

# Thermal mass flowmeter Sensyflow FMT500-IG Compressed air measurement

Save energy by measuring compressed air in industrial environments.

Measurement made easy



## Introduction

Producing compressed air uses a significant share of the total energy of an industrial facility. There are numerous opportunities to optimize the compressor system by measuring the valuable air in different locations.

Having information about the total amount of produced compressed air, and the amount of compressed air used by each consumer helps to control the energy that is used to produce the compressed air. Evaluating that data gives also indication of possible leaks in the compressed air system and the total usage of compressed air over time.

To make the production of compressed air more efficient it is necessary to detect and locate leaks. The ABB thermal mass flowmeter Sensyflow FMT500-IG is able to measure the smallest flowrates and can detect even small leakages.

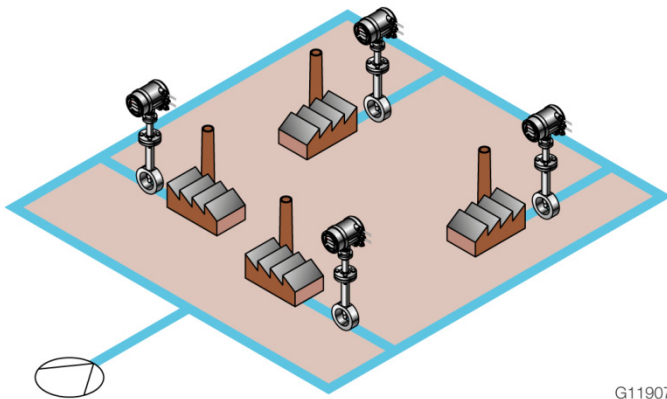
Due to its wide measuring dynamic the same Sensyflow meter can be used to measure the consumption at each consumer and the total flow of compressed air. It helps to save a significant amount of energy by optimizing the number of operating compressors in a compressor system in times when less compressed air is needed.

# Thermal mass flowmeter Sensyflow FMT500-IG

## Compressed air measurement

### Instrumentation

ABB Sensyflow meters are easy to install. They come with pipeline matching pipe components that ensure a perfect and repeatable alignment of the meter and can be equipped with ball valves, hot tap fittings, or integrated flow straighteners for difficult applications.

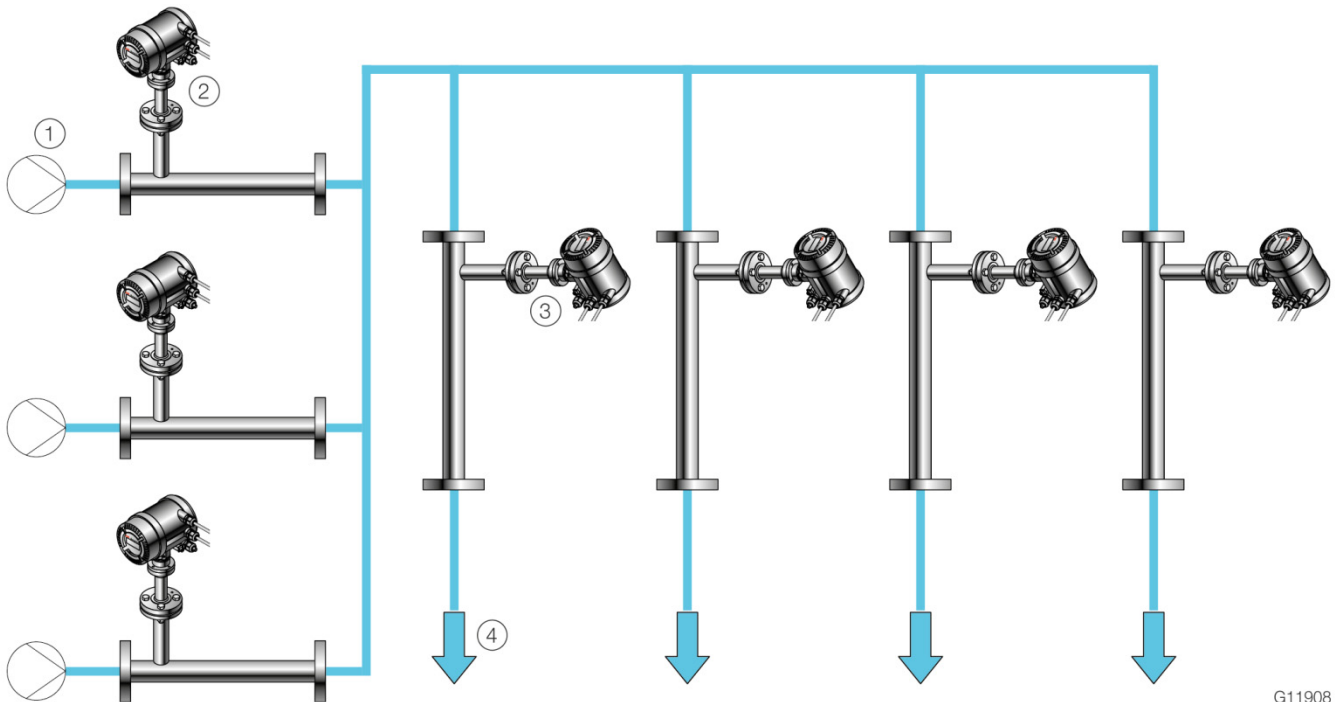


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Fig. 1: Compressed air network in an industrial park

ABB thermal mass flowmeters measure the mass of streaming gas directly. There is no need to install additional temperature and pressure transmitters to compensate the measurement. No moving parts ensure a maintenance friendly installation and the pressure loss created by the obstruction in the line is negligible.

The extremely wide measuring range of up to 1:150 is a result of optimized digital signal processing as well as the market outperforming accuracy and the fast response time of less than 0.5 seconds. The integrated design communication options like analog / HART, digital output, or PROFIBUS DP. It has a totalizer inbuilt and features an inbuilt totalizer, temperature measurement, alarm functionality and diagnostic functions. For difficult to reach installation spots a remote design is available, too.



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Fig. 2: Sensyflow installation scheme in a compressed air network  
① Compressor ② Mass flowmeter ③ Mass flowmeter ④ Consumer

## Compressed air leakage detection

### Assumption

- Price e. g. = 0.115 [Euro/kWh]
- Efficiency of the compressor = 0.65
- Operating hours = 8000 [h/a]

Leakages	●	●	●	●
Leak diameter [mm]	1	3	5	10
Mass flow [kg/h]	3	29	80	322
Volume flow [Nm <sup>3</sup> /h]	2	22	62	249
Loss of energy [kW]	0.2	2	6	23
Potential savings [Euro/a]	214	1.927	5.352	21.411

The location is an industrial plant with compressed air and gas distribution in a pipe network to individual users in the plant. Leakage detection within this pipe network is the challenge to save gas and energy and at least variable and fixed costs by reduced compressor capacity. The table shows the loss in € for a single leak with a diameter of 1 ... 10 mm. Sensyflow can measure and detect even small leakages e. g. 1 % of the compressor capacity. The challenge is that the differences of the flow rate as shown in line 3 of the table are very small for typical pipe networks.

This effects a huge lost of energy. The resulting costs are shown in line 4 and 5, with assumed energy cost of 0.115 €/kwh, a compressor efficiency of 0.65 and 8000 operating hours per year.

The solution is to install a direct mass flow metering with a Sensyflow without pressure and temperature compensation. The totalizer signal allows for a smart breakdown of the air consumption into allocated costs.

Quick signal response additionally demonstrates e.g. peaks in consumption changes.

Due to the high turndown ratio it sensitively detects leakages and measures full scale with only one instrument per measuring point.

As the pressure loss is negligibly low, it does not lead to an additional energy loss caused by the measurement.

## Flowmeter benefits

- Direct mass flow measurement
- Great sensitivity at the low end of the Measuring range
- Extremely wide measuring range up to 150:1
- Easy menu handling
- Warnings, alarms and diagnostics
- Negligible pressure loss
- Maintenance friendly design
- Easy and repeatable installation by pipe components

### Track overall gas usage

- Improve plant efficiency
- Optimize energy management systems

### Detect gas leakages

- Prevent energy waste
- Locate leakages

### Control user gas consumption

- Help departments to reduce their energy usage

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