

FRICK INDIA

HIGH SPEED RECIPROCATING COMPRESSORS

www.filcompressors.com



Frick India 450 XL Series High Speed Reciprocating Compressors

DESCRIPTIONS

Frick India offers five models of high-speed reciprocating compressors, ranging from a nominal 2-cylinder machine all the way to the high end of the scale nominal 12-cylinder model. In between, there are 4, 6, and 8-cylinder midsize units. All high-speed reciprocating compressors run at a maximum of 1200 RPM, and all are provided with built-in capacity reduction steps for economical operation at reduced loads. V-belt and direct connected motor operation are also available throughout the entire range of high-speed reciprocating models.

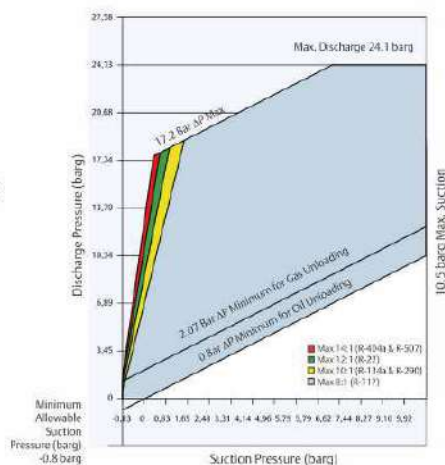
The 450XL can operate with ammonia, halocarbon, and hydrocarbon refrigerants. It works in extreme applications ranging from 2.07 bar to 17.2 bar pressure differential. It can run at high compression ratios, and these compressors are extremely cost-efficient. Frick India High Speed Compressors have a whopping cylinder displacement of 84.5 m³/h while running at 1200 RPM. COP is as high as compared to other compressions available in a market.

The 450XL can be installed almost anywhere, even on the upper floor if necessary, since vibration is kept to a minimum. The noise level is too low due to the use of quick-acting, precise ring plates in suction and discharge valves.

FEATURES

- High COP
- Energy Efficiency Performance
- Superior Part Load Performance
- Double Bellow Shaft Seal
- Inherent Variable Volume Ratio
- Liquid resistant Safety Head Protection
- Double Tapered Roller Bearing
- Tri Micro Oil Filtration
- Smooth 100 % Unloading system
- Low Vibration & Noise
- Low Power Consumption
- Less Maintenance
- Environment Friendly
- User Friendly

OPERATIONAL LIMITS



452 XL



454 XL



456 XL



458 XL

SPECIFICATIONS

DESCRIPTION / MODELS		452XL	454XL	456XL	458XL	4512XL
Number of Cylinders		2	4	6	8	12
Maximum RPM		1440	1440	1440	1440	1440
Bore and Stroke	Inch	4 1/2 x 4 1/2	4 1/2 x 4 1/2	4 1/2 x 4 1/2	4 1/2 x 4 1/2	4 1/2 x 4 1/2
	mm	114x114	114 x 114	114 x 114	114 x 114	114 x 114
Swept Volume@ 1440 RPM	CFM (CMH)	119.28 (202.79)	238.79 (405.59)	357.59 (608.4)	477.59 (811.19)	715.19 (1215.59)
Swept Volume@ 1200 RPM	CFM (CMH)	99.4 (169)	199 (338)	298 (507)	398 (676)	596 (1013)
Suction Connection	in. (mm)	2 1/2 (65)	3 (80)	4(100)	4(100)	6(150)
Discharge Connection	in. (mm)	2 (50)	2 1/2 (65)	3(80)	3(80)	3(80x2)
Unit weight Less Motor	Lbs. (kg)	1900 (862)	2700 (1225)	3100(1406)	3400(1542)	5580 (2565)
Oil Charge	Ga(Lts)	5(19)	7(27)	7(27)	7(27)	15(54)
Standard Steps of Unloading	(%)	0	50/100	33/66/100	25/50/75/100	33/66/100

Frick India Genuine Spare Parts



Frick India 450 XL Series High Speed Reciprocating Compressors

Spring Loaded Safety Heads

Spring-loaded safety heads are provided on all 450XL models for protection against liquid slugs. In the case of slugging, the springs can compress, and the safety heads rise to provide additional volume, thereby avoiding the transmission of a heavy shock load and subsequent damage to compressor parts. The extra space provided by this arrangement allows liquid to be forced out of the cylinder more easily. The 450 XL suction and discharge valve porting was designed to improve the compressor's efficiency and capacity.



Capacity Control System

A piston-operated unloading mechanism that is actuated by suction pressure raises the suction valve to unload individual cylinders and/or pairs of cylinders for easy starting and capacity control. High-pressure oil is metered into the operating chamber of the unloader piston through a small port, thereby depressing the piston to lower the suction valve plate and thus loading the compressor. This system's unique design allows for the removal of the unloader piston and seal assembly for servicing without dismantling the entire compressor.



Ductile Iron Crankshaft

The 450 XL crankpin diameter was designed for greater shaft strength and to provide a greater projected bearing area. Bearing surfaces are carefully ground and polished to close tolerance. Shafts are balanced both statically and dynamically to minimise vibration and are specially drilled to ensure hydrodynamic lubrication of the bearings throughout the compression cycle. For the 6- and 8-cylinder models, the shafts are shot-peened for even greater strength.



Tri-Micro Oil Filter

Removes 95% of contaminants as small as 3 microns in size. Allow full flow of oil at all times, resulting in reduced wear on compressor components. Combines extreme filtering capacity with the convenience of a throw-away recharge element. The filter is enclosed in a seamless drawn carbon steel shell with a cast iron cover and is equipped with a means for determining pressure drop across the filter.



Piston, Ring & Ring Assembly

A new, unique shrink-fit wrist pin is used on the 450 XL to increase the piston's load-carrying capabilities. Piston pins are made of case-hardened steel, ground and polished to size. Piston rings are made of special, close-grained, heat-treated cast iron. The ring set includes three compression rings and one oil ring. The entire aluminium piston is tin-plated to prevent scuffing during the break-in period.



Taper Roller Ball Bearing

Taper roller ball bearings are specially designed to manage heavy radial loads. Bearings are fitted at both ends of the crankshaft for better efficiency of crankshaft rotation. Less power losses, higher speed, lower maintenance, and being better equipped to deal with liquid slugs are the main advantages of taper roller bearings over welded bush-type bearings.



Fully Automatic

Easy to Install and Operate Frick India PLC Control Panel have manual as well as automatic function for Compressor Loading & Unloading. Energy saving through auto operation. USB port to connect USB drive for data logging.

Double Bellow Shaft Seal

The 450 XL shaft seal is manufactured from materials strictly used for industrial refrigeration applications. The seal unit assembly consists of two opposed seals, one sealing from the atmosphere and the other from the crankcase. Mating seal surfaces are lubricated and cooled by circulated oil.

Oil Separator

A cyclone-type oil separator has an auto-oil draining system without any controls.

Cast Iron Body

Suitable for refrigeration applications, being thermally insensitive to expansion or contraction during operations. Better thermal insulation, leading to low noise.

Two stage compressor with gauge panel



Compressor block with drive set



Two stage compressor with PLC



Direct coupled with PLC



Technical Specifications

Refrigerant		R22									R134a						R-290						NH3				
Model	RPM	Temp. (°C)	Condensing Temperature						Condensing Temperature						Condensing Temperature						Condensing Temperature						
			35°C			40°C			35°C			40°C			35°C			40°C			35°C		40°C				
			Qo (kW)	TR	Pe kW	Qo (kW)	TR	Pe kW	Qo (kW)	TR	Pe kW	Qo (kW)	TR	Pe kW	Qo (kW)	TR	Pe kW	Qo (kW)	TR	Pe kW	Qo (kW)	TR	Pe kW	Qo (kW)	TR		
452 XL	1200	5	165.61	47.18	32.26	153.95	43.86	34.94	100.6	28.66	21.2	93.6	26.67	23	--	--	--	--	--	--	192.56	54.86	29.89	184.41	52.54		
		0	136.56	38.91	31.36	127.43	36.30	33.59	79.5	22.65	20.2	74.6	21.25	21.7	115.4	32.88	29.5	106.6	30.37	31.6	156.7	44.64	28.78	151.16	43.07		
		-5	113.52	32.34	29.86	104.25	29.70	31.74	61.9	17.64	19	57.7	16.44	20.1	95.7	27.26	28.3	87.6	24.96	30.1	126.06	35.91	28.87	121.17	34.52		
		-10	93.17	26.54	27.95	84.62	24.11	29.4	47.1	13.42	17.6	44	12.54	18.2	78.1	22.25	26.8	71	20.23	28.1	99.11	28.24	27.14	94.4	26.89		
		-15	74.62	21.26	25.8	67.74	19.30	26.85	35.5	10.11	15.9	32.7	9.32	16	62.6	17.83	24.9	57	16.24	26	76.43	21.77	24.98	71.83	20.46		
		-20	58.25	16.60	23.39	52.74	15.03	24.03	27.1	7.72	13.9	23.9	6.81	13.6	49.6	14.13	22.8	44.7	12.74	23.6	58.39	16.64	22.58		0.00		
454 XL	1200	5	331.66	94.49	61.67	308.26	87.82	66.77	201.2	57.32	40.5	187.1	53.30	44.1	-	-	-	-	-	-	385.64	109.87	57.06	370.49	105.55		
		0	273.85	78.02	59.94	255.38	72.76	64.23	159.3	45.38	38.7	148.8	42.39	41.5	231.1	65.84	56.4	213.1	60.71	60.5	313.99	89.46	56.91	302.9	86.30		
		-5	227.63	64.85	57.14	208.72	59.46	60.63	123.4	35.16	36.4	115.7	32.96	38.5	191	54.42	54.2	175.5	50.00	57.4	252.84	72.03	55.24	242.95	69.22		
		-10	186.33	53.09	53.41	169.6	48.32	56.21	94.3	26.87	33.6	87.9	25.04	34.8	155.8	44.39	51.2	142.4	40.57	53.8	198.8	56.64	51.9	189.01	53.85		
		-15	149.24	42.52	49.29	135.84	38.70	51.3	71	20.23	30.3	65.4	18.63	30.6	125.2	35.67	47.7	113.6	32.36	49.6	153.23	43.66	47.72	143.66	40.93		
		-20	116.86	33.29	44.67	105.48	30.05	45.88	53.8	15.33	26.6	47.8	13.62	25.9	98.8	28.15	43.6	89	25.36	45	116.86	33.29	43.12		0.00		
456 XL	1200	5	497.28	141.68	90.6	462.21	131.68	98.13	301.8	85.98	59.5	281	80.06	64.8	-	-	-	-	-	-	578.2	164.73	83.91	554	157.83		
		0	410.41	116.93	88.14	382.81	109.06	94.44	238.8	68.03	56.9	223.3	63.62	61.1	46.4	13.22	83	319.7	91.08	88.9	470.69	134.10	83.67	454.1	129.37		
		-5	341.15	97.19	84	312.97	89.17	89.14	185.3	52.79	53.5	173.4	49.40	56.5	286.6	81.65	79.6	263.1	74.96	84.4	378.9	107.95	81.24	364.14	103.74		
		-10	279.5	79.63	78.49	254.22	72.43	82.65	141.4	40.28	49.4	131.9	37.58	51.2	233.9	66.64	75.2	213.5	60.83	79	297.9	84.87	76.3	283.45	80.75		
		-15	223.86	63.78	72.48	203.58	58.00	75.39	106.6	30.37	44.7	97.8	27.86	45	187.8	53.50	70	170.6	48.60	72.9	229.66	65.43	70.17	215.49	61.39		
		-20	175.1	49.89	65.65	158.22	45.08	97.43	80.9	23.05	39.1	72.1	20.54	38	148.4	42.28	64.1	133.6	38.06	66.2	175.25	49.93	63.35		0.00		
458 XL	1200	5	661.44	188.44	120.79	614.71	175.13	130.86	402.3	114.62	79.3	374.6	106.72	86.4	-	-	-	-	-	-	769.03	219.10	111.81	736.9	209.94		
		0	546.11	155.59	117.46	507.71	144.65	125.9	318.6	90.77	75.8	297.5	84.76	81.4	461.8	131.57	110.7	426.6	121.54	118.6	626.16	178.39	111.54	604.03	172.09		
		-5	453.95	129.33	111.99	416.14	118.56	118.82	247.2	70.43	71.4	231.4	65.93	75.4	381.9	108.80	106.2	350.6	99.89	112.6	504.23	143.66	108.28	484.49	138.03		
		-10	371.58	105.86	104.67	338.18	96.35	110.2	188.2	53.62	65.9	175.9	50.11	68.2	311.6	88.77	100.3	284.5	81.05	105.4	396.5	112.96	101.73	376.98	107.40		
		-15	297.76	84.83	96.64	270.95	77.19	100.59	141.7	40.37	59.6	130.5	37.18	60	250.4	71.34	93.4	227.2	64.73	97.2	305.73	87.10	93.51	286.62	81.66		
		-20	232.99	66.38	87.53	210.24	59.90	89.93	108	30.77	52.2	96	27.35	50.8	197.7	56.32	85.5	178	50.71	88.3	232.99	66.38	84.5		0.00		
4512 XL	1200	5		0.00		866.90	246.98	176.20		0.00		581.69	165.72	141.40	-	-	-	-	-	-	1122.86	319.90	167.89	1086.78	309.62		
		0	777.22	221.43	164.90	731.15	208.31	178.50	500.45	142.58	133.60	464.93	132.46	137.90	693.17	197.48	165.40	640.42	182.46	177.30	914.17	260.45	167.45	890.12	253.60		
		-5	650.62	185.36	160.30	609.12	173.54	171.30	398.46	113.52	125.60	368.21	104.90	127.50	573.60	163.42	158.80	527.18	150.19	168.40	736.08	209.71	162.54	713.71	203.34		
		-10	534.91	152.40	152.60	497.63	141.78	161.30	312.65	89.07	114.00	286.98	81.76	114.10	468.44	133.46	150.10	428.00	121.94	157.70	578.73	164.88	152.72	557.07	158.71		
		-15	429.41	122.34	142.40	396.35	112.92	148.90	239.85	68.33	100.50	218.04	62.12	99.40	376.65	107.31	139.70	342.19	97.49	145.50	446.29	127.15	140.40	424.13	120.83		
		-20	335.16	95.49	130.30	305.61	87.07	134.80	176.19	50.20	86.60	157.91	44.99	84.90	297.53	84.77	128.10	268.34	76.45	132.30	340.36	96.97	126.83	319.47	91.02		
452 XL	1440	5	198.732	56.5085	38.712	184.74	52.53	41.928	238.48	67.81	67.81	46.45	13.21	221.69	--	--	--	--	--	--	231.001	65.7	35.3	221.227	62.92		
		0	163.872	46.5962	37.632	152.916	43.481	40.308	196.65	55.92	55.92	45.16	12.84	183.50	67.10	19.08	67.10	54.19	15.41	15.41	187.965	53.46	33.96	181.345	51.577		
		-5	136.224	38.7347	35.832	125.1	35.5716	38.088	163.47	46.48	46.48	43.00	12.23	150.12	55.78	15.86	55.78	51.60	14.67	14.67	151.188	43	34.07	145.351	41.34		
		-10	111.804	31.7909	33.54	101.544	28.8736	35.28	134.16	38.15	38.15	40.25	11.44	121.85	45.78	13.02	45.78	48.30	13.73	13.73	118.841	33.8	32.03	110.086	31.31		
		-15	89.544	25.4614	30.96	81.288	23.1139	32.22	107.45	30.55	30.55	37.15	10.56	97.55	36.66	10.43	36.66	44.58	12.68	12.68	91.416	26	29.48	86.142	24.5		
		-20	69.9	19.8757	28.068	63.288	17.9956	28.836	83.88	23.85	23.85	33.68	9.58	75.95	28.62	8.14	28.62	40.42	11.49	11.49	69.9684	19.9	26.65				
454 XL	1440	5	397.992	113.167	74.004	369.912	105.183	80.124	477.59	135.80	135.80	88.80	25.25	443.89	--	--	--	--	--	--	462.635	131.58	67.34	444.458	126.41		
		0	328.62	93.4416	71.928	306.456	87.1393	77.076	394.34	112.13	112.13	86.31	24.54	367.75	134.56	38.26	134.56	103.58	29.45	29.45	377.513	107.37	67.17	363.379	103.35		
		-5	273.156	77.6706	68.568	250.464	71.2183	72.756	327.79	93.20	93.20	82.28	23.40	300.56	111.85	31.80	111.85	98.74	28.08	28.08	303.325	86.27	65.20	291.441	82.89		
		-10	223.596	63.5785	64.092	203.52	57.87	67.452	268.32	76.29	76.29	76.91	21.87	244.22	91.55	26.03	91.55	92.29	26.24	26.24	238.49	67.83	61.25	226.747	64.49		
		-15	179.088	50.9228	59.148	163.008	46.3506	61.56	214.91	61.11	61.11	70.98	20.18	195.61	73.33	20.85	73.33	85.17	24.22	24.22	183.816	52.28	56.32	172.284	49		
		-20	140.232	39.8743	53.604	126.576	35.9913	55.056	168.28	47.85	47.85	64.32	18.29	151.89	57.42	16.33	57.42	77.19	21.95	21.95	140.183	39.87	50.89				
456 XL	1440	5	596.736	169.679	108.72	554.652	157.713	117.756	716.08	203.61	203.61	130.46	37.10	665.58	--	--	--	--	--	--	693.672	197.29	106.12	664.524	189		
		0	492.492	140.038	105.768	459.372	130.62	113.328	590.99	168.05	168.05	126.92	36.09	551.25	201.65	57.34	201.65	152.31	43.31	43.31	564.67	160.6	98.75	544.769	154.94		
		-5	409.38	116.405	100.8	375.564	106.79	106.968	491.26	139.69	139.69	120.96	34.3														