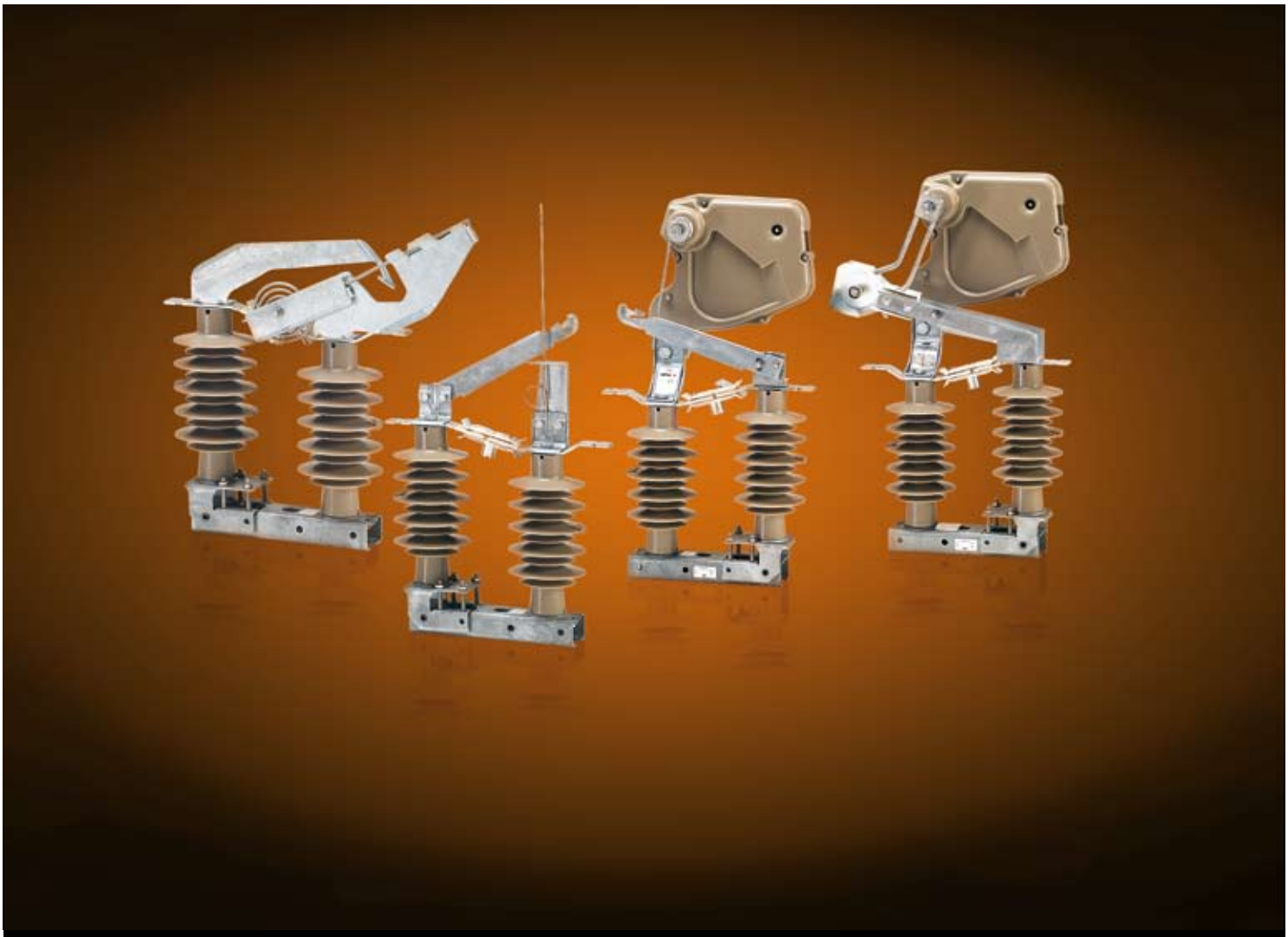


NPS
modular outdoor switch-disconnectors

Power and productivity
for a better world™

Index

Introduction

The NPS design is based on many years of experience with installations around the world. With the NPS, ABB delivers reliable operation in all climatic conditions and configurations. In addition, the NPS can be either manually or remotely controlled, with the option of incorporation into automated networks as a sectionalizer. Thanks to its modular construction and important design features, the NPS is a key component in creating future smart grids.

NPS

– Current breaking solutions from 25A – 630A
– Manual or remote motor controlled configurations available
– Capability to install additional pole equipment for different distribution network needs

Features

– Mechanically stable structure to suit different climatic conditions
– Flexible mounting and installation options
– Modular NPS design minimizes on site assembly and installation time
– Wide range of breaking current parameters
– Compact packaging reduces transportation and storage costs
– Insulators available in porcelain, epoxy and silicon
– Special metal surface treatment – durable and resistant to high corrosion environments
– No oil used in breaking chambers – environmental protection and reduced maintenance
– Designed to be fitted with a wide range of optional modular accessories:
  – Earthing switches from both sides of main switch
  – Separate earthing switch solutions
  – Current transformers and surge arresters on same supporting structure
  – Current limiting fuses
  – Manual or motor operating mechanisms
  – Wide range of control cabinets to allow installation of communication equipment

1. Wide range of operating mechanisms | 2. 3. Remote controlled NPS | 4. Various breaking current solutions | 5. Pole mounted transformer substations

Technology review
NPS technology

The modular NPS design allows for a wide range of accessories for various applications for outdoor air-insulated switches. The NPS can be expanded and adapted to changing distribution network needs, even after installation.

The NPS offers three types of insulators - porcelain, epoxy (cycloaliphatic) and silicone.
The epoxy and silicon insulators provide reduced weight, resistance to mechanical shock and good performance in heavy polluted areas. In order to heavily polluted achieve high creepage performance, the NPS offers a wide range of insulators.

The NPS is provided with breaking whips as standard. If higher interrupting ratings are required, breaking chambers are provided.

The main current carrying path is electrolytic copper, silver plated to ensure a suitably low level of contact resistance. The design of the main contacts consists of copper contact tips fixed by stainless steel springs. This design ensures self positioning of the main contacts in the closed position. In addition, this design requires a lower amount of force for closing and opening the disconnector. The short circuit withstand of the NPS is increased as a result of the effect of electrodynamic forces during short circuit current flow through the main current path. In addition, the tips may be reversed by 180° which extends the life of the contacts. This is a simple operation using ordinary pliers.

1. Wide range of various equipment (third insulator, fuse bases, earthing switch from the rocking side, fuse base integrated with NPS, UEKO3A1 & UEKO3B1 – manual operating mechanism | 2. Various types of insulators

1

2

Technology review
NPS technology

All steel components are coated with zinc galvanizing which provides a high level of corrosion resistance All copper components are silver-plated with the exception of terminals, which are coated with tin to allow line terminals, aluminium and copper, to be connected to the NPS without degrading their performance. Flexible copper parts of the NPS are coated with tin, aluminum components are made of special aluminum alloy to ensure high resistance to extreme ambient conditions. For special customer requirements, acetal resin insulators are available for disconnectors rated up to 24 kV, or composite insulators for up to 36 kV used in connection rods between the operating mechanism and switch.

All standardized fasteners are zinc galvanized or stainless steel. This allows the NPS switch disconnector to provide long-term operation even in the harshest environments

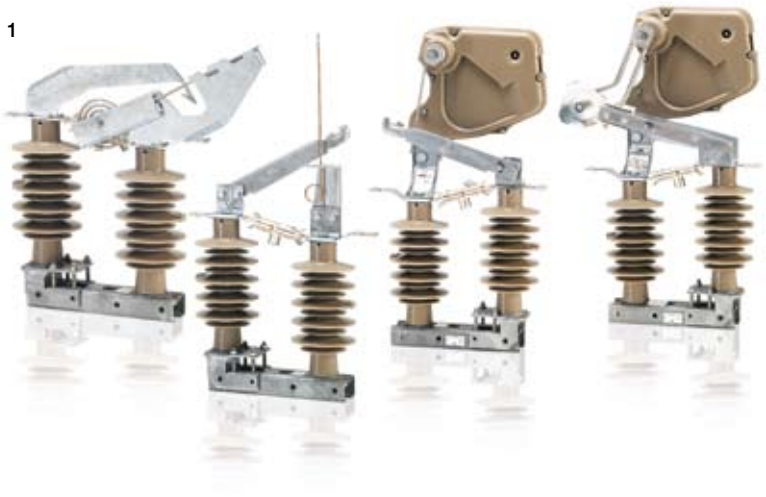
Breaking chambers

There are four different rated current breaking versions used in the NPS. Using one of the 2 types of chambers it is possible to achieve significant values of breaking rated currents:

– Standard flexible breaking whips for switching-off small currents (up to 25 A for 24 kV, up to 40 A for 12 kV)
– Special (K1) breaking whips for switching off higher currents (up to 50 A at 24 kV, up to 80 A for 12 kV)
– Air type breaking chamber (K4) with breaking capacity up to 250 A (24kV),
– Air type breaking chamber (K5) with breaking capacity up to 630 A (24kV).

1. Different rated current breaking versions | 2. Stainless or zinc galvanized for high anti-corrosion resistance

1



2

Technology review
NPS technology

Control cabinets

The NPS control cabinets are designed for remote control and local automation applications of NPS switch disconnectors and other similar types with up/down operating movement.
Together with the ABB REC 501 or REC 523 monitoring and control units both simple applications such as remote open/close operations and more sophisticated auto sectionalizing schemes and measurements can be realized.

Basic functions of REC501:

1. Controls: one or two drives, charging battery system and temperature.
2. Measurement: the internal temperature and battery voltage level.
3. Monitoring: the level of battery charging, protection against excessive battery discharge, operations counting, internal inspection of the relay status.
4. Communication protocols: SPA, LON (with adapter), IEC 870-5-101, Modus, DNP 3,0, ANSI X3.28, RP570.

Basic functions of REC523:

1. Control: max four switches, charging battery system and temperature.
2. Measurement: continuous network parameters, the internal temperature and battery voltage level.
3. Registration and identification: short-circuit currents and voltages in special application functions.
4. Monitoring: the level of battery charging, protection against excessive battery discharge, the operations counting, internal control of the relay status.
5. Protection functions and automation: auto-reclosing, phase discontinuity, overcurrent, earth-fault, under-voltage, transformer and motors inrush current.
6. Communication protocols: SPA, LON, IEC 870-5-101, Modus, DNP 3.0.

Analog inputs available for standard CTs and VTs.

1. Motor operating mechanism | 2. Motor operating mechanism with REC501 | 3. Motor operating mechanism with REC523

1

2

3

Technology review
NPS technology

Control cabinets can also be used without the integrated motor mechanism. These can be used in applications such as master terminal for monitoring and controlling existing motor devices for indoor and outdoor switch disconnectors and other motor operated apparatus. It is also applicable for switching devices with an integrated actuator.

Control cabinet features:
– The product range includes master and slave units
– Can be equipped with third party electronics/IED
– Two different cabinet sizes
– Terminals for installing different IED's
– Cabinets available with different options for batteries, battery chargers etc
– Up/down tube operation of disconnectors
– Stainless steel cabinet and mechanism
– Dust tight (IP55) to ensure long lifetime of critical electrical components
– High torque, choice of 1.2 sec or 3 sec operating time
– Optimum materials used
– Over 30 years experience
– Operating voltages: 24, 48, 110, 220 VDC 110, 230 VAC

1. 2. Control cabinet with REC523 | 3. Control cabinet with REC501 | 4. REC523 control unit

1

2

3

4

Product review
Benefits

NPS can operate in all climatic conditions, and can be installed in a variety of different positions, with either manual or remote control.
Disconnectors equipped with electric drives can be used in system automation solutions for distribution networks using the remote control or auto-closing functions. In this case, in addition to the motor operating mechanism the NPS will also be equipped with the latest automation systems. So in this application, the NPS switch disconnectors will become an integral part of the development of Smart Grids.

Benefits

– Modular design:
  – Allows for easy for installation reducing significantly reducing site time and costs and improving safety
  – Reduced transportation and storage size reduces associated costs
  – Easily upgradeable
  – Simple changing of current breaking devices, pole distances and manual to motor drive
  – Easy to accommodate various overhead line connections and operations – third insulator version, rocking terminals
  – Extended life cycle – reversible main current path parts
  – Capability to offer specific solutions/functions to suit local installation needs – both side earthing switches, current limiting fuses, surge arresters, instrument transformers
– High quality materials and coating surface:
  – Increased performance over the life of the switch
  – Terminals can be connected to both aluminium and copper lines without degradation in performance
– Feeder Automation Solutions:
  – Can be applied to remote control applications – optimizing overhead network
  – Can be applied to auto-reclosing applications – sectionalizer function
  – Failure detection and localization support functions
  – Communication with local Scada systems

Modular design and high quality materials makes it safe and easy during the installation



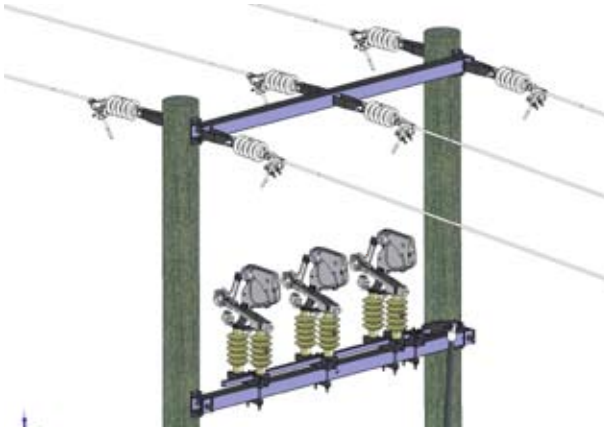


Product review
Technical data

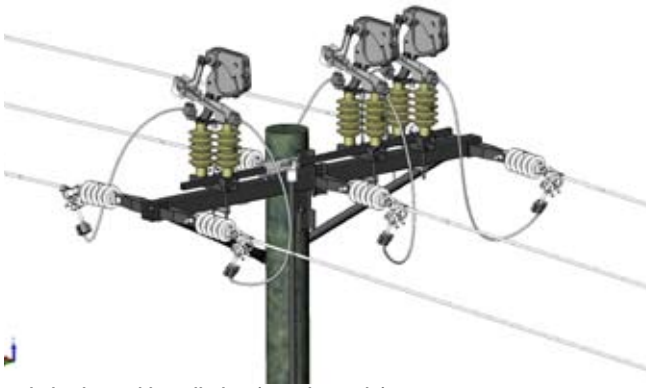
Type	NPS				
Rated maximum voltage [kV]	24	24	24	36	36
Rated current [A]	630	630	630	630	630
Rated frequency [Hz]	50/60	50/60	50/60	50/60	50/60
Rated lighting impulse withstand voltage [kV]:					
- across the insulating distance	145	145	165	220[4)]	220[4)]
- to earth and between phases	125	125	150	200[4)]	200[4)]
Rated power frequency withstand voltage in wet conditions [kV]:					
- across the insulating distance	75	75	75	88[4)]	88[4)]
- to earth and between phases	55	55	55	80[4)]	80[4)]
Creepage distance [mm]	740[1)]	715[2)]	760[2)]	1205[2)]	1365[2)]
Minimum distance between phases [mm]	260	260	350	430	430
Minimum insulating distance [mm]	200	200	230	350	350
Rated short-time withstand current - 1s [kA]	16	16	20	21	21
Rated short-time withstand current - 3s [kA]	12.5	12.5	16	16	16
Rated peak withstand current [kA]	40	40	50	52	52
Making current [kA/no. operations]	5/7	5/7	5/7	-	-
Rated breaking current with breaking whips [A] - 100 breaking operations	25[3)]	25[3)]	25[3)]	16	16
Cable and overhead line charging current - 20 CO operations [A]	15	15	15	10	10
Mechanical endurance [no. CO operations]	2000	2000	2000	2000	2000
Ambitne temperature limits [°C]	-50 to +40	-40 to +40	-40 to +40	-40 to +40	-40 to +40
Centilever strenght [kN]	2	9	9	6.2	6.2

[1)] Epoxy insulators version
[2)] Silicon insulators version
[3)] 40A for 12kV version
[4)] Version with earthing switch got lower ratings

Product review
Examples of pole installation



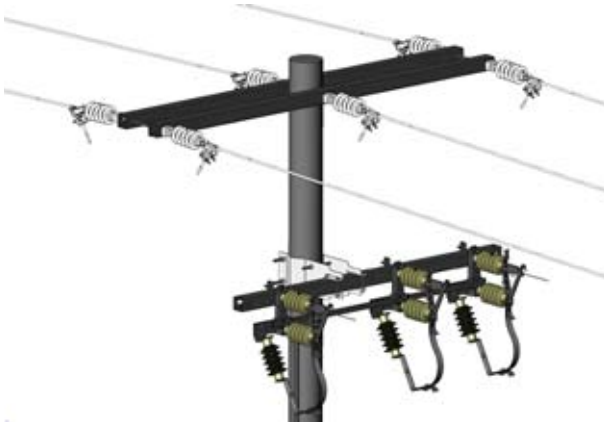
Two pole horizontal installation (wooden pole)



One pole horizontal installation (wooden pole)

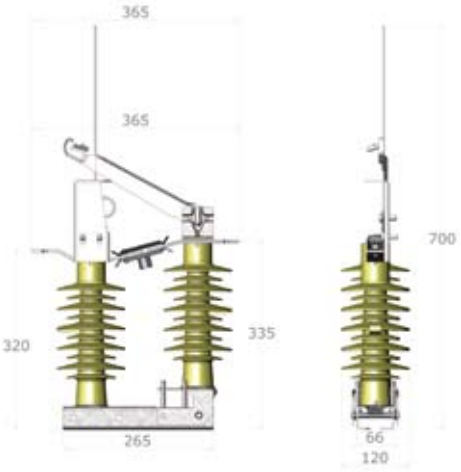
One pole horizontal installation (concrete rectangular pole)

One pole horizontal installation steel pole structure



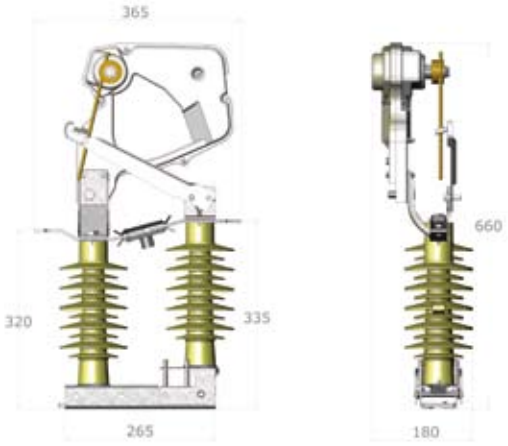
One pole vertical installation (concrete circular pole)

Product review
NPS dimensional drawings

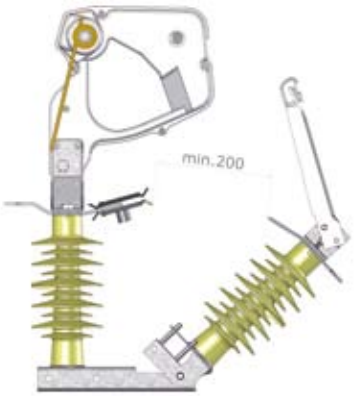


NPS (25A breaking whips) epoxy insulators

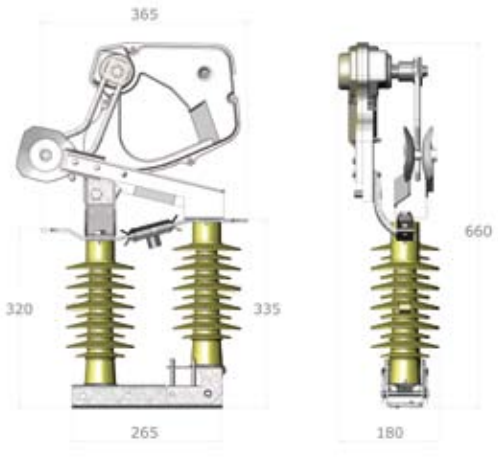
Open position



NPS (250A breaking chamber) epoxy insulators



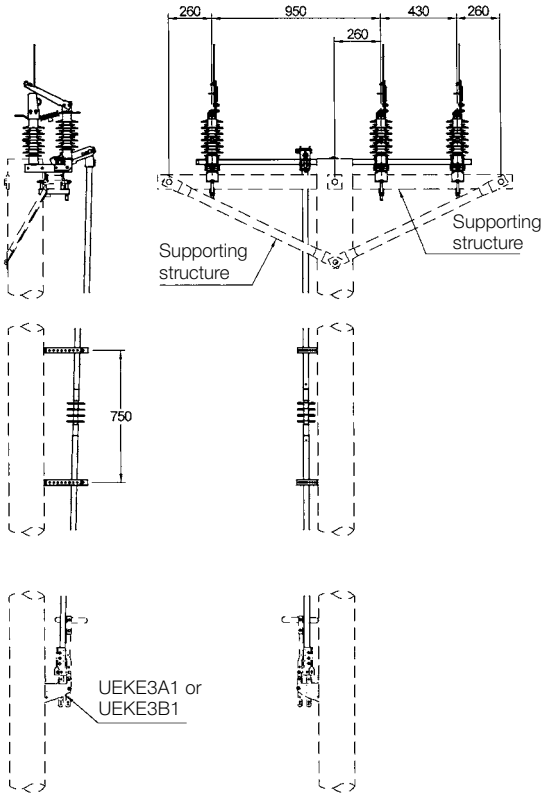
Open position



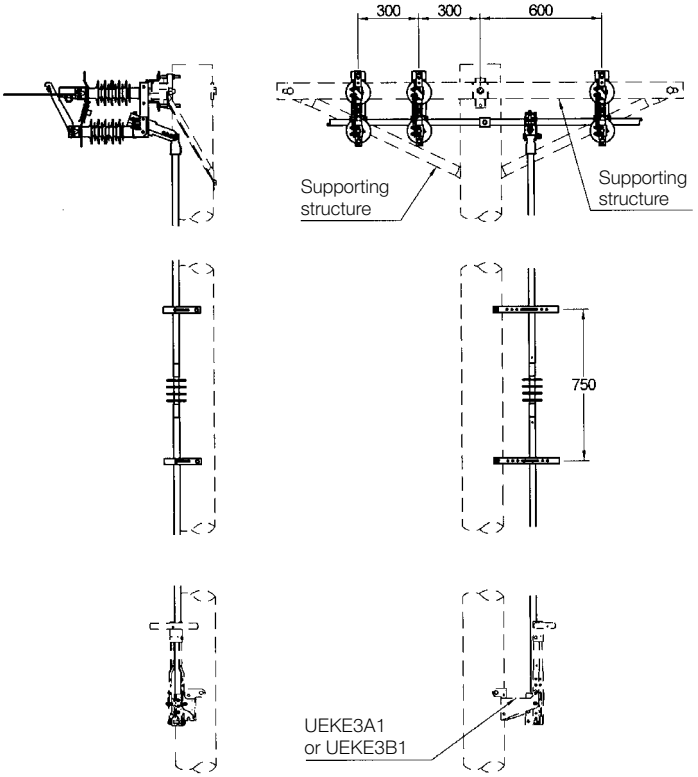
NPS (630A breaking chamber) epoxy insulators

Open position

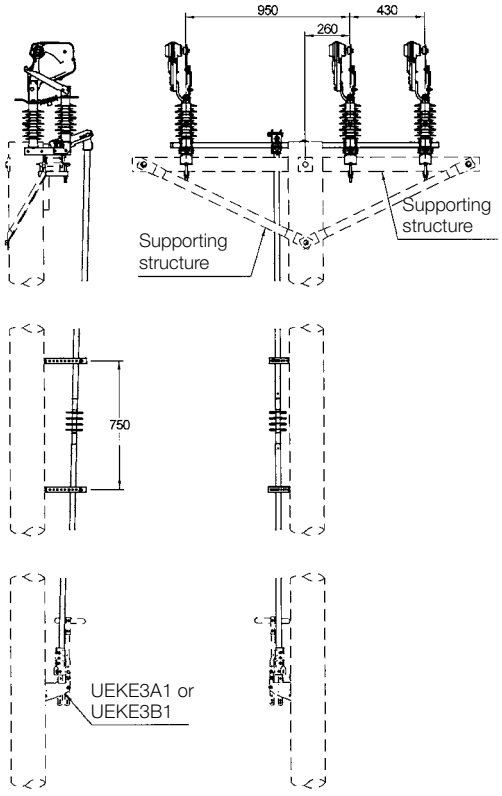
Product review
NPS dimensional drawings



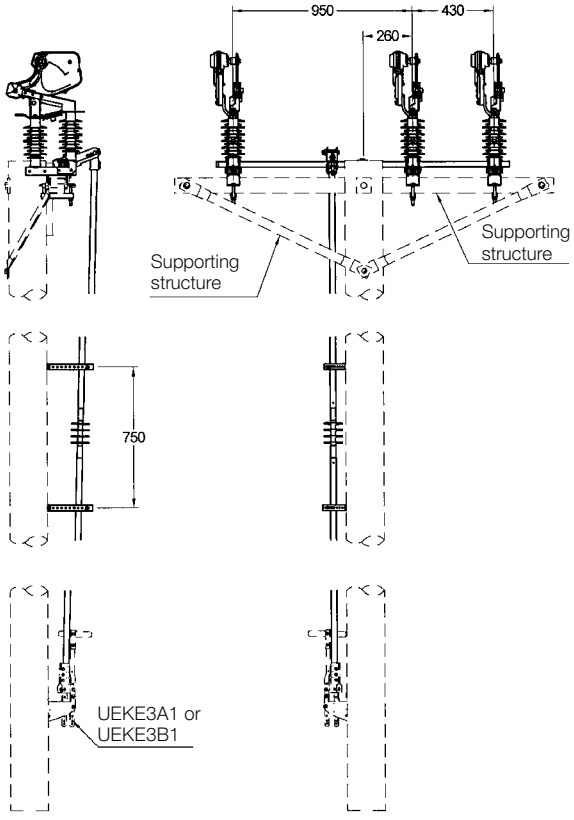
One pole horizontal installation (25A switch)



One pole vertical installation (25A switch)

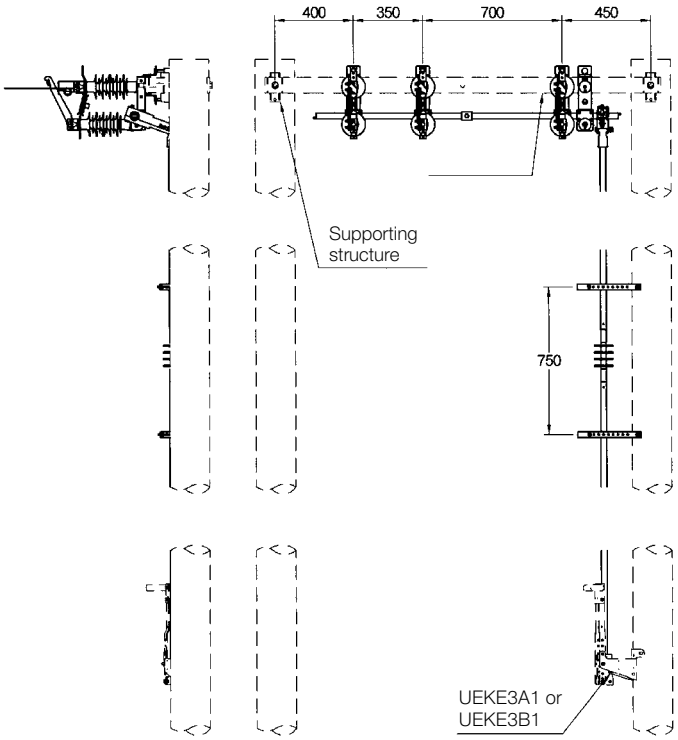


One pole horizontal installation (250A switch)

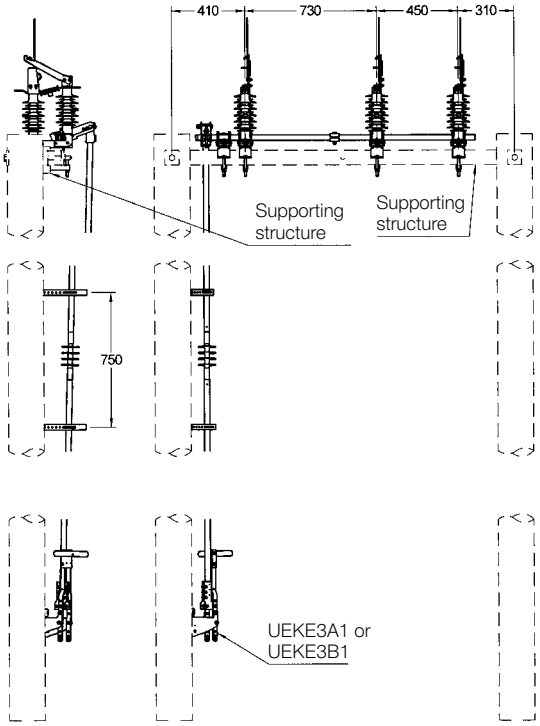


One pole horizontal installation (630A switch)

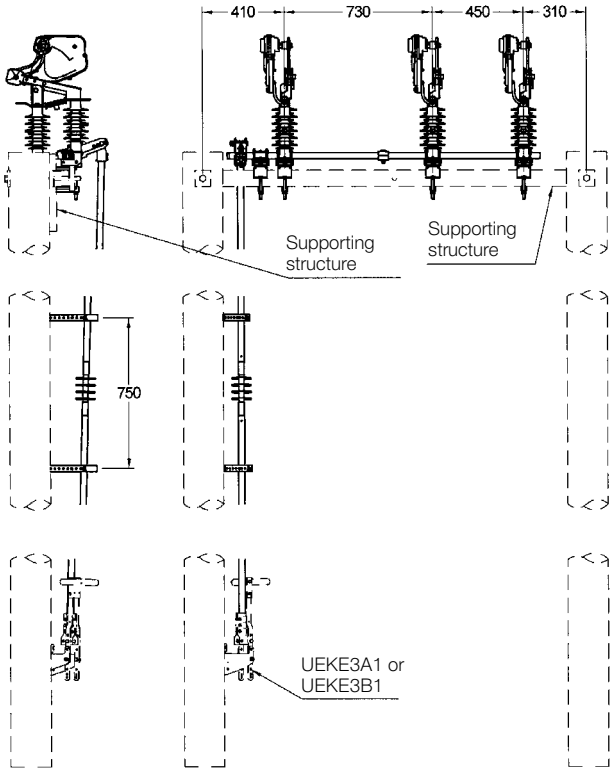
Product review
NPS dimensional drawings



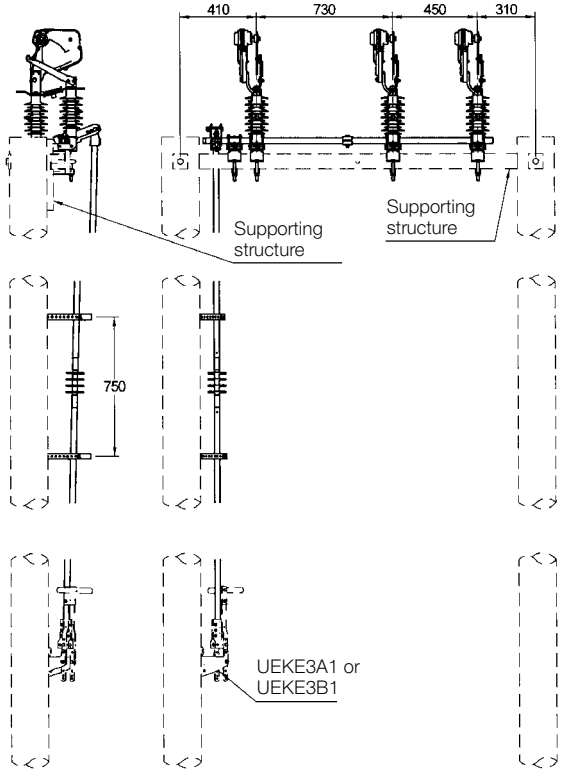
Two pole vertical installation (25A switch)



Two pole horizontal installation (25A switch)



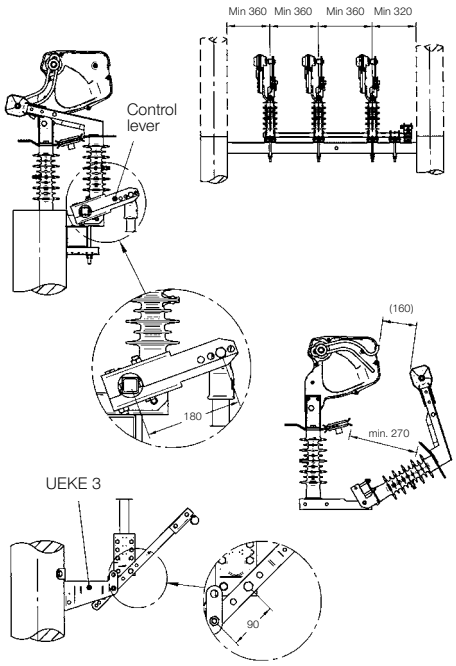
Two pole horizontal installation (630A switch)



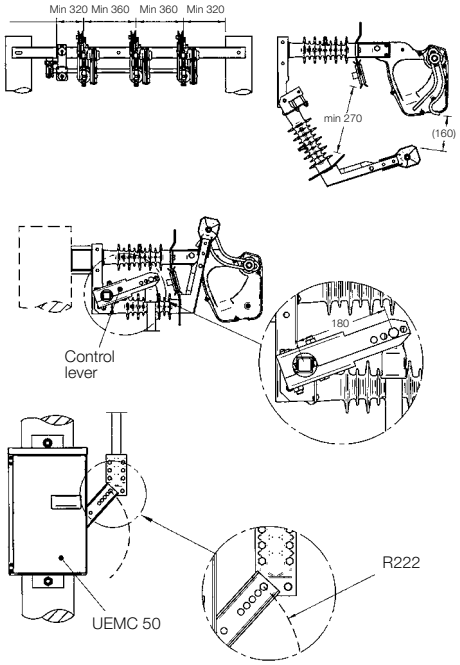
Two pole horizontal installation (250A switch)

Product review
NPS dimensional drawings

Hand operated NPS 630A version, horizontal installation



Motor operated NPS 630 A version, vertical installation



Product review
NPS ordering guide

Style Code	NPS	2	3	E	1	G	Q	N	B	N	N	N	K	K	1			
Style Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

The guide above shows the specification of: 3 phase NPS, 24 kV, 25 A breaking current (version with standard breaking whips and epoxy insulators), set of third insulator, hand operating mechanism type UEKO1A1 with operating rods 2x4m for horizontal installation on the single wooden pole.

Digits “16”, “17” and “18” are used to define the version of the selected accessories. There are 999 different options for selecting accessories. Specific accessories should be selected and noted according to the selection guide below. If further options are required please contact your local ABB representative.

Selections	**Style code**		**Style digit**
	Sample	**Actual**	
NPS switch	NPS	NPS	1
Rated Maximum Voltage: 1 - 12 kV 2 - 24 kV 3 - 36 kV*	3	2	2
Poles number: 1 - one pole solution 3 - three pole solution	1	3	3
Insulators type: E - epoxy (this version available up to 24 kV only) P - porcelain S - silicon	S	E	4
Creepage distance solution: 1 - increased increased means: 740 mm for epoxy insulators - 24 kV, 760 mm for silicon insulators - 24 kV, 1365 mm for silicon insulators - 36 kV; 2 - normal normal means: 715 mm for silicon insulators - 24 kV, 1205 mm for silicon insulators - 36 kV	1	1	5
Breaking current solution: F - disconnector without breaking capacity G - standard breaking whips - up to 16 A (36 kV), up to 25 A (24 kV), up to 40 A (12 kV) H - K1 breaking whips - up to 50 A (24 kV), up to 80 A (12 kV) K - K4 breaking chamber - 250 A (24 kV) L - K5 breaking chamber - 630 A (24 kV)	F	G	6
NPS equipment installed at the rocking insulator site: P - self aligning terminal Q - third insulator set R - surge arrester S - current transformer type KOHU U - flexible dropping set for cable connection V - bar for line connection to transformer N - no equipment	P	Q	7

* see remarks on page 20

Product review
NPS ordering guide

Selections	Style code		Style digit
	Sample	Actual	
NPS equipment installed at the fixed insulator site: A - bars set for cable connection B - surge arrester C - current transformer type KOHU E - flexible dropping set for cable connection G-fuse base integrated with NPS for OFCD fuses N - no equipment	A	N	8
Hand operating mechanism type for NPS switch L A - UEKE5A1 type hook stick operation B - UEKO1A1 type - one hand operation for low end switches C - UEME3A1 type for all NPS types D - UEKE3B1 type for all NPS types with rod length regulation device G - UEMC50L5-24 VDC/21 H - UEMC50H5-24 VDC/21 J - UEMC50L1-24 VDC/1 K - UEMC50H1-24 VDC/1 N - no hand operation mechanism	1	B	9
Earthing switch L A - integrated with NPS switch - rocking insulator site - close, open-earthed positions (do not needs additional operating mechanism) B - integrated with NPS switch - fixed insulator site (does not need additional operating mechanism) C - both sides earthing switches (operated with separate operating mechanisms) N - No earthing switch	A	N	10
Hand operating mechanism type for earthing switch - rocking insulator side L B - UEKO1A1 type - one hand operation for low end switches C - UEME3A1 type for all NPS types D - UEKE3B1 type for all NPS types with rod length regulation device N - no hand operation mechanism	1	N	11
Hand operating mechanism type for earthing switch - fixed insulator side L B - UEKO1A1 type - one hand operating for low end switches C - UEME3A1 type for all NPS types D - UEKE3B1 type for all NPS types with rod length regulation device N - no hand operating mechanism	1	N	12

Product review
NPS ordering guide

Selections	Style code		Style digit
	sample	actual	
Operating rod L			
K - 2 x 4 m for installation up to 9 m above the ground level			
L - 3 x 3 m for installation up to 10 m above the ground level			
M - 2 x 4 m + 3 m for installation up to 12 m above the ground level			
N - without operating rod	K	K	13
Type of the pole and pole dimmensions at NPS/operating mechanism level			
A - concrete pole, rectangular cross-section, dimensions 200 - 235 mm			
B - concrete pole, rectangular cross-section, dimensions 210 x 210 - 280 mm			
C - concrete pole, rectangular cross-section, dimensions 240 x 240 - 300 mm			
D - concrete pole, circular cross-section, dimensions 170 mm to 235 mm			
E - concrete pole, circular cross-section, dimensions 220 mm to 270 mm			
F - concrete pole, circular cross-section, dimensions 270 mm to 400 mm			
G - ZN type			
H - BSW type			
J - EPV12/12; 13.5/12 or 15/12 types			
K - wooden pole			
N - other type of supporting structure	A	K	14
Method of NPS installation under the line:			
1 - one pole horizontal installation			
2 - one pole vertical installation			
3 - two pole horizontal installation			
4 - two pole vertical installation			
N - not defined	1	1	15

Additional equipment

A - separating insulator in connection rod up to 24 kV if additional needed.

B - separating insulator in connection rod up to 36 kV if additional needed..

C - crossarm set for NPS installation between 2 wooden poles 1900mm if additional needed.

D - crossarm and fixing arms set for NPS installation on the top of wooden pole (epoxy and silicon insulators solutions) if additional needed.

E - crossarm and fixing arms set for NPS installation on the top of wooden pole (porcelain insulators solutions) if additional needed.

G - terminals for copper line connection 16mmkw OJUZLL 1/3.

H - terminals for aluminum line connection 16 mm^2 ...2 x 70 mm^2 OJUZLL 3/3.

J - terminals for aluminum line connection 62 mm^2 ...99 mm^2 NPTL24/3.

K - terminals for aluminum line connection 95 mm^2 ...240 mm^2 OJUZLL 4/3.

L - terminals for aluminum line connection ...99 mm^2 and copper ...16 mm^2. NPTLA24/3.

M - earthing switch for separate installation if additional needed.

N - self aligning terminal - Ag plated.

Additional equipment dedicated to MV fuses

1 - fuse link OFCD24/6,3 type - 3 pcs.

2 - fuse link OFCD24/16 type - 3 pcs.

3 - fuse link OFCD24/25 type - 3 pcs.

4 - fuse elements - 12 pcs. in one package.

5 - operating rod for fuses installation.

6 - operating rod for UEKO5A1 operation.

7 - operating rod for fuses installation and UEKO5A1 operation.

8 - fuse base for separate installation of for OFCD fuses.

9 - fuse base for separate installation for DIN type fuses 442 mm.

10 - fuse base for separate installation for DIN type fuses 537 mm.

11 - tube support for melting fuses acc to Swedish building standard.

Product review
NPS ordering guide

Additional equipment dedicated to motor operating mechanism

Batteries G2 and G3:

A - UEZGP 17AH-24 V - Battery - 17 AH, 2 PCS -YUA NP17-12 (YUA ..TYPES) (all UEMC types).

B - UEZGL 24AH-24 V - Battery - 24 AH, 2 PCS-YUA NPL24-12, long life (YUA ..TYPES)
(not for UEMC50H1 and L1).

C - UEZGL 38AH-24 V - Battery - 38 AH, 2 PS -YUA NPL24-12, long life (YUA ..TYPES)
(only for UEMC50 H5/21 and L5/21).

Battery chargers G1:

D - UEZGC 24 V/3 A/230 VAC - installed charged, supply 170..260 VAC (GYC RUN TYPE).

E - UEZGC 24 V/3 A/110 VAC - installed charged, supply 87..132 VAC (GYC RUN TYPE).

Other alternative accessories:

F - UEZS2/S10 - 3 NC/NO additional aux. contacts for UEMC50L...

G - UEZS3/S10 - 3 NC/NO additional aux. contacts for UEMC50H...

H - UEZS2/S11 - 6 NC/NO additional aux. contacts for UEMC50L...

J - UEZS3/S11 - 6 NC/NO additional aux. contacts for UEMC50H...

K - UEZS2/S12 - 4NC/NO+1NC/C+1NO/D additional aux. contacts for UEMC50H...

L - UEZS3/S12 - 4NC/NO+1NC/C+1NO/D additional aux. contacts for UEMC50H...

M - UEMZ 199 - heater switch.

P - UEMZ 200 - charger and heater switch.

Q - UEMZ 318 - thermostat, not adjustable. Disconnect at +30ºC.

R - UEMZ 319 - M.C.B. for charging and heater circ. 1 A.

S - UEMZ1191/24 VDC - service light from 24 VDC batteries.

T - UEMZ1066 - fixing bracket for rectangular pole.

U - UEMZ1146 - fixing bracket for rectangular bigger pole.

W - UEMZ938 - door switch.

X - UEMZ1276 - door retainer.

Product review
NPS ordering guide

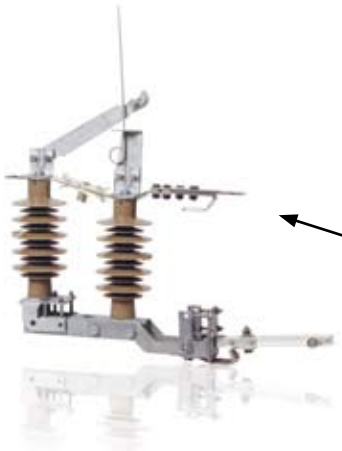
Remarks:

1. Standard short circuit withstand is 16/40 kA for 24 kV, version with silicon insulators (increased creepage distance) provides 20/50 kA.
2. When using 3rd insulator, SAs or CTs it is not possible to use an integrated earthing switch at the same site of the NPS unit. In this case, refer to column 14 and select loose installation earthing switches if necessary.
3. Fuse bases for separate installation for OFCD type fuses are available only with epoxy insulators version.
4. Selection of KOHU CTs electrical parameters should be defined according to the separate KOHU CT catalogue.
5. ABB recommends SAs POLIM D and POLIM K type.
6. When selecting any style code then just one choice is available for the specific switch solution. Only the additional equipment has multi-choice options.
7. Please note that 36 kV versions have limited versions of additional equipment such as: earthing switches, different pole installation methods, SAs, fuses, insulator types. Therefore, especially when selecting 36 kV versions we recommend discussion of the required solution with your local ABB representative.

Product review
NPS ordering guide

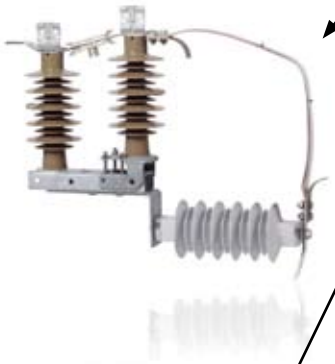
Various equipment installed on both sides of 24kV NPS switch

Earthing switch for the rocking insulator side



Flexible dropping set for cable connection equipped with surge arrester

Earthing switch integrated with NPS switch – rocking insulator site – close, open-earthed positions

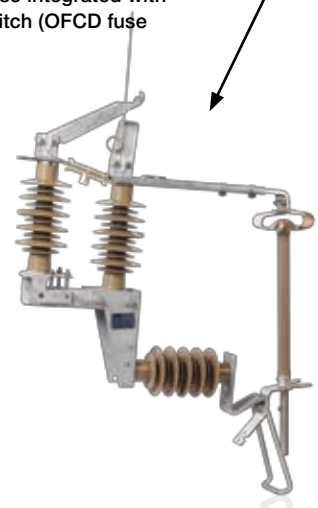


Third insulator version

Version 25A

Version 50A

Fuse base integrated with NPS switch (OFCD fuse links)



Version 250A

Version 630A

Product review
NPS ordering guide

Selected accessories

1

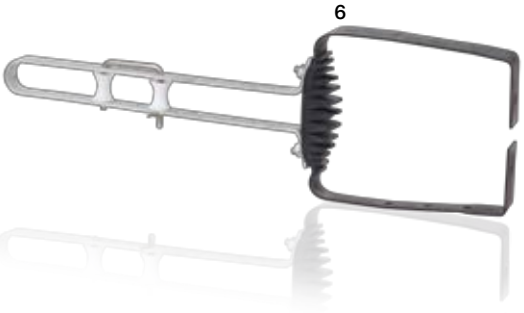
2

3

5

4

6



7

Product review
Service and support

1. UEKE2/1 | 2. UEKE3A1 | 3. UEKE3B1 | 4. UEKO1A1 | 5. UEKE5A1 | 6. Operating tube support (concrete poles installation) | 7. Operating tube support (wooden poles installation) | 8. Self-aligning terminal | 9. 10. Separating insulators | 11. Operating lever

NPS Customer Support

– for technical enquiries please contact the factory or relevant local ABB representative (see www.abb.com for contact details),
– our Feeder Automation Users website features news, FAQs, discussion board, technical information, product brochures, software downloads, contact information, instruction manuals, programming shortcuts, drawings,
– standard two years warranty.

Training

– factory based training: two-day training course designed for participants to become proficient in application, installation, operation, maintenance, testing, and commissioning of NPS.

Distribution Automation Strategies

– ABB can help you achieve your organization's goals by analyzing the performance of existing distribution lines to provide a cost-benefit analysis of the different technologies and strategies that can improve your system reliability.

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