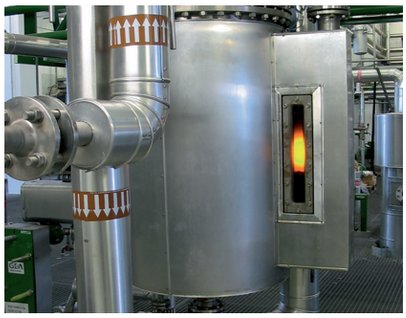
Smart Scale Energy Solutions Heating Systems

Constant monitoring of the heat system cools down energy costs



Benefits

Monitoring the performance of a heating system helps to:

- Benchmark efficiency of heating system
- Determine the cost of heating
- Assess a system's ability to meet added loads
- Define system modifications and quantify their improvements
- Verify predicted performance and ensure that the highest energy efficiency is being reached
- Decrease the amount of feedstock needed for the process

There are a huge range of industry-specific heating processes and technologies which require individual approach and measures to evaluate and improve system performance.

The Challenge Process heating systems include combustion systems that run on fossil fuels and biomass; electric systems, exchange and recovery systems. By monitoring these components and the system performance significant energy savings are possible.

The Solution Define the right KPIs which help you to evaluate:
1. Heating system efficiency,
2. Specific energy consumption

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

1. Heating System Efficiency

Boilers and fired heaters (furnace) are typically large sources of energy loss due to inefficient combustion, improper operation, and poor maintenance.
The simplest way of evaluating such losses is efficiency measurement. In direct heating systems efficiency has to be evaluated by quantifying losses or production rate.

By monitoring parameters like fuel flow, combustion air, flue gas temperature or thermal energy transfer rate the efficiency of heat production can be evaluated to:

- Identify, quantify and allocate losses in the system, e.g. due to idle (dry cycling) or part load operation of the burner,
- Benchmark boilers, consumers and optimize their use,
- Minimize maintenance cost and downtimes (e.g. find ideal point to clean heat transfer surface),
- Quantify measures such as preheating of combustion air.

Apart from efficiency calculation heating load data are useful to calculate the load factor, which helps to detect peak demands, reduce start/stop cycles and thus saves energy.

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By monitoring temperature gradients along pipes radiation losses can be found and thus insulation can be justified.

Indirect heating systems using heat transfer media (e.g. water, air) need energy in order to distribute heat. Monitoring this energy helps to:

- Evaluate pump or blower efficiency as well as wear and tear (ratio to volume, pressure),
- Find the ideal point of operation (ratio of energy transfer rate to energy required for distribution),
- Justify measures like hydraulic heat balance or installation of high efficient, speed controlled pumps.

3. Specific Energy Consumption

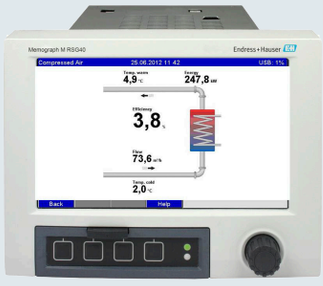
The allocation of energy usage to specific areas and processes is one of the key factors for energy management systems (e.g. ISO 50001) and precondition for transparent bookkeeping (Energy Accountable Centers). The exact measurement of heating energy consumption per product unit or per m^3 and year is also essential to assess the system efficiency and helpful to improve/optimize production processes. The loads that significantly affect costs can be highlighted. Furthermore the data are suitable for a carbon footprint evaluation.

Waste Heat Recovery In heating systems significant improvements in efficiency may come from recapturing waste heat through direct load preheating, combustion air preheating or steam generation. The measurement of the heat recovery rate (gas/gas, gas/water) is useful to monitor the proper operation of equipment used for heat recovery and quantify the amount of energy gained by heat recovery measures. In this way the most significant heat (energy) loss can be reduced to a minimum.

RSG40 Analysis The energy and data manager RSG40 collects, stores and displays all the required data necessary for the monitoring of a heating 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:

- Boiler efficiency
- Pump efficiency
- Specific energy consumption
- Waste heat recovery rate
- Evaluate performance of heat exchangers over time and optimize maintenance.



Memograph M RSG40 with process display

Payback Calculation Example:

Situation:

- Gas fired boiler 2 MW
- Operating time: 5,000 h/a

Sources of energy loss:

- Efficiency loss due to supply of heat at times without heat demand (Can be eliminated, savings 3%)
- Distribution losses due to uncontrolled pumps and bad insulation 5% (Can be detected by monitoring and reduced to 2%, savings 3%)
- Boiler efficiency loss running the boiler at partial load 5% (Savings due to load adjustment based on monitoring approx. 2%)

Payback:
Overall costs of instruments for boiler efficiency and heat consumption metering (two lines): 12,036 €
Fuel Costs: 0.02 € /kWh
Total amount heating energy reduction: 8% * (2 MW * 5,000 h/a) = 800 MWh

Savings:
800,000 kWh * 0.02 €/kWh = 16,000 €/a
12,036 €/16,000 € = 0.75 years
The payback time is less than 8 month.

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