Smart Scale Energy Solutions Compressed Air Systems

Reduce costs with improved system performance

Benefits

- Evaluate the performance of your compressed air system in the right way by using application specific key performance indicators
- Save up to 30% of energy by:
  - Monitoring the system performance
  - Balancing the compressed air system
  - Detecting leakages early
  - Doing maintenance at the right time
- Quantify and reuse waste heat

Compressed air systems are complex systems and often "grow over time". With constant system monitoring using meaningful KPIs, operators, supervisors and management are kept informed and constructive energy management is possible. As up to 85% of total costs of a compressed air system are energy costs, investment in measurement and system equipment pays off.

The Challenge Improving compressed air system performance requires a systematic approach analyzing both the supply and demand sides of the system. This is the prerequisite for any kind of cost reduction using energy management.

The Solution Define the right KPIs which help you to evaluate:
1. Compressor efficiency,
2. System balancing and leakage,
3. Specific energy consumption

This is the precondition for energy management and cost reduction. Our energy manager RSG40 collects, stores and displays all the required data.

1. Compressor Efficiency

The key to evaluate the compressor performance is the specific power or air consumption (kWh/Nm^3).
It is the basis to:
- Benchmark compressors and optimize their use,
- Optimize the control system and load profile,
- Assess the system and performance improvements.

Apart from efficiency calculation the compressors power consumption indicates load/idling times which have a significant influence on energy costs.

Another parameter of greatest importance for the compressor and system performance is the pressure. Note: By reducing pressure by only one bar energy savings of 10% can be obtained.

Pressure values measured at different points across a compressed air system are used to:
- Detect filter blockage and exchange filter at an ideal point of time (avoiding pressure/ energy losses).

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- Supervise compressor, dryer aftercooler, etc. and activate alarm when service is required.
- Analyze system design with respect to efficiency (actual or after adjustment/extension).
- Indicate system disruptions and general system conditions.

2. System Balancing and Leakage

Typical plants have a leakage rate of 20-30% of the total compressed air production capacity.
In well maintained systems this loss can be reduced to less than 10%.
By using flow measurement at different points in the air systems balancing can be used to calculate leakage loss "in time" and thus:

- Detect and repair disruptions or leakages.
- Avoid operation loss (pressure drop makes air tools function less efficiently, adversely affecting production).
- Avoid longer compressor runtime and thus prolong lifetime (for almost all system equipment).
- Reduce maintenance and increased unscheduled downtime.
- Avoid adding unnecessary compressor capacity.

3. Air Consumption

The allocation of energy usage to specific areas and processes is one of the key factors for energy management systems (e.g. ISO 50001) and precondition for transparent bookkeeping. The exact measurement of air consumption per unit of product is also helpful to optimize production processes.

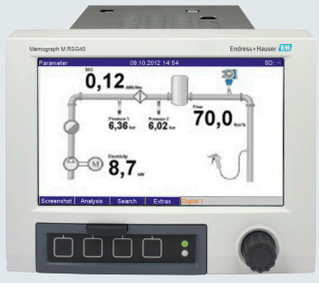
Furthermore the data are suitable for a carbon footprint evaluation.

Waste Heat Recovery Typically 90% of energy used for the production of compressed air gets lost in the form of waste heat. A large amount of this energy can be recovered for space heating, water heating, etc. By measuring delta heat the heat recovery rate can be quantified and verified that the respective process and equipment is working correctly.

RSG40 Analysis The energy and data manager RSG40 collects, stores and displays all the required data necessary for the monitoring of a compressed air system. By using the intuitive Field Data Manager software (FDM) it can be accessed from the desk and processed into a user friendly and meaningful format.

System performance and trends:

- Compressor efficiency
- Leakage loss
- Filter supervising with maintenance alarm
- Specific air consumption
- Waste heat recovery rate
- Cost and efficiency for air drying



Memograph M RSG40 with process display

Payback Calculation Example:

Situation:

- 1 Compressor à 75 kW
- Operating time: 4,000 h/a
- 4 consumers (branch lines)

Sources of energy loss:

- Average leakage rate of 20% (Can be reduced by "real time" leakage detection to 15%)
- Waste of air due to "useless" consumption, e.g. during non operation or weekends (Can be eliminated, energy savings about 5%)
- Reduction of pressure loss due to filter exchange at ideal point of time and optimizing of system design (based on Delta P data) (Saves about 5% energy)

Payback:

Overall costs of instruments for compressor efficiency, leakage monitoring and filter supervision: 9,780.- €
Electricity costs: 0.15 € /kWh
Total amount energy reduction: 15% * (75 kW * 4,000 h/a) = 45,000 kWh

Savings: 45,000 kWh* 0.15 €/t = 6,750 €/a

9,780 €/6,750 € = 1.45 years
The payback time is less than 1.5 years.

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