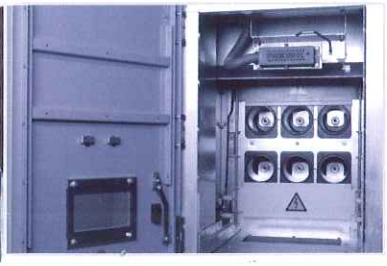
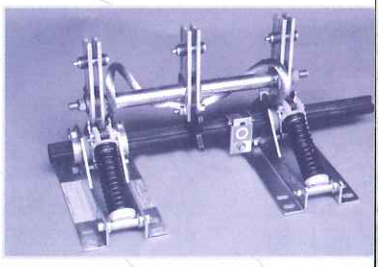
AMS 12.31/24.25

Air insulated **M**edium voltage **S**witchgear

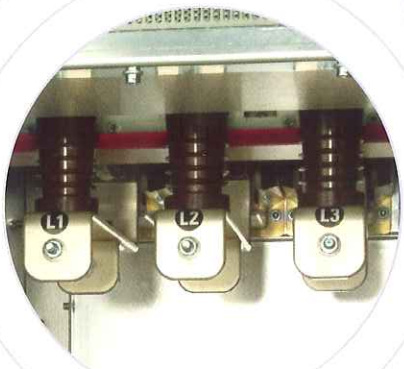


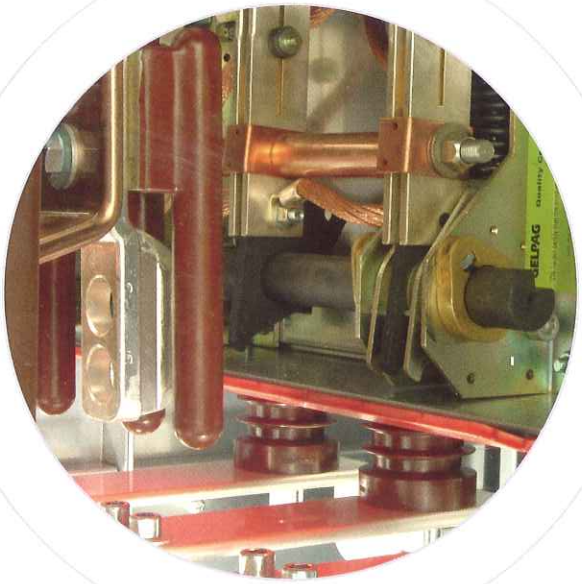


Type tested, air-insulated, metal-clad switchgear cubicles with withdrawable circuit breakers

SENTEC
Schaltanlagen für Energietechnik GmbH

AMS 12.31/24.25





1. General information

The air-insulated, metal-clad switchgear cubicle "AMS" has been developed by SENTEG Schaltanlagen für Energietechnik GmbH in accordance with international standards and technical requirements.

The AMS switchgear cubicles are designed for industrial facilities and energy supply companies. They are suitable for installation in steelworks, roller plants and cement works, for chemical industry and infrastructural projects such as buildings, airports, pump stations, etc.

2. Construction design

The switchgear cubicle is constructed in a buckling resistant way out of 2mm galvanized steel plates. The AMS cubicle consists of withdrawable circuit breakers and is divided into the following four functional compartments:

- Busbar compartment
- Circuit breaker compartment
- MV cable compartment
- Low voltage compartment

The functional compartments are separated by earthed metallic partitions.

The MV cable is installed through the bottom of the compartment.

The low voltage compartment, circuit breaker and MV cable compartments are accessible from the front side of the cubicle.

The circuit breaker and MV cable compartments are closed by lift and swing doors at the front.

The doors, side and back covers are powder coated to RAL 7035 colour. Other colours are available if required by customer.

Using state-of-the-art CNC-controlled manufacturing machines we guarantee the unchanging highest quality and uniform measurements of the switchgear cubicles.

3. Installation

The AMS cubicles are meant for indoor installation.
The installation of the AMS cubicle is possible in switchgear rooms with a false floor or a cable celler as stand alone version or in front of a wall.
The switchgear room should be at least 390 cm high.
For rooms less than 390 cm it is advisable to install/use a pressure relief duct additionally.

4. Standards

The AMS cubicles are manufactured in accordance with the standards for factory build, type tested medium voltage switchgear cubicles as per IEC 62271-200 or DIN EN 62271-200 (VDE 0671 part 200).

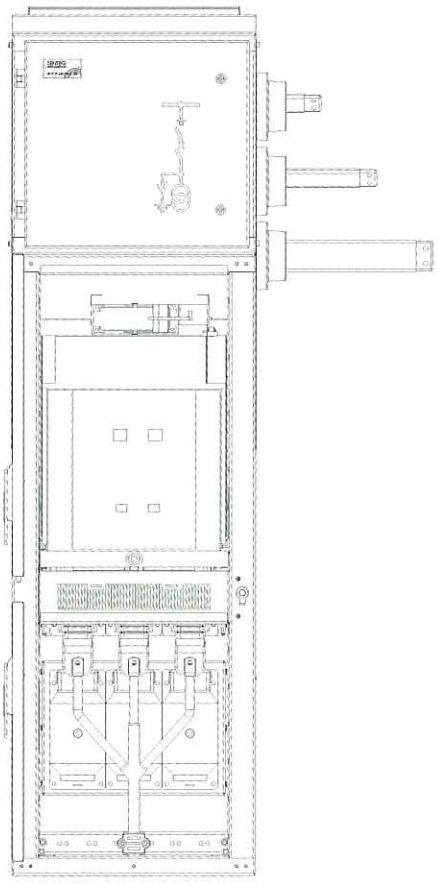
6. Operator protection and operation safety

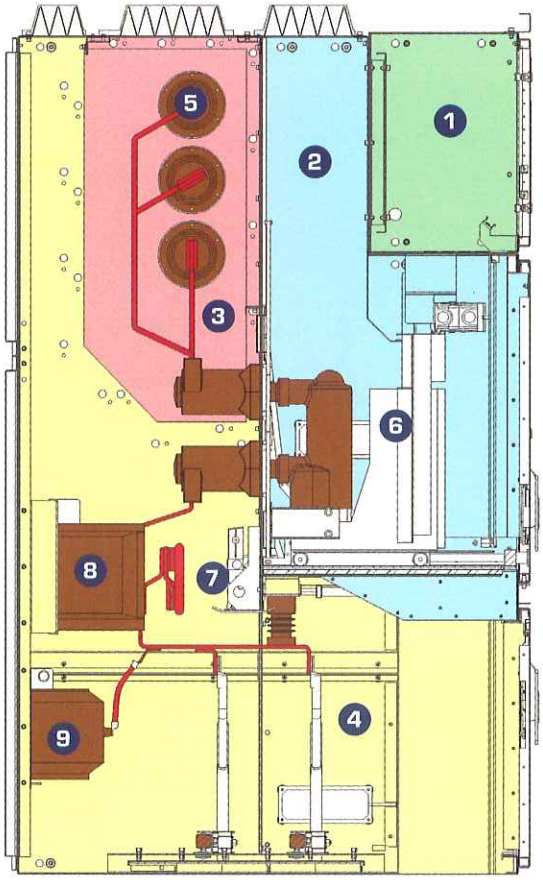
The AMS switchgear cubicles are safeguarded against accidental arcing. Switching operations can only be performed if the doors of the cubicles are closed.
The low voltage compartment is completely separated from the high voltage compartment.
The metallic partitions of the functional compartments guarantee that damage due to any technical faults is limited to the respective compartment.
In order to avoid operational errors, the AMS cubicles are equipped with a complex locking system.

7. Protection system

The protection systems correspond to IP3X for the exterior casing and to IP2X for interior compartments.

5. Front and sectional view





1. Low voltage compartment
2. Circuit breaker compartment
3. Busbar compartment
4. MV cable compartment
5. Busbar
6. Circuit breaker
7. Earthing switch
8. Current transformer
9. Voltage transformer

8. Technical Data

Rated Voltage			**7,2 kV**	**12 kV**	**17,5 kV**	**24 kV**
Rated frequency			50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Rated power frequency withstand voltage (1 min)			20 kV	28 kV	38 kV	50 kV
Rated lightning impulse withstand voltage			60 kV	75 kV	95 kV	125 kV
Rated current, busbar			up to 2500 A	up to 2500 A	up to 2500 A	up to 2500 A
Rated current, feeder			up to 2500 A	up to 2500 A	up to 2500 A	up to 2500 A
Rated short time withstand current (3 s)			up to 31,5 kA	up to 31,5 kA	up to 25 kA	up to 25 kA
IAC Internal Arc Classification (1 s)			31,5 kA	31,5 kA	25 kA	25 kA
Rated peak withstand current			up to 80 kA	up to 80 kA	up to 63 kA	up to 63 kA
Protection system		inside / outside	IP2X / IP3X	IP2X / IP3X	IP2X / IP3X	IP2X / IP3X
Degree of accessibility			A FLR	A FLR	A FLR	A FLR
Loss of service continuity LSC			2 B	2 B	2 B	2 B
Class of partitioning			PM	PM	PM	PM
Dimensions	Width	< 1250 A	650 mm	650 mm	800 mm	800 mm
		< 2000 A	800 mm	800 mm	1000 mm	1000 mm
		2500 A	1000 mm	1000 mm	1000 mm	1000 mm
	Depth		1400 mm	1400 mm	1500 mm	1500 mm
	Height		2250 m	2250 mm	2330 mm	2330 mm
Weight		< 1250 A	800 kg	800 kg	900 kg	900 kg
		> 1250 A	1200 kg	1200 kg	1300 kg	1300 kg

More technical information upon request

9. Operating conditions

The AMS switchgear cubicles are designed for normal service conditions and only for indoor installation.

Ambient temperature	Maximum	40° C
	24h-Medium	35° C
	Minimum	- 5° C
Relative air humidity	24h-Medium	95 %
Altitude at side	< 1000 m height above sea level	

Deviant operating conditions are possible but need to be discussed with the manufacturer (see manual).

10. Busbar compartment

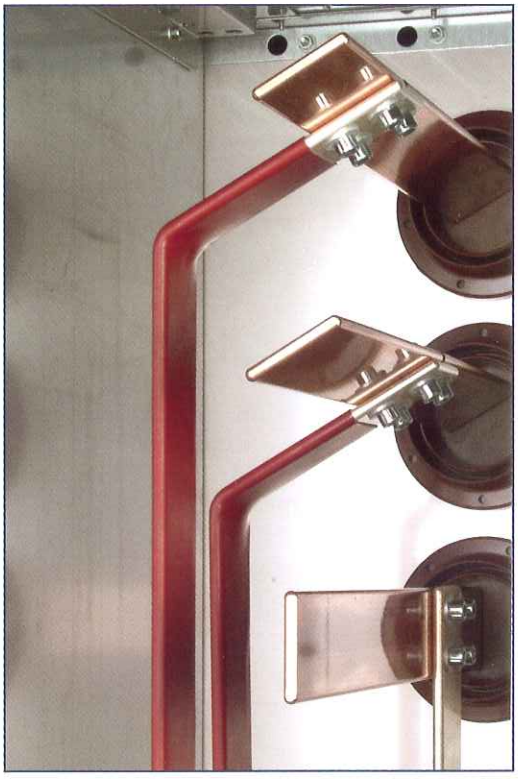
The busbar compartment is separated from the adjoining cubicles.
The busbars are linked through cast resin bushings panel to panel.

11. Busbars

The busbars are made of insulated copper bars.

Rated Current	Cross Section
630 A	Cu 1 x 80 / 10 mm
1250 A	Cu 1 x 80 / 10 mm
1600 A	Cu 2 x 80 / 10 mm
2000 A	Cu 2 x 80 / 10 mm
2500 A	Cu 2 x 80 / 10 mm

Busbar compartment



Busbars

12. Circuit breaker compartment

The circuit breaker compartment may be optionally equipped with:

- Circuit breaker
- Contactor
- Withdrawable earthing switch
- Withdrawable measuring unit

The withdrawable unit allows the following settings:

- Operation mode
- Test mode
- Withdrawn position

The switching devices can only be in operation if the doors are closed.

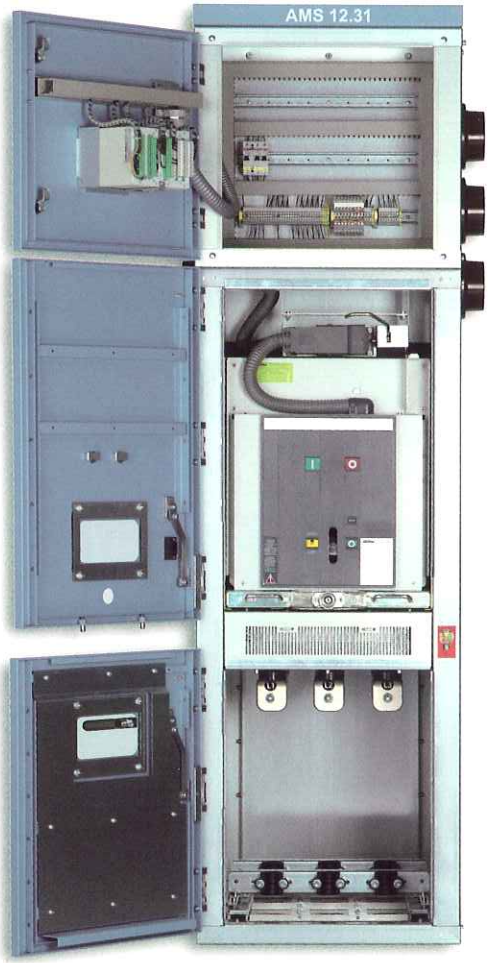
The switching devices can only be switched from test into operation mode (and vice versa) when they are switched off.

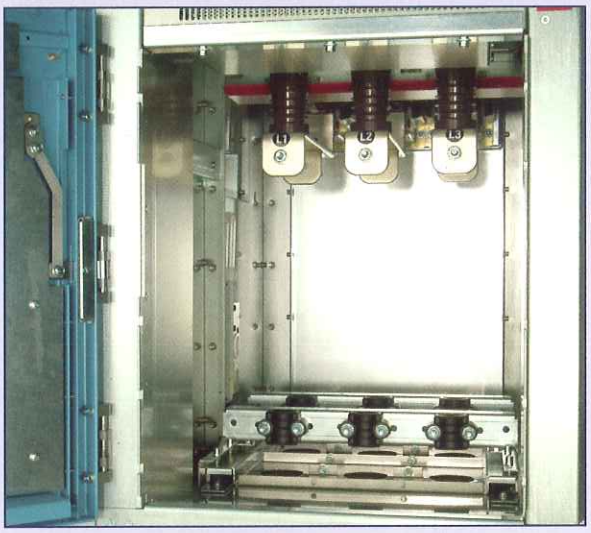
The circuit breaker compartment is accessible from the front.

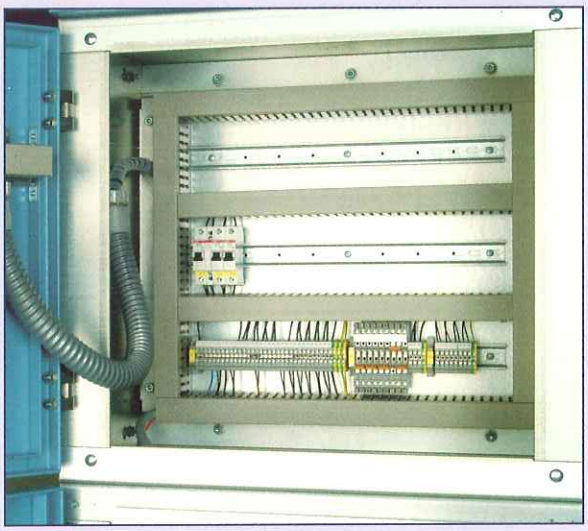
The control voltage plug connector can only be plugged in or plugged out if the truck is in test mode.

The switching devices can only be switched on if the truck is in test or operating mode.

When the truck is withdrawn from operation mode the shutters will close automatically.







13. MV cable compartment

The MV cable compartment allows adequate space for connecting the cables easily.

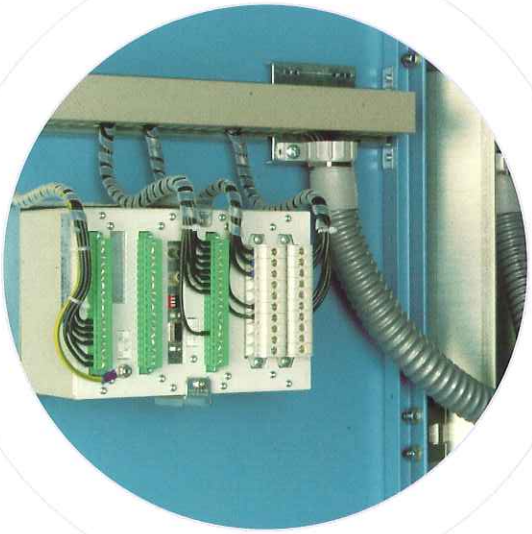
- Up to 4 cables of 500 mm^2 can be terminated

The MV cable compartment is also housing the current transformer, voltage transformer and earthing switch assemblies and is accessible from the front.

14. Low voltage compartment

The low voltage compartment is also accessible from the front.
It is extendable in height if required.

All secondary equipments like measuring, protection and control equipment (manufacturer and type can be chosen by client) are installed into the low voltage compartment.



15. Pressure relief

All high voltage compartments are equipped with pressure relief flaps on top of the switchgear.

Overpressure within the switchgear cubicles due to an internal arc opens the respective pressure relief flap.

16. Circuit breaker

Circuit breakers are mounted onto trucks. The circuit breakers are connected to the low voltage compartment by plug-in control wires.

17. Current transformer

For protection and measuring purposes cast resin (support type) current transformers are used.

18. Voltage transformer

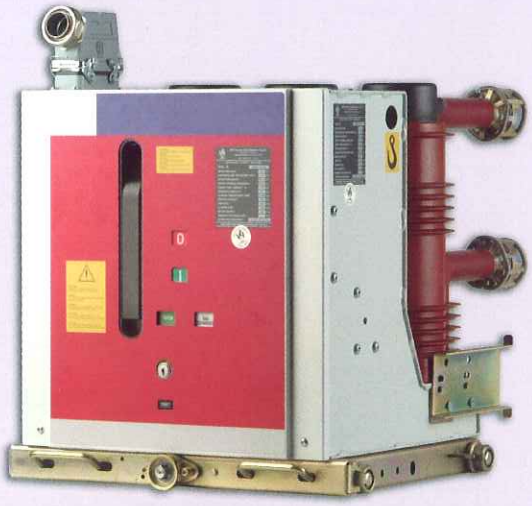
Single-pole cast resin voltage transformers are primarily used. A draw-out type might be installed if required.

19. Earthing switch

Earthing switches with **breaking capacity E2** may be used for the earthing of cables or busbars. The earthing switch is operated by a lever system. It can be actuated by hand or by motor drive. The earthing switch is mechanically interlocked to the circuit breaker truck.

20. Environment protection

The AMS switchgear cubicles conform to the requirements and standards according to ISO 14001 Environmental Management (for more detailed information we kindly refer to the instruction manual).



21. Tests

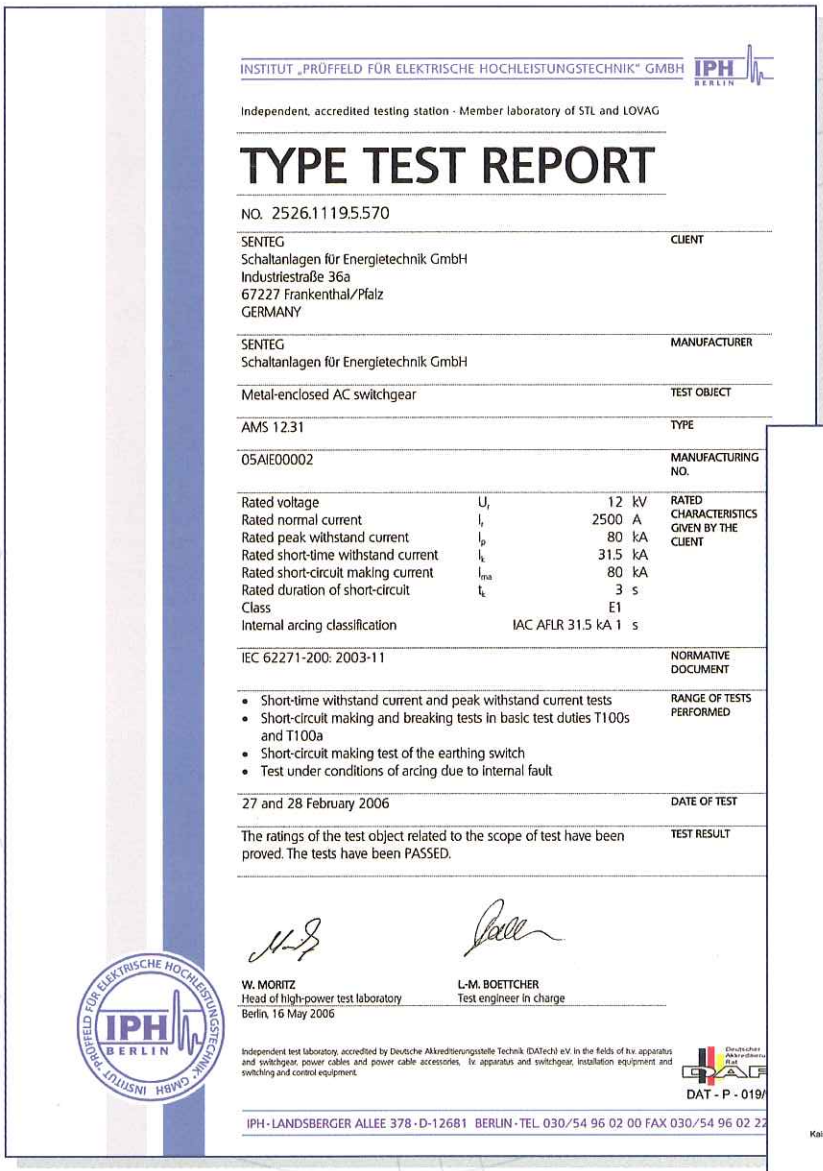
The SENTEG AMS are type tested medium voltage switchgears.

A witness routine test will be arranged before dispatch, consisting of:

- Visual inspection
- Mechanical function check
- Electrical function check
- Power frequency test
- Check for completeness

22. Quality management

SENTEG GmbH is certified according to DIN EN ISO 9001:2000.



INSTITUT „PRÜFFELD FÜR ELEKTRISCHE HOCHLEISTUNGSTECHNIK" GMBH IPH BERLIN

Independent, accredited testing station · Member laboratory of STL and LOVAG

TYPE TEST REPORT

NO. 2526.1119.5.570

SENTEG Schaltanlagen für Energietechnik GmbH Industriestraße 36a 67227 Frankenthal/Pfalz GERMANY		CLIENT
SENTEG Schaltanlagen für Energietechnik GmbH		MANUFACTURER
Metal-enclosed AC switchgear		TEST OBJECT
AMS 12.31		TYPE
05AIE00002		MANUFACTURING NO.
Rated voltage	U_r 12 kV	RATED CHARACTERISTICS GIVEN BY THE CLIENT
Rated normal current	I_r 2500 A	
Rated peak withstand current	I_p 80 kA	
Rated short-time withstand current	I_k 31.5 kA	
Rated short-circuit making current	I_{ma} 80 kA	
Rated duration of short-circuit	t_k 3 s	
Class	E1	
Internal arcing classification	IAC AFLR 31.5 kA 1 s	
IEC 62271-200: 2003-11		NORMATIVE DOCUMENT
• Short-time withstand current and peak withstand current tests • Short-circuit making and breaking tests in basic test duties T100s and T100a • Short-circuit making test of the earthing switch • Test under conditions of arcing due to internal fault		RANGE OF TESTS PERFORMED
27 and 28 February 2006		DATE OF TEST
The ratings of the test object related to the scope of test have been proved. The tests have been PASSED.		TEST RESULT

W. MORITZ
Head of high-power test laboratory
Berlin, 16 May 2006

L-M. BOETTCHER
Test engineer in charge

Independent test laboratory, accredited by Deutsche Akkreditierungsstelle Technik (DATech) e.V. in the fields of h.v. apparatus and switchgear, power cables and power cable accessories, l.v. apparatus and switchgear, installation equipment and switching and control equipment.

DAT - P - 019/

IPH · LANDSBERGER ALLEE 378 · D-12681 BERLIN · TEL. 030/54 96 02 00 FAX 030/54 96 02 22

IPH BERLIN INSTITUT PRÜFFELD FÜR ELEKTRISCHE HOCHLEISTUNGSTECHNIK GMBH

TÜV CERT

CERTIFICATE

The TÜV CERT Certification Body of TÜV Industrie Service GmbH TÜV Rheinland Group

certifies in accordance with TÜV CERT procedures that

SENTEG
Schaltanlagen für Energietechnik GmbH
Industriestraße 36 a
D - 67227 Frankenthal

has established and applies a quality management system for

Engineering, manufacturing, delivery, assembly, commissioning and maintenance of electrical switchgears

An audit was performed, Report No. 044808.
Proof has been furnished that the requirements according to

DIN EN ISO 9001:2000

are fulfilled. The certificate is valid in conjunction with the main certificate until 2008-07-11.
Certificate Registration No. 01 100 044808/02

TGA-ZM-28-96-00

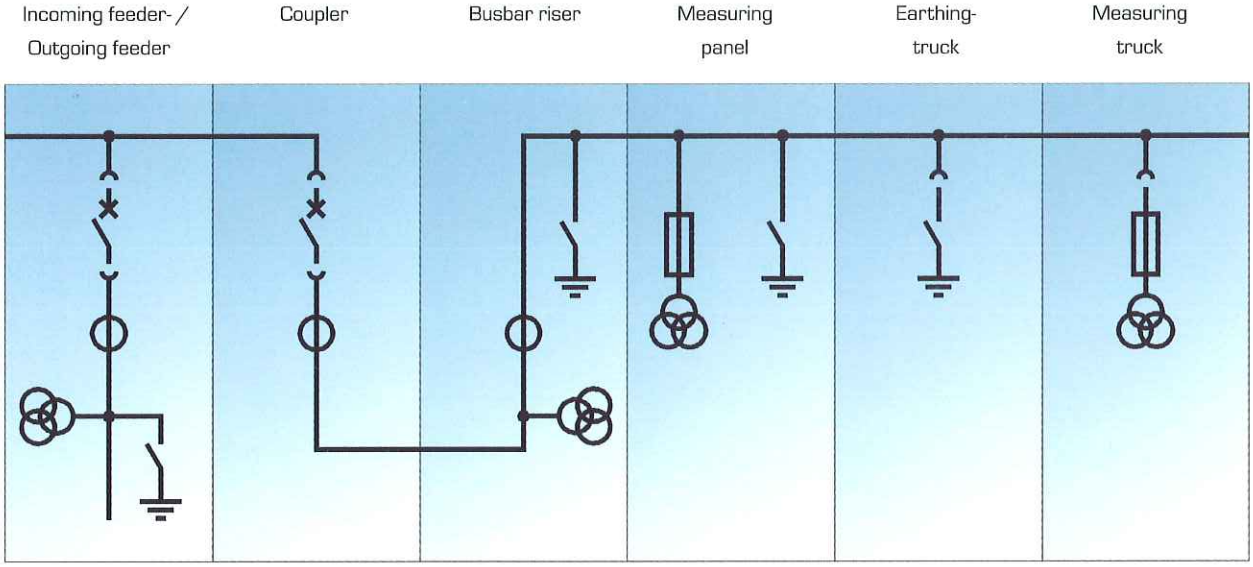
TÜV TÜV Rheinland Group

Kaiserslautern, 2005-07-15

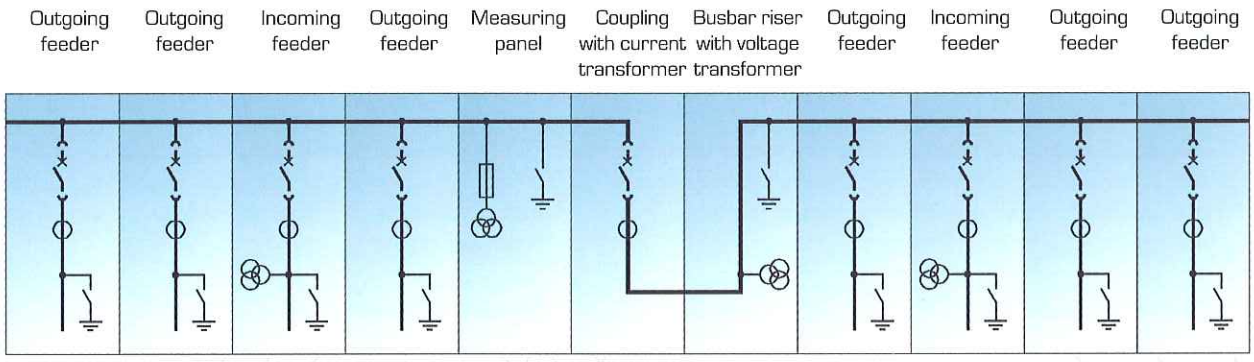
TÜV CERT Certification Body of TÜV Industrie Service GmbH

www.tuv.com

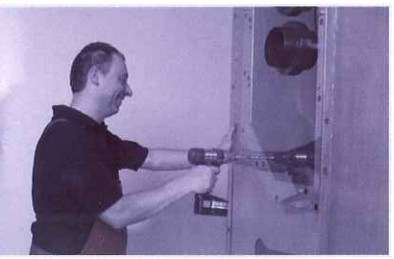
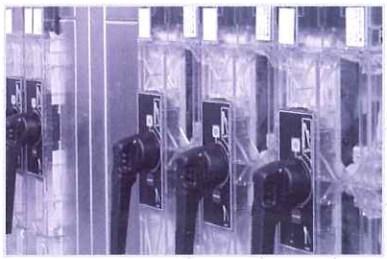
23. Different versions



24. Examples



Switch over to our Services that guarantee Safety, Flexibility and High Quality


We do have the know-how! We have had over 30 years experience in designing, engineering and manufacturing switchgears for the power engineering sector as well as for electrical plants and auxiliary units with our focus on medium and low voltage systems.

We are future-oriented

Our specially trained staff develop innovative products and solutions that not only meet the requirements and expectations of the present-day market but also anticipate future requirements.

We are flexible

Our responsiveness to our clients and our flexibility enable us to adapt our processes, our products and our services to our clients' requirements.

We guarantee high quality

The high-quality standard of our products is guaranteed by our commitment to a Total Quality Management system and the fact that we exclusively produce at our Frankenthal site.

We are competent

A combination of experience, expertise and commitment to high-quality standards makes us a competent partner for realizing complete solutions for electrical plants of almost any kind.

SENTEG Schaltanlagen für Energietechnik GmbH
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SENTEG
Schaltanlagen für Energietechnik GmbH