

HUMPHREY TANDEM CYLINDERS

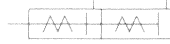
DOUBLE ACTING AND SINGLE ACTING PUSH TYPES

SYMBOLS

Double Acting (HJDAT)



Single Acting-Push (HJSAT)



SPECIFICATIONS

Item	Nominal bore size inch (mm)									
	1/2 (12)	5/8 (16)	3/4 (20)	1 (25)	1 1/4 (32)	1 1/2 (40)	2 (50)	2 1/2 (63)	3 1/4 (80)	4 (100)
Operation	All double & single acting types							All double acting types		
Media	Air									
Pressure – PSI (kgf/cm ²)	60 ~ 100 (4 ~ 7)		45 ~ 100 (3 ~ 7)			30 ~ 100 (2 ~ 7)				
Temperature °F (°C)	32 ~ 140 (0 ~ 60)									
Operating speeds in./sec. (mm/sec.)	Double	1 ~ 20 (30 ~ 500)				1 ~ 13.5 (30 ~ 350)		1 ~ 10 (30 ~ 250)		
	Single	4 ~ 20 (100 ~ 500)						-		
Bumpers	Double	Not available					Optional			
	Single	Not available					-			
Lubrication	Not required									
Port size	10 ~ 32				1/8 NPT		1/4 NPT		3/8 NPT	

NOTE : Refer to page 56 for mounting and handling information.

WEIGHT

oz. (gf)

Bore nominal (mm)	Base weight		Additional weights to base			
	Double acting type	Single acting type	Stroke 1 per 1/4"	Stroke 2 per 1/4"	Sensor	
					Double	Single
1/2 (12)	2.6 (75)	3.3 (94)	.8 (22.2)	.3 (8.3)	.21 (6)	.37 (10.5)
5/8 (16)	3.4 (96)	3.5 (99)	1.1 (30.5)	.4 (11.4)	.35 (10)	.63 (18)
3/4 (20)	4.5 (128)	4.7 (132)	1.4 (40)	.5 (15.2)	.46 (13)	.85 (24)
1 (25)	6.4 (181)	6.7 (190)	2 (57.2)	.7 (21)	1.16 (33)	1.66 (47)
1 1/4 (32)	9.6 (273)	9 (256)	2.5 (70.5)	.9 (24.8)	1.73 (49)	2.33 (66)
1 1/2 (40)	14.2 (402)	13.4 (379)	3.8 (108)	1.3 (35.6)	3.88 (110)	4.73 (134)
2 (50)	22.9 (648)	20 (568)	5.5 (155)	1.7 (48.3)	6.88 (195)	6.7 (190)
2 1/2 (63)	32.2 (914)	-	6.2 (175)	2.1 (59.1)	9.13 (259)	-
3 1/4 (80)	61.4 (1740)	-	9.7 (275)	3.2 (91.4)	13.72 (389)	-
4 (100)	110.8 (3142)	-	14.4 (408)	4.6 (129.5)	25.11 (712)	-

COMPUTATION EXAMPLE (in oz.)

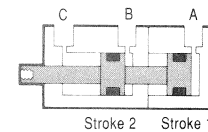
Double acting 1" (25mm) bore with magnet.
 Stroke 1 = 1", Stroke 2 = 1/4", with two CS3HA-HJDAS mounted.
 $6.4 + (2 \times 4) + (.7 \times 1) + 1.16 + (1.06 \times 2) = 18.38 \text{ oz. (523.8mm.)}$

PRINCIPLE OF OPERATION

The tandem cylinder is constructed from two block cylinders joined end to end (see drawing below).

By applying air to, first the A-port, then B-port, it can be used as a two-step stroke cylinder. It can also be used to obtain twice the power within the "stroke 1" range.

Tandem cylinder



BORES AND STROKES

Operation	Nominal bore in. (mm)	Std Strokes (1 or 2) - in.		Maximum stroke (S ₁ + S ₂ total)
		w/o magnet	w/magnet See Note 2	
Double	1/2 (12)	1/4, 3/8, 1/2, 5/8,	3/8, 1/2, 5/8,	1 1/2
	5/8 (16)	3/4, 1, 1 1/4	3/4, 1	
	3/4 (20)			
	1 (25)	1/4, 1/2, 3/4, 1,	3/8, 1/2, 3/4, 1,	2
	1 1/4 (32)	1 1/4, 1 1/2, 2	1 1/4, 1 1/2, 2	
	1 1/2 (40)	1/4, 3/8, 1/2, 5/8, 3/4, 1, 1 1/4, 1 1/2, 2	3/8, 1/2, 5/8, 3/4, 1, 1 1/4, 1 1/2, 2	2
	2 (50)			
	2 1/2 (63)	1/2, 3/4, 1, 1 1/4,	1/2, 3/4, 1, 1 1/4,	4
Single	3 1/4 (80)	1 1/2, 2, 3, 4	1 1/2, 2, 3, 4	
	4 (100)			
	1/2 (12)			5/8
	5/8 (16)	1/2, 5/8	3/8, 1/2, 5/8	
	3/4 (20)			
	1 (25)			5/8
	1 1/4 (32)	1/4, 1/2	3/8, 1/2	
	1 1/2 (40)	1/4, 3/8, 1/2	3/8, 1/2, 5/8	5/8
	2 (50)	1/2, 3/4	1/2, 3/4	3/4

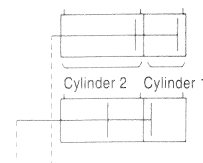
NOTE 1: If double power only is required, specify 0 (zero) as Stroke 2. Maximum total stroke for Stroke 1 plus Stroke 2 is listed at right side of chart.

NOTE 2: Minimum stroke 1 for cylinders with magnet (option S) is 1/2".

NOTE 3: Stroke 1 or Stroke 2 tolerance is $\pm .039"/- .000"$.

NOTE 4: Refer to page 56 for non-standard strokes.

*How to specify stroke 1 and stroke 2:



STROKE 1 = Cylinder 1 Stroke
 STROKE 2 = Cylinder 2 Stroke - STROKE 1

HOW TO ORDER INFORMATION

HJ **DA** **T** **25 x 1/4 x 1/2** — —

BORE₁
x
STROKE 1
x
STROKE 2

OPTIONS
Blank: No option
S: Magnet₂
F: Fluoroelastomer₃

Tandem cylinder

Blank: No bumper
R: Bumper₄

TYPE
DA: Double acting
SA: Single acting

ROD OPTIONS₅
Blank: Female rod
B: Male rod
N: Plain rod

SERIES: Block cylinder

NOTE : Ordering strokes over 1", use ____ / ____ . Examples: 1 1/4, 2 1/8.

NOTE 1: When ordering bore size, specify by using actual mm bore size.

NOTE 2: Refer to Sensor Section for sensor switch selection and information.

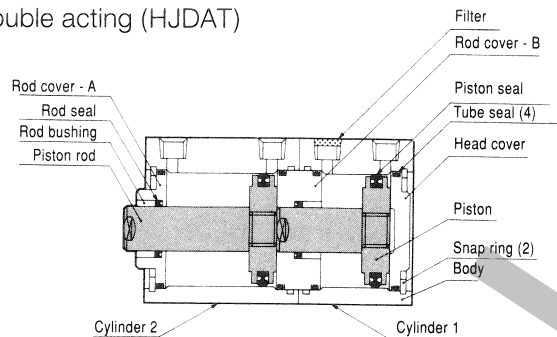
NOTE 3: Fluoroelastomer option not available with Magnet (S) and Bumper (R) options.

NOTE 4: Bumper option only available in bore sizes 1 1/2 (40) thru 4 (100).

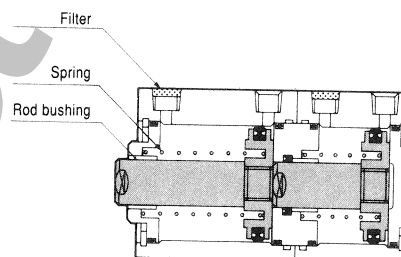
NOTE 5: Refer to page 50 for male rod thread (B) and plain rod (N) information.
Rod nuts sold separately.

INNER CONSTRUCTION AND MAJOR PARTS

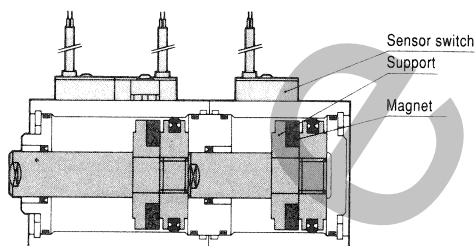
Double acting (HJDAT)



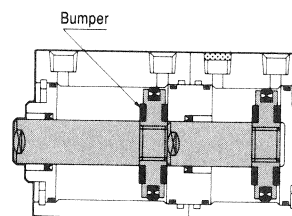
Single acting – push (HJSAT)



Magnet/sensor option



Bumper option



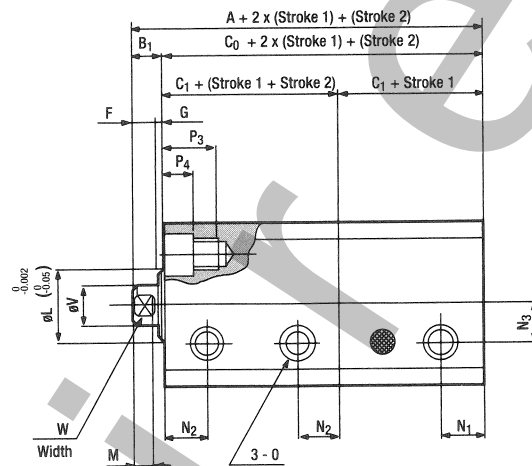
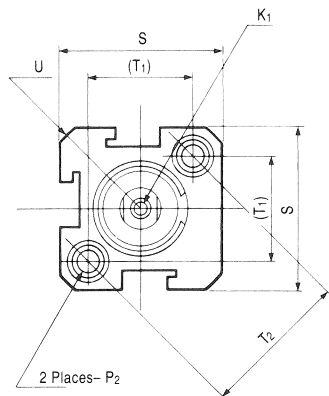
MATERIALS OF MAJOR PARTS

Item	Nominal bore size inch (mm)									
	1/2 (12)	5/8 (16)	3/4 (20)	1 (25)	1 1/4 (32)	1 1/2 (40)	2 (50)	2 1/2 (63)	3 1/4 (80)	4 (100)
Body	Aluminum (anodized)									
Piston	Stainless steel		Aluminum (anodized) ¹							
Piston rod	Stainless steel			Hard steel (chrome plated) ¹						
Seals (piston, rod, tube)	Buna N standard (fluoroelastomer option)									
Rod bushing	None		Double act. – oil permeated bronze, single act. – bronze							
Rod cover (A + B)	Phosphorous bronze		Aluminum (anodized)							
Head cover	Aluminum (anodized)									
Snap ring	Hard steel									
Spacer	Aluminum (anodized)									
Spring	Music wire							–		
Filter	Porous aluminum							–		
Magnet	Resinous magnet									
Support	Aluminum (anodized)									
Bumper	Buna N									

NOTE ¹: Models HJSAT 20 and 25 have stainless steel pistons and piston rods.

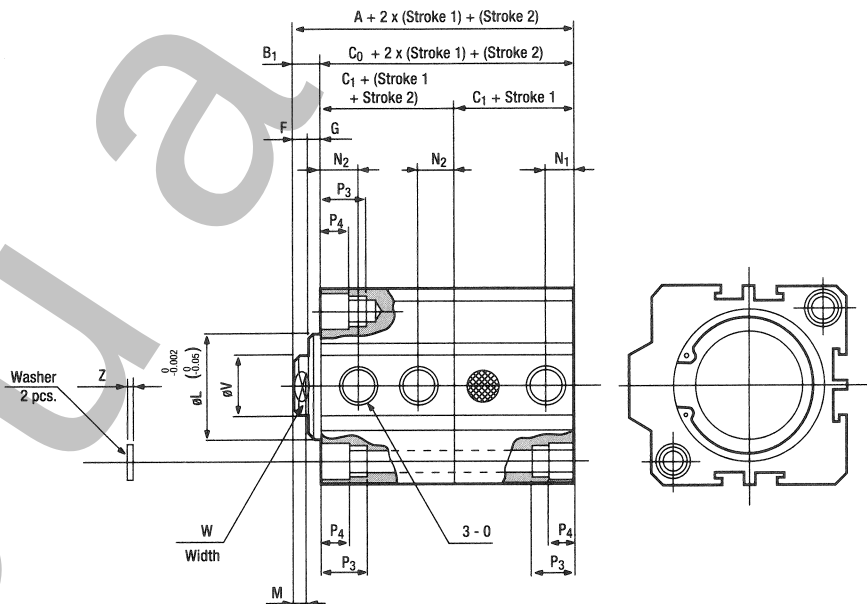
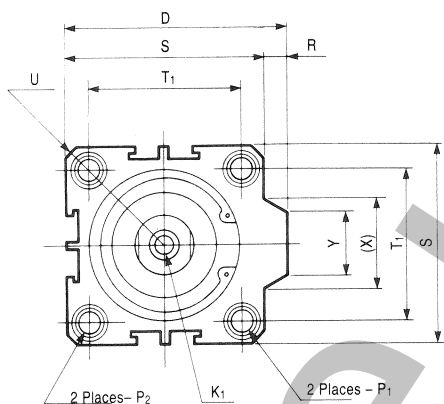
DOUBLE ACTING (HJDAT) DOUBLE ACTING WITH MAGNET (HJDATS)

Bores $\frac{1}{2}$ (12) & $\frac{5}{8}$ (16)



$\frac{1}{2}$ (12) bore is shown above. Refer to page 56 for non-standard strokes.

Bores $\frac{3}{4}$ (20) thru 4 (100)



Refer to page 56 for non-standard strokes.

Bore Nominal in. (mm)	Dimension - inch (mm)								
	HJDAT (without magnet)				HJDATS (with magnet)				D
	A	B ₁	C ₀	C ₁	A	B ₁	C ₀	C ₁	
1/2 (12)	1.535 (39)	.197 (5)	1.339 (34)	.669 (17)	2.032 (51.6)	.197 (5)	1.835 (46.6)	.918 (23.3)	—
5/8 (16)	1.674 (42.5)	.217 (5.5)	1.457 (37)	.729 (18.5)	2.681 (68.1)	.217 (5.5)	2.465 (62.6)	1.232 (31.3)	—
3/4 (20)	1.752 (44.5)	.217 (5.5)	1.535 (39)	.768 (19.5)	2.500 (63.5)	.217 (5.5)	2.283 (58)	1.142 (29)	1.417 (36)
1 (25)	1.890 (48)	.236 (6)	1.656 (42)	.827 (21)	2.638 (67)	.236 (6)	2.402 (61)	1.201 (30.5)	1.654 (42)
1 1/4 (32)	2.205 (56)	.276 (7)	1.929 (49)	.965 (24.5)	2.953 (75)	.276 (7)	2.677 (68)	1.339 (34)	1.969 (50)
1 1/2 (40)	2.323 (59)	.276 (7)	2.047 (52)	1.024 (26)	3.071 (78)	.276 (7)	2.795 (71)	1.398 (35.5)	2.303 (58.5)
2 (50)	2.559 (65)	.354 (9)	2.205 (56)	1.102 (28)	3.307 (84)	.354 (9)	2.953 (75)	1.477 (37.5)	2.815 (71.5)
2 1/2 (63)	2.874 (73)	.354 (9)	2.520 (64)	1.260 (32)	3.622 (92)	.354 (9)	3.268 (83)	1.634 (41.5)	3.327 (84.5)
3 1/4 (80)	3.764 (95.6)	.433 (11)	3.331 (84.6)	1.665 (42.3)	4.512 (114.6)	.433 (11)	4.079 (103.6)	2.039 (51.8)	4.094 (104)
4 (100)	4.591 (116.6)	.472 (12)	4.118 (104.6)	2.059 (52.3)	5.339 (135.6)	.472 (12)	4.866 (123.6)	2.433 (61.8)	4.882 (124)

Bore Nominal in. (mm)	Dimension - inch (mm)							
	F	G	K ₁	L	M	N ₁ /N ₂	N ₃	O
1/2 (12)	.157 (4)	.039 (1)	4-40 UNC x .236 (6) dp.	.433 (11)	.118 (3)	.256 (6.5)	.236 (6)	10-32
5/8 (16)	.157 (4)	.059 (1.5)	4-40 UNC x .236 (6) dp.	.433 (11)	.118 (3)	.276 (7)	.236 (6)	10-32
3/4 (20)	.157 (4)	.059 (1.5)	8-32 UNC x .315 (8) dp.	.591 (15)	.118 (3)	.296 (7.5)	—	10-32
1 (25)	.157 (4)	.079 (2)	10-32 UNF x .394 (10) dp.	.669 (17)	.118 (3)	.315 (8)	—	10-32
1 1/4 (32)	.157 (4)	.118 (3)	1/4-20 UNC x .472 (12) dp.	.866 (22)	.118 (3)	.354 (9)*	—	1/8 NPT
1 1/2 (40)	.157 (4)	.118 (3)	5/16-18 UNC x .472 (12) dp.	1.102 (28)	.118 (3)	.394 (10)	—	1/8 NPT
2 (50)	.197 (5)	.157 (4)	3/8-16 UNC x .591 (15) dp.	1.496 (38)	.118 (3)	.394 (10)	—	1/4 NPT
2 1/2 (63)	.197 (5)	.157 (4)	3/8-16 UNC x .591 (15) dp.	1.575 (40)	.118 (3)	.472 (12)	—	1/4 NPT
3 1/4 (80)	.236 (6)	.197 (5)	1/2-13 UNC x .787 (20) dp.	1.772 (45)	.157 (4)	.492 (12.5)	—	3/8 NPT
4 (100)	.276 (7)	.197 (5)	3/4-10 UNC x .787 (20) dp.	2.165 (55)	.157 (4)	.669 (17)	—	3/8 NPT

Bore Nominal in. (mm)	Dimension - inch (mm)					
	P ₁ - thru hole x C bore x thru hole thread	P ₂	P ₃	P ₄	R	S
1/2 (12)	—	10-32 UNF x .256 (6.5)	.374 (9.5)	.177 (4.5)	—	.984 (25)
5/8 (16)	—	10-32 UNF x .256 (6.5)	.374 (9.5)	.177 (4.5)	—	1.142 (29)
3/4 (20)	.138 (3.5) x .256 (6.5) x 10-32 UNF	10-32 UNF x .256 (6.5)	.374 (9.5)	.177 (4.5)	.079 (2)	1.339 (34)
1 (25)	.181 (4.6) x .315 (8) x 1/4-20 UNC	1/4-20 UNC x .315 (8)	.453 (11.5)	.217 (5.5)	.079 (2)	1.575 (40)
1 1/4 (32)	.181 (4.6) x .315 (8) x 1/4-20 UNC	1/4-20 UNC x .315 (8)	.453 (11.5)	.217 (5.5)	.236 (6)	1.732 (44)
1 1/2 (40)	.225 (5.7) x .374 (9.5) x 5/16-18 UNC	5/16-18 UNC x .374 (9.5)	.611 (15.5)	.296 (7.5)	.256 (6.5)	2.047 (52)
2 (50)	.276 (7) x .433 (11) x 3/8-16 UNC	3/8-16 UNC x .433 (11)	.650 (16.5)	.335 (8.5)	.374 (9.5)	2.441 (62)
2 1/2 (63)	.276 (7) x .433 (11) x 3/8-16 UNC	3/8-16 UNC x .433 (11)	.650 (16.5)	.335 (8.5)	.374 (9.5)	2.953 (75)
3 1/4 (80)	.362 (9.2) x .551 (14) x 1/2-13 UNC	1/2-13 UNC x .551 (14)	.886 (22.5)	.414 (10.5)	.394 (10)	3.701 (94)
4 (100)	.445 (11.3) x .689 (17.5) x 1/2-13 UNC	1/2-13 UNC x .689 (17.5)	1.063 (27)	.512 (13)	.394 (10)	4.488 (114)

Bore Nominal in. (mm)	Dimension - inch (mm)							
	T ₁	T ₂	U (Radius)	V	W	X	Y	Z
1/2 (12)	.638 (16.2)	.906 (23)	.630 (16)	.236 (6)	.197 (5)	—	—	—
5/8 (16)	.779 (19.8)	1.102 (28)	.748 (19)	.236 (6)	.197 (5)	—	—	—
3/4 (20)	.945 (24)	—	.866 (22)	.315 (8)	.236 (6)	.484 (12.3)	.394 (10)	.039 (1)
1 (25)	1.102 (28)	—	.984 (25)	.394 (10)	.315 (8)	.484 (12.3)	.394 (10)	.039 (1)
1 1/4 (32)	1.339 (34)	—	1.162 (29.5)	.472 (12)	.394 (10)	.901 (22.9)	.630 (16)	.039 (1)
1 1/2 (40)	1.575 (40)	—	1.378 (35)	.630 (16)	.551 (14)	.926 (23.5)	.630 (16)	.063 (1.6)
2 (50)	1.890 (48)	—	1.614 (41)	.787 (20)	.669 (17)	1.220 (31)	.787 (20)	.063 (1.6)
2 1/2 (63)	2.362 (60)	—	1.969 (50)	.787 (20)	.669 (17)	1.220 (31)	.787 (20)	.063 (1.6)
3 1/4 (80)	2.913 (74)	—	2.441 (62)	.984 (25)	.866 (22)	1.477 (37.5)	1.024 (26)	.063 (1.6)
4 (100)	3.543 (90)	—	2.953 (75)	1.260 (32)	1.063 (27)	1.447 (37.5)	1.024 (26)	.079 (2)

• Dimension is .276 (7) for 1 1/4 (32) bore with 1/4" stroke. Dimension is .287 (7.3) for 1 1/2 (40) bore with 1/4" stroke.

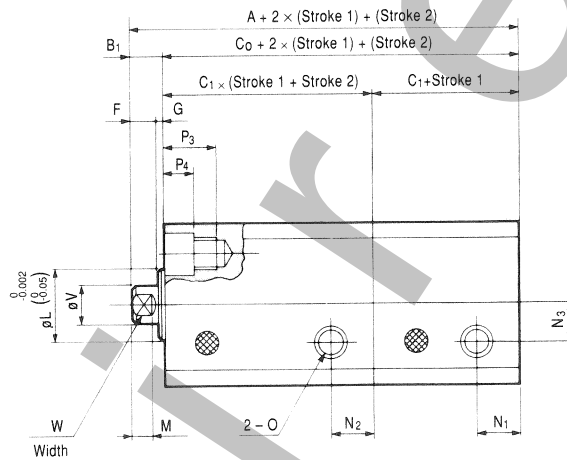
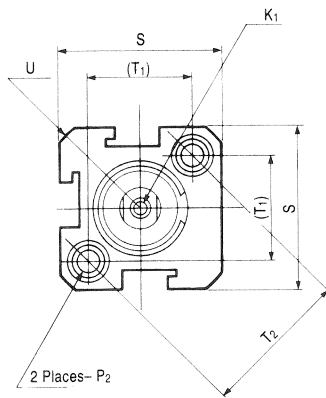
NOTE 1: Please refer to page 50 for male rod thread information.

NOTE 2: Plain rod is same as female rod end except no threads.

NOTE 3: Please refer to page 50 for sensor switch dimensional information.

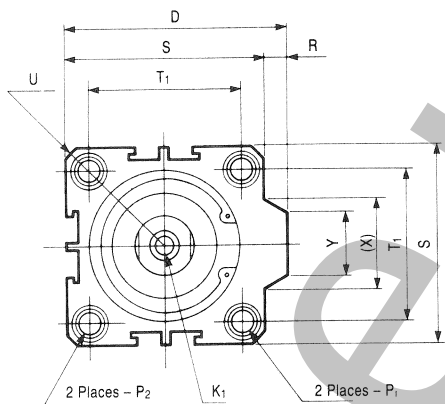
SINGLE ACTING (HJSAT)
SINGLE ACTING WITH MAGNET (HJSATS)

Bores $\frac{1}{2}$ (12) & $\frac{5}{8}$ (16)

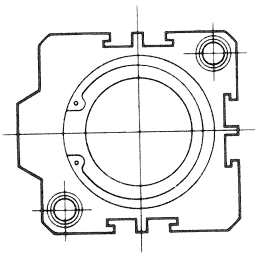
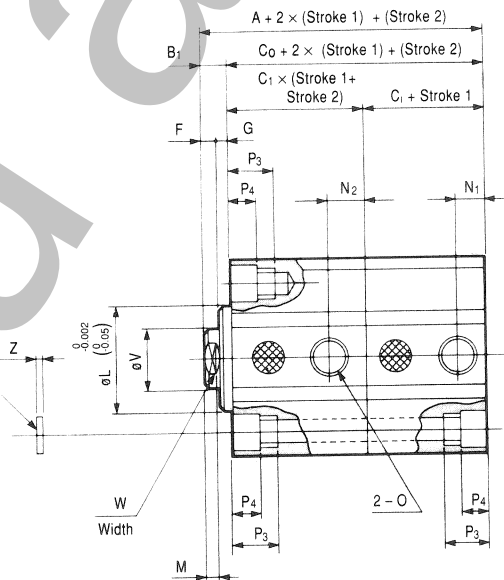


$\frac{1}{2}$ (12) bore is shown above. Refer to page 56 for non-standard strokes.

Bores $\frac{3}{4}$ (20) thru 2 (50)



Washer
2 pcs.



Refer to page 56 for non-standard strokes.

Bore Nominal in. (mm)	Dimension - inch (mm)								
	HJSAT (without magnet)				HJSATS (with magnet)				D
	A	B ₁	C ₀	C ₁	A	B ₁	C ₀	C ₁	
1/2 (12)	2.031 (51.6)	.197 (5)	1.835 (46.6)	.917 (23.3)	2.528 (64.2)	.197 (5)	2.331 (59.2)	1.166 (29.6)	—
5/8 (16)	2.169 (55.1)	.217 (5.5)	1.953 (49.6)	.976 (24.8)	2.666 (67.7)	.217 (5.5)	2.449 (62.2)	1.224 (31.1)	—
3/4 (20)	1.752 (44.5)	.217 (5.5)	1.535 (39)	.768 (19.5)	2.500 (63.5)	.217 (5.5)	2.283 (58)	1.142 (29)	1.417 (36)
1 (25)	1.890 (48)	.236 (6)	1.656 (42)	.827 (21)	2.638 (67)	.236 (6)	2.402 (61)	1.201 (30.5)	1.654 (42)
1 1/4 (32)	2.205 (56)	.276 (7)	1.929 (49)	.965 (24.5)	2.953 (75)	.276 (7)	2.677 (68)	1.339 (34)	1.969 (50)
1 1/2 (40)	2.323 (59)	.276 (7)	2.047 (52)	1.024 (26)	3.071 (78)	.276 (7)	2.795 (71)	1.398 (35.5)	2.303 (58.5)
2 (50)	2.559 (65)	.354 (9)	2.205 (56)	1.102 (28)	3.307 (84)	.354 (9)	2.953 (75)	1.477 (37.5)	2.815 (71.5)

Bore Nominal in. (mm)	Dimension - inch (mm)							
	F	G	K ₁	L	M	N ₁ /N ₂	N ₃	O
1/2 (12)	.157 (4)	.039 (1)	4-40 UNC x .236 (6) dp.	.433 (11)	.118 (3)	.256 (6.5)	.236 (6)	10-32
5/8 (16)	.157 (4)	.059 (1.5)	4-40 UNC x .236 (6) dp.	.433 (11)	.118 (3)	.276 (7)	.236 (6)	10-32
3/4 (20)	.157 (4)	.059 (1.5)	8-32 UNC x .315 (8) dp.	.591 (15)	.118 (3)	.296 (7.5)	—	10-32
1 (25)	.157 (4)	.079 (2)	10-32 UNF x .394 (10) dp.	.669 (17)	.118 (3)	.315 (8)	—	10-32
1 1/4 (32)	.157 (4)	.118 (3)	1/4-20 UNC x .472 (12) dp.	.866 (22)	.118 (3)	.354 (9)*	—	1/8 NPT
1 1/2 (40)	.157 (4)	.118 (3)	5/16-18 UNC x .472 (12) dp.	1.102 (28)	.118 (3)	.394 (10)	—	1/8 NPT
2 (50)	.197 (5)	.157 (4)	3/8-16 UNC x .591 (15) dp.	1.496 (38)	.118 (3)	.394 (10)	—	1/4 NPT

Bore Nominal in. (mm)	Dimension - inch (mm)					
	P ₁ - thru hole x C bore x thru hole thread	P ₂	P ₃	P ₄	R	S
1/2 (12)	—	10-32 UNF x .256 (6.5)	.374 (9.5)	.177 (4.5)	—	.984 (25)
5/8 (16)	—	10-32 UNF x .256 (6.5)	.374 (9.5)	.177 (4.5)	—	1.142 (29)
3/4 (20)	.138 (3.5) x .256 (6.5) x 10-32 UNF	10-32 UNF x .256 (6.5)	.374 (9.5)	.177 (4.5)	.079 (2)	1.339 (34)
1 (25)	.181 (4.6) x .315 (8) x 1/4-20 UNC	1/4-20 UNC x .315 (8)	.453 (11.5)	.217 (5.5)	.079 (2)	1.575 (40)
1 1/4 (32)	.181 (4.6) x .315 (8) x 1/4-20 UNC	1/4-20 UNC x .315 (8)	.453 (11.5)	.217 (5.5)	.236 (6)	1.732 (44)
1 1/2 (40)	.225 (5.7) x .374 (9.5) x 5/16-18 UNC	5/16-18 UNC x .374 (9.5)	.611 (15.5)	.296 (7.5)	.256 (6.5)	2.047 (52)
2 (50)	.276 (7) x .433 (11) x 3/8-16 UNC	3/8-16 UNC x .433 (11)	.650 (16.5)	.335 (8.5)	.374 (9.5)	2.441 (62)

Bore Nominal in. (mm)	Dimension - inch (mm)							
	T ₁	T ₂	U (Radius)	V	W	X	Y	Z
1/2 (12)	.638 (16.2)	.906 (23)	.630 (16)	.236 (6)	.197 (5)	—	—	—
5/8 (16)	.779 (19.8)	1.102 (28)	.748 (19)	.236 (6)	.197 (5)	—	—	—
3/4 (20)	.945 (24)	—	.866 (22)	.315 (8)	.236 (6)	.484 (12.3)	.394 (10)	.039 (1)
1 (25)	1.102 (28)	—	.984 (25)	.394 (10)	.315 (8)	.484 (12.3)	.394 (10)	.039 (1)
1 1/4 (32)	1.339 (34)	—	1.162 (29.5)	.472 (12)	.394 (10)	.901 (22.9)	.630 (16)	.039 (1)
1 1/2 (40)	1.575 (40)	—	1.378 (35)	.630 (16)	.551 (14)	.926 (23.5)	.630 (16)	.063 (1.6)
2 (50)	1.890 (48)	—	1.614 (41)	.787 (20)	.669 (17)	1.220 (31)	.787 (20)	.063 (1.6)

• Dimension is .276 (7) for 1 1/4 (32) bore with 1/4" stroke. Dimension is .287 (7.3) for 1 1/2 (40) bore with 1/4" stroke.

NOTE 1: Please refer to page 50 for male rod thread information.

NOTE 2: Plain rod is same as female rod end except no threads.

NOTE 3: Please refer to page 50 for sensor switch dimensional information.