Due to magnetic field asymmetry in the machine, voltage in the shaft can be induced, which, depending on the type of machine, its size and load, varies in amplitude and frequency composition. Low circuit impedance consisting of shaft, bearing, oil film and other structural components, can cause shaft current flow which leads to bearing destruction.

Shaft Current and Voltage Protection Relay (SCVP) is used to measure/analyze shaft voltage and current that may damage the generator bearing.

**SCVP Features**
- On-line analysis
- Protection relay configuration based on harmonic composition
- Database (trends, waveforms, alarms …)
- Local/remote HMI
SCVP Benefits

**INSTALLATION**
- Installation without machine interruption and integration with other systems (e.g. SCADA)
- Web integration into a single access point which supervises critical equipment in multiple power plants

**CONNECTIVITY**
- Integration of multiple user accounts into one user application
- Innovative technology which connects local HMI, database for long term archive and web server for a compact product

**USER FRIENDLY**
- Intuitive data presentation and remote access using standard Internet browsers
- Automated report generation with all relevant information on machine status
- Online analysis and real trending for a reliable form of predictive monitoring

**PROTECTION**
- The system performs spectral analysis (FFT) using instrument transformer which can be used to set custom alarms for critical values
- Long term archive of data and historical values stored for detailed analyses and trends

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**Worldwide recognized and implemented**

SCVP has found its place on many hydro and turbo generators around the globe. Our customers recognize its value and the importance of monitoring one of the biggest issues that arise during the generator usage.
1. SCVP specification

**Architecture:**
- Two channel acquisition unit with real time controller

**Current input:**
- Measuring range: 0 to ± 50 mA
- Overload: 300 mA
- Measuring error: < 0.05 mA for 0 to 50 mA measuring range
- Frequency range: up to the 10 kHz
- Input resistance: 5 Ω
- Input capacitance: 1 nF
- Test voltage: 4 kV
- Rated isolation voltage: 600 V overload (category III) by EN 50178
- Surge withstand: 5 kV (1,25/50 μs), by IEC 255-4

**Voltage input:**
- Measuring range: 0 to ± 10 V
- Overload: 250 V
- Measuring error: < 10 mV for 0 to 10 V measuring range
- Frequency range: up to the 10 kHz
- Input resistance: 1 MΩ
- Input capacitance: 500 pF
- Test voltage: 4 kV
- Rated isolation voltage: 600 V overload (category III) by EN 50178
- Surge withstand: 5 kV (1,25/50 μs), by IEC 255-4

**Digital/relay outputs:**
- Number of outputs: 2 to 8
- Continuous current: 6 A
- Maximum switching power: 1500 VA
- Maximum switching voltage: 250 VAC/DC
- Maximum switching frequency: 0.1 Hz
- Rated isolation voltage: 300 V overload (category III) by EN 50178
- Surge withstand: 4 kV (1,25/50 μs), by IEC 5017

**Communication:**
- Ethernet 10/100
- Supported protocols: Modbus TCP slave, FTP server, IEC 60870-104, HTTP server (other on request)

**Power supply:**
- DC: 80 V to 370 V
- AC: 85 to 264 V, frequency 47 to 63 Hz
- Maximum allowed power supply interruption: 100 ms for 230 VAC/ 20 ms for 115 VAC
- Test voltage: 3 kV (2 kV against ground)

**Temperature range:**
- Operational temperature range: -20°C to +70°C
- -0°C to +55°C (for SCVP variant with touch screen)
- Storage temperature range: -40° to +85°C

**Dimensions:**
- 19” installation – WHD: 482.5x177.5x250
- Cabinet IP 54 (IP 66 on request) – WHD: 300x300x200

2. Measuring sensors

**Instrument transformer** (current measurement):
- Rated voltage: 0.7 kV
- Insulation level: 3 kV
- Transfer ratio: typically 1:1000
- Dimension: On request
- Test winding: yes
- Frequency: 50 Hz, 60 Hz
- Typical transformer curve

**Sliding brush and small CT** (current and voltage measurement):
- CT – typically 100 mA, 1A, 5 A and 10 A

3. Documentation

Complete documentation required for system installation, maintenance and usage of the SCVP system is provided. Usual scope of the documentation:
- Mechanical documentation (book I)
- Electrical documentation (book II)
- User instructions (book III)
- Initial state records (book IV)
- Certificates, test reports... (book V)
4. Software

Depending on the selected SCVP type, users can get insight into measuring data through local touch display (local HMI) and through web server (web application). Local visualization enables insight into real-time data (waveform and spectrum) and setup. All screens can be modified according to the Customer’s requests which includes native language.

The SCVP system is equipped with a multiuser web server which enables remote access and overview of all system data through standard web browser. This web server provides access to the SCVP system from any desktop or a laptop computer (with Windows or iOS operating system), tablet (with iOS, Android OS..) or smartphone (with iOS, Android OS...). System access is provided without the need to install any additional software, using a standard web browser (Google Chrome, Internet Explorer, Mozilla Firefox, Safari ...). Web server enables insight into real-time data (spectrum), alarms and for SCVP variant with data base trends and waveforms are on the Customers disposal.

5. Ordering guide

1. SCVP version (V)

V1 version (basic configuration)
This system enables measurement, online FFT signal analysis and protection by outputs relays. Alarm and trip signal can be configured (limit and delay).

V2 version
This version of protection system besides all characteristics of basic configuration is equipped with 5.7” display (resolution 640 x 480). By local and remote HMI this version provides the user insight into the on line measuring signal and FFT harmonics. This version of protection system is limited to temperature range 0 to 55 °C

V3 version
This version of protection system in addition to all characteristics of SCP – V2 version enables long term data storage and insight in history data through local or remote HMI application.

2. Inputs/outputs (IO)

Analog input
1. Shaft current measurement
2. Shaft current and voltage measurement

Digital output
0. None
n. Digital outputs

Analog output
0. None
n. Analog outputs

3. Sensors (S)

Shaft current
0. None
1. Instrument transformer for shaft installation (shaft size should be specified)
2. Sliding brush and shunt

Shaft voltage
0. None
2. Sliding brush (two pcs.)
### 4. Services (SRV)

#### Documentation
- None…………………………………………..………..…….. 0
- Electro documentation (BOOK I) ....…………….……..….... 1
- Mechanical documentation (BOOK II)
- Initial state records (BOOK III) 0

#### Installation
- No ………………………………………………….………………….. 0
- Yes …………………………………………………….……….....……. 1

#### Commissioning
- No ……………………………………………………………..………....….…….. 0
- Yes …………………………………………………….……….………….. 1

#### User training
- No ………………………………………………………………………………..………....….…… 0
- Yes ………………………………………………………………………....…………...........…… 1

#### Warranty
- Standard ………………………………………………………………………………………..…...….…… 0
- Extended* …………………………..……………………………………………....…………….…...…… n
  *(n – number of additional years)

#### Periodical status reports (diagnostics)
- No ………………………………………………………………………………………..….……………………….…… 0
- Yes* ………………………………………………………………………....………………………………..….......… 1
  *(report scope must be defined)

### 5. Installation material (IM)

#### Sensor holders
- No ………………………………………….………….……………………………..…..…..…….…. 0
- Painted steal* ……………………………….………………….…………………….…..…….………. n
  *(n – no. of holders)

#### Cables
- No ……………………………………………………………..………....................................….…....…….. 0
- Twisted pair cable *……………………….……….…..……..….……………..……………......…..…….... n
  *(n – meters)

### 6. SCVP housing (H)

#### Housing
- Electrical cabinet ………………………………………………………………………………………… 0
- 19" rack installation …………………………………………………………………………………….…….. 1

### Order example

**Example of Customer request:**
- SENSORS, CABLES, SENSOR HOLDERS
- Measurement of shaft current with instrument transformer (shaft diameter = 1000 mm)
- Measurement of shaft voltage
- Number of analogue inputs = 2, number of digital outputs/relays = 4
- V1 version of SCVP
- Sensor holders (set)

**DOCUMENTATION**
- Complete scope of the documentation

**ELECTRICAL CABINET**
- SCVP version in electrical cabinet

- **1** SCVP version
  - SCVP V - 1
- **2** SCVP inputs/outputs
  - SCVP IO - 2 - 4
- **3** SCVP sensors
  - SCVP S - 2 - 2
- **4** Services
  - SCVP SRV - 1 - 0 - 0 - 0 - 0 - 0
- **5** Installation material
  - SCVP IM - 6 - 0
- **6** SCVP housing
  - SCVP H - 0