Humphrey
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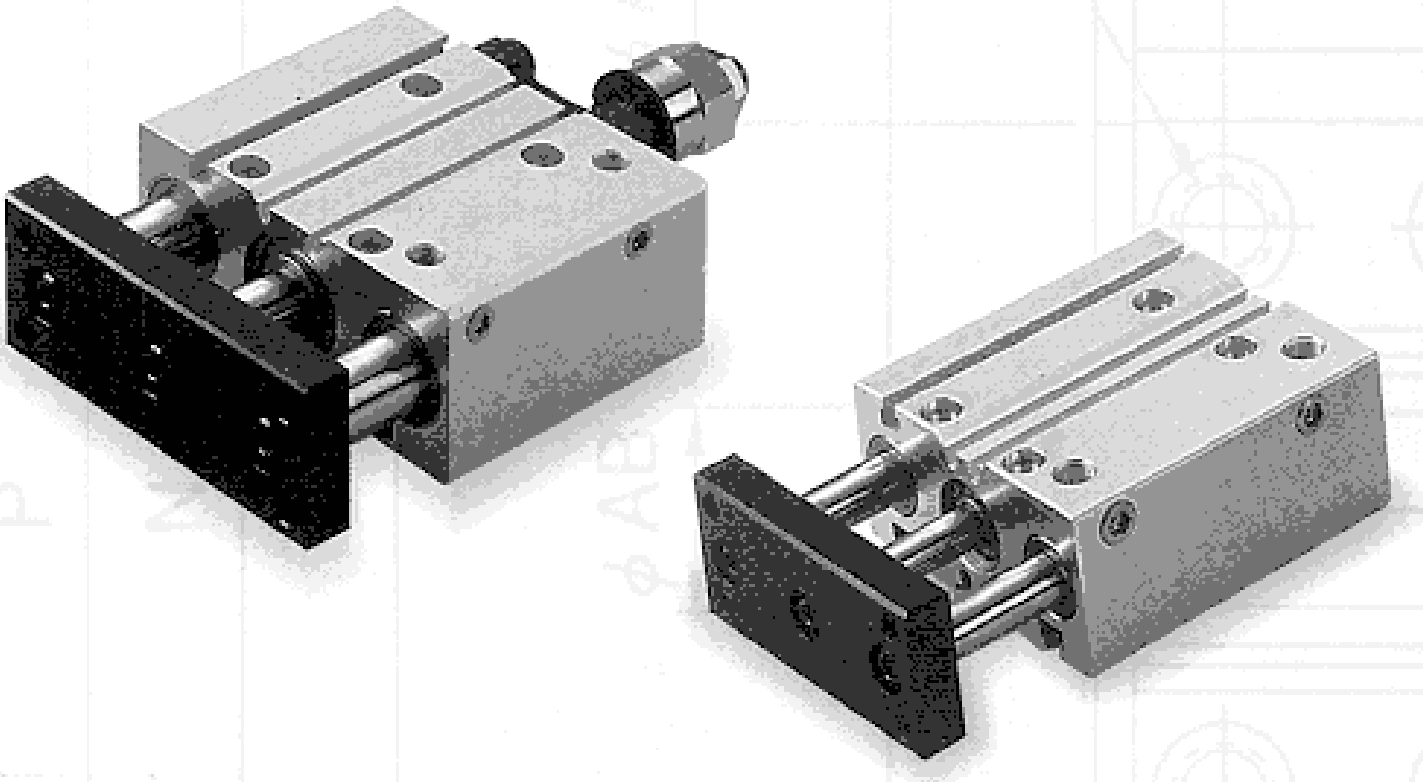
CATALOG HGB

HUMPHREY GUIDED BLOCK AIR CYLINDERS

HSGDA Standard Double Acting
HSGDAP Double Acting with Stroke Adjuster



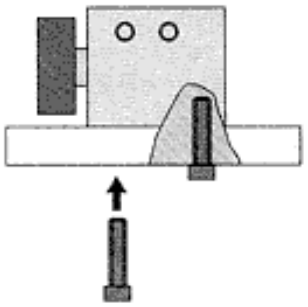
GUIDED BLOCK CYLINDERS

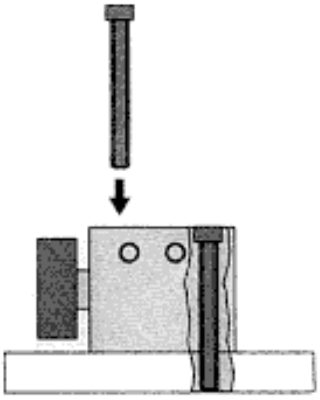
Humphrey Guided Block Cylinders are heavy duty air cylinders with precision guide shafts that are integrated into a unique extruded aluminum body. Guided Block Cylinders provide rigid movement of substantial loads, plus they have the strength to withstand significant side loading.

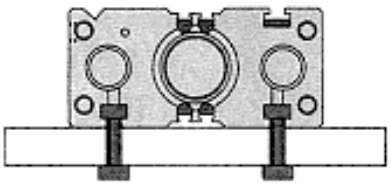
The rectangular design saves space and provides a wide selection of mounting, porting and sensor switch options.

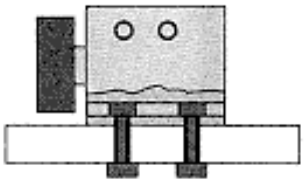
Two types are offered: a standard double-acting model, and a double-acting model with integral stroke adjuster. Both are available in eight bore sizes, with strokes up to eight inches in length.

Hard chrome plated piston rods are standard on 12–25mm bore models. Hard chrome plated hard steel piston rods are standard on 32~63mm bore models.









T-SLOT MOUNTING GROOVES

Metric T-slot mounting grooves provide flexible, secure and easy mounting. These grooves are standard on all models and are located on two different cylinder surfaces.

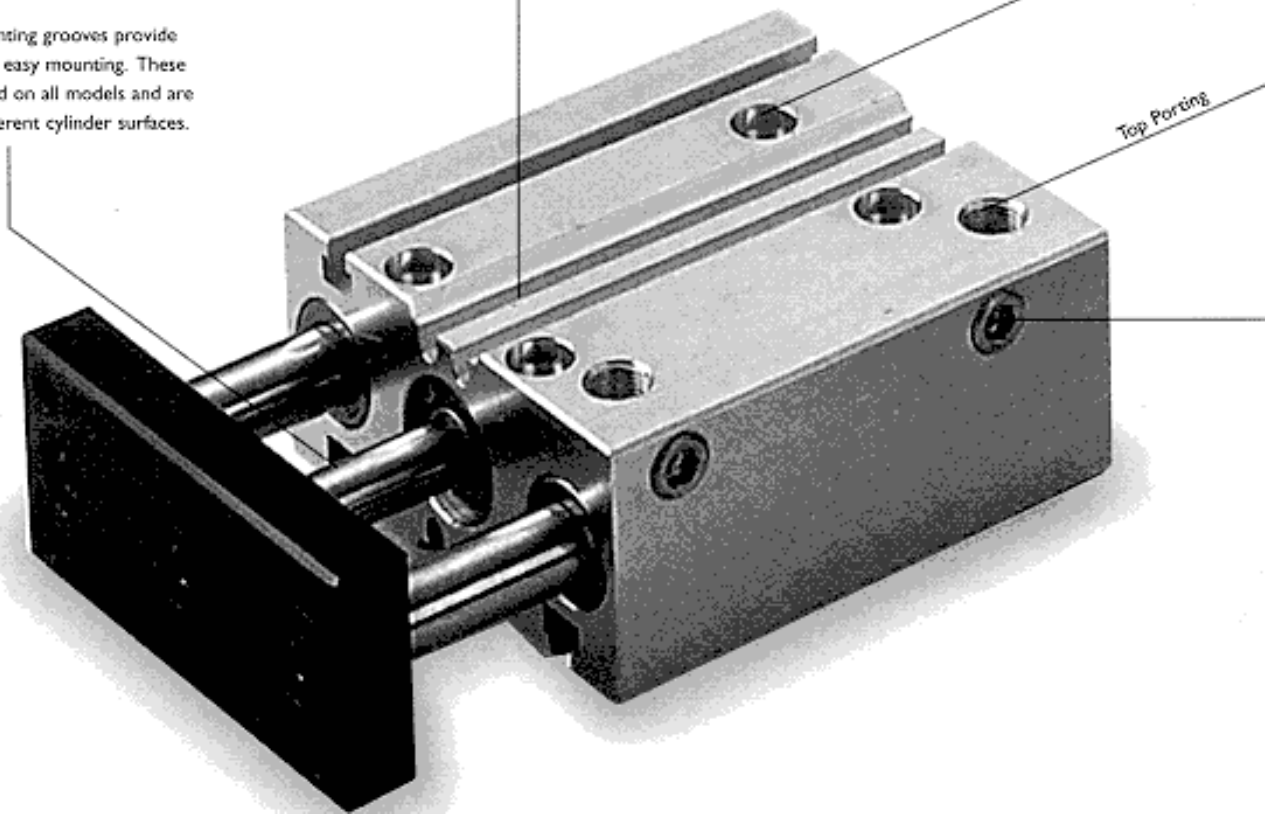
UNIQUE SENSOR SWITCH DESIGN

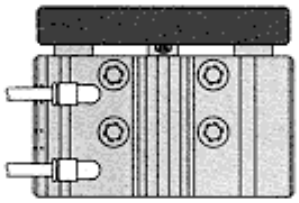
Sensor switches provide position feedback for various rod-end tooling plate locations. Highly compact, the sensor switches are embedded beneath the surface of the cylinder. This provides flush mounting with the cylinder surface, further enhancing the space-saving characteristics of these products. It also helps protect switches from damage. Eight different sensor switches are offered, including both reed switch and solid state design.

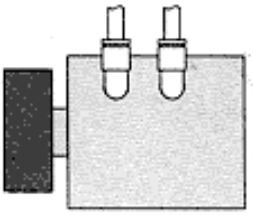
Both PNP (sourcing) and NPN (sinking) sensors are available. Environmental protection: IP67 standard (JIS CO920).

THROUGH HOLE MOUNTING

All Humphrey Guided Block Cylinders have "top to bottom" through hole mounting. These four counterbored through holes allow for bolt mounting from the top surface. The through holes are threaded at the bottom for mounting with threaded fasteners.

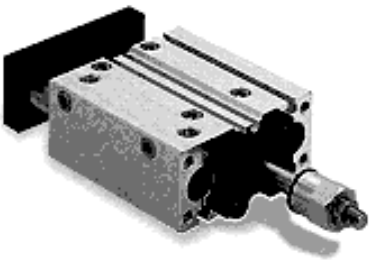






TOP OR SIDE PORTING

Two different sets of ports provide system design and installation flexibility. Top ports are open when shipped from the factory. Side ports are plugged.



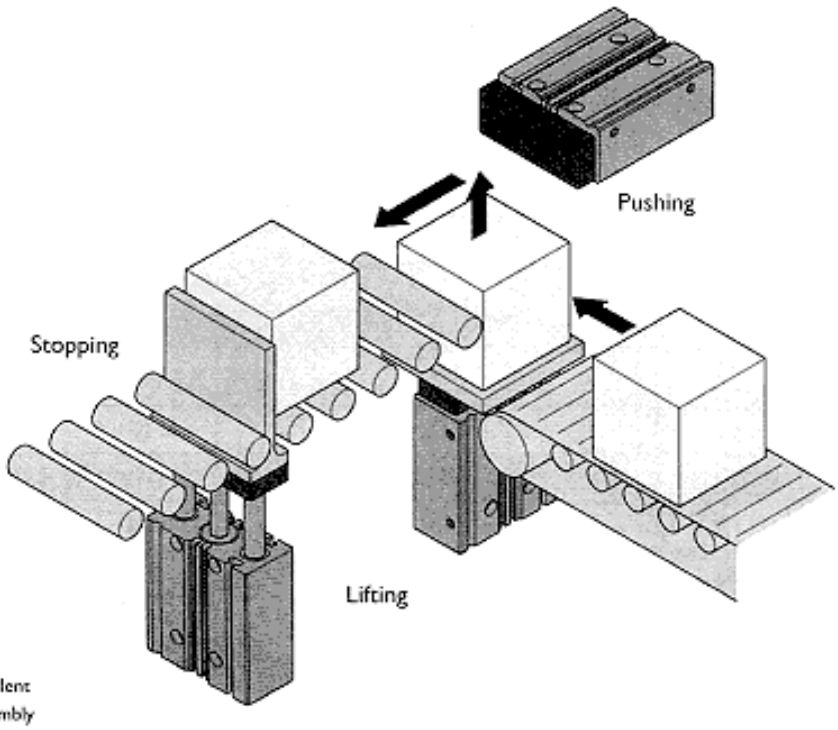
STROKE ADJUSTER MODELS

Models with stroke adjustment facilitate fine-tuning of stroke to minus 10mm (0.393 inches).

Side Porting

BASE MOUNTING

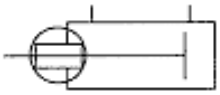
For base mounting, all models have four threaded mounting holes located on the non-rod end of the cylinder.

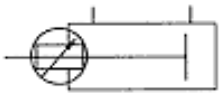


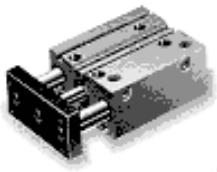
MODEL HSGDA & MODEL HSGDAP APPLICATIONS

Humphrey Guided Block Cylinders are excellent for stopping, lifting and pushing loads on assembly transfer lines.

HSGDA & HSGDAP
GUIDED BLOCK CYLINDER SPECIFICATIONS







HSGDA STANDARD DOUBLE ACTING SPECIFICATIONS

Bore mm	12	16	20	25	32	40	50	63
Operating Method	Double Acting							
Media	Air							
Operating Pressure psi	22–145			15–145				
Operating Temperature Range F° (C°)	32–140 (0–60)							
Operating Speed Range mm/s (in/s)	100–500 (3.9–19.7)							
Cushion	Rubber Bumper							
Sensors	Piston-mounted magnet is standard.							
Lubrication	Not required, but if used, specify turbine oil type 1 (ISO VG32 or equivalent, or lithium grease).							
Filtration	40 micron							
Ports	10-32 UNC		1/8 - NPSF				1/4 - NPSF	
Stroke Tolerance mm (inches)	+1.5 (+0.059)							
Bearing Type	Bronze Slide Bearing, standard							
Major Materials	Anodized aluminum, aluminum alloy, stainless steel, hard steel, nitrile.							

HSGDA GUIDED BLOCK CYLINDER ORDER CODES

HSGDA 16 x 4

Cylinder Bore x Stroke

HSG: Guided Block Cylinder
DA: Double Acting

Bore Size	Stroke
12 and 16 mm	1/2, 1, 1 1/2, 2, 3, 4
20 ~ 63 mm	1/2, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8

HSGDAP DOUBLE ACTING WITH STROKE ADJUSTER SPECIFICATIONS

Bore mm	12	16	20	25	32	40	50	63
Operating Method	Double Acting							
Media	Air							
Operating Pressure psi	22–145			15–145				
Operating Temperature Range F° (C°)	32–140 (0–60)							
Operating Speed Range mm/s (in/s)	100–500 (3.9–19.7)							
Cushion	Rubber Bumper							
Sensors	Piston-mounted magnet is standard.							
Lubrication	Not required, but if used, specify turbine oil type 1 (ISO VG32 or equivalent, or lithium grease).							
Filtration	40 microns							
Ports	10-32 UNC		1/8 - NPSF				1/4 - NPSF	
Stroke Tolerance mm (inches)	+1.5 (+0.059)							
Bearing Type	Bronze Slide Bearing, standard							
Push-Side Stroke Adjustment mm (inches)	0–10 (0–0.3937)							
Major Materials	Anodized aluminum, aluminum alloy, stainless steel, hard steel, nitrile.							

HSGDAP GUIDED BLOCK CYLINDER ORDER CODES

HSGDAP 16 x 4

Cylinder Bore x Stroke

HSG: Guided Block Cylinder
DA: Double Acting
P: Push-Side Stroke Adjuster

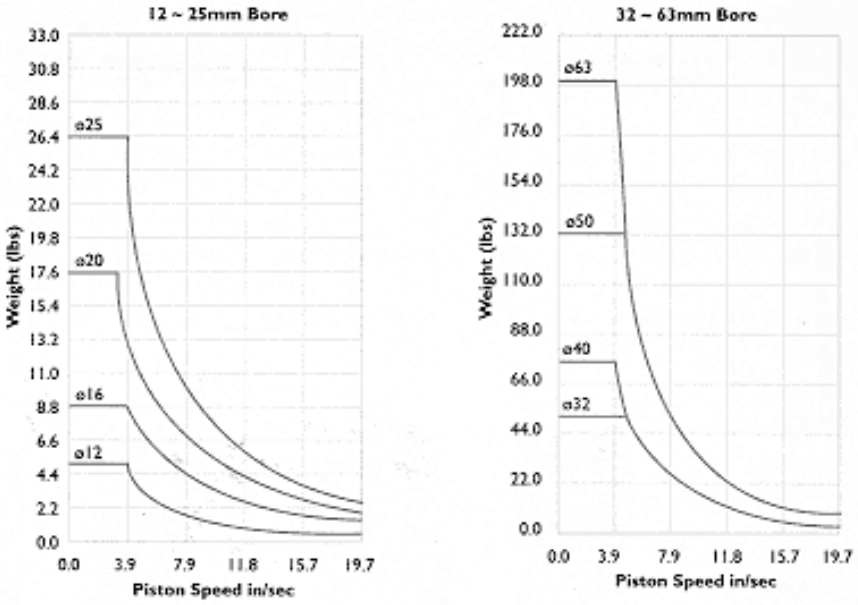
Bore Size	Stroke
12 and 16 mm	1/2, 1, 1 1/2, 2, 3, 4
20 – 63 mm	1/2, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8

HSGDA AND HSGDAP WEIGHT CHART

Bore	Stroke	Standard Type (HSGDA)		Stroke Adjuster Type (HSGDAP)	
		Weight @ Zero Stroke	Weight per 1/2 inch Stroke	Weight @ Zero Stroke	Weight per 1/2 inch Stroke
12	</=2 inches	4.5 (130)	1.8 (51)	6.2 (178)	1.9 (53)
	>/=3 inches	4.9 (140)	1.8 (51)	6.6 (188)	1.9 (53)
16	</=2 inches	8.8 (250)	2.3 (66)	11.3 (323)	2.5 (70)
	>/=3 inches	9.8 (280)	2.3 (66)	12.9 (369)	2.5 (70)
20	</=2 inches	15.8 (450)	4 (114)	22.1 (630)	4.2 (121)
	>/=3 inches	17.5 (500)	4 (114)	25.2 (720)	4.2 (121)
25	</=2 inches	22.5 (642)	4.8 (137)	30.5 (870)	5.1 (147)
	>/=3 inches	25.2 (720)	4.8 (137)	33.3 (950)	5.1 (147)
32	</=2 inches	32.3 (923)	7.1 (203)	42 (1200)	7.7 (221)
	>/=3 inches	45.5 (1300)	7.1 (203)	49 (1400)	7.7 (221)
40	</=2 inches	42 (1200)	7.8 (224)	53.2 (1520)	8.4 (241)
	>/=3 inches	50.4 (1440)	7.8 (224)	60.2 (1720)	8.4 (241)
50	</=2 inches	66.6 (1903)	11.8 (337)	91 (2600)	12.7 (362)
	>/=3 inches	77.2 (2206)	11.8 (337)	104 (2970)	12.7 (362)
63	</=2 inches	86.5 (2470)	13.2 (377)	109.6 (3130)	14.1 (404)
	>/=3 inches	97 (2770)	13.2 (377)	120.1 (3430)	14.1 (404)

Weight: ounces (grams)

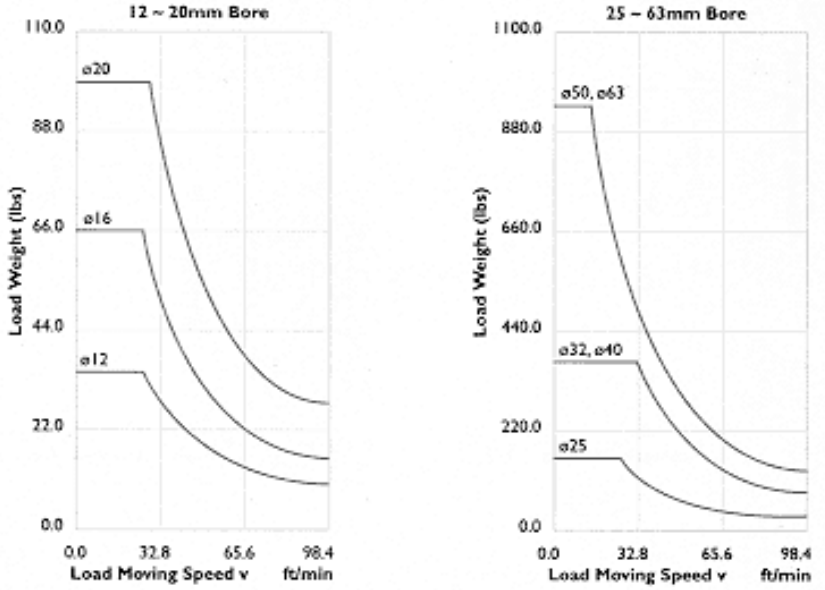
ALLOWABLE LOAD RANGE VS PISTON SPEED



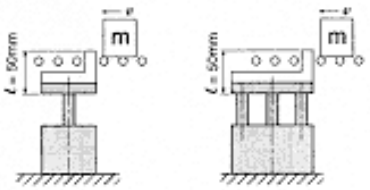
HANDLING CAUTION

Keep the relationship between the loads and piston speeds beneath the values presented in the charts. Values exceeding those shown require the use of an external shock absorber.

OPERATING RANGE WHEN USED AS A STOPPER



Graphs are for both actuator orientations.



HANDLING CAUTION

When this product is used as a stopper, select a cylinder with stroke of two inches or less.

HSGDA AND HSGDAP SENSOR ORDER CODES

ZE 102 A - HP

Lead Wire Length
A: 1000mm (39.37 inches)
B: 3000mm (118.11 inches)

Sensor Switch Type

ZE135: 2 wires, horizontal lead, solid state with LED (PNP, sourcing)
10 ~ 28VDC

ZE155: 3 wires, horizontal lead, solid state with LED (NPN, sinking)
4.5 ~ 28VDC

ZE235: 2 wires, vertical lead, solid state with LED (PNP, sourcing)
10 ~ 28VDC

ZE255: 3 wires, vertical lead, solid state with LED (NPN, sinking)
4.5 ~ 28VDC

ZE101: 2 wires, horizontal lead, reed switch without LED
5 ~ 28VDC, 85 ~ 115VAC

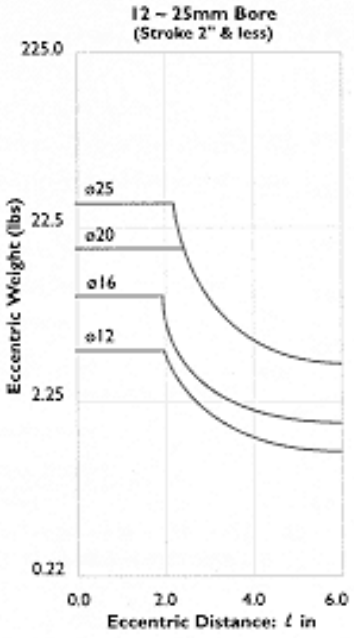
ZE102: 2 wires, horizontal lead, reed switch with LED
10 ~ 28VDC, 85 ~ 115VAC

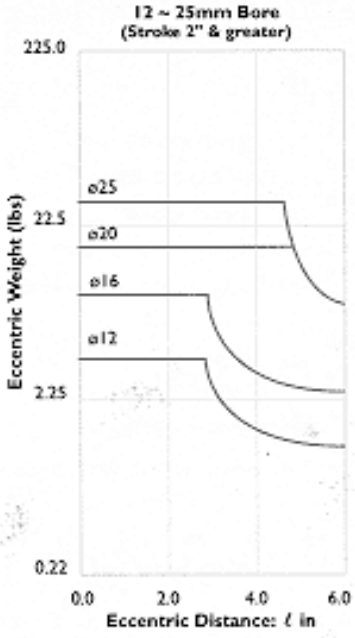
ZE201: 2 wires, vertical lead, reed switch without LED
5 ~ 28VDC, 85 ~ 115VAC

ZE202: 2 wires, vertical lead, reed switch with LED
10 ~ 28VDC, 85 ~ 115VAC

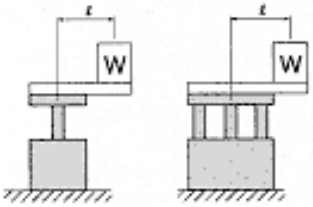
GDA & HSGDAP
IDED BLOCK CYLINDER
SPECIFICATIONS

OPERATING RANGE WHEN USED AS A LIFTER FOR OFF-CENTERED LOADS

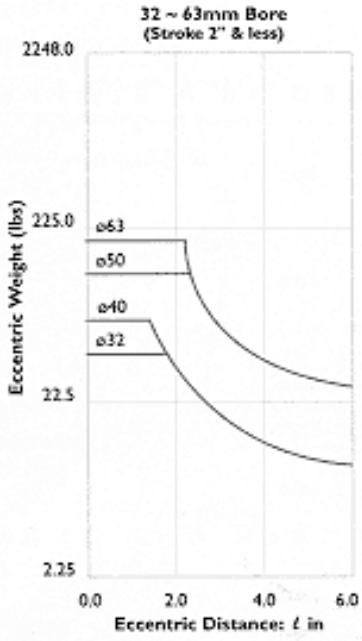


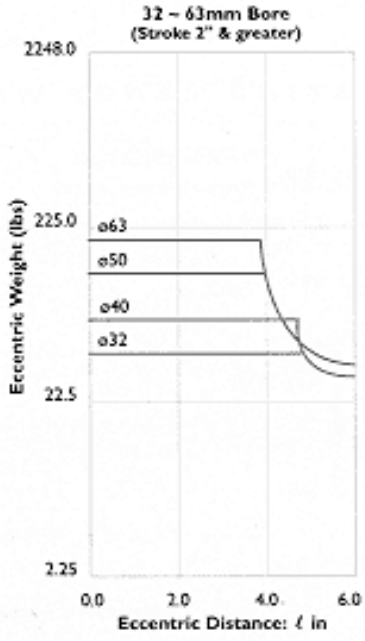


Graphs are for both actuator orientations.



Pressure Supply = 72.5 psi





Test conditions:
Pressure Supply = 72.5 psi

Cylinder Bore mm	Theoretical Force Output
12 and 16	40% of maximum force
20 and 25	50% of maximum force
32 and 63	60% of maximum force

Example: 50 mm bore

F = Force in lbs

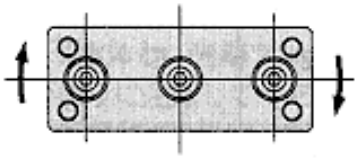
P = Pressure in psi

A = Area of push side of cylinder piston in in^2

$F = P \times A$
$F = 72.5 \times 3.14$
$F = 227.65$

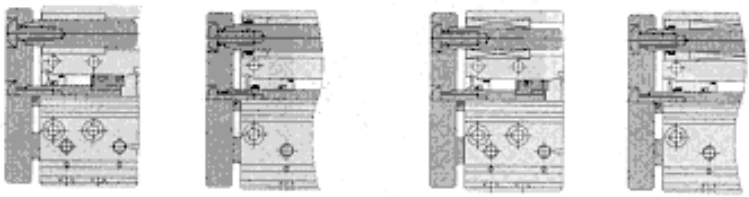
Theoretical Force = 227.65 x 60%
Theoretical Force = 136.59 lbs

END PLATE ALLOWABLE ROTATING TORQUE

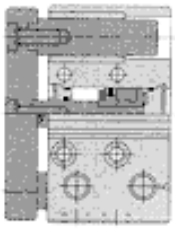


Bore \ Stroke in	1/2	1	1 1/2	2	3	4	5	6	7	8
12 mm	3.5	2.7	2.2	2.0	4.0	3.3				
16 mm	5.8	4.4	3.6	3.2	5.8	4.9				
20 mm	10.7	9.0	7.6	6.9	17.3	15.0	13.2	11.3	10.3	9.4
25 mm	18.5	15.2	12.9	11.6	26.2	22.8	20.0	17.9	16.2	14.8
32 mm	75.1	60.0	51.9	46.7	50.8	44.3	39.5	35.5	32.2	29.6
40 mm	82.6	65.0	56.8	51.3	55.8	48.7	43.4	39.0	35.4	32.5
50 mm	146.0	125.0	110.6	100.9	105.8	93.4	83.7	75.8	69.2	63.8
63 mm	160.2	139.0	122.0	111.0	116.3	102.7	92.1	83.3	76.1	70.2

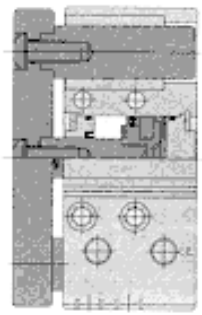
lbs•in



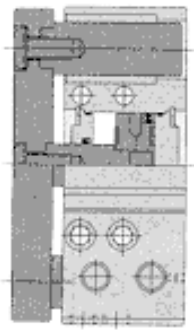
Ø 1 2



Ø 1 6 • Ø 2 0 • Ø 2 5

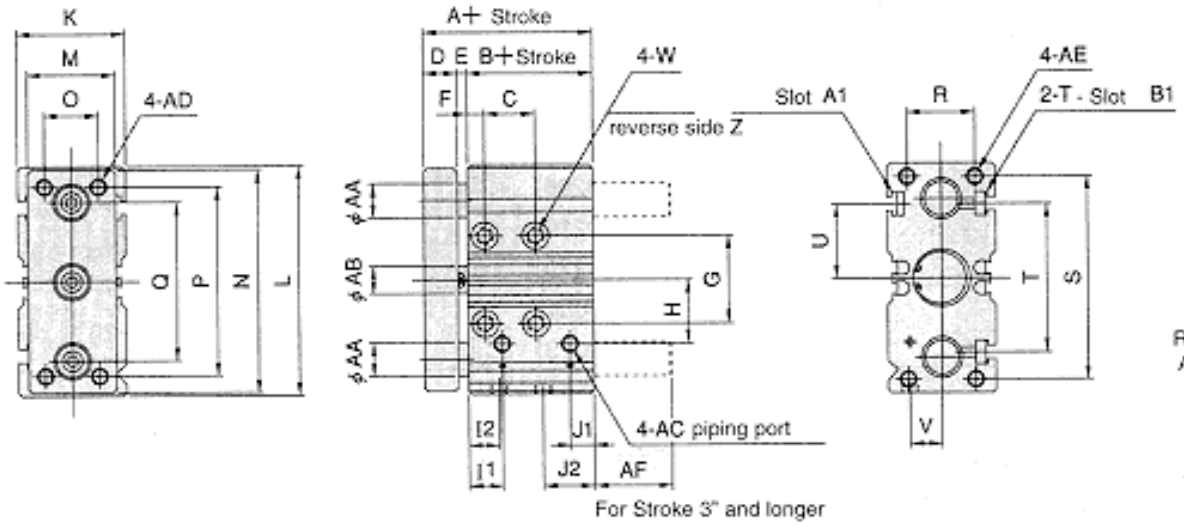


Ø 3 2 • Ø 4 0



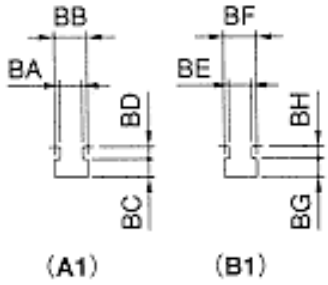
Ø 5 0 • Ø 6 3

Ø12 • Ø16



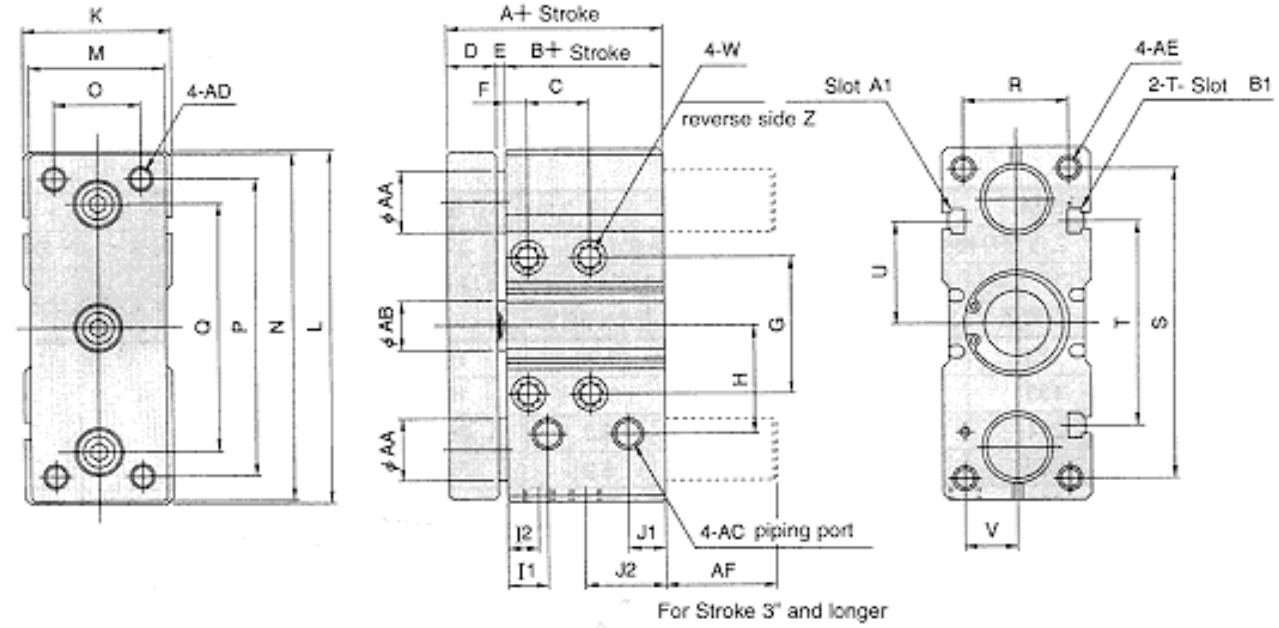
For Stroke 3" and longer

Recommended thread for T-bolt
A1, B1 Dimension



(T-slot grooves are designed for metric fasteners. A1 and B1 dimensions are recommended thread sizes.)

Ø20 ~ Ø63



For Stroke 3" and longer

C

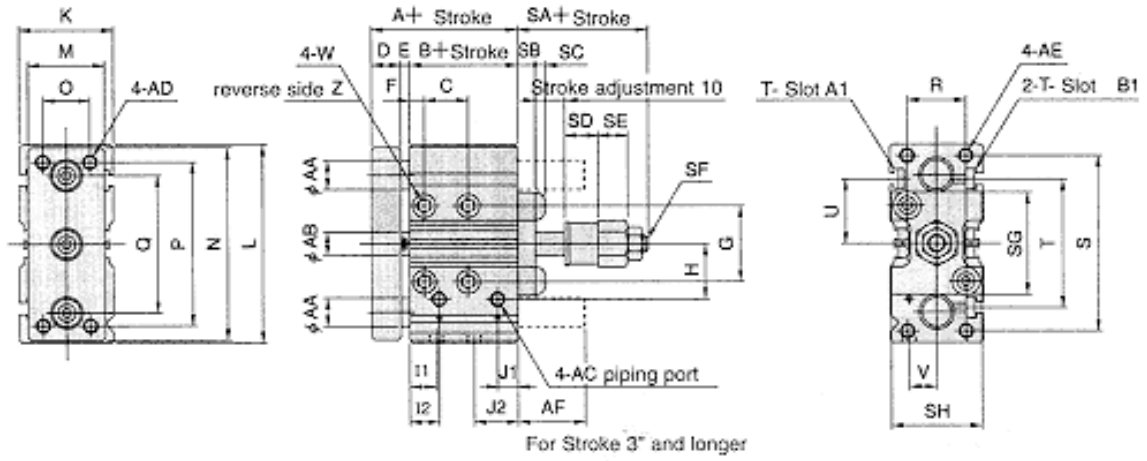
Bore / Stroke (in)	A	B	1/2	1	1 1/2	2–4	5–8	125+	D	E	F	G	H	I1	I2
12	36 (1.417)	25 (0.984)	18 (0.6968)	30 (1.1968)	43 (1.6968)	55 (2.1653)	NA	NA	8 (0.315)	3 (0.118)	5 (0.197)	22 (0.866)	17 (0.669)	10 (0.394)	9 (0.354)
16	40 (1.575)	27 (1.063)	18 (0.6968)	30 (1.1968)	43 (1.6968)	55 (2.1653)	NA	NA	10 (0.394)	3 (0.118)	5 (0.197)	26 (1.024)	19 (0.748)	10 (0.394)	9 (0.354)
20	52 (2.047)	36 (1.417)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	12 (0.472)	4 (0.157)	6 (0.236)	30 (1.181)	27 (1.063)	11 (0.433)	11 (0.433)
25	54 (2.126)	38 (1.496)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	12 (0.472)	4 (0.157)	6 (0.236)	33 (1.299)	29 (1.142)	12 (0.472)	12 (0.472)
32	59 (2.323)	40 (1.575)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	15 (0.591)	4 (0.157)	7 (0.276)	44 (1.732)	35 (1.378)	13 (0.512)	10 (0.394)
40	63 (2.480)	44 (1.732)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	15 (0.591)	4 (0.157)	7 (0.276)	52 (2.047)	40 (1.575)	14 (0.551)	14 (0.551)
50	70 (2.756)	47 (1.85)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	18 (0.709)	5 (0.197)	8 (0.315)	66 (2.598)	52.5 (2.067)	15.5 (0.61)	10 (0.394)
63	70 (2.756)	47 (1.85)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	18 (0.709)	5 (0.197)	8 (0.315)	78 (3.071)	60 (2.362)	17 (0.669)	10 (0.394)

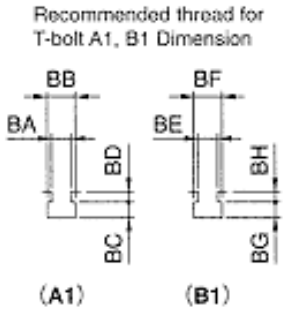
Bore / Codes	J1	J2	K	L	M	N	O	P	Q	R	S	T	U	V
12	6 (0.236)	14 (0.551)	28 (1.102)	58 (2.283)	22 (0.866)	56 (2.205)	14 (0.551)	48 (1.89)	42 (1.654)	18 (0.709)	51 (2.008)	37 (1.457)	18.5 (0.728)	8.5 (0.335)
16	7.5 (0.295)	16 (0.63)	32 (1.26)	68 (2.677)	26 (1.024)	66 (2.598)	16 (0.63)	56 (2.205)	47 (1.85)	20 (0.787)	60 (2.362)	44 (1.732)	22 (0.866)	9.5 (0.374)
20	10 (0.394)	20 (0.787)	40 (1.575)	82 (3.228)	36 (1.417)	80 (3.15)	24 (0.945)	66 (2.598)	58 (2.283)	26 (1.024)	72 (2.835)	54 (2.126)	27 (1.063)	13.5 (0.531)
25	10 (0.394)	21 (0.827)	42 (1.654)	92 (3.622)	38 (1.496)	90 (3.543)	26 (1.024)	76 (2.992)	63 (2.48)	30 (1.181)	80 (3.15)	54 (2.126)	27 (1.063)	14.5 (0.571)
32	12 (0.472)	25 (0.984)	48 (1.89)	114 (4.488)	44 (1.732)	112 (4.409)	28 (1.102)	96 (3.78)	80 (3.15)	34 (1.339)	100 (3.937)	66 (2.598)	33 (1.299)	17 (0.669)
40	13 (0.512)	25 (0.984)	54 (2.126)	124 (4.882)	50 (1.969)	122 (4.803)	34 (1.339)	106 (4.173)	90 (3.543)	40 (1.575)	106 (4.173)	82 (3.228)	41 (1.614)	18 (0.709)
50	15 (0.591)	31 (1.22)	66 (2.598)	150 (5.906)	62 (2.441)	148 (5.827)	42 (1.654)	120 (4.724)	110 (4.331)	44 (1.732)	130 (5.118)	100 (3.937)	50 (1.969)	22 (0.866)
63	14 (0.551)	31 (1.22)	76 (2.992)	162 (6.378)	72 (2.835)	160 (6.299)	52 (2.047)	132 (5.197)	122 (4.803)	44 (1.732)	144 (5.669)	120 (4.724)	60 (2.362)	24 (0.945)

Bore / Codes	W	Z	AA	AB	AC	AD
12	4.35 (.171) dia thru-hole X 8 (.315) c' bore, depth 4.5 (.177) Clearance for #8 fastener.	10-32 UNF depth 0.31 inches	8 (0.315)	6 (0.236)	10-32 UNF	8-32 UNC
16	4.35 (.171) dia thru-hole X 8 (.315) c' bore, depth 4.5 (.177) Clearance for #8 fastener.	10-32 UNF depth 0.43 inches	10 (0.394)	8 (0.315)	10-32 UNF	10-32 UNC
20	5.2 (.205) dia thru-hole X 9.5 (.374) c' bore, depth 5.5 (.217) Clearance for #10 fastener.	1/4-20 UNC depth 0.47 inches	14 (0.551)	10 (0.394)	1/8 NPSF	1/4-20 UNC
25	5.2 (.205) dia thru-hole X 9.5 (.374) c' bore, depth 5.5 (.217) Clearance for #10 fastener.	1/4-20 UNC depth 0.47 inches	16 (0.63)	12 (0.472)	1/8 NPSF	1/4-20 UNC
32	6.8 (.268) dia thru-hole X 11 (.433) c' bore, depth 7 (.276) Clearance for 1/4-inch fastener.	5/16-18 UNC depth 0.63 inches	20 (0.787)	16 (0.63)	1/8 NPSF	5/16-18 UNC
40	6.8 (.268) dia thru-hole X 11 (.433) c' bore, depth 7 (.276) Clearance for 1/4-inch fastener.	5/16-18 UNC depth 0.63 inches	20 (0.787)	16 (0.63)	1/8 NPSF	5/16-18 UNC
50	8.6 (.339) dia thru-hole X 14 (.551) c' bore, depth 9 (.354) Clearance for 5/16-inch fastener.	3/8-16 UNC depth 0.79 inches	25 (0.984)	20 (0.787)	1/4 NPSF	3/8-16 UNC
63	8.6 (.339) dia thru-hole X 14 (.551) c' bore, depth 9 (.354) Clearance for 5/16-inch fastener.	3/8-16 UNC depth 0.79 inches	25 (0.984)	20 (0.787)	1/4 NPSF	3/8-16 UNC

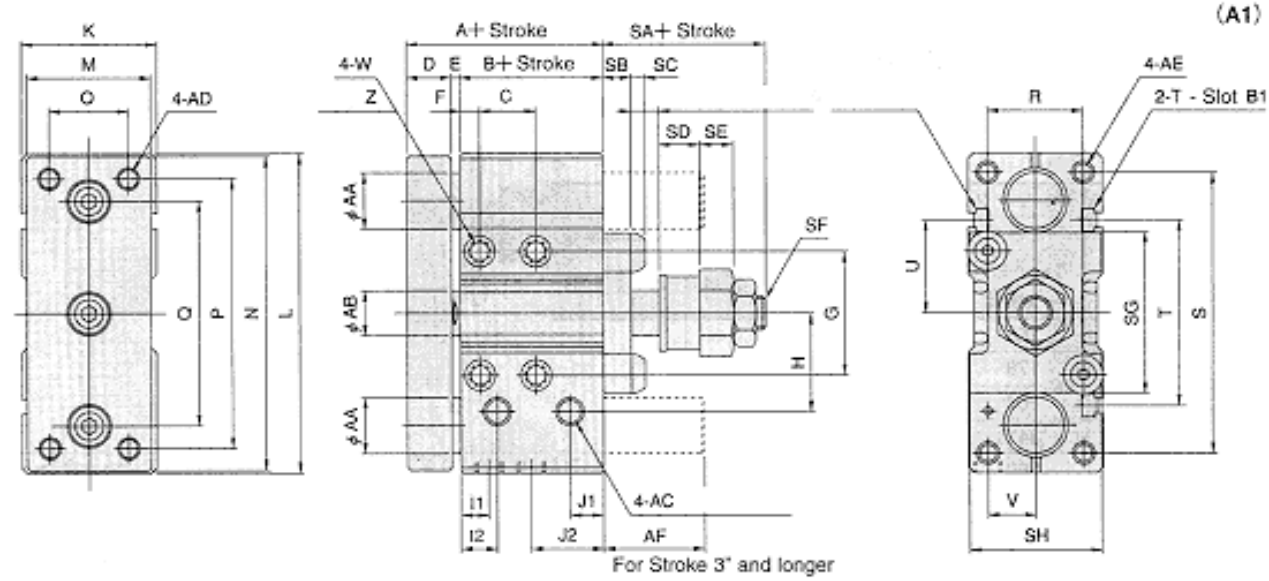
Bore / Codes	AE	AF	AI	BI	BA	BB	BC	BD	BE	BF	BG	BH
12	8-32 UNC depth 0.31 inches	15 (0.591)	M3 x 0.5	M4 x 0.7	3.3 (0.13)	5.8 (0.228)	3 (0.118)	1.5 (0.059)	4.3 (0.169)	7.3 (0.287)	3.5 (0.138)	2.5 (0.098)
16	10-32 UNF depth 0.39 inches	23 (0.906)	M4 x 0.7	M4 x 0.7	4.3 (0.169)	7.3 (0.287)	3.5 (0.138)	1.5 (0.059)	4.3 (0.169)	7.3 (0.287)	3.5 (0.138)	3 (0.118)
20	1/4-20 UNC depth 0.47 inches	23 (0.906)	M4 x 0.7	M5 x 0.8	4.3 (0.169)	7.3 (0.287)	4 (0.157)	3 (0.118)	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)
25	1/4-20 UNC depth 0.47 inches	28 (1.102)	M4 x 0.7	M5 x 0.8	4.3 (0.169)	7.3 (0.287)	4 (0.157)	3 (0.118)	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)
32	5/16-18 UNC depth 0.63 inches	36 (1.417)	M5 x 0.8	M5 x 0.8	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)
40	5/16-18 UNC depth 0.63 inches	32 (1.26)	M5 x 0.8	M6 x 1.0	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	6.3 (0.248)	10.3 (0.406)	5.5 (0.217)	3 (0.118)
50	3/8-16 UNC depth 0.79 inches	39 (1.535)	M5 x 0.8	M8 x 1.25	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	8.3 (0.327)	13.3 (0.524)	7 (0.276)	4.5 (0.177)
63	3/8-16 UNC depth 0.79 inches	39 (1.535)	M5 x 0.8	M8 x 1.25	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	8.3 (0.327)	13.3 (0.524)	7 (0.276)	4.5 (0.177)

Ø12 • Ø16





Ø20 ~ Ø63



(T-slot grooves are designed for metric fasteners. A1 and B1 dimensions are recommended thread sizes.)

Bore \ Stroke (in)	A	B	C: 1/2	C: 1	C: 1 1/2	C: 2~4	C: 5~8	C: 125+	D	E	F	G	H	I1	I2
12	36 (1.417)	25 (0.984)	18 (0.6968)	30 (1.1968)	43 (1.6968)	55 (2.1653)	NA	NA	8 (0.315)	3 (0.118)	5 (0.197)	22 (0.866)	17 (0.669)	10 (0.394)	9 (0.354)
16	40 (1.575)	27 (1.063)	18 (0.6968)	30 (1.1968)	43 (1.6968)	55 (2.1653)	NA	NA	10 (0.394)	3 (0.118)	5 (0.197)	26 (1.024)	19 (0.748)	10 (0.394)	9 (0.354)
20	52 (2.047)	36 (1.417)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	12 (0.472)	4 (0.157)	6 (0.236)	30 (1.181)	27 (1.063)	11 (0.433)	11 (0.433)
25	54 (2.126)	38 (1.496)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	12 (0.472)	4 (0.157)	6 (0.236)	33 (1.299)	29 (1.142)	12 (0.472)	12 (0.472)
32	59 (2.323)	40 (1.575)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	15 (0.591)	4 (0.157)	7 (0.276)	44 (1.732)	35 (1.378)	13 (0.512)	10 (0.394)
40	63 (2.480)	44 (1.732)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	15 (0.591)	4 (0.157)	7 (0.276)	52 (2.047)	40 (1.575)	14 (0.551)	14 (0.551)
50	70 (2.756)	47 (1.85)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	18 (0.709)	5 (0.197)	8 (0.315)	66 (2.598)	52.5 (2.067)	15.5 (0.61)	10 (0.394)
63	70 (2.756)	47 (1.85)	23 (0.8937)	35 (1.3937)	48 (1.8937)	60 (2.3622)	110 (4.3307)	110 (4.3307)	18 (0.709)	5 (0.197)	8 (0.315)	78 (3.071)	60 (2.362)	17 (0.669)	10 (0.394)

Bore / Codes	J1	J2	K	L	M	N	O	P	Q	R	S	T	U	V
12	6 (0.236)	14 (0.551)	28 (1.102)	58 (2.283)	22 (0.866)	56 (2.205)	14 (0.551)	48 (1.89)	42 (1.654)	18 (0.709)	51 (2.008)	37 (1.457)	18.5 (0.728)	8.5 (0.335)
16	7.5 (0.295)	16 (0.63)	32 (1.26)	68 (2.677)	26 (1.024)	66 (2.598)	16 (0.63)	56 (2.205)	47 (1.85)	20 (0.787)	60 (2.362)	44 (1.732)	22 (0.866)	9.5 (0.374)
20	10 (0.394)	20 (0.787)	40 (1.575)	82 (3.228)	36 (1.417)	80 (3.15)	24 (0.945)	66 (2.598)	58 (2.283)	26 (1.024)	72 (2.835)	54 (2.126)	27 (1.063)	13.5 (0.531)
25	10 (0.394)	21 (0.827)	42 (1.654)	92 (3.622)	38 (1.496)	90 (3.543)	26 (1.024)	76 (2.992)	63 (2.48)	30 (1.181)	80 (3.15)	54 (2.126)	27 (1.063)	14.5 (0.571)
32	12 (0.472)	25 (0.984)	48 (1.89)	114 (4.488)	44 (1.732)	112 (4.409)	28 (1.102)	96 (3.78)	80 (3.15)	34 (1.339)	100 (3.937)	66 (2.598)	33 (1.299)	17 (0.669)
40	13 (0.512)	25 (0.984)	54 (2.126)	124 (4.882)	50 (1.969)	122 (4.803)	34 (1.339)	106 (4.173)	90 (3.543)	40 (1.575)	106 (4.173)	82 (3.228)	41 (1.614)	18 (0.709)
50	15 (0.591)	31 (1.22)	66 (2.598)	150 (5.906)	62 (2.441)	148 (5.827)	42 (1.654)	120 (4.724)	110 (4.331)	44 (1.732)	130 (5.118)	100 (3.937)	50 (1.969)	22 (0.866)
63	14 (0.551)	31 (1.22)	76 (2.992)	162 (6.378)	72 (2.835)	160 (6.299)	52 (2.047)	132 (5.197)	122 (4.803)	44 (1.732)	144 (5.669)	120 (4.724)	60 (2.362)	24 (0.945)

Bore / Codes	W	Z	AA	AB	AC	AD
12	4.35 (.171) dia thru-hole X 8 (.315) c' bore, depth 4.5 (.177)	10-32 UNC depth 0.31 inches	8 (0.315)	6 (0.236)	10-32 UNC	8-32 UNC
16	4.35 (.171) dia thru-hole X 8 (.315) c' bore, depth 4.5 (.177)	10-32 UNC depth 0.43 inches	10 (0.394)	8 (0.315)	10-32 UNC	10-32 UNC
20	5.2 (.205) dia thru-hole X 9.5 (.374) c' bore, depth 5.5 (.217)	1/4-20 UNC depth 0.47 inches	14 (0.551)	10 (0.394)	1/8 NPSF	1/4-20 UNC
25	5.2 (.205) dia thru-hole X 9.5 (.374) c' bore, depth 5.5 (.217)	1/4-20 UNC depth 0.47 inches	16 (0.63)	12 (0.472)	1/8 NPSF	1/4-20 UNC
32	6.8 (.268) dia thru-hole X 11 (.433) c' bore, depth 7 (.276)	5/16-18 UNC depth 0.63 inches	20 (0.787)	16 (0.63)	1/8 NPSF	5/16-18 UNC
40	6.8 (.268) dia thru-hole X 11 (.433) c' bore, depth 7 (.276)	5/16-18 UNC depth 0.63 inches	20 (0.787)	16 (0.63)	1/8 NPSF	5/16-18 UNC
50	8.6 (.339) dia thru-hole X 14 (.551) c' bore, depth 9 (.354)	3/8-16 UNC depth 0.79 inches	25 (0.984)	20 (0.787)	1/4 NPSF	3/8-16 UNC
63	8.6 (.339) dia thru-hole X 14 (.551) c' bore, depth 9 (.354)	3/8-16 UNC depth 0.79 inches	25 (0.984)	20 (0.787)	1/4 NPSF	3/8-16 UNC

Bore / Codes	AE	AF	SA	SB	SC	SD	SE	SF	SG	SH
12	8-32 UNC depth 0.31 inches	15 (0.591)	31.5 (1.24)	6 (0.236)	0.6 (0.024)	9.7 (0.382)	10 (0.394)	M5 x 21	32 (1.26)	27 (1.063)
16	10-32 UNC depth 0.39 inches	23 (0.906)	34.4 (1.354)	6 (0.236)	3.4 (0.134)	11.5 (0.453)	10 (0.394)	M6 x 23	35.5 (1.398)	31 (1.22)
20	1/4-20 UNC depth 0.47 inches	23 (0.906)	36.8 (1.449)	8 (0.315)	4 (0.157)	12 (0.472)	10 (0.394)	M8 x 25	42 (1.654)	36.5 (1.437)
25	1/4-20 UNC depth 0.47 inches	28 (1.102)	40.5 (1.594)	8 (0.315)	4 (0.157)	12.5 (0.492)	12 (0.472)	M10 x 27	45 (1.772)	40.5 (1.594)
32	5/16-18 UNC depth 0.63 inches	36 (1.417)	48.5 (1.909)	10 (0.394)	5 (0.197)	14.5 (0.571)	12 (0.472)	M14 x 31	58 (2.283)	48 (1.89)
40	5/16-18 UNC depth 0.63 inches	32 (1.26)	47 (1.85)	10 (0.394)	5 (0.197)	14.5 (0.571)	12 (0.472)	M14 x 31	67 (2.638)	54 (2.126)
50	3/8-16 UNC depth 0.79 inches	39 (1.535)	53 (2.087)	12 (0.472)	6 (0.236)	13 (0.512)	15 (0.591)	M18 x 35	83 (3.268)	62 (2.441)
63	3/8-16 UNC depth 0.79 inches	39 (1.535)	54 (2.126)	12 (0.472)	6 (0.236)	13 (0.512)	15 (0.591)	M18 x 35	95.5 (3.76)	64 (2.52)

Bore / Codes	A1	B1	BA	BB	BC	BD	BE	BF	BG	BH
12	M3 x 0.5	M4 x 0.7	3.3 (0.13)	5.8 (0.228)	3 (0.118)	1.5 (0.059)	4.3 (0.169)	7.3 (0.287)	3.5 (0.138)	2.5 (0.098)
16	M4 x 0.7	M4 x 0.7	4.3 (0.169)	7.3 (0.287)	3.5 (0.138)	1.5 (0.059)	4.3 (0.169)	7.3 (0.287)	3.5 (0.138)	3 (0.118)
20	M4 x 0.7	M5 x 0.8	4.3 (0.169)	7.3 (0.287)	4 (.0157)	3 (0.118)	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)
25	M4 x 0.7	M5 x 0.8	4.3 (0.169)	7.3 (0.287)	4 (0.157)	3 (0.118)	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)
32	M5 x 0.8	M5 x 0.8	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)
40	M5 x 0.8	M6 x 1.0	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	6.3 (0.248)	10.3 (0.406)	5.5 (0.217)	3 (0.118)
50	M5 x 0.8	M8 x 1.25	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	8.3 (0.327)	13.3 (0.524)	7 (0.276)	4.5 (0.177)
63	M5 x 0.8	M8 x 1.25	5.3 (0.209)	8.3 (0.327)	4.5 (0.177)	3 (0.118)	8.3 (0.327)	13.3 (0.524)	7 (0.276)	4.5 (0.177)

SOLID STATE TYPE

Item \ Model	ZE135	ZE155	ZE235	ZE255
Sensor Type	DC 2-wire type, PNP	DC 3-wire type, NPN	DC 2-wire type, PNP	DC 3-wire type, NPN
Lead Wire Direction	Horizontal		Vertical	
Power Supply Voltage	–	DC 4.5~28V	–	DC 4.5~28V
Load Voltage	DC 10~28V	DC 4.5~28V	DC 10~28V	DC 4.5~28V
Load Current	4~20 mA (at 25°C, 10 mA at 60°C)	50 mA MAX.	4~20 mA (at 25°C, 10 mA at 60°C)	50 mA MAX.
ON Current Consumption	–	10 mA MAX. (DC 24V)	–	10 mA MAX. (DC 24V)
Internal Voltage Drop note 1	4.5V MAX.	0.5V MAX. (<10V at 20 mA)	4.5V MAX.	0.5V MAX. (<10V at 20 mA)
Leakage Current	1 mA MAX. (DC 24V, 25°C)	50 µA MAX. (DC 24V)	1 mA MAX. (DC 24V, 25°C)	50 µA MAX. (DC 24V)
Delay Time	1ms MAX.			
Insulation Resistance	100 MΩ MIN.			
Dielectric Strength	AC500V (50/60Hz) 1min. (between case and lead wire)			
Shock Resistance	30.0G			
Vibration Resistance	9.0G Total amplitude 1.5 mm, 10 ~ 55Hz			
Environmental Protection	IP67 IEC standard (JIS C0920)			
Indicator Lamp	ON : Red LED			
Lead Wire note 2	(2x0.15 mm^2) Brown/Blue X ℓ	(3x0.15 mm^2) Brown/Blue/Black X ℓ	(2x0.15 mm^2) Brown/Blue X ℓ	(3x0.15 mm^2) Brown/Blue/Black X ℓ
Temperature Range F° (C°)	32~140 (0~60)			
Storage Temperature F° (C°)	14~158 (-10~70)			
Weight ounces	.48 (for lead wire length A : 1000mm), 1.13 (for lead wire length B : 3000mm)			

Notes:

1. Internal voltage drop depends on load current.
2. Lead wire length A : 1000mm, B : 3000mm. All are PCCV insulated cable.

REED SWITCH TYPE

Item \ Model	ZE101		ZE102		ZE201		ZE202	
Sensor Type	DC 2-wire type							
Lead Wire Direction	Horizontal				Vertical			
Load Voltage	DC 5~28V	AC 85~115V(r.m.s.)	DC 10~28V	AC 85~115V(r.m.s.)	DC 5~28V	AC 85~115V(r.m.s.)	DC 10~28V	AC 85~115V(r.m.s.)
Load Current	40 mA MAX.	20 mA MAX.	5~40 mA	5~20 mA	40 mA MAX.	20 mA MAX.	5~40 mA	5~20 mA
Internal Voltage Drop note 1	10 mV MAX. (at load current DC40mA)		3.0V MAX.		10 mV MAX. (at load current DC40mA)		3.0V MAX.	
Leakage Current	0 mA							
Delay Time	1ms MAX.							
Insulation Resistance	100 MΩ MIN.							
Dielectric Strength	AC500V (50/60Hz) 1min. (between case and lead wire)							
Shock Resistance	294m/s² (30.0G) (non repeated shock)							
Vibration Resistance	88.3m/s² (9.0G) Total amplitude 1.5mm, 10~55Hz, Resonance frequency 2750±250Hz							
Environmental Protection	IP67 IEC standard (JIS C0920)							
Indicator Lamp	None		ON : Red LED		None		ON : Red LED	
Lead Wire note 2	PVC insulated cable (2x0.15 mm^2) Brown/Blue X ℓ							
Temperature Range F° (C°)	32~140 (0~60)							
Storage Temperature F° (C°)	14~158 (-10~70)							
Sensor Switch Protection	Required							
Weight ounces	.48 (for lead wire length A : 1000mm), 1.13 (for lead wire length B : 3000mm)							

Notes:

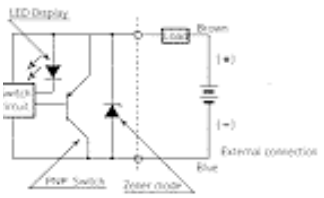
1. Internal voltage drop depends on load current.
2. Lead wire length A : 1000mm, B : 3000mm.

CIRCUITRY

SOLID STATE TYPE

2-WIRE TYPE

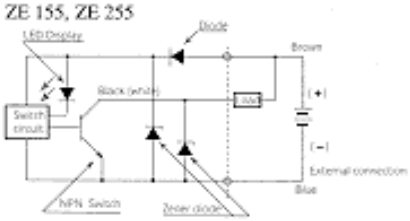
E 135, ZE 235



Sourcing sensor

3-WIRE TYPE

ZE 155, ZE 255

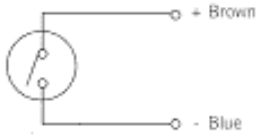


Sinking sensor

REED SWITCH TYPE

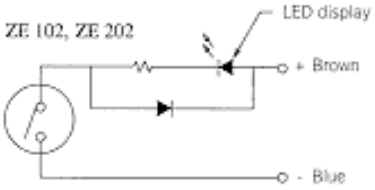
WITHOUT INDICATOR

ZE 101, ZE 201



WITH INDICATOR

ZE 102, ZE 202

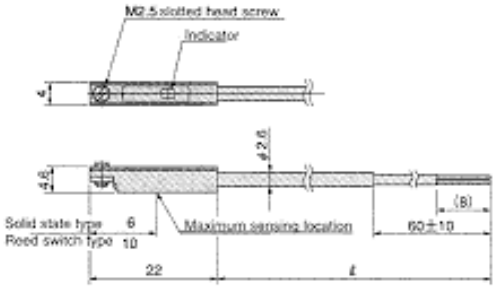


DIMENSIONS OF SENSOR SWITCH

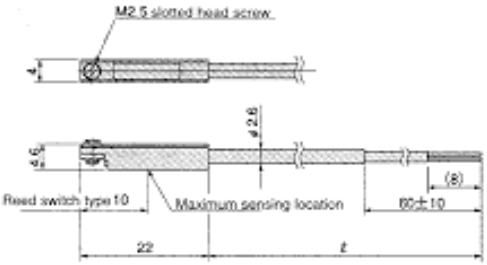
(UNIT: MM)

HORIZONTAL LEAD WIRE

WITH INDICATOR

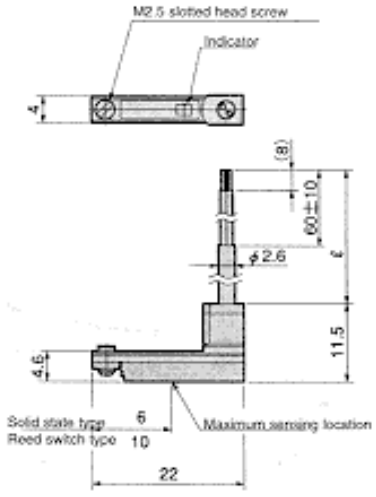


WITHOUT INDICATOR

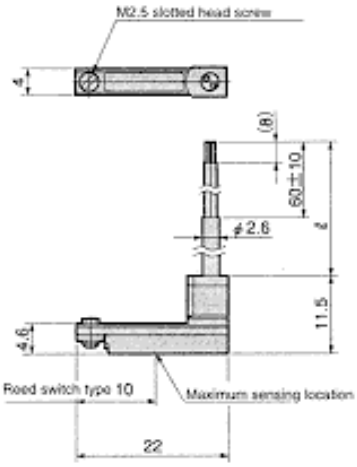


VERTICAL LEAD WIRE

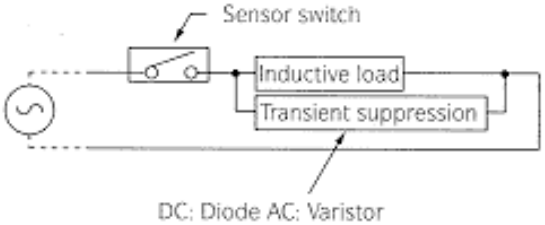
WITH INDICATOR



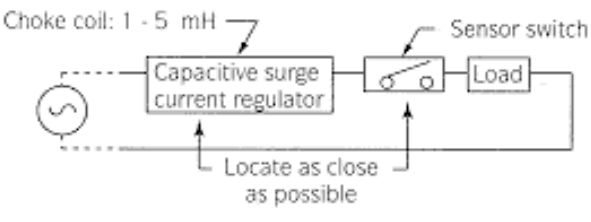
WITHOUT INDICATOR



USE WITH INDUCTIVE LOADS (MAGNETIC RELAYS, ETC.)



USE WITH LONG LEAD WIRES (10M) BETWEEN SENSOR SWITCH AND LOAD



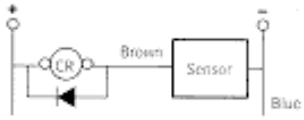
HSGDA AND HSGDAP
SENSOR SWITCH CONNECTING PROCEDURES

CONNECTING PROCEDURES FOR SOLID STATE SENSOR SWITCHES

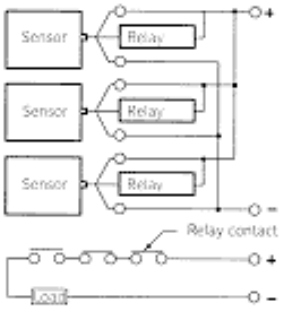
2-WIRE TYPE

BASIC CONNECTION

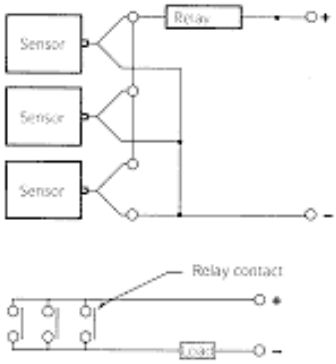
CONNECTION TO RELAY



AND CONNECTION

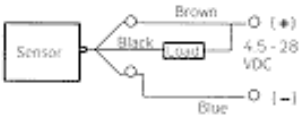


OR CONNECTION

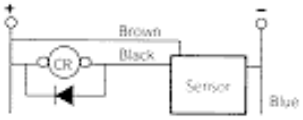


3-WIRE TYPE

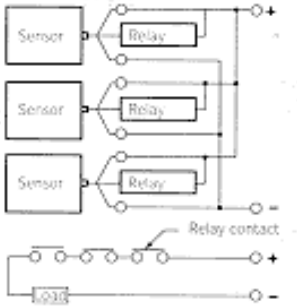
BASIC CONNECTION



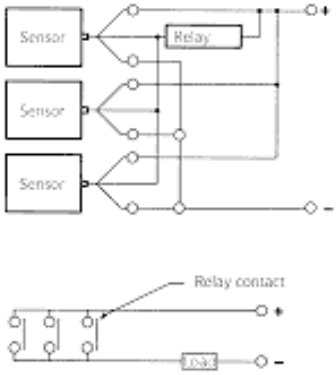
CONNECTION TO RELAY



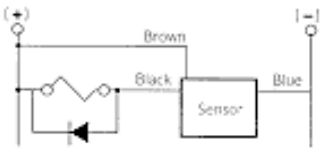
AND CONNECTION



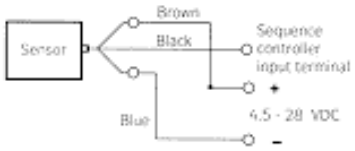
OR CONNECTION



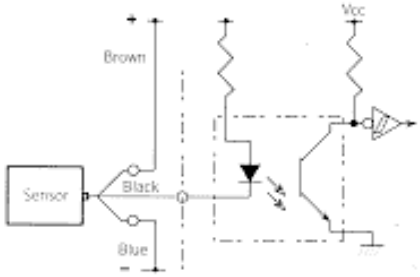
CONNECTION TO SOLENOID



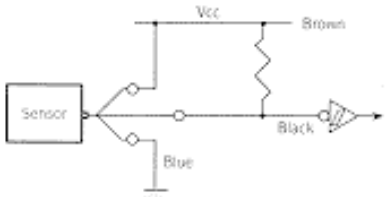
CONNECTION TO SEQUENCER



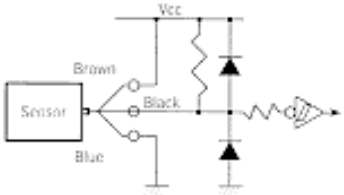
CONNECTION TO TTL



DIRECT CONNECTION



C-MOS CONNECTION



Notes:

1. Follow wire color code for proper connection; otherwise switch will malfunction or may be damaged.
2. Solid state 2-wire type sensor switches should not be connected to TTL or C-MOS.
3. Use of a surge protection diode is recommended for inductive loads such as relays.
4. For OR Connection, it is possible to directly connect outputs of sensor switches (for example, two brown wires). But the amount of leakage current will increase proportionally by the number of sensor switches. Therefore, be cautious against load return failure.
5. Avoid using sensor switches in places where other strong magnetic forces are present or near large current such as power lines (switches are actuated by magnetism).
6. Use care with lead wires. Do not pull or bend lead wires excessively.
7. Do not use sensor switches in areas where chemically active agents or gases are present.
8. Consult us before using sensor switches in oily or wet surroundings.

HSGDA AND HSGDAP
CAUTIONS

CAUTION

Compressed air is powerful and may be dangerous. Before attempting to remove a component from air line or system, always disconnect the supply air and thoroughly exhaust the line or system. Never attempt to construct, operate or service anything using compressed air unless you have been properly trained to do so. Failure to heed this warning could result in SERIOUS, EVEN FATAL PERSONAL INJURY.

PLUMBING

Before connecting fittings and tubing, eliminate any foreign material that may have become lodged within. Be sure that valve and actuator ports are free of debris such as packaging material. If you use a sealant, make sure that it does not get inside of the components as it may cause them to malfunction.