

Indoor Vacuum Circuit Breaker - 11kV & 33kV

EVB-1225/ EVB-3625



EASUN REYROLLE

Operation & Maintenance Instruction Manual

1.0. GENERAL

Recommended Procedure and Practice for :

- General Safety and Cautionary Practices
- Receipt Unpacking and Storage
- Erection Testing & Commissioning
- Periodical & Routine Maintenance
- Recommended Spares

The switchgear provides satisfactory service over its planned lifetime by correctly observing these recommendations.

- 1.1 The data furnished in this manual are for the guidance of qualified installation and operating personnel. In case of doubts in the meaning or interpretation of the information's given, please refer to us. For prompt attention please quote the contract and serial numbers of the supplies in all correspondence.
- 1.2 The equipment supplied may differ in details from that described in this manual, due to our goal towards continuous improvement.

2.0 GENERAL DESCRIPTION OF EQUIPMENT

Easun type Switchgear is indoor metal clad equipment with air-insulated bus bars and with horizontally isolatable, horizontally withdrawable vacuum circuit breakers.

The switchgear is complete with an instrument / relay chamber with hinged door, forming part of the fixed portion of the gear.

3.0 RECEIPT, UNPACKING AND STORAGE

- 3.1 Switchboard panels are dispatched as individual / Multi units. Each panel consists of a fixed housing panel and the vacuum breaker truck. The loose items comprise of a spring charging handle and racking handle.
- 3.2 At that time of dispatch, movements of sensitive instruments such as relays are restricted and the induction relay discs are wedged, as per their manufacturer's recommendations. The indicating instrument movements are however not secured.
- 3.3 Upon receipt, the packages shall be visually inspected to their exterior damages and if found, these shall be reported to insurance agency. However the packing cases are intact, unpacking of the cases for further checks of internal damages

may be carried out. When unpacking care should be taken so that no damages to instruments and relays result. Scratches to painted metal sheets are to be avoided.

- 3.4 In case the equipment is to be further stored before being used, the consignments may be repacked after certifying for no transit damages and storages. They shall then be stored under permanent cover, free from moisture and dust. Silica gel may be kept in the packages to facilitate dry atmosphere.

4.0 SITE PREPARATION

- 4.1 The switchgear is jig assembled on level surface in the works and is an accurately made product. Satisfactory performance is therefore assured if the area of the substation floor is finished and leveled accurately. Once this is ensured the VCB carriage truck would be truly vertical in position at the point of entry into the housing.
- 4.2 Also suitable foundation holes / pockets to be marked & made as per the General Arrangement diagram submitted along with manual for providing foundation bolts (not in our scope).
- 4.3 The holes of the breaker panel are then matched with the foundation bolts. Shims or washers may be used to obtain vertical alignment of the panel.

5.0 EARTH CONNECTION

- 5.1 At the time of commissioning, the station earth resistance shall be measured and the value obtained shall be preferably about 0.5 ohms and not more than 1 ohm for effective grounding of solidly earthed systems depending upon soil conditions. This shall be recorded for the purposes of Comparison with subsequent periodical measurements. A suitable earth bar is run along the length of the panel at its rear for grid earthing.

6.0 CABLE TERMINATION

Provision for cable termination with adequate space, is available for 3-core or 1-core cables. The chambers are suitable for dry type joints.

7.0 OPERATION OF CIRCUIT BREAKER – FIXED PANEL HOUSING:

The fixed panel housing consists of two parts (Refer General Arrangement diagram)

- 7.1 The bottom housing which contains safety shutters, racking rails, vertical guides, earth connections etc., into which the circuit breaker with its carriage is inserted.
- 7.2 The rear housing containing the busbar and current transformer chamber. On top of the housing a relay chamber and voltage transformer are mounted when required. The fixed housing consists of folded steel welded together and are of robust construction. The bottom housing is fitted with a hinged door to give a flush-front appearance. A window coincides with the circuit breaker ON/OFF indicator. Door swing upto 180° possible, to give greater accessibility during erection and maintenance.

8.0 OPERATION OF TRUCK-MOUNTED CIRCUIT BREAKER

The circuit breaker is mounted in a carriage of sturdy folded steel construction. Horizontal movement of the breaker is via rollers and vertical guides. It can be racked-in or racked-out with the help of racking handle.

9.0 OPERATION OF CIRCUIT BREAKER TRUCK:

- a. Positioning of the truck in front of the bottom fixed panel such that the wheels of the truck are guided by the guide rails provided on the bottom plate of the panel.
 - b. After the selection of the required position (with the truck fully withdrawn), insert the truck inside the fixed housing gradually until its roller arm comes to stop with vertical guide.
 - c. Racking the breaker and the isolating contacts. The insulating shutters are opened and the cluster contacts of the isolating contacts mate with the fixed contacts of the fixed panel housing (Ref instruction pasted in the front panel for racking operation).
 - d. The circuit breaker can be charged and operated manually.
 - e. Racking out of the truck with the breaker open, to isolate the breaker.
 - f. Withdrawal of the truck fully out of the panel for inspection, testing and maintenance purposes.
- 9.1 The positioning of the truck shall be such as to facilitate the smooth guidance of the truck by the rails on the bottom housing. This is achieved if the

wheels are in a straight line from the outsides of the rails.

10.0 TYPE: OPERATING MECHANISM

This Mechanism is of the stored energy spring operated type specifically designed for operating short stroke vacuum circuit breakers. The closing spring is normally charged by manual means, but as an optional alternative a charging motor may be fitted. When charged, the closing spring is held by a latch, which may be released either by manual means or by a release-closing coil to close the circuit breaker.

The mechanism is retained in the 'ON' position (i.e. the circuit breaker closed) by a Transmission shaft and catch which may be released either by manual trigger or by a trip coil to open the circuit breaker.

The energy required for opening the circuit breaker is provided by springs incorporated in the drive assemblies, which are compressed during the closing stroke.

11.0 DETAILS OF OPERATING MECHANISM TRANSMISSION (Fig. 1)

The mechanism drive rod (29) is connected to a bell crank is attached to a cross bar (5) which in turn coupled to the vacuum interrupter stems via individual contact springs (9) and insulated drive rods. In a closing operation up to the point of contacts touching, the cross bar and insulated drive rods move together as one due to the pre-stressed contact springs. After the contact touch, the cross bar moves on to the end of the stroke, further compressing the contact springs upto the dimension specified in contact spring assembly drawing. This is called 'Snatch gap". During the closing movement the opening spring is compressed. When the mechanism is tripped the initial opening acceleration is provided by the contact springs and the opening spring together until the point of contact separation is reached, after which the drive is maintained by the opening spring along the fully open position.

12.0 OPERATION OF MECHANISM (Fig.2 & 3)

The operation of the control mechanism can be understood by observing the control mechanism as follows:

Circuit Breaker open and springs free (Fig 2 & 3) : It is the position of the circuit breaker at the shipment and in the instant immediately following every C-O cycle.

Loading of closing springs (Fig 2 & 3): You can get the closing springs loaded by rotating the cam (32), which is linked to the spur gear (12). The rotation is carried out manually or automatically by the motor (15), in both cases you must act on the spur gear (12) by means of a system of ratchet gears. The spur gear (12) is linked to the loading cam (32), whose profile, developing on roller (46), compresses the closing springs (33). At the end of the stroke the loading cam frees itself from the roller and stops owing to the action of the lever (17).

The same lever (17) de-energizes the motor and, at the same time, lifts the system of ratchet gears (14), thus preventing spur gear (12) from moving forward. The hook (42) maintains the closing springs in their position.

At the end of the stroke the profile of the dragging hook (34) hits against the stop (49) and disengages itself from the lever (47); the control mechanism is now ready to carry out the next opening operation.

Loading the closing springs with circuit breaker closed: At the end of closing operation, it is possible to load the closing springs, as described under point (b).

Circuit Breaker Tripping (Fig. 2 & 3): In order to trip the circuit breaker dis-engage the opening hook (36) by means of control handle (2) or of trip coil (38).

13.0 RECOMMENDED MAINTENANCE PLAN

a.	General	<ol style="list-style-type: none"> 1. Wiping off dust etc., on mechanism, interrupter and insulation. 2. Checks for security of fixings & fasteners 3. Checks for loose / corroded terminals and damages to coils 	<p>Regular and after 2 years OR 2000 operations whichever is earlier</p> <p>After 2 years / OR 2000 operations whichever is earlier.</p> <p>- do -</p>
b.	Mechanism & Drive Linkage	<ol style="list-style-type: none"> 1. Lubrication of pins / sliding surfaces. 2. Check for damages to springs, components etc. 	<p>- do -</p> <p>- do -</p>
c.	Switch Carriage	<ol style="list-style-type: none"> 1. Greasing jackscrew and racking box nuts. 2. Lubrication of vertical guides and carriage wheels 	<p>- do -</p> <p>- do -</p>
d.	Operation	<ol style="list-style-type: none"> 1. Checks on mech. & Elect. Operation, closing / Tripping coil settings. 	<p>- do -</p>
e.	Vacuum interrupter	<ol style="list-style-type: none"> 1. Check snatch gap in closed conditions. 	<p>4 years OR 4000 operation, whichever is earlier.</p>

Note: 1. For lubrication oil, use good quality gear oil containing high-pressure additive (SAE 80 or 90)

2. For lubrication grease, use Royal Molten MTS 2000 or its equivalent.

14.0 PROCEDURE FOR REPLACEMENT OF VACUUM INTERRUPTERS

14.1 Dislocating the insulating rod (8) by removing its Top & Bottom pins. Remove the lamination (10) & clamping blocks (34). Remove the vacuum Interrupter bottle retainer (24) the SMC supports (16 & 27). Remove the contact spring assembly (48) by turning the relevant screw (32) from the Vacuum Interrupter moving contact (please ensure that the moving contact is not having any rotation by holding it at the step provided by double Epoxy insulators (13) & loose it slightly to remove the Vacuum interrupter (12) For put back the breaker into service with new Vacuum Interrupter do the operations described above reversly.

14.2 Contact Erosion measurement: (Fig 1)

Please ensure that the measurement is to be taken in the breaker closed condition. If the contact wear exceeds the permissible limit of 3mm. interrupter needs replacement.

14.3 Snatch Gap:

Snatch gap is ensured by self-maintained contact spring compressed length in breaker-closed conditions as mentioned in the contact spring assembly drawing (Fig 4)

15.0 PRECAUTIONS

- Please study contents of this manual fully before unpacking the equipment.
- Electricity is friendly when treated with care.
- The medium voltage switchgear described in this manual handle voltage of the order of 12 KV when live. Hence great care is needed.
- Please comply fully with the supply utility regulations when energizing or de-energizing the equipment.

- Please do not operate equipment without prior knowledge and training about this equipment.
- Please do not over look or defeat safety features provided in order to avoid likely dangerous / Fatal situations.
- Please avoid hazardous practices, especially when live potential is being handled during testing / Commissioning.

PRE – COMMISSIONING CHECKS

- Check for smooth operation of shutter & Racking guides.
- Check primary & secondary isolating contacts. Clean and apply white petroleum jelly.
- Position the trolley to ensure that the wheels run along with the rails and racking arm rollers are inline with the guide provided in fixed portion.
- Further movement will ensure engaging of Fixed & Isolating Contacts.
- The integral earth strip will now align at the center of the earth contact assembly.

Charge the spring manually until the indication ' charged' appears

DO'S AND DON'TS

Do select of the contact interlocking castel key position during breaker rack-in or rack-out operation.

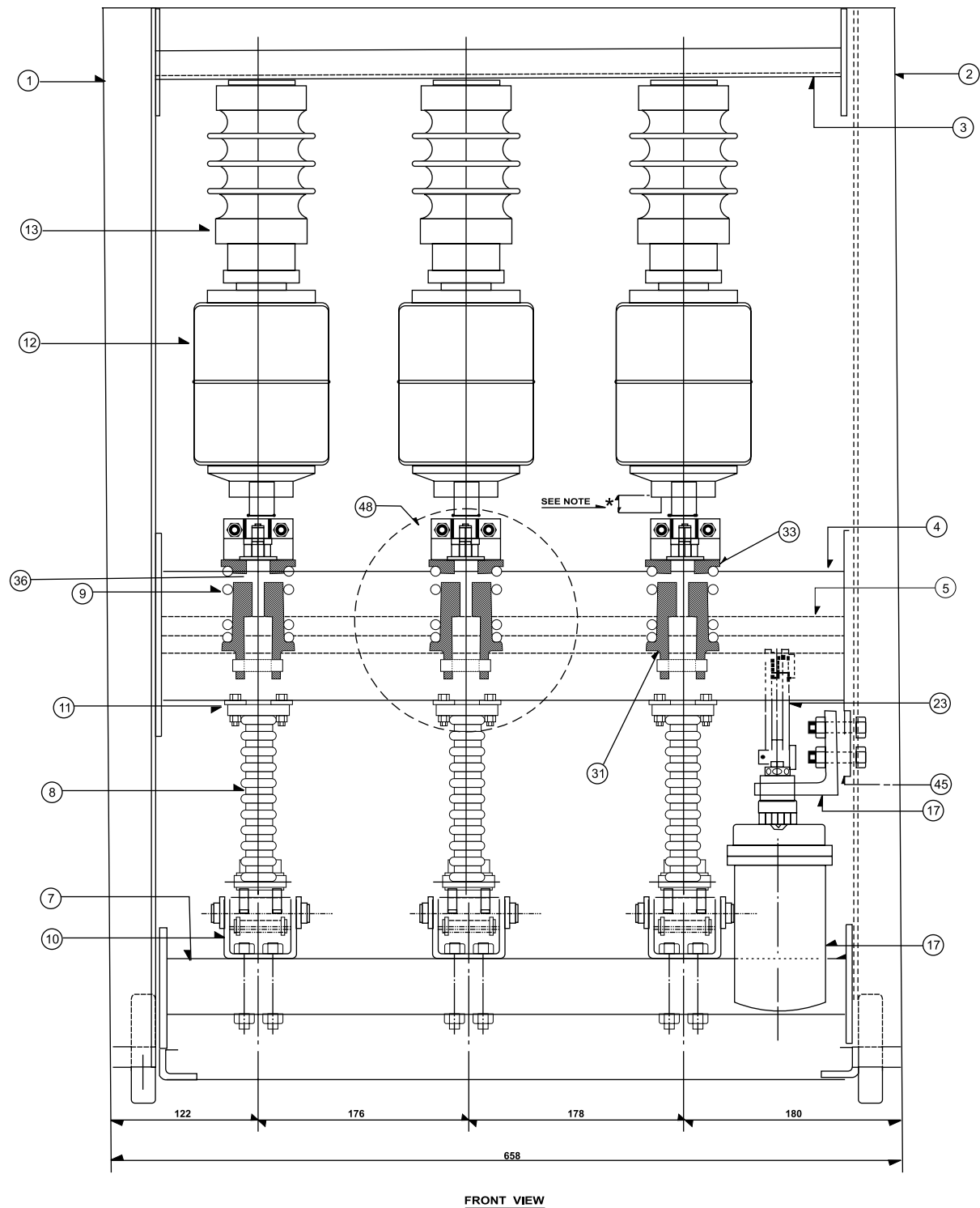
Do keep a safe distance of 2 meters min. from the interrupters, while performing the H.V.test.

Do check the interior of the panels and free them of any foreign materials, before closing the front door.

Do ensure spare spring charge be kept in the mechanism for proper latching, in case of manual charging.

Do not discard the safety interlock and the safety link.

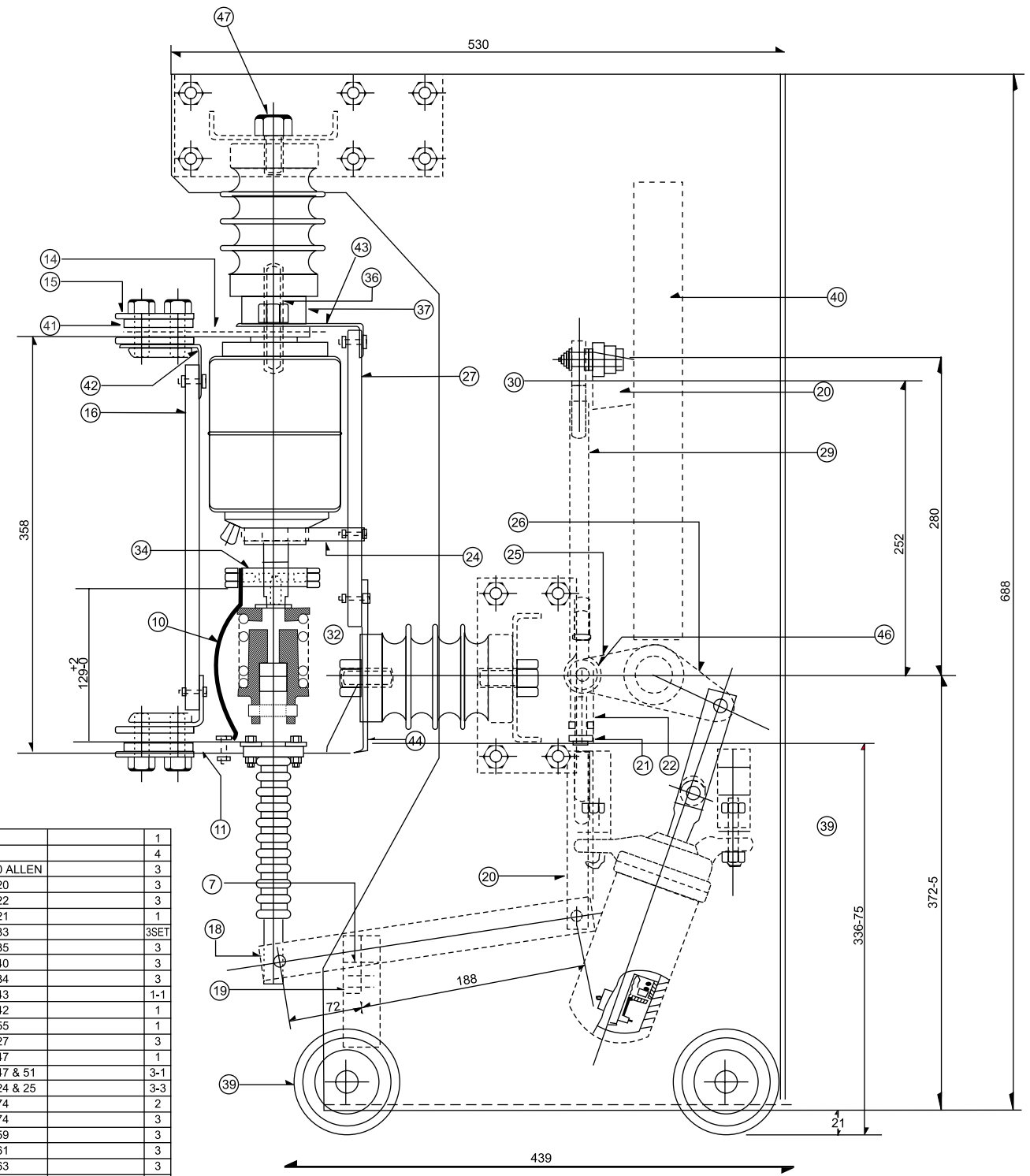
Do not force the secondary plugs in the wrong direction.



NOTE :
* CONTACTEROSIONPERMISSIBLELIMITASPERMANUAL IS TO BE
OBSERVED BETWEEN THESEPOINTS IN LINE WITHFACTORY SETTING.

TRACED	R.S
DATE	27-1-95
DRQWN	
CHECKUP	
APPROVED	

40	MEHANISM			1
39	DRAW-OUT WHEEL	RT 102		4
38	SOCRET HEAD BOLT	M14x50 ALLEN		3
37	SPACER	VB14020		3
36	TURN BUKLE	VB14022		3
35	CENTRE ROD	VB14021		1
34	CLAMPING	VB14033		3SET
33	SPRING SUPPORT	VB14035		3
32	MOVING CONTACT COUPLING	VB14040		3
31	SPRING GUIDE	VB14034		3
30	ROD ENDS BEARING - LH	VB14043		1-1
29	TIE BAR	VB14042		1
28	LEVER	VB14055		1
27	SMC SUPPORT	VB14027		3
26	CLEVIS ASSY	VB14047		1
25	CLEVIS ASSY	VB14047 & 51		3-1
24	BOTTLE SUPPORT	VB14024 & 25		3-3
23	LINK	VB14074		2
22	CLEVIS	VB14074		3
21	BUCKLE	VB14059		3
20	CONNECTING ROD	VB14061		3
19	LINK SUPPORT	VB14063		3
18	LINK	VB14062		6
17	BRACKET	VB14070		2
16	SMC SUPPORT	VB14028		3
15	EXTERNAL CONNECTION	VB14085		24
14	UPPER TERMINAL	VB14023		3
13	INSULATOR	VB14021		6
12	VACUUM INTERRUPTER	VB13005		3
11	LOWER TERMINAL	VB14036		3
10	FLEXIBLE CONNECTION	VB14039		6
9	CONTACT SPRING	VB14038		3
8	INSULATING ROD	VB13006		3
7	SQ. BAR ASSY	VB14064		1
6	SHOCK ABSORBER ASSY	TMA87650		1
5	MAIN SHAFT ASSY	VB13007		1
4	B TM CHANNEL WELDED ASSY	VB13002		1
3	TOP CHANNEL WELDED ASSY	VB14011		1
2	SIDE PANEL RH	VB12002		1
1	SIDE PANEL LH	VB12001		1
REF. No.	DESCRIPTION	DRG.No.	BREAKER CONDITION	QTY.



48	CONTACT SPRING ASSY	VB14032		1
47	M16 HEX SCREW			3
46	ROD ENDS BEARING -RH	VB14044		1
45	PACKER	VB14072		2
44	BOTTOM TERMINAL BRACKET	VB14031		3
43	TOP TERMINAL BRACKET	VB14030		3
42	SMC SUPPORT BRACKET	VB14026		6
41	PACKER	VB14066		6
REF. No.	DESCRIPTION	DRG.No.	QTY.	

Fig -1

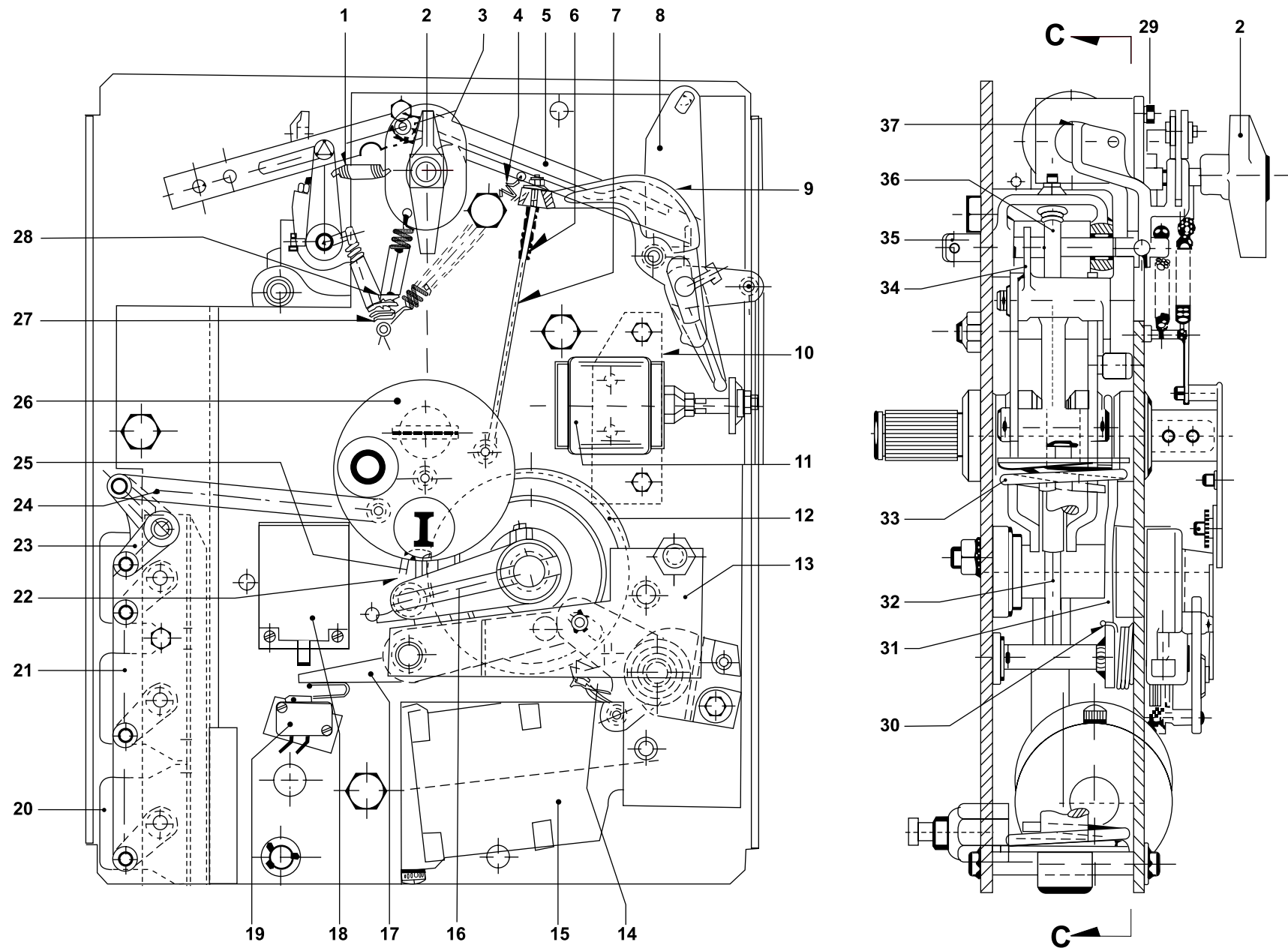
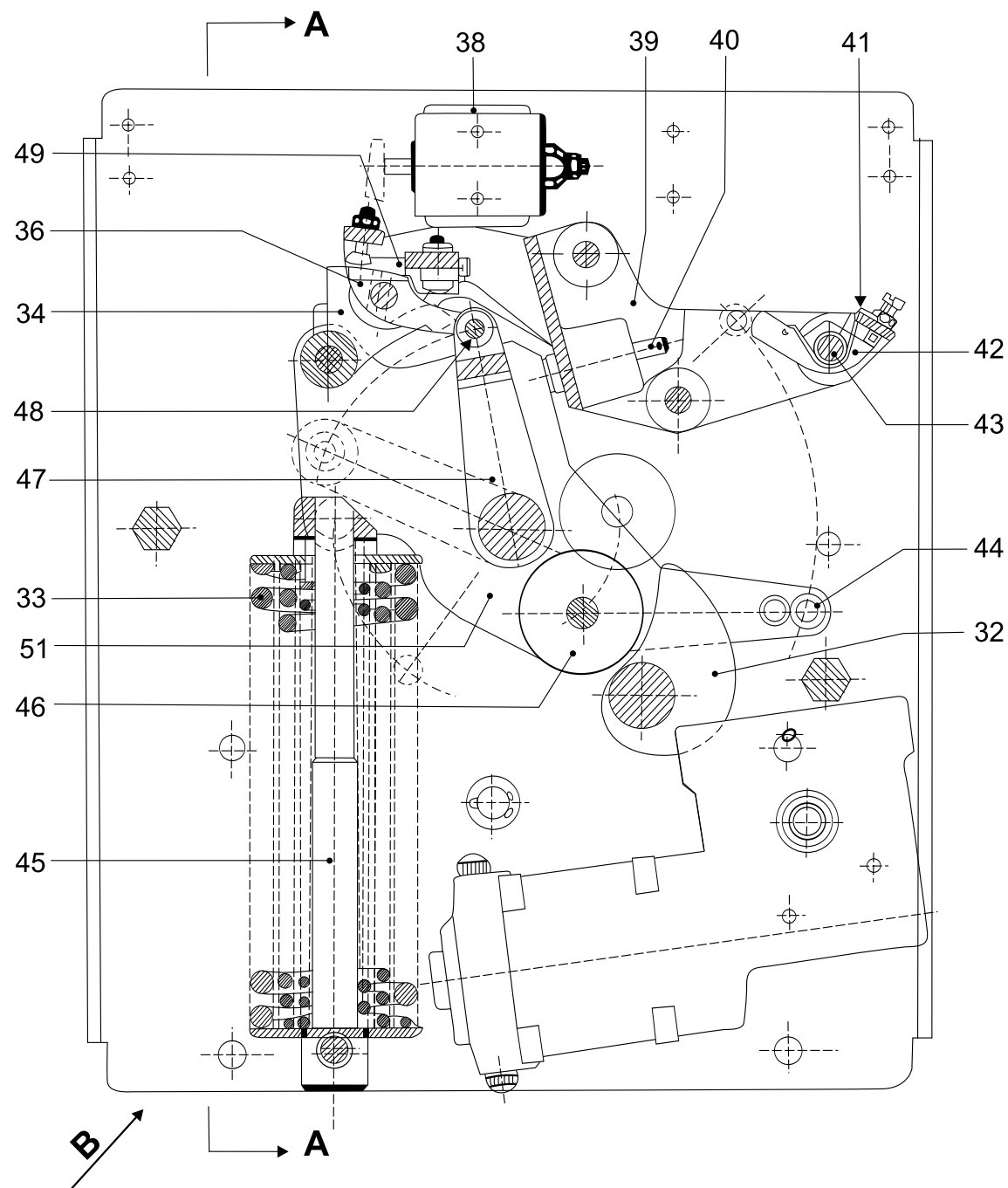
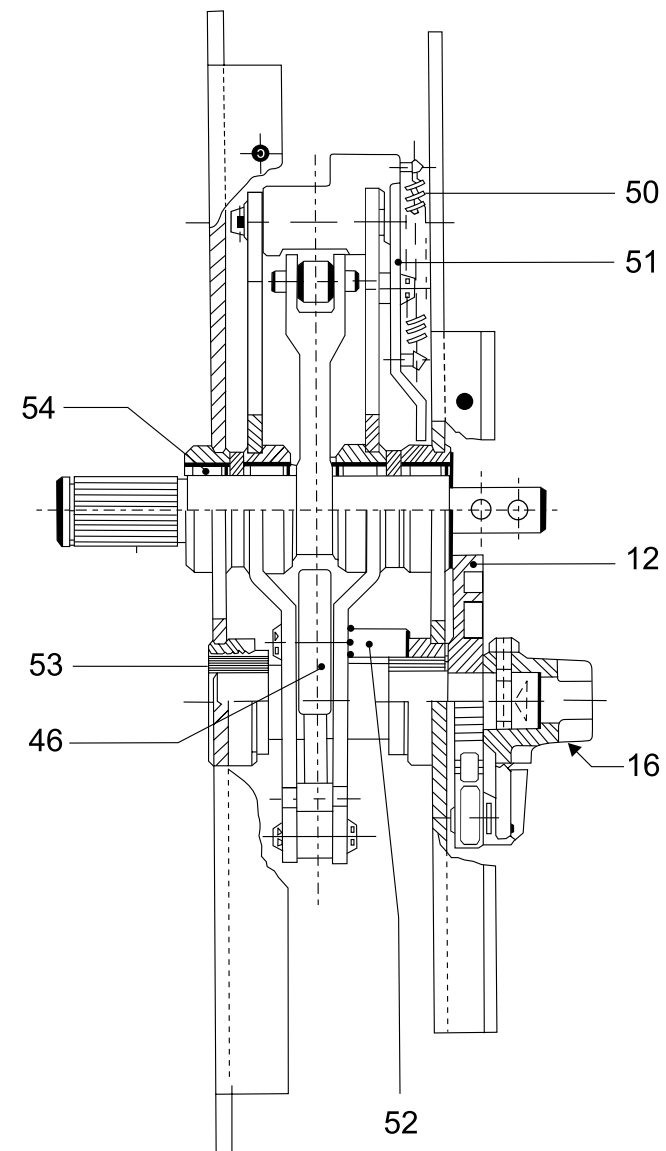


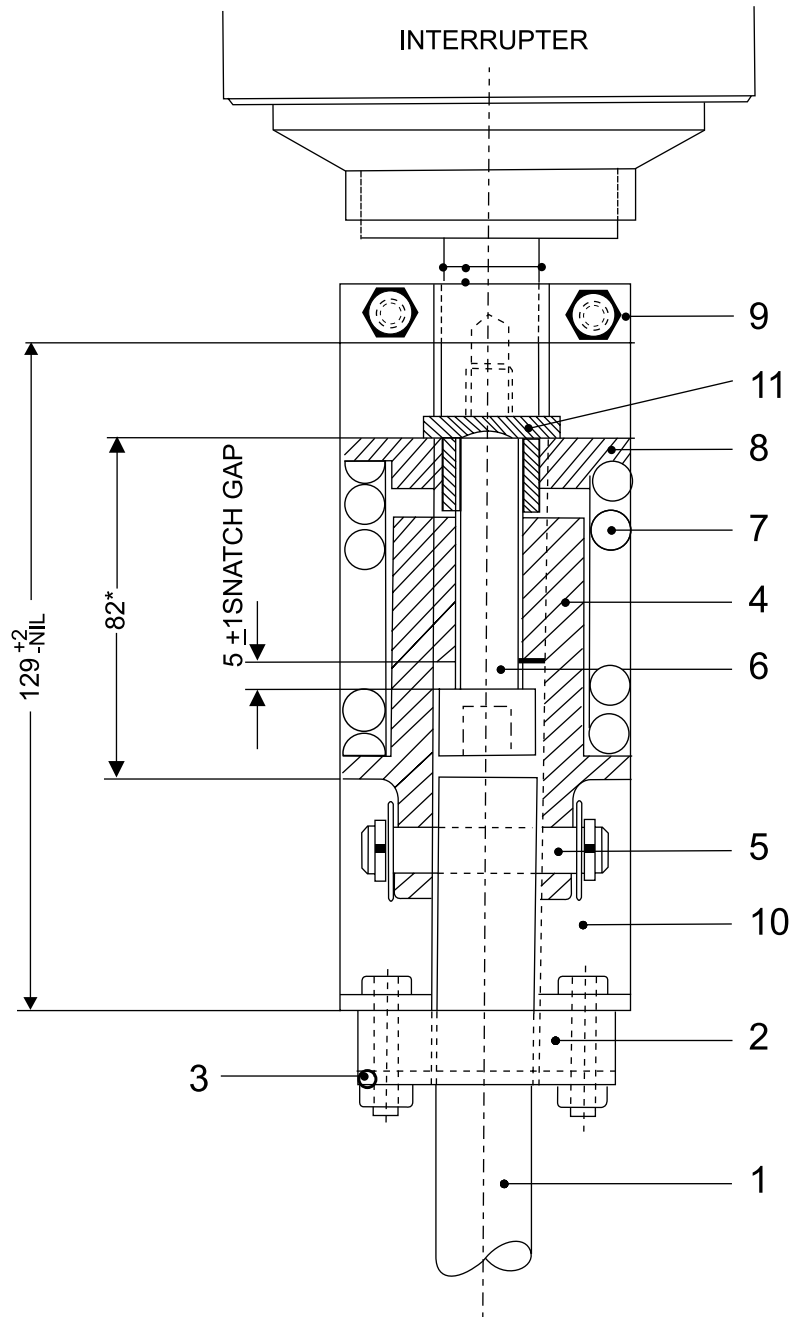
Fig - 2 Control mechanism reresented n theposition of circuit breaker « CLOSED » and closing srings « FREE »



Sectional view C-C of Fig - 3



View in the direction of arrow <> of Fig - 3



PART	DESCRIPTION
1	INSULATING ROD
2	LOWER TERMINAL
3	LOWER TERMINAL BRACKET
4	SPRING GUIDE
5	PIN
6	SK. HD. ALLEN SCREW 14X50mm
7	CONTACT SPRING
8	SPRING SUPPORT
9	CLAMPING BLOCK
10	LAMINATION
11	MOVING CONTACT COUPLING

NOTE:

* REFERENCE DIMENSION TO ENSURE SNATCH GAP

The policy of Easun Reyrolle is one of continuous improvement and development. The company therefore reserves the right to supply equipment which may differ slightly from described and illustrated in this publication.

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