RecipCOM

Expertise, reciprocating compressor monitoring and protection tailored to your needs
Do your reciprocating compressors have sufficient protection?

Due to the increasing demands on availability and because of their special mode of operation, reciprocating compressors require monitoring and protection systems designed specifically for this type of machines. These systems monitor the compressor around the clock, enable a more efficient operation and avoid unscheduled downtimes and major damage.

**Why monitoring and protection are a must**

Your reciprocating compressors are at the heart of your process. Inefficient operation and unplanned shutdowns can seriously harm your business. You cannot rely on conventional measurement technology alone to guarantee the early detection of potential failures to prevent damages in time. Only through the use of RecipCOM it is possible to minimize failures and high repair costs.

**Without appropriate monitoring, many problems are detected too late or not at all**

- Loose or damaged mechanical connections
- Liquid carry-over damages valves, pistons and piston rings
- Clogged valves cause increased pressure in the cylinder and poor compressor performance
- Worn seals cause gas leakage and loss of efficiency
- Damage due to piston rod overloading or loss of rod load reversal

**A compressor failure can have serious consequences for your business**

- Major damage and resulting downtimes
- Loss of production
- Safety risk to workers
- Inefficient operation
- Unnecessary and unplanned maintenance work
- High costs for repairs, risk management and environmental protection
Compressor monitoring and protection is the best investment you can make

Investing in RecipCOM pays off if even a single outage can be prevented or compressor downtime shortened.

Monitoring and protection systems ensure optimal and profitable operation of your compressor. If the system prevents major compressor damage only once, or is able to reduce the duration of a maintenance stoppage, the investment will have already paid for itself.

HOERBIGER’s RecipCOM protects your compressor in real time and ensures optimal and cost-efficient operation of your plant.

RecipCOM continuously monitors critical equipment parameters such as vibration, rod position, indicator pressure and temperature. This allows you to exploit the full potential of your compressor and gives you early warning of potential failures.

The benefits are clear

**Dependable protection against compressor failures - for increased operational safety and reliability**
- SIL certified protection of compressors, people and environment
- Prevention of major compressor damage
- Reduction in the number of compressor failures

**Improved maintenance planning and lower service costs**
- Early and unambiguous fault detection
- Online condition monitoring
- Precise root-cause analysis
- Condition-based maintenance

**Lower operating costs and increased productivity**
- Risk-free extension of maintenance intervals
- Provision of information to optimize compressor performance
- Reduction of risk transfer costs and insurance premiums
Thanks to RecipCOM’s modular design...

RecipCOM combines a modular system architecture with sophisticated analysis capabilities for the monitoring and protection of reciprocating compressors. This allows you to fine tune the system to fully match your compressor.

No two compressors are alike. No two operators work in the same way. That’s why RecipCOM has been designed to be flexible and can be upgraded to meet your needs.

RecipCOM Core
Detects and monitors wear and gradually developing problems. Monitors vibration, piston rod position, rod load reversal, indicator pressure and static readings. All dynamic signals (indicator pressure, vibration and piston rod position) are stored on the RecipCOM Compressor Interface Unit (CIU²) at the start and stop of the compressor. The recorded measurements and the current live signal can be visualized by the user on a laptop.

RecipCOM Pro
Protects your compressor from rapidly developing problems, with the possibility of automatic shutdown to prevent severe damage. In the case of an alarm, the dynamic signals prior to the alarm are recorded on the CIU² similar to a “Flight Recorder”. Failure analysis can thus be carried out easily and quickly. RecipCOM Pro requires RecipCOM Core.

RecipCOM Diagnostics
Advanced diagnostics, fault analysis and online condition monitoring.
RecipCOM Diagnostics requires the RecipCOM Core module.

RecipCOM Top
Synonymous with training and performance optimization, monitoring services and upgrade solutions.
RecipCOM Top requires the RecipCOM Diagnostics module including remote access for HOERBIGER.
... you invest only in the features you really need

Maximum flexibility combined with deep technical know-how: choose the RecipCOM modules relevant to your current compressor operation and upgrade your system when you need it.

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- **RecipCOM Core**: Detects and monitors gradually developing problems.
- **RecipCOM Pro**: Protects your compressor from rapidly developing problems, with automatic shutdown to prevent severe damage.
- **RecipCOM Diagnostics**: Advanced diagnostics, fault analysis and online condition monitoring.
- **RecipCOM Top**: Training, optimization of performance and remote monitoring services by HOERBIGER experts.
...you get better insight into your compressor's performance and can directly retrieve health status data.

Eddy current sensors in the distance piece monitor rider ring wear and piston rod run-out over each revolution. An increase in run-out indicates a loose connection between piston rod and crosshead, a change in cylinder alignment or excessive crosshead clearance. Early detection of these problems can prevent major damage, help scheduling repair work and reduce maintenance costs.

Dynamic pressure sensors in the clearance spaces measure the gas pressure in the cylinders at a high frequency. The RecipCOM hardware uses the cylinder pressures and compressor parameters to calculate the piston rod load, the load ratio and the duration of the load reversal. As a result, your compressors are protected against excessive stress on the oscillating components and insufficient lubrication of the crosshead pin. In addition, the system performs comprehensive thermodynamic analyses (pV).
You can directly retrieve health status data.

**Crosshead**
Incorrect assembly, crosshead pin damage, excessive crosshead clearance, loose connection between crosshead and piston rod

**Cylinder**
Liquid carry-over

**Piston**
Loose connection between piston and piston rod, cracked piston

**Piston rod**
Breakage

**Others**
Loose valves or cages, loose foundation bolts, major imbalance, failure of main and connecting rod bearings

Vibration sensors on the distance piece and crankcase monitor the moving parts of the crank drive and check for mechanical failure. The unique method of vibration monitoring with a resolution of 1 degree crank angle enables the detection of malfunctions much earlier than conventional systems. This allows for prompt initiation of the necessary measures to resolve the problem at an early stage and prevent potential serious damage.

RecipCOM Pro is certified by TÜV Rheinland and complies with IEC 61508/61511 (SIL). RecipCOM is a monitoring and protection system developed specifically for reciprocating compressors. Because every single revolution is monitored in real time, the compressor can be shut down immediately in the case of developing problems. Thanks to the operating condition-based alarm limits, a smart alarm counter and continuous self-diagnosis, false alarms are reliably eliminated.

Temperature readings on components, leakage and lubricating oil lines are important maintenance parameters. The following applies to suction and discharge valves: Temperature deviations are a sign of wear on valves or piston rings. Bearing temperatures can be used to identify problems with lubrication, load or wear. Accurate trending shows whether a problem must be corrected immediately or if it can wait until the next scheduled shutdown.
Get the winning edge: RecipCOM Diagnostics

With RecipCOM Diagnostics you can benefit from HOERBIGER’s extensive experience in the fields of reciprocating compressors and condition monitoring.

**RecipCOM Diagnostics for advanced diagnostics and fault analysis**

**Performance**
Sophisticated pV-analysis allows RecipCOM to detect problems at the suction and discharge valves, identify leaking rings and packing or malfunctions on other cylinder-related components. At the click of a mouse, compressor performance tables can be called up to evaluate critical equipment parameters which can be used to assess compressor efficiency and energy costs and to determine the impact of new operating conditions.

**Damage prediction**
Where other monitoring systems use fixed alarm limits, RecipCOM monitors vibration levels and relates them to the crank angle for reliable and robust fault detection. Comparing vibration signals with rod load and cylinder pressure diagrams pinpoints events such as rod load reversal and valve opening and closing. The result is precise diagnosis of liquid carry-over, delayed valve closing and loose components.

**Rod Motion**
Rod motion plots display the movement of the piston rod at the main packing over a crank angle of 360 degrees. On the basis of deviations from the normal operating conditions, changes in cylinder alignment, excessive crosshead clearance, as well as liner or rider ring wear can be detected as a function of the crank angle. An XY-analysis of the rod position over a 360° angle is also possible.

**RecipCOM Top stands for training and performance optimization**

**System implementation**, ranging from the assessment of existing monitoring equipment and failure history of individual compressors to turnkey installations.

**Monitoring services** for increased reliability and improved maintenance planning.

Support and **training** in using RecipCOM to its full potential and ensuring optimal performance.

Customized **upgrade solutions** that make the operation of your compressor more efficient, reliable and environmentally friendly – on the basis of an integrated REE assessment.
Powerful, compact, versatile

RecipCOM provides unmatched monitoring capabilities and reliable protection of your reciprocating compressors. With only a small number of system interfaces, RecipCOM can be integrated quickly and easily into both existing and new installations.

How does RecipCOM work?

RecipCOM is a monitoring and protection system designed specifically for reciprocating compressors. It is certified to IEC 61508/61511 and compliant with API 670. **RecipCOM is reliable, versatile and fast**: if necessary, it can immediately shut down a compressor automatically. RecipCOM combines the speed and robustness of its evaluation electronics with a Windows®-based software for simple and powerful data analysis.

The new generation of Fast Transmitter Interface Modules (FTIM²’s) enables a decentralized acquisition of the measured signals. Each of these FTIM²’s contains a power supply and barriers for up to eight intrinsically safe transmitters. The FTIM²’s can be installed in explosion-proof areas.

Compared to conventional monitoring systems, the simple system architecture reduces planning, wiring, and installation from the compressor to the control cabinet. All the measurements are made synchronously over each revolution and the readings transferred over a secure and redundant high-speed communication link to the compressor interface unit (CIU²).

The CIU² receives and compares these data with the alarm thresholds set for the particular operating conditions. The RecipCOM system immediately detects any limit violation and communicates this to the control system by means of a relay contact. **To avoid false alarms**, the CIU² triggers the alarm relays only if the alarm threshold is exceeded for a set number of revolutions. The alarm signal is passed from the CIU² to a dedicated safety system or the main DCS.

Detailed analysis with the built-in "Flight Recorder"

RecipCOM is the only machine protection system with integrated dynamic signal recording capabilities. The on-board “Flight Recorder” stores all dynamic signals during start-up, shutdown and alarms over a number of revolutions directly on the hardware of the CIU². If required, these data can be loaded onto a laptop or PC to carry out a detailed analysis. A separate RecipCOM server can also be used to record and visualize all data collected by the system. A comprehensive exchange of information with the PLC or DCS takes place via standard interfaces. The connection over TCP/IP enables full network integration and remote access.
Benefits of RecipCOM at a glance

RecipCOM offers more than other compressor monitoring systems. With more than 100 years of experience in the field of reciprocating compressors, HOERBIGER has implemented over 1,300 mechatronic solutions for compressor monitoring and protection.

Take advantage of HOERBIGER’s expertise in the field of reciprocating compressors and condition monitoring

- Specialists with expert knowledge of compressor components, their operation and service.

Modular and customized monitoring solutions tailored to your needs

- Easy to use, with simple installation and quick integration
  - Distributed data acquisition in hazardous areas: reduced wiring costs, fewer terminal blocks, easier installation in the control cabinet
  - Digital communication: cable lengths of up to 500 meters between compressor and CIU² possible (60% longer than conventional systems)
  - Plug and work: Reduced installation and commissioning costs
  - User-specific operating modes: "Basic" for plant operators and "Expert" for maintenance engineers
  - Online assessment of compressor condition
  - On-board ‘Flight Recorder’

Highest precision and reliability

- Functional safety certified by TÜV Rheinland, Germany
- Extra-fine resolution of alarm limits: 1 degree crank angle
- Reliable and fault-resistant redundant digital data transmission
- "Trust" function for internal fault detection and system monitoring
- Smart alarm counter: envelope type alarming with operating condition-dependent limits to prevent false alarms

Areas of application: natural gas, petrochemical industry, refining

Take advantage of HOERBIGER’s unmatched global technical support and contact your local HOERBIGER branch or write to: compressor-mechatronics@hoerbiger.com.

www.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 and services that offer unique selling propositions and long-term benefits for the customer.

We set standards.