

SIPREC C

Thyristor Controller Upgrade - HV Power Supply for
Electrostatic Precipitator ESP

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SIPREC C Technical Description

The upgrade of existing ESP thyristor controller is typically carried out when:

- Due to missing functionality of the existing controller the maximum required ESP collecting efficiency cannot be reached
- No energy management available to reduce the operating costs
- No services provided by the OEM
- No spare parts available
- No possibility for bus coupling to subordinated control systems (PLC/DCS) with additional diagnostic data for ESP operation
- The required availability cannot be ensured any more

SIPREC C is a thyristor controller upgrade set for the retrofit of existing thyristor controller of different brands. The existing control cubicle with all power components (fused disconnect/circuit breaker, main contactor, SCR-thyristor stack, CT) and peripheral components (interface relays, terminals etc.) are reused.

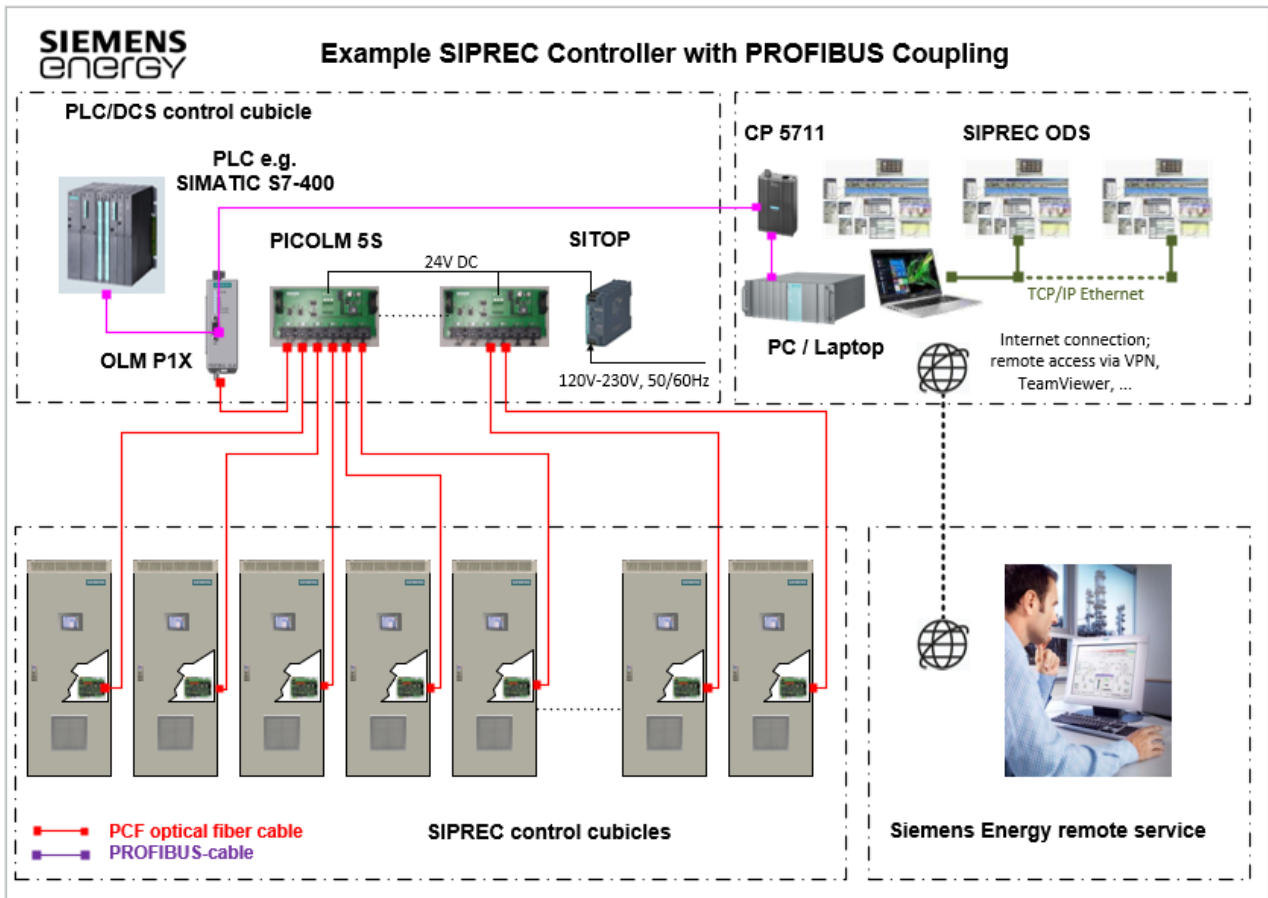
In case the power components are already obsolete with increasing failure rate or when the cubicle is worn down, it is recommended to install new thyristor control cubicles.

The effort of the upgrade depends on the design (OEM, type), the condition of the equipment, the peripheral connections and installation type of the HV power supplies. In case the power components of the control cubicle and the transformer rectifier set (TR set) can be reused, essentially only the control components in the control cubicle and inside the TR set junction box needs to be exchanged.

To achieve highest electromagnetic compatibility optical fiber cables are installed for the signal exchange between thyristor controller (control cubicle) and TR set. In case no optical fiber cables are installed with the previous installation and the installation of new optical fiber cables is not possible, then the existing signal cables can be reused for the signal exchange.



Based on the circuit diagrams of the existing HV power supplies, optimized solutions for the retrofit and signal exchange in conjunction with the new available controller functions, are suggested and defined. For this purpose, the SIPREC controller consist of sufficient number of configurable digital and analogue in-/outputs.

Typically, nowadays only the safety signals are hardwired where all other control, signal and diagnosis signals are communicated via bus. For highest EMC standard all SIPREC controller provide the optical PROFIBUS interface. Special optical link modules, converter and gateways enable the easy networking to existing PLC/DCS with the required bus protocol.



SIPREC C Installation

Thyristor control cubicle



	<p>Typically, the new SIPREC controller (PIC 167 controller board) will be installed inside the control cubicle and the new SITOUCH operating panel in the control cubicle front door.</p>
	<p>For the retrofit of previous thyristor controller type COROMATIC-F / SIFUPIC F installed in a box (PICBOX) at the cubicle door, the controller is replaced with installation of a new PICBOX.</p> <p>For the retrofit of previous thyristor controller type COROMATIC-F / SIFUPIC F installed in a mounting rack, the rack will be reused for the installation of the SIPREC controller board.</p>

If not already existing, the optical fiber cable can be laid during plant operation. This saves plant down time when the upgrade shall be done during operation. The existing optical fiber cable can be reused with original COROMATIC-F / SIFUPIC F installations.




Depending on plant configuration the SIPREC installation can be carried out one by one with electrostatic precipitator in operation or during a plant down time.

The following installation steps are typically carried out at the control cabinet:

	<p>Remove of old controller (e.g. EFST, COROMATIC C/R/F, FSR6x, PROFIMAT, TH S3-6, ELIN, SCHRACK,) and non-reusable controller components and cables</p>
	<p>Installation of the new SIPREC PIC167 controller board depending on type of installation (see above)</p>
	<p>Remove existing operating panel/displays. Carry out cubicle door cut-out and installation of the new SITOUCH operating touch panel.</p>
	<p>Installation of new EFIP 167 thyristor firing board closed to the SCR (thyristor stack)</p>
	<p>Installation of the SITOP 24V DC power module for the SIPREC PIC167 controller board and SITOUCH operating panel</p>
	<p>Installation for optional components:</p> <p>Isolation amplifier</p> <ul style="list-style-type: none"> • For integration of analogue process signals (like process load conditions, ESP gas temperature, emission value, ...) • For remote trending of the analogue signals for ESP voltage / current • SIPREC PIC167 analogue input for ESP voltage/current signal in case the optical fiber cable is not or cannot be installed

	<p>Coupling relays</p> <ul style="list-style-type: none"> • For the control of rapper motors • For integration of additional signals as e.g. calibration emission monitoring system, WESP protection, monitoring main contactor, remote acknowledgement etc.
	<p>Execute of cable connections for the 24V DC power supply, for the control of the thyristors, for all analogue and digital in-/outputs of the SIPREC PIC167 controller board, for the isolation amplifier and the current transformer.</p>
	<p>Installation of optical fiber cables and optical link modules for PROFIBUS coupling to PLC/DCS and SIPREC ODS.</p>

Examples for realized thyristor controller upgrades:

		
<p>PIC167 installed at cubicle mounting plate</p>	<p>PIC167 installed at existing controller rack</p>	<p>PIC167 / SITOUCH operating panel installed in controller box at cubicle front door</p>

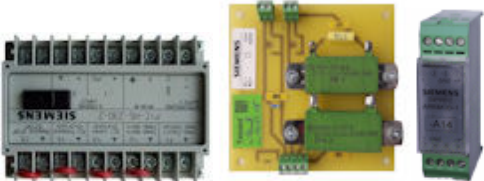
HV Transformer rectifier set (TR set)

Old TR set may not be equipped with an internal or external HV divider for the measurement of the secondary voltage. As this is required for the operation of today's thyristor controller, the installation of a new TR set is recommended rather than the cost intensive installation of a separate HV divider.



Available analogue signal cables for the secondary voltage and current measurement and the binary TR set protection signals may be reused. For highest electromagnetic compatibility however, it is recommended to use the standard solution with optical fiber cables and HV acquisition unit. With the optical fiber cable beside the TR set analogue signals also the binary signals of the TR set protection device(s) are transmitted to the SIPREC controller. Therefore, beside the power cable and the optical fiber cable no other cable is required between TR set and control cubicle.

The following modifications are carried out at the TR set junction box:

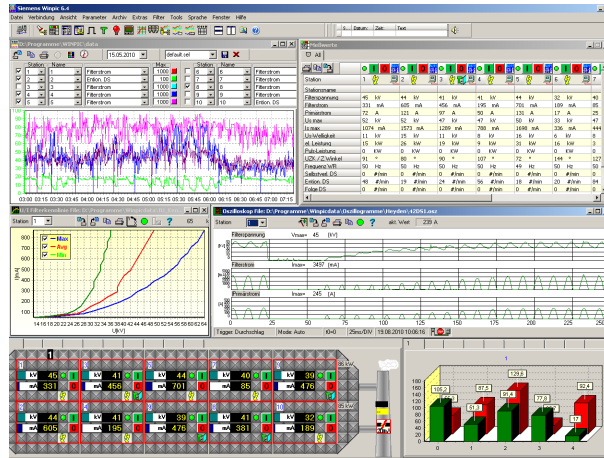
Reuse of the existing analogue signals and cables:	Depending on the analogue signal value the existing shunt modules at TR set junction box and isolation amplifiers at the control cubicle may be exchanged.
Transmission of TR set signals via optical fiber cable: 	Installation of the SIPREC HS-230 HV acquisition unit and exchange of the shunt module and surge arrestors. No modifications are required for the retrofit of the COROMATIC-F / SIFUPIC F controller with optical fiber cable connectors type DUPLEX.

In general: When a HV cable is installed for the HV supply to the ESP field, a high voltage damping resistor must be installed at the cable end on ESP side.

Addon: SIPREC ODS

The SIPREC ODS program based on WINDOWS operating system supports the SIPREC HV power supply systems for the central operation, visualization, data archiving of measured operating values, for optimization of the ESP operation and diagnostic purposes.

SIPREC ODS optimizes the ESP collecting efficiency at lowest power consumption. The extensive diagnostic functions enable beside the fault analysis, the evaluation of the ESP operating process and provide information for the predictive maintenance. Furthermore, the diagnostic functions also form the basis for the fast and inexpensive Siemens Energy remote service.



For further information please see our separate SIPREC ODS brochure.

Time Frame

The installation / commissioning must be carried out only by special qualified personal. The time required for the installation/commissioning work depends on the type of controller upgrade, the additional peripheral connections to be installed and the condition of the installation (one by one during operation or during plant down-time).

The installation / commissioning of the first TR set of course takes longer compared to the next sets. The upgrade of four thyristor controller takes typically 5 working days carried out by two of our experienced specialists. This estimation is based on a typical installation excluding works for cable installation (optical fiber cable).

The time required for the technical instructions (customer training) depends on number of employees to be trained and the availability of the attendees. Suggested is to do the training already during the installation and commissioning period.

Take advantage from our experience

We are looking forward answering your questions concerning the modernization of ESP high voltage power supplies, the data exchange to the PLC / DCS, the possible increase in ESP collecting efficiency, potential for power savings or other questions related to the ESP operation.

Just get in contact with us.

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