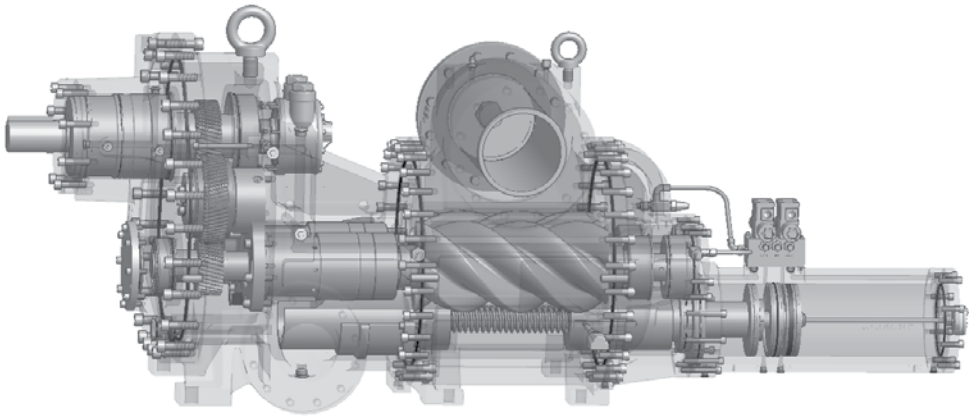
070.550-SPC (OCT 2012)
SPECIFICATIONS

File: EQUIPMENT MANUAL - Section 70
Replaces: 070.550-SPC (JAN 2011)
Dist: 10

ROTARY SCREW COMPRESSORS
Models NGC 100, 150, 200, 250, 300, 400, 450



FEATURES AND BENEFITS

The Frick NGC screw compressors are designed for natural gas compression in many different applications including wellhead compression, gas gathering, and vapor recovery. The compressors are capable of operating with a wide variety of gas compositions, and are able to operate successfully in sour and acid gas applications.

Internal Gears – All models have an assortment of internal gear combinations to allow better match-up with hp and capacity requirements. Compressors are designed to allow gearsets to be changed in the field, without requiring the compressor to be removed from the unit.

Stepless Capacity Control - A hydraulically actuated slide valve moves axially along the rotor mesh line to provide infinite unloading down to approximately 10% of full load capacity for most models. Unloaded gas is bypassed back to suction before compression has begun, allowing the compressor to efficiently accommodate system requirements. External piping is dramatically reduced by cylinder mounted solenoid control valves.

Variable Volume Ratio - A hydraulically actuated slide stop adjusts slide valve position to optimize internal discharge pressure. This matches compressor volume ratio to system pressure ratio and eliminates the power penalties associated with under or overcompression.

Linear Transmitters - Hermetically sealed Linear Transmitters eliminate direct contact with the compressed gases, and provide more accurate and reliable feedback of slide valve and slide stop position.

Antifriction Bearings - Cylindrical roller bearings handle radial loads, and four-point angular contact ball bearings, aided by balance pistons, absorb thrust loads. No preloading is required. L10 life is in excess of 100,000 hours, at most design conditions,. Roller bearings also maintain superior rotor positioning to minimize internal leakage and provide excellent performance. Antifriction bearings have lower frictional horsepower requirements that results in lower power consumption. Compressor housings are machined to provide static oil reservoirs for the bearings.

Dynamically Balanced - Rotors and rotating parts are dynamically balanced to demanding requirements providing low vibration from high speed rotation.

Built-In Suction Strainer - Models 100 through 300 have an integrated suction strainer with horizontal inlet on left or right. Models 400 and 450 do not have an integrated strainer, and are arranged for vertical inlet,

Drive and Motor Arrangement - The Frick NGC compressors were designed to be foot-mounted and direct coupled to either a natural gas engine, diesel engine. or an electric motor.

Oil Pump – All models include an integral oil pump as a standard. Pump provides full-flow lubrication to the bearings and gears for all NGC compressor models. The oil pump may be eliminated when operating conditions and package design provide sufficient pressure differential to feed system oil to the compressor.

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. It keeps the compressor cool to prevent overheating by absorbing much of the heat from compression.

Oil Passages - Internally machined oil passages reduce the risk of leaks inherent in external piping.

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

MATERIALS OF CONSTRUCTION

Castings - ASTM A48 class 40 gray cast iron or equivalent is standard for pressure-retaining parts. Suction and discharge flanges comply with ANSI B16.1. A 300 class suction and discharge flange is standard for all models.

Alternate Casing Material - ductile iron grade 60-40-18 per ASTM A395 and ASME SA 395 including a Charpy V-notch test at room temperature and a material certificate type 3.1 per EN 10204. Material is similar to European standard EN 1563, material designation EN-GJS-400-18.

Rotors - AISI 1141 low carbon steel. Rotors are dynamically balanced to class G2.5 (ISO 1940).

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.

Jackshaft - AISI 1141 low carbon steel, balanced to class Q2.5 (ISO 1940)

Gears - Helical Gears made of 04 AISI 8620 H Steel (ASTM A534) balanced to Class 2.5 (ISO 1940)

Slide Valve Spindle - AISI 1141 low carbon steel

Slide Valve Linear Transmitter Rod – Stainless Steel

Slide Stop Linear Transmitter Rod – Aluminum w/steel tip

Slide Stop Linear Transmitter Well - Stainless Steel

Pistons, Spacers, Etc. - Gray cast iron, A516 steel plate, regular carbon steel plate, or various types of hot rolled, cold rolled or cold drawn steel bar

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 rides in a stainless steel carrier against a rotating nonmagnetic cast iron alloy floating seat. The assembly is fully balanced and capable of sealing high pressure, but is vented to low pressure to extend seal life. Secondary seals are HNBR or Viton® O-rings.

TYPICAL PERFORMANCE

MODEL	NATURAL GAS (SG = .65, k = 1.26) (1,2)			
	CAPACITY (3)		POWER	
	MMSCFD (1)	MSCMH (1)	BHP (1)	kW (1)
100	.702 - 1.465	.829 - 1.729	52 - 117	39 - 87
150	.936 - 1.954	1.105 - 2.305	70 - 156	52 - 117
200	1.436 - 2.711	1.694 - 3.199	103 - 192	77 - 143
250	2.234 - 4.218	2.635 - 4.976	160 - 299	120 - 223
300	4.277 - 8.146	5.046 - 9.611	310 - 621	231 - 463
400	4.262 - 7.517	5.029 - 8.948	298 - 459	222 - 402
450	9.345 - 16.627	11.026 - 19.618	654 - 1182	488 - 882

Notes:

1. SG=Specific Gravity, k=Ratio of Specific Heats (Cp/Cv), MMSCFD=Million Standard Cubic Feet per Day, MSCMH=Thousand Standard Cubic Meters per Hour, BHP = Brake Horsepower, kW = Kilowatts.

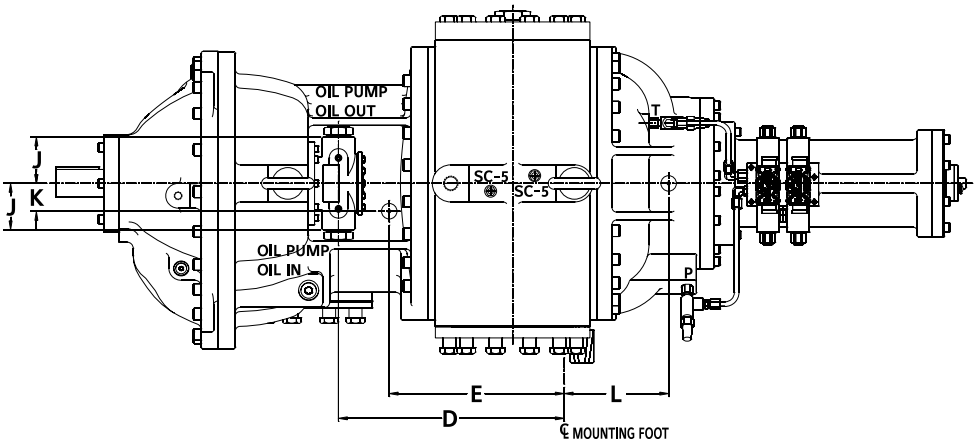
2. Natural Gas Ratings are flange-to-flange and are based on 80°F gas from 25 PSIA (172 kPaA) Suction to 75 PSIA (517 kPaA) Discharge at 1800 rpm.

3. Capacity will vary greatly depending on suction and discharge pressures.

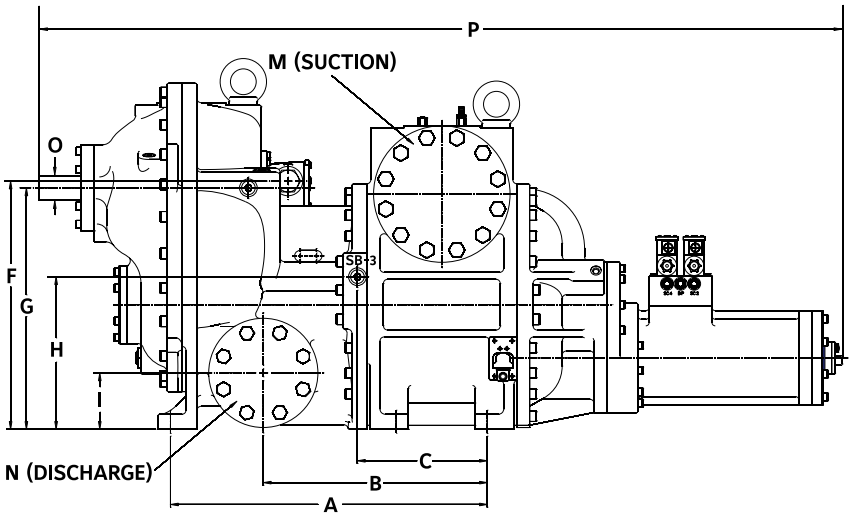
DESIGN LIMITATIONS AND MECHANICAL CHARACTERISTICS

NGC Model	100	150	200	250	300	400	450
Approx. Compressor Wt. Lb. (kg)	2,900 (1315)	3,150 (1429)	4,410 (2000)	4,815 (2184)	6,660 (3020)	9,980 (4526)	13,200 (5986)
Rotor Dia. mm	193	193	233	233	283	355	355
Drive Arrangement	All jackshafts rotate clockwise facing the compressor						
Idler gear Standard rotor helix Reverse rotor helix	Yes Yes No	Yes Yes No	Yes Yes No	Yes Yes No	Yes Yes No	No No Yes	No No Yes
Minimum Driver Speed RPM (1,2)	600	600	600	600	600	600	600
Maximum Driver Speed RPM	A-C: 2400 D: 2000	A-C: 2400 D: 2000	1800	1800	1800	A-D:1800 E: 1500 F:1400	A-D:1800 E: 1500 F:1400
Max. Input Power @ 1800 rpm to Jackshaft BHP (kW)	A: 210 (157) B-D: 254 (189)	A: 210 (157) B-D: 254 (189)	A: 550 (410) B: 700 (522) C-D: 800 (597)	A: 550 (410) B: 700 (522) C-D: 800 (597)	A: 600 (447) B-D: 800 (597)	Low Pressure Bearings A-D: 2550 (1902)(7) High Pressure Bearings A-D: 3190 (2379)(7)	
Max. Breakaway Torque Ft-lb. (Nm)	A: 11 (14.9) B: 15 (20.3) C: 19 (25.7) D: 24 (32.5)	A: 11 (14.9) B: 15 (20.3) C: 19 (25.7) D: 24 (32.5)	A: 18 (24.4) B: 22 (29.8) C: 28 (38.0) D: 32 (43.4)	A: 18 (24.4) B: 22 (29.8) C: 28 (38.0) D: 32 (43.4)	A: 25 (33.9) B: 32 (43.4) C: 40 (54.2) D: 46 (62.3)	A: 33 (44.6) B: 39 (53.3) C: 49 (66.6) D: 58 (78.0) E: 65 (88.5) F: 73 (99.4)	A: 33 (44.6) B: 39 (53.3) C: 49 (66.6) D: 58 (78.0) E: 65 (88.5) F: 73 (99.4)
Mass Moment of Inertia (3) ft2-lbm (m2-kg)	A: 6.5 (0.27) B: 11.0 (0.46) C: 19.0 (0.80) D: 34.9 (1.47)	A: 8.6 (0.36) B:14.5 (0.61) C: 24.8 (1.04) D: 44.3 (1.87)	A: 22.1 (0.93) B: 35.8 (1.51) C: 58.8 (2.48) D: 78.4 (3.30)	A: 32.0 (1.32) B: 51.7 (2.18) C: 83.9 (3.54) D: 111.9 (4.71)	A: 86.9 (3.66) B: 139.5 (5.88) C: 222.9 (9.39) D: 297.0 (12.51)	A: 280.0 (11.80) B: 367.1 (15.47) C: 520.0 (21.91) D: 669.6 (28.21) E: 822.9 (34.67) F: 996.6 (41.99)	A: 434.8 (18.32) B: 588.4 (24.79) C: 887.9 (37.41) D: 1143.3 (48.17) E: 1433.1 (60.38) F: 1765.8 (74.40)
Suction Flange in. (mm)	5 (127)	6 (152)	6 (152)	8 (203)	10 (254)	14 (356)	14 (356)
Discharge Flange in. (mm)	4 (102)	4 (102)	6 (152)	6 (152)	8 (203)	10 (254)	10 (254)
Theoretical Displacement Ft3/rev. (m3/rev.)	A: .19151 (.00542) B: .24471 (.00693) C: .31209 (.00884) D: .40075 (.01135)	A: .25521 (.00723) B: .32610 (.00923) C: .41590 (.01178) D: .53406 (.01512)	A: .36827 (.01043) B: .46597 (.01319) C: .58622 (.01660) D: .67641 (.01915)	A: .57281 (.01622) B: .72478 (.02052) C: .91182 (.02582) D: 1.05211(.02979)	A: 1.13582 (.03216) B: 1.43716 (.04070) C: 1.80804 (.05120) D: 2.08620 (.05907)	A: 1.08221 (.03064) B: 1.29419 (.03665) C: 1.61708 (.04579) D: 1.89325 (.05361) E: 2.14852 (.06084) F: 2.41260 (.06832)	A: 2.37445 (.06724) B: 2.83956 (.08041) C: 3.54799 (.10047) D: 4.15394 (.11763) E: 4.71400 (.13349) F: 5.29343 (.14989)
Capacity Control Infinite adjustment from 100% to min. listed	12	12	12(5)	12(5)	15(5)	12	26
Slide Valve Travel - in.	6.50	8.18	7.84	9.89	16.94	8.99	15.48
Volume ratio - Infinite adjustment range	2.2 - 5.0	2.2 - 5.0	2.2 - 5.0	2.2 - 5.0	2.0 - 4.1	2.2 - 5.0	2.2 - 3.9(7)
Slide Stop Travel - in.	2.53	3.19	3.06	4.75	6.95	3.69	6.40
Max. Inlet Press.(1) psig (bar)	150.0 (11.4)						
Max. Outlet Press.(1) psig (bar)	400 (27.6)(6)	400 (27.6)(6)	400 (27.6)	400 (27.6)	300 (20.7)(6)	400 (27.6)(7)	400 (27.6)(6)
Minimum Inlet Temp.(4) °F (°C)	-76.0 (-60.0)						
Maximum Inlet Temp. °F (°C)	200.0 (93.3)						
Maximum Outlet Temp. °F (°C)	250.0 (121.1)						
Maximum Temp. Diff. (Suc. To Disch.) °F (°C)	250.0 (138.9)						
Max. Bearing Oil Supply Temp. °F (°C)	230.0 (110.0)						

1. Contingent upon compression ratio, bearing L10 limitations, oil viscosity, and other operating conditions. Refer to CoolWare™ for acceptable operating limits.
2. Compressor suction flow may be zero at full unload slide valve position and reduced speed. Consult Johnson Controls - Frick® Engineering for additional information.
3. Does not include coupling. Resolved to drive shaft.
4. At compressor suction flange.
5. Revised 12/4/08.
6. Revised 9/22/09.
7. Revised 5/11/11



TOP VIEW

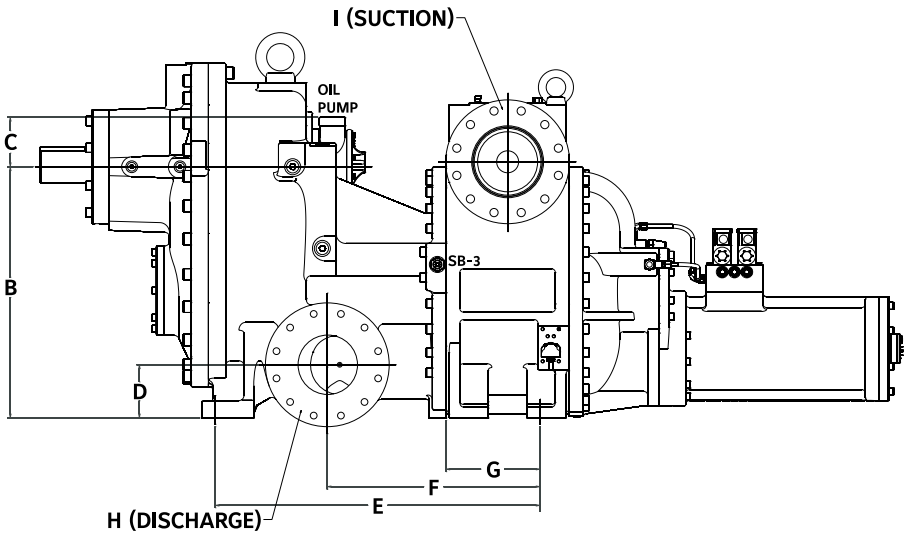


SIDE VIEW

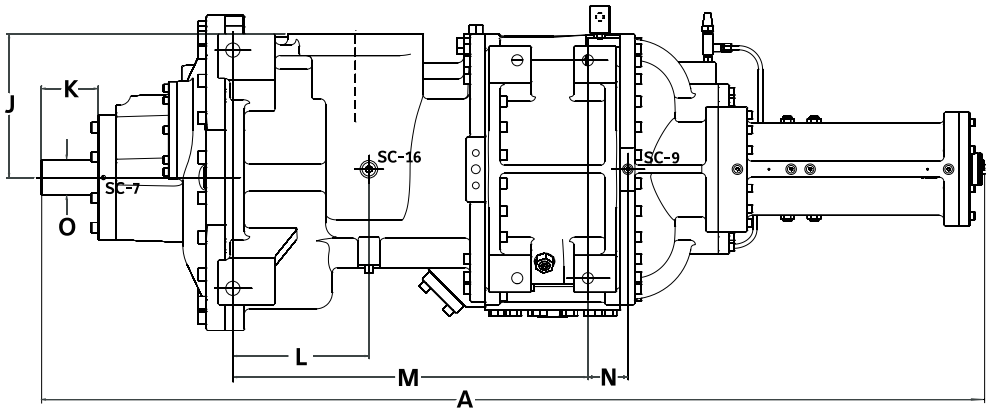
NGC 100-150 DIMENSIONAL OUTLINE

APPROXIMATE DIMENSIONS		MODEL	
		100	150
A	in. (mm)	25 5/8 (650.9)	29 (736.6)
B	in. (mm)	17 1/8 (435.0)	20 1/2 (520.7)
C	in. (mm)	8 1/2 (215.9)	11 7/8 (301.6)
D	in. (mm)	14 7/8 (377.8)	18 1/4 (463.6)
E	in. (mm)	10 3/4 (273.0)	14 1/8 (358.8)
F	in. (mm)	22 3/4 (577.9)	
G	in. (mm)	22 1/8 (562.0)	
H	in. (mm)	14 (355.6)	

APPROXIMATE DIMENSIONS		MODEL	
		100	150
I	in. (mm)	5 3/16 (131.8)	
J	in. (mm)	3 3/4 (95.3)	
K	in. (mm)	2 1/4 (57.2)	
L	in. (mm)	8 7/16 (214.3)	
M	in. (mm)	5 (127.0)	6 (152.4)
N	in. (mm)	4 (101.6	
O	in. (mm)	2 1/4 (57.2)	
P	in. (mm)	70 3/16 (1782.8)	73 5/8 (1870.1)



SIDE VIEW



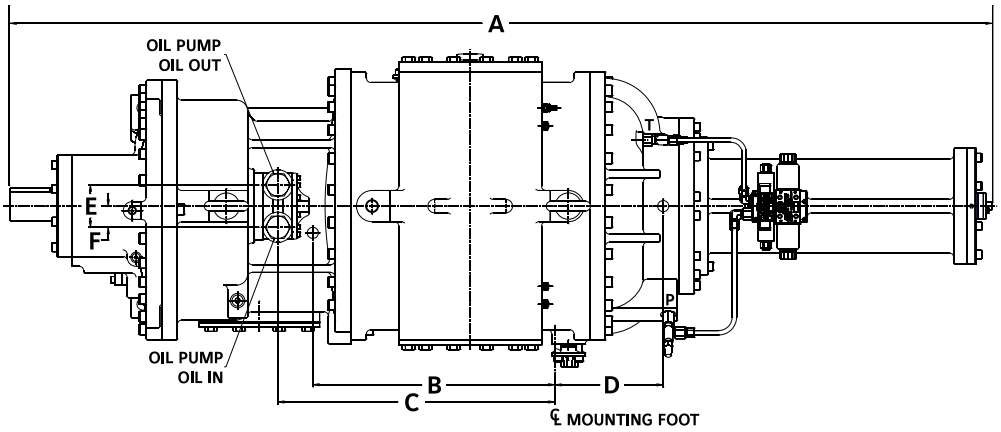
BOTTOM VIEW

NGC 200-250 DIMENSIONAL OUTLINE

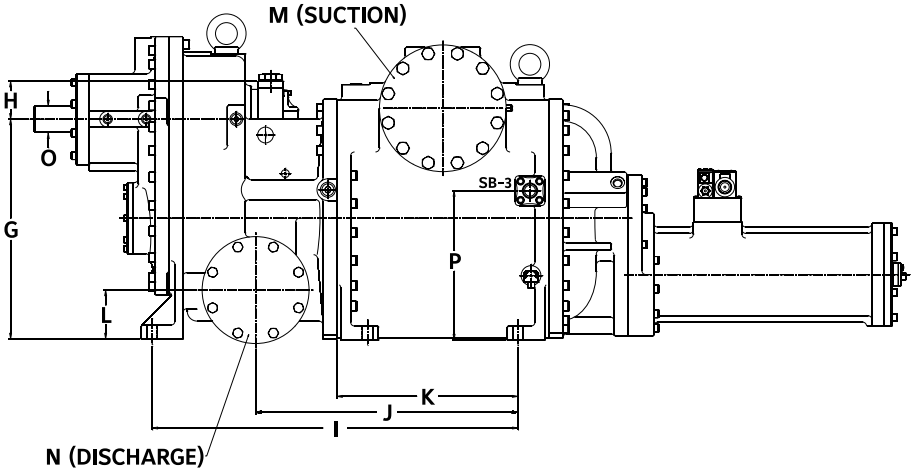
APPROXIMATE DIMENSIONS		MODEL	
		200	250
A	in. (mm)	87 1/8 (2213.0)	97 11/16 (2481.3)
B	in. (mm)	25 3/8 (644.5)	
C	in. (mm)	5 (127.0)	
D	in. (mm)	5 3/8 (136.5)	
E	in. (mm)	32 3/4 (831.9)	39 11/16 (1008.1)
F	in. (mm)	21 1/2 (546.1)	28 3/8 (720.7)
G	in. (mm)	9 1/2 (241.3)	16 3/8 (415.9)
H	in. (mm)	6 (152.4)	

APPROXIMATE DIMENSIONS		MODEL	
		200	250
I	in. (mm)	6 (152.4)	8 (203.2)
J	in. (mm)	13 1/4 (336.5)	
K	in. (mm)	5 1/4 (133.4)	
L	in. (mm)	12 9/16 (319.1)	
M	in. (mm)	32 3/4 (831.9)	39 11/16 (1008.1)
N	in. (mm)	3 11/16 (93.7)	
O	in. (mm)	3 1/4 (82.6)	

Notes:
1. Model 200 is shown for illustrative purposes only. Configurations of other compressors will vary.



TOP VIEW

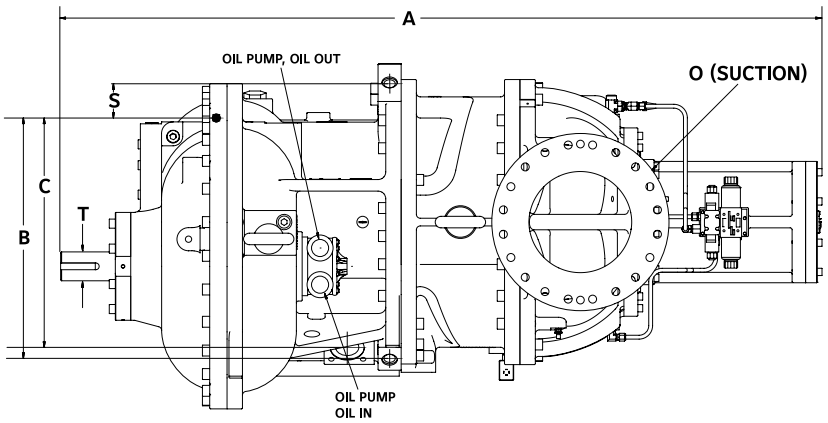


SIDE VIEW

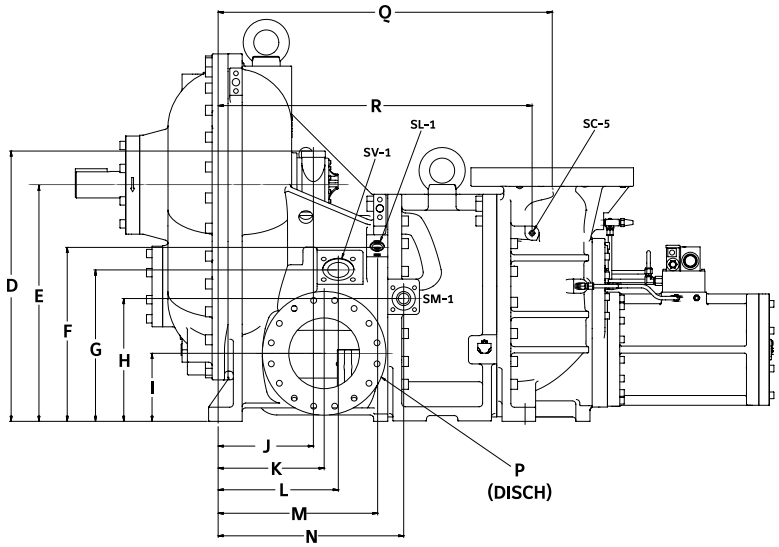
NGC 300 DIMENSIONAL OUTLINE

APPROXIMATE DIMENSIONS		MODEL 300
A	in. (mm)	110 1/16 (2795.6)
B	in. (mm)	27 1/8 (689.0)
C	in. (mm)	31 1/16 (789.0)
D	in. (mm)	12 1/8 (308.0)
E	in. (mm)	4 3/4 120.7
F	in. (mm)	2 3/8 60.3
G	in. (mm)	27 3/4 705.0
H	in. (mm)	4 13/16 122.2
I	in. (mm)	46 3/16 1173.2

APPROXIMATE DIMENSIONS		MODEL 300
J	in. (mm)	33 1/8 841.4
K	in. (mm)	22 7/8 581.0
L	in. (mm)	6 3/16 157.2
M	in. (mm)	10 254.0
N	in. (mm)	8 203.2
O	in. (mm)	3 1/4 82.6
P	in. (mm)	18 13/16 477.8



TOP VIEW



SIDE VIEW

NGC 400-450 DIMENSIONAL OUTLINE

APPROXIMATE DIMENSIONS		MODEL	
		400	450
A	in. (mm)	98 13/16 (2509.8)	117 (2971.8)
B	in. (mm)	31 3/16 (792.2)	
C	in. (mm)	29 3/4 (755.7)	
D	in. (mm)	38 1/4 (971.6)	38 1/2 (977.9)
E	in. (mm)	33 1/2 (850.9)	
F	in. (mm)	24 5/8 (625.5)	
G	in. (mm)	21 7/16 (544.5)	
H	in. (mm)	17 3/8 (441.3)	
I	in. (mm)	9 5/8 (244.5)	
J	in. (mm)	13 1/2 (342.9)	13 3/16 (335.0)

APPROXIMATE DIMENSIONS		MODEL	
		400	450
K	in. (mm)	15 (381.0)	
L	in. (mm)	17 (431.8)	
M	in. (mm)	22 9/16 (573.1)	22 1/2 (571.5)
N	in. (mm)	26 1/4 (666.8)	29 11/16 (754.1)
O	in. (mm)	14 (355.6)	
P	in. (mm)	10 (254.0)	
Q	in. (mm)	47 1/4 (1200.2)	65 7/16 (1662.1)
R	in. (mm)	44 7/16 (1128.7)	62 5/8 (1690.7)
S	in. (mm)	4 7/16 (112.7)	
T	in. (mm)	3 3/4 (95.3)	

Notes:
1. Model 400 is shown for illustrative purposes only. Configurations of other compressors will vary.

NOTES

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