Decco®

A ROSS CONTROLS Company

INDUSTRIAL SOLENOIDS

ROSS DECCO COMPANY

INDEX

DECCO SOLENOID 60 HERTZ FORCE CHARACTERISTICS (IN POUNDS)

MODELS	QUIET HOLD	STROKE IN INCHES											APPROX. SHIP WT.	PAGE
		.13	.19	.25	.31	.38	.44	.50	.63	.75	.88	1.0		
01	4.75	4.10	2.75	2.20	1.95	1.85	1.75	1.70					.38	5
02	5.50	5.00	3.90	3.10	2.80	2.60	2.50	2.40					.44	5
15	8.00	7.00	5.80	5.25	4.75	4.60	4.50	4.50					1.00	6-7
16	12.00	8.50	7.15	6.75	6.60	6.50	6.50	6.40					1.13	6-7
17	16.00	11.00	9.90	9.00	8.50	8.10	8.00	8.00					1.25	6-7
18	18.50	14.50	12.25	11.40	11.00	10.50	10.25	10.25					1.63	6-7
20	25.00	18.00		13.50		12.50		12.50	12.50	12.25			3.50	8-9
21	35.00	20.00		16.00		15.00		15.00	15.00	15.00			3.63	8-9
51	40.00			23.00		21.00		20.00	20.00	20.00	20.00	20.00	4.63	8-9
52	45.00			28.00		25.00		25.00	25.00	25.00	25.00	25.00	5.13	8-9
53	50.00			37.00		32.00		30.00	30.00	30.00	30.00	30.00	5.63	8-9

General Ordering Information 2
710 Packaged Solenoids 10
Oil Immersed Solenoids 11
M-Line Solenoids 12
Tubular DC Solenoids . . . . . 13 - 14 - 15
DC Solenoids . . . . . 16 - 17
Replacement Coils & Terminals 18
Check list for quotations 19

GENERAL ORDERING INFORMATION

Select the size solenoid you require by using the Force Charts on pages 5 - 17. Specify Type (push or pull, horizontal or vertical), Voltage and Frequency.

On Teen, Twenty and Fifty Series push type solenoids the part number will vary with the stroke (as shown in these charts).

EXAMPLES: 15 Series, Horizontal mount, Pull type, chain link clevis. 115 Volts, 60 Hertz.

PULL TYPE 15 - 650 - 115 - 60

Series Type Volts Hertz

15 Series, Vertical mount, Push type with .50 stroke. 115 Volts, 60 Hertz.

PUSH TYPE 15 - 1076 - 115 - 60

Series Type Volts Hertz

	Stroke-Inches	Vertical Mount Push Type	Horizontal Mount Push Type
TEEN SERIES	.13	15-1070	15-1090
	.19	15-1071	15-1091
	.25	15-1072	15-1092
	.31	15-1073	15-1093
	.38	15-1074	15-1094
	.44	15-1075	15-1095
	.50	15-1076	15-1096
TWENTY SERIES	.13	20-1040	20-1050
	.25	20-1041	20-1051
	.38	20-1042	20-1052
	.50	20-1043	20-1053
	.63	20-1044	20-1054
	.75	20-1045	20-1055
FIFTY SERIES	.25	51-1000	(Horizontal Mount Not Standard In Fifty Series)
	.38	51-1001	
	.50	51-1002	
	.63	51-1003	
	.75	51-1004	
	.88	51-1005	
	1.00	51-1006	

SOLENOID STROKE, FORCE & A.C. CURRENT are shown in this catalog at 115 Volts, 60 Hertz. Forces are for a spring load. Dead weight loads require more force.

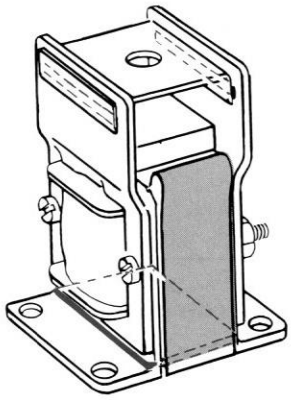
Decco® INDUSTRIAL GRADE SOLENOIDS OFFER THESE IMPORTANT ADVANTAGES:

LONG SERVICE LIFE

Over our many years in the industry our staff of solenoid engineering specialists has been involved with every conceivable aspect of solenoid design, application and performance. This accumulated know-how is reflected in the fine quality and performance of our solenoids.

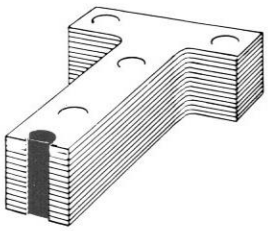
Most vertical Decco solenoids are equipped with a patented rubber cushion between the solenoid frame and the base plate. This cushion absorbs the impact force of the plunger when the solenoid closes, reduces hammering of metal parts and greatly extends the life of the unit.

The complete solenoid assembly is securely held together by a flat steel spring which also flexes to absorb impact shock.



On push type solenoids, a shock mounted backstop absorbs the impact when the plunger returns to open position.

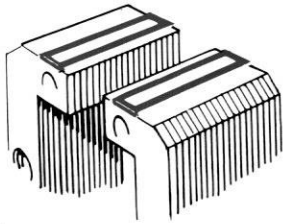
A tool steel anvil is provided at the bottom of push type solenoid plungers. This anvil distributes the load evenly across the plunger and resists wear for longer service life.



The plungers and field stacks of Decco solenoids are built up of laminations made of silicon steel which will not develop residual magnetism. Because there is no residual magnetism, break-away springs (which are susceptible to failure) are not necessary.

The plunger is guided by a heat treated beryllium copper liner and a glass filled nylon sleeve on the top of the nylon bobbin. Under normal operating conditions these guides will substantially lengthen service life.

Shading coils on Decco solenoids are silver soldered in position to prevent breakage or dropping out under continuous, heavy service.



QUIET OPERATION

Decco shading coil surfaces are carefully machined and plunger contact surfaces are finished to hold 60 cycle hum below the audible level. Each Decco solenoid is tested for quietness, under rated load conditions.

COOLER OPERATING TEMPERATURES

Decco solenoids generate less heat ... run cooler because electrical losses are held to a minimum. Their special silicon steel laminations will not "age" magnetically, so hysteresis loss is greatly reduced. Furthermore, each lamination is insulated from the others to cut eddy current losses.

Each solenoid receives a special black coating which aids heat dissipation for cooler operation.

During manufacture, each Decco unit is checked for controlled air-gap to assure lowest possible holding current and heat build-up.

REPLACEABLE COILS

Decco solenoid coils are easily replaced after long service or for a change in electrical supply characteristics.

UNIFORM, SUPERIOR QUALITY

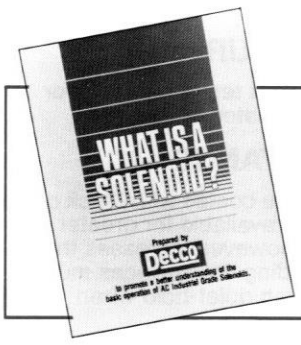
Careful, scientific selection of materials, quality control inspections and tests assure uniformly high level performance.

A MODEL FOR EVERY APPLICATION

A complete range of strokes and forces are available to meet your specific needs.

CUSTOM ENGINEERING

Decco will also design and build special solenoids for specific applications or unusual requirements.



ASK FOR THIS INFORMATIVE BROCHURE

"WHAT IS A SOLENOID" is designed to promote a better understanding of the basic operation of AC Solenoids. It takes a step-by-step look at the innerworkings of an industrial solenoid and discusses solenoid troubleshooting. Call or write for your free copy.

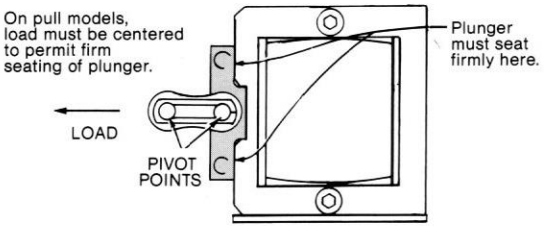
SUGGESTIONS FOR LONGER SOLENOID LIFE

The careful selection and installation of your solenoids will pay off in trouble-free operation and longer service life.

ALIGNMENT OF LOAD WITH SOLENOID

The solenoid plunger must be free to move in and out in a straight line with the load. Side pressure causes drag and wear. Plunger bar must seat firmly on BOTH shading coils to avoid buzz.

Chain link connection is best for most applications as it affords an extra pivot to assure proper seating.

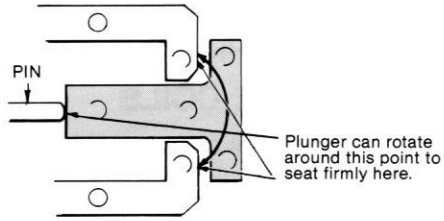


HORIZONTAL OR VERTICAL MOUNTS

If possible use vertical mounting as this minimizes wear on the coil liner.

PUSH OR PULL ACTION

Both will give satisfactory performance but alignment is less critical with the push solenoid because the plunger is free to rock or rotate on top of the push pin to seat evenly on the shading coils.



VOLTAGE VARIATION

Be sure to select a solenoid large enough to move the load at your lowest probable voltage level. Less than rated voltage reduces solenoid force. Overvoltage causes overheating. Check your power supply for wide current fluctuations to avoid trouble.

STROKE

Use the shortest stroke that will accomplish your requirement. This will reduce wear and impact force and extend service life.

SOLENOID LOADING

Choose a solenoid with rated force as close as possible to your load. Excess force must be absorbed by the solenoid and causes early breakdown.

SPRING LOAD and DEAD WEIGHT LOAD are quite different. Dead weight has inertia which requires greater solenoid force than an equal spring load.

Decco will supply special coils with reduced forces to meet a specific load requirement when extremely long life is necessary.

CONTINUOUS OR INTERMITTENT DUTY

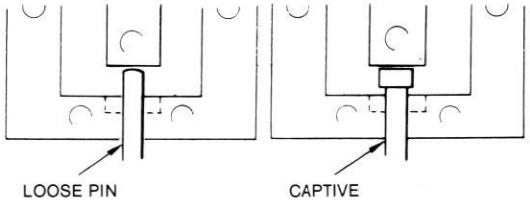
All standard Decco AC solenoids are rated for continuous duty. They can be held energized continuously in normal ambients (25°C) without overheating.

Intermittent duty solenoids are special. They provide more than continuous rated force, but will overheat if held energized or if cycled too fast.

PUSH PINS

Our standard push pins are made of non-magnetic stainless steel or heat treated beryllium copper. Tool steel or other magnetic materials can be used but they short the magnetic path and reduce the rated force of the solenoid about 20%.

Push pins soldered or tapped into the plunger have not proven to be practical. We can supply loose or captive pins for all Teen, 20 or 50 series solenoids to meet your requirements.



50-60 HERTZ FREQUENCY

Decco solenoids can be equipped with coils for 50 or 60 Hertz frequencies. Try to match coil frequency with your power supply for best results. A 50 Hertz coil will not develop rated force on 60 Hertz and a 60 Hertz coil will overheat on 50 Hertz. A dual frequency 50-60 Hertz coil can be supplied or special frequency coils will be wound on request.

CYCLE RATE

As cycling rate is increased, temperature will increase and force is reduced. Force ratings shown in this catalog are figured to compensate for such force drop at normal cycling rates. Force levels for specific cycling rates are available.

SOLENOID PROTECTION

If a solenoid is blocked open the coil soon burns out . . . protect it with a "slow blow" fuse with an ampere rating of 1.5 times the solenoid current at the "zero stroke, quiet hold" rating shown in this catalog. These ratings are for 115 Volt, 60 Hertz frequency.

Current for other voltages is inversely proportional to voltage.

AMBIENT TEMPERATURES

Solenoids operating in ambient temperatures over 25°C may require special insulated coils.

CORROSION RESISTANCE

Standard Decco solenoids are coated with black oxide or painted. Electro-plating is available for greater protection. Electro-plating, however, increases the operating temperature. Shading coil surfaces must be left unplated to accomplish quiet-hold when held energized.

"O" SERIES

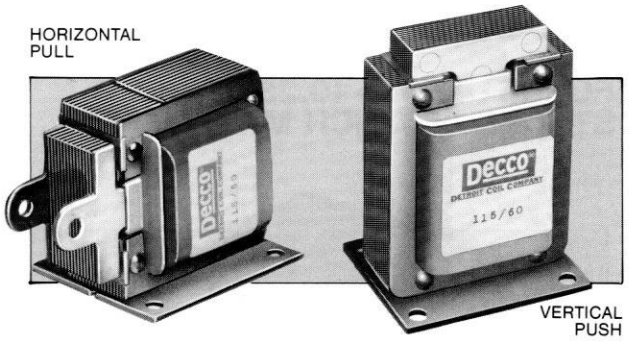
INDUSTRIAL SOLENOIDS

FORCE - 1.7 to 2.4 LBS.
STROKE - .50 INCH MAX.

"O" series solenoids are made in two sizes, the 01 and 02. They are compact, high performance units designed especially for use where space is a problem.

Plunger and C-stack laminations are of special silicon steel to reduce electrical loss and hold heating to a minimum. Residual magnetism is eliminated so break-away springs are not required.

Silver soldered shading coils assure the quiet operation so essential for use in office machines, etc.



The "O" series is available in horizontal or vertical mounting, push or pull models. Coils are easily replaced. Twelve inch electrical leads are standard but special terminations are available.

Coils can be supplied for 12 to 480 Volts, 60 Hz or 12 to 460 Volts, 50 Hz.

SOLENOID FORCE & COIL CURRENT AT 115 VOLTS, 60 HERTZ

These forces are for a spring load with no inertia. Dead weight loads require more force.

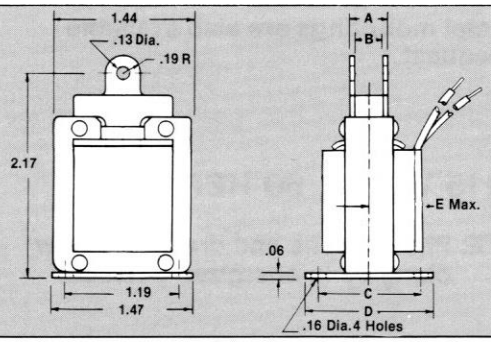
NOTE: Photographs and drawings show plungers in energized position.

STROKE IN INCHES	MODEL 01				MODEL 02			
	100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE	
	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current
0 STROKE QUIET HOLD	4.75	.23	3.75	.15	5.50	.26	4.50	.18
.13	4.10	.70	2.70	.57	5.00	.95	3.60	.78
.19	2.75	.81	1.85	.67	3.90	1.08	2.70	.90
.25	2.20	.88	1.50	.74	3.10	1.22	2.00	1.02
.31	1.95	.98	1.35	.82	2.80	1.33	1.90	1.13
.38	1.85	1.02	1.25	.87	2.60	1.42	1.80	1.22
.44	1.75	1.08	1.15	.94	2.50	1.52	1.60	1.33
.50	1.70	1.10	1.10	.97	2.40	1.61	1.50	1.41

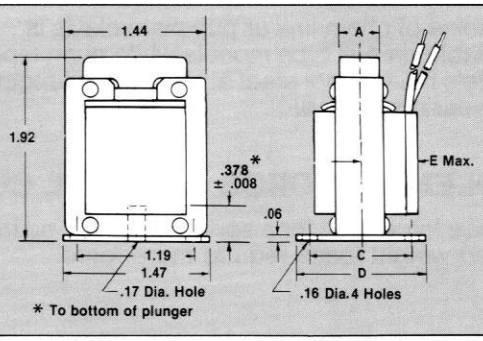
VARIABLE DIMENSIONS

MODEL	A	B	C	D	E
01-750	.44	.34	.89	1.19	.65
02-750	.58	.48	1.05	1.34	.73
01-550	.44	–	.89	1.19	.65
02-550	.58	–	1.05	1.34	.73
01-700	.44	.34	1.06	1.34	.65
02-700	.58	.48	1.19	1.47	.73
01-500	.44	–	1.06	1.34	.65
02-500	.58	–	1.19	1.47	.73

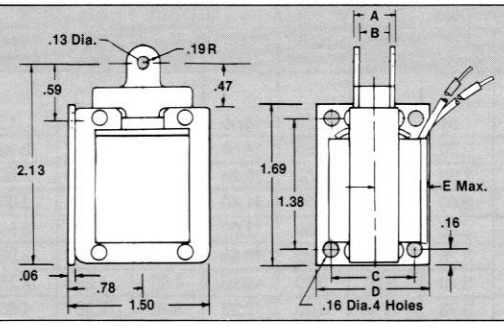
VERTICAL MOUNT, PULL-TYPE MODELS 01-700 & 02-700



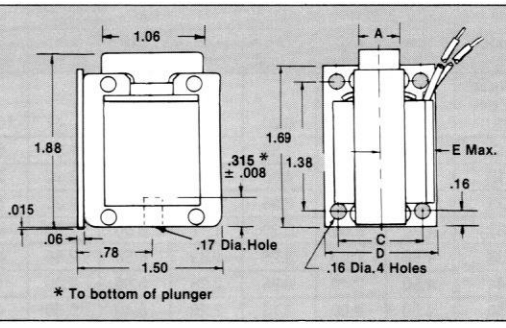
VERTICAL MOUNT, PUSH-TYPE MODELS 01-500 & 02-500



HORIZONTAL MOUNT, PULL-TYPE MODELS 01-750 & 02-750



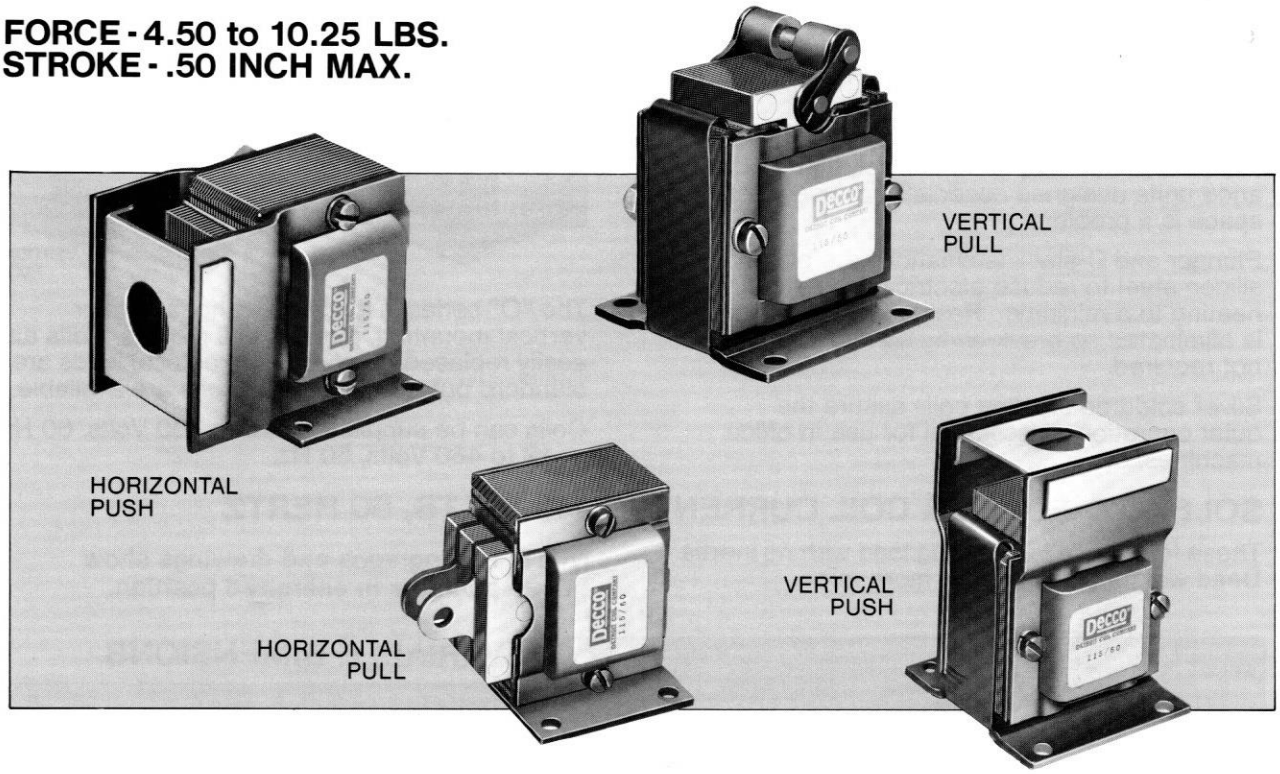
HORIZONTAL MOUNT, PUSH-TYPE MODELS 01-550 & 02-550



TEEN SERIES

INDUSTRIAL SOLENOIDS

FORCE - 4.50 to 10.25 LBS.
STROKE - .50 INCH MAX.



Decco Teen Solenoids are widely used in machine tools, packaging machinery and similar industrial and business equipment.

Their broad capacity range and ease of installation and servicing makes them ideal for operation of valves, clutches, latches, cutters, switches and all types of robotic devices where space and remote control is a problem.

A choice of chain link or pull-plate clevis is available on pull type models while push type models have a tool steel anvil on the plunger for wear resistance.

Coils are easily changed for field replacement or to achieve different electrical characteristics. They are available for use on 12 to 480 Volts, 60 Hertz, and 12 to 460 Volts, 50 Hertz or specials can be wound to meet specific requirements.

Twelve inch leads are standard but most other terminal types are available.

Special mountings are also available on request.

SOLENOID FORCE AND COIL CURRENT AT 115 VOLTS, 60 HERTZ

These forces are for a spring load with no inertia. Dead weight loads require more force.

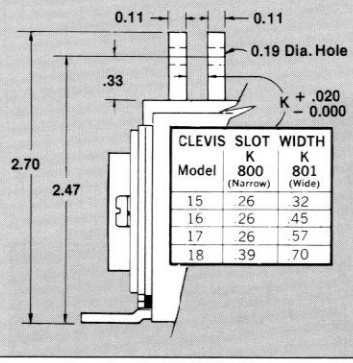
NOTE: Photographs and drawings show plungers in energized position.

STROKE IN INCHES	MODEL 15				MODEL 16				MODEL 17				MODEL 18			
	100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE	
	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current
0 STROKE QUIET HOLD	8.00	.38	6.00	.29	12.00	.47	10.00	.34	16.00	.51	14.00	.33	18.50	.60	16.00	.45
.13	7.00	1.38	4.85	1.16	8.50	1.90	6.10	1.60	11.20	2.00	8.20	1.60	14.50	2.60	10.50	2.12
.19	5.80	1.62	4.00	1.36	7.15	2.10	5.15	1.90	9.90	2.30	7.00	2.00	12.25	3.15	9.00	2.62
.25	5.25	1.83	3.35	1.54	6.75	2.30	4.75	2.10	9.00	2.60	6.30	2.20	11.40	3.62	8.25	3.05
.31	4.75	2.05	3.30	1.72	6.60	2.60	4.60	2.30	8.50	2.90	6.20	2.50	11.00	4.20	7.75	3.50
.38	4.60	2.15	3.25	1.88	6.50	2.80	4.50	2.50	8.10	3.20	6.10	2.80	10.50	4.60	7.50	3.90
.44	4.50	2.40	3.25	2.06	6.50	3.00	4.50	2.60	8.00	3.40	6.00	3.00	10.25	4.90	7.25	4.25
.50	4.50	2.60	3.10	2.20	6.40	3.30	4.50	2.80	8.00	3.70	6.00	3.20	10.25	5.30	7.25	4.55

TEEN SERIES

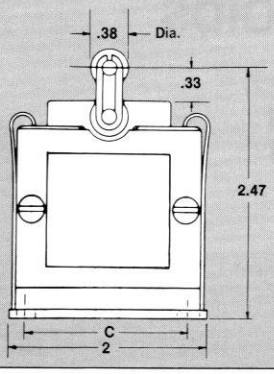
VERTICAL MOUNT PULL TYPE

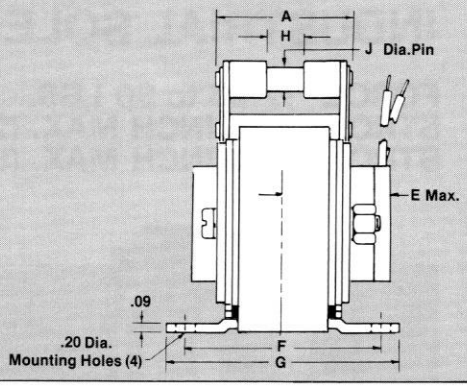
PULL-PLATE CLEVIS
Models 15-800; 16-800; 17-800; 18-800 (Narrow slot)
Models 15-801; 16-801; 17-801; 18-801 (Wide slot)



CLEVIS Model	SLOT WIDTH K 800 (Narrow)	K 801 (Wide)
15	.26	.32
16	.26	.45
17	.26	.57
18	.39	.70

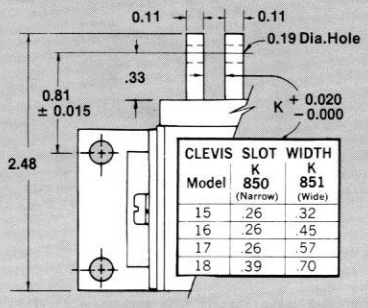
CHAIN LINK CLEVIS
Models 15-600; 16-600; 17-600; 18-600





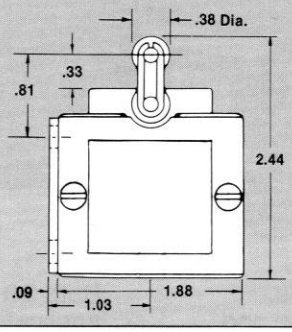
HORIZONTAL MOUNT PULL TYPE

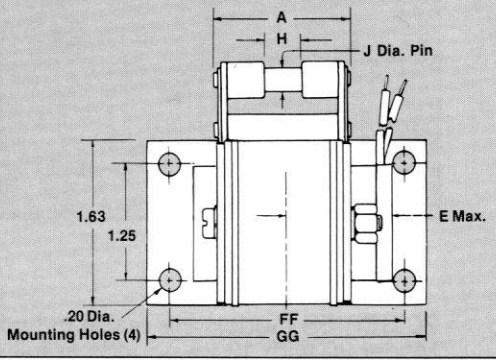
PULL-PLATE CLEVIS
Models 15-850; 16-850; 17-850; 18-850 (Narrow slot)
Models 15-851; 16-851; 17-851; 18-851 (Wide slot)



CLEVIS Model	SLOT WIDTH K 850 (Narrow)	K 851 (Wide)
15	.26	.32
16	.26	.45
17	.26	.57
18	.39	.70

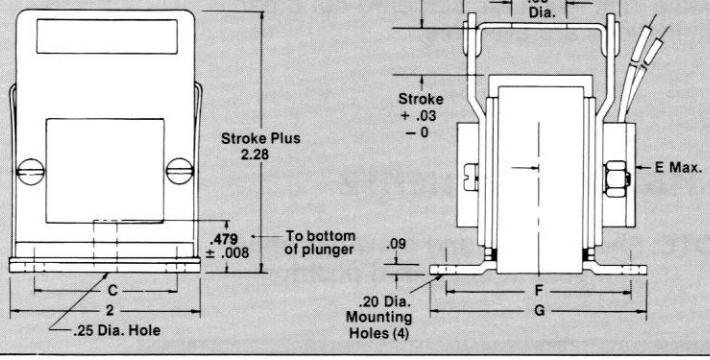
CHAIN LINK CLEVIS
Model 15-650; 16-650; 17-650; 18-650





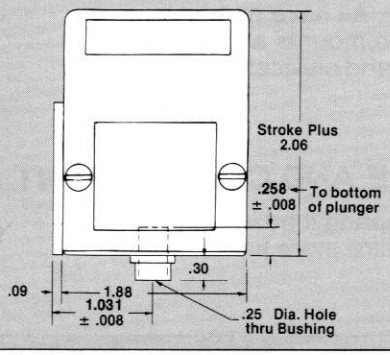
VERTICAL MOUNT PUSH TYPE

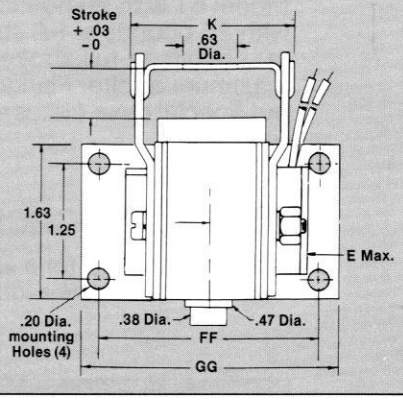
Models 15-1070; 16-1070; 17-1070; 18-1070



HORIZONTAL MOUNT PUSH TYPE

Models 15-1090; 16-1090; 17-1090; 18-1090





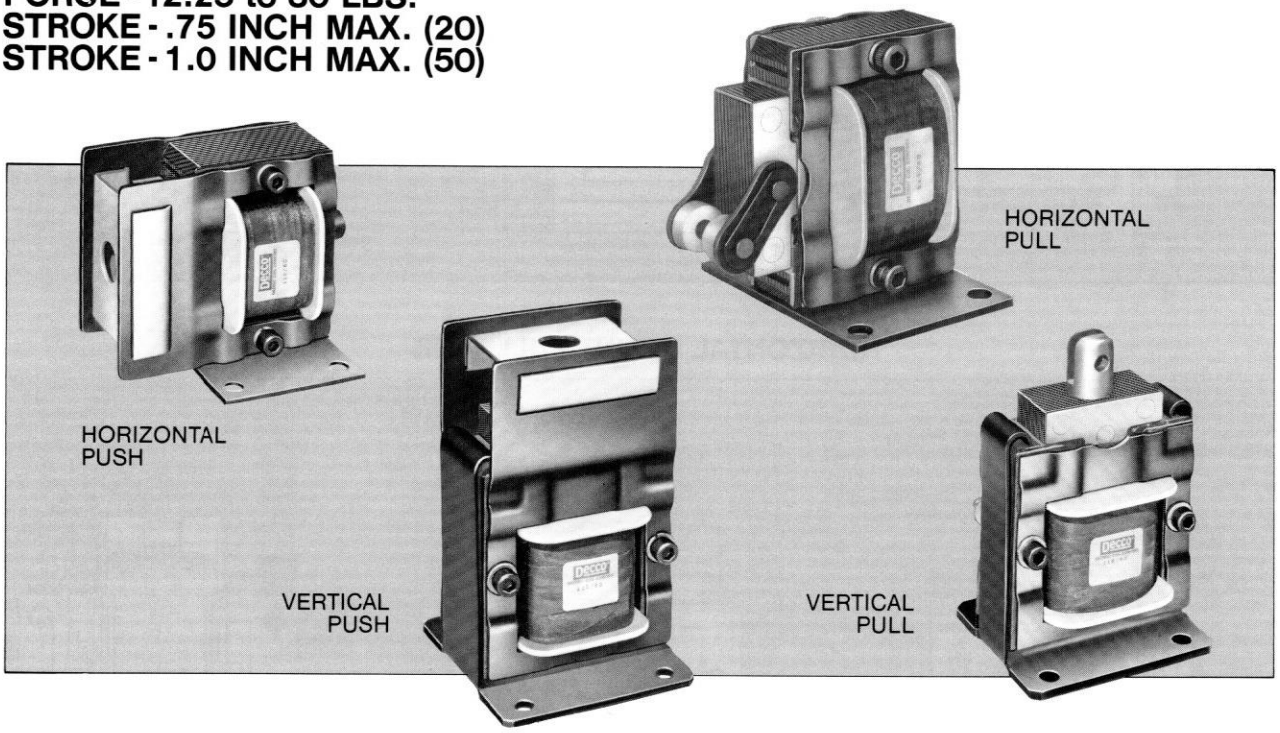
VARIABLE DIMENSIONS PUSH & PULL TYPES

MODEL	A	C	E	F	FF	G	GG	H	J	K
15	1.05	1.50	.95	1.81	1.67	2.13	2.06	.25	.19	1.38
16	1.17	1.50	1.02	1.81	1.80	2.13	2.19	.25	.19	1.50
17	1.30	1.50	1.08	1.81	1.92	2.13	2.31	.25	.19	1.63
18	1.50	1.63	1.17	2.13	2.13	2.50	2.50	.38	.25	1.84

20 & 50 SERIES

INDUSTRIAL SOLENOIDS

FORCE - 12.25 to 30 LBS.
STROKE - .75 INCH MAX. (20)
STROKE - 1.0 INCH MAX. (50)



20 SERIES models are made in two sizes. Model 20 with 12.25 pounds at full stroke and Model 21 with 15 pounds at full stroke. Both have a .75 inch maximum stroke and both are available in horizontal or vertical mount.

50 SERIES models are made in three sizes. Model 51 with 20 pounds at full stroke. Model 52 with 25 pounds at full stroke and Model 53 with 30 pounds at full stroke. All have one inch maximum stroke. Flange mounts are standard but special base plates and clevises are available on request.

Both 20 and 50 series are built for heavy duty applications and will provide long service life under normal conditions.

Coils are available for 12 to 480 Volts, 60 Hertz, or 12 to 460 Volts, 50 Hertz. They are easily removed for field replacement or to meet changed electrical characteristics.

Twelve inch leads are standard but other terminations are available.

SOLENOID FORCE AND COIL CURRENT AT 115 VOLTS, 60 HERTZ

These forces are for a spring load with no inertia. Dead weight loads require more force.

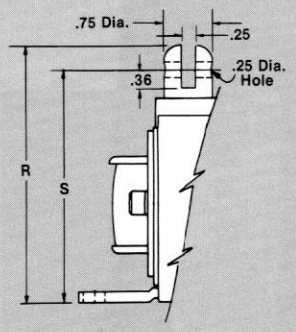
NOTE: Photographs and drawings show plungers in energized position.

STROKE IN INCHES	MODEL 20				MODEL 21				MODEL 51				MODEL 52				MODEL 53			
	100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE	
	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current
0 STROKE QUIET HOLD	25.00	1.00	20.00	.73	35.00	1.20	25.00	.90	40.00	1.28	30.00	.92	45.00	1.32	33.00	.98	50.00	1.52	36.00	1.15
.13	18.00	3.50	12.00	2.70	20.00	4.00	14.00	3.50	–	–	–	–	–	–	–	–	–	–	–	–
.25	13.50	4.80	9.00	3.80	16.00	5.60	10.50	4.90	23.00	7.30	17.00	6.00	28.00	8.20	19.00	7.30	37.00	10.20	25.00	8.60
.38	12.50	5.90	8.50	4.90	15.00	7.30	10.25	6.10	21.00	9.70	15.50	8.00	25.00	11.20	17.00	9.40	32.00	13.30	22.00	11.20
.50	12.50	7.40	8.50	5.90	15.00	8.90	10.00	7.60	20.00	11.60	14.50	9.80	25.00	14.20	17.00	12.00	30.00	16.80	20.00	14.00
.63	12.50	8.80	8.50	7.20	15.00	10.60	10.00	9.10	20.00	14.00	14.50	11.80	25.00	16.80	17.00	14.00	30.00	20.00	20.00	16.80
.75	12.25	10.40	8.50	8.60	15.00	12.40	10.00	10.50	20.00	16.20	14.50	13.90	25.00	19.50	17.00	16.70	30.00	23.30	20.00	20.00
.88	–	–	–	–	–	–	–	–	20.00	18.30	14.50	15.30	25.00	22.00	17.00	18.50	30.00	25.50	20.00	22.00
1.0	–	–	–	–	–	–	–	–	20.00	20.20	14.50	17.00	25.00	24.50	17.00	20.50	30.00	28.50	20.00	24.50

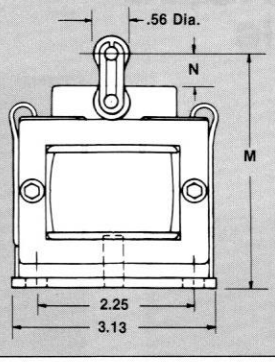
20 & 50 SERIES

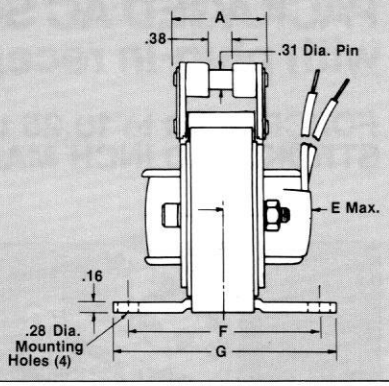
VERTICAL MOUNT PULL TYPE

20 & 50 SERIES SOLID CLEVIS
Models 20-700; 21-700; 51-700; 52-700; 53-700



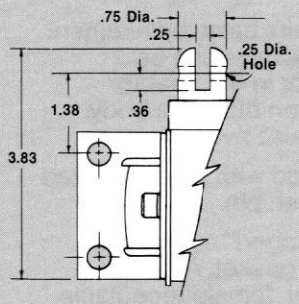
20 & 50 SERIES CHAIN LINK CLEVIS
Models 20-600; 21-600; 51-600; 52-600; 53-600



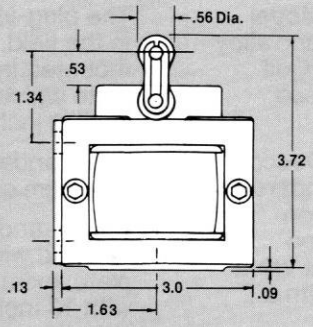


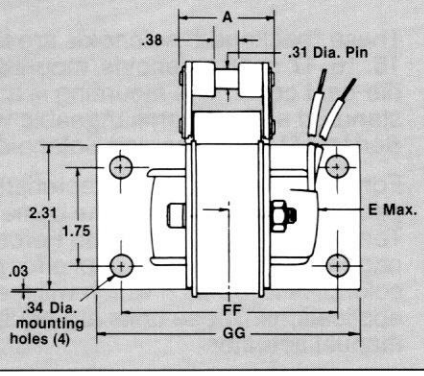
HORIZONTAL MOUNT PULL TYPE

SOLID CLEVIS
Models 20-750; 21-750



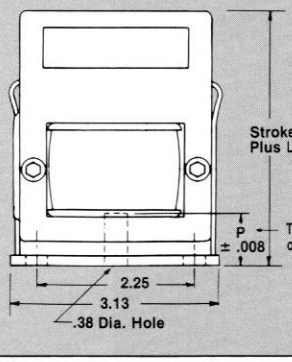
CHAIN LINK CLEVIS
Models 20-650; 21-650

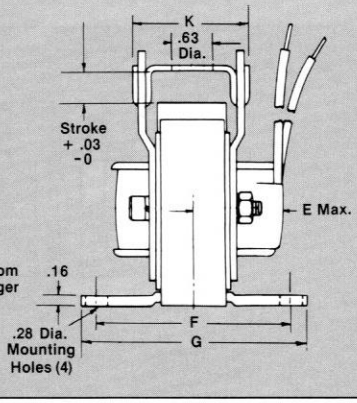




VERTICAL MOUNT PUSH TYPE

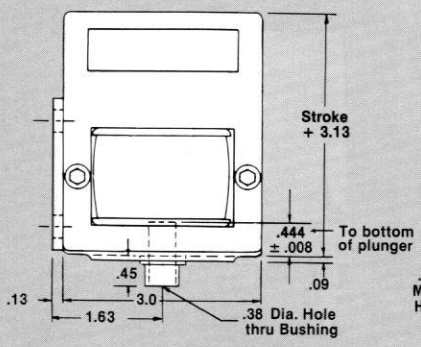
Models 20-1040; 21-1040; 51-1000; 52-1000; 53-1000

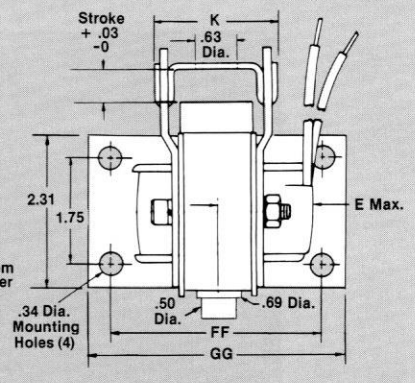




HORIZONTAL MOUNT PUSH TYPE

Models 20-1050; 21-1050





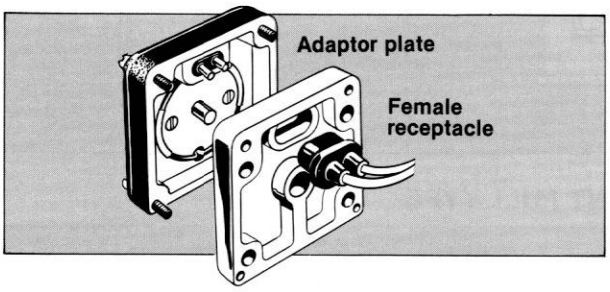
VARIABLE DIMENSIONS PUSH & PULL TYPES

MODEL	A	E	F	FF	G	GG	K	L	M	N	P	R	S
20	1.25	1.28	2.25	2.63	2.88	3.25	1.59	3.53	3.77	.53	.805	4.16	3.77
21	1.50	1.41	2.50	2.88	3.13	3.50	1.84	3.53	3.77	.53	.805	4.16	3.77
51	1.50	1.41	2.50	–	3.13	–	1.84	4.22	4.47	.50	1.180	4.92	4.53
52	1.75	1.53	2.75	–	3.38	–	2.11	4.22	4.47	.50	1.180	4.92	4.53
53	2.00	1.66	3.00	–	3.63	–	2.36	4.22	4.47	.50	1.180	4.92	4.53

SERIES 710

PACKAGED AC SOLENOIDS with plug-in receptacle

FORCE - 4.50 to 10.25 LBS.
STROKE - .50 INCH MAX.



These "packaged" solenoids are Decco Model 15, 16, 17 or 18 solenoids, mounted in a zinc alloy die-cast cover. The mounting is a Detroit Coil standard and is interchangeable with Decco Series 171 Oil Immersed Solenoids.

Forces and electrical characteristics for Decco packaged solenoids are the same as standard Teen Series solenoids. (See Force Chart on page 6.) The maximum stroke for packaged solenoids is .50 inch which will meet most valve applications. These units are equipped with a manual actuator.

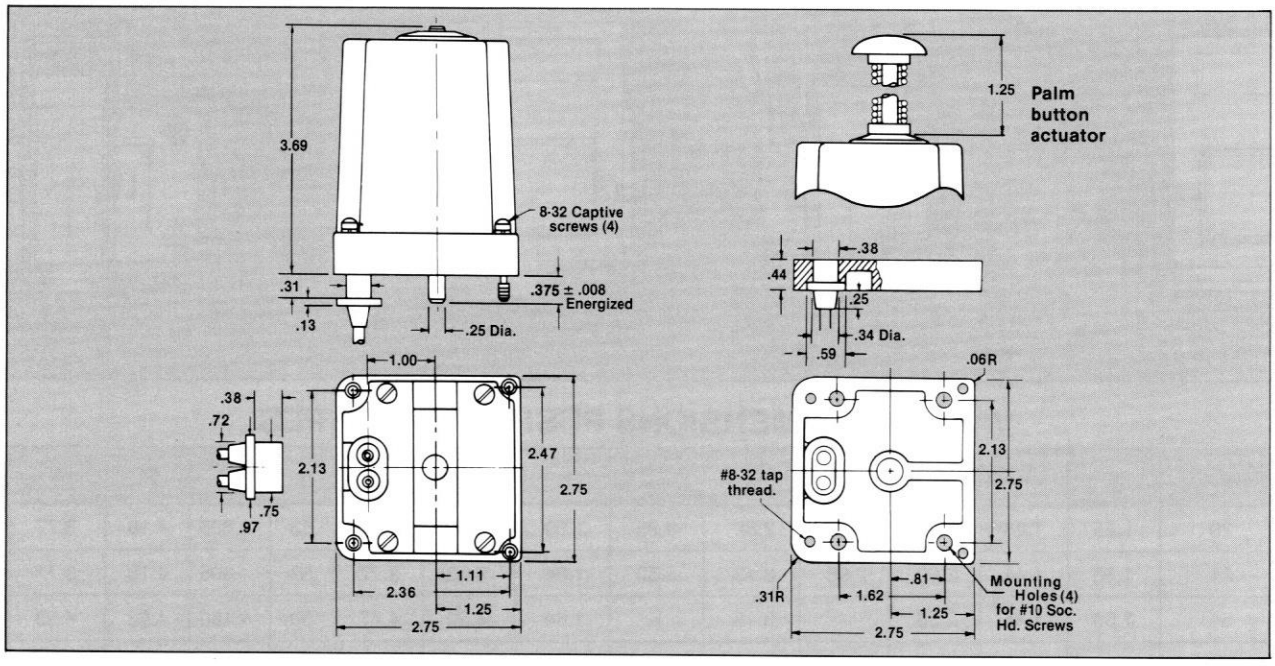
Four captive screws permit mounting directly on the valve body or to an intermediate die-cast adaptor plate.

The plug-in connector permits easy replacement in the field. The female receptacle can be mounted in the valve body or in the adaptor plate which screws directly on the valve body. Twelve inch wire leads are also available.

The standard unit is equipped with a heat treated beryllium copper captive push pin.

Each standard Decco "packaged" solenoid is shipped with one vellumoid gasket. Adaptor plate, extra vellumoid gasket, female receptacle with 12 inch leads and palm button manual actuator are optional at extra cost.

Coils are available for use on 12 to 480 Volts, 60 Hertz and 12 to 460 Volts, 50 Hertz.



These are standard TEEN SERIES AC Solenoids.
See page 6 for force/stroke characteristics.

OIL IMMERSED SOLENOIDS

FORCE - 4.75 to 10.25 LBS.
STROKE - .31 INCH MAX. (171)
STROKE - .50 INCH MAX. (191)

Decco Oil Immersed models are Teen Series units mounted in an oil-filled, die-cast housing. They are available in two series.

The 171 series has a .31 inch max. stroke using Models 15, 16 or 17 solenoids. The 191 series has a .50 inch max. stroke using Models 15, 16, 17 or 18 solenoids.

These solenoids are designed for use in dirty or corrosive atmospheres or high cycling applications for cool performance.

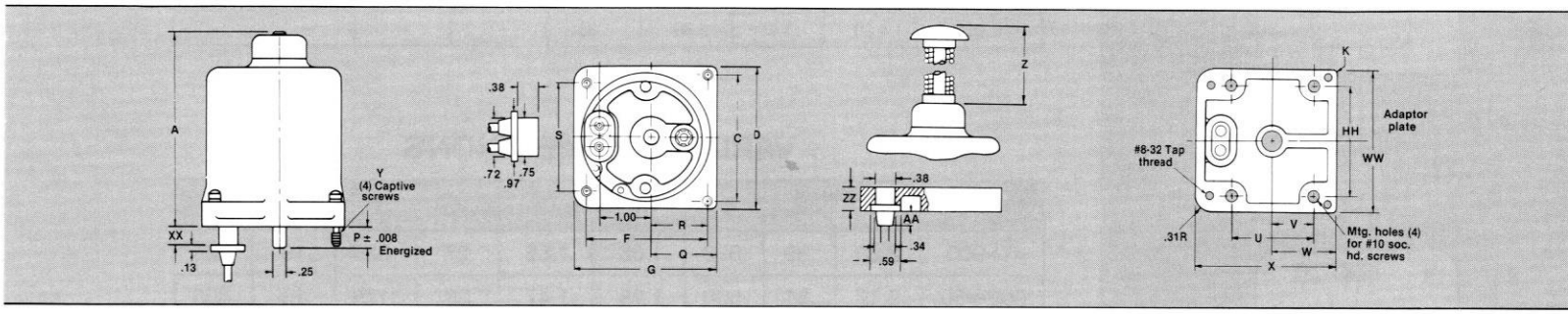
Standard units have a plug-in connector, "O" ring sealed manual actuator and vellumoid gasket. An adaptor plate, extra vellumoid gasket, female receptacle with 12 inch leads and palm button actuator are optional at extra cost.

CAUTION

Do not use this solenoid in connection with any device that can be operated by a force of less than one and one half (1.5) pounds. This solenoid may also require one and one half (1.5) pounds to return it to the de-energized position.

SOLENOID FORCE AND COIL CURRENT AT 115 VOLTS, 60 HERTZ

STROKE (INCHES)	MODEL 15-171 & 15-191				MODEL 16-171 & 16-191				MODEL 17-171 & 17-191				MODEL 18-191			
	100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE	
	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current
CLOSED	8.00	.41	6.00	.29	12.00	.47	10.00	.34	16.00	.59	14.00	.44	18.50	.57	16.00	.43
.13	7.00	1.57	4.85	1.29	8.50	1.90	6.10	1.60	11.20	2.30	8.20	1.90	14.50	2.40	10.50	2.00
.19	5.80	1.86	4.00	1.53	7.15	2.10	5.15	1.90	9.90	2.75	7.00	2.30	12.25	2.90	9.00	2.40
.25	5.25	2.13	3.35	1.80	6.75	2.30	4.75	2.10	9.00	3.20	6.30	2.70	11.40	3.30	8.25	2.80
.31	4.75	2.39	3.30	2.04	6.60	2.60	4.60	2.30	8.50	3.65	6.20	3.05	11.00	3.60	7.75	3.10
.38	4.60	2.59	3.25	2.25	6.50	2.80	4.50	2.50	8.10	4.05	6.10	3.40	10.50	4.00	7.50	3.40
.44	4.50	2.80	3.25	2.44	6.50	3.00	4.50	2.60	8.00	4.45	6.00	3.75	10.25	4.30	7.25	3.80
.50	4.50	2.94	3.10	2.60	6.40	3.10	4.50	2.80	8.00	4.85	6.00	4.10	10.25	4.60	7.25	4.00



VARIABLE DIMENSIONS

MODEL	A	C	D	F	G	K	P	Q	R	S	U	V	W	X	Y	Z	AA	HH	WW	XX	ZZ
171	3.66	2.47	2.75	2.36	2.75	.06R	.375	1.25	1.11	2.13	1.63	.81	1.25	2.75	8.32	1.25	.25	2.13	2.75	.31	.44
191	4.13	2.38	2.88	2.38	2.88	.25R	.562	1.44	1.19	2.38	1.75	.88	1.44	2.88	10.32	1.33	.05	1.75	2.88	.30	.63

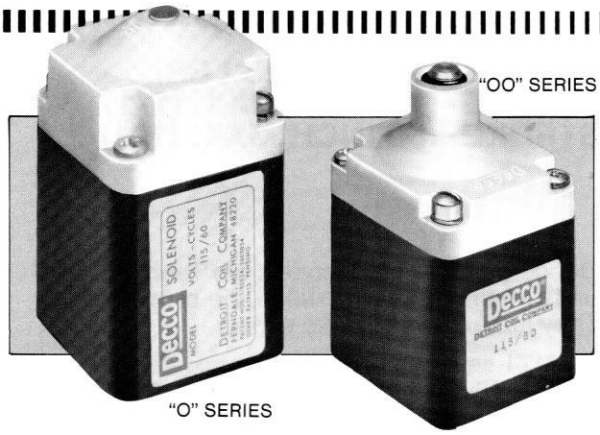
M-LINE "O" & "OO" SERIES

"O" SERIES

FORCE - 4.2 LBS.
STROKE - .25 INCH MAX.

"OO" SERIES

FORCE - 2.6 LBS.
STROKE - .13 INCH MAX.



The M-LINE solenoid is an encapsulated, complete package valve operator which offers convenience, economy and improved force because of its construction.

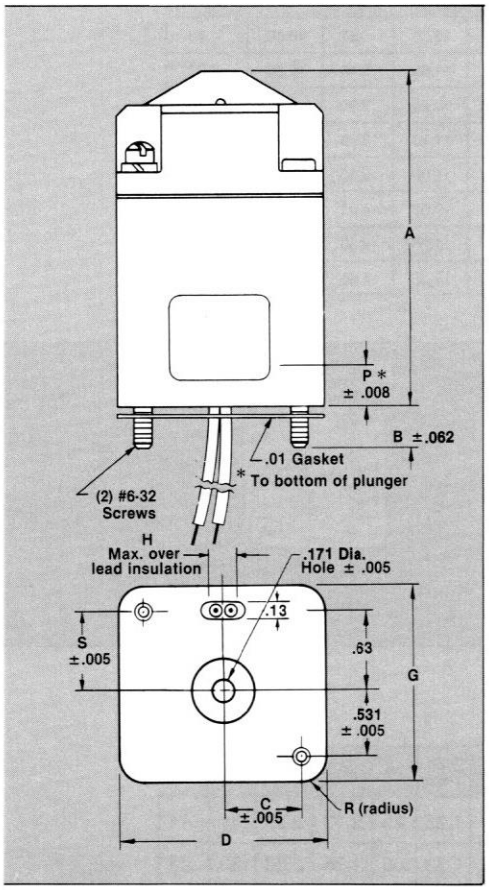
These encapsulated units save you money because there is no extra cover tooling and fabricating cost, no labor or assembly cost and no inventory of parts. Cover, actuator, screws and gasket are all factory assembled, ready for fast, easy installation with the two captive mounting screws.

The M-LINES' compact, molded cover dissipates heat faster, assuring cool operation in spite of greater power input and a resultant greater force and longer service life.

M-LINE "O" series is available for use with 24 to 480 Volts, 60 Hertz, and 24 to 460 Volts, 50 Hertz. "OO" series is available for use with 24 to 230 Volts, 60 Hertz and 24 to 220 Volts, 50 Hertz. A manual actuator and six inch leads are standard. Plug-in connections are also available on the "O" models by request.

SOLENOID FORCE AND COIL CURRENT AT 115 VOLTS, 60 HERTZ

These forces are for a spring load with no inertia.
Dead weight loads require more force.



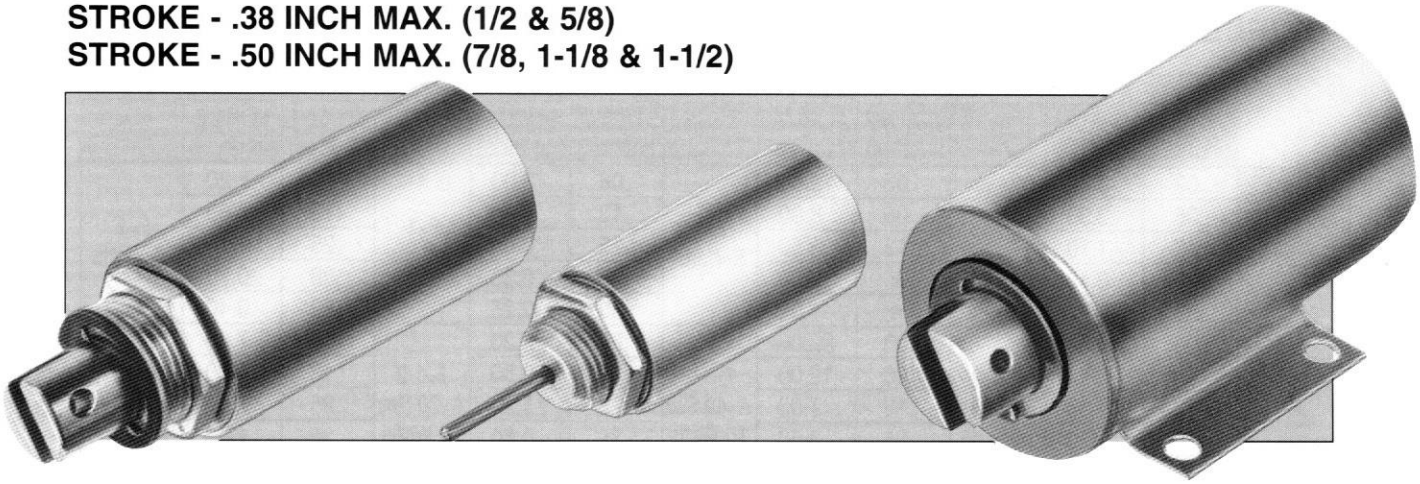
STROKE IN INCHES	MODEL 02-900				MODEL 002-950			
	100% VOLTAGE		85% VOLTAGE		100% VOLTAGE		85% VOLTAGE	
	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current	Lbs. Force	Coil Current
0 STROKE QUIET HOLD	9.00	.35	8.00	.20	7.40	.23	6.20	.11
.03	–	–	–	–	4.90	.37	4.00	.28
.06	7.80	1.02	5.20	.78	3.80	.44	3.00	.37
.09	–	–	–	–	3.30	.49	2.60	.41
.13	6.20	1.28	4.40	1.05	2.60	.54	1.90	.46
.19	4.90	1.48	3.50	1.25	–	–	–	–
.25	4.20	1.65	2.80	1.38	–	–	–	–

VARIABLE DIMENSIONS

MODEL	A	B	C	D	G	H	P	R	S
02-900	2.63	.30	.623	1.66	1.56	.27	.325	.19	.625
002-950	2.17	.31	.500	1.28	1.47	.20	.175	.13	.656

TUBULAR DC SOLENOIDS

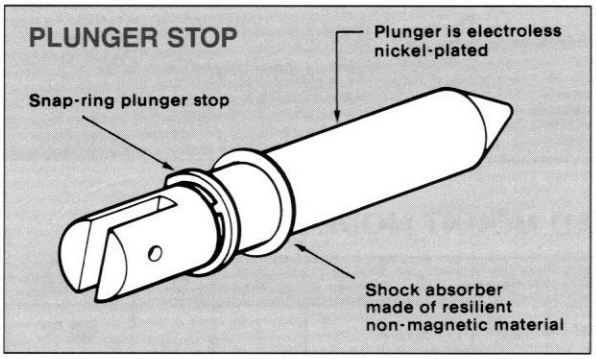
FORCE - .22 OZ. to 10.4 LBS.
STROKE - .38 INCH MAX. (1/2 & 5/8)
STROKE - .50 INCH MAX. (7/8, 1-1/8 & 1-1/2)



Decco Tubular DC Solenoids are designed for economy and long service life. Ideal for use in products such as office or business machines, computer peripheral equipment, medical equipment and test instruments, they are quiet and unusually reliable.

Nylon bobbins, coupled with electroless nickel-plated plungers, assure longer life by providing nylon-to-metal bearing surfaces for a low coefficient of friction.

A snap-ring prevents the plunger from bottoming out and deforming any metal surfaces. A resilient, non-magnetic shock absorbing disc under the snap-ring absorbs and dampens the impact at the end of each stroke. This further extends solenoid life, eliminates residual magnetism and minimizes noise.



These solenoids are available from 6 to 110 volts DC. (12 volts and 24 volts are standard.)

FIVE SIZES, PUSH OR PULL

1/2", 5/8", 7/8" and 1-1/8" sizes are thread-mounted and available in both push and pull models. The 1-1/2" size has a side mounting bracket and comes in pull only. Temperature rating is Class A (105°C), and 6" leads are standard. Hexagonal mounting nuts are standard on thread-mounted models, and customized models are also available.

THREE DUTY CYCLES

A solenoid can produce higher forces when it is ON for only short periods of time or cycled infrequently. We offer our tubular solenoids in three "Duty Cycles";

- Continuous Duty (F=1) – ON continuously
- Intermittent Duty (F=1/2) – ON 50% of cycle
- Pulse Duty (F=1/8) – ON 12.5% of each cycle (F=1/10 for 1/2" and 1-1/2" models)

In the force chart on page 14, "F" designates the fraction of time each solenoid is ON during one cycle.

$$\frac{\text{On Time}}{\text{ON Time + OFF Time}}$$

"A" designates the maximum length of time (in seconds) that an intermittent or pulse duty solenoid can be ON during one cycle while cycling before reaching its temperature limit.

SELECTING THE CORRECT MODEL

In order to help you choose the proper Tubular DC Solenoid for your job, it is important that we know the required load, stroke length, duty cycle, ambient temperature, speed of actuation, mounting and space limitations.

CHOOSE FROM 27 MODELS	MODEL NUMBERS								
	1/2 DIA.		5/8 DIA.		7/8 DIA.		1-1/8 DIA.		1-1/2 DIA.
	PUSH	PULL	PUSH	PULL	PUSH	PULL	PUSH	PULL	PULL
CONTINUOUS DUTY	28-618	28-584	28-397	28-398	28-439	28-440	28-441	28-442	28-631
INTERMITTENT DUTY	28-645	28-647	28-453	28-452	28-454	28-459	28-455	28-460	28-654
PULSE DUTY	28-646	28-648	28-456	28-461	28-457	28-462	28-458	28-463	28-655

Continued on Pages 14 and 15.

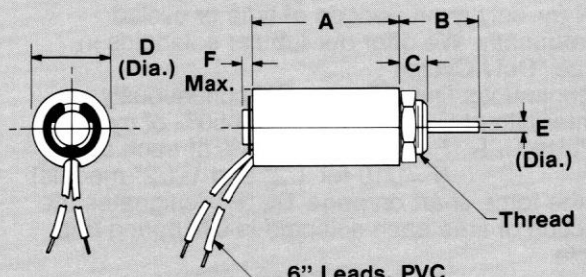
TUBULAR DC SOLENOIDS (Continued)

FORCE* CHARACTERISTICS FOR TUBULAR DC THREAD MOUNT SOLENOIDS

	1/2 DIA.			5/8 DIA.			7/8 DIA.			1-1/8 DIA.		
	STROKE (inches)	FORCE (ounces)		STROKE (inches)	FORCE (ounces)		STROKE (inches)	FORCE (pounds)		STROKE (inches)	FORCE (pounds)	
CONTINUOUS DUTY	.03	8.80	F=1 4 Watts	.03	19.00	F=1 5 Watts	.06	3.00	F=1 10 Watts	.06	5.20	F=1 10 Watts
	.06	3.30		.06	8.00		.13	1.60		.13	2.60	
	.13	1.10		.13	3.50		.25	0.65		.25	1.10	
	.25	0.42		.25	2.00		.38	0.35		.38	0.70	
	.38	0.22		.38	1.00		.50	0.25		.50	0.40	
INTERMITTENT DUTY	.03	16.50	F=1/2 A=3 Sec 8 Watts	.03	22.00	F=1/2 A=40 Sec 10 Watts	.06	4.30	F=1/2 A=30 Sec 20 Watts	.06	7.50	F=1/2 A=135 Sec 20 Watts
	.06	8.40		.06	12.00		.13	2.50		.13	5.00	
	.13	3.30		.13	7.00		.25	1.10		.25	2.40	
	.25	1.30		.25	3.50		.38	0.60		.38	1.40	
	.38	0.85		.38	2.50		.50	0.40		.50	1.00	
PULSE DUTY	.03	18.20	F=1/10 A=2 Sec 32 Watts	.03	24.00	F=1/8 A=2 Sec 40 Watts	.06	6.90	F=1/8 A=2 Sec 80 Watts	.06	12.00	F=1/8 A=7 Sec 80 Watts
	.06	13.10		.06	17.50		.13	5.40		.13	9.70	
	.13	6.20		.13	11.00		.25	3.20		.25	6.50	
	.25	3.00		.25	8.00		.38	2.20		.38	4.80	
	.38	2.10		.38	7.00		.50	1.50		.50	3.50	

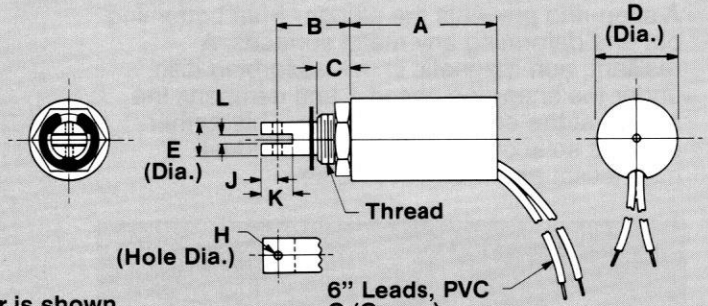
*All forces were measured using a heat sink (2" X 2" X 1/4" aluminum plate).

PUSH TYPE



Hex Mounting Nuts are standard

PULL TYPE



Plunger is shown in energized position

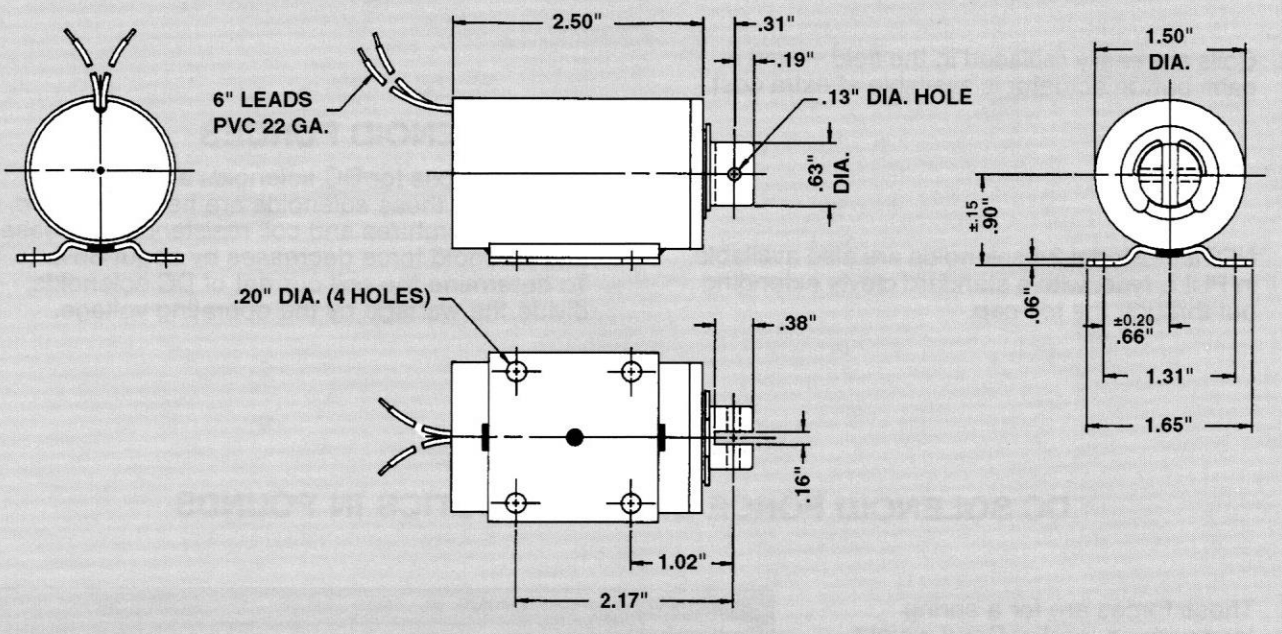
VARIABLE DIMENSIONS FOR THREAD MOUNT MODELS (inches)

	MODEL	A	B	C	D	E	F	G	H	J	K	L	THREAD
PUSH TYPE	1/2" DIA.	1.00"	.75"	.25"	.50"	.06"	.11"	26	–	–	–	–	3/8-32
	5/8" DIA.	1.13"	.75"	.25"	.63"	.06"	.11"	26	–	–	–	–	3/8-32
	7/8" DIA.	1.63"	1.13"	.38"	.88"	.09"	.14"	24	–	–	–	–	9/16-18
	1-1/8" DIA.	2.13"	1.13"	.38"	1.13"	.13"	.14"	24	–	–	–	–	3/4-16
PULL TYPE	1/2" DIA.	1.00"	.56"	.25"	.50"	.19"	–	26	.06"	.13"	.25"	.06"	3/8-32
	5/8" DIA.	1.13"	.56"	.25"	.63"	.22"	–	26	.06"	.13"	.25"	.06"	3/8-32
	7/8" DIA.	1.63"	.75"	.38"	.88"	.38"	–	24	.09"	.19"	.38"	.09"	9/16-18
	1-1/8" DIA.	2.13"	.75"	.38"	1.13"	.50"	–	24	.13"	.19"	.38"	.13"	3/4-16

1-1/2" PULL TYPE SIDE MOUNT TUBULAR DC SOLENOIDS

FORCE CHARACTERISTICS FOR 1-1/2" SIDE MOUNT MODELS

	MODEL 28-631 CONTINUOUS DUTY ON 100% (17 Watts)	MODEL 28-654 INTERMITTENT DUTY ON 50% (34 Watts) A=445 SEC.	MODEL 28-655 PULSE DUTY ON 10% (165 Watts) A=25 SEC.
.06" STROKE	8.10 lb	11.90 lb	20.00 lb
.13" STROKE	6.20 lb	9.50 lb	18.20 lb
.25" STROKE	3.30 lb	5.90 lb	14.60 lb
.38" STROKE	1.90 lb	3.70 lb	12.10 lb
.50" STROKE	1.30 lb	2.50 lb	10.40 lb



DC INDUSTRIAL SOLENOIDS

MODELS 24 & 25

FORCE - 6 to 20 LBS.
STROKE - .50 INCH MAX.

These units are specifically designed for direct current application. They are not modifications of AC solenoids. They are push models, primarily for use as valve actuators. Maximum stroke is .50 inch, and models are available to operate on 6 to 250 Volts DC power supply.

The case is heavy wall steel tubing. They can be supplied with leads through the base plate, (permitting entrance of the leads directly into the valve body wiring cavity), or with leads through a 1/2 inch pipe spud on the top cap.

The base plate is welded to the bottom of the solenoid, permitting easy application directly to the valve body. When the solenoid is installed on the valve, with a gasket, it is completely enclosed and splash-proof.

Coils are easily replaced in the field — and a palm button actuator is available at extra cost.

NOTE — Model 24 solenoids are also available in PULL type, with a standard clevis extending out through the top cap.

DC SOLENOID FORCES

Catalog forces for DC solenoids are "Cold Forces". As these solenoids are held energized, their temperatures and coil resistances increase and solenoid force decreases by about 35%. To determine the coil current of DC solenoids, divide the wattage by the operating voltage.

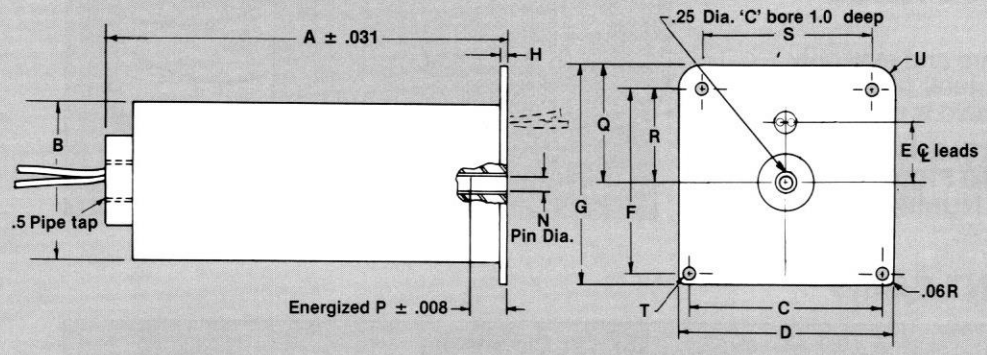
DC SOLENOID FORCE CHARACTERISTICS IN POUNDS

These forces are for a spring load with no inertia. Dead weight loads require more force.

STROKE (INCHES)	MODEL 24		MODEL 25	
	100% Voltage	85% Voltage	100% Voltage	85% Voltage
CLOSED	30.00	27.00	50.00+	50.00
.13	18.60	16.70	40.00	37.00
.19	15.80	12.70	37.00	34.00
.25	13.40	10.90	33.00	29.00
.31	11.20	8.80	29.00	26.00
.38	8.70	6.70	26.00	22.00
.44	7.20	5.10	23.00	19.00
.50	6.00	4.30	20.00	16.00

DC INDUSTRIAL SOLENOIDS

MODEL 24-1000 & 25-18



WATTAGE

MODEL	PULL IN	HOLD
24	44	44
25	55	55

NOTICE—Models 24-1010 & 24-1020 have wire leads out the bottom.

VARIABLE DIMENSIONS

MODEL	A	B	C	D	E	F	G	H	N	P	Q	R	S	T	U
24-1000	5.250	2	2.47	2.75	–	2.36	2.75	.09	.19	.479	1.50	1.25	2.13	.18	.31
24-1010	5.250	2	2.47	2.75	.75	2.36	2.75	.09	.19	.479	1.50	1.25	2.13	.18	.31
24-1020	5.312	2	2.47	2.75	1.00	2.36	2.75	.16	.19	.479	1.50	1.25	2.13	.18	.31
25-18	6.937	3	2.50	3.00	–	3.00	3.50	.13	.24	.805	1.75	1.50	2.50	.34	–

REPLACEMENT COILS & TERMINALS

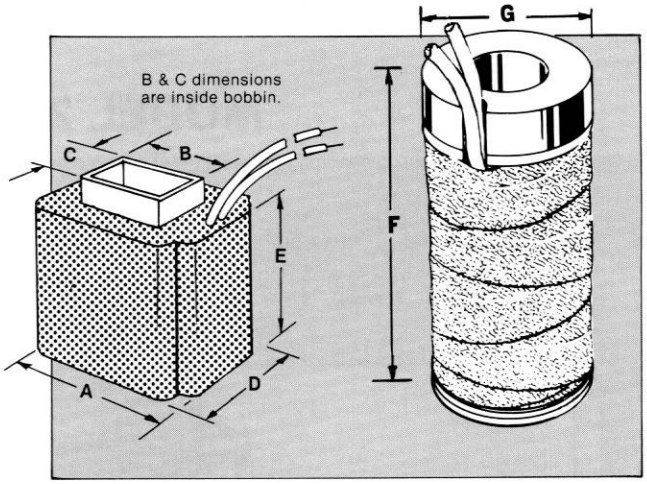
Coils for Decco solenoids are easily changed for field replacement.

Standard replacement coils are available direct from Detroit Coil Company. They are identified by a number stamped on the side of the coil. On push solenoids, the coil number is also etched on the solenoid back strap.

Identifying number of STANDARD coils are listed below.

Coils not listed are not standard and may only be available from the manufacturer of the equipment on which the solenoid is mounted.

WHEN ORDERING REPLACEMENT COILS, SPECIFY THE VOLTAGE AND FREQUENCY IN ADDITION TO THE COIL NUMBER.



DECCO REPLACEMENT COILS

Standard Coil Numbers	Solenoid Series	Variable Dimensions						
		A	B	C	D	E	F	G
9-291	01	1.20	.45	.40	1.03	1.08		
9-297	02	1.36	.60	.40	1.03	1.08		
9-10	15	1.72	.81	.51	1.24	1.13		
9-11	16	1.84	.94	.51	1.24	1.13		
9-12	17	1.97	1.06	.51	1.24	1.13		
9-100	18	2.17	1.27	.51	1.24	1.13		
9-14	20	2.25	.89	.88	2.11	1.48		
9-15	21	2.50	1.14	.88	2.11	1.48		
9-191	51	2.50	1.14	.89	2.10	1.86		
9-192	52	2.75	1.39	.89	2.10	1.86		
9-193	53	3.00	1.64	.89	2.10	1.86		
9-1271	24-1000						4.00	1.88
9-1234	24-1010						4.00	1.88
9-1234	24-1020						4.00	1.88
9-110	25-18						4.27	2.69

SPECIAL COILS

Standard Decco solenoid coils are made of UL approved, Class A materials. They will withstand continuous ultimate temperatures up to 105°C.

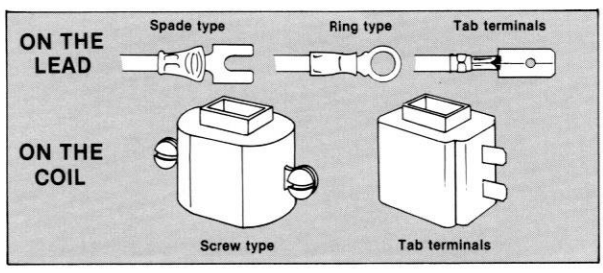
For operation of solenoids in elevated ambient temperatures, Class H coils can be supplied. They will withstand ultimate temperatures up to 180°C.

When required, coils can be tropicalized or made fungus resistant by the use of a special varnish.

Coils can be supplied with special insulation to resist attack by inflammable, hydraulic system fluids.

TERMINALS

Coil leads can be equipped with spade, ring type, tab or other type terminals. Number eight ring terminals, number eight spade terminals and 1/4 inch wide tab terminals are stocked. Binder head screw terminals and tab terminals can be wound into the coil. Standard screw terminals are for number eight screws.



CHECKLIST FOR QUOTATIONS

Company Name _____ Division _____ Date _____

Address _____ City _____ State _____ Zip Code _____

Your Name _____ Title _____

Description of solenoid application considered _____

_____

_____

_____

FEATURES DESIRED

TYPE - Push _____ Pull _____ Voltage _____ (AC or DC ?) Frequency _____

CLEVIS - Solid _____ Chain Link _____ Pull Plate _____

TYPE OF MOUNTING - Horizontal _____ Vertical _____ Other _____

STROKE (Inches) _____

FORCE - Start of Stroke _____ (oz or lbs ?) End of Stroke _____ (oz or lbs ?)

* **PLUNGER PIN** (Push-type only) - Fixed _____ Loose _____ Captive _____ Pin Extension _____ inches

AMBIENT TEMPERATURE - Max. _____ °F Min. _____ °F

ENVIRONMENTAL CONDITION - Dust _____ Water _____ Oil _____ Other _____

LIFE EXPECTANCY _____ cycles

OPERATING RATE - (Cycles per minute) _____

ELECTRICAL DUTY - Continuous _____ Intermittent _____ Pulse _____ Time on _____ Time off _____

QUANTITIES DESIRED QUOTED _____

SPECIAL INSTRUCTIONS _____

_____

* PLUNGER PIN EXTENSION is measured from mounting surface of VERTICAL MOUNT SOLENOIDS to end of pin with plunger in ENERGIZED position. HORIZONTAL MOUNTS are measured from end of field stack laminations to end of pin, in ENERGIZED position.

ROSS OPERATING VALVE, ROSS CONTROLS®, ROSS DECCO®, and AUTOMATIC VALVE INDUSTRIAL, collectively the "ROSS Group".

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure all sources of energy are turned off, the entire pneumatic system is shut down and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS Group Products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any product can be tampered with and/or need servicing after installation, persons responsible for the safety of others or the care of equipment must check ROSS Group Products on a regular basis and perform all necessary maintenance to ensure safe operating conditions.

3. All applicable instructions should be read and complied with before using any fluid power system to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use. If you have any questions, call your nearest ROSS Group location.

4. Each ROSS Group Product should be used within its specification limits. In addition, use only ROSS Group components to repair ROSS Group Products.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

FILTRATION and LUBRICATION

1. Dirt, scale, moisture, etc., are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. The ROSS Group recommends a filter with a 5-micron rating for normal applications.

2. All standard ROSS Group filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition and hazardous leakage. Immediately replace crazed, cracked, or deteriorated bowls.

3. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure which risks personal injury, and/or damage to property.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

AVOID INTAKE/EXHAUST RESTRICTION

1. Do not restrict air flow in the supply line. To do so could reduce the pressure of the supply air below minimum requirements for the valve and thereby causing erratic action.

2. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and must have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

SAFETY APPLICATIONS

1. Mechanical Power Presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

2. Safety exhaust (dump) valves without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All safety exhaust valve installations should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

3. Per specifications and regulations, the ROSS L-O-X® and L-O-X® with EEZ-ON®, N06 and N16 Series operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARNINGS: Failure to follow these instructions can result in personal injury and/or property damage.

STANDARD WARRANTY

All products sold by the ROSS Group are warranted for a one-year period [with the exception of Filters, Regulators and Lubricators ("FRLs") which are warranted for a period of seven (7) years] from the date of purchase. All products are, during their respective warranty periods, warranted to be free of defects in material and workmanship. The ROSS Group's obligation under this warranty is limited to repair, replacement or refund of the purchase price paid for products which the ROSS Group has determined, in its sole discretion, are defective. All warranties become void if a product has been subject to misuse, misapplication, improper maintenance, modification or tampering. Products for which warranty protection is sought must be returned to the ROSS Group freight prepaid.

ALL PRODUCTS SOLD BY THE ROSS GROUP ARE WARRANTED FOR A ONE-YEAR PERIOD [WITH THE EXCEPTION OF FILTERS, REGULATORS AND LUBRICATORS ("FRLS") WHICH ARE WARRANTED FOR A PERIOD OF SEVEN (7) YEARS] FROM THE DATE OF PURCHASE. ALL PRODUCTS ARE, DURING THEIR RESPECTIVE WARRANTY PERIODS, WARRANTED TO BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP. THE ROSS GROUP'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR, REPLACEMENT OR REFUND OF THE PURCHASE PRICE PAID FOR PRODUCTS WHICH THE ROSS GROUP HAS DETERMINED, IN ITS SOLE DISCRETION, ARE DEFECTIVE. ALL WARRANTIES BECOME VOID IF A PRODUCT HAS BEEN SUBJECT TO MISUSE, MISAPPLICATION, IMPROPER MAINTENANCE, MODIFICATION OR TAMPERING. PRODUCTS FOR WHICH WARRANTY PROTECTION IS SOUGHT MUST BE RETURNED TO THE ROSS GROUP FREIGHT PREPAID.

Decco®

A ROSS CONTROLS Company

ROSS DECCO COMPANY

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U.S.A. - Rev. 04/23/19.
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