

MAIN PARAMETERS OF COMPARATIVE ANALYSIS OF ERROR OF MODERN GAS METERS

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Annotation: Selection of an alternative option for gas flow meters through a comparative analysis of modern gas meters and the implementation of measures to reduce the errors of modern gas meters.

Key words : Counter gas , municipal , industrial , domestic , rotary , tubular , vortex , diaphragm counter gas , direct accounting , collective accounting , joint accounting , indirect accounting , counter flow rate , raxodometer , ultrasonic counter gas , meters speed and volume .

A gas meter is a device that measures the volume of gas passing through per unit of time; it is designed for natural and other non-toxic gases. Depending on the operating mode, there are diaphragm, turbine, rotor and other types. In diaphragm gas meters, the measuring device consists of two chambers separated by gas-tight diaphragms.

Thanks to a system of special valves, the diaphragms move back and forth due to the difference in gas pressures the inlet and outlet tubes of the meter. The kinematic device converts this movement of the diaphragms into the rotational movement of the rollers of the unit. Such gas meters are used in households. In a turbine gas meter, the flow straightener balances the gas flow through the turbine. The measuring mechanism consists of a bladed turbine and a gearbox, the turbine axis is fixed on two supports. A magnetic transmission transmits the rotation of the turbine to the computing device. A roller accumulator in the meter measures the volume of gas passing through the meter. Such a gas meter works with low, medium and high pressure gases, it can be connected to various measuring devices. Such counter gas used in industry .

Types counters gas

There are different types of gas meters:

- communal;
- industry;
- family;



Industrial gas meters

It is also divided into classes according to gas consumption.

Their types according to the principle of operation:

- With rotor ;
- turbine ;
- whirlwind ;

The turbine gas meter is a very complex mechanism and is sold at high prices.

Modern turbine meters are equipped with electronic systems that display gas consumption, continuously check the system, detect errors or signals about damage during the operation of the equipment, and send signals to a remote monitor. In addition, the meter gives an alarm signal about cases of unauthorized connection to the system.



Industrial gas meters

Thus, these meters are intended for installation in industrial enterprises or gas pipelines. The rotary gas meter is a more common meter. Its high cost is due to the prices of materials used in its production. The operating principle of the meter is very simple - inside it is a rotor rotating under the influence of gas. This meter is designed for a gas consumption of 200 cubic meters per hour.



Domestic gas meter

Rotary meters can be installed in a private home or at industrial enterprises with low gas consumption. The advantages of this meter are small dimensions, light weight, long service life. Membrane gas meters are mainly installed in apartments, private houses, cottages. This meter is designed for a consumption of 12 cubic meters of gas per hour, has high accuracy and reliability, as well as a low price.

The vortex flow meter is the most complex device for measuring gas flow. This flow meter has the highest accuracy and passes a large amount of the gas it consumes. The vortex flow meter is installed only in large enterprises whose production process is based on gas consumption.

Gas measurement methods

Currently, the following methods are used to measure gas and substance consumption:

- direct (correct) measurement method;
- general measurement method;
- method of joint measurements;
- method of indirect measurements.

Flow rate is the amount of a certain substance passing through a pipe cross-section per unit of time.

The amount of a substance can be measured both in units of mass (kg, t) and in units of volume ($m^3 \cdot l$).

Table 1

Analysis of gas flow measurement methods

Method	Advantage	Flaw
Device for measuring flow (volume) pressure differential pressure of liquid	It has the ability to measure large consumption; it is used in places where large pressure loss is unacceptable.	The consumption rate is high.
Constant differential pressure flow meters	The pressure loss was not high and the consumption did not decrease; used to measure waste	The rotameter tube is usually made of glass.
Tachometric speedometers	Low inertia and high precision	The flow rate depends on the viscosity of the medium, expansion and turbine flow rate.

Speed and volume meters	The basic error does not increase with the counter speed of 2%	The corrosion level is good, the warranty is no more than 7 years.
Electromagnetic and ultrasonic flow meters	Used to determine the flow rate of conducting fluid.	The construction is heavy

Mass consumption in selected units Q_m in (kg/ h ; kg/ h ; t/ h and other units) or volumetric flow rate Q_h in (m^3/s ; m^3/p , l / h and other units) is measured.

Mass units can provide more complete information about the amount or flow rate of a substance than volume units, since the volume of a substance, especially gases, is highly dependent on pressure and temperature. When measuring the volumetric flow rate of gases, the value of the results being compared is reduced to certain measurement conditions (standard conditions).

The relative error of gas meters consists of determining the loss of gas flow through the meters in the manner established by specific types of meters and regulatory documents.

The accuracy of the flow rate is specified in the regulatory documents for a specific type of meter.

State acceptance, control and periodic tests, as well as in the measurement range. $(0.9-1) Q_{max}$ during additional checks, the relative error is determined and calculated.

The flow readings of the meter are compared with the meter being tested and the reference measuring instrument at least three times in accordance with the established requirements.

The relative error in percentage is found using the following formula.

$$\delta_i = \frac{V_c - V_{обр}}{V_{обр}} 100$$

V_c — volume of gas of the meter being tested, m^3 ($V_c = KN$, here N is the number of pulses registered. with the meter; K— meter conversion factor, the value is clearly indicated on the scale of the counting mechanism or in the meter passport.

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