



APPLICATION REPORT Chemical

Monitoring operating fluid in hazardous areas of liquid ring vacuum pumps and compressors

- Local display of the flowrate and monitoring of the minimum flowrate
- Fully pre-configured solution for quick start-up
- System standardization with a device type for different Ex requirements and fluid properties



1. Background

Sterling SIHI GmbH manufactures process engineering systems with liquid ring vacuum pumps and compressors. Liquid ring vacuum pumps have a star-shaped impeller eccentrically arranged in a cylindrical housing. The operating fluid is located in the housing. During rotation, and through centrifugal force, it forms a concentric liquid ring on the housing that seals the impeller chamber. Due to eccentricity, the blades immerse at different depths in the liquid ring and act like a piston, which alternately results in suction and compression. Thanks to the almost isothermal compression, this type of pump is ideally suited for conveying or evacuation of explosive gases and vapours. During operation, a liquid ring vacuum pump must be continuously supplied with operating fluid. This is necessary both for the operation of the pump, as well as to avoid a potential spark discharge in the pump.

2. Measurement requirements

When conveying explosive gases and vapours, it must be ensured that the pump supplies a sufficient amount of operating fluid. For simple applications, the operating fluid is water. Depending on the process, the operating fluid can enrich with the media to be evacuated or consist entirely of a chemical compound (e.g. sulphuric acid). For the monitoring, a volume flow measurement of the operating fluid is necessary to ensure the functioning of the pump, and in particular, to avoid a spark discharge in the pump when idle. Depending on the application, the flowrate can be a few hundred to several thousand litres per hour.

3. KROHNE solution

The measurement of the operating fluid is carried out with H250 M40 variable area flowmeters.

For each liquid ring vacuum pump or compressor, a device is used and installed in the operating liquid supply by flange connection (DN 15 / ½" or DN 25 / 1").

The devices are equipped with an analogue display and a limit switch contact. The system operator is therefore able to read the current volume flow on site at any time. When there is an unacceptably low flow of operating fluid, the system is shut down via this limit switch contact.



H250 M40 monitors the operating fluid supply

4. Customer benefits

The use of the H250 M40 fully meets the requirements of the operating fluid measurement. A maximum measuring error of 1.6% of the measured value is sufficiently accurate for this application because the focus is on a low-cost solution. The measuring devices are fully configured by KROHNE for the measuring task, the outlay for system manufacturers is limited to installation in the piping and wiring of the limit switch contact. The outlay for the system operator is also minimal since it only needs to evaluate the preset digital switching signal and no further evaluation hardware must be procured or configured.

A major advantage for Sterling SIHI is that the H250 M40 has more than 30 global Ex approvals, including, for example, ATEX, IECEx, FM and NEPSI. Furthermore, Sterling SIHI can also revert to the same device type for applications in which an operating fluid with special chemical or physical properties is used, as KROHNE offers a variety of material types. This way system engineers can standardize all liquid ring vacuum and compressors worldwide with the same flowmeter, regardless of the regional Ex requirements and the properties of the operating fluid.

5. Product used

H250 M40 variable area flowmeter

- Robust metal version, available in a variety of materials
- Unique modular concept for maximum flexibility
- Limit switch (NAMUR, transistor or reed contact)
- 2-wire current output 4...20 mA with HART communication
- Foundation Fieldbus / Profibus PA communication
- Graphic display with flow counter and pulse output
- Universal Ex concept: explosion proof and intrinsically safe
- Can be used for both horizontal and fall pipes



Contact

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