

# Maxon Oil Electro-mechanical Valves

## TECHNICAL CATALOG



**1/2" Series 8730  
position "TO"**



**1" Series 760  
position "L"**

- **Electrically actuated valves** shut off oil (or other liquid) lines reliably, in less than 1 second.
- **Application flexibility provided** with 3/8" through 1.25" diameter line sizes, Cv flow factors up to 45, and line pressures up to 550 PSIG.
- **Handles flowing fluid temperatures:**
  - Swinging gate bodies from -20°F (-28°C) to +550°F (+288°C)
  - Any ambient temperature from -20°F (-28°C) to +140°F (+60°C)
- **Various application requirements met** with manual reset or automatic reset motorized operators.
- **Minimize line pressure drops** with straight-through flow swinging gate valve bodies
- **Positive visual indication of valve body position** is provided by large two-color open/shut indicator.
- **Installation piping convenience obtained** from field rotatable top assemblies.
- **Special operating features** available in Special Service Packaged versions.
- **Micro-lapped seating** wears in, not out.



# FEATURES AND BENEFITS

## Valves with electro-mechanical actuators

**Normally closed shut-off valves** are used in burner system fuel supply lines on industrial boilers, furnaces, ovens, kilns, and other heating processes. All valves are designed to shut-off fuel flow, in less than one (1) second, with any interruption in the electric power supplied through your safety circuit.

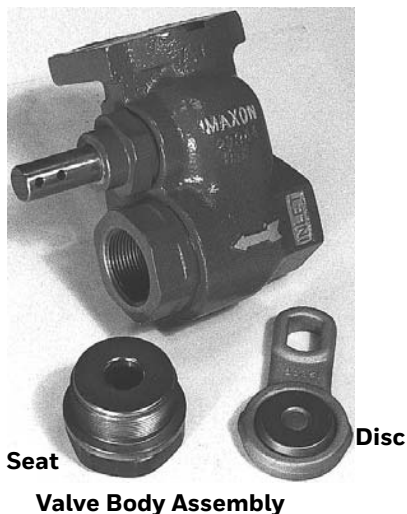
These valves are also used for the **manual** or **motorized** opening or closing of pipe lines carrying gases and liquids commonly used in industrial processes. Normally closed valves cannot be opened until the interlocking safety control circuit is proven and resulting electrical power is supplied to the shut-off valve.

**Motorized automatic valve actuators** are used where remote access or unmanned applications are needed.

**NOTE:** Valve motors are protected against thermal overload. Normal duty cycles of 1 cycle per minute or less will allow motor thermal overload to sufficiently cool between cycles. If the normal valve duty cycle is repeatedly exceeded, the thermal cutout will trip, and the motor must be allowed to cool before the thermal protection will automatically reset.

**Manual reset actuators** require operating personnel to be physically present to actuate the valve from its at rest position.

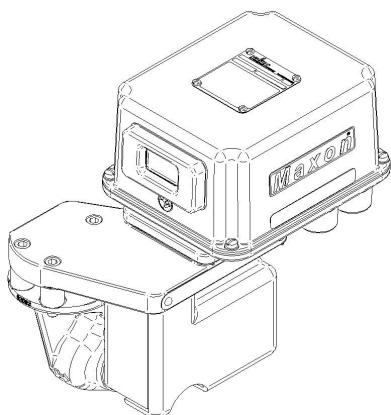
## VALVE BODY DESIGN DETAILS



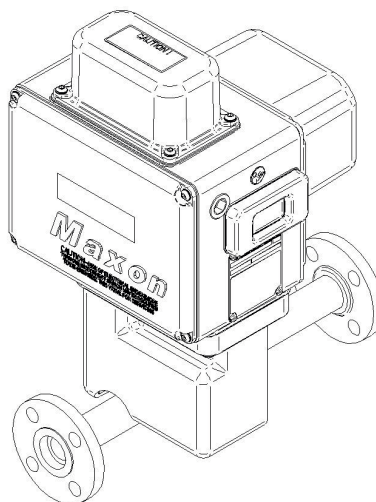
**Swinging gate valves** are frequently used in normally closed oil service, and for some non-combustible gas applications. The carefully machined and micro lapped sealing surfaces promote a positive shutoff, which meets the FCI 70.2 Class VI standard. Frequent cycling of the valve shears accumulated dirt or residue from the disc/seat interface to provide consistent and reliable sealing. The hard faced and lapped seat nut is threaded into the onepiece valve body. The free-floating, hard faced lapped, spring loaded circular disc slides across the seat. Line pressure also assists in sealing the disc to the downstream seat.

Frequent use and cycling actually helps to keep your valve clean. Since the free-floating disc is swinging across the circular seat nut on the arc created by the disc carrier, the disc rotates slightly on every cycle. This provides fresh, clean surfaces for sealing.

**Maxon valves** have special service trim options available to meet your particular fluid service requirements. Contact your Maxon representative for details.








**1/2" 8760 Threaded**



**1" 4760 w/ Class 150 Flanges**

# AGENCY APPROVALS AND CERTIFICATIONS

Table 1. Approvals and Certifications.

	General Purpose Valves		Non-Incendive/Non-Sparking Valves	
	730, 760, 4730, 4760 8730, 8760		730NI, 760NI, 4730NI, 4760NI	
	Standards	Markings	Standards	Markings
<b>FM Approvals</b>	FM 7400		FM 3600 FM 3611 FM 3810	Class I, Div 2, Groups ABCD Class II, Div 2, Groups FG Class III, Div 2 T4 (AC) T3C Ta = 60°C, T3B Ta = 65°C 
<b>UL</b>	UL 429		Not Applicable	Not Applicable
<b>CSA</b>	CSA 6.5 CSA 22.2 No. 139		CSA 22.2 No. 0 CSA 22.2 No. 0.4 CSA 22.2 No. 25 CSA 22.2 No. 94 CSA 22.2 No. 142 CSA 22.2 No. 213	Class I, Div 2, Groups ABCD Class II, Div 2, Groups FG Class III, Div 2 T4 (AC) T3C (DC)
<b>IEC Approvals</b>	Not Applicable	Not Applicable	IEC 60079-0 IEC 60079-15 IEC 60079-31	IECEx FMG 11.0032X Ex nA nC IIC T4(AC), T3(DC) Gc Ex tc III C T135C Dc IP65
<b>KTL Approvals</b>	Not Applicable	Not Applicable	Announcement No. 2010-36 of Ministry of Employment and Labor	 16-KA480-0567X 4700NI

## Valve cycle requirements

This is based on the standards that MAXON valves are approved to and the corresponding minimum number of cycles to be completed without failure as shown in the chart below.

Table 2. Minimum number of cycles.

	CSA (CSA 6.5)	FM (FM 7400)	UL (UL 429)
Automatic Models	100.000	20.000	100.000

# VALVE BODY CAPACITIES/SPECIFICATIONS

**Table 3. Normally closed valve bodies.**

Body Material	End Connections	Pipe Size (in inches)	C <sub>v</sub> Factor
Gray Iron	Threaded	.375 & .5	3.4
			9.6
		.75	20
			12
		1	20
			17
Cast Steel	Threaded & Flanged	1.25	45
			3.4
		.5	9.6
			12
		.75	17
			45

Each complete valve assembly must include one of these valve bodies, regardless of ultimate series designation.

Flows through the valve body and resulting pressure drops may be estimated by inserting your specific conditions into the following formula and using C<sub>v</sub> flow factors given for each valve body.

$$\text{Gases: } Q = (1360) \times (C_v) \times \left( \sqrt{\frac{(P_1 + P_2)}{G T_f}} \right) \times \left( \sqrt{\frac{(P_1 - P_2)}{2}} \right)$$

$$\text{Liquids: } V = (C_v) \times \left( \sqrt{\frac{(P_1 - P_2)}{G_f}} \right)$$

## Where:

G = Gas specific gravity (air = 1.0)

G<sub>f</sub> = Specific gravity @ flowing temperature °F

P<sub>1</sub> = Inlet pressure PSIA (14.7 psi + psi gauge)

P<sub>2</sub> = Outlet pressure PSIA (14.7 psi + psi gauge)

Q = Cubic feet per hour @ 14.7 PSIA and 60°F

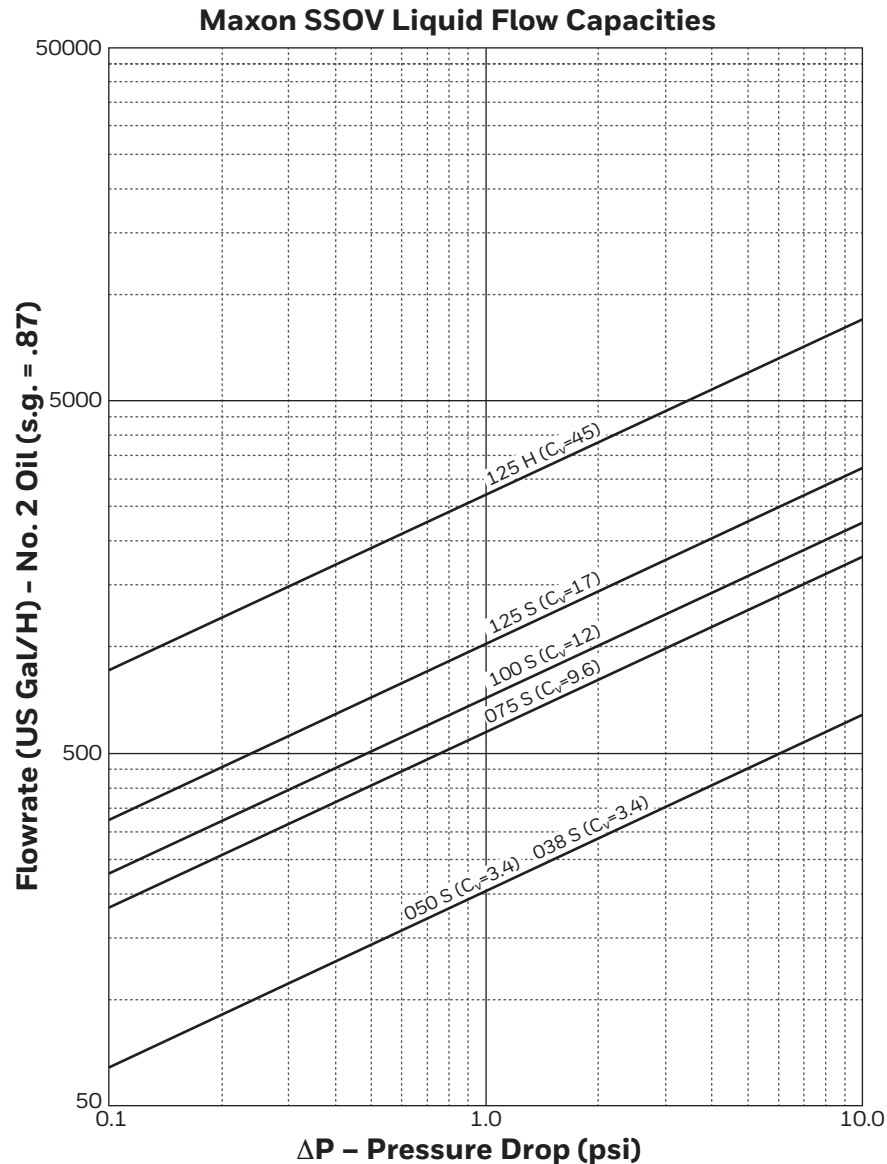
T<sub>f</sub> = Flowing temperature absolute (460° + °F)

V = Flow in U.S. gallons/minute of water

# VALVE BODY CAPACITIES WITH #2 OIL

To select a valve for your application, use either  $C_v$  factor calculations, or this graph showing approximate pressure drop at various flows of #2 oil.

Typically, pressure drop for fuel flows should not exceed 10% of inlet pressure.



For preheated #5 or #6 oil, multiply the required flow rate in GPH by the factor given in the table at right, then select a valve based upon that equivalent flow of #2 oil and the allowable drop.

**Table 4. Factors for preheated #5 and #6 oil**

Oil Grade	#5		#6				
°F @ Inlet	125	160	120	140	180	210	220
Factor	1.43	1.11	2.86	2.00	1.25	1.11	1.05

For example: To size for 5 PSIG drop with a 3500 GPH flow of #6 oil preheated to 140°F, the multiplier is 2. Equivalent flow of #2 oil is then 3500 x 2, or 7000 GPH. Chart shows that a 5 PSIG drop will require use of a valve body having a  $C_v$  factor of at least 45.

# SELECTION DATA

## Normally closed, swinging gate valves

**Table 5. Series Designation**

Body Material	Gray Iron		Cast Steel	
Top Assembly Function	Sanctioned Service [1]	Special Service (Non-sanctioned) [2]	Sanctioned Service [1]	Special Service (Non-sanctioned) [2]
Automatic Reset	4730; 8730	4790; 8790	4730-S 4760; 8760	4790-S; 8790-S 33479

[1] Sanctioned valves are sold for fuel oils and may carry one or more sanctions (UL, FM, CGA). They are IRI approvable for liquified petroleum gases, #1 and #2 fuel oils, kerosene, JP-4 and preheated #4, #5 and #6 oils with maximum viscosity of 5000 SSU.

[2] Non-sanctioned valves do not carry blanket approval/listings, and the pressure limits shown apply only for selected special service applications. An analysis of your fluid will determine the actual rating, trim, and specifics for your application.

### Features:

- **Normally closed**
- **Electrically actuated**
- **Swinging gate body**
- **For shut-off service**
- **For liquid and noncombustible gas service**

**Ambient temperature limits vary.** Any valve on this page using DC voltage and all Series 8700 valves can handle ambient temperatures from -20°F (-28°C) to +125°F (+52°C). The other valves on this page handle ambient temperatures from -20°F (-28°C) to +140°F (+60°C).

### Operation

All of these electro-mechanical valves require a constant supply of electrical energy to their holding solenoids inside the top assembly actuators. Once the solenoid is energized, the manual reset valve may be opened manually, or the automatic reset valve will automatically open. Any interruption of the electrical power to either of these valves causes an immediate trip of the valve to its normally closed position.

### Temperature Limits

All of these valves can handle **fluid temperatures** from -20°F (-28°C) to +250°F (+121°C). The Series 33000 valves are designed to handle higher fluid temperatures up to +450°F (+232°C) and even up to +550°F (+288°C) with addition (at extra charge) of special stem seals.

**Table 6. Available Sizes and Pressure Ratings**

Pipe Size (inches)	Body C <sub>v</sub> Flow Factor	Maximum Inlet Pressure (PSIG)				
		Gray Iron Bodies		Cast Steel Bodies		
		Fuel Oils	Special Service	Fuel Oils	Liquid Propane	Special Service
.375 [1]	3.4	300	300	---	---	---
.5 [1]				550	300	550
.75 [1]	9.6	250	250	250	250	250
1	12					
1.25	17					
1.25 HC	45	---	---	125	---	125

[1] Available in 8730, 8760 & 8790

# SWINGING GATE BODY/TRIM SPECIFICATIONS

**Trim identification** of Maxon Swinging Gate Shut-Off Valves is two-part. The first digit before the hyphen is a number (2) identifying body material as shown in Table 2 below. The second digit after the hyphen identifies a trim utilizing the materials indicated in Table 3 below.

Standard sanctioned valves incorporating a *cast iron body* will normally be identified by trim 1-B or 1-D. Sanctioned valves with *steel body* will normally be trim 2-D.

Non-sanctioned services or unusual applications may require upgrading of internal trim. Contact Maxon with specific fuel analysis for price and availability.

The drawings shown on the following page carry item numbers matching those in Table 3. This information is furnished for identification only, not for ordering parts.



## WARNING

**Do not attempt field repair of Maxon valve body or electro-mechanical top actuator. Any field alterations void all warranties.**

**Table 7. Body Specifications**

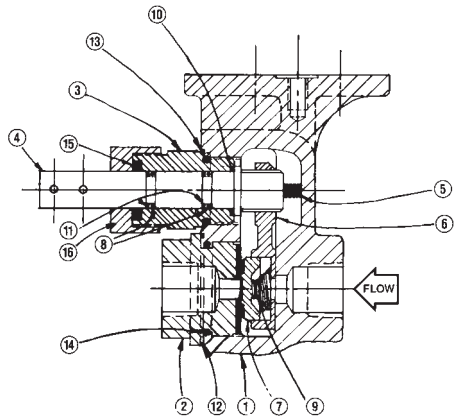
Body Description	Body 1-	Body 2-
Material	Cast Iron, G3000	Cast Steel
ASTM Spec	A126 Class B	A216-WCB

**Table 8. Internal Trim Material Specifications.**

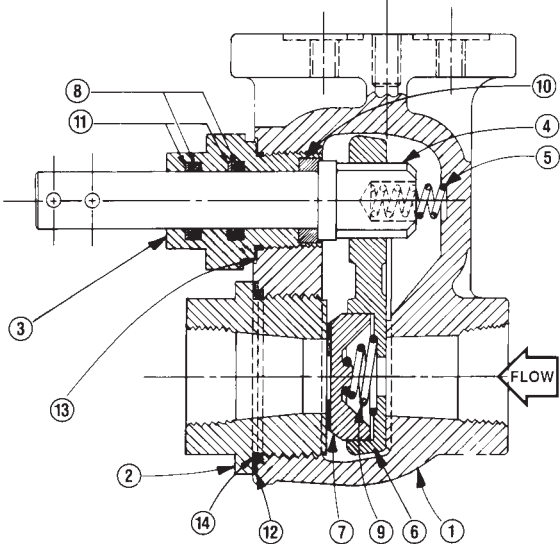
Item No.	Part Description	for .375" & .75" valves		For 1" & 1.25" valves		
		Trim: -D	Trim: -P	Trim: -B	Trim: -D	Trim: -P
2	Hex Nut or Renewable Seat	Hard-Faced Steel	Hard-Faced Steel	Cast Iron with #420 Stainless Steel Seat Ring	Hard-Faced Steel	Hard-Faced Steel
3	Stem Bushing	Zinc-Plated Steel	Zinc-Plated Steel	Zinc-Plated Steel	Zinc-Plated Steel	Zinc-Plated Steel
4	Stem	#416 Stainless Steel	#416 Stainless Steel	#416 Stainless Steel	#416 Stainless Steel	#416 Stainless Steel
5	Stem Spring	#302 Stainless Steel	#302 Stainless Steel	#302 Stainless Steel	#302 Stainless Steel	#302 Stainless Steel
6	Disc Carrier	Steel	Steel w/PEEK Insert	Steel	Steel	Steel w/PEEK Insert
7	Disc	Hard-Faced Steel	Hard-Faced Steel	Nodular Iron	Hard-Faced Steel	Hard-Faced Steel
8	Stem O-Rings	Hydrin	Viton	Viton	Viton	Viton
9	Disc Spring	#302 Stainless Steel	#302 Stainless Steel	#302 Stainless Steel	#302 Stainless Steel	#302 Stainless Steel
10	Inner Stem Thrust Ring	Teflon	Teflon	Teflon	Teflon	Teflon
11	Back-up O-Rings	Teflon	Teflon	Teflon	Teflon	Teflon
12	Body Gaskets	Soft Iron	Soft Iron	Soft Iron	Soft Iron	Soft Iron
13	Stem Bushing Gasket	Soft Iron	Soft Iron	Soft Iron	Soft Iron	Soft Iron
14	Body O-Ring	Viton	Viton	Viton	Viton	Viton
15	Stem Packing Ring	Grafoil	Grafoil	---	---	---
16	Packing Nut	Zinc-Plated Steel	Zinc-Plated Steel	---	---	---
17	Outlet Flange	---	---	---	---	---

# SWINGING GATE BODY/TRIM SPECIFICATIONS

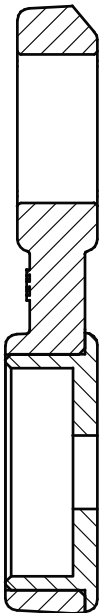
Typical construction of .375" through .75" screwed body valves



Typical construction of 1" through 1.25" screwed body valves



2-P trim disc carrier (Item No. 6)





# COMPONENT IDENTIFICATION

## General Maintenance and Spare Parts

**All safety devices should be tested at least monthly\* and more often if deemed advisable. Periodic testing for tightness of manual or motorized shut-off valve closure is equally essential.**

\*per NFPA 86-Appendix B-4 (1995)

These Maxon valves are designed for long troublefree service. Only items shown as suggested spare parts are considered field replaceable.



## WARNING

**Do not attempt field repair of valve body, top assembly or motor drive unit. Any alterations void all warranties.**

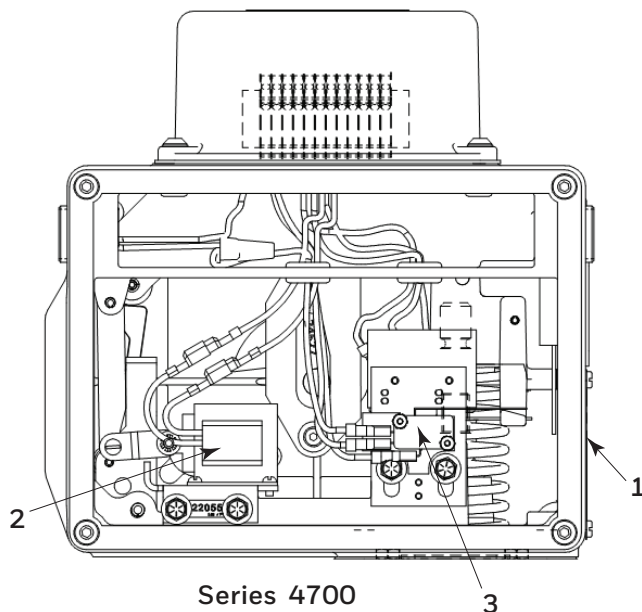
To determine suggested spare parts, identify series designation and serial number from the valve's nameplate. Refer to the illustration and legend below to identify suggested spare parts.

To order, specify:

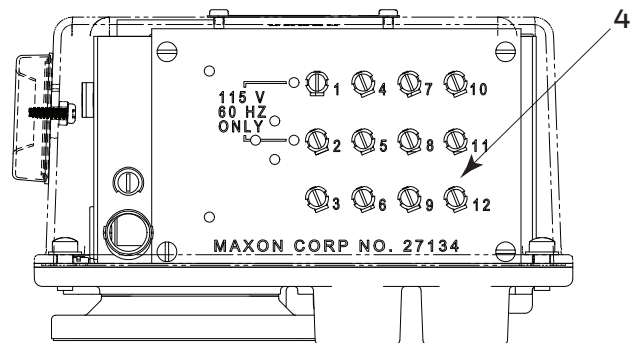
1. Quantity
2. Assembly part number (if available)
3. Description
4. Electrical specification
5. Full nameplate information (from existing valve)

## Automatic Reset

*Note: Drawings are illustrative only. Actual valves may vary slightly.*



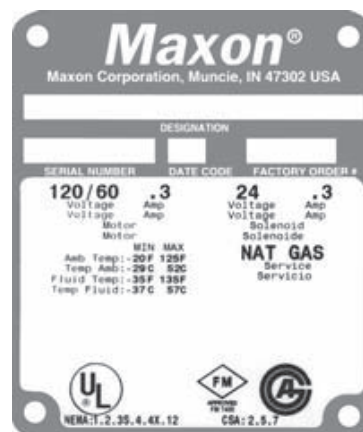
Series 4700



Series 8700

### Legend:

- ① – Nameplate
- ② – Solenoid
- ③ – VOS motor limit/signal switch for normally closed valve; VCS for normally open valve
- ④ – Printed Circuit Board (PCB)



### Nameplate (typical)

*(shown for listed valves; others similar)*

Nameplate designation does not reflect external accessory items or motor limit switch

Normally closed valve designation

# ELECTRICAL DATA

## for normally closed valves

### General

All Maxon shut-off valves are electrically actuated from a power source, normally through the flame safeguard and/or safety control circuits.

Standard valve assemblies include an internal holding solenoid or printed circuit board for 115 volt 60 hertz AC power. (Other electrical current options are available upon request.)

Series 4730, and 4760 valves have the internal solenoid. Series 8700 valves incorporate the printed circuit board.

The solenoid (or the printed circuit board) is energized whenever the valve is powered. The motor operator on automatic reset versions is powered only during the opening stroke.

**Switch wiring diagrams** (reproduced on the next page) are part of each valve assembly, summarizing electrical data and wiring for a valve equipped with terminal block and a full complement of optional signal switches.

Diagrams show valve in its normally closed (at rest) position. The indicated internal wiring is present only when the appropriate auxiliary switches are specified. Automatic reset valves always include a VOS-1 SPDT valve open motor limit switch.

Good practice *normally* dictates that auxiliary switches in valves used for safety shut-off functions should be used for signal duty **only**, not to operate additional safety devices.

### Signal switch designations:

**VCS** (Valve Closed Switch) is actuated at the end of the closing stroke. VCS-1 is SPDT; VCS-2 is DPDT.

**VOS** (Valve Open Switch) is actuated at the end of the opening stroke. VOS-1 is SPDT; VOS-2 is DPDT.

Switch amp ratings are shown on the schematic wiring diagrams. DO NOT EXCEED rated amperage or total load shown.

### Volt Ampere (VA) Ratings: Automatic Reset

Valve		AC Operation (115 VAC, 60 Hz)		DC Operation (24 VDC)	
Size	Series	Opening	Holding	Opening	Holding
1" - 1.25"	4730, 4760, 4790 (-S)	220 [1]	22	222	24
1" - 1.25"	33479	220 [1]	22	222	24
.375" - .75"	8730, 8760, 8790 (-S)	143	5	---	---

[1] 220 VA shown is for 60 hertz; if 50 hertz power, VA rating is 342

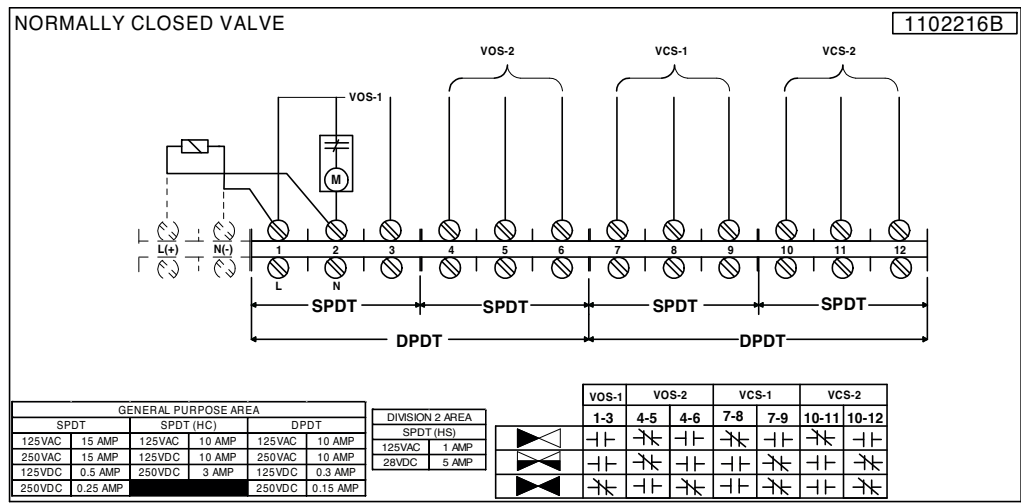
NOTE: The VA rating shown in the DC column is based on an AC motor, DC solenoid.

# ELECTRICAL DATA

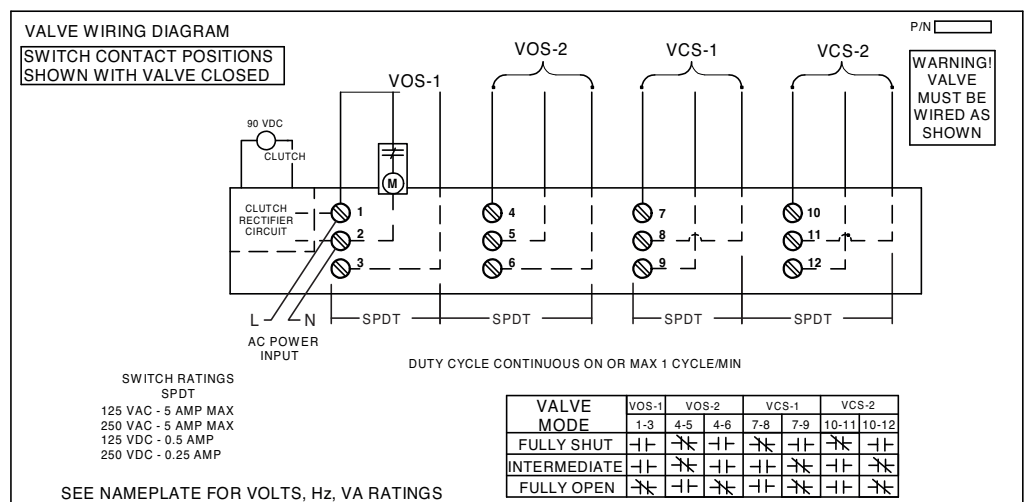
for normally closed valves

## Automatic Reset Series:

- 1" – 1.25" Series 4730, 4760, 4790 (-S);
- 1" – 1.25" Series 33479;



.375" through .75"  
Series 8730, 8760,  
and 8790 (-S)

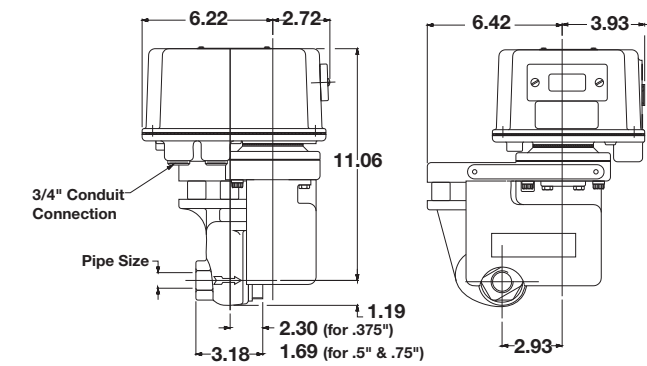


**DIMENSIONS** (IN INCHES)

8700, 25300

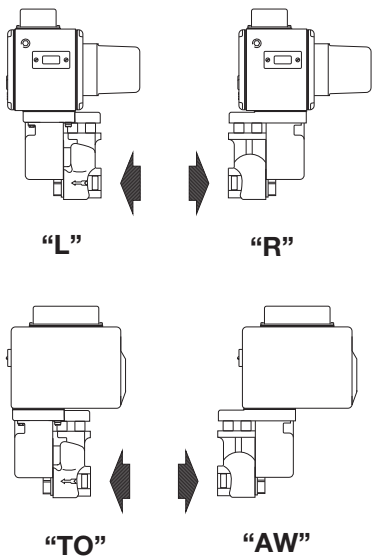
**.375" through 2" valves with swinging gate bodies**

**Series 8730, 8760, 8790 & 8790-S (.375", .5" & .75")**



**NOTE:** Series 8700 valves are available in top assembly positions "R" and "TO" only.

**Available Top Assembly Positions  
for Series 25300**



**NOTE:** 2.75" needed for terminal block cover removal.

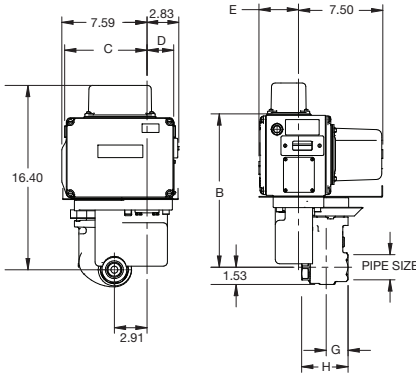
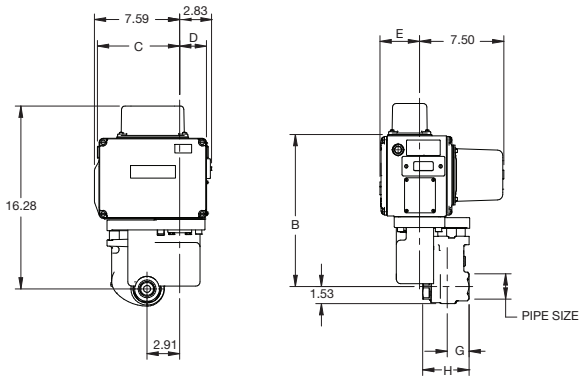
**DIMENSIONS** (IN INCHES)

**4700, 33479**

**1" & 1.25" valves with swinging gate bodies**

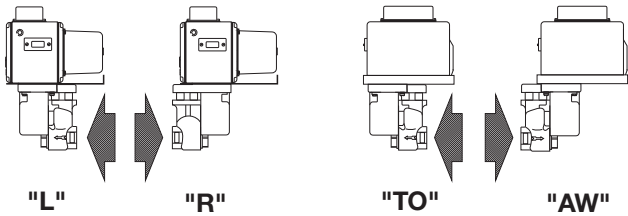
**1" & 1.25" Series 4700**

**1" & 1.25" Series 33479**



**Available Top Assembly Positions**

**NOTE:** 2.75" needed for terminal block cover removal.



Valve Size	Valve Series	B	C	D	E	G	H
1"	4730, 4760, 4790, & 4790-S	13.53	7.59	2.38	3.5	1.94	4.12
	33479	---					4.19
1.25"	4730, 4760, 4790, & 4790-S	13.53	7.59	2.38	3.5	1.94	4.12
	33479	---					4.19

## AUXILIARY SIGNAL SWITCHES

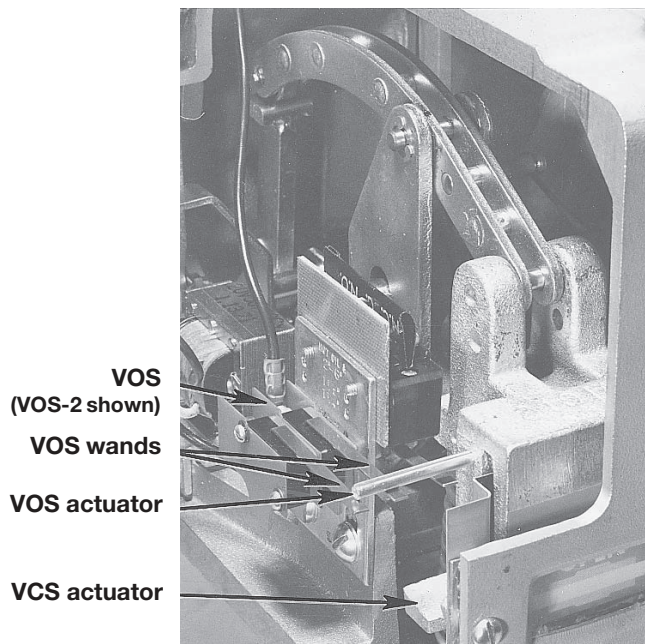
All Maxon valves may be equipped with internally-mounted signal switch(es) to provide a “proof-of-open” or “proof-of-closure” valve position indication.

### For normally-closed valves:

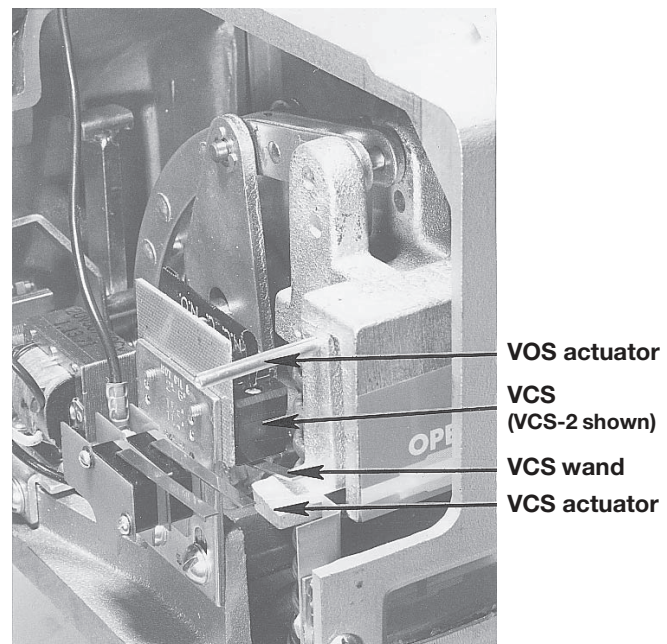
VCS (Valve Closed Switch) is actuated when valve is fully shut. It is the upper, inverted snap-switch mounted on rear of switch bracket. VCS-1 is an SPDT (single-pole, double-throw) switch. VCS-2 is a DPDT (double-pole, double-throw) switch. All contacts are available for external circuitry.

Auxiliary signal switches indicate when valve is open or closed and are normally connected electrically into your control panel lights or warning device circuit(s).

VOS (Valve Open Switch) is actuated when valve reaches full-open. It is the lower snap-switch mounted on front of switch bracket. VOS-1 is an SPDT switch. On automatic reset valves, its normally closed contact serves as a motor limit switch and is not available for external circuitry. On manual reset valves, normally closed contact is available for external circuitry, but is not wired to optional terminal block. VOS-2 is DPDT, used in lieu of VOS-1 for additional contacts.



**Valve Open**

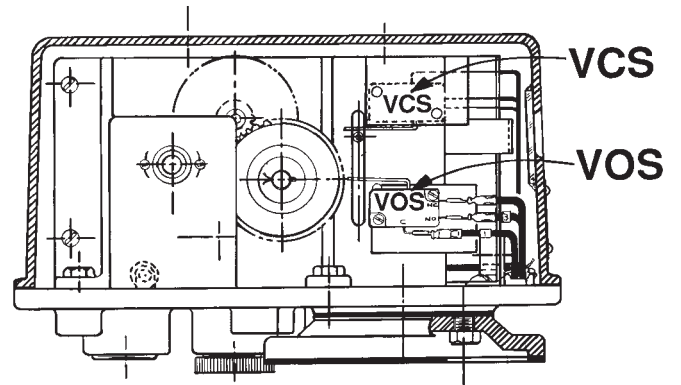


**Valve Shut**

**Photos above of normally-closed valve  
(typical for Series 4730, 4760, 4790)**

## AUXILIARY SIGNAL SWITCHES

All Maxon proof-of-open and proof-of-closure signal switches work in a similar manner; but due to different styles and types of top assembly housings, the switches appear in slightly different positions in the various types



### **For More Information**

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