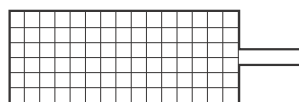




FUJIKURA COMPOSITES

Fujikura BF Cylinders

FC *SERIES***FCS** Single Action Push Type**FCD** Double Action Type**F**ujikura
Cylinder

FUJIKURA COMPOSITES Inc.

Fujikura BF Cylinders

DESIGN CONCEPTION :

"No Leakage and Less Friction"

— *The main Design conception that lies extended at the basis of **BF Cylinders**.*

"Precision Control rather than Power"

— *The main object of developing **BF Cylinders**.*

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General Description of BF Cylinders

TYPES

FC Series : Single/Double Action Standard Cylinders

FEATURES IN COMMON

BF Cylinders are bound together by unique unrivaled common features, which are all attributable to the rolling action of **BF Diaphragms**.

- Perfect Leak-proof No Blow-By Leakage.
- Very Low Friction : Responsive to minute pressure variations.
: Virtually no hysteresis-loss in movement.
: Low start up pressure as low as 0.01MPa.
: Smooth "Non-Jarring" action.
: Ready to start even after long interval.
- Lubrication-Free No Lubricator required in the air line.
- Excellent resistance to pressure ... Assured by the rolling principle of **BF Diaphragms**.
(Molded products of durable fabric-reinforced NBR)

PREFERRED APPLICATIONS

BF Cylinders find its best applications in such cases where air leakage is not allowed and/or sensitive response is desired to minute pressure variations.

- Sensitive Actuators in Automatic Controllers & Instruments, Pressure rollers and Dancer rollers.
- Air line equipment in the clean factories disliking oil mist contamination.
- Polishing equipment for Lenses and Jewels.
- Precision actuators of constant output force. (Spot welder etc.)
- Actuator for emergency use.



Model FCS: Single Action (push)

Model FCD: Double Action

SPECIFICATIONS

Operating Style	Single Action (Push)/ Double Action
Cylinder Diameter mm	10 to 200
Stroke mm	6 to 320
Working Fluid	Compressed Air (Non-Lubricated)
Working Pressure Range MPa	0.01~0.7
Working Temperature Range °C	0 to 60
Rod Bearing	Dry Bearing
Mounting	Direct, L, Front Flange, Rear Flange, Trunnion, Pivot-Mounting

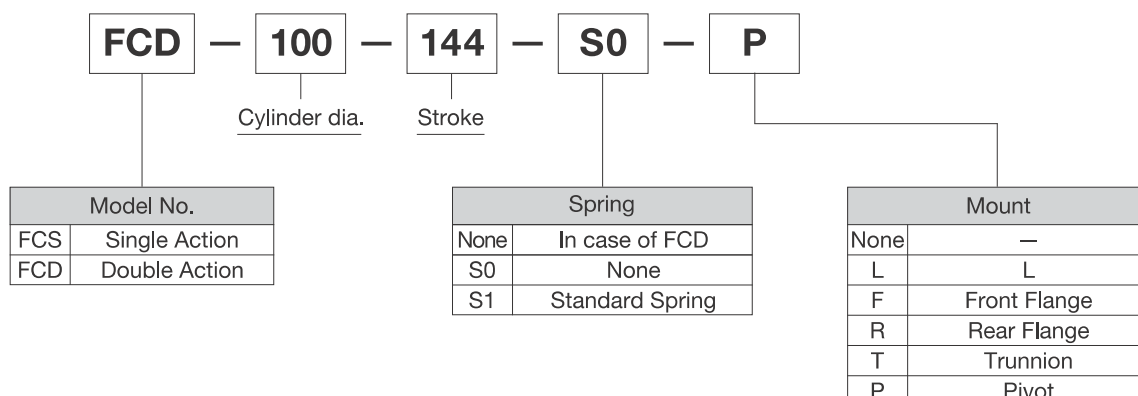
FEATURES

- FC Series are standard type of **BF Cylinders**. They are designed in a variety of sizes from 10 to 200.
- Each size is available in both a single action and a double action style.
- A variety of mounts is provided.

NOTE

- Customers are requested to follow the " **BF Cylinders** Handling Manual " (KS-569E) before installing and putting in service.
- Large size **BF Cylinders** of 112mm and over in diameter are customized only for individual requirement.
Customers are kindly advised to check up the delivery time.
- Consult Fujikura for any special requirements.

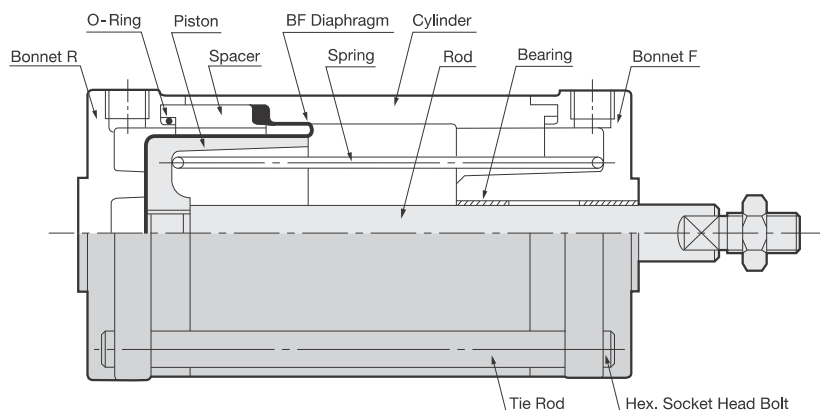
ORDERING DATA [Example]



INTERNAL CONSTRUCTION/PARTS DESCRIPTION

(For Cylinders of 40mm and over in diameter)

SINGLE ACTION TYPE Model FCS-40 to-200

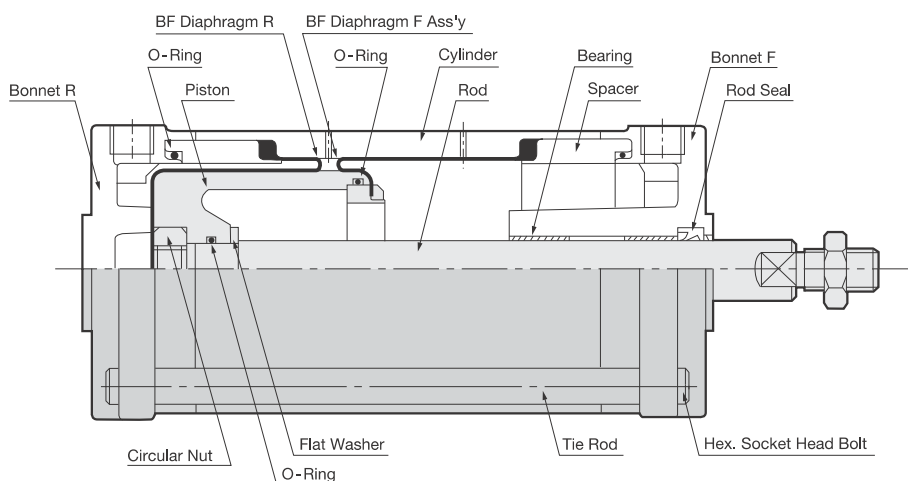


■ PARTS LIST

DESCRIPTION	MATERIAL
Bonnet F/R	A ℓ Alloy Die-Casting A ℓ Alloy Casting (FCS-160 & over)
O-Ring	NBR
Piston	A ℓ Alloy Casting
Cylinder/Spacer	A ℓ Alloy
Rod	Stainless Steel Hard Steel, Hard Chrome Plated (FCS-80 & over)
BF Diaphragm	Fabric Reinforced NBR
Return Spring	Spring Steel Wire
Bearing	Dry Bearing
Tie Rod	Carbon Steel

Note : 1. A ℓ parts are anodic treated.
2. Unless otherwise specified, steel parts are galvanized.
3. A ℓ die-casting parts are bake painted.

DOUBLE ACTION TYPE Model FCD-40 to-100

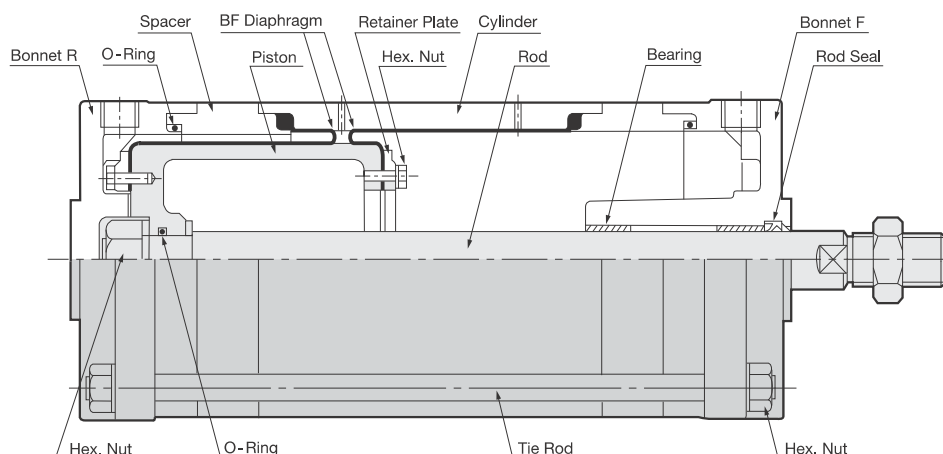


■ PARTS LIST

DESCRIPTION	MATERIAL
Bonnet F/R	A ℓ Alloy Die-Casting
Circular Nut	Carbon Steel
O-Ring	NBR
Piston	A ℓ Alloy Casting
BF Diaphragm R	Fabric Reinforced NBR
BF Diaphragm F Ass'y	Fabric Reinforced NBR with Fitting Caulked
Cylinder/Spacer	A ℓ Alloy
Rod	Stainless Steel Hard Steel, Hard Chrome Plated (FCD-80 & -100)
Bearing	Dry Bearing
Rod Seal	NBR
Tie Rod	Carbon Steel

Note : 1. A ℓ parts are anodic treated.
2. Unless otherwise specified, steel parts are galvanized.
3. A ℓ die-casting parts are bake painted.

DOUBLE ACTION TYPE Model FCD-112 to-200



■ PARTS LIST

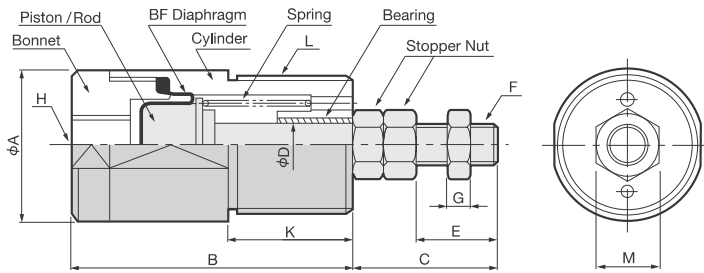
DESCRIPTION	MATERIAL
Bonnet F/R	A ℓ Alloy Die-Casting A ℓ Alloy Casting (FCD-160 & over)
Cylinder/Spacer	A ℓ Alloy Casting
Piston	A ℓ Alloy Casting
BF Diaphragm	Fabric Reinforced NBR
Retainer Plate	A ℓ Alloy Casting
Rod	Hard Steel, Hard Chrome Plated
Bearing	Dry Bearing
Rod Seal	NBR
Tie Rod	Carbon Steel

Note : 1. A ℓ parts are anodic treated.
2. Unless otherwise specified, steel parts are galvanized.
3. A ℓ die-casting parts are bake painted.

Model FCS-10-6 to 20-22



**Internal Construction
Outline Dimensions**



■ PARTS LIST

DESCRIPTION	MATERIAL
Piston/Rod	Stainless Steel
BF Diaphragm	Fabric Reinforced NBR
Bonnet	Brass
Cylinder	Brass
Spring	Spring Steel Wire
Bearing	Dry Bearing
Stopper Nut	Carbon Steel

F₀/F₁ : Spring force at zero/full stroke (N)
A_e : Effective area (mm²)

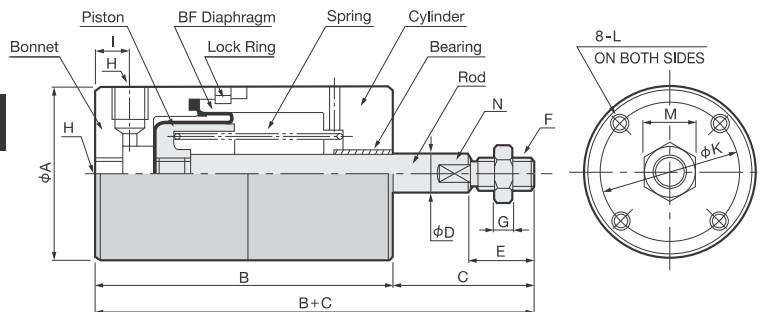
■ OUTLINE DIMENSIONS

Dc-STROKE	A	B	C	D	E	F	G	H	K	L	M	Ae	SPRING FORCE			
													F ₀	F ₁		
10 - 6	18	35	18	5	10	M5×0.5	3.2	Rc 1/8	16	M16×1.5	8	57	0.3	0.9		
12.5 - 11	20	45	20		12				20	M18×1.5		95	0.8	2		
16 - 10	24	45	23	7	13	M6×0.75	3.6		20	M22×1.5	10	165	1.5	2.9		
16		58							25							
20 - 8	28	44	26	8	16			20	M26×1.5			269	2	4.9		
22		72						30								

Model FCS-25-6 to 31.5-35



**Internal Construction
Outline Dimensions**



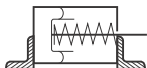
■ PARTS LIST

DESCRIPTION	MATERIAL
Bonnet	Al Alloy
Piston	Al Alloy
BF Diaphragm	Fabric Reinforced NBR
Lock Ring	Brass Wire
Spring	Spring Steel Wire
Cylinder	Al Alloy
Bearing	Dry Bearing
Rod	Stainless Steel

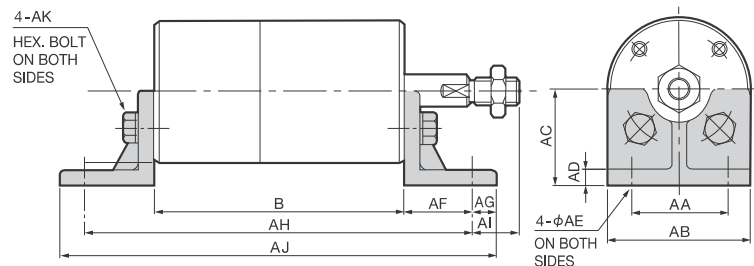
F₀/F₁ : Spring force at zero/full stroke (N)
A_e : Effective area (mm²)
N : Wrench flat width

■ OUTLINE DIMENSIONS

Dc-STROKE	A	B	C	B+C	D	E	F	G	H	I	K	L	M	N	A _e	SPRING FORCE	
																F ₀	F ₁
25 - 6	38	46	30	76	8	12	M6 P=0.75	3.6	Rc 1/8	9	30	M4 DP6	10	6	400	3.4	6.9
16		63		93													
26		79		109													
31.5 - 14	45	61	36	97	10	16	M8 P=1	5	Rc 1/8	10	35	M5 DP7.5	13	8	660	4.9	11.8
24		78		114													
35		97		133													

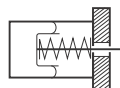


L Type Mount

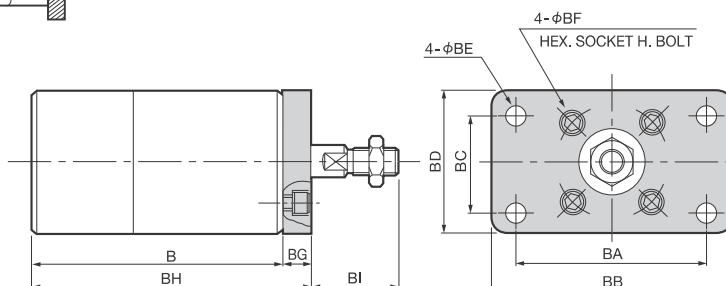


Dc-STROKE	B	AH	AJ
25 - 6	46	84	96
16	63	101	113
26	79	117	129
31.5 - 14	61	105	121
24	78	122	138
35	97	141	157

Dc	AA	AB	AC	AD	AE	AF	AG	AI	AK
25	25	38	25	4	6	19	6	11	M4×10
31.5	30	45	30	5	6	22	8	14	M5×12

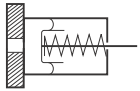


Front Flange Type Mount

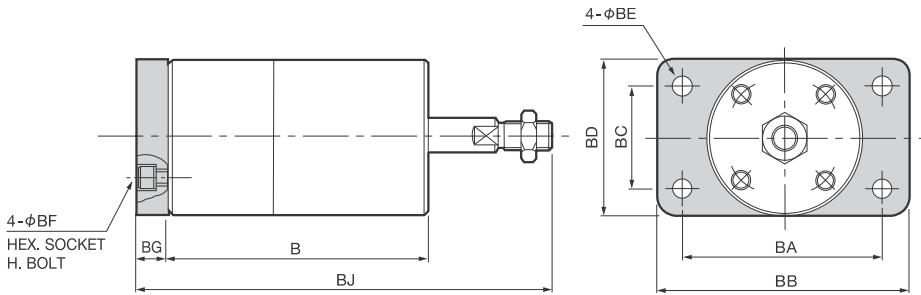


Dc-STROKE	B	BH
25 - 6	46	52
16	63	69
26	79	85
31.5 - 14	61	69
24	78	86
35	97	105

Dc	BA	BB	BC	BD	BE	BF	BG	BI
25	50	65	25	38	5	M4×6	6	24
31.5	60	75	30	45	6	M5×8	8	28

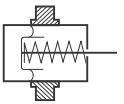


Rear Flange Type Mount

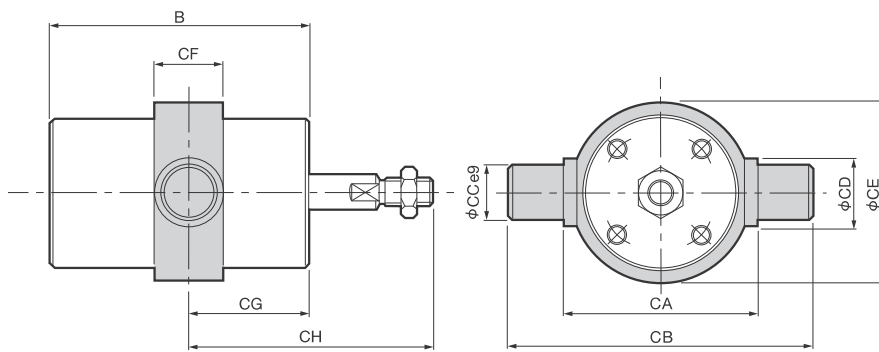


Dc-STROKE	B	BJ
25 - 6	46	82
16	63	99
26	79	115
31.5 - 14	61	105
24	78	122
35	97	141

Dc	BA	BB	BC	BD	BE	BF	BG
25	50	65	25	38	5	M4×6	6
31.5	60	75	30	45	6	M5×8	8

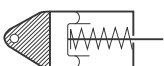


Trunnion Type Mount

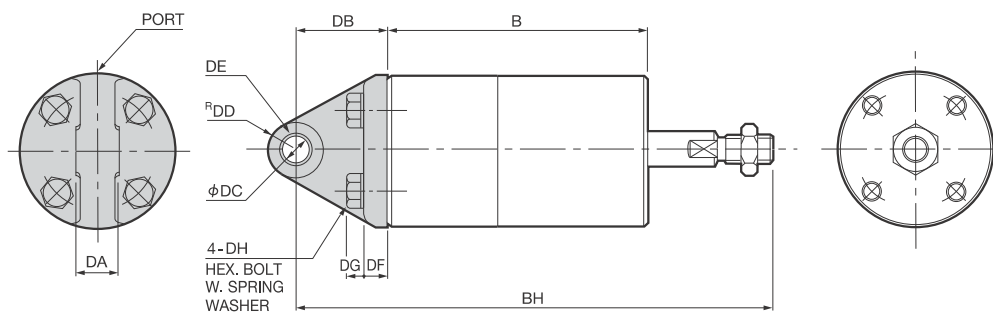


Dc-STROKE	B	CG	CH
25 - 6	46	12	42
16	63	24	54
26	79	40	70
31.5 - 14	61	24	60
24	78	36	72
35	97	48	84

Dc	CA	CB	CC	CD	CE	CF
25	46	66	10	15	46	16
31.5	54	78	12	16	53	17



Pivot Type Mount

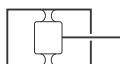


Dc-STROKE	B	BH
25 - 6	46	101
16	63	118
26	79	134
31.5 - 14	61	124
24	78	141
35	97	160

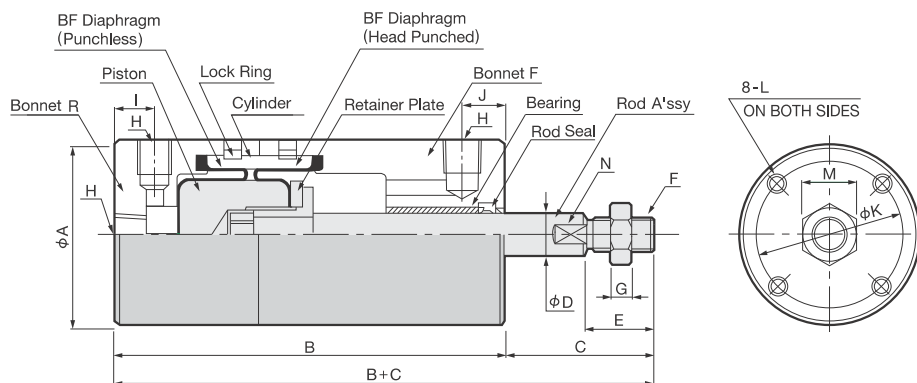
Dc	DA	DB	DC	DD	DE	DF	DG	DH
25	12	25	8	8	0812	6	3.8	M4×12
31.5	13	27	8	8	0812	7	4.8	M4×14

DE : Bearing Size No.

Model FCD-25-6 to 31.5-35



Internal Construction Outline Dimensions



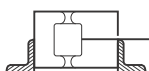
PARTS LIST

DESCRIPTION	MATERIAL
Bonnet	Al Alloy
Piston	Al Alloy
BF Diaphragm	Fabric Reinforced NBR
Lock Ring	Brass Wire
Cylinder	Al Alloy
Retainer Plate	Al Alloy
Bearing	Dry Bearing
Rod Seal	NBR
Rod Ass'y	Stainless Steel/Carbon Steel

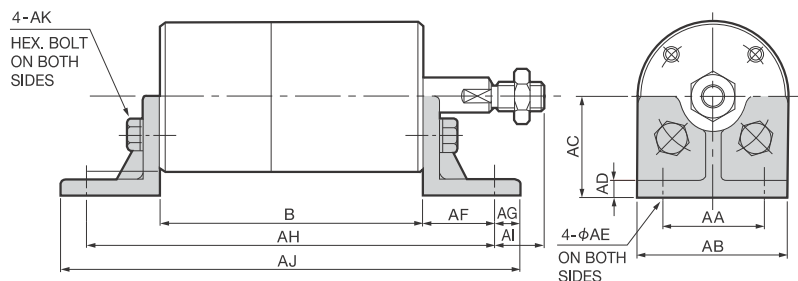
OUTLINE DIMENSIONS

Ae : Effective area (mm²)
N : Wrench flat width

Dc-STROKE	A	B	C	B+C	D	E	F	G	H	I	J	K	L	M	N	Ae	
																PUSH	PULL
25 - 6	38	71	30	101	8	12	M6 P=0.75	3.6	Rc1/8	9	9	30	M4 DP6	10	6	400	350
		86		116													
		101		131													
31.5 - 14	45	85	36	121	10	16	M8 P=1	5	Rc1/8	10	10	35	M5 DP7.5	13	8	660	580
		101		137													
		118		154													

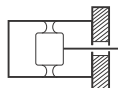


L Type Mount

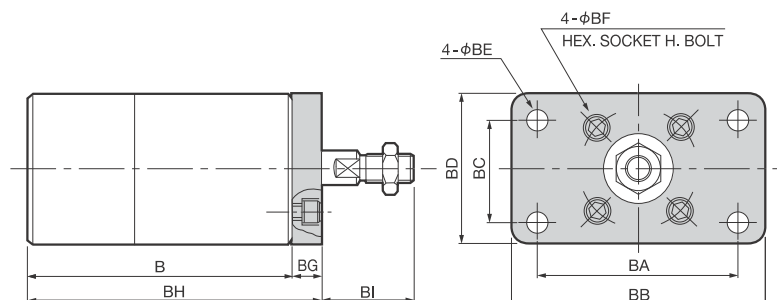


Dc-STROKE	B	AH	AJ
25 - 6	71	109	121
	86	124	136
	101	139	151
31.5 - 14	85	129	145
	101	145	161
	118	162	178

Dc	AA	AB	AC	AD	AE	AF	AG	AI	AK
25	25	38	25	4	6	19	6	11	M4×10
31.5	30	45	30	5	6	22	8	14	M5×12

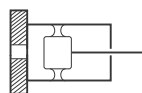


Front Flange Type Mount

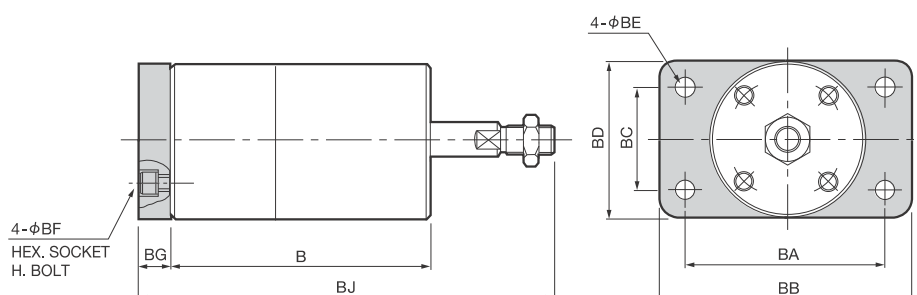


Dc-STROKE	B	BH
25 - 6	71	77
	86	92
	101	107
31.5 - 14	85	93
	101	109
	118	126

Dc	BA	BB	BC	BD	BE	BF	BG	BI
25	50	65	25	38	5	M4×6	6	24
31.5	60	75	30	45	6	M5×8	8	28

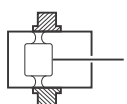


Rear Flange Type Mount

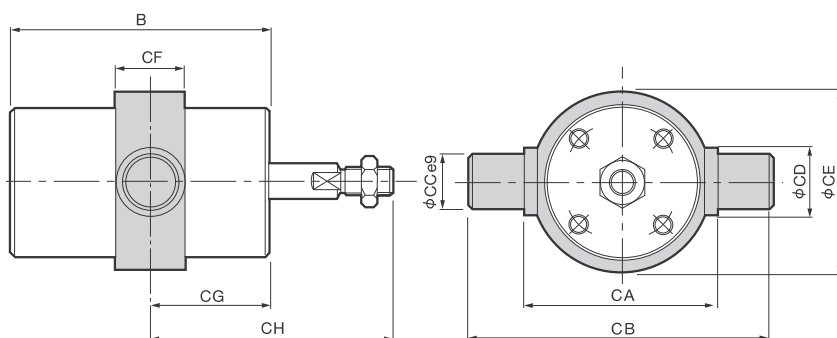


Dc-STROKE	B	BJ
25 - 6	71	107
16	86	122
26	101	137
31.5 - 14	85	129
24	101	145
35	118	162

Dc	BA	BB	BC	BD	BE	BF	BG
25	50	65	25	38	5	M4×6	6
31.5	60	75	30	45	6	M5×8	8

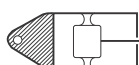


Trunnion Type Mount

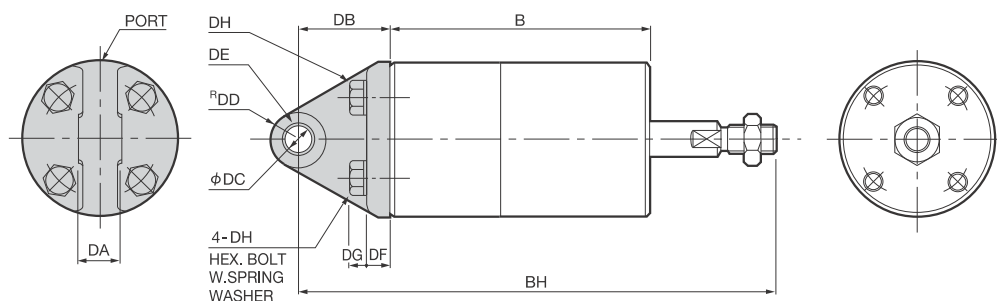


Dc-STROKE	B	CG	CH
25 - 6	71	26	56
16	86	33	63
26	101	38	68
31.5 - 14	85	44	80
24	101	60	96
35	118	67	103

Dc	CA	CB	CC	CD	CE	CF
25	46	66	10	15	46	16
31.5	54	78	12	16	53	17



Pivot Type Mount

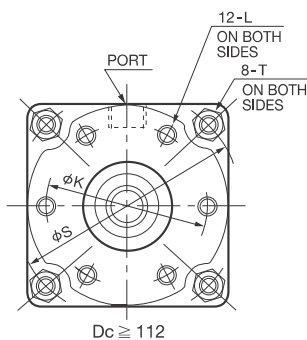


Dc-STROKE	B	BH
25 - 6	71	126
16	86	141
26	101	156
31.5 - 14	85	148
24	101	164
35	118	181

Dc	DA	DB	DC	DD	DE	DF	DG	DH
25	12	25	8	8	0812	6	3.8	M4×12
31.5	13	27	8	8	0812	7	4.8	M4×14

DE : Bearing Size No.

Model FCS-40-8 to 140-204



F_0/F_1 : Spring force at zero/full stroke (N)
 A_e : Effective area (mm²)
 N : Wrench flat width

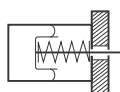
■ OUTLINE DIMENSIONS

Dc-STROKE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	Ae	SPRING FORCE	
																						F ₀	F ₁
40 – 8	53	44	42	12	20	M10 × 1.25	6	Rc 1/8	9	—	42	M6 DP 9	17	10	14	8	7	51.5	61	M5	1100	7.8	19.6
		24																					
		36																					
		48																					
		105																					
50 – 16	63	57	45	12	20	M10 × 1.25	6	Rc 1/8	10	—	50	M6 DP 9	17	10	25	8	8	61.5	73	M6	1770	14.7	29.4
		36																					
		50																					
		64																					
		109																					
63 – 16	82	66	50	16	24	M12 × 1.5	7	Rc 1/4	12	—	63	M8 DP 12	19	13	26	9	11	78.5	94	M8	2730	23.5	47
		42																					
		59																					
		78																					
		131																					
80 – 30	100	87	58	20	32	M16 × 1.5	10	Rc 1/4	14	—	80	M8 DP 12	24	17	39	10	14	97	114	M8	4540	39.2	78.4
		62																					
		87																					
		108																					
		173																					
100 – 46	120	118	65	25	40	M20 × 1.5	12	Rc 1/4	14	—	98	M10 DP 15	30	22	64	11	16	117.5	136	M10	7240	61.7	127.4
		86																					
		115																					
		144																					
		223																					
112 – 42	137	117	72	25	44	M22 × 1.5	13	Rc 3/8	18	—	112	M10 DP 15	32	22	55	12	19	135	156	M12	8820	76.4	158.8
		88																					
		122																					
		156																					
		238																					
125 – 52	150	132	76	30	48	M24 × 1.5	14	Rc 3/8	18	—	125	M10 DP 15	36	24	58	16	20	149	170	M14	11100	95.1	198
		102																					
		140																					
		178																					
		265																					
140 – 62	165	154	84	35	52	M27 × 1.5	16	Rc 3/8	18	—	140	M12 DP 18	41	30	74	16	24	164	190	M14	14100	119.6	254.8
		122																					
		162																					
		204																					
		306																					

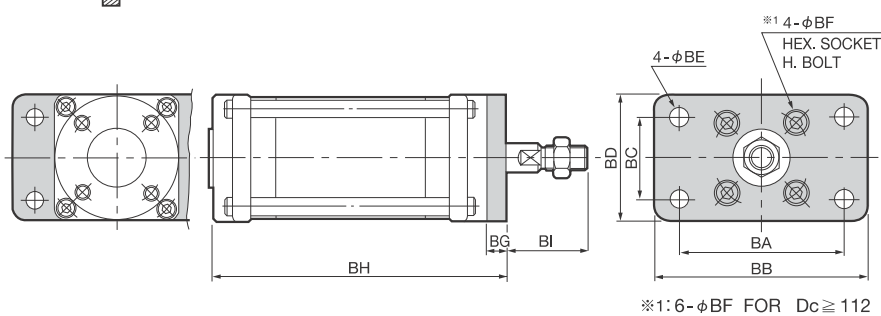


※1 : 12-L FOR $D_c \geq 112$ ON BOTH SIDES
 ※2 : 6-AK FOR $D_c \geq 112$ ON BOTH SIDES

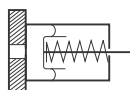
Dc-STROKE	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
40 - 8	35	53	35	5	6.5	25	10	94	17	114	M6 × 14
								118		138	
								137		157	
								155		175	
50 - 16	40	63	40	6	7.5	26	11	109	19	131	M6 × 14
								139		161	
								161		183	
								182		204	
63 - 16	50	82	50	6	9.5	31	14	128	19	156	M8 × 20
								167		195	
								193		221	
								222		250	
80 - 30	60	100	60	8	9.5	35	17	157	23	191	M8 × 20
								205		239	
								243		277	
								275		309	
100 - 46	75	120	70	8	12	40	20	198	25	238	M10 × 25
								258		298	
								303		343	
								348		388	
112 - 42	85	137	80	8	14	44	23	205	28	251	M10 × 25
								274		320	
								326		372	
								378		424	
125 - 52	95	150	87	10	14	46	24	224	30	272	M10 × 25
								299		347	
								357		405	
								415		463	
140 - 62	100	165	95	10	16	46	24	246	38	294	M12 × 30
								336		384	
								398		446	
								462		510	



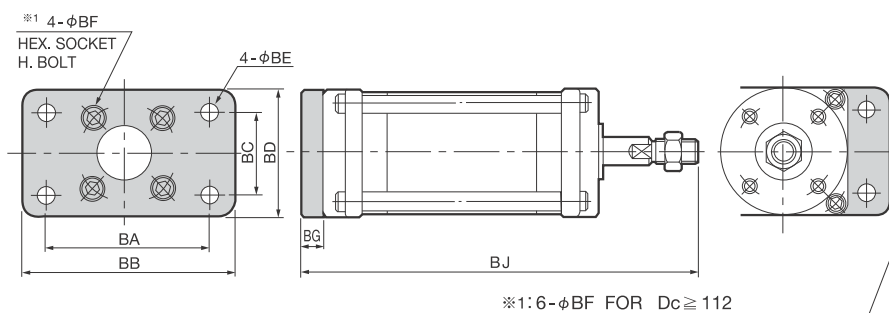
Front Flange Type Mount



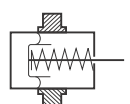
Dc-STROKE	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ
40 - 8										
24	70	90	35	53	6.5	M6 × 10	9	53	33	95
36								77		119
48								96		138
50 - 16								114		156
36	80	100	40	63	7.5	M6 × 10	10	67	35	112
50								97		142
64								119		164
63 - 16								140		185
42	105	130	55	82	9.5	M8 × 12	12	78	38	128
59								117		167
78								143		193
80 - 30								172		222
62	120	150	70	100	9.5	M8 × 12	13	100	45	158
87								148		206
108								186		244
100 - 46								218		276
86	150	180	85	120	11.5	M10 × 16	14	132	51	197
115								192		257
144								237		302
112 - 42								282		347
88	166	195	100	137	14	M10 × 16	15	132	57	204
122								201		273
156								253		325
125 - 52								305		377
102	180	210	115	150	14	M10 × 16	16	148	60	224
140								223		299
178								281		357
140 - 62								338		414
122	195	225	125	165	16	M12 × 20	19	173	65	257
162								263		347
204								325		409
								389		473



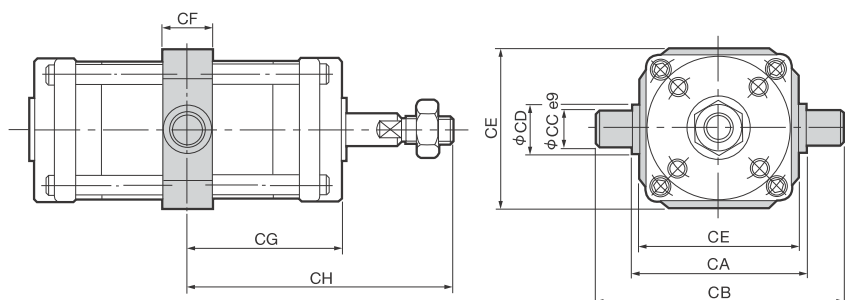
Rear Flange Type Mount



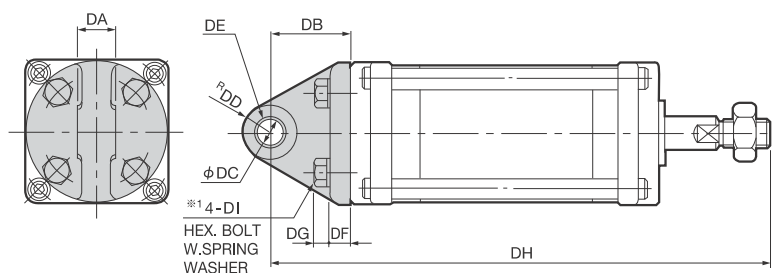
Dc-STROKE	CA	CB	CC	CD	CE	CF	CG	CH
40 - 8								
24	64	92	14	18	60	18	34	76
36							43.5	85.5
48							52.5	94.5
50 - 16							28.5	73.5
36	74	106	16	20	70	20	43.5	88.5
50							54.5	99.5
64							65	110
63 - 16							33	83
42	94	134	20	25	88	25	52.5	102.5
59							65.5	115.5
78							80	130
80 - 30							43.5	101.5
62	114	168	25	30	108	30	67.5	125.5
87							86.5	144.5
108							102.5	160.5
100 - 46							59	124
86	134	194	30	35	128	35	89	154
115							111.5	176.5
144							134	199
112 - 42							58.5	130.5
88	156	216	30	35	150	35	93	165
122							119	191
156							145	217
125 - 52							66	142
102	170	234	32	38	164	38	103.5	179.5
140							132.5	208.5
178							161	237
140 - 62							77	161
122	190	260	35	42	184	42	122	206
162							153	237
204							185	269



Trunnion Type Mount



Pivot Type Mount

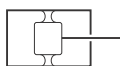


※1: 6-DI FOR Dc ≥ 112

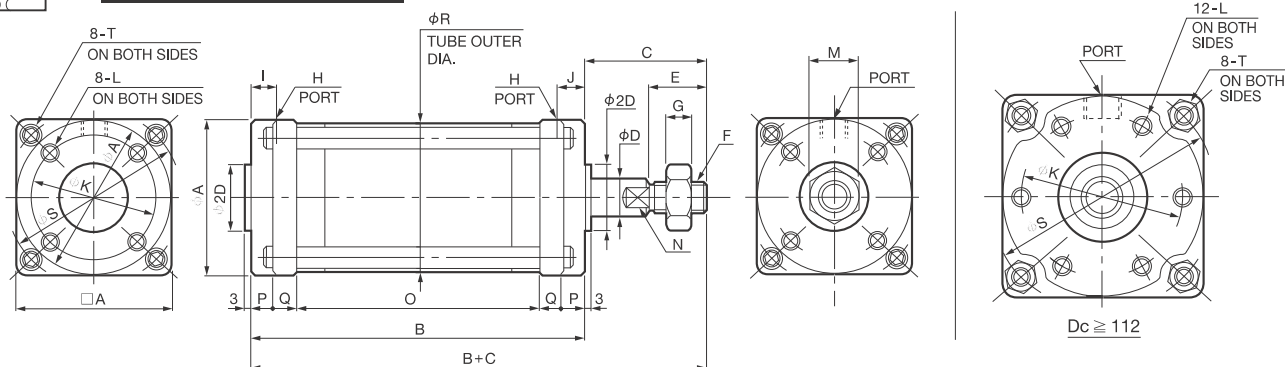
Dc-STROKE	DA	DB	DC	DD	DE	DF	DG	DH	DI
40 - 8									
24	15	30	10	14	1015	8	5.5	116	M6 × 18
36								140	
48								159	
50 - 16								177	
36	15	33	10	14	1015	9	5.5	135	M6 × 18
50								165	
64								187	
63 - 16								208	
42	20	38	12	15	1220	10	7.5	154	M8 × 22
59								193	
78								219	
80 - 30								248	
62	20	44	15	16.5	1520	12	7.5	189	M8 × 22
87								237	
108								275	
100 - 46								307	
86	25	50	18	18	1825	15	9.5	233	M10 × 30
115								293	
144								338	
112 - 42								383	
88	28	54	18	20	1810	16	9.5	243	M10 × 30
122								312	
156								364	
125 - 52								416	
102	30	59	20	23	2010	17	9.5	267	M10 × 30
140								342	
178								400	
140 - 62								457	
122	34	64	22	25	2210	19	11	302	M12 × 35
162								392	
204								454	
								518	

DE : Bearing Size No.

Model FCD-40-8 to 140-204



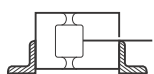
Outline Dimensions



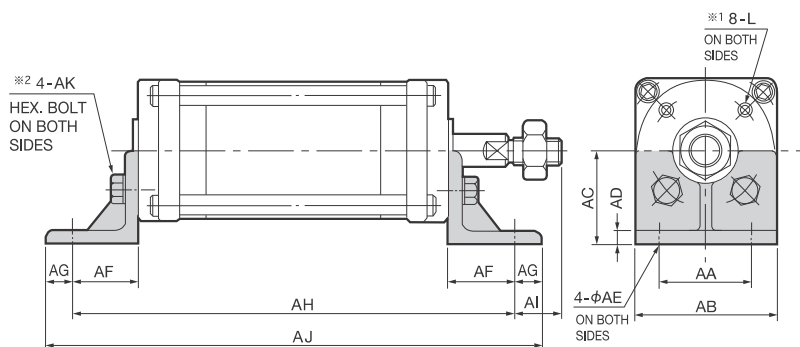
OUTLINE DIMENSIONS

Ae : Effective area (mm²)
N : Wrench flat width

Dc-STROKE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	Ae	
																					PUSH	PULL
40 - 8		54													24							
		78				M10		Rc 1/8	9	9	42	M6	17	10	48	8	7	51.5	61	M5	1100	980
	24	97	42	12	20	× 1.25	6					DP 9			67							
	36	116													86							
50 - 16		67													35							
		97	45	12	20	M10	6	Rc 1/8	10	10	50	M6	17	10	65	8	8	61.5	73	M6	1770	1650
	36	119				× 1.25						DP 9			87							
	50	141													109							
63 - 16		79													39							
		118	50	16	24	M12	7	Rc 1/4	12	12	63	M8	19	13	78	9	11	78.5	94	M8	2730	2530
	42	145				× 1.5						DP 12			105							
	59	175													135							
80 - 30		100													52							
		148	58	20	32	M16	10	Rc 1/4	14	14	80	M8	24	17	100	10	14	97	114	M8	4540	4230
	62	187				× 1.5						DP 12			139							
	87	220													172							
100 - 46		132													78							
		192	65	25	40	M20	12	Rc 1/4	14	14	98	M10	30	22	138	11	16	117.5	136	M10	7240	6750
	86	239				× 1.5						DP 15			185							
	115	284													230							
112 - 42		138													76							
		207	72	25	44	M22	13	Rc 3/8	18	18	112	M10	32	22	145	12	19	135	156	M12	8820	8330
	88	260				× 1.5						DP 15			198							
	122	313													251							
125 - 52		153													81							
		228	76	30	48	M24	14	Rc 3/8	18	18	125	M10	36	24	156	16	20	149	170	M14	11100	10400
	102	287				× 1.5						DP 15			215							
	140	346													274							
140 - 62		173													93							
		263	84	35	52	M27	16	Rc 3/8	18	18	140	M12	41	30	183	16	24	164	190	M14	14100	13300
	122	326				× 1.5						DP 18			246							
	162	392													312							
204																						



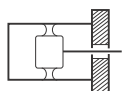
L Type Mount



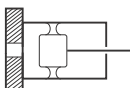
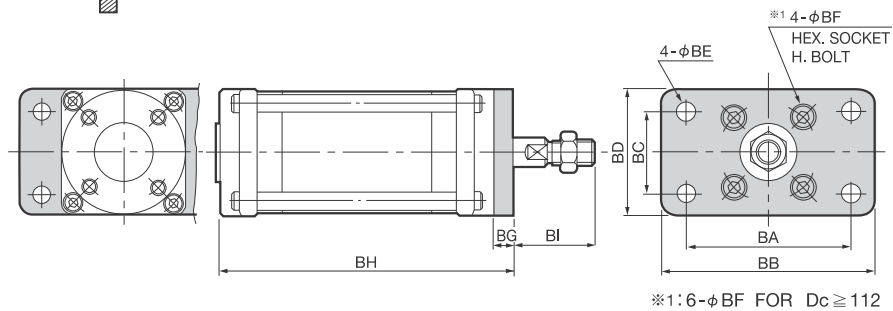
※1 : 12-L FOR Dc ≥ 112 ON BOTH SIDES

※2 : 6-AK FOR Dc ≥ 112 ON BOTH SIDES

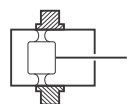
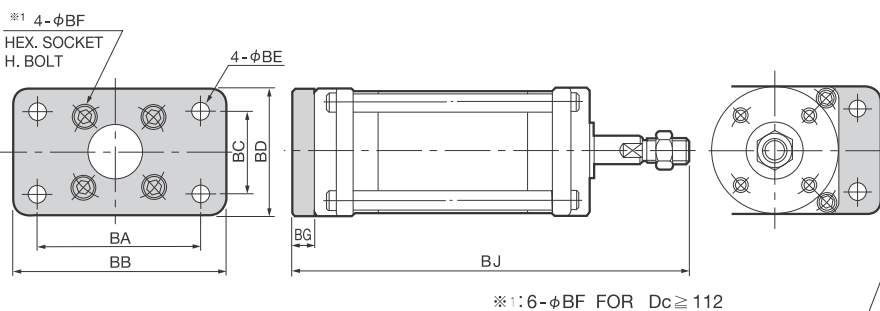
Dc-STROKE	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
40 - 8								104		124	
								128	17	148	M6
	35	53	35	5	6.5	25	10	147		167	× 14
								166		186	
50 - 16								119		141	
								149	19	171	M6
	40	63	40	6	7.5	26	11	171		193	× 14
								193		215	
63 - 16								141		169	
								180	19	208	M8
	50	82	50	6	9.5	31	14	207		235	× 20
								237		265	
80 - 30								170		204	
								218	23	252	M8
	60	100	60	8	9.5	35	17	257		291	× 20
								290		324	
100 - 46								212		252	
								272	25	312	M10
	75	120	70	8	12	40	20	319		359	× 25
								364		404	
112 - 42								226		272	
								295	28	341	M10
	85	137	80	8	14	44	23	348		394	× 25
								401		447	
125 - 52								245		293	
								320	30	368	M10
	95	150	87	10	14	46	24	379		427	× 25
								438		486	
140 - 62								265		313	
								355	38	403	M12
	100	165	95	10	16	46	24	418		466	× 30
								484		532	
204											



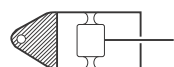
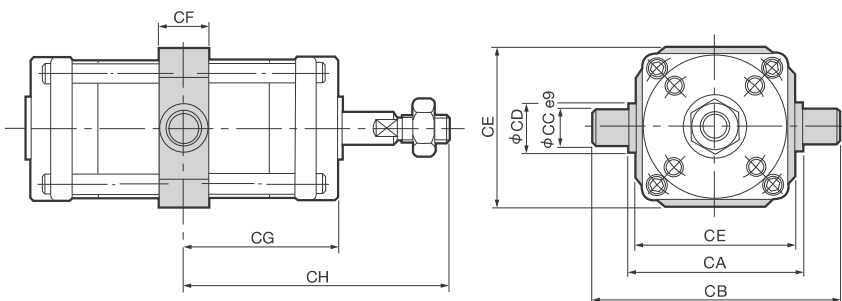
Front Flange Type Mount



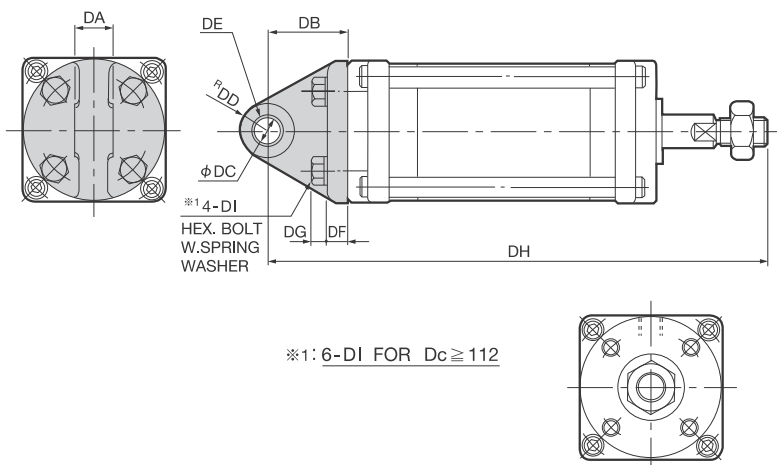
Rear Flange Type Mount



Trunnion Type Mount



Pivot Type Mount



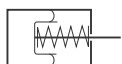
Dc-STROKE	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ
40 - 8										
24	70	90	35	53	6.5	M6	9	63	33	105
36						× 10		87		129
48								106		148
50 - 16								125		167
36	80	100	40	63	7.5	M6	10	77		122
50						× 10		107		152
64								129	35	174
63 - 16								151		196
42	105	130	55	82	9.5	M8	12	91		141
59						× 14		130	38	179
78								157		207
80 - 30								187		237
62	120	150	70	100	9.5	M8	13	113		171
87						× 14		161	45	219
108								200		258
100 - 46								233		291
86	150	180	85	120	11.5	M10	14	146		211
115						× 16		206	51	271
144								253		318
112 - 42								298		363
88	166	195	100	137	14	M10	15	153		225
122						× 16		222	57	294
156								275		347
125 - 52								328		400
102	180	210	115	150	14	M10	16	169		245
140						× 16		244	60	320
178								303		379
140 - 62								362		438
122	195	225	125	165	16	M12	19	192		276
162						× 20		282	65	366
204								345		429
								411		495

Dc-STROKE	CA	CB	CC	CD	CE	CF	CG	CH
40 - 8								
24	64	92	14	18	60	18	27	69
36							39	81
48							48.5	90.5
50 - 16							58	100
36	74	106	16	20	70	20	33.5	78.5
50							48.5	93.5
64							59.5	104.5
63 - 16							70.5	115.5
42	94	134	20	25	88	25	39.5	89.5
59							59	109
78							72.5	122.5
80 - 30							87.5	137.5
62	114	168	25	30	108	30	50	108
87							74	132
108							93.5	151.5
100 - 46							110	168
86	134	194	30	35	128	35	66	131
115							96	161
144							119.5	184.5
112 - 42							142	207
88	156	216	30	35	150	35	69	141
122							103.5	175.5
156							130	202
125 - 52							156.5	228.5
102	170	234	32	38	164	38	76.5	152.5
140							114	190
178							143.5	219.5
140 - 62							173	249
122	190	260	35	42	184	42	86.5	170.5
162							131.5	215.5
204							163	247
							196	280

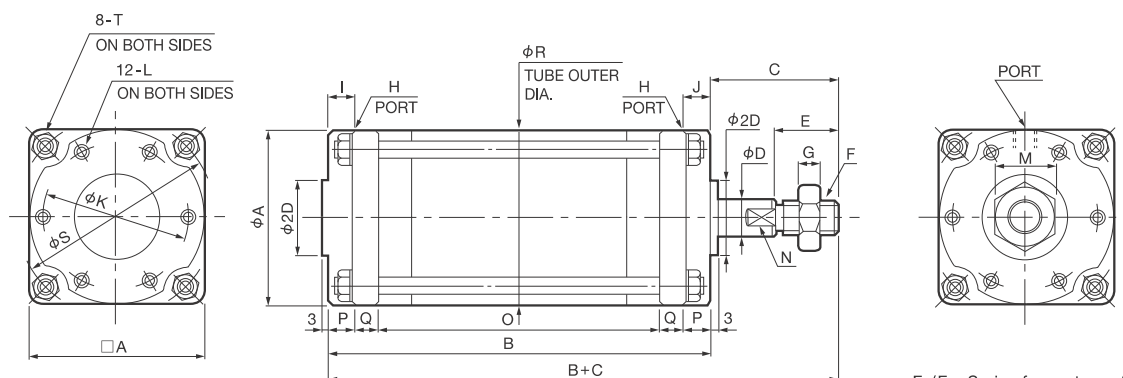
Dc-STROKE	DA	DB	DC	DD	DE	DF	DG	DH	DI
40 - 8									
24	15	30	10	14	1015	8	5.5	126	M6
36								150	× 18
48								169	
50 - 16								188	
36	15	33	10	14	1015	9	5.5	145	M6
50								175	× 18
64								197	
63 - 16								219	
42	20	38	12	15	1220	10	7.5	167	M8
59								206	× 22
78								233	
80 - 30								263	
62	20	44	15	16.5	1520	12	7.5	202	M8
87								250	× 22
108								289	
100 - 46								322	
86	25	50	18	18	1825	15	9.5	247	M10
115								307	× 30
144								354	
112 - 42								399	
88	28	54	18	20	1810	16	9.5	264	M10
122					2pcs.			333	× 30
156								386	
125 - 52								439	
102	30	59	20	23	2010	17	9.5	288	M10
140					2pcs.			363	× 30
178								422	
140 - 62								481	
122	34	64	22	25	2210	19	11	321	M12
162					2pcs.			411	× 35
204								474	
								570	

DE : Bearing Size No.

Model FCS-160-82 to 200-320



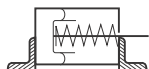
Outline Dimensions



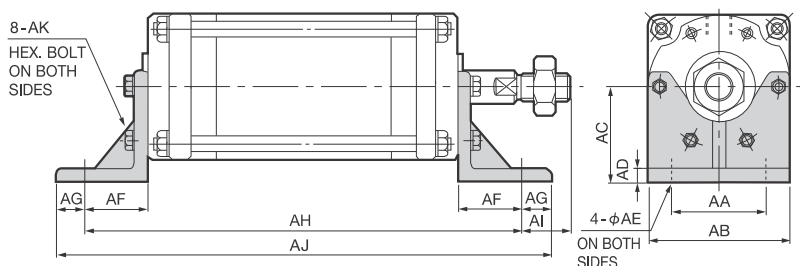
F₀/F₁ : Spring force at zero/full stroke (N)
Ae : Effective area (mm²)
N : Wrench flat width

OUTLINE DIMENSIONS

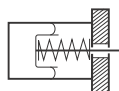
Dc-STROKE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	Ae	SPRING FORCE	
																						F ₀	F ₁
160 – 82	185	184	94	35	60	M30 × 1.5	18	Rc ½	22	—	160	M12 DP 18	46	30	86	23	26	185	215	M16	18600	158.8	356.7
		142													176								
		192													253								
		240													327								
180 – 96	205	213	104	40	64	M33 × 1.5	20	Rc ½	22	—	176	M14 DP 21	50	36	101	26	30	205	238	M18	23800	205.8	490
		168													209								
		226													298								
		280													381								
200 – 112	225	244	120	45	72	M36 × 1.5	21	Rc ¾	24	—	194	M16 DP 24	55	41	118	28	35	225	262	M20	29600	254.8	656.6
		192													238								
		256													336								
		320													434								



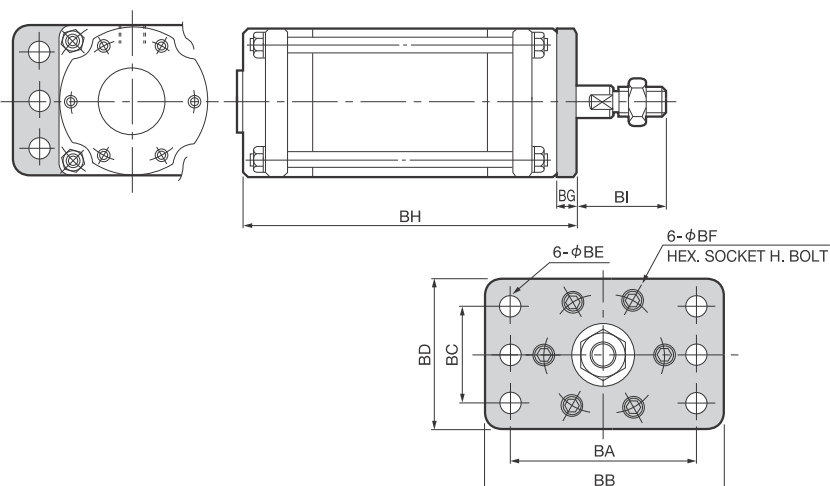
L Type Mount



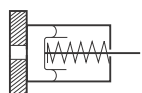
Dc-STROKE	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
160 - 82											
142	115	185	105	13	18	49	26	282	334	M12	
192								372	424	× 30	
240								449	501		
								523	575		
180 - 96								317	373	M14	
168	130	205	115	14	18	52	28	425	481	× 35	
226								514	570		
280								597	653		
200 - 112								348	404	M16	
192	140	225	125	14	18	52	28	468	524	× 35	
256								566	622		
320								664	720		



Front Flange Type Mount

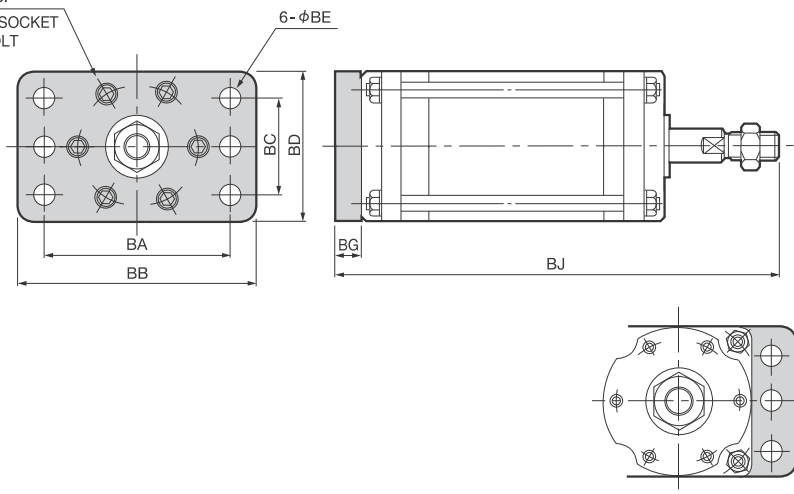


Dc-STROKE	BA	BB	BC	BD	BE	BF	BG	BH	BI
160 - 82									
142	220	260	140	185	16	M12	19	203	75
192						× 20		293	
240								370	
								444	
180 - 96								235	
168	250	300	160	205	18	M14	22	343	82
226						× 25		432	
280								515	
200 - 112								269	
192	275	320	180	225	18	M16	25	389	95
256						× 25		487	
320								585	

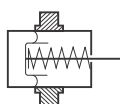


Rear Flange Type Mount

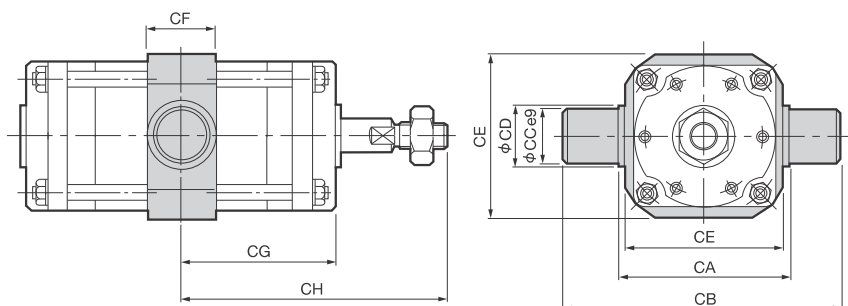
6- ϕ BF
HEX. SOCKET
H. BOLT



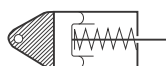
Dc-STROKE	BA	BB	BC	BD	BE	BF	BG	BJ
160 - 82								297
142	220	260	140	185	16	M12 × 20	19	387
192								464
240								538
180 - 96								339
168	250	300	160	205	18	M14 × 25	22	447
226								536
280								619
200 - 112								389
192	275	320	180	225	18	M16 × 25	25	509
256								607
320								705



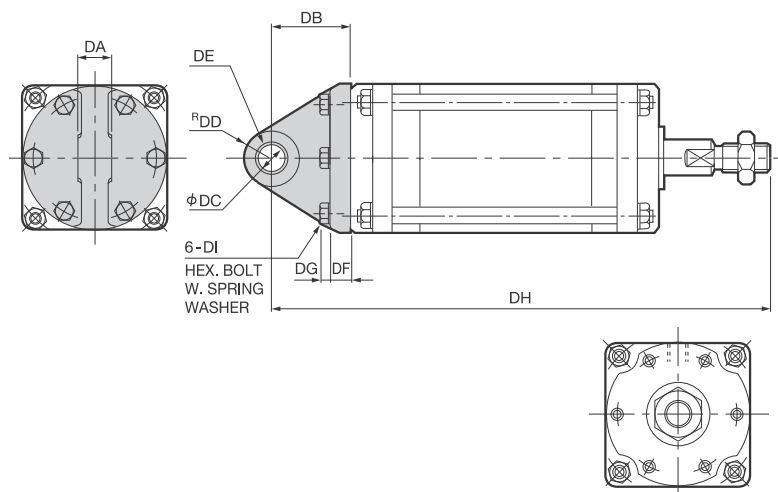
Trunnion Type Mount



Dc-STROKE	CA	CB	CC	CD	CE	CF	CG	CH
160 - 82							92	186
142	215	295	40	60	205	60	137	231
192							175.5	269.5
240							212.5	306.5
180 - 96							106.5	210.5
168	235	325	45	63	225	63	160.5	264.5
226							205	309
280							246.5	350.5
200 - 112							122	242
192	260	350	45	65	250	65	182	302
256							231	351
320							280	400



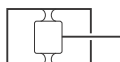
Pivot Type Mount



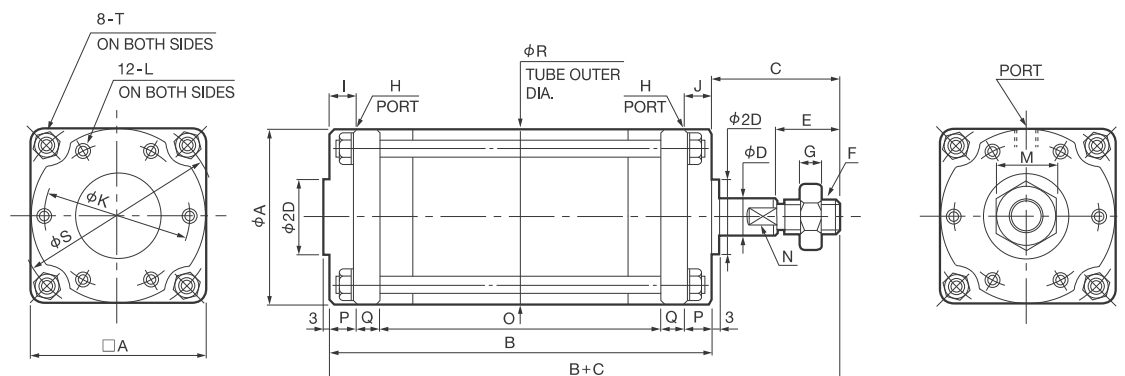
Dc-STROKE	DA	DB	DC	DD	DE	DF	DG	DH	DI
160 - 82								348	M12
142	38	70	25	28	2510	21	11	438	× 40
192					2pcs.			515	
240								589	
180 - 96								394	M14
168	42	77	28	32	2812	24	12.5	502	× 45
226					2pcs.			591	
280								674	
200 - 112								449	M16
192	45	85	30	34	3012	26	14	569	× 50
256					2pcs.			667	
320								765	

DE : Bearing Size No.

Model FCD-160-82 to 200-320



Outline Dimensions

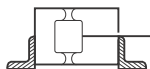


OUTLINE DIMENSIONS

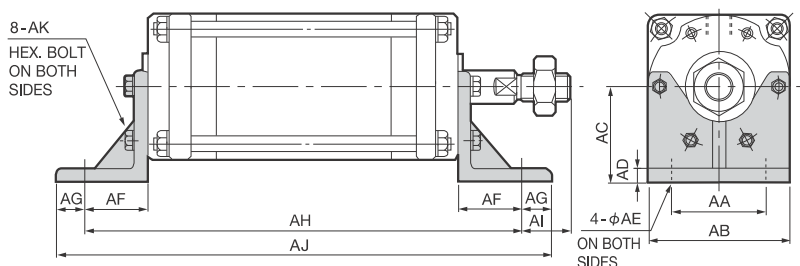
Ae : Effective area (mm²)

N : Wrench flat width

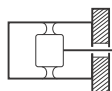
Dc-STROKE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	Ae	
																					PUSH	PULL
160 - 82		230				M30		Rc 1/2	22	22	160	M12			132							
142	185	320	94	35	60	× 1.5	18					DP 18	46	30	222	23	26	185	215	M16	18600	17600
192		399													301							
240		475													377							
180 - 96		260				M33		Rc 1/2	22	22	176	M14			148							
168	205	368	104	40	64	× 1.5	20					DP 21	50	36	256	26	30	205	238	M18	23800	22500
226		459													347							
280		544													432							
200 - 112		292				M36		Rc 3/4	24	24	194	M16			166							
192	225	412	120	45	72	× 1.5	21					DP 24	55	41	286	28	35	225	262	M20	29600	28000
256		512													386							
320		612													486							



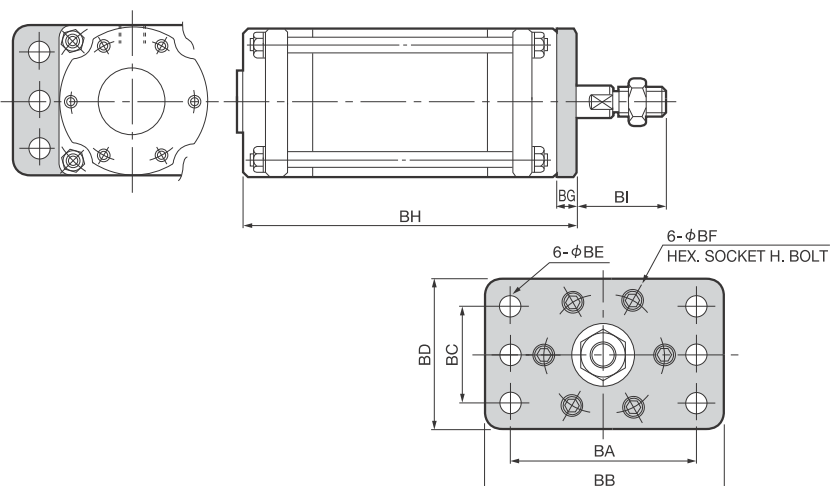
L Type Mount



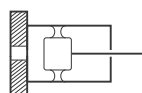
Dc-STROKE	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
160 - 82								328		380	M12
142	115	185	105	13	18	49	26	418	45	470	× 30
192								497		549	
240								573		625	
180 - 96								364		420	M14
168	130	205	115	14	18	52	28	472	52	528	× 35
226								563		619	
280								648		704	
200 - 112								396		452	M16
192	140	225	125	14	18	52	28	516	68	572	× 35
256								616		672	
320								716		772	



Front Flange Type Mount

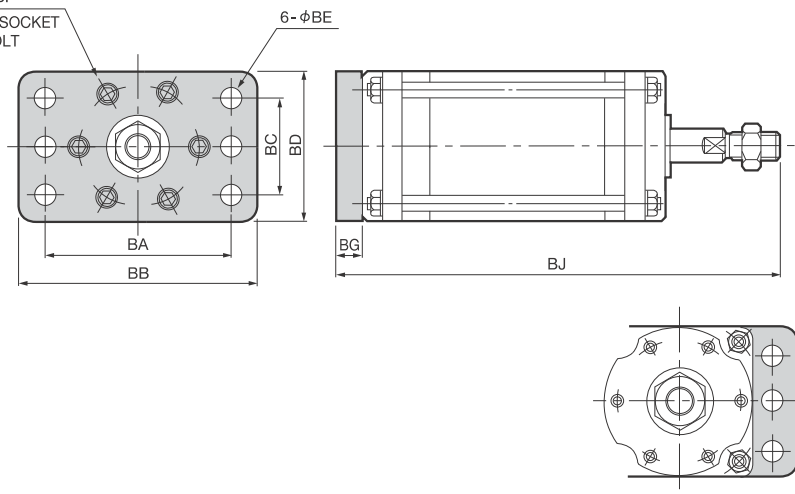


Dc-STROKE	BA	BB	BC	BD	BE	BF	BG	BH	BI
160 - 82								249	
142	220	260	140	185	16	M12	19	339	75
192						× 20		418	
240								494	
180 - 96								282	
168	250	300	160	205	18	M14	22	390	82
226						× 25		481	
280								566	
200 - 112								317	
192	275	320	180	225	18	M16	25	437	95
256						× 25		537	
320								637	

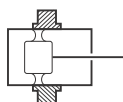


Rear Flange Type Mount

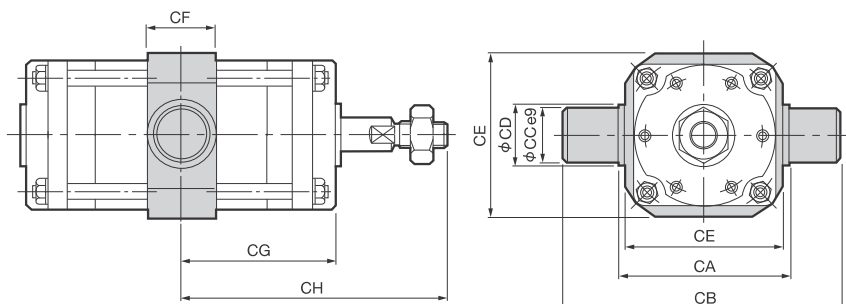
6- ϕ BF
HEX. SOCKET
H. BOLT



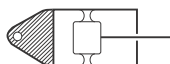
Dc-STROKE	BA	BB	BC	BD	BE	BF	BG	BJ
160 - 82								343
142	220	260	140	185	16	M12 × 20	19	433
192								512
240								588
180 - 96								386
168	250	300	160	205	18	M14 × 25	22	494
226								585
280								670
200 - 112								437
192	275	320	180	225	18	M16 × 25	25	557
256								657
320								757



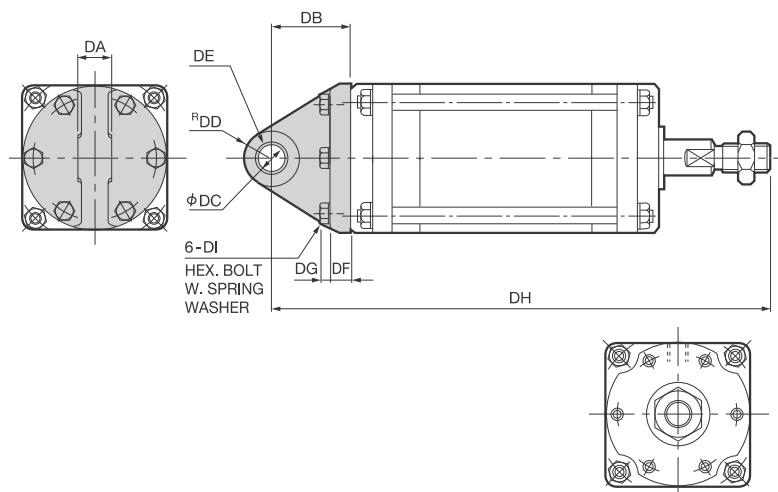
Trunnion Type Mount



Dc-STROKE	CA	CB	CC	CD	CE	CF	CG	CH
160 - 82							115	209
142	215	295	40	60	205	60	160	254
192							199.5	293.5
240							237.5	331.5
180 - 96							130	234
168	235	325	45	63	225	63	184	288
226							229.5	333.5
280							272	376
200 - 112							146	266
192	260	350	45	65	250	65	206	326
256							256	376
320							306	426



Pivot Type Mount



Dc-STROKE	DA	DB	DC	DD	DE	DF	DG	DH	DI
160 - 82								394	M12 × 40
142	38	70	25	28	2510 2pcs.	21	11	484	
192								563	
240								639	
180 - 96								441	M14 × 45
168	42	77	28	32	2812 2pcs.	24	12.5	549	
226								640	
280								725	
200 - 112								497	M16 × 50
192	45	85	30	34	3012 2pcs.	26	14	617	
256								717	
320								817	

DE : Bearing Size No.

[illegible]

[illegible]

Fujikura's Pneumatic Control Products Line

■ General Guide		Cat. No. KS-572E
■ Fujikura BF Cylinder	Series FC	Cat. No. KS-570E
■ Super Precision Air Regulators	Series RS	} Cat. No. KS-128E
■ Super Precision Air Relays	Series RR	
■ Precision Air Regulators	Series RP	Cat. No. KS-129E
■ Precision Vacuum Pressure Regulators	Series RV	Cat. No. KS-131E

[Please request respective catalog for detailed contents of each product.]

Note: Specifications subject to change without notice for improvements and modifications.

FUJIKURA BF CYLINDER HANDLING INSTRUCTION

Note : Keep this Handling Instruction in a place so that it can be used whenever required.

1. Precautions for Safety

⚠ CAUTION:

Be sure to observe the following precautions for safety.

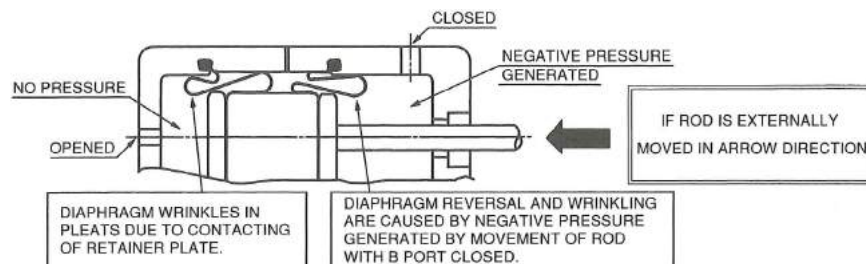
If not so, the BF Cylinder could not only make its full peculiar functions, but also might cause the cylinder-coupled machine to do unexpected operation, resulting in occurrence of an accident involving a human life.

1

The thin diaphragm(s) contained in BF Cylinder are in an unstable state when no operating pressure is applied. Should Cylinder Rod be pulled out or pushed in during such condition, the diaphragm(s) would be caused to reverse or wrinkle in pleats between Piston and Cylinder wall as illustrated. Be sure to apply a slight (at most 0.1 kgf/cm²) pressure in BF Cylinder before moving Rod externally.

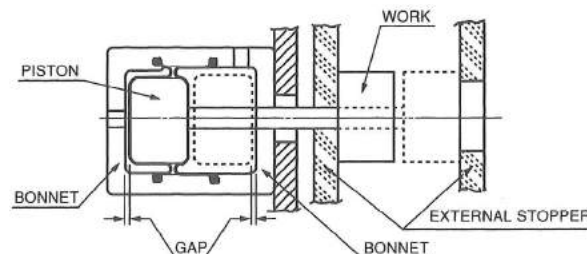
2

Do not carry BF Cylinder about with its Rod grasped so that the same troubles as stated in 1 will not occur.



3

Internal shock load on Bonnet acted by Piston may cause failure of BF Cylinder body. Provide external stoppers on the machine parts at the stroke ends or reinforcing members (such as tie rods) on Cylinder to allow Cylinder body to be free from shock load.



4

When BF Cylinder is required to operate at a very low speed or to carry fluctuating load, select a Cylinder size of good output allowance.

5

Do not apply lateral or eccentric axial load at the Rod end.

6

If necessary, install accessory pneumatic equipment in the pipe line preferably in close proximity to BF Cylinder.

7

Cylinder speed control should be performed by means of meter-out device.

8

Use filter and pressure reducing valve in the pipe line.

9

Automatic oiling device such as oiler may be installed in the pipe line. In this case, use well refined mineral oil such as hydraulic fluid.

10

BF Cylinders are used for a variety of applications. Customers are requested to pay reasonable attention according to each way of use or operating circumstances.

11

For protecting BF Diaphragm(s) from failure, do not apply excess pressure to BF Cylinder exceeding the specified allowable maximum operating pressure.

2. Cautions for Handling

Customers are advised to read thoroughly the following Handling Instructions before placing the BF Cylinder at service, and are requested, when replacing its diaphragm, to handle it with care observing the cautions stated below, because BF Diaphragm is sensitive functional rubber parts.

2-1. Prevention of BF Diaphragm's wrinkling

- a) Do not move Rod externally with no operating pressure applied for preventing BF Diaphragm's wrinkling in pleats. (Fig.1)

Once generated, the wrinkling can not be corrected even though air pressure is applied on the high pressure side, and would cause premature failure of BF Diaphragm during service operation.

As a general rule, Rod must be moved by operating air force.

Note : When manual driving of Rod with zero operating-pressure is required from necessity,

- (1) In Single acting type cylinder:
With the air port opened to atmosphere, pull Rod out slowly with as small stroke as possible.
- (2) In Double acting type cylinder:
With the air port of exhaust side plugged up by finger and the air port of suction side opened to atmosphere, move Rod slowly so that the air is released gradually from the plugged port to maintain invariably some residual pressure in the exhaust side.

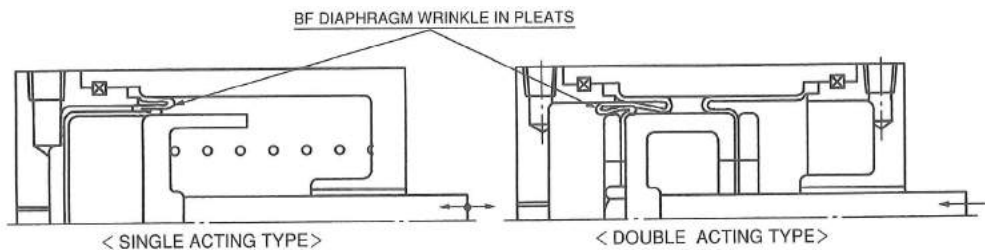


Fig.1

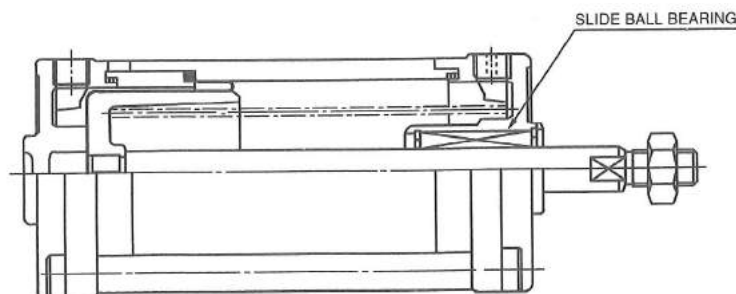
- b) Be sure BF Cylinder is kept always with its Rod upward during handling to prevent unexpected rod protrusion due to gravity. (For return-spring-less Single acting type and also for Double acting type cylinders, especially special care must be taken for Super Cylinder of spring-less type.)
- c) Provide meter-out device respectively by means of speed control valve preferably in close proximity to each air port of Cylinder so that a residual pressure of at least 0.1 kgf/cm² may be applied on each BF Diaphragm in the exhausting stroke during cylinder operations. (For Double acting cylinders only.)

2-2. Prevention of BF Diaphragm's Twisting

- a) As a rule, do not apply torque to rotate Rod during handling for avoiding BF Diaphragm failure.
- b) Do not apply torque to rotate Rod especially with pressure applied on Piston or even with no pressure applied in case after long term use.

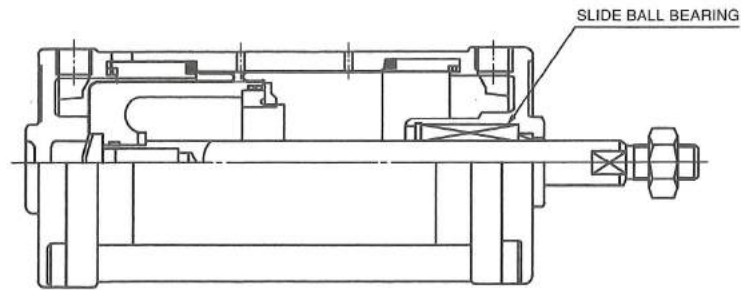
2-3. Lateral Load on Rod

- a) Do not apply lateral load on the Rod end.
Bending deflection of Rod due to lateral load would cause increased frictional resistance, leading to premature wear of the bearing metal of the BF Cylinder.
- b) In a design case involving unavoidable lateral load, or when minimum rod-friction is desired, a type of BF Cylinder with slide ball bearing Super Cylinder is available for use. (Consult our company.) (Fig.2-1, 2-2)



BF CYLINDER - SINGLE ACTING TYPE

Fig.2-1



BF CYLINDER - DOUBLE ACTING TYPE

Fig.2-2

2-4. No lubrication oil is required.

BF Cylinder requires no lubrication oil because of BF Diaphragm's rolling action, eliminating the need to install oiler in the pipe line.

2-5. Do not tighten excessively the pipe joints of Cylinder.

Although BF Cylinder body is made of high strength aluminum alloy, care must be taken to ensure that the pipe threads of Cylinder are not damaged due to excessive tightening of connecting pipe joints.

2-6. Internal shock load on Bonnet acted by Piston may cause failure of BF Cylinder body. Provide external stoppers on the machine parts at the stroke ends or reinforcing members (such as tie rods) on Cylinder to allow Cylinder body to be free from shock load.(Fig.3)

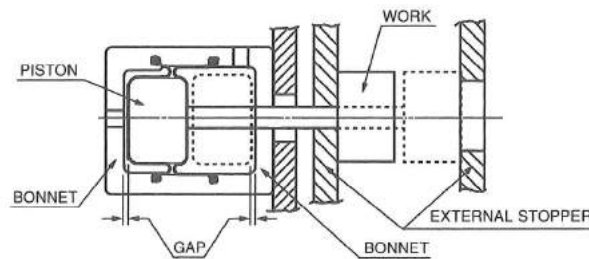


Fig.3

2-7. Installing BF Diaphragm

- a) When replacing BF Diaphragm, be sure BF Diaphragm is installed so that the fabric side comes in contact with the side walls of Cylinder and Piston and the rubber side faces inside the annular convolution (pressure side).(Fig.4)

⚠ CAUTION:

If reversely installed, BF Diaphragm would be damaged promptly during service operation.

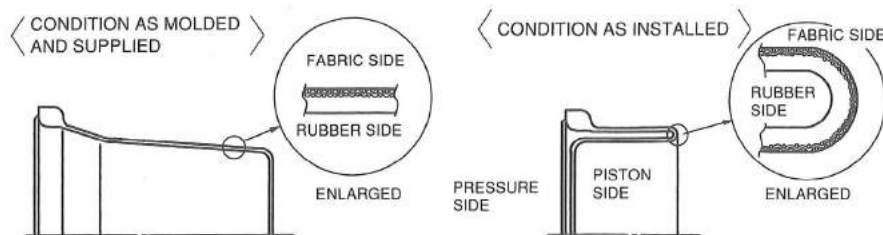


Fig.4

- b) Apply lubricant such as molybdenum disulfide powder to both surfaces of BF Diaphragm before installing.

3. Installing BF Cylinder to Machine

3-1. Installing BF Cylinder Body to Machine Body

Regardless of the Cylinder type (single acting or double acting) and the installing position (upward, downward, or sideways), provide, as a rule, a temporary lock to hold Rod at the fully retracted position before installing Cylinder body (or Bonnet) to the machine body.

3-2. Coupling Rod End to Movable Parts of Machine

- a) Apply a slight air pressure thru the rod side port to assure regular rolling action of BF Diaphragm of front side.
- b) Then, apply an air pressure thru the piston side port to protrude Rod all the way out.

Note : (b) term is not necessary for an upwardly installed Cylinder.

- c) Tighten securely the nut to couple Rod end to the movable parts of machine with the rod end double flats held by a spanner wrench to prevent rotation of Rod.

3-3. Preventing wrinkling in Pleats of BF Diaphragm to be caused by Unexpected Protrusion of Rod (for Cylinders to be installed downward).

In cases where BF Cylinder is installed downward, special attention must be paid to prevent the wrinkling in pleats of BF Diaphragm caused by unexpected protrusion of Rod under the condition when air pressure supply is cut off.

- a) Prior to transporting or transferring the BF Cylinder-installed machine, provide a temporary mechanical lock on Rod.
- b) After finishing daily operating work, move Rod all the way down to stop at this safe position, then cut off whole air pressure supply.