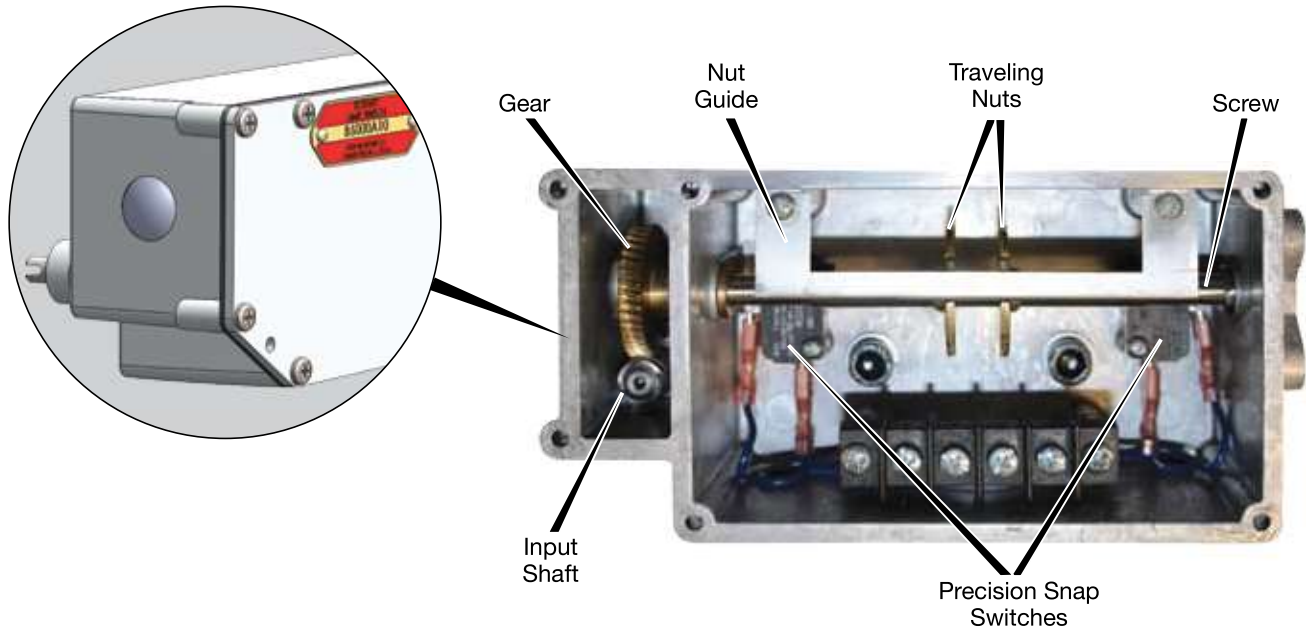


SCREW JACK

ACTUATOR CONTROLS

B6000 SERIES ROTARY LIMIT SWITCH

When you need precise control of your mechanical actuator Duff-Norton's newest B6000 Series Rotary Union Limit Switch design provides the ultimate in adjustability with even higher accuracy than a cam switch. By eliminating plastic mechanical components we also ensure robust durability.



FEATURES

- Switches rated 15 amps, 125-277 VAC; 1/2 amp, 125 VDC; 1/4 amp, 250 VDC.
- Switches SPST-N.C. SPDT available.
- Adaptable to all Duff-Norton mechanical actuators 2 ton and larger.
- Sturdy and compact, corrosion-resistant aluminum housing and cover, NEMA 4 enclosure rating, threaded 1/2 inch NPT conduit opening, brass nuts travel on stainless steel shaft.
- Easy to adjust, slotted traveling nuts allow precise fine-adjustment without the trial and error of cam type switches.
- Three available ratios to serve different travel requirements, while optimizing repeatability.
- Operating temperature, -20° to 150°F. Lifetime lubricated with synthetic grease.
- Can be mounted on either side of actuator, in four 90° orientations.
- May be ordered on actuators close-mounted to shortened worms, reducing actuator width.
- Additional rotary limit switches available with 4 positions, or for hazardous locations, consult factory.

To ensure that limit switch has sufficient travel capability for the actuator unit, use the following formula:

$$\text{Required worm revolutions} = (\text{Inches of Actuator Travel}) \times (\text{Actuator Turns per Inch})$$

NOTE

Need a specialty Limit Switch not shown above with options such as 4 Pole, or Explosion Proof capabilities? Contact our Customer Service group for more information.

SCREW JACK

ACTUATOR CONTROLS

ROTARY LIMIT SWITCHES

Performance Specifications

Rotary Limit Switch Performance Specifications					
Model Number	Gear Ratio	Maximum Worm Revolution	Maximum Actuator Raise	Maximum Over-travel	Switch Reset Dist.
B6000A10	10:1	1200	1200/TPI	24/TPI	5/TPI
B6000A20	20:1	2400	2400/TPI	48/TPI	10/TPI
B6000A40	40:1	4800	4800/TPI	96/TPI	20/TPI

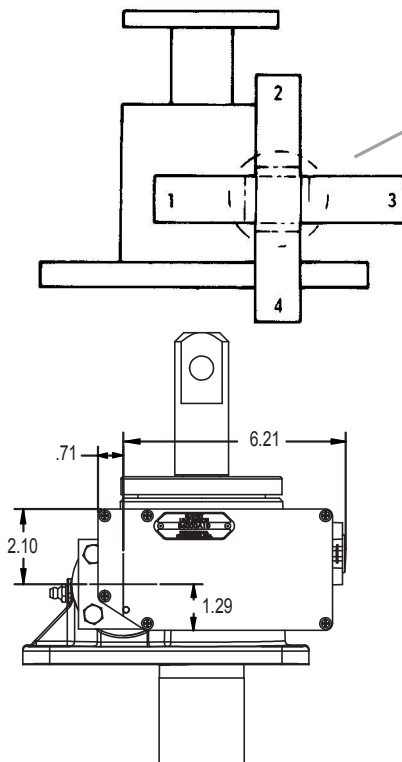
Mounting and Adjustment

Mounting and Adjustment Chart		
Actuator Model, Tons	Width, "W", inches	
	Extended Mount Switch	Close Mount Switch
2	6.50	5.19*
5	7.50	6.00
10	8.50	6.63
15	8.50	6.63
20	8.50	6.87
25	10.00	7.56
35	10.00	7.56
50	14.00	9.81
75	15.00	10.38
100	14.50	10.75
150	14.50	10.75

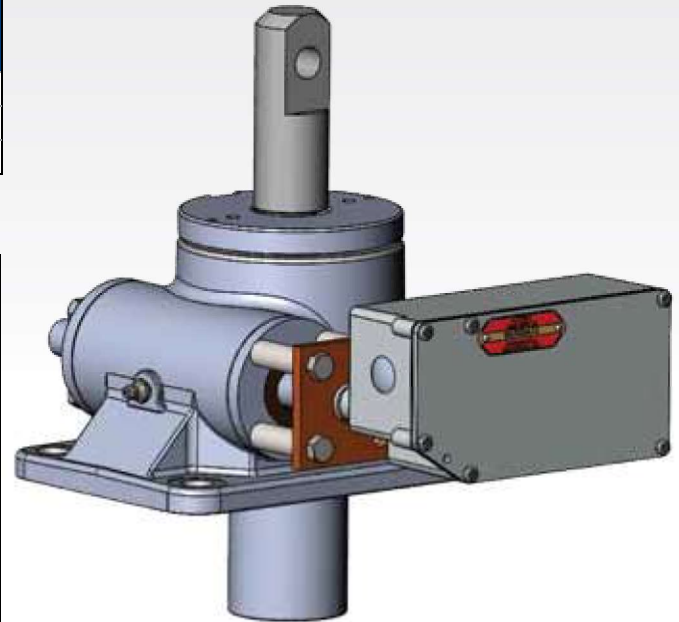
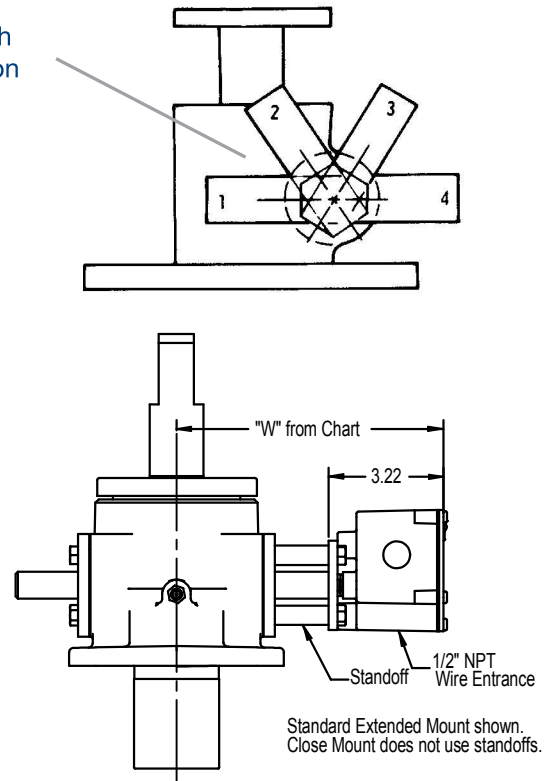
* M1802: Pos. 2 & 3 only.

M9002: Pos. 1,2,&3 only.

All models except 75, 100, and 150 Ton



75, 100, and 150 Ton only

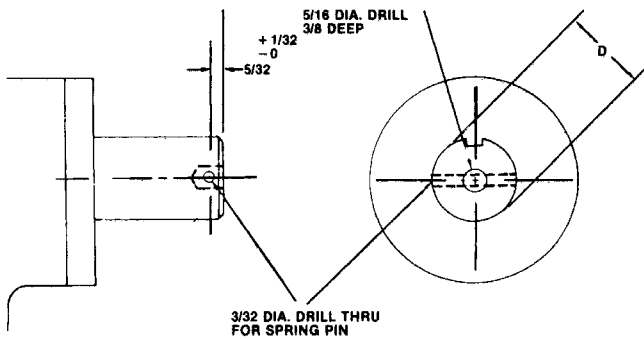


SCREW JACK

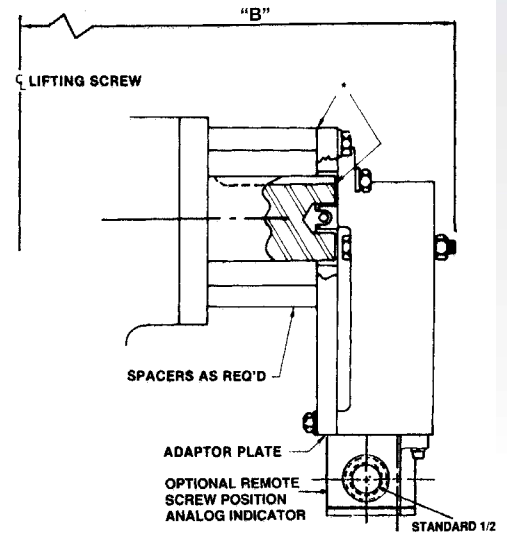
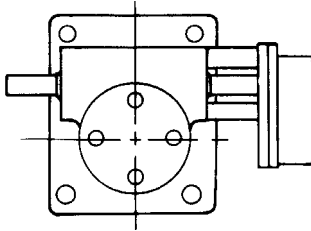
ACTUATOR CONTROLS

ROTARY LIMIT SWITCHES

Limit Switch Field Installation Dimensions

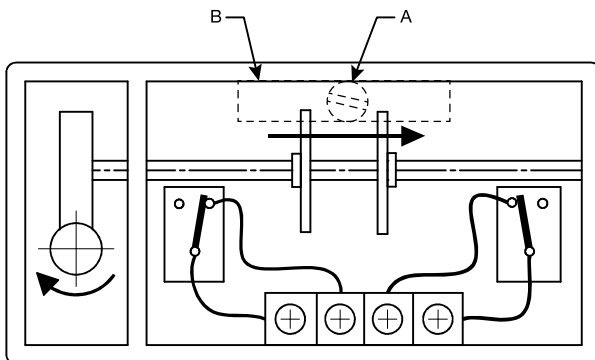


*NOTE: SHIM OUT ON LIMIT SWITCH IF NECESSARY.
WORM SHAFT END MUST NOT RUB SWITCH HOUSING.



Rotary Limit Switch Electrical Wiring Diagram and Setting Instructions

1. **CAUTION:** Disconnect power before making any adjustment.
2. Check drift before adjusting limits.
3. Remove screw "A" and nut guide keeper "B" to adjust limits.
4. Run actuator unit to desired limit.
5. Rotate appropriate nut until switch clicks, then turn 1/2 turn more.
6. Replace "A" and "B."
7. Run actuator unit to other limit.
8. Repeat steps 2, 4 and 5 to adjust this nut.



Note: N.C. = Normally Closed

N.C. N.C.

Wiring Diagram A & B Models

NOTE

Limit switch cannot be fitted directly to 1/4, 1/2 and 1 ton series. Anti-backlash mounting is the same as machine screw actuators. Dimensions are subject to change without notice.

Worm Shaft Dimensions

Capacity	MS	BS	Mounting Dimensions	Worm Shaft Diameter
2 and 3 Ton	X		6-3/4	.500
3 Ton		X	6-3/4	.500
5 Ton	X	X	7-3/4	.750
10 and 15 Ton	X	X	8-3/4	1.000
20 Ton	X	X	8-3/4	1.000
25 Ton	X	X	10-1/4	1.375
30 Ton	X		10-1/4	1.375
35 Ton	X		10-1/4	1.375
50 Ton	X	X	14-1/4	1.375
75 Ton	X		15-1/4	1.500
100 Ton	X		14-3/4	1.750
150 Ton	X		14-3/4	1.875

NOTE

Slight adjustments may be necessary. See Performance Specification Chart on the previous page for notch adjustment value.

SCREW JACK ACTUATOR CONTROLS POTENTIOMETER / TRANSDUCER

The Duff-Norton SKA6205 Series Position Feedback Potentiometer/Transducer is designed to mount on the end of any SKA6000T limit switch. Its active component is a precision potentiometer which may be used as voltage divider to provide a feedback voltage that is proportional to actuator position.

FEATURES

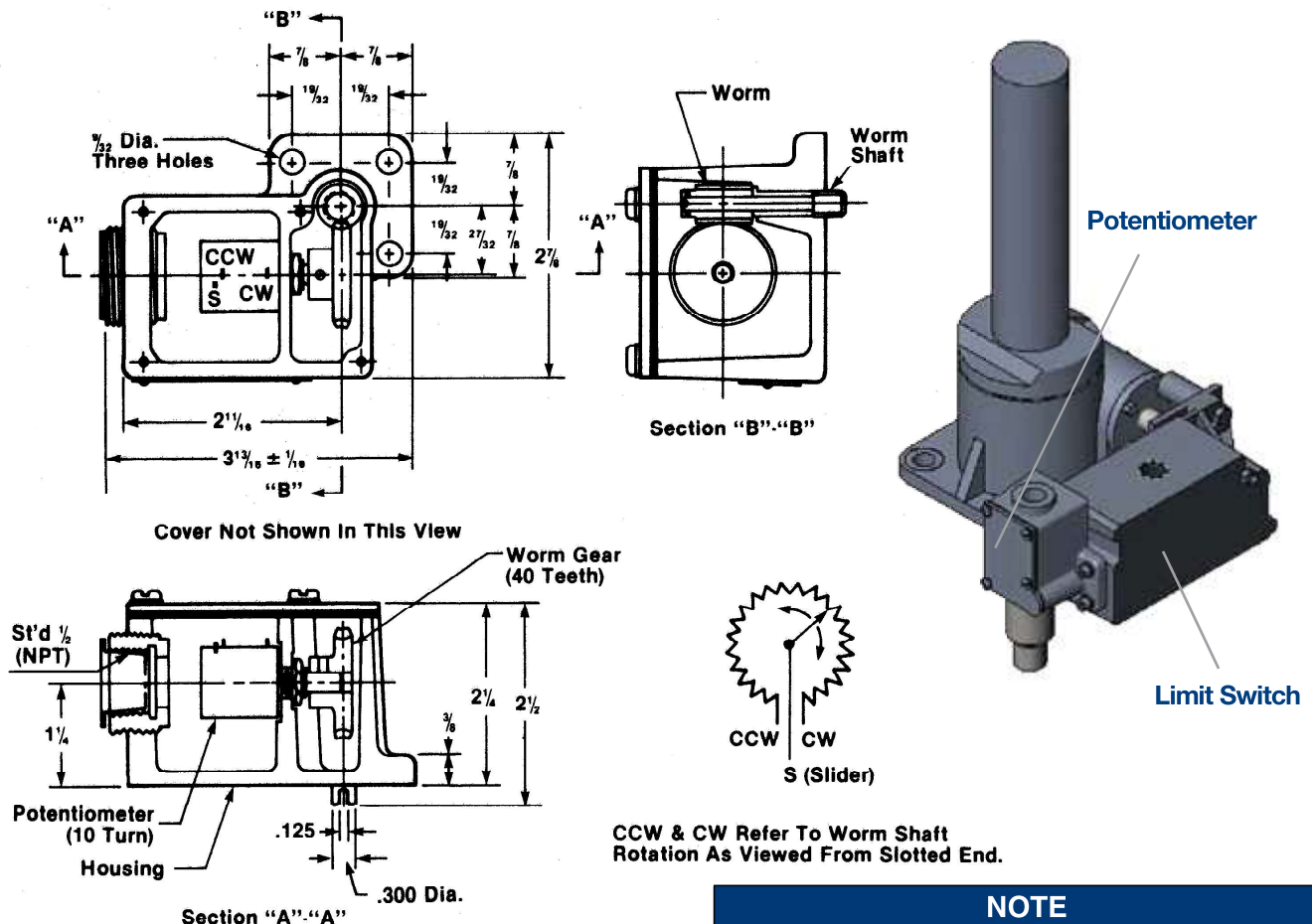
- Multiple gear ratios allow for a wide range of raises.
- Standard resistance is 5000 ohms. Other resistances are available on special order.
- Power rating: 2 watts at 40°C
- Maximum service temperature: 85°C
- Interface directly with the Model SK6300-4K Digital Position Indicator to provide a scalable readout of position. The SKA6205 series models can also be used with most motor controls that have provision for potentiometer feedback signal.
- Transducer supplied with black anodized finish as standard.

Potentiometer Performance Specifications

Model Number	Maximum Turns Potentiometer Worm Shaft
SKA6205-30	30
SKA6205-50	50
SKA6205-60	60
SKA6205-100	100
SKA6205-200	200
SKA6205-400	400

Note: When used with Duff-Norton actuators and limit switched the potentiometer selection should be:

$$\text{Desired potentiometer turns} = \frac{\text{Total stroke} \times \text{Worm turns per inch}}{\text{L.S. gear ratio}}$$



NOTE

Transducer shipped unattached, to be installed at site. Includes required mounting hardware; soldering to potentiometer required.

SCREW JACK ACTUATOR CONTROLS

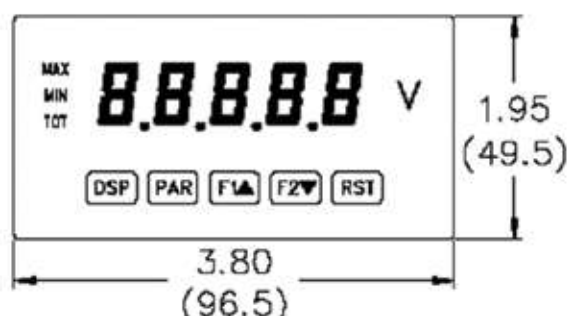
DIGITAL POSITION INDICATOR FOR DUFF-NORTON POTENTIOMETERS

The Duff-Norton model SK6300-4K Digital Position Indicator processes a feedback signal from a the SKA6205 series potentiometers to provide position readout with user selectable scaling factor. By running the actuator to two positions in its stroke and keying in the desired readout at each point, the indicator automatically scales the input signal to provide linear readout over the full travel of the actuator.

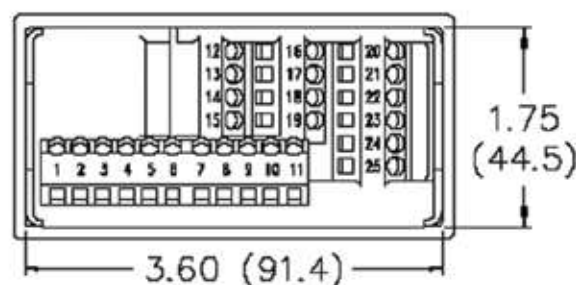
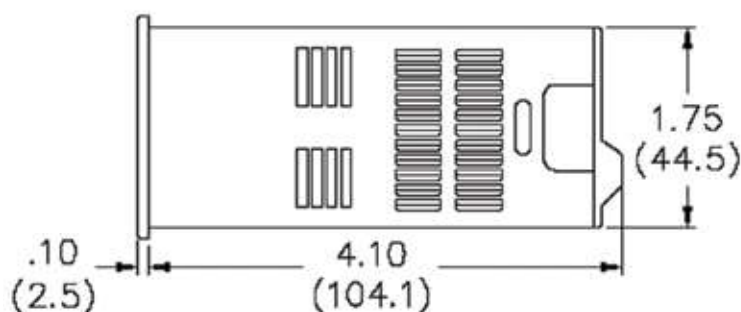
The SK6300-4K has a universal, 85-250 VAC power input and generates a regulated 24 VDC excitation signal to the potentiometer. The SK6300-4K operates seamlessly with any potentiometer equipped Duff-Norton actuator.

FEATURES

- Self scaling by inputting minimum and maximum readings – either by key stroke or input signal.
- Two adjustable up / down limits with 0 to +/- 99999.
- Accepts 1K to 10K potentiometer inputs.
- Programmable decimal point location.
- Input power requirement from 85 – 250 VAC.
- Programmable front panel functions.
- For use with Duff-Norton 2 through 150 ton machine or ball screw actuators.

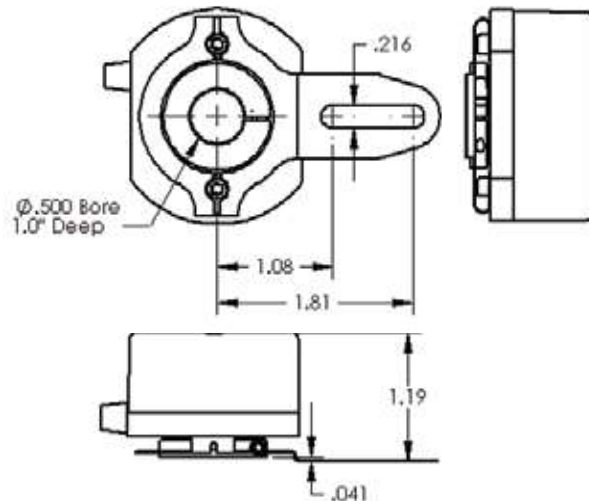


NOTE: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.4) H x 5.0" (127) W
Dimension in inches (mm)



Incremental Encoders

Incremental encoders provide pulses or counts back to a PLC or VFD. A PLC can be programmed to use encoder pulses to synchronize, position, or vary the speed of an electric motor. They can be mounted on limit switches, reducers, or electric motors and can offer a variety of different pulses per revolution (PPR). Incremental encoders can provide as little as one pulse per revolution up to several thousand pulses per revolution.

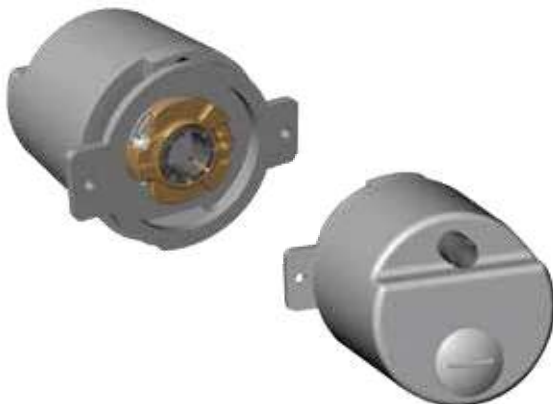


FEATURES

- Up to 10000 pulses per revolution (60 ppr standard)
- Input voltage 4.75 to +28VDC
- Operating temperature (-0° to +70°C)
- M12 cable connector or prewired cable options

Absolute Encoders

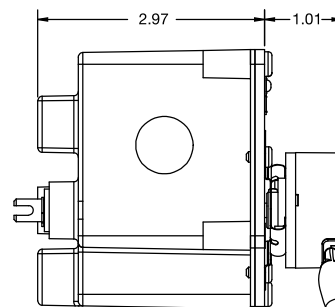
Absolute encoders work similarly to incremental encoders. Pulses or counts are monitored by a PLC or VFD. Ethernet/IP encoders communicate with a PLC over an Ethernet cable. Unlike incremental encoders, absolute encoders retain position through a power cycle. There is no need to reference or home absolute encoders after a power cycle.



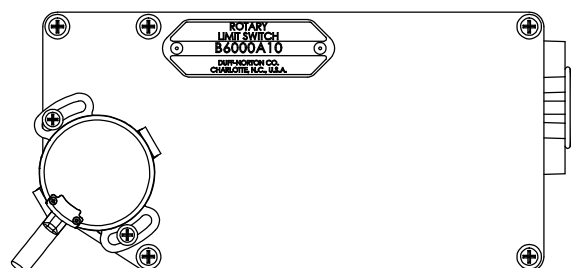
Ethernet/IP Absolute Encoder

Mounted Encoders

Try this new innovation from Duff-Norton! Customers can now choose to expand their controls capabilities with encoders mounted on our Duff-Norton B Series limit switches.



Mounted Encoder



SCREW JACK

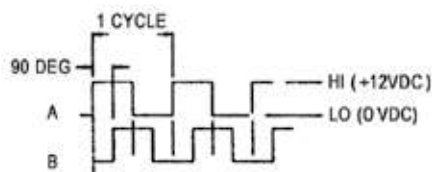
ACTUATOR CONTROLS

RING KIT ENCODER

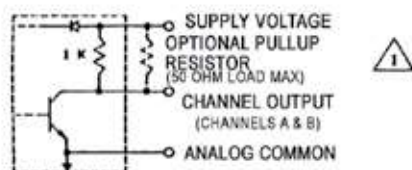
The Ring Kit Encoder counts motor revolutions and is mounted between the C-face motor and motor mounting flange. This mounting allows the actuator worm opposite the motor to be available for mounting a limit switch or driving another actuator. With 60 pulses per motor revolution, the ring kit offers a high pulse count relative to actuator travel. A small junction box with NPT opening is attached to the ring, allowing easy, protected electrical connections. Available for all sizes of NEMA C flanges used on Duff-Norton actuators. Additional output types available. Contact Duff-Norton Application Engineering for specifics.

SPECIFICATIONS

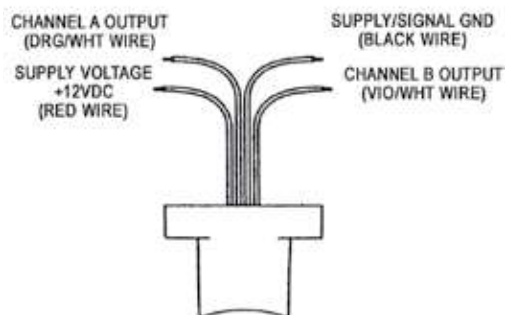
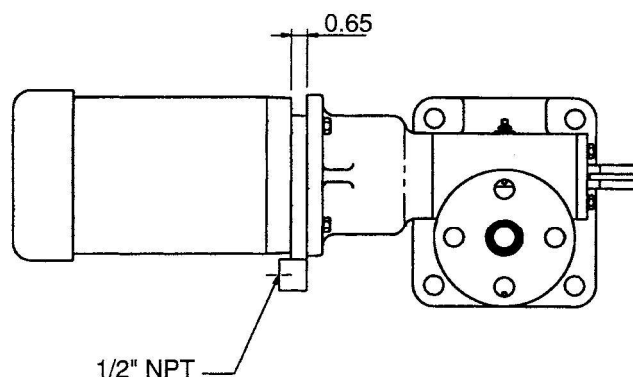
- Sensor Type..... Bidirectional shaft speed sensor
- Pulse Per Revolution 60 cycles each channel
- Supply Voltage..... 5 - 24VDC
- Supply Current..... 60 mA typical (115 mA maximum)
- Output Drive Capability .. 250 mA per channel continuous
- Maximum Load..... 50 ohms per channel



Output Channel Waveforms



Output Channel Schematic (Channels A & B)



Electrical Connections

SCREW JACK

ACTUATOR CONTROLS

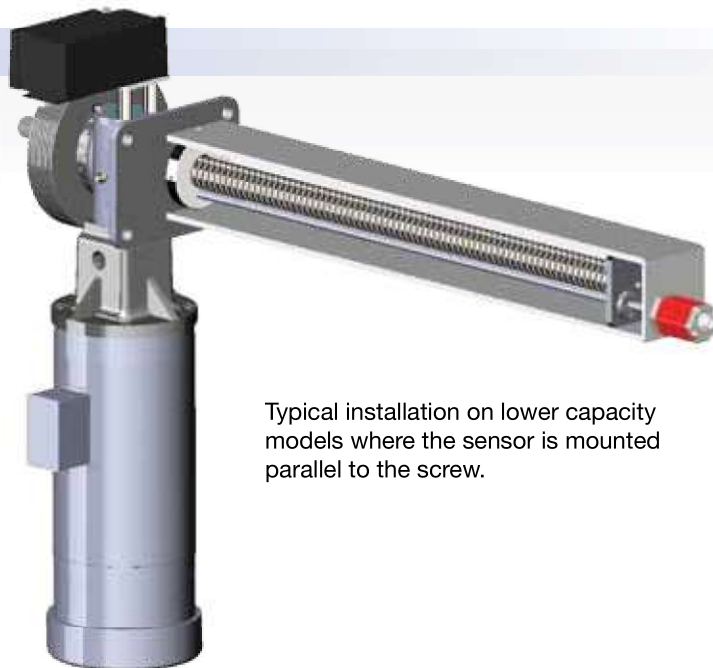
MAGNETOSTRICTIVE POSITION SENSOR

Duff-Norton offers Magnetostrictive Position Sensors for machine and ball screw actuators. These sensors offer analog or digital outputs, and can be used for accurate position indication or with a PLC in a closed loop control system. Magnetostrictive position sensors are non-contacting, resulting in longer life than other linear transducers or potentiometers.

Due to the fact that the magnet senses actual screw displacement, position indication is absolute and unaffected by gearset backlash.

FEATURES

- Absolute position indication
- Non-contacting, magnetostrictive technology
- Replaceable sensing element
- Fully enclosed in actuator coverpipe
- Lengths up to 60 inches (1525mm)
- Shock and vibration resistant
 - Analog or digital outputs
 - Voltage 0 to +10 vdc or +10 to 0 vdc
 - Current (4-20 mA or 0-20 mA grounded)
 - Start/stop
 - Pulse width modulated
- Open or closed loop control
- Available for a wide range of duff-norton machine and ball screw actuators



Typical installation on lower capacity models where the sensor is mounted parallel to the screw.

Typical installation on higher capacity models where the screw is "gun drilled" with the sensor mounted inside the screw.



SPECIFICATIONS

- Supply Voltage..... +15 to 26 VDC
- Non-Linearity $\pm 0.02\%$ of full scale on 0.002 inch whichever is greater
(± 0.05 mm) whichever is greater
- Repeatability..... $\pm 0.001\%$ of full scale, or ± 0.0001 in. (± 0.002 mm) whichever is greater
- Hysteresis 0.0008 in. (0.076 mm) maximum
- Measuring Range..... U.S. customary: 1 to 60 inch (0.1 inch increments)
Metric: 50 to 1500 mm (5 mm increments)

SCREW JACK

ACTUATOR CONTROLS

ROTARY COUNTERS

The Duff-Norton Rotary Counter is for actuator customers who are looking for a more economical and easy way to determine an actuator's position. Our counters have been designed to match our most common actuator ratios. An operator viewing the reading in the display window will know his actuator's exact position because the counter's display shows stroke to the nearest Thousandths of an inch up to 99 inches of travel. Custom numeric displays are also available.

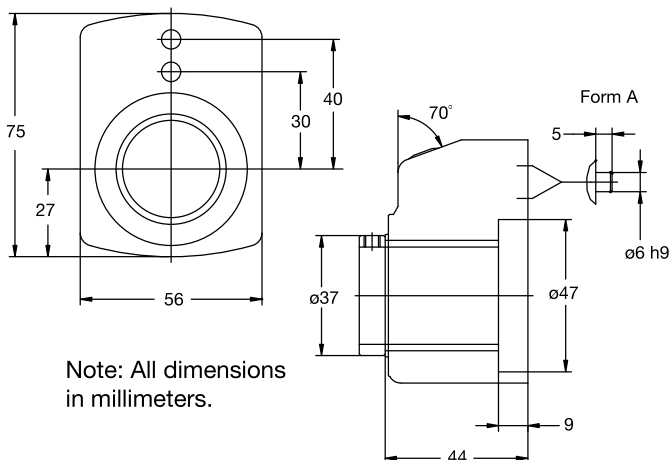
FEATURES

- Display readings have been pre-matched to the actuator's ratios.
- Display reading has been extended to the nearest Thousandths of an inch.
- Clockwise and counter clockwise models available.
- Easy mounting kits available for installation to existing field actuators.

Model Number	Turns of Worm for 1 Inch Raise	MS Actuator Capacity and Ratio				Approx. Width
		Standard	Optional 1	Optional 2	Numeric	
Clockwise Rotation						
RC16R	16	5-100 Tons				2 inch
RC24R	24	2-3 Tons				2 inch
RC32R	32			5 Ton		2 inch
RC48R	48		10-100 Ton	2-3 Ton		2 inch
RC64R	64		5 Ton			2 inch
RC96R	96		2-3 Ton			2 inch
RC100R	100				2-25 Ton	2 inch
Counter Clockwise Rotation						
RC16L	16	5-100 Tons				2 inch
RC24L	24	2-3 Tons				2 inch
RC32L	32			5 Ton		2 inch
RC48L	48		10-100 Ton	2-3 Ton		2 inch
RC64L	64		5 Ton			2 inch
RC96L	96		2-3 Ton			2 inch
RC100L	100				2-25 Ton	2 inch

Note: counter models with either 24 or 96 turns will be short .002 inch per inch. For those models, instead of a 1.000 inch reading, one would have a .998 inch reading.

Rotary Counter Installation



Rotary Counters - Mounting Information

The Duff-Norton Rotary Counter fits over the actuator's worm shaft. A special worm bushing fills dimensional difference between the counter's bore and the worms' diameter (see table). An anti-rotation pin from the counter's rear into the actuators' worm flange holds the counter steady.

Model Number	Bore Size	Capacity
SK8001-6	.500"	2 Ton MS
BU10-.625	.625"	3 Ton MS
BU10-.750	.750"	5 Ton MS
BU10-1.00	1.00"	10 - 20 Ton MS

Note: Capacities greater than 20 Tons have their worm diameters turned down to size.

