POWER SUPPLY AND CONTROL SYSTEMSFOR ELECTROSTATIC PRECIPITATORS

BASIC CHARACTERISTICS

Application

Power supply and control systems for the electrostatic precipitators (ESP) were designed to supply power and control applied voltage on the electrodes and to control functionality of the concomitant devices of the electrostatic precipitators

Primary features

- ESP voltage and current regulation or
- regulation of number of sparks

Additional functions

- Opacity monitoring in function of power saving
- Reduction of voltage at rapping
- Reduction of voltage at starting/stoping of boiler
- Back corona detection
- ESP short circuit detection

Current asymmetry detection

Operating modes of the automatic regulator

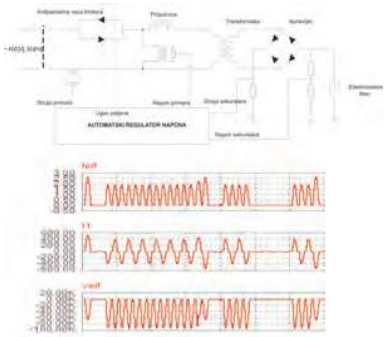
- test, manual, continuous, intermittent

Single-phase digital control units for electrostatic precipitators

This is a typical solution for voltage control using antiparallel thyristors.

Basic parameters:
Input voltage: 400V, 690V
Input current: < 500A

Block diagram of the control system

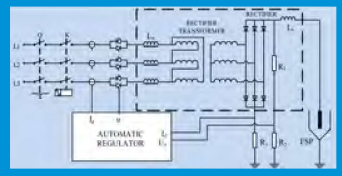


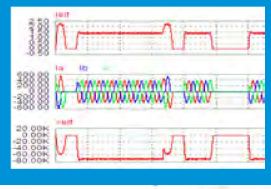
Three-phase digital control units for electrostatic precipitators

Benefits

- early corona detection and prevention of arcing
- power saving in intermittent mode
- efficient cleaning
- modular application
- increasing of form factor
- efficient rapping because of voltage reduction

Block diagram of the control system





Single-phase and three-phase transformer/rectifier units for electrostatic precipitators

Basic parameters

- DC voltage peak: 95kVp, 105kVp, 115kVp, 125kVp, 150kVp
- DC average current: <2500mA



Control and monitoring system of ESP

Device designed for control and monitoring of entire ESP system.
Basis of the system is a PLC with corresponding I/O modules.
480 digital inputs, 160 digital outputs, 52 analog inputs, 2 analog outputs and 2 communication channels are
realized using I/O modules.
Data communications protocol used is Modbus (RTU).
Remote control, monitoring and data archiving are realised using SCADA system.

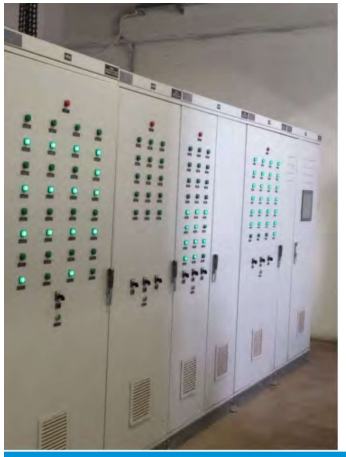


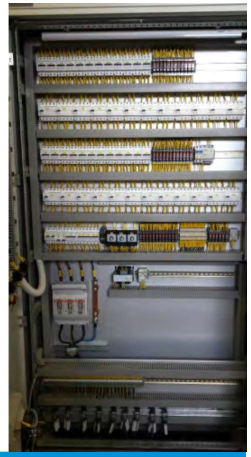


Power supply system for rappers and heaters on ESP

This device supplies:

- Rapping motors of discharge and collector electrodes,
- Motors of dust rotary valves,
- Insulator heaters and hopper heaters.





Main references for electrostatic precipitators

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2. Single-phase power supply control unit for ESP in TPP Kostolac, unit A2, 1 pcs, 2004.
3. Single-phase power supply control unit for ESP in TPP Kostolac, unit B1, 1 pcs, 2005.
4. Single-phase power supply control unit for ESP in TPP Nikola Tesla, unit A1, 4 pcs, 2005.
5. Single-phase power supply control unit for ESP in TPP Kolubara, unit A5, 4 pcs, 2006.
6. Single-phase power supply control unit for ESP in TPP Nikola Tesla, unit A1, 8 pcs, 2006.
7. Single-phase power supply control unit for ESP in TPP Nikola Tesla, unit A4, 8 pcs, 2007.
8. Single-phase power supply control unit for ESP in TPP Kolubara, unit A5, 8 pcs, 2009.
9. Single-phase power supply control unit for ESP in TPP Nikola Tesla, unit A6, 16 pcs, 2010.
10. Medium-frequency power supply for reconstruction of existing single-phase power supply, prototype, 1 pcs, 2013- 2014.
11. Three-phase power supply control unit for ESP in TPP Nikola Tesla, unit A3, 16 pcs, 2014.
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13. Three-phase transformer/rectifier unit for ESP in TPP Nikola Tesla, unit A3, 2 pcs, 2015.
14. Single-phase power supply control unit for ESP in TPP Kolubara, unit A3, 4 pcs, 2015.
15. Single-phase power supply control unit for ESP in TPP Kolubara, unit A1, 2 pcs, 2015.
16. Contol and monitoring system for ESP in TPP Ugljevik, 1 pcs, 2017.
17. Three-phase power supply control unit for ESP in TPP Nikola Tesla, unit A4, 2 pcs, 2018.
18. Single-phase power supply control unit for ESP in TPP Gacko, 4 pcs, 2020.
19. Power supply and control unit for heaters in ESP in TPP Kostolac, unit B1, 2 pcs, 2020.
20. INCREASING THE EFFICIENCY OF THE ELECTROSTATIC PRECIPITATOR ON UNIT B2 IN TE „KOSTOLAC B“ BY IMPROVING POWER SUPPLY UNITS, Research study, 2019.

Total:

- 1 ph control unit = 64 pcs
- 3 ph control unit = 18 pcs
- 3 ph T/R unit = 20 pcs
- Control system = 2 pcs