

# Swedish Neutral

*Premium Power Protection*

## Variable Shunt Reactor



Variable Shunt-Reactor 34kV 87.5 – 800kVAr



## General

Shunt Reactors are used to stabilize the voltage during load variations in high voltage networks.

## Fixed Shunt Reactors

Traditional shunt reactors have a fixed rating. The Shunt Reactor is either connected to the network or not connected to the network depending on the load.

## Variable Shunt Reactors

Variable Shunt Reactors (VSR) have a variable rating. The rating of a VSR can be changed in steps.

## Benefits of Variable Shunt Reactors

The variability brings several benefits:

- *The VSR can continuously compensate reactive power as the load varies and thereby securing voltage stability.*
- *Reduced voltage jumps resulting from switching in and out of traditional fixed reactors.*
- *Flexibility for future (today unknown) load and generation patterns.*
- *Limiting the foot print of a substation if parallel fixed shunt reactors can be replaced with one VSR.*
- *A VSR can be used as a flexible spare unit and be moved to other locations in the power grid if needed.*



## Swedish Neutral Variable Shunt Reactors (VSR)

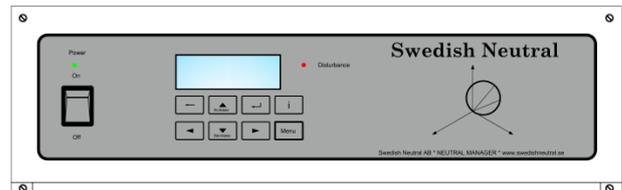
The Swedish Neutral Variable Shunt Reactor is made up of a 3-limb fixed core with suitable air gaps and three delta connected primary windings specified for continuous duty. Each primary winding has a 690V secondary winding for reactive output control.

The unit is contained in an oil filled hermetically sealed tank with protected bushings for primary and secondary connections.

The Variable Shunt Reactor output control is accomplished by connection of an adjustable low voltage capacitor bank to the secondary windings. The bank is made up of contactor controlled capacitor elements.

The capacitive power of the bank is subtracted from the fixed inductive power of the primary winding allowing for variable inductive power of the Shunt Reactor.

Manual step control of the bank is provided from a separate indoor control panel with up and down buttons. The panel also has provisions for remote SCADA-control by IEC 61850 protocol.



### **Variable**

*Local control panel and remote control via protocol*

### **Modern solid core**

*No moving parts – robust design*

### **Hermetically sealed tank**

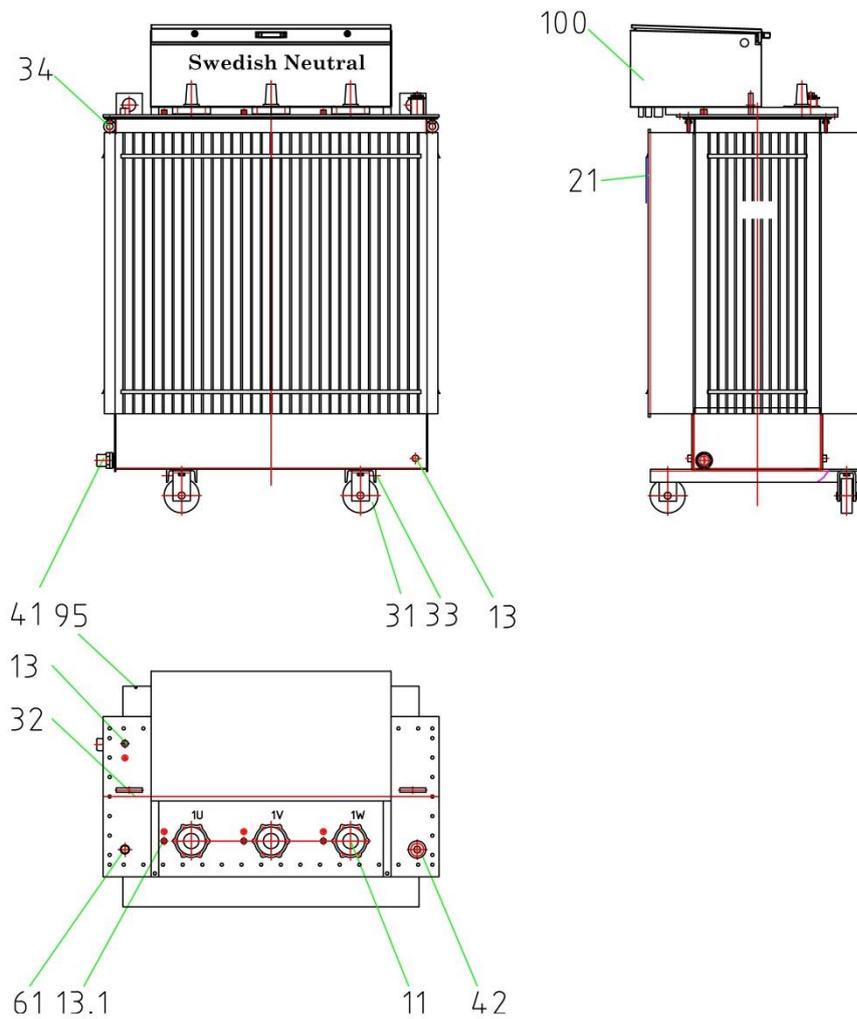
*No maintenance – no oil samples needed*

### **From min to max position in <1s**

*Fastest VSR on the market*



## Swedish Neutral Variable Shunt Reactors (VSR)



### Legend

- 11. HV bushing
- 13 Protective earth
- 13.1 Protective earth
- 21 Rating plate and connection diagram (movable)
- 32 Lifting lugs
- 33 Haulage lugs
- 34 Fixing lugs
- 41 Oil draining device
- 42 Filling pipe
- 61 Thermometer pocket
- 95 Holding device for cables
- 100 Control box (can also be mounted separately)



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