

MOBILE SUBSTATIONS

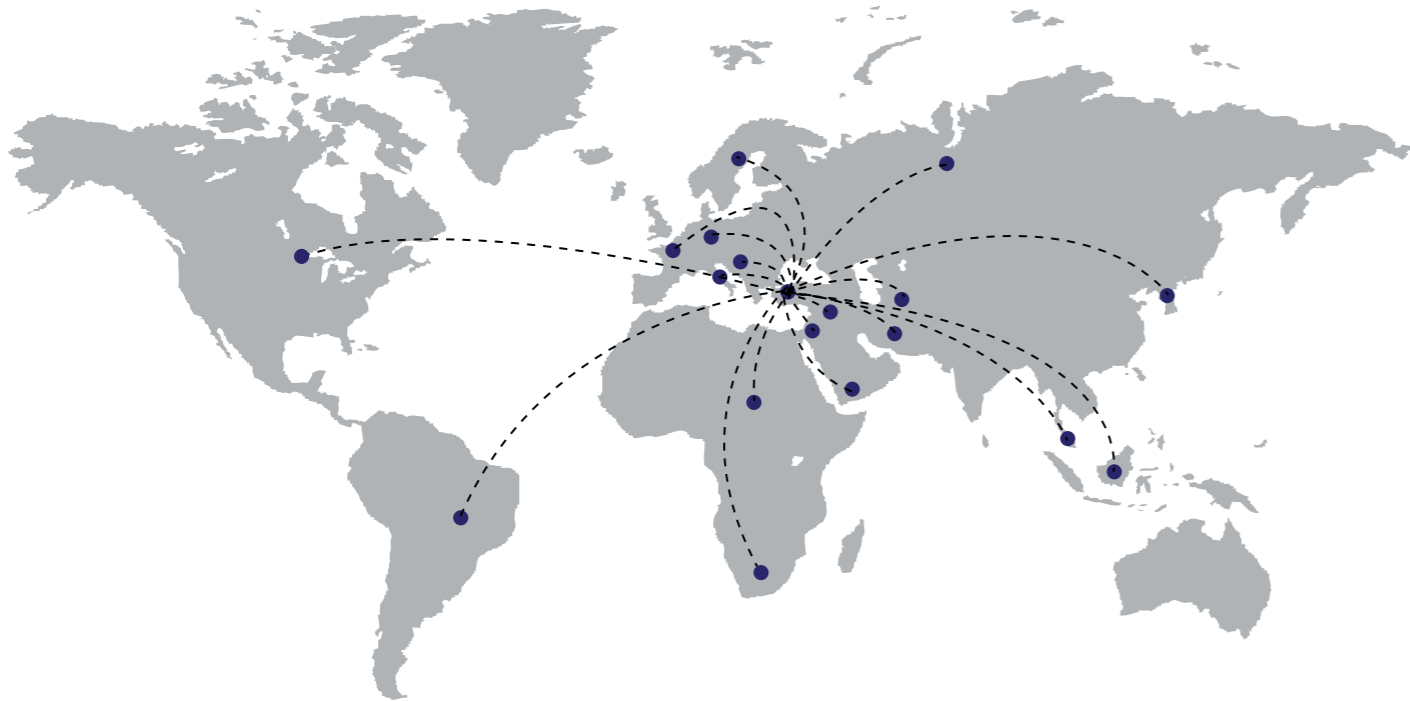


CATALOG
2021

Our Trademarks



Where we are



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Overview

Aktif Elektrotechnik is reputable as one of leading companies in designing and manufacturing Mobile Substation.

SMS Mobile Substations which are designed and manufactured by Aktif Elektrotechnik are used since 1995 in the field.

SMS series Mobile transformer and distribution centers provide easy and flexible solution to the user by means of short manufacturing time and very easy transport facility in cases of:

- Fixed substations construction
- Maintenance and repair of fixed substations
- Power shortage of fixed substations installed.

Mobile substations can be transportable easily and fast to where they are needed and may easily be integrated to the system.



3-Dimensional Project Study



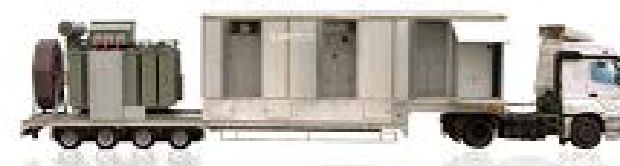
Application of 3-Dimensional Project

They are also used as fixed substation centers in some areas where construction of fixed substations take long time and cost expensive.

Experienced Engineers of Aktif Elektrotechnik analyze the real necessity and site conditions to design the most suitable Mobile Substation according to the necessity.

Application Areas

- Temporary Power Demands
- Emergency Power Demands
- Additional Power Necessities
- Mining Applications
- Military Camps
- Industrial Facilities



Types & Voltage Levels

Maximum Mobility

Mobile substations are designed considering maximum mobility and maximum operation safety. They are integrated with different types of applications in dimension and suspension structure in compliance with international road/rail/sea regulations and also with the country to use.

SMS series Mobile Substations are designed and manufactured tailored according to the necessity of application and/or customer.

Mobile substations are produced in 4 different designs according to its mobility.

- Trailer type
- Platform type
- Wagon type
- Vessel type

However, SMS series Mobile Substations are classified as 3 main types according to the voltage levels by design and production according to the IEC directives.

Technical Values		SMS-1	SMS-2	SMS-3
Rated Primary Voltage	kV	3.6 - 40.5	3.6 - 40.5	52 - 245
Rated Secondary Voltage	kV	0.23 - 0.6	1 - 24	3.6 - 40.5
Rated Short Time Withstand Current	kA	1 - 10	16 - 50	25 - 50
Rated Power	MVA	0.5 - 4	1 - 31.5	1 - 45
Power Consumption (max)	kVA	10	15	15
Rated Frequency	Hz	50/60		



SMS-1 Series

MV/LV Mobile Substation

SMS-1 series MV/LV Mobile Substations are used in power generation or distribution at LV.

SMS-1 series Mobile Substations are designed and manufactured as tail made with the primary voltage up to 40.5 kV and the secondary voltage up to 0.69 kV with the power up to 4 MVA according to the necessity.

3 different solutions are available for switching of primary medium voltage distribution busbars as;

- Air insulated Metal Clad Switchgears
- Air insulated Metal Enclosed Switchgears
- Gas insulated Switchgears

Secondary Low Voltage Distribution boards are designed and manufactured as standard or withdrawable type according to the customer requirement up to 6000 A busbars.

SMS-2 Series

MV/MV Mobile Substation

SMS-2 series MV/MV Mobile Substations are used in Medium Voltage Distribution networks for power generation or distribution.

SMS-2 series Mobile Substations are designed and manufactured as tail made with the primary voltage up to 40.5 kV and the secondary voltage up to 24 kV with the power up to 31.5 MVA according to the necessity.

MV/MV Mobile Substations are designed and manufactured as two different forms according to the layout of the transformer.



SMS-3 Series

HV/MV Mobile Substation

SMS-3 series Mobile Substations are used in High Voltage Transmission lines and Medium Voltage Distribution networks.

SMS-3 series Mobile Substations are designed and manufactured as tail made with the primary voltage between 52 - 245 kV and the secondary voltage between 1 - 52 kV while the power up to 60 MVA according to the necessity.

The Primary High Voltage level is side Open type air insulated busbars are used in with 2 different switching solutions as;

- Gas insulated system
- Air insulated system

3 different solutions are available for switching of secondary medium voltage distribution busbars as;

- Air insulated Metal Clad Switchgears
- Air insulated Metal Enclosed Switchgears
- Gas insulated Switchgears



Equipment and Accessories	SMS-1	SMS-2	SMS-3
Power Transformer	-	✓	✓
Distribution Transformer	✓	-	-
Auxiliary Supply Transformer	-	o	o
Generator	o	o	o
Grounding Transformer	o	o	o
Neutral Grounding Resistor	o	o	o
Neutral Grounding Reactor	o	o	o
High Voltage Switching Equipment	-	-	✓
Medium Voltage Switchgears	✓	✓	✓
Low Voltage Switchboard	✓	-	-
Voltage Transformers	✓	✓	✓
Current Transformers	✓	✓	✓
Capacitor Banks	o	o	o
Auxiliary AC Supply Panel	-	✓	✓
Auxiliary DC Supply Panel	✓	✓	✓
Battery and Rectifier Set	✓	✓	✓
Protection and Control Panel	✓	✓	✓
Sheet Steel / Sandwich Panel Kiosk / Container	✓	✓	✓
On Trailer	✓	✓	✓
On Platform	o	o	o
On Wagon	o	o	o
Cables	✓	✓	✓
Cable Terminations	✓	✓	✓
Cable Drums	o	o	✓
Phase Sequence Controller	o	o	o
Gantry	o	o	o
SCADA and Communication Systems	o	o	o
Air Conditioner	o	o	o
Lighting Projectors	✓	✓	✓
Fire Detection & Extinguisher System	o	o	o
Safety Equipment	✓	✓	✓
Isolated Carpet	o	o	o
Operation Equipment	✓	✓	✓
Maintenance Equipment	✓	✓	✓
Spare Parts	o	o	o
Documentation	✓	✓	✓

Main Equipment Used

Transformers

Power Transformers

Both in SMS-2 and SMS-3 Power transformers are used according to the necessity voltage level and power of maximum 60 MVA.

Power transformers are especially designed and manufactured according to the Mobile application with the sizes and weight according to the international roadway rules to allow the maximum mobility.

They may be manufactured with ONAN, ONAF, OFAF, OFWF cooling systems and different connection groups according to the system. Tap changing is generally made with OLTC.

Transformers located to Mobile substations are consist of high quality materials and process. For instance oil tank manufactures as corrugated by using modern folding facility processes the steel sheet into high-quality corrugated walls. Tank has been controlled after precise welding with control liquid and ultraviolet light for leakage. Additionally Coating of tank and cover based on hydro-coating material by flooding or dipping method against to corrosion. On request the tank can also be manufactured in a hot-dip galvanized design.

According to the voltage and power necessity also Dry type Power Transformers can be used on Mobile Substation.



Distribution Transformers

Distribution transformers are used as standard on SMS-1 series MV/LV Mobile Substations.

Distribution transformers up to 4 MVA are especially designed and manufactured according to the Mobile application with the sizes and weight. Two types of transformers are possible for the Mobile application as Oil type and Cast resin type.

One of the major important issues is noise of the transformers in mobile applications. During routine test in the factory quietude of transformer are part of the checklist together with standard controls such as temperature rise test, impulse voltage test, partial discharge measurement, Short-circuit strength, test with applied voltage (winding test), test with induced voltage (turn test), measurement of winding resistance, measurement of voltage ratio and determination of vector group, measurement of short-circuit voltage and of short-circuit losses, measurement of no-load current and of no-load losses.



Main Equipment Used

Switching Equipment

High Voltage Switching Equipment

According to the structure of High Voltage system 1-pole or 3-poles SF6 gas insulated circuit breakers are used for switching on-load and under failure. The height of the Circuit breakers can be adjustable by thanks to the platform applied.

Also Disconnectors are one of main items of primary equipment used in high voltage together with the earthing disconnector to insulate the substation from the network as off-load and also for the maintenance and repairing of circuit breaker. Operating mechanisms can be manual or motor operated according to the request.

Medium Voltage Switchgears

Medium voltage switchgears are switching and control cabinets manufactured in conformity with IEC 62271-200 standard. For the Medium Voltage switchgears there are 3 possibilities to apply as follow:

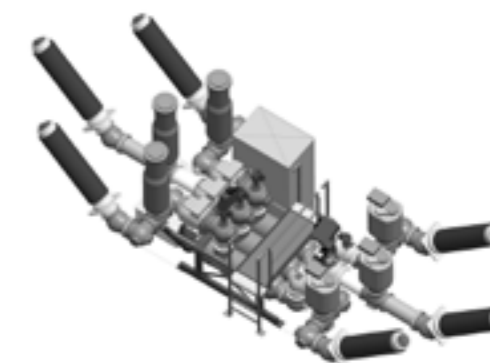
- SMC or SNC Series Air insulated Metal Clad Switchgears up to 40.5 kV, 4000 A, 40 kA AFLR, PM, LSC 2B
- SME Series Air insulated Metal Enclosed Switchgears up to 40.5 kV, 1250 A, 25 kA AFL, PI, LSC 2A
- Gas insulated Switchgears up to 40.5 kV, 1250 A, 25 kA AFLR, PM (LSC is not classifiable)

Any of above switchgears is suitable for Mobile application which should be chose according to the rated and withstand currents of the necessity. Detailed information about Switchgears is included inside "Medium Voltage Switchgears" catalogue.

Low Voltage Switchboard

Low Voltage Switchboards are designed according to specifications. Low Voltage Switchboards can be two types;

- MCC Type
- MCCB Type



Main Equipment Used

Grounding Equipment

According to the rules of National Electricity Transmission and Distribution Company different kind of grounding equipment can be used in SMS series Mobile Substations in safe as follow.

- Grounding Resistors
- Grounding Reactors
- Grounding Transformers

Detailed information concerning Earthing resistor is included inside our "Resistors" catalogue.

Capacitor Banks

Where there is a strict requirement about the reactive power consumption or reduce the losses Capacitor banks are used also in Mobile Substations to compensate the Load.

In case of requirement also to reduce the harmonics capacitor banks can be installed together with harmonic filters.

Detailed information concerning Capacitor banks is included inside our "Power Quality" catalogue.



Measurement Transformers

Current Transformers

These are the one of the main equipment of Mobile Substations to provide the measurement and protection as it's required in various voltage levels from the point of electricity production till to consumption.

Following current transformers are used according to the application.

- HV applications : Bushing type
- MV applications : Epoxy Resin or Toroidal type
- LV applications : Epoxy Resin or Toroidal type



Voltage Transformers

Also the Voltage transformers are the one of the main equipment of Mobile Substation to provide the measurement, protection, frequency and synchronization parameters as well as all the electrical systems.

Following voltage transformers are used according to the application.

- HV applications : Bushing type Capacitive Voltage Transformer
- MV applications : Support type Inductive Voltage Transformer
- LV applications : Support type Inductive Voltage Transformer

Control & Protection Panels

The monitoring, control and protection of all equipment at Mobile Substation is provided by the using of interactive position indicators and mimic diagrams on this panel.

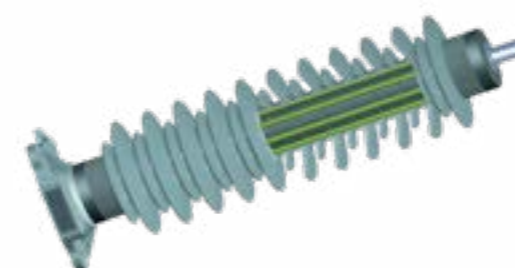
This panel can be consist of following equipment according to the specification:

- protection relay,
- energy meter,
- energy analyser,
- position indicators,
- mimic diagrams..

Scada & Communication Panels

SMS Series Mobile Substations can be prepared with the remote measuring, control and command facilities by the supplying of system with Scada applications and GSM/GPRS communication properties.

It's possible to follow the full situation of Mobile Substation with phones or computers and send operation commands in case of necessity.



Main Equipment Used



Surge Arresters

Surge arrester is a device used on electrical power systems to protect the insulation on the system from the damaging effect of lightning and switching transients. The typical surge arresters also known as lightning arrester has a high voltage terminal and a ground terminal. When a lightning surge or switching surge travels down the power system to the arrester, the current from the surge is diverted around the protected insulation in most cases to earth. Surge arrester also can be used with surge counter according to the specification.

Main Equipment Used

DC Distribution Panels

DC power supply necessity for the internal usage of Mobile Substation (e.g. Protection relays) are made by these DC supply distribution panel.

Auxiliary Supply Panel

Auxiliary transformers are employed to supply the required power for the operation of Mobile Substation. In some cases they may be designed as ground transformer and in some applications gensets can be used to produce the necessary power.

Battery & Rectifier Group

It is composed of Battery and Rectifier Group system suitable for the auxiliary voltage feeding level of primary and secondary equipment used in the mobile substation and the power demand. Generally Ni-Cad batteries are preferred both because of their long-life and non-maintenance operation advantages.



Sheet Steel & Sandwich Panel Kiosk

To be able to keep all the indoor equipment's SCK type Sheet Steel or Sandwich Panel kiosks are used on Mobile Substation according to its form as on Trailer, on Platform, etc...

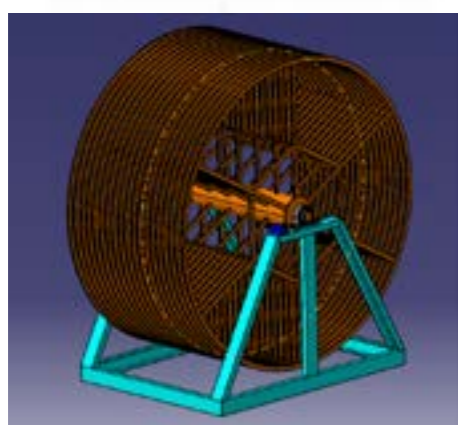
Also SCK kiosks are designed and produced according to the system requirement.

Detailed information concerning SCK is included inside "Transformer & Distribution Kiosks" Catalogue.

Cable Drum

MV and LV cables are suitable according to the project's nominal currents and voltages are wound on drums established on the mobile Substation and thus the mobility of the system is enhanced.

These reels may operate manually as well as be motor-driven. Flexi cables are used for voltage cables in order to provide maximum bending diameter, round more cables to the reel and also for the long service life.



Trailers

Trailers used in SMS Mobile Substations are designed for use on general roads, main roads and hard, irregular roads in compliance with heavy road transport and the axles are designed to adapt to the road surface automatically in rough road conditions. The steel frame formed in steel profiles conforming the load to be carried are sand blasted and painted with industrial prime and finish paint and the corrosion strength is provided.

Each trailer has mechanical or hydraulic support feet and double speed landing apparatus (lift jacks) for the situations of separating the tow car and long term parking of the trailer. In addition, reinforced steel bottom plates are included on all support feet and jacks (landing apparatus). If requested, the most suitable way of fixing the Substation on the ground is provided by using independent hydraulic feet and automatic balancing system.

Maximum security is ensured by ABS braking system by selecting the tire and axle suitable to the weight of the SMS Series Mobile Substation and use area. Also rotary axle system may be used according to the number of axles.

Gooseneck height and length, and king pin distances are designed in compliance with any type and brand of tow truck. In addition, steering cylinder of the neck, air and electricity lines are again designed in compliance with any type and brand of tow truck.



Mobile Trailers are equipped with lighting, flashlight, signaling and warning signs determined by the international highway authorities.

The trailer is designed according to maximum velocity of 60 km/hour unless otherwise specified. There are two pieces of spare tires with rims on each trailer.

Trailers have heavy duty type bumpers relevant to towing and pushing as required. Standard cabinets suitable for tool kits are established on the trailer.







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