8PU003 Premium

TYP-TESTED TRANSFORMER LOAD CENTRE SUBSTATIONS

Power for technology

ENERGOLINE

FEAG

... die intelligente Lösung ...

TECHNICAL DATA SPECIFICATIONS

ENERGOLINE 8PU Premium

Transformer component

Transformer

- Rated output 400 up to 1250 kVA
- Achievement increase by purposeful ventilation up 560 up to 1750 kVA
- Nominal impedance voltage 4 %, 6 %, 8 %
- Nominal primary voltage
  - · List 2 (R10N) 3 up to 12 kV
  - · List 1 (R20S) 12 up to 24 kV
- Tappings (primary voltage-laterally) ± 5 %
- Nominal undervoltage 400 / 690 V
- Switches Dyn 5
- Nominal frequency 50 Hz
- Temperature sensor 2 oder 3 Kaltleiter / Spule

Transformer housing

- Enclosure
  - · Side panels IP40 / IP54
  - · Roof (exhaust) IP20 / IP43
- Painting
  - · Stand according to option of the customer
  - · Linings according to option of the customer
- Roof ventilator
  - · Flow rate 2 x 2950 m^3/h or 2 x 4400 m^3/h
  - · Exhaust achievement 0,5 up to 0,95 kW

High voltage component

- Rated voltage list 2 up to 12 kV
  up to 24 kV
- To 12 kV with load switchgear SIEMENS/ABB/Schneider for pass and/or ring cable feed:
  - · Branch rated current 630 A
  - · Short-time current 1 s 20 kA
- To 24 kV with load switchgear SIEMENS/ABB/Schneider for pass cable feed:
  - · Branch rated current 630 A
  - · Short-time current 1 s 16 kA
- Housing enclosure IP40

Technical Data 8PU003

- Rated operating voltage U_e up to 690 V
  40 up to 60 Hz
- Rated current I_e
  - Main busbar up to 8500 A
  - Field distribution busbar
    - L1/L2 -Field 6300 A
    - L10/L20 -Field 6300 A
    - T2/T20 -Field 2000 A
    - T5/T50 -Field 1700 A
    - F1/F10 -Field 2000 A
    - F5/F50 -Field 1700 A
    - C -Field 630 A
    - Z -Field 630 A
- Device rated current I_n
  - Circuit-breaker
    - SIEMENS WL up to 6300 A
    - ABB SACE Emax up to 6300 A
    - Schneider Electric Masterpact up to 6300 A
  - Fuse switch-disconnector
    - 3NJ4/EFEN/Jean Müller up to 1250 A
    - 3NJ6/SlimeLine/SASIL up to 630 A
- Capacitor sub-assemblies up to 300 kVar /Field reactance
  up to 600 kVar /Field without
- Nennstossstrom I_{pk}
  - Main busbar 375 kA
  - Field distribution busbar
    - L -Field 330 kA
    - T2/T20 -Field 143 kA
    - T5/T50 -Field 143 kA
    - F -Field 120 kA
    - C -Field 120 kA
    - Z -Field 120 kA

Standards and specifications

- Transformer components
  - · GEAFOL-Transformer VDE 0532 Teil 1, DIN 42523 bzw. IEC-Publ. 726
  - · Traformer housing VDE 0101
  - · High voltage component VDE 0101
- Low voltage switchgear station IEC 60439-1, DIN VDE 0660 Teil 500
- Air and creepage distances DIN VDE 0110 insulation group C for 1000 V, 40 up to 60 Hz, degree of protection as defined in IEC 529, EN 60529, IP20 bis IP54
- Paint system as defined DIN 43656
  Epoxy-Polyester-powder
  Thickness of layer standard 65 μm
  Colours at costumer's option and
  Double-coating up to 115 μm can be provided

YOUR FUTURE HAS GOT A NAME

ENERGOLINE®
8PU Premium

Application

Transformer load centre substations 8FA (short: Trafo-S-stations) with GEAFOL casting resin transformer are used everywhere where, for economic reasons, the high voltage load centre is enlarged. They are suitable for installation in generally accessible business premises (interiors), like workshops, warehouses, larges buildings etc.

Construction

- Employment of the Trafo-S-stations in generally accessible work place, installed in the load centre
- Advance the high voltage (to 24 kV) to the load centre result in short cable lengths in the low-voltage system
- With short low-voltage cables come small power losses (heat loss due to current) and minimum capital outlays
- With GEAFOL transformers:
  - · pollution free
  - · maintenance-free
  - · Increase in output of the rated output with AF-operation by 140%
  - · no additional fire protection measures
  - · fire resistant and self-extinguishing
  - · no poisonous gases in the case of loss
- Safe usage and arc-fault tested

Protection against arcing fault

Trafo-S-stations 8FA are built in such a way that, during normal operation, if an arcing fault occurs, no danger exists for the operating personnel or other people in the proximity of the switchgear.

TÜV CERT

CERTIFICATE

The TÜV CERT Certification Body of TÜV Saarland e.V.

certifies in accordance with TÜV CERT procedures that

Fertigungscenter für Elektrische Anlagen Sangerhausen GmbH
Stiftsweg 1 + 2
D-06526 Sangerhausen

has established and applies a quality management system for

low and medium voltage switchgear including hard- and software engineering

An audit was performed, report No. B 2020/06.
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 2010-02-26.
Certificate Registration No. 71 100 D 316/3

IAF TGA-ZM-26-96-00

TÜV SAARLAND

Sulzbach, 2007-02-27

DESCRIPTION

Trafo-S-station 8FA, consisting of transformer component and low-voltage switchgear

Transformer housing and available achievement

- The transformer housing is available in two types:
  - Transformer housing for natural air-flow (DC-operation with approx. 90% of the transformer rated output)
  - Transformer housing for forced air-flow (AC-operation to approx. 140% of the transformer rated output)
- The louvers in the transformer housing are stoke-proof

Increase in output by purposeful ventilation

The increase in output to 140% of the transformer rated output with AC-operation can be reached by purposeful ventilation. The air-flow is pumped across an air guide plate, which is made from insulation material in such a way that the coil windings lying inside, the under-voltage coil and the iron core are sufficiently cooled.

Primary voltage	Rated power	Available power		Transformer housing
		DC-operation, AC-operation, roof ventilators deactivated	AC-operation, roof ventilators activated	
	S_N kVA	S_{AN} kVA	S_{AF} kVA	dimension
up to 12 kV	400	400	560	1
List 2	500	500	700	1
	630	570	900	1
	800	720	1120	1
	1000	900	1400	2
	1250	1130	1750	2
up to 24 kV	400	400	560	1
List 1	500	500	700	1
	630	570	900	1
	800	720	1120	2
	1000	900	1400	2
	1250	1130	1750	2

A finished wired unit (exhaust control) exists in order to control the two roof ventilators. The control is governed by semiconductor temperature sensor inserted in the under-voltage coil of the transformer.

Mode of operation

- When the maximum permissible temperature is exceeded, the the roof ventilators are instantaneously switched on.
- A time delay relay ensures that when the temperature falls below the permissible maximum, the exhausts still keep running for some time afterwards
- In the case of excessive heating up of the transformer, a switching-off-instruction on the full load current trip at the high-voltage and/or low-voltage incoming circuit breaker.
- The exhaust-controller-unit is installed either into the low-voltage switchgear or into a separate switchgear cabinet.

Transformer bringing in rail framework

The transformer is located in the transformer housing on a bringing in rail framework. This framework is mounted on a sliding insertion rail in such a way that the transformer can be attached easily and can be retracted and extended from all four sides of the housing.

INCOMING FEED

Primary voltage feed

Appropriate devices, for example rear spar safety devices, must be present for the short-circuit protection of primary voltage cable and transformer.

For example, if rear spar fused outgoing feeders are already present in the external high voltage switching station; then the primary voltage cable can be attached directly at an earth switch during pass cable feed, which is built into the transformer. The primary voltage cable can be earthed without the door of the transformer housing being opened from the outside, and thereby short-circuited.

A high voltage component is necessarily if:

- during pass cable feed in the external high voltage switchgear, no rear spar fused feeders are available,
- a ring cable feed is required.

Earthing and short-circuiting of the primary voltage cable takes place in a high voltage component. An earth switch at the transformer is therefore not necessary on a high voltage component.

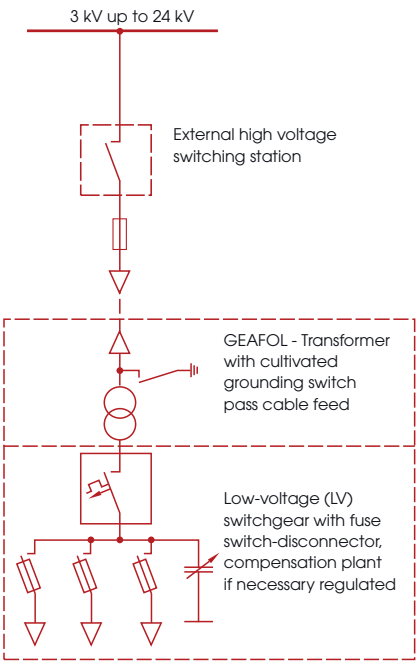
The cable entry takes place from above via the roof sheet metal or from underneath through the open base of the transformer housing.

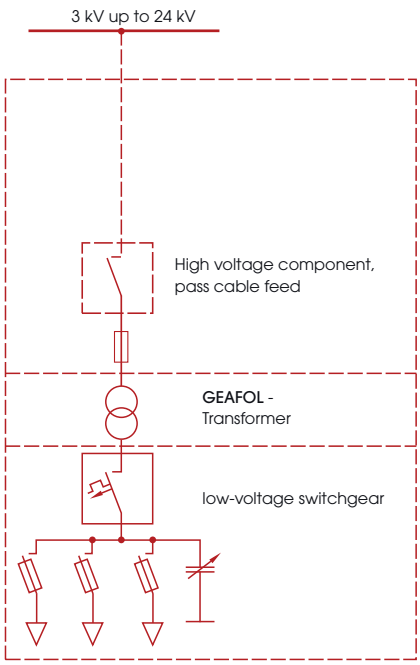
Low voltage feed

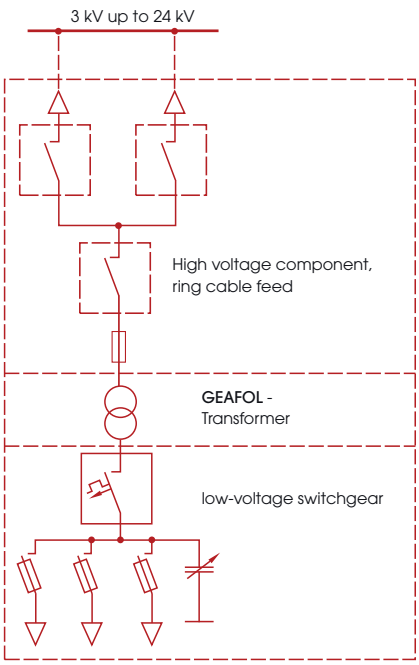
Under normal conditions is flanged on the low-voltage switchgear directly on the transformer housing. The electrical connection from the transformer to the low-voltage incoming circuit breaker is alternatively made by means of cables or by bus bar.

The connection of feeding cable bus bar and outlet cables takes place from the control side.

Feed of the low-voltageschwitchgear







DELIVERY PROGRAM

The Trafo-S-station 8FA can be alternatively built up from the following standardised and type tested components:

- Transformer component
- High voltage component
- Low-voltage switchgear

Transformer component

- The Transformer component consists of:
  - · GEAFOL transformer with or without earth switch
  - · Transformer housings equipped with raised roof sheet metal or roof ventilators, alternatively with earth switch drive. The high voltage component and/or the low-voltage switchgear can be flanged on to the transformer housing.

High voltage component

- The high voltage component is available in the following variants:
  - · during nominal primary voltage up to 12 kV
    - » Pass cable feed, consisting of one switch-disconnector with rear spar safety devices downstream as short-circuit protection
    - » Ring cable feed, consisting of the combination of switch-disconnector units with rear spar safety devices downstream as short-circuit protection and two switch-disconnectors for the ring cable feed
  - · during nominal primary voltage to 24 kV
    - » Pass-cable feed with switch disconnector unit from all reputable European manufacturers, consisting of a load disconnecting switch with rear spar safety devices downstream as short-circuit protection.
    - » Ring-cable feed with load switchgear from all considerable European manufacturers, consisting of a transformer branch with rear spar safety devices and two Ring cable branches.

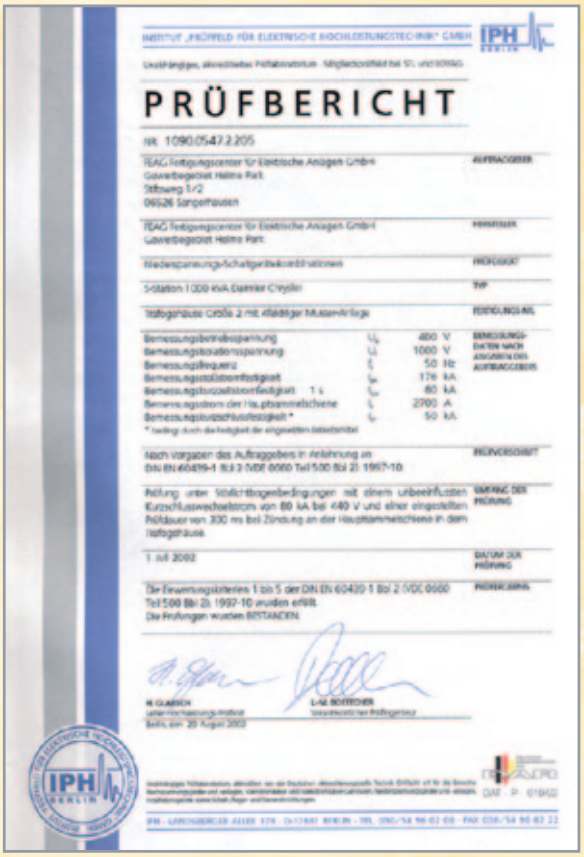
Arcing fault behaviour

Trafo-S-stations 8FA are intended for installation in generally accessible working locations. In the case of failure therefore, all doors have to remain closed and no hot gases allowed out.

The behaviour with internal arcing faults was examined for the high voltage component and for the transformer component - with upstream rear spar safety devices - following PEHLA guideline No. 2.

Low-voltage-lateral arcing fault examination takes place with 440V, 80kA and 0.3s.

- All test specimens fulfilled the following test criteria:
  - · The doors and linings remained closed
  - · No parts were separated
  - · No holes or breakage of the lining resulted from burning
  - · None of the perpendicularly or horizontally arranged indicators were ignited
  - · The effectiveness of all earthing connections was not impaired



PRÜFBERICHT

Application

INDUSTRIAL-SWITCHGEAR-SYSTEMS

The type tested modular low-voltage switchgear is used in process industries (e.g. in chemistry and industrial firms with a complex production technology) and infrastructure (e.g. in hospitals and public and/or private buildings).

All performance levels, i.e. from the Power Center to 8500A over main and sub-distribution branches up to the Motor Control Center in fixed mounting and

plug-in technology, as well as in withdrawable designs, are available. It is suitable for all switching, disconnecting, distributing and controlling tasks, for which low-voltage switchgear is needed.

The technical bases for the low-voltage switchgear were laid by SIEMENS AG. We further developed the low-voltage switchgear according to new technical requirements.

Further detailed information in our folders:

8PU003 Edition
type tested
POWER CENTER up to 8500 A
MAIN DISTRIBUTORS up to 5500 A
MCC-TECHNOLOGY

DELIVERY FORMATS – DIMENSIONS

L10-Field and T20-Field

Transformer components

- The GEAFOL transformer - with or without cultivated grounding switch – is supplied separately from the housing.
- The transformer housing is supplied as a partly assembled kit (low transport costs).
- It is easily assembly on the building site with the help of the manual.

Dimensions

Benennung	Dimension		
	Width mm	Depth mm	Height mm
Transformer housing			
DC-operation			
size 1	1800	1200	2370
size 2	2200	1400	2370
AC-operation			
size 1	1800	1200	2530
size 2	2200	1400	2560
High voltage component			
up to 12 kV	1470	1000 [1)]	2200
up to kV	1830	1320 [1)]	2200
Low-voltage switchgear			
L-, T-, F- or C-Field	800	800	2200

[1)] with pressure discharge pipe

Additionally belonging to the transformer housing:

- Temperature monitoring (with DC-operation) and/or exhaust controlling unit (AC- operation) is alternatively installed on mounting frames or built in a separate cabinet.
- Connecting cables and/or connecting bus bars including shifting and connection accessories for the electrical connection of the transformer and LV switchgear. The dimensioning depends on the respective transformer rated output and the mode of operation.

High voltage component

- The high voltage component is supplied completely installed, including the rear spar safety devices. To the scope of supply also includes, as an enclosure, the primary voltage cable connections from the high voltage component to the transformer.

Low-voltage switchgear

- Each low-voltage switchgear cabinet has own bus bars.

  This gives an advantage: Those with L, F, T, or C-field equipped cabinets will be able to line up next to each other. In order to complete this advantage, the delivery takes place in single cabinet units.

GEAFOL CASTING RESIN TRANSFORMER

The highest security must be guaranteed everywhere distribution transformers are in direct proximity to humans; GEAFOL casting resin transformers are the perfect solution. Because of the flexible and environmentally friendly technology, the transformer can be directly placed where the user needs it.

GEAFOL casting resin transformers are not to be used where there may be safety compromises. Due to the superior principle, GEAFOL technology is built by many transformer manufacturers world-wide under licence.

The GEAFOL casting resin transformer is an air cooled. The windings are insulated by a pollution free material, a self-extinguishing of epoxy resin/ quartz powder mixture, which makes the windings maintenance-free and difficult inflame, so withstanding tropical conditions. No toxic gases develop, even under arc effect. Special fire protection measures are not necessary.

Temperature monitoring

For temperature monitoring, PTC resistor temperature sensors are inserted into each of the three low-voltage coils:

2 pieces for DC-operation

3 pieces for AC-operation

Earthing switch

An earthing switch can be built in to the transformer. Thus, e.g. during maintenance work, inadvertent locking of the voltage can be prevented.

Connection

The electrical connection from the transformer to the low-voltage switchgear can alternatively take place via copper cables or via copper bus bars. The transformer has low level connecting terminals.

GEAFOL-transfomer with Earthing switch,
Transformer- Rated output

- without housing 630 kVA
- in housing by DC-cooling 570 kVA
- in housing by AC-Cooling 900 kVA
- no-load running transmission 20000 ± 5 % /400 V

rated undervoltage	Transformer rated power S_N kVA	Transformer rated current I_e A	No-load running power P_O W	short-circuit power P_k W
up to 12 kV List 2	400	610	1000	4400
	500	760	1200	5200
	630	960	1400	6100
	800	1220	1700	6800
	1000	1520	2000	8000
	1250	1900	2400	9500
up to 24 kV List 1	400	610	1200	4500
	500	760	1400	5400
	630	960	1650	6400
	800	1220	1900	7500
	1000	1520	2300	8800
	1250	1900	2700	10400

TRANSFORMER HOUSING FOR DC-OPERATION

Application

Consisting of the transformer component, the transformer housing, GEAFOL transformer and transformer control device, the increased high voltage load centre (to 24 kV) is stepped down on low-voltage (until 660 V).

In addition to the transformer housing belong:

- Temperature monitoring on mounting frames assembled or built in the separate cabinet.
- Connecting cables and/or connecting bus bars including shifting and connection accessories for the electrical connection of transformer and LV switchgear. The dimensioning depends on the respective transformer rated output and the mode of operation.

Primary voltage	Transformer Rated power S_N kVA	Available Transformator power DC-operation S_{AN} kVA	transformer housing dimension
up to 12 kV List 2	400	400	1
	500	500	1
	630	570	1
	800	720	1
	1000	900	2
	1250	1130	2
up to 24 kV List 1	400	400	1
	500	500	1
	630	570	1
	800	720	2
	1000	900	2
	1250	1130	2

Transformer housing 8FA1

TRANSFORMER HOUSING FOR THE AC-OPERATION

Application

Consisting of the transformer component, the transformer housing, GEAFOL transformer and transformer control device, the increased high voltage load centre (to 24 kV) is stepped down on low-voltage (until 660 V).

In addition to the transformer housing belong:

- Exhaust controlling unit, on mounting frames assembled or built in the separate cabinet.
- Connecting cables and/or connecting bus bars including shifting and connection accessories for the electrical connection of transformer and LV switchgear. The dimensioning depends on the respective transformer rated output and the mode of operation.

Primary voltage	Transformer Rated power S_N kVA	Available Transformator power AC-operation S_{AN} kVA	transformer housing dimension
up to 12 kV List 2	400	560	1
	500	700	1
	630	900	1
	800	1120	1
	1000	1400	2
	1250	1750	2
up to 24 kV List 1	400	560	1
	500	700	1
	630	900	1
	800	1120	2
	1000	1400	2
	1250	1750	2

SECURITY WITH CERTIFICATE

Generally

The low-voltage switchgear ENERGOLINE is a type tested switchgear combination (TSK). An accredited Inspection institution proved its physical characteristics both in the experimental field, operating and disturbance situations.

Locking type-testing guarantees both maximum operating and personal security.

Type testing

- Proof of the adherence to the high temperature limit through examination
- Proof of the isolation ability by examination
- Proof of the perfect connection between the Switchgear combination bodies and protective earthing by control or resistance test
- Proof of the resistance to short-circuits of protective earthing by examination proof of the creeping and clearance
- Proof of the mechanical function
- Proof of the IP-protection type

Arcing fault examination

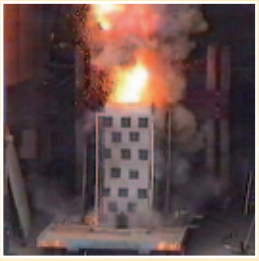
- Arcing fault examination with increased requirements 726 V; 100 kA; Standard firmness 300 ms
- Tested with 40g-indicators with a distance of approx. 300 mm

Routine checks applied to each low-voltage switchgear before distribution:

- Examination of the switchgear combinations including the wiring and if necessary, an electrical functional test
- Insulation check
- Control of the preventive measures and examination of the continuous protective earthing connection

- L- Field 400 V up to 80 kA 0,3 s
- Output panels, MCC-Field 726 V up to 100 kA 0,3 s
- Arcsafe partitioning field to field

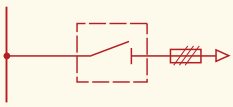
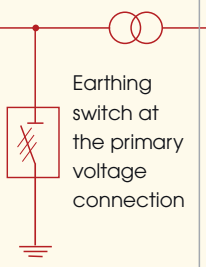
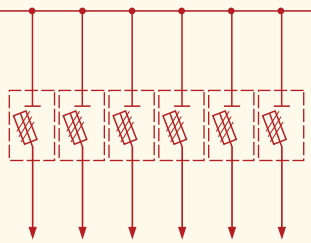
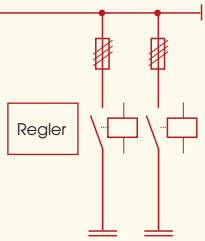
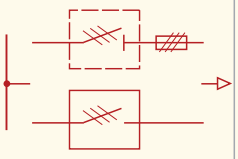
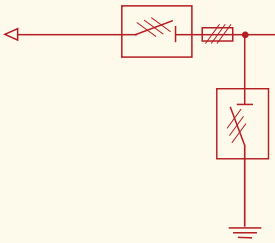
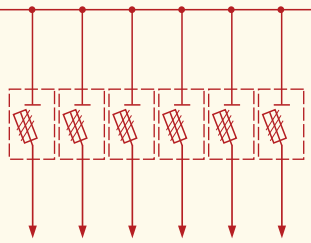
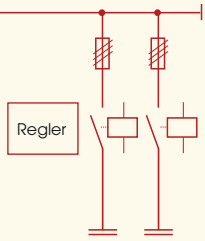
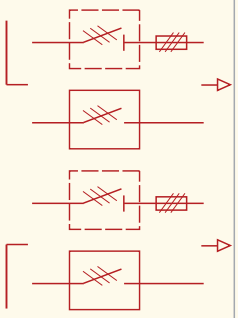
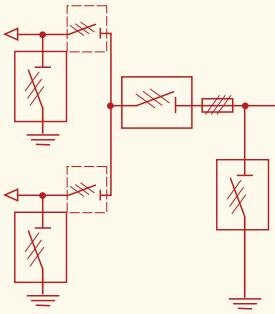
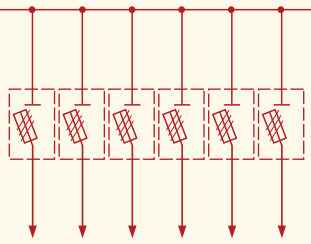
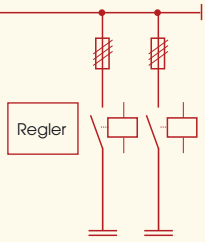


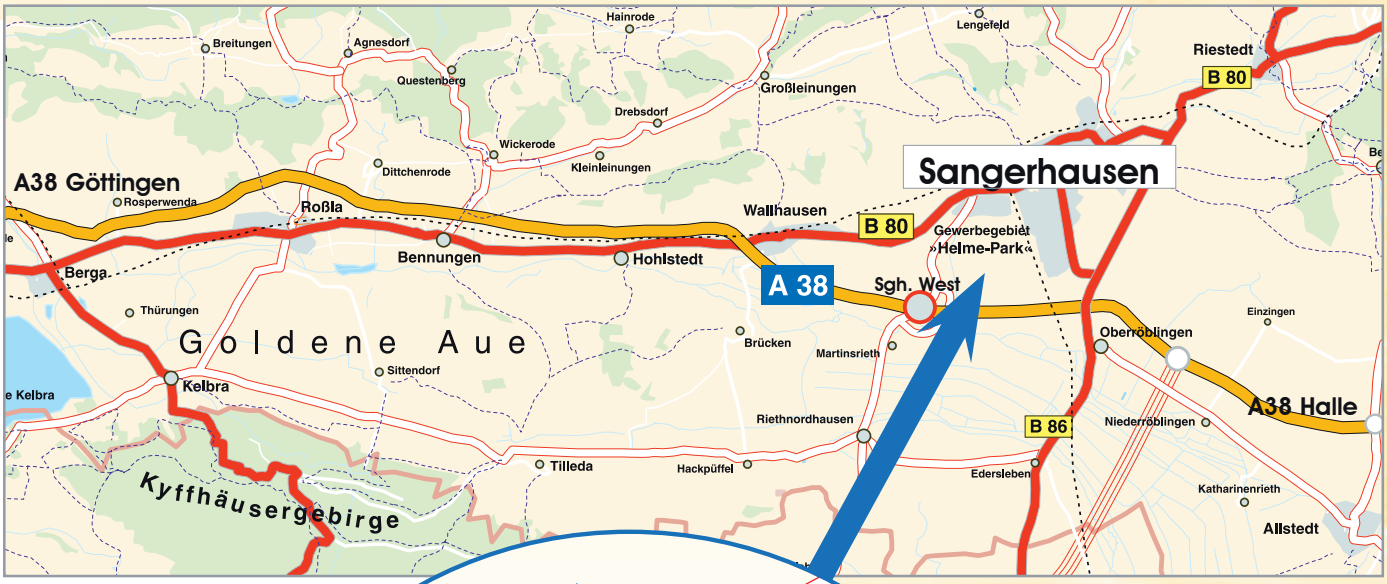
This high security requirement is supported by further details:

- Today, arcing fault security represents an important demand on modern low-voltage switchgear, indispensable in many applications. An arising arcing fault endangers people by expelled casing parts and/or by hot gases. In addition, arcing fault security avoids downtimes, which can cause high costs depending upon the complexity of a plant.
- Avoidance of faulty operations with the circuit-breaker plug-in design by accurately prepared mechanical guidance and bolting devices
- Uses less, exclusively high-quality insulants (e.g. bus bar owner, reinforcements etc.)
- Employment of qualitatively high-quality switchgears from renowned manufacturers, like SIEMENS, ABB, etc., secures long life span and minimizes down-times
- Secure disconnection after 70 to 100 ms also with high deceleration time by circuit-breakers with ZSS (selectivity control time-shortened)
- Data processing-supported project engineering, secures error free selection and placement of working capital
- Effective quality management

TRANSFORMER LOAD CENTRE SUBSTATIONS

Superordinate high voltage switching station	Transformer load centre substations				
	High voltage component	GEAFOL CASTING RESIN TRANSFORMER	Low-voltage switchgear ENERGOLINE® 8PU Premium		
			Feeding field with circuit-breaker	Departure field with fuse switch-disconnector	Reactive power compensation
 Load disconnecting switch with rear spar safety devices	Pass cable feed without high voltage component	 Earthing switch at the primary voltage connection			
 Load disconnecting switch with rear spar safety devices or circuit-breakers	 Pass cable feed				
 Load disconnecting switch with rear spar safety devices or circuit-breakers	 Ring cable feed				

OUR LOCATION



from
Sangerhausen Zentrum
Halle

from
Wallhausen
Nordhausen

from
Highway A38
Exit Sangerhausen
West

Fertigungscenter für Elektrische Anlagen Sangerhausen GmbH

Gewerbegebiet Helme-Park
Stiftsweg 1/2
06526 Sangerhausen

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