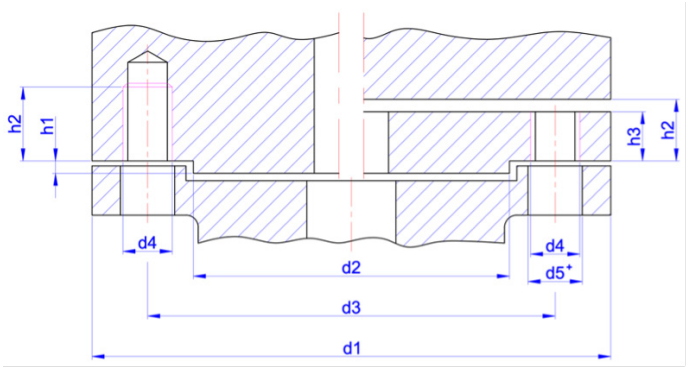
ISO 5211/MSS SP-101 MOUNT FLANGE DIMENSIONS COMPARISON



CROSS SECTION

DIMENSIONS (ISO 5211:2017, MSS SP-101:2014)

Specification	Flange Type	d^1 min. Flange Diameter [mm]	d^2 [mm]	d^3 Pitch Circle [mm]	d^4 Bolt Thread	h^1 max. [mm]	h^2 min. [mm]	h^3 min. [mm]	Number of screws, studs, or bolts n	Maximum allowed torque [Nm]
ISO 5211	F03	Ø46	Ø25	Ø36	M5	3	8	5	4	32
ISO 5211	F04	Ø54	Ø30	Ø42	M5	3	8	5	4	63
ISO 5211	F05	Ø65	Ø35	Ø50	M6	3	9	6	4	125
MSS SP-101	FA05	Ø65	Ø35	Ø50.8	1/4-20 UNC	3	9	6	4	129
ISO 5211	F07	Ø90	Ø55	Ø70	M8	3	12	8	4	250
MSS SP-101	FA07	Ø89.9	Ø55	Ø69.9	5/16-18 UNC	3	12	8	4	292
MSS SP-101	FA08	Ø89.9	Ø55	Ø80	5/16-18 UNC	3	12	8	4	332
/	F08*	Ø89.9	Ø55	Ø80	M8	3	12	8	4	332
ISO 5211	F10	Ø125	Ø70	Ø102	M10	3	15	10	4	500
MSS SP-101	FA10	Ø125	Ø70	Ø101.6	3/8-16 UNC	3	15	10	4	630
MSS SP-101	FA11	Ø127	Ø70	Ø107.7	3/8-16 UNC	3	15	10	4	664
ISO 5211	F12	Ø150	Ø85	Ø125	M12	3	18	12	4	1 000
MSS SP-101	FA12	Ø150.1	Ø85	Ø125.7	1/2-13 UNC	3	18	12	4	1 424
ISO 5211	F14	Ø175	Ø100	Ø140	M16	4	24	16	4	2 000
MSS SP-101	FA14	Ø175	Ø100	Ø139.7	5/8-11 UNC	4	24	16	4	2 508
ISO 5211	F16	Ø210	Ø130	Ø165	M20	5	30	20	4	4 000
MSS SP-101	FA16	Ø209.6	Ø130	Ø165.1	3/4-10 UNC	5	30	20	4	4 406
MSS SP-101	FA19	Ø222.3	Ø155	Ø190.5	5/8-11 UNC	5	27	18	8	6 881
/	F19*	Ø222	Ø155	Ø190	M16	5	27	18	8	6 881
/	F20**	Ø255	Ø160	Ø205	M16	5	24	16	8	7 100
/	FA20**	Ø255	Ø160	Ø205	5/8-11 UNC	5	24	16	8	7 100
ISO 5211	F25	Ø300	Ø200	Ø254	M16	5	24	16	8	8 000
MSS SP-101	FA25	Ø289.1	Ø200	Ø254	5/8-11 UNC	5	24	16	8	9 186
ISO 5211	F30	Ø350	Ø230	Ø298	M20	5	30	20	8	16 000
MSS SP-101	FA30	Ø342.9	Ø230	Ø298.5	3/4-10 UNC	5	30	20	8	15 965
ISO 5211	F35	Ø415	Ø260	Ø356	M30	5	45	30	8	32 000
MSS SP-101	FA35	Ø406.4	Ø260	Ø355.6	1-8 UNC	5	45	30	8	34 438
MSS SP-101	FA36	Ø406.4	Ø260	Ø355.6	1 ¼-7 UNC	5	48	32	8	55 182
/	F36*	Ø406.4	Ø260	Ø355.6	M32	5	48	32	8	55 182
ISO 5211	F40	Ø475	Ø300	Ø406	M36	8	54	36	8	63 000
MSS SP-101	FA40	Ø475	Ø300	Ø406.4	1 ¼-7 UNC	8	54	36	8	63 046
ISO 5211	F48	Ø560	Ø370	Ø483	M36	8	54	36	12	125000
MSS SP-101	FA48	Ø558.8	Ø370	Ø482.6	1 ¼-7 UNC	8	54	36	12	112 262
ISO 5211	F60	Ø686	Ø470	Ø603	M36	8	54	36	20	250 000
MSS SP-101	FA60	Ø673.1	Ø470	Ø603.3	1 ¼-7 UNC	8	54	36	20	233 879
ISO 5211	F80	Ø900	Ø670	Ø813	M42	10	63	42	20	500 000
ISO 5211	F100	Ø1200	Ø870	Ø1042	M42	10	63	42	32	1 000 000

* Not part of ISO 5211:2017. F08, F19 and F36 are sometimes used by manufacturers to fill the gap between other ISO sizes, but also to allow mounting if MSS SP-101 through bolted gearboxes and actuators onto valves (or vice versa) used in metric markets. They are mirror version of MSS SP-101 FA08, FA19, FA36 with metricated bolt holes. F19 is being considered by the ISO committee to be added to a next revision of ISO 5211.

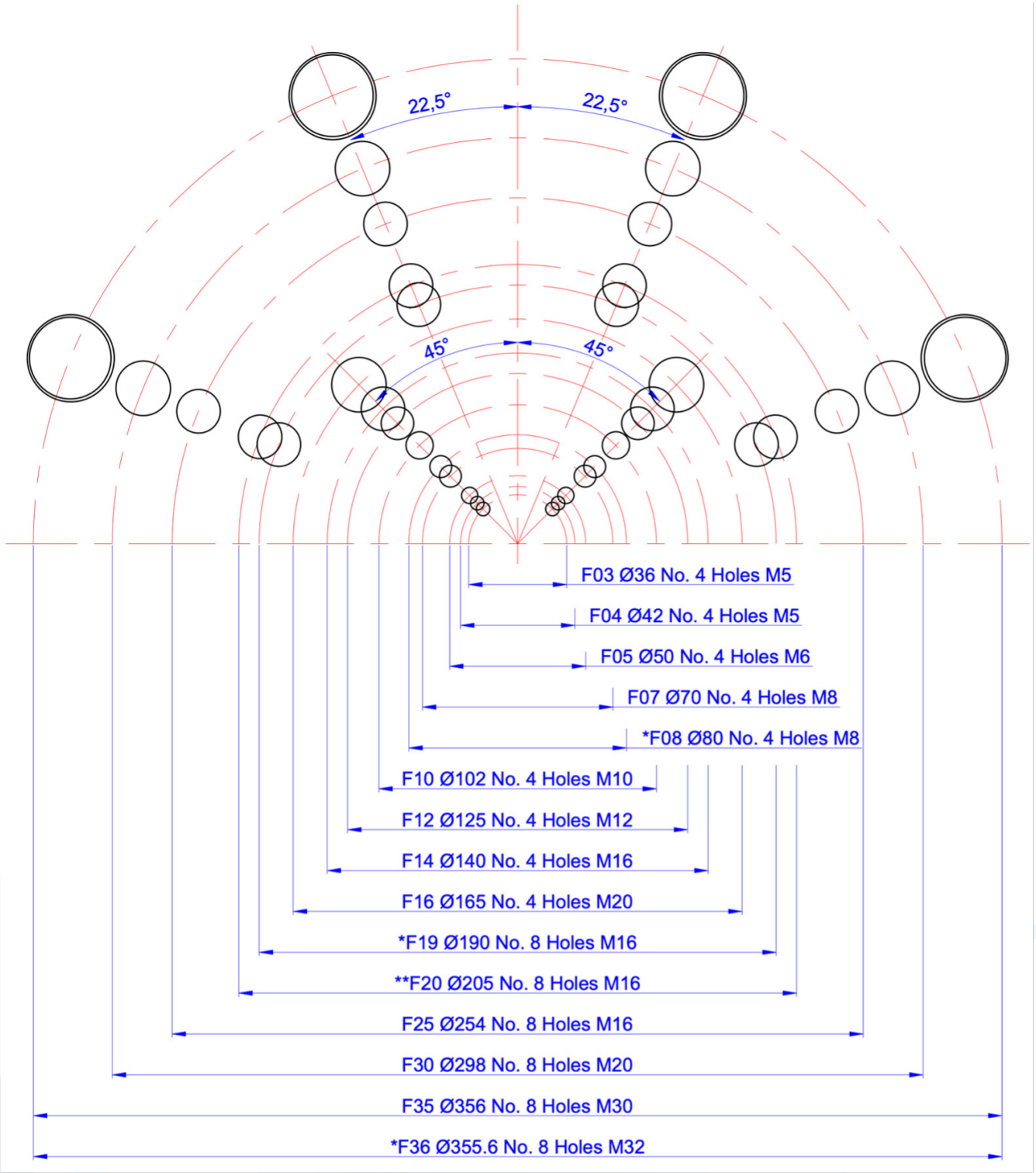
** Not part of ISO 5211 or MSS SP-101:2014 – F20/FA20 are sometimes used by manufacturers to fill the gap between F19/FA19 and F25/FA25.

+ Bolt Hole d5 as per ISO 273 Medium or ASME B18.2.8 Normal (see page 11).

Global Supply Line Pty Ltd ABN 86 008 134 512

Head Office - 1 to 19 Barndioota Rd Salisbury Plain South Australia 5109 Ph +61 (0)8 8285 0000 www.globalsupplyline.com.au

ISO 5211 FLANGE TYPE F3 – F35 INTERFACE / SEPARATION COMPARISON (TAPPED HOLES)

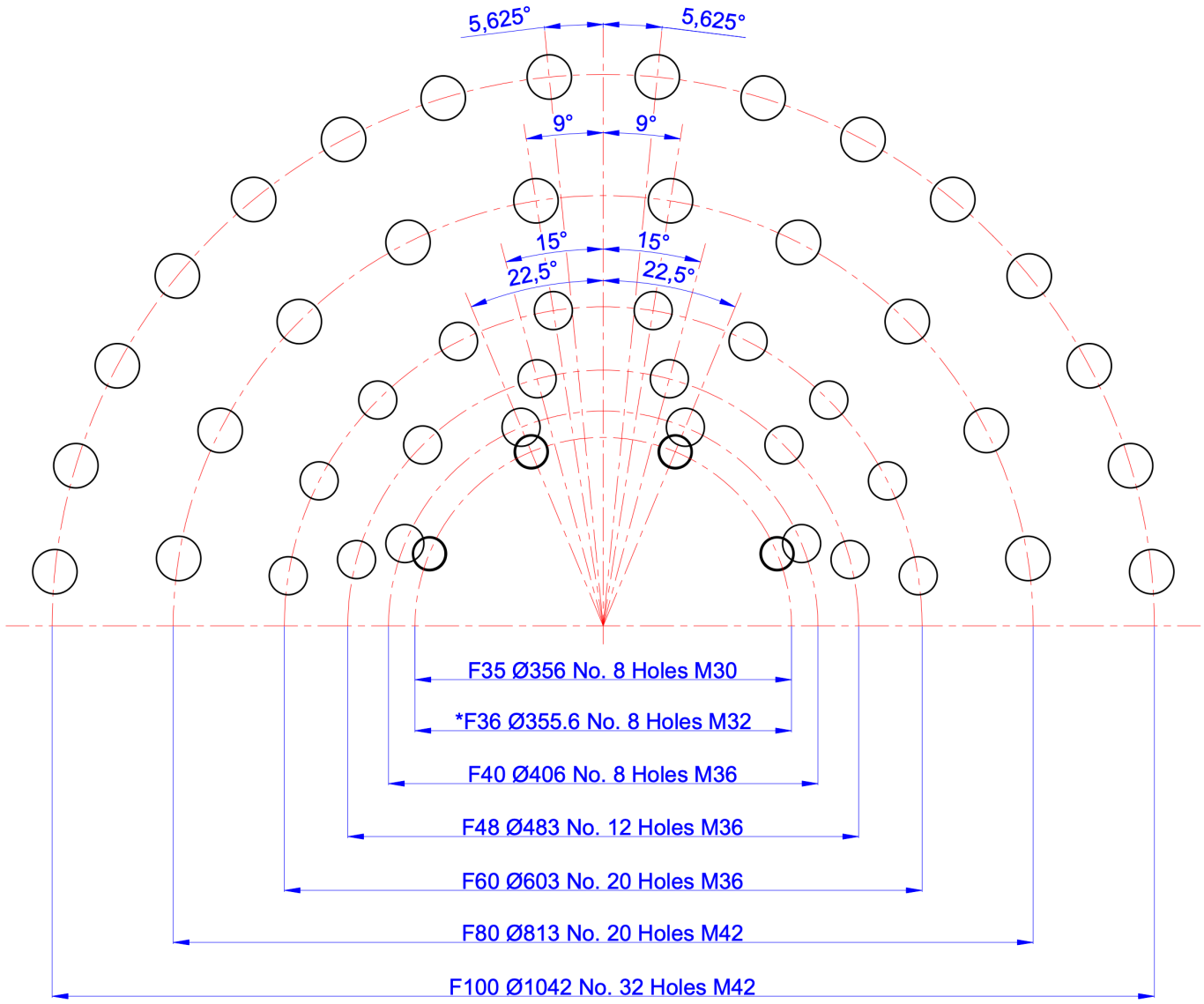


* Not part of ISO 5211:2017. F08, F19 and F36 are sometimes used by manufacturers to fill the gap between other ISO sizes. They are mirror version of MSS SP-101 FA08, FA19, FA36 with metricated bolt holes. F19 is being considered by the ISO committee to be added to a next revision of ISO 5211.

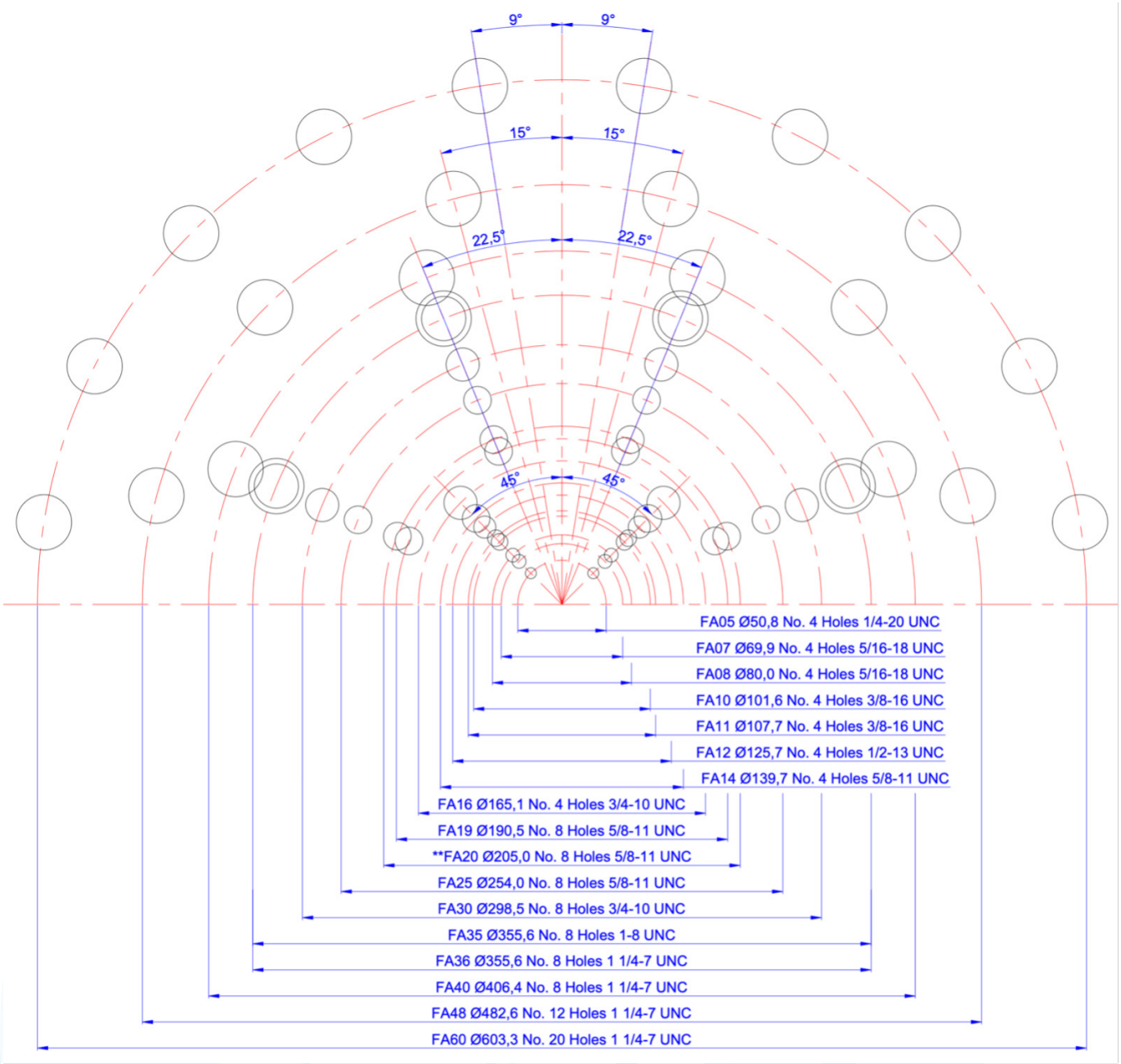
** Not part of ISO 5211 or MSS SP-101:2014 – F20/FA20 are sometimes used by manufacturers to fill the gap between F19/FA19 and F25/FA25.

Sizes shown are tapped, see page 11 for true bolt sizes.

ISO 5211 FLANGE TYPE F40 – F100 INTERFACE / SEPARATION COMPARISON (TAPPED HOLES)



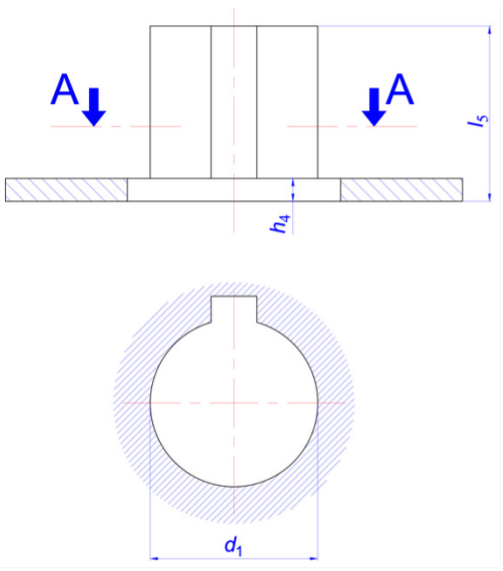
MSS SP-101 FLANGE TYPE FA05 – FA60 INTERFACE / SEPARATION COMPARISON (TAPPED HOLES)



** Not part of ISO 5211 or MSS SP-101 – F20/FA20 are sometimes used by manufacturers to fill the gap between F19/FA19 and F25/FA25.

ISO 5211 EXTRACT - DRIVE TYPES (BASED ON MAXIMUM ALLOWABLE TORSIONAL STRESS OF 280MPa)

1. DRIVE BY KEY(S)

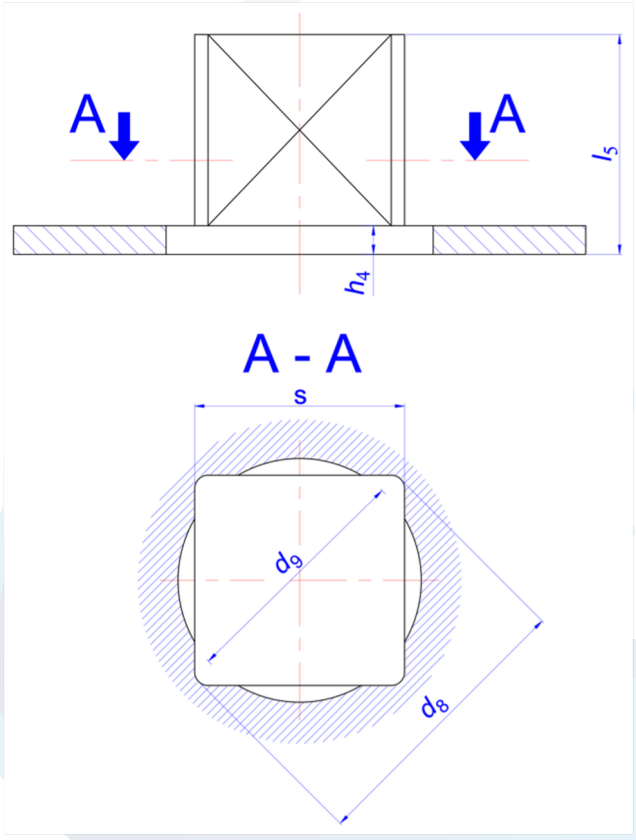


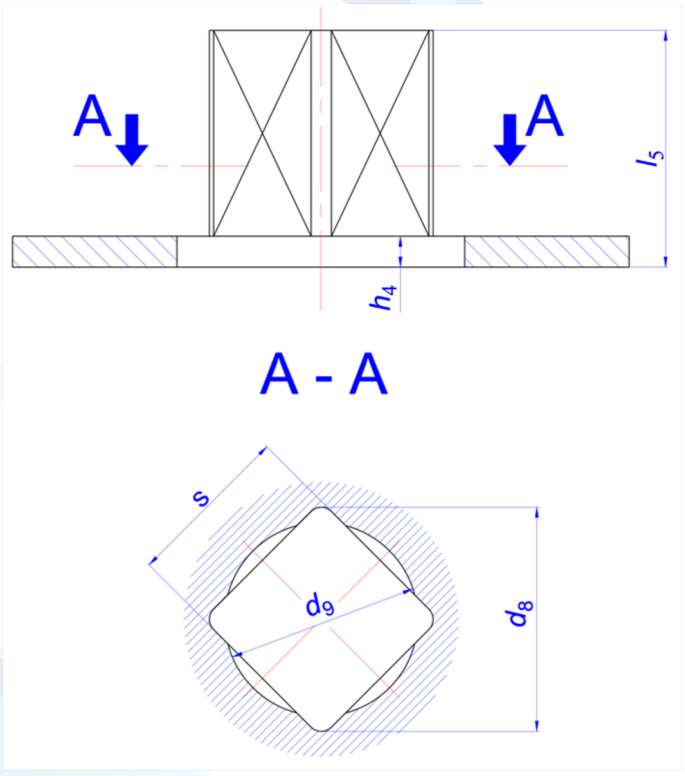
Flange type	h4 max. [mm]	l5 min. [mm]	d7 [mm] Max. transmissible torque [Nm]					
F05	3.0	30	ø12	ø14	**ø18**	ø22	-	-
			32	63	125	250	-	-
F07	3.0	35	ø14	ø18	**ø22**	ø28	-	-
			63	125	250	500	-	-
F10	3.0	45	ø18	ø22	**ø28**	ø36	ø42	-
			125	250	500	1 000	1 500	-
F12	3.0	55	ø22	ø28	**ø36**	ø42	ø48	ø50
			250	500	1 000	1 500	2 000	3 000
F14	5.0	65	ø28	ø36	ø42	**ø48**	ø50	ø60
			500	1 000	1 500	2 000	3 000	4 000
F16	5.0	80	ø42	ø48	ø50	**ø60**	ø72	ø80
			1 500	2 000	3 000	4 000	8 000	12 000
F25	5.0	110	ø48	ø50	ø60	**ø72**	ø80	ø98
			2 000	3 000	4 000	8 000	12 000	16 000
F30	5.0	130	ø60	ø72	ø80	**ø98**	ø100	ø120
			4 000	8 000	12 000	16 000		
F35	5.0	180	ø160					
F40	8.0	200	ø180					
F48	8.0	250	ø220					
F60	08	310	ø280					
F80	10	455	ø350					
F100	10	655	ø440					

Maximum transmissible torque by calculation

Values in bold indicated preferred dimension.

2. DRIVE BY PARALLEL OR DIAGONAL SQUARE HEAD



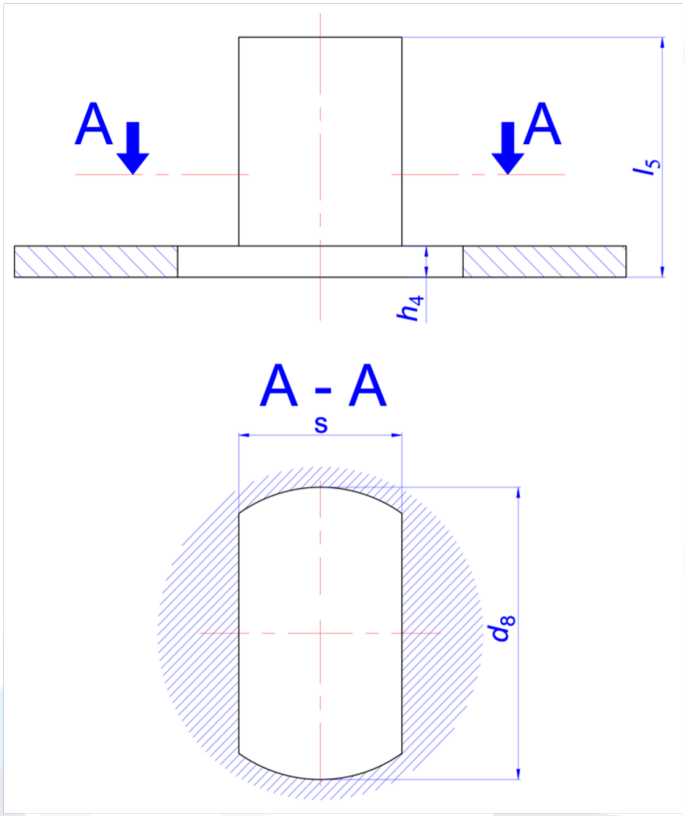


CONTINUED

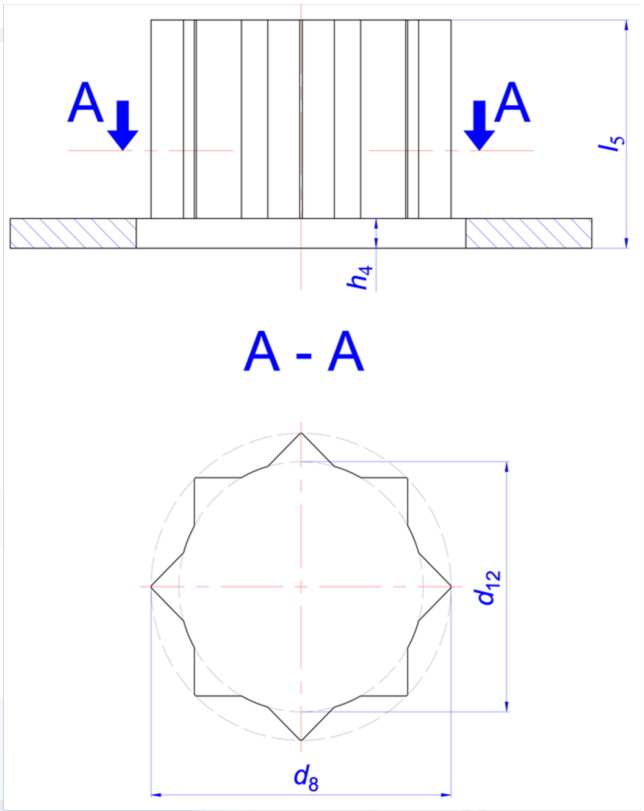
Flange type	h_4 max. [mm]	s [mm]										
F03	**1.5**	9	-	-	-	-	-	-	-	-	-	-
F04	**1.5**	9	**11**	-	-	-	-	-	-	-	-	-
F05	**3.0**	9	11	**14**	-	-	-	-	-	-	-	-
F07	**3.0**	-	11	14	**17**	-	-	-	-	-	-	-
F10	**3.0**	-	-	14	17	19	**22**	-	-	-	-	-
F12	**3.0**	-	-	-	17	19	22	**27**	-	-	-	-
F14	**5.0**	-	-	-	-	-	22	27	**36**	-	-	-
F16	**5.0**	-	-	-	-	-	-	27	36	46	-	-
F25	**5.0**	-	-	-	-	-	-	-	36	46	**55**	-
F30	**5.0**	-	-	-	-	-	-	-	-	46	55	**75**
d_8 min.		ø12.1	ø14.1	ø18.1	ø22.2	ø25.2	ø28.2	ø36.2	ø48.2	ø60.2	ø72.2	ø98.2
d_9 max.		ø9.5	Ø11.6	Ø14.7	Ø17.9	Ø20	Ø23.1	Ø28.4	Ø38	Ø48.5	Ø57.9	Ø79.1
l_5 min.		10	12	16	19	21	24	29	38	48	57	77
Max. transmissible torque [Nm]		32	63	125	250	350	500	1 000	2 000	4 000	8 000	16 000

Values in bold indicated preferred dimension.

3. DRIVE BY FLAT HEAD / IMPROVED FLAT HEAD



4. DRIVE BY BI-SQUARE

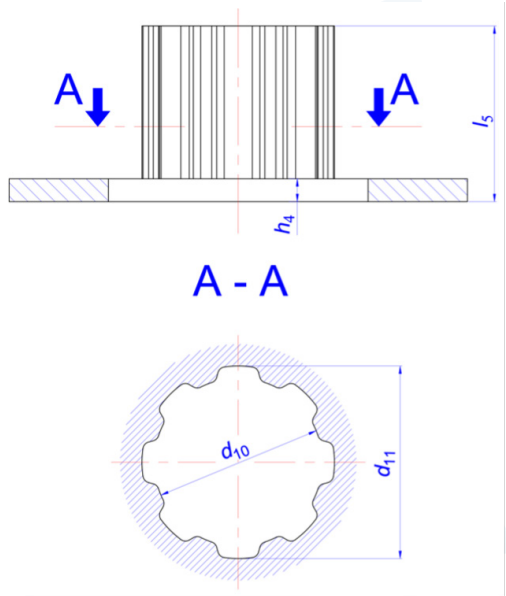


CONTINUED

Flange type	h_4 max. [mm]	s [mm]										
F03	**1.5**	9 (8)	-	-	-	-	-	-	-	-	-	-
F04	**1.5**	9	**11 (9.5)**	-	-	-	-	-	-	-	-	-
F05	**3.0**	9	11	**14 (12)**	-	-	-	-	-	-	-	-
F07	**3.0**	-	11	14	**17 (15)**	-	-	-	-	-	-	-
F10	**3.0**	-	-	14	17	19 (19)	**22**	-	-	-	-	-
F12	**3.0**	-	-	-	17	19	22	**27 (24)**	-	-	-	-
F14	**5.0**	-	-	-	-	-	22	27	**36 (32)**	-	-	-
F16	**5.0**	-	-	-	-	-	-	27	36	**46 (40)**	-	-
F25	**5.0**	-	-	-	-	-	-	-	36	46	**55 (48)**	-
F30	**5.0**	-	-	-	-	-	-	-	-	46	55	**75 (66)**
d_8 min.		ø12.1	ø14.1	ø18.1	ø22.2	ø25.2	ø28.2	ø36.2	ø48.2	ø60.2	ø72.2	ø98.2
d_9 max.		ø10	ø12.2	ø15.5	ø18.7	ø20.9	ø24.2	ø29.6	ø39.3	ø50.2	ø59.9	ø81.6
l_5 min.		10 (12)	12 (15)	16 (18)	19 (22)	21	24 (28)	29 (36)	38 (40)	48 (44)	57 (52)	77 (70)
Max. transmissible torque for flat head [Nm]		32	63	125	250	350	500	1 000	2 000	4 000	8 000	16 000
Max. transmissible torque for bi-square [Nm]		20	40	80	175	225	350	700	1 400	2 800	5 600	11 200

Values in bold indicated preferred dimension.
Values in parenthesis indicate dimension for improved flat head.

5. DRIVE BY INVOLUTE SPINE



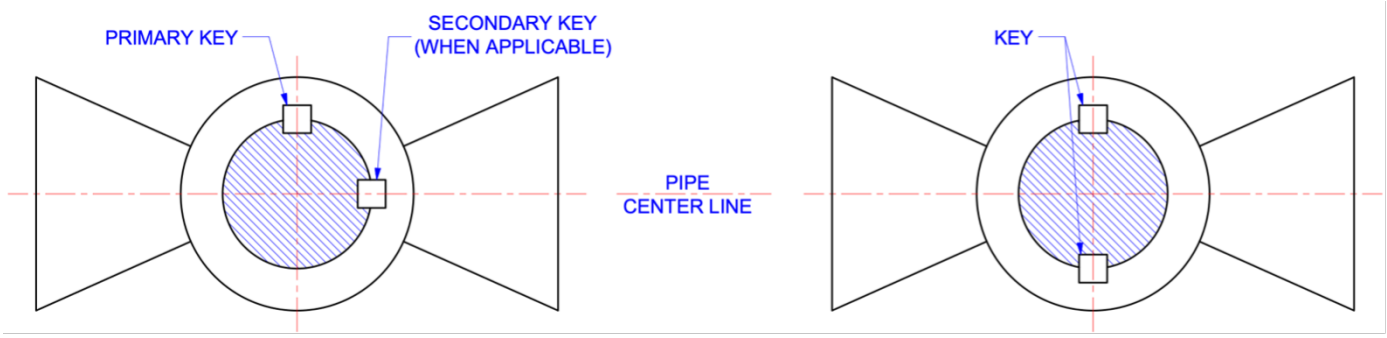
Flange type	h4 max. [mm]	d_{11} [mm]	d_{10} min. [mm]	Modul m ISO 4156-1	l_5 min.[mm]	Max. transmis-sible torque [Nm]
F03	1.5	ø16.1	ø14.5	1.5	12	32
F04	1.5	ø19.1	ø17	2.0	15	63
F05	3.0	ø24.1	ø21.5	2.5	18	125
F07	3.0	ø28.1	ø25	3.0	22	250
F10	3.0	ø36.1	ø32	4.0	28	500
F12	3.0	ø47.1	ø42	5.0	36	1 000
F14	5.0	ø60.1	ø54	6.0	40	2 000
F16	5.0	ø74.1	ø67	7.0	44	4 000
F25	5.0	ø88.1	ø80	8.0	52	8 000
F30	5.0	ø116.1	ø106	10	70	16 000

6. ISO 5211 – POSITION OF DRIVEN COMPONENTS AT INTERFACE

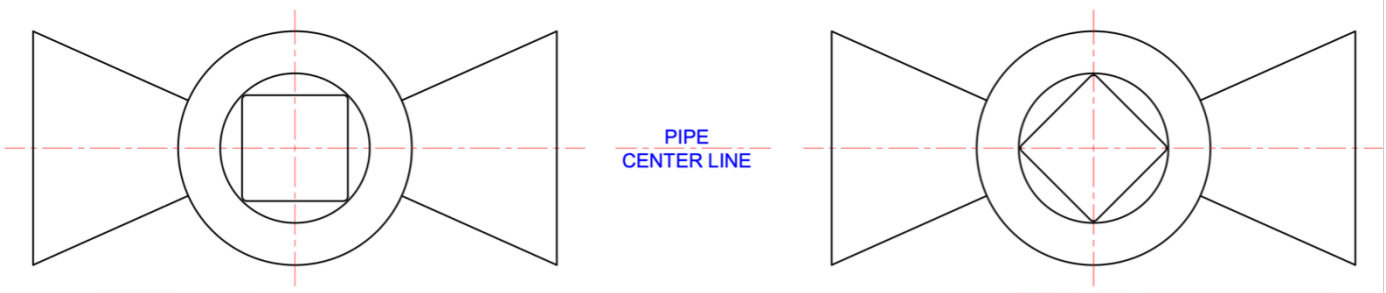
CLOSING ORIENTATION IS CLOCKWISE

VALVE SHOWN IN CLOSED POSITION

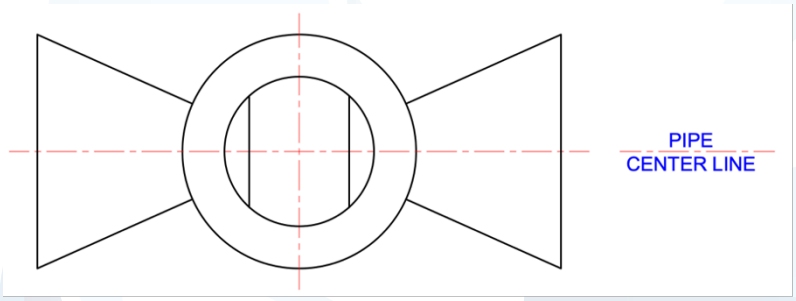
a. DRIVE BY KEY, 90° KEYS, AND 180° KEYS



b. DRIVE BY PARALLEL OR DIAGONAL SQUARE HEAD OR BI-SQUARE

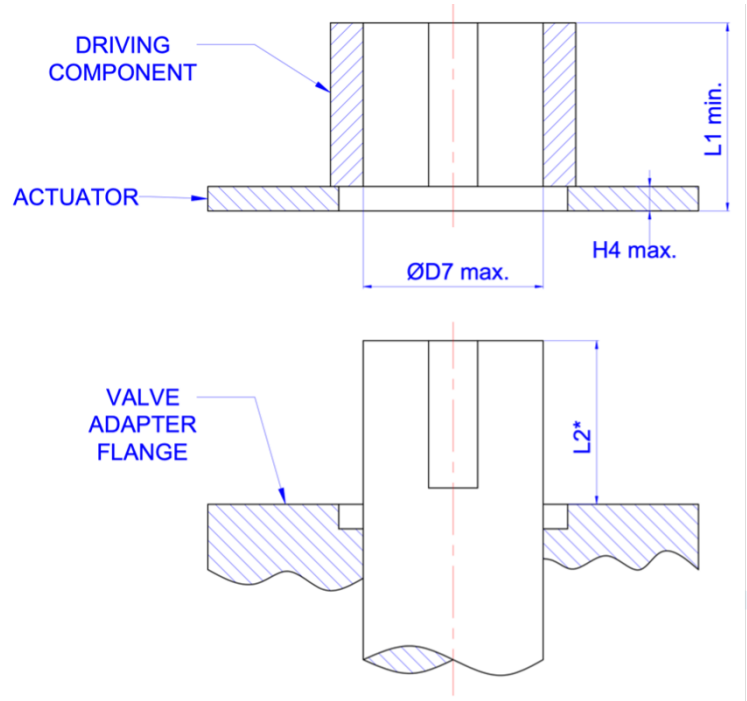


c. DRIVE BY FLAT HEAD



MSS SP-101 EXTRACT - DRIVE TYPES

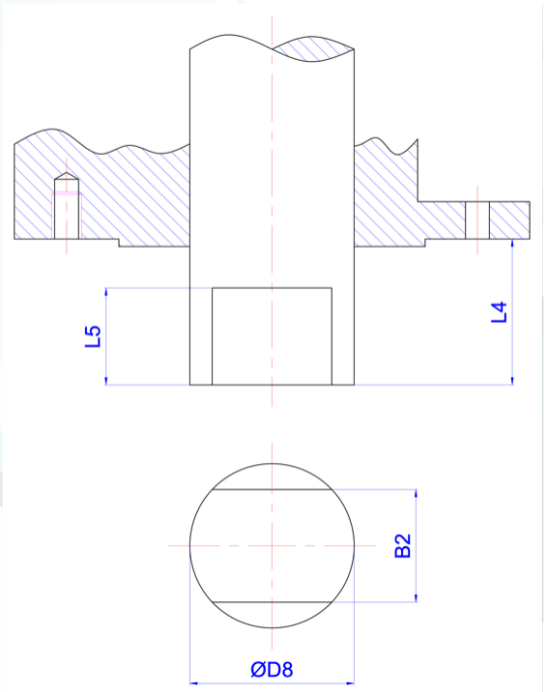
1. KEYED OUTPUT ASSEMBLY



Flange type/size	D7 max. in. [mm]	L1 min. [mm]	Key Section Width x Thickness, in.
FA05	0.87 (22.1)	1.30 (33.0)	3/16 x 3/16
FA07	1.10 (27.9)	1.50 (38.1)	1/4 x 1/4
FA08	1.10 (27.9)	1.50 (38.1)	1/4 x 1/4
FA10	1.65 (41.9)	1.77 (45.0)	3/8 x 3/8
FA11	1.65 (41.9)	1.77 (45.0)	3/8 x 3/8
FA12	1.97 (50.0)	2.17 (55.1)	1/2 x 1/2
FA14	2.36 (59.9)	2.90 (73.7)	5/8 x 5/8
FA16	3.15 (80.0)	3.15 (80.0)	3/4 x 3/4
FA19	3.50 (88.9)	3.00 (76.2)	7/8 x 7/8
FA25	3.94 (100.1)	4.33 (110.0)	1 x 1
FA30	4.72 (119.9)	5.12 (130.0)	1 ¼ x 1 ½
FA35	6.30 (160.0)	7.09 (180.1)	1 ½ x 1 ½
FA36	6.30 (160.0)	7.09 (180.1)	1 ½ x 1 ½
FA40	7.09 (180.1)	8.30 (210.8)	1 ¾ x 1 ½
FA48	8.66 (220.0)	11.00 (279.4)	2 x 1 ½
FA60	12.00 (305)	11.00 (279.4)	3 x 2

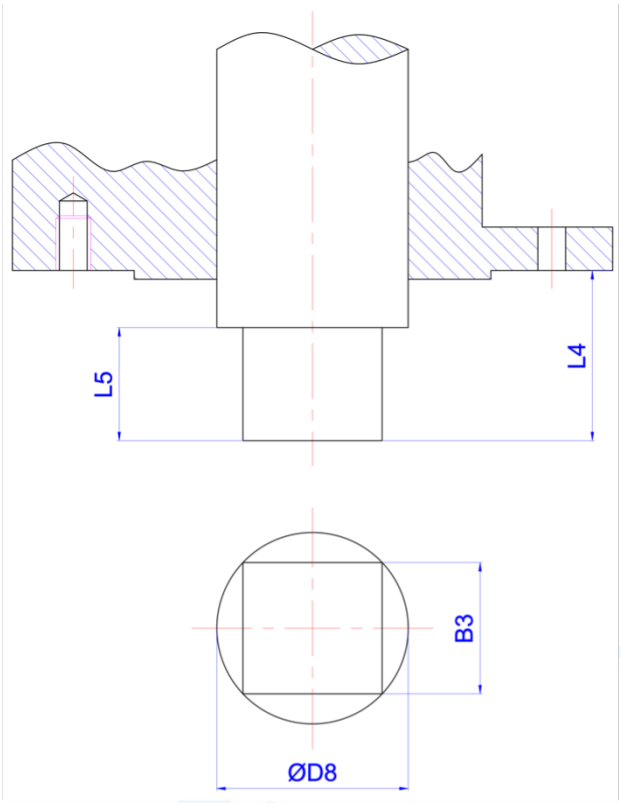
*** The length L2 shall be limited so there is full key engagement with the key slot (L1 – H4) where H4 is the max. flange thickness of the actuator.**

2. FLATTED OUTPUT SHAFT ASSEMBLY



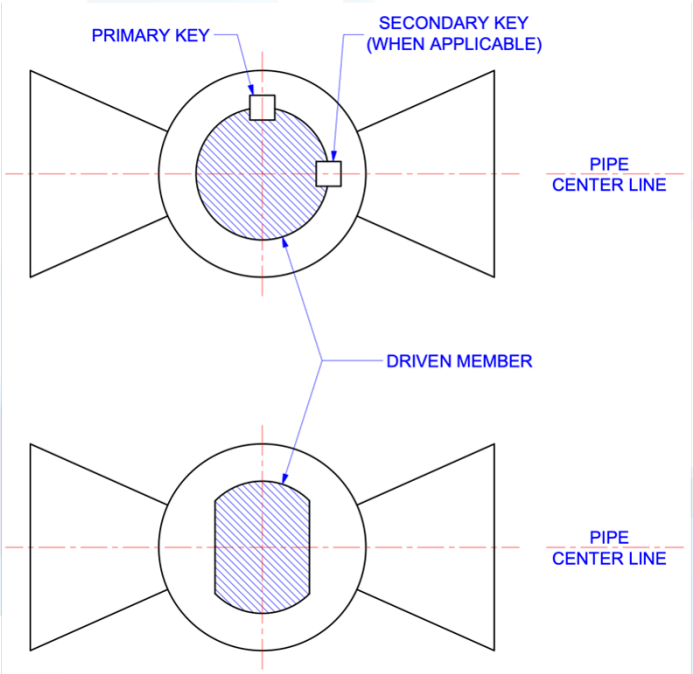
Flange type/size	D8 in. [mm]	B2 in. [mm]	L4 in. [mm]	L5 in. [mm]
FA05	0.75 (19.1)	0.50 (12.7)	0.75 (19.1	0.50 (12.7)
FA08	0.88 (22.4)	0.62 (15.7)	1.03 (26.2)	0.75 (19.1)
FA11	1.12 (28.5)	0.88 (22.4)	1.03 (26.2)	0.88 (22.4)
FA12	1.50 (38.1)	1.12 (28.5)	1.75 (38.1)	1.50 (28.5)
FA14	2.00 (50.8)	1.50 (38.1)	1.75 (44.4)	1.50 (38.1)
FA16	2.62 (66.5)	1.75 (44.4)	2.00 (50.8)	1.75 (44.4)

3. SQUARE OUTPUT SHAFT ASSEMBLY



Flange type/size	D8 in. [mm]	B3 in. [mm]	L4 in. [mm]	L5 in. [mm]
FA05	0.75 (19.1)	0.56 (14.2)	0.75 (19.1	0.50 (12.7)
FA08	0.88 (22.4)	0.75 (19.1)	1.03 (26.2)	0.75 (19.1)
FA11	1.12 (28.5)	0.88 (22.4)	1.03 (26.2)	0.88 (22.4)
FA12	1.50 (38.1)	1.12 (28.5)	1.50 (38.1)	1.12 (28.5)
FA14	2.00 (50.8)	1.62 (41.1)	1.75 (44.4)	1.50 (38.1)
FA16	2.62 (66.5)	2.00 (50.8)	2.00 (50.8)	1.75 (44.4)

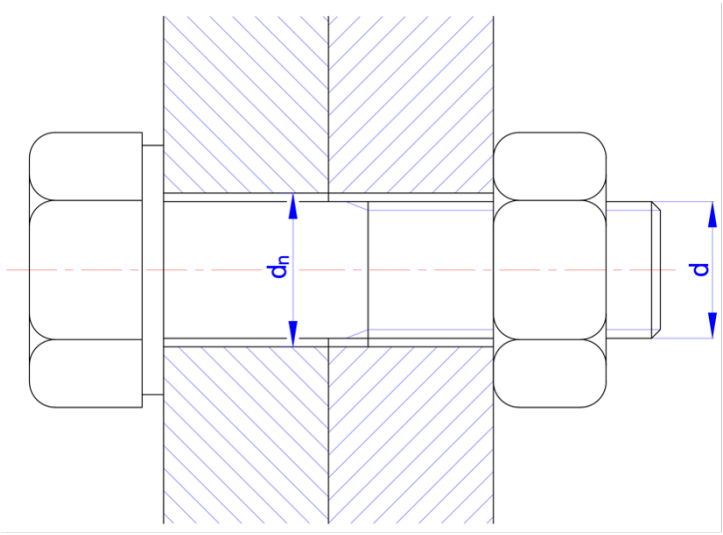
4. MSS SP-101 SHAFT ORIENTATIONS



CLOSING ORIENTATION IS CLOCKWISE

VALVE SHOWN IN CLOSED POSITION

APPENDIX A – CLEARANCE HOLES FOR BOLTS AND SCREWS



1. ISO 273* - CLEARANCE HOLES FOR BOLTS AND SCREW

Thread diameter d [mm]	Clearance hole d_h [mm]		
	Fine	Medium	Coarse
5	5.3	5.5	5.8
6	6.4	6.6	7
8	8.4	9	10
10	10.5	11	12
12	13	13.5	14.5
16	17	17.5	18.5
20	21	22	24
30	31	33	35
36	37	39	42
42	43	45	48

*** Referenced in ISO 5211 latest revision**
**** Referenced in. MSS SP-101 latest revision**

2. ASME B18.2.8** – CLEARANCE HOLES FOR BOLTS, SCREWS AND STUDS

Nominal screw size d [inch]	Clearance hole d_h [inch]		
	Close	Normal	Loose
1/4	17/64	9/32	19/64
5/16	21/64	11/32	23/64
3/8	25/64	13/32	27/64
1/2	17/32	9/16	39/64
5/8	21/32	11/16	47/64
3/4	25/32	13/16	29/32
1 ¼	1 9/32	1 11/32	1 7/15