developing solutions

FISCHER
MESS- UND REGELTECHNIK

Measurement technology to record relevant process factors

Energy management

- Record energy consumption
- Analyse energy consumption
- Save energy costs

SITUATION AND OUTLOOK

Increasing energy costs and the global promotion of reduction of the CO_2 emissions are issues that place increasing demands on building industrial systems.

The reduction of energy consumption is possible in a variety of means and ways. So-called "**energy management**" has been created as a new term. This includes the planning and operation of energy generation units.

The political framework

Alongside the legal aspects which might specify limit values for emissions in industrial operations for example, political components for encouraging energy savings are gaining more and more weight. The term "energy management" and the associated aspects are precisely defined in connection with this. These issues are reflected by the new norm, DIN EN 16001, which serves the purpose of developing operational energy management.

OBSERVATION OF ENERGY CONSUMPTION

"Energy management" should put a company in a position to be able to continually improve its energetic performance with a systematic approach. The first step is usually an energy flow analysis which records the observation range in the operation or system. The consumption amounts are then detected. This can include analysis of load profiles that measure the individual consumption types.

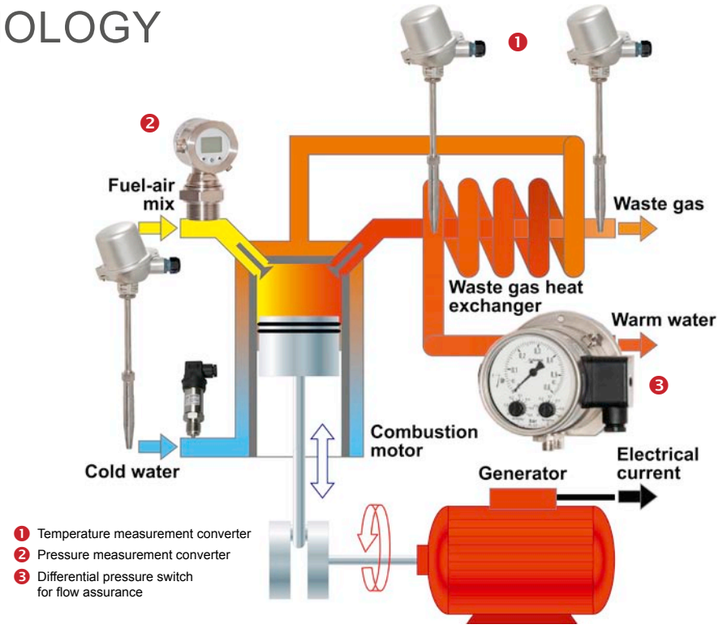
This includes the factors entering the process such as electricity, water, compressed air, heat and cold among others. However, it can also include process flows that leave the process unused in the form of waste air, waste heat or waste water. Alongside the sequences in the processes, the secondary circuits play an important role in energy management. These circuits provide the processes with energy, such as through heat transmission mediums, thermal oil, steam or hot water. Volume flows and process parameters such as pressure and temperature, to control the operating parameters on heat exchangers and pumps for example, also belong to the factors detected.

PROCESS TECHNOLOGY

The application areas are multifaceted. Monitoring the pressures and load cycles in a compressed air system can give information on the possible leaks in the system. Recording the pressures, temperatures and flow is offered in the area of forced heat coupling, cooling water and return cooling water, heating equipment, compressors, pumps or heat exchangers.

Cogeneration power stations are a typical application area for saving energy. A gas or diesel motor drives the generator for electricity production. If not used otherwise, the exhaust gases enter the environment at a high temperature. There is now the option of channelling these waste gases through a waste heat boiler. These have a circuit with a hot water pipe and thermal oil. Thermal carriers are heated up using the hot waste gas and transport the energy gained to the consumers. This means that electricity is produced and heat is gained at the same time. The energy is used for heating purposes or for drying in systems such as used in the textile, paper and wood industry. The circulating oil volume is controlled using so-called flow guards. These monitor the process and also protect the pumps against dry run and the boiler against overheating.Furthermore, process factors such as the pre-run and return temperature or the availability of sufficiently filled hot water tanks are also important factors for maintaining system safety and achieving an optimum effectiveness level.

Measurement of the volume flows using the so-called effective pressure panel has proven itself in these processes measurements. This process is inexpensive and robust. By tying the measurement point in the pipeline, the differential pressure is converted into a volume flow using the substance parameter



Alternative to the differential pressure switch: differential pressure measurement converter for flow assurance with previously mounted measurement panel

of the medium. If the minimum circulation volume of the heat carrier is not achieved, the switch contact blocks the hot waste gas to ensure the flow. This ensures that the pipes in the boiler are protected and overheating is avoided.

A construction type approval is necessary to ensure the flow, consisting of an effective pressure panel and a differential pressure switch. In order to optimise the boiler system, the flow volume is also detected on the effective pressure panel with a differential pressure transmitter with constant output signal and correspondingly integrated in the process.

BUILDING TECHNOLOGY

In building technology, energy management is gaining significance in the optimisation of air flow. The ventilators are optimally controlled with the use of frequency converters. Only the air volume actually required is produced. The optimisation and reduction of circulation volumes allow ventilation systems to be designed smaller and lead to lower electricity consumption. Alongside the temperature and the operating pressure, volume flows are also important process factors. These can be calculated using a Venturi pipe or pitot tube probe using the differential pressure. Temperature compensation of signals is offered for temperature fluctuations.

Application examples for energy efficiency increase according to measurement points

Measurement point	Target	Measurement parameters
Filter monitoring	Reduce pressure losses	Differential pressure pre-run and return
Steam boiler monitoring	Reduce primary energy (oil and gas), increase effect level	Temperature pre-run and return
Compressed air system	Reduce pressure losses	Flow monitoring
Cooling water systems	Improve heat insulation, reduce pressure losses Reduce waste water amounts	Pressure, differential pressure, temperature and flow
Thermal oil systems	Monitor pump protection, ageing, process heat exchanger	Volume flow
Ventilation technology	Minimisation of electricity consumption on the ventilation systems	Volume flow regulation using the frequency converter
Pump monitoring	Regulation of the heating pump	Suction and pressure side pump pressure
Storage tanks	Sufficient storage, optimal tank cycles	Continual measurement process (capacitive, hydrostatic, bubbling method), limit value monitoring (proximity switches, conductive measurement)
Compensation tanks	Avoid system standstill	Limit level monitoring

Small figures – big effect

The following table establishes how big the savings potential is by reducing the leaks.

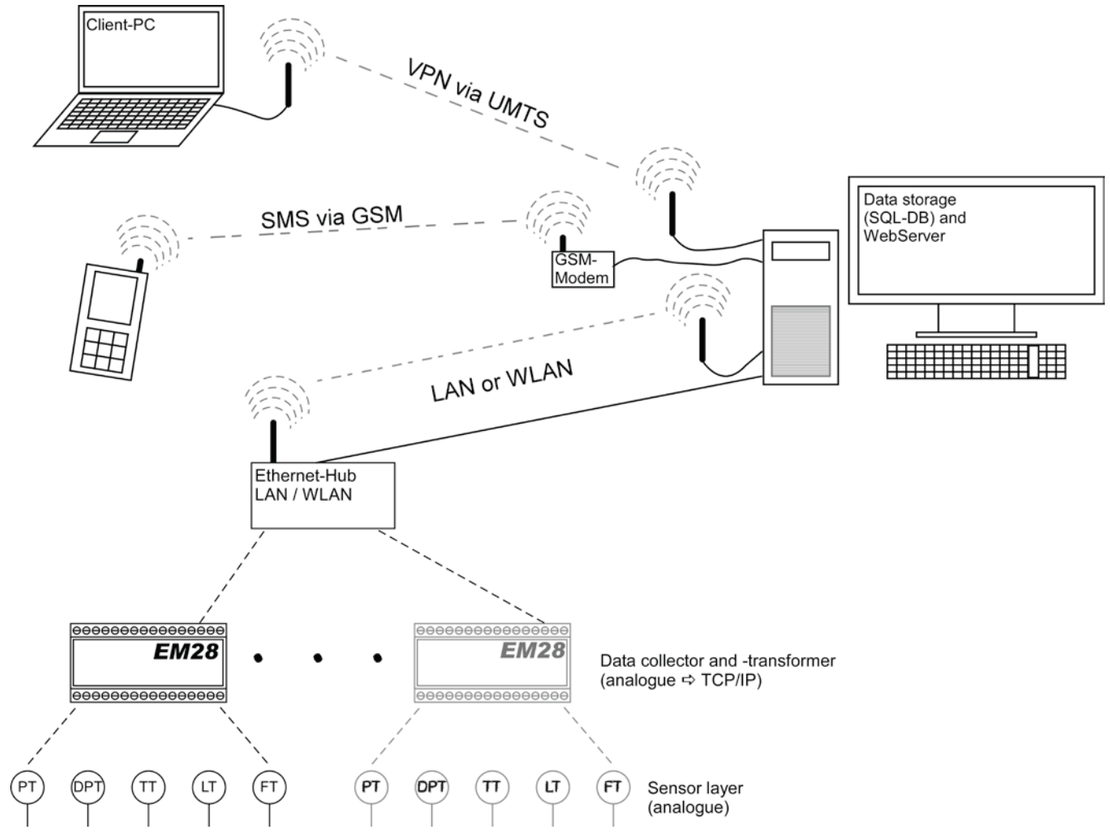
Comment: leaks are a "round the clock" threat 24 hours a day – even when production isn't running!

Hole diameter (mm)	Air loss at 6 bar (l/s)	Air loss at 12 bar (l/s)	Energy loss* at 6 bar (kW/h)	Energy loss* at 12 bar (kW/h)	Costs of 6 bar (Euro/year)	Costs of 12 bar (Euro/year)
1	1.2	1.8	0.3	1.0	263	876
3	11.1	20.8	3.1	12.7	2,716	11,125
5	30.9	58.5	8.6	33.7	7,534	29,521

** = kW x 0.10 Euro x 8760 operating hours / year*

Leak related energy costs, source: VDMA "compressed air seminar"

Remote data transmission - possibilities without limits



Wireless transmission of measurement signals is available for particularly difficult to reach measurement points.

For complex systems with several measurement points, there is the option of locally placing the data on a central data collector (EM28). From here, the information is directly transmitted using WLAN and ETHERNET to the operator's IT system. The supplied server software contains a standardised SQL database for long-term storage of the data. Information can also be processed in Excel for analysis.

Scanning rates and limit values can be set individually. Using the supplied client software, the placement of background images as part of energy monitoring can be achieved.

Transmission of the data using the RAMOC data module is available for de-centralised individual solutions. The device is directly connected with the detecting sensor and transmits the analog output signals. Limit value excesses or routine requests are directly reported as a text message or e-mail to the operator.

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Which measurement devices for which applications?

AND LOTS MORE ...

Differential pressure



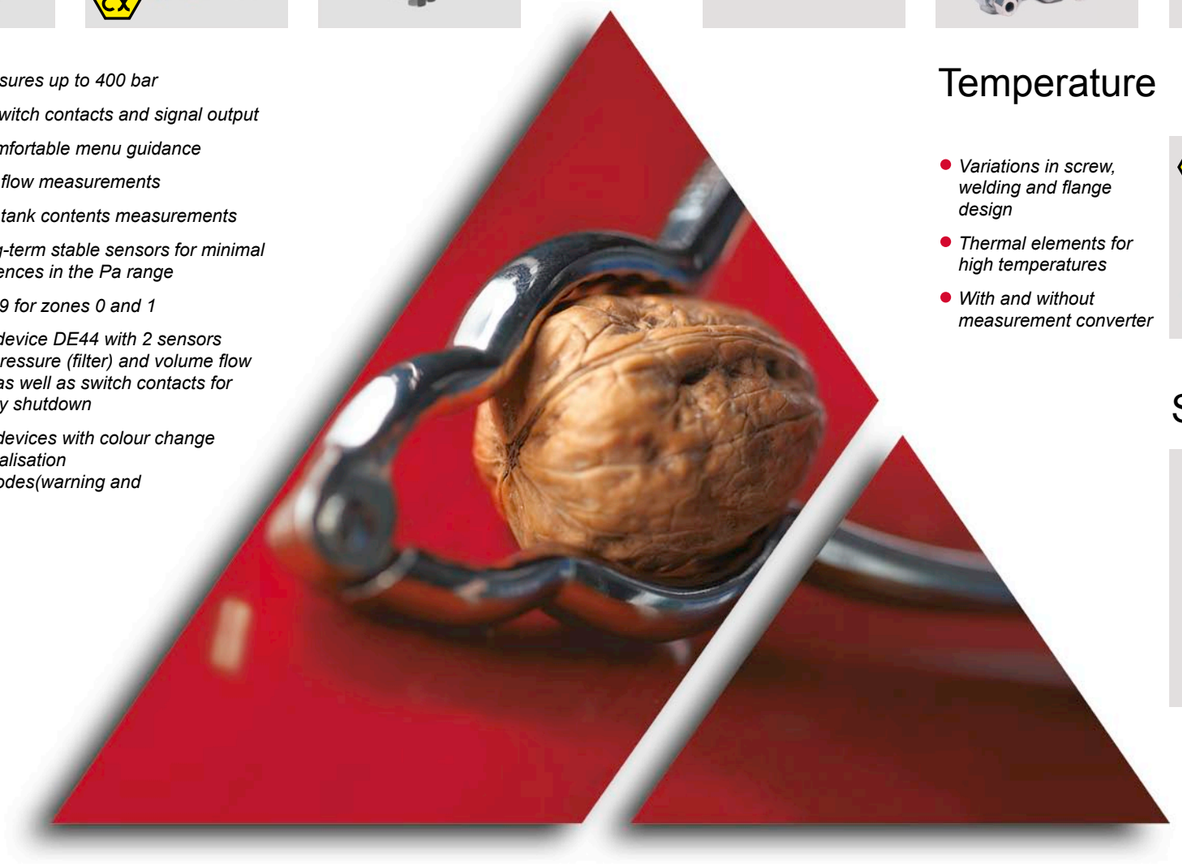






▲ ***DE39*** *with 2 sensors for differential pressure measurement and optional pressure measurement in the pre-run and return in a device.*

- *Operating pressures up to 400 bar*
- *Optional with switch contacts and signal output*
- *Simple and comfortable menu guidance*
- *Extendable for flow measurements*
- *Extendable for tank contents measurements*
- *Capacitive long-term stable sensors for minimal pressure differences in the Pa range*
- *Ex-device DE49 for zones 0 and 1*
- *Measurement device DE44 with 2 sensors for difference pressure (filter) and volume flow measurement as well as switch contacts for filter emergency shutdown*
- *Measurement devices with colour change display for visualisation of operating modes(warning and alarms)*



Pressure





- *Sensors up to 600 bar*
- *Remote parameterisation*
- *Parts touching mediums, made of PVDF for highly aggressive mediums*

Extended system technology




- *Accessories (pressure transmitter and valve blocks)*
- *LOGGER for data recording*
- *Remote data transmission*

Temperature

- *Variations in screw, welding and flange design*
- *Thermal elements for high temperatures*
- *With and without measurement converter*



System control

The energy consumption can be precisely adapted to the requirements with the use of control valves and frequency converters.

In combination with a flow measurement device, precise control is possible. It is worth using more control valves with this in mind. The quality of control processes is improved. Less energy is also used. Initialisation of the systems is quicker and saves time. Warming up the systems is not required by limiting the parameters.

Filling level



- *Filling level limiter*
- *Continual measurements with reed or capacitive systems*
- **New:** *Conductive filling level probe with integrated switch contacts !*

FISCHER Mess- und Regeltechnik GmbH supplies an optimally customised model series for these applications.

The measuring instruments are distinguished by:

- Families of measuring instruments for various measuring tasks
- Comfortable user prompt
- Tables for asymmetric tank containers or flow measurements (K-factors) may be saved
- Some instruments with extended proofs (SIL, GL, structural testing, etc.)
- Industry-compliant equipment for housings and process connections
- Special instruments with colour-change displays for visualisation of operating conditions (e.g. warnings, alarms)
- Customer-specific system solutions, for example with logger functions for recording of measurement data or with wireless remote transmission (via SMS, email, WLAN)

Numerous references from the areas of system planning, system engineering and construction and from operators prove the quality of our products.

FISCHER Mess- und Regeltechnik GmbH offers individual concept solutions for your application.

We are an owner-operated family business with efficient decision-making processes.

We offer our customers tailored systems and product solutions, as well as OEM products.

Our devices and solutions are optimally suited for a variety of applications, such as:

- Pressure measurement (under- and over-pressure)
- Differential pressure measurement
- Flow measurement
- Temperature measurement
- Level measurement
- Humidity measurement
- Control Systems

Our sales engineers are available for a detailed consultation regarding our products and solutions.
Contact details can be found on our website:

www.fischermesstechnik.de

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