

APECS® 0175 Series Actuators

Provides proportional fuel control for construction, industrial and agricultural equipment. 1.75" diameter spring-return actuator, pull or push models, three spring types available.



Features:

- Pull or push actuation (Model 0175 pull, Model 0175P push)
- Flange or base mount
- Failsafe operation using spring to return actuator to minimum fuel position
- Corrosion resistant, plated steel housing and mounting base/flange
- Precise engine speed control when used with APECS electronic controllers. (See Controllers section, pages 74-83, for ordering information.)
- Variety of mounting styles, plungers, terminations, and springs available

Order Information: Complete the following model descriptions to build your Order No.

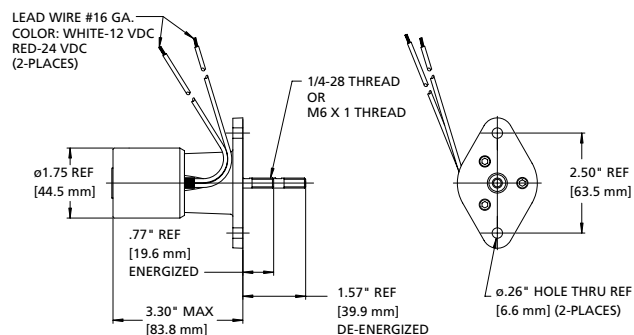
()	()	()	()	()	()
Model No.	Voltage	Mounting Style	Plunger Type	Termination Type	Return Spring*
0175 Pull	12 12 VDC	A Flange	2 Ext. ¼-28 thread	L Lead wire	S1
0175P Push	24 24 VDC	E Base	3 Ext. M-6 thread	C Connector	S2
					S3

*Spring Chart

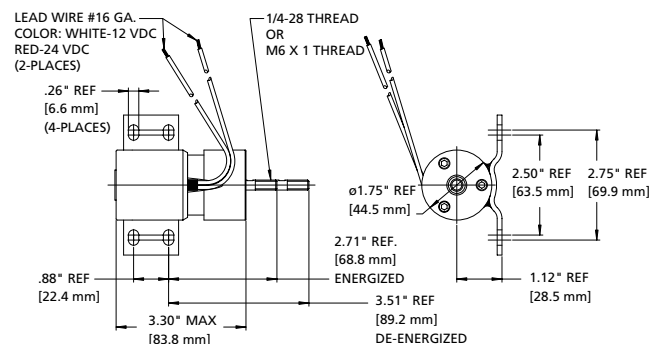
Spring Type	PART NO.	De-energized Spring Force	Energized Spring Force	Spring Rate
S1	SA-4703	0.50 lbs (2.2 N)	5.25 lbs (23.4 N)	5.94 lbs/in (0.16 kg/mm)
S2	SA-4704	0.25 lbs (1.1 N)	6.00 lbs (26.7 N)	7.20 lbs/in (0.13 kg/mm)
S3	SA-4472	0.40 lbs (1.8 N)	1.60 lbs (7.1 N)	1.53 lbs/in (0.03 kg/mm)

0175 / Pull Actuation

FLANGE MOUNT

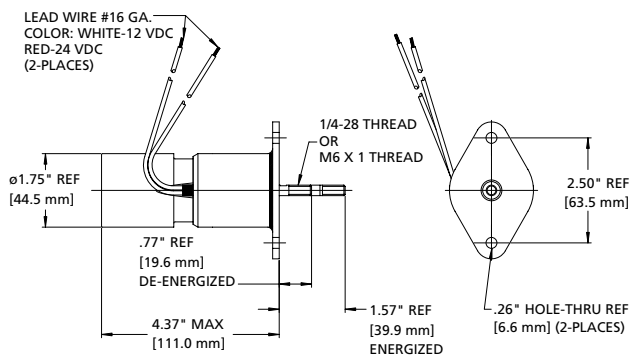


BASE MOUNT

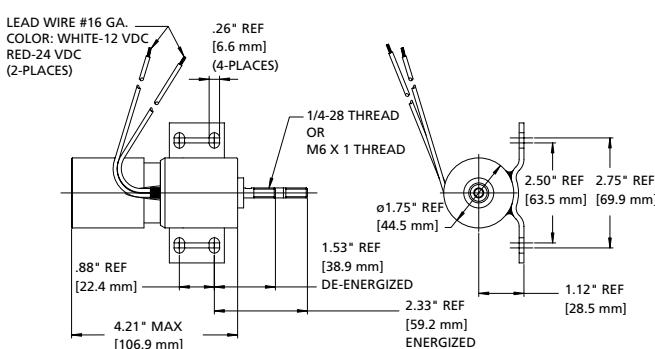


0175P / Push Actuation

FLANGE MOUNT



BASE MOUNT



Electrical Specifications:

Stroke	0.8" Maximum (20.3 mm)
Net Force	4.0 lbs (17.8 N)
Work Rating	0.3 ft. lbs (0.41 Nm)
Nominal Rated Current	4.3 A (12 VDC) 2.3 A (24 VDC)
Response Time	30 milliseconds for 10%-90% of stroke
Resistance* (nominal)	2.80 Ohms (12 Volt) 10.63 Ohms (24 Volt)

Mechanical Specifications:

Operating Temperature	-40°F to +250°F (-40°C to +121°C)
Vibration	15 G's
Shock	200 G's
Weight	Approx. 1.5 lbs (0.7 kg)

Specifications are for reference only.

*At ambient temperature



WARNING: An overspeed shutdown device, independent of the APECS system, should be provided to prevent loss of engine control that may cause personal injury or equipment damage.

APECS® 0250 Series Actuators

Provides proportional fuel control for construction, industrial and agricultural equipment. 2.50" diameter spring-return actuator, pull or push models, four spring types available.



Features:

- Pull or push actuation (Model 0250 pull, Model 0250P push)
- Flange or base mount
- Failsafe operation using spring to return actuator to minimum fuel position
- Corrosion resistant, plated steel housing and mounting base/flange
- Precise engine speed control when used with APECS electronic controllers. (See Controllers section, pages 74-83, for ordering information.)
- Variety of mounting styles, plungers, terminations, and springs available

Order Information: Complete the following model descriptions to build your Order No.

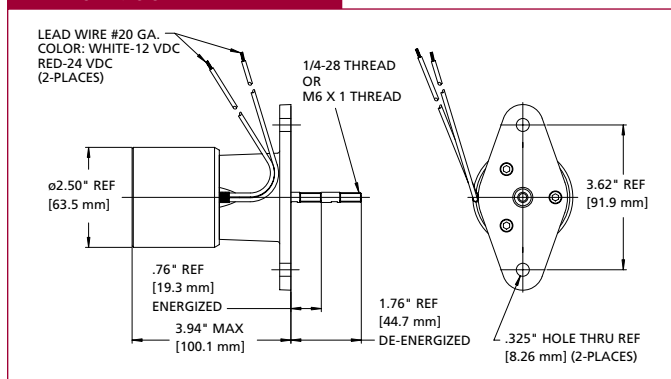
()	()	()	()	()	()
Model No.	Voltage	Mounting Style	Plunger Type	Termination Type	Return Spring*
0250 Pull	12 12 VDC	A Flange	2 Ext. ¼-28 thread	L Lead wire	S1
0250P Push	24 24 VDC	E Base	3 Ext. M-6 thread	C Connector	S2
					S3
					S4

*Spring Chart

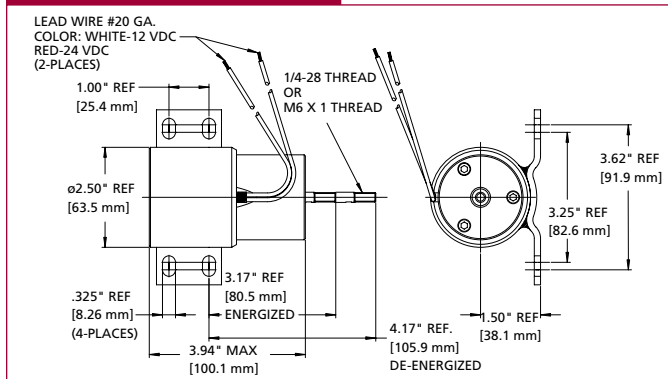
Spring Type	PART NO.	De-energized Spring Force	Energized Spring Force	Spring Rate
S1	SA-4684	1.60 lbs (7.1 N)	11.40 lbs (50.7 N)	9.80 lbs/in (0.17 kg/mm)
S2	SA-4685	0.75 lbs (3.3 N)	14.00 lbs (62.3 N)	13.25 lbs/in (0.24 kg/mm)
S3	SA-4728	0.75 lbs (3.3 N)	8.80 lbs (39.1 N)	8.05 lbs/in (0.14 kg/mm)
S4	SA-4729	0.75 lbs (3.3 N)	14.55 lbs (64.7 N)	13.80 lbs/in (0.25 kg/mm)

0250 / Pull Actuation

FLANGE MOUNT

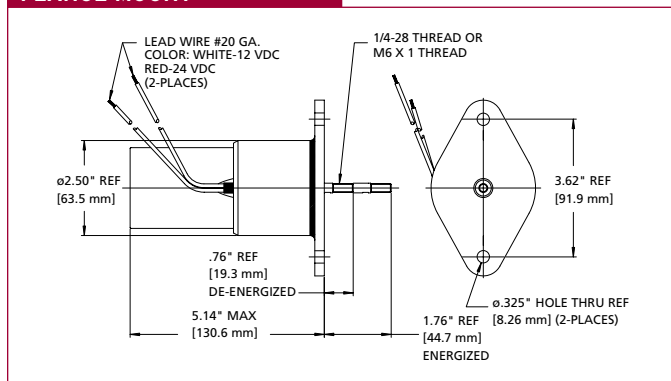


BASE MOUNT

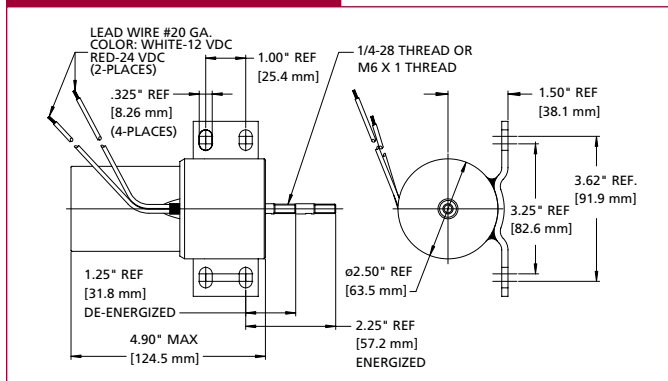


0250P / Push Actuation

FLANGE MOUNT



BASE MOUNT



Electrical Specifications:

Stroke	1.0" Maximum (25.4 mm)
Net Force	6.0 lbs (26.7 N)
Work Rating	0.7 ft. lbs (0.95 Nm)
Nominal Rated Current	6.8 A (12 VDC) 3.5 A (24 VDC)
Response Time	65 milliseconds for 10%-90% of stroke
Resistance* (nominal)	1.76 Ohms (12 Volt) 6.84 Ohms (24 Volt)

Mechanical Specifications:

Operating Temperature	-40°F to + 250°F (-40°C to + 121°C)
Vibration	15 G's
Shock	200 G's
Weight	Approx. 3.0 lbs (1.4 kg)

Specifications are for reference only.

*At ambient temperature



WARNING: An overspeed shutdown device, independent of the APECS system, should be provided to prevent loss of engine control that may cause personal injury or equipment damage.

APECS® 0300 Series Actuators

Provides proportional fuel control for construction, industrial and agricultural equipment. 3.00" diameter spring-return actuator, pull or push models, three spring types available.



Features:

- Pull or push actuation (Model 0300 pull, Model 0300P push)
- Flange or base mount
- Failsafe operation using spring to return actuator to minimum fuel position
- Corrosion resistant, plated steel housing and mounting base/flange
- Precise engine speed control when used with APECS electronic controllers. (See Controllers section, pages 74-83, for ordering information.)
- Variety of mounting styles, plungers, terminations, and springs available

Order Information: Complete the following model descriptions to build your Order No.

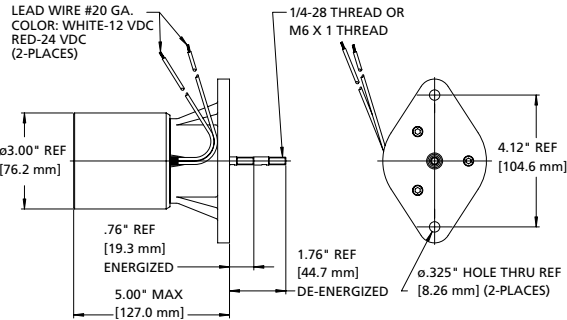
()	()	()	()	()	()
Model No.	Voltage	Mounting Style	Plunger Type	Termination Type	Return Spring*
0300 Pull	12 12 VDC	A Flange	2 Ext. ¼-28 thread	L Lead wire	S1
0300P Push	24 24 VDC	E Base	3 Ext. M-6 thread	C Connector	S2
					S3

*Spring Chart

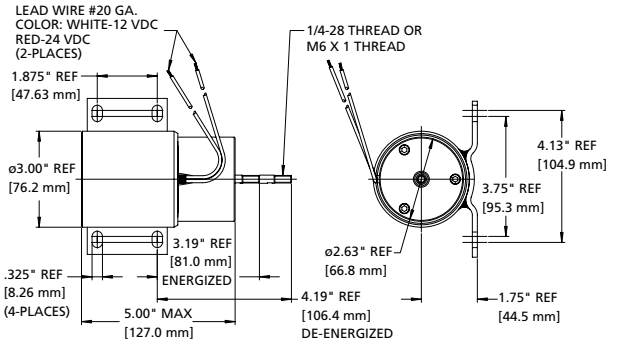
Spring Type	PART NO.	De-energized Spring Force	Energized Spring Force	Spring Rate
S1	SA-4713	4.25 lbs (18.9 N)	19.50 lbs (86.7 N)	15.25 lbs/in (0.27 kg/mm)
S2	SA-4714	1.00 lbs (4.4 N)	22.00 lbs (97.9 N)	21.00 lbs/in (0.37 kg/mm)
S3	SA-4829	2.13 lbs (9.5 N)	9.75 lbs (43.4 N)	7.62 lbs/in (0.14 kg/mm)

0300 / Pull Actuation

FLANGE MOUNT

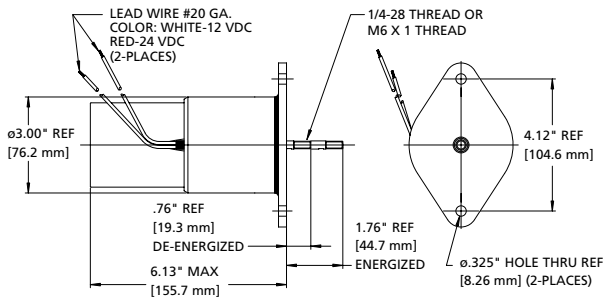


BASE MOUNT

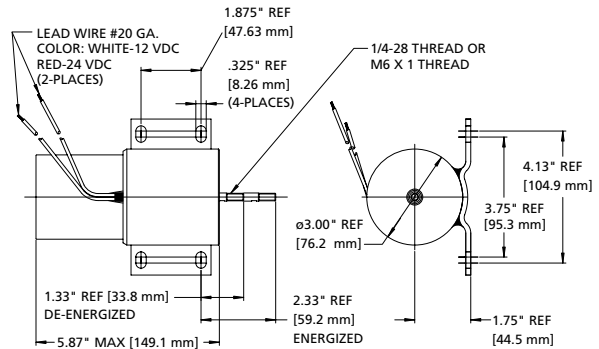


0300P / Push Actuation

FLANGE MOUNT



BASE MOUNT



Electrical Specifications:

Stroke	1.0" Maximum (25.5 mm)
Net Force	15.0 lbs (66.7 N)
Work Rating	1.3 ft. lbs (1.76 Nm)
Nominal Rated Current	6.9 A (12 VDC) 3.6 A (24 VDC)
Response Time	80 milliseconds for 10%-90% of stroke
Resistance* (nominal)	1.72 Ohms (12 Volt) 6.57 Ohms (24 Volt)

Specifications are for reference only.

*At ambient temperature

Mechanical Specifications:

Operating Temperature	-40°F to + 250°F (-40°C to + 121°C)
Vibration	15 G's
Shock	200 G's
Weight	Approx. 6.5 lbs (3.0 kg)



WARNING: An overspeed shutdown device, independent of the APECS system, should be provided to prevent loss of engine control that may cause personal injury or equipment damage.

Linkage Free Integral-Type

Actuators provide proportional fuel control for construction, industrial, and agricultural equipment. For direct mounting to specific engines.



Features:

- Direct replacement for integral mount fuel shutoff solenoid
- Fuel pump shutoff force built into actuator
- Responds in milliseconds to changes in current from a pulse width modulated signal generated by the controller
- Precise engine speed control when used with APECS electronic controllers (See Controllers section, pages 74-83, for ordering information)
- Simple installation, no brackets or linkages necessary

Available for:

- Kubota Super 5 Series
- Kubota 3300 Series
- Mitsubishi SL Series
- Perkins 700 Series
- Yanmar TNE Series
- Yanmar 2V78 Series

Order Information:

ORDER NO.	Engine Series	Model	Voltage
SA-4573-12	Kubota Super 5	0175-12 A5LS Kubota	12 VDC
SA-4573-24	Kubota Super 5	0175-24 A5LS Kubota	24 VDC
SA-4828-12	Kubota 3300	0175-12 A6LS Kubota	12 VDC
SA-4828-24	Kubota 3300	0175-24 A6LS Kubota	24 VDC
SA-4837-12*	Mitsubishi SL	0175-12 B7LS Mitsubishi	12 VDC
SA-4837-24*	Mitsubishi SL	0175-24 B7LS Mitsubishi	24 VDC
SA-4777-12	Perkins 700	0175-12 A6LS Perkins	12 VDC
SA-4777-24	Perkins 700	0175-24 A6LS Perkins	24 VDC
SA-4574-12	Yanmar TNE	0175-12 S5LS Yanmar	12 VDC
SA-4574-24	Yanmar TNE	0175-24 S5LS Yanmar	24 VDC
SA-4848-12	Yanmar 2V78	0175-12 S6LS Yanmar	12 VDC
SA-4848-24	Yanmar 2V78	0175-24 S6LS Yanmar	24 VDC

*Threaded-mount unit, locknut supplied

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Linkage Free Integral-Type

Electrical Specifications:

Rated Voltage	12 or 24 VDC
Rated Current	4.3 A (12 VDC) 2.3 A (24 VDC)
Input Signal	Pulse width modulated
Connections	Two wires, open lead

Mechanical Specifications:

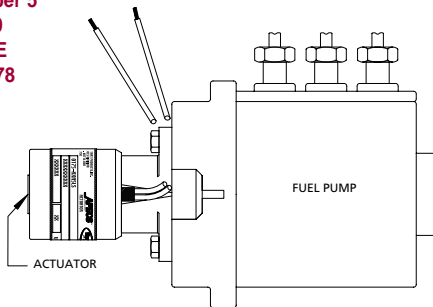
Temperature Range	-40°F to +250°F (-40°C to +121°C)
Vibration	15 G's from 50 to 500 Hz sinusoidal, 3-planes
Shock	200 G's, 0-Peak @ 21 Hz
Housing	Anodized aluminum, sealed up to 3 psi for environmental protection

Engine Series	Stroke	Weight
Kubota Super 5	0.47" (12 mm)	1.16 lbs (0.53 kg)
Kubota 3300	0.47" (12 mm)	1.16 lbs (0.53 kg)
Mitsubishi SL	0.53" (13.5 mm)	1.28 lbs (0.58 kg)
Perkins 700	0.63" (16.0 mm)	1.19 lbs (0.54 kg)
Yanmar TNE	0.29" (7.4 mm)	1.19 lbs (0.54 kg)
Yanmar 2V78	0.29" (7.4 mm)	1.19 lbs (0.54 kg)

SIDE MOUNTING

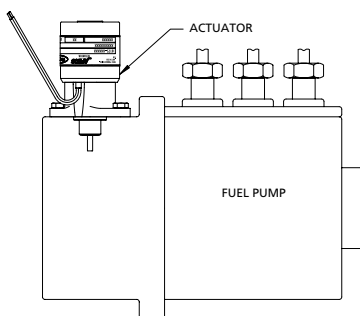
Actuator mounts directly to fuel pump in place of the fuel shutoff solenoid

Kubota Super 5
Perkins 700
Yanmar TNE
Yanmar 2V78



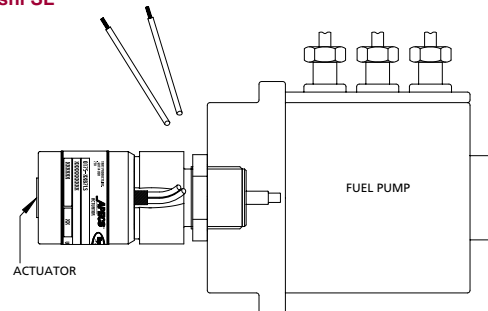
TOP MOUNTING

Kubota 3330



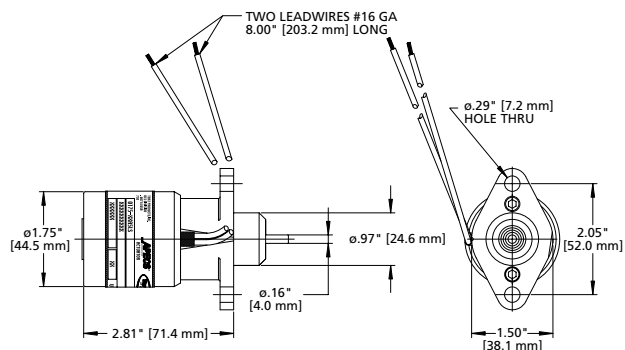
THREAD MOUNTING

Mitsubishi SL

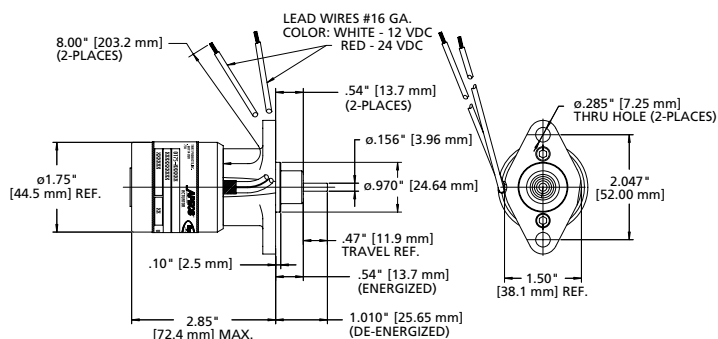


Linkage Free Integral-Type

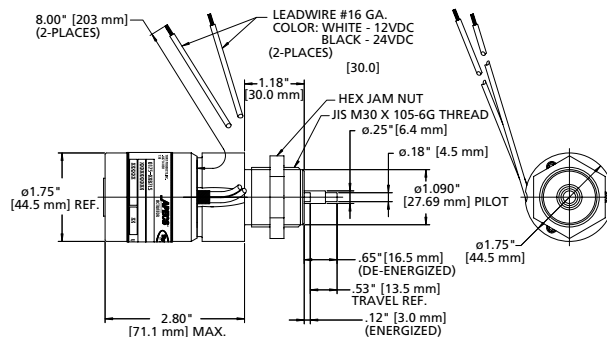
KUBOTA SUPER 5 SERIES



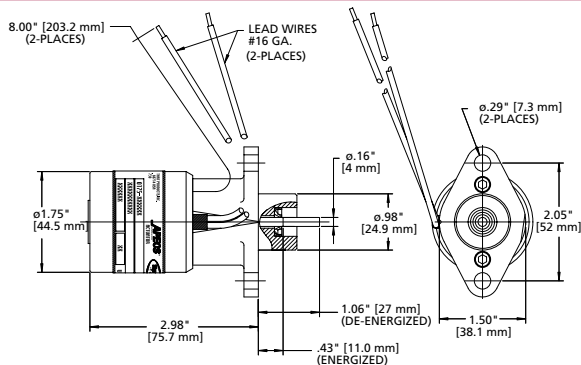
KUBOTA 3300 SERIES



MITSUBISHI SL SERIES

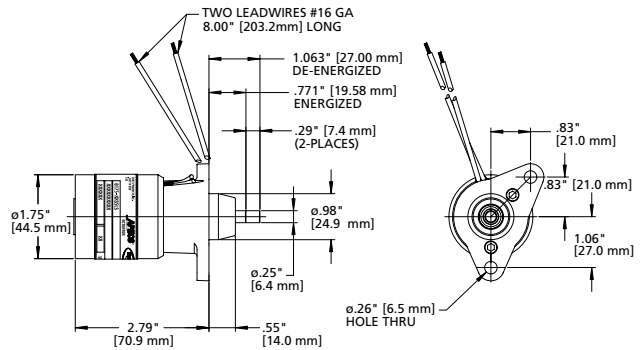


PERKINS 700 SERIES

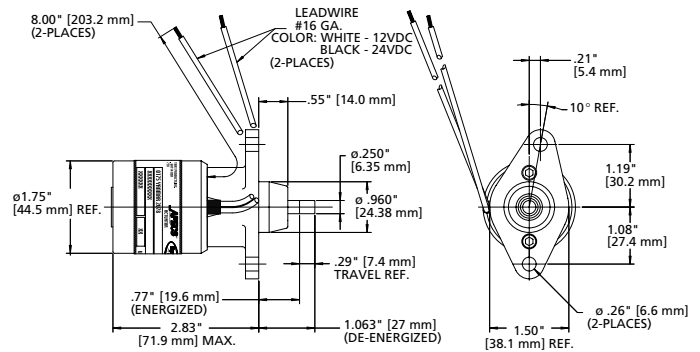


Linkage Free Integral-Type

YANMAR TNE SERIES



YANMAR 2V78 SERIES



Specifications are for reference only.



WARNING: An overspeed shutdown device, independent of the APECS system, should be provided to prevent loss of engine control that may cause personal injury or equipment damage.

APECS® 0200R Rotary Actuator

Versatile rotary actuator is suitable for a variety of stationary and off-road engine applications. Direct connection eliminates the need for any external linkage.



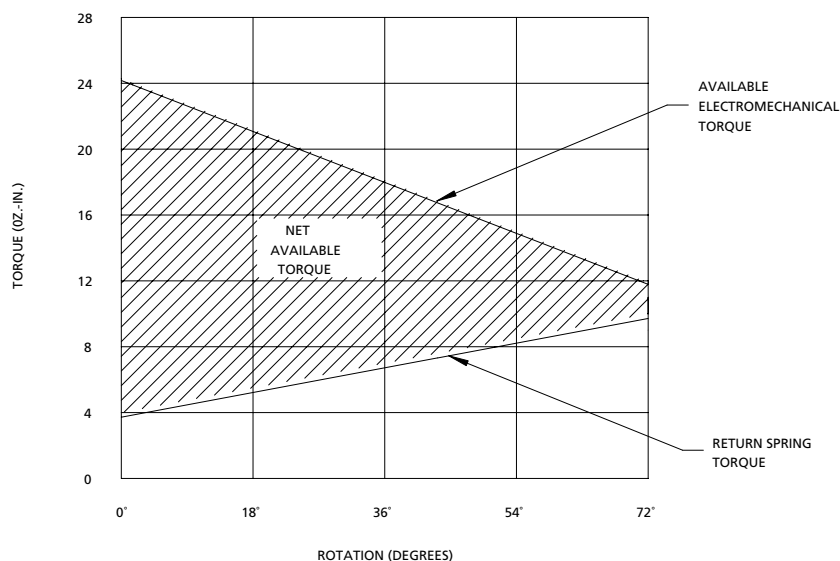
Features:

- Angular position proportional to input coil current
- Direct interface between actuator and shut-off lever
- Multiple terminal connections available
- Spring return to minimum position
- Precise engine speed control when used with APECS electronic controllers (See Controllers section, pages 74-83, for ordering information)
- Withstands harsh temperature and vibration conditions
- Corrosion resistant housing with sealed plastic cover

Order Information:

ORDER NO.	Voltage
SA-4928-12	12 VDC
SA-4928-24	24 VDC

Torque vs. Rotation*



*At 68°F (20°C) and rated voltage

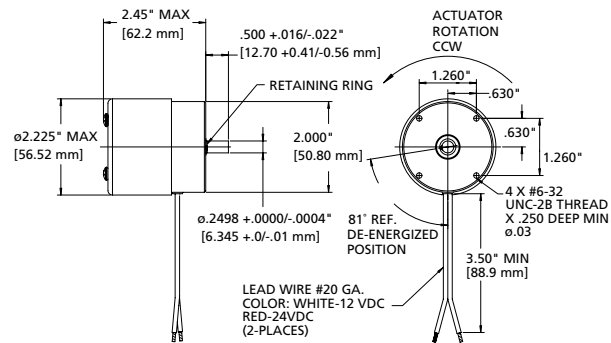


WARNING: An overspeed shutdown device, independent of the APECS system, should be provided to prevent loss of engine control that may cause personal injury or equipment damage.

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APECS® 0200R Rotary Actuator

DIMENSIONS



Electrical Specifications:

Rated Voltage	12 or 24 VDC
Rated Current	68°F(20°C)
Nominal Steady State	<u>12 Volt</u> <u>24 Volt</u>
Nominal Intermittent at Stall	3.0 A 1.6 A
	6.0 A 3.1 A
Response Time	0.05 sec nominal ON time for 63% stroke
	0.05 sec nominal OFF time for 63% stroke

Mechanical Specifications:

Temperature Range	-40°F to + 221°F (-40°C to + 105°C)
Rotation	72° (±2°)
Vibration	15 G's
Shock	200 G's
Sealing	Oil, water and dust resistant
Weight	1.2 lbs (0.54 kg)

Specifications are for reference only.

e-mail: info_niles@woodward.com

Engine Mounting Kits

Proportional fuel control for construction, industrial, and agricultural equipment. Maintains isochronous engine speed for demanding applications such as gensets, eliminating droop inherent in mechanical governors. Includes mounting hardware and control linkage for electronic engine governing systems.



Features:

- Fast, easy installation
- Corrosion resistant, plated steel bracket, linkage and hardware
- For use with APECS proportional actuators. (Vanguard kit includes O175 actuator)
- Precise engine speed control when used with APECS electronic controllers (See APECS Controllers section, pages 74-83, for ordering information)

Kits Available

- Cummins C Series
- Kubota V2203-E
- Vanguard 3/LC
DM-700D, DM-850D & DM-950D



WARNING: An overspeed shutdown device, independent of the APECS system, should be provided to prevent loss of engine control that may cause personal injury or equipment damage.

Engine Mounting Kits

Specifications:

Actuator Rated Voltage	12 or 24 VDC
Temperature Range	-40°F to +250°F (-40°C to +121°C)
Input Signal	Pulse width modulated
Housing	Anodized aluminum
Connections	Two wires, open lead

	Rated Current	Stroke	Weight (excluding actuator)	Kit Contents
Cummins	6.8 A-12 VDC 3.5 A-24 VDC	1.00" (25.4 mm)	1.4 lbs (0.64 kg)	Adapter plate, linkage, reinforcing bar for A & MW pump mounting hardware
Kubota	6.8 A-12 VDC 3.5 A-24 VDC	1.00" (25.4 mm)	2.7 lbs (1.2 kg)	Mounting bracket, linkage, lever extension, mounting hardware
Vanguard	4.3 A-12 VDC 2.3 A-24 VDC	0.80" (20 mm)	1.7 lbs (0.78 kg)	Actuator with welded bracket, linkage and mounting hardware

Specifications are for reference only.

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Engine Mounting Kits

Cummins C Series Kit

Kits are custom fit for Cummins C series engines that are equipped with an RSV governor on Bosch A, MW and P fuel pumps. Kit mounts horizontally on the side of the engine block behind the pump.

APECS linear actuator (ordered separately) responds in milliseconds to changes in current from a pulse width modulated signal generated by the controller. When the actuator is de-energized, an internal spring moves the shutoff lever to shutdown.



Kit for A and MW pumps
shown with reinforcing bar

Kit for P Pump

Order Information:

Mounting Kit

APECS Proportional Actuators

ORDER NO.	Application	ORDER NO.	Model	Spring	Voltage
SA-4598	Cummins C Series (A, MW & P pumps)	SA-4506-12 SA-4506-24	0250 0250	SA-4684 (S1) SA-4684 (S1)	12 VDC 24 VDC

When you order: Order bracket from Cummins if it is not already on the engine:

PUMP MODEL	Bracket
A	No. 3923254
MW	No. 3923255
P	No. 3930290

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Engine Mounting Kits

Kubota V2203-E Kit

The Kubota V2203-E kit mounts closely behind the fuel pump.

APECS linear proportional actuator (ordered separately) responds in milliseconds to changes in current from a pulse width modulated signal generated by the controller. When the actuator is de-energized, an internal spring moves the shutoff lever to shutdown.



Order Information:

Mounting Kit

ORDER NO.	Application
SA-4457	Kubota V2203-E

APECS Proportional Actuators

ORDER NO.	Model	Spring	Voltage
SA-4502-12	0251	SA-4684 (S1)	12 VDC
SA-4502-24	0251	SA-4684 (S1)	24 VDC

Vanguard 3/LC DM-700D, DM-850D & DM-950D Kit

The Vanguard 3/LC kit mounts closely above the front gear housing, behind the fan, to minimize interference with other components or housing.

APECS linear proportional actuator responds in milliseconds to changes in current from a pulse width modulated signal generated by the controller. When the actuator is de-energized, an internal spring moves the shutoff lever to shutdown.



Order Information:

Mounting Kit

ORDER NO.	Application
SA-4779-12	Vanguard 3/LC (all models)
SA-4779-24	Vanguard 3/LC (all models)

APECS Proportional Actuators

ORDER NO.	Model	Spring	Voltage
Included in Kit	0175	Included	12 VDC
Included in Kit	0175	Included	24 VDC

Note: The throttle lever with an extra hole must be ordered from Briggs and Stratton Daihatsu in the U.S.

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Linkage Hardware

Linkage components connect the actuator shaft to the engine control lever. A good linkage contributes to accurate, stable and responsive performance with minimal play or friction.



Features:

- Allows for minor misalignments
- Minimal friction, binding and backlash
- Threaded rod for longer linkages
- Spherical male and female rod-end bearings for shorter linkages
- Built to withstand extreme conditions
- Corrosion resistant

Kit Contents:

Long Linkage Kit includes:

- (1) Threaded rod
- (4) Hex nuts
- (4) Split lockwashers
- (1) Hex screw
- (2) Rod ends, female
- (1) Clevis

Short Linkage Kit includes:

- (3) Hex nuts
- (3) Split lockwashers
- (1) Hex screw
- (1) Rod end, female
- (1) Rod end, male
- (1) Clevis

Order Information:

APECS Linkage Kits

ORDER NO.	Description	Thread Size	Center to center of spherical rod ends	
			Minimum Length	Maximum Length
SA-4661	Long Linkage Kit	¼-28	3.3"	7.9"
SA-4845	Long Linkage Kit	M6	83.8 mm	200.6 mm
SA-4742	Short Linkage Kit	¼-28	2.2"	2.6"
SA-4844	Short Linkage Kit	M6	55.8 mm	66.0 mm

Individual APECS Kit Components

ORDER NO. for Thread Size:

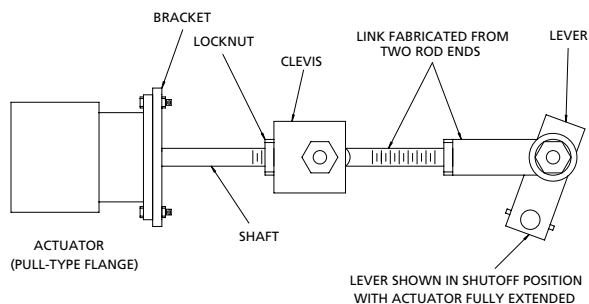
¼-28	M6	Description
SA-4599	SA-4804	Clevis (fits actuators to the rod ends sold below)
SA-4619	SA-4843	Spherical rod end, female
SA-4600	SA-4842	Spherical rod end, male
SA-4602	SA-4846	Long threaded rod

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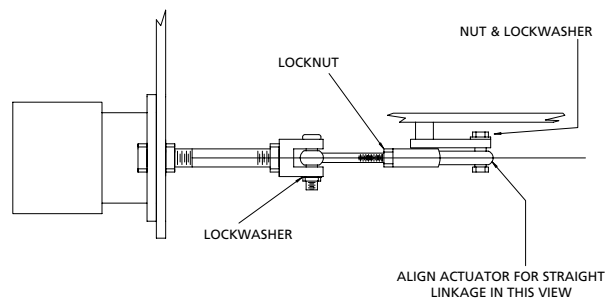
Linkage Hardware

Assembled Kits:

SIDE VIEW



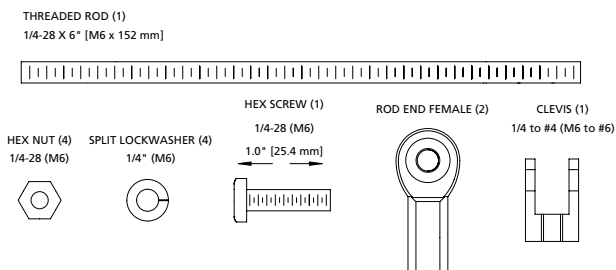
TOP VIEW



NOTE: Actuator and control lever are not part of the linkage kit.

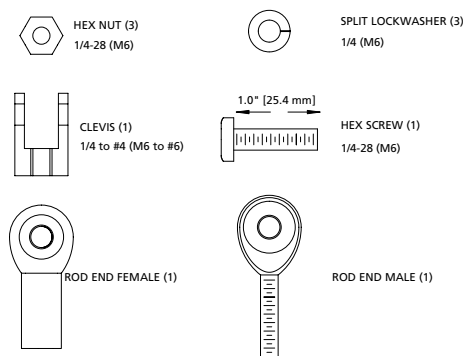
Kit Components:

LONG LINKAGE KIT



NOTE: Kit components are bagged, not assembled.

SHORT LINKAGE KIT



NOTE: Kit components are bagged, not assembled.



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