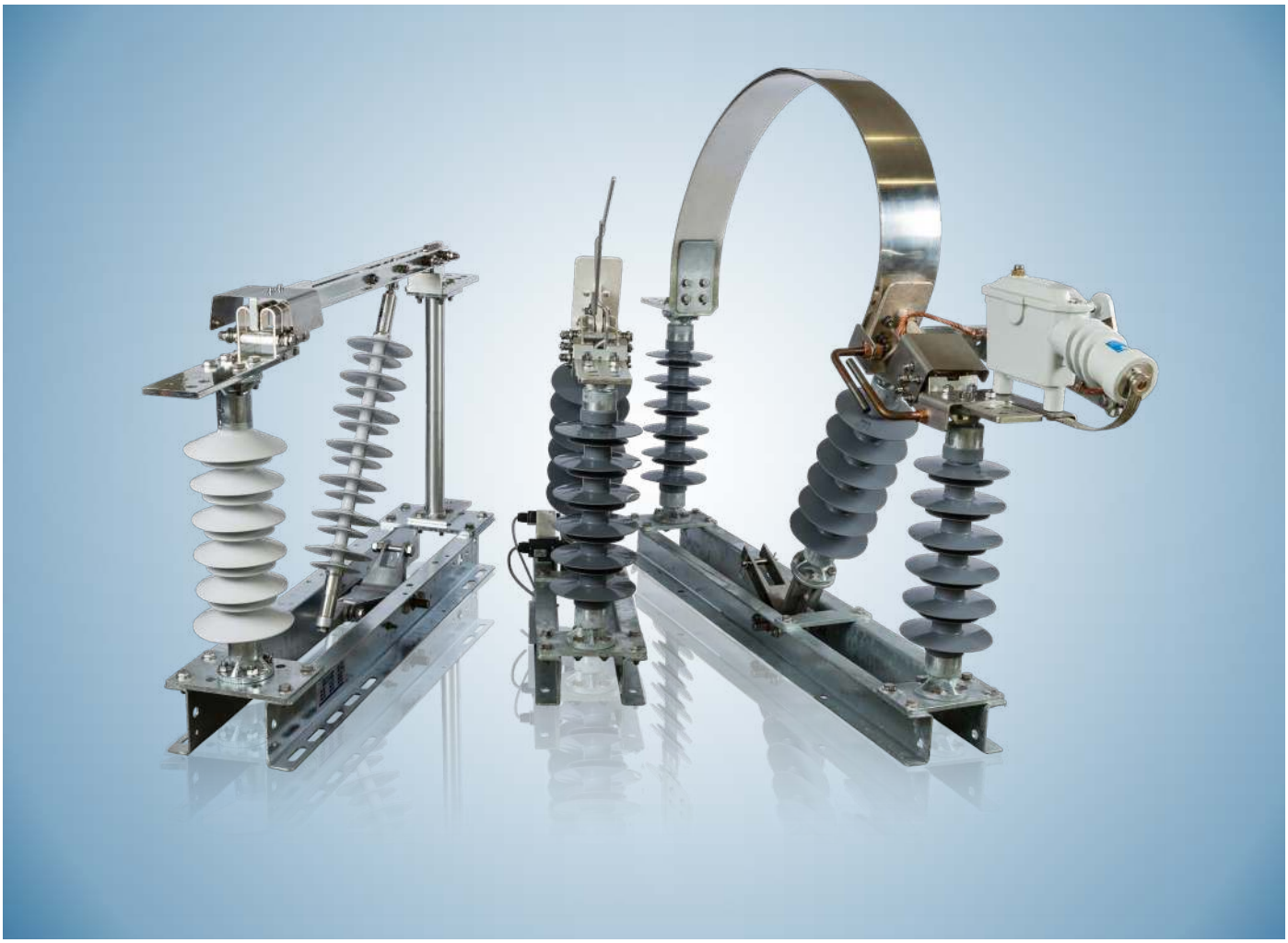
RAUSCHER STOECKLIN



Railway Electrification

Switching Devices Swiss Engineered

Our switching devices

Reliable operations at every weather

Table of Contents

Long tradition
Firmly anchored in Switzerland

Electricity is one of the most important sources of energy and driving forces of modern society.

With almost a century of experience, we are the right partner for high-quality electrotechnical products and systems for energy distribution.

Our product portfolio

- Transformers
- Railway switches
- High-current connectors
- House service connection systems
- Switchgear

Because of our flexibility and urge towards innovation, we are a reliable partner, capable of solving all challenges presented to us by our customers. With our high-quality electrotechnical products and sustainable, innovative solutions we are a trusted partner to our customers. Experienced long-term employees and junior employees with the will and ambition to continuously learn are the foundation of our company.

Our company is certified to all established standards.

Our production site in Sissach

More safety, more flexibility

Rauscher & Stoecklin - a company of the R&S Group

The companies of the R&S have a long-standing history and experience in manufacturing power products with the ambition for improvement and innovation.

The R&S Group, founded in 2012 is an international oriented Group with its headquarters in Sissach, Switzerland and offices worldwide.

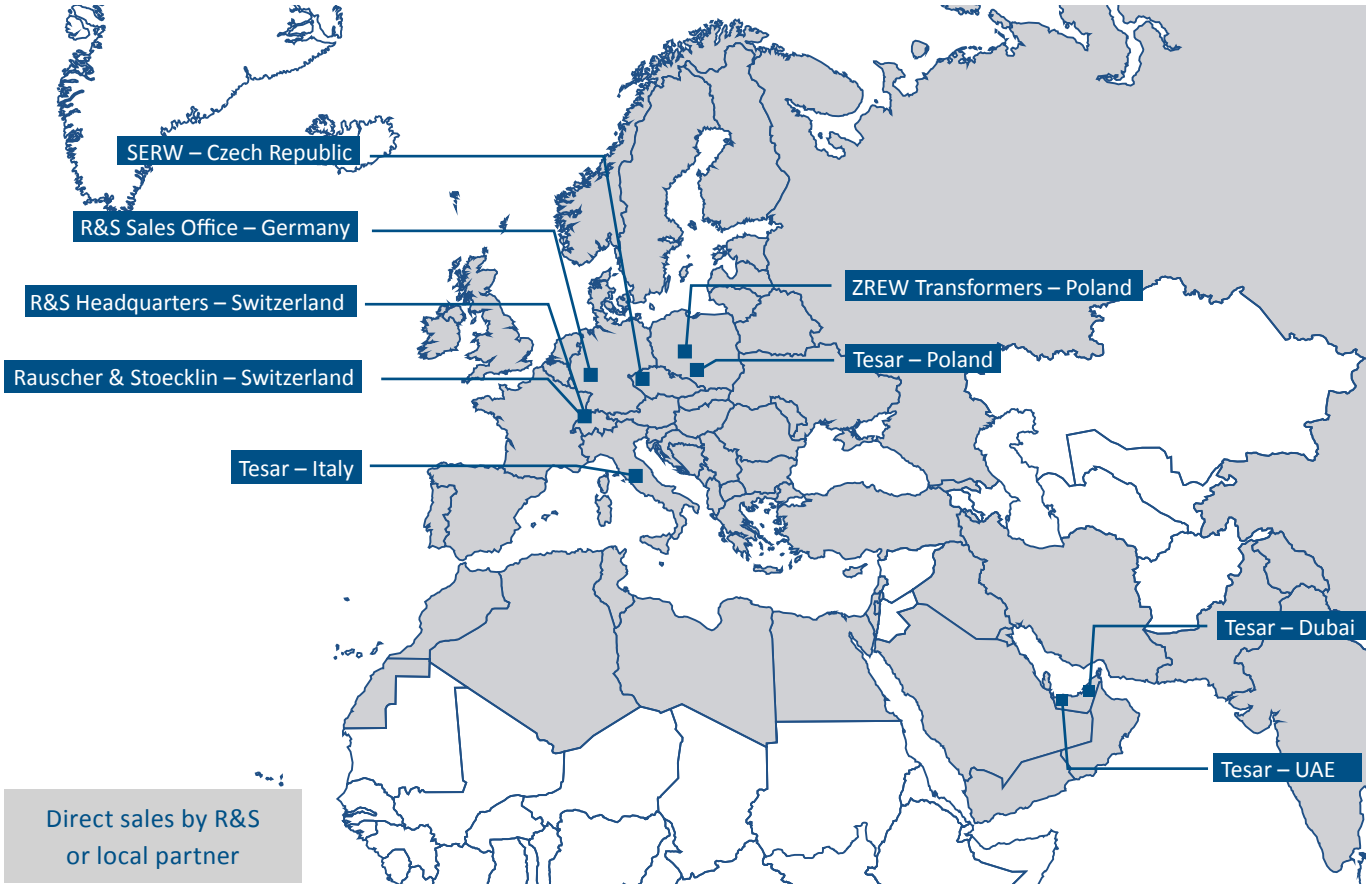
The success of the R&S is built upon:

- Longtime experience of the different companies in their particular core competencies
- Highly motivated and trained employees
- Products based on proven technologies that go hand in hand with innovative and efficient manufacturing processes

The results are products with highest possible quality and reliability for our customers.

Companies of R&S

- Rauscher & Stoecklin
  Distribution transformers, railway switches, high current connectors
- SERW
  HV and MV switching devices
- ZREW Transformers
  Power transformers
- Tesar
  Cast resin transformers, distribution transformers, instrument transformers



Our offices worldwide

Railway electrification

Everything from a single source

Complete solution consisting of overhead line (OHL) switches, Actuation drives and force transmission systems.

General

Rauscher & Stoecklin offers a full range of switching devices for overhead line equipment for electric traction systems at AC voltages of 15kV and 25kV.

Depending on the requirement, complete systems or single can be delivered.

Customized solutions

If standard solutions cannot meet all requirements, customer-specific solutions are made upon request.

Therefore a broad range of standardized options are available. Furthermore new developments of customer or project tailored solutions are currently made with the direct involvement of the customer, in order to achieve the perfect solution. Rauscher & Stoecklin has extensive expertise and a large list of reference projects in this area.

Our Switchgear on a portal in Winterthur

Switching devices overview

Combined switching devices

The Rauscher & Stoecklin is capable of offering different kinds of combined switching devices.

OHL switch

The OHL switches are used to isolate and commute overhead line sections in railway systems with an alternating voltage up to 25 kV.

Force transmission system

The force transmission system - the rod assembly or flexball - transmits the movement / force applied by the motor dirve / manual handle to the OHL switch.

Actuation device

The actuators - motor drives or manual handle - provide the necessary force for the operation of the switch.

Installation options

A solution for each application

Mast

Portal

Tunnel

Two-pole operation

Customized solutions

Project specific versions

On request, Rauscher & Stoecklin has developed a load-break switch with current transformer. As a result, the currents occurring across the overhead line can be measured at any time.

Our high flexibility allows us to exchange entire components in a project-specific manner and to equip them with the perfect materials for the applications. In this case, special insulators have been used.

The Rauscher & Stoecklin also offers „intelligent“ motor drives. These are developed according to the customer‘s requirements and include various monitoring and control functions.

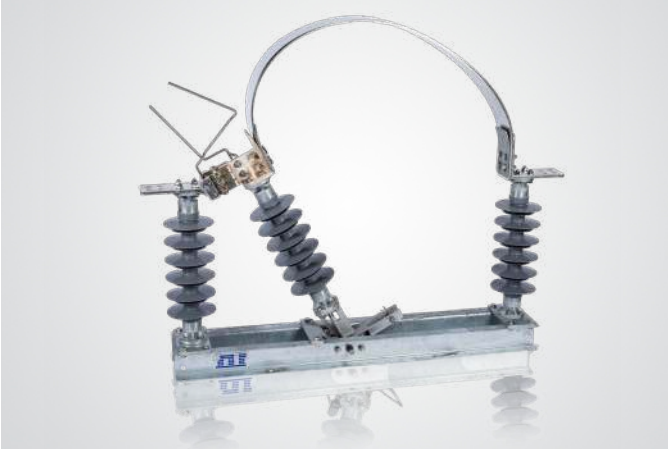
Product Overview

OHL switches

The Rauscher & Stoecklin portfolio is constantly growing to meet all new customer requirements.

The range of our products includes OHL switches from disconnectors for electrical and visible isolation of de-energized sections, load-break switches for switching on and off under load, earthing switches for the safe and reliable earthing of a de-energized sections as well as maintenance switches for further safety measures.

With a comprehensive range of switching devices for 15kV or 25kV, Rauscher & Stoecklin can always offer the right solution for the electrification of railway systems.



Disconnector

Load-break switch

Earthing switch

Maintenance switch

Actuation devices and force transmission systems

Continuous development and optimization make the Rauscher & Stoecklin products the most reliable switchgear on the market.

Our OHL switches can be reliably actuated with the associated device. Whether manual handle or motor drive; Rauscher & Stoecklin offers various options and customer-specific designs.

A rod assembly or a flexible solution (Flexball®) is recommended for the transmission of force between the actuation device and the switch, depending on the spatial conditions.

Motor drive

Operating rod assembly

Manual Handle

Flexball

Standards and typetest

Compliance with all relevant standards

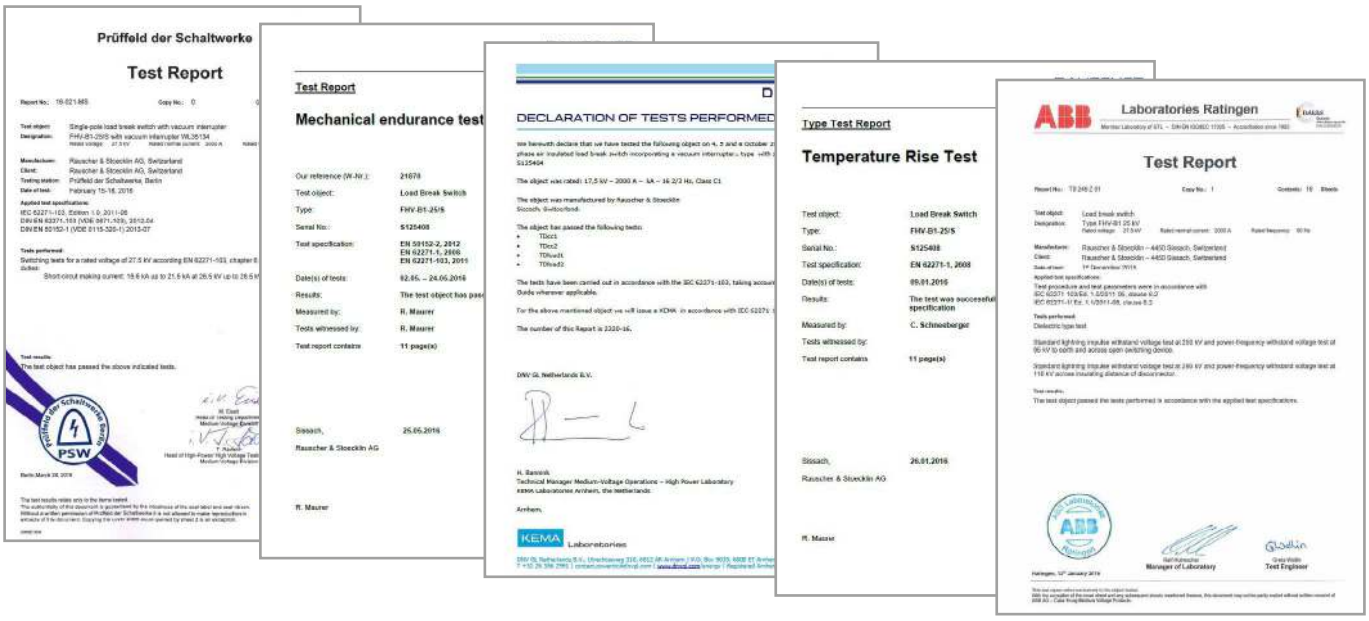
All products are tested according to important national and international testing procedures.

Standards	
EN 50152-2	Railway applications - Fixed installations - Particular requirements for alternating current switchgear - Part 2: Disconnectors, earthing switches and switches with nominal voltage above 1 kV
IEC 62505-2	Railway applications - Fixed installations - Particular requirements for a.c. switchgear - Part 2: Single-phase disconnectors, earthing switches and switches with Un above 1 kV
IEC 62271-1	High-voltage switchgear and controlgear - Part 1: Common specifications
IEC 62271-102	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches
IEC 62271-103	High-voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV
IEC 62497-1	Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment

Standards that need to be upheld

Type tests

- Dielectric strength test
- Short circuit making current test
- Making/breaking of rated current tests
- Short time current test
- No load open and close test
- Continuous current test (Temperature rise)
- Primary circuit resistance measurement test
- Electrical and mechanical tests



Certification

Labeling of our products

In order to meet the requirements of our customers, all switching devices must fulfill various quality criteria.

ISO certification

The quality and environmental management system of Rauscher & Stoecklin has been certified according to the standards ISO 9001: 2015, OHSAS 18001: 2007 & ISO 14001: 2015.

SQS

Certificate

SQS herewith certifies that the company named below has a management system which meets the requirements of the standards specified below.

Rauscher & Stoecklin AG
Reuslistrasse 32
4450 Sissach
Switzerland

Scope of certification

Whole Company

Field of activity

Electrotechnical components and systems

Normative basis

ISO 9001:2015	Quality Management System
ISO 14001:2015	Environmental Management System
OHSAS 18001:2007	Safety Management System

Scope(s) 19

Validity 26. 10. 2015 – 25. 10. 2018
Issue 26. 10. 2015

Reg. no. 11250

X. Edelmann, President SQS

R. Glauser, CEO SQS

Swiss Association for Quality and Management Systems SQS
Bernstrasse 103, 3052 Zollikofen, Switzerland

Partner of IQNet

CE

OHL switches

Various switches for each application

To meet every application requirements, various types of OHL switches are available.

Disconnector

A disconnector is a mechanical device which, in the open position, provides an isolating distance in accordance with the relevant standard. It is able to open and close an electric circuit as long as the current is negligible (up to 6A). A disconnector is also able to carry the rated current under normal circuit conditions and bear currents under ab-normal conditions (such as short-circuit) for a defined period.

Load-break switch

A load-break switch is a mechanical device which in the open position provides an isolating distance in accordance with the relevant standard. Futhermore it is able of making an fault for a limited numer of times (Class E3). It is able to open and close an electric circuit at the rated current under normal conditions. It also absorbs a limited number of activations for short circuit. A load-break switch is also able to bear currents under ab-normal conditions as well as under non-standard conditions (such as short-circuit power) for a specific period.

Earthing switch

An earthing switch is a mechanical device which reliably earths the isolated track sections. An earthing switch is also able to bear currents under ab-normal conditions (such as short-circuit) for a defined period of time.

Design
Standard designs

Since each railway network is designed in a different way worldwide, Rauscher & Stoecklin offers various designs to always meet the local needs. On request, two switches can be connected to a two-pole switch.

Design B1

The design-B1 is of rocker type with two fixed and one movable insulators, the latter ensuring the switching, whereas the former two, placed at the switch's extremities, support the terminals. The length variation is absorbed by flexible copper strips. The flat terminals allow various connections.

Design B2

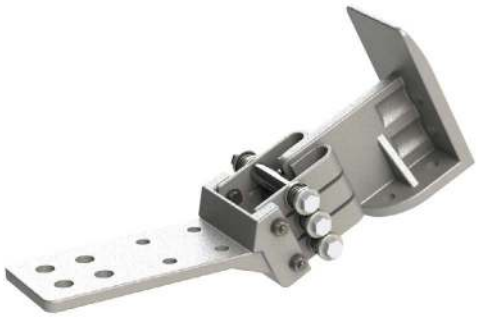
The design-B2 is of rocker type with one fixed and one movable insulator. The flat terminals allow different connections.

Design B3

The design-B3 is of knife type with two fixed insulators supporting the terminals, and one silicone rod insulator ensuring the switching procedure. The flat terminals allow various connections.

Characteristics

Reliability in every component



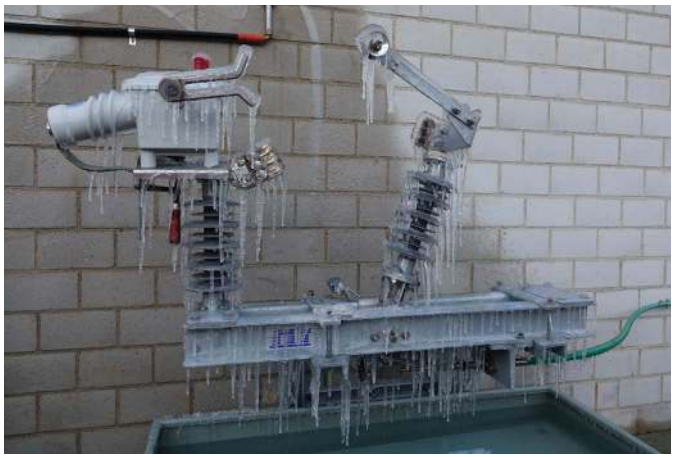
Contact system

Contact knife with silver graphite coating does not require any additional lubrication. Six curved contact fingers allow an optimal current distribution (large contact surface) and allow a vertical positioning without additional joint.

Vacuum chamber

The main component of the load-break switch is the vacuum chamber. The interruption of the current flow in vacuum allows the disconnection of high currents and voltages without arcing on the main contact.

The vacuum chamber is based on proven and tested vacuum switching tubes and a specially developed switching mechanism. In addition, the auxiliary contact system allows a safe switching process under any weather conditions.. The system is lifetime maintenance-free.



Silicone insulators

The silicone insulators have an extremely high bending stress load.

They are fully functional even during heavy icing and ensure a proper switching process.

Connection options

On request, Rauscher & Stoecklin produces adapted drilling patterns for the customer.

Rocking lever

The complete rocking lever is an aluminum cast part with a high strength. The rocking lever is stored in a lubricated bronze bearing, which is maintenance- and lubrication-free for a lifetime.

Lifting - eye nuts

The silicone insulators are equipped with a special lifting-eye nut, which makes transportation considerably easier.

Disconnector
Technical Data

Features and benefits

- All steel parts either in stainless steel or hot-dip galvanised
- Solid and stable base frame
- Minimal sag for the line-connection thanks to the two fixed terminals
- Fixing on the supporting structure either by clamps (free setting) or screws (holes in the base frame)
- Easy on-site installation and setting
- High reliability: up to 10’000 cycles
- All conducting parts either silver, nickel or tin-plated
- Practically maintenance-free

Lifetime		
Mechanical life	10’000	Cycles

Rated values		15kV	25kV	Unit
Nominal voltage	Un	15	25	kV
Rated insulation voltage (acc. to IEC 62497-1)	UNm	17.5	27.5	kV
Rated voltage (acc. to IEC 62271-1)	Ur	36	52	kV
Rated frequency	f	16.7	50	Hz
Rated normal current	Ir	2‘000	2‘000	A

Withstand values		15kV	25kV	Unit
1 - minute power frequency withstand voltage (dry & wet)	Ua			
A –To earth		70	95	kV
B – Across the isolating distance		95	110	kV
Impulse withstand voltage (1.2/50 µs)	UNi			
A – To earth		170	250	kV
B – Across the isolating distance		195	290	kV

Short-circuit current		15kV	25kV	Unit
Rated short time withstand current	Ik	40	31.5	kA
Rated peak withstand current	Ip	100	80	kA
Rated duration of short-circuit	tk	1	3	s

Making and breaking current		15kV	25kV	Unit
Breaking current at power factor 0.7	Ibreak	2	2	A
Making current at power factor 0.7	Imake	2	2	A
Breaking current at power factor 0.35	Ibreak	6	6	A

Environmental conditions		
Operating temperature	-30 to +40	°C
Relative humidity	100	%
Solar radiation	1‘000	W/m²
Operating altitude	1‘000	m above sea level
Icing	10	mm
Pollution degree (acc. to IEC 62497-1)	PD4B	
Wind speed	34	m/s

Technical modifications reserved

Load-break switch
Technical Data

Features and benefits

- All steel parts either in stainless steel or hot-dip galvanised
- Solid and stable base frame
- Minimal sag for the line-connection thanks to the two fixed terminals
- Fixing on the supporting structure either by clamps (free setting) or screws (holes in the base frame)
- Easy on-site installation and setting
- High reliability: up to 10’000 cycles
- All conducting parts either silver, nickel or tin-plated
- Practically maintenance-free

Rated values		15kV	25kV	Unit
Nominal voltage	Un	15	25	kV
Rated insulation voltage (acc. to IEC 62497-1)	UNm	17.5	27.5	kV
Rated voltage (acc. to IEC 62271-1)	Ur	36	52	kV
Rated frequency	f	16.7	50	Hz
Rated normal current	Ir	2‘000	2‘000	A

Withstand values		15kV	25kV	Unit
1-minute power frequency withstand voltage (50Hz, dry & wet)	Ua			
A – To earth		70	95	kV
B – Across the isolating distance		95	110	kV
Impulse withstand voltage (1.2/50µs)	UNi			
A – To earth		170	250	kV
B – Across the isolating distance		195	290	kV

Short-circuit-current		15kV	25kV	Unit
Rated short time withstand current	Ik	40	31.5	kA
Rated peak withstand current	Ip	100	80	kA
Rated duration of short-circuit	tk	1	3	s

Making and breaking current		15kV	25kV	Unit
Rated breaking current at power factor 0.7	Ibreak	2‘000	2‘000	A
Rated making current at power factor 0.7	Imake	2‘000	2‘000	A
Breaking current at power factor 0.35	Icc	10	10	A
Peak making current (duration 0.2s)	Ima	20	20	kA
Peak making current (by closing with pre-arcing horns)	Ima	32	32	kA

Environmental conditions		
Operating temperature	-30 to +40	°C
Operating altitude	1‘000	m above sea level
Icing	10	mm
Pollution degree (acc. to IEC 62497-1)	PD4B	

Lifetime		
Mechanical life	10‘000	Cycles
Rated short circuit (making on fault)	5	Times

Technical modifications reserved

Earthing switch
Technical Data

Features and benefits

- Compact design
- All steel parts either in stainless steel or hot-dip galvanised
- Solid and stable base frame
- Minimal sag for the line-connection thanks to the two fixed terminals
- Fixing on the supporting structure either by clamps (free setting) or screws (holes in the base frame)
- Easy on-site installation and setting
- All conducting parts either silver, nickel or tin-plated
- Practically maintenance-free

Rated values		15kV	25kV	Unit
Nominal voltage	Un	15	25	kV
Rated insulation voltage (acc. to IEC 62497-1)	UNm	17.5	27.5	kV
Rated voltage (acc. to IEC 62271-1)	Ur	36	52	kV
Rated frequency	f	16.7	50	Hz
Rated normal current	Ir	2‘000	2‘000	A

Withstand values		15kV	25kV	Unit
1 minute power frequency withstand voltage (dry and wet)	Ua			
A – To earth		70	95	kV
B – Across the isolating distance		95	110	kV
Impulse withstand voltage (1.2/50 µs)	UNi			
A – To earth		170	250	kV
B – Across the isolating distance		195	290	kV

Short-circuit-current		15kV	25kV	Unit
Rated short time withstand current	Ik	40	31.5	kA
Rated peak withstand current	Ip	100	80	kA
Rated duration of short-circuit	tk	1	3	s

Making and breaking current		15kV	25kV	Unit
Peak making current (Standard, class E0)		0	0	kA
Peak making current (by closing with pre-arcing horns)	Ima	32	32	kA

Environmental conditions		
Operating temperature	-30 to +40	°C
Relative humidity	100	%
Solar radiation	1‘000	W/m²
Operating altitude	1‘000	m above sea level
Icing	10	mm
Pollution degree (acc. to IEC 62497-1)	PD4B	
Wind speed	34	m/s

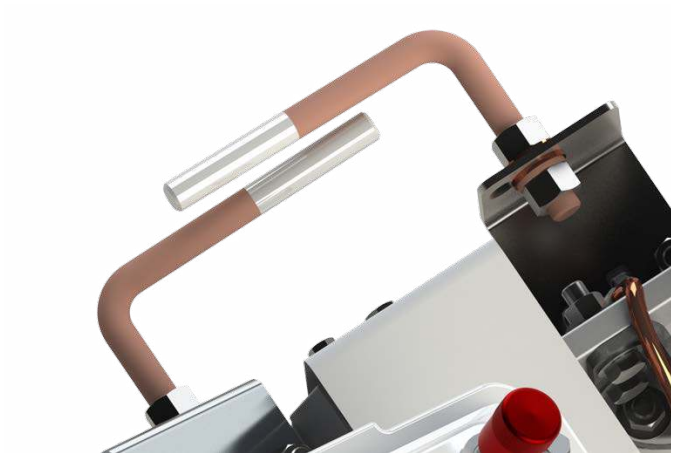
Lifetime			
Mechanical life		10‘000	Cycles
Peak making current	Ima	0	Ein
Peak making current (by closing with pre-arcing horns) Class E2	Ima	5	Ein

Technical modifications reserved

Options

Status indication

The status indication gives information about the precise position of the switch



Pre arcing horns

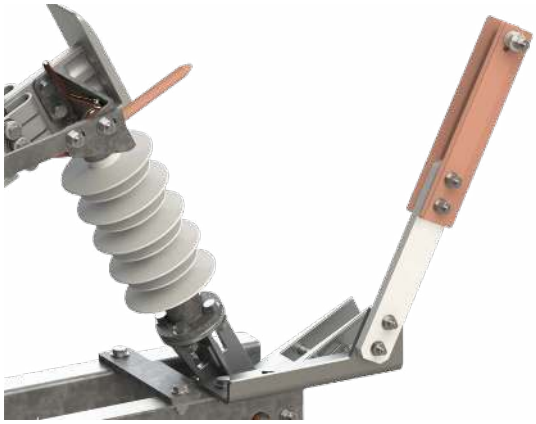
The optional pre arcing horns (for load-break and earthing switch) increase the peak making current to 32kA (E3)

Horizontal flexball actuation

On request special solution for horizontal actuation with flexball.

Clamps

Mounting bracket for easy and fast assembly of OHL switches. Switches can be flexibly moved in the longitudinal direction.



Forced earthing

Earthing knife for more safety

Current transformer

Monitoring component for a reliable current measurement anytime

Actuation devices

Rauscher & Stoecklin offers a wide range of acutation devices systems to meet all customer requirements.

Motor drive MFL

The motor drive MFL is used for the electrical actuation and control of the OHL switches. The thrust or pulling force acting on the rod assembly or the flexible connection (Flexball®) is generated by a motor-driven spindle. The MFL is usually mounted in the lower area of the OHL mast. Particular customer solutions can be realized especially for specific projects in a short time.

Motor drive MDR3

The MDR3 motor drive is used to safely and reliably actuate and control the OHL switches. The thrust or pulling force acting on the rod assembly or the flexible link (e.g., Flexball®) is generated by a transmission motor and transmitted to the drive lever.

The MDR3 is usually mounted in the lower part of the pole.

Manual handle

The manual handle is used for the manual actuation of OHL switches.

Installation possibilities

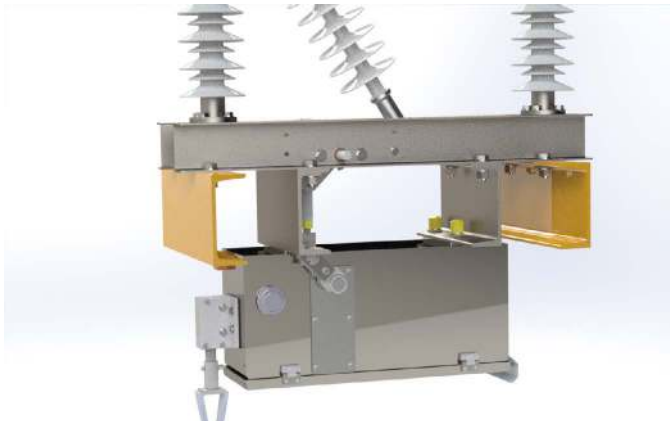
A variety of mounting options extend the application area of our actuation devices.

Standard installation

Mounting on traverse

Flexball

Motor drive MFL with flexball bracket



Customized solution

We are using the in-depth know-how in railway electrification to develop new solutions. Hereby our customer could do without a rod assembly by installing the motor drive directly under the OHL switch.

Motordrive MFL & MDR3

Motor drive for overhead line switch

Benefits

- Compliant – According to IEC 62505-2 and IEC 62271-1
- Weather-proof – Protection degree IP 54 according to EN60529:1991
- Failure safe – Motor protected against overheating
- Durable – Corrosion Category C4 according to DIN EN ISO 12944-2
- Robust – highest rating against mechanical impact (IK 10 up to 20 Joules) according to IEC 62262:2002 / IEC 62271:2007
- Application-oriented – Cable inlets (M25x1.5)
- Easy and fast installation – Enclosure with four screws
- Always ready – Emergency crank handle in case of power outage

Electrical data	MFL	MDR3	Unit
Operational voltage	230 AC 110 DC	230 AC 110 DC	V
Control voltage	230 AC 110 DC	230 AC 110 DC	V
Frequency range	16.7 - 60	50	Hz
Electricity demand during a half cycle (on or off)	3	3	A
Power input	300	300	W
Nominal current input during switching operation	3-7	3-7	A
Max. initial current	11	11	A
Safety limit switch for hand operation	√	√	
Voltage auxiliary contact	48 DC	48 DC	V
Potential-free contacts (NO/NC)	1x each	6x each	
Impulse signal	√	√	

Mechanical data	MFL	MDR3	Unit
Dimensions	See drawing	See drawing	
Outside lever rotation angle (from open to close)	90	90	°
Stroke	120/190	125/148/190	mm
Torque output		400	Nm
Mechanical life	>10‘000	>10‘000	Cycles
Operating time (depending on mechanical load and voltage tolerance)	3-7	3-7	s
Weight	35	33	kg

Construction characteristics	MFL	MDR3	Unit
Protection degree	IP 54	IP 54	
Protection degree against mechanical damage	IK 10	IK 10	
Emergency crank handle	√	√	
No sharp edges	√	√	
No damage in case of defect limit switches	√	√	
Ambient temperature	-30 ... +50	-30 ... +50	°C
Connection area to clamps	≥ 20	≥ 20	mm
Maintenance	free	free	

Technical modifications reserved

Options

Operational voltages: • 230 V DC • Customized versions	On request
Control voltages: • 24 V DC • 48 V DC • 60 V DC • 220 V DC • 230 V AC	On request
Local electrical operation • Main switch • Customized control panel	On request
Heating • With thermostat • With thermo-hygrostat • Continuous heating (remote control ON/OFF)	On request
Mechanical counter of switching cycles	On request
Door switch (signal transmitter)	On request
Customized stroke: 120 bis 200mm	On request
Permanent signal	On request

Technical modifications reserved

Counter

Heating

Characteristics

Reliable

- End positions
  - Very precise and load-independent end positions
- IP54
  - For adequate protection against dust and water

Assembly

- Low weight
  - Weight: 33 kg
- Transport by only one person possible
  - Customized connection plates

Safety

- Emergency crank handle
  - Can be used at any time in case of power outage
- Motor protection switch
  - Prevent from switching in case of excessive heating
- Grounding lugs included by default

Force transmission system
Technical data

Rod assembly

The force transfer from the motor drive or manual handle to the OHL switch is effected by means of a rod assembly. Rauscher & Stoecklin‘s rod assembly is tailored to the different actuating devices and takes part in quality and longevity of the entire system. Depending on the situation, the Operating rod assembly can be preassembled and adapted to the various conditions. The fixed Operating rod assembly can be installed quickly and easily and allows straightforward transmission of force for distances up to 10 meters.

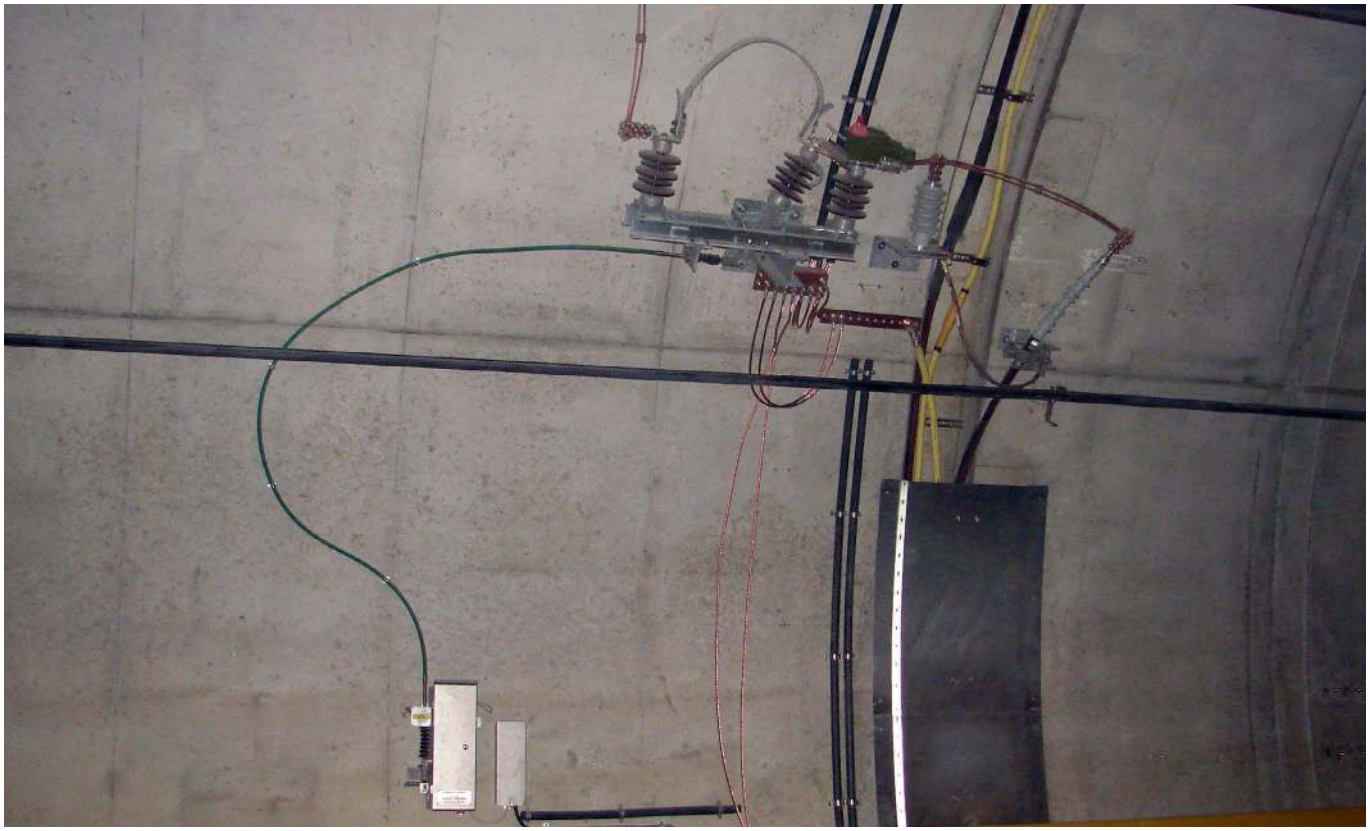
Two-pole

When limited space conditions or special customer requirements ask for a two-pole solution - a two-pole connection element can be used (enabling actuation with a single motor drive).

Flexball

Whenever space requirements limit the use of conventional rods (e.g. in tunnels or at ports), Flexball® provides the perfect solution for transferring power from the drive to the OHL switch.

Application examples



SBB Flexball assembly - SBB Dulliken 8-10-13 Flexball experiment

Operating rod assembly with drive

Operating rod assembly

The simple and robust force transmission

Advantages

- Simple - quick and easy installation on metal poles
- Maintenance-free, no lubrication required
- Custom-fit - passive sideways offset by cranked push rod

Technical requirements	
Length	6 to 10m, in meter steps
Contact travel	up to 200mm (longest required stroke)
Adjustment (top)	ca. 1000mm (along top steel pipe)
Adjustment (bottom)	ca. 50mm
Maximum load	8000N (maximum force of the motor drives)
Load switching operation	ca. 3500N (pull/push, two-pole)
Operating temperatures	-30 to +40°C
Relative humidity	100%
Sunlight	1‘000W/m²
Altitude	1‘000m above sea level
Icing	10mm
Pollution degree	PD4B
Wind speeds	34m/s
Mechanical life	10‘000 cycles
Standard	EN 50152-2

Technical modifications reserved

Pipe guide

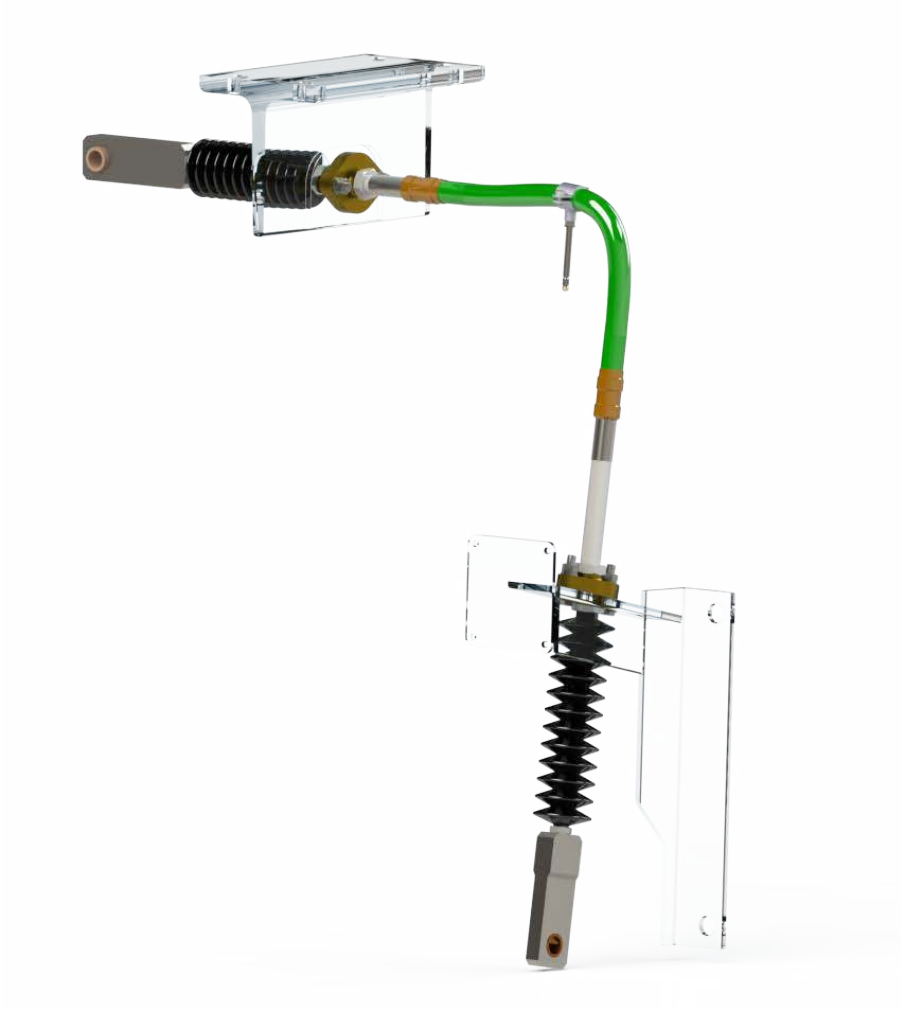
Optionally a pipe guide with rollers is available.

Transportation

Few items allow easy transportation.

Flexball®

The flexible force transmission



Advantages

- Durability – stainless steel inner components
- Easy to use – convenient installation, also on uneven surfaces
- Maintenance-free – no maintenance or lubrication required
- Reliable – temperature-resistant and versatile
- Flexible – can be laid spatially on three levels (bending radii up to 180° in only one loop)

Technical specifications		
Efficiency	%	90 - 97
Maximum permissible load (tensile force)	N	10‘000
Maximum permissible load (pressure force)	N	2‘500
Minimum laying radius	mm	200
Elastic deformation per m at 100N load	mm	0.05
Temperature range	°C	-50 to +120

Technical modifications reserved

Brackets load-break switch FHV

Brackets motor drive MDR3

Order information

Disconnector

Type	Description	Article-No.
FHF-B1-25/S	Disconnector 25 kV with silicone insulators	22257
FHF-B1-15/S	Disconnector 15 kV with silicone insulators	22258
FHF-B2-25/S	Disconnector 25 kV with silicone insulators	22259
FHF-B2-15/S	Disconnector 15 kV with silicone insulators	22057
FHF-B3-25/S	Disconnector 25 kV with silicone insulators	18370
FHF-B3-15/S	Disconnector 15 kV with silicone insulators	20711

Load-break switch

Type	Description	Article-No.
FHV-B1-25/S	Load-break switch 25 kV with silicone insulators	21870
FHV-B1-15/S	Load-break switch 15 kV with silicone insulators	21869
FHV-B2-25/S	Load-break switch 25 kV with silicone insulators	22246
FHV-B2-15/S	Load-break switch 15 kV with silicone insulators	22254
FHV-B3-25/S	Load-break switch 25 kV with silicone insulators	19512
FHV-B3-15/S	Load-break switch 15 kV with silicone insulators	20714

Earthing switch

Type	Description	Article-No.
FHE-B3-15/S	Earthing switch 25 kV with silicone insulators	21477
FHE-B3-25/S	Earthing switch 15 kV with silicone insulators	19300
FHE-B2-25/S	Earthing switch 25 kV with silicone insulators	21868
FHE-B2-15/S	Earthing switch 15 kV with silicone insulators	21830

Accessories

Options	Description	Article-No.
Status indication	The status indication gives information about the precise position of the switch	On request
Forced earthing	Earthing knife for more safety	
Porcelain insulators	For specific applications or regions	
Horizontal flexball actuation	On request special solution for horizontal actuation with flexball	
Pre arcing horns	The optional pre arcing horns (for load-break and earthing switch) increase the peak making current to 32ka (E3)	
Current transformer	Monitoring component for a reliable current measurement anytime	
Clamps	Mounting bracket for easy and fast assembly of OHL switches. Switches can be flexibly moved in the longitudinal direction.	

Technical modifications reserved

Motordrive MDR3 & MFL

Type	Description	Article-No.
MDR3 230A - 230A-61-V00	Motor drive MDR3 with remote control and local operation, Multihub (125mm, 148mm, 190mm), operational voltage of 230 V AC, control voltage of 110 V DC	22572
MDR3 110D – 110D-61-V00	Motor drive MDR3 with remote control and local operation, Multihub(125mm, 148mm, 190mm), operational voltage of 110 V DC, control voltage of 110 V DC	22384
MDR3 110D – 110D-61-V10	Motor drive MDR3 with remote control and local operation, Multihub (125mm, 148mm, 190mm), operational voltage of 110 V DC, control voltage of 110 V DC, heating with thermostat	22385
MFL 250-230A1-101	Motor drive with remote electrical and local manual operations, operational voltage of 230 V AC, control voltage 230 V AC	17450

Manual handle

Type	Description	Article-No.
Manual handle	for manual operation	13157

Operating rod assembly

Type	Description	Article-No.
Operating rod assembly	Up to 6m without lower adjustment	22994
Operating rod assembly	Up to 6m with lower adjustment	22995
Operating rod assembly	Up to 10m without lower adjustment	22996
Operating rod assembly	Up to 10m with lower adjustment	22997
Two-pole		On request

Flexball

Type	Description	Article-No.
According to customer request	Customer-specific Flexball® set (type, stroke and length according to customer request)	17652

Accessories

Options	Articel-No.
Heating with thermostat/with thermo-hygrostat	
Continuous heating (remote control ON/OFF)	
Local electrical operation	
Several auxiliary contacts	
Multihub (120-190 mm)	On request
Special Hub	
Door switch (signal transmitter)	
Mechanical counter of switching cycles	
Lock device	

Drawings

Disconnector

Disconnector B1

Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	870	1255	mm
Operating stroke	120	180	mm
Weight	62	68	kg

Disconnector B2

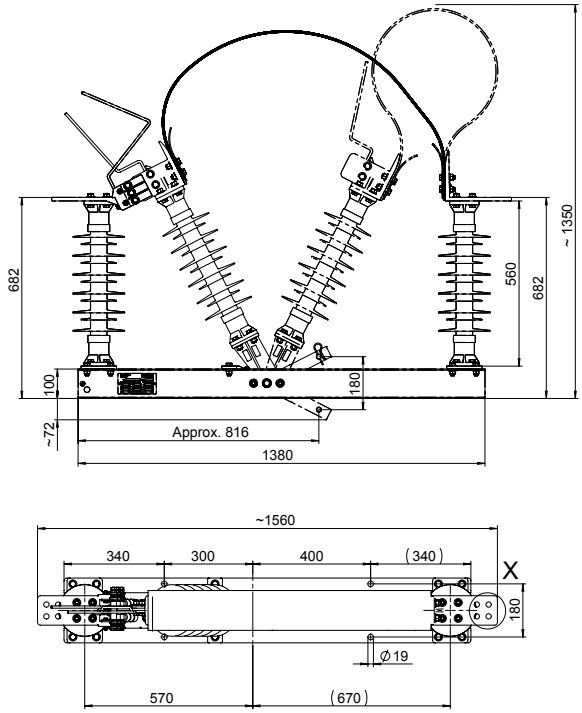
Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	870	1255	mm
Operating stroke	120	180	mm
Weight	34	43	kg

Disconnector B3

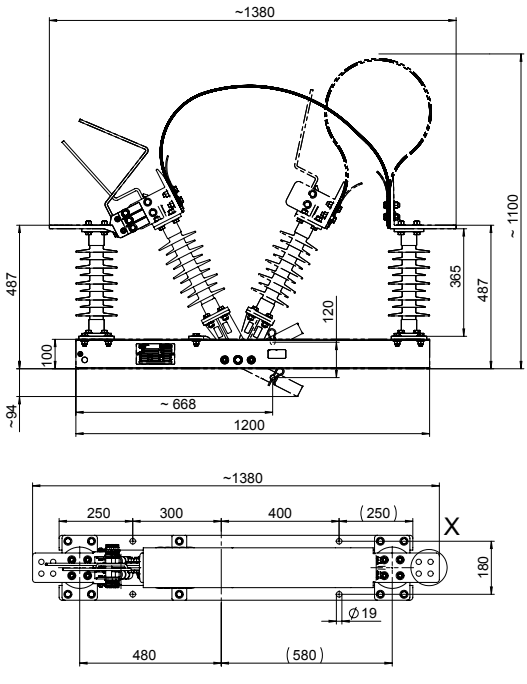
Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	715	1255	mm
Operating stroke	120	180	mm
Weight	42	68	kg

Technical modifications reserved

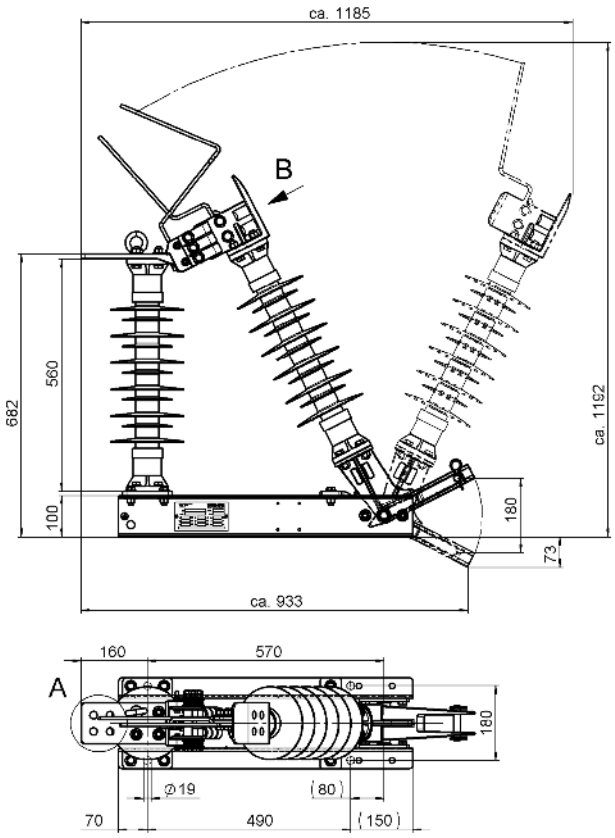
FHF B1 25/5



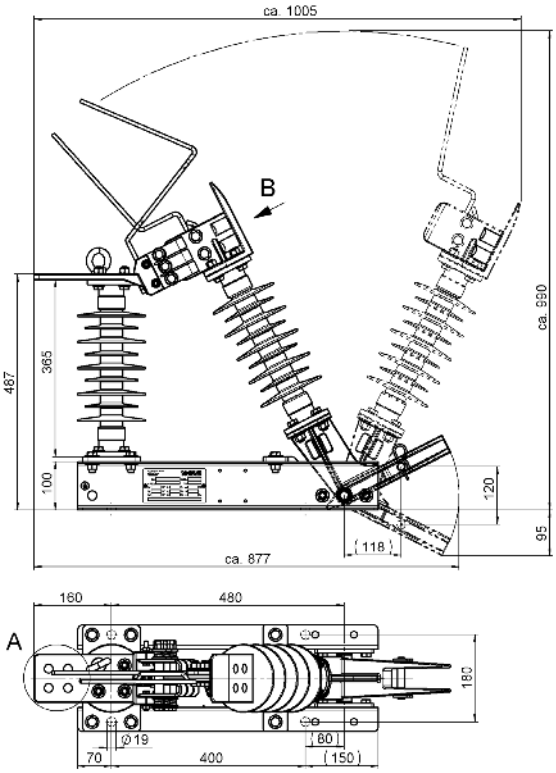
FHF B1 15/5



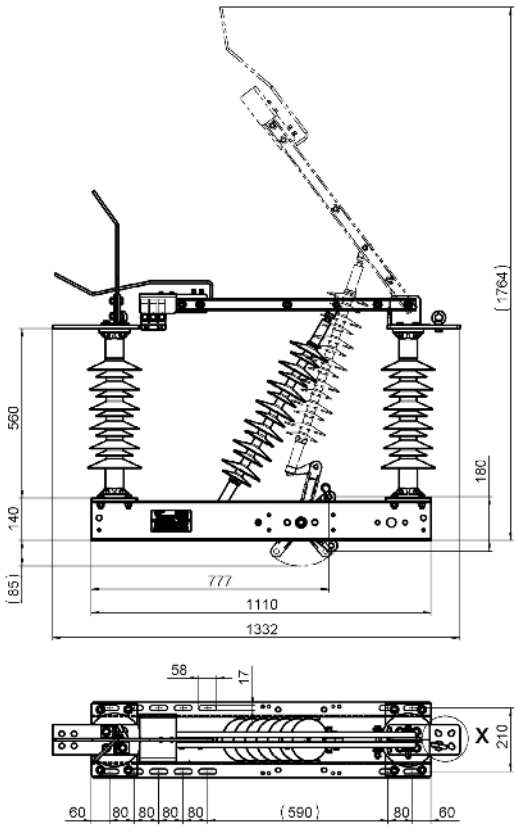
FHF B2 25/5



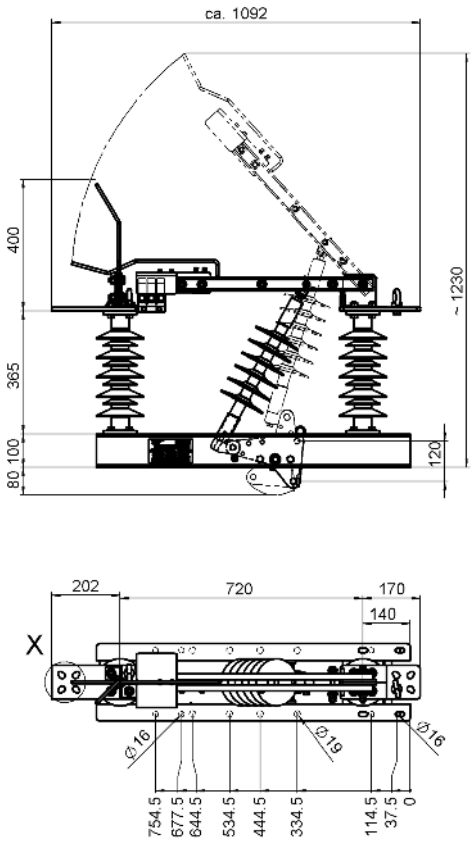
FHF B2 15/5



FHF B3 25/5



FHF B3 15/5



Load-break switch

Load-break switch B1

Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	870	1255	mm
Operating stroke	120	180	mm
Weight	62	68	kg

Load-break switch B2

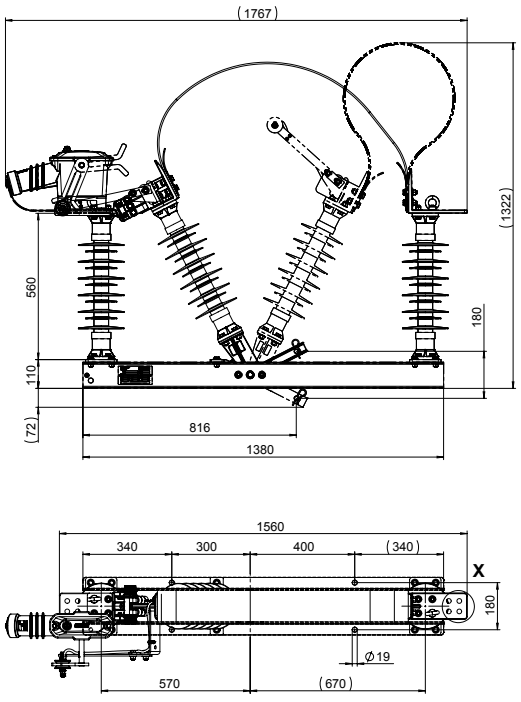
Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	870	1255	mm
Operating stroke	120	180	mm
Weight	52	54	kg

Load-break switch B3

Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	715	1255	mm
Operating stroke	120	180	mm
Weight	50	78	kg

Technical modifications reserved

FHV-B1-25/S



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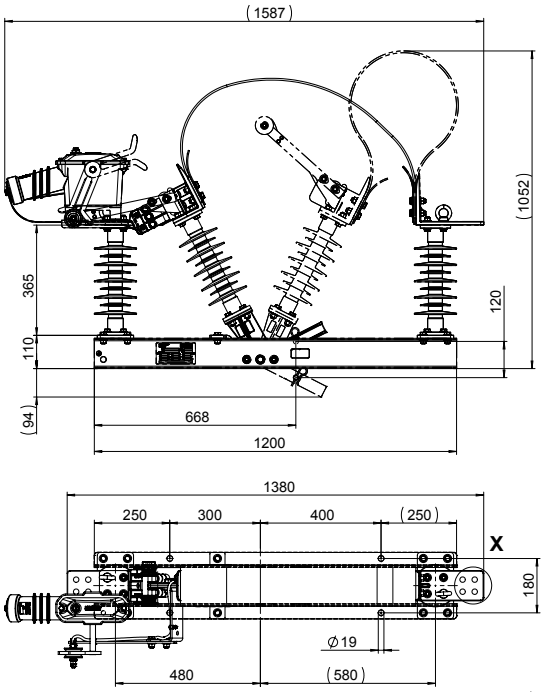

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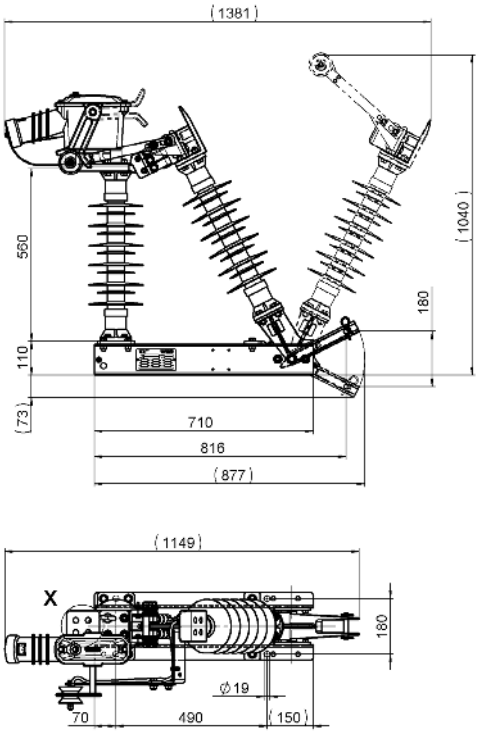

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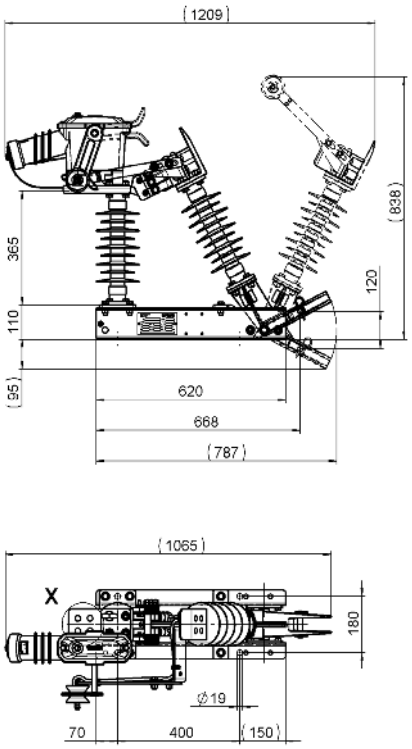

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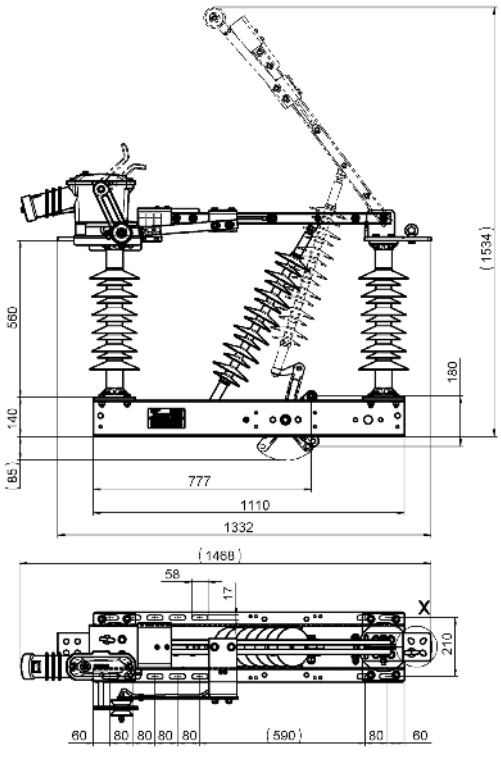

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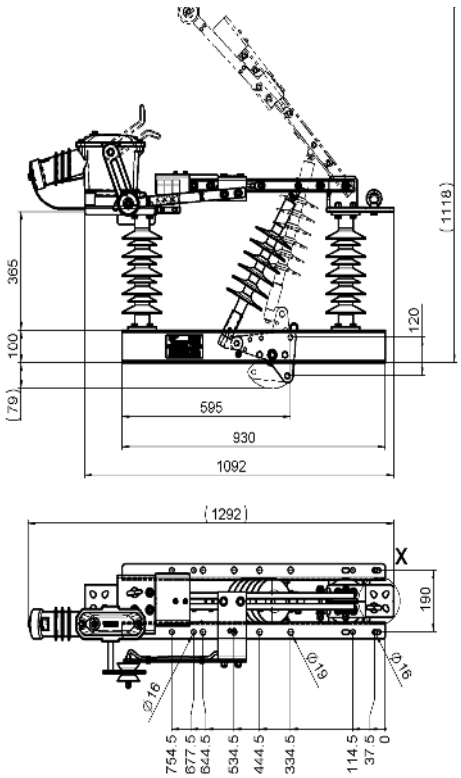


Earthing switch

Earthing switch B2

Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	870	1255	mm
Operating stroke	120	180	mm
Weight	32	36	kg

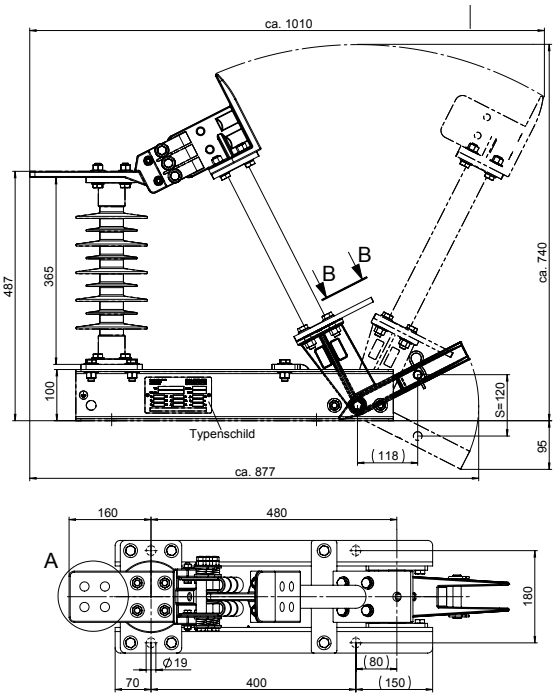
Technical modifications reserved

Earthing switch B3

Geometry	15kV	25kV	Unit
Minimum creepage distance (silicone insulators)	715	1255	mm
Operating stroke	120	180	mm
Weight	50	78	kg

Technical modifications reserved

FHE-B2-25/S



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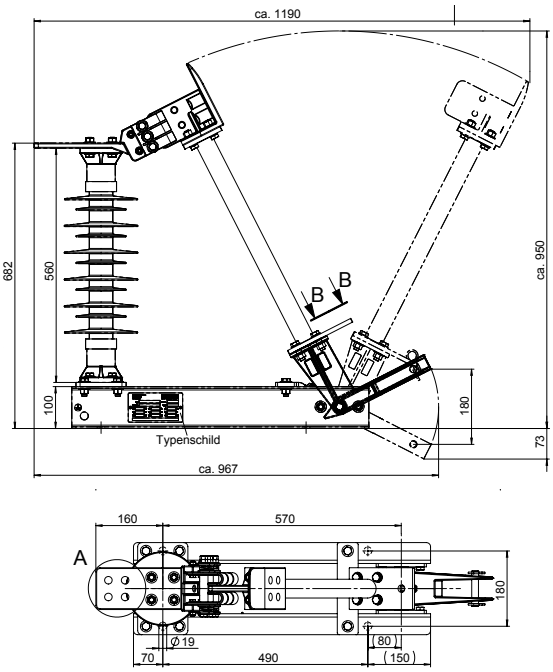

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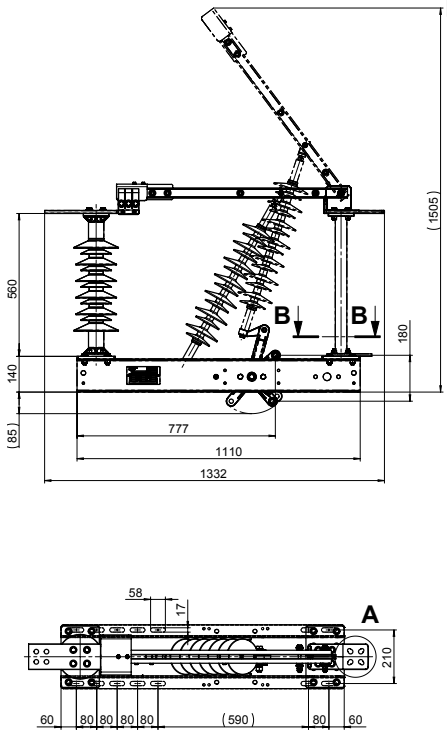

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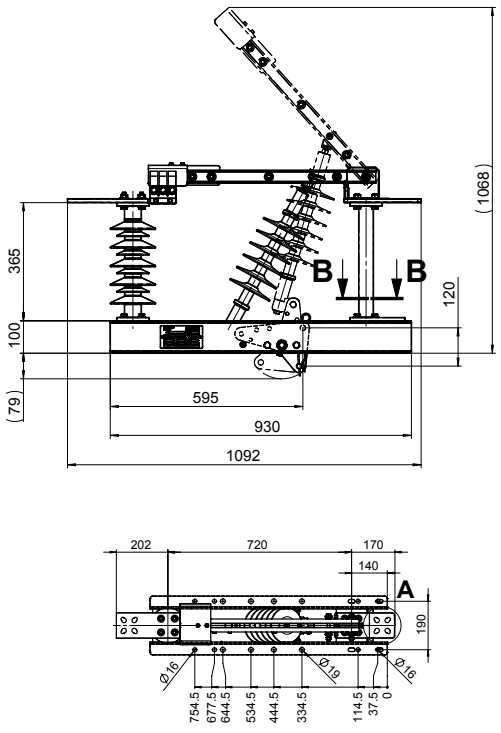
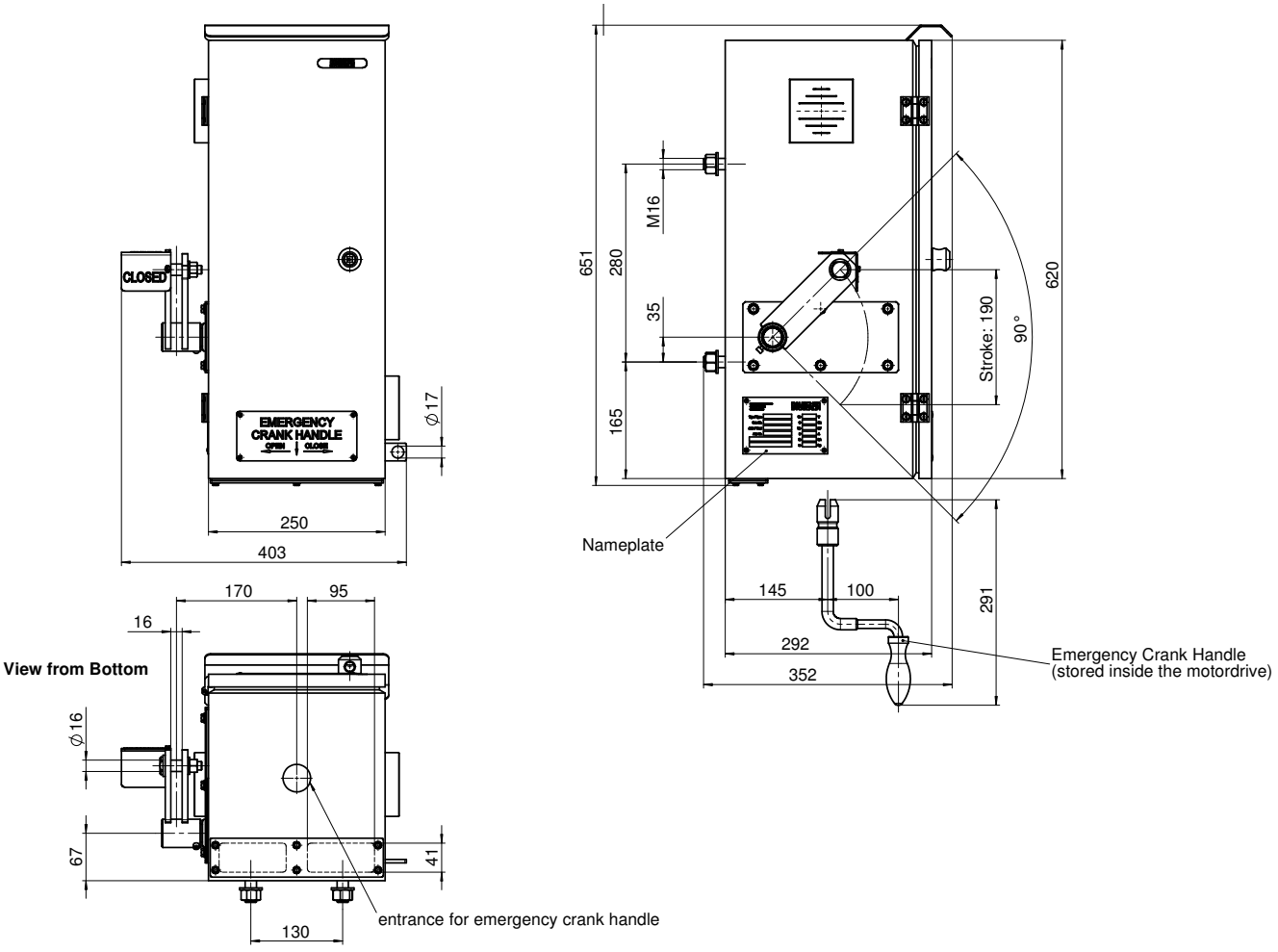
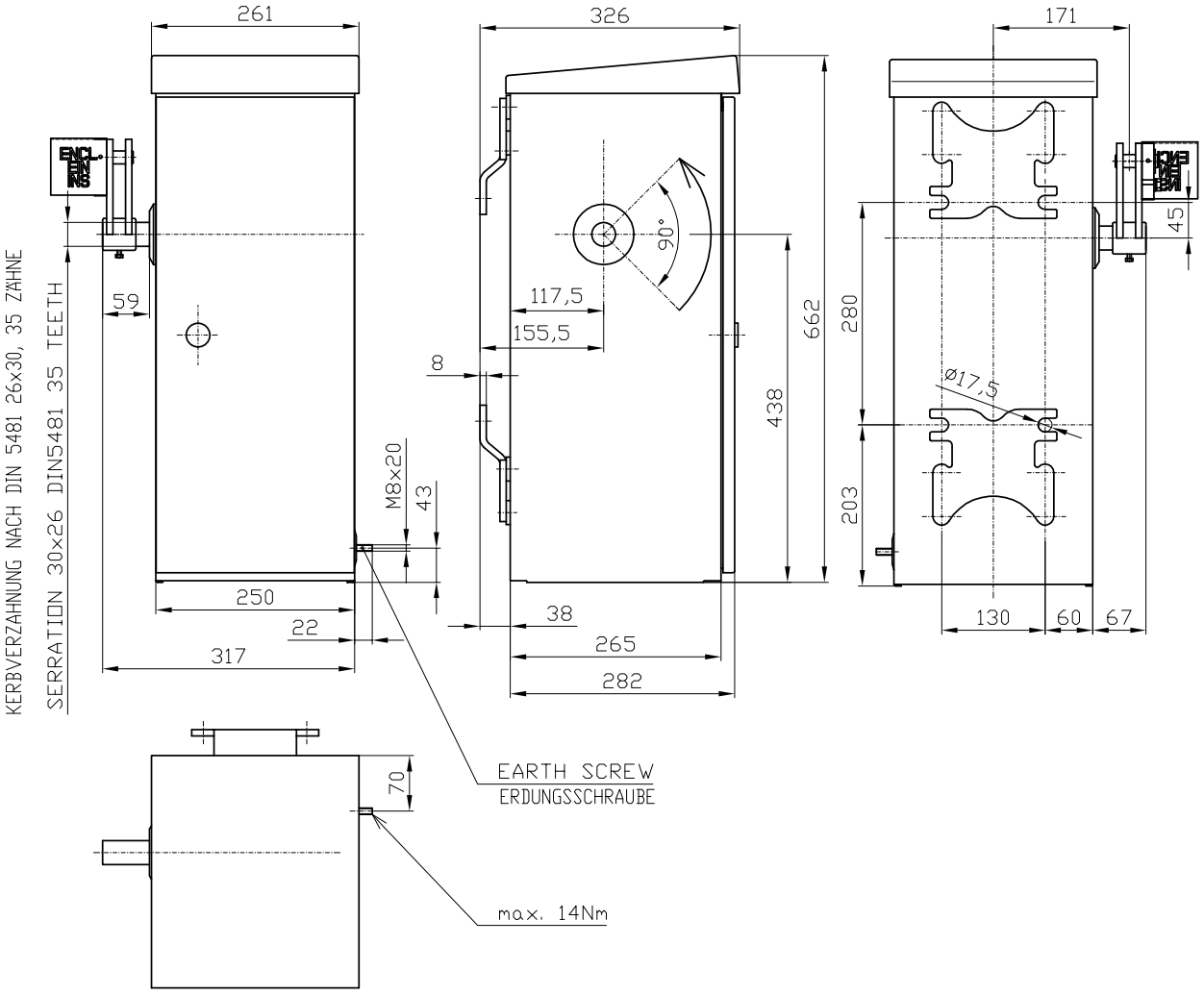


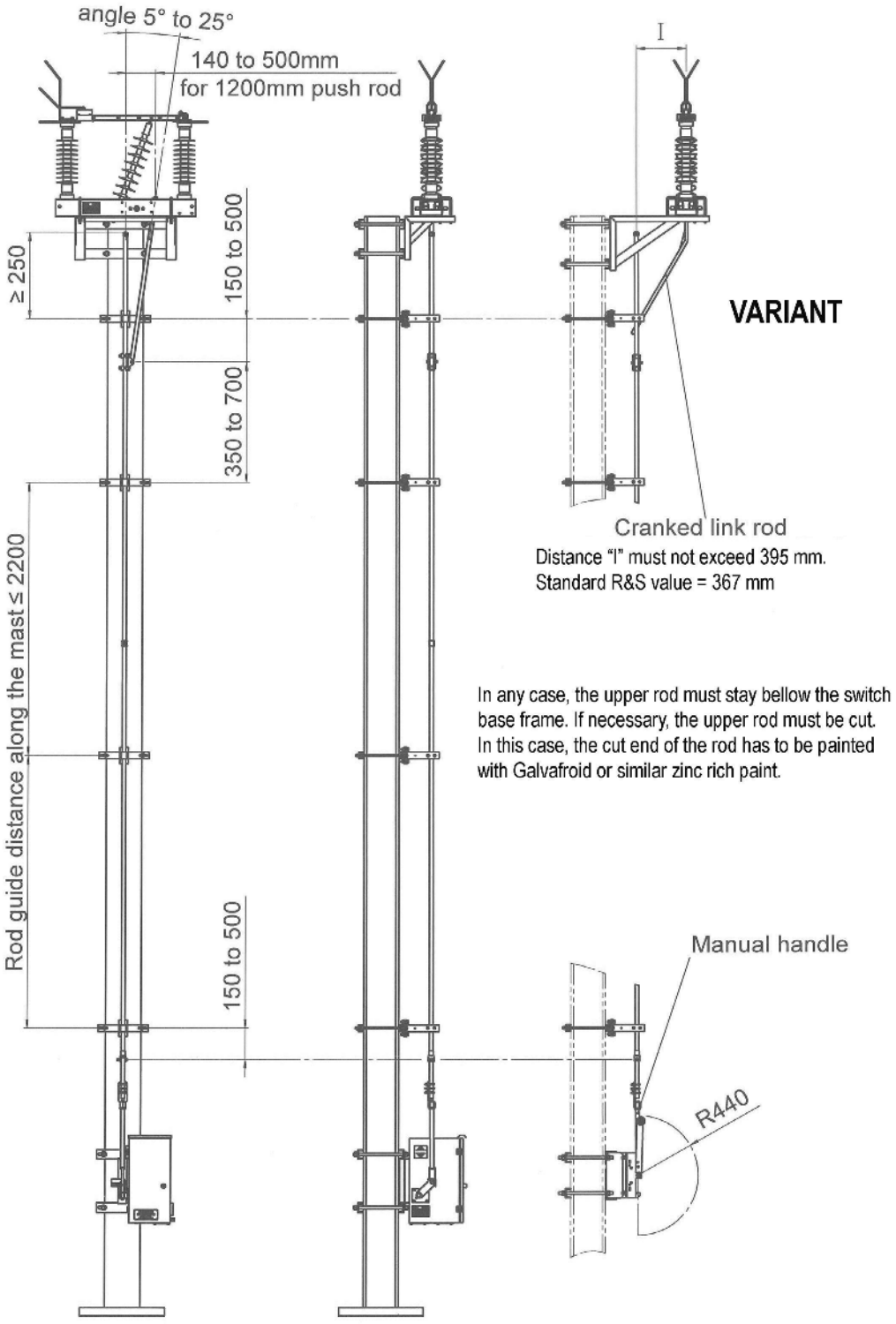
Motordrive MFL



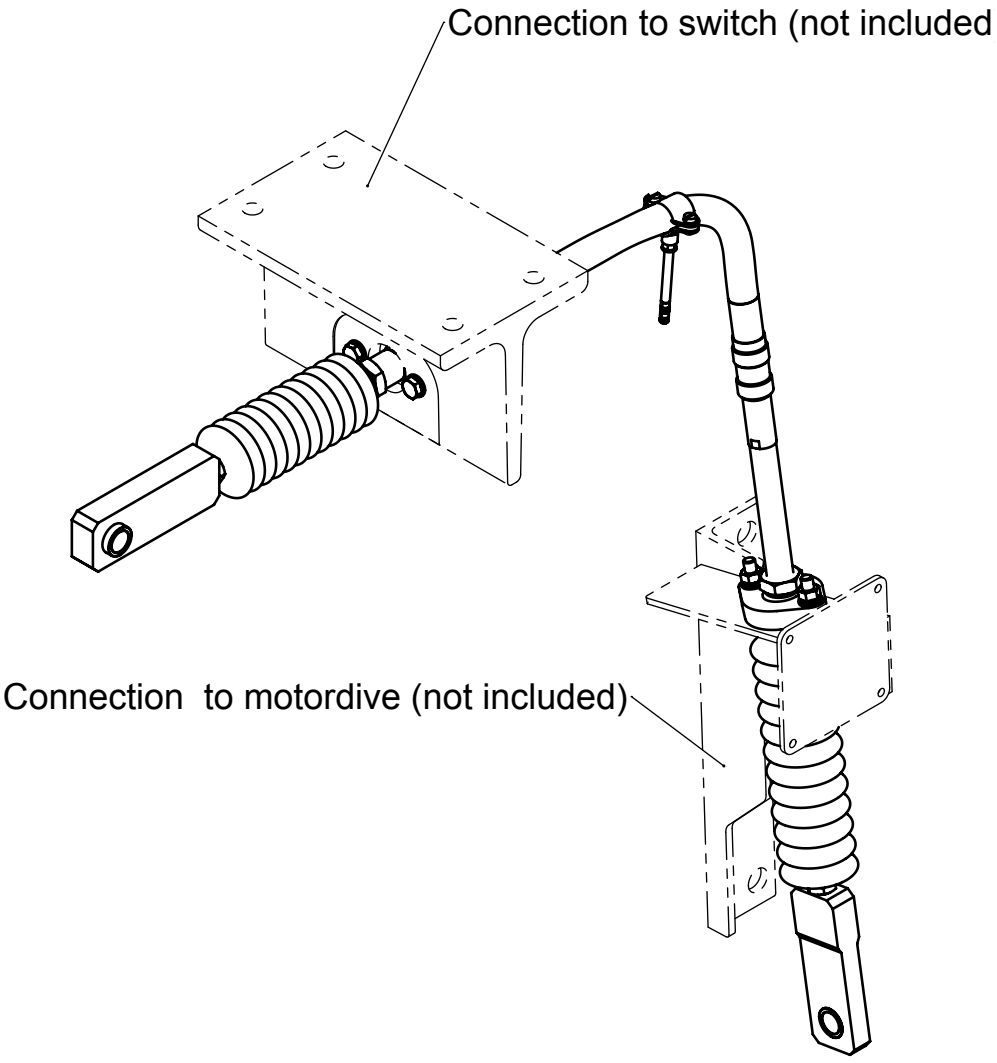
Motordrive MDR3



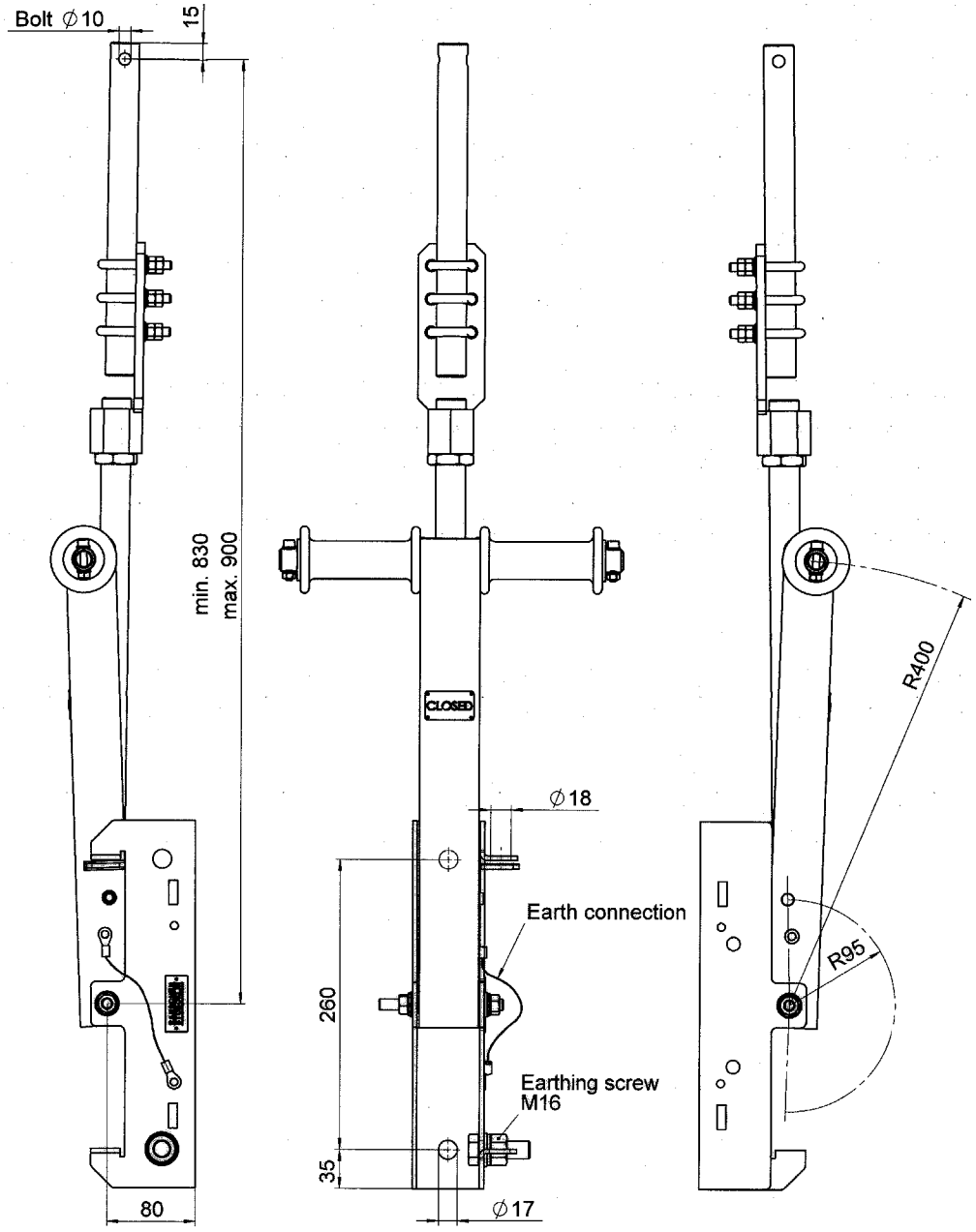
Operating rod assembly



Flexball


Connection to switch (not included
Connection to motordive (not included)

Manual handle



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