

NOPAK[®]

POSITION FEEDBACK

CATALOG NEPF
NOPAK ELECTRO POSITION FEEDBACK

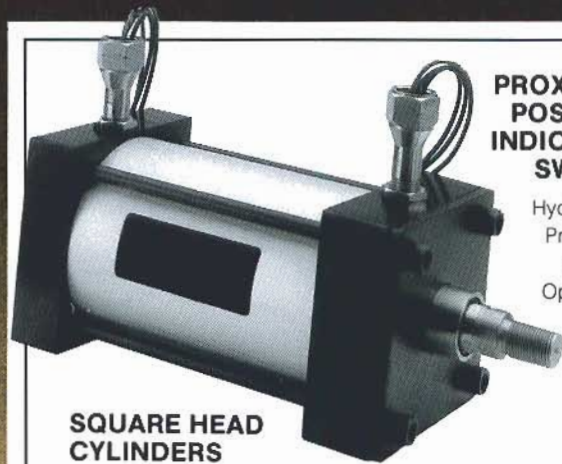


REED PROXIMITY SWITCH AIR CYLINDER

CLASS 1
CLASS 6

AVAILABLE FOR
1½ DIA. THRU
8" DIA. BORES

See Page 3



PROXIMITY POSITION INDICATOR SWITCH

Hydraulic or
Pneumatic
Cylinder
Operations

SQUARE HEAD CYLINDERS

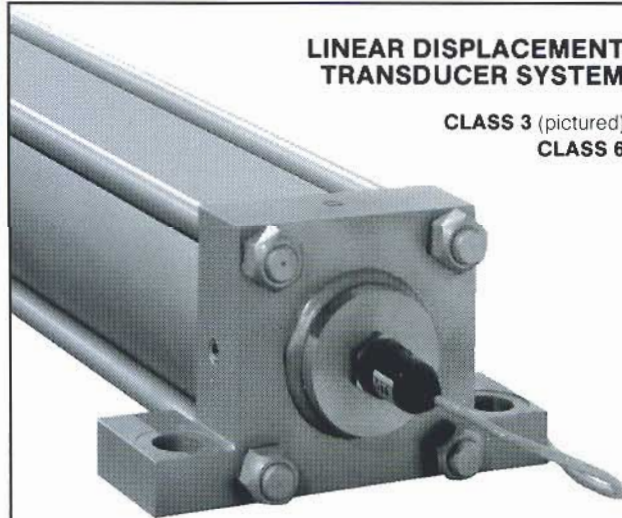
CLASS 3
CLASS 6

See Pages 4-5

- Non-contact design
- Long life
- Pressures to 3000 PSI
- High reliability
- Versatile, easy operation

LINEAR DISPLACEMENT TRANSDUCER SYSTEM

CLASS 3 (pictured)
CLASS 6



See Pages 6-7



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SWITCH APPLICATION GUIDE

See Page	Switch Type	PSI Max.	CYLINDER CLASS								SPECIFICATION					
			1	2	M	P6	H6	3	EP	7	Schematic	Current @ 120 VAC	Oper. Temp.	Max. Voltage	Advantages	
3	Reed Proximity 10990E00	250	1½" thru 8" Bore *		—	1½" thru 8" Bore	1½" thru 8" Bore *	—	*	All	—		3.0 Amp	-40°F. to 190°F.	120 VAC	1. Economical 2. Adjustable 3. Non-Contact
4-5	Position Indicator P1-3-2-0	3000	All	All	All	All	All	All	All	All		4.0 Amp	-22°F. to 250°F.	240 VAC 24 VDC	1. Durable 2. Resists Harsh Environment	
6-7	Linear Displacement Transducer T1-30	3000	—	—	—	2" Bore and Larger (Minimum 1.38" Dia. Rod)				—	Analog or Digital	N/A	-35°F. to 150°F. Other Ranges Available	N/A	1. Senses Entire Stroke With Extreme Accuracy 2. Non-Contact 3. Extreme Versatility	

* For low pressure hydraulic, non-ferrous tube is used.

NOPAK QUALITY WARRANTY

GALLAND HENNING NOPAK, INC. warrants every product of its manufacture to be of proper materials and first class workmanship. We agree to repair or replace, F.O.B. Factory, but not to remove or install in the field, any perishable "soft goods" such as seals, gaskets, etc., which fail within a six-month period after shipment, normal wear excepted. We warrant for one year from date of shipment, all other parts which fail because of defective materials or workmanship. GHN assumes no responsibility for work done or expenses incurred, in the field, pertaining to such repairs or replacements, except

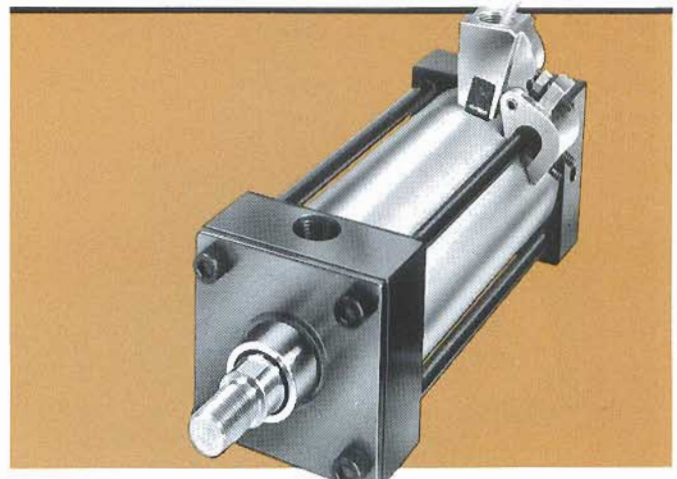
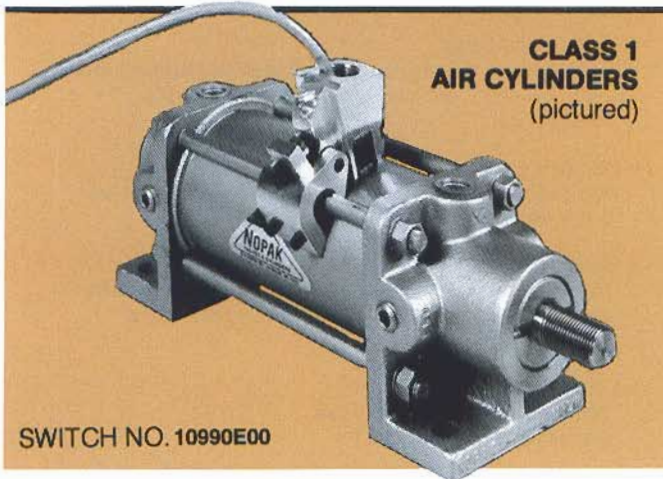
upon written authority from our home office. Components not produced by GHN are subject only to the warranty extended to GHN by their respective manufacturer. For a complete statement of terms and warranty, see your NOPAK distributor or the reverse side of any GHN order acknowledgement or invoice.

When orders have been correctly filled, there shall be no returns without GHN's approval. Such returns will be subject to a restocking charge.

REED PROXIMITY SWITCH CYLINDERS

AIR CYLINDER APPLICATIONS

Long Life/High Performance



FEATURES AND ADVANTAGES

- Adjustable mounting allows switches to be located anywhere within range of piston travel.
- Several switches may be mounted to control or initiate any sequence function.
- No externally moving parts to wear or maintain.
- Suited for use in plant environments where dirt and contamination create difficulties for electromechanical and other types of controls.
- Neon Indicator Light provides convenient means for positioning and trouble-shooting switch and circuits.
- Suitable for AC service only.

WORKING PRINCIPLE

Basically the Reed Switch consists of two overlapping ferro magnetic blades (reeds). The reeds are hermetically sealed inside a glass tube leaving a small air gap between them.

Since the reeds are magnetic, they will assume opposite polarity and be attracted to each other when influenced by a magnetic field. Sufficient magnetic flux density will cause the reeds to flex and contact each other. When the magnetic field is removed, they will again spring apart to their normal positions.

The cylinder/Reed Switch combination operates by using a magnetic band on the cylinder piston, which closes the externally mounted reed switch, as it approaches. When the piston moves away again the switch opens.

Proper application of this versatile REED SWITCH can offer millions of cycles of trouble free operation.

3 AMP REED SWITCH SPECIFICATIONS

Circuit — Normally open — SPST (Form A)
 VA (Max) — 360
 Switching voltage — 65-120 VAC (50/60 Hz)
 Current (Break) — 3.0 Amp
 Leakage — 1.7 mA
 Response Time — 1.5 ms On, 0.83 ms Off
 Switch Burden Current — 5 mA

Note: All incandescent loads derate switch capacity to 10% due to inrush current.

Moisture and dust proof (no NEMA rating)

SHOCK RATING

The basic switch can withstand up to 60 G maximum in the direction of contact closure without misfire or malfunction.

VIBRATION SENSITIVITY

Switch will withstand amplitude of 30 G at frequencies up to 6000 Hz without misfire. False operation can occur at vibration frequency levels higher than 6000 Hz.

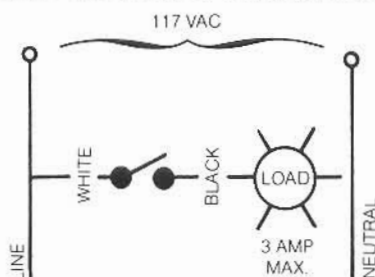
OPERATING TEMPERATURE

-40°F to +170°F for standard cable.

CABLE SPECIFICATION

The conductors are tinned copper with polyethylene insulation, conductors are cabled with a rayon braid, a tinned copper braided shield and a chrome vinyl jacket that is resistant to hydraulic fluids.

SWITCH WIRING SCHEMATIC



CAUTION:

Do not connect switch without a load. Permanent damage to switch will result.

NOTE:
 Switch is internally protected against failure due to normal electrical transient levels. However, it may be necessary to use additional transient protection if high levels exist.

ORDER NUMBERS

For switch and bracket assembly complete or separate units.

10990E00 For switch and bracket assembly

10988E00 Part No. - Switch Unit

3985E00 Part No. - Adjustable Bracket Unit

See Switch Application Guide on Page 2.

PROXIMITY POSITION INDICATOR SWITCH

HYDRAULIC OR PNEUMATIC CYLINDER OPERATIONS

SQUARE-HEAD CYLINDERS

NOPAK CYLINDER WITH SWITCH
NO. P — 1 — 3 — 2 — 0
 (pictured)



AVAILABLE IN —
CLASS 3
CLASS 6

- Non-contact design
- Long life
- Pressures to 3000 PSI
- High reliability
- Versatile, easy operation

For positive full indication of stroke Hydraulic and Pneumatic Cylinders

DESIGN FEATURES:

- **Very Economical**
Easy to install, Nopak Position Indicator Switches are totally self-contained, eliminating external power supply requirements.
- **Enclosure**
300 Series Stainless Steel provides reliable performance under even the most adverse conditions.
- **Hermetically Sealed**
To assure a clean, stable contact environment, the entire assembly is completely evacuated, then back-filled under pressure.
- **Long Life**
Tested to over 1,000,000 cycles. (Actual life varies with load.)
- **High Contact Pressure**
Heavy vibrations will not cause false operations of the switch. Good electrical characteristics for dry circuit and low load applications.

WORKING PRINCIPLE:

Nopak Position Indicator Switches are easily mounted in both hydraulic and pneumatic cylinder heads to confirm the position of the piston in either extended or retracted positions. Designed for versatility, Nopak switches can be mounted in virtually any position. When inserted in the cylinder head, the switch senses cushion sleeves position at end of stroke. Nopak's threaded switch screws easily into the cylinder heads making it a natural for accurate confirmation. Totally self-contained, the switch will not be contaminated by dirt, oil, grease, and most corrosive atmospheres. The non-contact design also eliminates the need for linkage or external actuators. Heavy duty construction allows the switch to withstand up to 3000 PSI of external pressure (higher pressure available upon request).

SPECIFICATIONS

CONTACT ARRANGEMENT:
Single Pole Double Throw SPDT (Form C)

CONTACT RATINGS:
 UL General Purpose (NEMA Type 1)
 240 VAC @ 2A
 250 VDC @ 0.5A Resistive

Although not UL rated, switch is suitable for:
 24 VDC @ 50 mA

TEMPERATURE RANGE:
 -40°F (-40°C) to 221°F (105°C)

RESPONSE TIME: 8 milliseconds

REPEATABILITY
 0.002" (0.05mm) of set point under identical operating conditions.

Consult Factory for other contact arrangements, ratings, terminations, and approvals.

PRINCIPLES OF OPERATION

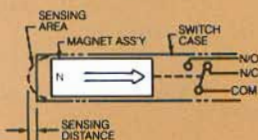
The Nopak Proximity Limit Switch is based on a revolutionary operating principle which utilizes "new," high energy, rare earth magnets to provide an end sensing range fixed at approximately .072" (1.83 mm) with a ferrous actuator. Use of an external magnet increases this appreciably. The differential

(hysteresis) is approximately half of the sensing range.

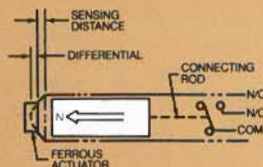
When time, accuracy, and dependability count... you can count on a NOPAK INDICATOR SWITCH. Maintenance free: engineered for precision performance and reliability.

NOTE: This is not a "reed" type switch.

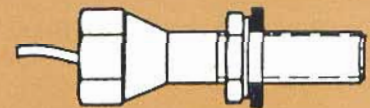
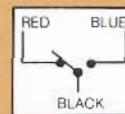
UNOPERATED



OPERATED

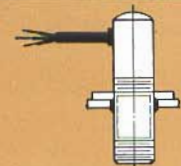


Wiring color code: Black = Common; Red = Normally Closed; Blue = Normally Open.

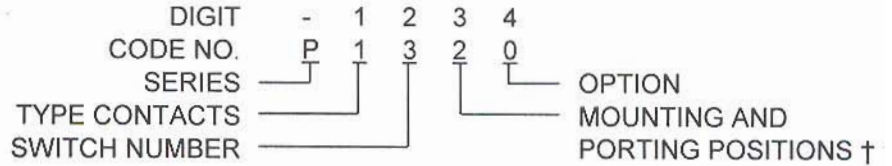


SWITCH ENCLOSURE INCORPORATES A 1/2-14 NPT CONDUIT CONNECTION. SWITCH WIRE CONNECTIONS ARE A POTTED 3 WIRE CABLE 18" LONG. EXTERNAL MOUNTING THREADS ARE LOCKED TO CYLINDER HEAD PORT WITH A HEX JAM NUT AND SEAL.

Where installation height is limited some switches are available with side-potted leads. Consult factory.



PROXIMITY POSITION INDICATOR SWITCH NUMBER ORDERING CODE

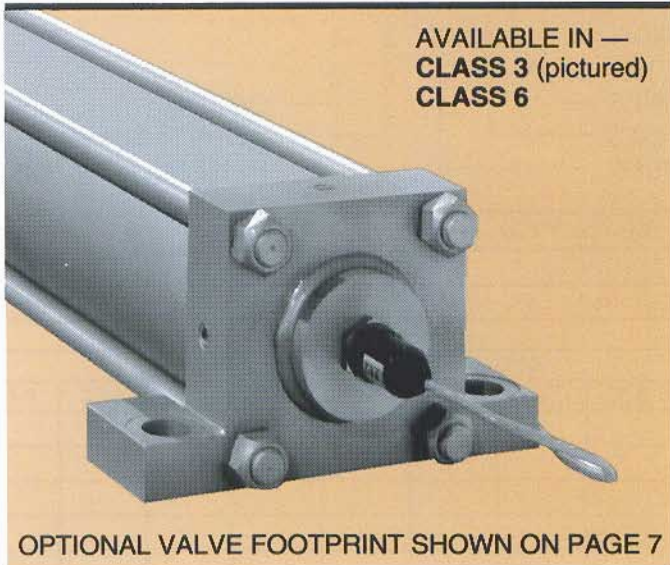


DIGIT	DESCRIPTION															
FIRST	1 SPDT, SINGLE POLE - DOUBLE THROW (FORM C CONTACTS)															
SECOND	SWITCH NUMBER CHART															
	CLASS 6															
	BORE SIZE	BLIND HEAD	ROD SIZE													
			0.63	1.00	1.38	1.75	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50		
	1.50	1	1	1												
	2.00	1	1	1	1											
	2.50	1	1	1	1	1										
	3.25	2		2	2	2	1									
	4.00	2		2	2	2	1	2								
	5.00	3		3	3	3	2	2	2	2						
	6.00	3			3	3	3	3	2	2	2					
	8.00	4			4	4	4	N/A	3	3	3	3	3	3		
	10.00	4				4	4	4	4	4	4	4	3	3		
	CLASS 3															
	BORE SIZE	BLIND HEAD	ROD SIZE													
			0.63	1.00	1.38	1.75	2.00	2.50	3.00	3.50	4.00	4.50	5.00	5.50		
	1.50	2	2	2												
	2.00	2		2	2											
	2.50	2		2	2	2										
	3.25	2			2	2	2									
	4.00	3				2	2	2								
	5.00	3					3	3	2	2						
	6.00	3						3	3	3	2					
	7.00	3							3	3	3	3	2			
	8.00	3								3	3	3	3	3		
THIRD	CODE NO. †	SWITCH POS.			INLET POS.			ADJUST POS.			CHECK POS.					
	2	2			1			4			3					
	4	4			1			2			3					
	1 ■	1			2			4			3					
	3 ■	3			1			4			2					
	0	IF SWITCH IS SOLD AS A SERVICE PART ONLY														
FOURTH	0 NO OPTIONS — SWITCH FURNISHED AS STOCKED.												† Code numbers 1 thru 4 (above) cover popular options. If your requirements differ, use "X" and describe all positions in writing.			
	9 CUSTOMER SPECIFICATION — OTHER THAN STOCKED															
<p>■ CONSULT FACTORY FOR LEAD TIME AND PRICE ADDERS, IF APPLICABLE, ON THE FOLLOWING CYLINDER MODELS:</p> <p>MODEL: B(MS3), FR(MT1), FB(MT2), G(ME5), and J(ME6).</p>														L-MAX		
														BORE	CLASS 6	CLASS 3
														1.50	4.88	4.25
														2.00	5.13	4.50
														2.50	5.38	4.75
														3.25	5.50	5.00
														4.00	5.50	5.38
														5.00	5.50	6.00
														6.00	5.88	6.50
														7.00	-	7.00
8.00	7.25	7.50														
10.00	8.25	-														

When Ordering: Code Number must be completed using options listed above.

For further detailed information contact your Nopak distributor.

NLDT SYSTEM



AVAILABLE IN —
CLASS 3 (pictured)
CLASS 6

OPTIONAL VALVE FOOTPRINT SHOWN ON PAGE 7

DESIGN AND PERFORMANCE FEATURES

- Non-contacting design — no wear, no friction, no noise and no adjustments.
- Completely solid state.
- Both analog and digital outputs are available.
- Quartz crystal time reference.
- Withstands corrosive environments and pressures up to 3000 psi.
- Feedback sensor inside cylinder is protected from debris and mechanical damage.
- Absolute output, not incremental — no loss of position at restart.

NOPAK LINEAR DISPLACEMENT TRANSDUCER

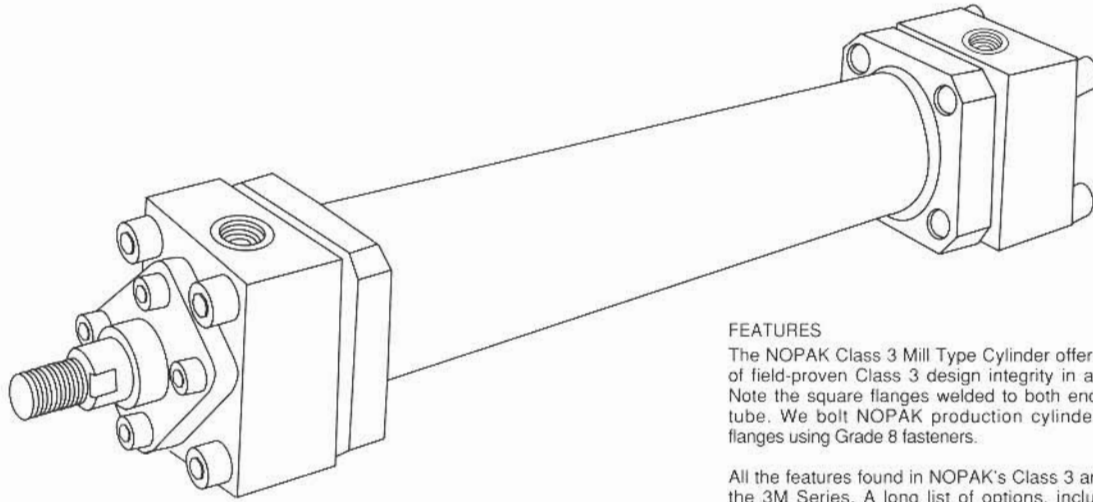
- **NOPAK** has a linear displacement transducer that is designed for use in air or hydraulic cylinder actuators. The transducer, available in lengths up to thirty feet, is threaded into the cylinder and sealed to withstand the pressures of hydraulic fluid. A permanent magnet is mounted on the piston end of the cylinder rod, and is used to determine the position of the piston inside the cylinder. Double ended rods not applicable.
- **HERE'S HOW IT WORKS:**
 It simply measures the time interval required for an electric current pulse to travel between two points. The two points of measurement are the fixed magnet located on the piston position and the sensor at the end of the transducer probe. This concept has been successful in eliminating considerable expense for potentiometers, tach generators, encoders, racks, pinions, and other special hardware.
- **ADVANTAGES PLUS:**
 Includes a non-contact operation, no wear, no noise generation, high reliability, infinite resolution (analog), high linearity (.05%), excellent repeatability (.002%), and direct digital output if required.

LDT Systems can be adapted to all Nopak P6, H6 and H3 cylinder diameters with a 1/8" diameter rod or larger.

We welcome the opportunity to discuss your applications and help you supply your needs.

NLDT SPECIFICATIONS

Electrical stroke	Standard — up to 25 feet.
Null	Positioned as required.
Null adjustment	2% of total stroke nominal.
Scale adjustment	1% of total stroke nominal.
Non-linearity	Less than $\pm 0.05\%$ of full range.
Repeatability	Better than $\pm 0.001\%$ of full range.
Temperature coef. of scale factor	Transducer — Less than $0.00011 \text{ inch}/^\circ\text{F} + [3 \text{ ppm}/^\circ\text{F per inch of full stroke}]$. Analog Output Module — $20 \text{ ppm}/^\circ\text{F}$.
Frequency response	Stroke dependent. 200 Hz to 50 Hz is typical for lengths of 12 inch to 100 inch respectively — wider response frequencies are available upon request. For digital systems, output is updated at discrete intervals.
Hysteresis	Less than 0.0008 in. maximum.
Output	Analog — 0 to +10 vdc, 4 to 20 mA ungrounded, (others available). Digital — pulse width modulated signal, TTL compatible.
Operating impedance	10 ohms.
Operating temperature range	-35°F to 150°F (transducer probe to 180°F).
Storage temperature range	-40°F to 180°F .
Operation in hydraulic fluid	The .375 inch dia. transducer probe is capable of operating in hydraulic fluid and will withstand 3,000 psi operating pressure.



FEATURES

The NOPAK Class 3 Mill Type Cylinder offers the advantages of field-proven Class 3 design integrity in a non-tie-rod unit. Note the square flanges welded to both ends of the cylinder tube. We bolt NOPAK production cylinder heads to these flanges using Grade 8 fasteners.

All the features found in NOPAK's Class 3 are incorporated in the 3M Series. A long list of options, including dual piston stop tube, integral LDT (Linear Displacement Transducer), servo or proportional valve footprint in cylinder head and multiple mounting styles are available.

WARRANTY

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NATIONAL
FLUID POWER
ASSOCIATION
MEMBER

GALLAND HENNING NOPAK, Inc.

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Catalog NEPF 10/03 10K Printed in U.S.A.

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