



# Measurement of compressed air consumption can help reducing energy costs

Each factory needs compressed air, however, often it is not realized that compressed air is one of the most expensive types of energy. Therefore, the intelligent use of compressed air holds an enormous potential for saving energy. In most cases the user mainly concentrates on the production, i. e. on the compressors. In order to save energy very often new compressors, control systems or heat recovery systems are installed.





If we talk about operational costs of compressed air plants we are actually talking about the energy costs as they make up about 70 to 80 % of the total costs of a compressed air plant.

Depending on the size of the plant this means considerable operating costs. Even in smaller plants this may quickly add up to 10,000 to 20,000 € per year. This is an amount which can be considerably reduced – even in case of well operated and maintained plants.

In case of a three shift operation with 200 kW compressor performance a bad compressed air distribution can create redundant energy costs of more than 50,000 € per year.

This mainly concerns to the elimination of leakages and the correct diameters of the compressed air lines for minimization of the pressure losses.

Energy resources like electricity, water or gas are usually monitored and therefore the costs are transparent.

Contrary to compressed air, a water leak is usually found quickly due to the visibility of the leak and therefore they are eliminated immediately. Compressed air leaks are often not noticed and can "silently" cause a lot of unnecessary costs, even during production downtime or over the weekend.

Also during that time compressors are running continuously in order to establish a constant pressure within the system. In case of compressed air systems which have grown during the years the leakage rate can be between 25 and 35 per cent.

They are the busiest consumers of compressed air, working all around 365 days a year.

Not included are the hidden costs of producing clean and dry compressed air. Refrigeration and desiccant driers are producing dry air with high

running costs involved. Air that is then later lost through leaks within the system.

At constantly rising energy costs these potential energy savings have to be implemented in order to stay competitive within the market. Only if the consumption of single machines or plants becomes known and transparent for all it is possible to make use of possible savings.

However, often any knowledge about the leak ratio is missing. In the following we show you how you can easily determine the leakage amounts in your company.

#### **Formerly the simple but inaccurate container method was applied very often**

A simplified determination of the leakages is possible by means of the emptying of the tank.

For carrying out this measurement you just need a clock and a manometer.

Furthermore you should know the storage volume of the tank as well as of the compressed air system.

For measurement first the tank and the compressed air system are set to the upper cut-out pressure value. All compressed air consumers have to be switched off.

Then the compressor is switched off and there will be no compressed air feeding into the system.

Now the time T is measured which passes by until there is a pressure drop of 1 to 2 bar due to the leakages.

The pressure drop between which the measurement is taking place can be selected freely.

However, in practice the described method is very time-consuming, not adequate and inaccurate due to the following reasons:

Storage volume, distribution pipe-

lines cannot be determined exactly.

The accuracy of the differential pressure measurement and time measurement has to be observed

During pressure drop the compressed air volume cools down and therefore it changes the volume flow reference value

An online measurement with consumption record is not possible

This method belongs to the so-called indirect measurements, like also the method of the load and unload measurement during which the current intake is measured by means of clamp-on ammeters and calculated back to the volume flow over the technical data of the compressor.

These indirect methods are antiquated and not suitable to detect leakages in the lower measuring range.

#### **Determination of compressed air leakages with modern flow meters**

A modern compressed air consumption measurement resp. leakage measurement should be able to measure the real compressed air flow and also the smallest leakages quickly and reliably and record them.



## New: Flow measurement DS 400 for compressed air and gases

Worldwide unique with 3.5 inch, graphic display with touch screen and print function.

For more than 20 years CS Instruments GmbH develops, manufactures and sells precise long-term stable flow sensors for compressed air and gases.

With the new "ready for plug-in" flow measurement DS 400 the current flow in m<sup>3</sup>/h, l/min etc. as well as the consumption in m<sup>3</sup> or l can be measured.

The new flow station works according to the approved calorimetric measuring principle.



The heart is the flow sensor which has been proven and tested for years. It is characterized by a new thermally more efficient sensor structure which shows a higher chip temperature in case of same electrical connection values. Compared to other calorimetric measuring instruments the sensor has a considerably lower mass and therefore a faster response time.

An additional pressure and temperature compensation is not necessary.

The advantage is that the customer can use the flow sensors in different pressures and temperatures without any further compensation.

Apart from compressed air also other gases like e. g. oxygen, CO<sub>2</sub>, argon, natural gas and helium can be

measured.

Flow measurement DS 400 will be supplied completely wired. Therefore a time consuming studying of the instruction manual is not necessary.

Exceeding of threshold values can be reported optically and acoustically. 2 relays for pre- and main alarm are freely adjustable.



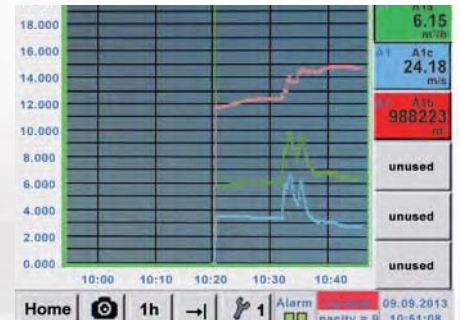
An alarm delay can be set for each relay. This grants that only really long-term exceedings of the threshold values are indicated. Additionally every alarm can be reset.

The intuitive operation with the 3.5 inch touch screen graphic display with zoom function and print key is worldwide unique in this price class.

The graphic display with zoom function shows the actual flow, the peak values and the leakage at a glance, the values are stored in the data logger.

So the user can take a look at the stored measuring curves also without any computer at any time on site. This grants a quick and easy analysis of the compressed air or gas consumption.

By means of the print key the actual screen can be stored as an image file to the internal SD card or to a USB stick and printed out at the



computer without any additional software.

Ideal for documentation of the measured values/ curves on site. Coloured measured curves can be sent by e-mail as image files or integrated into a service report.

The internal data logger enables the storage of the measured data for several years. The measured data can be evaluated via a USB stick or via Ethernet by means of the comfortable software CS Soft Basic.

Particularly comfortable is the consumption analysis at the touch of a button. The CS Soft Basic automatically draws up daily, weekly and monthly reports.

## Special features:

- 3.5" graphic display, intuitive operation via touch screen
- Zoom function for accurate analysis of measured values
- Consumption analysis with daily/weekly/monthly reports
- Coloured measured curves with names
- Mathematical calculation function e. g. addition of several consumers to a total consumption or energy costs per kWh/m<sup>3</sup>
- Print key: Optional indications can be stored as image
- files directly on a USB stick and sent by e-mail
- without any software
- 2 alarm contacts for exceedings of threshold values



- Freely adjustable alarm delay for both alarm contacts
- with reset function
- Up to 4 sensor inputs for: Further flow sensors, dew point, pressure, temperature, consumption, active power meters, optional third-party sensors can be
- connected: Pt100/1000, 0/4..20 mA, 0-1/10 V,
- Modbus, pulse
- Integrated data logger 2 GB
- USB, Ethernet interface, RS 485
- Webserver

### VA 500 flow sensor for compressed air and gases

The installation of the VA 500 flow sensor is carried out by means of a 1/2" ball valve and can be done under load of the system. The safety ring prevents the instrument from being pushed out by the operating pressure.

For the installation at different pipe diameters, the VA 500 can be ordered at special lengths: 120, 160, 220, 300, 400 mm. Therefore it is possible to use the VA 500 flow sensor from inner pipe diameters of 1/2" up to 12" and bigger.

The exact positioning of the sensor is carried out with the aid of the engraved depth scale at the sensors shaft. The maximum insertion depth is therefore determined by the sensor length. Please see picture to determine the sensor length required.



### Measuring site

If no 1/2" ball valve is present to carry out the installation of the VA 500 sensor, CS Instruments GmbH has two possible alternatives to offer:

- A 1/2"-thread needs to be welded onto the pipework and the ball valve is then threaded on.
- B A spot drilling collar can be ordered and installed.

Making use of the specialized drilling jig, it is then possible to drill a whole into the pipework under load. The filings are caught in a special filter system at the drilling jig. Afterwards the VA 500 probe should be installed as described above.

The VA 500 measuring range allows for measurements in almost all possible applications. Even high flow rates in small pipe diameters can be measured.

