

# Rotary Twin Screw Compressors

For industrial refrigeration, gas processing and other industries



**Revolving Around You™**

# Howden manufactures oil injected and oil free rotary twin screw compressors, and supplies bare shaft oil injected screw compressors for use in the refrigeration, gas processing and other industries.

Rotary twin screw compressor technology was developed in the 1930s by a Swedish company, SRM, in collaboration with Howden. We manufactured the world's first operational screw compressor and further developed the technology in the 1960s with the introduction of the oil injected twin screw compressor. This has revolutionised designs of refrigeration and gas handling plants worldwide.

Today, in thousands of installations worldwide, our oil injected screw compressors provide high integrity, low maintenance solutions for liquid chilling, direct refrigeration and gas compression applications.



**Revolving Around You™**



# World pioneers of rotary twin screw compressors

## Compressor package systems

Howden Compressors is a specialist manufacturer of twin screw compressors. We supply oil injected bare shaft compressor units to independent packagers worldwide who design and supply gas and refrigeration systems on a local basis.

For high specification process critical applications we can offer this packaging service by use of our own specialist knowledge and capabilities through our Howden global companies.

# Manufacturing excellence

We are committed to manufacturing the highest quality compressors in the industry. We employ state of the art machine tools to attain the highest possible accuracy and tolerances so as to produce compressors with high efficiency and outstanding reliability.

## Rotors

All rotors for Howden twin screw compressors are machined from solid bar or forgings on highly accurate cutting machinery. The standard material is carbon steel, but forgings or special alloys can be used for more arduous applications. Following machining and balancing to ISO standards, male and female rotors are paired for assembly to ensure the ideal combination for maximum efficiency.

## Casings

Casings are precision machined from castings using state of the art horizontal machining centres to achieve the essential close tolerances. Cast iron is the normally casing material; alternative casing materials are spheroidal graphite iron or various grades of steel.

The main casing and the inlet and outlet end covers are flanged, bolted and dowelled through flanges to ensure correct alignment. Removal of the end covers provides ready access for maintenance when required.

## Compressor assembly and testing

All oil injected twin screw compressors are factory assembled by skilled engineers. The casing components are hydraulically tested to a minimum of 1.5 times maximum operating pressure to ensure integrity. Additionally, all oil injected compressors are tested with air under water following final assembly. The compressors are then mechanically run on air test rigs to confirm that volumetric efficiency, absorbed power, oil flows and vibration levels meet the stringent acceptance standards.





# Best practices

Lifetime quality and care

Today in thousands of applications worldwide, Howden screw compressors provide high integrity, low maintenance solutions for liquid chilling, direct refrigeration and gas compression.

## Design specifications

Our twin screw compressors are designed to match the exacting specifications required by our customers. They comply with International standards and codes, e.g., API 619. Compressors are generally Lloyds approved, and installations have been accepted by many major authorities such as Lloyds, Bureau Veritas, Norske Veritas, RINA, DSRK, Bureau de Mines, ABS, Germanischer Lloyd and NKK.

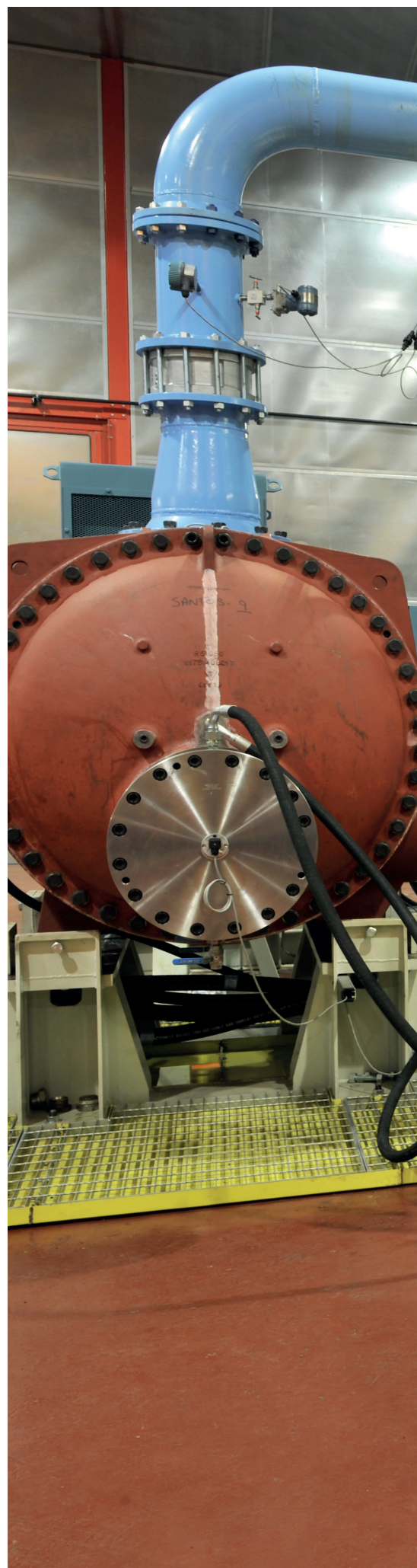
## Testing

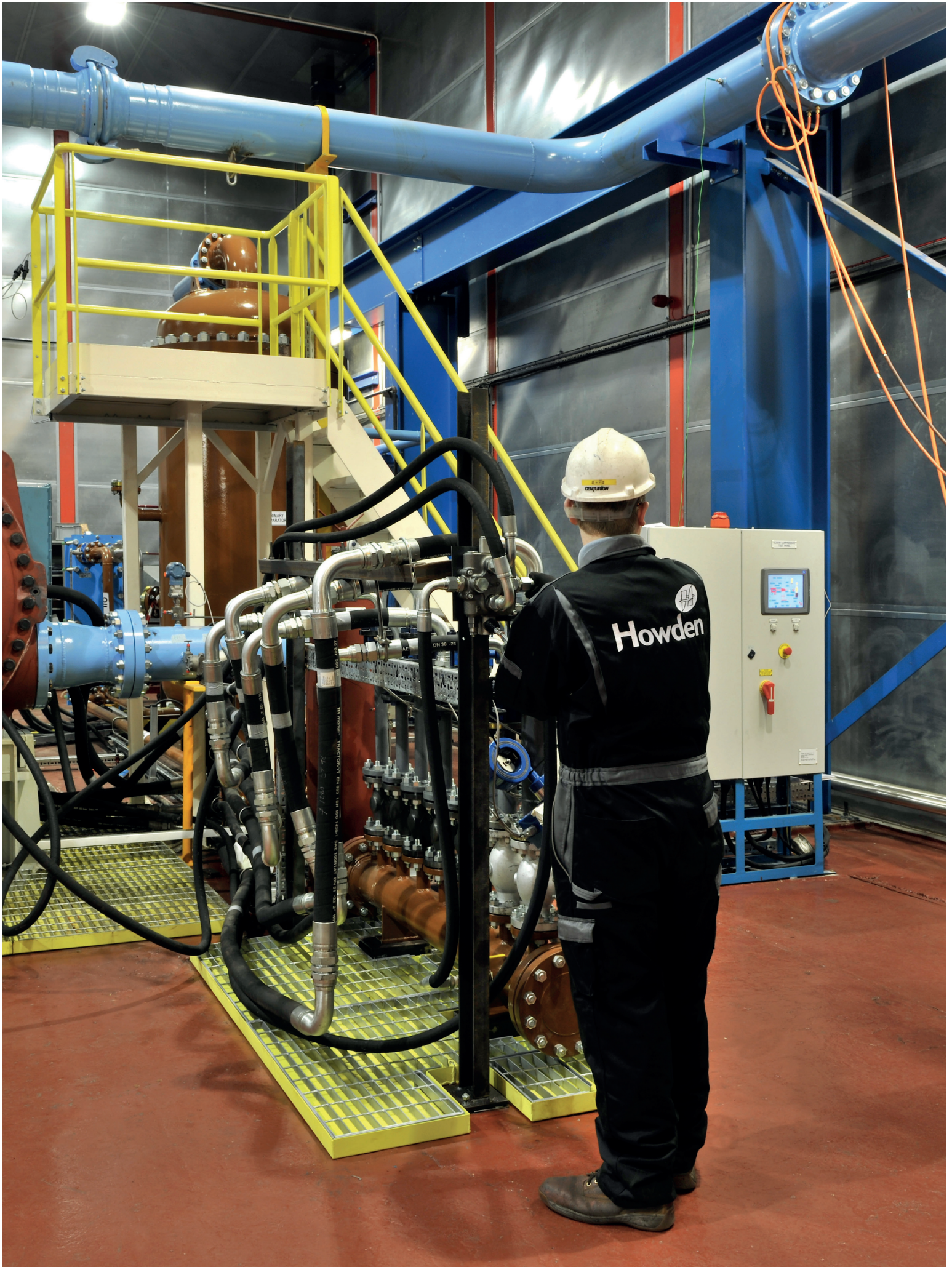
Howden has extensive test facilities. Comprehensive testing ensures that the test performance data, particularly relating to the computer selection programs for standard gases and refrigerants, are as accurate as possible. Project specific tests, such as to API 619, can be carried out to customer requirements. Our thorough testing gives confidence that the unit will perform reliably throughout its life.

## Aftersales

We provide a lifelong spare parts and maintenance service through our global network. Spare parts are authenticated with our 'Original Spare Parts' certificate and it is recommended that only these parts are used. Parts are generally supplied in pre-packaged kits that provide all items for particular types of model and maintenance operation.

**Comprehensive testing ensures that the test performance data are as accurate as possible.**





# Twin screw compressors

## Principles of operation

### Design concept

Compression is achieved by the intermeshing of two helical rotors contained in a suitable casing. Figures 1–4 give details of the compression cycle.

The Howden twin screw compressor is a positive displacement rotary design. As such it has the characteristics and stability of reciprocating compressors but in addition offers particular advantages:

Reduced physical size.

Fewer moving parts.

Low vibration.

Extended operating life cycle.

### Options

Our compressors have a range of design options.

#### Typical ones are:

Twin wall construction with sleeve bearings.

Single wall construction with roller bearings.

Slide valve capacity control from 100% to 10% nominal.

Inverter speed control.

Variable volume ratio.

Superfeed.

Oil cooling.

Liquid refrigeration injection.

Specialist sealing systems.



## Features and benefits

### Positive displacement

Cannot surge.

High compression ratios per stage.

### Rotary action

Vibration free running.

Extreme reliability & on-line availability.

Smooth gas flow, low pulsation.

Lightweight foundations.

### Stiff action rotors

Ability to withstand high pressure differences.

### No inlet or outlet valves

Lower maintenance costs.

### Compact size & light weight

Minimal space and foundation requirement, resulting in low installation costs.

### Designed for long periods of continuous running

Maximum on-line availability.

Minimal service requirements.

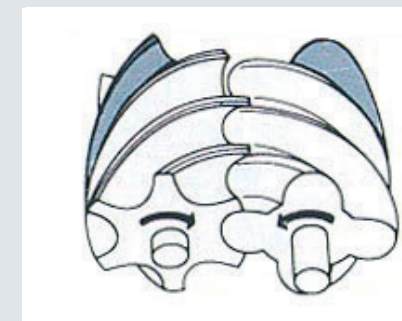
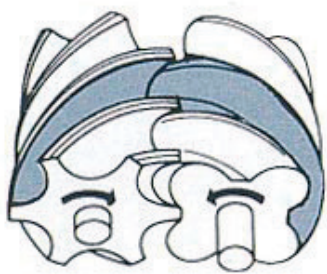


Figure 1

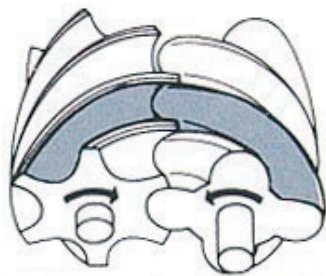
Gas is drawn in to fill the interlobe space between adjacent lobes.





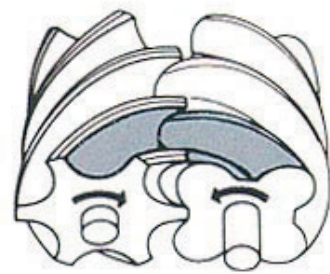
**Figure 2**

As the rotors mesh, the gas is trapped between the rotors and the casing.



**Figure 3**

Continued rotation progressively reduces the space occupied by the gas, causing compression.



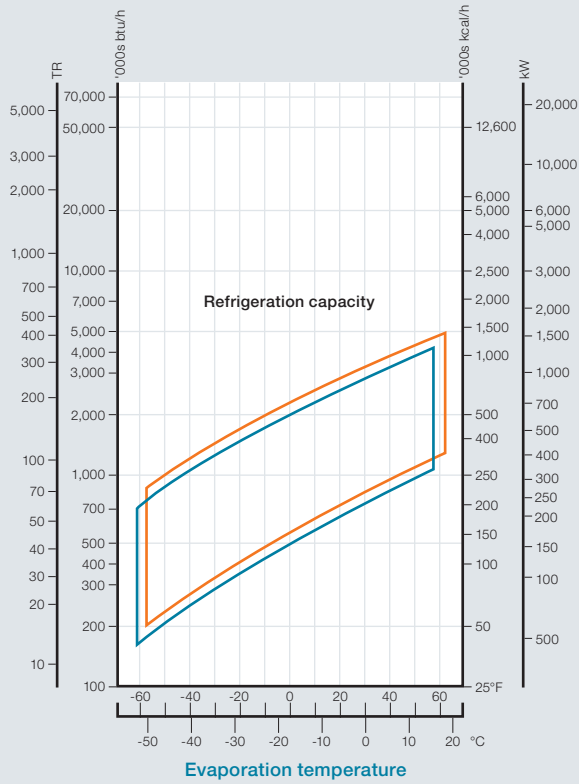
**Figure 4**

Compression continues until the interlobe space becomes exposed to the outlet port, through which the gas is discharged.

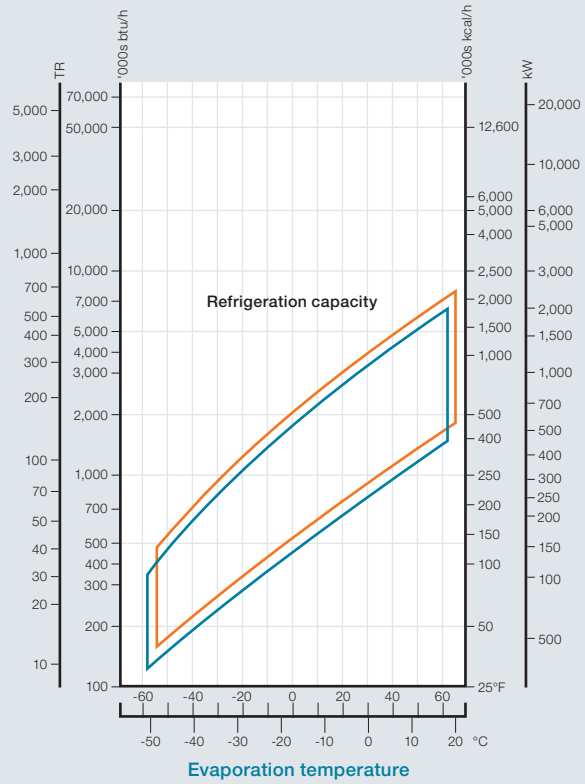
# XRV technical data

## Typical performance

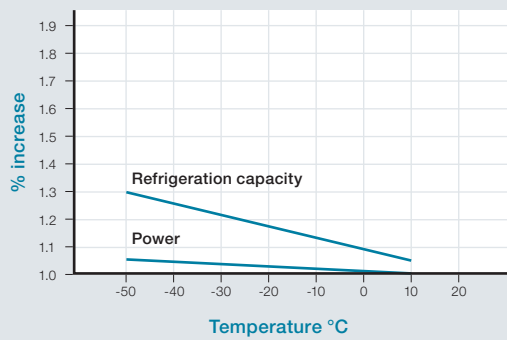
XRV ammonia



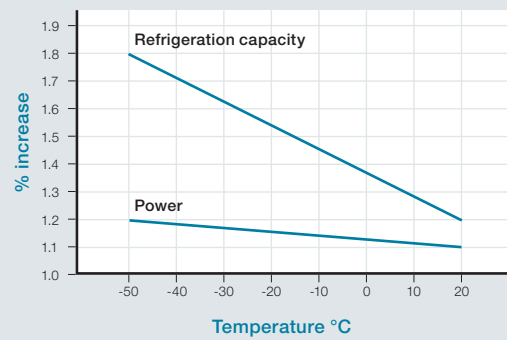
XRV R404A



XRV superfeed effect ammonia



XRV superfeed effect R404A



### Key to graphs

- Full duty 50 Hz (excluding Superfeed)  
Condensing temperature 35°C (95°F)
- Full duty 60 Hz (excluding Superfeed)  
Condensing temperature 35°C (95°F)

### Notes

Refrigeration capacity based on 5.6°C (10°F) superheat at compressor suction and no sub-cooling of condensed liquid.

No allowance has been made for pressure losses between the evaporator and the compressor suction flange.

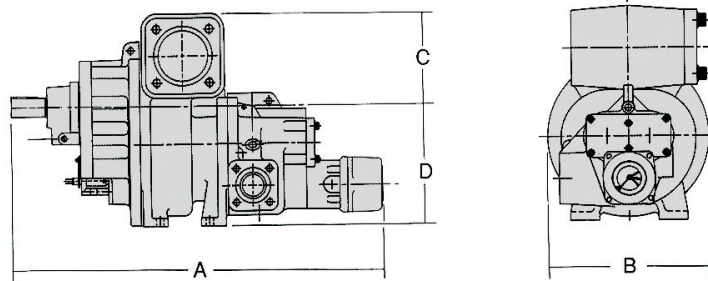


Model range XRV 163

# XRV compressors

## XRV 127/1.65 Compressor

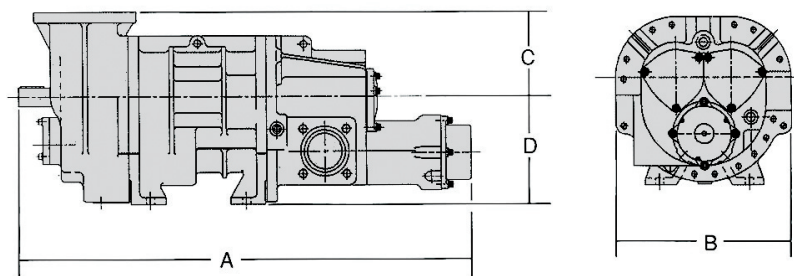
(with anti-clockwise rotation except for XRV 127-R1)



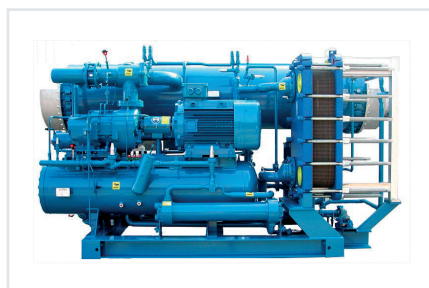
Howden compressor specification	*Swept volume 50Hz		*Swept volume 60Hz		Suction port Ø	Discharge port Ø	Dimension A	Dimension B	Dimension C	Dimension D	Weight approx	
	m³/hr	cfm	m³/hr	cfm							mm	mm
XRV 127-R1	293	172	352	207	100	50	850	390	299	201	250	550
XRV 127-R3	397	234	476	280	100	50	900	390	209	291	250	550
XRV 127-R4	489	288	586	345	100	50	900	390	209	291	250	550
XRV 127-R5	576	340	-	-	100	50	900	390	209	291	250	550

## XRV 163 & XRV 204 Compressors

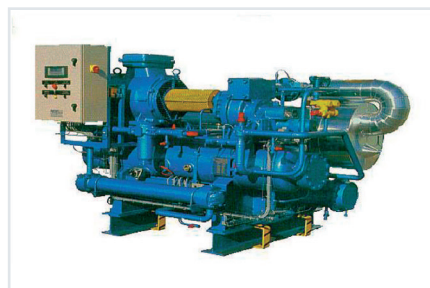
(all with clockwise rotation)



Howden compressor specification	*Swept volume 50Hz		*Swept volume 60Hz		Suction port Ø	Discharge port Ø	Dimension A	Dimension B	Dimension C	Dimension D	Weight approx	
	m³/hr	cfm	m³/hr	cfm							mm	mm
XRV 163/1.65	593	350	712	420	125	76	1070	430	200	250	364	802
XRV 163/1.93	710	418	852	500	125	76	1116	430	200	250	388	855
XRV 204/1.10	812	478	974	573	150	100	1178	516	240	305	636	1400
<b>XRV 204/1.45</b>	<b>1070</b>	<b>630</b>	<b>1284</b>	<b>756</b>	<b>150</b>	<b>100</b>	<b>1249</b>	<b>516</b>	<b>240</b>	<b>305</b>	<b>660</b>	<b>1454</b>
XRV 204/1.65	1219	717	1463	860	150	100	1255	516	240	305	690	1520
XRV 204/1.93	1348	793	1618	952	150	100	1312	516	240	305	736	1621



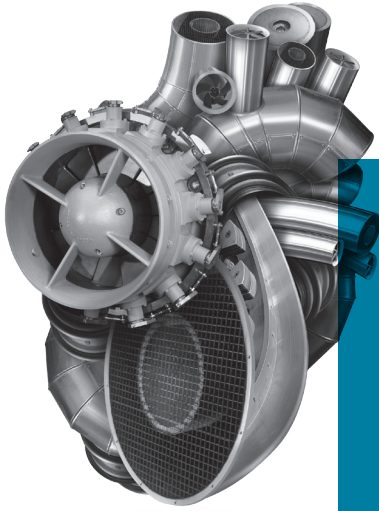
Marine freezing unit



Glycol chiller



Ethyleneglycol chiller unit



## At the heart of your operations

Howden people live to improve our products and services and for over 160 years our world has revolved around our customers. This dedication means our air and gas handling equipment adds maximum value to your operations. We have innovation in our hearts and every day we focus on providing you with the best solutions for your vital operations.



### Howden Compressors

Howden's global service centre of excellence for bare shaft screw compressor design, manufacture, sales and support.

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