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AUTONOMOUS POWER SUPPLY FOR SAFETY SYSTEMS

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It is well-known that in mines for mining equipment supply is used the high voltage values ($U = 1140/660$ V). Besides, the safety system's devices are based on chip components that used the spark-safe voltage of lesser of 5 V. Taking into account this fact, for automation systems supply a lot of companies produced the low-voltage power supplies. To convert the high-voltage into low-voltage are used transformers or high-voltage capacitors in pulsed power supplies. These devices have a significantly overall dimension and are needed to use a bulk explosion-safe protective covers. There is also difficult problem of the electro-magnetic pulses safety. These pulses are occurred while switching the electrical motors with power.

In Konotop Institute of SSU is designed the autonomous power supply with air flow energy usage. According to the "Safety rules in coal mines", at working in mines dangerous for gas and coal dust explosions it needs to secure the ventilation of mine works. The air flow velocity must be in the range of $v = (0.5-0.8)$ mps depending on the scales of methane excretion.

Using the air flow energy allows to simplify the safety devices supply by the lack of energy consumption for example – in ventilation drifts.

Autonomous power supply is designed in cylindrical cover. During the low air flow velocities the cover has the cone-view and is used as a constrictor. Inside the cover is placed the micro-air-generator. On micro-air-generator output is connected the supercapacitor for smoothing the voltage drops and the energy accumulation. The output voltage is stabilized by the chip converter BQ25504, which has a wide range of input voltage.

The explosions may occur in mines, grain elevators, mills, foundries, furniture factories (during the usage of high-velocity grinding equipment), on the chemical and petro-chemistry industries, in aboveground and underground explosive storages etc. Supply technique proposed by us with usage the air-flow energy may be used in autonomous power supplies design.

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