

Report

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World Market for Compressors

Americas

Report 19650/4
July 2007

A multi client study

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No. of pages: 38 of text

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PREFACE, DEFINITIONS AND METHODOLOGY

PREFACE

This report forms part of a series of reports for this second market study on the world compressor market. This study is the result of a joint effort between JARN, Japan and BSRIA, UK.

We would like to thank all those companies who have supported this study, as well as the European Compressor Association "ASERCOM", which through its members has also supported the study.

The regional reports available and products covered are as follows; however, for confidentiality reasons not all products/segmentation are available for all individual regional reports. These are included in the World report only. Each report includes:

- A word report with key data and charts
- Company profiles of key producers in a specific region

1. JAPAN	2. EUROPE
<ul style="list-style-type: none"> • By application: <ul style="list-style-type: none"> - Air conditioning - Refrigeration • By usage: <ul style="list-style-type: none"> - Own use - Third party sales • By compressor type: <ul style="list-style-type: none"> - Rotary (1 cylinder) - Rotary (2 cylinder) - Scroll - Reciprocating (Refrigerator) - Screw - Centrifugal • By size: Air conditioning <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Rotary (2 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp - >7hp - Reciprocating: < 1.5hp - 120hp+ - Screw: < 30hp- 300hp+ - Centrifugal: 100hp - > 300hp • By size: Refrigeration <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp - <7hp - Reciprocating: < 1.5hp - 120hp+ (Refrigerator: <100W - 500W) - Screw: < 60hp- 300hp+ • By type: <ul style="list-style-type: none"> - Hermetic - Semi-hermetic - Open • By refrigerants: <ul style="list-style-type: none"> - R12 - R22 - R134a 	<ul style="list-style-type: none"> • By application: <ul style="list-style-type: none"> - Air conditioning - Refrigeration • By usage: <ul style="list-style-type: none"> - Own use - Third party sales • By compressor type: <ul style="list-style-type: none"> - Rotary (1 cylinder) - Rotary (2 cylinder) - Scroll - Reciprocating (Refrigerator) - Screw - Centrifugal • By size: Air conditioning <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Rotary (2 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp - 50hp - Reciprocating: < 1.5hp - 250hp+ - Screw: < 60hp- 200hp+ - Centrifugal (100hp - > 300hp) • By size: Refrigeration <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp - 6hp - Reciprocating: < 1.5hp - 200hp+ (Refrigerator: <100W - 500W) - Screw: < 60hp- 200hp+ • By type: <ul style="list-style-type: none"> - Hermetic - Semi-hermetic - Open • By refrigerants: <ul style="list-style-type: none"> - R12 - R22 - R134a

<ul style="list-style-type: none"> - R407c - R410a - R404a - R123 - R124 - R507 - R507A - R507c - R512 - NH₃ - HC/R600a - CO₂ - He 	<ul style="list-style-type: none"> - R407c - R410a - R404a - R123 - R507c - R512 - NH₃ - HC/R600a - CO₂
<p>3. CHINA & EAST ASIA</p> <ul style="list-style-type: none"> • By application: <ul style="list-style-type: none"> - Air conditioning - Refrigeration • By usage: <ul style="list-style-type: none"> - Own use - Third party sales • By compressor type: <ul style="list-style-type: none"> - Rotary (1 cylinder) - Rotary (2 cylinder) - Scroll - Reciprocating (Refrigerator) - Screw - Centrifugal • By size: Air conditioning <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Rotary (2 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp – 50hp - Reciprocating: < 1.5hp – 250hp+ - Screw: < 60hp– 200hp+ - Centrifugal (100hp - > 300hp) • By size: Refrigeration <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp – 6hp - Reciprocating: < 1.5hp – 200hp+ (Refrigerator: <100W – 500W) - Screw: < 60hp– 200hp+ • By type: <ul style="list-style-type: none"> - Hermetic - Semi-hermetic - Open • By refrigerants: <ul style="list-style-type: none"> - R12 - R22 - R134a - R407c - R410a - R404a - R123 - R507c - R512 - NH₃ - HC/R600a 	<p>4. AMERICAS</p> <ul style="list-style-type: none"> • By application: <ul style="list-style-type: none"> - Air conditioning - Refrigeration • By usage: <ul style="list-style-type: none"> - Own use - Third party sales • By compressor type: <ul style="list-style-type: none"> - Rotary (1 cylinder) - Rotary (2 cylinder) - Scroll - Reciprocating (Refrigerator) - Screw - Centrifugal • By size: Air conditioning <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Rotary (2 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp – 50hp - Reciprocating: < 1.5hp – 250hp+ - Screw: < 60hp– 200hp+ - Centrifugal (100hp - > 300hp) • By size: Refrigeration <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp – 6hp - Reciprocating: < 1.5hp – 200hp+ (Refrigerator: <100W – 500W) - Screw: < 60hp– 200hp+ • By type: <ul style="list-style-type: none"> - Hermetic - Semi-hermetic - Open • By refrigerants: <ul style="list-style-type: none"> - R12 - R22 - R134a - R407c - R410a - R404a - R123 - R507c - R512 - NH₃ - HC/R600a - CO₂

<p>5. THE WORLD</p> <ul style="list-style-type: none"> • By application: <ul style="list-style-type: none"> - Air conditioning - Refrigeration • By usage: <ul style="list-style-type: none"> - Own use - Third party sales • By compressor type: <ul style="list-style-type: none"> - Refrigerator - Rotary (1 cylinder) - Rotary (2 cylinder) - Scroll - Reciprocating - Screw - Centrifugal • By size: Air conditioning <ul style="list-style-type: none"> - Rotary (1 cyl): <0.5hp - > 3hp - Rotary (2 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp – 50hp - Reciprocating: < 1.5hp – 250hp+ - Screw: < 60hp– 200hp+ - Centrifugal (100hp - > 300hp) 	<ul style="list-style-type: none"> • By size: Refrigeration <ul style="list-style-type: none"> - Refrigerator: <100W – 500W - Rotary (1 cyl): <0.5hp - > 3hp - Scroll: < 1.5hp – 6hp - Reciprocating: < 1.5hp – 200hp+ - Screw: < 60hp– 200hp+ • By type: <ul style="list-style-type: none"> - Hermetic - Semi-hermetic - Open • By refrigerants: <ul style="list-style-type: none"> - R12 - R22 - R134a - R407c - R410a - R404a - R123 - R507c - R512 - NH₃ - HC/R600a - CO₂
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CONFIDENTIALITY & DEFINITIONS

CONFIDENTIALITY

In order to gain the trust of companies participating in this study, confidentiality has been of key importance in producing this study. Any data which has been passed to JARN or BSRIA are kept confidential, with individual data only being available to the persons putting the data together. Data will not be passed to any third party, but only used to build up a total picture of the market.

In order to maintain confidentiality, the following rules have been applied:

- Any one cell has a minimum of three companies. Where this has not been the case, cells have, either:
 - Been merged with other cells and only qualitative commentary made available to alert to trends and issues regarding specific companies choice of for example refrigerants
 - This is the case for specific compressors for a particular application (eg. scroll for refrigeration applications) in certain regions. They have been taken out of the region all together and are only available in the World report.

Regional reports:

4 individual word reports are available, with accompanying company profiles for key producers, producing in the specific region only. The table below explains what is available for the **AMERICAS** regional report only:

<p>AMERICAS:</p> <p>Air conditioning:</p> <p>Rotary (1cyl):</p> <ul style="list-style-type: none"> • There are only 1 company making 1 cylinder rotary compressors in Americas so the data will only be shown as part of the world total. <p>Rotary (2cyl):</p> <ul style="list-style-type: none"> • There are no producers of 2 cylinder rotary compressors in Americas. <p>Scroll:</p> <ul style="list-style-type: none"> • There are only 2 companies making scroll compressors in Americas so the data will only be shown as part of the world total. <p>Reciprocating:</p> <ul style="list-style-type: none"> • Only two companies make reciprocating units for own use. Therefore these units are published with the others category. • Only one company supplies <1.5hp units, thus these data will be merged with 1.5-3hp units to make a <1.5-3hp range. • Only 2 companies are represented in hermetic, thus, these units will be merged together with semi-hermetic as a total. <p>Screw:</p> <ul style="list-style-type: none"> • Only two companies make screw units for others. Therefore these units are published with the own use category. • All sizes have been merged as there are insufficient numbers to show these separately. • Refrigerants R22, R134A and R407C have been merged as there are insufficient numbers to show these separately. • Only one company makes hermetic units and only one company makes open units thus these data are presented together with semi-hermetic units. 	<p>AMERICAS:</p> <p>Refrigeration:</p> <p>Rotary (1cyl):</p> <ul style="list-style-type: none"> • There is only one company making rotary 1 cyl compressors in Americas so the data will only be shown as part of the world total. <p>Rotary (2cyl):</p> <ul style="list-style-type: none"> • There are no producers of rotary 2 cyl compressors in Americas. <p>Scroll:</p> <ul style="list-style-type: none"> • As there are only two producers of scroll for ref in Americas, the data has been merged to produce world data only <p>Reciprocating:</p> <ul style="list-style-type: none"> • Sizes 15-60hp and 120hp+ were merged as only one company is making 120hp+ compressors. • Refrigerants R407C, R410A and NH3 have been merged as there are insufficient numbers to show these separately. • Only 2 companies make AC compressors so the data has been merged with the Non Inverter category. <p>Screw:</p> <ul style="list-style-type: none"> • Only 2 companies make screw units for own use. Therefore these units are published with the others category. • Sizes 60hp and 60-150hp merged as only two companies make 60-150hp compressors. • Sizes 150-300hp and 300hp+ merged as only one company makes 300hp+ compressors. • Refrigerants R407C, R410A, R404A, R507C and NH3 are merged as there are insufficient numbers to show these separately. • Only one company makes hermetic units thus the data are presented together with semi-hermetic units.
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<ul style="list-style-type: none"> • Only two companies make single units thus only the total for single and twin units was published. <p>Centrifugal:</p> <ul style="list-style-type: none"> • Only two companies are making compressors for others so the data has been merged with the own use category. • There is not a sufficient number of producers making R123A and NH3 units, thus these units were merged with R134A units. 	<ul style="list-style-type: none"> • Only two companies make twin units thus only the total for single and twin units was published.
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World summary report:

The Word Report includes:

- Copies of four regional word reports: Japan, China & East Asia, Europe and Americas, which individually have some merged cells due to confidentiality.
- A word document with unmerged cells from each of the region, which therefore provide a full detailed picture of the world production of compressors, without breaking confidentiality, *thus the total of the four regional reports, does not add up to the same as the total world report.*
- A set of company profiles for key compressor manufacturers in the world

DEFINITIONS

- All data in the reports are based on actual production, not production capacity or sales.
- In value terms, the terminology used is mixed, due to the way different producers collect data and whether it is sales to third parties or sold at transfer prices for internal use – whether at domestic or International level. All companies have been asked to provide value data, at prices to first point of sale. Although prices may not be collected at directly comparable prices; we believe this is a best estimate and will even out across totals and therefore give very good indications.

Transfer prices: Typically factory cost price + a possible additional small charge

Third party sales: Cost price (turnover value) + mark up

For **International sales** other factors, such as freight, insurance and tax (duty) may be incorporated in the price; thus prices can be quoted in Ex-go down (to warehouse/seller) f.o.b (free on board), c & f (cost and freight), c.i.f (cost, insurance and freight), c.i.f + tax (cost, insurance, freight and tax)

- In terms of sizes, some producers have product ranges which have not fallen within the specified categories and best estimates have therefore been made.
- For comparative reasons, all data has been collected in nominal hp. The following conversion rates can be used:

1000w (1kw) =1.33hp

1kW = 3428Btus

1 cooling tonnes=3.5kW

- The compressors for transportation – ie. car air conditioners, refrigeration tracks and sea containers— are not included in the study.
- All the companies have been asked to provide data segmented by application (either AC or refrigeration). However, although most of the compressors are produced for ‘dedicated’ application, there is some overlapping between compressors for commercial air conditioning and refrigeration. This overlapping has been estimated by BSRIA to account for 5% to 10% of the commercial end of the market.

METHODOLOGY

The interviewing programme has been slowly built up over the past year.

The data required was not always available in the format requested and in most cases needed the involvement of up to 5 people in any one organisation in order to cover all product areas, obtaining data was time-consuming.

In most cases the methodology consisted of:

- The sending of spreadsheets for compressor producers to fill in;
- A personal visit
- Submission of part or fully completed questionnaire
- Checking of returned data and BSRIA/JARN in many cases filling in estimations for “gaps”, or % in questionnaires.

- Feeding back questionnaires to Compressor producers for confirmation, along with a company profile for key manufacturers at HQ level.
- Merging of all producers in individual regions and checking for confidentiality
- Providing two separate excel sheets; one with merged cells for regional reports to ensure confidentiality; one with all product segmentations to produce a World Summary Report. Where confidentiality is an issue, production volumes have not been published in the regional reports, but only as a combined number in the world summary report.
- Producing final regional and world word reports with company profiles to be published.

It should be noted that in some cases manufacturers have not been able to make a distinct segmentation between production and actual sales.

BSRIA has attempted to obtain information as regards regional trade and applications; however, in some cases little detail has been derived and the % have been derived based on existing information, written feed back from some suppliers and interviews. The applications side has been particularly difficult for refrigeration applications, where outside some key OEM sales, commercial suppliers have little detail or control over where the compressors are going as they are sold into the open market through distributors and contractors.

This study did not include a separate end user/contractor survey to obtain such detailed data.

Checking of data:

There is little collection of compressor data around the world to use for counter checking.

- The European compressor Association (ASERCOM) does produce some summarised compressor data, which have been issued to BSRIA. However, this merges a number of categories, does not segment AC and refrigeration and does include transport compressors, so it is not directly comparable.
- In Japan, the Ministry of Economy, Trade and Industry issues the data of production (quantity and value), sales (quantity and value) and inventory (quantity) of compressors every month, but the classification is rather rough. Scroll compressors are included in rotary type and no detailed information is available other than quantity and value.
- The ARI in the US does have a compressor club, but this is mainly looking at applications, not compressor production.
- A number of other trade associations do have some statistical collection on air conditioning and to a lesser extent refrigeration units, so this can be used as a cross check. BSRIA regularly publish data on air conditioning worldwide and have good information on the sales and production of air conditioners, which has been used as cross reference. BSRIA also has some refrigeration equipment data from Europe and China

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