TRACTION
POWER
SYSTEMS

Sécheron

CONTROL &
PROTECTION RELAYS

STELLA-**SEPCOS-PRISM**

STELLA

Sécheron has been developing and manufacturing safety devices for DC traction systems for the railway industry for decades. We have drawn upon our extensive experience with DC traction systems and the related industry standards to develop our STELLA product range.

All STELLA products, including control and protection devices (SEPCOS range), control and supervision (KEOPS), stray current monitoring system (SCMS) and for the help of operation and predictive maintenance (IOMS), are designed based on our strong experience in the field and customer feedback to answer the railway requirement and simplify our customer's follow up of their traction power substations.

STELLA products are designed with the latest technology, with the modular design allowing the customer needs to be met even on the most complex of projects.

GENERAL INFORMATION

SEPCOS-PRISM benefits from SEPCOS main functions and power, all in a compact design including an integrated and user-friendly touch screen display.

SEPCOS-PRISM is made of high-tech equipment which satisfies the most demanding safety requirements applicable to DC traction distribution networks.

Used as a control and protection unit, SEPCOS-PRISM integrates the necessary functions for the protection, the control and the measurement of DC traction equipment related to transportation systems (streetcars, underground railways, commuter trains, trolley buses etc.).

SEPCOS-PRISM is stand alone and easily adaptable by software. It is equipped with a programmable logic unit which allows to freely define the operating logic functions, in order to match the requirements of the unit or the system to supervise.

SEPCOS-PRISM is based on a monoboard product which embeds all functions.

MAIN **BENEFITS**

- ✔ Application adapted to each project and functionality
- ✔ Numerous functions: control, protection and recording
- ✔ IEC 61850 and IEC 60870-5-104 protocols available
- ✔ External synchronization (NTP/SNTP)
- ✔ Monitoring of analog measurements
- ✔ Simple, user-friendly and modern communication tools
- ✔ High resolution 7" graphic color Display
- ✔ High accuracy and very good noise immunity thanks to a high sampling rate based on high performance 16-bit A/D converter
- ✔ Provide data to our intelligent operation & maintenance system (IOMS)
- ✔ Safe and reliable

ALL-IN-ONE

SEPCOS–PRISM have the advantage to embed complete functionalities of protection relay, programmable logic controller (PLC) and color touch screen display in a compact housing.

Thanks to this, the mechanical integration through door mounting is easy and increases the free space on low voltage compartment.

STANDARDS

SEPCOS-PRISM is fully approved in railway substation environments according to the following standards:

- **IEC 60255-1 (EN 60255-1)** | Measuring relays and protection equipment – Part 1: Common requirements
- **IEC 60255-21 (EN 60255-21)** | Electrical relays – Part 21: Vibration, Shock, Bump and Seismic tests on measuring relays and protection equipment
- **IEC 60255-26 (EN 60255-26)** | Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements
- **IEC 60255-27 (EN 60255-27)** | Measuring relays and protection equipment – Part 27: Product safety requirements
- **IEC 61131-3 (EN 61131-3)** | Programmable controllers – Part 3: Programming languages
- **IEEE C37.90** | Relays and relay systems associated with electric power apparatus

⫻ **Main characteristics – *According to the standards mentioned***

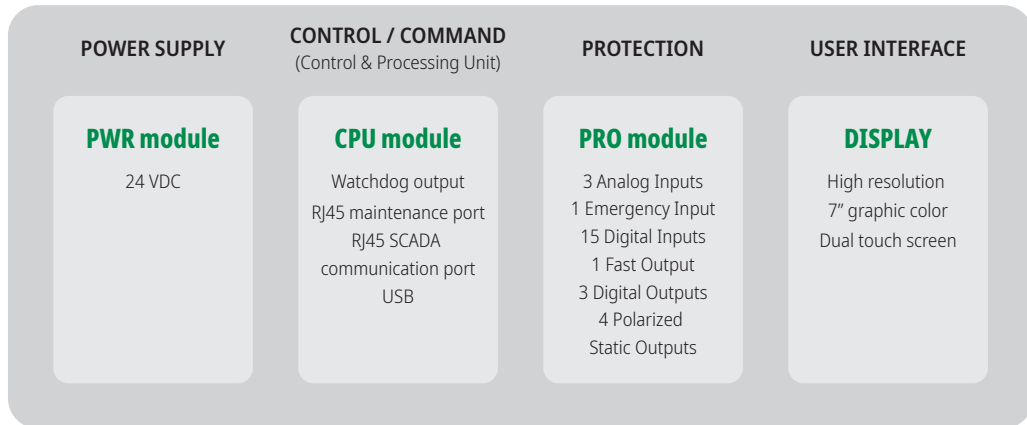|	Unit	Values
Supply voltage	[V]	24 to 48 (-20% / +10%)
Insulation	[kV$_{AC}$]	2 kV$_{AC}$, 50 Hz , 1min
Analog voltage input levels	[V]	±5, ±10, 0-5, 0-10 [1]
Analog current input levels	[mA]	±20, 0-20, ±40, 0-40, 4-20, 4-20 extended [1]
Degree of protection	-	IP52 / IK05 [2] IP20 [3]
Storage temperature	[°C]	-40 to +85
Operating temperature	[°C]	-25 to +70
Max. humidity	[%]	93 [4]

[1] Configurable software.
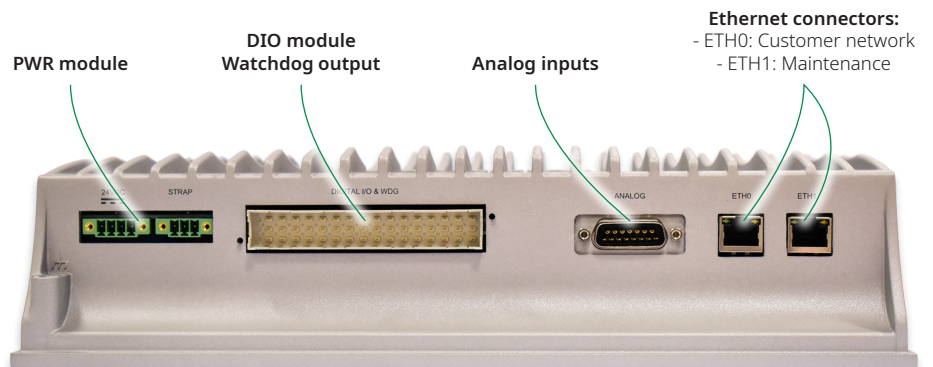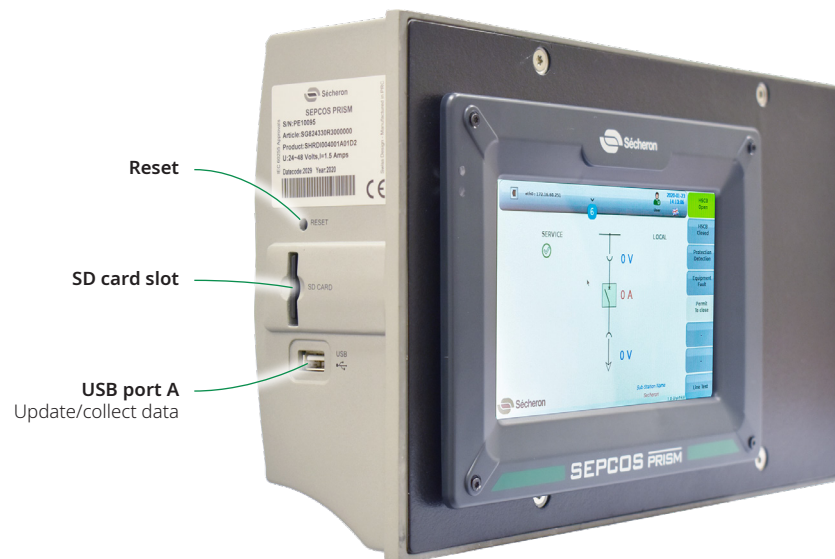[2] Front side – Door mounted.
[3] Rear face.
[4] Without condensation.

ARCHITECTURE

SEPCOS-PRISM is a monoboard product integrating all different functionalities (power supply, control/command, protection and display) in an electronic board.

POWER SUPPLY	CONTROL / COMMAND (Control & Processing Unit)	PROTECTION	USER INTERFACE
PWR module	**CPU module**	**PRO module**	**DISPLAY**
24 VDC	Watchdog output RJ45 maintenance port RJ45 SCADA communication port USB	3 Analog Inputs 1 Emergency Input 15 Digital Inputs 1 Fast Output 3 Digital Outputs 4 Polarized Static Outputs	High resolution 7" graphic color Dual touch screen

Example of SEPCOS-PRISM configuration

Reset

SD card slot

USB port A
Update/collect data

All connections (power supply, analog and digital signals, network, etc.) are placed at the rear.

PWR module

DIO module
Watchdog output

Analog inputs

Ethernet connectors:
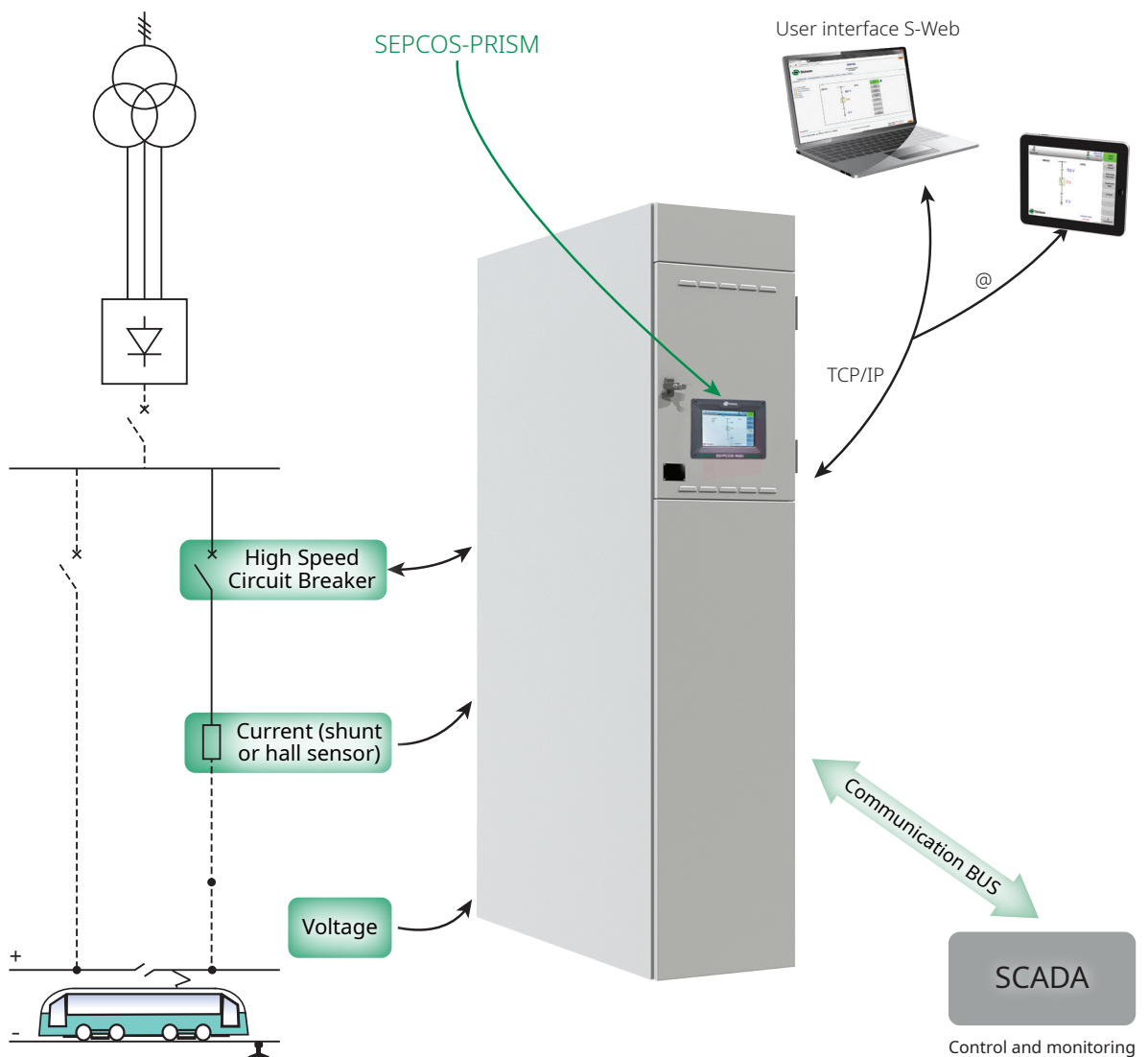- ETH0: Customer network
- ETH1: Maintenance

APPLICATIONS

With many control/command and protection functions, SEPCOS-PRISM satisfies the needs of DC power traction networks.

SEPCOS-PRISM is used for monitoring traction network segments and for logging events. It analyses the current gradient and voltages through cyclic measurements at the feeding point of the substation to the catenary.

SEPCOS-PRISM can be used in a large panel of cubicles (feeder, rectifier breaker, negative cubicle, voltage limiting devices (VGUARD), local SCADA, stray current monitoring systems (SCMS), etc.). The measurements are made through an electrically isolated transducer (i.e. Sécheron's VM10/ VM12 or MIU10 measuring amplifiers).

// **Example of SEPCOS-PRISM typical use**

SEPCOS-PRISM

User interface S-Web

TCP/IP

@

High Speed
Circuit Breaker

Current (shunt
or hall sensor)

Voltage

Communication BUS

SCADA

Control and monitoring

MECHANICAL CHARACTERISTICS

	Unit	Values
Height	[mm]	192
Width	[mm]	327
Depth	[mm]	90
Typical weight	[kg]	2.6
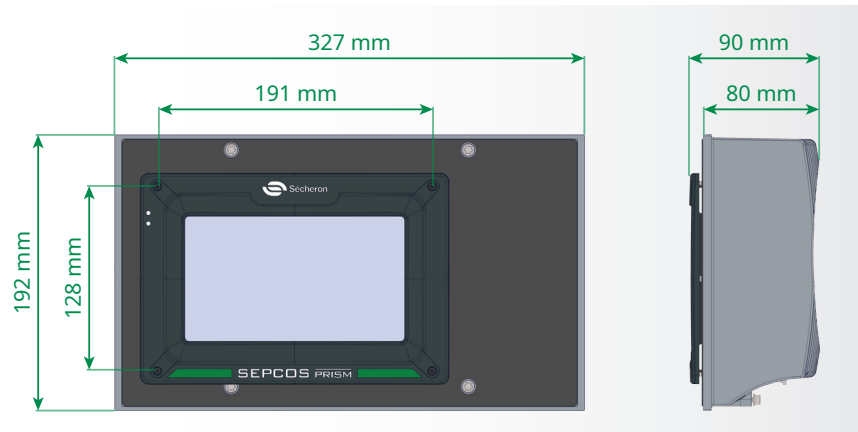
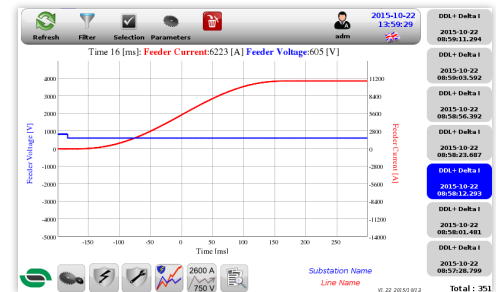Increased space in low voltage compartment

Door mounting

PROTECTION

MAIN FEATURES

- For each detection, 1 set of 3 curves is memorized:
  - current (I)
  - voltage (U)
  - di/dt
- Curve memorized pitch: 200 µs to 5 s
- Sampling rate: ~ 20 µs per analog input (total = 80 µs)
- Time stamps: 1 ms
- Availability of the last 5000 events and 1000 curves

List of protection functions

- DDL+ Delta I (di/dt)
- DDL+ Delta T (di/dt)
- DDL- Delta I
- DDL- Delta T
- DDL Limited (di/dt)
- Open arm

- Incomplete sequence
- Thermic
- HSCB maintenance
- IDMT Level 1/ 2 / 3
- Imax+ / Imax++
- Imax- / Imax--

- Ufeeder Min
- Ufeeder max
- Track alive
- Falling voltage
- Umin+
- Energy+ / Energy-

- Umax+ / Umax++
- Umax- / Umax--
- Amp monitoring

RATE OF RISE PROTECTION FUNCTIONS (DI/DT)

DDL+ Delta T

If the value measured of Delta T is higher than the parameter Tmax and the value measured of Delta I is higher than the parameter Delta Imin, the function declares a detection by DDL+ Delta T and tripping is initiated.

DDL+ Delta I

If the current rise measured of Delta I is higher than the parameter Delta Imax during a time higher or equal to the parameter Delta Imax, the function declares a detection by DDL+ Delta I and tripping is initiated.
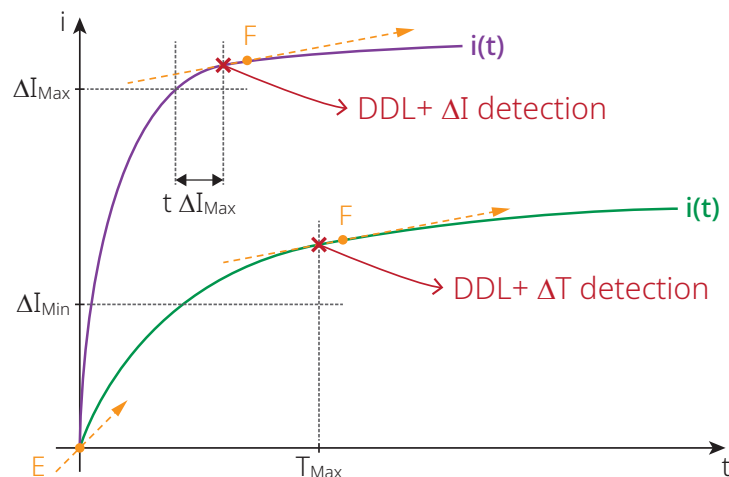
BUS CONNECTIONS

Sécheron can provide engineering support while elaborating a network regardless of the type of communication and its architecture.

⫽ Ethernet protocols

- Modbus-TCP
- IEC 60870-5-104 (-5-101)
- IEC 61850
- DNP 3.0 (Ethernet)

⫽ Connectivity
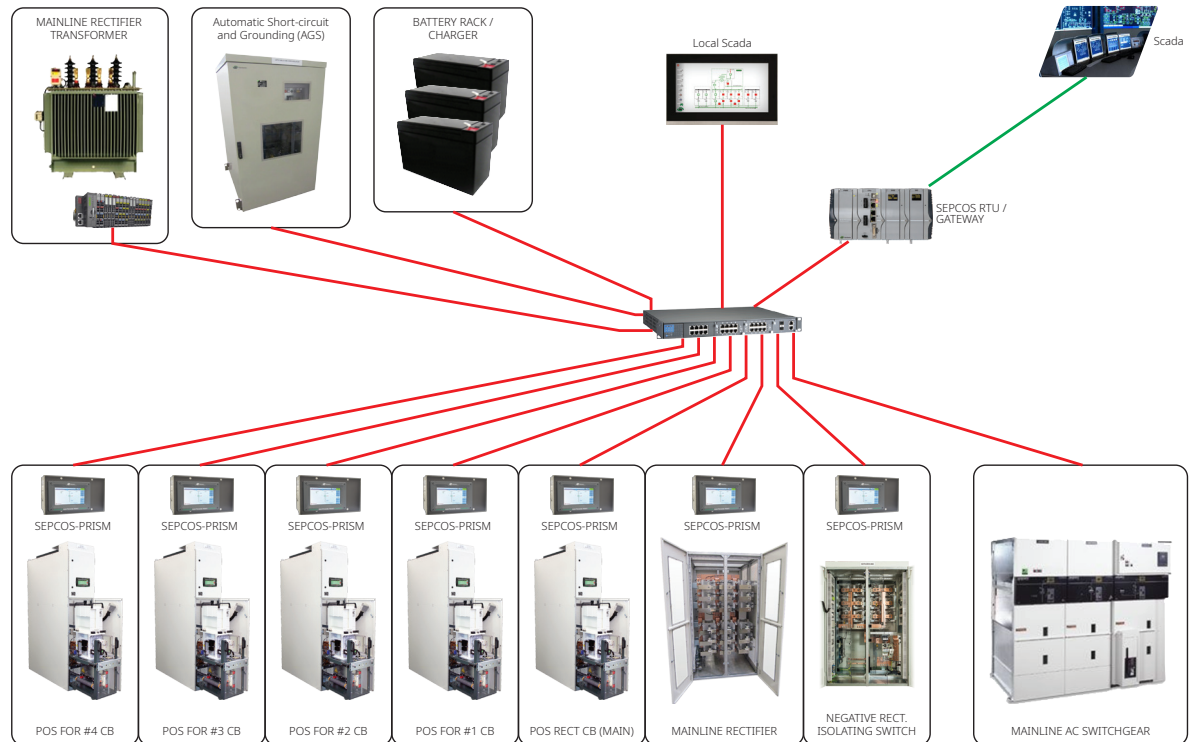
- Copper cable (RJ45)

SEPCOS-PRISM integrated in MBS

SEPCOS-PRISM integrated in VGUARD

EXAMPLE OF CONFIGURATION

⫽ Typical star network

SEPCOS-PRISM allows the communication between different cubicles to the local SCADA and SCADA via technology network (ethernet bus).

MAINLINE RECTIFIER TRANSFORMER

Automatic Short-circuit and Grounding (AGS)

BATTERY RACK / CHARGER

Local Scada

Scada

SEPCOS RTU / GATEWAY

SEPCOS-PRISM — POS FOR #4 CB

SEPCOS-PRISM — POS FOR #3 CB

SEPCOS-PRISM — POS FOR #2 CB

SEPCOS-PRISM — POS FOR #1 CB

SEPCOS-PRISM — POS RECT CB (MAIN)

SEPCOS-PRISM — MAINLINE RECTIFIER

SEPCOS-PRISM — NEGATIVE RECT. ISOLATING SWITCH

MAINLINE AC SWITCHGEAR

DISPLAY

A user-friendly interface is associated through a high resolution 7" graphic color display and capacitive dual touch screen allowing easy and intuitive navigation.

This device is equipped with 8 LEDs related to dynamic labels (color and text) for the visualization of the state of the PLC (position, type of fault, etc.).

The Display allows a complete visualization, control and setting of the equipment and collects the information available from SEPCOS.

It includes the modification of SEPCOS parameters (command parameters, setting protections, etc.).

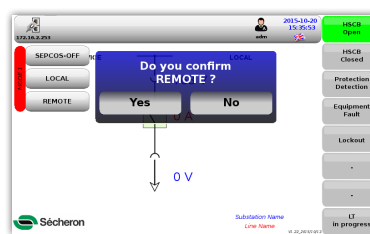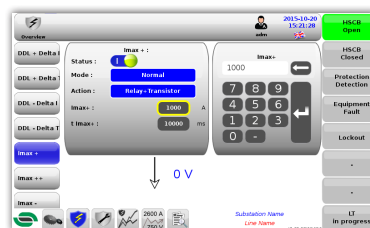Control and configuration actions are password protected.

MAIN FEATURES

- Control of the equipment (orders in, out, reset, etc.)
- Display of the last 5000 events recorded by SEPCOS and time-stamped
- Multilingual (the languages can be adapted upon request)
- Different administration modes (Root, Admin, PowerUser, Operator and User)
- Backup and export of settings, curves, events or log information on a USB key
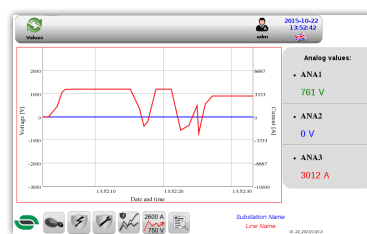
EXAMPLES OF SCREENS

Control orders

Trends

Protection parameters

Events list

S-WEB TOOL

The S-Web tool is an integrated webserver within each SEPCOS.

This interface is used to configure, visualize, analyze and retrieve various data. The connection with the S-Web tool is done through ethernet cable.

The S-Web tool does not require any software installation on a computer, its operation only requires a web browser.

MAIN FEATURES

- Reading and modification of the protection and command functions settings
- Collection of data recorded by SEPCOS and download on a PC
- Upload of information (parameters) from a PC to one or more SEPCOS
- Real-time visualization of analog inputs values, detection results and events
- Continuous recording of trends and visualization for a given period
- Display of detection curves (di/dt, U and I) of protection functions
- Application software upgrade
- Multi settings (7 different sets of parameters)

All functions of the Display (i.e. opening and closing of the HSCB, switching from "Local" to "Remote" mode and inversely, etc.) are available on the S-Web tool.

The trends of the analog inputs can be memorized on a USB mass storage unit (USB key or other) for the first 3 analog inputs. This function can only be activated when a USB mass storage is connected to the SEPCOS with enough free space.

The status of the USB mass storage unit is displayed for information: connected or disconnected and quantity of free space still available. Data are memorized in COMTRADE (Common format for Transient Data Exchange for power systems). It is possible to access the USB key through the FTP.

EXAMPLES OF SCREENS

Trends
(analog values)

Events list

Protection curves

SG847023BEN_B00-10.21