CATALOGUE

ConVac Medium voltage vacuum contactors

7.2/12 kV, ...400 A

- Increase productivity, maximize your results
- Improve efficiency, optimize your investments
- High reliability, protect your resources

ConVac Medium voltage vacuum contactor is applicable in AC power distribution system, It's an ideal solution for controlling motors and switching apparatus requiring a great many hourly operating sequences.ConVac contactors use vacuum interrupters. Thanks to this breaking technique, they provide excellent performance and can operate in extremely harsh environmental conditions.

ConVac is suitable for switching motors, transformers, capacitor banks, switching and power factor correction systems and can be used for a variety of applications in industries, utility, service-providing and shipbuilding sectors, etc.

When equipped with fuses, ConVac can be used for circuits with up to 50 kA fault levels.

Contents

ConVac
ABB strengths, your benefits

Productivity

Efficiency

Reliability

Productivity
Maximize your results

Speed up your projects
- One product suitable for IEC, UL and CSA standards
- Rapid answer to changing customer specifications

Easy to install
- All electrical connections are plug-and-socket with integrated terminal box. This method saves up to 40% of wiring time
- Fast assembly of accessories with no adjustments needed
- Interchangeable between different solution packages and configurations

Efficiency
Optimize your investments

Space saving
- Linear electromagnetic actuator design, panel dimen-sions can be optimized

Flexible installation position
- Multiple installation position, forward or backward wiring available, easier for main circuit design and set up, connection routes can be optimized so as to use less material

Automatic order management
- Electrical components online selection : E-configure and TSOL
- MES manufacturing execution system

Reliability

Protect your resources

Better insulation and mechanical characters
- 3 - phase independent pole
- Environmentally friendly recyclable material

Complete mechanical and electrical interlock
- Single phase fuse indicator, precise fault location
- Mechanical interlock between contactors (for fixed version)

Optimized operation performance
- Linear actuator design, reduce mechanical stress
- Reduce number of spare parts
- Longer service life

Description

01 Front view

02 Rear view

03 Vacuum interrupter

ConVac operates in alternating current and is normally used to control devices requiring a high number of hourly operating sequences.

The ConVac contactor has a linear electromagnetic actuator that moves in line with the moving contact of the vacuum interrupters to guarantee the best performance and long, reliable mechanical life.

The ConVac contactor is available in the electrically or mechanically latched version on request.

Applications
ConVac contactors are suitable for controlling electrical apparatus in industries, in service-providing and shipbuilding sectors, etc.

Thanks to vacuum breaking technology, they can operate in particularly difficult environments.

They are ideal for controlling motors, transformers, capacitor banks, switching systems, etc.

Fitted with fuses, they can be used in circuits with up to 50 kA fault levels.

Compliance with the Standards
ConVac contactor is in accordance with industrial standards of most countries, in alliance with the following standards:
- GB/T 14808
- IEC 62271-106

Operating characteristics
- Ambient temperature: -15℃...+40℃
- Relative humidity: <95% （within 24 hours）
- Altitude ≤ 1000 m

For other conditions, please contact us.

Main technical characteristics
- Chopping current value≤0.5 A
- Maintenance-free
- High number of operations
- Long electrical and mechanical life
- Multi-voltage feeder

Interruption principle
The main contacts operate inside the vacuum interrupters.

On opening, there is rapid separation of the fixed and moving contacts in each contactor interrupter.Overheating of the contacts, generated at the moment they separate, causes formation of metallic vapours which allow the electric arc to be sustained up to the first passage through zero current.

On passage of zero current, cooling of the metallic vapours allows recovery of high dielectric resistance able to withstand high values of the return voltage.

For motor switching, the value of the chopped current is less than 0.5 A with extremely limited overvoltages.

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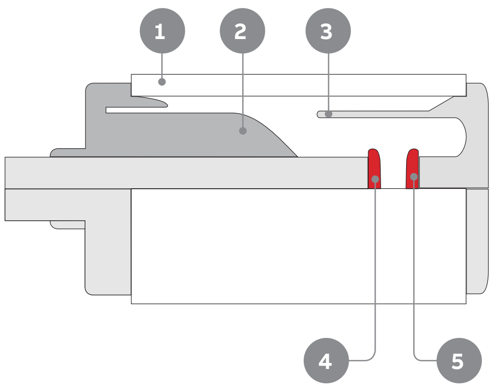
cross-section of the vacuum interrupter



1 Ceramic housing
2 Seal diaphragm
3 Metal screen
4 Moving contact
5 Fixed contact

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The ConVac contactor has a linear electromagnetic actuator.

The actuator moves in line with the moving contact of the vacuum in-terrupters to guarantee the best performance and long, reliable me-chanical life.

Versions available
Electrical latching:
Closing takes place by supplying auxiliary power to the multi-voltage feeder. On the other hand, open-ing occurs when the auxiliary power is interrupted either intentionally (by means of a command) or unintentionally (due to lack of auxiliary power in the installation).

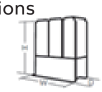
Mechanical latching:
The contactor closes as in the electrical latching version but when the apparatus reaches the closed position, this is maintained by a mechanical device. Opening takes place when the opening coil is supplied. This releases the mechanical lock and allows the opening springs to operate.

Quality system
Conforms to the ISO 9001 standards, certified by an external independent organization.

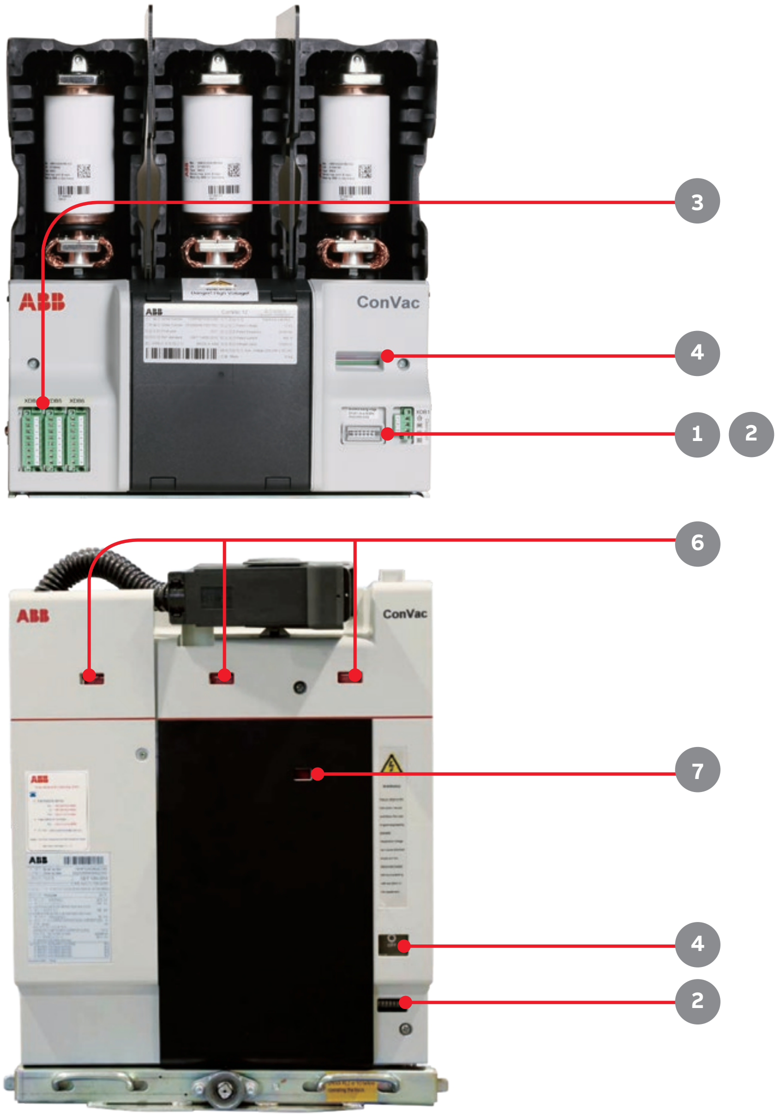
Environmental management system
Conforms to the ISO 14001 standards, certified by an external independent organization.

Health and safety management system
Conforms to the OHSAS 45001 standards, certified by an external independent organization.

Selection and ordering

Technical parameters		Unit	ConVac 7	ConVac 7/P	ConVac 12	ConVac 12/P
Rated voltages (Ur)		kV	7.2		12	
Rated short-duration power frequency withstand voltage (Ud) 50/60 Hz (1 min)		kV	30		42	
Rated lightning impulse withstand voltage (Up)		kV peak	60		75	
Rated frequency (fr)		Hz	50-60		50-60	
Rated operational current (Ie)		A	400		400	
Short-time withstand current Ik (4 s)		A	4000		4000	
Rated peak current (Ip)		kA peak	10		10	
Overload withstand current Ic (1 s)		A	6000		6000	
Overload withstand current Ic (30 s)		A	2400		2400	
Short-circuit breaking capacity		kA	5		5	
Short circuit making capacity		kAp	12.5		12.5	
Short circuit breaking current (Isc)-combined with fuses		kA	50		50	
Rated short-circuit making current (Ima)-combined with fuses		kA	130		130	
Rated making and breaking capacities,per category of use			AC-4		AC-4	
Rated duty		Cycles/hour	1200		1200	
Mechanical life	Electrical latched	Cycles	1,000,000		1,000,000	
	Mechanical latched	Cycles	1,000,000 [2)]		1,000,000 [2)]	
Opening time	Electrical latched	ms	70...150		70...150	
	Mechanical latched	ms	15...35		15...35	
Closing time		ms	40...70		40...70	
Ultimate performances for back-to-back capacitors banks			C2		C2	
	Rated current	A	250		160	
	Max. transient current of the capacitor	kA	8		8	
	Max. transient frequency of the capacitor	Hz	2500		2500	
Operating temperature		°C	-15...+40 [1)]			
Weight [2)]		kg	15	50	20	60
Overall dimenstions 	H	mm	380	652	405	652
	W	mm	342	530	342	530
	D	mm	231	658	256	658

1) For higher temperature please contact ABB.
2) Mechanical life for mechanical latched: Mechanical locking devices (Rime) should be replaced every 250,000 times.



Standard fittings

1. Feeder/Control Module

ConVac is equipped with a multi-voltage electronic feeder which is able to cover a wide variety of auxiliary voltages and with plug-in design.

Supply Voltage	In-rush current	Holding power
110...125 VDC/AC 50-60Hz	10.5 A 200 ms	~50 W
220...240 VDC/AC 50-60Hz	7 A 200 ms	~50 W

2. Pulse counter

ConVac is equipped with an electric pulse counter which provides a visual indication of the number of operations performed by the contactor.

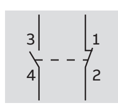
3. Auxiliary contacts

The contactor is equipped with positively driven, class 1 (according GB11022-2022) auxiliary contacts.

Contactor	Normally open	Normally closed
ConVac 7	6	6
ConVac 12	6	6
ConVac/P 7	6	6
ConVac/P 12	6	6

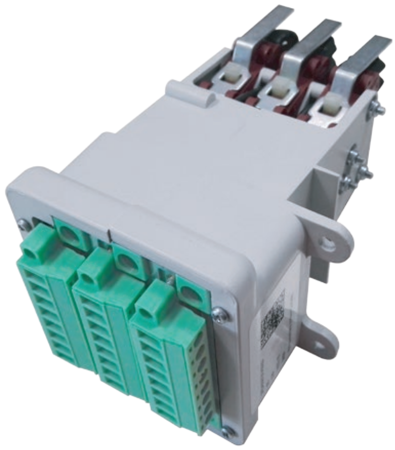
Characteristics of the auxiliary contacts	
Class:	1
Rated DC current:	10 A
Rated insulation level:	2000 V/1 min 50 Hz
Rated short-time withstand current:	100 A/30 ms
Breaking capacity（110 V≤ Ua≤ 250 V）:	440 W

Breaking capacity according to GB/T 14048.5 standards:
AC-15: 220 V 2 A / 110 V 3 A
DC-13: 220 V 1 A / 110 V 1.5 A



Each group of auxiliary contacts (as picture shows, is composed of one normally open and one normally closed contact),they should be powered with same voltage level.

Remark: ConVac auxiliary contacts are housed in a plug-in terminal box, easy for installation.



4. Open/Close indicator
Indicates the state of the contactor.

5. Mechanical latching (RiMe)
The RiMe device for upgrading the electrically latched contactor to a mechanically latched one on request.

The device is also equipped with a mechanical pull rod to allow emergency opening in the manual mode (B).

To avoid opening coil overheat or deliberately connect the auxiliary contacts into the opening circuit, RiMe is integrated with a switch, which will open automatically if the coil is out of power.

Electrical characteristic

Voltage	peak	time
24	40 A	100 ms
48...60	25 A	100 ms
110...125 Vac/dc	10 A	100 ms
220...240 Vac/dc	7 A	100 ms

6. Fuse installed/not installed indicator
Indicates if the 3-phase fuses are installed, when the fuse is not installed or not installed properly, the indicator shows red.

7. Fuse blow/not blow indicator
If the fuse of any phase blows, the indicator shows red.

8. Fuseholders (only for ConVac/P)
Could be fitted with fuseholders able to hold DIN or BS type fuses according to what the customer requests.

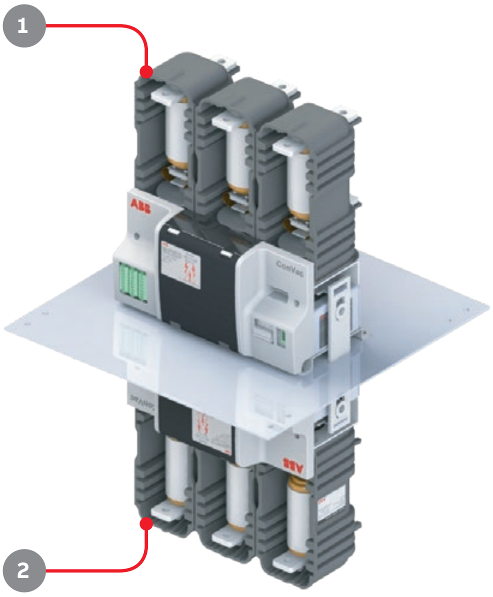
The fuses must have the dimensions and striker of average type according to DIN 43625 standards with maximum cartridge size e=442 mm and BS 2692 with maximum cartridge size L=454 mm, meanwhile,The electrical characteristics must conform to the IEC 60282-1 standards.

The fuseholder is fitted with a special kinematics mechanism which automatically opens the contactor when even a single fuse blows and prevents contactor closing when even a single fuse is missing.

Optional accessories

9. Mechanical interlock between two contactors
This is a link that interconnects two contactors, one of which is on the upper level of the bearing plate (1) and the other on the opposite side of the same plate (2).

This device prevents the contactors from being both in the closed position at the same time.



10. Self-supplied VT
ConVac contactor could be self-supplied by means of a VT. This solution only applies to electrical latching.

Self-supply VT uses ABB JDZ24-10（3/6）indoor voltage transformer，please refer to the following table for general parameters and versions. Any special requirements please contact ABB.

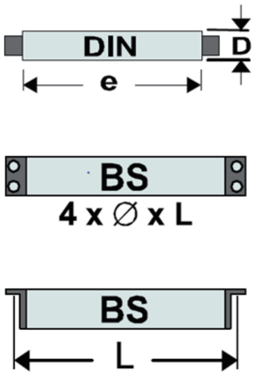
Primary side protection fuse is optional, please select according to project requirements.

Rated voltage ratio（kV）	Accuracy	Rated output （VA）
10（3/6）|0.11	1.0	200
10（3/6）|0.22	1.0	200

11. Adapter for application of fuses
The kit includes all the accessories needed to adapt and mount three fuses (according to DIN Standards with dimension e less than 442 mm; according to BS Standards with dimension L less than 454 mm).

The adaptation kits are available in the following types:
according to DIN Standards with distance e=192 mm
according to DIN Standards with distance e=292 mm
according to DIN Standards with distance e=367 mm
according to BS Standards (4×10×L=305 mm)

The fuses must have dimensions and striker of aver-age type according to DIN 43625 and BS 2692 (1975) Standards. The electrical characteristics must con-form to the IEC 282-1 (1974) Standards.



12. Connections alternative to the fuses
The kit includes three flat copper busbars and fixing screws to be installed when the fuses are not needed.

The kit can be installed directly onto the fuseholder supports.

13. Isolation lock
Isolation lock for UniGear type ZS1 switchgear or KYN28 modules. It prevents the apparatus from being racked-in if the unit door is open.

This lock only works if the door of the switchgear/enclosure is also fitted with the corresponding lock.

14. Locking magnet in the truck (-RLE2)
This only allows the withdrawable contactor to be racked into/out of the enclosure with the electromagnet energised and the contactor open.

Charactors	
Un: 24-30-48-60-110-125-127-132-220-240 V-	
Un: 24-30-48-60-110-125...127-220-230...240 V V~ 50/60 Hz	
Operation voltage range:	80...110% Un
Inrush power:	DC=250 W; AC=250 VA
Continuous power:	DC=5 W; AC=5 VA
In-rush lasting time:	~150 ms

The table above shows the power supply voltages available.

15. Lock for different rated currents
This prevents insertion of the plug-socket and therefore apparatus closing, in a panel provided for a circuit-breaker.

This lock, which is compulsory for UniGear switchgear, requires the same lock provided on the enclosure/switchgear.

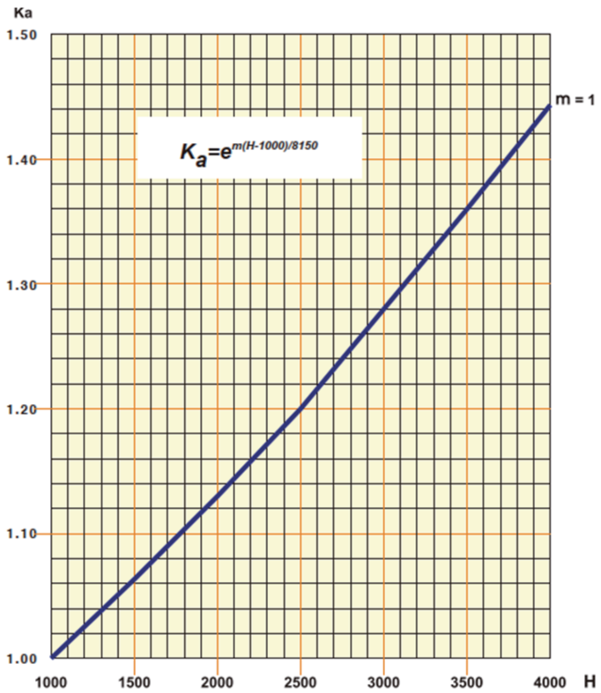
16. Motorised truck (-MAT)
Remotely control the motorized truck to rack in/out inside the panel.

Charactors	
Rated voltage Un:	48-110-220 VDC
Operation voltage range:	80...110% Un
Power:	40 W

Note:
MAT should be used together with MDC2 control unit. MDC2 is used to control and protect the motor, when the motorized truck got stuck due to improper installation or other mechanical failures, MDC2 brakes the truck immediately to prevent the motor from burning due to blockage, also release the mechanism from stuck state.

17. Fuse uninstall tool
This tool is used to remove fuses which accords to DIN standard.

Specific product characteristics



Altitude
It is well-known that the insulating properties of air decrease as the altitude increases.This phenomenon must always be taken into account during the design stage of insulating parts of equipment which is to be installed over 1000m above sea level. However the insulation level inside the vacuum interrupter will not be influenced by altitude.

In this case a correction coefficient must be applied, which can be taken from the graph drawn up according to the indications given in the IEC 62271-1 or GB/T 11022 standards. Please refer to the example below:

Example:
- Installation altitude: 2000 m
- Rated voltage: 12 kV
- Rated insulation level 50/60Hz: 42 kVrms
- Rated insulation level,impulse: 75 kVp
- Ka, read from the chart: Ka=1.13

From the parameters above, the contactor must satisfy (when tested at altitude 0m):
- Power frequency withstand voltage : 42x1.13=47.5 kVrms
- Impulse withstand voltage: 75x1.13=84.7 kVp

When the contactor is used in high-altitude environments, it must pass higher insulation level test in 0-altitude area. Detailed configuration about high-altitude products, please contact ABB.

Tropicalisation
ConVac contactors are manufactured in compliance with the prescriptions regarding use in hot-humid-saline climates. Galvanization is carried out in compliance with the GB/T 9799 Standard, classification code Fe/Zn 12, with thickness of 12 µm, protectedby a layer of conversion mainly consisting of chromates in compliance with GB/T 9800 Standard.These construction characteristics mean that all the ConVac contactors and their accessories comply with the standards below:
- GB/T 4797.1 (Climate graph no. 8)
- GB/T 2423.2 (Test B: Dry Heat)
- GB/T 2423.4 (Test Dd: Damp Heat (cycle 12 h+12 h)

Installation of fixed contactors

Contactor performance remains unaltered in the indicated installation positions:

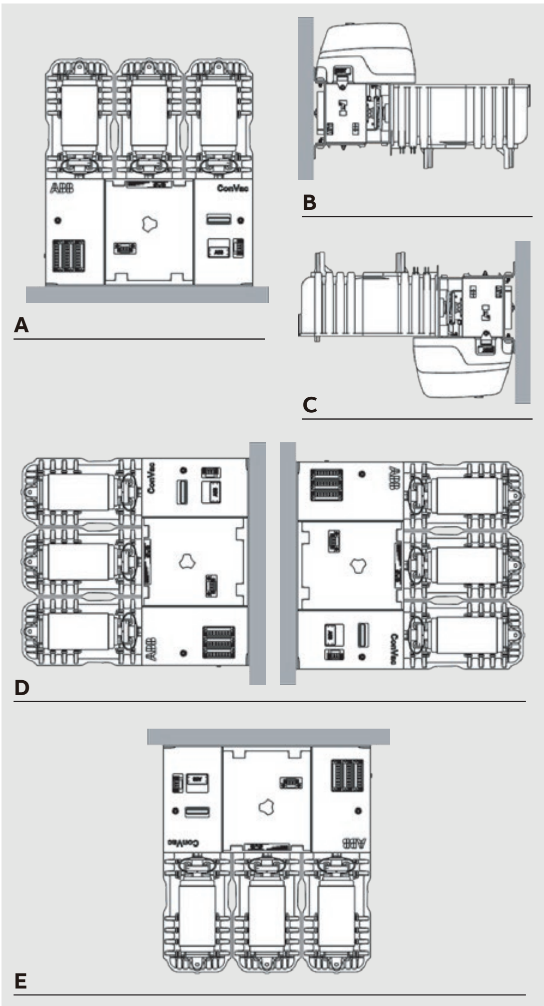
A) Floor-mounted with moving contacts at the bottom

B) Wall-mounted with horizontal moving contacts and terminals at the bottom

C) Wall-mounted with horizontal moving contacts and terminals at the top

D) Wall-mounted with horizontal moving contacts, interrupters on the front (or rear) and vertical terminals

E) Ceiling-mounted with moving contacts at the top



Environmental protection program

ConVac contactors are constructed in compliance with the ISO 14001 Standards.

The production processes are carried out in compliance with the restrictions for environmental protection:

- Reduction of energy consumption
- Environmentally-friendly raw material
- Recycle of production waste

The minimal environmental impact during the life cycle of the product (LCA-Life Cycle Assessment), is obtained by targeted selection of materials, processes and packing made during the design stage. The production techniques prepare the products for easy dismantling and easy separation of the components to allow maximum recycling at the end of the useful life cycle of the apparatus.

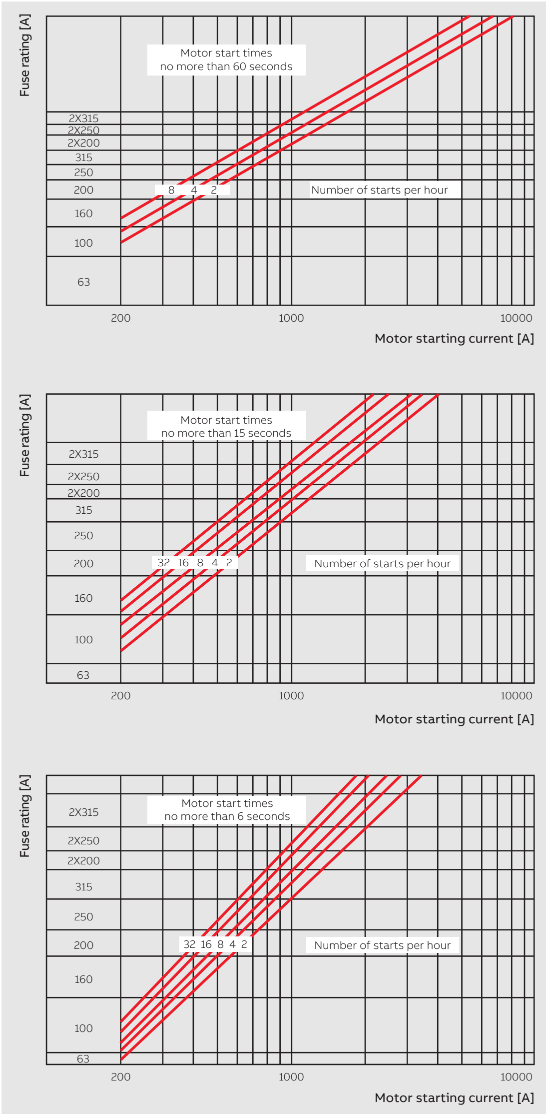


Fig. A

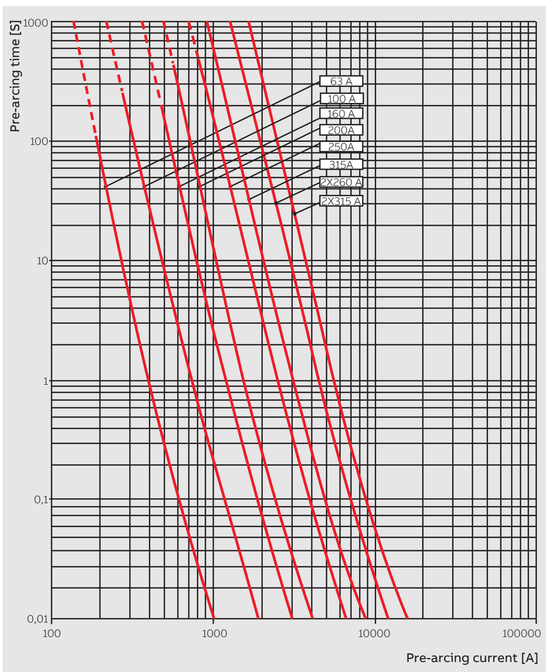


Fig. B

Fuse for motor control and protection
The motors are supplied at low voltage, generally up to a power of 630 kW. to reduce costs and the dimensions of the apparatus forming the circuit. ConVac contactors can be used for voltages from 2.2 kV to 7.2 kV and for motors with up to 3000 kW power ratings.

To ensure protection against short-circuits, the contactors must be used in conjunction with current limiting fuses. This solution allows the cost of the apparatus on the load side (cables, current transformers, busbar and cable anchoring devices, etc.) to be reduced still further on the basis of the fuse melting time and current.

More cost-effective devices can be used for withstanding lower short circuit voltages. This solution also allows the user to become practically independent of any subsequent enlargements and resulting increases in network power.

How to choose motor protection fuses for ConVac contactors

Fuse should be chosen properly, should apply to DIN 43625 or BS 2692.

The customer is responsible for choosing a brand of fuse that conforms to the specifications below and for selecting the actual fuse:
- Supply voltage
- Inrush current
- Inrush time
- Number of starts/hour
- Motor full load current
- Short circuit current of installation

Overload protection is often performed by relays, and must coordinate with fuse protection to avoid damage caused by prolonged overloads or by spe-cific let through energy (I^2t) that exceeds the with-stand rating.

Short-circuit protection is provided by fuses. The rated current of the fuses must always be higher than that of the motor to prevent them from tripping on start-up. However, this method of selection does not allow them to be used as protection against repeated overloads.

In any case, fuses do not provide this protection, especially with the current values up to the end of the initial asymptotic extension of the characteristic curve.

The characteristics of the relay and fuse curves must intersect in a point that allows:

1. Motor protection against overcurrents due to overloads, single-phase operation, blocked rotor and repeated starts. Protection is provided by an indirect inverse time delay trip or definite time delay relay which acts on the contactor.
2. Protection of the circuit against fault currents of low value between phases and towards earth is provided by an inverse time delay trip or definite time delay release, which must only trip for short-circuits that can be interrupted by the contactor.
3. Protection of the circuit against fault currents that are higher than the breaking capacity of the contactor up to the maximum internal arc withstand current. Protection is provided by the fuse.

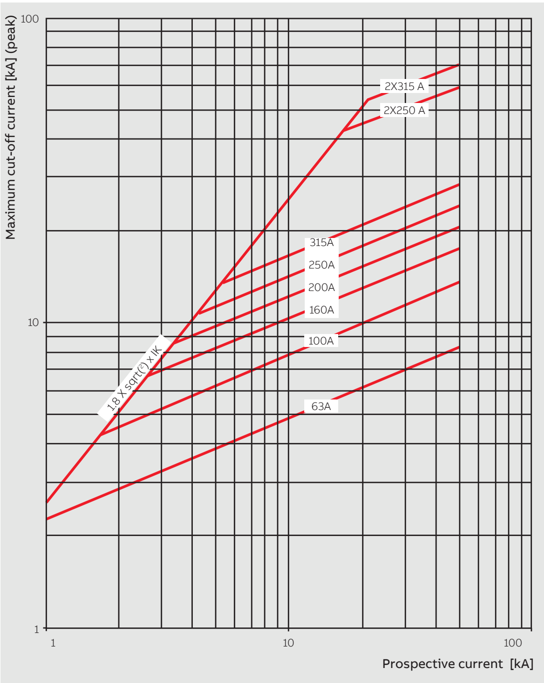


Fig. C

Un (kV)	In (A)					
3.6	63	100	160	200	250	315
7.2	63	100	160	200	250	315
12	63	100	160	200	-	-
K	0.75	0.75	0.7	0.7	0.6	0.6

Fig. D

Proceed as follows to verify the service conditions :

- Rated voltage Un

This should be the same as the service voltage of the installation or higher.

- Rated current In

This must be selected by consulting the diag-rams in fig. A. They refer to motors starting at regular time in-tervals except for the first two starts of each hourly cy-cle, which can take place in immediate succession Each diagram refers to a different starting time:
6 s - 15 s - 60 s. If there are two starts close to-gether, check that the starting current does not exceed the value of If x K.

If is the fuse pre-arching current in correspon-dence to the starting time of the motor, while K is a minor factor of the unit which depends on the In of the fuse. The table in fig D. gives K factor in relation to the rated current of the fuse.

- Full-load current

The rated current of the fuse must be 1.33 times the full load rated current of the motor or higher. This condition is always obtained for motors started at full voltage for which the procedure described for selecting the rated current of the fuse necessarily imposes values which are always higher than 1.33 In.

- Short-circuit current

The short-circuit current limiting curves in fig. C allow the short-circuit current on the load side of the fuses affected by the fault to be as-sessed.

Short-circuit current limitation on the load side of the fuses allows the equipment to be sized as a function of the devices protected by the fuses, e.g. the cables.

Example of fuseinverse time delay trip relay coor-dination for overload:

Motor data:	
Pn:	1000 kW
Un:	6 kV
Istart:	~5In=650 A
Tstart:	6 S
No. hourly operations::	16

With reference to the curve with 6 s starting time in fig. A, plot a vertical line on a level with starting current value 650 A which intersects the 16 hourly starts line in the 250 A fuse field.

From Fig.B , a fuse of 250 A rated current, when the prearching time equals 6s, the prearching current would be 1800 A.

Also from the table in Fig.D, the factor K of a 250 A fuse equals 0.6, thus: If x K = 1800 x 0.6 = 1080 A.

This current is higher than the starting current (650 A) , which means under frequent operations, the fuse of 250A is proper and reliable. By analyzing the prearching curve of the 250 A fuse, Overload protection is often performed by inverse time delay or fixed time delay time relays, worth noticing that prolonged overloads or by specific let through energy (I^2t) that exceeds the withstand rating is harmful to motors and will shorten the service life of the motor.

Motor starting
Motor starting poses the problem of high current consumption on inrush.In most cases, since these are asynchronous motors, the starting current can be:
- Asynchronous with simple squirrel cage: 4.5 ... 5.5 In
- Asynchronous with double squirrel cage: 5 ... 7 In
- Asynchronous with wound motor: low values, depending on the choice of starting resistors

This current will not be available if the short-circuit power of the network is not sufficiently high and in any case, can give rise to a voltage drop for the whole duration of starting, which cannot be tolerated by loads derived from the network itself. Normally a voltage drop between 15 and 20 percent is considered acceptable, but this must be assessed in the case of special users.

Full voltage start condition applies to most cases
If the calculations show that the starting power causes a higher voltage drop than that allowed, proceed by starting with reduced voltage and a consequent reduction in the starting current. In this case,starting is generally performed by a stepdown autotransformer.

For large motors it may be more convenient to use a transformer dedicated exclusively to the machine, which can be slightly oversized in relation to the power required for the the motor: starting therefore takes place at reduced voltage without the rest of the installation being affected.

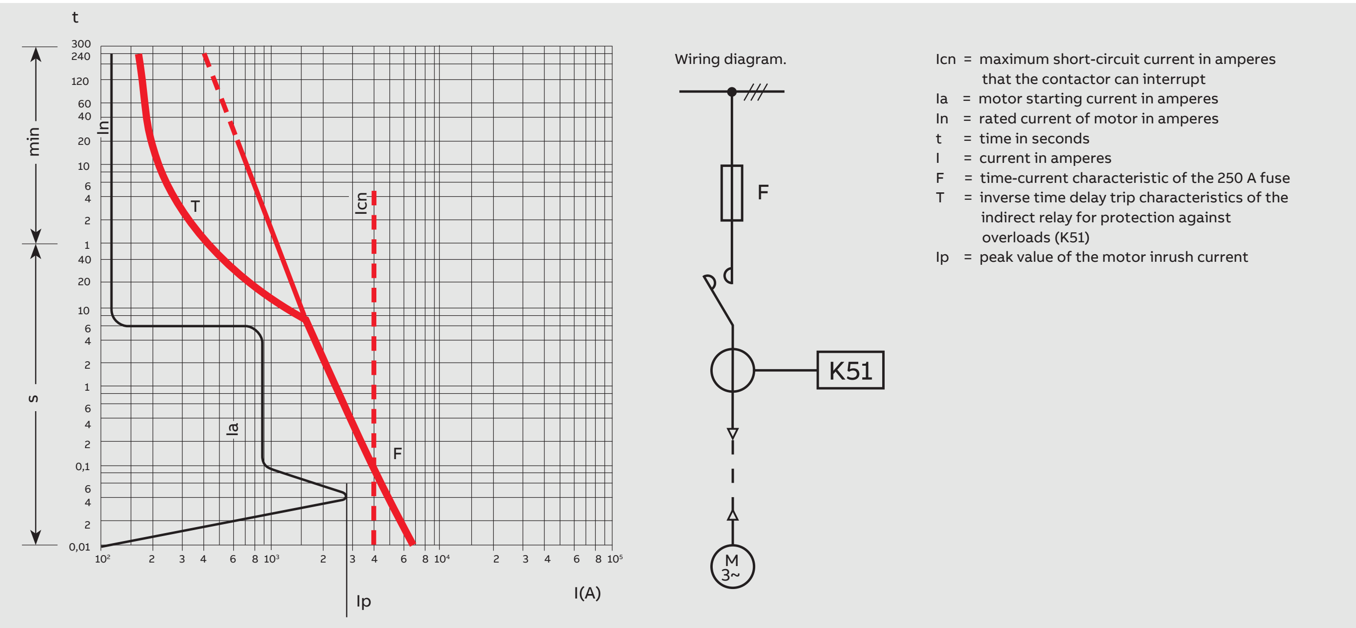


Fig. E - Graph showing coordination between the 250 A ABB CMF fuse and inverse time delay trip release.

Any motor starting, control, protection and measurement layout can be created by combining different enclosures, with withdrawable contactors appropriately fitted with accessories. Fig. E shows some typical wiring diagrams.

Transformer protection and fuse selection
When contactors are used for transformer control and protection, they are fitted with a dedicated type of current limiting fuses which ensure selectivity in relation to other protection devices and support the high transformer inrush currents without deteriorating.Unlike motors, in this case, protection against overcurrents on the medium voltage side of the transformer is not essential as this task is accomplished by the protection on the low voltage side.

Protection on the medium voltage side can therefore be entrusted to this fuse alone. This must be selected by taking the noload inrush current into account. For smaller transformers made with grainorientated laminations this value can reach 10 times the rated current.

Circuit-breaker closing occurs at maximum inrush current, which corresponds to the moment in which the voltage crosses zero.

Another result to be guaranteed is protection against faults in the low voltage winding and in that part of the connection from this to the circuit-breaker on the secondary winding, avoiding the use of fuses with rated current which is too high, so as to be able to ensure tripping within a short time even under these fault conditions.

A rapid check of the short-circuit current on a level with the secondary terminals of the transformer and on the supply side of the circuit-breaker on the secondary winding, if positioned at a significant distance, allows the release time on the fuse tripping curve to be verified.

The table below takes both conditions into account, i.e. rated current sufficiently high to prevent unwarranted fuse blowing during the noload inrush phase and, in any case, of a value which guarantees protection of the machine against faults on the low voltage side.

Capacitor switching
The capacitor switching application can normally be of two types:
1) Single bank installation (single three-phase capacitor bank)
   In installations of this sort there is only one type of switching-in transient, called switching-in transient of a single capacitor bank to the network.
2) Back-to-back installation (several three-phase capacitor banks in parallel, which can be switched-in separately).

In installations of this sort there are two types of switching-in transients:
- when the first capacitor bank is switched-in a switching-in transient of a capacitor bank to the network occurs
- when the other banks are switched-in a switching-in transient of a capacitor bank to the network with other banks already supplied in parallel occurs. In this case, the current transient is the type shown in fig. G

According Standards IEC 871-1/2 specify that capacitor banks:"… must be able to operate correctly under overload conditions with up to 1.3 In rms value of the line current, without considering the transients". Thus the switching, protection and connection devices must be designed to continuously withstand a current 1.3 times higher than the current there would be at rated sine wave voltage and frequency. On the basis of the rms value of the capacitance, the tolerance of which can be +10 percent of the rated value, a device must be chosen for a maximum current value of 1.3 x 1.10 = 1.43 times the rated current of the bank.

ConVac contactors fully fulfil the requirements of IEC 62271-106 and GB/T 14808 Standards, and are certified class C2 (the highest) for back-to-back capacitor bank switching.

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Selection table for fuses for transformers

Rated	**Rated power [kVA]**														
	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500
[kV]	Rated fuse current [A]														
3.6	40	40	63	63	63	63	100	100	160	160	200	250	315	--	--
5	25	25	40	40	63	63	63	100	100	160	160	200	250	250	315
6.6	25	25	26	40	40	63	63	63	100	100	100	160	200	200	250
7.2	25	25	26	40	40	63	63	63	63	100	100	160	160	160	200
10	16	16	25	25	25	40	40	63	63	63	100	100	160	160	160
12	16	16	16	25	25	25	40	40	63	63	63	100	100	160	160

Single bank
The parameters of the current transient, peak values and own frequency, which are present when the bank is switched into the network, are usually of a considerably smaller size than those in the case of multiple banks.

Two or more banks (back-to-back)
When there are several capacitor banks, calculations regarding the installation must be made, considering the case of a single bank

Peak current	Inrush frequency	Ip(kA) x f(Hz)
8 kAp	2500 Hz	20000

being switched-in with the other capacitor banks already switched in.
Under these conditions, check that:
- maximum inrush current does not exceed the value given below (see table);
- inrush current frequency does not exceed the value given below (see table).

For maximum inrush current values below 8kA, the inrush frequency can be increased so that the product of current by frequency results as less than Ip (kA) x f (Hz) = 8 x 2.500 = 20,000

For instance:
Ip (kA) = 5kA the maximum admissible inrush fre-quency becomes
f (Hz) = 20,000 / 5 = 4,000Hz

This rule can be applied to inrush currents below 8kAp, corresponding to the maximum value, which must not be exceeded even when the frequency is lower than 2500Hz.

Refer to GB/T 1984 Annex H to calculate the inrush current and frequency.If the calculations result in inrush current and frequency values which are higher than the maximum allowed, then air reactors of a suitable value must be installed in the the circuit, while the cables connected must also be considered.

Use of reactors is also recommended when there are frequent operating sequences with high inrush frequencies.

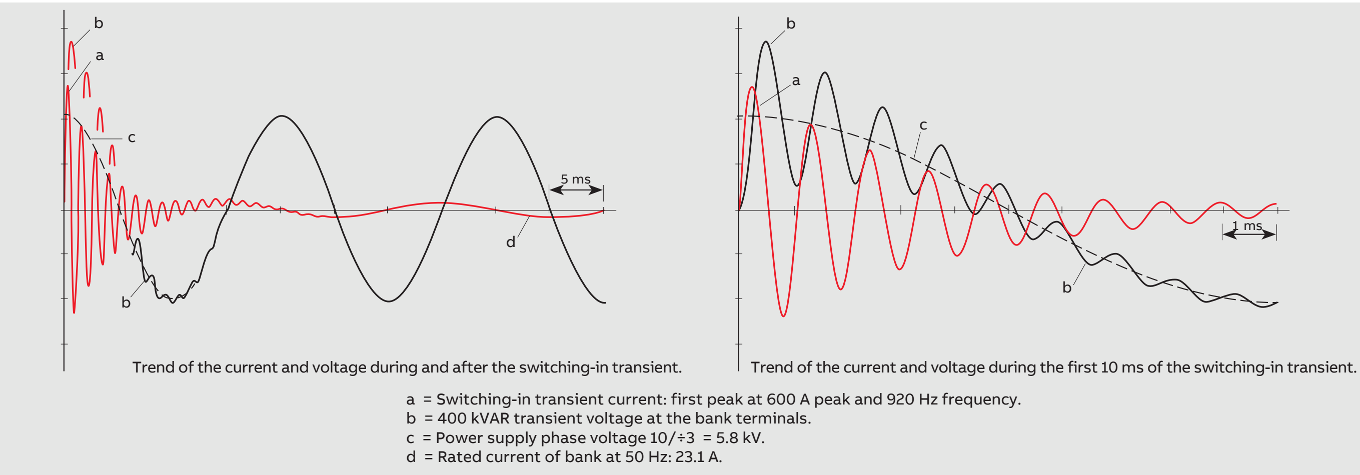


Fig. F: Example of a current transient when a single capacitor bank is switched-in.

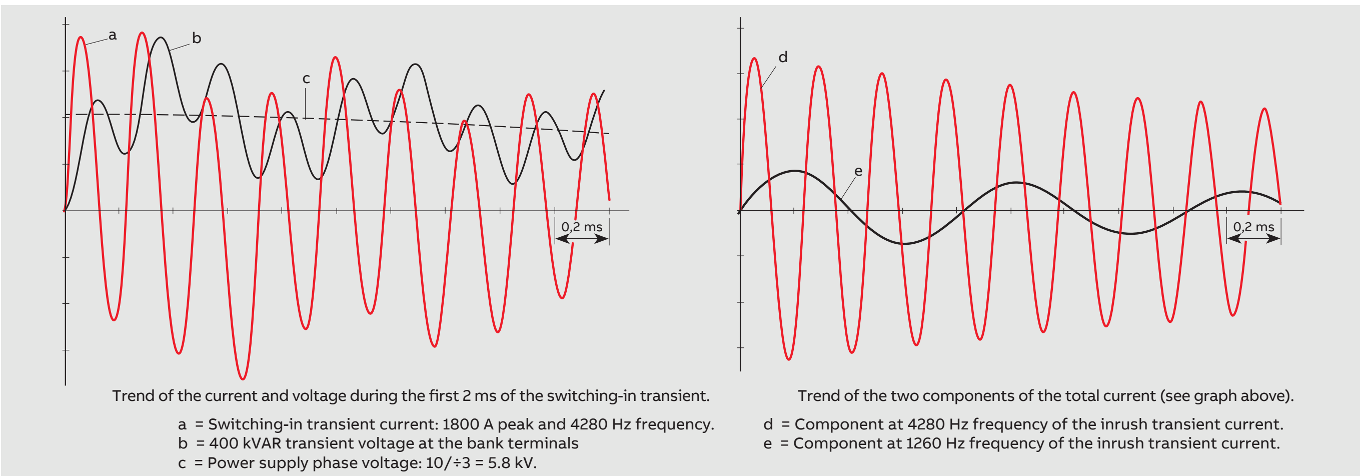
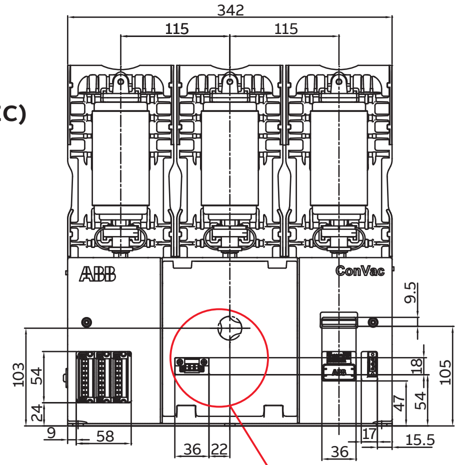


Fig.G: Example of a current transient when a capacitor bank is switched-in with another already supplied.

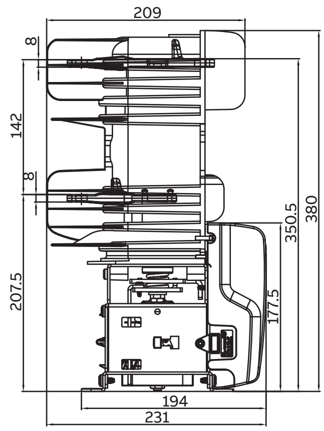
Overall dimensions

ConVac 7 fixed（GB and IEC)

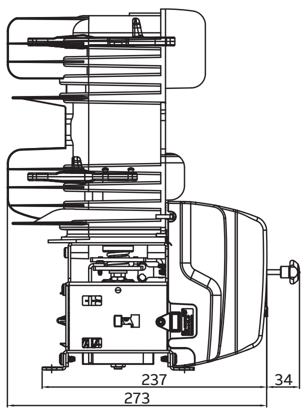
ConVac 12 fixed（IEC)



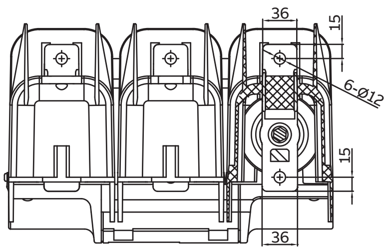
Mechanical latched

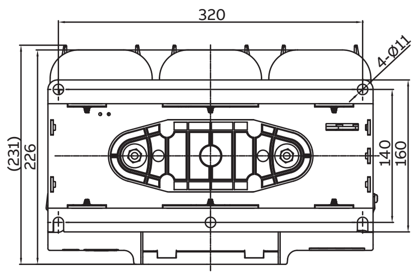


Electrically latched

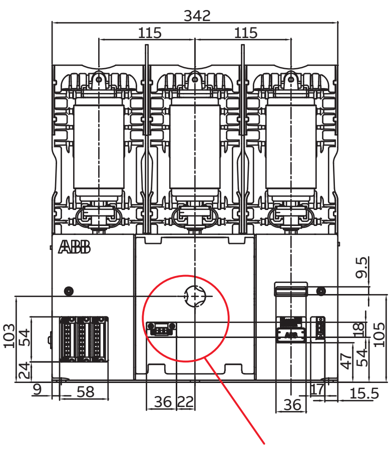


Mechanical latched

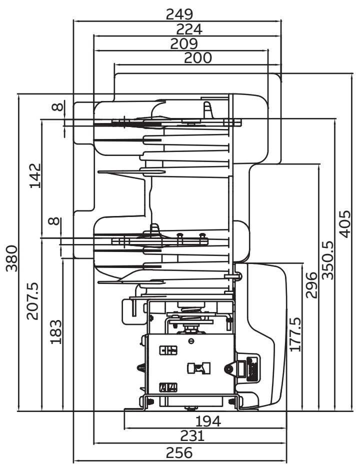




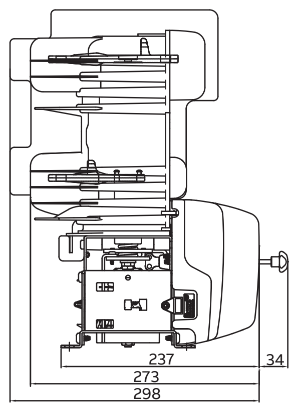
ConVac 12 fixed（GB)



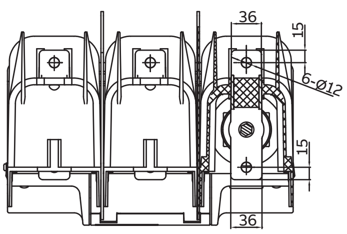
Mechanical latched

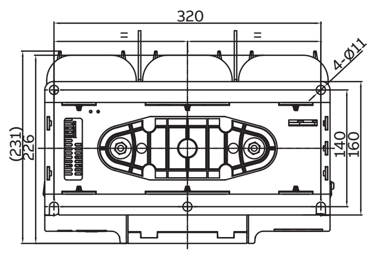


Electrically latched

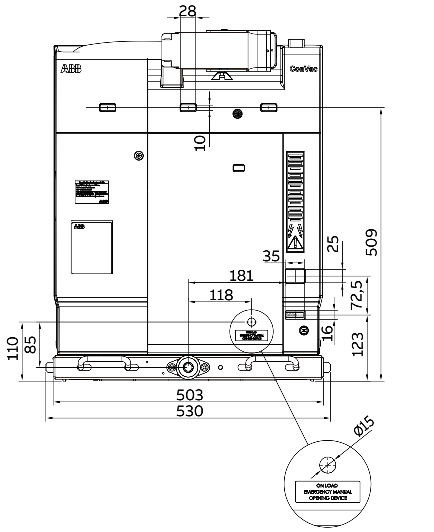


Mechanical latched

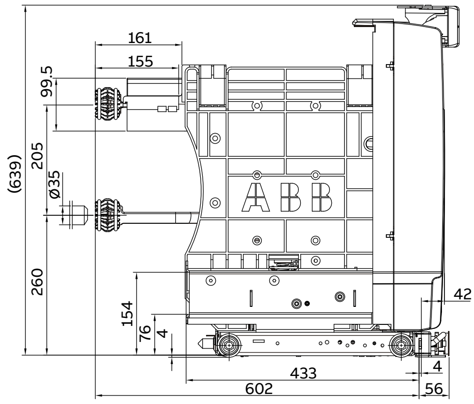


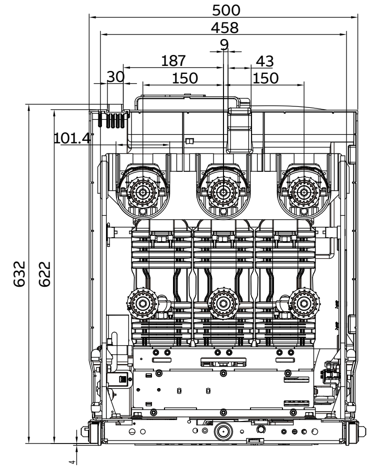


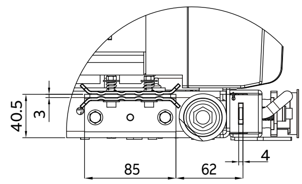
ConVac 7/P，ConVac 12/P withdrawable



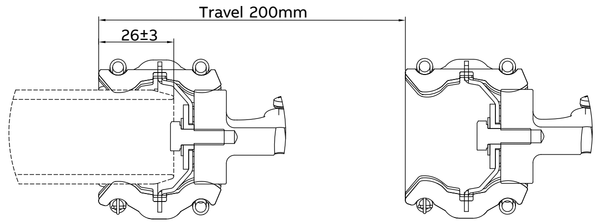
Only for mechanical latched







Moving and static contact match dimention

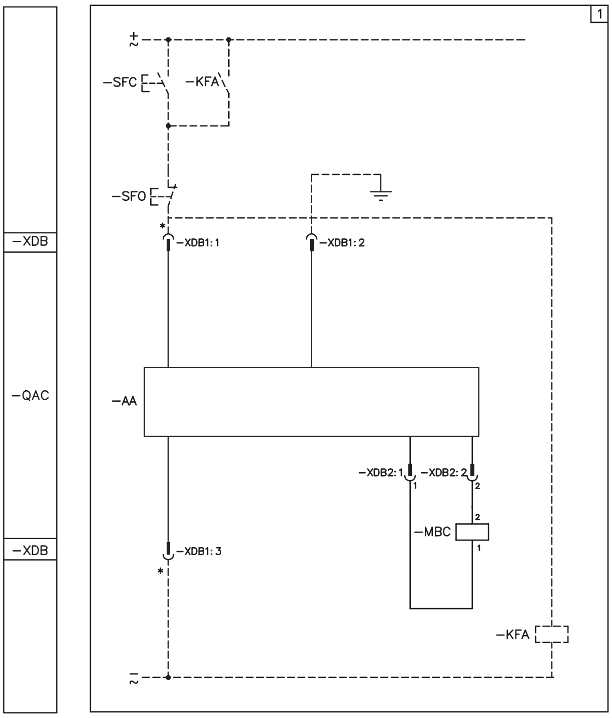


Working position

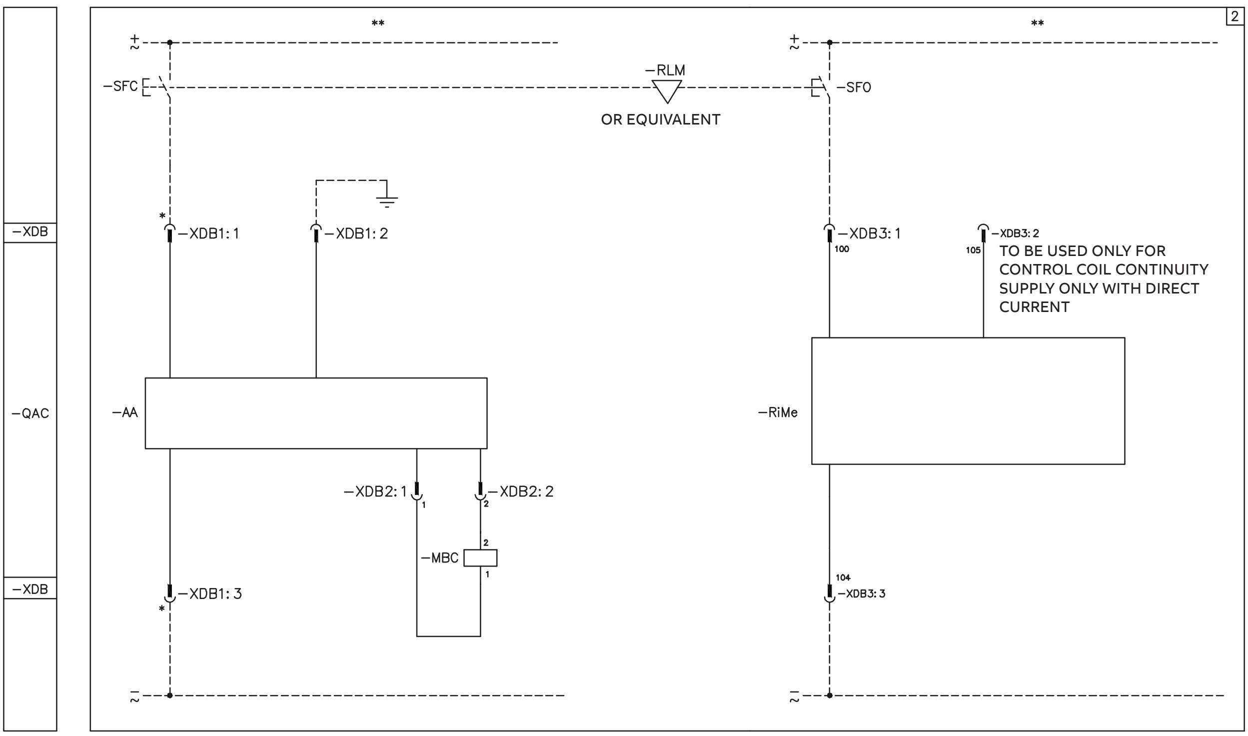
Testing position

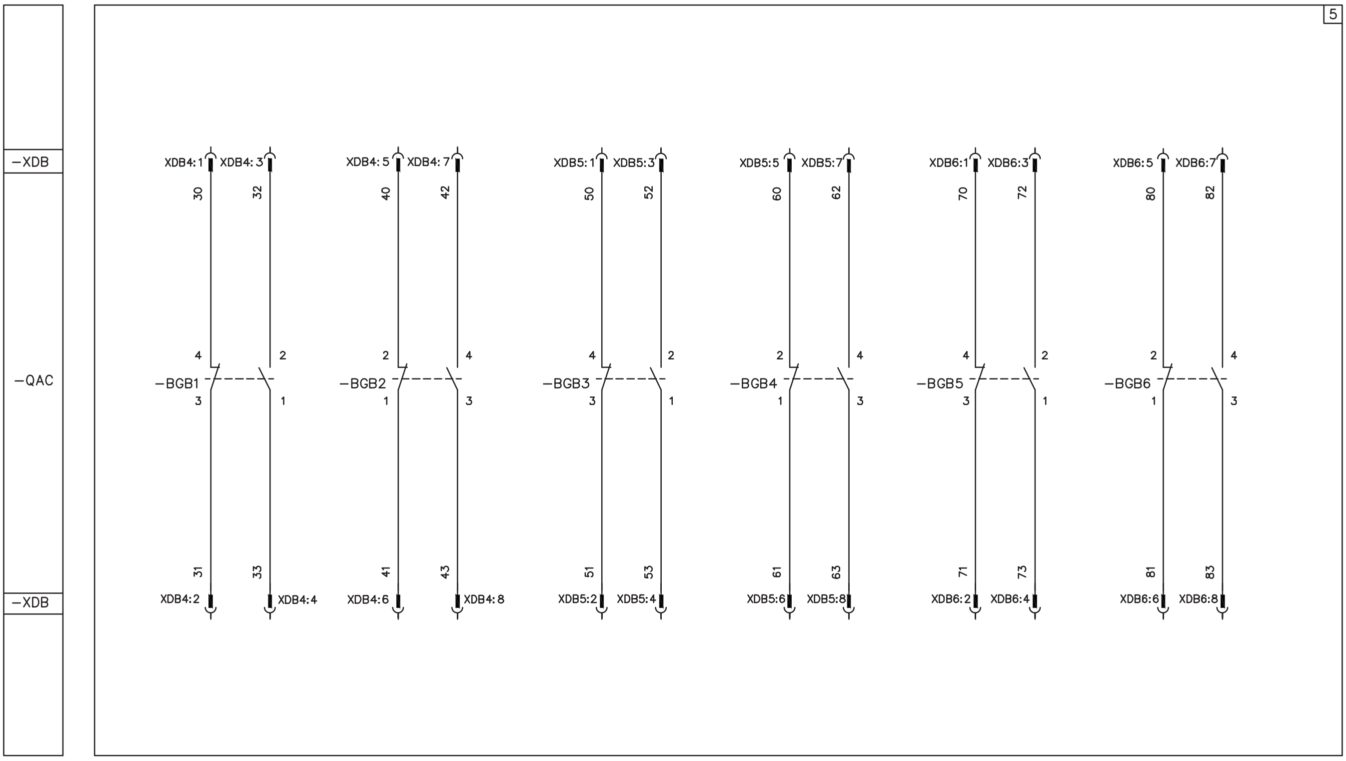
Electric circuit diagram

ConVac fixed version
Electrically latching



Mechanical latching





The contactor circuits are illustrated in the dia-grams below by way of example. In any case, in view of product development and for specific applications, it is always useful to refer to the electric circuit diagram provided with each piece of appa-ratus.

Operating state shown
The diagram illustrates the following conditions:
- contactor open
- circuits de-energized

Description of diagram figures

Fig.1 Control circuits of ConVac fixed version with electrically latching

Fig.2 Control circuits of ConVac fixed version with mechanical latching

Fig.5 Auxiliary contacts.

Key

□ =Reference number of the diagram figure

-XDB... =Onnectors for the contactor circuits

-QAC =Ontactor

-SFC =Push-button or contact for contactor closing

-SFO =Push-button or contact for contactor opening

-KFA =Auxiliary control relay or contactor (use ABB contactor type B7 or BC7 or equivalent)

-MBC =Closing coil

-AA =Power supply

-BGB1...6 =Contactor auxiliary contacts

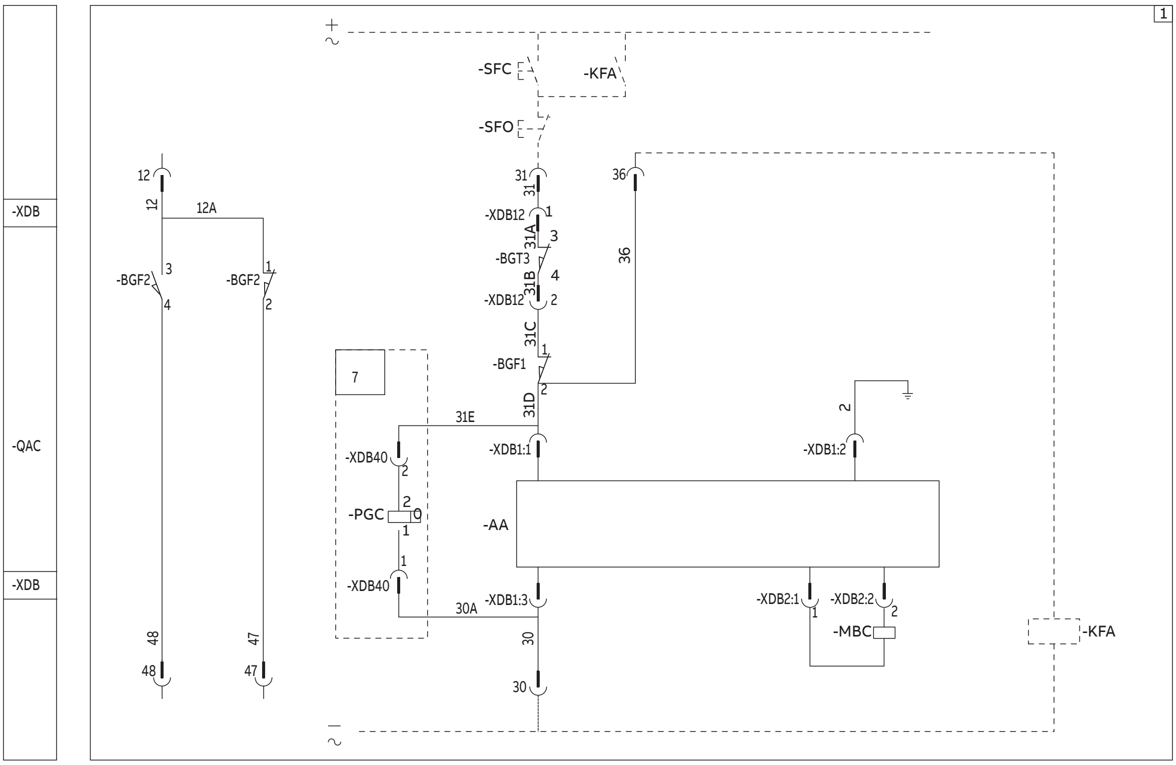
-RLM =Mechanical interlock

Notes

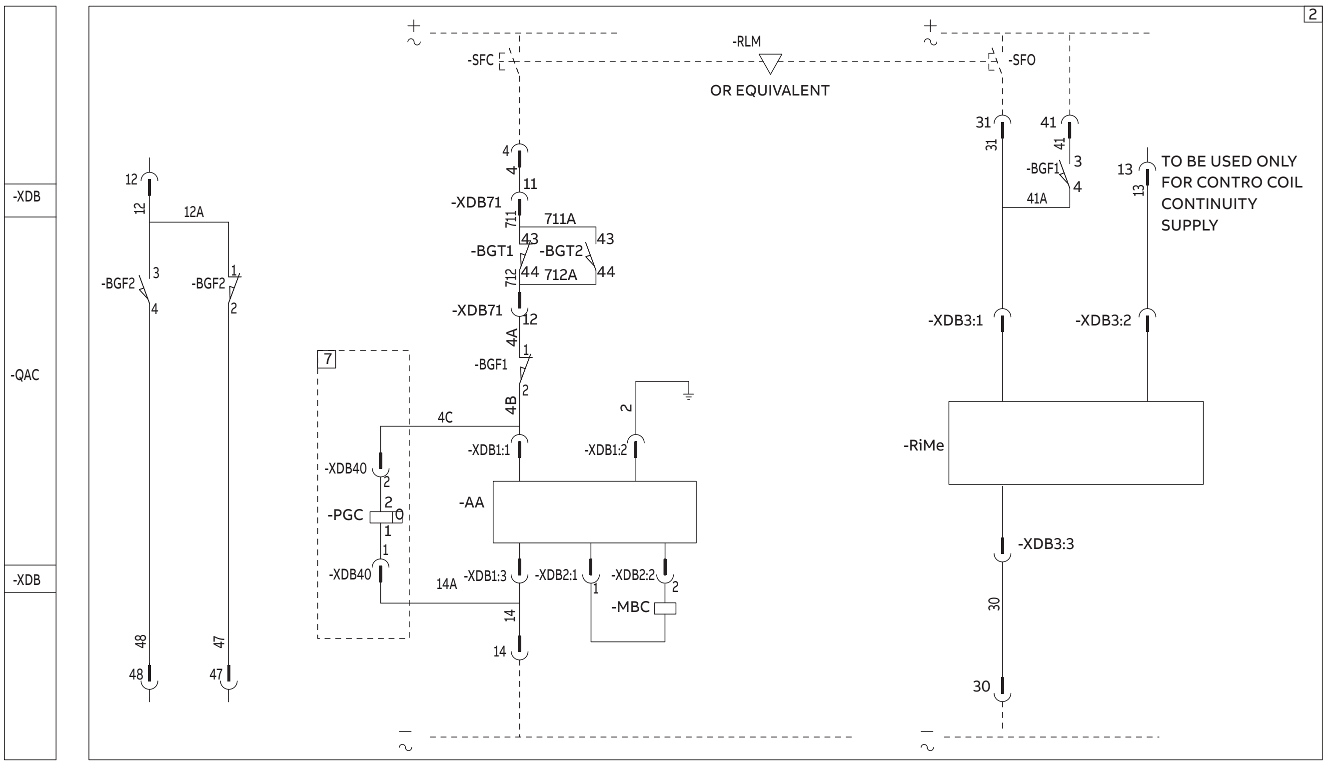
A) The contactor is delivered complete with the sole applications specified in the ABB order confirmation. Consult the catalog of the apparatus when making out the order.

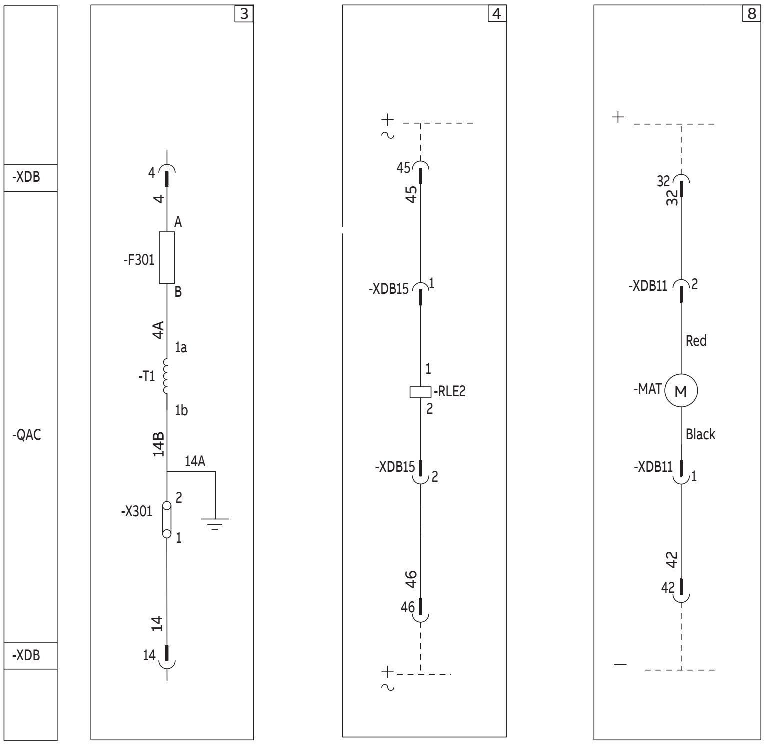
B) Control command duration (-SFO and -SFC) at rated voltage Ua
Fig. 1 and Fig. 2: -SFC minimun 300ms,
-SFO minimum 300ms.

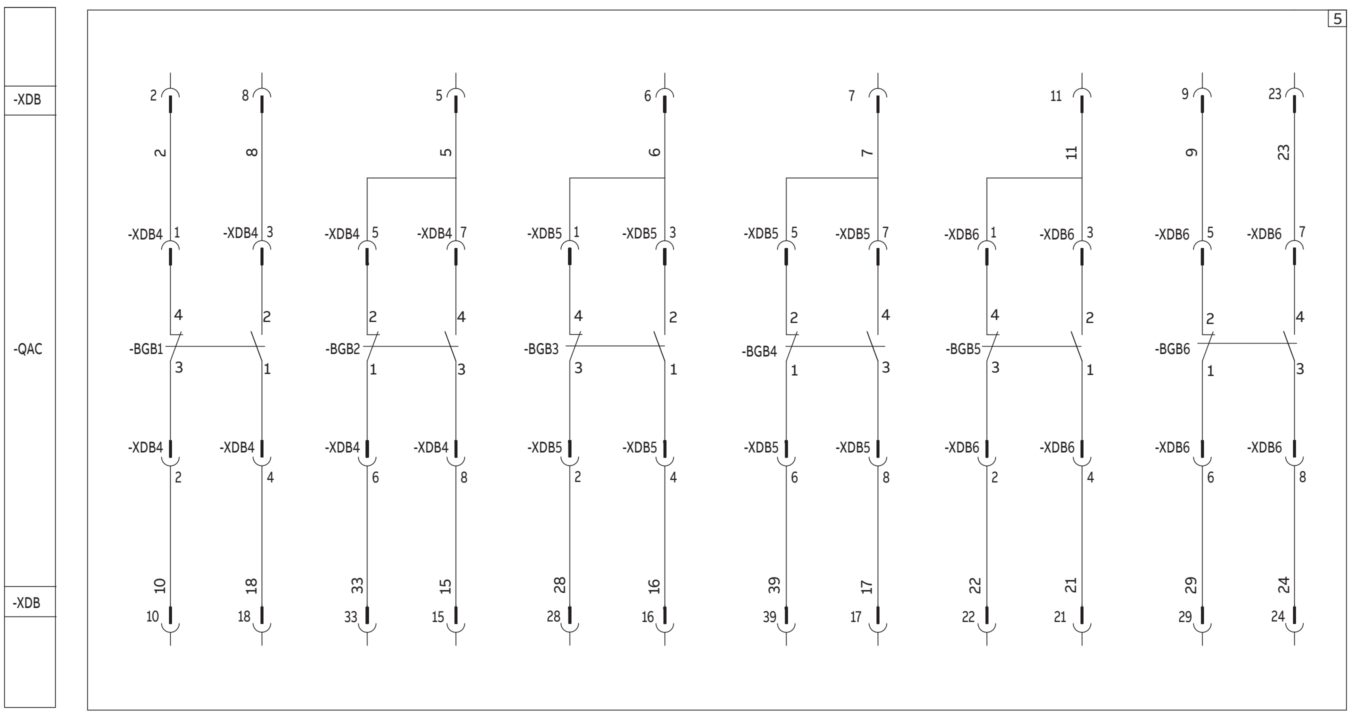
ConVac/P withdrawable
Electrically latching

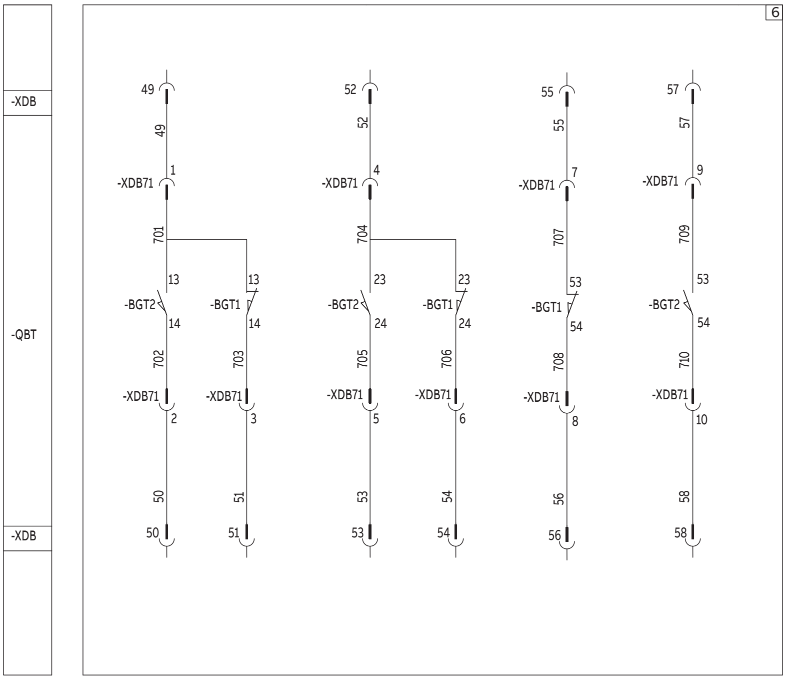


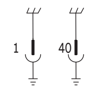
Mechanical latching




-XDB
-QAC
-XDB
3
4
-F301
A
B
4A
1a
-T1
1b
14B
14A
-X301
2
1
14
4
+
~
45
-XDB15
1
-RLE2
2
46
8
+
32
-XDB11
2
Red
-MAT
M
Black
1
42
—


-XDB
-QAC
-XDB
5
-XDB4
-XDB5
-XDB6
-BGB1
-BGB2
-BGB3
-BGB4
-BGB5
-BGB6





The contactor circuits are illustrated in the diagrams below by way of example. In any case, in view of product development and for specific applications, it is always useful to refer to the electric circuit diagram provided with each piece of appara-tus.

Operating state shown
The diagram illustrates the following conditions:
- contactor open
- circuits de-energized

Description of diagram figures

Fig.1	Control circuits of electrically latched contactor
Fig.2	Control circuits of contactor with mechanical latching (RIMe)
Fig.3	Control circuits of self supplied electrically latched contactor
Fig.4	Locking magnet for the truck
Fig.5	Auxiliary contacts.
Fig.6	Truck position contacts
Fig.7	Impulse counter
Fig.8	Motorized truck

Key

◻	=Reference number of the diagram figure
-XDB...	=Connectors for the contactor circuits
-QAC	=Contactor
-SFC	=Push-button or contact for contactor closing
-SFO	=Push-button or contact for contactor opening
-KFA	=Auxiliary control relay or contactor (use ABB contactor type B7 or BC7 or equivalent)
-MBC	=Closing coil
-AA	=Control unit
-PGC	=Counter
-BGF1, -BGF2	=Status contacts of MV fuses
-RiMe	=Contactor closing device
-BGB1...6	=Contactor auxiliary contacts
-BGT1	=Contacts signaling contactor in connected position
-BGT2	=Contacts signaling contactor in isolated position
-BGT3	=Contactor position contact.
-RLE2	=Locking magnet, if de-energized, it prevents contactor to be racked in/out of the enclosure
-T1	=Transformer secondary coil
-F301	=VT secondary protection fuse
-X301	=Link
-MAT	=Motorized truck
-RLM	=Mechanical interlock

Incompatibility
The circuits indicated in the following figures cannot be supplied at the same time on the same contactor:
1 – 2 2 – 3 4 – 8

Notes
A) The contactor is delivered complete with the sole applications specified in the ABB order confirmation. Consult the catalog of the apparatus when making out the order.
B) Control command duration (-SFO and -SFC) at rated voltage Ua
Fig. 1 and Fig. 2: -SFC minimun 300ms, -SFO minimum 300ms.

Note

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