

VILTER[®]
Since 1867

Vilter 450 XL[®] Compressor
For Industrial Refrigeration




EMERSON[™]
Climate Technologies

450XL Cross Section

Spring Loaded Safety Heads

Protect against liquid slugging by relieving internal cylinder pressure if cylinders are subjected to an incompressible fluid.

Suction and Discharge Porting

Maximum suction and discharge porting through the compressor achieves minimum pressure drop with valve plates that are made to exacting Vilter material and manufacturing requirements for long-term service.

Piston and Connecting Rod

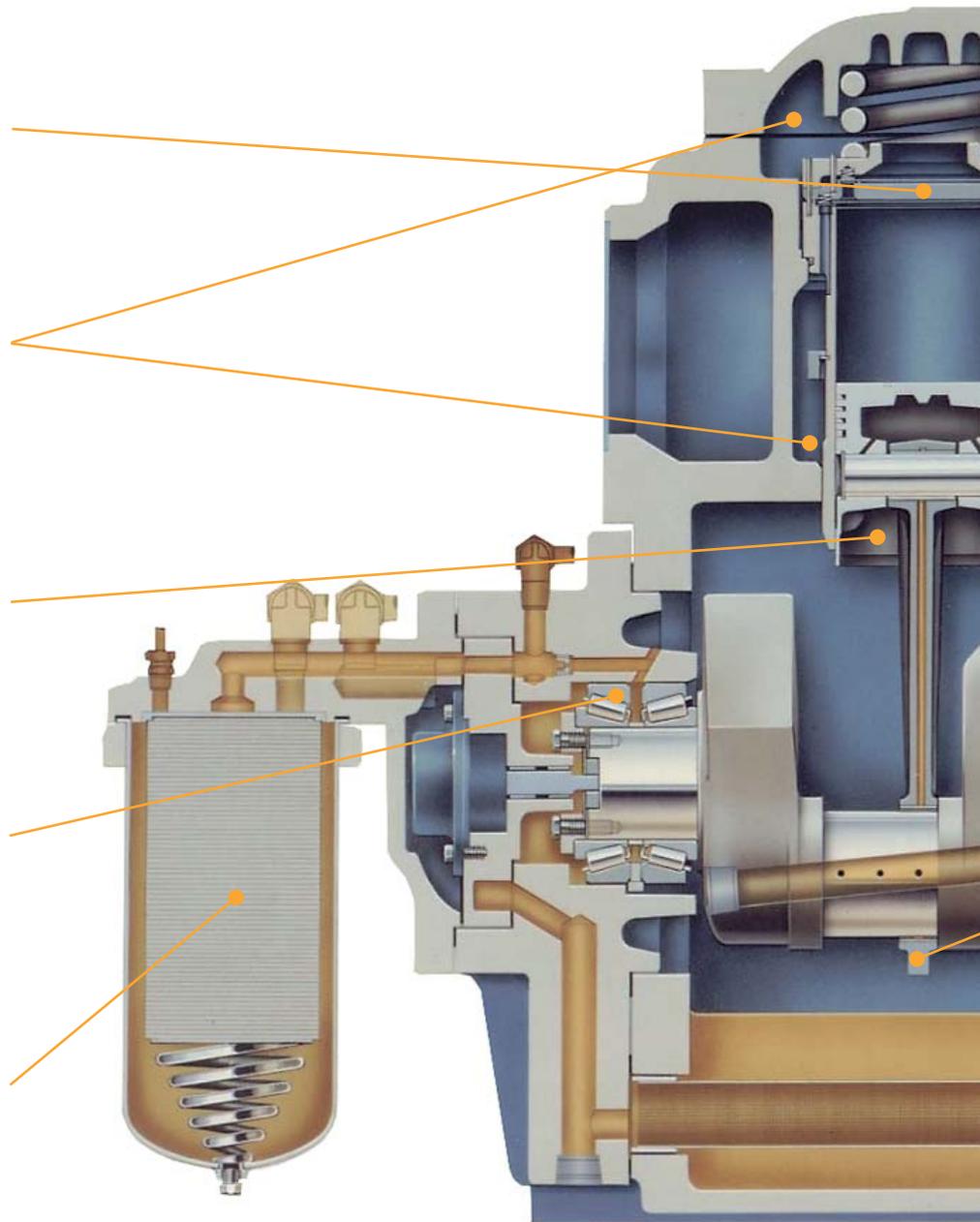
The unique design of the piston and connecting rod assembly allows for movement only between the connecting rod bushing and piston pin, while providing positive lubrication throughout the entire compression cycle.

Double Tapered Roller Bearings

Energy-efficient roller bearings enable the compressor to be used for high suction pressure applications as well as high belt-drive horsepower requirements.

Tri-Micro® Oil Filter

Removes 95% of contaminants as small as 3 microns in size. Allows 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. Filter is enclosed in a seamless drawn carbon steel shell with cast iron cover, and is equipped with a means for determining pressure drop across the filter.



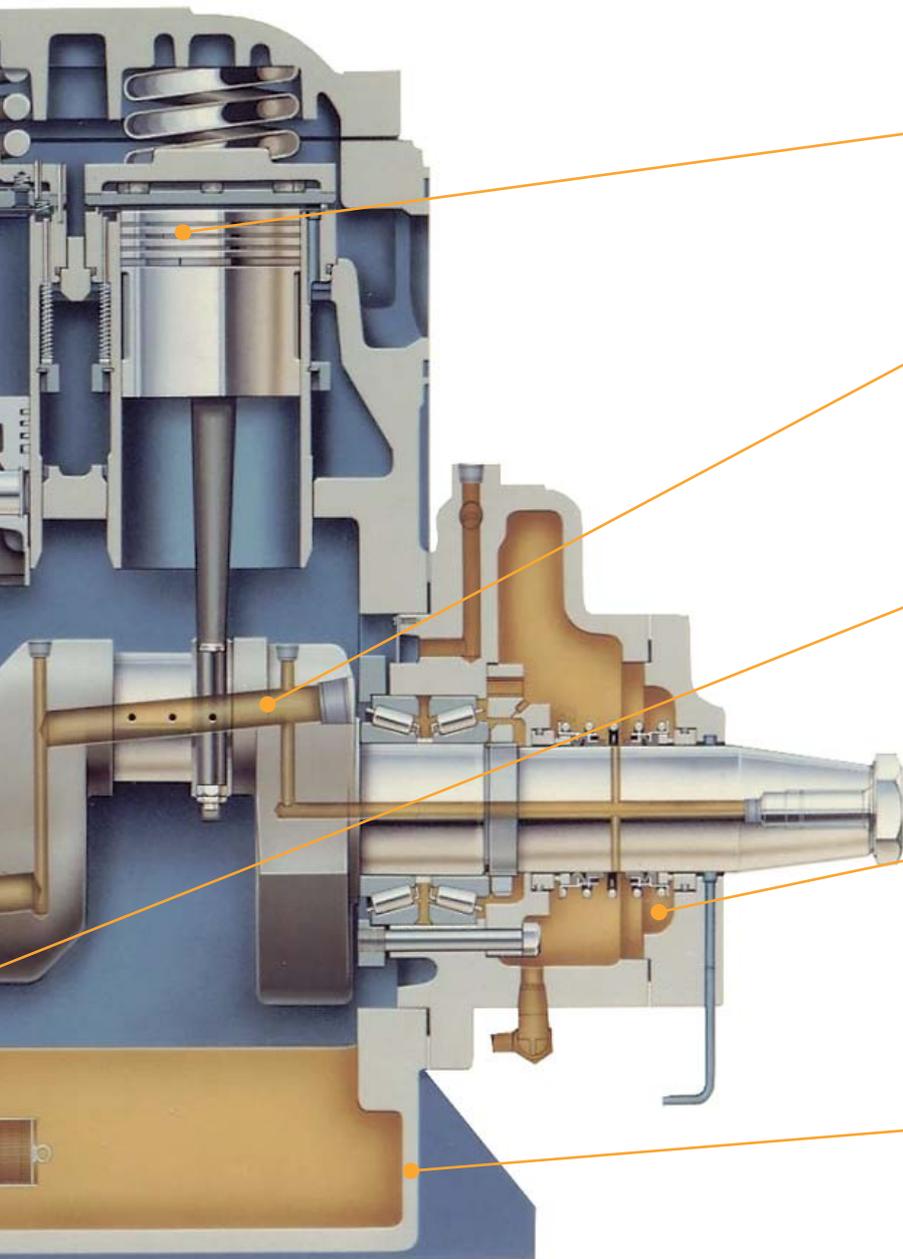
The versatile VMC 450XL is now even better!

While retaining all of the features that are exclusive to Vilter compressors, we've made several design improvements:

- Piston
- Connecting road and bearing insert
- Crankshaft
- Safety head
- Capacity reduction system

Even though we've made these specific changes, we've retained all of the exclusive Vilter features, including provisions for fast and easy servicing with components that are easy to access.

The 450XL can operate with ammonia, halocarbon and even some hydrocarbon refrigerants. It works in extreme applications with up to a 17,2 bar pressure differential. It can be belt-driven up to 224 kW or direct driven all the way up to 285 kW. And it can run at high compression ratios all the way up to 12:1 with certain halocarbon refrigerants.



Compression and Oil Rings

The 450XL piston ring set consists of three compression rings and a single, special oil scraper ring for keeping oil consumption to an absolute minimum.

Heavy-Duty Crankshaft*

An over-sized crankshaft pin diameter provides years of rugged, dependable duty, while the larger bearing surface allows for higher pressure differential capabilities.

Connecting Rod Bearings*

Vilter's unique oil circuit drilling arrangement ensures proper hydrodynamic lubrication of insert bearings throughout the entire compression process. Rod bearings are specially designed to supply lubrication to the piston pin bushing at all times.

Double Bellows Shaft Seal

The 450XL shaft seal, designed to specific Vilter specifications, is manufactured from materials strictly used for industrial refrigeration applications. 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.

Single Casting Frame

The single casting frame incorporates suction and discharge manifolds plus bearing supports. It's cast to exacting tolerances from a high grade of cast iron to withstand extreme changes in heat and pressure. The castings are notably free from porosity and internal strains, and display excellent wearing qualities.

*Patented Design

Even with all these built-in features, you'll still find the 450XL to be extremely cost-efficient. This compressor has a whopping cylinder displacement of 84,5 m³/h while running at 1200 RPM. And the high isentropic efficiency of the 450XL means its COP is second to none when compared to other compression systems.

The 450XL can be installed almost anywhere, even on an upper floor if necessary, since vibration is kept to a minimum. Noise level is low too, due to the use of quickacting, precise ring plate suction and discharge valves.

Far-Reaching Applications

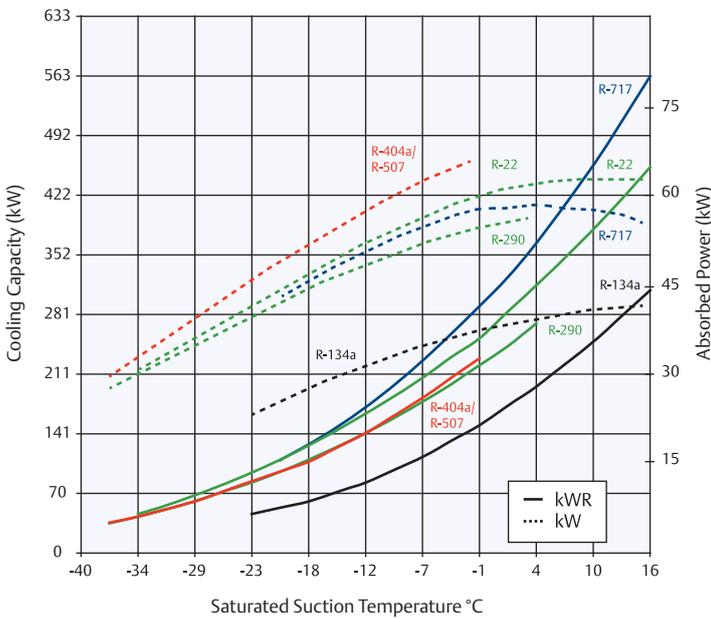
The 450XL is so versatile it can handle almost any refrigeration system conditions. Up to 24.1 bar maximum discharge, and up to 10.3 bar maximum suction with a maximum 17.2 bar pressure differential. At different compression ratios, too, from 8:1 for ammonia to 14:1 for R404A. In V-belt configurations all the way up to 224 kW, or direct drive setups up to 285 kW. And it's usable for both 50Hz and 60Hz applications up to 1200 RPM. The graph (Figure 2) on the next page depicts the broad range of applications that the 450XL covers.

Nominal High-Stage Capacities

With its 114 mm bore and stroke, the 450XL provides up to 30% more capacity than similar size compressor units, all while maintaining a favorable COP ratio.

Nominal high-stage ratings for the 450XL are shown in Figure 1 below.

Figure 1 | High Stage capacities 450XL ratings



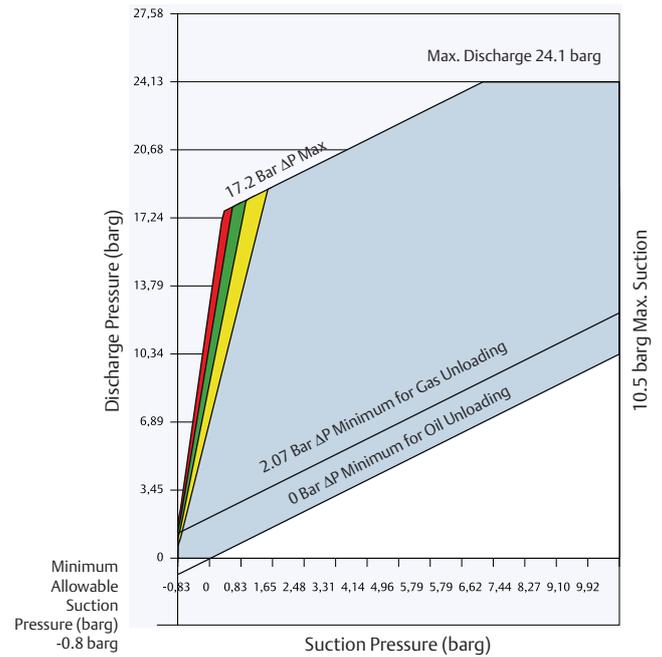
These ratings are established under the following conditions:

- 1200 RPM
- Saturated suction
- No subcooling
- No belt losses
- All ratings are based on 60°C condensing temperature
- Ratings are based on a 4-cylinder 450XL (454XL).

For cooling capacity and approximate kW figures of other 450XL models, use a direct proportion to the number of cylinders of the 454XL. For example, use a 3.0 factor for determining the 12-cylinder 450XL cooling capacity and approximate kW figures.

Complete detailed ratings for all 450XL high-stage models, plus ratings for 450XL booster compressors, special high suction pressure compressors, and even integral two-stage compressors, are available for all major refrigerants either from the Vilter Sales Offices.

Figure 2 | Broad Applications



	Maximum Motor kW		
	RPM	452XL-458XL	4512XL-4516XL
■ Max 14:1 (R-404a & R-507)	1200	150	225
■ Max 12:1 (R-22)	1130	150	225
■ Max 10:1 (R-134a & R-290)	1000	112	185
■ Max 8:1 (R-717)			



4516XL Belt Drive Recip Pak with VILTech Micro-Controller

Time-Honored Features

Vilter's attention to detail shows wherever you look. Over a century of experience in refrigeration compressor design goes into each and every part that comprises the 450XL.

We have designed our component parts to work together, not just fit together. That's why Vilter guarantees that all Genuine Vilter Parts will match your Vilter compressor dimensionally, metallurgically and thermally for optimum compressor performance.

With Genuine Vilter Parts, you can be assured of getting the engineering design and special construction features that only Vilter can offer. Consider some of the special manufacturing steps that Vilter parts go through:

- Select surfaces are shot-peened for added strength
- Mating faces are lapped for greater compressor efficiency
- Many parts are ultrasonically inspected for maximum reliability
- The steels used are of special alloys for durable performance
- Exact tolerances are measured in light bands rather than in hundredths of millimetres

The Vilter 450XL Full Two-Year Warranty

The 450XL compressor is fully warranted against defects of materials and workmanship under normal use and service, for a period of two years from date of shipment regardless of startup date. For example, if startup occurs one month from shipping date, the customer will have a full twentythree (23) months of warranty coverage after startup.

Genuine Vilter Parts

When you need parts for your 450XL compressor – whether for repair work or scheduled maintenance – make sure you specify Genuine Vilter Parts.



Look for the Genuine Vilter Part mark that is either etched or stamped directly on all major Vilter parts. It's your assurance of Vilter warranty protection. In some cases, where a replacement part does not lend itself to stamping or etching, a blue tag will identify the part as a Genuine Vilter Part. Vilter replacement parts (except those too big to box) are shipped in boxes that have the Genuine Vilter Part mark right on the box itself.

Don't be misled by look-alike, no-name imitations of Vilter compressor parts that carry vague warranties. Cheap parts can become an expensive mistake. Make sure you insist on using only Genuine Vilter Parts, and that you contact an Authorized Vilter Distributor (or Vilter direct) for all your 450XL parts requirements.

Piston, Pin and Ring Assembly



- A shrink-fit wrist pin is used to increase bearing load capacity.
- Hardened steel wrist pins are ground and polished to size.
- Three cast iron compression rings and one oil ring provide a positive seal while wiping oil back to the crankcase.

Connecting Rod, Bearing and Bushing



- Replaceable insert bearing improves lubrication and load carrying capacity.
- Forged connecting rods back the precision-made, steel-backed Babbitt insert bearing.
- Grooved wrist pin bushings are fed with pressurized lubricating oil.

Ductile Iron Crankshaft



- Designed with a bigger crankpin diameter for greater load bearing and bearing surface.
- All crankshafts are statically and dynamically balanced for reduced vibration.
- Precision drilled crankshaft ensures proper lubrication through the compression cycle.
- The 6, 8, 12, and 16-cylinder crankshafts are shot-peened for greater strength.

Spring Loaded Safety Heads



- Spring loaded safety heads provide protection against liquid slugging.
- The suction and discharge porting improve compressor efficiency.

Capacity Reduction System



- A piston operated unloading mechanism lifts the suction valve plate to unload the cylinders for reduced capacity or unloaded starts.
- Simplified unloading piston allows easy removal for seal servicing.

General Specifications

The complete line of 450XL compressors is comprised of six models ranging from a nominal 88 kW cooling capacity 2-cylinder machine all the way to the high end of the scale – a nominal 704 kW cooling capacity 16-cylinder model. In-between are the 4, 6, 8 and 12-cylinder mid-size units. All 450XL 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 450XL models.

We have tried to make every centimetre count in designing the 450XL to fit into even the tightest space requirements. The 450XL is a machine that provides displacement of 84,5 m³/h per cylinder, giving you maximum capacity in a minimum amount of space. There's sure to be a 450XL model that's a perfect match to your refrigeration application.

Engineering Specifications

The compressor shall have double shaft seal, double tapered, roller main shaft bearings.

Tri-Micro® oil filter and oil strainer that removes 95% of contaminants as small as 3 microns in size; dynamically and statically balanced heavy duty crankshaft of ductile iron, also shot-peened on 6, 8, 12 and 16-cylinder models; spring safety heads; die-forged, steel connecting rods with replaceable bearing halves; aluminum type heat treated pistons with three compression rings and one oil ring; piston operated suction valve lifters to unload the compressor

for starting and to provide capacity control. The piston and connecting rods shall be assembled with a shrink-fit wrist pin for higher load carrying capabilities and superior wearing qualities.

The compressor shall come complete with structural steel base and be equipped with the additional following standard equipments: crankcase oil thermometer and heater; oil filter pressure gauge with manual 3-way valve; oil failure switch; high and low pressure cutout; capacity control switches and unloader solenoid valves based on the number of steps of capacity reduction; water or refrigerant cooled oil cooler; suction, discharge, and oil pressure gauges complete with Stedy-Mounts® and shut-off valves; (water or refrigerant) cooled cylinder covers following your need.

The parameters for the motors selection shall be:

- Required power (kW)
- Frequency (Hz) and Rotational speed (RPM)
- Voltage (Volt) and phasing
- Direct coupling or V-belt drive

The compressor minimal cooling capacity (kW) shall be defined for given:

- Suction temperature (°C) or pressure (barg)
- Condensing temperature (°C) or pressure (barg)

Compressors are to be manufactured by Vilter Manufacturing Corporation, Cudahy, Wisconsin, or equal as approved.



4512XL Direct Drive Recip Pak with Superseparator and VILTech Micro-Controller

2 & 4 Cylinder Units						6 & 8 Cylinder Units						12 & 16 Cylinder Units					
V-Belt Drive Ammonia																	
Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E
12	2108	2013	1486	508	1514	6	1930	1410	1026	508	867	12	2108	2013	1486	508	1514
16	2108	2013	1581	508	1514	8	1930	1422	991	508	883	16	2108	2013	1581	508	1514
Direct Drive Ammonia																	
Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E
2	2000	1041	1259	508	740	12	2356	1073	1026	508	867	12	3258	1280	1524	546	1514
4	2203	1054	1310	508	802	16	2419	1140	991	508	883	16	3258	1280	1616	546	1514
V-Belt Drive Halocarbon																	
Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E
2	1753	1241	1256	508	740	6	1930	1435	1026	508	867	12	2108	2038	1448	508	1514
4	1880	1271	1310	508	802	8	1930	1448	991	508	883	16	2108	2038	1527	508	1514
Direct Drive Halocarbon																	
Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E	Cyl.	A	B	C	D	E
2	2000	1041	1256	508	740	6	2369	1073	1026	508	867	12	3270	1280	1486	546	1514
4	2203	1054	1310	508	802	8	2432	1140	991	508	883	16	3270	1280	1565	546	1514

General Dimensions – The dimensions shown above are approximate, and should not be used for construction. Vilter issues certified prints for construction purposes. These dimensions are provided in millimeters. Space needed to remove flywheel 178mm. Space needed to remove crankshaft, from wall to centerline of compressor 1067mm for 2-8 cylinder models, and 2134mm for 12-16 cylinder models.



General Dimensions

	452XL	454XL	456XL	458XL	4512XL	4516XL
Number of Cylinders	2	4	6	8	12	16
Maximum RPM	1200	1200	1200	1200	1200	1200
Bore & Stroke (mm)	114 x 114	114 x 114	114 x 114	114 x 114	114 x 114	114 x 114
CFM @ Maximum RPM (m ³ /h)	169	336	507	676	1014	1352
Refrigeration Capacity at -12°C/+35°C, R-717 (kW)	84	172	257	341	514	686
Suction Connection (inch)	2 1/2	3	4	4	5	6
Discharge Connection (inch)	2	2 1/2	3	3	2 x 3	2 x 3
Unit Weight Less Motor (kg)	862	1225	1406	1542	2404	2630
Oil Charge (l)	19	27	27	27	53	53
Standard Steps of Unloading (%)	0	50	33/66	24/50	33/66	25/50
Option 1 Steps of Unloading (%)	50	25/50/75	-	25/50/75	-	25/50/75
Option 2 Steps of Unloading (%)	100	50/100	33/66/100	25/50/75/100	33/66/100	25/50/75/100
Maximum Discharge Temperature (°C)	149	149	149	149	149	149
Crankcase Oil Temperature Range (°C)	43-54	43-54	43-54	43-54	43-54	43-54

Vilter reserves the right to make changes in design and specifications without notice.

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For more details, see www.emersonclimate.eu

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