



# The new Grasso V Series Reciprocating compressors for industrial refrigeration

GEA Refrigeration Technologies



# The new Grasso V series challenges

## Trendsetter

With its new Grasso V-series reciprocating compressors, Grasso is heralding the start of a completely new era for the industrial refrigeration market. Grasso continue to invest in reciprocating technology with a clear vision for the future. And with good reason. The Total Cost of Ownership, where energy is the major part, has become an important issue, which is why the market is now demanding energy efficient systems/solutions.

Grasso's answer: The new Grasso V series reciprocating compressors.



## Innovation

During the development of the Grasso V-series, Grasso continually put itself in the position of the end user. Time and again, each component was assessed for the most important elements that contribute to a low Total Cost of Ownership:

- Energy efficiency
- Minimal maintenance costs
- Maximum reliability with minimal downtime

Besides the end user, the contractors also benefit from this new development in terms of ease of installation, on time maintenance and a satisfied customer in terms of lower running costs and very long service life. GEA's worldwide professional product support is a known fact inside the world of industrial refrigeration.

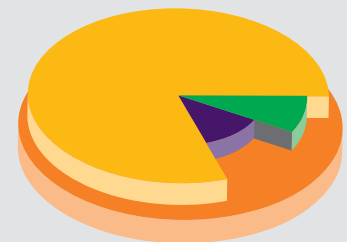
The new V-series is a 100% European quality product. More than 100 years of design experience has been combined with contemporary research and technology.

The result is, not only the most efficient and reliable reciprocating compressor on the market but also a compressor with extended as well as flexible service intervals, compared to today's standards.

The newly developed compressor series is not only very efficient and requires less maintenance but at the same time achieves the highest possible reliability. With this V-series, Grasso has set a new standard for the future.

Grasso is ready to herald the start of a new era!

Total Cost of Ownership  
reductions up to 12%



- previous total costs
- reduced energy costs
- reduced maintenance costs
- reduced investment costs

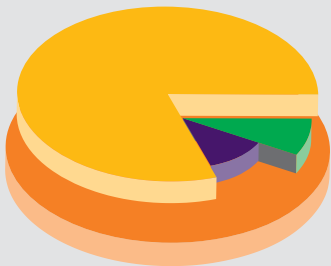
# your Total Cost of Ownership

## Unconditional Reliability

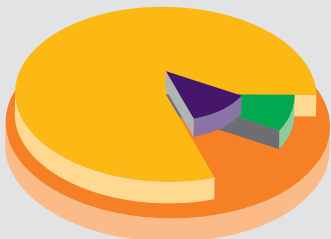
Grasso believes its customers should focus 100% on their business. That is why we place so much emphasis on reliable and trustworthy systems. With the maintenance carried out in accordance with the maintenance intervals indicated by the Grasso online conditional maintenance monitor, you can be sure of problem-free operation throughout the entire lifespan of the machine so you can concentrate on your business.



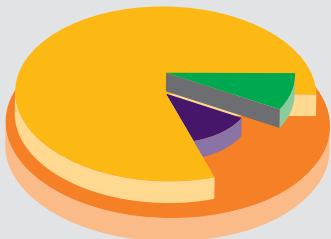
### Energy



### Maintenance



### Investment / Depreciation



## Energy

Reciprocating compressor technology is synonymous with highly efficient operation resulting in lower power consumption. This is the result of minimum internal leakages, automatic head pressure adjustment and increased efficiency at lower speeds (in combination with a frequency inverter). This new design contributes to a further reduction of power consumption under all circumstances.

## Minimum Maintenance

The selection of the highest quality parts & methods enables Grasso to reduce the downtime and maintenance frequency for this machine significantly compared with the traditional compressor maintenance guidelines!

Furthermore we believe that maintenance should only be carried out when it is necessary, this is in contradiction with the fixed maintenance schedules in use today for existing compressor series. That is why each V-compressor is factory fitted with a so called "conditional maintenance monitor".

## Lower Investment

All optimized elements of this new compressor series as well as the optimised running speed result in a lower price per kW cooling power.

## An unequalled design

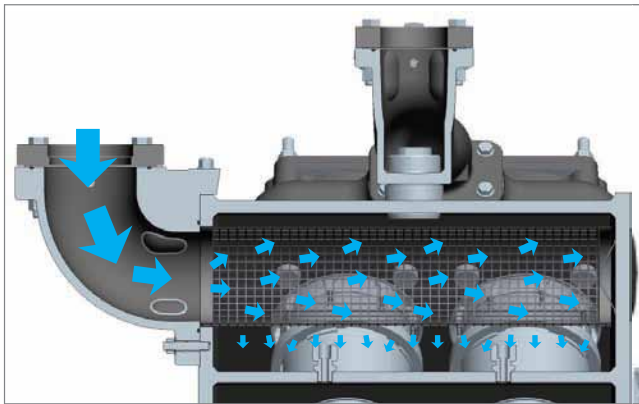
Higher energy efficiency, minimum maintenance and maximum reliability can only be achieved when the complete design is optimized. The welded compressor crankcase housing is newly designed from "top to bottom". This is probably the most striking change in the history of Grasso welded compressor construction. By using a revolutionary process of forming the steel sections creating the complete crankcase, the optimum shape and size can be made without compromise, and keeping all the advantages of a welded concept.

## Features in a glance:

### Oversized common suction chamber.

Oversized suction gas entry chamber and optimized filtering & distribution results in increased resistance against liquid hammer.

- Controlled oil return system possible via suction line
- Accepts the use of most new synthetic refrigerants



### Grasso Maintenance Monitor

Indication of upcoming maintenance intervals

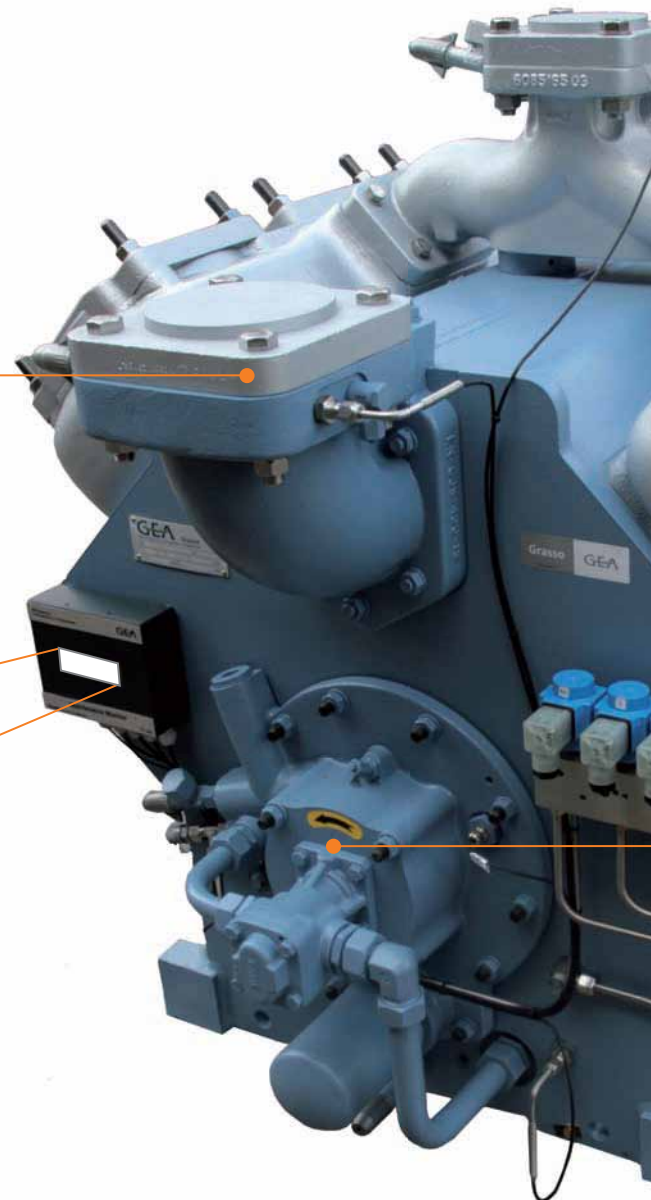
Ase in month:	12
Running hour:	7912
Next insp(h):	3419 B
Sensor	: 1 2 3

### Minimized internal temperature transfer

Clearly separated suction area (cold) from discharge area (hot) area resulting in lower overall running temperatures

Result:

- Higher efficiency (up to 6% better than the Grasso 12)
- Extended field of application under part load running conditions
- Longer life time of suction & discharge valves

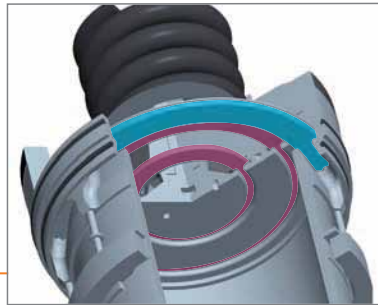


## Higher Energy efficiency

The overall design of the Grasso V-series is aimed at creating the most energy efficient compressor. The unique combination of a welded crankcase with integrated suction chamber and cast iron externally positioned cylinder heads. This creates an even better temperature separation between the suction side and the discharge side of the compressor compared with existing models. The performance and the field of application are thus further increased with this series.

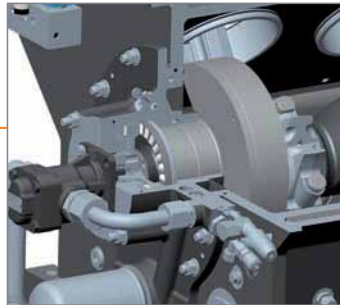
### High efficiency

- Composite material for suction and discharge valves
- Free flow discharge valve configuration with gas damping chambers
- High volume low speed suction chamber



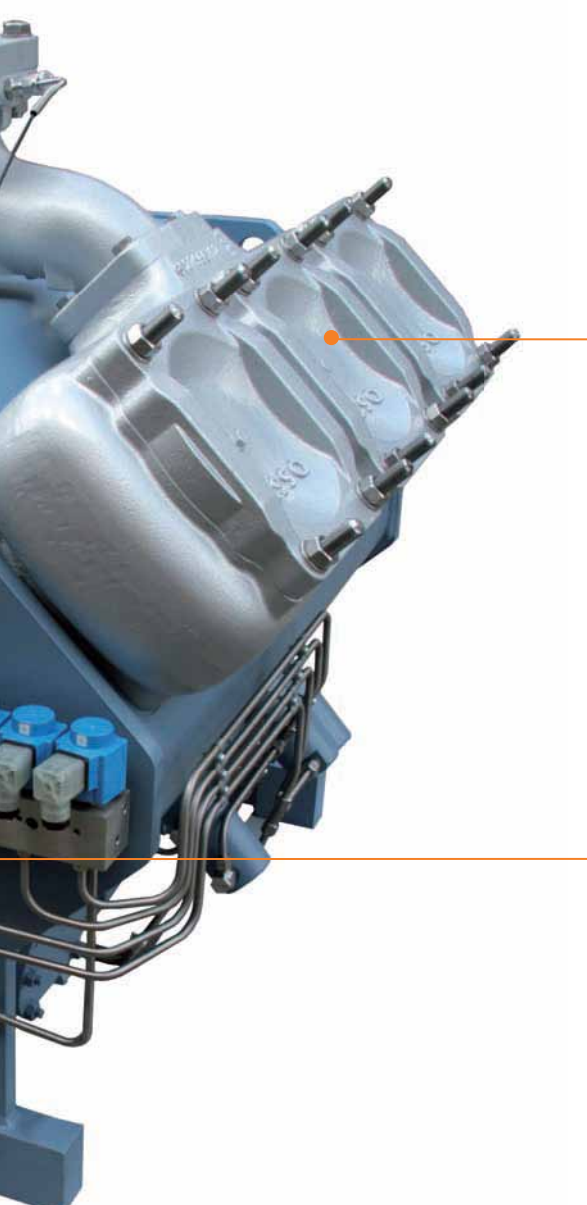
### Reliability & Ease of maintenance

- Axial roller bearing construction to withstand high crankcase pressures for maximum lifetime at high loads
- Increased main bearing diameter for stable low speed inverter drive running
- Large capacity oil filter for long service intervals
- Full oil pump flow over shaft seal for maximum cooling/life time extension
- O-ring sealing for maximum tightness, easy disassembly and assembly
- Over 60% less fixing bolts contribute to reduced service times



### Minimized oil carryover to refrigeration system

The oversized common suction chamber, the position of the cylinder liners as well as the increased distance between oil sump and crankshaft result in an extremely low oil carry-over.



## Every Grasso V series compressor is equipped with the Grasso Maintenance Monitor

### Grasso Maintenance Monitor

The Grasso maintenance monitor is a compact microprocessor physically mounted, as standard, on the compressor body. It measures the relevant data to determine the "On time" maintenance intervals on line. The monitor automatically issues a warning message when the compressor needs to be serviced, what service type is needed and what service time is calculated/expected. The service history is available online.



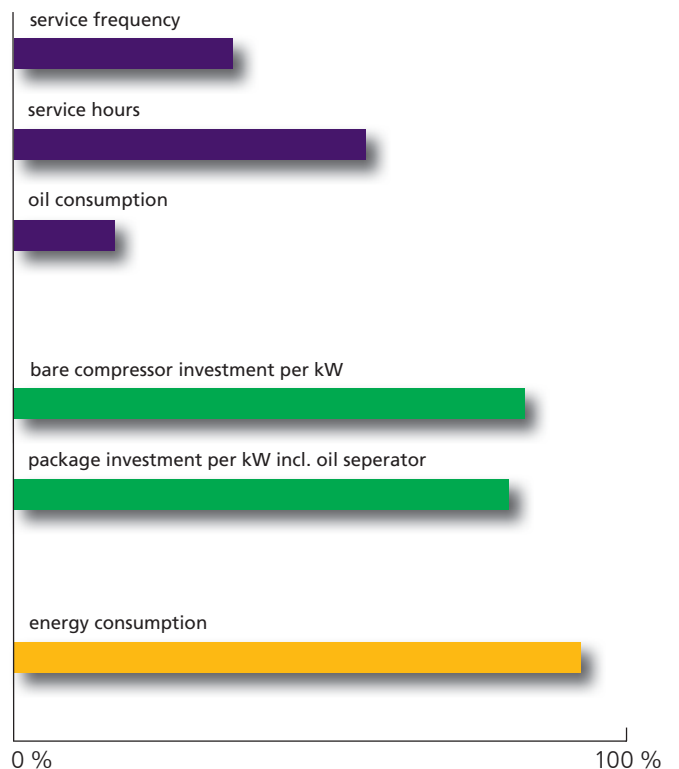
Extended maintenance intervals due to

- Best possible "running" parts
- Optimum speed chosen: maximum 1200 rpm

Flexible maintenance intervals

- Monitoring online operating conditions

### Reduced costs compared to existing models



## The product range

Grasso is well known for its extensive range of products covering practically every application. The new Grasso V-series will be expanded in time to become a complete range of single-stage and two-stage machines. From the date of finalizing the V series will replace all the existing welded Grasso reciprocating compressor series will be replaced in order to extend the benefits from this revolutionary design over the complete range.



## Physical data

Single Stage Models	Cylinder numbers	Swept volume CFM	Bore (inch)	Stroke (inch)	Speed (rpm)	Mass (lbs)
Grasso V 300	4	171	4 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	1500	
Grasso V 450	6	256	4 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	1500	
Grasso V 600	8	342	4 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	1500	
<b>Grasso V 700 <sup>1)</sup></b>	<b>4</b>	<b>375</b>	<b>6 <sup>1</sup>/<sub>4</sub></b>	<b>4 <sup>5</sup>/<sub>16</sub></b>	<b>1200 <sup>2)</sup></b>	<b>1653</b>
<b>Grasso V 1100 <sup>1)</sup></b>	<b>6</b>	<b>562</b>	<b>6 <sup>1</sup>/<sub>4</sub></b>	<b>4 <sup>5</sup>/<sub>16</sub></b>	<b>1200 <sup>2)</sup></b>	<b>2150</b>
<b>Grasso V 1400 <sup>1)</sup></b>	<b>8</b>	<b>750</b>	<b>6 <sup>1</sup>/<sub>4</sub></b>	<b>4 <sup>5</sup>/<sub>16</sub></b>	<b>1200 <sup>2)</sup></b>	<b>2463</b>
<b>Grasso V 1800 <sup>1)</sup></b>	<b>10</b>	<b>938</b>	<b>6 <sup>1</sup>/<sub>4</sub></b>	<b>4 <sup>5</sup>/<sub>16</sub></b>	<b>1200 <sup>2)</sup></b>	<b>2846</b>

Two Stage Models	Cylinder LP + HP	Swept volume (low stage) CFM	Bore (inch)	Stroke (inch)	Speed (rpm)	Mass (lbs)
Grasso V 300 T	3+1	128	4 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	1500	
Grasso V 450 T	4+2	171	4 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	1500	
Grasso V 600 T	6+2	256	4 <sup>5</sup> / <sub>16</sub>	3 <sup>5</sup> / <sub>16</sub>	1500	
Grasso V 700 T	3+1	282	6 <sup>1</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>16</sub>	1200	
Grasso V 1100 T	4+2	375	6 <sup>1</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>16</sub>	1200	
Grasso V 1400 T	6+2	562	6 <sup>1</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>16</sub>	1200	
Grasso V 1800 T	8+2	750	6 <sup>1</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>16</sub>	1200	

<sup>1)</sup> Available

<sup>1)</sup> Available as from 1<sup>st</sup> of January 2011

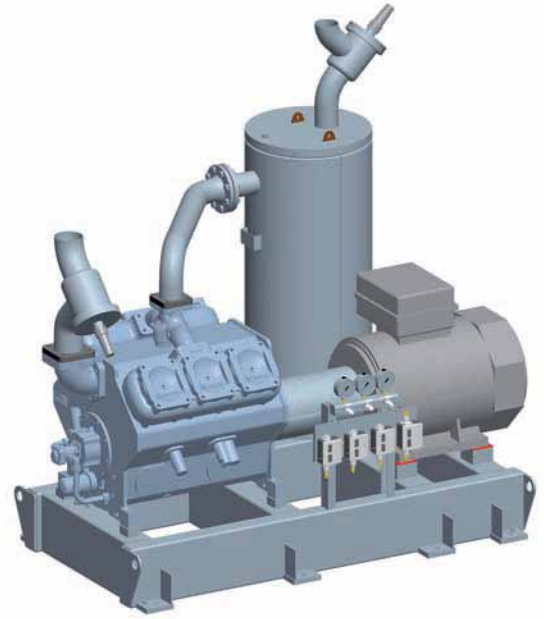
<sup>2)</sup> Based on Ammonia, for synthetic refrigerants 1000 rpm

# The benefits at a glance:

- Unconditional reliability
- Best possible "Coefficient Of Performance" or in short: lowest energy costs
- Considerably less maintenance intervals and related costs
- Flexible maintenance intervals by means of the application of the Grasso Maintenance Monitor
- Low oil carry-over

**A combination that results in a Total Cost of Ownership reduction up to 12%.**

The strength of Grasso has been demonstrated in every sector where it is active. Activities that include the food industry, industrial processing, sports and leisure, and air-conditioning systems. Grasso has a leading position in every one of these sectors.



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