

# A device for measuring carbon dioxide



## A device for measuring carbon dioxide emissions from mine waste dumps

### Technology description

This device for measuring the level of carbon dioxide emissions from mine waste dumps originated from a part of the development project entitled 'The management system for CO<sub>2</sub> emission reduction from mine waste dumps' with the acronym COOL'S. The result of the work was a portable measurement set for field tests, consisting of a CO<sub>2</sub> IR-GIG meter, a desorption cover, an ultrasonic anemometer to measure force and wind rose, a flow meter, an optical pyrometer and a supply and recording module. As the

device is configured in such a way it enables the measurement and subsequent balancing of the outflow of carbon dioxide from mine waste dumps in all conditions, including measurements within areas of fire occurrence. Monitoring of this type of greenhouse gas emitters makes it possible to take technological measures to counteract CO<sub>2</sub> emissions to the environment. This provides the basis for making the right decisions regarding solving the problem of emissions from mine waste dumps, including their harmful impact on the health of communities living in the areas affected by such sites. It is possible to develop an intrinsically safe version of the meter, which will increase the safety of work in the coal mines, enable the control of CO<sub>2</sub> emissions from the mine or monitoring of areas in the direct vicinity of fire occurrence and the control of underground coal gasification processes.

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### The advantages of this technology

The measurement of carbon dioxide emissions in a wide range of concentrations is possible due to the development of this dedicated self-produced test meter. Measurement in this instance, according to a known principle, is the result of the difference in the absorption of monochromatic and infrared laser radiation for two different wavelengths in the adopted spectral band of CO<sub>2</sub> absorption. However, it is characterized by a wide measuring range (0-50 000 ppm), linearity of characteristics, resistance to other fire gases, smoke, and changes in temperature, pressure and air humidity. The accuracy of the measurements is in the order of 1% of the scale. This was possible thanks to the construction solutions used, including the construction of the measuring chamber itself, which receives, simultaneously, the heat from the electric refrigerators stabilizing the temperature of the emitter and the infrared detector. High measurement accuracy and the ability to measure both low and high concentrations were obtained.

### Application

The measuring instrument enables the measurement and subsequent balancing of the outflow of carbon dioxide from mine waste dumps under all conditions, including within areas of fire occurrence.



Constant monitoring of such emitters of greenhouse gases allows technological measures to be taken to counteract CO<sub>2</sub> emissions from the dumps to the environment.

