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AIR CIRCUIT BREAKERS

CATALOGUE OF AIR CIRCUIT BREAKERS, AIR SWITCH DISCONNECTORS AND ACCESSORIES

Valid from 17th March 2014

Noark
New opportunity for you

Catalogues and assortment overview

INSTALLATION DEVICES

- Miniature Circuit Breakers
- Residual Current Devices
- Isolators
- Surge Protection Devices
- Other Installation Devices

MOULDED CASE CIRCUIT BREAKERS

- Moulded Case Circuit Breakers
- Moulded Case Switch Disconnectors

CONTACTORS AND OVERLOAD RELAYS

- Industrial Contactors
- Overload Relays

PLASTIC CONSUMER UNITS AND BUSBARS

- Consumer Units
- Interconnection Busbars

PHOTOVOLTAIC COMPONENTS AND SOLUTIONS

- Miniature Circuit Breakers
- Fuse Disconnectors
- Isolators
- Surge Protection Devices
- Moulded Case Circuit Breakers and Switch Disconnectors
- DC boards and Combiner Boxes

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Air Circuit Breakers Ex9A

- **Air Circuit Breakers**
- **Tested according to IEC / EN 60947-2**
- **Rated current up to 4000 A**
- **Rated operating voltage 690 V AC**
- **Breaking capacity up to 100 kA**
- **Fixed and withdrawable versions**
- **Wide range of accessories**
- **Utilization category B circuit breakers**

An extensive assortment of Air Circuit Breakers with rated currents up to 4000 A. Thanks to wide range of available protection, measuring and additional functions, the ACB line provides optimum solution for various applications.

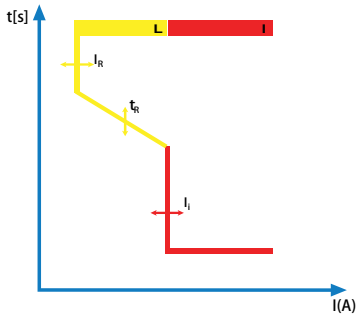
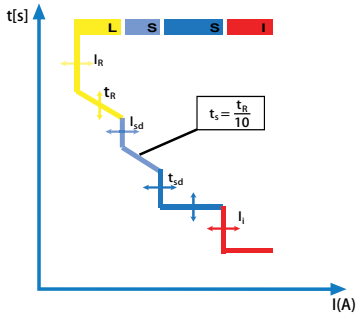
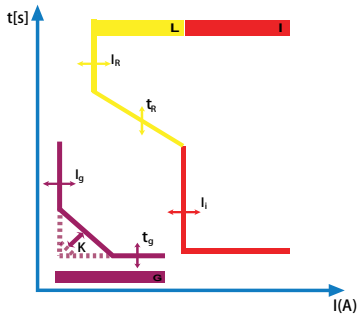
Can be used for protection of circuits, motors, generators as well as all power distribution applications.

Offered also as switch disconnectors.

Type Key

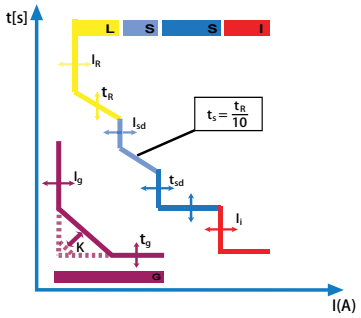
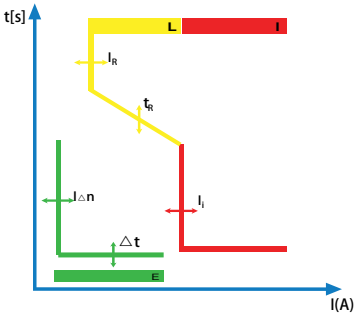
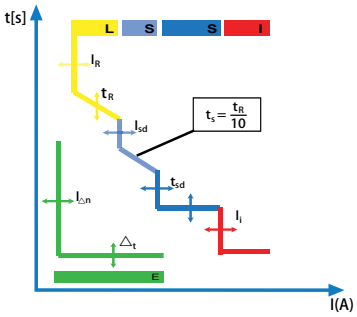
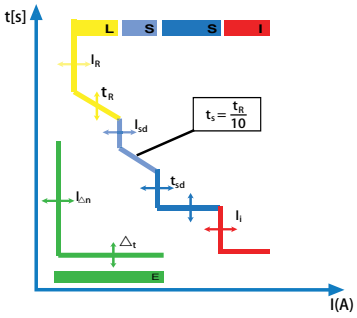
Ex9	A	16	N	3P	F	1250
Product family	Product	Frame size	Breaking capacity	Poles	Version	Rated current
Ex9	A: ACBs	16: to 1600 A 25: to 2500 A 32: to 3200 A 40: to 4000 A	N: 55 kA Q: 65 kA R: 85 kA H: 100 kA	3P 4P	F: Fixed D/O: With-drawable	400 - 4000 A

Certification marks

Selection guide		Rated current I_n
		Device frame size
		Breaking capacity I_{cu} (I_{cw}) at 415 V AC
Requested functionality	Protection functions (required)	Device version
Switching and disconnection	None	fixed
		withdrawable
Basic circuit protection	 LI	fixed
		withdrawable
Circuit protection in selective systems	 LSI	fixed
		withdrawable
Basic circuit and ground fault protection	 LIG	fixed
		withdrawable

< 1600 A		630 - 2500 A		1600 - 3200 A			2000 - 4000 A		
Ex9A16		Ex9A25		Ex9A32			Ex9A40		
55 kA	65 kA	65 kA	85 kA	65 kA	85 kA	100 kA	65 kA	85 kA	100 kA
Type		Type		Type			Type		
Ex9ASD F see page 36					Ex9ASD F see page 36			Ex9ASD F see page 36	
Ex9ASD D/O +CAS 11 see page 37					Ex9ASD D/O +CAS 12 see page 38			Ex9ASD D/O +CAS 13 see page 38	
Ex9A16N F see page 20 +SU3.0A see page 12	Ex9A16Q F see page 20 +SU3.0A see page 12	Ex9A25Q F see page 24 +SU3.0A see page 12	Ex9A25R F see page 24 +SU3.0A see page 12	Ex9A32Q F see page 28 +SU3.0A see page 12	Ex9A32R F see page 28 +SU3.0A see page 12	Ex9A32H F see page 28 +SU3.0A see page 12	Ex9A40Q F see page 32 +SU3.0A see page 12	Ex9A40R F see page 32 +SU3.0A see page 12	Ex9A40H F see page 32 +SU3.0A see page 12
Ex9A16N D/O +CAS 11 see page 21 +SU3.0A see page 12	Ex9A16Q D/O +CAS 11 see page 21 +SU3.0A see page 12	Ex9A25Q D/O +CAS 14 see page 25 +SU3.0A see page 12	Ex9A25R D/O +CAS 14 see page 25 +SU3.0A see page 12	Ex9A32Q D/O +CAS 12 see page 29 +SU3.0A see page 12	Ex9A32R D/O +CAS 12 see page 29 +SU3.0A see page 12	Ex9A32H D/O +CAS 12 see page 30 +SU3.0A see page 12	Ex9A40Q D/O +CAS 13 see page 33 +SU3.0A see page 12	Ex9A40R D/O +CAS 13 see page 33 +SU3.0A see page 12	Ex9A40H D/O +CAS 13 see page 34 +SU3.0A see page 12
Ex9A16N F see page 20 +SU3.0A see page 12	Ex9A16Q F see page 20 +SU3.0A see page 12	Ex9A25Q F see page 24 +SU3.0A see page 12	Ex9A25R F see page 24 +SU3.0A see page 12	Ex9A32Q F see page 28 +SU3.0A see page 12	Ex9A32R F see page 28 +SU3.0A see page 12	Ex9A32H F see page 28 +SU3.0A see page 12	Ex9A40Q F see page 32 +SU3.0A see page 12	Ex9A40R F see page 32 +SU3.0A see page 12	Ex9A40H F see page 32 +SU3.0A see page 12
Ex9A16N D/O +CAS 11 see page 21 +SU3.0A see page 12	Ex9A16Q D/O +CAS 11 see page 21 +SU3.0A see page 12	Ex9A25Q D/O +CAS 14 see page 25 +SU3.0A see page 12	Ex9A25R D/O +CAS 14 see page 25 +SU3.0A see page 12	Ex9A32Q D/O +CAS 12 see page 29 +SU3.0A see page 12	Ex9A32R D/O +CAS 12 see page 29 +SU3.0A see page 12	Ex9A32H D/O +CAS 12 see page 30 +SU3.0A see page 12	Ex9A40Q D/O +CAS 13 see page 33 +SU3.0A see page 12	Ex9A40R D/O +CAS 13 see page 33 +SU3.0A see page 12	Ex9A40H D/O +CAS 13 see page 34 +SU3.0A see page 12
Ex9A16N F see page 20 +SU4.0A see page 14	Ex9A16Q F see page 20 +SU4.0A see page 14	Ex9A25Q F see page 24 +SU4.0A see page 14	Ex9A25R F see page 24 +SU4.0A see page 14	Ex9A32Q F see page 28 +SU4.0A see page 14	Ex9A32R F see page 28 +SU4.0A see page 14	Ex9A32H F see page 28 +SU4.0A see page 14	Ex9A40Q F see page 32 +SU4.0A see page 14	Ex9A40R F see page 32 +SU4.0A see page 14	Ex9A40H F see page 32 +SU4.0A see page 14
Ex9A16N D/O +CAS 11 see page 21 +SU4.0A see page 14	Ex9A16Q D/O +CAS 11 see page 21 +SU4.0A see page 14	Ex9A25Q D/O +CAS 14 see page 25 +SU4.0A see page 14	Ex9A25R D/O +CAS 14 see page 25 +SU4.0A see page 14	Ex9A32Q D/O +CAS 12 see page 29 +SU4.0A see page 14	Ex9A32R D/O +CAS 12 see page 29 +SU4.0A see page 14	Ex9A32H D/O +CAS 12 see page 30 +SU4.0A see page 14	Ex9A40Q D/O +CAS 13 see page 33 +SU4.0A see page 14	Ex9A40R D/O +CAS 13 see page 33 +SU4.0A see page 14	Ex9A40H D/O +CAS 13 see page 34 +SU4.0A see page 14

In preparation...

Selection guide		Rated current I_n
		Device frame size
		Breaking capacity I_{cu} (I_{cw}) at 415 V AC
Requested functionality	Protection functions (required)	Device version
Circuit protection in selective system with ground fault protection	 LSIG	fixed
		withdrawable
Basic circuit and earth leakage protection	 LI + E	fixed
		withdrawable
Circuit protection in selective systems with earth leakage protection	 LSI + E	fixed
		withdrawable
Generator protection with earth leakage protection and net analyzer	 LSI + E	fixed
		withdrawable

< 1600 A		630 - 2500 A		1600 - 3200 A			2000 - 4000 A		
Ex9A16		Ex9A25		Ex9A32			Ex9A40		
55 kA	65 kA	65 kA	85 kA	65 kA	85 kA	100 kA	65 kA	85 kA	100 kA
Type		Type		Type			Type		
Ex9A16N F see page 20 +SU4.0A see page 14	Ex9A16Q F see page 20 +SU4.0A see page 14	Ex9A25Q F see page 24 +SU4.0A see page 14	Ex9A25R F see page 24 +SU4.0A see page 14	Ex9A32Q F see page 28 +SU4.0A see page 14	Ex9A32R F see page 28 +SU4.0A see page 14	Ex9A32H F see page 28 +SU4.0A see page 14	Ex9A40Q F see page 32 +SU4.0A see page 14	Ex9A40R F see page 32 +SU4.0A see page 14	Ex9A40H F see page 32 +SU4.0A see page 14
Ex9A16N D/O +CAS 11 see page 21 +SU4.0A see page 14	Ex9A16Q D/O +CAS 11 see page 21 +SU4.0A see page 14	Ex9A25Q D/O +CAS 14 see page 25 +SU4.0A see page 14	Ex9A25R D/O +CAS 14 see page 25 +SU4.0A see page 14	Ex9A32Q D/O +CAS 12 see page 29 +SU4.0A see page 14	Ex9A32R D/O +CAS 12 see page 29 +SU4.0A see page 14	Ex9A32H D/O +CAS 12 see page 30 +SU4.0A see page 14	Ex9A40Q D/O +CAS 13 see page 33 +SU4.0A see page 14	Ex9A40R D/O +CAS 13 see page 33 +SU4.0A see page 14	Ex9A40H D/O +CAS 13 see page 34 +SU4.0A see page 14
Ex9A16N F see page 20 +SU5.0A see page 16	Ex9A16Q F see page 20 +SU5.0A see page 16	Ex9A25Q F see page 24 +SU5.0A see page 16	Ex9A25R F see page 24 +SU5.0A see page 16	Ex9A32Q F see page 28 +SU5.0A see page 16	Ex9A32R F see page 28 +SU5.0A see page 16	Ex9A32H F see page 28 +SU5.0A see page 16	Ex9A40Q F see page 32 +SU5.0A see page 16	Ex9A40R F see page 32 +SU5.0A see page 16	Ex9A40H F see page 32 +SU5.0A see page 16
Ex9A16N D/O +CAS 11 see page 21 +SU5.0A see page 16	Ex9A16Q D/O +CAS 11 see page 21 +SU5.0A see page 16	Ex9A25Q D/O +CAS 14 see page 25 +SU5.0A see page 16	Ex9A25R D/O +CAS 14 see page 25 +SU5.0A see page 16	Ex9A32Q D/O +CAS 12 see page 29 +SU5.0A see page 16	Ex9A32R D/O +CAS 12 see page 29 +SU5.0A see page 16	Ex9A32H D/O +CAS 12 see page 30 +SU5.0A see page 16	Ex9A40Q D/O +CAS 13 see page 33 +SU5.0A see page 16	Ex9A40R D/O +CAS 13 see page 33 +SU5.0A see page 16	Ex9A40H D/O +CAS 13 see page 34 +SU5.0A see page 16
Ex9A16N F see page 20 +SU5.0A see page 16	Ex9A16Q F see page 20 +SU5.0A see page 16	Ex9A25Q F see page 24 +SU5.0A see page 16	Ex9A25R F see page 24 +SU5.0A see page 16	Ex9A32Q F see page 28 +SU5.0A see page 16	Ex9A32R F see page 28 +SU5.0A see page 16	Ex9A32H F see page 28 +SU5.0A see page 16	Ex9A40Q F see page 32 +SU5.0A see page 16	Ex9A40R F see page 32 +SU5.0A see page 16	Ex9A40H F see page 32 +SU5.0A see page 16
Ex9A16N D/O +CAS 11 see page 21 +SU5.0A see page 16	Ex9A16Q D/O +CAS 11 see page 21 +SU5.0A see page 16	Ex9A25Q D/O +CAS 14 see page 25 +SU5.0A see page 16	Ex9A25R D/O +CAS 14 see page 25 +SU5.0A see page 16	Ex9A32Q D/O +CAS 12 see page 29 +SU5.0A see page 16	Ex9A32R D/O +CAS 12 see page 29 +SU5.0A see page 16	Ex9A32H D/O +CAS 12 see page 30 +SU5.0A see page 16	Ex9A40Q D/O +CAS 13 see page 33 +SU5.0A see page 16	Ex9A40R D/O +CAS 13 see page 33 +SU5.0A see page 16	Ex9A40H D/O +CAS 13 see page 34 +SU5.0A see page 16
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Ex9A16N D/O +CAS 11 see page 21 +SU5.0H see page 17	Ex9A16Q D/O +CAS 11 see page 21 +SU5.0H see page 17	Ex9A25Q D/O +CAS 14 see page 25 +SU5.0H see page 17	Ex9A25R D/O +CAS 14 see page 25 +SU5.0H see page 17	Ex9A32Q D/O +CAS 12 see page 29 +SU5.0H see page 17	Ex9A32R D/O +CAS 12 see page 29 +SU5.0H see page 17	Ex9A32H D/O +CAS 12 see page 30 +SU5.0H see page 17	Ex9A40Q D/O +CAS 13 see page 33 +SU5.0H see page 17	Ex9A40R D/O +CAS 13 see page 33 +SU5.0H see page 17	Ex9A40H D/O +CAS 13 see page 34 +SU5.0H see page 17

Tripping units "Smart Unit" +SU

- **Tripping units SU for ACBs line Ex9A**
- **Selected and ordered separatelly, delivered as mounted in ACB only**
- **32-bit DSP technology**
- **SU3.0 series with LSI protection**
  SU4.0 series with LSIG protection
  SU5.0 series with LSIE protection
- **LCD display for all versions, coloured indication of status for variants D, P and H**
- **Optional communication function**
- **Wide range of other protective and alarm functions**
- **Net analysing possibility**

Tripping units of the line “Smart Unit SU” provide a comprehensive range of functionalities to Air Circuit Breaker device body. The SU units bring modern state of the art digital technology into ACB tripping units. All versions of SU contain LSI protection functions, several measuring possibilities and many advanced functions. All types are also equipped with LCD display to show actual conditions in the circuit. It brings an ultimate choice, without any compromise of basic tripping units with insufficient functionalities.

SU units are offered in three main lines as SU3.0, SU4.0, and SU5.0. The basic type 3.0 contains all principal protection functions L (Long time delay protection), S (Short time delay protection), I (Instantaneous protection). It allows to use this type also as an upstream breaker in selective systems. Advanced types 4.0 and 5.0 provide additionally G (Ground-fault) and E (Earth leakage) protection, respectively. Both these functions are based on measuring of differential residual current. The G function in SU4.0 is designed in order to register ground faults, i.e. residual currents with level similar to nominal currents (in 0.1 multiples of I_n), through PE conductor. In contrast to this, the SU5.0 records leakage currents from the level of 0.5 A also with adjusted insensitivity time. For this reason it is suitable as protection against leakage currents caused e.g. by imperfect insulation, high impedance faults etc.

Settings of tripping parameters allow besides changing of time delay parameters and current limits to shape tripping curve significantly. For overload protection in the L zone, it is possible to choose from various versions of inverse time delay functions $I^{0.5}t$, It, I^2t, I^4t, I^5t. It brings an easy way of adaptation of tripping curve to different types of other protection devices in the system in order to keep selectivity as well as to minimize gaps in between particular tripping curves for maximum protection. It is extended with the inverse time possibility also for short time delay curve S with function I^2t. An inverse time function It is available and adjustable also for Ground fault protection G in SU of version 4.0, and as fixed for Earth fault protection in SU5.0.

All the three types of tripping units are further available in 4 variants with suffix A, D, P, and H. The variant A offers additional detailed current analysis. It means that detailed information about currents can be shown on the integrated LCD display. For versions D, P and H it can be also communicated via ModBus interface. The variant D extends the current analysis with voltage analysis. The variant P adds also power analysis, i.e. measuring of energy and power factor. Finally, the most complex variant H provides full net analysis including measuring and calculation of harmonic content. With the integrated LCD, ACB equipped with the H version of tripping unit fully replaces separate use of net analyzer, the functionality is in the tripping unit itself.

The analyses variants do not allow the informational or alarm functions only. Key parameters of given analysis can be set also as a protection function which means they can initiate tripping of the breaker.

Tripping units "Smart Unit" +SU

All versions of SU (except variants A) can be extended with communication possibilities with ModBus-RTU protocol. For all versions there is available function ZSI (Zone Selective Interlocking), see page 54.

The tripping units SU are equipped with a rating plug. Please refer to particular type page for information about down rating possibilities.

External power supply of tripping unit SU allows operation with the unit in case when main voltage is off (also e.g. in disconnected position of a withdrawable breaker). It assures also preserving of data logs in the unit. The external power supply is recommended when highest possible accuracy of measured data is required - power consumption of SU is covered with energy from external supply, not from measuring transformers. The external power supply is necessary to allow operation of SU, storing and accessing fault reasons when the breaker is open, in case that chosen main voltage side of ACBs differs from the side of measuring transformers. In such case, SU does not have power supply when the breaker is open.

Tripping units "Smart Unit" +SU

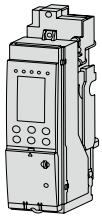
Function overview		Smart Unit measurement type			
		A	D	P	H
Protection functions	Overload protection	■	■	■	■
	Overload pre-alarm	■	■	■	■
	Short-circuit short delay protection	■	■	■	■
	Short-circuit instantaneous protection	■	■	■	■
	Ground-fault protection (4.0 only), alarm	■	■	■	■
	Earth leakage protection (5.0 only), alarm	■	■	■	■
	MCR & HSISC protection	■	■	■	■
	Unbalanced current protection, alarm	■	■	■	■
	Neutral conductor protection	■	■	■	■
	Temperature protection, alarm	■	■	■	■
	Thermal memory	■	■	■	■
	Overvoltage protection, alarm	–	■	■	■
	Undervoltage protection, alarm	–	■	■	■
	Unbalanced Voltage protection, alarm	–	■	■	■
	Over-frequency protection, alarm	–	■	■	■
	Under-frequency protection, alarm	–	■	■	■
	Phase rotation protection	–	■	■	■
	Reverse Power protection	–	–	■	■
	Harmonic Wave protection	–	–	–	■
Measurement functions	Current measurement	■	■	■	■
	Voltage measurement	–	■	■	■
	Frequency measurement	–	■	■	■
	Unbalanced Voltage measurement	–	■	■	■
	Phase rotation detection	–	■	■	■
	Power Factor measurement	–	–	■	■
	Electric energy measurement	–	–	■	■
	Harmonic Wave analysis	–	–	–	■
Maitenance functions	8 latest fault record	■	■	■	■
	8 latest alarm record	■	■	■	■
	8 latest operations record	■	■	■	■
	Historic current peak value	■	■	■	■
	Contact wear indication	■	■	■	■
	Operating cycles	■	■	■	■
	Clock function	■	■	■	■
	Self diagnosis	■	■	■	■
Optional	Zone Selective Interlock (ZSI)	□	□	□	□
	Communication function (Modbus)	–	□	□	□
	Programmable DO outputs	□	□	□	□

Tripping units "Smart Unit" +SU3.0

- **Selective protection (LSI)**
- Three-colour LCD display for alarm and fault indication (except A version)
- Real-time status indicator
- Load monitoring
- Rating-plug for nominal current included
- Optional communication possibility (except A version), ZSI function
- External power supply can be connected via secondary terminals (#1, 2). It allows storing of data and SU operation without main voltage present and also higher accuracy of measured voltages and currents. Recommended when above main terminals are used for line voltage connection to allow operation of SU when ACB is open.
- Basic protection functions of SU are supplied from main voltage of ACB
- N protection for 3P breakers in combination with NEC transformer
- Current/Voltage/Power/Harmonic measurement and protection types
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n
- Fine setting of tripping parameters via LCD menu

A-type - LSI protection with analysis of currents

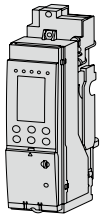
- Protection functions (overload, short-circuit, unbalance, neutral conductor, temperature)
- Measurement functions (current, thermal)
- LCD display



Analysis type	Ext. power supply	Article No.	Type
Current	230 V AC	105025	+SU30A AC230
Current	400 V AC	105026	+SU30A AC400
Current	24 V DC	105027	+SU30A DC24

D-type - LSI protection with analyses of currents and voltages

- Protection functions (as A-type plus overvoltage, undervoltage, voltage unbalance, frequency, phase sequence)
- Measurement functions (as A-type plus voltage, frequency, voltage unbalance, phase sequence)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Voltage	230 V AC	105028	+SU30D AC230
Voltage	400 V AC	105029	+SU30D AC400
Voltage	24 V DC	105030	+SU30D DC24

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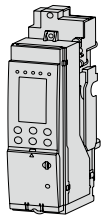
Tripping units "Smart Unit" +SU3.0

P-type - LSI protection with analyses of currents, voltages and powers

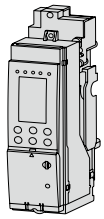
- Protection functions (as D-type plus reverse power protection)
- Measurement functions (as D-type plus power factor, electric energy)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Power	230 V AC	105031	+SU30P AC230
Power	400 V AC	105032	+SU30P AC400
Power	24 V DC	105033	+SU30P DC24

H-type - LSI protection with complete net analysis

- Protection functions (as P-type plus harmonic wave)
- Measurement functions (as P-type plus harmonic wave)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Harmonic	230 V AC	105034	+SU30H AC230
Harmonic	400 V AC	105035	+SU30H AC400
Harmonic	24 V DC	105036	+SU30H DC24

Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

	Article No.	Type
	105734	+VM3P4W

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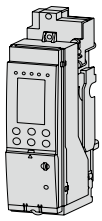
Tripping units "Smart Unit" +SU4.0

- **Selective protection (LSI) + ground-fault protection (G)**
- Three-colour LCD display for alarm and fault indication (except A version)
- Real-time status indicator
- Load monitoring
- Rating-plug for nominal current included
- Optional communication possibility (except A version), ZSI function
- External power supply can be connected via secondary terminals (#1, 2). It allows storing of data and SU operation without main voltage present and also higher accuracy of measured voltages and currents. Recommended when above main terminals are used for line voltage connection to allow operation of SU when ACB is open.
- Basic protection functions of SU are supplied from main voltage of ACB
- Ground fault protection can be realized as differential residual current function or source ground fault function. Source ground fault function requires a use of external transformer WEC (ordered separately). WEC transformer measures actual current through PE conductor (usually grounding of transformer neutral point).
- Ground fault by means of differential residual current as default. When source ground fault function with WEC is required, please add item +GECT to ordered ACB. WEC and +GECT in preparation (please check actual pricelist for availability)
- When WEC transformer is used it is not possible to install NEC transformer for N protection with 3P ACB (connection to the same secondary terminals)
- Current/Voltage/Power/Harmonic measurement and protection types
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n
- Fine setting of tripping parameters via LCD menu

A-type - LSIG protection with analysis of currents

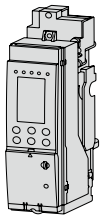
- Protection functions (overload, short-circuit, unbalanced, neutral conductor, temperature)
- Measurement functions (current, thermal)
- LCD display



Analysis type	Ext. power supply	Article No.	Type
Current	230 V AC	105037	+SU40A AC230
Current	400 V AC	105038	+SU40A AC400
Current	24 V DC	105039	+SU40A DC24

D-type - LSIG protection with analyses of currents and voltages

- Protection functions (as A-type plus overvoltage, undervoltage, voltage unbalance, frequency, phase sequence)
- Measurement functions (as A-type plus voltage, frequency, voltage unbalance, phase sequence)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Voltage	230 V AC	105040	+SU40D AC230
Voltage	400 V AC	105041	+SU40D AC400
Voltage	24 V DC	105042	+SU40D DC24

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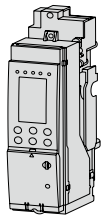
Tripping units "Smart Unit" +SU4.0

P-type - LSIG protection with analyses of currents, voltages and powers

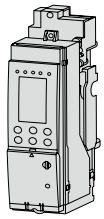
- Protection functions (as D-type plus reverse power protection)
- Measurement functions (as D-type plus power factor, electric energy)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Power	230 V AC	105043	+SU40P AC230
Power	400 V AC	105044	+SU40P AC400
Power	24 V DC	105045	+SU40P DC24

H-type - LSIG protection with complete net analysis

- Protection functions (as P-type plus harmonic wave)
- Measurement functions (as P-type plus harmonic wave)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Harmonic	230 V AC	105046	+SU40H AC230
Harmonic	400 V AC	105047	+SU40H AC400
Harmonic	24 V DC	105048	+SU40H DC24

Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

Article No.	Type
105734	+VM3P4W

Ground fault function with WEC transformer

- When source ground fault function with WEC is required, please add item +GECT to ordered ACB.
- WEC and +GECT in preparation (please check actual pricelist for availability)

Article No.	Type
105733	+GECT

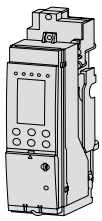
Technical data p. 58

Tripping units "Smart Unit" +SU5.0

- **Selective protection (LSI) + earth-leakage protection (E)**
- Three-colour LCD display for alarm and fault indication (except A version)
- Real-time status indicator
- Load monitoring
- Rating-plug for nominal current included
- Optional communication possibility (except A version), ZSI function
- External power supply can be connected via secondary terminals (#1, 2). It allows storing of data and SU operation without main voltage present and also higher accuracy of measured voltages and currents. Recommended when above main terminals are used for line voltage connection to allow operation of SU when ACB is open.
- Basic protection functions of SU are supplied from main voltage of ACB
- Earth leakage protection in combination with LEC transformer (it is necessary to order separately) measuring differential residual current in working conductors
- Current/Voltage/Power/Harmonic measurement and protection types
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n
- Fine setting of tripping parameters via LCD menu

A-type - LSIE protection with analysis of currents

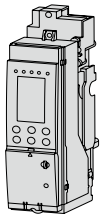
- Protection functions (overload, short-circuit, unbalanced, neutral conductor, temperature)
- Measurement functions (current, thermal)
- LCD display



Analysis type	Ext. power supply	Article No.	Type
Current	230 V AC	105049	+SU50A AC230
Current	400 V AC	105050	+SU50A AC400
Current	24 V DC	105051	+SU50A DC24

D-type - LSIE protection with analyses of currents and voltages

- Protection functions (as A-type plus overvoltage, undervoltage, voltage unbalance, frequency, phase sequence)
- Measurement functions (as A-type plus voltage, frequency, voltage unbalance, phase sequence)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Voltage	230 V AC	105052	+SU50D AC230
Voltage	400 V AC	105053	+SU50D AC400
Voltage	24 V DC	105054	+SU50D DC24

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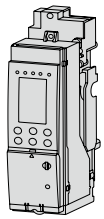
Tripping units "Smart Unit" +SU5.0

P-type - LSIE protection with analyses of currents, voltages and powers

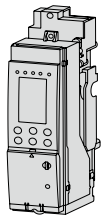
- Protection functions (as D-type plus reverse power protection)
- Measurement functions (as D-type plus power factor, electric energy)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Power	230 V AC	105055	+SU50P AC230
Power	400 V AC	105056	+SU50P AC400
Power	24 V DC	105057	+SU50P DC24

H-type - LSIE protection with complete net analysis

- Protection functions (as P-type plus harmonic wave)
- Measurement functions (as P-type plus harmonic wave)
- Optional Modbus communication (+COM MODBUS, see page 54)
- Coloured LCD display
- For voltage based measurement and analyses, system voltages must be connected to secondary terminals #24-27
- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB



Analysis type	Ext. power supply	Article No.	Type
Harmonic	230 V AC	105058	+SU50H AC230
Harmonic	400 V AC	105059	+SU50H AC400
Harmonic	24 V DC	105060	+SU50H DC24

Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

	Article No.	Type
	105734	+VM3P4W

Technical data p. 58

Air Circuit Breakers Ex9A16

- **Air circuit breakers, frame size A16**
- **Rated current up to 1600 A**
- **Rated operating voltage 690 V AC**
- **Breaking capacity I_{cu} 55 and 65 kA**
- **Fixed and withdrawable versions**
- **ACBs category B acc. to EN 60947-2**
- **Free choice of tripping unit SU**
- **Very compact design**
- **Screwless secondary terminals**
- **Wide range of accessories**

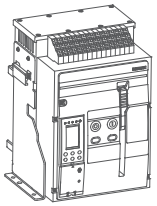
Type Key

Ex9	A	16	N	3P	F	1250
Product family	Product	Frame size	Breaking capacity	Poles	Version	Rated current
Ex9	A: ACBs	16: to 1600 A	N: 55 kA Q: 65 kA	3P 4P	F: Fixed D/O: With-drawable	400 - 1600 A

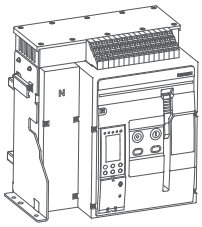
Air Circuit Breakers Ex9A16

- Fixed version
- Frame size A16
- Rated current up to 1600 A
- Rated short-circuit breaking capacity I_{cu} 55 and 65 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: fixed Air Circuit Breaker body, full set of secondary terminals, tripping unit (see previous point), door frame, main terminals mounted in horizontal position, alarm contacts
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

Fixed version, I_{cu} = 55 kA at 415 V AC

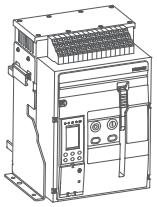


Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	400 A	160-400 A	800-6000 A	104858	Ex9A16N 3P F 400	1
3P	630 A	252-630 A	1260-9450 A	104860	Ex9A16N 3P F 630	1
3P	800 A	320-800 A	1600-12000 A	104862	Ex9A16N 3P F 800	1
3P	1000 A	400-1000 A	2000-15000 A	104864	Ex9A16N 3P F 1000	1
3P	1250 A	500-1250 A	2500-18750 A	104866	Ex9A16N 3P F 1250	1
3P	1600 A	640-1600 A	3200-24000 A	104868	Ex9A16N 3P F 1600	1

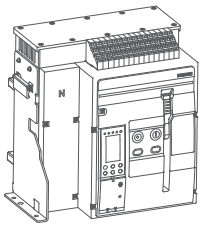


4P	400 A	160-400 A	800-6000 A	104870	Ex9A16N 4P F 400	1
4P	630 A	252-630 A	1260-9450 A	104872	Ex9A16N 4P F 630	1
4P	800 A	320-800 A	1600-12000 A	104874	Ex9A16N 4P F 800	1
4P	1000 A	400-1000 A	2000-15000 A	104876	Ex9A16N 4P F 1000	1
4P	1250 A	500-1250 A	2500-18750 A	104878	Ex9A16N 4P F 1250	1
4P	1600 A	640-1600 A	3200-24000 A	104880	Ex9A16N 4P F 1600	1

Fixed version, I_{cu} = 65 kA at 415 V AC



Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	
3P	400 A	160-400 A	800-6000 A	104882	Ex9A16Q 3P F 400	1
3P	630 A	252-630 A	1260-9450 A	104884	Ex9A16Q 3P F 630	1
3P	800 A	320-800 A	1600-12000 A	104886	Ex9A16Q 3P F 800	1
3P	1000 A	400-1000 A	2000-15000 A	104888	Ex9A16Q 3P F 1000	1
3P	1250 A	500-1250 A	2500-18750 A	104890	Ex9A16Q 3P F 1250	1
3P	1600 A	640-1600 A	3200-24000 A	104892	Ex9A16Q 3P F 1600	1



4P	400 A	160-400 A	800-6000 A	104894	Ex9A16Q 4P F 400	1
4P	630 A	252-630 A	1260-9450 A	104896	Ex9A16Q 4P F 630	1
4P	800 A	320-800 A	1600-12000 A	104898	Ex9A16Q 4P F 800	1
4P	1000 A	400-1000 A	2000-15000 A	104900	Ex9A16Q 4P F 1000	1
4P	1250 A	500-1250 A	2500-18750 A	104902	Ex9A16Q 4P F 1250	1
4P	1600 A	640-1600 A	3200-24000 A	104904	Ex9A16Q 4P F 1600	1

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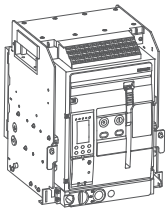
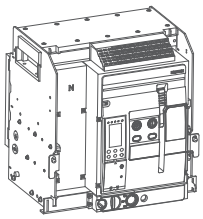
Air Circuit Breakers Ex9A16

- Withdrawable version
- Frame size A16
- Rated current up to 1600 A
- Rated short-circuit breaking capacity I_{cu} 55 and 65 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: withdrawable Air Circuit Breaker body, holder, tripping unit (see previous point), door frame, alarm contacts
- Cassete to be selected separatelly (ordered as premounted or separate delivery)
- Cassete equipped with full set of secondary terminals, mechanical device position indicator, safety shutters of main terminals
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

Withdrawable version, I_{cu} = 55 kA at 415 V AC

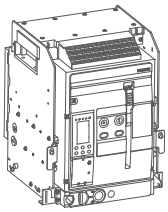


Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	400 A	160-400 A	800-6000 A	104857	Ex9A16N 3P D/O 400	1
3P	630 A	252-630 A	1260-9450 A	104859	Ex9A16N 3P D/O 630	1
3P	800 A	320-800 A	1600-12000 A	104861	Ex9A16N 3P D/O 800	1
3P	1000 A	400-1000 A	2000-15000 A	104863	Ex9A16N 3P D/O 1000	1
3P	1250 A	500-1250 A	2500-18750 A	104865	Ex9A16N 3P D/O 1250	1
3P	1600 A	640-1600 A	3200-24000 A	104867	Ex9A16N 3P D/O 1600	1

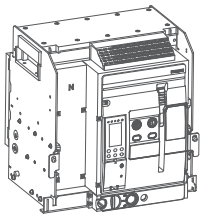


4P	400 A	160-400 A	800-6000 A	104869	Ex9A16N 4P D/O 400	1
4P	630 A	252-630 A	1260-9450 A	104871	Ex9A16N 4P D/O 630	1
4P	800 A	320-800 A	1600-12000 A	104873	Ex9A16N 4P D/O 800	1
4P	1000 A	400-1000 A	2000-15000 A	104875	Ex9A16N 4P D/O 1000	1
4P	1250 A	500-1250 A	2500-18750 A	104877	Ex9A16N 4P D/O 1250	1
4P	1600 A	640-1600 A	3200-24000 A	104879	Ex9A16N 4P D/O 1600	1

Withdrawable version, I_{cu} = 65 kA at 415 V AC



Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	400 A	160-400 A	800-6000 A	104881	Ex9A16Q 3P D/O 400	1
3P	630 A	252-630 A	1260-9450 A	104883	Ex9A16Q 3P D/O 630	1
3P	800 A	320-800 A	1600-12000 A	104885	Ex9A16Q 3P D/O 800	1
3P	1000 A	400-1000 A	2000-15000 A	104887	Ex9A16Q 3P D/O 1000	1
3P	1250 A	500-1250 A	2500-18750 A	104889	Ex9A16Q 3P D/O 1250	1
3P	1600 A	640-1600 A	3200-24000 A	104891	Ex9A16Q 3P D/O 1600	1



4P	400 A	160-400 A	800-6000 A	104893	Ex9A16Q 4P D/O 400	1
4P	630 A	252-630 A	1260-9450 A	104895	Ex9A16Q 4P D/O 630	1
4P	800 A	320-800 A	1600-12000 A	104897	Ex9A16Q 4P D/O 800	1
4P	1000 A	400-1000 A	2000-15000 A	104899	Ex9A16Q 4P D/O 1000	1
4P	1250 A	500-1250 A	2500-18750 A	104901	Ex9A16Q 4P D/O 1250	1
4P	1600 A	640-1600 A	3200-24000 A	104903	Ex9A16Q 4P D/O 1600	1

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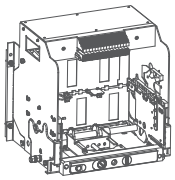
Cassete for Ex9A16 withdrawable ACBs

- Safety shutters of main terminals connectors in the scope of delivery
- Equipped with full set of secondary terminals and mechanical device position indicator
- Delivered with main terminals in horizontal position



Version	Poles	Rated current I_n	Article No.	Type	Packing
Premounted	3P	630 A	105139	+CAS 11 3P 630	1
Premounted	3P	1600 A	105140	+CAS 11 3P 1600	1
Premounted	4P	630 A	105141	+CAS 11 4P 630	1
Premounted	4P	1600 A	105142	+CAS 11 4P 1600	1
Separately orderable	3P	630 A	105157	CAS 11 3P 630	1
Separately orderable	3P	1600 A	105158	CAS 11 3P 1600	1
Separately orderable	4P	630 A	105159	CAS 11 4P 630	1
Separately orderable	4P	1600 A	105160	CAS 11 4P 1600	1

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Air Circuit Breakers Ex9A25

In preparation...

- **Air circuit breakers, frame size A25**
- **Rated current up to 2500 A**
- **Rated operating voltage 690 V AC**
- **Breaking capacity I_{cu} 65 and 85 kA**
- **I_{cs} = 100 % I_{cu}**
- **Fixed and withdrawable versions**
- **ACBs category B acc. to EN 60947-2**
- **Free choice of tripping unit SU**
- **Compact design**
- **Screwless secondary terminals**
- **Wide range of accessories**

ACBs of frame size A25 and all related accessories are in preparation.

Expected availability is 12/2014 (see actual pricelist)

Type Key

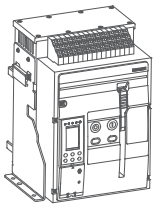
Ex9	A	25	Q	3P	F	1250
Product family	Product	Frame size	Breaking capacity	Poles	Version	Rated current
Ex9	A: ACBs	25: to 2500 A	Q: 65 kA R: 85 kA	3P 4P	F: Fixed D/O: With-drawable	630 - 2500 A

Air Circuit Breakers Ex9A25

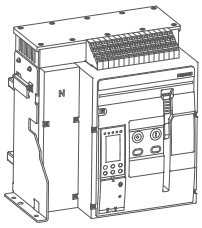
In preparation...

- Fixed version
- Frame size A25
- Rated current up to 2500 A
- Rated short-circuit breaking capacity I_{cu} 65 and 85 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: fixed Air Circuit Breaker body, full set of secondary terminals, tripping unit (see previous point), door frame, main terminals mounted in horizontal position, alarm contacts
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

Fixed version, I_{cu} = 65 kA at 415 V AC

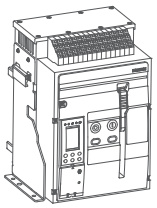


Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	630 A	252-630 A	1260-9450 A	105735	Ex9A25Q 3P F 630	1
3P	800 A	320-800 A	1600-12000 A	105736	Ex9A25Q 3P F 800	1
3P	1000 A	400-1000 A	2000-15000 A	105737	Ex9A25Q 3P F 1000	1
3P	1250 A	500-1250 A	2500-18750 A	105738	Ex9A25Q 3P F 1250	1
3P	1600 A	640-1600 A	3200-24000 A	105739	Ex9A25Q 3P F 1600	1
3P	2000 A	800-2000 A	4000-30000 A	105740	Ex9A25Q 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	105741	Ex9A25Q 3P F 2500	1

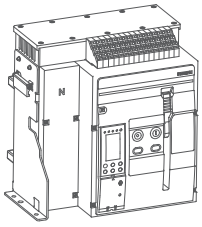


4P	630 A	252-630 A	1260-9450 A	105742	Ex9A25Q 4P F 630	1
4P	800 A	320-800 A	1600-12000 A	105743	Ex9A25Q 4P F 800	1
4P	1000 A	400-1000 A	2000-15000 A	105744	Ex9A25Q 4P F 1000	1
4P	1250 A	500-1250 A	2500-18750 A	105745	Ex9A25Q 4P F 1250	1
4P	1600 A	640-1600 A	3200-24000 A	105746	Ex9A25Q 4P F 1600	1
4P	2000 A	800-2000 A	4000-30000 A	105747	Ex9A25Q 4P F 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	105748	Ex9A25Q 4P F 2500	1

Fixed version, I_{cu} = 85 kA at 415 V AC



Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	
3P	630 A	252-630 A	1260-9450 A	105749	Ex9A25R 3P F 630	1
3P	800 A	320-800 A	1600-12000 A	105750	Ex9A25R 3P F 800	1
3P	1000 A	400-1000 A	2000-15000 A	105751	Ex9A25R 3P F 1000	1
3P	1250 A	500-1250 A	2500-18750 A	105752	Ex9A25R 3P F 1250	1
3P	1600 A	640-1600 A	3200-24000 A	105753	Ex9A25R 3P F 1600	1
3P	2000 A	800-2000 A	4000-30000 A	105754	Ex9A25R 3P F 1600	1
3P	2500 A	1000-2500 A	5000-37500 A	105755	Ex9A25R 3P F 1600	1



4P	630 A	252-630 A	1260-9450 A	105756	Ex9A25R 4P F 630	1
4P	800 A	320-800 A	1600-12000 A	105757	Ex9A25R 4P F 800	1
4P	1000 A	400-1000 A	2000-15000 A	105758	Ex9A25R 4P F 1000	1
4P	1250 A	500-1250 A	2500-18750 A	105759	Ex9A25R 4P F 1250	1
4P	1600 A	640-1600 A	3200-24000 A	105760	Ex9A25R 4P F 1600	1
4P	2000 A	800-2000 A	4000-30000 A	105761	Ex9A25R 4P F 1600	1
4P	2500 A	1000-2500 A	5000-37500 A	105762	Ex9A25R 4P F 1600	1

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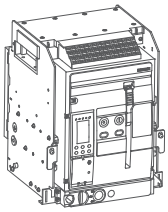
Air Circuit Breakers Ex9A25

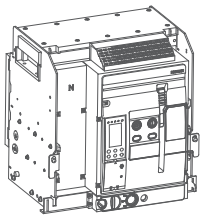
In preparation...

- Withdrawable version
- Frame size A25
- Rated current up to 2500 A
- Rated short-circuit breaking capacity I_{cu} 65 and 85 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: withdrawable Air Circuit Breaker body, holder, tripping unit (see previous point), door frame, alarm contacts
- Cassete to be selected separatelly (ordered as premounted or separate delivery)
- Cassete equipped with full set of secondary terminals, mechanical device position indicator, safety shutters of main terminals
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

Withdrawable version, I_{cu} = 65 kA at 415 V AC

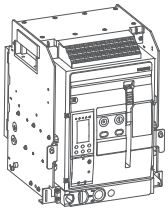


Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	630 A	252-630 A	1260-9450 A	105763	Ex9A25Q 3P D/O 630	1
3P	800 A	320-800 A	1600-12000 A	105764	Ex9A25Q 3P D/O 800	1
3P	1000 A	400-1000 A	2000-15000 A	105765	Ex9A25Q 3P D/O 1000	1
3P	1250 A	500-1250 A	2500-18750 A	105766	Ex9A25Q 3P D/O 1250	1
3P	1600 A	640-1600 A	3200-24000 A	105767	Ex9A25Q 3P D/O 1600	1
3P	2000 A	800-2000 A	4000-30000 A	105768	Ex9A25Q 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	105769	Ex9A25Q 3P D/O 2500	1

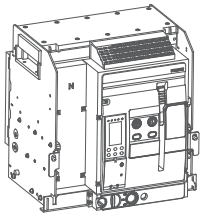


4P	630 A	252-630 A	1260-9450 A	105770	Ex9A25Q 4P D/O 630	1
4P	800 A	320-800 A	1600-12000 A	105771	Ex9A25Q 4P D/O 800	1
4P	1000 A	400-1000 A	2000-15000 A	105772	Ex9A25Q 4P D/O 1000	1
4P	1250 A	500-1250 A	2500-18750 A	105773	Ex9A25Q 4P D/O 1250	1
4P	1600 A	640-1600 A	3200-24000 A	105774	Ex9A25Q 4P D/O 1600	1
4P	2000 A	800-2000 A	4000-30000 A	105775	Ex9A25Q 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	105776	Ex9A25Q 4P D/O 2500	1

Withdrawable version, I_{cu} = 85 kA at 415 V AC



Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	630 A	252-630 A	1260-9450 A	105777	Ex9A25R 3P D/O 630	1
3P	800 A	320-800 A	1600-12000 A	105778	Ex9A25R 3P D/O 800	1
3P	1000 A	400-1000 A	2000-15000 A	105779	Ex9A25R 3P D/O 1000	1
3P	1250 A	500-1250 A	2500-18750 A	105780	Ex9A25R 3P D/O 1250	1
3P	1600 A	640-1600 A	3200-24000 A	105781	Ex9A25R 3P D/O 1600	1
3P	2000 A	800-2000 A	4000-30000 A	105782	Ex9A25R 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	105783	Ex9A25R 3P D/O 2500	1



4P	630 A	252-630 A	1260-9450 A	105784	Ex9A25R 4P D/O 630	1
4P	800 A	320-800 A	1600-12000 A	105785	Ex9A25R 4P D/O 800	1
4P	1000 A	400-1000 A	2000-15000 A	105786	Ex9A25R 4P D/O 1000	1
4P	1250 A	500-1250 A	2500-18750 A	105787	Ex9A25R 4P D/O 1250	1
4P	1600 A	640-1600 A	3200-24000 A	105788	Ex9A25R 4P D/O 1600	1
4P	2000 A	800-2000 A	4000-30000 A	105789	Ex9A25R 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	105790	Ex9A25R 4P D/O 2500	1

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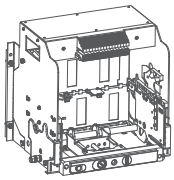
Air Circuit Breakers Ex9A25

In preparation...

Cassete for Ex9A25 withdrawable ACBs

- Safety shutters of main terminals connectors in the scope of delivery
- Equipped with full set of secondary terminals and mechanical device position indicator
- Delivered with main terminals in horizontal position



Version	Poles	Rated current I_n	Article No.	Type	Packing
Premounted	3P	630-1600 A	105791	+CAS 14 3P 1600	1
Premounted	3P	2000-2500 A	105792	+CAS 14 3P 2500	1
Premounted	4P	630-1600 A	105793	+CAS 14 4P 1600	1
Premounted	4P	2000-2500 A	105794	+CAS 14 4P 2500	1
Separately orderable	3P	630-1600 A	105795	CAS 14 3P 1600	1
Separately orderable	3P	2000-2500 A	105796	CAS 14 3P 2500	1
Separately orderable	4P	630-1600 A	105797	CAS 14 4P 1600	1
Separately orderable	4P	2000-2500 A	105798	CAS 14 4P 2500	1

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Air Circuit Breakers Ex9A32

- **Air circuit breakers, frame size A32**
- **Rated current I_n up to 3200 A**
- **Rated operating voltage 690 V AC**
- **Breaking capacity I_{cu} 65, 85 and 100 kA**
- **I_{cs} = 100 % I_{cu}**
- **Fixed and withdrawable versions**
- **ACBs category B acc. to EN 60947-2**
- **Free choice of tripping unit SU**
- **Wide range of accessories**

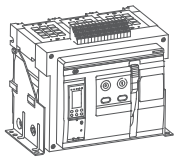
Type Key

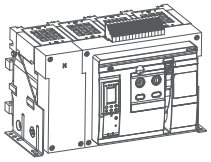
Ex9	A	32	Q	3P	D/O	2000
Product family	Product	Frame size	Breaking capacity	Poles	Version	Rated current
Ex9	A: ACBs	32: to 3200 A	Q: 65 kA R: 85 kA H: 100 kA	3P 4P	F: Fixed D/O: With-drawable	1600-3200 A

Air Circuit Breakers Ex9A32

- Fixed version
- Frame size A32
- Rated current up to 3200 A
- Rated short-circuit breaking capacity I_{cu} 65, 85 and 100 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: fixed Air Circuit Breaker body, full set of secondary terminals, tripping unit (see previous point), door frame, main terminals in horizontal position, alarm contacts
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

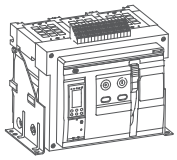
Fixed version, I_{cu} = 65 kA at 415 V AC

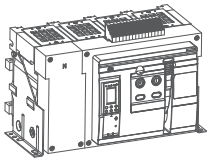




Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	1600 A	640-1600 A	3200-24000 A	104906	Ex9A32Q 3P F 1600	1
3P	2000 A	800-2000 A	4000-30000 A	104908	Ex9A32Q 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104910	Ex9A32Q 3P F 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104912	Ex9A32Q 3P F 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104914	Ex9A32Q 3P F 3200	1
4P	1600 A	640-1600 A	3200-24000 A	104916	Ex9A32Q 4P F 1600	1
4P	2000 A	800-2000 A	4000-30000 A	104918	Ex9A32Q 4P F 2000	1
4P	2500 A	1160-2900 A	5800-43500 A	104920	Ex9A32Q 4P F 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104922	Ex9A32Q 4P F 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104924	Ex9A32Q 4P F 3200	1

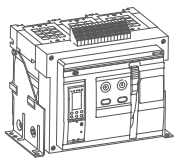
Fixed version, I_{cu} = 85 kA at 415 V AC

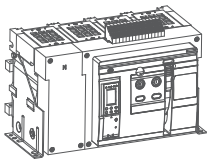




Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	1600 A	640-1600 A	3200-24000 A	104926	Ex9A32R 3P F 1600	1
3P	2000 A	800-2000 A	4000-30000 A	104928	Ex9A32R 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104930	Ex9A32R 3P F 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104932	Ex9A32R 3P F 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104934	Ex9A32R 3P F 3200	1
4P	1600 A	640-1600 A	3200-24000 A	104936	Ex9A32R 4P F 1600	1
4P	2000 A	800-2000 A	4000-30000 A	104938	Ex9A32R 4P F 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104940	Ex9A32R 4P F 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104942	Ex9A32R 4P F 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104944	Ex9A32R 4P F 3200	1

Fixed version, I_{cu} = 100 kA at 415 V AC





Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	1600 A	640-1600 A	3200-24000 A	104946	Ex9A32H 3P F 1600	1
3P	2000 A	800-2000 A	4000-30000 A	104948	Ex9A32H 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104950	Ex9A32H 3P F 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104952	Ex9A32H 3P F 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104954	Ex9A32H 3P F 3200	1
4P	1600 A	640-1600 A	3200-24000 A	104956	Ex9A32H 4P F 1600	1
4P	2000 A	800-2000 A	4000-30000 A	104958	Ex9A32H 4P F 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104960	Ex9A32H 4P F 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104962	Ex9A32H 4P F 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104964	Ex9A32H 4P F 3200	1

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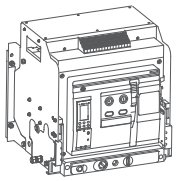
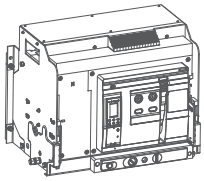
Air Circuit Breakers Ex9A32

- Withdrawable version
- Frame size A32
- Rated current up to 3200 A
- Rated short-circuit breaking capacity I_{cu} 65, 85 and 100 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: withdrawable Air Circuit Breaker body, holder, tripping unit (see previous point), door frame, alarm contacts
- Cassete to be selected separatelly (ordered as premounted or separate delivery)
- Cassete equipped with full set of secondary terminals, mechanical device position indicator, safety shutters of main terminals
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

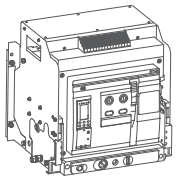
Withdrawable version, I_{cu} = 65 kA at 415 V AC

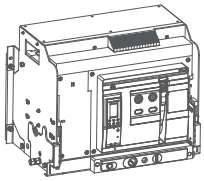




Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	1600 A	640-1600 A	3200-24000 A	104905	Ex9A32Q 3P D/O 1600	1
3P	2000 A	800-2000 A	4000-30000 A	104907	Ex9A32Q 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104909	Ex9A32Q 3P D/O 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104911	Ex9A32Q 3P D/O 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104913	Ex9A32Q 3P D/O 3200	1
4P	1600 A	640-1600 A	3200-24000 A	104915	Ex9A32Q 4P D/O 1600	1
4P	2000 A	800-2000 A	4000-30000 A	104917	Ex9A32Q 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104919	Ex9A32Q 4P D/O 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104921	Ex9A32Q 4P D/O 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104923	Ex9A32Q 4P D/O 3200	1

Withdrawable version, I_{cu} = 85 kA at 415 V AC





Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	1600 A	640-1600 A	3200-24000 A	104925	Ex9A32R 3P D/O 1600	1
3P	2000 A	800-2000 A	4000-30000 A	104927	Ex9A32R 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104929	Ex9A32R 3P D/O 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104931	Ex9A32R 3P D/O 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104933	Ex9A32R 3P D/O 3200	1
4P	1600 A	640-1600 A	3200-24000 A	104935	Ex9A32R 4P D/O 1600	1
4P	2000 A	800-2000 A	4000-30000 A	104937	Ex9A32R 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104939	Ex9A32R 4P D/O 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104941	Ex9A32R 4P D/O 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104943	Ex9A32R 4P D/O 3200	1

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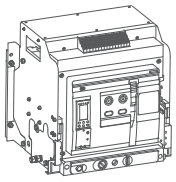
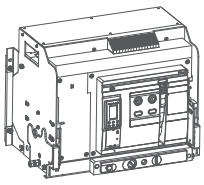
Air Circuit Breakers Ex9A32

Withdrawable version, I_{cu} = 100 kA at 415 V AC



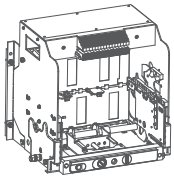
Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	1600 A	640-1600 A	3200-24000 A	104945	Ex9A32H 3P D/O 1600	1
3P	2000 A	800-2000 A	4000-30000 A	104947	Ex9A32H 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104949	Ex9A32H 3P D/O 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104951	Ex9A32H 3P D/O 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104953	Ex9A32H 3P D/O 3200	1



4P	1600 A	640-1600 A	3200-24000 A	104955	Ex9A32H 4P D/O 1600	1
4P	2000 A	800-2000 A	4000-30000 A	104957	Ex9A32H 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104959	Ex9A32H 4P D/O 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104961	Ex9A32H 4P D/O 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104963	Ex9A32H 4P D/O 3200	1

Cassete for Ex9A32 withdrawable ACBs

- Safety shutters of main terminals connectors in the scope of delivery
- Equipped with full set of secondary terminals and mechanical device position indicator
- Delivered with main terminals in horizontal position



Version	Poles	Rated current I_n	Article No.	Type	Packing
Premounted	3P	2500 A	105170	+CAS 12 3P 2500	1
Premounted	3P	3200 A	105171	+CAS 12 3P 3200	1
Premounted	4P	2500 A	105172	+CAS 12 4P 2500	1
Premounted	4P	3200 A	105173	+CAS 12 4P 3200	1
Separately orderable	3P	2500 A	105181	CAS 12 3P 2500	1
Separately orderable	3P	3200 A	105182	CAS 12 3P 3200	1
Separately orderable	4P	2500 A	105193	CAS 12 4P 2500	1
Separately orderable	4P	3200 A	105194	CAS 12 4P 3200	1

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Air Circuit Breakers Ex9A40

- **Air circuit breakers, frame size A40**
- **Rated current I_n up to 4000 A**
- **Rated operating voltage 690 V AC**
- **Breaking capacity I_{cu} 65, 85 and 100 kA**
- **I_{cs} = 100 % I_{cu}**
- **Fixed and withdrawable versions**
- **ACBs category B acc. to EN 60947-2**
- **Free choice of tripping unit SU**
- **Wide range of accessories**

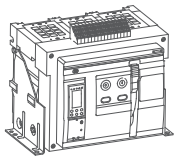
Type Key

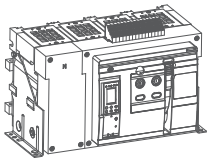
Ex9	A	16	N	3P	F	1250
Product family	Product	Frame size	Breaking capacity	Poles	Version	Rated current
Ex9	A: ACBs	40: to 4000 A	Q: 65 kA R: 85 kA H: 100 kA	3P 4P	F: Fixed D/O: With-drawable	2000-4000 A

Air Circuit Breakers Ex9A40

- Fixed version
- Frame size A40
- Rated current up to 4000 A
- Rated short-circuit breaking capacity I_{cu} 65, 85 and 100 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: fixed Air Circuit Breaker body, full set of secondary terminals, tripping unit (see previous point), door frame, main terminals in horizontal position, alarm contacts
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

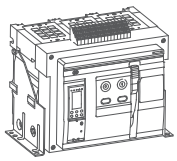
Fixed version, I_{cu} = 65 kA at 415 V AC

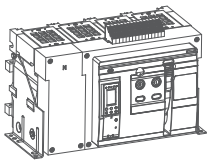




Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	2000 A	800-2000 A	4000-30000 A	104966	Ex9A40Q 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104968	Ex9A40Q 3P F 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104970	Ex9A40Q 3P F 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104972	Ex9A40Q 3P F 3200	1
3P	4000 A	1600-4000 A	8000-60000 A	104974	Ex9A40Q 3P F 4000	1
4P	2000 A	800-2000 A	4000-30000 A	104976	Ex9A40Q 4P F 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104978	Ex9A40Q 4P F 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104980	Ex9A40Q 4P F 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104982	Ex9A40Q 4P F 3200	1
4P	4000 A	1600-4000 A	8000-60000 A	104984	Ex9A40Q 4P F 4000	1

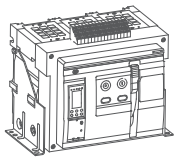
Fixed version, I_{cu} = 85 kA at 415 V AC

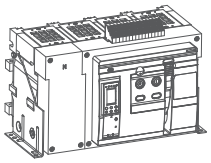




Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	2000 A	800-2000 A	4000-30000 A	104986	Ex9A40R 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104988	Ex9A40R 3P F 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104990	Ex9A40R 3P F 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104992	Ex9A40R 3P F 3200	1
3P	4000 A	1600-4000 A	8000-60000 A	104994	Ex9A40R 3P F 4000	1
4P	2000 A	800-2000 A	4000-30000 A	104996	Ex9A40R 4P F 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104998	Ex9A40R 4P F 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	105000	Ex9A40R 4P F 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	105002	Ex9A40R 4P F 3200	1
4P	4000 A	1600-4000 A	8000-60000 A	105004	Ex9A40R 4P F 4000	1

Fixed version, I_{cu} = 100 kA at 415 V AC





Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	2000 A	800-2000 A	4000-30000 A	105006	Ex9A40H 3P F 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	105008	Ex9A40H 3P F 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	105010	Ex9A40H 3P F 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	105012	Ex9A40H 3P F 3200	1
3P	4000 A	1600-4000 A	8000-60000 A	105014	Ex9A40H 3P F 4000	1
4P	2000 A	800-2000 A	4000-30000 A	105016	Ex9A40H 4P F 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	105018	Ex9A40H 4P F 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	105020	Ex9A40H 4P F 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	105022	Ex9A40H 4P F 3200	1
4P	4000 A	1600-4000 A	8000-60000 A	105024	Ex9A40H 4P F 4000	1

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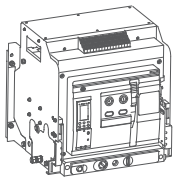
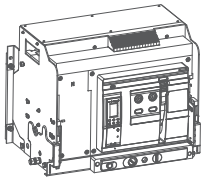
Air Circuit Breakers Ex9A40

- Withdrawable version
- Frame size A40
- Rated current up to 4000 A
- Rated short-circuit breaking capacity I_{cu} 65, 85 and 100 kA
- Device body only, tripping unit must be selected separatelly (see page 9)
- In the scope of delivery: withdrawable Air Circuit Breaker body, holder, tripping unit (see previous point), door frame, alarm contacts
- Cassete to be selected separatelly (ordered as premounted or separate delivery)
- Cassete equipped with full set of secondary terminals, mechanical device position indicator, safety shutters of main terminals
- Setting range of tripping units SU (all versions):
  I_r = 0.4 - 1 x I_n
  I_{sd} = 1.5 - 10 x I_r
  I_i = 2 - 15 x I_n

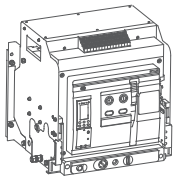
Withdrawable version, I_{cu} = 65 kA at 415 V AC

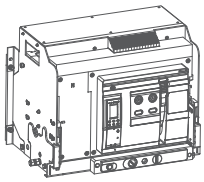




Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	2000 A	800-2000 A	4000-30000 A	104965	Ex9A40Q 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104967	Ex9A40Q 3P D/O 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104969	Ex9A40Q 3P D/O 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104971	Ex9A40Q 3P D/O 3200	1
3P	4000 A	1600-4000 A	8000-60000 A	104973	Ex9A40Q 3P D/O 4000	1
4P	2000 A	800-2000 A	4000-30000 A	104975	Ex9A40Q 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104977	Ex9A40Q 4P D/O 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104979	Ex9A40Q 4P D/O 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	104981	Ex9A40Q 4P D/O 3200	1
4P	4000 A	1600-4000 A	8000-60000 A	104983	Ex9A40Q 4P D/O 4000	1

Withdrawable version, I_{cu} = 85 kA at 415 V AC





Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	2000 A	800-2000 A	4000-30000 A	104985	Ex9A40R 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	104987	Ex9A40R 3P D/O 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	104989	Ex9A40R 3P D/O 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	104991	Ex9A40R 3P D/O 3200	1
3P	4000 A	1600-4000 A	8000-60000 A	104993	Ex9A40R 3P D/O 4000	1
4P	2000 A	800-2000 A	4000-30000 A	104995	Ex9A40R 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	104997	Ex9A40R 4P D/O 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	104999	Ex9A40R 4P D/O 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	105001	Ex9A40R 4P D/O 3200	1
4P	4000 A	1600-4000 A	8000-60000 A	105003	Ex9A40R 4P D/O 4000	1

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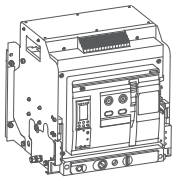
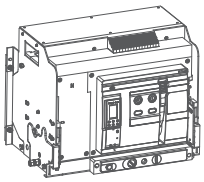
Air Circuit Breakers Ex9A40

Withdrawable version, I_{cu} = 100 kA at 415 V AC



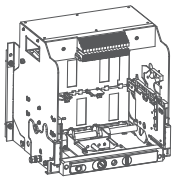
Poles	Rated current I_n	Overcurrent release I_r	Instant. release I_i	Article No.	Type	Packing
3P	2000 A	800-2000 A	4000-30000 A	105005	Ex9A40H 3P D/O 2000	1
3P	2500 A	1000-2500 A	5000-37500 A	105007	Ex9A40H 3P D/O 2500	1
3P	2900 A	1160-2900 A	5800-43500 A	105009	Ex9A40H 3P D/O 2900	1
3P	3200 A	1280-3200 A	6400-48000 A	105011	Ex9A40H 3P D/O 3200	1
3P	4000 A	1600-4000 A	8000-60000 A	105013	Ex9A40H 3P D/O 4000	1



4P	2000 A	800-2000 A	4000-30000 A	105015	Ex9A40H 4P D/O 2000	1
4P	2500 A	1000-2500 A	5000-37500 A	105017	Ex9A40H 4P D/O 2500	1
4P	2900 A	1160-2900 A	5800-43500 A	105019	Ex9A40H 4P D/O 2900	1
4P	3200 A	1280-3200 A	6400-48000 A	105021	Ex9A40H 4P D/O 3200	1
4P	4000 A	1600-4000 A	8000-60000 A	105023	Ex9A40H 4P D/O 4000	1

Cassete for Ex9A40 withdrawable ACBs

- Safety shutters of main terminals connectors in the scope of delivery
- Equipped with full set of secondary terminals and mechanical device position indicator
- Delivered with main terminals in horizontal position



Version	Poles	Rated current I_n	Article No.	Type	Packing
Premounted	3P	4000 A	105204	+CAS 13 3P 4000	1
Premounted	4P	4000 A	105205	+CAS 13 4P 4000	1
Separately orderable	3P	4000 A	107008	CAS 13 3P 4000	1
Separately orderable	4P	4000 A	107009	CAS 13 4P 4000	1

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Air Switch Disconnectors Ex9ASD

- **Air Switch Disconnectors Ex9ASD**
- **Tested according to IEC / EN 60947-3**
- **Rated current up to 4000 A**
- **Short-circuit making capacity I_{cm} up to 187 kA**
- **Rated withstand short-circuit current I_{cw} up to 85 kA / 1 s**
- **Fixed and withdrawable versions**
- **Wide range of accessories**

Air Switch Disconnectors Ex9ASD are intended for switch of high rated current applications with high prospective short circuit current. Thanks to isolation function can be used for all kinds of applications. Common design with Air Circuit Breakers Ex9A allows to use the same accessories and identical installation way.

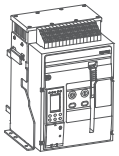
Type Key

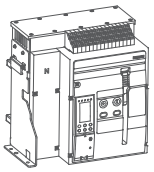
Ex9	A	SD	12	3P	F
Product family	Product	Function	Rated current	Poles	Version
Ex9	A: ACB based device	Switch disconnector	04: 400 A 06: 600 A 08: 800 A 10: 1000 A 12: 1200 A 16: 1600 A 20: 2000 A 25: 2500 A 29: 2900 A 32: 3200 A 40: 4000 A	3P 4P	F: Fixed D/O: With-drawable

Air Switch Disconnectors Ex9ASD

- Fixed version
- Rated current up to 4000 A
- Rated short-circuit making capacity I_{cm} up to 187 kA
- Rated withstand short-circuit current I_{cw} up to 85 kA / 1 s
- In the scope of delivery: fixed Air Switch Disconnector body, full set of secondary terminals, door frame, main terminals mounted in horizontal position

Fixed version, frame size A16





Poles	Rated current I_n	Article No.	Type	Packing
3P	400 A	105064	Ex9ASD04 3P F	1
3P	630 A	105066	Ex9ASD06 3P F	1
3P	800 A	105068	Ex9ASD08 3P F	1
3P	1000 A	105070	Ex9ASD10 3P F	1
3P	1200 A	105072	Ex9ASD12 3P F	1
3P	1600 A	105074	Ex9ASD16 3P F	1
4P	400 A	105090	Ex9ASD04 4P F	1
4P	630 A	105092	Ex9ASD06 4P F	1
4P	800 A	105094	Ex9ASD08 4P F	1
4P	1000 A	105096	Ex9ASD10 4P F	1
4P	1200 A	105098	Ex9ASD12 4P F	1
4P	1600 A	105100	Ex9ASD16 4P F	1

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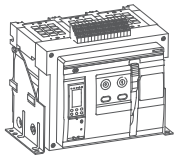
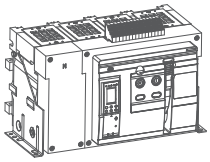
Fixed version, frame size A40





Poles	Rated current I_n	Article No.	Type	Packing
3P	1600 A	107111	Ex9ASD16b 3P F	1
3P	2000 A	105077	Ex9ASD20 3P F	1
3P	2500 A	105079	Ex9ASD25 3P F	1
3P	2900 A	105081	Ex9ASD29 3P F	1
3P	3200 A	105083	Ex9ASD32 3P F	1
3P	3600 A	105085	Ex9ASD36 3P F	1
3P	4000 A	105087	Ex9ASD40 3P F	1
4P	1600 A	107113	Ex9ASD16b 4P F	1
4P	2000 A	105103	Ex9ASD20 4P F	1
4P	2500 A	105105	Ex9ASD25 4P F	1
4P	2900 A	105107	Ex9ASD29 4P F	1
4P	3200 A	105109	Ex9ASD32 4P F	1
4P	3600 A	105111	Ex9ASD36 4P F	1
4P	4000 A	105113	Ex9ASD40 4P F	1

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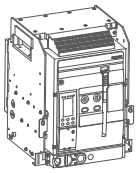
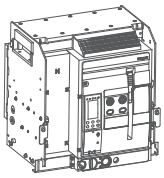
Air Switch Disconnectors Ex9ASD

- Withdrawable version
- Rated current up to 4000 A
- Rated short-circuit making capacity I_{cm} up to 187 kA
- Rated withstand short-circuit current I_{cw} up to 85 kA / 1 s
- In the scope of delivery: withdrawable Air Switch Disconnector body, holder, door frame
- Cassete to be selected separatelly (ordered as premounted or separate delivery)
- Cassete equipped with full set of secondary terminals, mechanical device position indicator, safety shutters of main terminals

Withdrawable version, frame size A16



Poles	Rated current I_n	Article No.	Type	Packing
3P	400 A	105063	Ex9ASD04 3P D/O	1
3P	630 A	105065	Ex9ASD06 3P D/O	1
3P	800 A	105067	Ex9ASD08 3P D/O	1
3P	1000 A	105069	Ex9ASD10 3P D/O	1
3P	1200 A	105071	Ex9ASD12 3P D/O	1
3P	1600 A	105073	Ex9ASD16 3P D/O	1



4P	400 A	105089	Ex9ASD04 4P D/O	1
4P	630 A	105091	Ex9ASD06 4P D/O	1
4P	800 A	105093	Ex9ASD08 4P D/O	1
4P	1000 A	105095	Ex9ASD10 4P D/O	1
4P	1200 A	105097	Ex9ASD12 4P D/O	1
4P	1600 A	105099	Ex9ASD16 4P D/O	1

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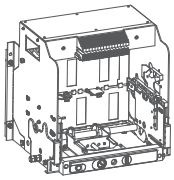
Cassete for A16 frame size withdrawable Switch Disconnectors

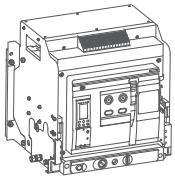
- Safety shutters of main terminals connectors in the scope of delivery
- Equipped with full set of secondary terminals and mechanical device position indicator
- Delivered with main terminals in horizontal position



Version	Poles	Max. rated current I_n	Article No.	Type	Packing
Premounted	3P	630 A	105139	+CAS 11 3P 630	1
Premounted	3P	1600 A	105140	+CAS 11 3P 1600	1
Premounted	4P	630 A	105141	+CAS 11 4P 630	1
Premounted	4P	1600 A	105142	+CAS 11 4P 1600	1
Separately orderable	3P	630 A	105157	CAS 11 3P 630	1
Separately orderable	3P	1600 A	105158	CAS 11 3P 1600	1
Separately orderable	4P	630 A	105159	CAS 11 4P 630	1
Separately orderable	4P	1600 A	105160	CAS 11 4P 1600	1

Air Switch Disconnectors Ex9ASD

Withdrawable version, frame size A40



Poles	Rated current I_n	Article No.	Type	Packing
3P	1600 A	107110	Ex9ASD16b 3P D/O	1
3P	2000 A	105076	Ex9ASD20 3P D/O	1
3P	2500 A	105078	Ex9ASD25 3P D/O	1
3P	2900 A	105080	Ex9ASD29 3P D/O	1
3P	3200 A	105082	Ex9ASD32 3P D/O	1
3P	3600 A	105084	Ex9ASD36 3P D/O	1
3P	4000 A	105086	Ex9ASD40 3P D/O	1
4P	1600 A	107112	Ex9ASD16b 4P D/O	1
4P	2000 A	105102	Ex9ASD20 4P D/O	1
4P	2500 A	105104	Ex9ASD25 4P D/O	1
4P	2900 A	105106	Ex9ASD29 4P D/O	1
4P	3200 A	105108	Ex9ASD32 4P D/O	1
4P	3600 A	105110	Ex9ASD36 4P D/O	1
4P	4000 A	105112	Ex9ASD40 4P D/O	1

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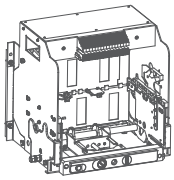
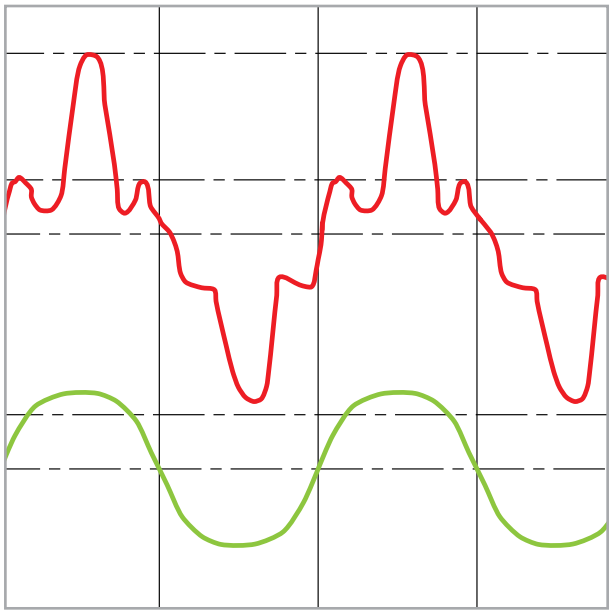
Cassete for A40 frame size withdrawable Switch Disconnectors

- Safety shutters of main terminals connectors in the scope of delivery
- Equipped with full set of secondary terminals and mechanical device position indicator
- Delivered with main terminals in horizontal position



Version	Poles	Max. rated current I_n	Article No.	Type	Packing
Premounted	3P	2500 A	105170	+CAS 12 3P 2500	1
Premounted	3P	3200 A	105171	+CAS 12 3P 3200	1
Premounted	3P	4000 A	105204	+CAS 13 3P 4000	1
Premounted	4P	2500 A	105172	+CAS 12 4P 2500	1
Premounted	4P	3200 A	105173	+CAS 12 4P 3200	1
Premounted	4P	4000 A	105205	+CAS 13 4P 4000	1
Separately orderable	3P	2500 A	105181	CAS 12 3P 2500	1
Separately orderable	3P	3200 A	105182	CAS 12 3P 3200	1
Separately orderable	3P	4000 A	107008	CAS 13 3P 4000	1
Separately orderable	4P	2500 A	105193	CAS 12 4P 2500	1
Separately orderable	4P	3200 A	105194	CAS 12 4P 3200	1
Separately orderable	4P	4000 A	107009	CAS 13 4P 4000	1

Net Analysers



- **Tripping units SU can provide also measuring and calculation functions**
- **Based on the variant of the unit, Net Analyser functionality can be reached**
- **Current, Voltage, Power, Energy and Harmonics analyses**
- **Direct display of alarm functions and analysed values on integrated LCD**
- **Transmission to advanced system via ModBus**
- **Alarm functions by means of programmable digital outputs DO**
- **Tripping actuation of the ACB (i.e. power relay function)**

Tripping units SU of ACBs line Ex9A allow possibility of complete net analysing. It brings significant reduction of structural complexity of a network system as well as reduction of necessary investment. In addition, measured and analysed network parameters can be immediately used for activation of tripping function of given ACB. Tripping unit SU thus offers not only functionality of net analyser but also full function of analyser power relay with extreme breaking capacity.

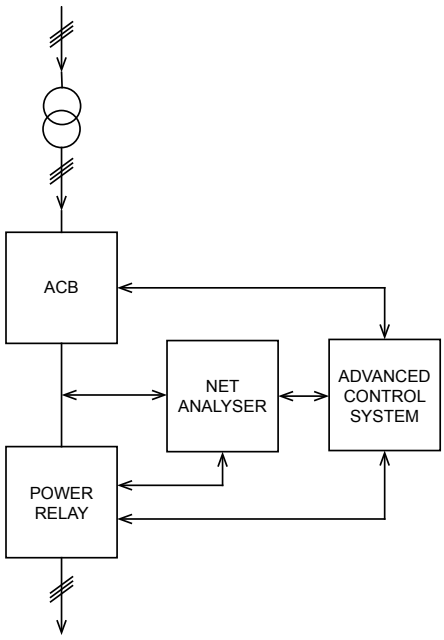


Fig.1. Standard configuration of system with ACB with Net Analyser and power relay.

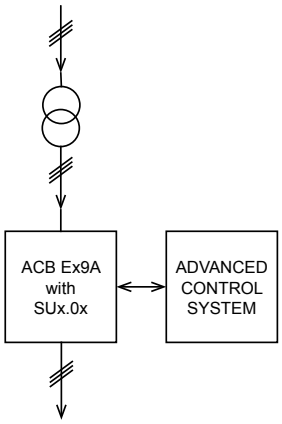


Fig.2. Modern configuration with ACB Ex9A providing functionalitics of ACB, Net Analyser and power relay in one device.

Net Analysers

Measured and analysed data can be consecutively used following ways

- Direct display on SU integrated LCD
- Actuation of alarm or tripping function of ACB
- Transmission of alarm via integrated programmable digital outputs DO
- Transition to advanced system via ModBus interface

By a choice of the type of tripping unit SU (defined with affix A, D, P, H) there is selected level of net analyse performed by the SU. Complete net analyse is provided with SU of variant H. This version allows to perform complex analyse of voltages, currents, frequency, phases, powers, and harmonics. If harmonics analyse is not required, version P can be selected. When also powers are not subject of evaluation, D version is recommended. Basic variant A provides detailed analyse of currents.

Net Analysers

Harmonic analysers SUx.0H

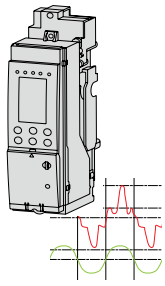
Analyses (displayed)
- Currents (actual, maximum, unbalance, thermal memory)
- Voltages (actual, average, unbalance, frequency, phase rotation)
- Powers (active, reactive, apparent; actual, power factor)
- Energies (active, reactive, apparent; total, total supplied, total consumed)
- Harmonics (voltage and current waveform capture, current and voltage for fundamental frequency, voltage and current THD/thd, amplitude of voltage and current harmonic components FFT)

Alarm functions (display)
- Currents (actual, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)
- Powers (reverse)
- Harmonics (voltage and current THD)

Alarm functions (DO outputs)
- Currents (actual, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)
- Power (reverse)
- Harmonics (current and voltage harmonic fault)

Relay functions (tripping of ACB)
- Currents (actual: I_A, I_B, I_C, I_N, I_g, $I_{\Delta n}$, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)
- Power (reverse)
- Harmonics (voltage and current THD)

If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB.



Line	Ext. power supply	Article No.	Type	Packing
SU3.0	230 V AC	105034	+SU30H AC230	1
SU3.0	400 V AC	105035	+SU30H AC400	1
SU3.0	24 V DC	105036	+SU30H DC24	1
SU4.0	230 V AC	105046	+SU40H AC230	1
SU4.0	400 V AC	105047	+SU40H AC400	1
SU4.0	24 V DC	105048	+SU40H DC24	1
SU5.0	230 V AC	105058	+SU50H AC230	1
SU5.0	400 V AC	105059	+SU50H AC400	1
SU5.0	24 V DC	105060	+SU50H DC24	1

Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

Article No.	Type
105734	+VM3P4W

Technical data p. 58

Net Analysers

Power analysers SUx.0P

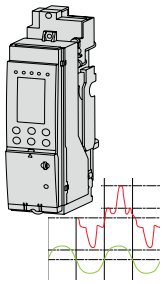
Analyses (displayed)
- Currents (actual, maximum, unbalance, thermal memory)
- Voltages (actual, average, unbalance, frequency, phase rotation)
- Powers (active, reactive, apparent; actual, power factor)
- Energies (active, reactive, apparent; total, total supplied, total consumed)

Alarm functions (display)
- Currents (actual, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)
- Powers (reverse)

Alarm functions (DO outputs)
- Currents (actual, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)
- Power (reverse)

Relay functions (tripping of ACB)
- Currents (actual: I_A, I_B, I_C, I_N, I_g, $I_{\Delta n}$, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)
- Power (reverse)

If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB.



Line	Ext. power supply	Article No.	Type	Packing
SU3.0	230 V AC	105031	+SU30P AC230	1
SU3.0	400 V AC	105032	+SU30P AC400	1
SU3.0	24 V DC	105033	+SU30P DC24	1
SU4.0	230 V AC	105040	+SU40D AC230	1
SU4.0	400 V AC	105041	+SU40D AC400	1
SU4.0	24 V DC	105042	+SU40D DC24	1
SU5.0	230 V AC	105052	+SU50D AC230	1
SU5.0	400 V AC	105053	+SU50D AC400	1
SU5.0	24 V DC	105054	+SU50D DC24	1

Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

Article No.	Type
105734	+VM3P4W

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Net Analysers

Voltage analysers SUx.0D

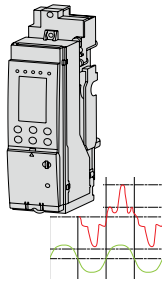
Analyses (displayed)
- Currents (actual, maximum, unbalance, thermal memory)
- Voltages (actual, average, unbalance, frequency, phase rotation)

Alarm functions (display)
- Currents (actual, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)

Alarm functions (DO outputs)
- Currents (actual, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)

Relay functions (tripping of ACB)
- Currents (actual: I_A, I_B, I_C, I_N, I_g, $I_{\Delta n}$, unbalance)
- Voltages (actual, undervoltage, overvoltage, unbalance, underfrequency, overfrequency, phase rotation)

If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB.



Line	Ext. power supply	Article No.	Type	Packing
SU3.0	230 V AC	105028	+SU30D AC230	1
SU3.0	400 V AC	105029	+SU30D AC400	1
SU3.0	24 V DC	105030	+SU30D DC24	1
SU4.0	230 V AC	105040	+SU40D AC230	1
SU4.0	400 V AC	105041	+SU40D AC400	1
SU4.0	24 V DC	105042	+SU40D DC24	1
SU5.0	230 V AC	105052	+SU50D AC230	1
SU5.0	400 V AC	105053	+SU50D AC400	1
SU5.0	24 V DC	105054	+SU50D DC24	1

Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

Article No.	Type
105734	+VM3P4W

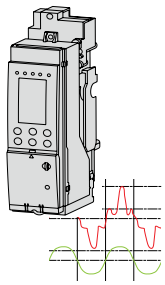
Current analysers SUx.0A

Analyses (displayed)
- Currents (actual, maximum, unbalance, thermal memory)

Alarm functions (display)
- Currents (actual, unbalance)

Alarm functions (DO outputs)
- Currents (actual, unbalance)

Relay functions (tripping of ACB)
- Currents (actual: I_A, I_B, I_C, I_N, I_g, $I_{\Delta n}$, unbalance)



Line	Ext. power supply	Article No.	Type	Packing
SU3.0	230 V AC	105025	+SU30A AC230	1
SU3.0	400 V AC	105026	+SU30A AC400	1
SU3.0	24 V DC	105027	+SU30A DC24	1
SU4.0	230 V AC	105037	+SU40A AC230	1
SU4.0	400 V AC	105038	+SU40A AC400	1
SU4.0	24 V DC	105039	+SU40A DC24	1
SU5.0	230 V AC	105049	+SU50A AC230	1
SU5.0	400 V AC	105050	+SU50A AC400	1
SU5.0	24 V DC	105051	+SU50A DC24	1

ModBus communication function for tripping units

- Additional communication possibility for tripping units
- Extension function for SU3.0, 4.0, 5.0 of variants D, P, H (cannot be used for variant A)
- ModBus-RTU communication protocol
- Connected via secondary terminals #10, 11, 12
- To assure communication possibility also when main voltage is missing, it is recommended to use external power supply for tripping unit SU (secondary terminals #1 and 2).

	Article No.	Type
	105061	+COM MODBUS

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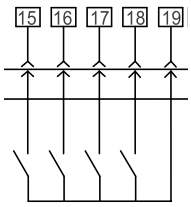
Programmable digital outputs DO

- Optional functionality of tripping unit SU
- Orderable as premounted only
- Can be programmed as DO for alarm functions
- One different functionality can be selected for every DO. Activation of all DOs is synchronous, i.e. all DOs are activated with any selected function type
- Functionality can be selected in SU menu
- 4 digital outputs (when ZSI functionality is not used only) or 2 digital outputs (in combination with ZSI, identical common point)
- Available functions:

ACB trip indication in case of any fault (Fault trip)
ACB alarm indication (Alarm)
Indication of closed position (Closed)
Indication of open position (Open)
Self-diagnosis alarm (Diagnosis alarm)
Output for Load Monitor 1 (Load Monitor 1)
Output for Load Monitor 2 (Load Monitor 2)
Overload pre alarm (Overload pre alarm)
Trip due to overload - L function (Overload fault)
Trip due to short-circuitry - S function (Short time fault)
Trip due to short-circuitry - I function (Inst. fault)
Trip due to ground-fault - G function (Ground fault)
Ground-fault alarm - G function (Ground alarm)
Trip due to Earth-leakage - E function (Leakage fault)
Earth-leakage alarm - E function (Leakage alarm)
Current unbalance (I unbal fault)
Trip due to fault in Neutral conductor (Neutral fault)
Undervoltage (V under fault)
Overvoltage (V over fault)
Voltage unbalance (V unbal fault)
Underfrequency (F under fault)
Overfrequency (F over fault)
Reverse power (rP fault)
Phase rotation (Pr fault)
Temperature (T fault)
Current THD (I harmonic fault)
Voltage THD (V harmonic fault)
Ultrafast tripping of high-value short circuit currents (MCS/HSISC fault)

For SU type	No. of DO	Secondary terminals	Article No.	Type
SUx0.x with +ZSI	2	#17, 18, 19 (COM)	105731	+DO2
SUx0.x without +ZSI	4	#15, 16, 17, 18, 19 (COM)	105732	+DO4

Wiring diagram



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Accessories for Ex9A and Ex9ASD

- **Internal and external accessories for Air Circuit Breakers and Air Switch Disconnectors**
- **Premounted or separatly orderable (for subsequent mounting) versions**
- **Extension functionalities for tripping units**

Closing releases XF
Shunt trip releases SHT
Undervoltage releases UVT
Auxiliary contacts AX
Alarm contacts
Motor operators MD
Position indicators EF
Pushbutton lock devices VBP
OFF position keylocks KLK
Doorframes DDP/CCP
Operation cycles counters CDM
Rating plugs IN
Door interlocks for withdrawable VPEC
Phase barriers DPS/PHS
Vertically mounted main terminals VCP
Connection terminals RCP/TEX/ACP
Current sensors for Neutral conductor NEC
Ground fault current transformer WEC
Earth-leakage current transformer LEC
ModBus communication function for tripping units
ZSI function for tripping units
Programmable digital outputs DO for tripping units
Mechanical interlocks with cables IPA

Accessories for Ex9A and Ex9ASD

Closing releases

- Remotely close the breaker after the spring has stored energy
- Versions for subsequent mounting as well as premounted
- Maximum length of control signal 2 s, see p. 117

Version	For frame size	Operating voltage	Article No.	Type	Packing
Premounted	A16/25/32/40	220-240 V AC	105115	+XF 11 AC220-240V	1
Premounted	A16/25/32/40	380-400 V AC	105116	+XF 11 AC380-415V	1
Premounted	A16/25/32/40	24 V DC	105799	+XF 11 DC24V	1
Premounted	A16/25/32/40	48 V DC	105800	+XF 11 DC48V	1
Premounted	A16/25/32/40	110 V DC	105117	+XF 11 DC110V	1
Premounted	A16/25/32/40	220 V DC	105118	+XF 11 DC220V	1
Separately orderable	A16/25/32/40	220-240 V AC	105231	XF 11 AC220-240V	1
Separately orderable	A16/25/32/40	380-400 V AC	105232	XF 11 AC380-415V	1
Separately orderable	A16/25/32/40	24 V DC	105801	XF 11 DC24V	1
Separately orderable	A16/25/32/40	48 V DC	105802	XF 11 DC48V	1
Separately orderable	A16/25/32/40	110 V DC	105233	XF 11 DC110V	1
Separately orderable	A16/25/32/40	220 V DC	105234	XF 11 DC220V	1

Technical data p. 117

Shunt trip releases

- Remotely opens the breaker after supplying of control impulse
- Various operating voltage versions
- Versions for subsequent mounting as well as premounted
- Separately orderable version can be used as first or second shunt trip release
- Maximum length of control signal 2 s, see p. 118

Version	For frame size	Operating voltage	Article No.	Type	Packing
Premounted	A16/25/32/40	220-240 V AC	105119	+SHT 11 AC220-240V	1
Premounted	A16/25/32/40	380-415 V AC	105120	+SHT 11 AC380-415V	1
Premounted	A16/25/32/40	24 V DC	105803	+SHT 11 DC24V	1
Premounted	A16/25/32/40	48 V DC	105804	+SHT 11 DC48V	1
Premounted	A16/25/32/40	110 V DC	105121	+SHT 11 DC110V	1
Premounted	A16/25/32/40	220 V DC	105122	+SHT 11 DC220V	1
Separately orderable	A16/25/32/40	220-240 V AC	105235	SHT 11 AC220-240V	1
Separately orderable	A16/25/32/40	380-415 V AC	105236	SHT 11 AC380-415V	1
Separately orderable	A16/25/32/40	24 V DC	105805	SHT 11 DC24V	1
Separately orderable	A16/25/32/40	48 V DC	105806	SHT 11 DC48V	1
Separately orderable	A16/25/32/40	110 V DC	105237	SHT 11 DC110V	1
Separately orderable	A16/25/32/40	220 V DC	105238	SHT 11 DC220V	1

Second shunt trip releases

- Remotely opens the breaker after supplying of control impulse
- Allows to have two independent shunt trip signals, with arbitrary combination of control voltages
- Various operating voltage versions
- Second shunt release has the same functionality as the first one. It defines mounting position only.
- Maximum length of control signal 2 s, see p. 118

Version	For frame size	Operating voltage	Article No.	Type	Packing
Premounted	A16/25/32/40	220-240 V AC	105123	+SHT 11 AC220-240V D	1
Premounted	A16/25/32/40	380-415 V AC	105124	+SHT 11 AC380-415V D	1
Premounted	A16/25/32/40	24 V DC	105807	+SHT 11 DC24V D	1
Premounted	A16/25/32/40	48 V DC	105808	+SHT 11 DC48V D	1
Premounted	A16/25/32/40	110 V DC	105125	+SHT 11 DC110V D	1
Premounted	A16/25/32/40	220 V DC	105126	+SHT 11 DC220V D	1

Technical data p. 118

Accessories for Ex9A and Ex9ASD

Undervoltage releases

- Opens the breaker when the voltage drops or power is off to prevent the load from damage caused by undervoltage
- Instantaneous and delayed types (delay time 1s, 3s or 5s)
- The delayed releases are used to eliminate circuit-breaker unwanted tripping during short time voltage drops
- Versions for subsequent mounting as well as premounted

Version	Delay	For frame size	Operating voltage	Article No.	Type	Packing
Premounted	undelayed	A16/32/40	220-240 V AC	105127	+UVT 11 AC220-240V UD	1
Premounted	undelayed	A25	220-240 V AC	105809	+UVT 14 AC220-240V UD	1
Premounted	undelayed	A16/32/40	380-415 V AC	105128	+UVT 11 AC380-415V UD	1
Premounted	undelayed	A25	380-415 V AC	105810	+UVT 14 AC380-415V UD	1
Premounted	1s delay	A16/32/40	220-240 V AC	105129	+UVT 11 AC220-240V D1	1
Premounted	1s delay	A16/32/40	380-415 V AC	105130	+UVT 11 AC380-415V D1	1
Premounted	3s delay	A16/32/40	220-240 V AC	105131	+UVT 11 AC220-240V D3	1
Premounted	3s delay	A16/32/40	380-415 V AC	105132	+UVT 11 AC380-415V D3	1
Premounted	5s delay	A16/32/40	220-240 V AC	105133	+UVT 11 AC220-240V D5	1
Premounted	5s delay	A16/32/40	380-415 V AC	105134	+UVT 11 AC380-415V D5	1
Premounted	1-5s delay	A25	220-240 V AC	105811	+UVT 14 AC220-240V D	1
Premounted	1-5s delay	A25	380-415 V AC	105812	+UVT 14 AC380-415V D	1
Separately orderable	undelayed	A16/32/40	220-240 V AC	105239	UVT 11 AC220-240V UD	1
Separately orderable	undelayed	A25	220-240 V AC	105813	UVT 14 AC220-240V UD	1
Separately orderable	undelayed	A16/32/40	380-415 V AC	105240	UVT 11 AC380-415V UD	1
Separately orderable	undelayed	A25	380-415 V AC	105814	UVT 14 AC380-415V UD	1
Separately orderable	1s delay	A16/32/40	220-240 V AC	105241	UVT 11 AC220-240V D1	1
Separately orderable	1s delay	A16/32/40	380-415 V AC	105242	UVT 11 AC380-415V D1	1
Separately orderable	3s delay	A16/32/40	220-240 V AC	105243	UVT 11 AC220-240V D3	1
Separately orderable	3s delay	A16/32/40	380-415 V AC	105244	UVT 11 AC380-415V D3	1
Separately orderable	5s delay	A16/32/40	220-240 V AC	105245	UVT 11 AC220-240V D5	1
Separately orderable	5s delay	A16/32/40	380-415 V AC	105246	UVT 11 AC380-415V D5	1
Separately orderable	1-5s delay	A25	220-240 V AC	105815	UVT 14 AC220-240V D	1
Separately orderable	1-5s delay	A25	380-415 V AC	105816	UVT 14 AC380-415V D	1

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Auxiliary contacts

- Used for monitoring the ON/OFF status of circuit breaker
- Connection wires to auxiliary terminals in the scope of delivery
- Versions with 2 CO, 4 CO and 6 CO available
- Versions for subsequent mounting as well as premounted
- Can be used also for time limiting of control signal for AX, XF and SHT

Version	For frame size	Contacts	Article No.	Type	Packing
Premounted	A16	4 CO	105145	+AX 11 44	1 set
Premounted	A16	6 CO	105146	+AX 11 66	1 set
Premounted	A25/32/40	2 CO	105178	+AX 12 22	1 set
Premounted	A25/32/40	4 CO	105179	+AX 12 44	1 set
Premounted	A25/32/40	6 CO	105180	+AX 12 66	1 set
Separately orderable	A16	4 CO	105154	AX 11 44	1 set
Separately orderable	A16	6 CO	105155	AX 11 66	1 set
Separately orderable	A25/32/40	2 CO	105206	AX 12 22	1 set
Separately orderable	A25/32/40	4 CO	105207	AX 12 44	1 set
Separately orderable	A25/32/40	6 CO	105208	AX 12 66	1 set

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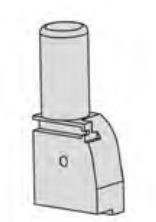
Alarm contacts

- In the scope of delivery of a breaker, function of all type tripping unit SU
- 1 CO contact
- Connected to secondary terminals #3, 4, 5

Accessories for Ex9A and Ex9ASD

Motor operators

- The electric motor charges the spring mechanism when the circuit breaker is closed
- Versions for subsequent mounting as well as premounted
- Mechanical charging handle can be used when maintaining or without power supply
- Equipped with a limit switch contact which signals that spring is charged



Version	For frame size	Operating voltage	Article No.	Type	Packing
Premounted	A16	230 V AC/220 V DC	105136	+MD 11 AC230/DC220	1
Premounted	A16	380-415 V AC	105137	+MD 11 AC380-415V	1
Premounted	A16	24 V DC	105817	+MD 11 DC24V	1
Premounted	A16	48 V DC	105818	+MD 11 DC48V	1
Premounted	A16	110 V DC	105138	+MD 11 DC110V	1
Premounted	A25	230 V AC/220 V DC	105819	+MD 14 AC230/DC220	1
Premounted	A25	380-415 V AC	105820	+MD 14 AC380-415V	1
Premounted	A25	24 V DC	105821	+MD 14 DC24V	1
Premounted	A25	48 V DC	105822	+MD 14 DC48V	1
Premounted	A25	110 V DC	105823	+MD 14 DC110V	1
Premounted	A32/40	230 V AC/220 V DC	105174	+MD 12 AC230/DC220V	1
Premounted	A32/40	380-415 V AC	105175	+MD 12 AC380-415V	1
Premounted	A32/40	24 V DC	105824	+MD 12 DC24V	1
Premounted	A32/40	48 V DC	105825	+MD 12 DC48V	1
Premounted	A32/40	110 V DC	105176	+MD 12 DC110V	1
Separately orderable	A16	230 V AC/220 V DC	105161	MD 11 AC230/DC220	1
Separately orderable	A16	380-415 V AC	105162	MD 11 AC380-415V	1
Separately orderable	A16	24 V DC	105826	MD 11 DC24V	1
Separately orderable	A16	48 V DC	105827	MD 11 DC48V	1
Separately orderable	A16	110 V DC	105225	MD 11 DC110V	1
Separately orderable	A25	230 V AC/220 V DC	105828	MD 14 AC230/DC220	1
Separately orderable	A25	380-415 V AC	105829	MD 14 AC380-415V	1
Separately orderable	A25	24 V DC	105830	MD 14 DC24V	1
Separately orderable	A25	48 V DC	105831	MD 14 DC48V	1
Separately orderable	A25	110 V DC	105832	MD 14 DC110V	1
Separately orderable	A32/40	230 V AC/220 V DC	105195	MD 12 AC230/DC220V	1
Separately orderable	A32/40	380-415 V AC	105196	MD 12 AC380-415V	1
Separately orderable	A32/40	24 V DC	105833	MD 12 DC24V	1
Separately orderable	A32/40	48 V DC	105834	MD 12 DC48V	1
Separately orderable	A32/40	110 V DC	105197	MD 12 DC110V	1

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Position indicators

- Indicate position of the breaker - connected, test, disconnected
- For withdrawable type devices only
- 3 CO contacts, one contact for each ACB position
- Connected to secondary terminals #58, 59, 60 (Connected), #61, 62, 63 (Test), #64, 65, 66 (Disconnected)
- Premounted version only - in the scope of delivery there are additional secondary terminals #58-66

Version size	For frame	Article No.	Type	Packing
Premounted	A16	105156	+EF 11	1
Premounted	A25/32/40	105192	+EF 12	1

Accessories for Ex9A and Ex9ASD

Pushbutton lock devices

- The cover prevents access to control push button of the breaker
- Premounted version only
- Scope of delivery: Lockable cover (lock with key is not a part of delivery)

Version	For frame size	Article No.	Type	Packing
Premounted	A16	105143	+VBP 11	1
Premounted	A25/32/40	105177	+VBP 12	1

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OFF position keylocks

- Block a breaker in OFF position to ensure the breaker cannot be closed
- Premounted version only
- One circuit breaker is provided with one lock and one key
  Two circuit breakers are provided with two locks and one key (necessary to mark in order)
  Three circuit breakers are provided with three locks and two keys (necessary to mark in order)

Number of ACBs to share the same key	For frame size	Article No.	Type	Packing
1	A16	105147	+KLK 11 1L1K	1 set
2	A16	105148	+KLK 11 2L1K	1 set
3	A16	105149	+KLK 11 3L2K	1 set
1	A25/32/40	105189	+KLK 12 1L1K	1 set
2	A25/32/40	105190	+KLK 12 2L1K	1 set
3	A25/32/40	105191	+KLK 12 3L2K	1 set

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Doorframes (spare part)

- In the scope of delivery for each ACB
- Degree of protection IP40
- Can be ordered separately as a spare part

Version	For device version	For frame size	Article No.	Type	Packing
Separately orderable	Withdrawable	A16	105247	DDP 11	1
Separately orderable	Fixed	A16	105248	CDP 11	1
Separately orderable	Withdrawable	A25	105835	DDP 14	1
Separately orderable	Fixed	A25	105836	CDP 14	1
Separately orderable	Withdrawable	A32/40	105274	DDP 12	1
Separately orderable	Fixed	A32/40	105275	CDP 12	1

Accessories for Ex9A and Ex9ASD

Operation counters

- Counts operation cycles of connected device
- CDM 11 function is dependent on operating mechanism, CDM 12 on motor operator
- Mechanical counter technology
- Premounted version only

Version	For frame size	Article No.	Type	Packing
Premounted	A16	105163	+CDM 11	1
Premounted	A25/32/40	105198	+CDM 12	1

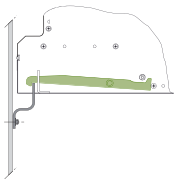
Rating plugs

- Allows to decrease Rated current of ACB I_n (derating)
- Bellow given down ratings are possible only
- Up rating is not possible
- For circuit breakers only
- Separately orderable version only
- Rating plug for rated current I_n of ordered breaker in the scope of delivery of the breaker

Version	Rating Plug I_n	I_n of ACB	For fr. size	Article No.	Type	Packing
Separately orderable	400 A	630-800 A	A16	105268	IN 11 400A	1
Separately orderable	630 A	800 A	A16/25	105269	IN 11 630A	1
Separately orderable	800 A	1000 A	A16/25	105270	IN 11 800A	1
Separately orderable	1000 A	1250-1600 A	A16/25	105271	IN 11 1000A	1
Separately orderable	1250 A	1600 A	A16/25	105272	IN 11 1250A	1
Separately orderable	1600 A	2000-4000 A	A25/32/40	105296	IN 12 1600A	1
Separately orderable	2000 A	2500-4000 A	A25/32/40	105297	IN 12 2000A	1
Separately orderable	2500 A	2900-4000 A	A32/40	105298	IN 12 2500A	1
Separately orderable	2900 A	3200-4000 A	A32/40	105299	IN 12 2900A	1
Separately orderable	3200 A	4000 A	A32/40	105300	IN 12 3200A	1

Door interlocks for withdrawable

- Ensures that door of distribution board cannot be open when the circuit breaker is closed or in test position
- Version for subsequent mounting only

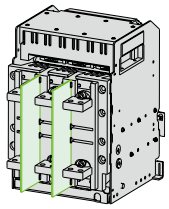


For frame size	Article	Type No.	Packing
A16	105267	VPEC 11	1
A32/40	105295	VPEC 12	1

Accessories for Ex9A and Ex9ASD

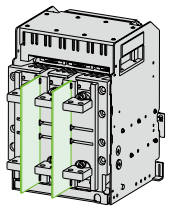
Phase barriers

- Improve insulation level between main terminals
- Versions for subsequent mounting for fixed and withdrawable devices
- Delivered as set (2pcs for 3P version, 3 pcs for 4P version)



For fixed devices

Version	For frame size	Poles	Article No.	Type	Packing
Separately orderable	A16	3P	105259	PHS 11 3P	1 set
Separately orderable	A16	4P	105260	PHS 11 4P	1 set
Separately orderable	A25/32	3P	105278	PHS 12 3P	1 set
Separately orderable	A25/32	4P	105279	PHS 12 4P	1 set
Separately orderable	A40	3P	105304	PHS 13 3P	1 set
Separately orderable	A40	4P	105305	PHS 13 4P	1 set



For withdrawable devices

Version	For frame size	Poles	Article No.	Type	Packing
Separately orderable	A16	3P	105249	DPS 11 3P	1 set
Separately orderable	A16	4P	105250	DPS 11 4P	1 set
Separately orderable	A25/32	3P	105276	DPS 12 3P	1 set
Separately orderable	A25/32	4P	105277	DPS 12 4P	1 set
Separately orderable	A40	3P	105302	DPS 13 3P	1 set
Separately orderable	A40	4P	105303	DPS 13 4P	1 set

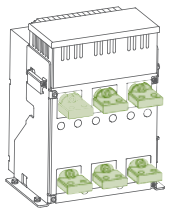
Vertically mounted main terminals

- Defines vertical orientation of pre-mounted main terminals (as default in horizontal position)

For frame	Article No.	Type	Packing
A16/25/32/40	105135	+VCP	1

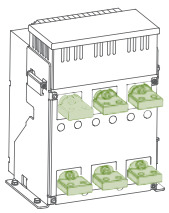
Spare connection terminals

- Main terminals, in the scope of delivery of ACB, spare set



Rear connection plates - spare parts, horizontal and vertical connection

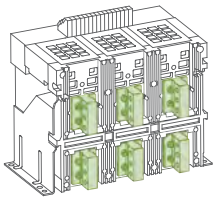
Version	For fr. size	Poles	Rated current	Article No.	Type	Packing
Separately orderable	A16	3P	400-630 A	105251	RCP 11 3P 400-630A	1 set
Separately orderable	A16	3P	800-1600 A	105252	RCP 11 3P 800-1600A	1 set
Separately orderable	A16	4P	400-630 A	105253	RCP 11 4P 400-630A	1 set
Separately orderable	A16	4P	800-1600 A	105254	RCP 11 4P 800-1600A	1 set
Separately orderable	A25	3P	630-1600 A	105837	RCP 14 3P 630-1600A	1 set
Separately orderable	A25	3P	2000-2500 A	105838	RCP 14 3P 2000-2500A	1 set
Separately orderable	A25	4P	630-1600 A	105839	RCP 14 4P 630-1600A	1 set
Separately orderable	A25	4P	2000-2500 A	105840	RCP 14 4P 2000-2500A	1 set
Separately orderable	A32/40	3P	1600-2500 A	105280	RCP 12 3P 1600-2500A	1 set
Separately orderable	A32/40	4P	1600-2500 A	105282	RCP 12 4P 1600-2500A	1 set



Rear connection plates - spare parts, horizontal connection

Version	For fr. size	Poles	Rated current	Article No.	Type	Packing
Separately orderable	A32/40	3P	2900-3200 A	105281	RCP 12 3P 2900-3200A	1 set
Separately orderable	A32/40	4P	2900-3200 A	105283	RCP 12 4P 2900-3200A	1 set
Separately orderable	A40	3P	3200-4000 A	105308	RCP 13 3P 3200-4000A	1 set
Separately orderable	A40	4P	3200-4000 A	105307	RCP 13 4P 3200-4000A	1 set

Accessories for Ex9A and Ex9ASD

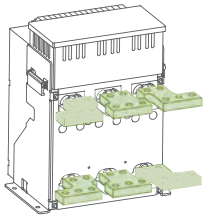


Real connection plates - spare parts, vertical connection

Version	For fr. size	Poles	Rated current	Article No.	Type	Packing
Separately orderable	A32/40	3P	2900-3200 A	106772	RCPV 12 3P 2900-3200A	1 set
Separately orderable	A32/40	4P	2900-3200 A	106773	RCPV 12 4P 2900-3200A	1 set
Separately orderable	A40	3P	3200-4000 A	106775	RCPV 13 3P 3200-4000A	1 set
Separately orderable	A40	4P	3200-4000 A	106774	RCPV 13 4P 3200-4000A	1 set

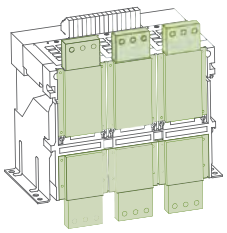
Connection terminals

- Various possibilities of ACB connection
- Versions for subsequent mounting as well as premounted



Connection terminals with spreaders

Version	For fr. size	Poles	Rated current	Article No.	Type	Packing
Premounted	A16	3P	400-630 A	105150	+TEX 11 3P 400-630A	1 set
Premounted	A16	3P	800-1600 A	105151	+TEX 11 3P 800-1600A	1 set
Premounted	A16	4P	400-630 A	105152	+TEX 11 4P 400-630A	1 set
Premounted	A16	4P	800-1600 A	105153	+TEX 11 4P 800-1600A	1 set
Premounted	A25	3P	630-1600 A	105841	+TEX 14 3P 630-1600A	1 set
Premounted	A25	3P	2000-2500 A	105842	+TEX 14 3P 2000-2500A	1 set
Premounted	A25	4P	630-1600 A	105843	+TEX 14 4P 630-1600A	1 set
Premounted	A25	4P	2000-2500 A	105844	+TEX 14 4P 2000-2500A	1 set
Separately orderable	A16	3P	400-630 A	105255	TEX 11 3P 400-630A	1 set
Separately orderable	A16	3P	800-1600 A	105256	TEX 11 3P 800-1600A	1 set
Separately orderable	A16	4P	400-630 A	105257	TEX 11 4P 400-630A	1 set
Separately orderable	A16	4P	800-1600 A	105258	TEX 11 4P 800-1600A	1 set
Separately orderable	A25	3P	630-1600 A	105845	TEX 14 3P 630-1600A	1 set
Separately orderable	A25	3P	2000-2500 A	105846	TEX 14 3P 2000-2500A	1 set
Separately orderable	A25	4P	630-1600 A	105847	TEX 14 4P 630-1600A	1 set
Separately orderable	A25	4P	2000-2500 A	105848	TEX 14 4P 2000-2500A	1 set



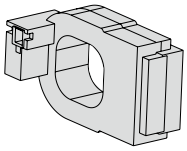
Front connection plates (in preparation)

Version	For fr. size	Poles	Rated current	Article No.	Type	Packing
Premounted	A25	3P	630-1600 A	105849	+ACP 14 3P 630-1600A	1 set
Premounted	A25	3P	2000-2500 A	105850	+ACP 14 3P 2000-2500A	1 set
Premounted	A32/40	3P	1600-2000 A	105183	+ACP 12 3P 1600-2000A	1 set
Premounted	A32/40	3P	2500 A	105184	+ACP 12 3P 2500A	1 set
Premounted	A32/40	3P	2900-3200 A	105185	+ACP 12 3P 2900-3200A	1 set
Premounted	A25	4P	630-1600 A	105851	+ACP 14 4P 630-1600A	1 set
Premounted	A25	4P	2000-2500 A	105852	+ACP 14 4P 2000-2500A	1 set
Premounted	A32/40	4P	1600-2000 A	105186	+ACP 12 4P 1600-2000A	1 set
Premounted	A32/40	4P	2500 A	105187	+ACP 12 4P 2500A	1 set
Premounted	A32/40	4P	2900-3200 A	105188	+ACP 12 4P 2900-3200A	1 set
Separately orderable	A25	3P	630-1600 A	105853	ACP 14 3P 630-1600A	1 set
Separately orderable	A25	3P	2000-2500 A	105854	ACP 14 3P 2000-2500A	1 set
Separately orderable	A32/40	3P	1600-2000 A	105284	ACP 12 3P 1600-2000A	1 set
Separately orderable	A32/40	3P	2500 A	105285	ACP 12 3P 2500A	1 set
Separately orderable	A32/40	3P	2900-3200 A	105286	ACP 12 3P 2900-3200A	1 set
Separately orderable	A25	4P	630-1600 A	105855	ACP 14 4P 630-1600A	1 set
Separately orderable	A25	4P	2000-2500 A	105856	ACP 14 4P 2000-2500A	1 set
Separately orderable	A32/40	4P	1600-2000 A	105287	ACP 12 4P 1600-2000A	1 set
Separately orderable	A32/40	4P	2500 A	105288	ACP 12 4P 2500A	1 set
Separately orderable	A32/40	4P	2900-3200 A	105289	ACP 12 4P 2900-3200A	1 set

Accessories for Ex9A and Ex9ASD

Current sensors for Neutral conductor NEC

- A transformer for N-pole protection of 3P ACB in four-wire network
- To be mounted onto N conductor
- Connected to secondary terminals #28, 29
- Cannot be combined with WEC or LEC transformers for G and E functions, respectively



For frame size	Rated current	Article No.	Type	Packing
A16	800 A	105857	NEC 11 800A	1
A16	1600 A	105266	NEC 11 1600A	1
A25	800 A	105858	NEC 14 800A	1
A25	2500 A	105859	NEC 14 2500A	1
A32/40	4000 A	105306	NEC 13 4000A	1

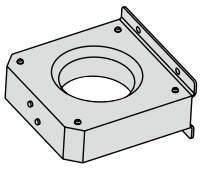
Ground fault function with WEC transformer (in preparation)

- To allow source ground fault function with WEC transformer, please add item +GECT to ordered ACB

Article No.	Type	Packing
105733	+GECT	1

Ground fault current transformer WEC (in preparation)

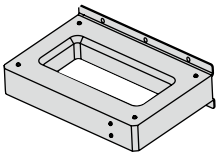
- For combination with tripping units SU4.0x to obtain Ground fault protection function (G) in the mode of source ground fault protection
- For rated currents up to 4000 A
- To be mounted onto PE conductor
- Measures absolute value of current through PE conductor or grounding conductor of mid point of transformer
- Connected to secondary terminals #28, 29
- Cannot be combined with NEC or LEC transformers for N and E functions, respectively



Article No.	Type	Packing
105265	WEC 11	1

Earth-leakage current transformer LEC

- Requires vertical connection of busbars
- Mounted over all phase and neutral busbars
- For combination with tripping units SU5.0 to obtain Earth leakage protection (E function)
- For rated currents up to 4000 A (per a conductor)
- Measures differential residual current of working conductors (vector sum)
- Connected to secondary terminals #28, 29
- Cannot be combined with NEC or WEC for N and G functions, respectively



Article No.	Type	Packing
105062	LEC 11	1

Accessories for Ex9A and Ex9ASD

ModBus communication function for tripping units

- Additional communacation possibility for tripping units
- Extension function for SU3.0, 4.0, 5.0 of variants D, P, H (cannot be used for variant A)
- ModBus-RTU communication protocol
- Connected via secondary terminals #10, 11, 12
- To assure communication possibility also when main voltage is missing, it is recommended to use external power supply for tripping unit SU (secondary terminals #1 and 2).

Article No.	Type
105061	+COM MODBUS

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ZSI (Zone Selective Interlock) function for tripping units

- Allows Zone Selective Interlock of breakers in selective systems, see p. 81
- Two independend circuits (DI1/DO1, DI2/DO2)
- Extension function for SU3.0, 4.0, 5.0 of variants A, D, P, H
- Possibility to select ZSI for protection funcions S (ZSI IN ST) or S+G (ZSI). Selection can be done for both ZSI circuits independently.
- Connected via secondary terminals (see diagram at p. 45):
  ZSI1 IN #20, 21
  ZSI1 OUT #15, 19 (COM)
  ZSI2 IN #22, 23
  ZSI2 OUT #16, 19 (COM)
- When ZSI is activated, tripping delays are reduced to tripping time of instantaneous release. ZSI activation time is about 20 ms, typical total tripping time ca. 60 ms.

Article No.	Type	Packing
107109	+ZSI	1

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Tripping unit configuration for measuring by 3P ACB in 4wire system

- If voltage based measurement and analyses are intended to be performed by 3P ACB in 4wire system, please add item +VM3P4W to ordered ACB

Article No.	Type
105734	+VM3P4W

Accessories for Ex9A and Ex9ASD

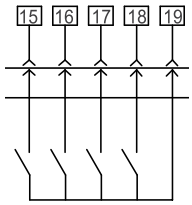
Programmable digital outputs DO

- Optional functionality of tripping unit SU
- Orderable as premounted only
- Can be programmed as DO for alarm functions
- One different functionality can be selected for every DO. Activation of all DOs is synchronous, i.e. all DOs are activated with any selected function type
- Functionality can be selected in SU menu
- 4 digital outputs (when ZSI functionality is not used only) or 2 digital outputs (in combination with ZSI, identical common point)
- Available functions:

ACB trip indication in case of any fault (Fault trip)
ACB alarm indication (Alarm)
Indication of closed position (Closed)
Indication of open position (Open)
Self-diagnosis alarm (Diagnosis alarm)
Output for Load Monitor 1 (Load Monitor 1)
Output for Load Monitor 2 (Load Monitor 2)
Overload pre alarm (Overload pre alarm)
Trip due to overload - L function (Overload fault)
Trip due to short-circuitry - S function (Short time fault)
Trip due to short-circuitry - I function (Inst. fault)
Trip due to ground-fault - G function (Ground fault)
Ground-fault alarm - G function (Ground alarm)
Trip due to Earth-leakage - E function (Leakage fault)
Earth-leakage alarm - E function (Leakage alarm)
Current unbalance (I unbal fault)
Trip due to fault in Neutral conductor (Neutral fault)
Undervoltage (V under fault)
Overvoltage (V over fault)
Voltage unbalance (V unbal fault)
Underfrequency (F under fault)
Overfrequency (F over fault)
Reverse power (rP fault)
Phase rotation (Pr fault)
Temperature (T fault)
Current THD (I harmonic fault)
Voltage THD (V harmonic fault)
Ultrafast tripping of high-value short circuit currents (MCS/HSISC fault)

For SU type	No. of DO	Secondary terminals	Article No.	Type
SUx0.x with +ZSI	2	#17, 18, 19 (COM)	105731	+DO2
SUx0.x without +ZSI	4	#15, 16, 17, 18, 19 (COM)	105732	+DO4

Wiring diagram



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Mechanical Interlocks with cables

- For mutual interlocking of 2 or 3* (*in preparation) ABC devices
- Mechanical interlock with cable
- Cable length for maximum distance of mounting positions of interlocks 2m
- Suitable for frame sizes A16, A32/A40 (A16 cannot be combined with A32/A40)
- Scope of delivery: 2 interlocks and 2 cables (2 ACBs version), 3 interlocks and 6 cables (3 ACBs version)
- Cable fixed in production
- Version for subsequent mounting only

For frame size	For No. of devices	Article No.	Type	Packing
A16, fixed	2	105261	IPA 11F 2-2	1 set
A16, withdrawable	2	105262	IPA 11D/O 2-2	1 set
A16, fixed	3*	105263	IPA 11F 3-2	1 set
A16, withdrawable	3*	105264	IPA 11D/O 3-2	1 set
A32/A40, fixed	2	105292	IPA 12F 2-2	1 set
A32/A40, withdrawable	2	105293	IPA 12D/O 2-2	1 set
A32/A40, fixed	3*	105294	IPA 12F 3-2	1 set
A32/A40, withdrawable	3*	105725	IPA 12D/O 3-2	1 set

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Contents

Technical data

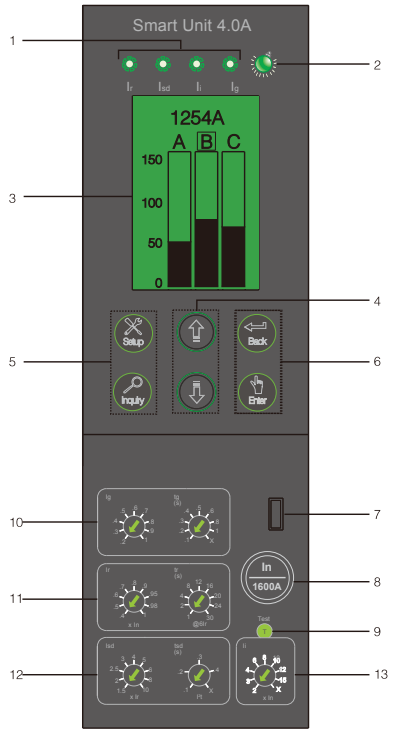
Technical Data Smart Units

Tripping units for ACBs

	Function overview	Smart Unit measurement type			
		A	D	P	H
Protection functions	Overload protection	■	■	■	■
	Overload pre-alarm	■	■	■	■
	Short-circuit short delay protection	■	■	■	■
	Short-circuit instantaneous protection	■	■	■	■
	Ground-fault protection (4.0 only), alarm	■	■	■	■
	Earth leakage protection (5.0 only), alarm	■	■	■	■
	MCR & HSISC protection	■	■	■	■
	Unbalanced current protection, alarm	■	■	■	■
	Neutral conductor protection	■	■	■	■
	Temperature protection, alarm	■	■	■	■
	Thermal memory	■	■	■	■
	Overvoltage protection, alarm	–	■	■	■
	Undervoltage protection, alarm	–	■	■	■
	Unbalanced Voltage protection, alarm	–	■	■	■
	Over-frequency protection, alarm	–	■	■	■
	Under-frequency protection, alarm	–	■	■	■
	Phase rotation protection	–	■	■	■
	Reverse Power protection	–	–	■	■
	Harmonic Wave protection	–	–	–	■
Measurement functions	Current measurement	■	■	■	■
	Voltage measurement	–	■	■	■
	Frequency measurement	–	■	■	■
	Unbalanced Voltage measurement	–	■	■	■
	Phase rotation detection	–	■	■	■
	Power Factor measurement	–	–	■	■
	Electric energy measurement	–	–	■	■
	Harmonic Wave analysis	–	–	–	■
Maitenance functions	8 latest fault record	■	■	■	■
	8 latest alarm record	■	■	■	■
	8 latest operations record	■	■	■	■
	Historic current peak value	■	■	■	■
	Contact wear indication	■	■	■	■
	Operating cycles	■	■	■	■
	Clock function	■	■	■	■
	Self diagnosis	■	■	■	■
Optional	Zone Selective Interlock (ZSI)	□	□	□	□
	Communication function (Modbus)	–	□	□	□
	Programmable DO outputs	□	□	□	□

Tripping units for ACBs

Smart Unit parts description



1	LED fault reason indicators (I_r, I_{sd}, I_i, I_g or $I_{\Delta n}$)
2	Running (real-time status) LED indicator
3	LCD
4	Navigation buttons
5	Setup and View buttons
6	Enter and Back buttons
7	Lockhole of front trasparent cover
8	Rating plug connector
9	Test button (for tripping test and reset of alarm and protection functions)
10	Ground protection (I_g, t_g) setting buttons (SU 4.0) only Leakage protection ($I_{\Delta n}$, Δt) setting buttons (SU 5.0) only
11	Long-time delay (I_r, t_r) setting buttons
12	Short-circuit short delay current (I_{sd}, t_{sd}) setting buttons
13	Short-circuit instantaneous current (I_i) setting buttons

Technical Data Smart Units

Tripping units for ACBs

Function parameter settings

Overload long-time delay protection (L function)					
Protection function L			ON / OFF	can be switched OFF in SU menu	
Current setting (power distribution)			I_r	0.4-0.5-0.6-0.7-0.8-0.9-0.95-0.98-1 x I_n	step 1 A via SU menu
Time delay setting			t_r (@6 x I_r)	1-2-4-8-12-16-20-24-30 s	
Tripping curve shape (Inverse time limit functions $I^n t$)				$I^{0.5}t$, It, I^2t, I^4t, I^5t, default I^2t	
Thermal memory (cooling duration for thermal capacity)				instantaneous / 30min	
I/I_r			= 1.05	< 2h without trip	
			= 1.30	< 1h trip	
Inverse time limit functions for t_r (can be selected in menu of SU tripping unit)					
	$I^{0.5}t$		Delay setting	$t = (6 \times I_r / I)^{0.5} \times t_r$	
			Current setting (activity range)	$1.05 \times I_r < I < I_{sd}$	
			Accuracy	± 10 %	
	It		Delay setting	$t = 6 \times I_r / I \times t_r$	
			Current setting (activity range)	$1.05 \times I_r < I < I_{sd}$	
			Accuracy	± 10 %	
	I^2t (default)		Delay setting	$t = (6 \times I_r / I)^2 \times t_r$	
			Current setting (activity range)	$1.05 \times I_r < I < I_{sd}$	
			Accuracy	± 10 %	
	I^4t		Delay setting	$t = (6 \times I_r / I)^4 \times t_r$	
			Current setting (activity range)	$1.05 \times I_r < I < I_{sd}$	
			Accuracy	± 10 %	
	I^5t		Delay setting	$t = (6 \times I_r / I)^5 \times t_r$	
			Current setting (activity range)	$1.05 \times I_r < I < I_{sd}$	
			Accuracy	± 10 %	
Short-time delay protection (S function)					
Fixed time limit current setting			I_{sd}	1.5-2-2.5-3-4-5-6-8-10 x I_r	step 1 A for $I_n \leq 2000$ A step 2 A for $I_n > 2000$ A via SU menu
Fixed time limit setting			t_{sd}	0.1-0.2-0.3-0.4 s / OFF (X)	
			Accuracy	± 10 %	
I^2t	Active range			$I_s \leq I \leq I_{sd}$	
	OFF			by setting $I_s = I_{sd}$ (same multiple of I_r)	
	Inverse time limit current setting		I_s	$1.5\text{-}10 \times I_r \leq I_s \leq I_{sd}$	step 1 A
	Inverse time limit delay setting		t_s	$(6 \times I_r / I)^2 \times t_r / 10$	
	Accuracy			± 10 %	
Short-circuit instantaneous protection (I function)					
Instantaneous current setting			I_i	2-3-4-6-8-10-12-15 x I_n / OFF	step 1 A for $I_n \leq 2000$ A step 2 A for $I_n > 2000$ A via SU menu
I/I_i				< 0.85	not trip
				> 1.15	< 40 ms trip
Maximum total tripping time of ACB				ca. 40 ms	
Accuracy				± 15 %	

Tripping units for ACBs

Function parameter settings

Ground-fault protection (G function, SU4.0 only)													
Current setting	I_g	0.2-0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0 x I_n								step 1 A			
Tripping threshold I/I_g	< 0.8	not trip											
	> 1.0	trip											
Fixed time setting	t_g	0.1-0.2-0.3-0.4-0.5-0.6-0.8-1 s / OFF (X)											
	Accuracy	± 10 %											
Type		Differential residual current vector sum (internal current transformers)											
		Source ground current (with WEC transformer), in preparation											
Type selection		Differential vector sum as default, Source ground current by means of additional item +GECT											
Inverse time setting ($I_g t$ function)	Time	$t = t_g \times K \times I_g / I$								@ $I < K \times I_g$			
		$t = t_g$ (i.e. function OFF)								@ $I \geq K \times I_g$			
	K factor	1.5-6 / OFF								step 0.5			
	OFF	by setting K as OFF											
	Accuracy	± 10 %											
Ground-fault alarm (SU4.0 only)													
Alarm type		Display / DO output (alarm & trip settings)											
Alarm startup threshold	I_g	0.25 - 1.0 I_r								step 1 A			
Alarm return threshold		0.2 - 1.0 I_r								step 1 A			
Time delay	t	0.1 - 1.0 s								step 0.1 s			
Earth-leakage protection (E function, SU5.0 only)													
Residual (leakage) current	$I_{\Delta n}$	0.5-1-2-3-5-7-10-20-30 A											
Tripping threshold $I_L/I_{\Delta n}$	< 0.8	not trip											
	> 1.0	trip											
Time delay (insensitivity)	Δt	0-0.06-0.17-0.25-0.33-0.58-0.75-0.83 s / OFF											
	Accuracy	± 10 %											
Type		Measures differential residual current in working conductors											
Inverse time setting ($I_{\Delta n} t$ function)	Time	$t = (6 \times I_{\Delta L} / I_L) \times \Delta t$								$I_{\Delta n} \leq I_L \leq 5 \times I_{\Delta n}$, $\Delta t > 0$			
		$t = 1.2 \times \Delta t$								$I_L > 5 \times I_{\Delta n}$, $\Delta t > 0$			
		t = 0.04 s								$\Delta t = 0$			
		$t = \infty$								$I_L < I_{\Delta n}$			
	OFF	by setting Δt as OFF											
Max. tripping time [s]	Δt	0	0.06	0.08	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.83
	$I_{\Delta n}$	0.04	0.36	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
	$2I_{\Delta n}$	0.04	0.18	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50
	$5I_{\Delta n}$	0.04	0.07	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
	$10I_{\Delta n}$	0.04	0.07	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Earth-leakage alarm (SU5.0 only)													
Alarm type		Display / DO output (alarm & trip settings)											
Alarm threshold	$I_{\Delta n}$	0.5 - 30 A								step 0.1 A			
Time delay	t	0.1 - 1.0 s								step 0.1 s			

Tripping units for ACBs

Function parameter settings

Current unbalance alarm and protection			
Working modes		OFF - Alarm - Trip	
I_{unbal} threshold setting	I_{unbal}	5 - 60 %	step 1 %
I_{unbal} calculation		$I_{unbal\ A,\ B,\ C}$ = 100% x $\lvert I_{A,\ B,\ C} - I_{avg} \rvert$ / I_{AVG}; $I_{avg} = (I_A+I_B+I_C)/3$	
Alarm type		Display / DO output	
Alarm startup threshold		> 1.1 x set value	
Alarm return threshold		< 0.9 x set value	
Time delay	t	0.1 - 40 s	step 0.1 / 1 s
Neutral protection - for protection of N-pole with 3P breaker			
Protection value	I_N	50%, 100%, 150%, 200% x I_r and I_{sd} (I_{sdN} max 10 x I_n); OFF	
Availability		4P ACB, 3P ACB with N protection and NEC transformer	
Temperature alarm and protection of control unit			
Working modes		OFF - Alarm - Trip	
Tripping threshold	T_{SU}	25 - 80 °C	step 0.5 °C
Alarm type		Display / DO output	
Alarm startup threshold		60 - 80 °C	step 0.5 °C
Alarm return threshold		25 - 60.5 °C	step 0.5 °C
Time delay	t	1 - 1200 s	step 1 s
Tripping threshold		> 1.1 x set value	
Closing threshold		< 0.9 x set value	
Tripping delay		40 ms	
Undervoltage alarm and protection			
Measured voltages		U_{AB} (L1-L2), U_{BC} (L2-L3), U_{AC} (L1-L3)	
Working modes		OFF - Alarm - Trip	
Activation		if all voltages U_{AB}, U_{BC}, U_{AC} < U_{min}	
Tripping threshold	U_{min}	100 - 800 V	step 1 / 10 / 100 V
Alarm type		Display / DO output	
Alarm startup threshold		100 - 800 V	step 1 / 10 / 100 V
Alarm return threshold		200 - 800 V	step 1 / 10 / 100 V
Time delay	t	0.2 - 60 s	step 0.1 / 1 / 10 s
Closing threshold		> 1.1 x set value	
Tripping threshold		< 0.9 x set value	
Tripping delay		40 ms	
Overvoltage alarm and protection			
Measured voltages		U_{AB} (L1-L2), U_{BC} (L2-L3), U_{AC} (L1-L3)	
Working modes		OFF - Alarm - Trip	
Activation		if all voltages U_{AB}, U_{BC}, U_{AC} < U_{min}	
Tripping threshold	U_{max}	100 - 900 V	step 1 / 10 / 100 V
Alarm type		Display / DO output	
Alarm startup threshold		250 - 900 V	step 1 / 10 / 100 V
Alarm return threshold		100 - 900 V	step 1 / 10 / 100 V
Time delay	t	0.2 - 60 s	step 0.1 / 1 / 10 s
Tripping threshold		> 1.1 x set value	
Closing threshold		< 0.9 x set value	
Tripping delay		40 ms	

Tripping units for ACBs

Function parameter settings

Voltage unbalance alarm and protection			
Measured voltages		U_{AB} (L1-L2), U_{BC} (L2-L3), U_{AC} (L1-L3)	
Working modes		OFF - Alarm - Trip	
U_{unbal} tripping threshold	U_{unbal}	2 - 30 %	step 1 %
U_{unbal} calculation		U_{unbal} = 100% x Max(|U_{AB}-U_{avg}|, |U_{BC}-U_{avg}|, |U_{AC}-U_{avg}|) / U_{avg} U_{avg} = (U_{AB}+U_{BC}+U_{AC})/3	
Alarm type		Display / DO output	
Alarm startup threshold		10 - 30 %	step 1 %
Alarm return threshold		2 - 10 %	step 1 %
Time delay	t	0.2 - 60 s	step 0.1 / 1 / 10 s
Underfrequency alarm and protection			
Working modes		OFF - Alarm - Trip	
Frequency tripping threshold	F_{min}	45 - 65 Hz	step 0.5 Hz
Tripping time delay	t	0.2 - 5 s	step 0.1 / 1 s
Alarm type		Display / DO output	
Alarm startup threshold		45 - 48 Hz	step 0.5 Hz
Startup time delay		0.2 - 5 s	step 0.1 / 1 s
Alarm return threshold		45 - 65 Hz	step 0.5 Hz
Return time delay		0.2 - 36 s	step 0.1 / 1 / 10 s
Overfrequency alarm and protection			
Working modes		OFF - Alarm - Trip	
Frequency tripping threshold	F_{max}	45 - 65 Hz	step 0.5 Hz
Time delay	t	0.2 - 5 s	step 0.1 / 1 s
Alarm type		Display / DO output	
Alarm startup threshold		52 - 65 Hz	step 0.5 Hz
Startup time delay		0.2 - 5 s	step 0.1 / 1 s
Alarm return threshold		45 - 52.5 Hz	step 0.5 Hz
Return time delay		0.2 - 36 s	step 0.1 / 1 / 10 s
Phase rotation alarm and protection			
Working modes		OFF - Alarm - Trip	
Action sequence		ABC or ACB	
Alarm type		Display / DO output	
Reverse power protection			
Action threshold	P	5 - 500 kW	step 1 kW
Time delay	t	0.2 - 20 s	step 0.1 s
Alarm type		Display / DO output	

Tripping units for ACBs

Function parameter settings

Harmonic wave alarm and protection			
Working modes		OFF - Alarm - Trip	
Tripping threshold		> 1.1 x set value	
Closing threshold		< 0.9 x set value	
Current harmonic alarm and protection			
Tripping threshold (total harmonic distortion)	THD	8 - 60 %	step 0.5 %
THD variant		to fundamental component (THD) and to total value of current (thd)	
Evaluated Harmonics		2nd to 31st of current	
Time delay	t	1 - 120 s	step 1 s
Alarm type		Display / DO output	
Voltage harmonic alarm and protection			
Tripping threshold (total harmonic distortion)	THD	4 - 10 %	step 0.1 %
THD variant		to fundamental component (THD) and to total value of voltage (thd)	
Evaluated Harmonics		2nd to 31st of voltage	
Time delay	t	1 - 120 s	step 1 s
Alarm type		Display / DO output	
Load monitor and protection			
Working modes		OFF - Mode1 - Mode2	
Inverse current function		as of L function (I_r)	
Activated functionality		DO outputs	
Shedding of both 2 loads L1 and L2			
Mode 1 threshold	L1	0.2 - 0.98 I_r	step 1 A
	L2	0.2 - 0.98 I_r	step 1 A
L1, L2 loads setting and evaluation		independent	
Delay time	t	20 - 80% t_r	step 1 %
Shedding and return of one load L1 and L1 return			
Mode 2 threshold	L1 startup	0.2 - 1.0 I_r	step 1 A
	L1 return	0.2 - 1.0 I_r	step 1 A
Delay time	L1 startup	20 - 80% t_r	step 1 %
	L1 return	10 - 600 s	step 1 s

Tripping units for ACBs

Measuring functions

	Parameters	Display / Communication (comm. not for A version)	SU type
Actual current rms [A]	I_A, I_B, I_C, (I_N, I_g, $I_{\Delta n}$)	■ / ■	A, D, P, H
Maximum current rms [A]	I_A, I_B, I_C, (I_N, I_g, $I_{\Delta n}$)	■ / ■	A, D, P, H
Current unbalance [%]	$I_{unbal\ A,\ B,\ C} = 100\% \times \lvert I_{A,\ B,\ C} - I_{avg} \rvert / I_{avg}$; $I_{avg} = (I_A+I_B+I_C)/3$		
	I_{unbal}	■ / ■	A, D, P, H
Internal temperature of SU [°C]	T	■ / ■	A, D, P, H
Load level [%]	% of I_r	■ / ■	A, D, P, H
Actual voltage rms [V]	U_{AB}, U_{BC}, U_{AC}, U_{AN}, U_{BN}, U_{CN}	■ / ■	D, P, H
Average voltage rms [V]	$U_{avg} = (U_{AB}+U_{BC}+U_{AC})/3$	■ / ■	D, P, H
Voltage unbalance [%]	$U_{unbal} = 100\% \times Max(\lvert U_{AB}-U_{avg} \rvert, \lvert U_{BC}-U_{avg} \rvert, \lvert U_{AC}-U_{avg} \rvert) / U_{avg}$ $U_{avg} = (U_{AB}+U_{BC}+U_{AC})/3$		
	U_{unbal}	■ / ■	D, P, H
Frequency (phase A) [Hz]	f	■ / ■	D, P, H
Phase rotation	per phases A, B, C	■ / ■	D, P, H
Actual active power P [W]	P_A, P_B, P_C, P_{total}	■ / ■	P, H
Actual reactive power Q [VAr]	Q_A, Q_B, Q_C, Q_{total}	■ / ■	P, H
Actual apparent power S [VA]	S_A, S_B, S_C, S_{total}	■ / ■	P, H
Actual power factor	PF_A, PF_B, PF_C, PF_{total} (cos φ)	■ / ■	P, H
Total active energy [Wh]	E_P	■ / ■	P, H
Total reactive energy [VArh]	E_Q	■ / ■	P, H
Total apparent energy [VAh]	E_S	■ / -	P, H
Total supplied active energy [Wh]	E_{Pin}	■ / -	P, H
Total supplied reactive energy [VArh]	E_{Qin}	■ / -	P, H
Time for energy measurement is given by the time when ACB is switched ON. The time can be reseted in SU menu.			
Total consumed active energy [Wh]	E_{Pout}	■ / -	P, H
Total consumed reactive energy [VArh]	E_{Qout}	■ / -	P, H
Energy calculation reset	by reset function	■ / ■	P, H
Voltage waveform capture (1 cycle)	U_{AB}, U_{BC}, U_{AC}	■ / -	H
Current waveform capture (1 cycle)	I_A, I_B, I_C, I_N	■ / -	H
Voltage THD (up to 31st harmonics) [%]	THD, related to voltage of fundamental component for U_{AB}, U_{BC}, U_{AC}, U_{AN}, U_{BN}, U_{CN}	■ / -	H
Current THD (up to 31st harmonics) [%]	THD, related to current of fundamental component for I_A, I_B, I_C, I_N	■ / -	H
Voltage thd (up to 31st harmonics) [%]	thd, related to total voltage for U_{AB}, U_{BC}, U_{AC}, U_{AN}, U_{BN}, U_{CN}	■ / -	H
Current thd (up to 31st harmonics) [%]	thd, related to total current for I_A, I_B, I_C, I_N	■ / -	H
Harmonics amplitude spectrum of current for 3rd to 31st odd harmonics	I_A(FFT), I_B(FFT), I_C(FFT), I_N(FFT)	■ / -	H
Harmonics amplitude spectrum of voltage for 3rd to 31st odd harmonics	U_{AB}(FFT), U_{BC}(FFT), U_{AC}(FFT)	■ / -	H

Technical Data Smart Units

Tripping units for ACBs

Measuring ranges

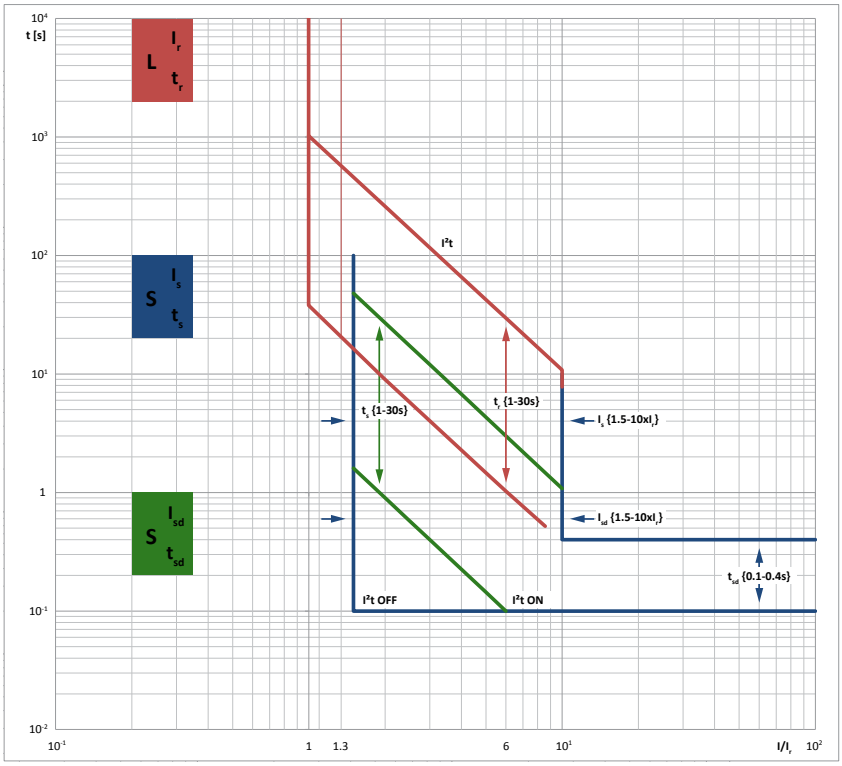
	Parameters	Measuring range	Accuracy	SU type
Current measurement (RMS)	I_A, I_B, I_C, I_N	0 - 25 I_n	≤ 2 I_n ± 2 % > 2 I_n ± 5 %	all
Ground-fault current	I_g	0 - 10 I_n	≤ I_n ± 2 % > I_n ± 5 %	all 4.0
Leakage current	$I_{\Delta n}$	0.5-1-2-3-5-7-10-20-30 A	± 20 %	all 5.0
Line voltage	U_{AB} / U_{BC} / U_{CA}	0 - 1000 V	± 1%	D, P, H
Phase voltage	U_A / U_B / U_C	0 - 600 V	± 1%	D, P, H
Frequency (from phase A)	f	40 - 65 Hz	± 0.05 Hz	D, P, H
Active power	P	-32767 - +32767 kW	± 1.5 %	P, H
Reactive power	Q	-32767 - +32767 kVar	± 1.5 %	P, H
Apparent power	S	0 - 65535 kVA	± 1.5 %	P, H
Power factor	PF	-1.0 - +1.0	± 0.02	P, H
Input / output active electric energy	EP_{in} / EP_{out}	0 - 4294967295 kWh	± 2.5 %	P, H
Input / output reactive electric energy	EQ_{in} / EQ_{out}	0 - 4294967295 kVarh	± 2.5 %	P, H
Input / output apparent electric energy	ES_{in} / ES_{out}	0 - 4294967295 kVAh	± 2.5 %	P, H
Harmonic wave	I_A / I_B / I_C / I_N U_{AB} / U_{BC} / U_{CA} U_{AN} / U_{BN} / U_{CN}	3rd - 31st harmonics	± 3.5 %	H

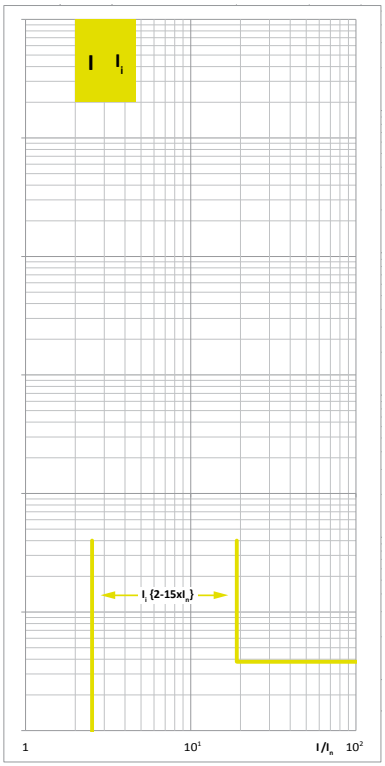
Communication parameters

Communication protocol	Modbus-RTU
Communication address	0 - 255
Baud rate (bit/s)	9.6k / 19.2k / 38.4k / 115.2k

Tripping units for ACBs

Current characteristics





L - long time delay overload protection
S - short circuit delay short circuit protection
I - instantaneous short circuit protection

Tripping units for ACBs

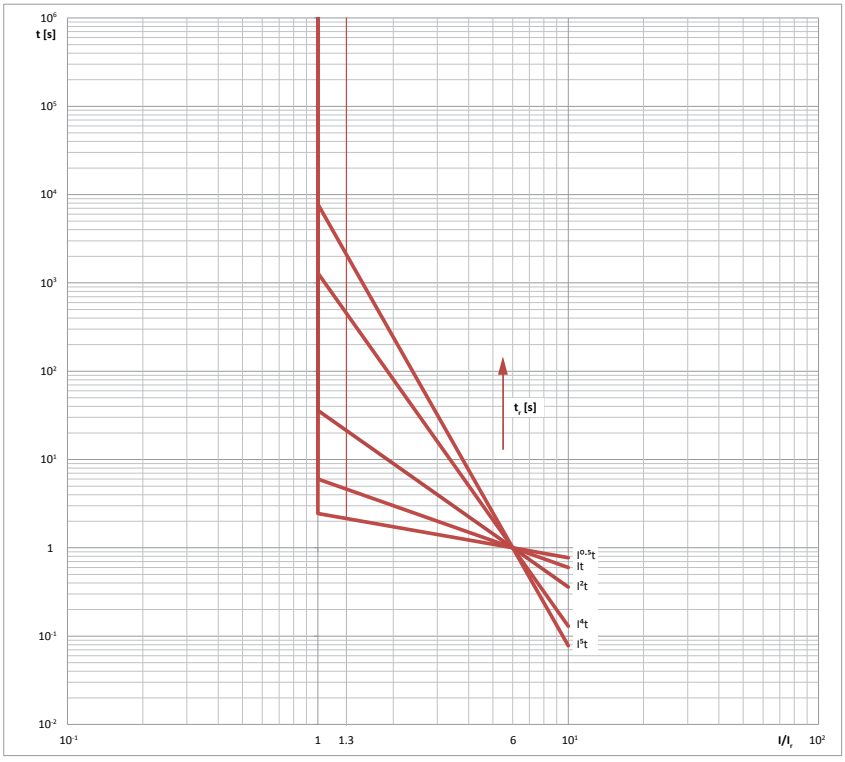
Current characteristics - L protection

L Protection (Long time delay overload protection)

Coarse setting of I_r and t_r by means of mechanical selectors at tripping unit SU. Fine setting is accessible via SU menu.
Time delay is set as an inverse time function of current

$t = ((6 \times I_r) / I)^n \times t_r$,

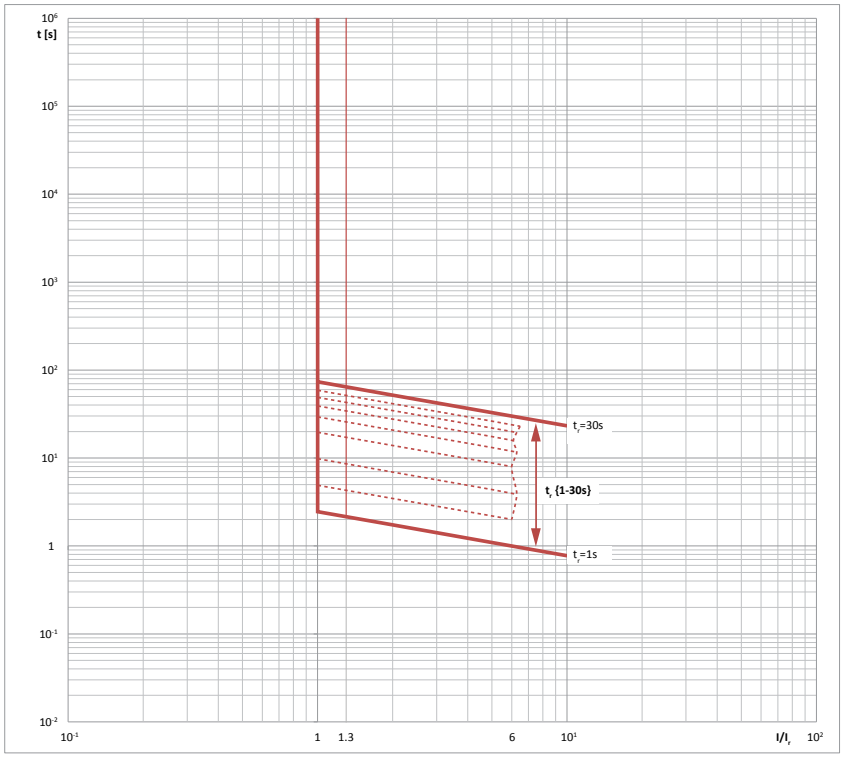
The respective characteristics slope defined by coefficient *n* can be selected in SU menu. Available curves are with *n* = 0.5, 1, 2, 4, and 5. Value *n* = 2 is set as default parameter.



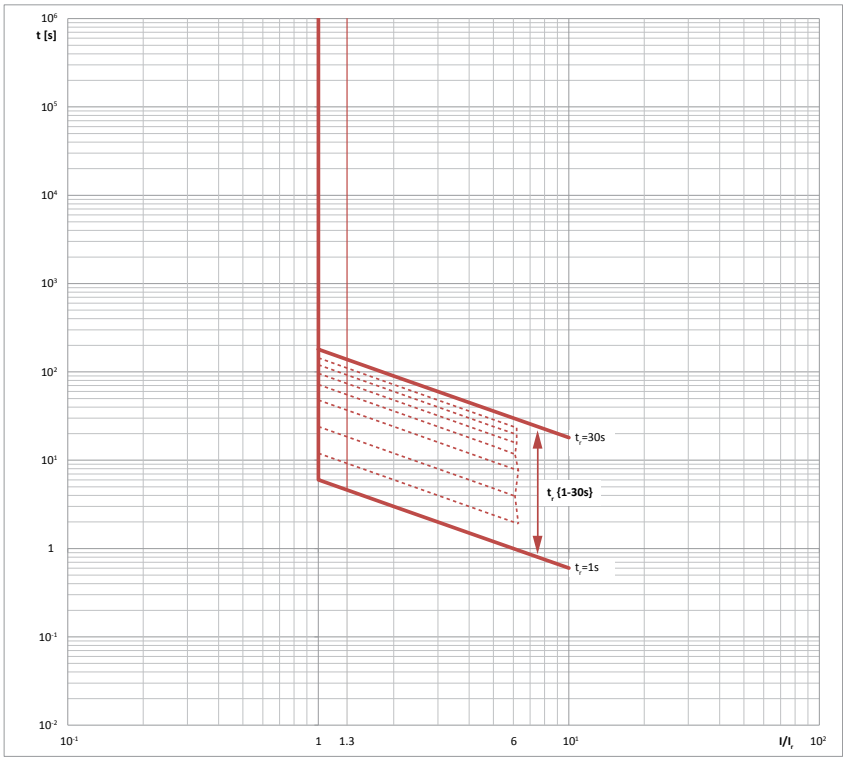
Shaping of tripping curve for L protection by means of *n*-power coefficient in inverse time delay function. Selection of the *n* coefficient is accessible via tripping unit SU menu. Maximum current limit is defined by setting of I_s, I_{sd}, or I_i.

Tripping units for ACBs

Current characteristics - L protection



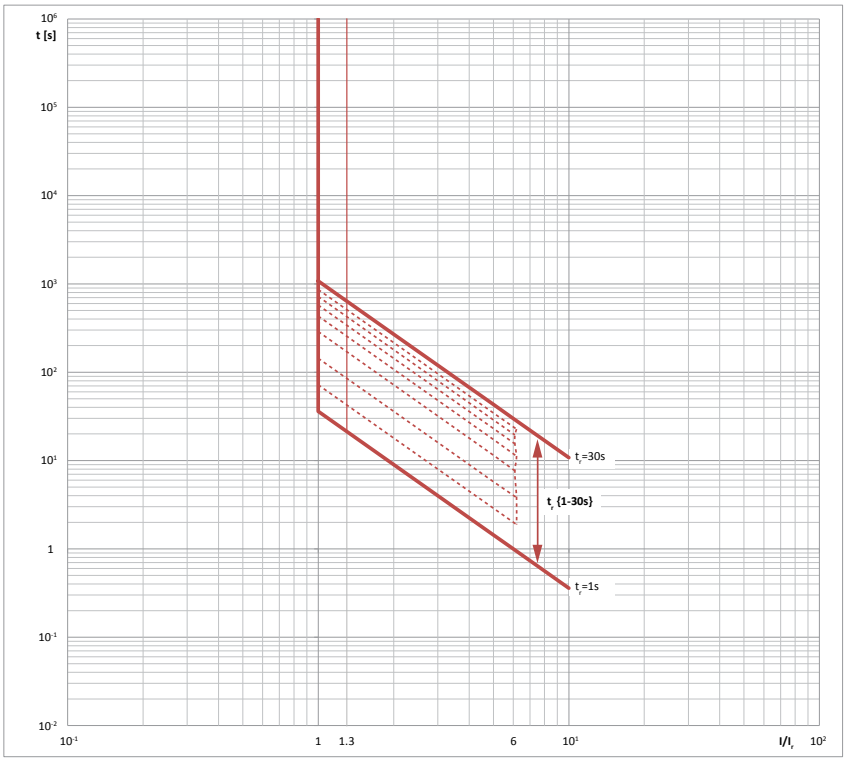
Setting range of L protection curve with inverse function power coefficient *n* = 0.5.



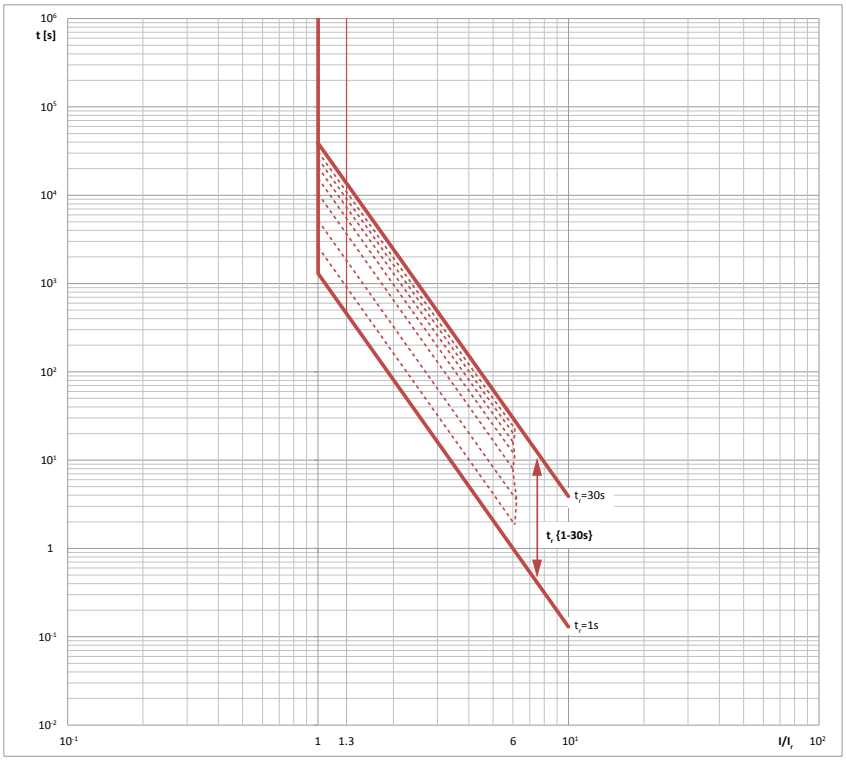
Setting range of L protection curve with inverse function power coefficient *n* = 1.

Tripping units for ACBs

Current characteristics - L protection



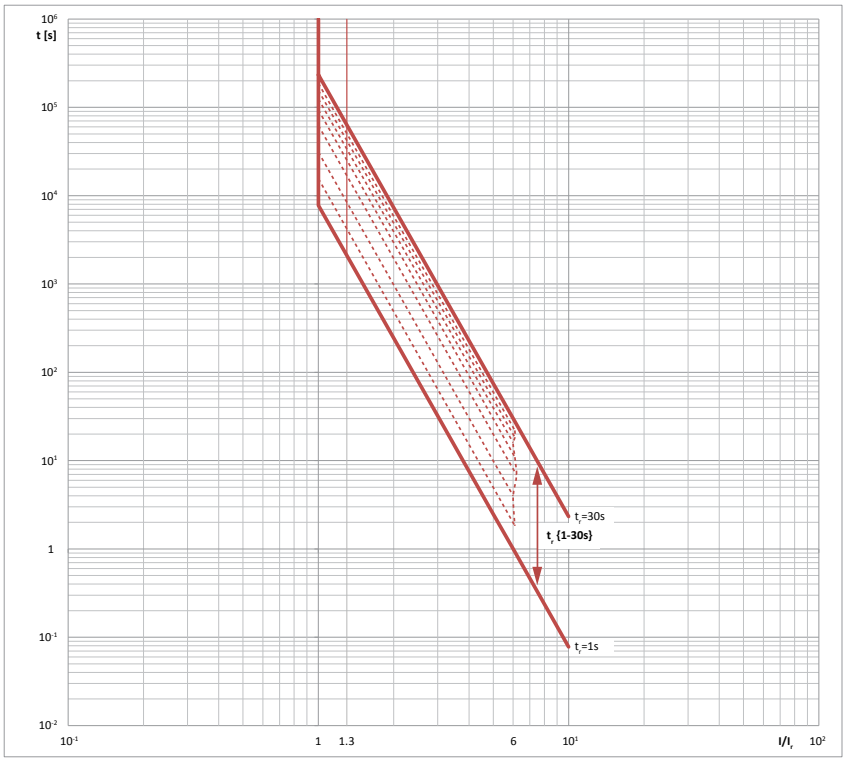
Setting range of L protection curve with inverse function power coefficient *n* = 2.



Setting range of L protection curve with inverse function power coefficient *n* = 4.

Tripping units for ACBs

Current characteristics - L protection



Setting range of L protection curve with inverse function power coefficient *n* = 5.

Tripping units for ACBs

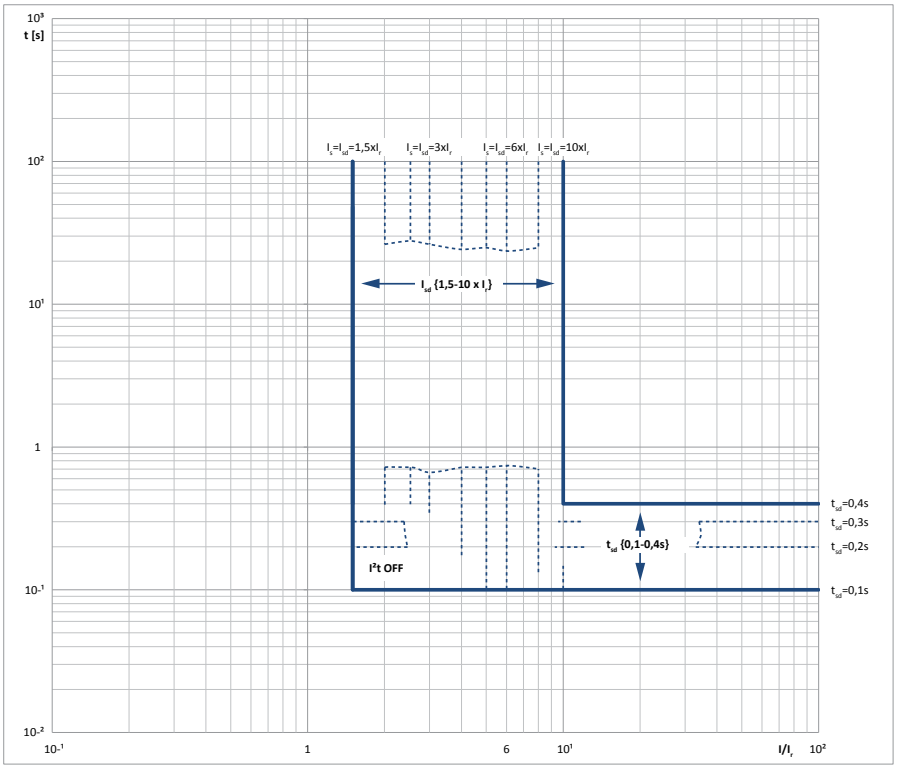
Current characteristics - S protection

S protection (Short delay short circuit protection)

Coarse setting of I_{sd} and t_{sd} by means of mechanical selectors at tripping unit SU. Fine setting is accessible via SU menu.

Time delay can be set as an inverse time function of current (I^2t) or as fixed t_{sd} (I^2t **OFF**). For I^2t = **OFF**, please set $I_s = I_{sd}$ in the SU menu. When I_{sd} is changed, also I_s needs to be reset. The inverse function is expressed as
$t_s = ((6 \times I_r) / I)^2 \times t_r / 10$,

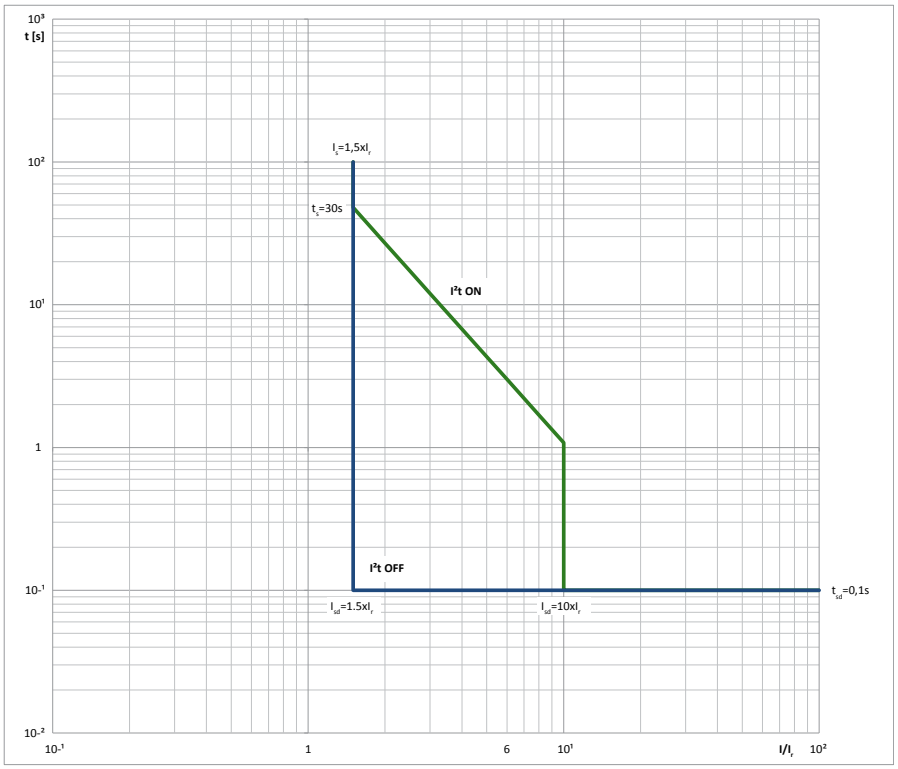
active in the range 1.5-10 × $I_r \le I_s \le I_{sd}$. When actual current I reaches value of I_s, the function turns to fixed time limit mode, i.e. time delay is switched to t_{sd}. Minimum tripping time in the time inverse mode is also given by t_{sd}.



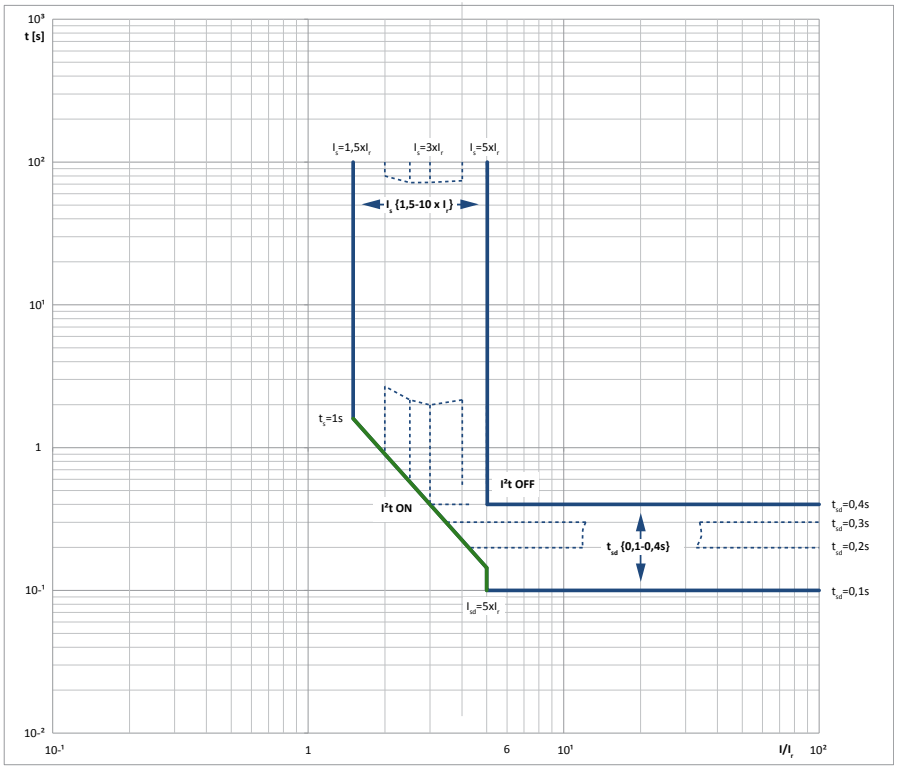
Setting range of S protection curve with fixed tripping time (I^2t **OFF**).

Tripping units for ACBs

Current characteristics - S protection



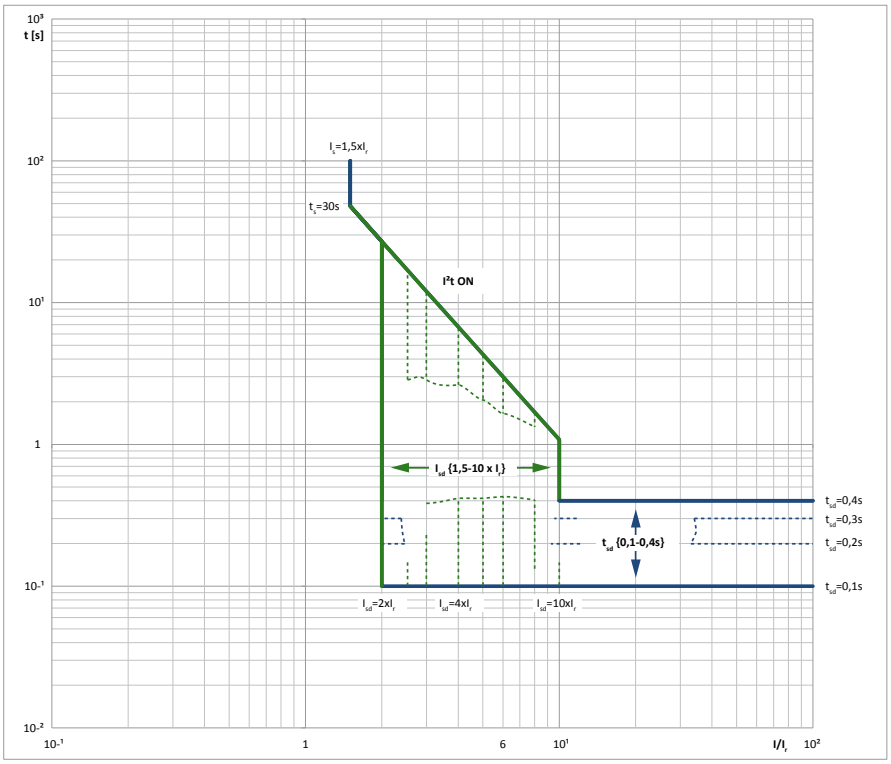
Effect of inverse time function I^2t
(t_r = 30 s, I_s = 1.5 x I_r, t_{sd} = 0.1 s; I^2t *ON:* I_{sd} = 10 x I_r; I^2t *OFF:* I_{sd} = 1.5 x I_r)



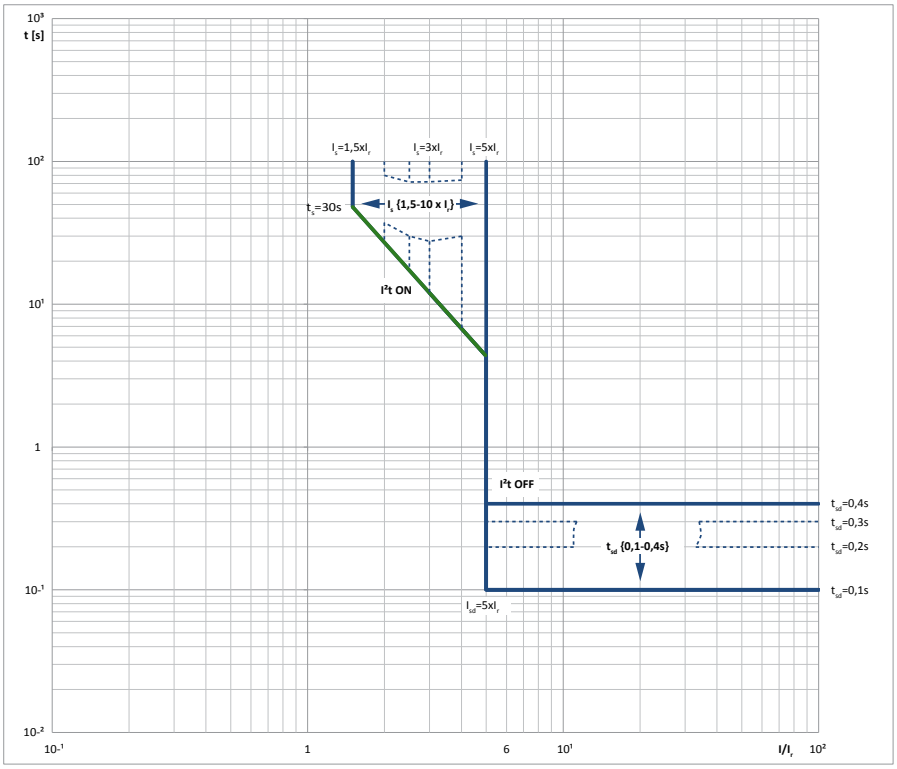
Setting range of S protection curve with inverse function of tripping time
(I^2t ON: t_r = 1 s, I_{sd} = 5 x I_r).

Tripping units for ACBs

Current characteristics - S protection



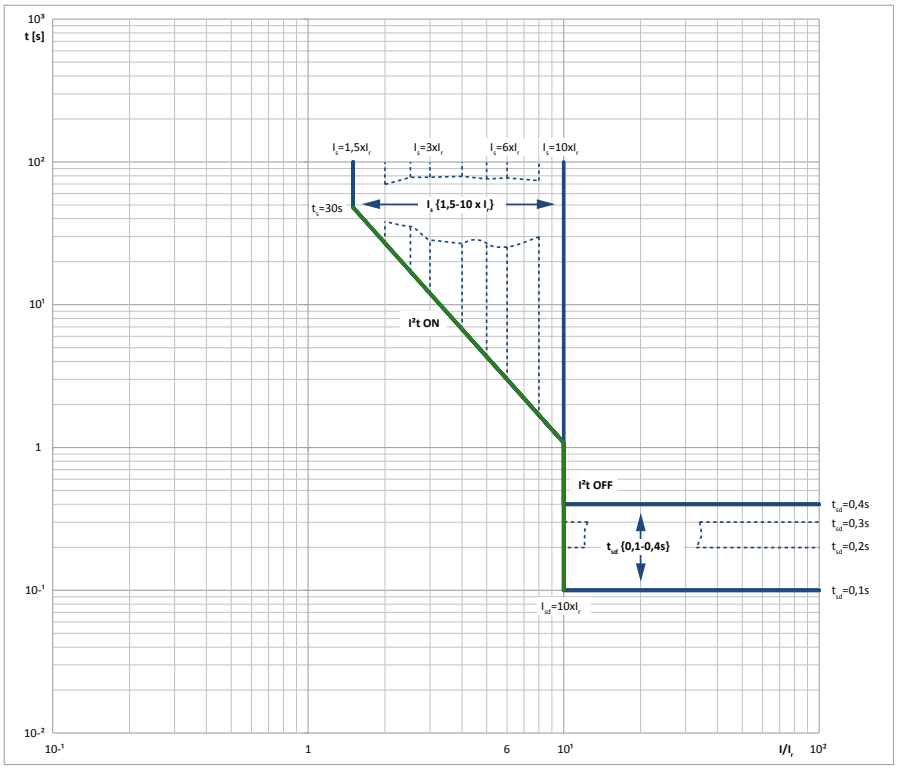
Setting range of S protection curve with inverse function of tripping time (I^2t ON: t_r = 30 s, I_s = 1.5 x I_r).



Setting range of S protection curve with inverse function of tripping time (I^2t ON: t_r = 30s, I_{sd} = 5 x I_r).

Tripping units for ACBs

Current characteristics - S protection



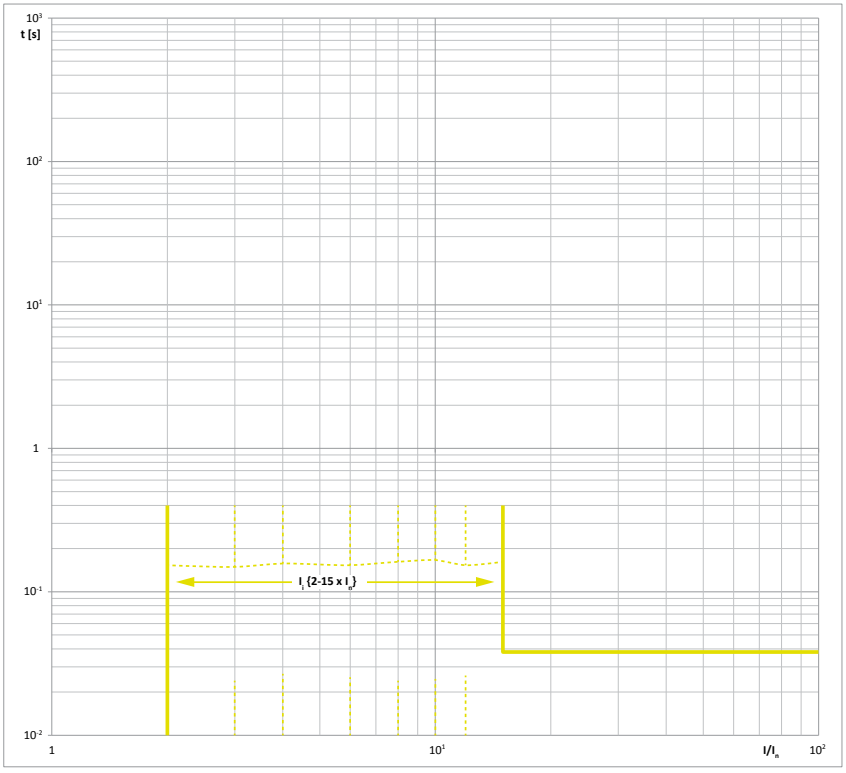
Setting range of S protection curve with inverse function of tripping time (I^2t ON: t_r = 30s, I_{sd} = 10 x I_r).

Tripping units for ACBs

Current characteristics - I protection

I protection (Instantaneous short circuit protection)

Coarse setting of I_i by means of mechanical selectors at tripping unit SU. Fine setting is accessible via SU menu.



Setting range of I_i protection.

Tripping units for ACBs

Current characteristics - G protection

G protection (Ground fault protection)

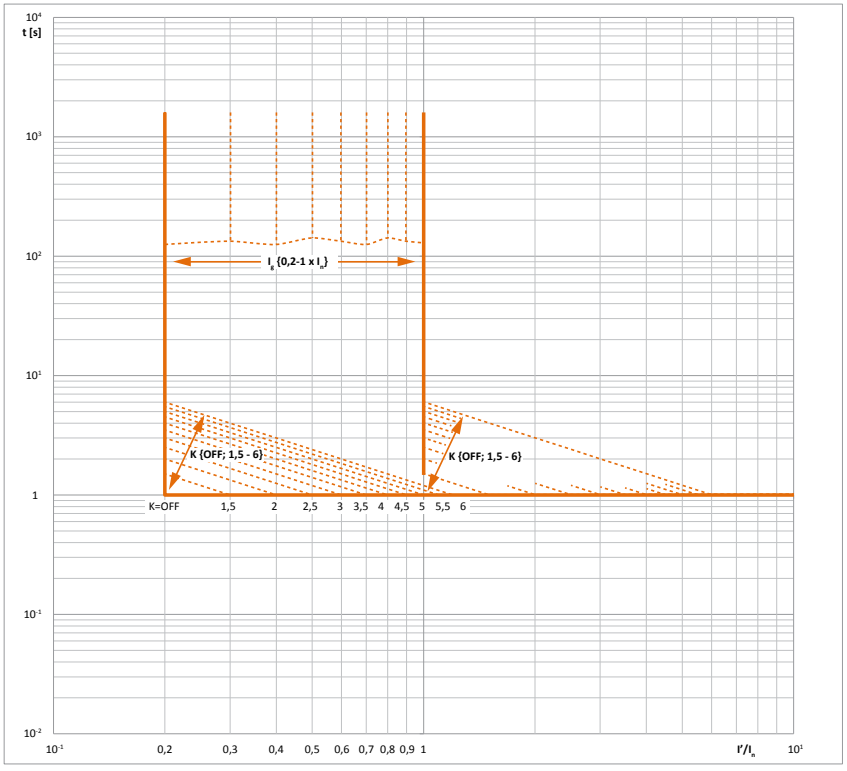
Protection against residual currents to grouding or PE conductors caused by (short-circuit) connection of L conductor with PE potential.

Inverse time limit function $I_g t$ is defined by factor K set in SU menu.

Tripping time is defined as $t = t_g \times K \times I_g / I'$ for currents $I' < K \times I_g$

For current $I \geq K \times I_g$, the function turns to Fixed time limit with $t = t_g$. The inverse function is deactivated by selecting K as OFF in the tripping unit menu.

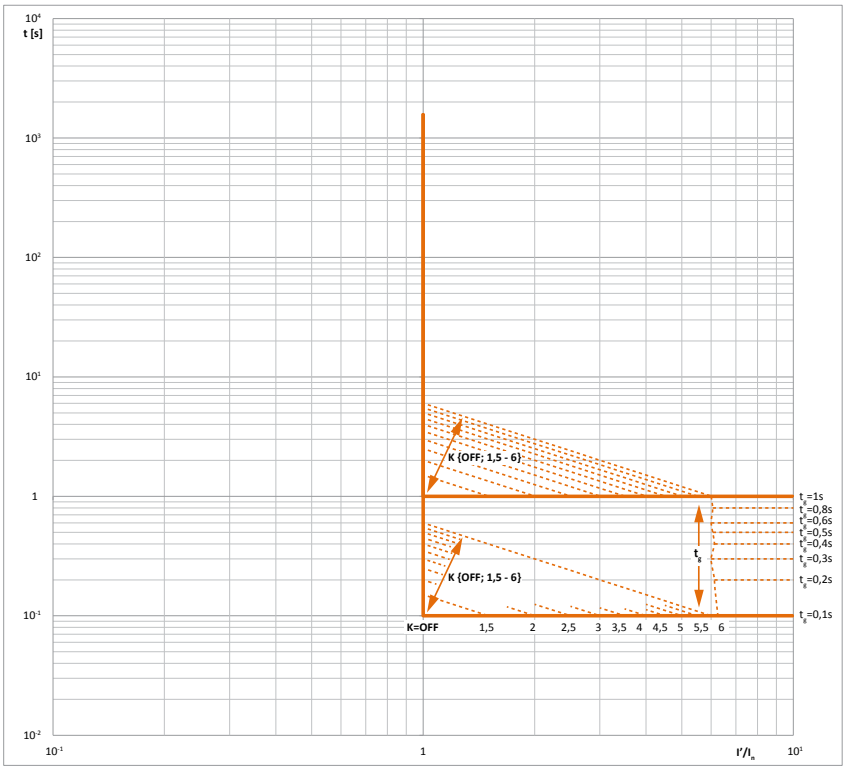
Parameter I_g is value set via button on the front panel of tripping unit. Can be smoothly adjusted in SU. Parameter I' defines actual ground fault current.



Setting range of G protection curve, parameter I_g.

Tripping units for ACBs

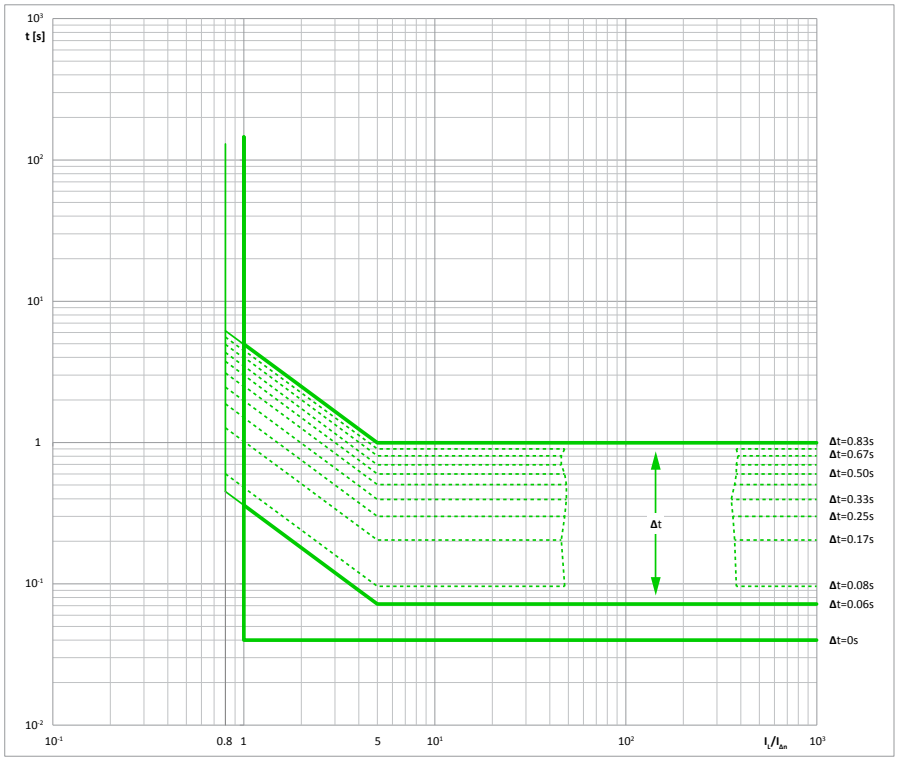
Current characteristics - G protection



Setting range of G protection curve, parameter t_g.

Tripping units for ACBs

Current characteristics - E protection



Protection against residual currents leakage out of working conductors. Indicates not only groud short--circuit faults, but also unwanted and dangerous connections via high impedance. In TN-S system, it can indicate also connection of N and PE conductor (which will cause leakage of part of current from N to PE and thus will unbalance vector current ratio).

Parameter *Δt* defines insensitivity of the protection against residual currents.

Tripping time is expressed as:

$$t = \frac{6 \times I_{\Delta L}}{I_L} \times \Delta t; \quad I_{\Delta n} \leq I_L \leq 5 \times I_{\Delta n}; \quad \Delta t > 0$$

$$t = 1.2 \times \Delta t; \quad I_L > 5 \times I_{\Delta n}; \quad \Delta t > 0$$

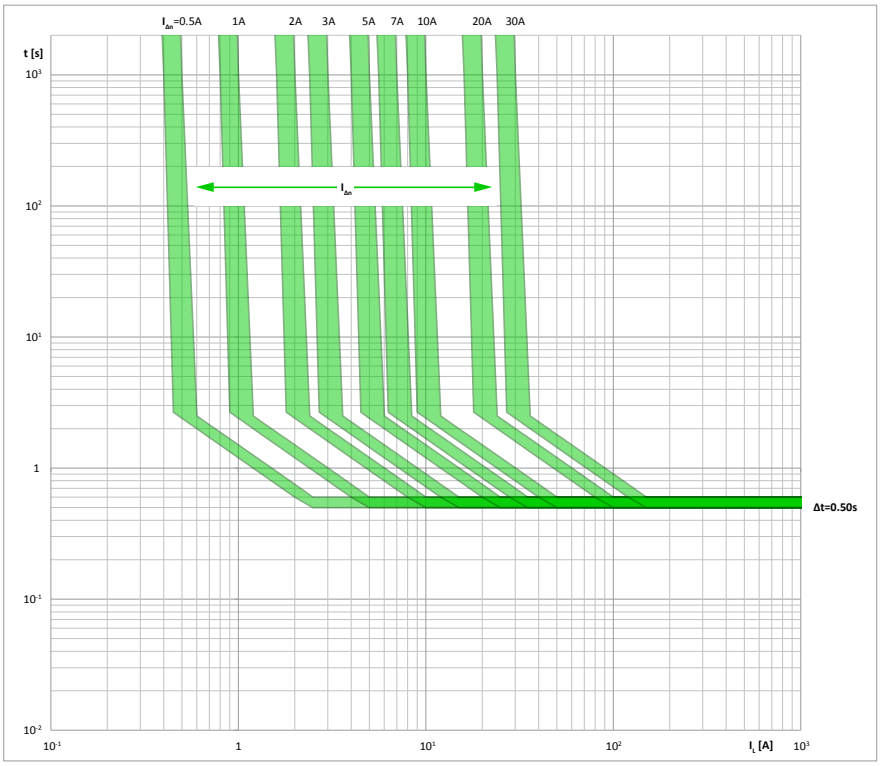
$$t = 0.04\ s; \quad \Delta t = 0$$

$$t = \infty; \quad I_L < I_{\Delta n}$$

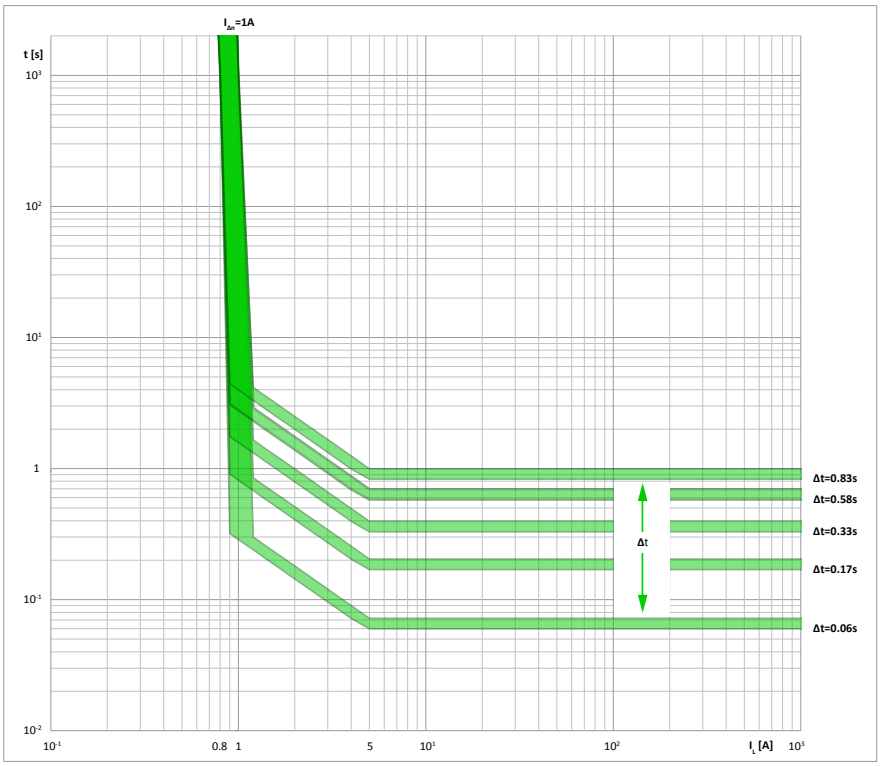
where I_L is the earth leakage current measured with LEC transformer.

Tripping units for ACBs

Current characteristics - E protection



Actual tripping characteristics of Earth leakage protection E.
Setting range of parameter $I_{\Delta n}$.



Actual tripping characteristics of Earth leakage protection E.
Setting range of parameter Δt.

Tripping units for ACBs

Zone Selective Interlock (ZSI)

One of the fundamental functions of protective systems is selectivity. Selectivity dramatically increases operational reliability of distribution systems and installations. As an example see Fig. 1.

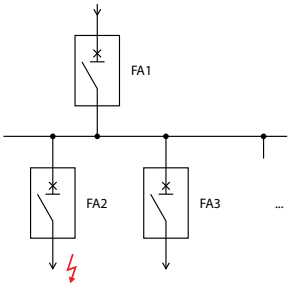


Fig. 1. Basic selective system.

If there is a short circuitry in downstream circuit to breaker FA2, both breakers FA2 and FA1 can trip. Such action of FA1 would, however, cause unavailability of electricity for circuit of FA3 and the other circuits which are not directly affected by the short circuitry. Protection and safety requirements would be fulfilled, but basic requirements for reliability of electricity supply are not kept.

Selectivity behaviour solves just this problem. Basic selectivity means that there is applied certain delay to tripping time of upstream breaker (FA1 in Fig. 1). The delayed trip assures that only downstream breaker will trip. It is set by parameters I_{sd} and t_{sd}.

Let us assume a circuit according to Fig. 2, without the green part for the first moment.

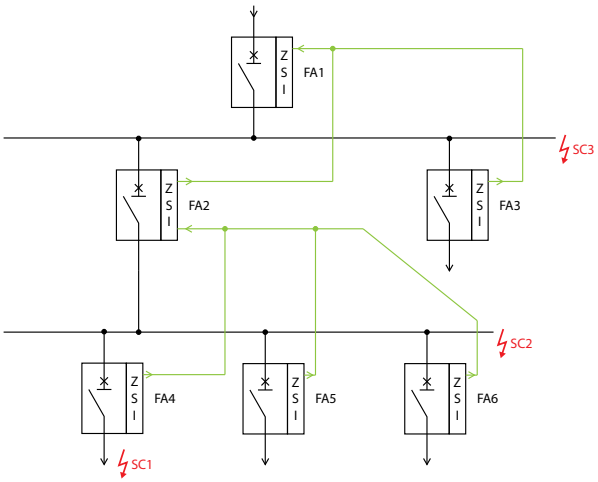


Fig. 2 Complex selective system with ZSI functionality.

In case of short circuitry SC1, the situation is the same as in the previous example. To assure selectivity, tripping of FA2 and FA1 must be delayed with respect to tripping time of FA4. Short circuitry SC2 shows that FA1 must be delayed towards FA2. For tripping times t_{sd} it means

$$t_{sd}\ FA4\ (FA5,FA6) < t_{sd}\ FA2 < t_{sd}\ FA1$$

This simple equation describes the selectivity conditions in standard range of short circuit currents (I_{sd}).

In case of deeper insight we can see, however, that this simple selective behaviour brings imperfections to protection of the system. For next description $t_{sd\ FA4\ (FA5,FA6)}$ = 100 ms, $t_{sd\ FA2\ (FA3)}$ = 250 ms, $t_{sd\ FA1}$ = 400 ms will be expected (typical values).

Let's assume case of SC2. This short circuit current should be tripped by FA2. Short time delay t_{sd} of FA2 is set to be selective with FA4, t_{sd} 250 ms is applied. This situation means that the short circuit current will flow through the affected circuit for 250 ms, but FA4 can never trip. It is obvious that the delayed tripping does not bring any selectivity in this case, but causes bigger damages of the affected circuit. Similar situation can be observed in case of SC3. The general selectivity requirement causes delay of the tripping 400 ms, but none of the downstream breakers can trip. Higher level of selective system we have, longer delay and thus bigger damages of affected circuit will appear.

Tripping units for ACBs

Zone Selective Interlock (ZSI)

Solution of above mentioned problem can be done by means of Zone Selective Interlock (ZSI). This additional system is depicted with green colour in Fig. 2. The whole idea of ZSI comes from simple principle of sharing information about evidence of short circuit current. Circuit breakers equipped with ZSI communicate perception of short circuitry via (digital) output of ZSI. This output signal is wired to ZSI input of upstream installed breaker. Several outputs can be connected in parallel to one input. ZSI module is able to initialize tripping of the breaker without respect to set t_{sd}.

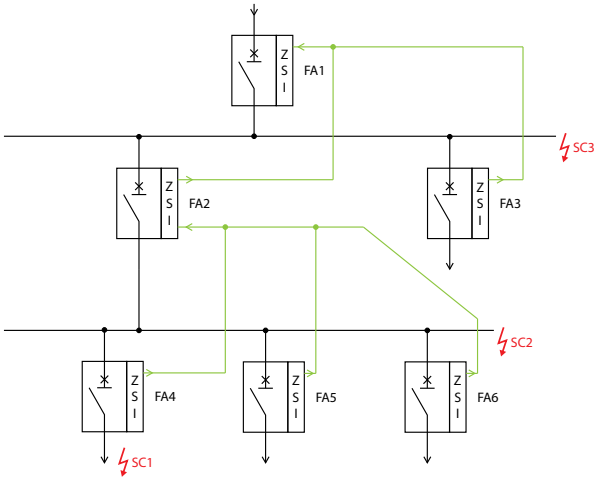


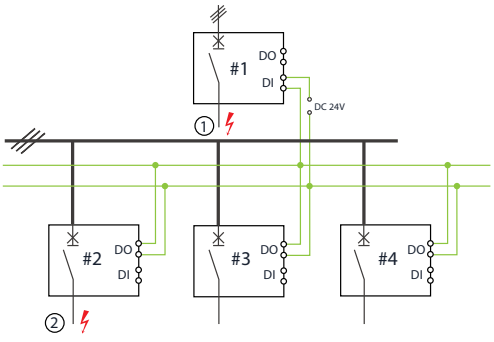
Fig. 2 Complex selective system with ZSI functionality.

In case of SC2, there is no ZSI signal from FA4 to FA2. Lack of the ZSI signal initializes the ZSI activation of tripping of FA2. As the result, FA2 trips in shorter time than $t_{sd\ FA2}$ which also significantly limits damage of the affected circuit.

The situation is similar in case of SC3. There is no ZSI signal from FA2 to FA1, breaker FA1 trips with $t < t_{sd\ FA1}$. When SC1 happens, ZSI outputs of both FA4 and FA2 signalize presence of short circuit current in their downstream circuits and neither $t_{sd\ FA2}$ nor $t_{sd\ FA1}$ is shortened. In the situation of SC2, the breaker FA1 receives ZSI information from FA2 and t_{sd} of FA1 is not affected.

The example shows that ZSI significantly reduces damages in case of short circuitry in all upstream circuits.

Actual connection diagram of Ex9A



Tripping units for ACBs

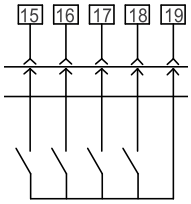
ZSI electrical parameters

Total tripping time with activated ZSI	max. ca. 60 ms
Rated operating voltage of ZSI system external supply	24 V DC
Maximum output current of ZSI	48 mA
ZSI output secondary terminals	ZSI1: #15, 19 (COM) ZSI2: #16, 19 (COM)
Input current of ZSI	typically 8 mA
ZSI input secondary terminals	ZSI1: #20, 21 ZSI2: #22, 23
Contact potential	common for all DO outputs as well as with ZSI outputs, #19

DO electrical parameters

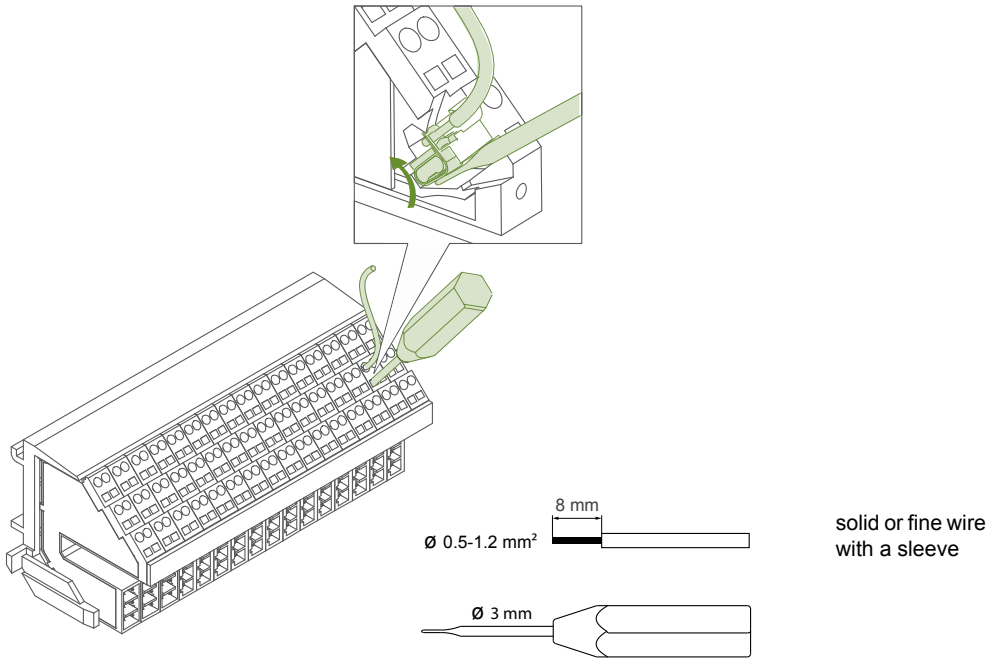
Rated operating voltage of external supply	24 V DC
Maximum output current of DO	48 mA
DO secondary terminals	#15, 16, 17, 18
Contact potential	common for all DO outputs as well as with ZSI outputs, #19

Wiring diagram

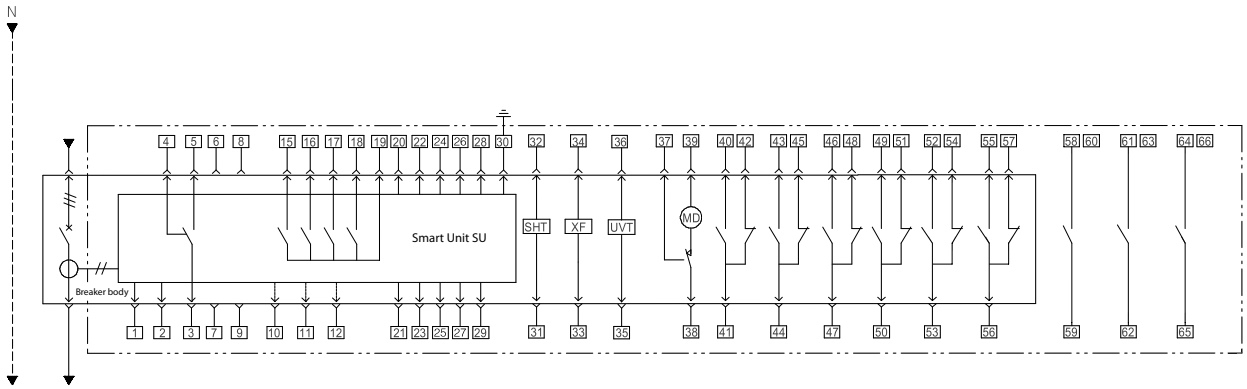


Air Circuit Breakers and tripping units

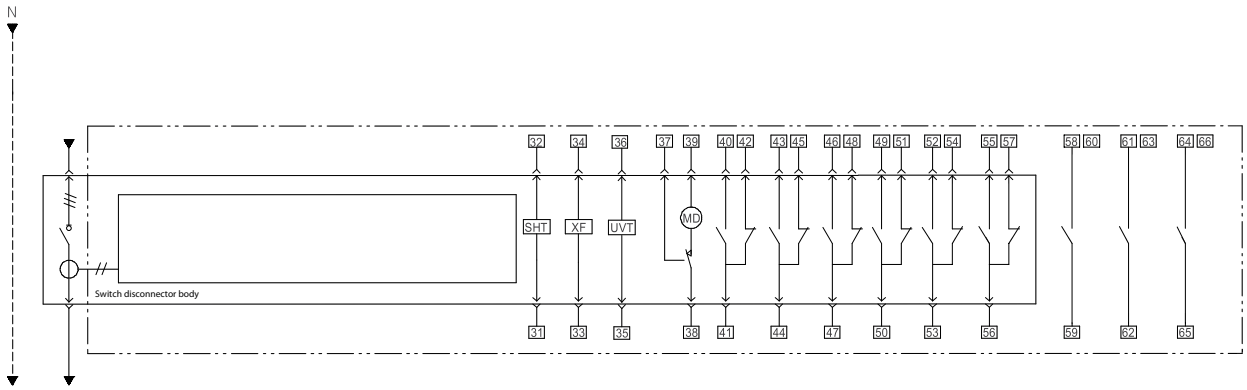
ACB's secondary terminals



ACB's secondary terminals wiring diagram



Switch disconnector's secondary terminals wiring diagram



Air Circuit Breakers and tripping units

Secondary terminals description

1, 2 – External auxiliary power supply for tripping unit SU (optional, recommended). Available for all types of SU.

3, 4, 5 – Tripping signal switch. Function of tripping unit SU, in the scope of delivery of a breaker. Available for all types of SU. Contact parameters 400 V AC / 1 A; 250 V DC / 0.15 A. Utilization categories AC-15, DC-13.

6, 7 and 8, 9 – Internal functions.

10, 11, 12 – Serial communication bus (10=A+, 11=B-, 12=GND). Available for SU of types D, P, H with optional communication module (Modbus), for Profi Bus-DP, Device Net it is necessary to use external communications conversion module.

13, 14 – Not used (internal functions)

15, 16 – ZSI1, ZSI2 outputs or digital outputs DO1, DO2

17, 18 – Digital outputs DO3 and DO4

19 – Common terminal of programmable outputs 15 – 18.

20, 21 and 22, 23 – Digital inputs for ZSI1 and ZSI2

24, 25, 26, 27 – Voltage inputs (A, B, C, N) for voltage based measurements. Available for SU of types D, P, H.

28, 29 – Inputs for external current transformer. The current transformer can be of three different types and functions
a) Current measurement of N pole for 3+Npole connection (NEC transformer)
b) Earth leakage (residual) current measurement (LEC transformer)
c) Ground fault current measurement (WEC transformer)
Respective type of SU must be used for these functionalities.

30 – PE connection point for EMC protection of SU. Please connect to PE conductor.

31, 32 – Shunt trip release (SHT). Second shunt trip release is connected to 35-36 instead of UVT.

33, 34 – Closing release (XF).

35, 36 – Undervoltage release (UVT) or second shunt trip release (SHT).

37, 38, 39 – Motor operator (MD). Terminals 38, 39 control the motor operator, terminal 37 (with potential of terminal 38) signalizes charged closing spring.

40, 41, 42 – Changeover auxiliary contact AX1 (main contact position indication).

43, 44, 45 – Changeover auxiliary contact AX2 (main contact position indication).

46, 47, 48 – Changeover auxiliary contact AX3 (main contact position indication).

49, 50, 51 – Changeover auxiliary contact AX4 (main contact position indication).

52, 53, 54 – Changeover auxiliary contact AX5 (main contact position indication).

55, 56, 57 – Changeover auxiliary contact AX6 (main contact position indication).

58, 59, 60 Position indicator for withdrawable version, status “Connected”

61, 62, 63 Position indicator for withdrawable version, status “Test”

64, 65, 66 Position indicator for withdrawable version, status “Disconnected”

Technical Data Ex9A16

Air Circuit Breakers up to 1600 A

General parameters

Compact design of ACB
Two values of breaking capacity I_{cn} (55 and 65 kA)
Arbitrary choice of tripping unit SU

Electrical parameters

	Ex9A16N	Ex9A16Q
Tested according to	IEC / EN 60947-2	
Rated operational voltage U_e	380 / 400 / 415 / 660 / 690 V AC	
Rated insulation voltage U_i	1000 V	
Rated impulse withstand voltage U_{imp}	12 kV	
Rated current I_n at 40°C	400 / 630 / 800 / 1000 / 1250 / 1600 A	
Rated frequency f	50 / 60 Hz	
Rated ultimate short-circuit breaking capacity I_{cu}	55 kA / 415 V 30 kA / 690 V	65 kA / 415 V 30 kA / 690 V
Rated service short-circuit breaking capacity I_{cs}	42 kA / 415 V 30 kA / 690 V	50 kA / 415 V 30 kA / 690 V
Rated short-circuit making capacity I_{cm}	121 kA / 415 V 63 kA / 690 V	121 kA / 415 V 63 kA / 690 V
Rated short-circuit withstand current I_{cw} for 1s	42 kA / 415 V 25 kA / 690 V	42 kA / 415 V 25 kA / 690 V
Internal resistance per pole	0.033 mΩ (fixed) 0.035 mΩ (withdrawable)	
Poles	3P / 4P	
Breaking operation time	20 — 30 ms	
Closing operation time	< 60 ms	
Electrical service life	6000 operation cycles / 415 V 3000 operation cycles / 690 V	
Mechanical service life	12500 operation cycles without maintenance 25000 operation cycles with maintenance	
Utilization category	B	
Line voltage connection	arbitrary above or below (with external power supply for SU)	

Mechanical parameters

	fixed	withdrawable
Device width (3P / 4P)	254 mm / 324 mm	282 mm / 352 mm
Device height	323 mm	352 mm
Device depth	213 mm	303 mm
Degree of protection	IP40	
Ambient temperature	-25°C — +60°C	
Storage temperature	-40°C — +85°C (without SU) -25°C — +85°C (with SU)	
Altitude	< 2000 m	
Relative humidity	< 90 %	
Installation category	IV (main circuit) / III (secondary circuit)	
Pollution degree	3	
Main terminals surface coating	silver	
Weight (3P / 4P)	22 kg / 26.5 kg	38 kg / 55 kg (including cassette)

Ordering data p. 19

Technical Data Ex9ASD

Air Switch Disconnectors frame size A16 up to 1600 A

General parameters

Rated current up to 1600 A
Fixed and withdrawable versions
Wide range of accessories common with Air circuit breakers

Electrical parameters

	Ex9ASD04-16
Tested according to	IEC / EN 60947-3
Rated operational voltage U_e	380 / 400 / 415 / 660 / 690 V AC
Rated insulation voltage U_i	1000 V
Rated impulse withstand voltage U_{imp}	12 kV
Rated current I_e at 40°C	400 / 630 / 800 / 1000 / 1250 / 1600 A
Rated frequency f	50 / 60 Hz
Short-time (1s) withstand current I_{cw} at 415 V	42 kA
Rated making (peak) current I_{cm} at 415 V	88 kA
Poles	3P / 4P
Breaking operation time	20 — 30 ms
Closing operation time	< 60 ms
Arcing distance	0
Isolation function	yes
Electrical service life at 415 V	6000 operation cycles
Mechanical service life	12500 operation cycles without maintenance 25000 operation cycles with maintenance
Operating frequency	20 operating cycles per hour
Overvoltage category	IV (main circuit) / III (secondary circuit)
Utilization category	AC22A / AC23A
Line voltage connection	arbitrary above or below

Mechanical parameters

	fixed	withdrawable
Device width (3P / 4P)	254 mm / 324 mm	282 mm / 382 mm
Device height	322 mm	352 mm
Device depth	213 mm	303 mm
Degree of protection	IP40	
Ambient temperature	-25°C — +60°C	
Storage temperature	-40°C — +85°C	
Altitude	< 2000 m	
Relative humidity	< 90 %	
Installation category	IV	
Pollution degree	3	
Weight (3P / 4P)	20 kg / 24 kg	36 kg / 52 kg (including cassette)

Ordering data p. 36, 37

Technical Data Ex9A16

Air Circuit Breakers and Switch Disconnectors up to 1600 A

Power dissipation at 3P device

Rated current [A]	Fixed version	Withdrawable version
400 A	80 W	140 W
630 A	100 W	161 W
800 A	110 W	215 W
1000 A	120 W	230 W
1250 A	130 W	250 W
1600 A	220 W	460 W

Temperature derating

***T* [°C]**	***I*$_u$ *(T)* [A]**					
	***I*$_n$ = 400 A**	***I*$_n$ = 630 A**	***I*$_n$ = 800 A**	***I*$_n$ = 1000 A**	***I*$_n$ = 1250 A**	***I*$_n$ = 1600 A**
-5 — +40	400	630	800	1000	1250	1600
45	400	630	800	1000	1250	1550
50	400	630	800	1000	1250	1500
55	400	630	800	950	1150	1450
60	400	550	700	900	1050	1350

Altitude derating

Altitude	**2000 m**	**3000 m**	**4000 m**	**5000 m**
Impulse withstand voltage *U*$_{imp}$	3500 V	3000 V	2500 V	2000 V
Insulation voltage *U*$_i$	1000 V AC	800 V AC	700 V AC	600 V AC
Rated voltage *U*$_e$	690 V AC	580 V AC	500 V AC	400 V AC
Rated uninterrupted current *I*$_u$,	1 x *I*$_u$ *(T)*	0.96 x *I*$_u$ *(T)*	0.91 x *I*$_u$ *(T)*	0.87 x *I*$_u$ *(T)*

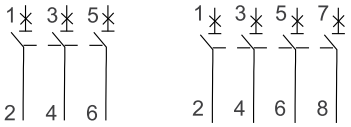
Secondary terminals

Secondary terminals	screwless
Terminals capacity	0.5 — 1.2 mm^2

Technical Data Ex9A16

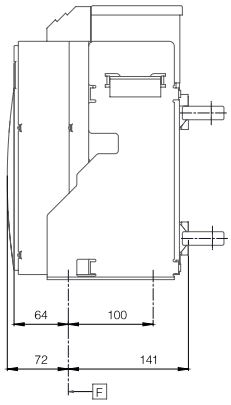
Air Circuit Breakers and Switch Disconnectors up to 1600 A

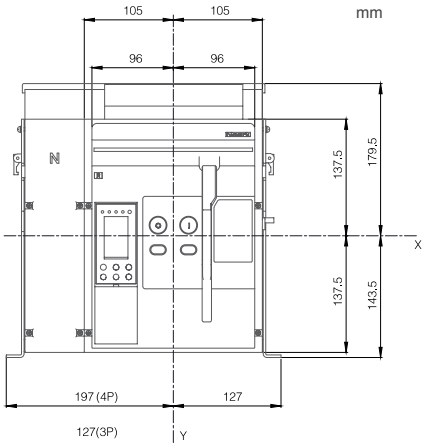
Main terminals wiring diagrams



3P 4P

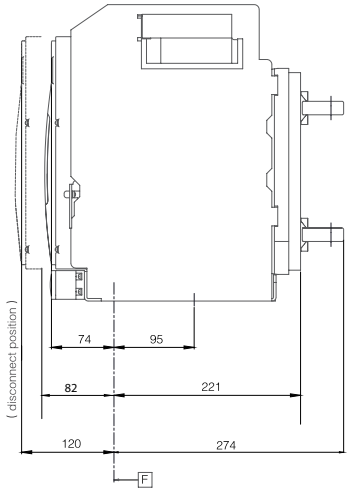
Dimensions - fixed version

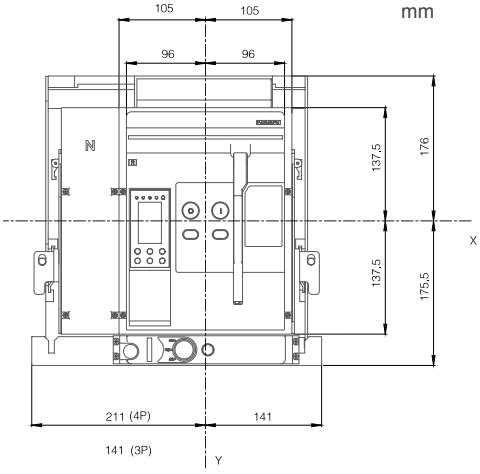




X, Y - door cut-out centering
F - minimum depth of mounting support panel

Dimensions - withdrawable version

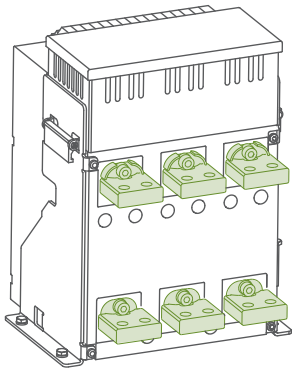




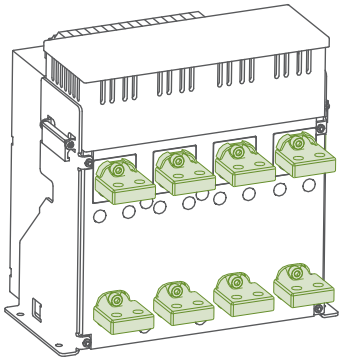
Air Circuit Breakers and Switch Disconnectors up to 1600 A

Horizontal connection - fixed version

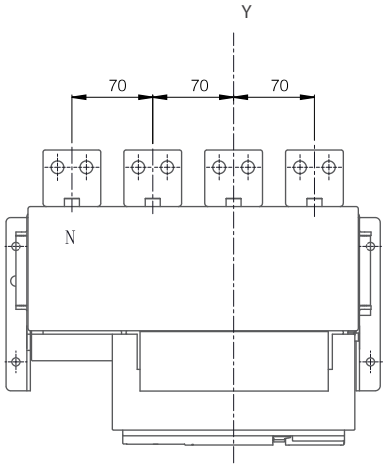
[mm]

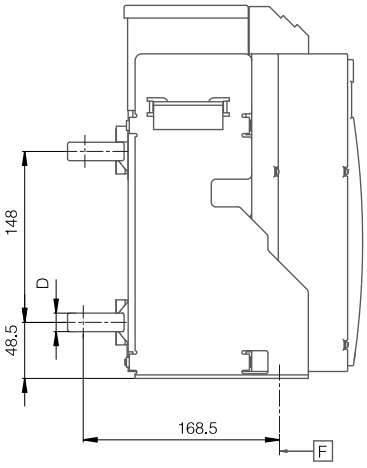


3P

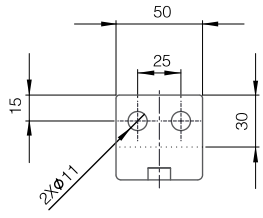


4P





X, Y - door cut-out centering
F - minimum depth of mounting support panel

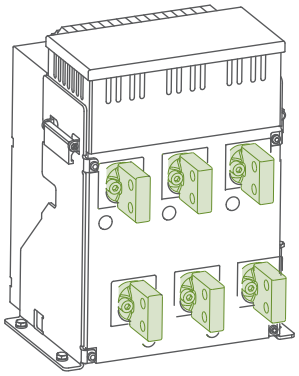


Rated current	D Thickness
400A–630A	10
800A–1600A	16

Air Circuit Breakers and Switch Disconnectors up to 1600 A

Vertical connection VCP - fixed version

[mm]



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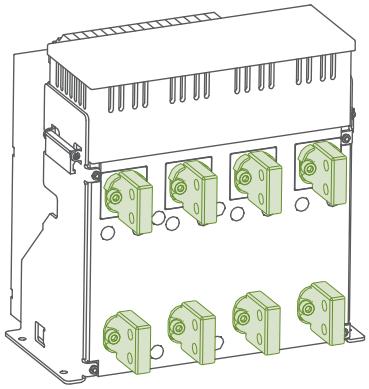

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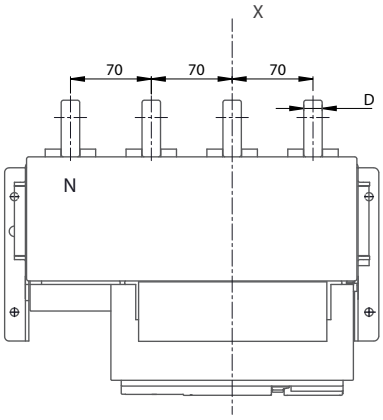
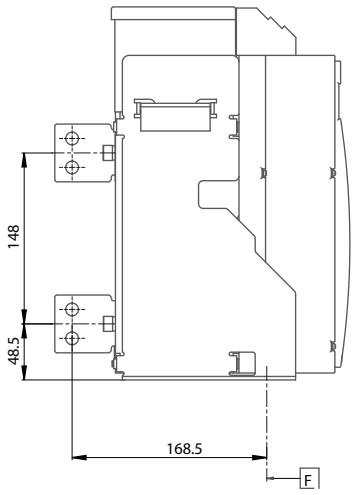
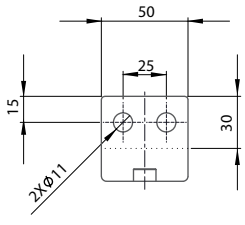




X, Y - door cut-out centering
F - minimum depth of mounting support panel



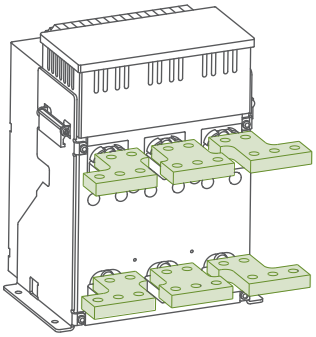
Rated current	D Thickness
400A-630A	10
800A-1600A	16

Technical Data Ex9A16

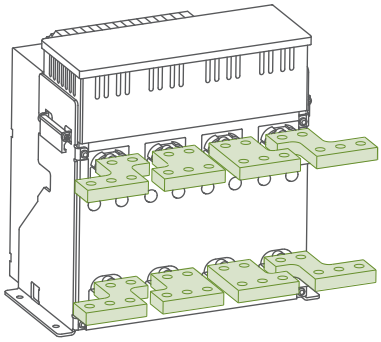
Air Circuit Breakers and Switch Disconnectors up to 1600 A

Horizontal connection with spreaders TEX - fixed version

[mm]



3P



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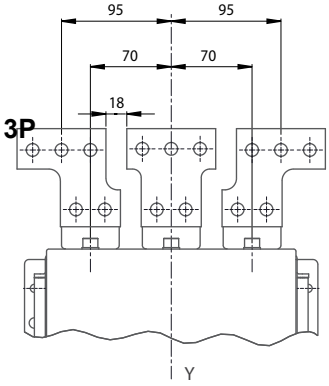
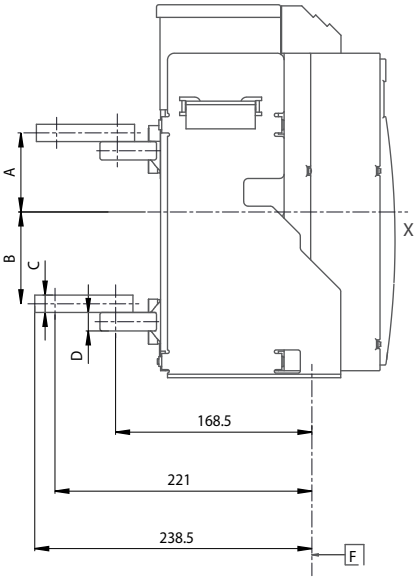
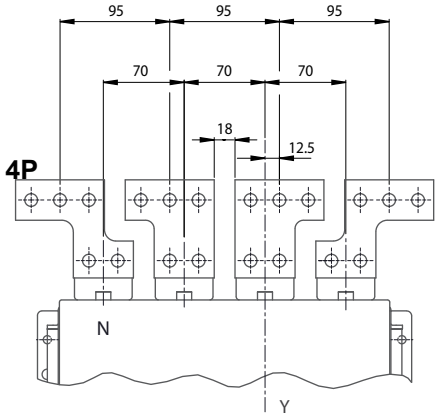


X, Y - door cut-out centering
F - minimum depth of mounting support panel



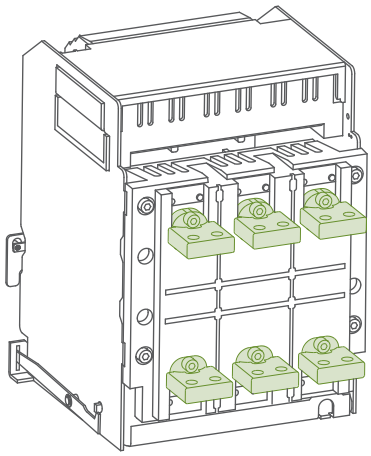


Rated current	A	B	C Thickness	D Thickness
400A-630A	63	87	10	10
800A-1600A	68.5	81.5	15	16

Air Circuit Breakers and Switch Disconnectors up to 1600 A

Horizontal connection - withdrawable version

[mm]



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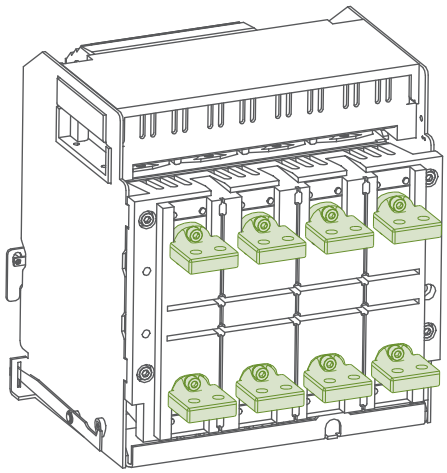

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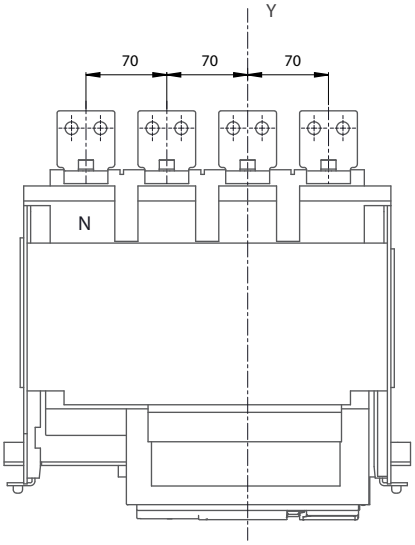
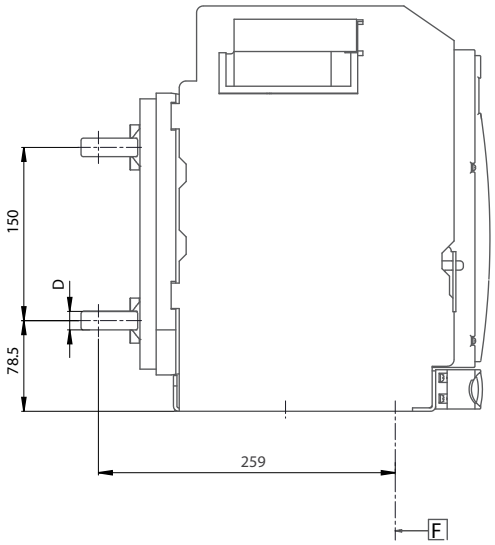
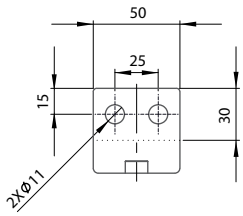




X, Y - door cut-out centering
F - minimum depth of mounting support panel

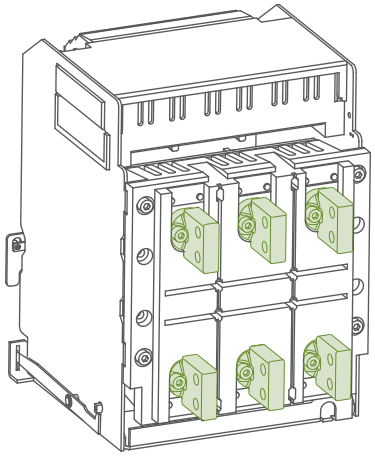


Rated current	D Thickness
400A-630A	10
800A-1600A	16

Air Circuit Breakers and Switch Disconnectors up to 1600 A

Vertical connection VCP - withdrawable version

[mm]



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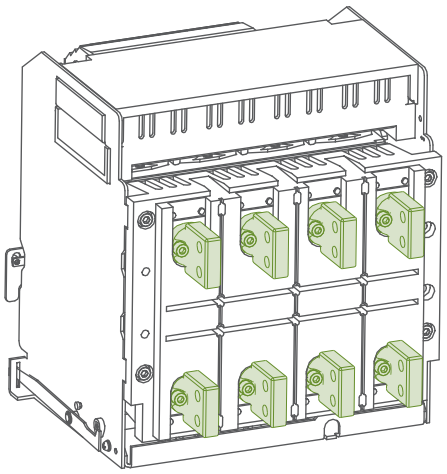

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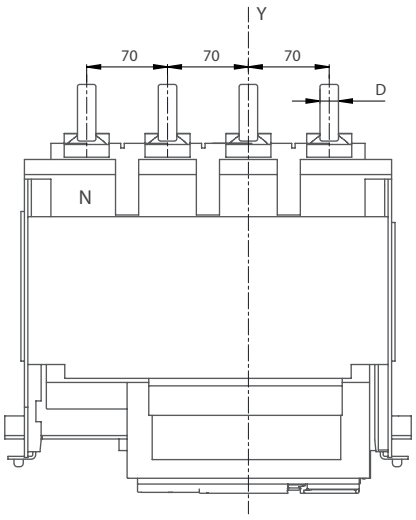
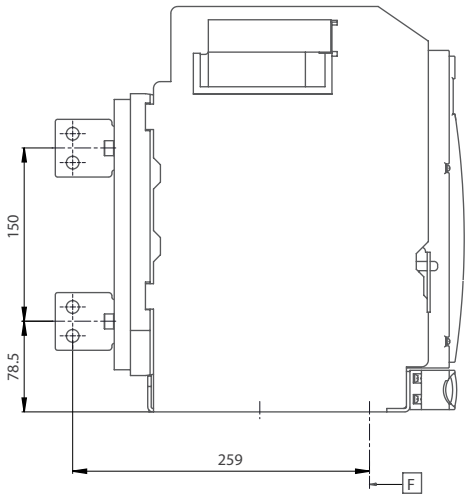
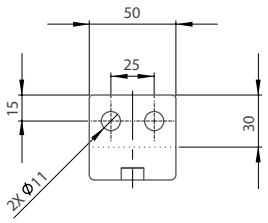




X, Y - door cut-out centering
F - minimum depth of mounting support panel

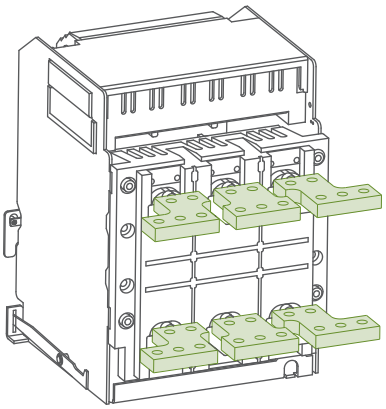


Rated current	D Thickness
400A-630A	10
800A-1600A	16

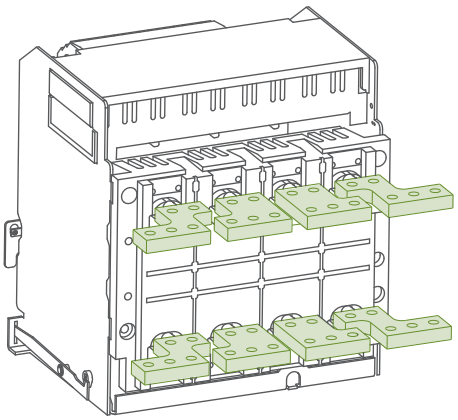
Air Circuit Breakers and Switch Disconnectors up to 1600 A

Horizontal connection with spreaders TEX - withdrawable version

[mm]

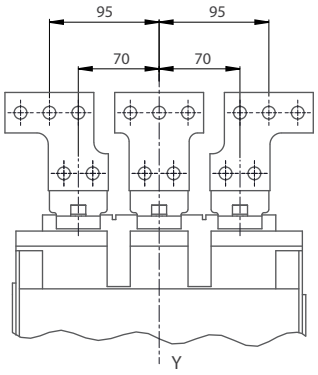


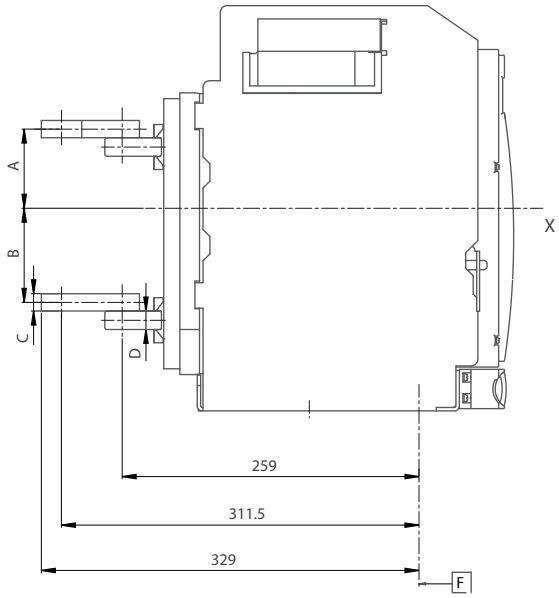
3P



4P

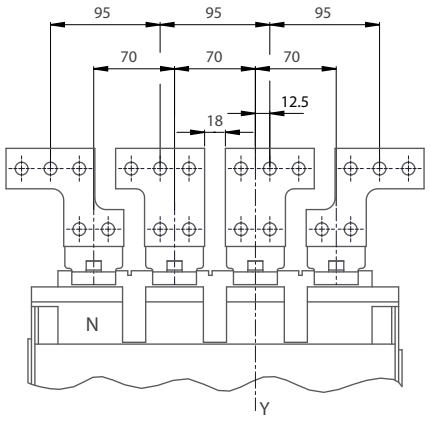
3P





X, Y - door cut-out centering
F - minimum depth of mounting support panel

4P



Rated current	A	B	C Thickness	D Thickness
400A-630A	63	87	10	10
800A-1600A	68.5	81.5	15	16

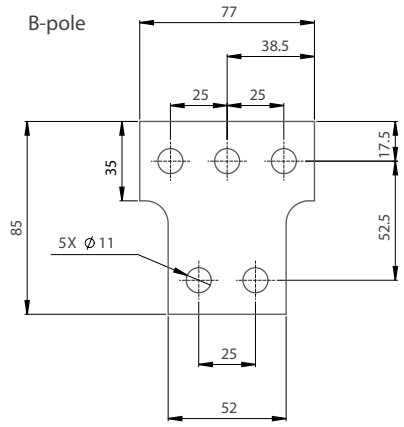
Air Circuit Breakers and Switch Disconnectors up to 1600 A

Spreaders TEX dimensions

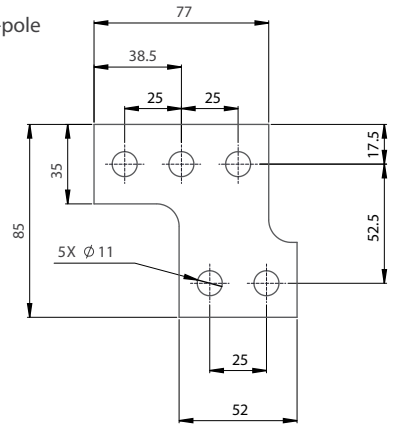
3P

[mm]

B-pole

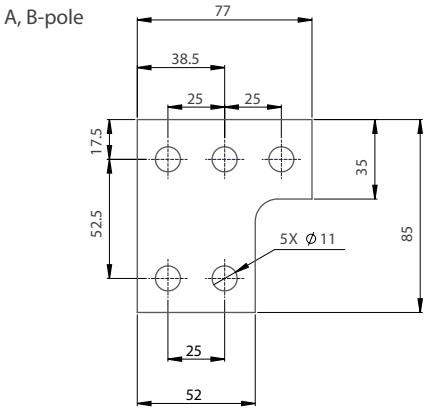


A, C-pole

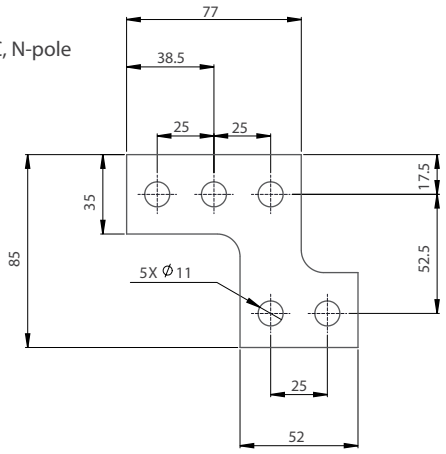


4P

A, B-pole



C, N-pole



Technical Data Ex9A25

In preparation...

Air Circuit Breakers up to 2500 A

General parameters

Compact design ACBs
Two values of breaking capacity I_{cn} (65 and 85 kA)
Arbitrary choice of tripping unit SU

Electrical parameters

	Ex9A25Q	Ex9A25R
Tested according to	IEC / EN 60947-2	
Rated operational voltage U_e	380 / 400 / 415 / 660 / 690 V AC	
Rated insulation voltage U_i	1000 V	
Rated impulse withstand voltage U_{imp}	12 kV	
Rated current I_n at 40°C	630 / 800 / 1000 / 1250 / 1600 / 2000 / 2500 A	
Rated frequency f	50 / 60 Hz	
Rated ultimate short-circuit breaking capacity I_{cu}	65 kA / 415 V 40 kA / 690 V	85 kA / 415 V 50 kA / 690 V
Rated service short-circuit breaking capacity I_{cs}	65 kA / 415 V 40 kA / 690 V	85 kA / 415 V 50 kA / 690 V
Rated short-circuit making capacity I_{cm}	143 kA / 415 V 84 kA / 690 V	187 kA / 415 V 105 kA / 690 V
Rated short-circuit withstand current I_{cw} for 1s	50 kA / 415 V 40 kA / 690 V	65 kA / 415 V 50 kA / 690 V
Rated current of N-pole I_N in 4P ACB	100% x I_n	
Internal resistance per pole		
Poles	3P / 4P	
Breaking operation time	20 — 30 ms	
Closing operation time	< 70 ms	
Electrical service life	5000 operation cycles / 415 V 2500 operation cycles / 690 V	
Mechanical service life	12500 operation cycles without maintenance 25000 operation cycles with maintenance	
Utilization category	B	
Line voltage connection	arbitrary above or below (with external power supply for SU)	

Mechanical parameters

	fixed	withdrawable
Device width (3P / 4P)	364 mm / 459 mm	377 mm / 472 mm
Device height	356 mm	430 mm
Device depth	298 mm	406 mm
Degree of protection	IP40	
Ambient temperature	-25°C — +60°C	
Storage temperature	- 40°C — +85°C (without SU) -25°C — +85°C (with SU)	
Altitude	< 2000 m	
Relative humidity	< 90 %	
Installation category	IV (main circuit) / III (secondary circuit)	
Pollution degree	3	
Main terminals surface coating	silver	
Weight (3P / 4P)	42 kg / 55 kg	86 kg / 106 kg

Ordering data p. 23

Technical Data Ex9A25

In preparation...

Air Circuit Breakers up to 2500 A

Power dissipation at 3P device

Rated current [A]	Fixed version	Withdrawable version
630 A	178 W	104 W
800 A	190 W	113 W
1000 A	237 W	124 W
1250 A	293 W	161 W
1600 A	435 W	232 W
2000 A	500 W	266 W
2500 A	560 W	300 W

Temperature derating

***T* [°C]**	***I*$_u$ *(T)* [A]**						
	***I*$_n$ = 630 A**	***I*$_n$ = 800 A**	***I*$_n$ = 1000 A**	***I*$_n$ = 1250 A**	***I*$_n$ = 1600 A**	***I*$_n$ = 2000 A**	***I*$_n$ = 2500 A**
-5 — +40	630	800	1000	1250	1600	2000	2500
45	630	800	1000	1250	1600	2000	2500
50	630	800	1000	1250	1600	2000	2400
55	630	800	1000	1200	1500	1900	2350
60	630	800	950	1150	1400	1750	2250

Altitude derating

Altitude	**2000 m**	**3000 m**	**4000 m**	**5000 m**
Impulse withstand voltage *U*$_{imp}$	3500 V	3150 V	2500 V	2000 V
Insulation voltage *U*$_i$	1000 V AC	800 V AC	700 V AC	600 V AC
Rated voltage *U*$_e$	690 V AC	580 V AC	500 V AC	400 V AC
Rated uninterrupted current *I*$_u$,	1 x *I*$_u$ *(T)*	0.96 x *I*$_u$ *(T)*	0.9 x *I*$_u$ *(T)*	0.85 x *I*$_u$ *(T)*

Secondary terminals

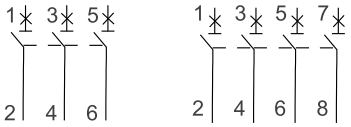
Secondary terminals	screwless
Terminals capacity	0.5 — 1.2 mm^2

Technical Data Ex9A25

In preparation...

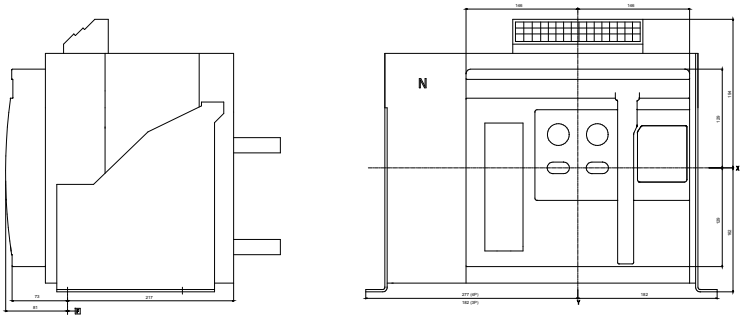
Air Circuit Breakers up to 2500 A

Main terminals wiring diagrams



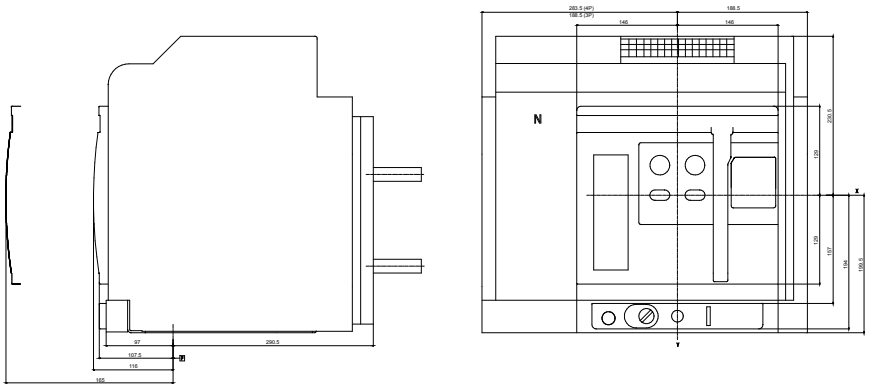
3P 4P

Dimensions - fixed version



X, Y - door cut-out centering
F - minimum depth of mounting support panel

Dimensions - withdrawable version



Noark

Technical Data Ex9A32

Air Circuit Breakers up to 3200 A

General parameters

Air circuit breakers up to 3200 A
Breaking capacity I_{cu} 65, 85 and 100 kA
Arbitrary choice of tripping unit SU

Electrical parameters

	Ex9A32Q	Ex9A32R	Ex9A32H
Tested according to	IEC / EN 60947-2		
Rated operational voltage U_e	380 / 400 / 415 / 660 / 690 V AC		
Rated insulation voltage U_i	1000 V		
Rated impulse withstand voltage U_{imp}	12 kV		
Rated current I_n at 40°C	1600 / 2000 / 2500 / 2900 / 3200 A		
Rated frequency f	50 / 60 Hz		
Rated ultimate short-circuit breaking capacity I_{cu}	65 kA / 415 V 50 kA / 690 V	85 kA / 415 V 65 kA / 690 V	100 kA / 415 V 75 kA / 690 V
Rated service short-circuit breaking capacity I_{cs}	65 kA / 415 V 50 kA / 690 V	85 kA / 415 V 65 kA / 690 V	100 kA / 415 V 75 kA / 690 V
Rated short-circuit making capacity I_{cm}	143 kA / 415 V 105 kA / 690 V	187 kA / 415 V 143 kA / 690 V	220 kA / 415 V 165 kA / 690 V
Rated short-circuit withstand current I_{cw} for 1s	50 kA / 415 V 32 kA / 690 V	65 kA / 415 V 40 kA / 690 V	85 kA / 415 V 50 kA / 690 V
Internal resistance per pole	0.025 mΩ (fixed) 0.038 mΩ (withdrawable)		
Poles	3P / 4P		
Breaking operation time	20 — 30 ms		
Closing operation time	< 70 ms		
Electrical service life	5000 operation cycles / 415 V 1500 operation cycles / 690 V		
Mechanical service life	10000 operation cycles without maintenance 15000 operation cycles with maintenance		
Utilization category	B		
Line voltage connection	arbitrary above or below (with external power supply for SU)		

Mechanical parameters

	fixed	withdrawable
Device width (3P / 4P)	424 mm / 539 mm	437 mm / 552 mm
Device height	353 mm	430 mm
Device depth	304 mm	401 mm
Degree of protection	IP40	
Ambient temperature	-25°C — +60°C	
Storage temperature	- 40°C — +85°C (without Smart Unit) -25°C — +85°C (with Smart Unit)	
Altitude	< 2000 m	
Relative humidity	< 90 %	
Installation category	IV (main circuit) / III (secondary circuit)	
Pollution degree	3	
Main terminals surface coating	silver	
Weight (3P / 4P)	52.5 kg / 66.5 kg	98 kg / 121 kg (including cassette)

Ordering data p. 27

Technical Data Ex9A32

Air Circuit Breakers up to 3200 A

Power dissipation at 3P connection

Rated current [A]	Fixed version	Withdrawable version
1600 A	170 W	390 W
2000 A	250 W	470 W
2500 A	260 W	600 W
2900 A	260 W	600 W
3200 A	420 W	670 W

Temperature derating

***T* [°C]**	***I*$_u$ *(T)* [A]**				
	***I*$_n$ = 1600 A**	***I*$_n$ = 2000 A**	***I*$_n$ = 2500 A**	***I*$_n$ = 2900 A**	***I*$_n$ = 3200 A**
-5 — +45	1600	2000	2500	2900	3200
50	1600	2000	2500	2900	3100
55	1600	2000	2450	2800	3000
60	1600	1900	2350	2700	2900

Altitude derating

Altitude	**2000 m**	**3000 m**	**4000 m**	**5000 m**
Impulse withstand voltage *U*$_{imp}$	3500 V	3000 V	2500 V	2000 V
Insulation voltage *U*$_i$	1000 V AC	800 V AC	700 V AC	600 V AC
Rated voltage *U*$_e$	690 V AC	580 V AC	500 V AC	400 V AC
Rated uninterrupted current *I*$_u$.	1 x *I*$_u$ *(T)*	0.96 x *I*$_u$ *(T)*	0.91 x *I*$_u$ *(T)*	0.87 x *I*$_u$ *(T)*

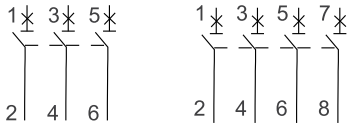
Secondary terminals

Secondary terminals	screwless
Terminals capacity	0.5 — 1.2 mm^2

Technical Data Ex9A32

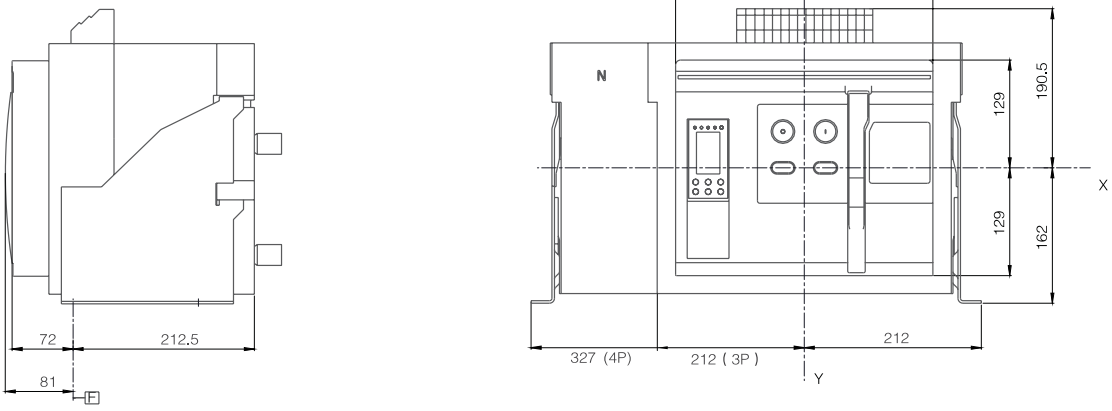
Air Circuit Breakers up to 3200 A

Main terminals wiring diagrams



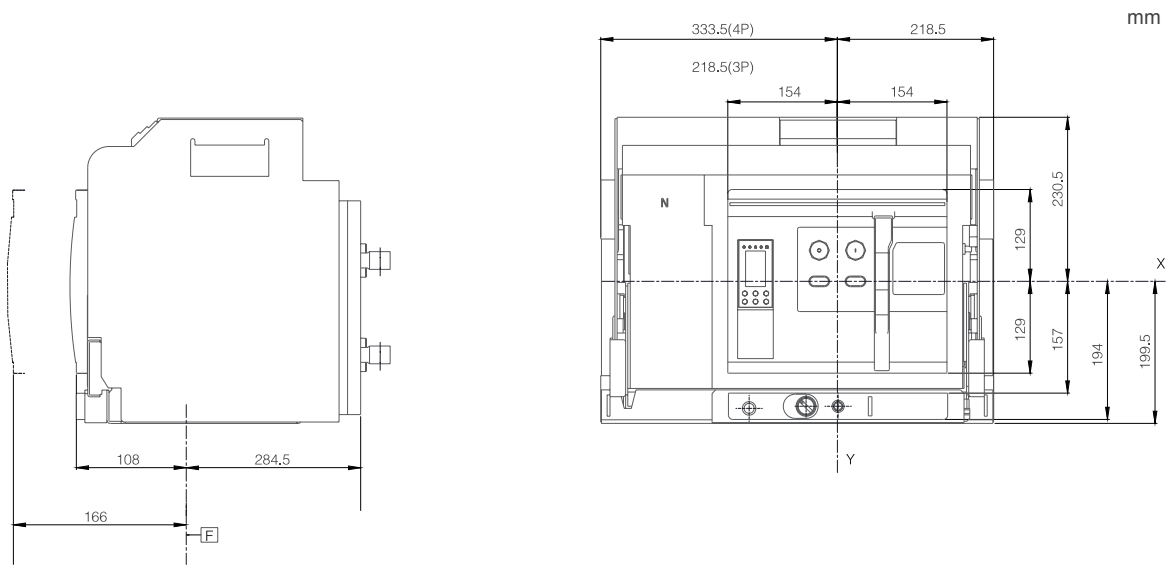
3P 4P

Dimensions - fixed version



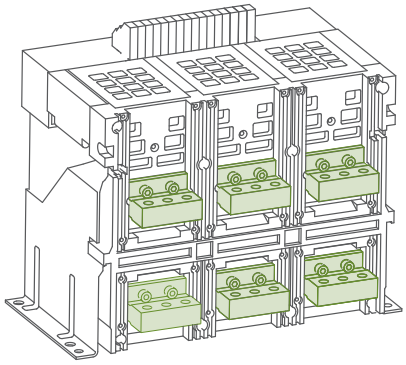
X, Y - door cut-out centering
F - minimum depth of mounting support panel

Dimensions - withdrawable version

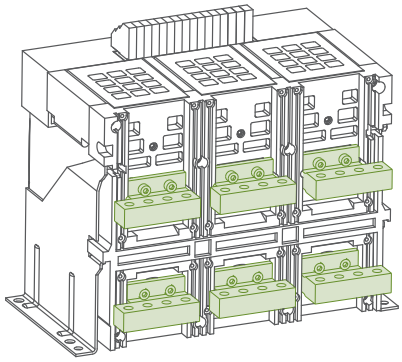


Air Circuit Breakers up to 3200 A

Horizontal connection - fixed version

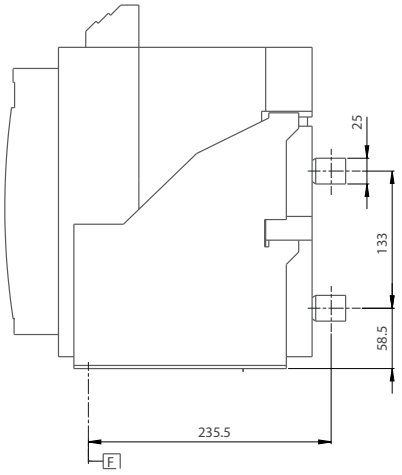


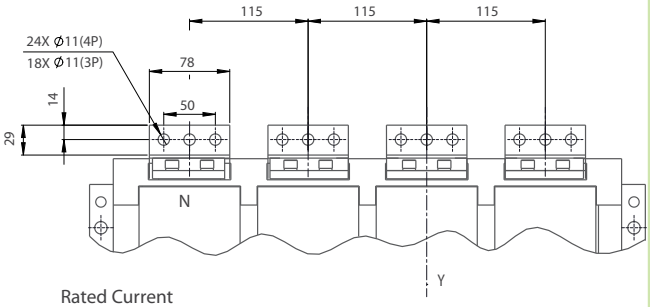
1600A - 2500A



2900A - 3200A

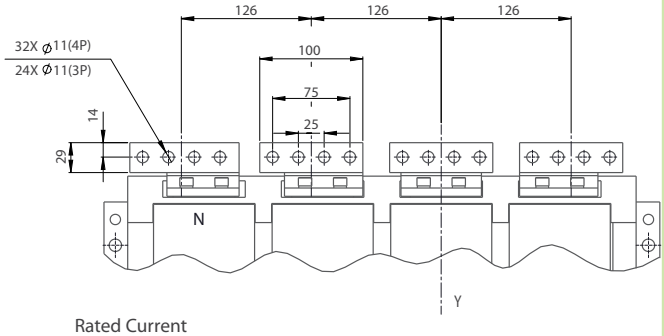
[mm]





Rated Current
1600-2500A

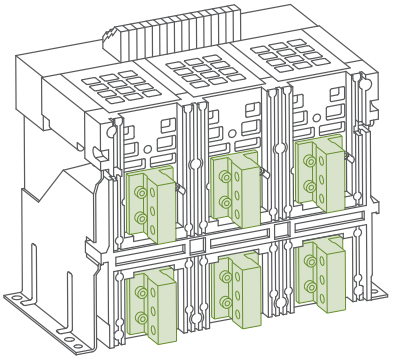
X, Y - door cut-out centering
F - minimum depth of mounting support panel



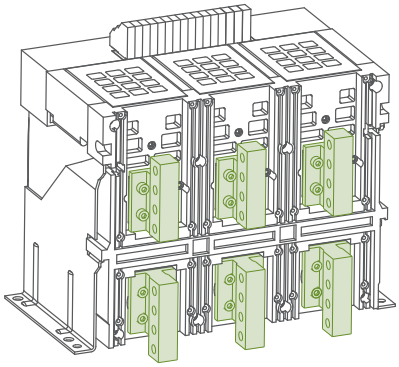
Rated Current
2900-3200A

Air Circuit Breakers up to 3200 A

Vertical connection VCP - fixed version

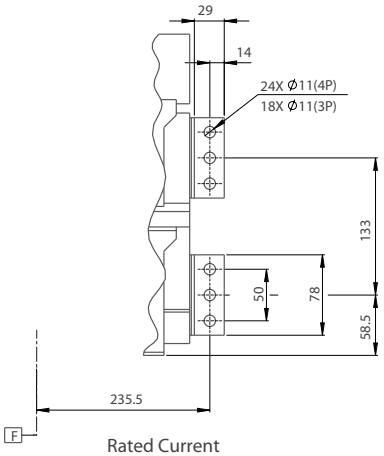


1600A - 2500A

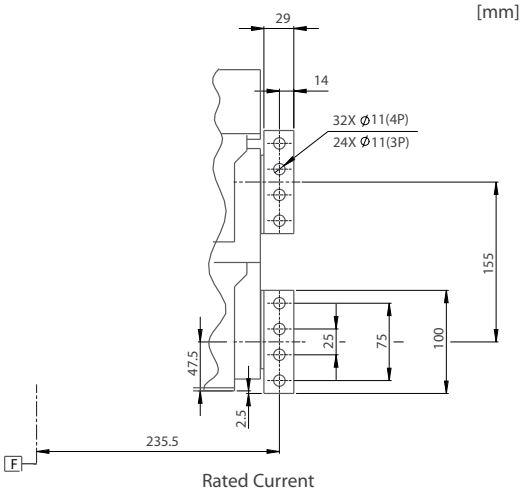


2900A - 3200A

[mm]

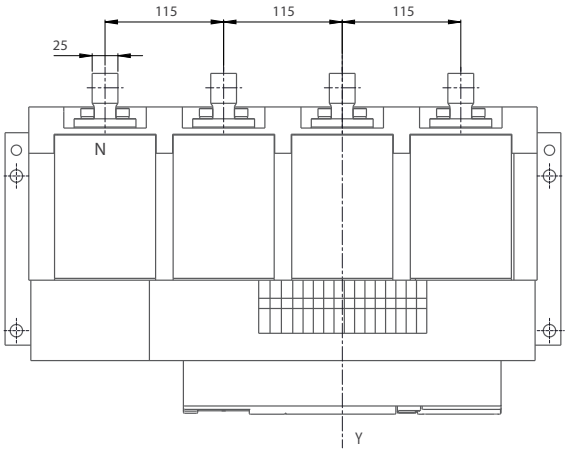


Rated Current
1600-2500A



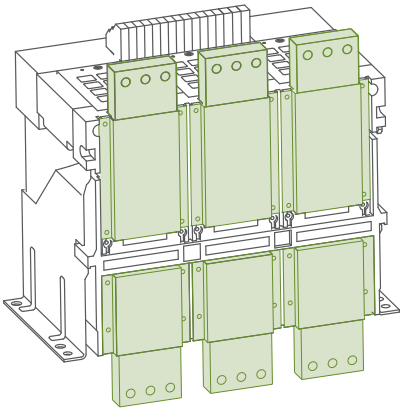
Rated Current
2900-3200A

X, Y - door cut-out centering
F - minimum depth of mounting support panel



Air Circuit Breakers up to 3200 A

Front connection ACP - fixed version



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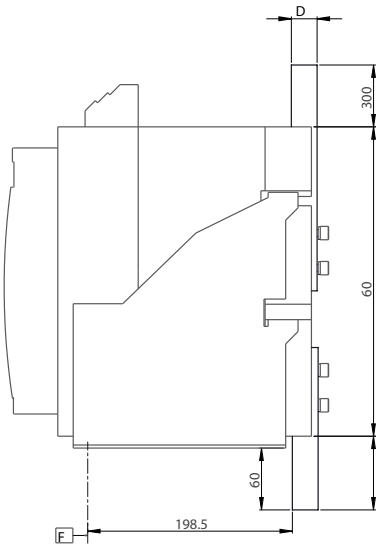
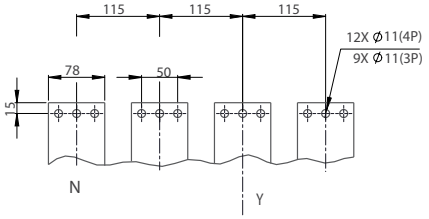
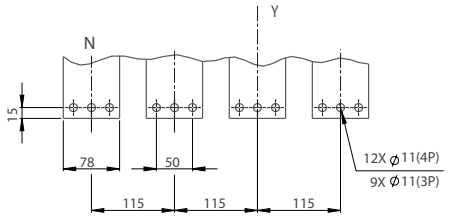


Top Connection



Bottom Connection



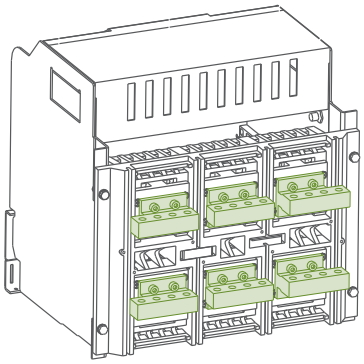
X, Y - door cut-out centering
F - minimum depth of mounting support panel

Rated current	Thickness
1600A-2000A	20
2500A	25
2900A-3200A	30

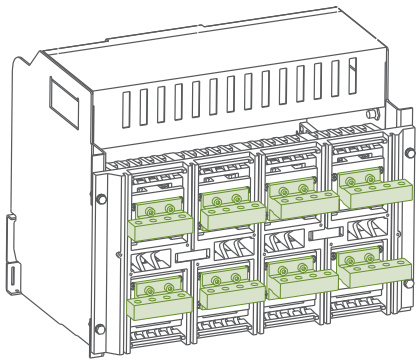
Technical Data Ex9A32

Air Circuit Breakers up to 3200 A

Horizontal connection - withdrawable version

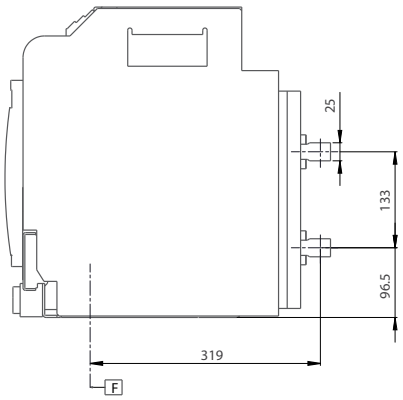


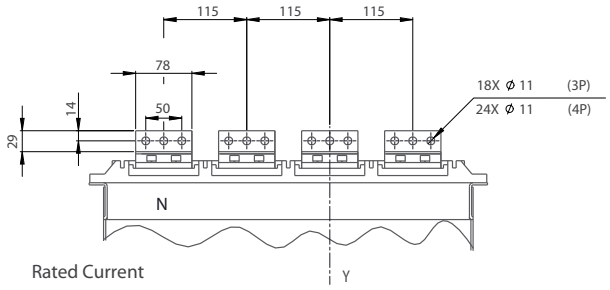
3P



4P

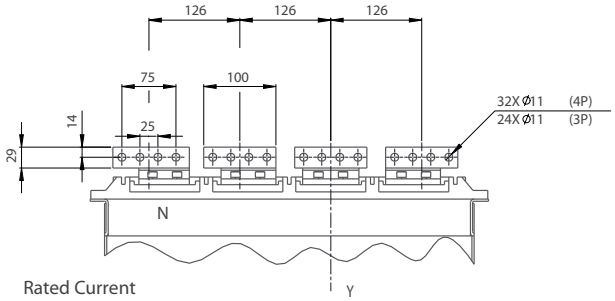
[mm]





Rated Current
1600-2500A

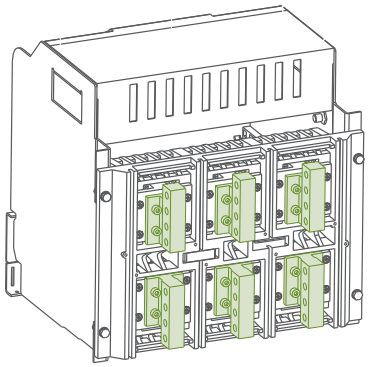
X, Y - door cut-out centering
F - minimum depth of mounting support panel



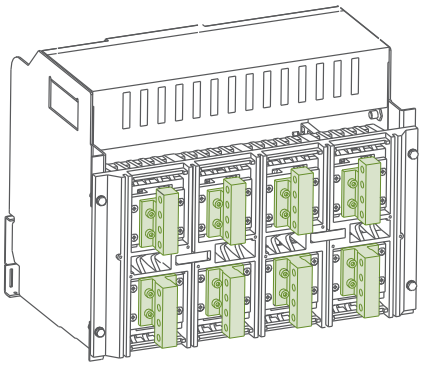
Rated Current
2900-3200A

Air Circuit Breakers up to 3200 A

Vertical connection VCP - withdrawable version

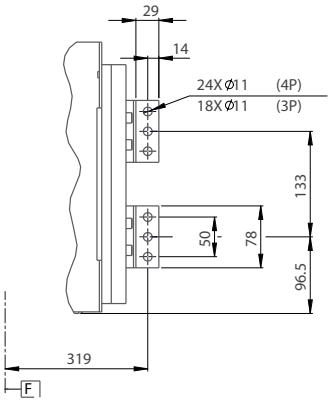


3P

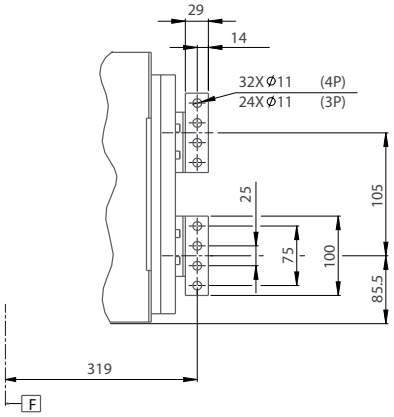


4P

[mm]

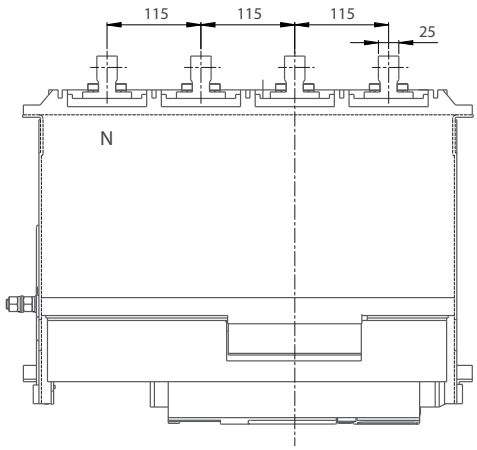


Rated Current
1600-2500A



Rated Current
2900-3200A

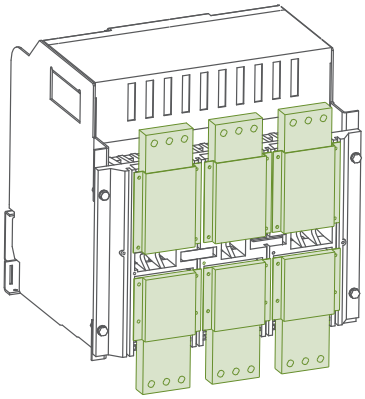
X, Y - door cut-out centering
F - minimum depth of mounting support panel



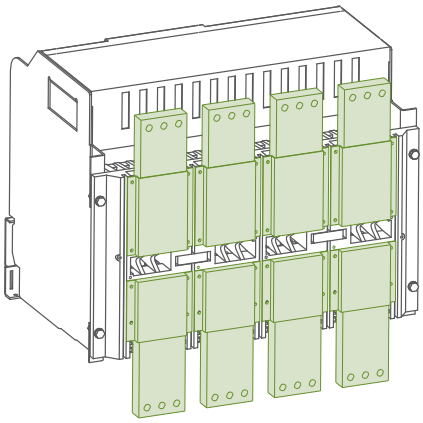
Technical Data Ex9A32

Air Circuit Breakers up to 3200 A

Front connection ACP - withdrawable version



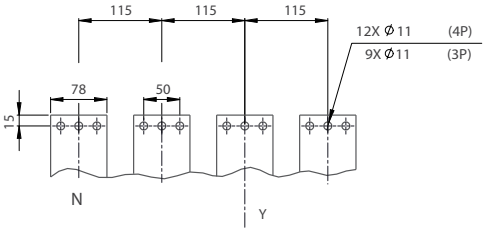
3P

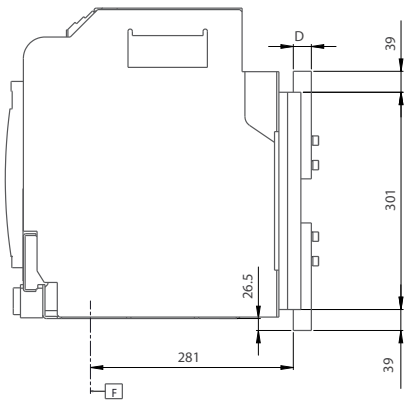


4P

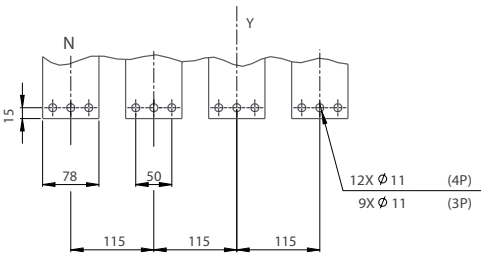
[mm]

Top Connection





Bottom Connection



X, Y - door cut-out centering
F - minimum depth of mounting support panel

Rated current	Thickness
1600-2000A	20
2500A	25
2900-3200A	30

Technical Data Ex9A40

Air Circuit Breakers up to 4000 A

General parameters

Air circuit breakers up to 4000 A
Breaking capacity I_{cu} 65, 85 and 100 kA
Arbitrary choice of tripping unit SU

Electrical parameters

	Ex9A40Q	Ex9A40R	Ex9A40H
Tested according to	IEC / EN 60947-2		
Rated operational voltage U_e	380 / 400 / 415 / 660 / 690 V AC		
Rated insulation voltage U_i	1000 V		
Rated impulse withstand voltage U_{imp}	12 kV		
Rated current I_n at 40°C	2000 / 2500 / 2900 / 3200 / 4000 A		
Rated frequency f	50 / 60 Hz		
Rated ultimate short-circuit breaking capacity I_{cu}	65 kA / 415 V 50 kA / 690 V	85 kA / 415 V 65 kA / 690 V	100 kA / 415 V 75 kA / 690 V
Rated service short-circuit breaking capacity I_{cs}	65 kA / 415 V 50 kA / 690 V	85 kA / 415 V 65 kA / 690 V	100 kA / 415 V 75 kA / 690 V
Rated short-circuit making capacity I_{cm}	143 kA / 415 V 105 kA / 690 V	187 kA / 415 V 143 kA / 690 V	220 kA / 415 V 165 kA / 690 V
Rated short-circuit withstand current I_{cw} for 1s	50 kA / 415 V 32 kA / 690 V	65 kA / 415 V 40 kA / 690 V	85 kA / 415 V 50 kA / 690 V
Internal resistance per pole	0.020 mΩ (fixed) 0.033 mΩ (withdrawable)		
Poles	3P / 4P		
Breaking operation time	20 — 30 ms		
Closing operation time	< 70 ms		
Electrical service life	3000 operation cycles / 415 V 1000 operation cycles / 690 V		
Mechanical service life	8000 operation cycles without maintenance 10000 operation cycles with maintenance		
Utilization category	B		
Line voltage connection	arbitrary above or below (with external power supply for SU)		

Mechanical parameters

	fixed	withdrawable
Device width (3P / 4P)	424 mm / 539 mm	437 mm / 552 mm
Device height	353 mm	430 mm
Device depth	304 mm	401 mm
Degree of protection	IP40	
Ambient temperature	-25°C — +60°C	
Storage temperature	-40°C — +85°C (without Smart Unit) -25°C — +85°C (with Smart Unit)	
Altitude	< 2000 m	
Relative humidity	< 90 %	
Installation category	IV (main circuit) / III (secondary circuit)	
Pollution degree	3	
Main terminals surface coating	silver	
Weight (3P / 4P)	72.5 kg / 86.5 kg	118 kg / 141 kg (including cassette)

Ordering data p. 31

Technical Data Ex9ASD

Air Switch Disconnectors frame size A40 up to 4000 A

General parameters

Rated current up to 4000 A
Fixed and withdrawable versions
Wide range of accessories common with Air circuit breakers

Electrical parameters

	Ex9ASD40
Tested according to	IEC / EN 60947-3
Rated operational voltage U_e	380 / 400 / 415 / 660 / 690 V AC
Rated insulation voltage U_i	1000 V
Rated impulse withstand voltage U_{imp}	12 kV
Rated current I_e at 40°C	1600 / 2000 / 2500 / 2900 / 3200 / 4000 A
Rated frequency f	50 / 60 Hz
Short-time (1s) withstand current I_{cw} at 415 V	85 kA
Rated making (peak) current I_{cm} at 415 V	187 kA
Poles	3P / 4P
Breaking operation time	20 — 30 ms
Closing operation time	< 70 ms
Arcing distance	0
Isolation function	yes
Electrical service life at 415 V	3000 operation cycles
Mechanical service life	12500 operation cycles without maintenance 25000 operation cycles with maintenance
Operating frequency	20 operating cycles per hour
Overvoltage category	IV (main circuit) / III (secondary circuit)
Utilization category	AC22A / AC23A
Line voltage connection	arbitrary above or below

Mechanical parameters

	fixed	withdrawable
Device width (3P / 4P)	424 mm / 539 mm	437 mm / 552 mm
Device height	353 mm	430 mm
Device depth	304 mm	401 mm
Degree of protection	IP40	
Ambient temperature	-25°C — +60°C	
Storage temperature	-40°C — +85°C	
Altitude	< 2000 m	
Relative humidity	< 90 %	
Installation category	IV	
Pollution degree	3	
Weight (3P / 4P)	70 kg / 84 kg	116 kg / 138 kg (including cassette)

Ordering data p. 36, 38

Technical Data Ex9A40

Air Circuit Breakers and Switch Disconnectors up to 4000 A

Power dissipation at 3P connection

Rated current [A]	Fixed version	Withdrawable version
1600 A (ASD only)	140 W	300 W
2000 A	170 W	390 W
2500 A	250 W	470 W
2900 A	260 W	600 W
3200 A	260 W	600 W
4000 A	420 W	670 W

Temperature derating

T [°C]	$I_u(T)$ [A]					
	I_n = 1600 A	I_n = 2000 A	I_n = 2500 A	I_n = 2900 A	I_n = 3200 A	I_n = 4000 A
-5 — +45	1600	2000	2500	2900	3200	4000
50	1600	2000	2500	2900	3200	3900
55	1600	2000	2500	2850	3100	3800
60	1600	2000	2400	2750	3000	3700

Altitude derating

Altitude	**2000 m**	**3000 m**	**4000 m**	**5000 m**
Impulse withstand voltage U_{imp}	3500 V	3000 V	2500 V	2000 V
Insulation voltage U_i	1000 V AC	800 V AC	700 V AC	600 V AC
Rated voltage U_e	690 V AC	580 V AC	500 V AC	400 V AC
Rated uninterrupted current I_u	1 x $I_u(T)$	0.96 x $I_u(T)$	0.91 x $I_u(T)$	0.87 x $I_u(T)$

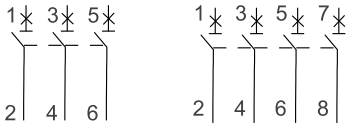
Secondary terminals

Secondary terminals	screwless
Terminals capacity	0.5 — 1.2 mm^2

Technical Data Ex9A40

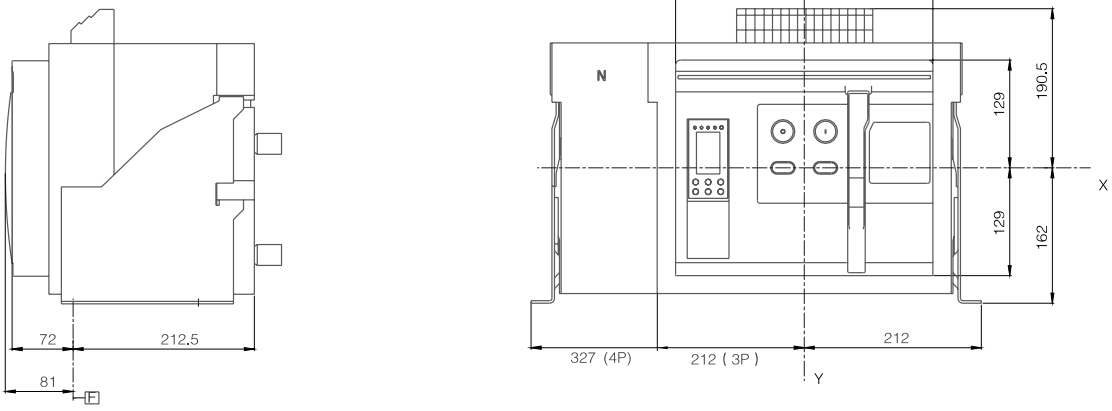
Air Circuit Breakers and Switch Disconnectors up to 4000 A

Main terminals wiring diagrams



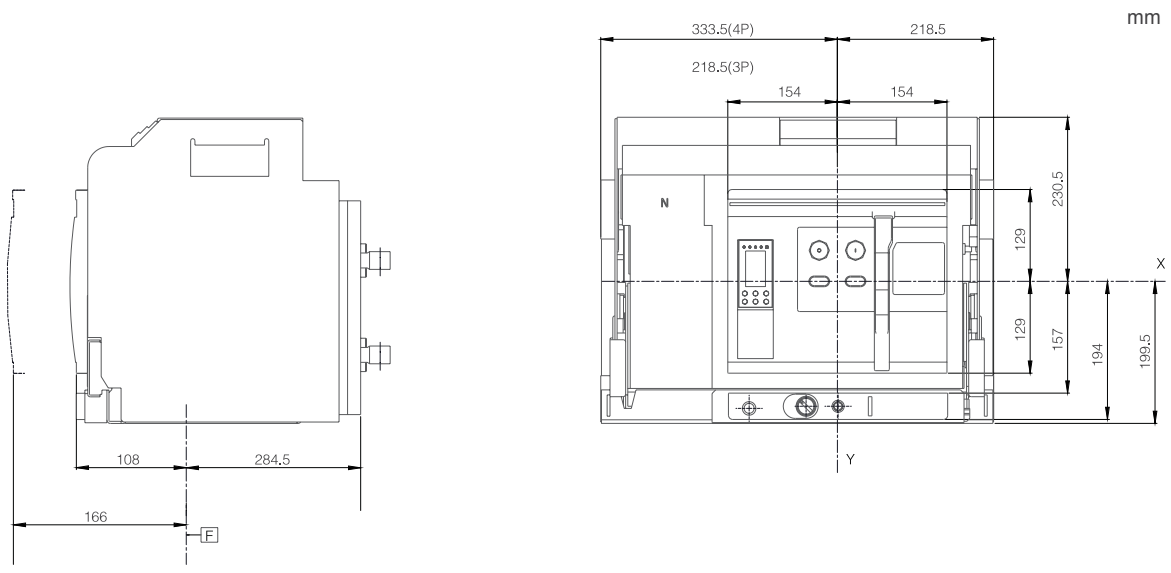
3P 4P

Dimensions - fixed version



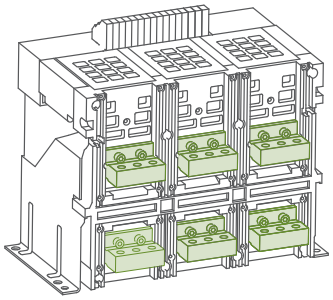
X, Y - door cut-out centering
F - minimum depth of mounting support panel

Dimensions - withdrawable version

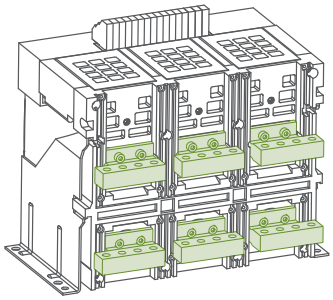


Air Circuit Breakers and Switch Disconnectors up to 4000 A

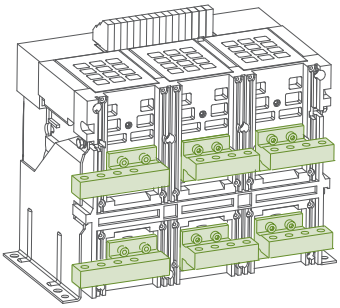
Horizontal connection - fixed version



2000-2500A

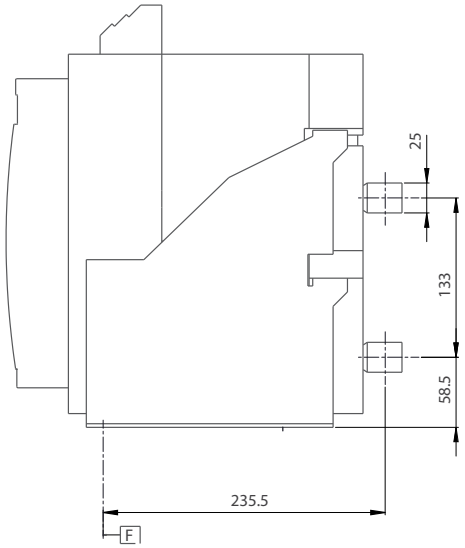


2900-3200A

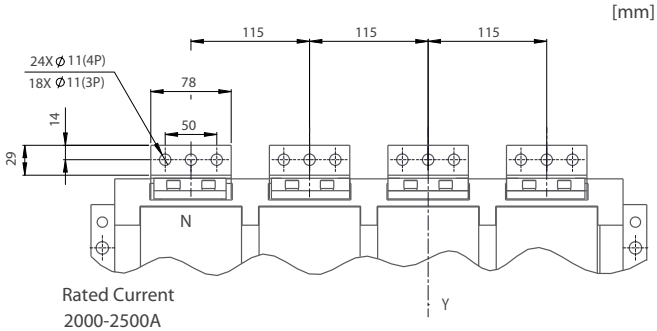


4000A

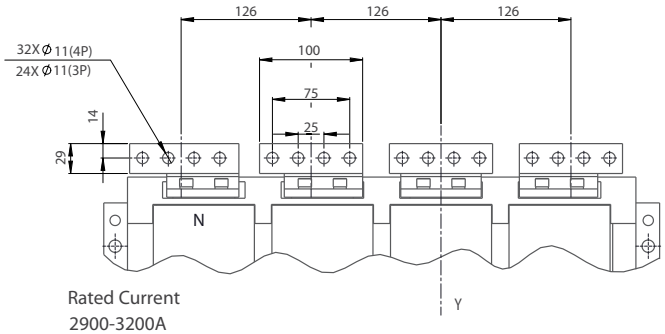
[mm]



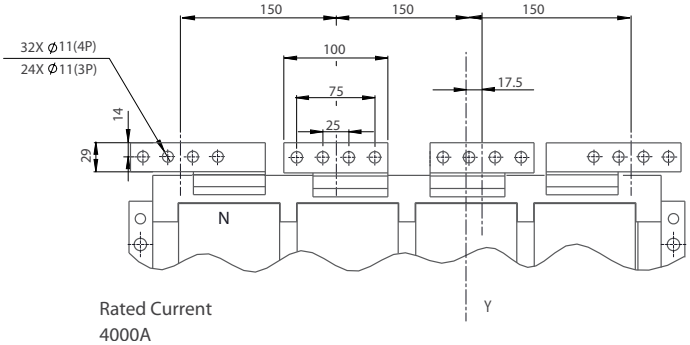
X, Y - door cut-out centering
F - minimum depth of mounting support panel



Rated Current
2000-2500A



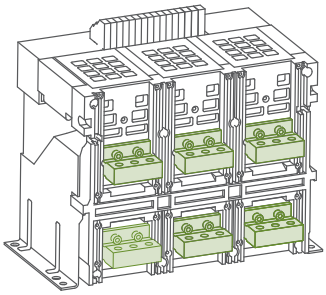
Rated Current
2900-3200A



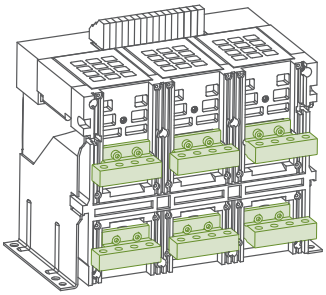
Rated Current
4000A

Air Circuit Breakers and Switch Disconnectors up to 4000 A

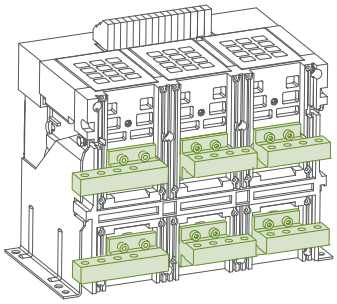
Vertical connection VCP - fixed version



2000-2500A

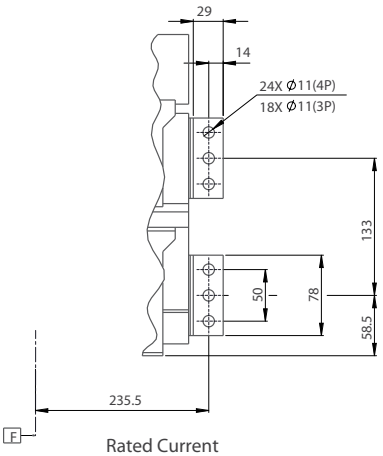


2900-3200A

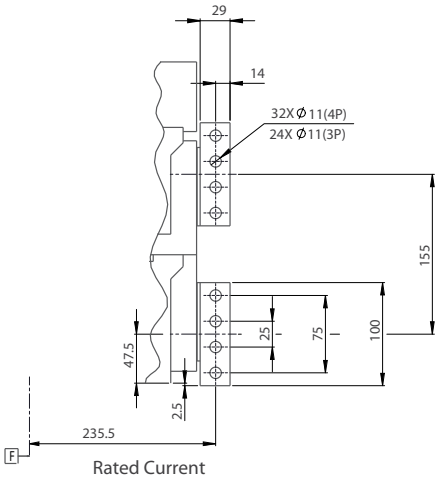


4000A

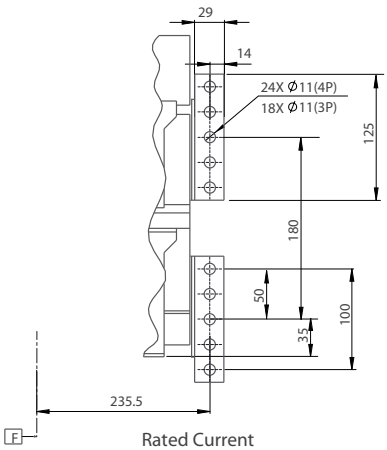
[mm]



Rated Current
2000-2500A

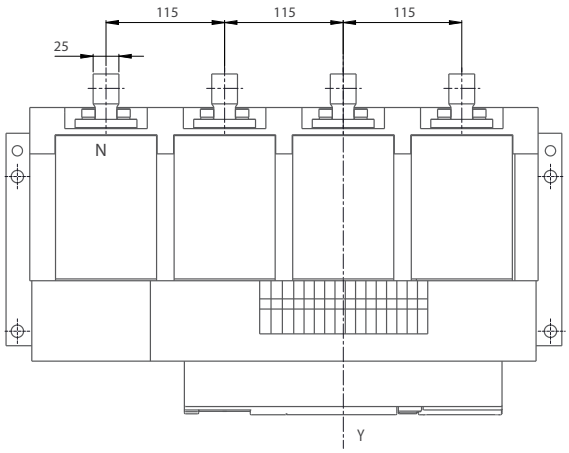


Rated Current
2900-3200A



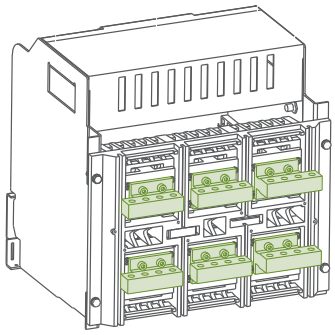
Rated Current
4000A

X, Y - door cut-out centering
F - minimum depth of mounting support panel

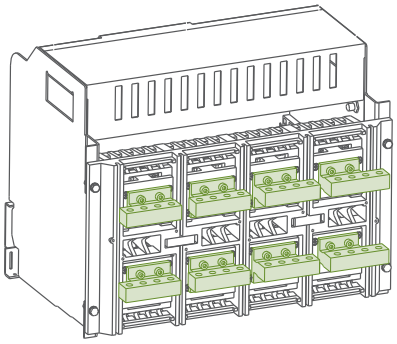


Air Circuit Breakers and Switch Disconnectors up to 4000 A

Horizontal connection - withdrawable version

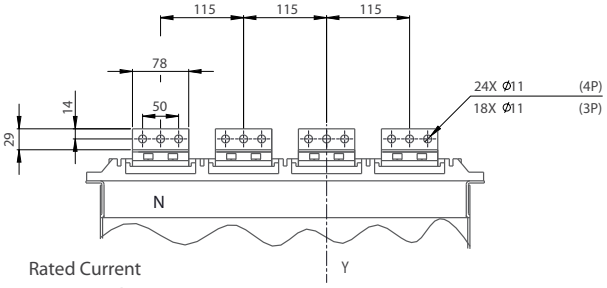


3P

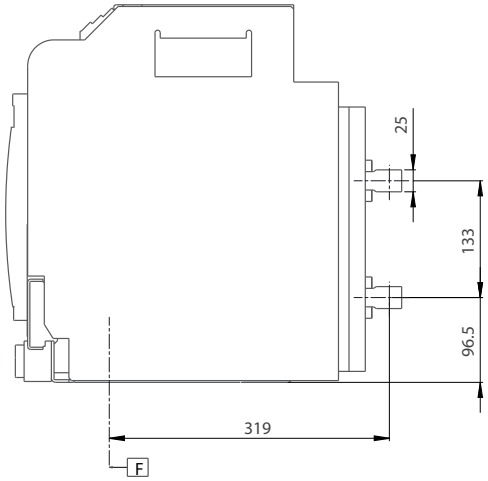


4P

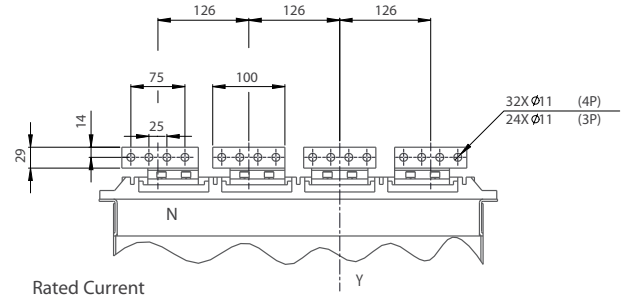
[mm]



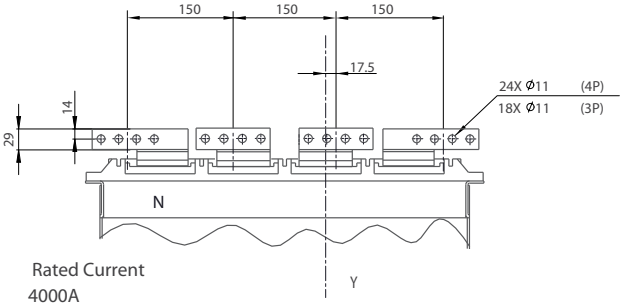
Rated Current
2000-2500A



X, Y - door cut-out centering
F - minimum depth of mounting support panel



Rated Current
2900-3200A

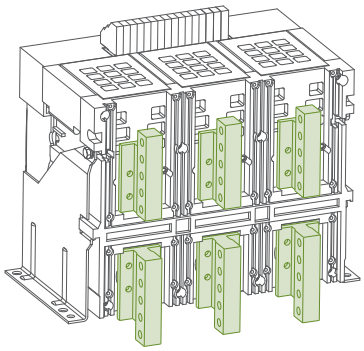


Rated Current
4000A

Technical Data Ex9A40

Air Circuit Breakers and Switch Disconnectors up to 4000 A

Vertical connection VCP - withdrawable version



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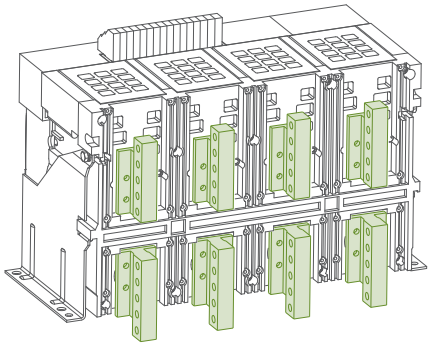
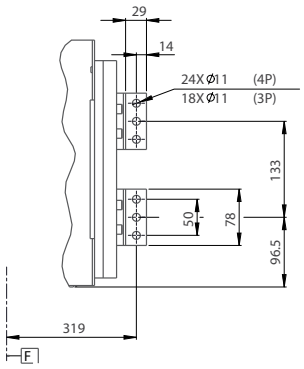
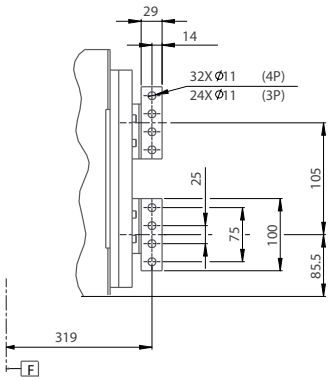


4P

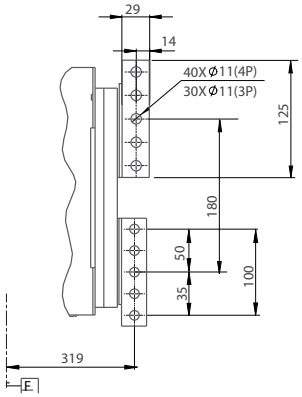
[mm]



Rated Current
2000-2500A

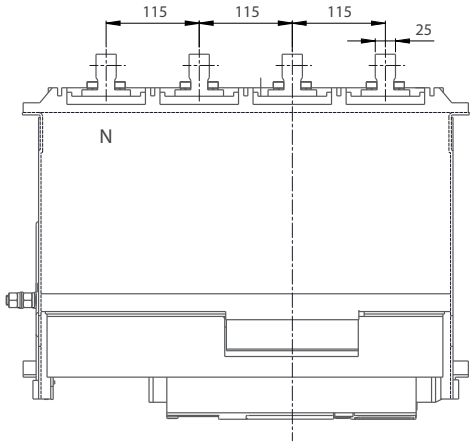


Rated Current
2900-3200A



Rated Current
4000A

X, Y - door cut-out centering
F - minimum depth of mounting support panel



Technical Data XF

Closing releases XF

General parameters

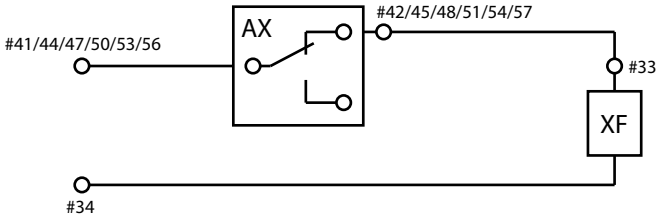
Remotely close the breaker after the spring has stored energy
Operating voltage range 85 - 110% of nominal vlaue U_e. Maximum allowed control command length 2 s (can be blocked e.g. by means of NC auxiliary contact, see below)

Electrical parameters

Operating voltage U_e	220-240 V AC 380-415 V AC 24 V DC 48 V DC 110 V DC 220 V DC
Operating threshold (IEC/EN 60947-2)	85 - 110% U_e
Minimum duration of control impuls	0.2 s
Max. allowed duration of control impuls	2 s
Pick-up power time 100ms AC DC	 200 VA 200 W
Power consumption AC DC	 5 VA 5 W
Circuit breaker closing time	< 70 ms
Breaking time	50 ± 10 ms
Insulation voltage	2 kV
Peak current	6 x I_n
ACB secondary terminals	#33, 34 (see page 45)

Connection diagram for long control signals

In case external control circuit cannot assure not-exceeding of max. impuls duration, AX contact of NC configuration can be used for limiting (direct connection with XF 230 or 400 V AC, signal to advanced control system in case of use of SHT for DC control voltages due to maximum allowed current of AX).



Ordering data p. 46

Technical Data SHT

Shunt trip releases SHT

General parameters

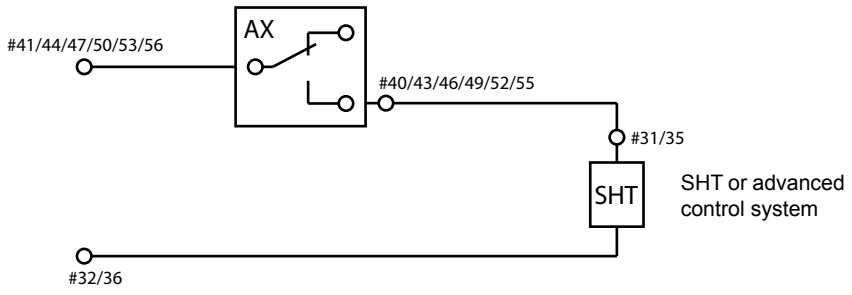
Remotely opens the breaker after supplying of control impulse
Operating voltage range 85-110 % of nominal vlaue U_e. Maximum allowed control command length 2 s (can be blocked e.g. by means of NO auxiliary contact)

Electrical parameters

Operating voltage U_e	220-240 V AC 380-415 V AC 24 V DC 48 V DC 110 V DC 220 V DC
Operating threshold (IEC/EN 60947-2)	70 - 110% U_e
Pick-up power time 100ms AC DC	 200 VA 200 W
Power consumption AC DC	 5 VA 5 W
Minimum duration of control impuls	0.2 s
Max. allowed duration of control impuls	2 s
Circuit breaker opening time	< 30 ms
Breaking time	50 ± 10 ms
Insulation voltage	2 kV
Peak current	6 x I_n
ACB secondary terminals	#31, 32 (secondary SHT is connected to #35, 36 instead of UVT, see page 45)

Connection diagram for long control signals

In case external control circuit cannot assure not-exceeding of max. impuls duration, AX contact of NO configuration can be used for limiting (direct connection with SHT 230 or 400 V AC, signal to advanced control system in case of use of SHT for DC control voltages due to maximum allowed current of AX).



Ordering data p. 46

Technical Data UVT

Undervoltage releases UVT

General parameters

Opens the breaker when the voltage drops or power off to prevent the load from damage caused by undervoltage
The control power supply of UVT could be from the primary side of circuit breaker of from independent supply
The delayed types are used to eliminate circuit-breaker nuisance tripping during short voltage dips. The delay time is 1s, 3s or 5s
The undervoltage release instantaneously opens the circuit breaker when its supply voltage drops to a value between 35 % and 70 % of its rated voltage
If there voltage is less than 35 % of supply voltage U_e, it is impossible to close the circuit breaker
Circuit breaker can be closed when the supply voltage of the release is 85 % - 110 % of supply voltage U_e

Electrical parameters

Operating voltage U_e	220 - 240 V AC 380 - 415 V AC
Operating threshold not close actuation closing	 < 35 % U_e 35 - 70 % U_e 85 - 110 % U_e
Pick-up power	200 VA
Power consumption	50 VA
Accuracy	± 20 %
Insulation voltage	2 kV
ACB secondary terminals	#35, 36 (see page 45)

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Technical Data MD

Motor operator MD

General parameters

The electric motor charges the spring mechanism when the circuit breaker is closed
The electric motor MD is equipped with a limit switch which signals the “charged” position of the mechanism (spring is charged)
The spring-mechanism charging handle can be used when maintaining or without power supply

Electrical parameters

Operating voltage U_e	230 V AC / 220 V DC 380-415 V AC 24 V DC 48 V DC 110 V DC
Operating frequency	1 operating cycle in 3 minutes
Operating threshold (IEC/EN 60947-2)	85 - 110% U_e
Pick-up power time 100 ms AC DC	 400 VA 200 W (A16 frame size), 350 W (A32/A40 frame size)
Power consumption AC DC	 75 VA (A16 frame size), 150 VA (A32/A40 frame size) 75 W (A16 frame size), 150 W (A32/A40 frame size)
Impulse time	0.2 s
Charging time	3 - 4 s
Insulation voltage	2 kV
Peak current	6 x I_n
ACB secondary terminals	#37, 38, 39 (see page 45)

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Technical Data AX

Auxiliary contacts AX

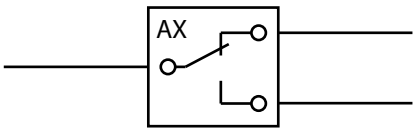
General parameters

Monitors the ON/OFF status of circuit breaker
2 CO, 4 CO and 6 CO versions available
Can realise the control or interlock with other components, signal of indicator or relay
Connection wires to auxiliary terminals in the scope of delivery

Electrical parameters

Operating voltage U_e	230 / 400 V AC 110 / 220 V DC
Rated operating current I_e Ex9A16 Ex9A32/40	 2 A (400 V AC) 0.25 A (220 V DC) 5 A (400 V AC) 0.35 A (220 V DC)
Contacts	2 CO (available only for A32/40 frame size) 4 CO 6 CO
Utilization category	AC-15 DC-13

Connection diagram



Ordering data p. 47

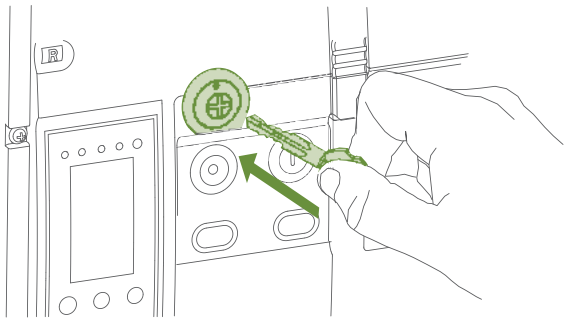
Technical Data Locks

OFF position keylocks KLK

General parameters

Block a breaker in OFF position to ensure the breakers cannot be closed
One circuit breaker is provided with one lock and one key Two circuit breakers are provided with two locks and one key Three circuit breakers are provided with three locks and two keys

Mounting position



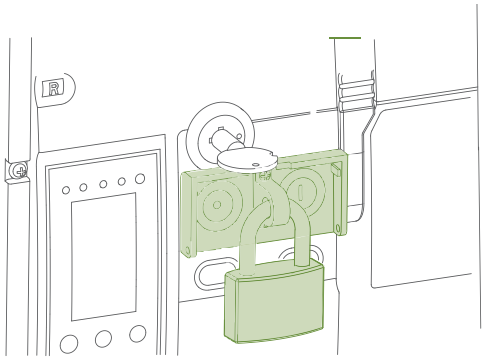
Ordering data p. 49

Pushbutton lock device VBP

General parameters

The cover prevents access to control push button of the breaker
Premounted only
Scope of delivery: Lockable cover (lock with key is not a part of delivery)

Mounting position



Ordering data p. 49

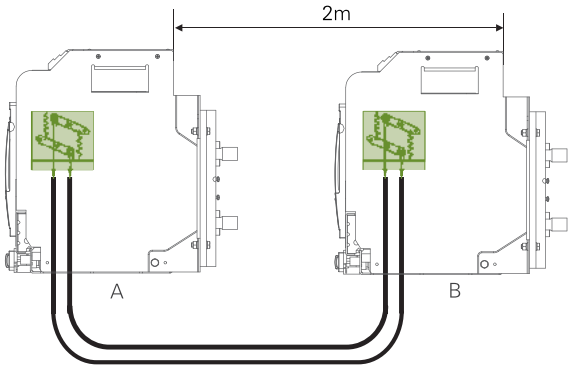
Technical Data Interlocks

Mechanical interlocks with cables IPA

General information

For mutual interlocking of 2 or 3 (in preparation) ABC devices
Mechanical interlock with cable
Cable length for maximum distance of mounting positions of interlocks 2 m
Suitable for frame sizes A16, A32/A40 (A16 cannot be combined with A32/A40)
Scope of delivery: 2 interlocks and 2 cables (2 ACBs version), 3 interlocks and 6 cables (3 ACBs version in preparation)
For subsequent mounting only

Mechanical diagram



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NOARK Electric Europe s.r.o.
Sezemicka 2757/2, 193 00 Prague 9, Czech Republic
Phone: +420 226 203 120
E-mail: Europe@noark-electric.com
www.noark-electric.eu

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