

## FS SERIES COMPRESSORS

Legacy Gemini

### High-Speed Reciprocating Compressors for Natural Gas Applications

Cooper's FS Series compressors are available in three-stroke and three-throw configurations, and a range of power ratings for 2,400 - 7,200 HP. They have a long, successful history in natural gas applications and are readily resized and reapplied in the field.

Performance features include:

- > Horizontal balanced opposed, two, four, or six throws, with a wide range of arrangements to meet your performance needs.
- > The frame is made from smoothly contoured iron casting with doweled, separable crosshead guides. Sides of the frame are bolted together with full depth main bearing caps that extend from the bearing to the top of the frame, adding strength and stiffness.
- > The one-piece forged steel crankshaft design offers maximum stiffness and torque transmission. The integral counterweights are balanced for smooth operation. Main and crankpin journals are precision ground and polished to close tolerances with same diameters for ease of maintenance.
- > A wide range of cylinder options are available. All 89, 95, 06, and 07 Series cylinders for the 5", 6", and 7" stroke frames are water cooled and feature field replaceable liners. Liners feature ion nitride bores.
- > Steel compressor valve seats and guards. Valve springs and plates are easily tailored to meet your operating conditions. Valves are arranged so that the suction valve cannot fit into the discharge valve ports.
- > 07 Series pistons are made of aluminum bar stock and hard anodized. 06 Series pistons have aluminum bar stock ends and steel ring carriers. 89 Series pistons are made of cast iron. Piston rods are 4140 steel with rolled threads and flame hardened in the packing area with full-floating vented rod and wiper rings.
- > Connecting rods are made from carbon steel I-section drop forgings. The crosshead end is fitted with a solid precision type bushing. The crank end uses split precision type tri-metal bearings.

- > Single-piece ductile iron crossheads are full-floating design with integral babbitt coated crosshead shoes. Crosshead pins are hardened and ground alloy steel.
- > Compressor lubrication oil pump is driven directly by the compressor crankshaft. There are no chains to wear or go out of adjustment. The system features an oil cooler, full-flow, non-bypassing lube synthetic media oil filter, and oil pressure regulating valve.
- > The standard lubrication system consists of a shaft driven force-feed lubricator pump, hand priming device, overpressure indicating DNFT no-flow shutdown switch, and block distribution system with cycle indicator.
- > Drive-through arrangement, material suitable for sour gas service, CSA or XP no-flow switches, immersion oil heaters, flywheels, and drive coupling and adapters. Also available are the 618 Type II and III distance pieces, Finger-type valve unloaders, and automatic VVCP.

#### Throw Configuration

Property	Specification		
Compressor throws	2	4	6
Max BHP/kW	2400/1790	4800/3580	7200/5370
Frame weight (lbs/kg) (dry)*	5000/1790	10,350/4700	15,700/7130
Frame length(in/cm)	53/135	100/254	147/373
Frame width (in/cm)	70/178	70/178	70/178
Frame height (in/cm)	36/914	36/914	36/914

#### Stroke Configuration

Property	Specification		
Stroke (in/mm)	5/127	6/152	7/178
Rated speed-max (rpm)	1,500	1,200	1000

#### Heavy Duty Running Gear

Property	Specification	
Rod load - tension	57,000 lbs-f	25,874 kg-f
Rod load - compression	60,000 lbs-f	27,236 kg-f
Combined rod load	117,000 lbs-f	53,110 kg-f
Piston rod diameter	2.50 inches	63.5 mm
Crankshaft material	4140 F.S.	
Connecting rod material	F.S.	
Crankpin & main bearing dia	6.5 inches	165 mm
Crankpin & main bearing width	3.25 inches	83 mm
Connecting rod pin bushing dia	5.25 inches	133 mm
Connecting rod pin bushing length	4 inches	102 mm

\*without cylinders

F.S. = Forged Steel

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Cylinders for the FS Frames										MAWP PSIG	Cylinder Cooling	Material	Flange dia inch	Flange rating PSIG	
Series	Cylinder bore - inches														
09	3	3.125	3.25	3.375	3.50	3.625	3.75			6,500	Gas	F.S.	1.5	Toper Lok	
89	2.75	2.875	3	3.125	3.25	3.375	3.50	3.625	3.725	5,000	Gas	F.S.	2.5	2,500 <b>a</b>	
89	2.75	2.875	3	3.125	3.25	3.375	3.50	3.625	3.725	4,700	Gas	F.S.	2.5	2,500 <b>a</b>	
89	3.50	3.75	4	4.25						3,600	Gas	F.S.	2.5	1,500	
89	4.25	4.50	4.75	5	5.25	<b>6</b>				2,500	Water	D.I.	3	1,500 <b>b</b>	
89	5.50	5.75	6	6.25	<b>6.50</b>	<b>7</b>				2,200	Water	D.I.	4	1,500 <b>b</b>	
95	5.50	5.75	6	6.25						3,600	Gas	F.S.	4	2,500	
95	6.75	7	7.25	7.50	<b>7.75</b>	<b>8.25</b>				1,800	Water	D.I.	4	900	
06	8	8.50	8.75	9	9.25	9.50	<b>9.75</b>	<b>10.25</b>		1,800	Water	D.I.	6	900	
06	8.50	9	9.50	10	10.25	10.50	10.75	11	<b>11.25</b>	<b>11.75</b>	1,250	Water	D.I.	6	600 <b>c</b>
95	11.50	11.75	12	12.50	12.75	13	13.50	<b>13.75</b>	<b>14.25</b>	800	Water	D.I.	8	400	
06	14	14.50	15							635	Water	D.I.	8	300 <b>d</b>	
06	<b>15</b>	15.50	16	16.50						635	Water	D.I.	8	300 <b>d</b>	
07	16.50	17	17.50	18	18.50					250	Water	C.I.	14	300 <b>e</b>	
07	19	19.50	20	20.50	21					250	Water	C.I.	14	300 <b>e</b>	
07	21.50	22	22.50							250	Water	C.I.	14	300 <b>e</b>	
07	<b>23.50</b>									250	Water	C.I.	14	300 <b>e</b>	
Pipeline	95P	9.75	10	10.25	10.50	10.75	11			1,250	Water	D.I.	6	600	

Double acting

L = Nitrided Liner - Field Replaceable  
 TL = Thin Liner  
 NL = No Liner  
 TH = Thick Liner

D.I. = Ductile Iron  
 F.S. = Forged Steel  
 C.I. = Cast Iron

a, b, c = Designates cylinders having identical XYZ flange dimensions to assist interchangeability and package piping standardization

## Designed for Flexibility

- > The FS Series is backed by 100+ years of Cooper compressor design experience.
- > The FS Series is part of a complete line of reciprocating compressors that feature advanced technology and work-proven designs.
- > The compressor stroke can be changed by replacing the crankshaft and piston assembly.
- > The cylinders can be relined to a variety of bore dimensions in the field to always match your operating conditions.
- > Many cylinders have identical X, Y, Z flange locations, allowing packages to be reconfigured without any changes to the piping and bottles.

- > Over 18,000 Cooper high-speed reciprocating compressors have been built to date.

All high-speed reciprocating compressors are packaged, serviced, and maintained by a worldwide network of authorized packagers and distributors.

## Operating Benefits

- > Compressor is easily reconfigured to meet your changing requirements
- > Reduces life cycle cost and increases production
- > High fleet utilization rates
- > Reduced inventory of machinery and parts
- > Higher efficiency, lower fuel or electricity consumption
- > Lower cost of reconfiguration
- > Greater use of driver power over wide range of conditions

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