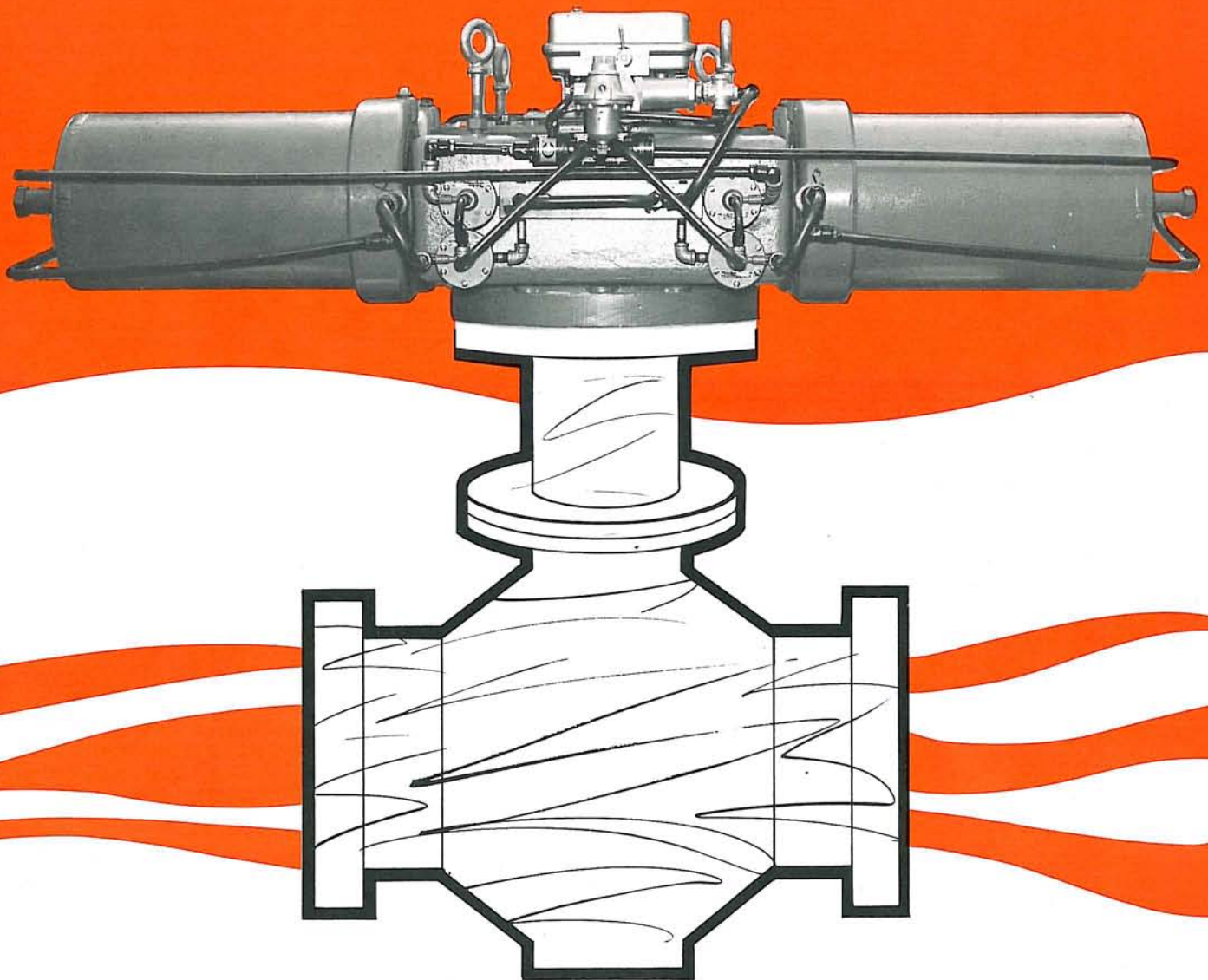


BETTIS ROBOTARM[®]

ROTARY VALVE ACTUATORS



HEAVY DUTY SERIES



3100 FALL AT GRAND • P. O. BOX 14689
PHONE: (713) RI 8-1143 • HOUSTON, TEXAS 77021

THE BETTIS ROBOTARM®

... is a superior cylinder-type actuator of proven design. Robotarm Actuators provide positive remote control for any type of rotary operation of ball, butterfly or plug valves, or any other 90°-180° rotating mechanism. Rugged, economical, simple—Robotarm Actuators afford the most practical and reliable method for opening and closing valves by remote signal.

All Robotarm Actuators are compact, totally enclosed and sealed. Adjustable stops in the actuator maintain precise position repeatability. All models of the Robotarm are so designed that no side thrust is imparted to the valve stem.

WIDE TORQUE RANGE

Robotarm Actuators are available in a wide variety of sizes, with opening and closing torque ranging from one hundred to one million inch-pounds. Pneumatic or hydraulic pressure can be utilized to operate Robotarm units. Actuators that operate off direct line pressure, on pressures from 40 to 2,000 psig., are also readily available.

EASY FIELD INSTALLATION

Robotarm Actuators are furnished as complete units, with all mounting accessories, ready for quick installation. Robotarm units fit like a socket wrench over the valve stem. The rotating plug or yoke is adapted to fit the stem of the valve before shipment. This shaft is hollow to allow extension of the valve lubricator fitting where necessary. Installation on the valve is simple, and can be performed easily in the field. In only rare instances is any valve alteration necessary or desirable. No special tools are required to mount the Robotarm. Units may be mounted in any position, horizontally or vertically. They may be mounted in line with or at right angles to the run of the valve. Square extensions for gear reduction or hydraulic manual assist equipment are available.

PERMANENT LUBRICATION

All bearing surfaces are coated with a baked-on coat of molybdenum disulfide for permanent lubrication. An optional feature is an oil bath, with all moving parts submerged. This increases the assurance of long-life, low maintenance, and trouble-free operation.

SIZES AND MODELS

Robotarm Actuators are manufactured to operate valve sizes from 1/4-inch to 42-inch. There are two basic designs, Scotch Yoke and Rack & Pinion. In addition to standard double-acting units, spring-return fail-safe and throttling models are available. Units are manufactured to give 180° of turning operation for automatic spheroid launching into pipe lines.

TEMPERATURES

All heavy duty Robotarm Actuators are designed to function in ambient temperatures from minus 20° to plus 200°F. Special packings and lubricants can be furnished for ambient temperatures ranging beyond these limits.

SPECIAL ACTUATORS

Special Robotarm Actuators are available (1) for operation on hydraulic pressures up to 3,000 psi.; (2) to adapt 90° rotation valves to line pressure regulators, relief valves or emergency shut-off valves; (3) for 180° three-position valve operation; (4) for operation of dampers, diverters, and other rotating devices.

POSITIVE FAIL-SAFE SPRING RETURN ACTUATORS



Spring Return Robotarm Actuators afford POSITIVE opening or closing where absolute emergency shut-down is imperative. Fail-safe spring return units are available in all models to close—or open—a valve on loss of operating pressure. Bettis spring return actuators are the only actuators which provide "Service-Safe" spring-loading. Unique internal spring-loading features make it practical to safely dismantle and service Robotarm Actuators in the field without special equipment and without danger to personnel.

HEAVY-DUTY SCOTCH YOKE OIL BATH ACTUATOR



Scotch Yoke Rotary Actuators are available in single, double, or quad piston models depending on the valve torque requirement. The Scotch Yoke Actuator operates on a yoke attached to the stem of the valve. The yoke is attached to a pin and roller on the piston rod. When pressure is applied, the piston moves horizontally and turns the yoke and drive to open the valve. When reverse pressure is applied, the piston rod moves back and the valve is closed. The design of the Scotch Yoke Model is such that the torque output is greatest at the breaking and closing positions. This coincides with most valve requirements.

Standard actuators operate on air, gas or hydraulic oil. Actuators with special trim can be furnished for water operation.

The Scotch Yoke Robotarm Actuator features a totally enclosed yoke and piston assembly fully submerged in the oil bath. An oil fill plug in the actuator housing affords easy access for lubrication. The rotating torque shaft has a recess in the bottom which can be factory machined to fit the size and shape of the valve stem to be actuated. The shaft is hollow to allow extension of the valve lubrication fitting where necessary. External adjustable stops are furnished with the actuator so that valve stops are not used

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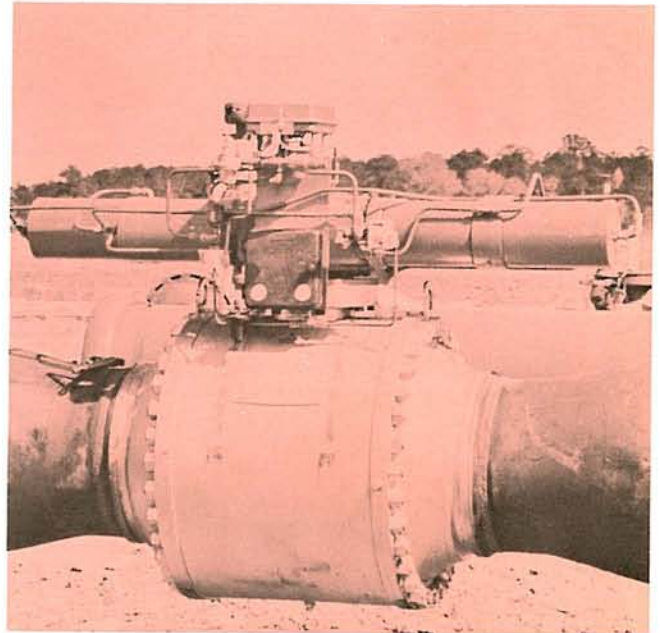
ROBOTARM ACTUATORS FOR REGULATION SERVICE AND METER TUBE SWITCHOVER SERVICE

The Robotarm Actuator is used in many installations as the driving "muscle" of a plug valve or ball valve regulator. In this service the actuator is equipped with a positioner which in turn takes its signal from a pressure or differential controller. Installations using the actuator-valve-positioner combinations acting as monitor and working regulators have been in service for many years with relatively little maintenance and few problems.

Ball valve regulators using Robotarm actuators-positioner-ball valve combinations have excellent low flow characteristics with high flow capacities many times that of conventional regulators. Also in the high flow condition there is relatively no pressure drop through the valve as would occur with conventional regulators.

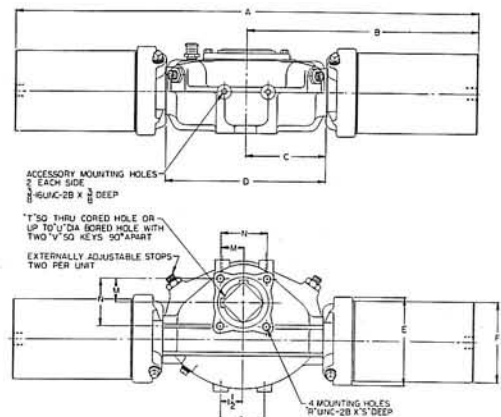
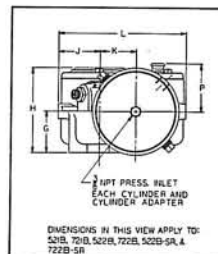
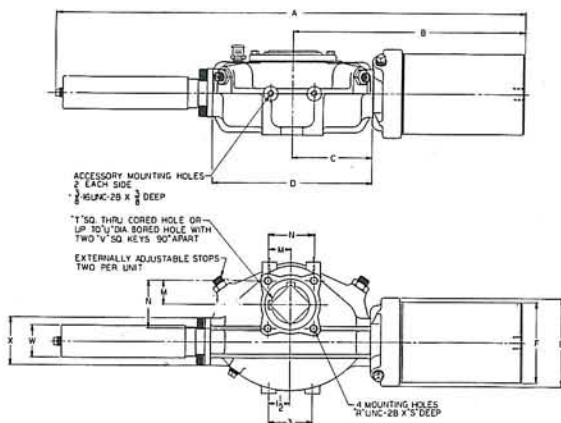
Actuators used in meter runs are equipped with pilot actuated four-way valves taking a signal from a differential limit controller. As the capacity of the primary meter run is exceeded the differential limit controller signals the actuator to open the second meter run and then the third, etc., until the full capacity of the station is utilized. As the demand through the station decreases the actuators close the respective meter runs in reverse order.

The pressure or differential limit controllers can be furnished mounted and piped to the actuator to the customers specifications. In most installations the controllers are furnished by the customer and field mounted. The positioners should be factory mounted by Bettis to insure proper functioning.



Model 2744 Robotarm Actuator equipped with positioner and overpressure controls to close valve when pressure exceeds the rating of the pipeline. Actuator is shown installed on 20" ASA 600 ball valve in regulating service.

ACTUATOR DIMENSIONS — INCHES



MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	X
521 B	31 1/2	16 1/2	5 3/8	11 1/8	5 1/8	5 3/8	2 1/2	5 5/8	2 7/8	2 1/2	8 3/4	1 1/2	3 1/2	3 1/2	1 1/2	4 1/2	2 1/2	2 5/8	8 5/8	2 1/2	3 3/4
721 B	31 1/2	16 1/2	5 3/8	11 1/8	7 1/2	8 1/8	2 1/2	5 5/8	2 7/8	2 1/2	8 3/4	1 1/2	3 1/2	3 1/2	1 1/2	4 1/2	2 1/2	2 5/8	8 5/8	2 1/2	3 3/4

521B
721B

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V		
522B	33 1/2	16 1/2	5 3/8	11 1/8	5 1/8	5 3/8	2 1/2	5 5/8	2 7/8	2 1/2	8 3/4	1 1/2	3 1/2	3 1/2	1 1/2	4 1/2	2 1/2	2 5/8	8 5/8	2 1/2	3 3/4
722B	32 1/2	16 1/2	5 3/8	11 1/8	7 1/2	8 1/8	2 1/2	5 5/8	2 7/8	2 1/2	8 3/4	1 1/2	3 1/2	3 1/2	1 1/2	4 1/2	2 1/2	2 5/8	8 5/8	2 1/2	3 3/4

522B
722B



ROBOTARM[®] VALVE ACTUATORS

TORQUE OUTPUT

OLD MODEL NUMBER	NEW MODEL NUMBER	Torque Output Inch-Lbs.	OPERATING PRESSURE — POUNDS PER SQUARE INCH										
			40	50	60	70	80	90	100	125	150	200	250
	150-A	RUNNING	DISCONTINUED										
301-BD	301-C	RUNNING	800	1,000	1,200	1,400	1,600	1,800	2,000	2,500	3,000	4,000	5,000
521-A	521-B	BREAK RUN	2,400 1,600	3,000 2,000	3,600 2,400	4,200 2,800	4,800 3,200	5,400 3,600	6,000 4,000	7,500 5,000	9,000 6,000	12,000 8,000	
522-A	522-B	BREAK RUN	4,800 3,200	6,000 4,000	7,200 4,800	8,400 5,600	9,600 6,400	10,800 7,200	12,000 8,000				
701-AD	701-C	RUNNING	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,250	7,500	10,000	12,500
721-A	721-B	BREAK RUN	4,650 3,100	5,775 3,850	6,900 4,600	8,100 5,400	9,300 6,200	10,350 6,900	11,050 7,700				
722-A	722-B	BREAK RUN	9,300 6,200	11,050 7,700									
731-A	731-B	BREAK RUN	6,300 4,200	7,875 5,250	9,450 6,300	10,525 7,350	12,600 8,400	14,250 9,500	15,750 10,500	19,650 13,100	23,550 15,700	31,500 21,000	39,375 26,250
732-A	732-B	BREAK RUN	12,600 8,400	15,750 10,500	18,900 12,600	22,050 14,700	25,200 16,800	28,500 19,000	31,500 21,000	39,375 26,250	48,250 31,500		
2732-A	733-B	BREAK RUN	18,900 12,600	23,625 15,750	28,350 18,900	33,000 22,000	37,800 25,200	42,600 28,400	47,250 31,500				
	742-A	BREAK RUN	15,300 10,200	19,050 12,700	22,800 15,200	26,700 17,800	30,600 20,400	34,500 23,000	38,100 25,400	48,000 32,000	57,000 38,000	76,200 50,800	95,100 63,400
	744-A	BREAK RUN	30,600 20,400	38,100 25,400	45,600 30,400	53,400 35,600	61,200 40,800	69,000 46,000	76,200 50,800	95,100 63,400	109,300 76,200	152,400 101,600	
2744-A	746-A	BREAK RUN	45,900 30,600	57,300 38,200	68,250 45,500	80,100 53,400	91,950 61,300	103,200 68,800	114,750 76,500	143,200 94,500			
	774	BREAK RUN	44,670 29,780	55,840 37,220	67,000 44,600	78,100 52,100	89,300 59,500	100,500 67,000	111,600 74,400	139,600 93,000	167,500 111,600	223,300 148,900	279,200 186,100
	1074	BREAK RUN	97,760 65,170	122,200 81,470	146,640 97,760	171,000 114,000	195,500 130,300	219,900 146,600	244,400 162,900	305,500 203,600	366,600 244,400	488,800 325,800	611,000 407,300

SPRING RETURN MODELS *

OLD MODEL NUMBER	NEW MODEL NUMBER	Torque Output Inch-Lbs.	OPERATING PRESSURE — POUNDS PER SQUARE INCH										
			40	50	60	70	80	90	100	125	150	200	250
150A-SR			DISCONTINUED										
301B-D-SR	301C-SR	BREAK END	335 225	530 420	560 450	560 450	825 515	1,010 710	1,050 750	1,500 1,000	1,500 1,000	2,000 1,500	2,500 2,000
701A-D-SR	701C-SR	BREAK END	1,400 700	1,400 700	2,100 1,050	2,100 1,050	2,800 1,400	2,800 1,400	3,500 1,750	4,400 2,200	5,000 2,500	7,000 3,500	
522A-SR	522B-SR	BREAK END	3,400 1,660	4,300 2,100	4,550 2,260	5,800 2,400	7,000 3,500	7,000 3,500	9,100 4,550	9,100 4,550	12,800 6,450		
722A-SR	722B-SR	BREAK END	7,000 3,000	7,000 3,000	10,500 5,250	10,500 5,250	13,500 7,000	13,500 7,000	17,500 8,700				
732A-SR	732B-SR	BREAK END	8,200 3,500	8,200 3,500	12,300 6,150	12,300 6,150	16,400 8,200	16,400 8,200	20,600 10,300	25,700 12,900	31,000 15,500		
2732A-SR	733B-SR	BREAK END	12,300 6,150	12,300 6,150	16,400 8,200	16,400 8,200	25,700 12,900	25,700 12,900	31,000 15,500				
	744A-1SR	BREAK END	22,000 11,000	27,000 13,500	28,000 14,000	38,600 19,800	38,600 19,800	38,600 19,800					
	744A-2SR	BREAK END							56,000 28,000	56,000 28,000	77,200 39,600		
2744A-1SR	746A-1SR	BREAK END	28,000 14,000	37,000 18,000									
2744A-2SR	746A-2SR	BREAK END			46,800 19,250	56,000 28,000	65,000 27,600	69,000 31,600	77,200 39,600				
	1074-SR	BREAK END		78,675 38,875	78,675 38,875	108,500 51,500	118,150 57,050	118,150 57,050	157,360 77,750	196,830 95,925	236,300 114,100	314,720 155,500	

* ALWAYS USE ENDING TORQUE VALUES TO SIZE SPRING RETURN ACTUATORS

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ORDERING INFORMATION

When ordering Bettis Robotarm Actuators, please specify:

- (1) Valve make, Figure Number, and Size
- (2) Service
- (3) Operating medium—air, gas or fluid
- (4) Minimum available operating medium pressure
- (5) Operating temperature range



Robotarm model 1074-SR Scotch Yoke Spring-return Actuator. At 100 psi operating air pressure, this unit develops 191,680 inch-pounds of breaking torque. The actuator pictured is now in use on a production platform off the coast of Louisiana.



Bettis Robotarm Actuators are patented in the U.S. and other nations. U.S. Patent No. 3,104,592.

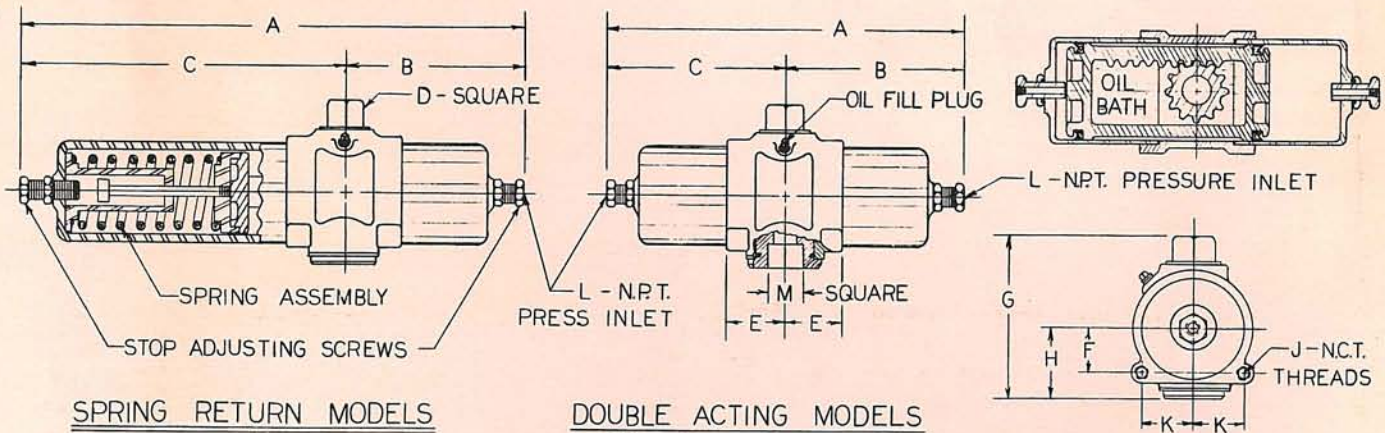
HEAVY-DUTY RACK & PINION OIL BATH ACTUATOR

The Bettis Rack & Pinion Model Robotarm Actuator is a 90° rotating, fully automatic valve actuator. Models of this actuator can also be furnished for 180° rotation. The Robotarm may be operated by air, gas or hydraulic fluid. Primarily used in air or gas service, actuators can be furnished with special trim for water or other fluid service.

This Robotarm Actuator design incorporates a totally enclosed piston rack and gear assembly fully submerged in an oil bath. The rotating gear shaft has a recess in the bottom allowing the Robotarm to be

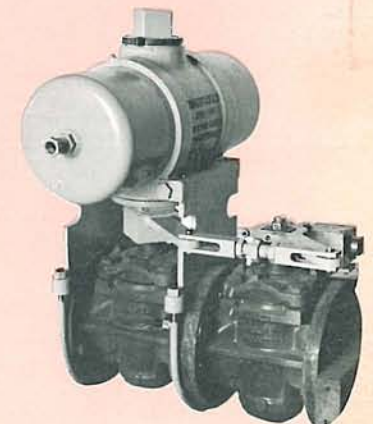
placed over and adapted to the average valve stem. The shaft is hollow to allow extension of the valve lubrication fitting, where necessary. A square shank on top of the shaft enables the unit to be hand wrench operated. Externally adjustable stops are furnished with the actuator so that valve stops are not used.

All units may be equipped with the necessary accessories for any degree of automation required. Fail-safe spring return models are also available in the Rack & Pinion Model series.



ACTUATOR DIMENSIONS												
MODEL	A	B	C	D	E	F	G	H	J	K	L	M
150A	DISCONTINUED											
150A-SR	DISCONTINUED											
301C	18½"	9¾"	9¼"	1¾"	3"	2¼"	8⅝"	3¾"	½"	2⅜"	⅜"	2"
301C-180°	21½"	10¾"	10¾"	1¾"	3"	2¼"	8⅝"	3¾"	½"	2⅜"	⅜"	2"
301C-SR	29⅝"	9¼"	20⅜"	1¾"	3"	2¼"	8⅝"	3¾"	½"	2⅜"	⅜"	2"
701C	23½"	11¾"	11¾"	2"	4⅞"	3⅞"	12⅜"	5⅜"	5/8"	3⅞"	⅜"	2½"
701C-180°	29¼"	14⅝"	14⅝"	2"	4⅞"	3⅞"	12⅜"	5⅜"	5/8"	3⅞"	⅜"	2½"
701C-SR	33⅜"	11¾"	21⅞"	2"	4⅞"	3⅞"	12⅜"	5⅜"	5/8"	3⅞"	⅜"	2½"

SR-Models will vary slightly in length with spring sizes
Refer to Page 6 for torque output of Robotarm Actuators

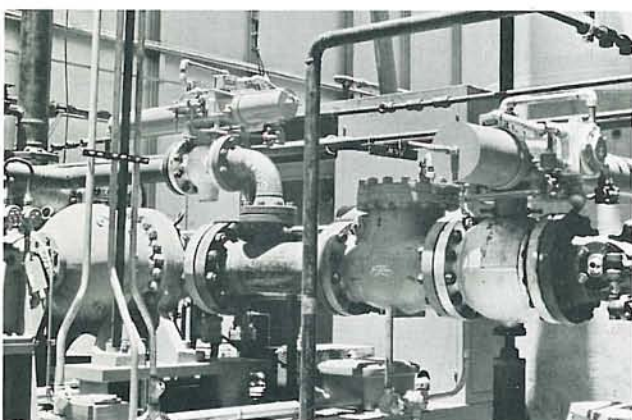


Model 701 with dual linkage to operate two 4-inch plug valves simultaneously.

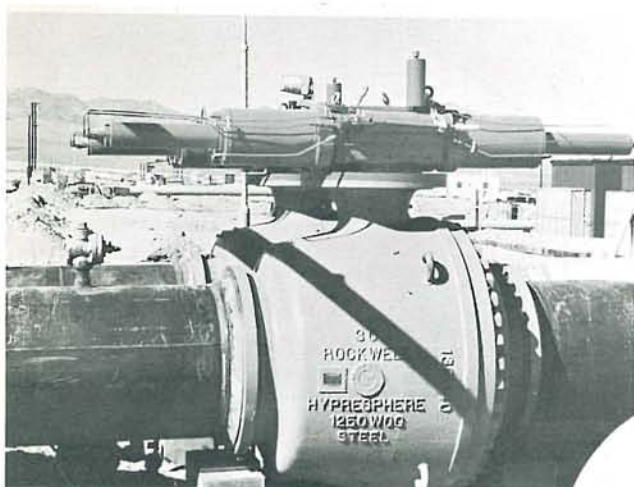
TYPICAL ROBOTARM® INSTALLATIONS



Robotarm Actuators used as ball valve regulators in a gas storage field.

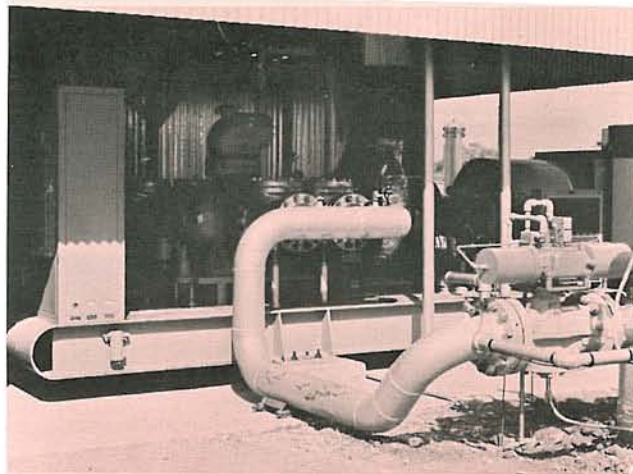


Robotarm Model 732 Spring Return Actuator in use in a process plant.



Model 1074 Robotarm Actuator with hydraulic-manual override, installed on a 30-inch pipeline valve.

For on-and-off service, a Model 722 Robotarm Actuator is mounted on an 8-inch ball valve. ▶



Model 732 Robotarm Actuator controlling the suction valve to a gas turbine-driven compressor.



Three Robotarm Actuators, Models 732, 701 and 301, controlling discharge, bypass and vent valves on a gas turbine-driven compressor.

