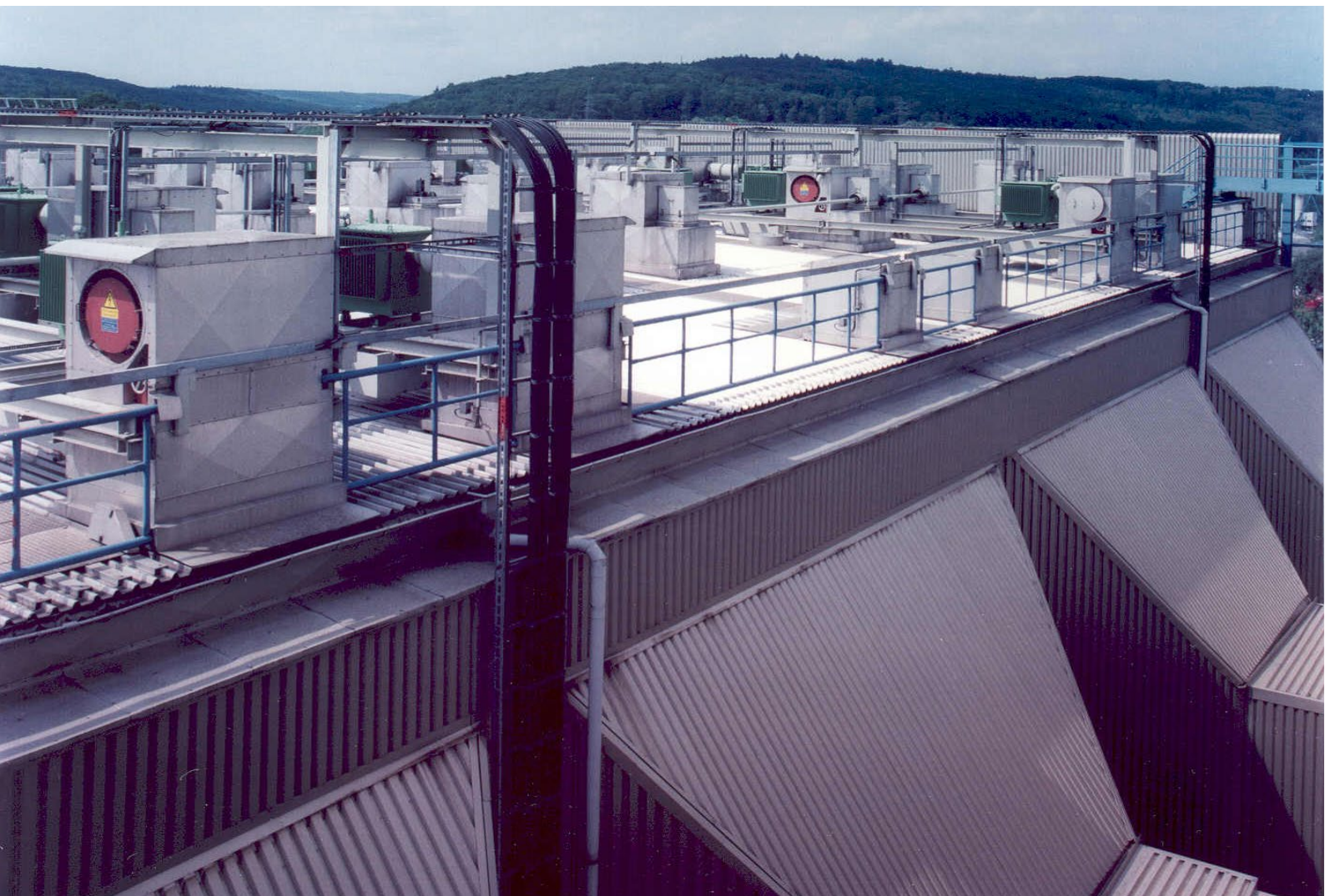


# SIPREC ODS

Electrostatic Precipitator – Operation, Visualization,  
Data Archiving, Optimization & Diagnostic

[siemens-energy.com](https://www.siemens-energy.com)



## SIPREC ODS Functions

The SIPREC ODS application is based on WINDOWS operating system and supports the Siemens Energy high voltage power supply systems for electrostatic precipitators (ESPs). SIPREC ODS (SCADA) connects simultaneously to all high voltage power supply controllers for comfortable 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 to achieve lowest power consumption. The extensive diagnostic functions beside the fault analysis enable 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.

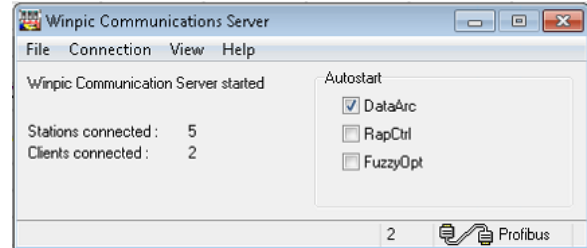
The following SIPREC ODS software versions are available:

	SIPREC ODS Light	SIPREC ODS Full Version
SIPREC ODS Server	x	x
SIPREC ODS Client	x	x
DataArc	x	x
Autostart		x
FuzzyOpt		x
RappCtrl		x
DataCopy	x	x
Month Report		x

In addition, SIPREC ODS single client licenses are offered for client installations at additional workplaces.

The SIPREC ODS Server coordinates the bus communication to the ESP controller relieving bus traffic. Furthermore, the SIPREC ODS Server

provides the data for multiple SIPREC ODS client installations at different locations of the TCP/IP network. The SIPREC ODS client user rights can be individually adjusted. With the SIPREC **Autostart** function the single SIPREC ODS applications are starting automatically.



## SIPREC ODS Requirements

For the installation of SIPREC ODS a PC or laptop is required with WINDOWS 7 or WINDOWS 10 operating system. SIPREC ODS supports the following ESP controller:

- SIFUPIC F
- PIC410F
- PIC420F
- SIPREC T
- SIPREC I

The controls provide an optical interface and support USS or PROFIBUS. PCF optical fiber cables are used for the connection.

### USS-Bus:

A special USS-bus adapter is used to convert the optical signals to connect to PC Serial interface or USB.

Multiple Controls can be star-coupled via an SIPREC PICOLM 5s

### PROFIBUS:

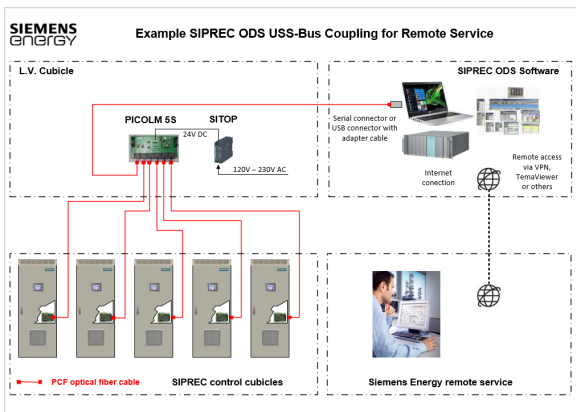
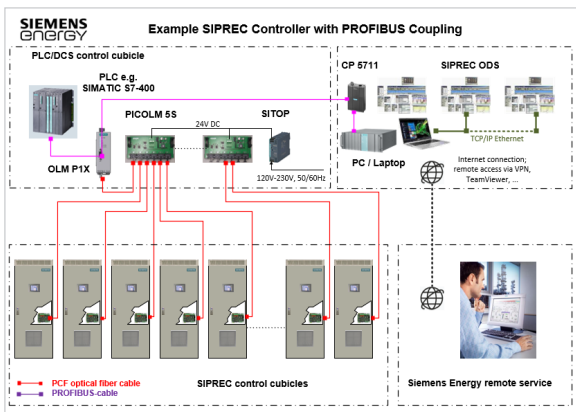
The Optical link module ( OLM ) is used to convert from optical bus to electrical bus which can be connected to the PROFIBUS

Communication Processor of the SIPREC PC ( e.g. CP5711 / CP5613 / CP 5623 . . . ).

Multiple Controls can be star-coupled or bus-connected via SIPREC PICOLM 5s, OLM P11/P12 or similar devices.

SIPREC ODS is a PROFIBUS Master. For the parallel operation of SIPREC ODS with other PROFIBUS masters such as PLC or DCS on the same PROFIBUS segment, the other master must have multi-master capability.

Required for the remote service is an existing internet connection as well as a possibility for remote access and remote control with appropriate access rights.



## Operation / Visualization

The parameter settings of the ESP controls are clearly displayed in tabular form in various frames/dialogs. In addition, a parameter report with configurable content is available in which parameter settings can also be made. The parameter settings can be saved (clipboard, PDF, specific file), printed, reloaded and transferred to the controls.

Example for parameter settings and report:

par set	18 1	19 1	20 1
Station name	HS-Trafo 1	HS-Trafo 2	HS-Trafo 3
Op. Mode	8 Fuzzy - Power	8 Fuzzy - Power	8 Fuzzy - Power
Ip	50 A	50 A	50 A
Is	1500 mA	1500 mA	1500 mA
Us	80 kV	80 kV	80 kV
FD-Sensitivity	50 %	50 %	50 %
FD-Deionisation time	10 ms	10 ms	10 ms
FD-Current drop	90 %	90 %	90 %
Ramp up time/FD-ramp up	100 ms	100 ms	100 ms
FD-wait time/Ramp up time	0 ms	0 ms	0 ms
SC-Deionisation time	100 ms	100 ms	100 ms
SC-wait time	100 ms	100 ms	100 ms
SC-Voltage limit	10 kV	10 kV	10 kV
Sampling time characteristics	500 ms	500 ms	500 ms

**SIPREC ODS Report** 28.02.2021

Name:

Plant/Type:

Order No.:

Cubicle No.:

T/R set No.:

Comment:

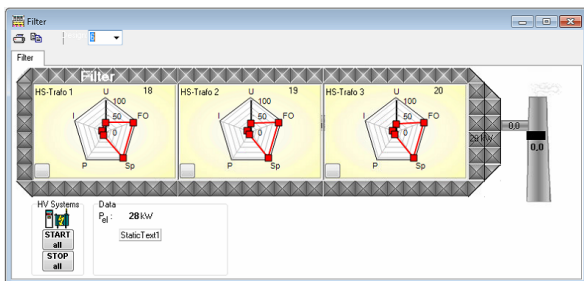
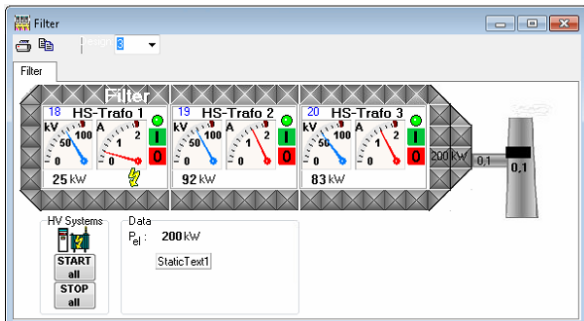
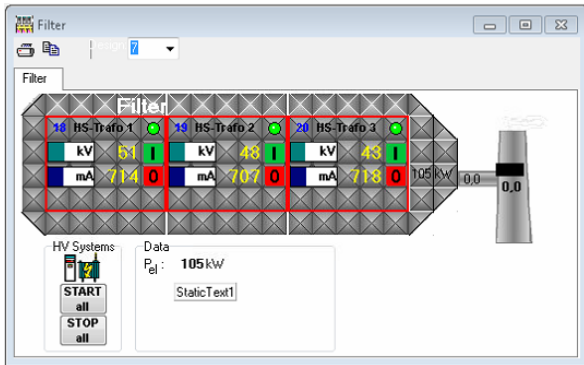
Station	18	19	20
Name	HS-Trafo 1	HS-Trafo 2	HS-Trafo 3
Station Type	SIPREC I	SIPREC I	SIPREC I
Serial Number	SLB6445734	SLB6445732	SLB6445732
Hardware-Version	V2.0.0201	V2.0.0201	V2.0.0201
Software-Version	V2.2.0011	V2.2.0011	V2.2.0011
Dp-Param/HW-Version	V2.0.0104	V2.0.0104	V2.0.0104
Dp-Param/SW-Version	V2.2.7208	V2.2.7208	V2.2.7208
Operating time	16977.04.23	11300.53.18	11283.58.21

Parameters	Station 18	HS-Trafo 1
Par. Set	0	1 2 3 4 5 6 7 8 9
Op. Mode	8	8 8 8 8 8 8 8 8 8
Ip	285 A	50 A 150 A 285 A 200 A 10 A 10 A 10 A 10 A 10 A
Is	1500 mA	1500 mA 1500 mA 1500 mA 1500 mA 2500 mA 2500 mA 2500 mA 2500 mA
Us	80 kV	80 kV 80 kV 80 kV 80 kV 80 kV 80 kV 80 kV 80 kV 80 kV
FD-Sensitivity	50 %	50 % 50 % 50 % 50 % 50 % 50 % 50 % 50 % 50 %
FD-Deionisation time	10 ms	10 ms 10 ms 10 ms 10 ms 10 ms 10 ms 10 ms 10 ms 10 ms
FD-Current drop	90 %	90 % 90 % 90 % 90 % 90 % 90 % 90 % 90 % 90 %
Ramp up time	100 ms	100 ms 100 ms 100 ms 200 ms 20 ms 20 ms 20 ms 20 ms 20 ms

Parameters	Station 19	HS-Trafo 2
Par. Set	0	1 2 3 4 5 6 7 8 9
Op. Mode	8	8 8 8 8 8 8 8 8 8
Ip	285 A	50 A 150 A 285 A 200 A 10 A 10 A 10 A 10 A 10 A
Is	1500 mA	1500 mA 1500 mA 1500 mA 1500 mA 2500 mA 2500 mA 2500 mA 2500 mA
Us	80 kV	80 kV 80 kV 80 kV 80 kV 80 kV 80 kV 80 kV 80 kV 80 kV
FD-Sensitivity	50 %	50 % 50 % 50 % 50 % 50 % 50 % 50 % 50 % 50 %
FD-Deionisation time	10 ms	10 ms 10 ms 10 ms 10 ms 10 ms 10 ms 10 ms 10 ms 10 ms
FD-Current drop	90 %	90 % 90 % 90 % 90 % 90 % 90 % 90 % 90 % 90 %
Ramp up time	100 ms	100 ms 100 ms 100 ms 200 ms 20 ms 20 ms 20 ms 20 ms 20 ms
FD-wait time	0 ms	0 ms 0 ms 0 ms 0 ms 0 ms 0 ms 0 ms 0 ms 0 ms
SC-Deionisation time	100 ms	100 ms 100 ms 100 ms 100 ms 100 ms 100 ms 100 ms 100 ms
SC-wait time	100 ms	100 ms 100 ms 100 ms 100 ms 100 ms 100 ms 100 ms 100 ms
SC-Voltage limit	10 kV	10 kV 10 kV 10 kV 10 kV 10 kV 10 kV 10 kV 10 kV 10 kV
Sampling time characteristics	500 ms	500 ms 500 ms 500 ms 500 ms 500 ms 500 ms 500 ms 500 ms

Example for visualization of measured values:

Station	18	19	20
Station name	HS-Trafo 1	HS-Trafo 2	HS-Trafo 3
Prec. voltage	61 kV	59 kV	54 kV
Prec. current	1245 mA	1243 mA	1255 mA
Prim current	265 A	266 A	262 A
Vs max	67 kV	64 kV	60 kV
Is max	1435 mA	1435 mA	1356 mA
Us ripple	11 kV	11 kV	11 kV
el. power	75 kW	72 kW	65 kW
Pulse-power	0 kW	0 kW	0 kW
V.link/ fir.ana	523 V	535 V	519 V
Frequency	50,00 Hz	50,50 Hz	50,00 Hz
Sparks	0 #/min	0 #/min	0 #/min
Normal FO	0 #/min	0 #/min	0 #/min
Repet. FO	0 #/min	0 #/min	0 #/min
Temperature	42,8 °	33,5 °	40,3 °
Analog1	0,1 mq/m <sup>3</sup>	0,1 mq/m <sup>3</sup>	0,1 mq/m <sup>3</sup>
Analog2	334,0 Tm <sup>3</sup> /h	335,0 Tm <sup>3</sup> /h	335,0 Tm <sup>3</sup> /h



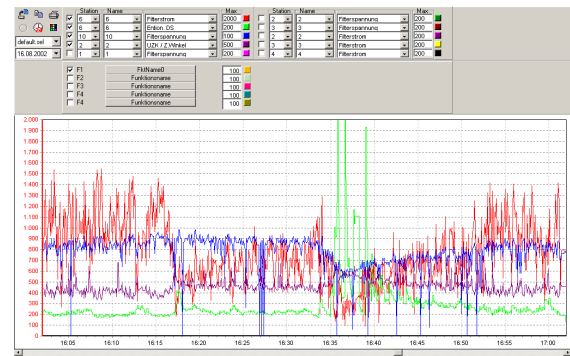
Visualization features:

- selectable views
- overview for different ESP's
- tabular and 3D graphical representation of all measured values (HV power supplies and process signals)

- status messages of all H.V. power supplies and rapter drives
- operation of individual T/R sets or ESP group
- adjustable scale

## Data Archiving and Trend Charts

All measurement values and status signals of the ESP controls as well as process signals, are stored in individual daily archive files in a selectable time-interval. The data can either be displayed with the trend function or imported into Excel or similar for further analysis.



Trend chart features:

- max. 10 signals visualized simultaneously
- max. 16 signals selectable per ESP controller
- individual presentation and scaling
- sample rate up to 1sec.
- 1h or 24h time axis
- zooming
- selectable average calculation
- pre-selected profiles can be stored and loaded
- trends can be copied to clipboard and printed

The data archiving is an independent application that runs in the background. This means that the recording of the measured values is not interrupted when the SIPREC ODS Client program is closed.

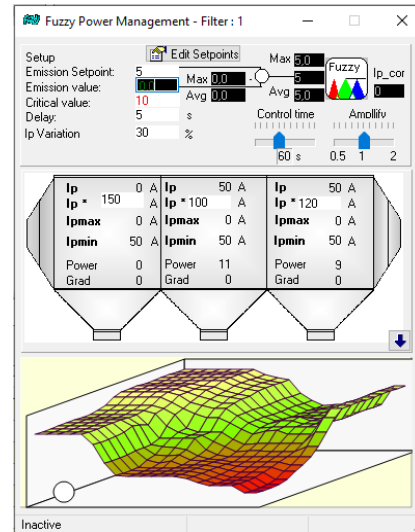
## Optimizations

SIPREC ODS includes the separate application **FuzzyOpt** through the optimizations, e.g. the energy minimization is carried out depending on the emission monitoring signal and is based on fuzzy logic.

Different ESP designs (number of electrical fields in series, number of parallel zones, ESPs in parallel or series connection) can be easily configured and up to 10 ESP systems can be optimized at the same time. 10 independent parameter sets are available, through which individual settings for different process conditions (start-up / shutdown operation, partial / full load, different fuels / primary materials etc.) can be specified.

No.	Name	Set	Em. Setp.	Emission	Power	AllowOpt	Type	Status	Details
1	Gesamt	3	43	2,2872	90 kW	<input type="checkbox"/>	No Optimization	●	Details
2	1	0	5	0,2344	42 kW	<input checked="" type="checkbox"/>	No Optimization	●	Details
3	2	3	5	2,2872	48 kW	<input checked="" type="checkbox"/>	Fuzzy-Energy-Management	●	Details
4						<input type="checkbox"/>			Details
5						<input type="checkbox"/>			Details
6						<input type="checkbox"/>			Details
7						<input type="checkbox"/>			Details
8						<input type="checkbox"/>			Details
9						<input type="checkbox"/>			Details
10						<input type="checkbox"/>			Details

The optimization program first transforms the ESP configuration into a 3-zone model. Depending on the settings made for each parameter set and the ESP configuration, the potential for each of the 3 zones of the ESP model is determined cyclically. After each cycle, the reverse transformation takes place with individual setpoints for each ESP controller.



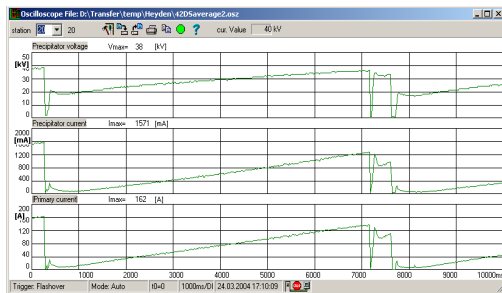
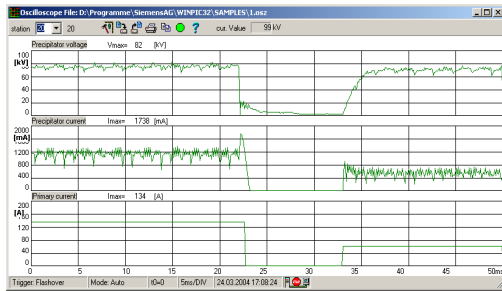
If the ESP controller control the rapper systems, the collecting electrode rapping is coordinated by the SIPREC ODS **RapCtrl** application to avoid emission peaks caused by unwanted simultaneous rapping of consecutive ESP fields. Like **FuzzyOpt**, **RapCtrl** is a separate application that runs in the background.

## Diagnosis

Numerous diagnostic functions are available with SIPREC ODS thanks to the adjustable measurement data recording of the ESP controller and the available operating data. These enable an operational analysis of the high voltage power supply, the ESP controller and the ESP without the need for additional measuring equipment.

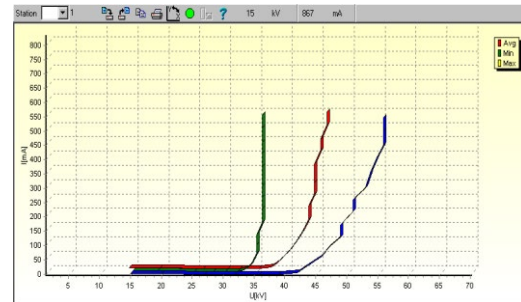
### Oscilloscope Function

The recording parameters are selected in SIPREC ODS and transferred to the ESP controls. After the measurement data have been transmitted, they are displayed in the oscilloscope window.



## V / I Curve Scanning

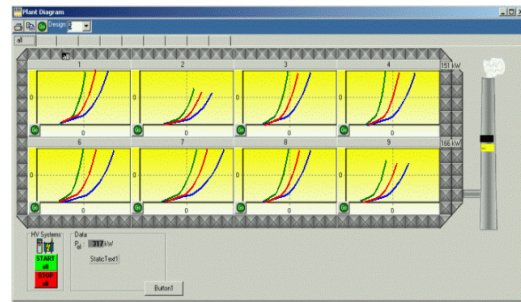
The V / I characteristic is used to diagnose the ESP electrical field operation and the mechanical state of the electrical field in comparison to other fields or to different operating conditions (e.g. with / without load).



## Oscilloscope features:

- sampling rate minimum 100µs with 3 curves simultaneously (ESP voltage / current, primary current)
- trigger mode AUTO, SINGLE, NORMAL
- trigger on e.g. flashover, ESP voltage/ current, primary current
- adjustable trigger delay
- zooming
- charts can be stored, reloaded and printed
- import of measured values into WINDOWS Excel for further analysis
- open as many oscilloscope windows as controllers connected and run them simultaneously
- recorder function for sample rates above 50ms/DIV
- automatic storage of oscilloscope recordings for unattended recording and later evaluation

The oscilloscope feature is always connected without no need to connect/disconnect measuring wires to the cubicles or to walk around with additional equipment saving time and effort.

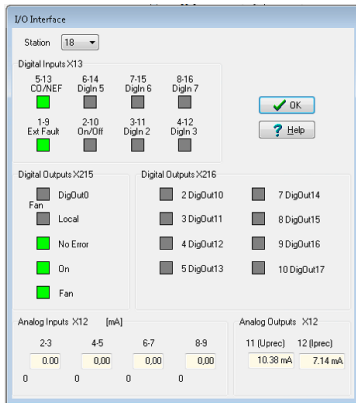


## V / I curve features:

- scanning ESP current and ESP voltage (minimum / maximum and average value)
- selection of scaling and curve
- charts can be stored, reloaded and printed
- zooming
- measured values importable into Windows Excel
- scan of V / I curve with ESP overview individual or with one mouse click

## Status Messages

A quick overview of all digital and analog inputs / outputs of the filter controls is given. In this way, interface errors can be identified quickly.



Sta.	Datum:	Zeit:	ID	Text
12	02.08.2019	12:05:20	24	Überspannung
12	02.08.2019	11:57:54	9	Lichtwellenleiter HS-controller
11	02.08.2019	08:00:08	10	Unterspannung Filter
52	03.07.2019	10:13:09	18	Parameter
10	31.10.2018	17:38:33	8	Lichtwellenleiter HS-controller
10	31.10.2018	17:38:33	6	Netzspannung
10	31.10.2018	17:38:33	10	externer Fehler
10	31.10.2018	17:10:54	8	Lichtwellenleiter HS-controller
10	31.10.2018	17:10:54	6	Netzspannung
10	31.10.2018	17:10:54	10	externer Fehler
10	31.10.2018	16:27:22	8	Lichtwellenleiter HS-controller
10	31.10.2018	16:27:22	10	externer Fehler
10	31.10.2018	16:27:21	5	Netzspannung
10	31.10.2018	16:25:07	9	Unterspannung Filter
10	31.10.2018	16:23:35	9	Unterspannung Filter

### Parameter History

The history of the parameter changes carried out via SIPREC ODS is logged. The effects of changed parameter settings can be verified with the trend charts.

Date	Time	Station	Setup	Parameter	Value
06.05.2020	14:16:53	3	2	4	70
06.05.2020	14:16:54	3	2	4	70
06.05.2020	14:17:08	3	2	4	70
06.05.2020	14:17:28	3	2	4	70
06.05.2020	14:26:51	3	2	4	70
06.05.2020	14:44:29	3	2	4	70
06.05.2020	14:44:31	3	2	4	70
06.05.2020	14:44:33	3	2	4	70
06.05.2020	14:58:57	3	2	4	70
06.05.2020	14:59:52	3	2	4	70
06.05.2020	15:02:26	3	2	0	70
06.05.2020	15:02:33	3	2	0	70
06.05.2020	15:15:52	4	1	0	50
06.05.2020	15:16:01	4	1	0	80
06.05.2020	15:15:56	4	1	0	100
06.05.2020	15:16:14	4	1	0	120
06.05.2020	15:16:20	4	1	0	120

### Fault History

The error messages of the ESP controls are displayed with the date, time, status of the fault and fault message. With double-click on a fault message, the trend chart is automatically opened at the time of the fault.

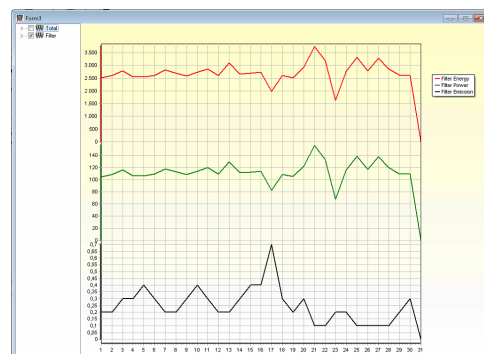
The errors are also saved in the archive files. An additional SIPREC ODS tool analyzes all archive files and creates a statistic with grouped fault events.

## Additional Features

### Month Report

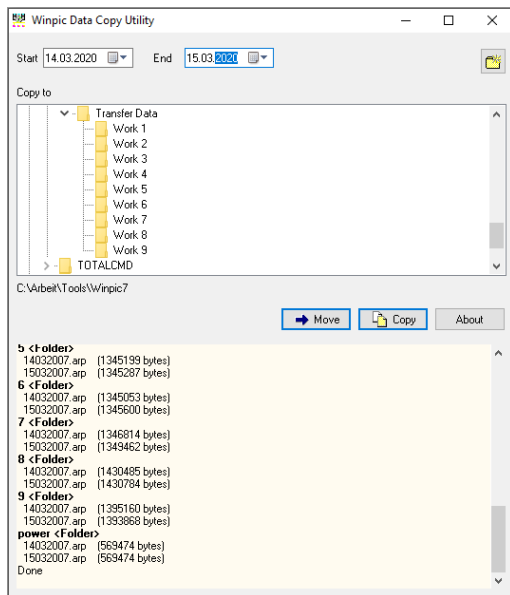
With the month report the power consumption of all ESP's including the opacity values are summarized per month in a table or as 3D chart. The data also can be imported into Windows Excel.

Day	Total	1	2	3	4	5	6	7	8	9	10	11	12
<b>All Stations</b>													
Energy Consumption:	638715,6	31155,2	1025,1	21776,3	22943,4	23236,9	22411,5	22915,9	23097,8	20940,2	15752,7	25746,4	26053,5
Average Power:	955,6	962,3	45,1	905,7	997,6	968,2	934,2	955,1	962,4	872,6	656,4	1072,7	1065,5
<b>ESP 1</b>													
Energy Consumption:	327463,1	13427,2	646,3	11879,5	12038,7	12280,1	12057,6	12091,2	12167,4	11570,3	8312,1	13007,6	14029,5
Average Power:	5202,2	599,5	271,1	496,1	564,2	553,8	544,4	546,7	546,7	482,1	346,4	502,8	593,9
Average Emission:	0,0												



## Data Copy

With this tool, the archive files of a selectable time frame can be copied or moved for further use.



## Services

Services in conjunction with SIPREC ODS are provide on-site or by the Siemens Energy remote service for:

- Fault analysis and troubleshooting
- Commissioning / support for commissioning
- Evaluation / optimization of ESP operation after changed operating conditions
- System check for predictive maintenance
- Customer training
- Software upgrades

### Fault Analysis and Troubleshooting

The archived SIPREC ODS data (fault and oscilloscope history, trend charts etc.) of the high voltage transformer rectifier systems is analyzed. Additional tests and detailed analyzes are carried out depending on the type of fault.

In case of the remote service this is carried out in cooperation with the customer personnel on-site.

In case of a hardware failure instructions are provided for the exchange to be carried out by customer staff.

### Commissioning / Support for Commissioning

The commissioning of the high voltage power supply is typically carried out by our special commissioning engineers on-site with SIPREC ODS as the basic equipment. However, if this should not be possible due to e.g. travel requirements, the commissioning can also be carried out by remote service in conjunction with on-site staff. For this, SIPREC ODS must be available on- site.

### Optimization of ESP controller parameter settings

A change in the ESP operating conditions (primary material, increased load, changed ESP mechanical condition etc.) typically requires optimization of the ESP controller parameters to maintain the best possible ESP collecting efficiency. The optimization will be carried out in conjunction with the available emission monitoring signal (continuous measurement downstream of the ESP). The emission monitoring signal must be available to SIPREC ODS. Is this signal not available, the optimization is carried out by maximizing the corona power.

## System Check

Typically, a detailed system check is carried out once a year consisting of:

### *High voltage power supplies*

- Analysis of the available archive/log files (measured values, fault history, warnings etc.)
- Analysis of the controller digital input/output signals
- Analysis of the controller analogue input wave forms (oscilloscope)
- Analysis of the optical fiber connection to the transformer rectifier sets
- Evaluation of all operating values with recommendations for eliminating operating faults or preventive measures

### *SIPREC ODS PC / laptop*

- Review/analysis of hardware and software resources (memory capacity, CPU usage, task manager processes / system services, etc.)
- Review/analysis of the bus connection between the ESP controller and SIPREC ODS
- Checking the connection to the remote control
- Implementation of minor optimizations (parameters, settings, etc.)
- Storage of inspection and maintenance activities

## Customer Training

With the help of SIPREC ODS and the documents provided for the training, the following topics are typically trained:

- SIPREC ODS – operation and use of applications

- SIPREC high voltage power supply – operation and functionality, fault analysis / troubleshooting, maintenance
- ESP – function, operating conditions, fault analysis

## Software Upgrade

With an additional function of SIPREC ODS, the latest software updates are loaded into the ESP controls, adjustments to the settings are made and the new functions are checked under operating conditions.

## Reporting

For each service carried out, a specific detailed report is provided presenting:

- Information on the work carried out
- Measurement and analysis results
- Parameter report
- Compilation of commissioning data (commissioning checklist)
- Recommendations for the maintenance of the high voltage power supplies and ESP(s)

## 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.

### Published by

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Or sent an email to: [siprec.energy@siemens-energy.com](mailto:siprec.energy@siemens-energy.com)

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