CVX for PIX Switchgear

Fuse Contactor Drawer

Primary Distribution Switchgear

Operating Instructions

No. AVXN01795-01-00
2016/04

Schneider Electric

As a global specialist in energy management with operations in more than 100 countries, Schneider Electric offers integrated solutions across multiple market segments, including leadership positions in energy and infrastructure, industrial processes, building automation, and data centres/networks, as well as a broad presence in residential applications. Focused on making energy safe, reliable, and efficient, the company's 100,000 plus employees achieved sales of more than 15.8 billion Euros in 2009, through an active commitment to help individuals and organisations make the most of their energy.

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Till now, Schneider Electric had established 77 offices, 26 factories, six distribution centers, one learning institute, three research and development centers, one laboratory, 500 distributors and a nation-wide sales network. Schneider Electric currently employs 22,000 staff in China, and helps create thousands of other jobs through its partners and distributors.

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With the professional know-how in multi markets we operate and the close care of our customers, as well as our best practices in energy management, Schneider Electric has grown up from a provider of best-in-class products into an integrated solution provider. This year, we launched EcoStruxure™, an architectural approach which unites Schneider Electric's unique expertise in power, datacentres, process and machines, building control, and physical security to enable intelligent energy management solutions for customers seeking to optimise energy efficiencies across multiple domains of their business. By providing our customers with clear and comprehensive reference architectures across key environments and applications, we intend to reduce inefficiencies and save energy up to 30%.

Contents

1 Operating conditions

Attention:

It is essential that no changes are made to the fuse contactor drawer.
Important instructions are marked.

- The CVX12 is a vacuum fuse contactor for application in PIX indoor switchgear
- The CVX operate perfectly under the following climate conditions corresponding to IEC 60694

1.1 Admissible ambient temperature

The maximum temperature of the ambient air is 40℃,the average measured over a 24h period does not exceed max.35℃. The minimum temperature of the ambient air is -5℃

1.2 Installation altitude

The CVX can be installed at altitudes up to 1000m above sea level.At higher installation altitudes,the reduced withstand voltage must be taken into account.It may be necessary to use cubicle of the next-higher voltage series.

1.3 Admissible air pollution

The ambient air is not essentially polluted by dust,smoke,corrosive or inflammable gases and vapours,or by salt.

1.4 Admissible atmospheric humidity

The average relative humidity,measure during a 24 h Period,does not exceed 95%.The average relative vapour pressure,measured during a 24 h period,does not exceed 22 mbar.The average relative humidity measured over a one month period,doesnot exceed 90%.The average vapour pressure,measured over a one month period,does not exceed 18mbar.

Under these conditions condensation may occur:

- Condensation must be expected if sudden temperature fluctuations occur in periods with high atmospheric humidity
- Condensation can be prevented by appropriate design and ventilation of the indivual panels,or by means of dehydrators
- These measures are recommended if an atmospheric humidity in excess of 75% is to be expected

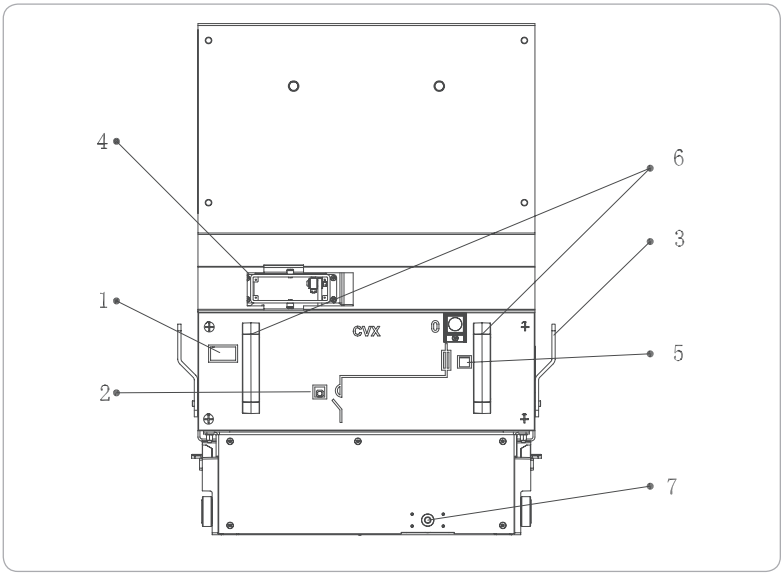
Note:

If vacuum contactors are to be used under conditions differing from those describde above,the manufactruer must be consultde.

2 CVX Moving part

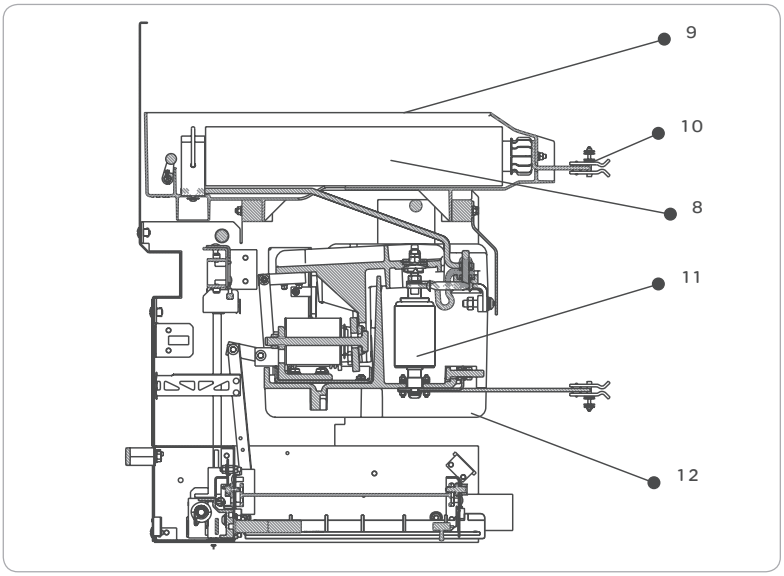
2.1 Rear view

1. Operating counter(optional)
2. Contactor(closed or opened)Indicator
3. Handling bars(only for handling)
4. LV plugging-in plug
5. Fuse fusion indicator
6. Handles
7. Hole for the plugging-in crank handle



2.2 Side view

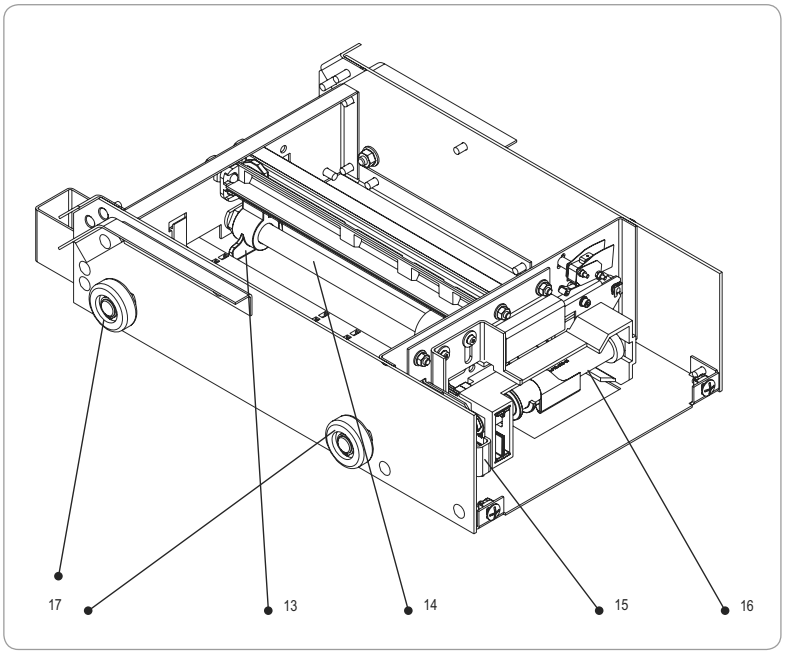
8. 442 mm fuse
9. Fuse holder
10. Disconnecting contacts
11. Vacuum interrupters
12. CBX contactor body



2 CVX Moving part

2.3 Drawer

13. Spindle nut
14. Spindle
15. Slide
16. Locking shaft
17. Wheels



3 Interlocks

3.1 Rack in/Rack out mechanism and cassette interlock

On turning the CVX crack handle which is inserted into the hexagonal opening of the spindle,the spindle nut in the CVX moves to service position and the isolating position.Two stops limit the travel.

The CVX which is racked into the cell by the transport trolley only latches in the moving rocker if the spindle nut is in the position corresponding to the isolating position.

3.2 Standard locking mechanisms

Locking	Locking function	Locking operation
Between the rack-in of the CVX and the fitting of the low voltage plug.	Rack-in the CVX is impossible if the low voltage plug is not connected.	Locking by obstacle;the blocking off Shutter in front of the rack-in screw of the CVX is locked Introduction of the rack-in crank handle is impossible.
Between the rack-in/rack –out And the closed state of the CVX	The rack-in/rack-out of the CVX is impossible if the contactor is closed	Locking by obstacle:the blocking off shutter in front of the rack-in screw of the CVX is locked Introduction of the rack-in crank handle is impossible.

3.3 Electric Interlocks

When the crank handle is introduced,a switch position is activated and the infor mation “handle in ” is sent to the low voltage cabinet.

The closing of the contactor is impossible if the handle is in.

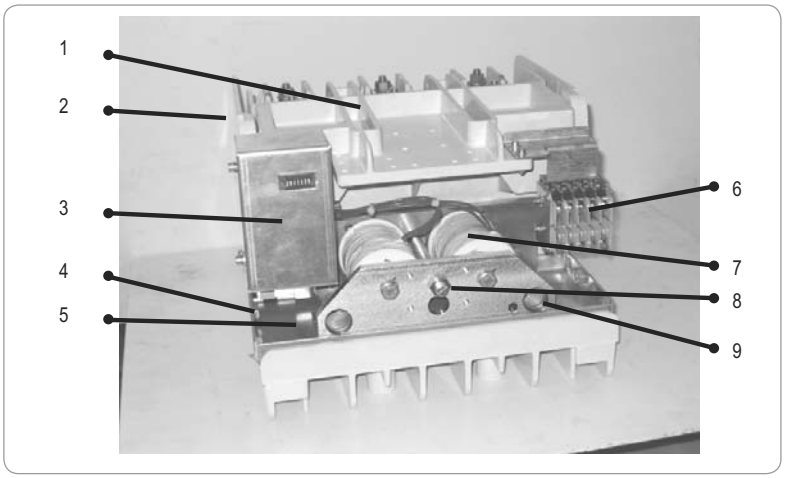
4 Contactor CBX

4.1 General Information

A contactor is primarily a three phase switching device,although single phase units are also available,used primarily in motor starting/reversing and capacitor bank switching applications. Each phase has a separate Vacuum Switch which switches at the first available current zero.

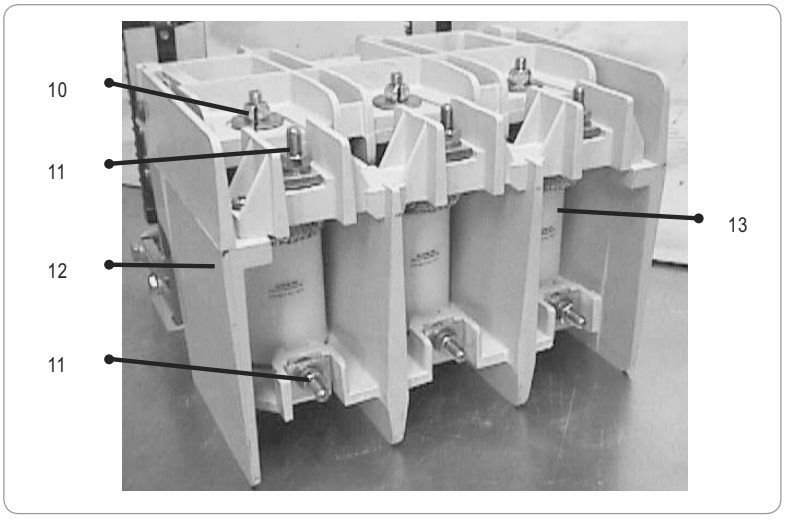
4.1.1 Contactor Front View

1. Armature moulding
2. Pivot point
3. Electronic card cover
4. Fixing holes
5. Steel mounting plate
6. Auxiliary switches
7. Closing coils
8. Stop pin
9. Operating springs



4.1.2 Contactor Rear View

10.Phase assembly
11.Main terminals
12.Main moulding
13.Vacuum switches



4.2 Description & Operation

As shown in[4.1.1&4.1.1],the Contactor comprises Main and Armature Mouldings with two Pivot Points,a Steel Mounting Plate,three Vacuum Switches,two Opening Springs,two Closing Coils,an Economy electronic card and one Auxiliary Contact Blocks.

4.2.1 Closing Coils Un-energised

In this condition the opening springs acting against the centre limb of the armature moulding hold the vacuum switches in the normally open position(main circuit off).

4.2.2 Closing Coils Energised

Energising the closing coils through the electronic card attracts the armature which compresses the opening springs.The armature movement is transmittde through the pivot points,allowing the vacuum switches to close under the effect of atmospheric pressure which acts on switches(main circuit on).The vacuum switches will remain closed as long as the closing coils are energised.The armature moulding moves further than necessary for switch closure providing overtravel which accommodates contact wear and,on opening,provides kinetic energy to break minor contact welds which may occur under severe operating duty.

The energy required to close the contactor is considerably more than the energy required maintaining a closed position.On initially energising the closing coils,a high current flows through the coils.After a short delay the electronic card automatically reduces the current in the closing coils which allowstheir continuous operation without over heating.The closing coil rating enables satisfactory operation of the contactor in cubicles with internal temperatures of up to 65℃.For use in temperatures higher than this,contact Schneider Electric T&d.Contactors are supplied fitted with closing coils and electronic card suitable for DC or AC supply voltages.

4.2.3 Closing Colls De-energised

When the closing coils are de-energised the opening springs will act on the armature moulding causing the vacuum switches to open,The vacuum switches provide a sealed gas-free environment making the switching operation unaffected by external conditions.Once the vacuum switch contacts have separated arcing occurs until the first available current zero,at which time the current is commutated.

4.2.4 Auxiliary Contacts

One auxiliary contact blocks is provided giving a maximum of 10 (ten) contacts avallable for customer use (5NO+5NC).

4.3 Electronic card

The closing coils are energised through an electronic card which automatically reduces the current when the contactor is closed.

We have two types of cards depending on the voltage supply.The electronic card accepts any control voltage in the range.

- 24 to 60 Vdc
- 110 to 240 Vac or 110 to 250 Vdc

The card is opening time delay of 100 ms by means of the ST3jumper(seepictures hereafter).This opening delay can be used for the coordination with fuses.

Configurable on demand by Schneider Electric T&D STS in order to introduce an additional it is also possible to connect in option an operations counter to the card.

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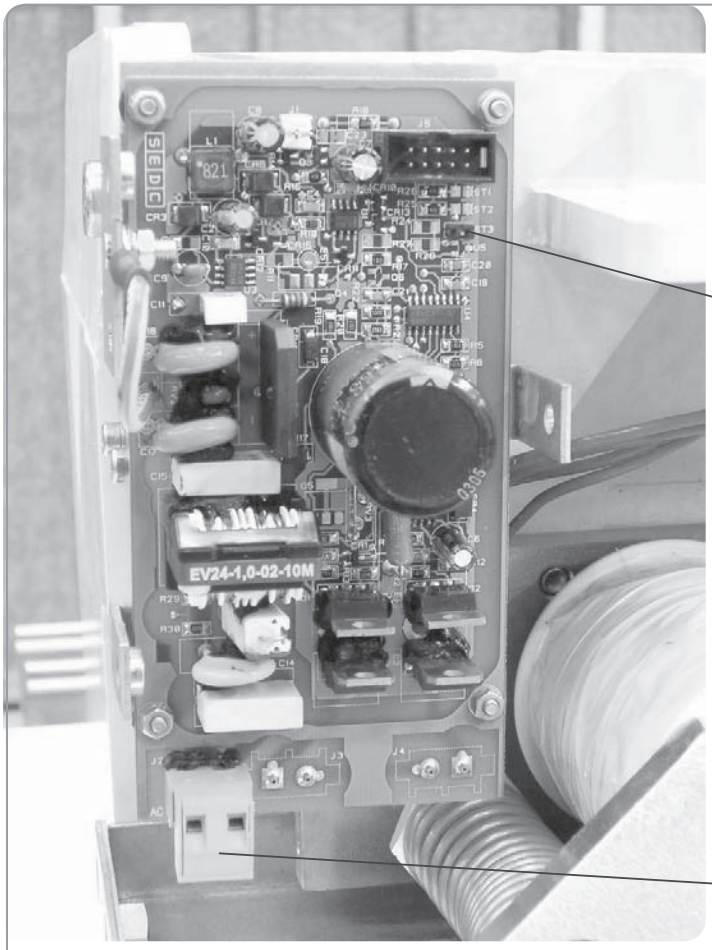
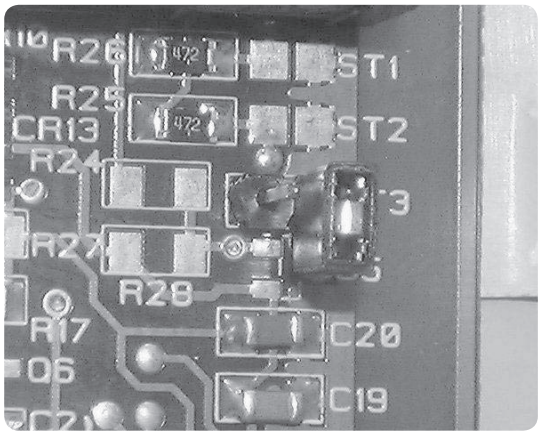


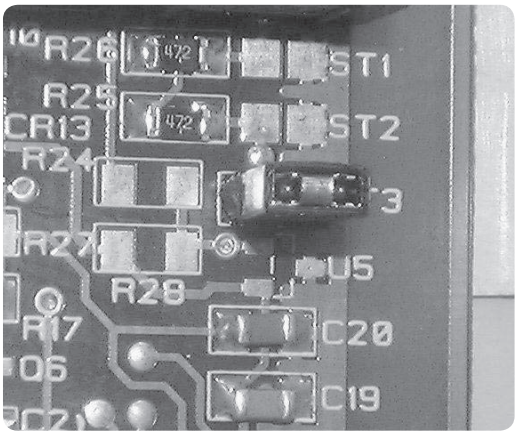
Configurable pin for opening delay of 100 ms

Power supply connector

No additional time delay



Additional time delay 100 ms



4.4 Pre-commissioning tests

- It is good practice to subject vacuum switches or contactors to precommissioning tests:
  - Check for the presence of llse screws
  - Check contactor operation at 85% of the control voltage after installation,including cables or busbars,but before applying full control voltage and power.
  - Perform foutine site voltage test.[4.4.1]
  - Perform auxiliary mainten-ance checks[4.6.3]
- It is also advisable to test vacuum switches and contactors under the following circumstances::
  - If the contactor or switch has been standing for 5 years or more without use-either in storage or inservice.
  - In special applications where the switch is in use for long periods without breaking current and without normal voltage across the contacts when switched off
  - After a main circuit fuse has operated

4.4.1 Routine Site Voltage Test

The following test shoule be carried out by using an a.c.test set of limited rating e.g.2 to 4KVA,on which the voltage is continuously variable from zero up to the maximum required for that particular switch.Return the contactor to the supplier if the test is not successful..

Note:

Applying very high voltagesto open vacuum switches may generate harmful levels of X radiation.However emission of X radiation is negligible at the specified test voltages.

Connect output leads of the test set across the open gap of each vacuum switch in turn.

Slowly raise the voltage from zero to the specified test value taking approximately one minute to reach full voltage.During this stage any discharge or test set tripping should be ignored unless it proves impossible to reach the full specified voltage within two minute.

Note:

On reversing applications and on applications with VS3-C vacuum switches no discharge or test set tripping can be tolerated whilst the voltage is being slowly raisedto,and held for one minute at the specified test voltage.

Contactor Type	Vacuum Switch Type	Nominal System Voltage kV	A.C. Test Voltage 45/65HZ kV	D.C. Test Voltage (Test in both polarities) kV
CBX3-C	VS3-C	12	22	22
CBX3	VS3	7.2	22	22

Note :

The coding given to contactors in the above table have additional suffix letters and numbers in their references.
When carrying out a.c,high voltage tests,current monitoring facilities are not usually available and in any event the leakage currents can be misleading due to the presence of currents associated with the vacuum switch capacitance.

When carrying out d.c.high voltage tests,current monitoring facilities usually are
Available.If any doubt exists about the eacuum switch dielectric to pass the routine site test procedure given above,an additional criterion can ba applied where the leakage current should not exceed 150 microamps at the relevant test voltage given in above table. However,before rejecting any vacuum switch which is apparently outside the limit,it shoule be ensured that the leakage current is due to faulty switch dielectric and not due to dirtetc,on the outside of the vacuum switch envelope.

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4.4.2 Maintenance

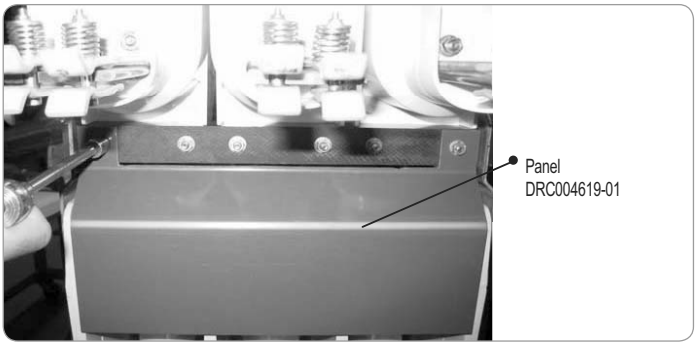
These contactors are extremely reliable and only slight mainten-ance is normally required.The following table outlines recom-mended maintenance intervals.

	Installa-tion	Pre-commission	Every 100,000 Operations *	Every 250,000 Operation	After Main Fuse Operation	Infrequent Switching (<1 year)	Every 5 Years
Contactor Operation	●	●		●	●	●	●
Auxiliary Contacts		●	●			●	●
Vacuum Switch Wear 400A **				●	●		●
Vacuum Switch Voltage Test		●			●		●

* These totals are only for ELECTRICAL operations as the Vacuum switch assemblies will mechanically operate for the life of the contactor.
** Assuming a normal starting peak of six times full load current when controlling a squirrel cage induction motor.

Mechanical & Electrical Life

The contactor has a design life of 1,000,000 mechanical operations.Electrical life depends upon the type of vacuum switch fitted and the level of current to be switched.Provided that the vacuum switch contact wear does not exceed the maximum permissible then the contactor will continue to function correctly.



Vacuum Switch Contact Wear Check

The CVX must be extracted to carry out this operation.
Take out the protecting panel DRC004619-01.

Note:
Remind to put back in place the protection panel after.

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After isolating the main circuit of the contactor,close the armature by energising the coils and insert the wear gauge DRC001528-02

Provided underneath the washer on top of each phase(as indicatedin the opposite piture).

With the gauge in position,slide it from back to front to gain a feel for the movement.If the gauge is trapped or tight fitting i.e.

Phase assembly,washer,and Nyloc nut also move this indicates that the switch contacts are worn and the switch its electrical life,

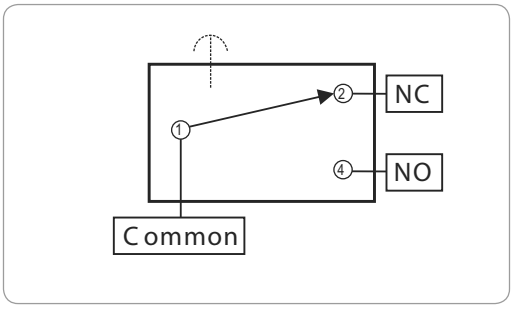
If one or more switches indicate worn contacts,all three vacuum switches must be replaced.

Remember to remove the gauge after checking for wear!

A switch assembly is worn out when each contact has been reduced in thickness by0.25mm i.e.a tatal of 0.5mm per pair of contacts in a switch,

4.5 Wiring Diagrams

See Electric diagram contactor DRC004497-01 in annex



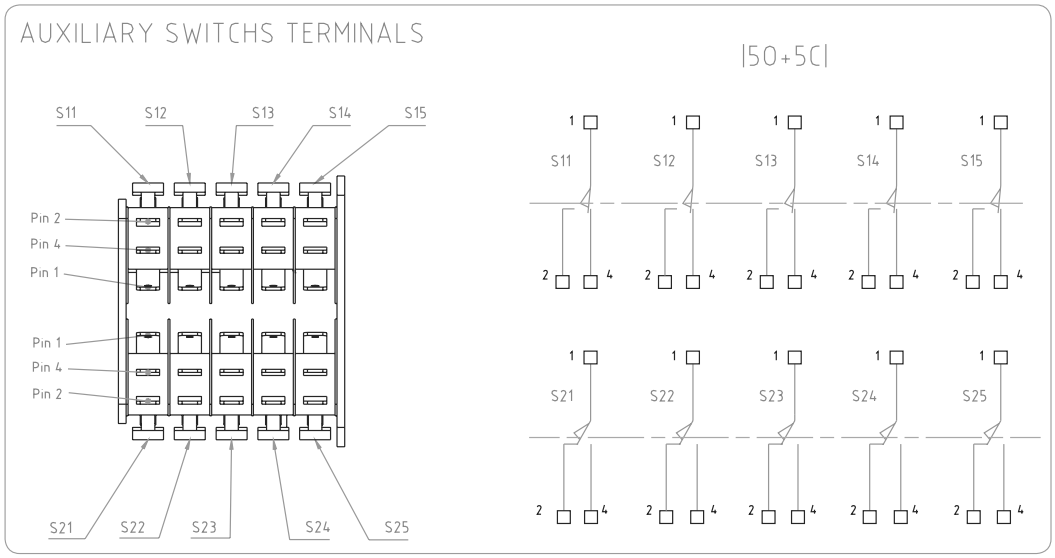
4.6 Auxiliary Switches

4.6.1 General Information

The micro switches used are 16A/250Vac-Faston 6.3x0.8 type.

Auxiliary contacts are 5 NO and 5 NC positively driven.They must be connected directly at their terminal.For each normally open or closed contact,the complement contact is avallable(i.e.Ncfor NO and vice versa).

4.6.2 Auxiliary Contact Blocks



4.6.3 Auxiliary Switch Maintenance

The auxiliary contacts reqrire little attentionbut should be kept free of dust and dirt.

- Examine moving parts for side play,badly worn pivots erc,which indicate that the auxiliary switch should be replaced
- Operate the contactor to check that the contacts have satisfactory wipe and break and that movement is free

Where reliability of operation is particularly critical-e.g.continuous processes,mine winding installations, etc,inspection of the auxiliary switches is recommended at intervals of approximately 100,000 operations.

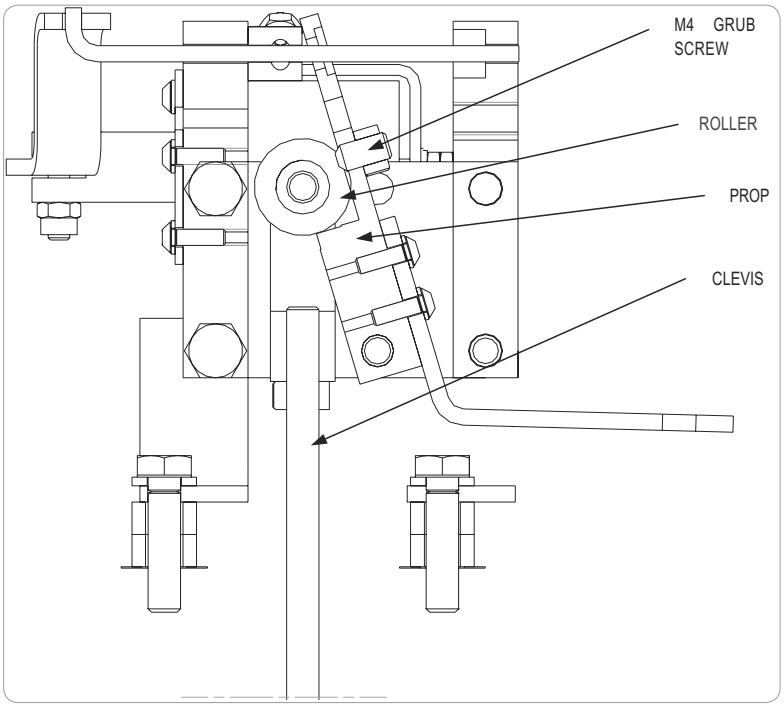
4.7 Latch-in Device

4.7.1 Maintenance off Latch-in Mechanism

No maintenance is requied for the latch-in mechanism,beyond an occasional light application of molybdenum disulphide loaded grease to the sliding parts.

4.7.2 Latch-in Device and Setting

- Latch-in Device and Setting



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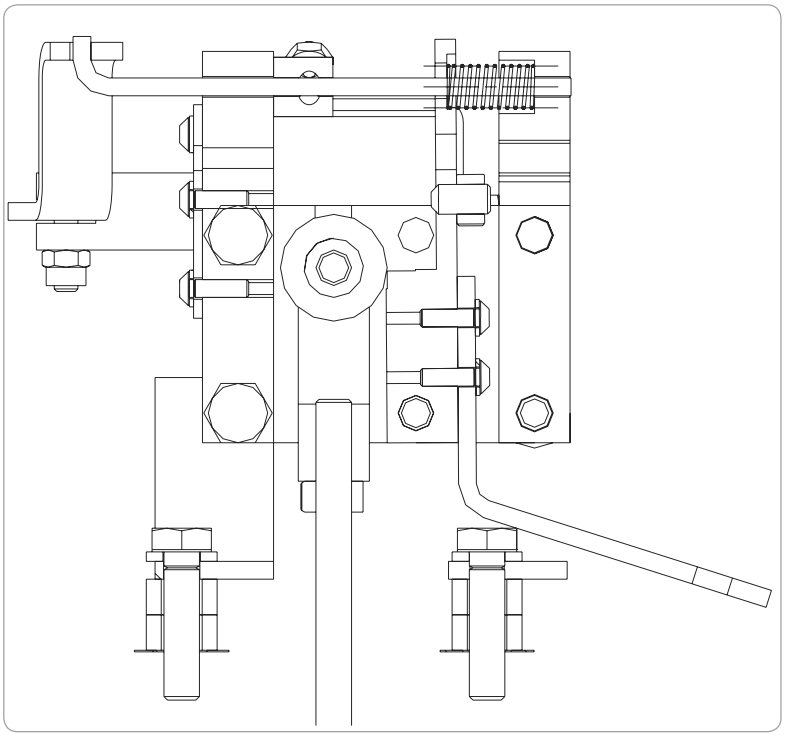
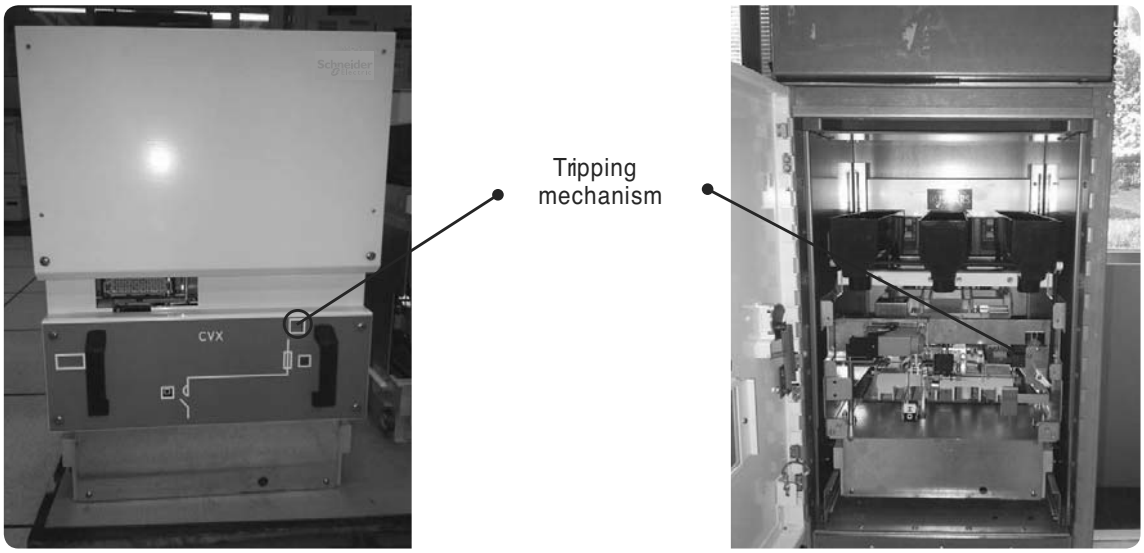
- Latch in open position



4.7.3 Manual opening

This option is available with the mechanical latch.You must use the PIX operation rod through the door in order to trip the contactor(See PIX manual).



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In the event of a maifunction of the latch

- The following points should be examinde:

○ Check freedom of moving parts.(It is posible that the alignment of the whole latch assemblymay have been disturbed during transit)

○ Check with a clock gauge,the set-back of the clevis holding the roller behind which the prop is located.(ie.its free movement in relation to the latch body in the horizontal direction,from the contactor coil energised condition to the latched-in,coil deenergised state)

○ This set-back should be between 0.2mm and 0.4mm.The set-back can be adjusted by slackening the screws fixing the whole latch assembly to the contactor coil support angle,and adding (to decrease the set-back) or removing (to increase set-back) slotted shim washers between the collars and the angle.Retighten screws and recheck set-back

○ Coarse adjustment necessitates removal of the latch assembly and screwing the clevis further on to or off its drive rod in one full turn steps.(The Eclip on the roller pivot pin must be located against the lower slotted guide plate)

Check prop engagement behind roller.Assuming the set-back is correct reluctant to trip,it is possible that the prop is too far into engagement behind the roller

Conversely,insufficient engagement can result in failure to latch.The engagement can be reset as follows：

○ Slacken the locknut on the M4 grubscrew in the prop and adjust this grubscrew until the contactor ust fails to latch.Unscew the grubscrew 1　full turns from this position so that the prop is further　into engagement behind the roller.Lock with locknut and recheck solenoid triping action and adjust as follows if necessary.

○ Three solenoids are available,for nominal voltages of 24 Vdc,48 Vdc and 110/240 volts ac or dc,having cold resistances of 3,14 or 54 ohms respectively.(Coils are marked 24 Vd.c. 5%,25% or 100% respectively)

○ With the contactor latched,there should be a clearance of 0.5mm to 1mm between the outer end of the prop and the 10mm diameter collar fixed to the trip rod passing through the prop.This dimension can be adjusted by addition or removal of M3 washers. With the 10mm diameter collar loose on the trip rod,allow the solenoid plunger to retract as far as opssible without forcing. Push in the plunger 1mm from this position and tightly secure the collar to the trip rod by means of the two grub screws and lock with the locknuts. The collar now acts as a stop for the lever/plunger assembly.The dimension between the outer end of the plunger and the solenoid mounting plate should be at least 24mm. Check that the solenoid plunger is not sticking at any stage in its movernent.

Notes:

- To ensure correct operation,ckisubg coils and tripping coil must be energised for a minimum of 300 milliseconds
- Closing coils and Tripping coil must not be energised for more than 2 seconds.
- The closing supply however,should not be wired directly through a normally closed contact on the auxiliary contact block,as this could cause the closing supply to be disconnected before the contactor is fully closed
- The use of an auxiliary switch on the vacuum contactor or on the latch(if fitted) to interrupt the contactor coil supply during the closing action is not recommended unless an intermediate relay with a delay of at least 0.3 seconds is employed

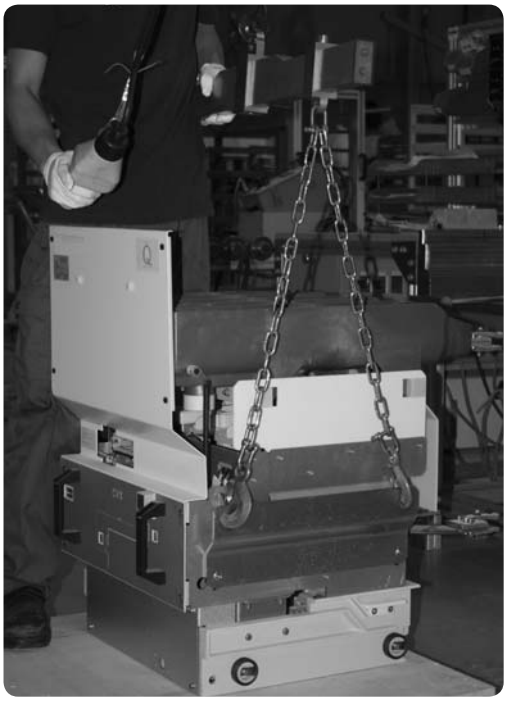
5 Transport,receipt,handling and storage

5.1 Transport

The fuse contactors are dispatched with packaging.When supplied,the CVX are completely assenbled and adjusted.

5.2 Receipt

- Unloading and packing the fuse contactors require maximum care!
- After receipt,the CVX must be unpacked without delay!The insurance company must be informed immediately about damage which may have occurred in transit!
- The CVX must be checked for completeness.The manufacturer should be contacted in case of deviations
- The CVX must not subjected to mechanical strain(placing abuptly on the floor,knocking against obstacles,etc…)



5.3 Handing

The CVX must be lifted as shown in the figures above.This work requires 2 handling bars DR004899-01.

Note:

- This moving part does not roll along the ground
- Never handle the CVX moving part by the connecting plates

5.4 Storage

- The fuse-contactor drawer must be stored in unpacked condition as specified under items 1.3 and 1.4
- The transport packaging is not intended for storage
- The risk of storing the CVX moving part in packed condition shall be the consigness s responsibility

6 Fuses replacement

CVX extracted

- The CVX is extracted to carry out this operation.
- The approximate duration for the replacement of one fude is 5 minutes.
- Unless other special instuctions exist,the fuses must be replaced by fuses with the same reference
- The description of the operation is made on a DIN-fuse equipped CVX

Note:

In case of a fuse operate we recommend to change the 3 fuses.

- With a help of the DIN-fuse extracting tool DRCN02651-01

- Take out the fuse to be replaced.Raise the fuse vertically.

6 Fuses replacement

- Release the fuse from the fixed lock cup and completely extract the fuse upwards

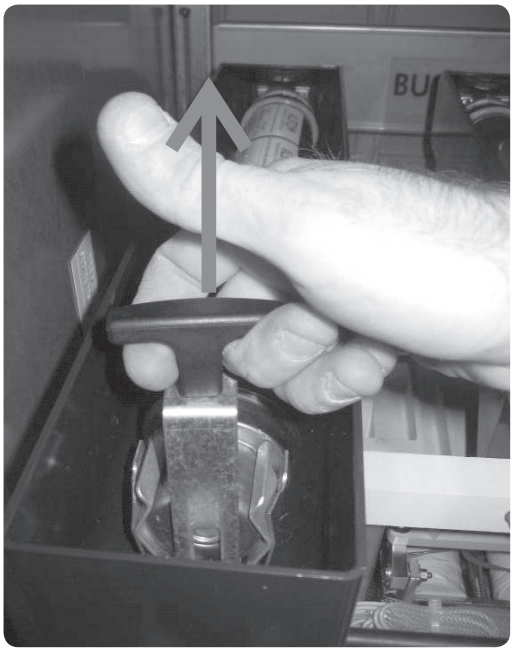
- Fit the fuse into the fixed lock cup,bu positioning the label on the top.Be careful with the striker side

- Push the fuse in his final position

6 Fuses replacement

Note:

This operation can be done with the CVX inside the PIX cubicle but in that case,it is necessary to take out the front cover.



After taking out the front cover,you must follow the same proc-edure as describe above to replace the fuse.

7 Annex

7.1 Wiring diagram

DRC00497-01

7.2 Outline drawing

DRC004970-1

Note:

Manufac turer:
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