/4 Way Field Convertible Solenoid Valves

#### General Description

The Versa C5 NAMUR mount control valve is a high flow, 5-port, solenoid/pilot valve. It is designed to mount directly to any NAMUR actuator, thus reducing actuator response time and cost of tubing, fittings, brackets, and labor. Many adaptor kits are available for non-NAMUR actuators. Consult factory for kit availability.



The 5-port design allows the C5 NAMUR to be ordered as either 4-way (for double acting actuators) or 3-way (for spring return or fail-safe actuators). The function of this valve is field convertible utilizing no special tools, gaskets, or sealants. Relocation of a port plug converts a 3-way to a 4-way, or a 4-way to a 3-way. When the 4-way valve is converted to 3-way function, the unused exhaust port becomes an actuator vent into which a filter/muffler can be installed to prevent contaminants from entering either the valve or the actuator.

Single solenoid models (for 2-position control), or double solenoid models (for 2 or 3-position control) are available. Actuator positioning is possible with the use of 3-position valves since all Versa C5 NAMUR valves are leakfree/bubbletight. A complete selection of electrical connections, area classifications, and power requirements makes the most exacting and demanding

#### Operating Pressures and Weights

Valve Type	Operating Pressure Range <sup>††</sup> Pneumatic	Approximate Weights	
		Ordinary Service	Hazardous Service
Single Solenoid/spring return (2-position)	15-115 psi (1-8 bar)	0.8 lbs. (363 gms.)	1.1 lbs. (500 gms.)
Double Solenoid/detented (2-position)	10-115 psi (0.7-8 bar)	1.2 lbs. (545 gms.)	1.8 lbs. (816 gms.)
<b>Double Solenoid/spring centered (3-position)</b>	<b>15-115 psi (1-8 bar)</b>	<b>1.2 lbs. (545 gms.)</b>	<b>1.8 lbs. (816 gms.)</b>

†† Pressure ranges may change based on solenoid option. See page 4.  
MPa =  $\frac{\text{bar}}{10}$

For higher pressure applications, consult factory.

#### Porting Size

Inlet and exhaust — 1/4 NPT or G1/4

Cylinder ports — O ring seal per NAMUR standard (For non-NAMUR actuators, consult factory)

#### Installation, Filtration and Lubrication

Valves have no limitations on mounting orientation.

40 to 50 micron filtration and general purpose lubricating oil ISO, ASTM viscosity grade 32 recommended.

Ambient temperature range 5°F (15°C) to 125°F (50°C).

#### Flow Rates

$C_v = 0.75$  ( $K_v = 11$ ) average for all ports (48 SCFM at 100 psi; 82 Nm<sup>3</sup>/h at 7 bar).

For actuator speed rates see page 4.

#### Options Suffix

Manual Override: none Standard on basic valves, guarded-push to operate.

All other options see page 4.

## C5 NAMUR Valve Product Number Selector

		Basic Valve Number*				
FUNCTION**	PORT SIZE	Cv (Kv)	SINGLE SOLENOID/SPRING RETURN, 2 POSITION	DOUBLE SOLENOID/DETENT, 2 POSITION	DOUBLE SOLENOID/SPRING CENTERED, 3 POSITION	
					Blocked Center	Exhaust Ports Open
4-way	1/4 NPT G1/4	.75 (11)	CGS-4232-NB1 .†. (coil code)	CGG-4232-NB1 .†. (coil code)	CXX-4233-NB1 .†. (coil code)	CXX-4234-NB1 .†. (coil code)
		.75 (11)	CGS-4292-NB1 .†. (coil code)	CGG-4292-NB1 .†. (coil code)	CXX-4293-NB1 .†. (coil code)	CXX-4294-NB1 .†. (coil code)
3-way** 3/2 & 3/3	1/4 NPT G1/4	.75 (11)	CGS-3232-NB1 .†. (coil code)	CGG-3232-NB1 .†. (coil code)	CXX-3233-NB1 .†. (coil code)	CXX-3234-NB1 .†. (coil code)
		.75 (11)	CGS-3292-NB1 .†. (coil code)	CGG-3292-NB1 .†. (coil code)	CXX-3293-NB1 .†. (coil code)	CXX-3294-NB1 .†. (coil code)

\* All valves include O ring interface seals and #10-24 mounting screws.

For #10-32 screws change NB1 to NB2. For M5 screws change NB1 to NB3.

\*\* 3-way is the same valve as 4-way, but is provided with a relocated cylinder port plug. See note on page 4

For coil code see page 4.

† Add suffix option here, if required.

Versa exercises diligence to assure that information contained in this catalog is correct, but does not accept responsibility for any errors or omissions. Versa also reserves the right to change or delete data or products at any time without prior notification. To be sure the data you require is correct, consult factory.



# SERIES C5 NAMUR & SERIES E5 NAMUR

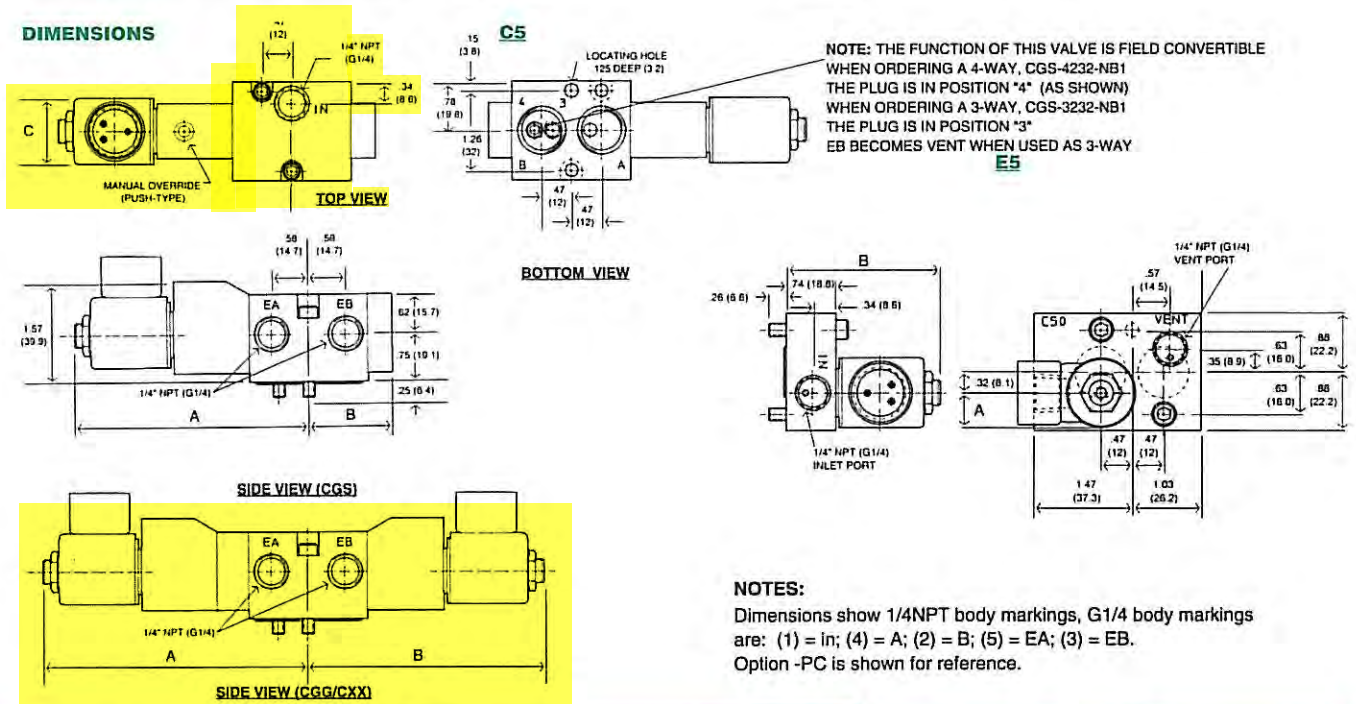
	NAMUR OPTIONS		VOLTAGES & COIL CODES**		NOMINAL COIL POWER
	DESCRIPTION	SUFFIX DETAIL*	VALVE TYPE		
			C5	E5	
NON- HAZARDOUS SERVICE	Spade Terminals (standard) Strain Relief mini-DIN type connector, cord grip PG9 1/2 NPT conduit mini-DIN type connector 1/2 NPT conduit, watertight, NEMA 4	None -HC -HCC -228L	24V60 (A024) 110V50 (E110) 120V60 (A120) 220V50 (E220) 240V60 (A240) 240V50 (E240)	12VDC (D012) 24VDC (D024) 48VDC (D048)	AC=8.5 W DC=10.5 W
	1/2 NPT conduit, general purpose, NEMA 1,2,3 1/2 NPT conduit, watertight, NEMA 4 & 4X	-C50 -PC			AC=6 W DC=7 W
HAZARDOUS SERVICE	Hazardous Locations, 1/2 NPT conduit, NEMA 7 & 9, UL listed, CSA approved -watertight, dusttight, NEMA 4, 4X, 7 & 9, UL listed, CSA approved Flameproof, M20x1.5 conduit, Zone 1 & 2 ATEX, IP66	-XX -PC-XX -XN	24V60 (A024) 110V50 (E110), 120V60 (A120) 220V50 (E220), 240V60 (A240) 240V50 (E240)	12VDC (D012) 24VDC (D024) 48VDC (D048)	AC=5.6 W DC=7.2 W
	Hazardous Locations, low power, 1/2 NPT conduit, NEMA 7 & 9, UL listed, CSA approved Flameproof, low power, M20x1.5 conduit, Zone 1 & 2 ATEX, IP66	-LB-XX -LB-XN	12V60 (A012) 24V60 (A024) 48V60 (A048) 120V60 (A120) 240V60 (A240)	6VDC (D006) 12VDC (D012) 24VDC (D024) 48VDC (D048) 120VDC (D120)	AC or DC =1.8 W
	Hazardous Locations, strain relief mini-DIN type connector, cord grip PG 9 1/2 NPT conduit entry, -Factory Mutual/CSA approved	-HC-XISC -HCC-XISC	24VDC (D024) system voltage	not available	DC=1.6 W max

\* Add option number to basic valve number as suffix.

\*\* Add coil code# to end of valve number.

For other options, voltages, or Versa's Direct Mount NAMUR Subplate for 1/4" brass V Series, please consult factory.

## DIMENSIONS



NAMUR DIMENSIONS: INCHES (mm)		Solenoid Option													
Valve Type	Standard, -228L			-027, -043			-C50, -PC			-XX, -XN			-XISP		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
CGS	3.71 (94.2)	1.31 (33.3)	.885 (22.5)	3.45 (87.6)	1.31 (33.3)	.875 (22.2)	3.71 (94.2)	1.31 (33.3)	1.04 (26.4)	3.79 (96.3)	1.31 (33.3)	1.45 (36.8)	3.53 (89.7)	1.31 (33.3)	1.15 (29.2)
CGG/CXX	4.21 (106.9)	3.71 (94.2)	.885 (22.5)	3.96 (100.6)	3.45 (87.6)	.875 (22.2)	4.21 (106.9)	3.71 (94.2)	1.04 (26.4)	4.29 (109.0)	3.79 (96.3)	1.45 (36.8)	4.03 (102.4)	3.53 (89.7)	1.15 (29.2)

NAMUR DIMENSIONS: INCHES (mm)		Solenoid Option					
Valve Type	STANDARD, -228L		-C50, -PC		-XX, -XN		
	A	B	A	B	A	B	
E5	.44 (11.2)	2.31 (58.7)	.52 (13.2)	2.31 (58.7)	.73 (18.4)	2.39 (60.7)	

		ACTUATOR VOLUME in <sup>3</sup> (cm <sup>3</sup> )									
		5 (82)	10 (164)	25 (410)	50 (820)	100 (1640)	150 (2460)	200 (3280)	400 (6560)	600 (9840)	1000 (16400)
ACTUATOR CYCLE TIME IN SECONDS	C5	.32	.36	.47	.63	.98	1.3	1.7	3.1	4.5	7.2
	E5	.46	.64	1.1	2.0	3.9	5.7	7.5	--	--	--

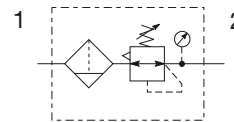
For double-acting actuators (open & close), use volumes from selected actuator specifications and the chart for estimated speed. The times indicated are per shift. For spring return actuators, use open volume to obtain time from chart. Actuator spring loading may affect shift time.

Slower speeds (adjustable) can always be accomplished by using Versa's Bleed Control Valves in the control valve exhaust port.

The above chart represents approximate actuator operation times under average load conditions at 80 psi (5.5 bar). Due to differing designs of quarter-turn actuators, breakaway friction, loading, internal airflow, inlet piping, fittings and exhaust port options, the values shown are intended as an estimate. Faster or slower times may actually be achieved.

**Mini Filter / Regulator - P31**

**Symbols**



- Integral 1/4" ports (NPT, BSPP & BSPT)
- High efficiency 5 micron element as standard
- Excellent water removal efficiency
- Robust but lightweight aluminum construction
- Positive bayonet latch to ensure correct & safe fitting
- Secondary pressure ranges 0-2 bar (0-30 psig), 0-4 bar, (0-60 psig), 0-8 bar (0-125 psig), 0-16 bar (0-232 psig)
- Secondary aspiration plus balanced poppet provides quick response and accurate pressure regulation

**Options:**

<b>P31EB</b>	<b>9</b>	<b>2</b>	<b>E</b>	<b>G</b>	<b>M</b>	<b>B</b>	<b>N</b>	<b>5</b>	<b>P</b>																																								
<b>Basic series</b> Global modular mini filter / regulator <b>P31EB</b>	<b>Thread type</b> BSPP <b>1</b> BSPT <b>2</b> NPT <b>9</b>	<b>Port size</b> 1/4 <b>2</b>	<b>Element</b> 5µ Element <b>E</b>	<b>Bowl type</b> Poly bowl with bowl guard <b>G</b> Metal bowl without sight gauge <b>M</b>	<b>Drain type</b> Pulse drain <b>B</b> Manual drain <b>M</b>	<b>Relief</b> <b>B</b> Relieving <b>N</b> Non-relieving	<b>Adjustment</b> <b>N</b> Non-rising knob	<b>Adjustment range</b>	<b>Mounting</b> <b>P</b> Plastic panel mount nut																																								
								<table border="1"> <tr> <th colspan="2">With square gauge</th> <th colspan="2">With round gauge</th> </tr> <tr> <th>psig</th> <th>bar</th> <th>Z</th> <th>2 bar; 30 psig; 0.2 MPa</th> </tr> <tr> <td><b>1</b> = 30*</td> <td><b>V</b> = 2*</td> <td><b>M</b></td> <td>4 bar; 60 psig; 0.4 MPa</td> </tr> <tr> <td><b>3</b> = 60</td> <td><b>S</b> = 4</td> <td><b>G</b></td> <td>8 bar; 125 psig; 0.8 MPa</td> </tr> <tr> <td><b>5</b> = 125</td> <td><b>T</b> = 8</td> <td><b>J</b>§</td> <td>16 bar; 232 psig; 1.6 MPa</td> </tr> <tr> <th colspan="4">Without gauge</th> </tr> <tr> <td></td> <td></td> <td><b>Y</b></td> <td>2 bar; 30 psig; 0.2 MPa</td> </tr> <tr> <td></td> <td></td> <td><b>L</b></td> <td>4 bar; 60 psig; 0.4 MPa</td> </tr> <tr> <td></td> <td></td> <td><b>N</b></td> <td>8 bar; 125 psig; 0.8 MPa</td> </tr> <tr> <td></td> <td></td> <td><b>H</b>§</td> <td>16 bar; 232 psig; 1.6 MPa</td> </tr> </table>	With square gauge		With round gauge		psig	bar	Z	2 bar; 30 psig; 0.2 MPa	<b>1</b> = 30*	<b>V</b> = 2*	<b>M</b>	4 bar; 60 psig; 0.4 MPa	<b>3</b> = 60	<b>S</b> = 4	<b>G</b>	8 bar; 125 psig; 0.8 MPa	<b>5</b> = 125	<b>T</b> = 8	<b>J</b> §	16 bar; 232 psig; 1.6 MPa	Without gauge						<b>Y</b>	2 bar; 30 psig; 0.2 MPa			<b>L</b>	4 bar; 60 psig; 0.4 MPa			<b>N</b>	8 bar; 125 psig; 0.8 MPa			<b>H</b> §	16 bar; 232 psig; 1.6 MPa	
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<p>* Unit comes with 0-4 bar or 0-60 psig gauge respectively.                  § Not available with poly bowl with bowl guard.</p>																																																	
<b>Bold items are most common.</b>																																																	

Port size	Description	Flow† dm³/s (scfm)	Max. bar (psig)	Height mm (inches)	Width mm (inches)	Depth mm (inches)	Part number†
1/4"	8 bar (125 psig) relieving - poly bowl - manual drain	10 (22)	10 (150)	176.9 (6.96)	40 (1.58)	61.3 (2.41)	<b>P31EB92EGMBN5P</b>
1/4"	8 bar (125 psig) relieving - poly bowl - pulse drain	10 (22)	10 (150)	172.0 (6.77)	40 (1.58)	61.3 (2.41)	<b>P31EB92EGBBN5P</b>
1/4"	8 bar (125 psig) relieving - metal bowl - manual drain	10 (22)	17 (250)	176.9 (6.96)	40 (1.58)	61.3 (2.41)	<b>P31EB92EMMBN5P</b>
1/4"	8 bar (125 psig) relieving - metal bowl - pulse drain	10 (22)	17 (250)	172.0 (6.77)	40 (1.58)	61.3 (2.41)	<b>P31EB92EMBBN5P</b>

† Standard part numbers shown in bold. For other models refer to Options chart above.  
 ‡ Flow with 10 bar (145 psig) inlet pressure, 6.3 bar (91.3 psig) set pressure and 1 bar (14.5 psig) pressure drop.

**Specifications**

Flow capacity*	1/4	10 dm <sup>3</sup> /s (22 scfm)
Operating temperature†	Plastic bowl	-10°C to 52°C (14°F to 125°F)
	Metal bowl	-10°C to 65.5°C (14°F to 150°F)
Max. supply pressure	Plastic bowl	10 bar (150 psig)
	Metal bowl	17 bar (250 psig)
Standard filtration	5 micron	
Useful retention	12 cm <sup>3</sup> (0.4 US oz.)	
Adjusting range pressure	0-2 bar (30 psig)	
	0-4 bar (60 psig)	
	0-8 bar (125 psig)	
	0-16 bar (232 psig)	
Port size	BSPP / BSPT / NPT	1/4
Gauge port (2 ea.)**	BSPP / BSPT / NPT	1/8
Weight	0.19 kg (0.42 lbs)	

\* Inlet pressure 10 bar (145 psig). Secondary pressure 6.3 bar (91.3 psig).  
 \*\* Non-gauge option only.  
 † Units with square gauges: -15°C to 65.5°C (5°F to 150°F)

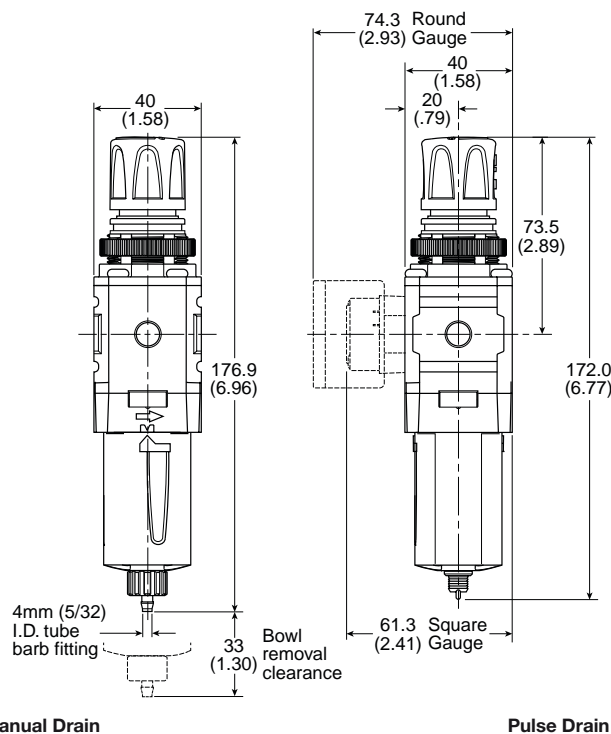
**Air quality:**

Within ISO 8573-1: 1991 Class 3 (Particulates)  
 Within ISO 8573-1: 2001 Class 6 (Particulates)

**⚠ WARNING**

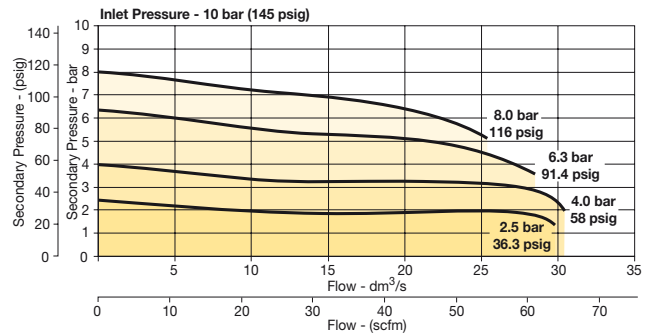
**Product rupture can cause serious injury.  
 Do not connect regulator to bottled gas.  
 Do not exceed Maximum primary pressure rating.**

**Dimensions mm (inches)**



**Flow Charts**

**1/4 Filter / Regulator**



**Material Specifications**

Body	Aluminum	
Adjustment knob	Acetal	
Body cap	ABS	
Bonnet	PBT	
Bowl	Plastic bowl	Polycarbonate
	Metal bowl	Aluminum
Bowl guard	Nylon	
Filter element	Polyethylene	
Seals	Nitrile	
Springs	Steel	
Valve assembly	Brass / Nitrile	
Diaphragm assembly	Brass / Nitrile	
Panel nut	Acetal	

For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

**Repair and Service Kits**

Plastic bowl / Bowl guard manual drain	<b>P31KB00BGM</b>
Plastic bowl / Bowl guard pulse drain	<b>P31KB00BGB</b>
Metal bowl / w/o sight gauge pulse drain	<b>P31KB00BMB</b>
5µ particle filter element	<b>P31KA00ESE</b>
Regulator repair kit - relieving	<b>P31KB00RB</b>
Regulator repair kit - non-relieving	<b>P31KB00RC</b>
Panel mount nut - aluminum	<b>P31KA00MM</b>
Panel mount nut - plastic	<b>P31KA00MP</b>
Angle bracket (attaches via panel nut)	<b>P31KB00MR</b>
C-bracket (fits to body)	<b>P31KA00MW</b>
T-bracket with body connector	<b>P31KA00MT</b>
Body connector	<b>P31KA00CB</b>

**Gauges**

**Square flush mount gauge**

0-4 bar	<b>K4511SCR04B</b>
0-11 bar	<b>K4511SCR11B</b>
0-60 psig	<b>K4511SCR060</b>
0-160 psig	<b>K4511SCR160</b>

For best performance, regulated pressure should always be set by increasing the pressure up to the desired setting.

# SPEED CONTROL MUFFLER

SCM-SERIES



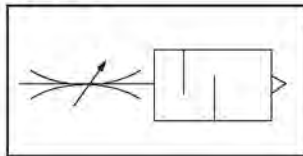
SCM-Series muffler with speed control provides infinite variation of control of air flow at an acceptable sound level on the exhaust ports of air valves with complete safety.

An external adjustment screw accurately varies orifice opening from closed to full flow as required. The final position is then locked in place by the lock nut. Objectionable exhaust air noise is eliminated by the surrounding sleeve of sintered bronze.

SCM-Series mufflers feature complete safety in operation. The sintered bronze sleeve is held securely in position and protected by an integral shroud.

Standard pipe thread connections provide easy attachment to equipment. Unit should be mounted in a protective position, free from excessive vibration. Use wrench on hex head to tighten unit to the device. Unit contains a 40 micron element.

## Symbol



## HOW TO ORDER

**SCM**

Speed Control  
Muffler



Connection  
18 = 1/8", 28 = 1/4"  
38 = 3/8", 48 = 1/2"  
68 = 3/4", 88 = 1"



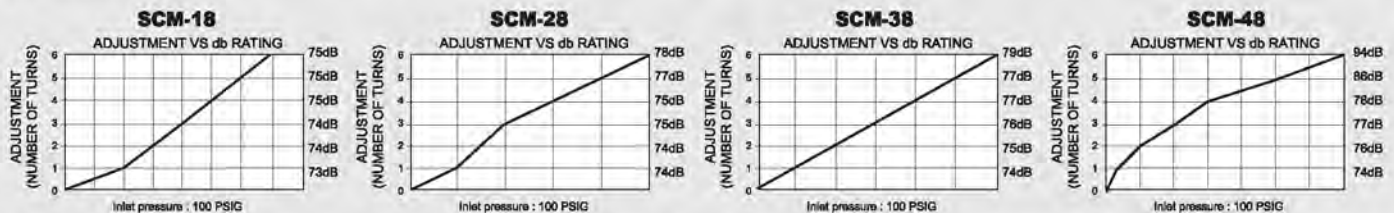
None=NPT (Inch)  
P=BSPT (Metric)

## SPECIFICATIONS

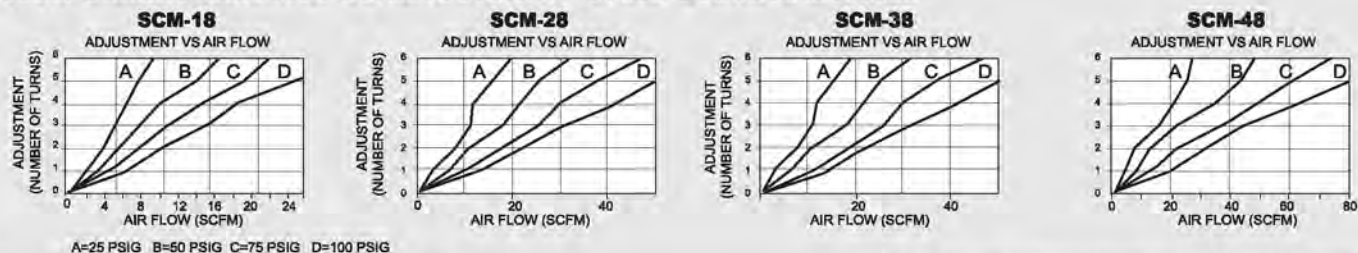
ITEM	MODEL	SCM-18	SCM-28	SCM-38	SCM-48	SCM-68	SCM-88
CONNECTION	NPT	1/8"	1/4"	3/8"	1/2"	3/4"	1"
MAX. ADJUSTMENT FLOW	SCFM	30	50	70	100	130	160
APPROX. HEIGHT (FULL OPEN)	IN.	1-1/2"	1-11/16"	1-11/16"	2"	2-3/4"	3"
HEX	IN.	1/2"	9/16"	11/16"	7/8"	1-7/64"	1-11/32"
MATERIAL	BODY	BRASS					
	ELEMENT	SINTERED BRONZE (40 micron)					
MAX OPERATING PRESSURE		300 PSI (21.1 kg/cm <sup>2</sup> )					
OPERATING TEMPERATURE		35~ 300°F (1.6~ 149°C)					
WEIGHT APPROX	OZ.	0.65	1.12	1.73	2.95	4.72	7.57
UNIT PACK	EA.	10	10	10	5	1	1

## SOUND CHARACTERISTICS VS. ADJUSTMENT - SPEED CONTROL MUFFLER

INLET PRESSURE = 100 PSIG

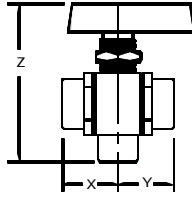


## FLOW CHARACTERISTICS VS. ADJUSTMENT - SPEED CONTROL MUFFLER

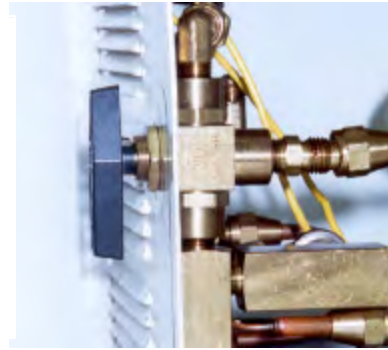




# KANTLEAK<sup>®</sup> 3200 SERIES INSTRUMENTATION 3-WAY BALL VALVES



NUMBER	SIZE	X	Y	Z
3222BV-J	1/8"	.915	.915	2.120
3222BV-L	1/4"	.915	.915	2.120
3222BV-N	3/8"	1.100	1.100	2.593
3222BV-P	1/2"	1.187	1.187	2.593



## FEATURES / BENEFITS

- ◆ Bar-Stock Brass or Stainless Body
- ◆ Double O-Ring Stem Seal
- ◆ 20,000 Leak Free Cycles
- ◆ Blow Out Proof Stem
- ◆ Metal Seal Retainer
- ◆ Made In USA
- ◆ Guaranteed Quality

## APPLICATIONS

- ◆ Panel Applications
- ◆ UL Approved for Refrigerant Service
- ◆ Oxygen Service
- ◆ Vacuum Service
- ◆ Center Off Position Standard
- ◆ See Optional Ball Drillings Below

## SERVICE CONDITIONS

- ◆ Maximum Pressure – 1500 psig
- ◆ Temperature - -40 to 300 F (standard) to 400 F (special)

## OPTIONS / BALL PORTING

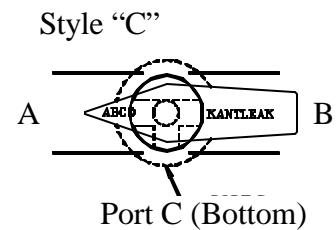
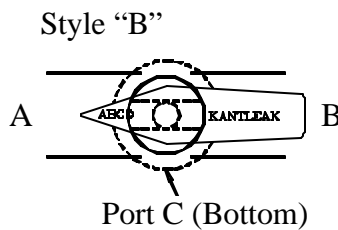
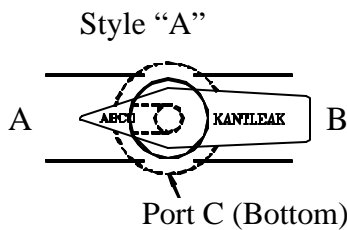
**WE ENCOURAGE SPECIALS**

Size	End Connection	Material	Part Number	CV	Orifice Diameter
1/8"	MxMxM NPTF	Brass	3211BV-JJxJ	1.57	0.250
1/8"	FxFxF NPTF	Brass	3222BV-JJxJ	1.57	0.250
1/8"	Shur-Loc	Brass	3244BVS-2	0.22	0.093
1/4"	MxMxM NPTF	Brass	3211BV-LLxL	1.57	0.250
1/4"	FxFxF NPTF	Brass	3222BV-LLxL	1.57	0.250
1/4"	Shur-Loc	Brass	3244BVS-6	0.88	0.187
3/8"	MxMxM NPTF	Brass	3211BV-NNxN	2.74	0.330
3/8"	FxFxF NPTF	Brass	3222BV-NNxN	2.74	0.330
3/8"	Shur-Loc	Brass	3244BVS-8	1.57	0.250

Size	End Connection	Material	Part Number	CV	Orifice Diameter
1/2"	MxMxM NPTF	Brass	3211BV-PPXP	2.74	0.330
1/2"	FxFxF NPTF	Brass	3222BVC-PPXP	2.74	0.330
1/8"	FxFxF NPTF	Stainless	*S3222BV-JJxJ	1.39	0.235
1/8"	Shur-Loc	Stainless	*S3244BVS-2	0.22	0.093
1/4"	FxFxF NPTF	Stainless	*S3222BV-LLxL	1.57	0.250
1/4"	Shur-Loc	Stainless	*S3244BVS-6	0.88	0.187
3/8"	FxFxF NPTF	Stainless	*S3222BV-NNxN	2.74	0.330
3/8"	Shur-Loc	Stainless	*S3244BVS-8	1.57	0.250
1/2"	FxFxF NPTF	Stainless	*S3222BVCPPXP	2.74	0.330

*\*Featuring Shur-Lok Tube Ends as Illustrated on Page 3*

## PORTING OPTIONS



# Spare Parts and Service

**RECOMMENDED SPARE PARTS AND SERVICE**

The Milliken Valve products are designed for long life. The stocking of spare parts is not recommended or required for normal operations. If the need for a replacement part develops, it may be ordered from our After Market Group:

**HOW TO ORDER PARTS:**

To order parts, contact our Parts Department:

Write - Milliken Valve Compan  
401 South Highland Avenue  
Aurora, IL 60506-5563

Attention: Parts Manager

Call - (630) 844-4000

Fax - (630) 844-4191

Please include valve serial number and description of part requested.

-----

**HOW TO OBTAIN SERVICE:**

To obtain further information or secure field service, contact our Field Service Department:

Write - Milliken Valve Company  
401 South Highland Avenue  
Aurora, IL 60506-5563

Attention: Field Service Manager

Call - (630) 844-4163

Fax - (630) 844-4160

Please include the following with your inquiry for service:

Milliken Order Number:  
Milliken Item Number  
Type of Service Requested

## Local Service Representative

Southwest Valve, LLC.  
402 W. Bedford #111  
Fresno, CA 93711  
Phone: 559-261-2703  
Fax: 559-261-2711

# Documentation



401 S. HIGHLAND AVENUE, AURORA, IL 60506  
TEL: (630) 844-4000 FAX: (630) 844-4160

Purchase Order #: LOI-Manteca CA  
Sales Order #: 2226531ML  
Proposal/Quote #: Q-017-17005  
Project Name: WQCF Digester Improvements 20  
Project Location: Manteca, CA  
Date: August 8, 2017  
Revision: 1

---

## MATERIAL WARRANTY

Seller warrants that, at its option, it will repair, replace, or refund the unit purchase price of any products which are non-conforming due to Seller's material or workmanship during the warranty period.

The warranty period shall be twelve (12) months for parts and eighteen (18) months for all other goods after date of shipment. This shall be Buyer's sole remedy.

In order to maintain this product warranty, Buyer must give written notice to Seller's Field Service Supervisor prior to any work being performed. In no event shall warranty include the cost of valve removal or reinstallation.

**IN CONSIDERATION OF THE FOREGOING, SELLER EXCLUDES ALL OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING BUT NOT LIMITED TO MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Seller does not warrant water-operated metallic cylinders against damage caused by corrosion, electrolysis or mineral deposits.

In no event shall warranty include valve removal or reinstallation.



401 S. HIGHLAND AVENUE, AURORA, IL 60506  
TEL: (630) 844-4000 FAX: (630) 844-4160

Purchase Order #: LOI-Manteca CA  
Sales Order #: 2226531ML  
Proposal/Quote #: Q-017-17005  
Project Name: WQCF Digester Improvements 20  
Project Location: Manteca, CA  
Date: August 8, 2017  
Revision: 1

---

**Certificate of Conformance**  
**Resilient Seated Eccentric Plug Valve**

**We hereby certify that the valves identified herein will be manufactured in accordance with referenced specifications and the applicable sections of AWWA C517-Latest Edition. The valves will be shop operated three (3) times to verify that the complete assembly is workable.**

A handwritten signature in blue ink that reads "Bob Newkirk".

Bob Newkirk  
Quality Assurance Manager  
Henry Pratt Company





# **KINETROL USA Inc.**

## **AWWA C540-02, Section 5.3 Performance Tests Conformance**

Kinetrol will comply with AWWA C540-02 Standard, Performance Tests (section 5.3) for all actuators when specified prior to shipment. If any component of the unit fails during testing, the malfunction shall be corrected or repaired as required and the unit retested.

Certification of tests and copies of test reports shall be provided on request if the request is made prior to the time of testing.

Certified by: Greg Mitchell  
General Manager  
Kinetrol USA, Inc.

Date: 7<sup>th</sup> May 2008

# KINETROL LIMITED

*Control Engineers*

TEL: (44+) 01252 733638  
FAX: (44+) 01252 713042

REGISTERED OFFICE: REG. NO. 900619 (ENGLAND)

TRADING ESTATE  
**FARNHAM**  
SURREY GU9 9NU  
ENGLAND

WWW.KINETROL.COM  
E-MAIL: SALES@KINETROL.COM

## **AWWA C540-02, Section 5.2 Proof-of-Design Tests Certification**

Kinetrol double acting actuator models size 05, 07, 08, 09, 10, 12, 14, 16, 18, 20 and 30 conform to AWWA C540-02 Standard, Proof-of-Design Tests (section 5.2) except for the following important safety deviation.

Kinetrol actuators, when subject to pressures above overload limit and lower than that required in the standard, safely give an audible warning via external leakage as potentially dangerous conditions are approached, and there is no permanent damage to the actuator at 450psi.

Certified by: Roger Chapman  
Engineering Manager  
Kinetrol Ltd

Date: 7<sup>th</sup> May 2008



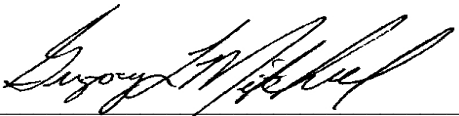
# KINETROL USA Inc.

## Standard Certificate of Conformity

Issue Date: January 24, 2018  
Issue Number: 20180124DM  
Customer and Purchase Order Number: Milliken, 1203008  
Kinetrol USA Sales Order Number: 1702263

Qty	Item Number	Description
5	087-104U005004M	Kit:087-100+077-004U005004M  Serial Number: 1873615 to 1873619
9	107-104U005004M	Kit:107-100+077-004U005004M  Gearbox Serial Number: 1873606 to 1873614

Certified that the whole of the supplies detailed hereon have been manufactured, inspected, tested and unless otherwise stated above conform in all respects to Kinetrol Specification(s), Drawing(s) and Contract/Order.

Signed:   
Gregory L. Mitchell  
General Manager

Date: 1/24/2018

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8754**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 4 : 1 OFF 087-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873615

Actuator tested to Kinetrol Works Instruction No: W11

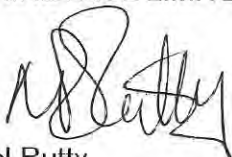
Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED



N.Ritty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8755**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 4 : 1 OFF 087-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873616

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.  
KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED

  
N. Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8756**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 4 : 1 OFF 087-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873617

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.  
KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED

  
N. Ritty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8757**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 4 : 1 OFF 087-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873618

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED

  
N. Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8758**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 4 : 1 OFF 087-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873619

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.  
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For and on behalf of  
KINETROL LIMITED



N.Ritty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8759**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3CON / MON  
Serial no: 1873606

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

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For and on behalf of  
KINETROL LIMITED



N. Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8760**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TCON / MON  
Serial no: 1873607

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.  
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For and on behalf of  
KINETROL LIMITED



N.Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8761**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 183608

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED



N.Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8762**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873609

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

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For and on behalf of  
KINETROL LIMITED



N. Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8763**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873610

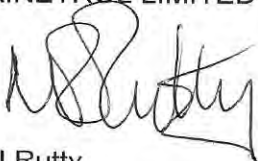
Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
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For and on behalf of  
KINETROL LIMITED



N.Ritty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8764**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873611

Actuator tested to Kinetrol Works Instruction No: W11

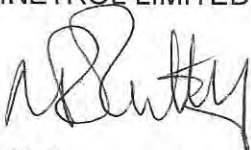
Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED



N.Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8765**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873612

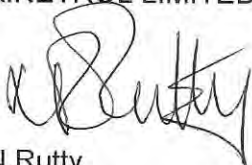
Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.  
KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED



N.Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8766**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873613

Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.

KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED



N.Ruty  
Quality Manager

TRADING ESTATE, FARNHAM, SURREY GU9 9NU, ENGLAND

Tel: 01252 733838. Fax: 01252 713042.

## TEST CERTIFICATE

**CUSTOMER** KINETROL USA INC.  
1085 OHIO DRIVE  
PLANO  
TEXAS  
75093  
USA

**No. 8767**

**Date:** 17 January 2018

**Customer Order No 2017238**  
**KINETROL Works Order No 142212**

Item 6 : 1 OFF 107-104U005004M ACT / ULS2xV34TPLUGS / 3x3TERM / MON  
Serial no: 1873614

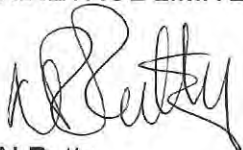
Actuator tested to Kinetrol Works Instruction No: W11

Limit switch tested to Kinetrol Works Instruction I.30

This is to certify that the aforementioned units have passed **KINETROL** standard test procedures as follows:

- 1) All parts manufactured to KINETROL specifications.
- 2) Order checked to conform to customer requirements.
- 3) This certificate excludes any items supplied to us as "free issue" by the customer and/or his sub-contractors and KINETROL Limited do not accept responsibility for the malfunction or failure of any such parts.  
KINETROL Limited reserve the right to claim any additional costs incurred by them by reason of the unsuitability of, or defects in, "free issue" material.

For and on behalf of  
KINETROL LIMITED



N. Ruty  
Quality Manager