Your partner for refinery and petrochemical applications
Leading expertise for constantly changing requirements

Refineries, petrochemical and chemical plants use compressors to pressurize gas at high temperatures for a number of chemical reactions. In these industries, the largest and highest performing reciprocating compressors are used in order to adequately pressurize the process gas. Thereby plant availability, reliability of machinery, profitability and safety are of great importance.

"Above all we need partners, who not only deliver products, but listen to us. And who work together with us when it comes to innovation and problem solving. We have found such a partner in HOERBIGER."

Satisfied customer, Germany

With his groundbreaking invention of the low-mass, frictionless steel plate valve in 1895, Hanns Hörbiger of Austria set a landmark in compression technology history, opening up totally new opportunities for the industry.

HOERBIGER has maintained this innovative strength throughout its history. Even over a century later, intensive research and development, meticulous engineering and design, the use of high-quality proprietary materials along with cutting-edge manufacturing technologies and stringent quality management continue to form the basis of our products.

HOERBIGER uses this specialized expertise together with standardized quality procedures for order processing to develop engineered solutions for both standard applications and special customer requirements.

HOERBIGER – Successful in the process gas industry:
- Refining and oil production
- Petrochemical industry
- Chemical industry
- Technical gases
Explosion relief valves
Protection for personnel and plant

HydroCOM
The high-tech system for stepless capacity control

OT oil wiper packings
Efficient, safe and environmentally friendly

RecipCOM
The comprehensive monitoring and protection system for continuous compressor monitoring

Upgrade and Revamp
Customer-specific optimization of reliability, efficiency and environmental soundness
Our products for the „Reliable Performance of Compressors“

- **Pressure packings and packing rings**
  - State-of-the-art materials and design

- **Pistons and piston rods**
  - Top-quality coatings provide optimal surface

- **Cylinder rings**
  - For all compressor designs and operating conditions

- **Cylinder liners**
  - For optimal guiding of pistons

- **Compressor valves**
  - The heart of every compressor
Rings and packings: Long-lasting and efficient with the unique HY material

- Increases reliability
- Reduces operating costs
- Improves compressor productivity

HOERBIGER offers the right sealing technology, regardless of whether it involves lubricated or non-lubricated operation, dry or wet, chemically aggressive or inert gases and high pressure or low pressure. The key to smooth compressor operation lies in the correct combination of materials and design for the packing and cylinder rings, perfectly adapted to the compressor’s construction and operating conditions.

With innovative solutions for known problems in the compression industry such as absolutely tight OT oil wiper packings and pressure balanced BCD packing rings, HOERBIGER demonstrates its leading role in the design of these key components.

“The use of HOERBIGER’s HY material increased the longevity and reliability of our cylinder and packing rings immensely. This allows us to have longer and better projectable service intervals, thereby reducing our costs.”

Satisfied customer, Germany

HY – The right material for your application

- Proven a thousand times
- Unique in its composition
- Customized for your process

HOERBIGER’s HY materials are developed and manufactured in-house and have proven themselves in numerous applications around the world. As a result of the continuous vertical integration of our HY materials, we ensure the highest quality standards throughout the entire manufacturing process for these critical key components.

In our research laboratories our engineers continuously develop and test improved materials and product designs for operations under the widest variety of operating conditions.

Not only quality products for standard applications are created, but also customized sealing systems for highly critical applications.
Did you know?

Cylinder rings made from HY material achieve operating times of 50,000 hours in bone-dry nitrogen applications.
BCD ring: Against leakage and premature wear

- Extended service life
- Very short packing length
- Significantly reduced leakage

HOERBIGER BCD packing rings are suited for applications in refineries and process gas industry, notably for handling industrial gases.

The patented segmented packing ring for piston rods is designed for long, maintenance-free operation with minimal leakage.

“There is no more leakage with the HOERBIGER BCD packing rings!”

Satisfied customer, United Kingdom

The segment concept is clearly superior to the properties of all existing industrial standards – such as those of the radial-tangential ring set.

The robust main segments seal the piston rod and form a gap for wear compensation. Cap segments ensure sealing in the axial and radial directions. This special design assures pressure equalization and guarantees high efficiency over the entire service life.

Even during pressurized idle times, leakage rates of up to 70 percent lower than conventional solutions are achieved.

The narrow design reduces friction and with it heat build-up. In addition, the whole packing case with BCD rings is much shorter than a packing with conventional radial-tangential pressure packings.

Technical data

<table>
<thead>
<tr>
<th>Piston rod diameter</th>
<th>20 – 200 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>3 – 300 bar</td>
</tr>
<tr>
<td>Gases</td>
<td>All</td>
</tr>
</tbody>
</table>
Did you know?

The service life of the BCD ring is approximately two to three times greater than that of existing solutions, which generally can be replaced with BCD packing ring without difficulties.
The CE valve offers reliability and efficiency even under difficult conditions. Especially the use with different mole weights such as hydrogen, hydrocarbon or nitrogen is optimized in the best possible manner.
CE valve: The efficient ring valve with outstanding reliability

- High reliability
- Special spring protection
- High efficiency and long service life

The HOERBIGER CE valve is optimally suited for applications in the chemical and process industries, in refineries and in the energy sector.

In designing the individual components, special emphasis was placed on the resistance to particles, catalyst dust and entrained polymers.

The flow-optimized geometries of the ports, ring and seat prevent deposits. This largely precludes leaks or even premature wear.

HOERBIGER manufactures the valve rings from light-weight, impact-resistant and carbon fiber-reinforced plastic material.

Large dimensioned and dynamically optimized springs are protected from wear by a “spring saver”. In addition, a dirt-repelling coating can be provided when higher gas impurities are anticipated.

“The make-up / recycle compressors in our diesel desulfurization unit require maximum availability to continuously run a stable process over the whole reactor cycle time. Only HOERBIGER CE ring type valves met our reliability expectations. The valves performed not only durable and reliable, but also enhanced the efficiency of our compressors.”

Satisfied customer, Japan

<table>
<thead>
<tr>
<th>Extremely high service life</th>
<th>Highest efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>By new, carbon fiber reinforced ring material and guided rings</td>
<td>By optimized geometry of flow channels and fine-meshed design</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optimized design of the valve seat</th>
<th>Highest reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>For highest reliability of sealing elements</td>
<td>By robust springs, guided and protected by non-metallic “spring savers”</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. compressor speed</td>
<td>1,200 rpm</td>
</tr>
<tr>
<td>Max. operating temperature</td>
<td>210°C at max. pressure of 200 bar</td>
</tr>
<tr>
<td>Max. pressure differential</td>
<td>100 bar</td>
</tr>
<tr>
<td>Lubrication</td>
<td>Lube and non-lube</td>
</tr>
<tr>
<td>Type diameter</td>
<td>48 – 314 mm</td>
</tr>
</tbody>
</table>
HydroCOM: Stepless control with state-of-the-art mechatronics

- Large stepless control range
- Reliable, standardized components
- Easy retrofitting and integration on existing compressors

Many applications of reciprocating compressors require efficient control of the capacity (flow rate). HydroCOM controls the gas throughput and with it the capacity using state-of-the-art mechatronics. Consequently, operators, process licensors, EPCs and OEMs, which use HydroCOM, are global leaders in technology and economic efficiency.

With approximately 800 installations the stepless HydroCOM control system is internationally successful.

The HydroCOM actuators allow fast and precise control without loss of power, if necessary from minimum load to 100% within three revolutions.

The large stepless control range assures optimal process control.

“Our hydrotreats demand for a stepless capacity control system for maximum flexibility in production and extended catalyst lifetime. HydroCOM was the only system providing unmatched reliability and performance. The system paid itself off in months because of the huge efficiency gains and energy savings.”

Satisfied customer, China

HydroCOM is based on standardized, reliable components. The system is easy to retrofit and can be fully integrated in the distributed control system or PLC of the reciprocating compressor.

For new equipment, a multi-stage compressor fitted with a HydroCOM control system offers clear cost advantages and improved reliability over a compressor equipped with stepped control such as plug or finger unloaders or clearance pocket control.

### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control range</td>
<td>(0) 10° ... 100%</td>
</tr>
<tr>
<td>Max. suction pressure</td>
<td>160 bar</td>
</tr>
<tr>
<td>Max. compressor speed</td>
<td>1,200 rpm</td>
</tr>
<tr>
<td>Ex-certificate</td>
<td>EU (ATEX), US (FM), Canada (CSA), Japan</td>
</tr>
</tbody>
</table>

* depends on application
Only the required amount of gas is compressed. This reduces the energy costs of a 2,000 kW compressor (80% utilization / 9 euro cent per kWh) by approximately 300,000 Euros annually. Moreover, carbon dioxide emissions are reduced with in-house energy generation.

Did you know?
Did you know?

With only a small number of system interfaces RecipCOM can also be integrated in existing plants with minimal installation efforts only. Depending on the security architecture remote monitoring can be performed by you or by HOERBIGER specialists.
RecipCOM: Monitoring- and protection system developed in cooperation with users

- Remote data acquisition in the Ex-zone
- Alarm resolution of crank angle of 1 degree
- Intelligent alarm counter

Malfunctions or failures of reciprocating compressors can quickly result in plant downtime and production losses. HOERBIGER offers smart monitoring systems, which continuously monitor the condition and key components of reciprocating compressors.

Our RecipCOM monitoring system opens up new possibilities for you to optimize machinery protection and reciprocating compressor monitoring.

The modular RecipCOM monitoring system is IEC 61508 / 61511 certified and complies with API 670. It acquires high-frequency, crank angle-related measurement values such as indicator pressure, vibrations and piston rod motion during every revolution.

It compares them with defined alarm values in real time. Critical situations are detected in a timely manner with an alarm limit resolution of a crank angle of 1 degree. Up to 16 limit sets can be defined for various operating conditions. An intelligent alarm counter avoids faulty alarms.

Over 300 compressors worldwide have been fitted with HOERBIGER on-line monitoring or machinery protection systems.

"Most of the traditional monitoring systems installed on our recips did not work reliably. Either they detected problems too late or created nuisance alarms too frequently. Now, with RecipCOM we have an experienced technology that is specifically developed for recips. Users will experience in their daily work that RecipCOM was developed by people that have reciprocating machinery as their core-business."

Satisfied customer, Germany

<table>
<thead>
<tr>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectable sensors</td>
</tr>
<tr>
<td>Ex-certification</td>
</tr>
<tr>
<td>Functional safety</td>
</tr>
</tbody>
</table>

The individual RecipCOM modules are:

RecipCOM Core detects gradually emerging problems by monitoring vibration, rod motion, rod load, rod load reversal, indicator pressure and static data.

RecipCOM Pro protects your compressor from severe damage using instant safety shutdown. Requires RecipCOM Core.

RecipCOM Diagnostics offers advanced diagnostics and root cause analysis, on-line health check and an expert view into your compressor as it runs. Requires RecipCOM Core.

RecipCOM Top includes training, optimization of performance and remote services by HOERBIGER specialists. Requires RecipCOM Diagnostics with remote access for HOERBIGER.
RecipCOM sees more.
At the right time.
Piston
Cracks, breakage

Cylinder
Alignment problems, liner wear, performance, efficiency, maximum cylinder pressure, pulsations, liquids carry-over

Suction line
Clogging of suction strainer

Piston rings
Leakage, breakage

Main packings
Gas leakage

Valves
Leakage, suction and pressure losses, clogging, late closing

Pressure line
Pulsations

Rider rings
Wear

Cracks, runout,
Our service comprises all compressor types and their components. The performance spectrum further includes retrofitting of ancillary and auxiliary units. We satisfy all specifications set out by OEMs and original part manufacturers as well as customer-specific requirements. Once repaired or serviced the compressor is restarted and all works that were performed are recorded in detail. Our goal is to upgrade your compressor according to state-of-the-art technology to ensure a like new performance.

In addition to standard components such as valves or rings & packings, HOERBIGER can also supply all other compressor spare parts such as piston rods, pistons or cylinders. A proprietary reference database ensures the secure identification of spare parts.

If requested, customized replacement parts can be both quickly produced and delivered to you.

A special service offered by HOERBIGER is the optional management of your spare parts portfolio for your compressors, allowing you to drastically reduce your own inventory.

In the event of major breakdowns or if production is dependent on specific units, HOERBIGER assists you in the search for used machines of the required type and retrofits them if necessary. Testing and certification of the refitted compressor is included.

“We know that we can always rely on HOERBIGER, that they deliver what we need at the right time. Reliability is extremely important when it comes to choosing our business partner.”

Satisfied customer, Norway
HOERBIGER also offers a spare parts service for compressors of all manufactures for OEMs as well as compressor operators. Our own stock of replacement and original spare parts guarantees short delivery times.

Did you know?
REE Assessment: the basis for upgrade and revamp of reciprocating compressors

- Customer-specific upgrade and revamp
- Improvements in reliability, efficiency and environmental soundness
- Analysis and optimum adjustment to your production requirements

The reliability, efficiency and environmental soundness of compressors largely determine the economy and safety of the plants in which they are used.

As a specialist in equipping reciprocating compressors with state-of-the-art, highly efficient solutions, HOERBIGER is able to revamp every existing compressor in a unique manner.

Processes change, plants are revamped or upgraded and new technologies are introduced.

“There are not many manufacturers of compressor key components, which have such a wide variety of products. HOERBIGER offers reliable products and a first-class service. We highly value both.”

Satisfied customer, Czech Republic

To meet today’s plant demand in terms of run cycle, energy efficiency and legal compliance, compressors have to be continuously improved.

For this reason HOERBIGER performs REE Assessment for compressor fleets. Senior compressor experts from HOERBIGER carry out a REE audit on site to build up a picture of each compressor’s design, operating conditions, maintenance and failure records. The detailed compliance report pinpoints then the performance of each compressor, with a REE index ranking equipment in terms of its potential for improvements and savings.

Available worldwide for any reciprocating compressor, the REE Assessment helps operators to choose the right technology and to make the right business decisions. The result is a proactive gain for the whole plant in term of

- Reliability
- Efficiency
- Environmental Soundness

HOERBIGER solutions for reciprocating compressors

<table>
<thead>
<tr>
<th>Category</th>
<th>Solutions</th>
<th>Reliability</th>
<th>Efficiency</th>
<th>Environmental soundness</th>
</tr>
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<tbody>
<tr>
<td>Component Upgrade</td>
<td>Compressor valves</td>
<td></td>
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<tr>
<td></td>
<td>Rings and packings</td>
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<tr>
<td>Control and Monitoring Upgrade</td>
<td>Control</td>
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<tr>
<td></td>
<td>Monitoring</td>
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<tr>
<td>Revamp</td>
<td>Capacity change</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Different gases and pressures</td>
<td></td>
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<tr>
<td></td>
<td>Change in lube system</td>
<td></td>
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<tr>
<td></td>
<td>Capital parts upgrading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compressor re-application</td>
<td></td>
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</tr>
</tbody>
</table>

“HOERBIGER’s unique REE Audit”

Solution

Assists with
Did you know?

The new REE Assessment process not only gives clear data on the real performance of your compressor, it also ranks your equipment in terms of its potential for improvement and savings.
Electrohydraulic valve actuator: Compact - powerful - reliable

- Compact design
- Integrated safety functions
- Low installation and maintenance costs

A piping-free design, the use of premium components and 100% functional testing stand for the operational safety and reliability of this system.

Moreover, the explosion proof encapsulation of all electrical components in one housing enables the use in areas that are prone to explosions (ATEX) and assures high protection under extreme usage conditions.

“By using the electrohydraulic valve actuator from HOERBIGER we were able to install the automated valve directly at the site of action in the hazardous Ex-zone. As a result, we can guarantee the operator a safe operation of his plant and moreover, can considerably reduce the installation costs.”

Satisfied customer, Germany

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Satisfied customer, Germany

Industrial automation brings about efficiency

The new electrohydraulic valve actuator developed by HOERBIGER meets the high requirements expected from a flexible, automated industrial valve. The robust, compact and modular design offers optimal solution options for specific requirements in industrial applications:

- Oil and gas
- Chemistry and petrochemistry
- Energy and water management
Did you know?
The HOERBIGER electrohydraulic valve actuator significantly reduces your installation and energy costs due to its up to 90% lower electric connection power.
Did you know?

HOERBIGER check valves are customized for each application. As a result, even in pulsating flow environments their wear and maintenance requirements are very low.
Check and explosion relief valves: Safety for personnel and plant

Check valves
- Reliable and rapid closing action at or before flow reversal
- Long service life even in pulsating flow environments
- Smooth function at different operating conditions

In plants critical pulsations after reciprocating compressors and in pipe work cannot be ruled out. Additionally, strong fluctuations in flow conditions after capacity controlled compressors have to be expected. HOERBIGER check valves offer effective protection against these risks.

HOERBIGER check valves comply with all important international standards and directives. They work safely and efficiently even in strongly pulsating flow environments and under suddenly changing operating conditions. They also open rapidly and reliably with very low flow rates.

The exact engineering of the check valve to the application reduces drops in pressure to a bare minimum. The proven design and application matched metals ensure smooth and efficient operation in any situation, even in highly corrosive applications. Thanks to the friction-free valve discs wear and maintenance requirements are very low.

“We have been using check valves from HOERBIGER in our pipe work for many years. We don’t compromise when it comes to the safety of our personnel and plant.”

Satisfied customer, USA

Explosion relief valves
- Flameless pressure relief
- No immediate plant shut-down necessarily required
- Virtually maintenance free and reliable pressure relief for years

For more than 50 years HOERBIGER has been very successful with customized explosion relief valves in the field of safety technology for compressors. They provide protection for man and machine against the consequences of oil mist and gas explosions.

The compact HOERBIGER explosion relief valves are ATEX certified and comply with the API 618 requirements. In the event of an explosion they react within milliseconds due to their low-mass valve plate and low response pressure. Because of their integrated flame arrester HOERBIGER relief valves guarantee flameless pressure relief discharge even into confined compartments. After the explosion they reseal tightly and thus, reduce the risk of subsequent explosions.

HOERBIGER explosion relief valves allow you to continue running your compressor or engine even straight after an explosion. They are virtually maintenance free and offer reliable explosion pressure relief for many years.
With more than 100 production and service facilities worldwide and approximately 4,000 employees HOERBIGER is here to support you in the oil, gas and process industry. We are leading partners for the economic retrofitting and reliable operation of your plants.

A highly organized exchange of technological experience and know-how within our organization guarantees our ability to deliver this knowledge anywhere throughout the world.

Regional headquarters for Europe, Middle East, Africa:
HOERBIGER KOMPRESSORTECHNIK HOLDING GMBH
Vienna, Austria
info-hkth@hoerbiger.com

Regional headquarters for North and South America:
HOERBIGER COMPRESSION TECHNOLOGY AMERICA HOLDING, INC
Pompano Beach, Florida
info-americas@hoerbiger.com

Regional headquarters for Asia and Pacific:
HOERBIGER KOMPRESSORTECHNIK ASIA HOLDING PTE. LTD.
Singapur
info-hktas@hoerbiger.com
HOERBIGER is active throughout the world as a leading player in the fields of compression technology, drive technology and automation technology. In 2013, its 6,400 employees achieved sales of 1.05 billion euros. The HOERBIGER brand is synonymous with performance-defining components in compressors, industrial engines and turbines, automobile transmissions, and multifaceted mechanical engineering applications. Innovations in attractive technological market niches are the basis for components, systems and services that offer unique selling propositions and long-term benefits for the customer. We set standards.

This document comprises a general overview of the products described herein. It is solely for informational purposes and does not represent a warranty or guarantee. Contact HOERBIGER for detailed design and engineering information suitable to your specific application. HOERBIGER reserves the right to modify its products and related product information at any time without prior notice.