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MAINS POWER SUPPLY OPTIONS FOR FLOW SORT X-RAY DIAMOND RECOVERY MACHINES

For details regarding the electric power requirements of FLOW SORT machines please refer to the relevant technical specification.

Typically our sorters require 3 Phases, 380 Volt, 50 Hertz power. 3 phases, neutral, earth. On request we have supplied sorters for different voltages (190V, 415V, 550V etc) as well as different frequencies (60 Hertz).

What is of importance is whatever the nominal supply voltage, this voltage remains within specified limits and there is a sound earth connection! The potential between neutral and earth should be 0 (zero) but must never exceed 1 (one) volt.

Operating limits are +10% above and -10% below the nominal value to ensure proper functioning of the sorter.

If the supply voltage exceeds +20% or -20%, even if only for a short duration of time, it is likely that some of the sorter components will be damaged.

1. Supply (RMS) voltage values may vary “slowly” due to varying loads on the same supply grid as the sorters.
2. Supply PEAK voltages positive or negative (spikes and transients) often are generated by lightning strikes, faulty electrical contacts in the supply grid, short circuits etc.

Both conditions are not uncommon in electrical mine supply systems be it via power lines or generator power plants.

To ensure proper and save operation of Flow Sort X-ray Diamond Recovery Machines under adverse supply conditions we recommend and offer the following.

1. To protect the sorter from damage by voltage spikes (and to some degree from transients). At the same time they shut the power to the sorter down if it exceeds the permissible voltage and / or frequency limits thus preventing the sorter from operating “out of specs.” Flow Sort offers a GENERAL SORTER PROTECTION UNIT (Part # 9500). It protects up to 4 (four) sorters. This unit provides essential power-supply protection against: OVER / UNDER VOLTAGE, OVER / UNDER FREQUENCY, MISSING PHASES, and to a limited degree, LIGHTNING. Our recommendation is to install this protection device in the supply line to all Flow Sort Machines.
2. To ensure that supply voltage fluctuations do not effect a sorters performance (especially as for as small diamonds are concerned) a voltage stabilizer should be installed in the supply line to the sorter(s).
3. We can supply a voltage stabilizer unit which stabilizes the voltage by means of variable transformers (VARIAC). The supply voltage to the sorter is continuously monitored by an electronic circuit which in turn automatically adjusts the variable transformer whenever a voltage variation is detected.
 - a. Response-time of such stabilizers is to slow to cope with fast voltage fluctuations such as spikes etc.
 - b. The suppression of transients is poor which means that in case of a lightning strike dangerous transients may reach the sorter causing damage.
 - c. It can happen that such transients even cause damage to the electronic circuitry of the stabilizer itself!
 - d. Frequency fluctuations of the electric supply are however not eliminated!
4. As an alternative to a VARIAC type stabilizer is a “same-shaft motor-generator”. The principle of this device is simple yet extremely effective. The supply to the sorter is fed to an electric motor which in turn drives an electric generator which supplies the sorter(s). There is no galvanic connection between the supply to the motor and the output of the generator! This option is FLOW SORT’S preferred sorter protection.
 - a. This concept provides for total isolation of the sorter from the supply grid.
 - b. The inertia of the motor / generator combination filters out any fast supply line voltage fluctuations.

- c. Spikes and transients can not get passed the electric motor thus keeping the sorter supply “clean.
 - d. Frequency fluctuations of the electric supply grid are not eliminated however our “electric gen-set” control unit will disconnect the sorter(s) if the frequency overruns the allowable limits!
5. Finally there is the option of supplying the Flow Sort machines via a UPS (uninterrupted power supply). Note that Flow Sort does not offer UPS systems. We are however more than happy to evaluate the suitability of an UPS of your choice.
- a. Output voltage stability (to the sorter) is excellent. Even fast input voltage changes are completely eliminated.
 - b. Output frequency stability is excellent.
 - c. Transients, as for instance generated by lightening can, damage the UPS circuitry. However unlikely this is, there is always a possibility that damaging voltage potentials can reach the sorter.
 - d. Some UPS systems do not work well with Flow Sort machines due to the high inductive load factor of the sorter (HT generator for x-ray, Coil of electro-magnetic feeder). Each UPS installation must thus be individually checked if suitable to supply power to Flow Sort machines.

NOTE: WHATEVER POWER SUPPLY / PROTECTION OPTION IS IMPLEMENTED IN ANY FLOW SORT X-RAY DIAMOND RECOVERY INSTALLATION IT IS ABSOLUTELY ESSENTIAL THAT WHATEVER THE POWER SUPPLY SOURCE IS LINKED TO (LOCKED TO) A 100% SOUND EARTH CONNECTION TO THE SORTER INSTALLATION

P. Wolf