RETROFIT in medium voltage switchgear

Metal-enclosed switchgear systems of types ZE, ZW, ZP, ZK, BB and others, and switchgear of non-enclosed types

There are switchgear systems with long service lives of the non-enclosed type, but also and above all in metal-enclosed, air-insulated design. The switching devices still in use in these systems are mainly minimum-oil circuit-breakers, but also air-blast and expansion circuit-breakers. Maintenance of these switching devices is time-consuming and costly, and spare parts are unlikely to remain available in the long term.

Operator safety and reliability no longer completely fulfil today's standards.

With the RETROFIT systems solutions from ABB Calor Emag Schaltanlagen AG, you can prolong the life of your switchgear by using the most modern components.

The design engineers at ABB Calor Emag Schaltanlagen AG have solutions at hand for many problems. Following an assessment of the condition of the system as a whole, a cost-effectiveness review, discussion of the technical feasibility and taking account of the general background conditions, the following opportunities, for example, may be presented:

Measures on switchgear of non-enclosed types

In the case of open-type switchgear installations, the main attention is focused on the applicable regulations and the associated retrofitting obligations.

“Switchgear systems are to be erected in such a way that persons are extensively protected from arc faults when operating them. This condition is fulfilled when one of the measures below or other equivalent measures have been adopted.

a) Switch-disconnectors in place of isolators.
   The switch-disconnectors must be capable of interrupting the maximum operating current occurring at the place of installation and be suitable for closing onto a short-circuit..

b) Protection against incorrect operation for disconnectors and earthing switches, e.g. interlocks, positively making earthing switches or uniquely assigned lock-outs.

c) Operation of the system from a safe distance.

d) Installation of suitable protective devices, e.g. arc runners, arc-proof windows, solid doors or partitions.”

Replacement of switching devices or Switch trucks

The replacement of switching devices or trucks provides the following advantages:

- Short implementation times for replacement
- Minimum interruptions to service
- Prolongation of remaining service life
- Increased system availability
- Improved operator protection
- Enhanced operator convenience
- Minimisation of maintenance costs
- Warranty on the conversion work
- Ensurance of spare parts supplies

Our solutions

The ABB Calor Emag Schaltanlagen AG Retrofit & Support Center supplies both individual and complex solutions for retrofitting:

- New switching devices (circuit-breakers or switch-disconnectors)
- New protection and control technology
- Improved operator protection
- Higher rated data for the system (U_N, I_N, I_k)
- Connection to existing or new telecontrol and automation systems

For us, RETROFIT in switchgear systems means upgrading them by suitable actions such as conversion or expansion, extension and modernisation, so that they are state of the art in terms of availability, remaining service life, operator convenience and operator safety. We ensure that the status of existing type tests and certifications can be preserved. We also provide servicing agreements and other services for maintenance, training etc. in connection with RETROFIT.

Switch trucks, trolleys or fixed- installations with Vacuum-Circuit breakers Type VD4

(Update November 2002)

Type of Panel (CB)	Make	Rated-voltage kV	Rated Current A	Rated SC breaking current kA
ZA3 (OD1)	Calor Emag	... 12	... 1250	... 31,5
ZE2 (OD1)	Calor Emag	… 12	… 1250	… 31,5
ZE3, ZE4, ZE7, ZE8 ZP1, ZP2 ZW3, ZW4 (OD3/4)	Calor Emag	... 12	... 1250	... 31,5
ZE4.3, ZW4.3 (OD3/4)	Calor Emag	... 12	... 1250	... 31,5
ZE5 (OD3/4)	Calor Emag	... 12	... 1250	... 31,5
ZH5 (OD3)	Calor Emag	… 12	… 1250	… 31,5
ZH5 (OD3)	Calor Emag	… 12	… 2500	… 31,5
ZK4 (OD1)	Calor Emag	... 12	... 3150	... 31,5
ZK4 (OD1)	Calor Emag	... 12	... 1250	... 31,5
ZK4(OD4)	Calor Emag	... 12	... 1250	... 31,5
ZK4	Calor Emag	... 12	... 1600	... 40
ZK4	Calor Emag	... 12	... 2500	... 40
ZK4	Calor Emag	... 12	... 3150	... 40
ZK6	Calor Emag	... 12	630	20
ZR1	Calor Emag	... 12	... 1250	... 31,5
ZR2, ZR3	Calor Emag	... 12	... 1250	... 25
ZE3, ZE4, ZE7, ZE8 ZP1, ZP2 ZW3, ZW4(OD3/4)	Calor Emag	... 17,5	... 2500	... 40
ZE3, ZE4 ZP1, ZP2 ZW3, ZW4 (OD3/4)	Calor Emag	... 17,5	... 1250	... 25
ZE7, ZE8 (OD3/4)	Calor Emag	... 17,5	... 1250	... 25
ZG3	Calor Emag	... 17,5	... 1250	20
ZE3, ZE4 ZP1, ZP2 ZW3, ZW4 (OD3/4)	Calor Emag	... 24	630	... 25
ZE3, ZE4 (OD3/VD2)	Calor Emag	... 36	... 2500	... 25
ZE8, ZE10.2 (OD3/VD2)	Calor Emag	... 36	... 2500	... 25
ZW3, ZW4 (OD3/VD2)	Calor Emag	... 36	... 2500	... 25
ZK3 (OD1)	Calor Emag	... 36	... 1250	... 25
ZK4 (OD1)	Calor Emag	... 36	... 1250	... 25
BA1 (SBJ)	BBC	… 12	… 1250	… 31,5
BB1 (SBJ)	BBC	… 12	... 1250	... 31,5

BA1, BA2 BB1, BB2 (OD3/4)	BBC	… 12	BA- und BB-Schaltwagen fast baugleich zu ZE-Schaltwagen bei VD4 für OD3 und OD4	
BC1 (OD4)	BBC	12	630	20
BAX (RM,RG)	BBC/Sace	… 12	… 1250	… 25
BAX (RM,RG)	BBC/Sace	… 17,5	… 1250	16
/BBC in Jemen/ (CB/CC)	BBC/CEM	… 24	… 1250	… 20
BA1, BA2 BB1, BB2 (OD3/4)	BBC	… 24	BA- und BB-Schaltwagen fast baugleich zu ZE-Schaltwagen bei VD4 für OD3 und OD4	
BB5 (SBJ)	BBC	36	... 1600	... 25
BB6 (SBJ)	BBC	36	... 1600	... 25
CSI-10/250	SAD	12	630	… 20
CSI1-10/250	SAD	12	630	… 20
CSIV-10/250	SAD	12	630	… 20
CSIV1-10/250	SAD	12	630	… 20
BSIG1-10/250	SAD	12	630	… 20
CSI 1-10/250	SAD	7,2	SACE VRC 7 mit Schütz	
CSIV 10/250	SAD	7,2		
CSIV 1-10/250	SAD	7,2		
BSIG 1-10/250	SAD	7,2		
CSIM-12/16	SAD	12	… 800	… 20
CSIM1-12/16	SAD	12	… 800	… 20
CSIM-12/25	SAD	12	… 1250	… 25
CSIM1-12/25…31,5	SAD	12	… 1250	… 31,5
CSI-10/350…500	SAD	12	… 1250	… 31,5
CSI1-10/350…500	SAD	12	… 1250	… 31,5
CSIM1-10/350…500	SAD	12	… 1250	… 31,5
CSI1-20/350	SAD	24	630 (1250)	16
CSIM1-20/350	SAD	24	630 (1250)	16
BSIG1-20/350	SAD	24	630	16
CSI 20/500	SAD	24	… 1250	… 25
CSIM 1-20/500	SAD	24	… 1250	… 25
/Elin/ (MT)	Elin/BBC Oerlikon	24	… 1250	… 25
/GEN/ (OD4)	/Holland/	12	630	20
GS (GTC)	/GS Korea/	12	630	31,5
„КРУ“ („ВМПЭ“)	/GUS/	12	… 1250	… 20
/Magrini/ (MG)	Magrini	12	… 1250	… 25
RPW (OD3)	Ritter	12	… 1250	20
/Ritter/ (VZ1)	Ritter	12	630	20

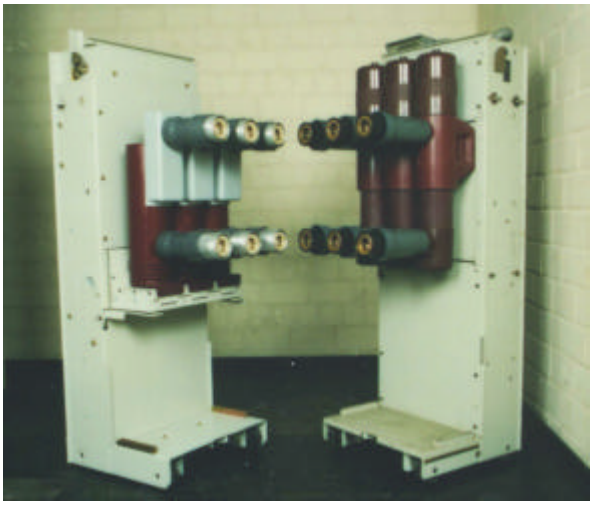
/Ritter/ (GD)	Ritter	12	630	31,5
/V&H/ (VZ1)	V&H	12	630	25
/AEG/ (Bf.E)	AEG	12	… 2000	50
/Siemens/ (H515)	Siemens	12	630	… 31,5
/Siemens/ (H515)	Siemens	24	1250	25
/Sace Thai./	Sace	24	1250	25
/Sace Thai./	Sace	24	2000	25
38 MG 1500	Westingh.	36	… 1600	… 25

Detailed technical clarification and specification before any quotations are mandatory

BB6	36	... 1600	... 25

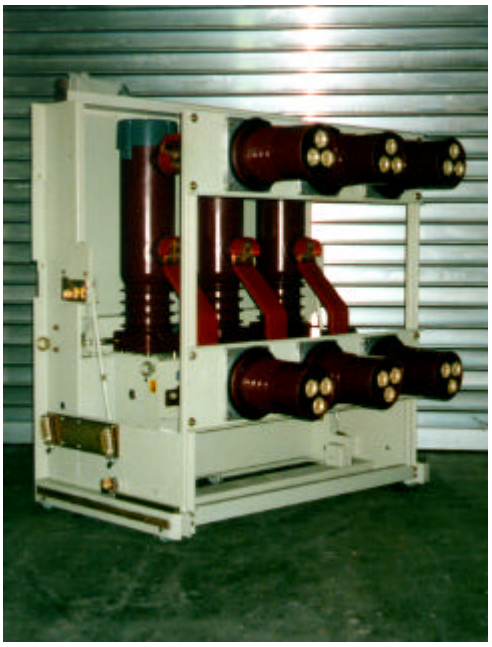
Technical clarification and detailed specification are essential for RETROFIT in advance of contractual agreements.

Examples of Switch trucks



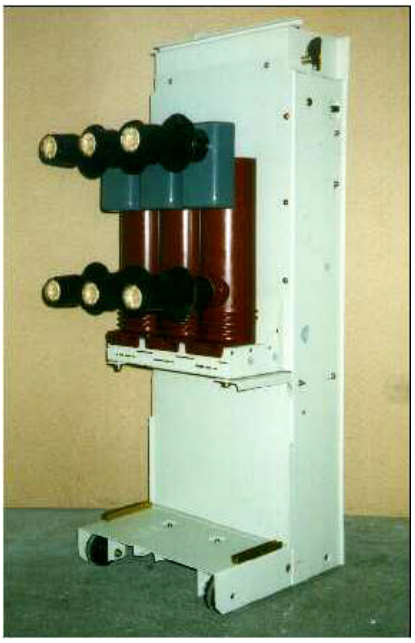
Replaceable Switch truck with vacuum circuit-breaker VD4 or minimum-oil circuit-breaker OD3

12 kV, 1250 A, 31.5 kA



ZE4 Switch truck with vacuum circuit-breaker VD4

36 kV, 2000 A, 25 kA



ZE4 Switch truck with VD4 in place of OD3

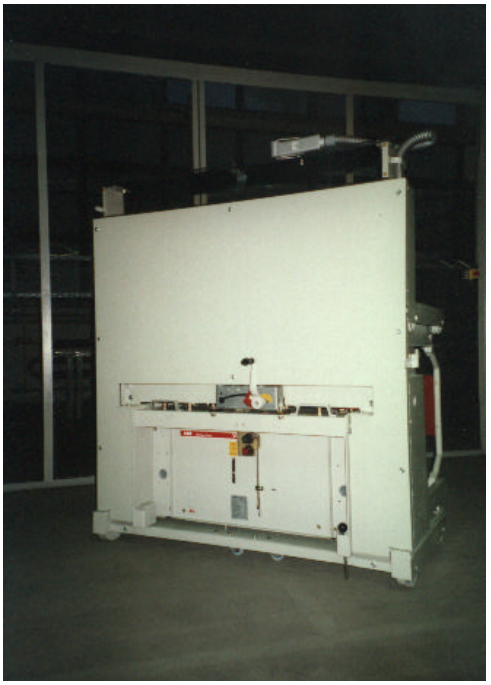
12 kV, 1250 A, 31.5 kA

ZG3 Switch truck with VD4 for ISOCOMPACT

17,5 kV, 1250 A, 20 kA

ZK4 Switch truck with VD4 in place of OD1

12 kV, 1250 A, 31.5 kA



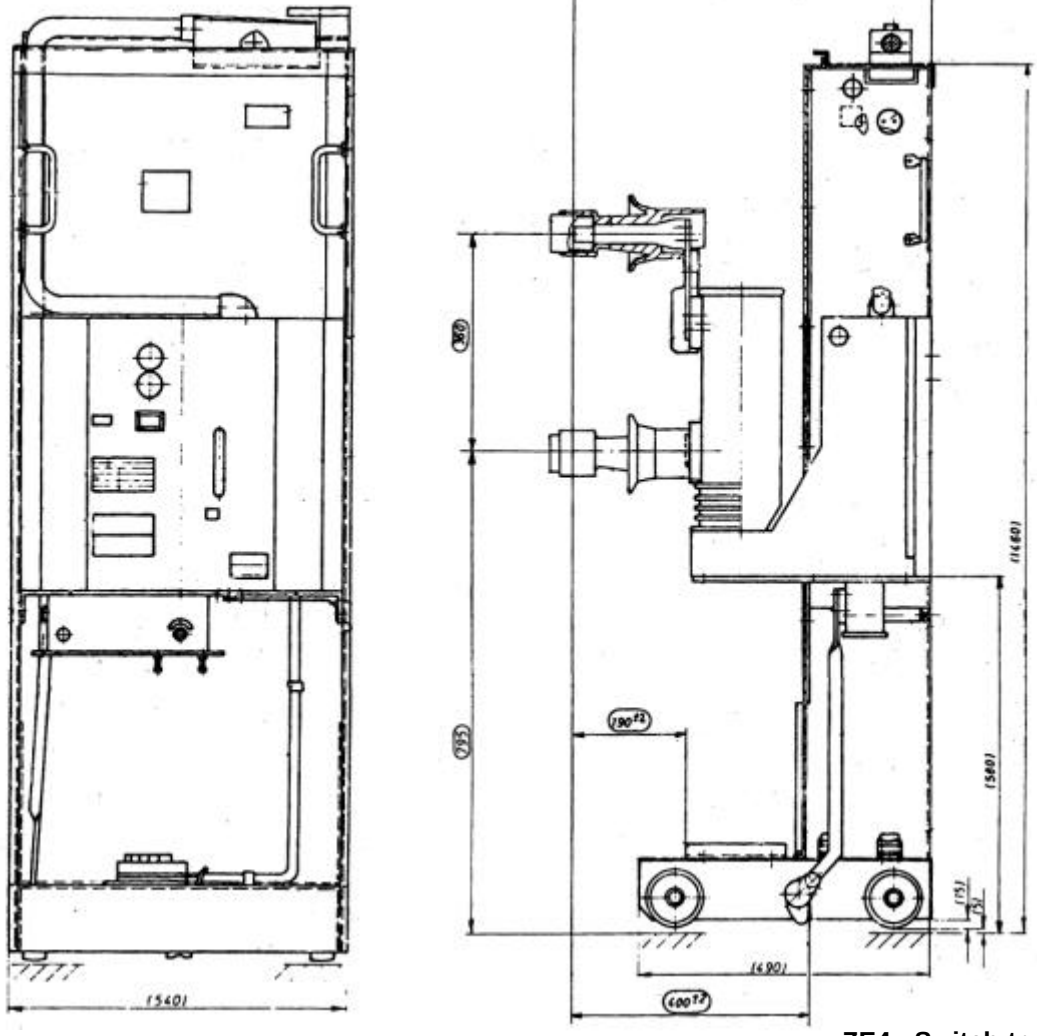
ZK4 Switch truck with VD4 in place of OD1

36 kV, 1250 A, 25 kA

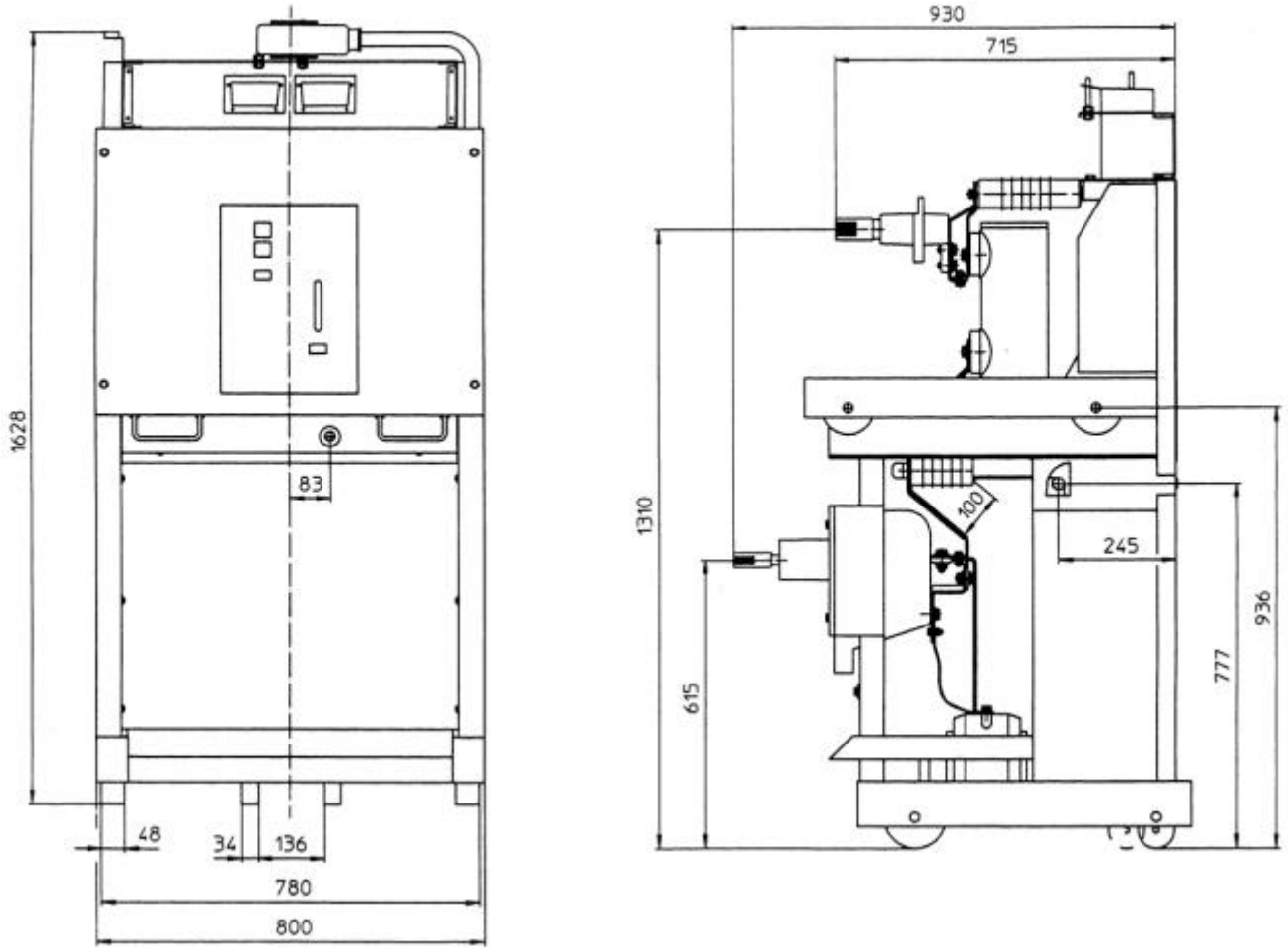
BB1 Switch truck with VD4 in place of SBKJ12
12 kV, 1250 A, 31.5 kA

BB6 Switch truck with VD4 in place of SBKJ36

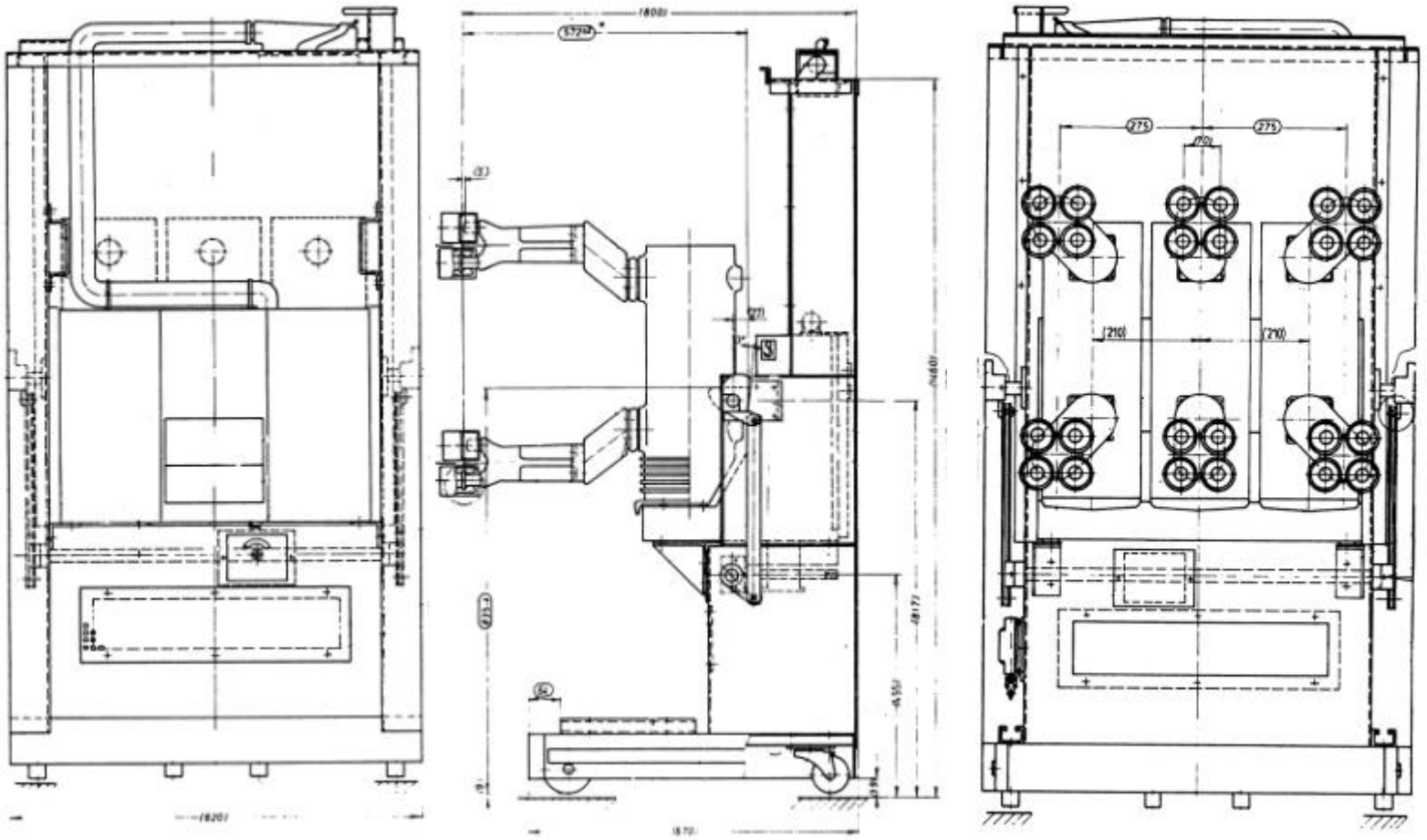
36 kV, 1600 A, 25 kA



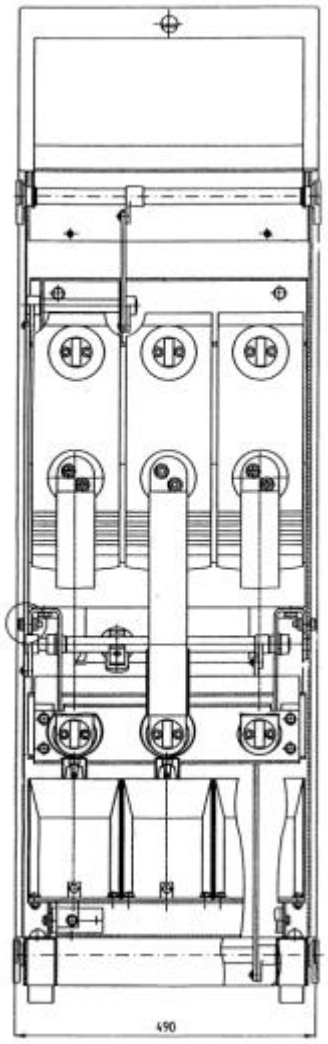
ZE4 - Switch truck 12kV, ... 1250 A, ...31,5 kA

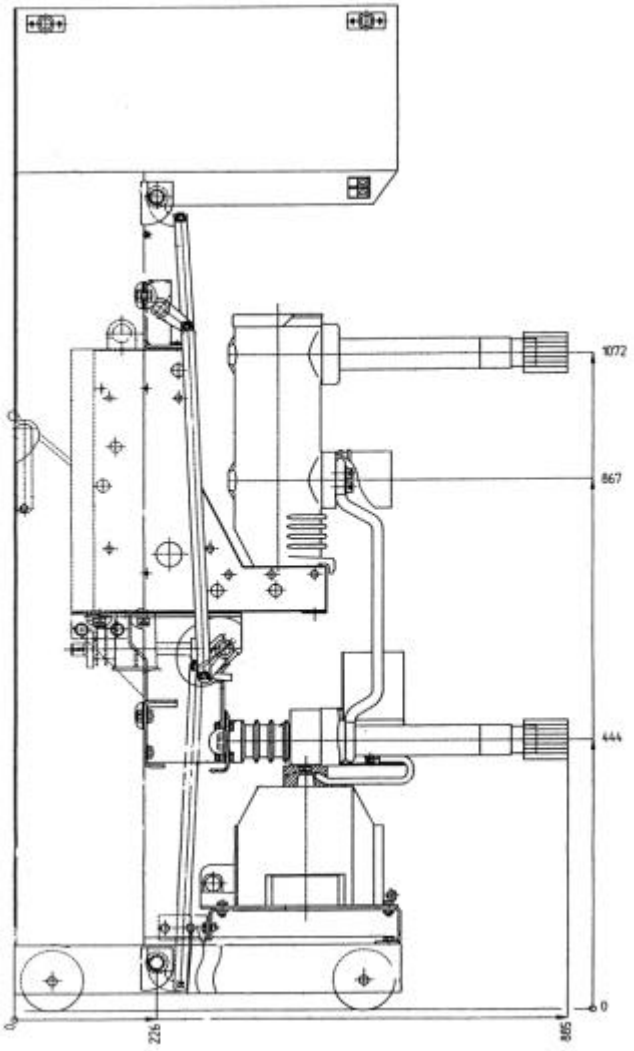


ZK4 - Switch truck 12kV, ... 1250 A, ...31,5 kA

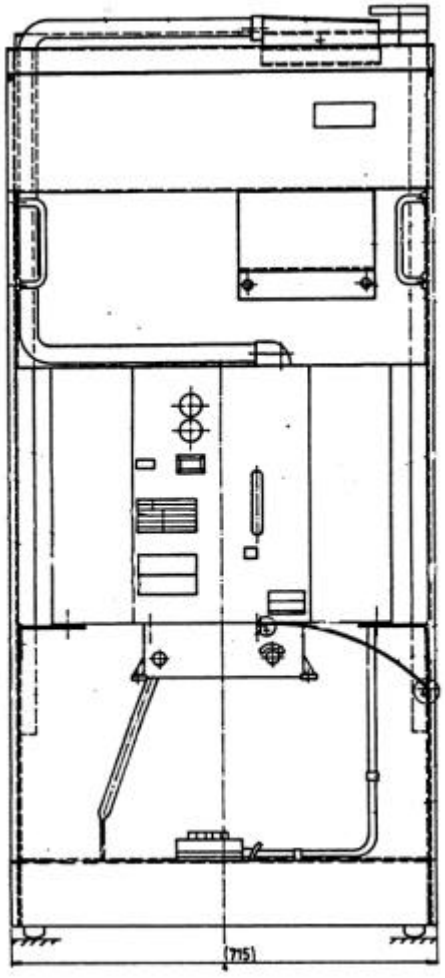


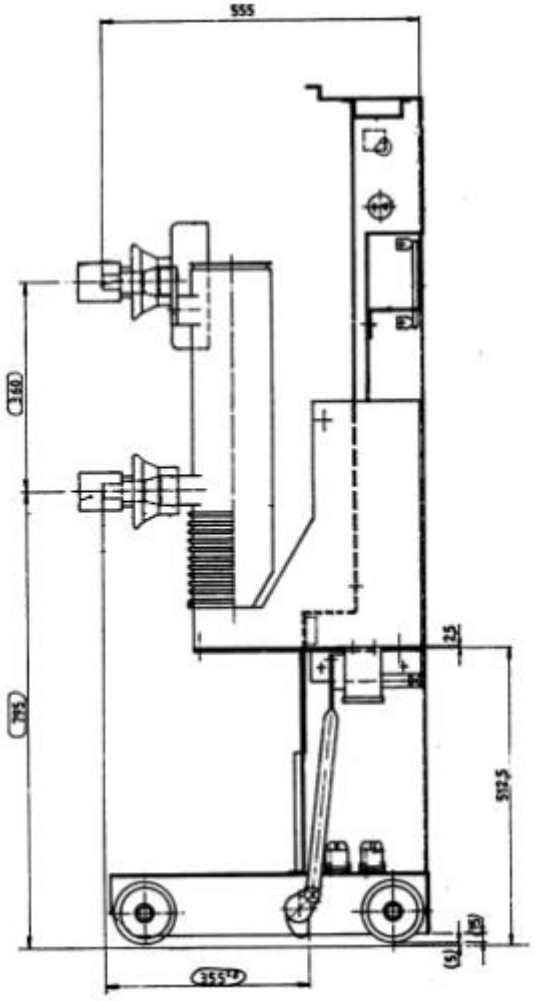
ZE4 - Switch truck ... 17,5kV, ... 2500 A, ... 40 kA



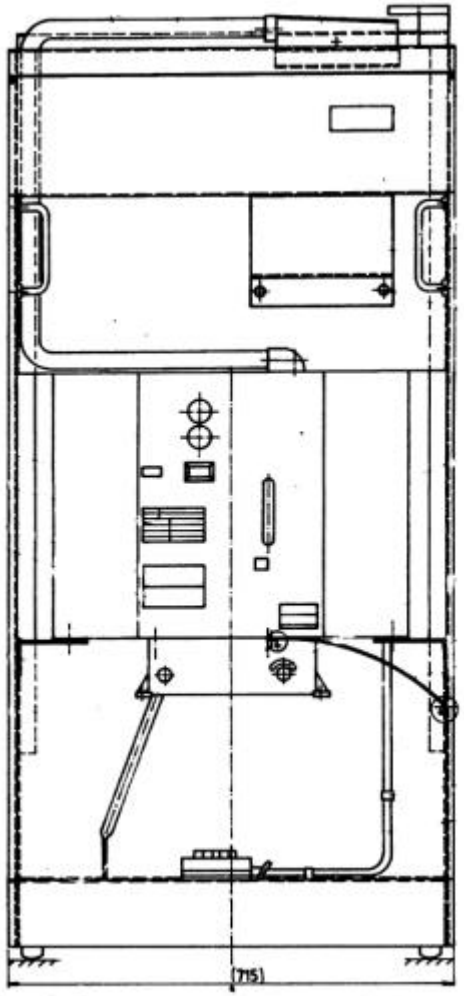


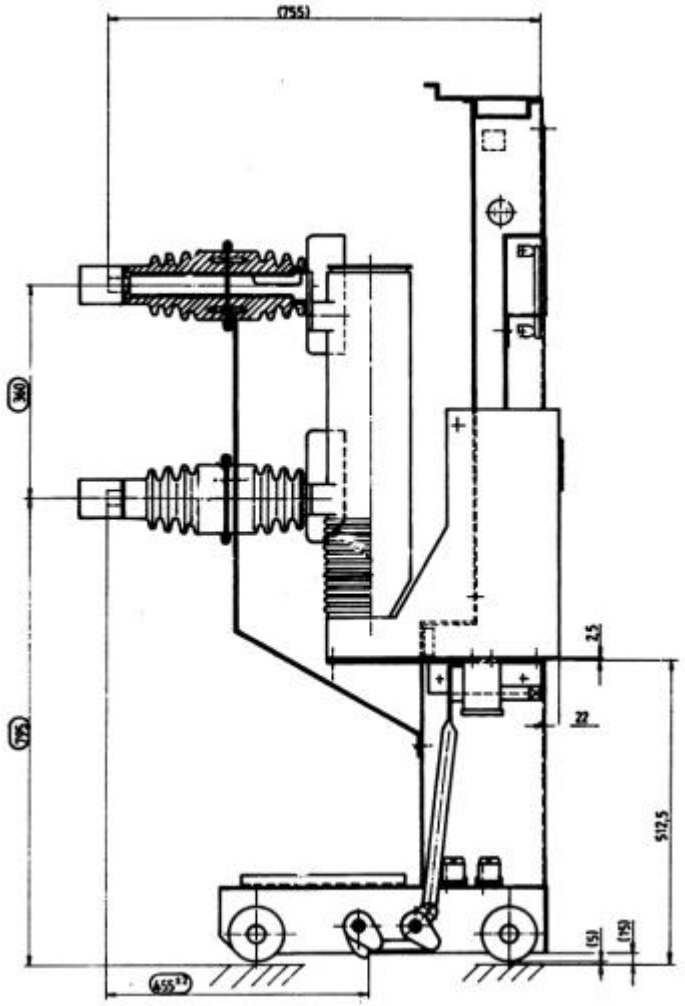
ZG3 - Switch truck 17,5kV, ... 1250 A, 20 kA



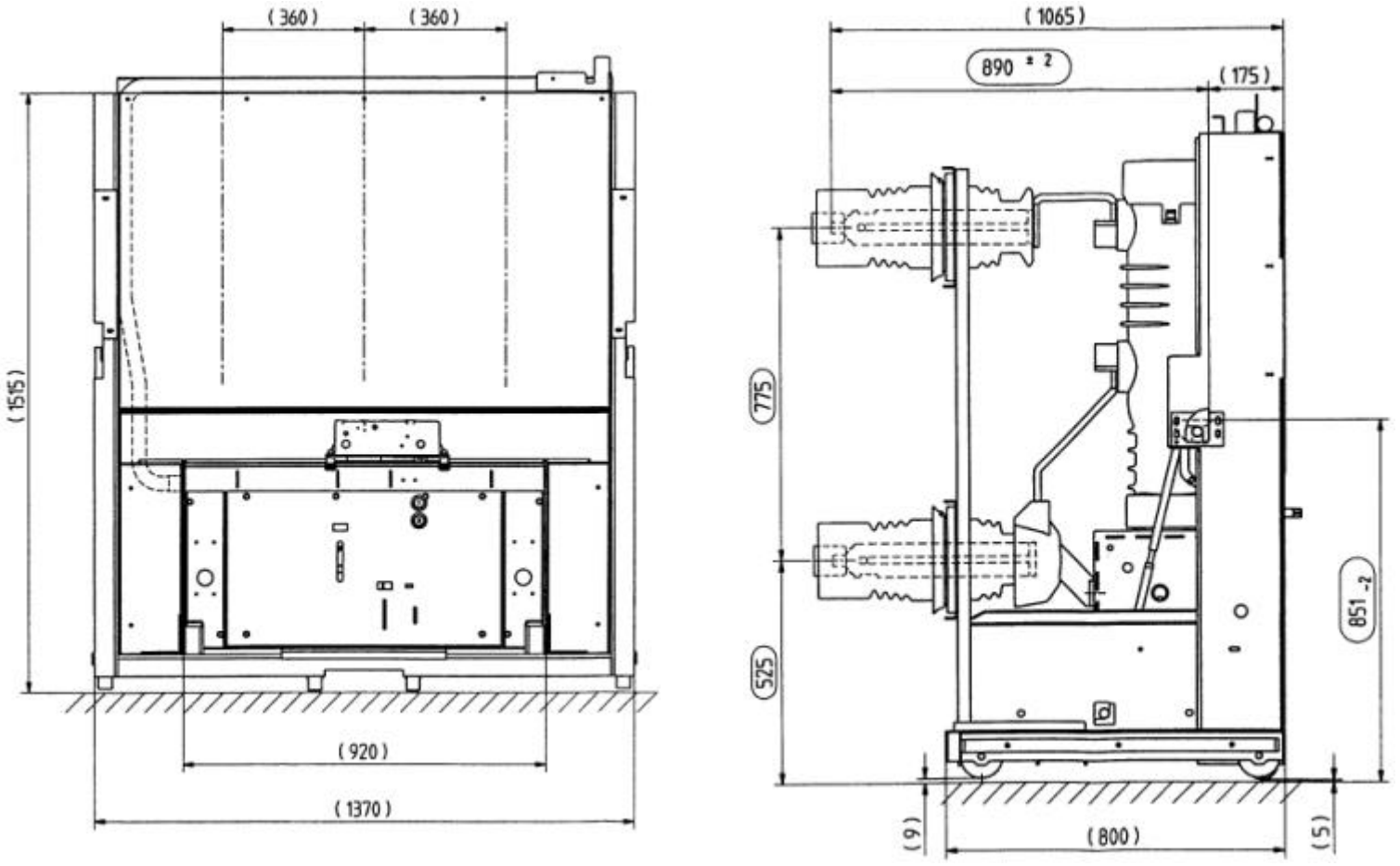


ZE8 - Switch truck 24 kV, ... 1250 A, 25 kA

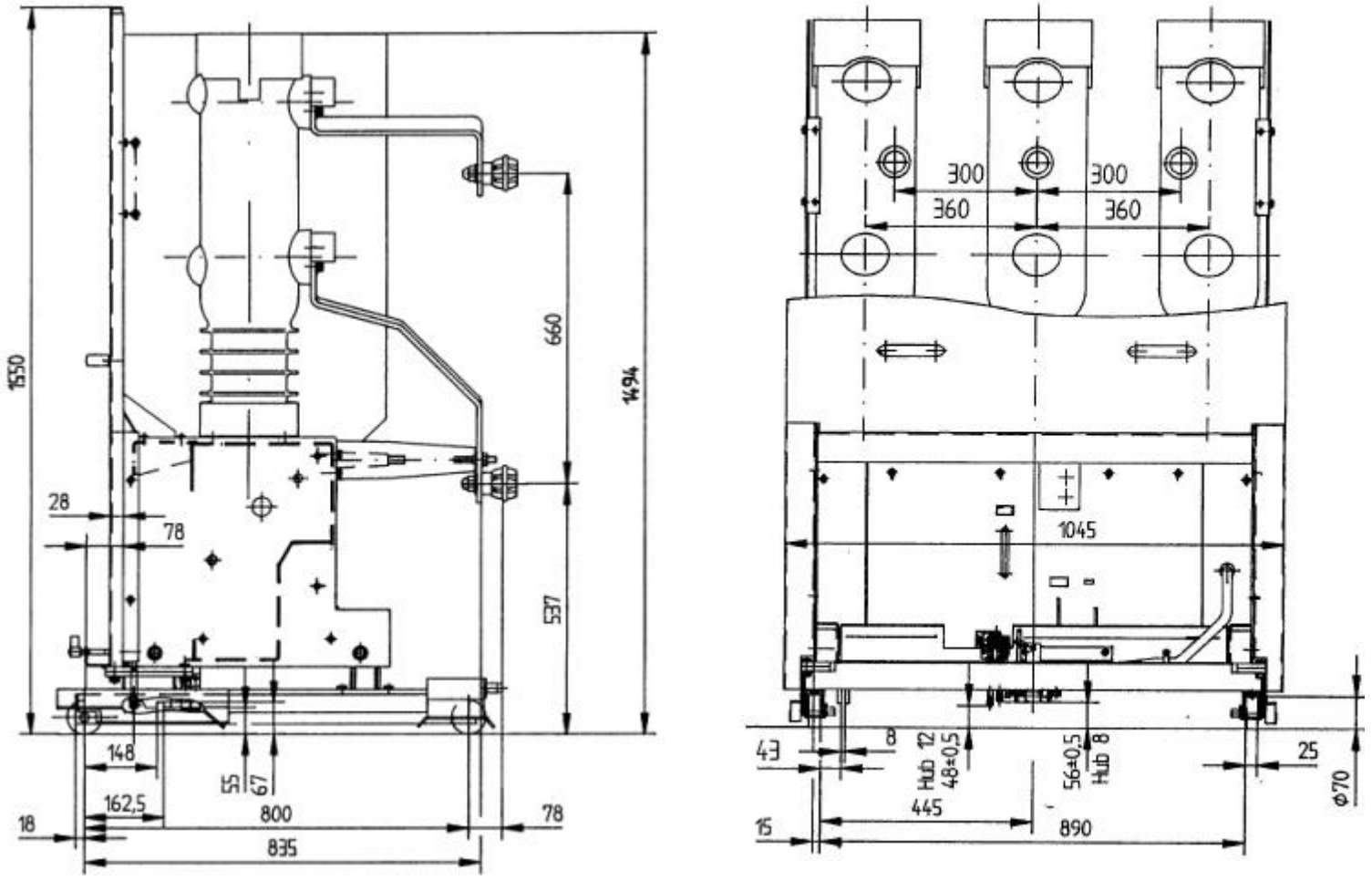




ZP2 - Switch truck 24 kV, 630 A, ... 25 kA

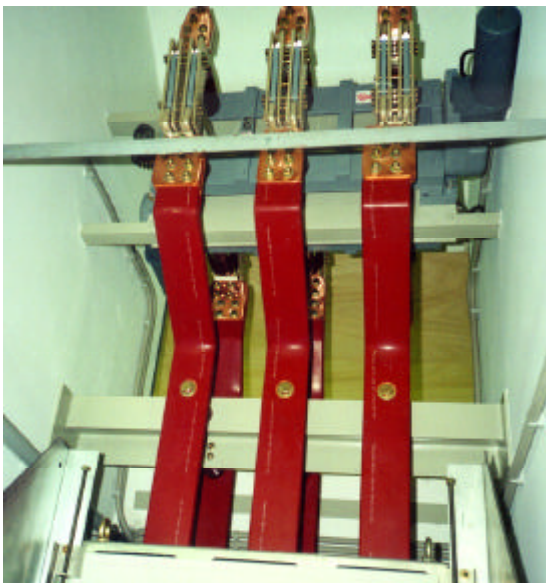


ZE4 - Switch truck 36 kV, ... 2500 A, ... 25 kA



BB5 - Switch truck 36 kV, ... 1600 A, ... 25 kA

Examples of switchgear in non-enclosed design



Bus sectionaliser with VD4 vacuum circuit-breaker on a mounting frame and isolator with motor-operated mechanism.

12 kV, 2500 A, 40 kA

24 kV switchgear system in non-enclosed design with completely new components.

Switch-disconnector C3 with motorised mechanism, vacuum circuit-breaker VD4 as a stationary-mounted unit, earthing switch EK6 with motorised mechanism, new instrument transformers and bus bar, new protection and control sy-

RETROFIT components in an open-type 24 kV switchgear system

Switch-disconnector C3 with motorised mechanism in place of an isolator.

VD4 as a stationary-mounted unit in place of an air-blast circuit-breaker.

Earthing switch EK6 with motorised mechanism.

Slide-in plates in ABS.

24 kV switchgear system with safety improvements.

Switch-disconnnectors in place of isolators, arc runners, flameproof front doors and cladding from ZS1, insulating plate insertable from outsde.

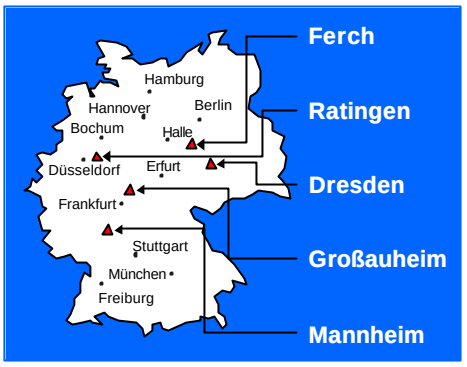
High current switchgear system (replaces air-blast circuit-breaker).

High current ZS1 panel with VD4 and new bus bar connections.

RETROFIT in medium voltage switchgear

There are overwhelming arguments for RETROFIT and our complete solutions from under one roof.

The Retrofit & Support Division of ABB Calor Emag Schaltanlagen AG, with around 570 staff, 12 decentralised sales locations and 5 logistics centres in Berlin, Ratingen, Dresden, Grossauheim and Mannheim provides services worldwide in the fields of diagnosis, RETROFIT, maintenance, installation, after sales service and commissioning of protection and control technology, and innovative service programmes such as Facility Management Engineering.



The Customer Oriented Service System (C.O.S. © System) starts with a well-founded system diagnosis and creates the basis for efficient action planning. The client then decides which investment is the most cost-effective for his system: the purchase of a new system, performance of a RETROFIT, or a specific maintenance plan. But C.O.S.© also focuses on further services such as consulting, IT solutions, eBusiness, training and financing models.

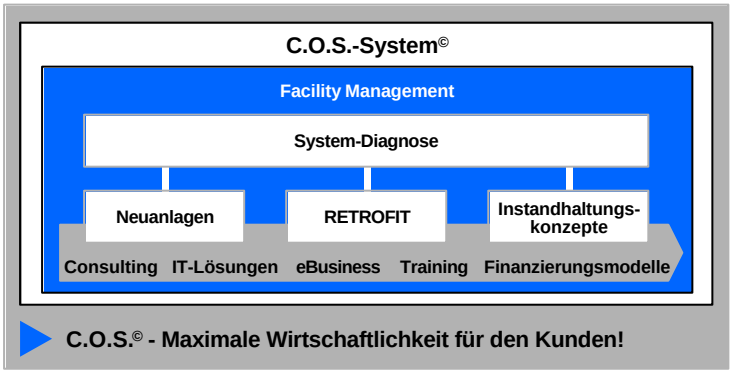


ABB Calor Emag Schaltanlagen AG
Käfertaler Strasse 250
D-68167 Mannheim
Tel.: +49/(0) 6 21/3 86 – 27 77
Fax: +49/(0) 6 21/3 86 – 21 93
E-mail: ace.produktinfo@de.abb.com
Internet: http://www.abb.com/Retrofit&Support