

REACTOR VALVE LIMIT SWITCH REPLACEMENT

ABERDEEN CHEMICAL PLANT

December 10, 1985

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ABERDEEN CHEMICAL PLANT

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LIMIT SWITCH REPLACEMENTABERDEEN CHEMICAL PLANTI. Purpose and Process Description

The purpose of this design is to provide the valves in VCM service with reliable indication of the valve position in the control room. The existing limit switches do not provide this reliability, since they are operated by the position of the actuator and not the position of the valve. This type of operation does not account for the possibility of shearing the coupling between the valve stem and actuator, which poses a potentially hazardous situation for a VCM release.

This design will provide each of the designated valves on the reactors and charge system with a new limit switch that operates on the position of the valve stem. These new limit switches will provide accurate indication in the control room and eliminate the hazard of a valve being open when it's acutator position is showing closed.

A total of 47 valves will be equipped with this new type of limit switch. These limit switches will be mounted on the bracket between the valve and the actuator. Drawings of several different types of valves with the new limit switches are attached. The valves which will be equipped with the new limit switches are listed in Table I.

TABLE I

<u>Reactor</u>	<u>Valve Location</u>	<u>Size</u>	<u>Manufacturer</u>
745	VCM Charge	6"	TuFlne (Plug) 300
+	VCM Charge	6"	TuFlne (Plug) 300
700	Main Dump	8"	Jamesbury (Ball) 300
	Evac./Rec.	8"	TuFlne (Plug) 300
600	VCM Charge	6"	TuFlne (Plug) 300
+	VCM Charge	6"	TuFlne (Plug) 300
500	Main Dump	8"	KTM (Ball)
	Eva./Rec.	6"	TuFlne (Plug) 300
400	VCM Charge	6"	TuFlne (Plug) 150
	VCM Charge	6"	TuFlne (Plug) 150
	Main Dump	8"	Jamesbury (Ball) 300
	Evac./Rec.	6"	Jamesbury (Ball) 300
300	VCM Charge	6"	TuFlne (Plug) 150
	VCM Charge	6"	TuFlne (Plug) 150
	Main Dump	8" ?	WKM (Ball) 300
	Evac./Rec.	6"	TuFlne (Plug) 300
744	VCM Charge	6"	Durco (Plug) 6411
743	VCM Charge	6"	TuFlne (Plug) 150
742	Main Dump	8"	WKM (Ball) 300 8134 - T312 <i>operator</i>
741	Evac./Rec.	6"	WKM (Ball) 6RB122

Charge System

New Module Charge Pumps

Suction	8"	WKM (Ball) 8RB101310
Discharge	6"	WKM (Ball) 6RB102
	6"	WKM (Ball) 6RB102

Old Module Charge Pumps

Suction	8"	TuFlne (Plug) 150
	8"	TuFlne (Plug) 150
Discharge	6"	Durco (Plug) Fig 0431
	6"	TuFlne (Plug) 150

Total Valves = 47

REACTOR VALVE LIMIT SWITCH REPLACEMENTABERDEEN CHEMICAL PLANTIII. Instrument Specification

<u>Item</u>	<u>Description</u>
PLS-101 through 147	Proximity Limit Switches



Conoco Inc.
Engineering Center
Ponca City, Oklahoma
SPECIFICATION SHEET

SPECIFICATION SHEET

PROJECT NO. _____

A F E (H) _____

DATE 7-31-85 (H) NO. _____MADE BY FAJ (H) NO. _____APPRO BY JRM (H) NO. _____

PLANT Aberdeen Chemical PROJECT Reactor valve Limit Switch Reprint

ITEM NO
SERVICE

PLS - 101 thru 147 Proximity Limit Switches

Quantity: 47 sets (There are two limit switches per set)

Service: Valve Indication

Location: On bracket between valve and actuator

Manufacturer: GO or company approved equal

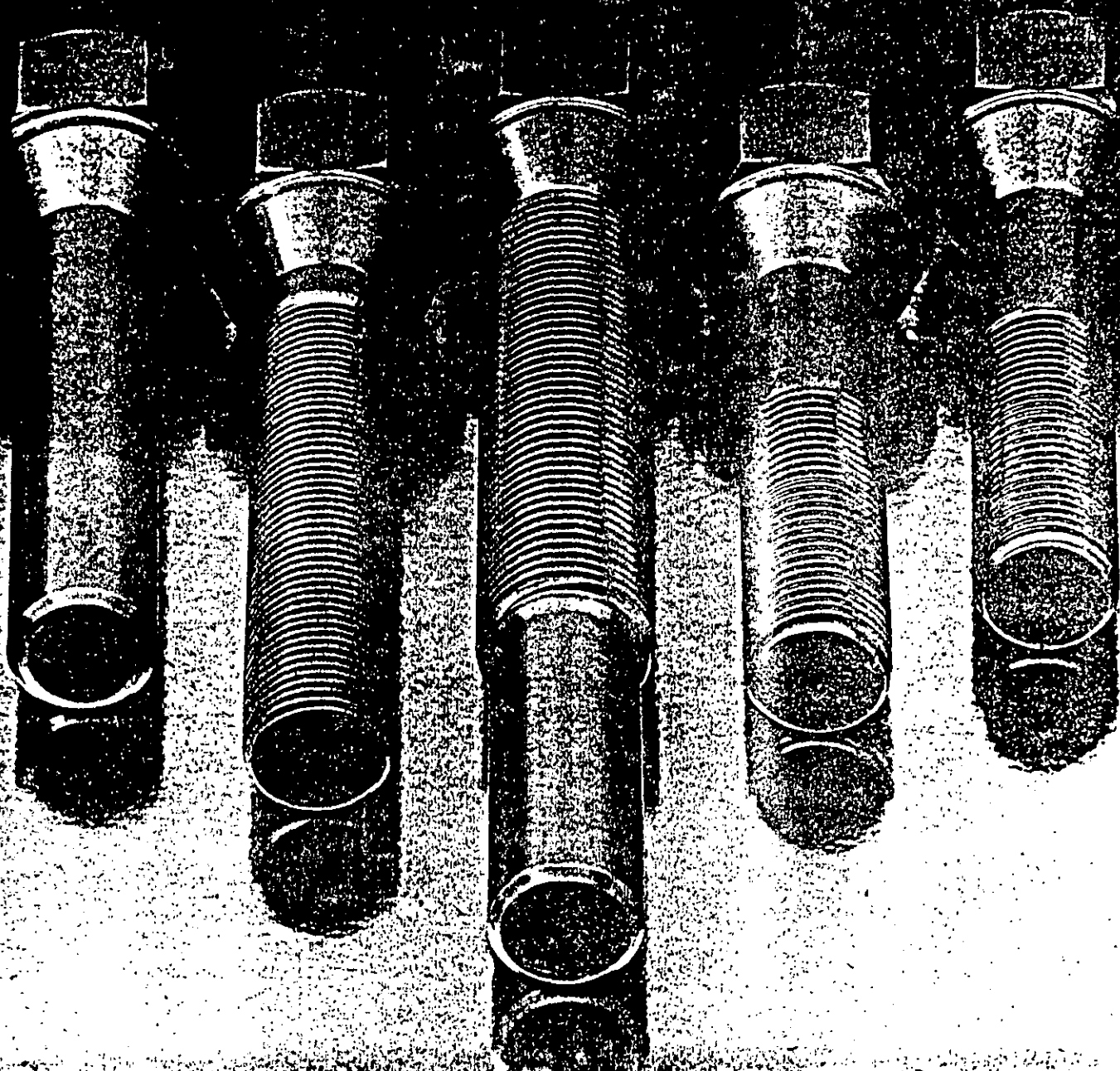
Model: 713774

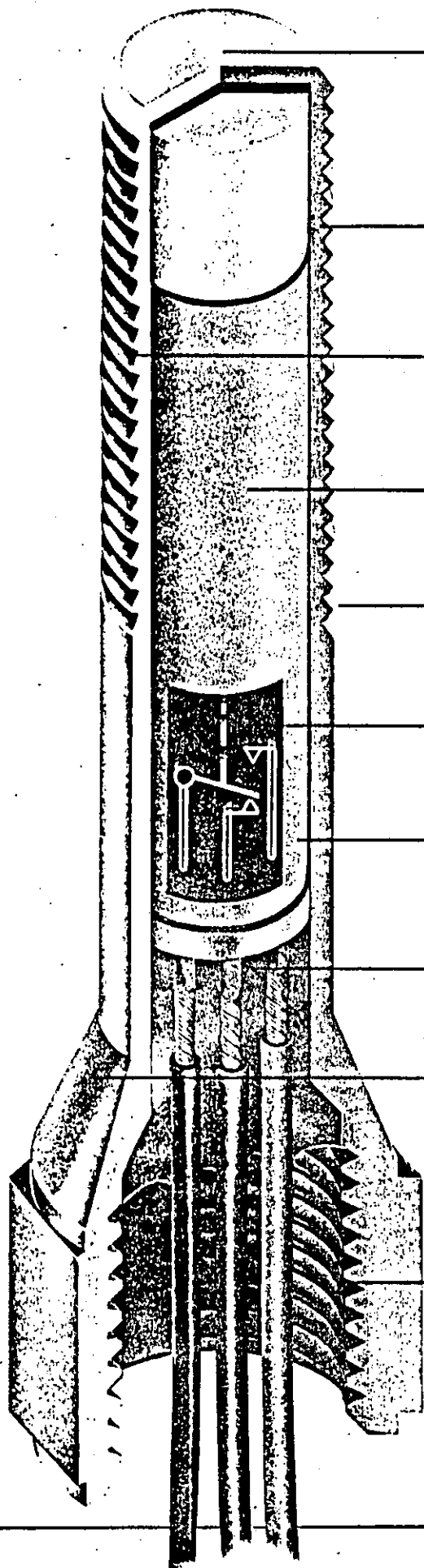
Description: 1/2 NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with 5/8 - 18 NF x 2.813" threads.

GO

Series 70 Switch

A Rugged and Dependable Line of Totally Enclosed Proximity Limit Switches
from General Equipment & Manufacturing Company, Inc.





End Cap: .050" Stainless Steel (304) End Cap, available with thicker End Caps for higher pressure.

Pressure Options: Normally the standard 5/8" diameter will withstand 2000 PSI. Larger cases with thicker walls and front End Caps will allow the switch to function at much higher pressures (up to 10,000 PSI). Certification available as factory option.

Case: 300 Series Stainless Steel case, plain or threaded body (5/8-18 NF). Different body lengths available, SEE options on MODELS AVAILABLE.

Magnets: Made with a high energy product magnet. An excellent coercive force which converts into grams of Contact Pressure for reliable operation. Meets MMPA Specifications.

External Threads: Machines to meet SAE 5/8-18 UNF Specifications. Units available with or without threads.

Contacts: Type Silver, Cadmium Oxide, resists welding and is some of the most widely used Contact Material in the industry. Sized to withstand approved ratings. Hermetically Sealed Contact Chamber.

Bearing: Consists of a finely ground Stainless Steel Pin and durable plastic housing. Sized to withstand a wide temperature range. Resists seizing and gives millions of free operations.

Potting: Terminal cavity filled with epoxy resin compound for sealing and mechanical support of wire/cable connections.

Body Tube: Made of Free Mechanical Stainless Steel. Resists most all harsh environments and withstands high working pressures. Impervious to water, oils and gases.

Internal Threads: 1/2-14 NPT. complies with CSA requirements for Explosion Proof Applications. Wire or cable leads available to meet Customer's Specifications.

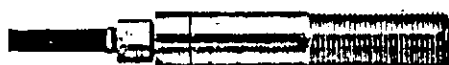
When time, accuracy, and dependability count... you can count on the 70 Series GO® Switch. Maintenance free; engineered for precision, performance and reliability.

The standard 70 Series GO® Proximity Limit Switch has been designed and built to rugged specifications for use in most industrial and environmental applications. Each switch is totally enclosed, hermetically sealed and capable of operating in hostile environments.

atmospheric conditions, with a broad operating temperature range. (See specification) Many different models of the switch are available for your design needs. (See ordering information for specifications, detail and options.)

The standard stainless steel housing is impervious to oils, caustic acids, water laden areas and most

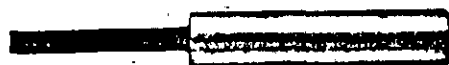
Standard Models



Model 713360
No conduit connection, 18" 3 conductor cable with water resistant squeeze connection, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



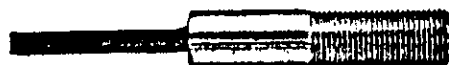
Model 713570
 $\frac{1}{2}$ NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 2.813" threads with 2 lock nuts.



Model 713420
No conduit outlet, 18" potted, 3 conductor cable, type 300 stainless steel housing, no threads.



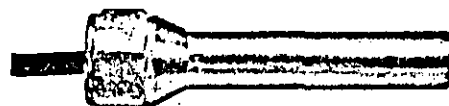
Model 713660
No conduit outlet, 18" potted, 3 wire leads, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



Model 713460
No conduit outlet, 18" potted, 3 conductor cable, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



Model 713720
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.



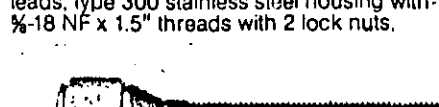
Model 713520
 $\frac{1}{2}$ NPT conduit outlet, 18" 3 conductor cable, type 300 stainless steel housing, no threads.



Model 713760
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



Model 713560
 $\frac{1}{2}$ NPT conduit outlet with 18" 3 conductor cable, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



Model 713770
 $\frac{1}{2}$ NPT conduit outlet, 18" potted 3 wire leads, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 2.813" threads with 2 lock nuts.

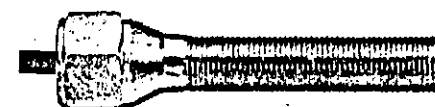
Hazardous Location approved models for Class I, Division 1, All Groups



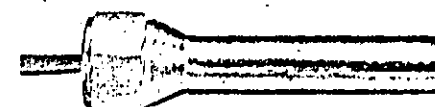
Model 713524
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing, no threads.



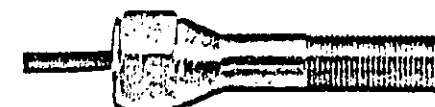
Model 713564
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



Model 713574
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 conductor cable, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 2.813" threads with 2 lock nuts.



Model 713724
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing, no threads.



Model 713764
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 1.5" threads with 2 lock nuts.



Model 713774
 $\frac{1}{2}$ NPT conduit outlet with 18" potted, 3 wire leads, type 300 stainless steel housing with $\frac{1}{2}$ -18 NF x 2.813" threads.



Approved switches are in compliance with current bulletins 1243, 1273 and 1308.

These switches are U/L and CSA approved for industrial control, general purpose use. See hazardous location approved models in Column 3, this page.

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $.XX \pm .01"$, $.XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator	V126411-1943
2	2	Mounting Bracket	V126411-1944
3	4	1/4-20 x 1/2 Hex Hd. Screw	
4	4	1/4 L.W.	
5	2	5/8 Shakeproof L.W.	
6	4	5/8 F.W. (1-5/16" O.D.)	

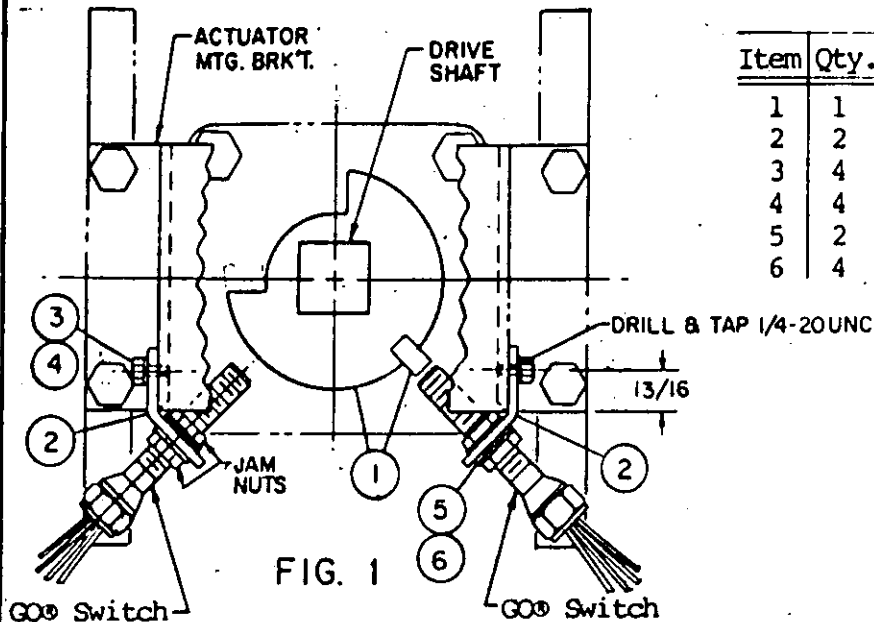


FIG. 1

INSTALLATION INSTRUCTIONS

1. Disassemble Actuator and Coupling from Valve and remove existing pointer.
2. Slide Switch Activator (item 1) onto drive shaft.
3. Drill and Tap Actuator Mtg. Brk't. for 1/4-20UNC screws and attach Mounting Bracket (item 2) with items 3 & 4.
4. Mount GO® Switches in Mounting Bracket (item 2) with two jam nuts supplied with switch and washers items 5 & 6.
5. Adjust Switches in slots on Mounting Bracket (item 2) to sense Switch Activator (item 1) in full open and full closed positions.

Note: 1. GO® Switches are not included in V.I.P. (Valve Indication Package) and should be ordered separately.

2. Use Model 713774 GO® Switches.

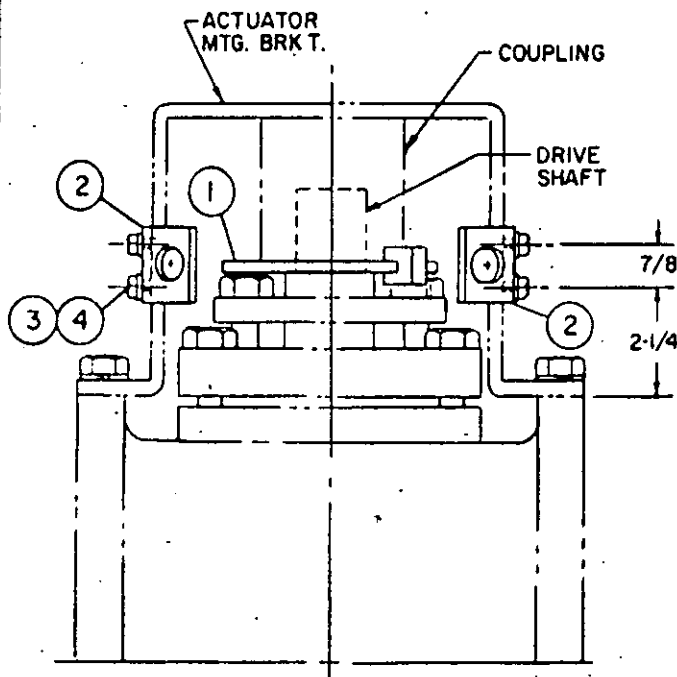


FIG. 2

Tag # 769 BVC

DWN. BY RON S.	DATE 9-28-83
CHK. BY	
APPD.	
NOTICE: Drawing contains confidential & proprietary material and is furnished upon request. It will not be used in any way contrary to the interest of General Equipment & Mfg. Co., Inc.	

70 SERIES GO® SWITCH V.I.P.
 ON DURCO 6" 150# G411 Valve
 WITH BETTIS ACTUATOR
 FOR CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA 40233
 (502) 860-2386, TWX 810-535-2786

GO.
SYSTEMS

DWG. NO.
 V126411-1942

REV.

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $.XX \pm .01"$, $.XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within _____ T.I.R.

NO.	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator	V907310-1951
2	1	Mounting Bracket	V907310-1952
3	1	Set Screw #12-24 x 1/4	
4	4	1/4-20 x 1/2 Hex Hd. Screw	
5	4	1/4- L.W.	
6	2	5/8 Ext. Tooth L.W.	
7	2	5/8 F.W.	

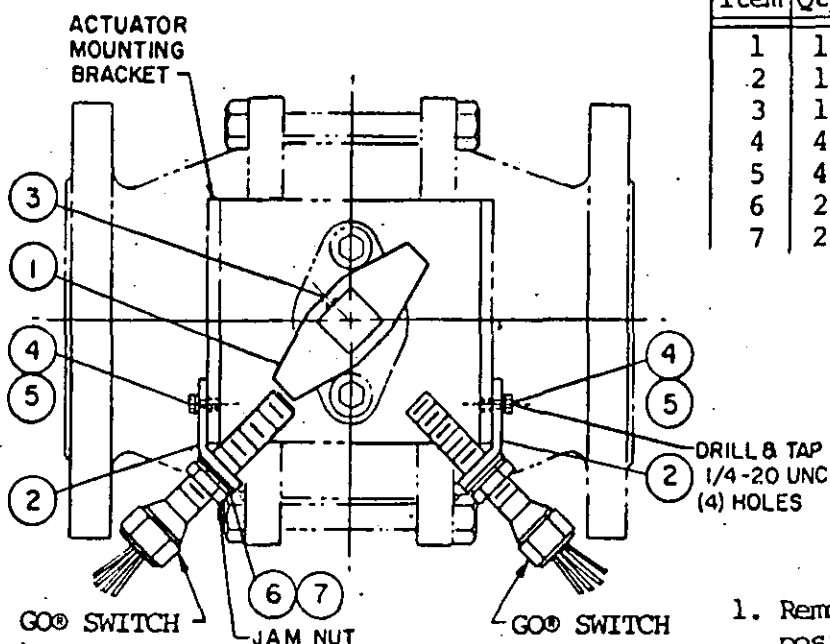


FIG. 1

INSTALLATION INSTRUCTIONS

1. Remove Actuator, Coupling and Existing position indication plate.
2. Slide Switch Activator (item 1) onto drive shaft and secure with set screw (item 3).
3. Assemble GOO Switches to Mounting Bracket (item 2) with Jam Nuts supplied with switches and washers items 6 & 7.
4. Place Switch mounted on bracket on sides of Actuator mounting bracket and align switch with Activator (item 1) then match drill Actuator mounting bracket with holes in Mounting Bracket (item 2). Secure with items 4 & 5.
5. Switches should sense Switch Activator when Valve is in full open and full closed positions.

NOTE: GOO Switches are not included in V.I.P. (Valve Indication Package) and should be ordered as a Separate item.

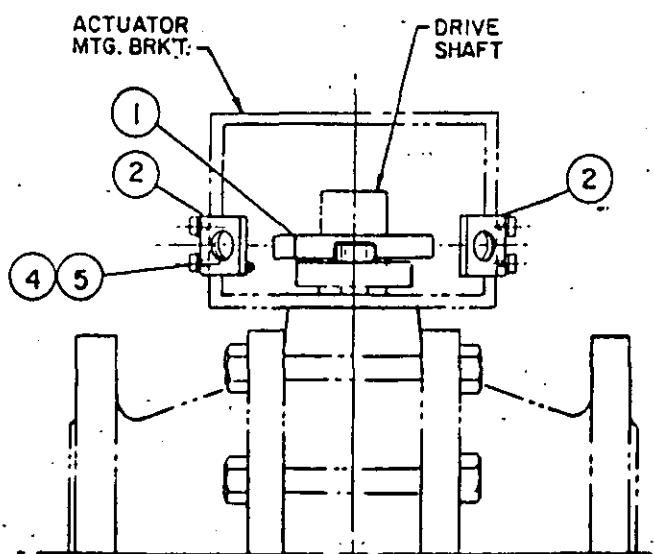


FIG. 2

DWN. BY	DATE
RON S.	10-5-83
CHK. BY	
APPD.	

NOTICE: Drawing contains confidential & proprietary material and is furnished upon condition that it will not be used in any way detrimental to the interest of General Equipment & Mfg. Co., Inc.

70 SERIES GOO SWITCH V.I.P.
 ON
 W-K-M 310 BALL VALVE 4"
 FOR
 CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 969-2306, TWX 810-636-2786

GO
SYSTEMS

DWG. NO.
 V 907310-1950

REV.

Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, $.XX \pm .01"$, $.XXX \pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator	V907310-1955
2	1	Mounting Bracket	V907310-1954
3	1	Set Screw #12-24 x 1/4	
4	4	1/4-20 x 1/2 Hex Hd. Screw	
5	4	1/4- L.W.	
6	2	5/8 Ext. Tooth L.W.	
7	2	5/8 F.W.	

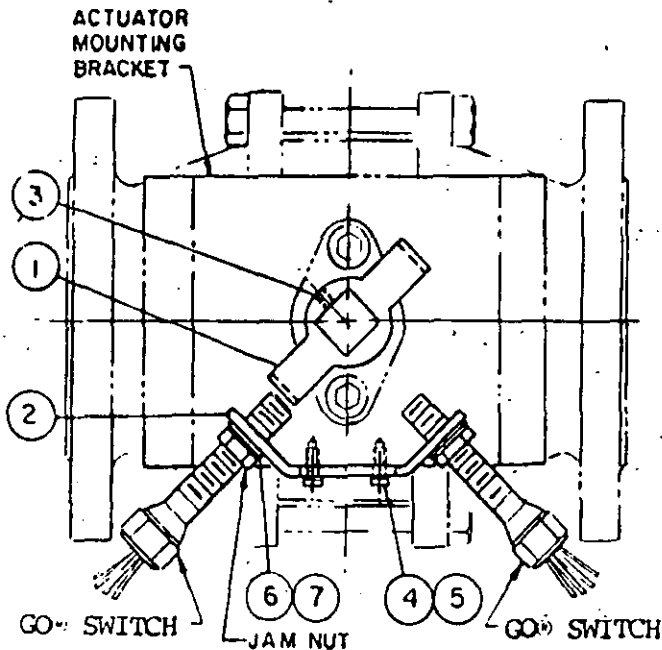


FIG. 1

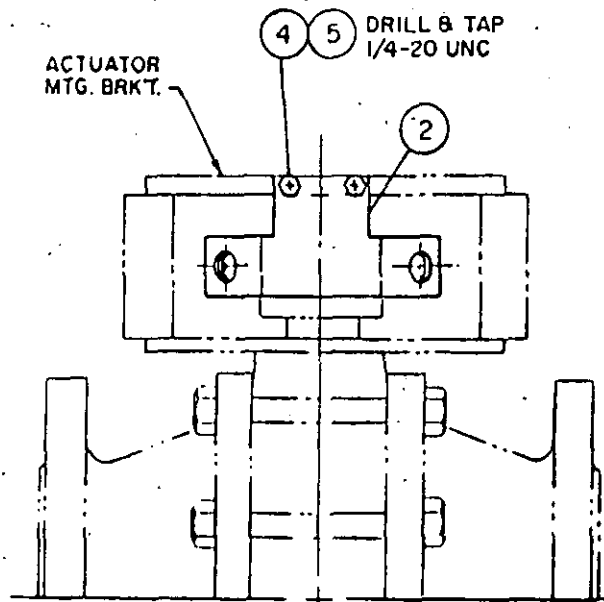


FIG. 2

INSTALLATION INSTRUCTIONS

1. Remove Actuator, Coupling and Existing position indication plate.
2. Slide Switch Activator (item 1) onto drive shaft and secure with set screw (item 3).
3. Place Mounting Bracket (item 2) onto Actuator Mtg. Brk't. and mark position of two holes. Drill and tap for 1/4-20 UNC holes. Secure Mounting Bracket (item 2) (item 2) with items 4 & 5.
4. Screw GO® Switches into Mounting Brk't. (item 2) till Gap between end of switch & Switch Activator (item 1) is approx. 1/16". Secure with Jam Nuts that are included with Switches and with washers (items 6 & 7).
5. Switches should sense Switch Activator when Valve is in full open and full closed positions.

NOTE: GO® Switches are not included in V.I.P. (Valve Indication Package) and should be ordered as a Separate item.

Tag # CV 754 & CV 760

DWN. BY RON S.	DATE 10-	70 SERIES GO® SWITCH V.I.P. ON W-K-M 310 BALL VALVE 6" FOR CONOCO	GENERAL EQUIPMENT & MANUFACTURING CO., INC. 3300 FERN VALLEY ROAD P.O. BOX 37290 LOUISVILLE, KENTUCKY, USA, 40233 (502) 969-2386, TWX 810-535-2766	
CHK. BY				
APPD.				
NOTICE: Drawing contains confidential & proprietary material and is furnished upon condition that it not be used in any way detrimental to the interest of General Equipment & Mfg. Co., Inc.				
			DWG. NO. V 907310-1953	REV.

TOLERANCES Unless otherwise specified
 Angles: $\pm 1^\circ$, Fractions: $\pm 1/32"$, XX $\pm .01"$, XXX $\pm .005"$
 Surfaces must be Concentric, Parallel, Flat & Square
 (as applicable) to each other within T.I.R.

NO.	REVISION	DATE	BY	APPD.

MATERIAL LIST

Item	Qty.	Description	Dwg. No.
1	1	Switch Activator V402800-1948	
2	1	Mounting plate V402800-1949	
3	3	#10-24 x 1/2 Rd. Hd. Screw	
4	3	#10 Ext. Tooth L.W.	

INSTALLATION INSTRUCTIONS

1. With Valve Actuator removed slide Switch Activator (item 1) onto drive shaft as shown in figure 1.
2. To Mount Mounting Bracket (item 2) match drill and tap for three #10-24 UNC screws and attach item 2 to Actuator mounting bracket with items 4 & 5.
3. Screw GO Switches into threaded holes on Mounting Bracket (item 2) and secure with jam nuts included with switches.
4. Adjust Switches to sense triangular bars on Switch Activator when Valve is in full open or full closed positions.

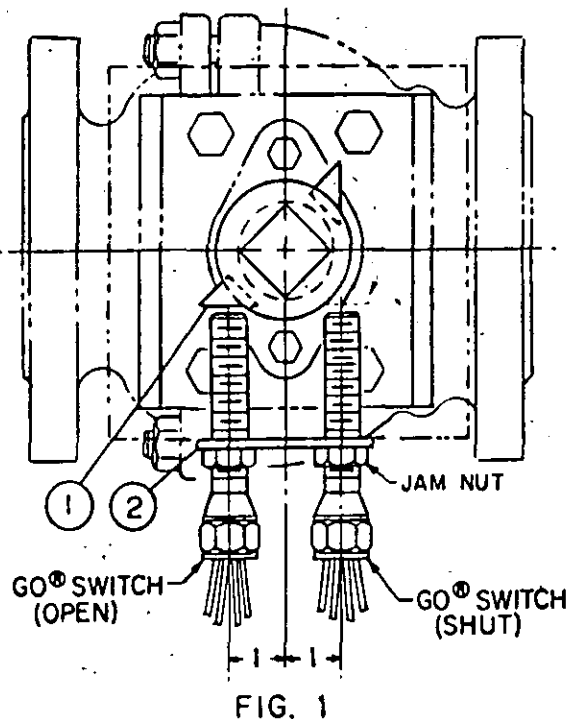


FIG. 1

MATCH DRILL FOR THREE
 10-24 UNC-2B THREADED
 HOLES

ACTUATOR
 MTG. BRKT.

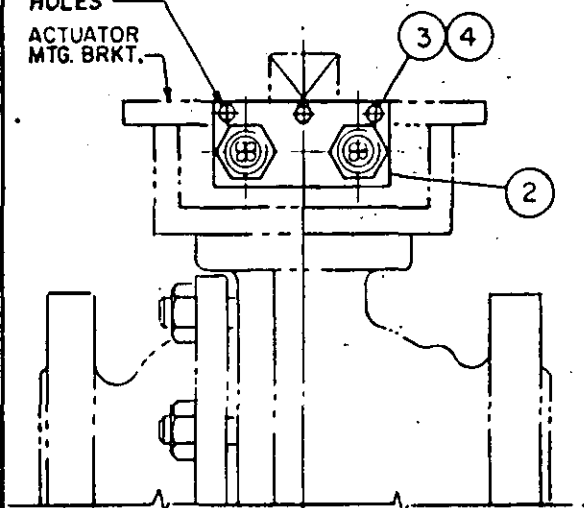


FIG. 2

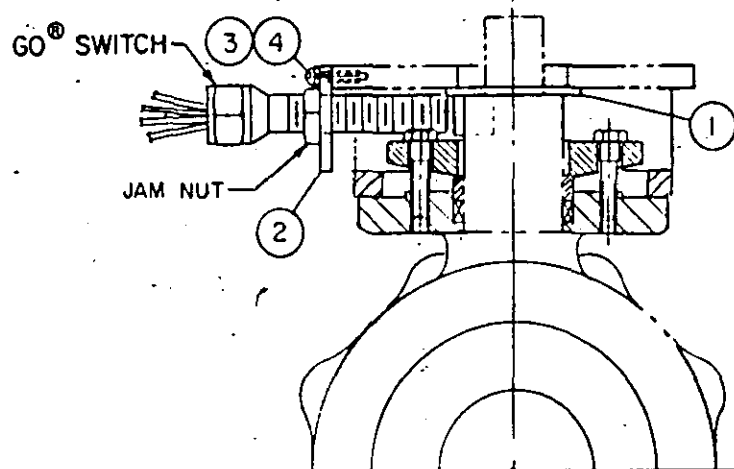


FIG. 3

DWN. BY RON S.	DATE 10-3-83
CHK. BY	
APPD.	

NOTICE: Drawing contains
 confidential & proprietary material
 and is furnished upon condition
 that it will not be used in any way
 detrimental to the interest of
 General Equipment & Mfg. Co., Inc.

70 SERIES GO® SWITCH V.I.P.
 ON KTM 6" VALVE E0800
 WITH JAMESBURY ACTUATOR
 FOR CONOCO

GENERAL EQUIPMENT
 & MANUFACTURING CO., INC.
 3300 FERN VALLEY ROAD
 P.O. BOX 37290
 LOUISVILLE, KENTUCKY, USA, 40233
 (502) 969-2388, TWX 810-535-2786

GO.
SYSTEMS

DWG. NO.
 V402800-1947

REV.