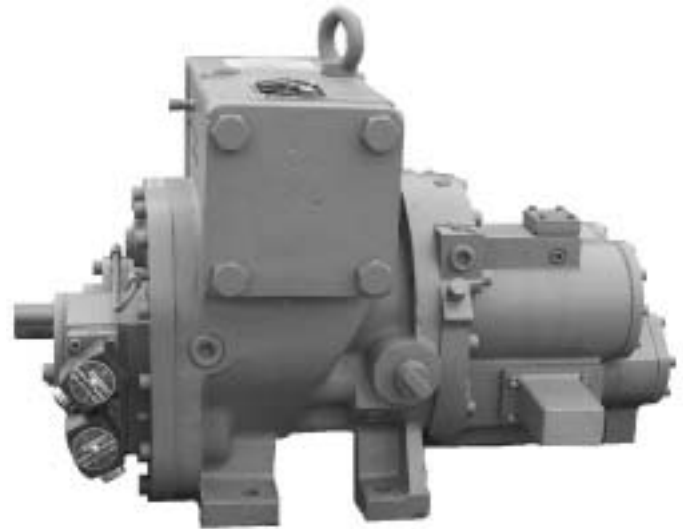


# ROTARY SCREW COMPRESSORS

## Models XJF/XJS 95 through 151



XJF



XJS

### SPECIFICATIONS

The Frick XJS/XJF screw compressor is designed to compress a variety of gases in many different applications including refrigeration, air conditioning, water chilling, well-head compression, gas gathering, and vapor recovery. Applications include booster duty (low temperature/pressure), high (single) stage, or swing duty compression.

**Stepless Capacity Control** - A hydraulically or manually actuated slide valve moves axially along the rotor mesh line to provide unloading down to 25% of full load capacity. Unloaded gas is bypassed back to suction before compression has begun, allowing the compressor to efficiently accommodate system requirements.

**Variable Volume Ratio** - A hydraulically actuated slide stop adjusts slide valve length to the most efficient of three possible volume ratios. This closely matches compressor volume ratio to system pressure ratio and minimizes the power penalties associated with under- or overcompression.

**Antifriction Bearings** - Cylindrical roller bearings handle radial loads and four-point angular contact ball bearings, aided by balance pistons (in some cases), absorb thrust loads. No preloading is required. At design conditions, L10 life is in excess of 100,000 hours. Roller bearings also maintain superior rotor positioning to minimize internal leakage

and provide excellent performance. System differential pressure is normally sufficient as the driving force to supply oil to the bearings, thereby eliminating the need for an oil pump. Antifriction bearings have lower frictional horsepower requirements for lower power consumption. Compressor housings are machined to provide static oil reservoirs for the bearings.

**Oil Injection** - Injected oil serves to lubricate the bearings, balance piston, and seal, fill any leakage paths between and around the rotors to prevent gas bypassing, and maintain superior efficiencies. Oil injection minimizes noise and vibration and keeps the compressor cool to prevent overheating by absorbing much of the heat from compression.

**Close-Coupled Motor** - XJF 95/120 model compressors are supplied with a C-flange adaptor. XJF 151 model compressors are available with a C-flange/D-flange adaptor as an option. This allows direct connection to a motor guaranteeing coupling alignment without requiring field labor.

**Made in the USA** - The entire compressor is designed and built by Frick in Waynesboro, PA. Expert engineering, automated machining centers, clean temperature controlled assembly, and stringent quality control requirements (ISO 9001) all contribute to assuring easy installation, reliable operation, and convenient servicing.

## MATERIALS OF CONSTRUCTION

**Castings** - ASTM A48 class 40 gray cast iron is standard for pressure-retaining parts. Suction and discharge flanges comply with ANSI B16.1. A 400 class suction and discharge is standard on all models. An alternate casing material is ASTM A536 grade 65-45-12 ductile (nodular) iron.

**Rotors** - AISI-1141 low carbon steel, machined from hot-rolled bar stock.

**Drive Shaft** - Jackshaft is made of AISI 1144 carbon steel.

**Gears** - 4140H steel, through hardened to 32–36 Rockwell "C". Nitride case hardened. ANSI/AGMA 2000 - A88 specifications.

**Bearings** - Rolling elements and rings are AISI-52100 medium carbon alloy steel. Cages are brass, polyamide, or steel. Tolerance quality complies with ABEC 1 through 3.

**Slide Valve Spindle** - AISI-1141 resulfurized, low carbon steel.

**Slide Valve & Slide Stop Indicators** - Type 304 stainless steel, bronze.

**Pistons, Spacers, Etc.** - Fabricated from class 40 gray cast iron.

**Retaining (Snap) Rings & Spring Washers** - High carbon spring steel.

**Bolts** - Grade 8.8, heat treated, medium carbon steel, socket head cap screws.

**Static Seals** - HNBR O-rings. Viton also available.

**Dynamic Seals** - Carbon filled teflon.

**Shaft Seal** - Spring-loaded, stationary, carbon end face with a stainless steel carrier against a rotating nonmagnetic cast iron alloy (Ni-resist) floating seat. The assembly is fully balanced and capable of sealing up to 350 PSIG but is vented to low pressure to extend seal life. Secondary seals are HNBR or viton o-rings. Alternate seal designs and materials are available for some applications.

## TYPICAL PERFORMANCE

Model	R-22 (HCFC)				R-717 (Ammonia , NH <sub>3</sub> )				Natural Gas (SG=.65, k=1.26)			
	Capacity		Power		Capacity		Power		Capacity		Power	
	TR	KW	BHP	KW	TR	KW	BHP	KW	MMSCFD	MSCMH	BHP	KW
<b>95S</b>	46	160	67	50	51	181	62	46	0.153	0.181	14	10
<b>95M</b>	28	98	41	31	32	111	38	28	0.094	0.111	8	6
<b>95L</b>	35	122	51	38	39	138	47	35	0.117	0.138	10	8
<b>120S</b>	92	322	135	101	104	364	124	92	0.309	0.365	27	20
<b>120M</b>	56	198	83	62	64	224	76	57	0.190	0.224	17	13
<b>120L</b>	70	245	103	77	79	278	95	71	0.235	0.277	21	16
<b>151A</b>	110	388	153	114	121	425	143	107	0.373	0.440	30	23
<b>151M</b>	130	459	181	135	143	502	169	126	0.441	0.520	36	27
<b>151L</b>	162	568	224	167	177	622	210	156	0.546	0.644	44	33
<b>151N</b>	193	679	268	200	211	744	251	187	0.652	0.769	53	40

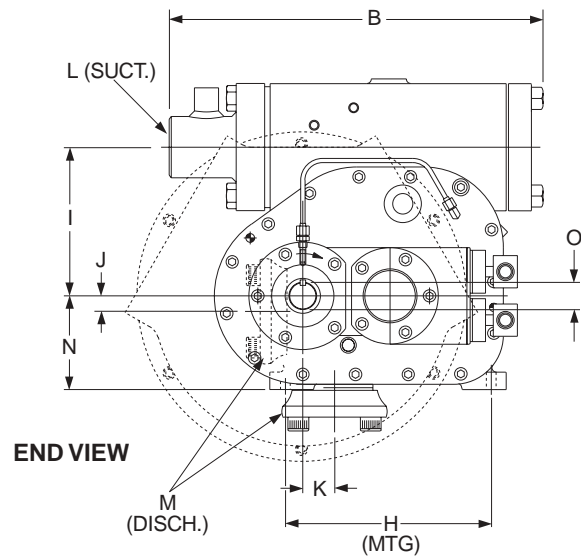
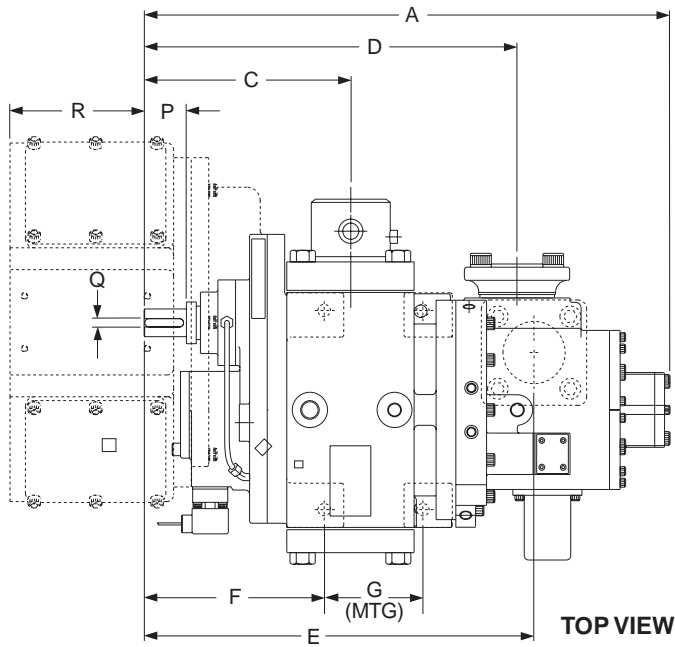
**Notes:**

1. SG=Specific Gravity, k=Ratio of Specific Heats (Cp/Cv), TR=Tons Refrigeration, KW=Kilowatts, BHP=Brake Horsepower, MMSCFD=Millions Standard Cubic Feet per Day, MSCMH=Thousands Standard Cubic Meters per Hour.
2. R-22 ratings based on 20°F (-6.7°C) suction and 105°F (41°C) condensing with 10°F(5.5°C) liquid subcooling and 10°F(5.5°C) suction superheat at 3550 RPM.
3. R-717 ratings based on 20°F (-6.7°C) suction and 95°F (35°C) condensing with 10°F(5.5°C) liquid subcooling and 10°F(5.5°C) suction superheat at 3550 RPM.
4. Natural gas ratings based on 25 PSIA (172 kPaA), 80°F (27°C) suction and 75 PSIA (517 kPaA) discharge at 1750 RPM.

**DESIGN LIMITATIONS AND MECHANICAL CHARACTERISTICS**

	COMPRESSOR MODEL									
	95S	95M	95L	120S	120M	120L	151A	151M	151L	151N
Approx Compr. Wt. lb (kg)	XJS = 460 (209) XJF = 660 (299)			XJS = 670 (305) XJF = 840 (380)			XJS = N/A XJF = 1195 (542)			
Rotor Dia. mm	95			120			151			
Gear Ratio (Drive:Pinion)	66:31	55:42	60:37	Male rotor driven by integral gear set						
	66:31	55:42	60:37	66:31	55:42	60:37	51:46	55:42	60:37	64:33
Minimum Driver Speed <sup>(1)(2)</sup> RPM	600									
Maximum Driver Speed RPM	3550	5772	4661	3550	5772	4661	6297	5332	4306	3600
Max. Input Power to Rotor Shaft BHP (KW)	100 (75)			208 (155)			400 (298)			
Min. Breakaway Torque ft-lb (Nm)	3 (4.1)			4 (5.4)			5 (6.8)			
Mass Moment of Inertia <sup>(3)</sup> ft <sup>2</sup> -lb <sub>m</sub> (m <sup>2</sup> -kg)	.9 (.038)	.38 (.016)	.55 (.023)	2.2 (.093)	.88 (.037)	1.3 (.055)	2.7 (.114)	3.6 (.154)	5.4 (.228)	7.6 (.319)
Suction Flange in. (mm)	2-1/2 (64)		3 (96)	4 <sup>(4)</sup> (102)			5 (127)			
Discharge Flange <sup>(5)</sup> in. (mm)	XJS = Side XJF = Bottom 2-1/2 (64)			XJS=Side XJF=Side or Bot. 3 (76)			XJS = N/A XJF = Bottom 4 (102)			
Theoretical Displacement ft <sup>3</sup> /rev. (m <sup>3</sup> /rev.)	.040864 (.001157)	.025134 (.000712)	.031125 (.000881)	.082343 (.002332)	.050648 (.001434)	.062718 (.001776)	.09623 (.002725)	.11366 (.003219)	.14075 (.003986)	.16833 (.004767)
Displ. at 3550 rpm Driver Speed ft <sup>3</sup> /min (m <sup>3</sup> /hr)	145 (247)	89 (152)	111 (188)	292 (497)	180 (306)	223 (378)	342 (580)	404 (686)	500 (849)	598 (1015)
Displ. at 2950 rpm Driver Speed ft <sup>3</sup> /min (m <sup>3</sup> /hr)	121 (205)	74 (126)	92 (156)	243 (413)	149 (234)	185 (314)	284 (482)	335 (570)	415 (706)	497 (844)
Displ. at 1750 rpm Driver Speed ft <sup>3</sup> /min (m <sup>3</sup> /hr)	72 (122)	44 (75)	54 (93)	144 (245)	89 (151)	110 (187)	168 (286)	199 (338)	246 (419)	295 (501)
Displ. at 1450 rpm Driver Speed ft <sup>3</sup> /min (m <sup>3</sup> /hr)	59 (101)	36 (62)	45 (77)	119 (203)	73 (125)	91 (155)	140 (237)	165 (280)	204 (347)	244 (415)
Capacity Control	Infinitely adjustable from 100% to 25% by piston- or handwheel- (except 95) actuated slide valve									
Volume Ratio	Variable in 3 steps: 2.2, 3.5, 5.0									
Max. Inlet Press. psia (bara)	100 (6.9)						150 (10.3)			
Max. Outlet Press. psia (bara)	375 (25.8)									
Minimum Inlet Temp. <sup>(6)</sup> °F (°C)	-76 (-60)									
Maximum Inlet Temp. <sup>(6)</sup> °F (°C)	200 (93.3)									
Maximum Outlet Temp. <sup>(6)</sup> °F (°C)	250 (121)									
Maximum Temp. Dif. (Suct. to Disch.) °F (°C)	250 (139)									
Max. Bearing Oil Supply Temp. °F (°C)	230 (110)									

1. Contingent upon compression ratio, bearing L10 limitations, oil viscosity, and other operating conditions.
2. Compressor suction flow may be zero at full unload slide valve position below 1800 RPM.
3. Does not include coupling. Resolved to drive shaft.
4. A 3 in. suction flange is installed on 120S compressors if operating at 1750 or 1450 rpm.
5. XJS and XJF discharge casings are interchangeable within a model size to allow selection of discharge flange orientation.
6. At compressor suction flange. Minimum evaporator temperature can be lower.



**NOTES:**

1. An XJS120 is shown for illustrative purposes only. Configurations of other compressor sizes vary slightly.
2. The suction connection may be moved to the other side.
3. The XJF151 has 3 pads instead of 4 feet for mounting.

**DIMENSIONAL OUTLINE**

DIM	DESCRIPTION	95mm		120mm		151mm	
		in	mm	in	mm	in	mm
A	Compr length (shaft end to bolt)	25.63	651	30.02	763	43.63	1108
B	Compr width (stubout to bolt w/o sealing disk)	22.94	583	23.37	594	29.23	743
C	Suction CL to shaft end	10.87	276	11.77	299	19.56	497
D	Discharge CL (side) to shaft end	18.57	472	21.27	540	N/A	N/A
E	Discharge CL (bottom) to shaft end	18.44	468	21.90	556	31.10	790
F	Shaft end to rear mounting holes	9.31	237	10.15	258	13.19	335
G	Mounting holes length between centers	4.06	103	5.62	143	12.56	319
H	Mounting holes width between centers, drive end	10.62	270	11.24	286	7.50	190
H	Mounting holes width between centers, nondrive end	10.62	270	11.24	286	2.25	57
I	Suction CL to shaft CL	6.93	176	8.47	215	10.70	272
J	Discharge CL (side) to shaft CL	1.38	35	0.97	25	N/A	N/A
K	Discharge CL (bottom) to shaft CL	4.34	110	1.83	47	6.09	155
L	Suction diameter, S	2.50	64	3.00	76	5.00	127
L	Suction diameter, M	2.50	64	4.00	102	5.00	127
L	Suction diameter, L	3.00	76	4.00	102	5.00	127
M	Discharge diameter	2.50	64	3.00	76	4.00	102
N	Shaft CL to base	4.72	120	5.34	136	5.80	147
O	Shaft diameter	1.38	35	1.58	40	2.00	51
P	Shaft length available for coupling, XJS	2.02	51	2.42	62	N/A	N/A
P	Shaft length available for coupling, XJF	2.02	51	2.24	57	3.86	98
Q	Keyway width	0.39	10	0.47	12	0.50	13
R	Motor adapter length from shaft end	6.87	175	7.48	190	8.13	207