



TOP NEWS

Maintenance Report 2026
Wie Europa heute wartet – und morgen gewinnt Seite 02

Intelligentes Netzmonitoring ...
... statt Maschinenstillstand durch Stromschwankungen Seite 14

Spannen von Maschinenriemen
Experten des VTH informieren über die fachgerechte Montage Seite 28

THEMEN

Nachrichten	02
Antriebs- & Steuerungstechnik	23
Arbeitssicherheit	12
Condition Monitoring Mess- & Überwachungstechnik	17
Drucklufttechnik	21
Energie-Effizienz	25
Facility Management	22
Fertigungstechnik	14
Industrieservice	05
Management & Technologie	07
Reinigung	15
Wartungs- & Werkstattbedarf	28
Zulieferteile	30
Messen & Events	32
Impressum	20



Pressure accumulators safely in view

Hydraulic accumulators perform crucial tasks in hydraulic systems – from energy storage to emergency supply in the event of a fault. However, the correct nitrogen preload pressure is crucial for them to operate reliably. This pressure can now be monitored contactlessly and very simply with PTRF pressure transmitters and corresponding Stauff readers – and of course without pressure loss, stresses the manufacturer.

Hydraulic accumulators are pressurised vessels that store energy in the form of compressed gas and return it to the hydraulic system when it is needed. They stabilise the system pressure, smooth out pressure fluctuations, absorb pressure peaks, vibrations and hydraulic shocks, ensuring smooth and seamless operation. Hydraulic accumulators are also used for volume balancing by compensating for temperature fluctuations or even for irregularities caused by leaks. They also cover short-term peak loads and provide an important emergency function in the event of power or pump failure. Nitrogen preload pressure must be within a

defined range for these functions to be reliably fulfilled. Incorrect preload pressure can lead to failures, safety risks, and high follow-on costs. If the pressure is too low, the usable storage capacity decreases to compensate for pressure fluctuations or spikes. The pump then needs to adjust itself more often, start up more frequently, and also suffers wear more quickly. This can lead to system failures and machine downtimes, especially in mobile hydraulics. If, by contrast, the preload pressure is too high, the available oil volume will be lower, reducing the absorption of pressure spikes. This may result in undamped impacts that

can damage workpieces or machines in presses etc. Destabilisation of the hydraulic circuit during rotor adjustment in wind turbines can result in particularly high downtime and repair costs. Depending on the type of accumulator, diaphragm or bladder damage can occur up to total failure of the hydraulic accumulator with incorrect pressure conditions. In many applications, regular, documented testing therefore forms an integral part of preventative maintenance and is often prescribed by standards or operating instructions. Continued on page 20



Stauff uses special accumulator adapters and the PTRF pressure transmitter to monitor hydraulic accumulators. The adapter is only fitted once and the filling valve can continue to be used. Images: Stauff

equipment available can still be used as usual. The compact PTRF pressure transmitter is mounted on the side of the adapter.

Without changing the basic construction of the accumulator, it is now permanently equipped with a gas pressure sensor. It is thus also possible to retrofit existing systems without interfering with the tube or the hydraulic part of the system, something that can be done during regular maintenance downtimes.

Pressure transmitters cover the normal hydraulic measuring ranges from 0 to 16 bar to 0 to 600 bar (relative), achieving a measuring accuracy of at most ± 0.5 percent of the measuring range limit.

This allows both low preload pressures in smaller accumulator sizes and also high pressures in demanding high-pressure applications to be recorded. Fixed assignment of the adapter and sensor to a specific accumulator creates a permanently measurable and clearly identifiable measuring point that can be achieved without additional screw connections or hoses, and is also mechanically robust.

Functional principle of RFID sensors

The functional principle of the PTRF reader is based on RFID technology: during measurement, the read and display unit generates a high-frequency electromagnetic field, the energy of which is transmitted contactlessly to the sensor via the built-in antenna.

The pressure transmitter therefore has no need for its own power supply or cable connection. Energy and data are transmitted exclusively via the radio field during the measuring process. After pressing the button on the sensor, the sensor detects the current pressure within about half a second, modulates the measured data into the field, and transmits it back to the hand-held device, where it is displayed on a illuminated display and simultaneously stored in the internal memory.

Additional information is transmitted for each measurement in addition to the actual pressure value:

date and time, temperature, the unique serial number of the respective pressure transmitter, and thus indirectly the associated measuring point. This results in a clear assignment of the measured value, accumulator and time without the operator having to enter additional information.

Over 15,000 data sets, such as this, can be stored in the internal memory of the reader and subsequently transmitted via a USB interface to a PC or notebook. The software supplied enables data to be evaluated, archived and further processed for trend analysis, maintenance logs or audit evidence etc.



Contactless measurement reduces testing, avoids nitrogen losses, and supports status-based maintenance, stresses Stauff.

Compared to conventional measurements, the system significantly reduces the amount of work required for each accumulator, as there is no need for test hoses to be screwed and unscrewed, and documentation is produced automatically.

Practical benefits in operation

Contactless monitoring prevents pressure losses at the gas filling valve and thus avoids a gradual lowering of the preload pressure by frequent testing. At the same time, the risk of leaks or damage to the valve seat is minimised by reducing the number of mechanical interventions.

Operators with multiple accumulators – for instance in pressing plants, steelworks, large test rigs or wind turbines – can thus plan inspection routes more efficiently, standardise measurements, and define maintenance intervals using reliable data.

The unique identification of each measuring point via the sensor's serial number provides transparency about the state of the individual accumulators and supports status-based maintenance. Anomalous accumulators can be detected early before faults or safety risks occur, while regular accumulators can remain in operation for longer. The system

Continued from page 1

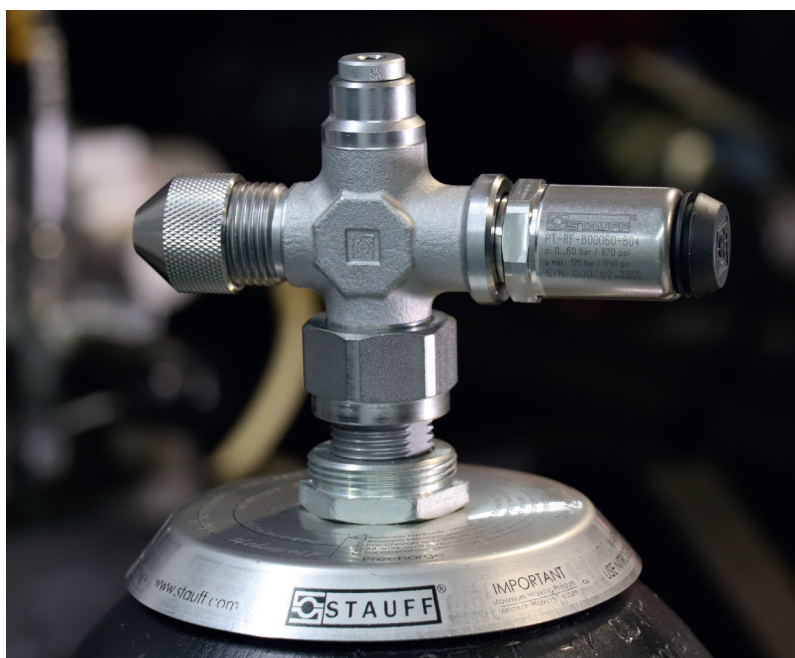
Usually, the preload pressure is controlled using traditional measuring instruments: an adapter, hose and pressure gauge are connected to the accumulator gas filling connector, the pressure is read, and the result is recorded manually. However, each connection means temporary venting at the valve, during which time nitrogen escapes and the preload pressure gradually decreases. The time required for each accumulator is typically 10 to 15 minutes, depending on accessibility and documentation requirements. This leads to considerable downtimes in systems with multiple accumulators, while the measuring accuracy can be limited by reading errors, unfavourable installation situations or a lack of traceability of the data.

This can sometimes result in users carrying out testing less often or even completely abandoning it. Most companies do not employ technical personnel authorised to carry out this type of testing.

Contactless monitoring with PTRF

Stauff is addressing these shortcomings with series SBAA-P accumulator adapters for bladder accumulators and series SDAA-P for diaphragm accumulators in conjunction with PTRF pressure transmitters and an associated read and display unit. The adapter is screwed once onto the gas connection of the hydraulic accumulator by trained technical personnel.

The standard filling valve remains operational on the upper connection and any filling



Stauff is using series SBAA-P accumulator adapters for bladder accumulators and series SDAA-P for diaphragm accumulators in conjunction with PTRF pressure transmitters for monitoring, and an associated read and display unit for data readout. The adapters are screwed once by trained technical personnel onto the gas connection of the hydraulic accumulator.



Hydraulic accumulators ensure the stable operation of hydraulic systems and take on central energy and safety functions. However, the correct nitrogen precharge pressure is crucial for the performance, service life, and safety of pressure accumulators. With this complete set from Stauff, the gas pressure can be monitored permanently and without any loss of pressure.

thus helps to increase the availability of hydraulic systems, reduce testing and, at the same time, comply with documentation requirements in relation to internal guidelines or external testing bodies: all this without losing the character of a simple, robust test instrument.

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<https://stauff.com/de/>