

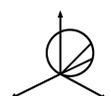
Swedish Neutral

Premium Power Protection

Arc Suppression Coils



(22kV Arc Suppression Coils)



Introduction

Resonance grounding by Petersen coils (Arc Suppression Coils) has been used in Scandinavia and other European countries for some eighty years. The excellent properties of this grounding concept are mirrored by very low outages rates.

Resonance grounding is mainly used in overhead networks where most of the faults are single phase-to-ground and often of transient nature. The Petersen coil chokes the fault current below the level of self-extinction ($< 35 \text{ A}$) by compensating for the capacitive fault current of the network. By this action all transient faults can be cleared without feeder tripping.

However sustained faults on overhead lines and cable faults cannot be cleared by any Arc Suppression Coil since no coil can compensate

for the active part of the fault current. Due to this remaining fault current it is necessary to trip the feeder to minimize the risk for fire and personal hazards in the network.

To obtain safe continuous operation during earth faults Swedish Neutral can offer the Ground Fault Neutralizer system which compensates for the complete fault current (capacitive+active). The Ground Fault Neutralizer reduces the fault current to practically zero, for all types of earth faults, faster than any other protection, while also maintaining power supply to the customers – no feeder tripping!



Arc Suppression Coil (ASC)

To reduce the capacitive fault current during an earth fault effectively the ASC needs to be tuned to the capacitive leakage of the network at the time of the earth fault. The capacitive leakage to ground is determined by the present size of the network, which in turn is determined by the number of feeders, overhead/cable, length of the feeders and other factors.

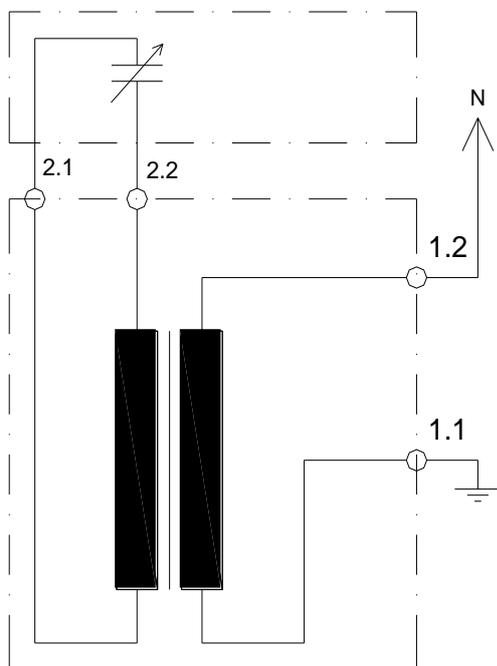
The Swedish Neutral ASC has a modern solid core design with one fixed winding and one auxiliary winding. To the auxiliary winding a capacitor bank is connected. The ASC is tuned by connecting the different elements of the capacitor bank in different combinations to the auxiliary winding.

The sum of the capacitive leakage in the network can change for different reasons. One example is when a feeder is disconnected

(reducing the sum of the capacitive leakage of the network). When the capacitive leakage is reduced an appropriate number of capacitors is connected to tune the coil to the network. If instead a feeder is connected to the network (increasing the sum of the capacitive leakage of the network) an appropriate number of capacitors are disconnected.

In 2006 Swedish Neutral sold its first oil free ASC for outdoor use. This coil has the same solid core design as the hermetically sealed oil immersed ASC with the difference that the winding is made up of a medium voltage cable using the screen as auxiliary winding.

Taking away the oil has a number of advantages – no oil catch needed, no need for emptying the oil catch from water/analyzing the water for oil, environmentally friendly – possible to install in sensitive areas.



Main Circuit Diagram



Oil Free ASC



Hermetically Sealed Design ASC

- **Modern solid core**
No moving parts – robust design
- **Hermetically sealed tank**
No maintenance – no oil samples needed
- **Standard tuning range 10-100%**
Other tuning ranges on request
- **From min to max position in <1s**
Fastest coil on the market
- **Resolution <1%**
More step less than a step less coil
- **Works in parallel with all types of ASC**
Possible to use existing ASC as fixed coil

Swedish Neutral has been producing Arc Suppression Coils since 1991 and has sold over a 1000 around the world.

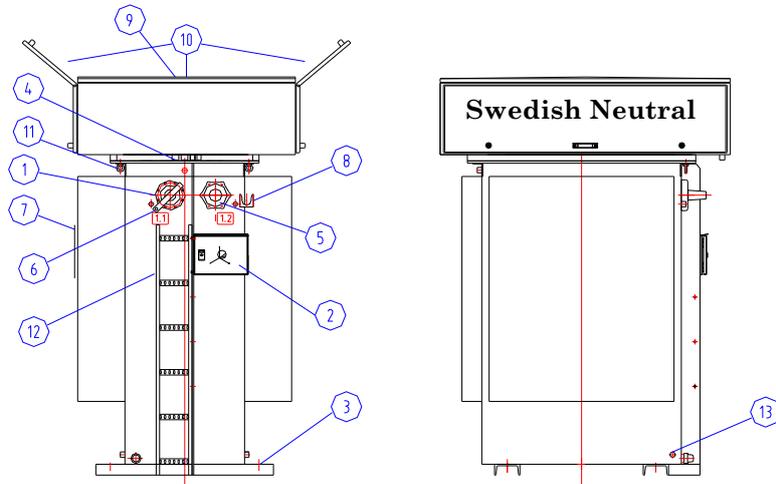
Oil Free Design ASC

- **Modern solid core**
No moving parts – robust design
- **Oil free**
No oil catch needed – environmentally friendly
- **Stainless Steel Enclosure**
No rust
- **Standard tuning range 10-100%**
Other tuning ranges on request
- **From min to max position in <1s**
Fastest coil on the market
- **Resolution <1%**
More step less than a step less coil
- **Works in parallel with all types of ASC**
Possible to use existing ASC as fixed coil

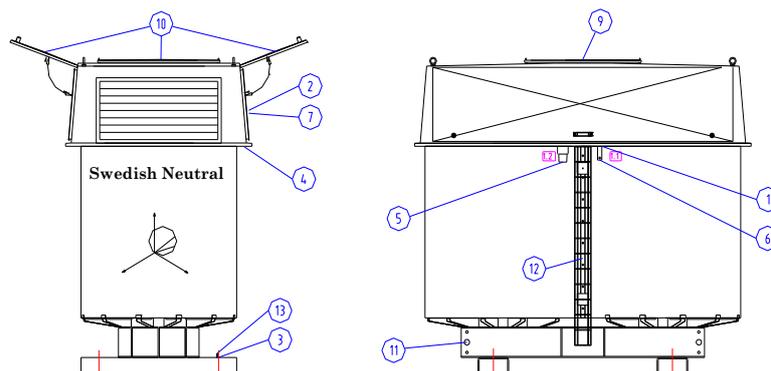


Arc Suppression Coils Layout

Hermetically Sealed Design



Oil Free Design



Legend

1. Current transformer (optional)
2. Local control panel
3. Mounting holes (16mm) for fixation of the Arc Suppression Coil to the foundation (optional wheels).
4. Low voltage bushing for auxiliary and control voltage.
5. High voltage bushing – Elastimold: Load break/Dead break, DIN, Pfisterer – connect to neutral of the power- or grounding transformer.
6. Earthing terminal – M12 Screw – connect to system earth
7. Rating plate (movable)
8. Parking stand
9. Lifting lugs (inside hatch)
10. Service hatch
11. Haulage lugs
12. Cable tray (optional)
13. Protective earth – connect to protective earth.



Technical specifications

Voltage	Up to 130/ $\sqrt{3}$ kV
Current	Up to 1000A
Tuning range	10-100%, other tuning ranges on request
Resolution	<1%
Duty	Continuous or short time (2 hours)
Cooling methods Hermetically sealed ASC Oil free ASC	ONAN (ANSI/IEE C57.12.00) Class AA or Class AFA (ANSI/IEE C57.12.01)
Frequency	50 or 60 Hz
Installation	Indoor or Outdoor
Secondary winding voltage	690 V and 345 V
Insulation level	According to the rated voltage (IEC70076-3)
Ambient temperature	-40 to +40 °C, other temperatures on request
Insulation oil in hermetically sealed ASC	Nynas: Nytro Taurus Starke & Sohn: Transformer Oil U Midel 7131 Other oils on request

Routine Tests

- Visual inspection (SS-EN 60439)
- Protective earth continuity test (SS-EN 60439)
- Verification of correct wiring (SS-EN 60439)
- Verification of correct function (IEC 60076-6)
- Measurement of capacitance (SN test routine)
- Measurement of reactance (SN test routine)
- Primary winding resistance (IEC 60076-1)
- ASC secondary winding ratio (IEC 60076-6)
- Rated voltage / current test (IEC 60076-6)
- HV insulation test (IEC 60076-6)
- LV winding insulation test (3kV ~ 60s) (IEC 60076-6)
- Control circuit - voltage withstand test (SS-EN 60204) (1kV ~ 1s *PELV circuits not included)
- Measurement of losses (IEC 60076-1)

Type tests

According to IEC 60076-6

- Measurement of current at rated voltage
- Temperature rise test
- Dielectric test

Special tests

- On request, as per agreement



Swedish Neutral

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