

INSTRUCTION HANDBOOK

1SDH002303A1001 - ECN000285442

EMAX 2 E1.2

Disassembly instructions



1. SCOPE

Scope of this document is to illustrate the step-by-step disassembly process of ABB SACE Emax 2 E1.2 air case circuit breaker equipped with an electronic trip unit (type Ekip TOUCH LSIG).

Document is focused on Emax 2 E1.2 3p IEC version, anyway it allows to cover other versions of Emax 2 E1.2 circuit breaker equipped with a electronic trip unit with just few slight differences to be taken into account.

2. SAFETY NOTES

Before proceeding with any disassembly operation, it's mandatory to put the circuit breaker in open position and make sure that the springs of the operating mechanism are discharged.

Disassembly operations of circuit breakers must be performed by qualified and skilled personnel in the electrical field (IEV 195-04-01: person with relevant education and experience to enable him or her to perceive risks and to avoid hazards which electricity can create) and having a detailed knowledge of circuit breakers.

Disassembly activities must be performed in an ergonomic workspace able to ensure protection of persons demanded to perform disassembly activities.

Applicable national legislation and international standards in force at the time of disassembly of circuit breakers must be taken into account in addition to prescriptions illustrated in this document.

ABB declines any responsibility for injury to people or damage to property resulting from a failure to comply with the instructions set out in this document and with any applicable safety standard.

3. PERSONAL PROTECTIVE EQUIPMENT (PPE)

When performing disassembly, following safety Personal Protective Equipment (PPE) must be worn:



4. TOOLS

Disassembly operations require the use of tools (e.g. screwdriver, torx key, pliers, ...); tools to be used are specified inside each phase of the disassembly process (see Chapter 6).

5. SEPARATE TREATMENT

Table below lists parts requiring a separate treatment adding information about part location inside circuit breakers and related quantity.

Description	Position inside circuit breaker	Quantity
Lever	In the T.U. reset group	1
Lever support	In the T.U. reset group	1
Right side wall	Mounted on the sliding contacts block	1
Flat cables assemblies	Mounted on the sliding contacts block	3
Connector cables assembly	Mounted on the sliding contacts block	1
Sliding contacts base	Mounted on the sliding contacts block	1
Slide	Mounted on the right shoulder	1
Support	Mounted on the upper part of the circuit breaker	1
Cables protection	Mounted on the back part of the trip unit	1
Rating plug case	Mounted on the front of the trip unit	1
Rating plug printed circuit board	In the rating plug case	1
Ekip measuring blind printed circuit board	On the trip unit	1
Battery cover	On the trip unit	1
Battery	On the trip unit	1
Display printed circuit board	On the trip unit	1
Display	On the trip unit	1
Backplane	Mounted on the back part of the trip unit	1
Trip unit case	On the trip unit	1
Trip unit back cover	On the trip unit	1
Trip unit printed circuit board	In the trip unit	1
Measuring module connector	On the trip unit	1
Protections	Mounted on the back part of the circuit breaker	6
Motor PCS support	Mounted on the left part of the circuit breaker	1
Microswitch support	Mounted on the left part of the circuit breaker	1
S51 signal	Mounted on the left part of the circuit breaker	1
Trip coil	In the trip coil group	1
Trip coil group	Mounted on the left part of the circuit breaker	1
Connector	On the MID	1
Auxiliary contacts	On the MID	4
Microswitch I/O	On the MID	1
Microswitch I/O support	On the MID	1
MID	Mounted on the right part of the circuit breaker	1
Wires cover	Mounted on the left part of the circuit breaker	1
Wiring	Mounted on the left part of the circuit breaker	1
Open lever	On the right side of the circuit breaker	1
RTC lever	Mounted on the right side of the operating mechanism	1
Conduit	Behind the trip unit	1
Operating mechanism	Mounted on the center of the circuit breaker	1
Unlocking shaft appendices	Mounted on the pin of the operating mechanism	2
Springs charging lever	Mounted on the left side of the operating mechanism	1
Protections	Mounted on the upper case assembly	2
Plastic parts	Mounted on the fixed contacts	3
Covers	Below the sensors	3
Sensors	In the bottom part of the circuit breaker	3
Insulation protections	On the moving contacts assembly	3

If disassembled parts require a separate treatment a specific indication is provided inside each phase with reason why for the separate treatment (see Chapter 6).

6. DISASSEMBLY PROCESS

Circuit breakers disassembly process is constituted by a sequence of operations to be performed on products after their dismounting from original installation. For each phase following information is provided:

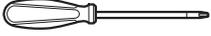
- Part/parts to be disassembled (title of the phase)
- Tools to be used
- Description of actions to be performed
- Pictures showing actions to be performed
- List, quantity and picture of disassembled parts with an indication about separate treatment (when applicable)
- In case of potential hazards signal below is reported



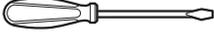
6.1 PHASE 1 – CIRCUIT BREAKER FRONT COVER, COVERS AND OPERATING MECHANISM COVER

Tools

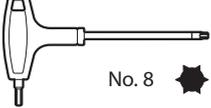
Cross screwdriver



Flat screwdriver



Torx key



No. 8

Actions to be performed

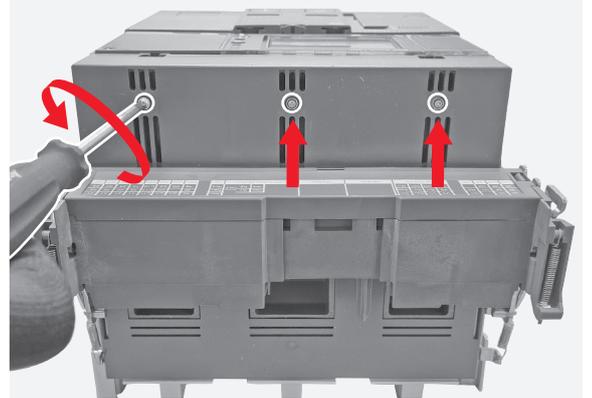
1

Manually push the trip unit transparent protection as indicated by the arrow and remove it.



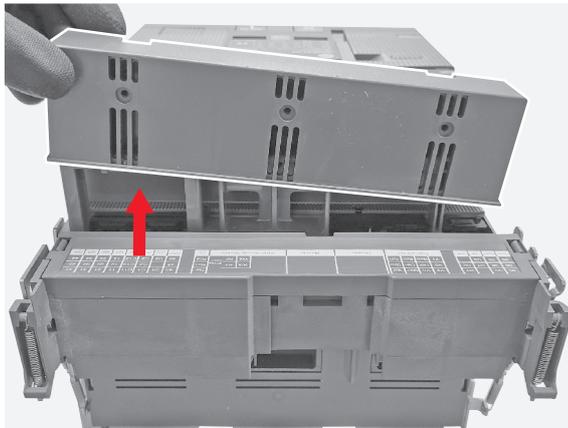
2

By means of the cross screwdriver unscrew the 3 screws fixing the cover.



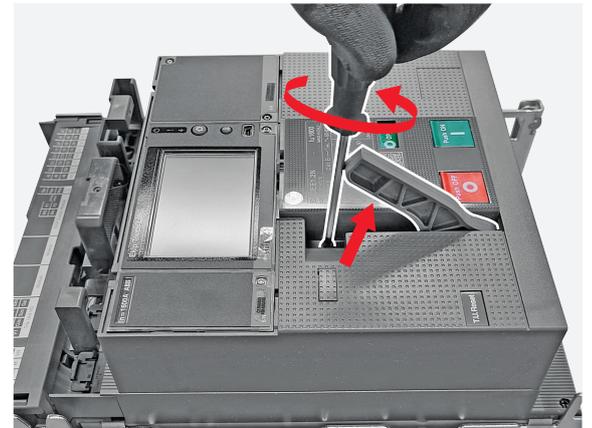
3

Manually complete the removal of the cover.



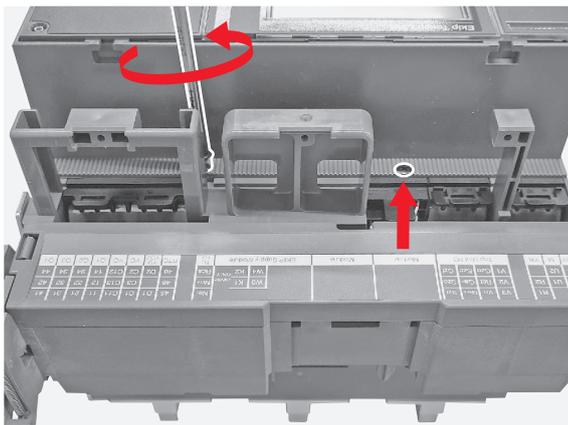
4

Lift the spring charging lever and by means of the cross screwdriver unscrew the screw located below the springs charging lever fixing the circuit breaker cover to the circuit breaker main structure.



5

By means of the cross screwdriver unscrew the 2 screws located in the upper part of the circuit breaker fixing the circuit breaker front cover to the circuit breaker main structure.

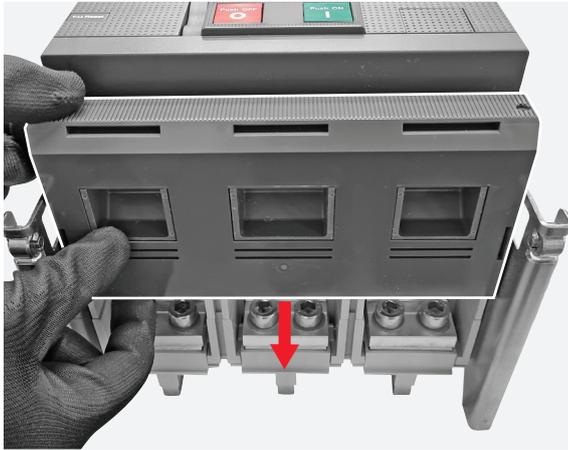


6

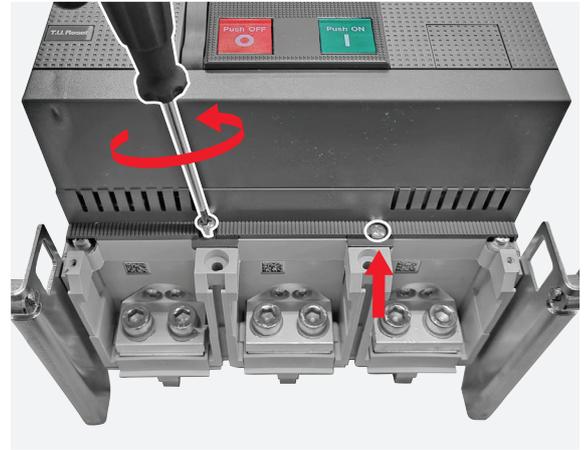
By means of the cross screwdriver unscrew the 2 screws fixing the withdrawable terminals cover.



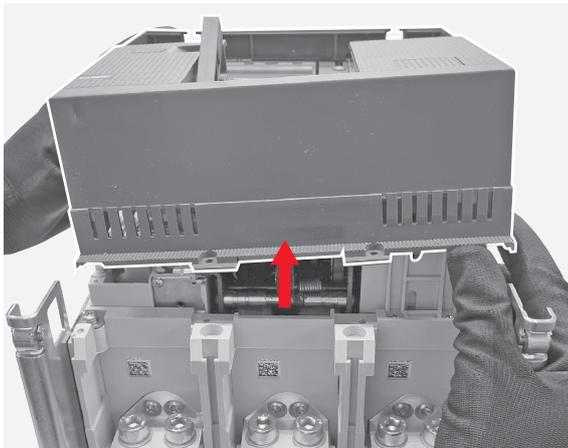
- 7**
Manually complete the removal of the withdrawable terminals cover.



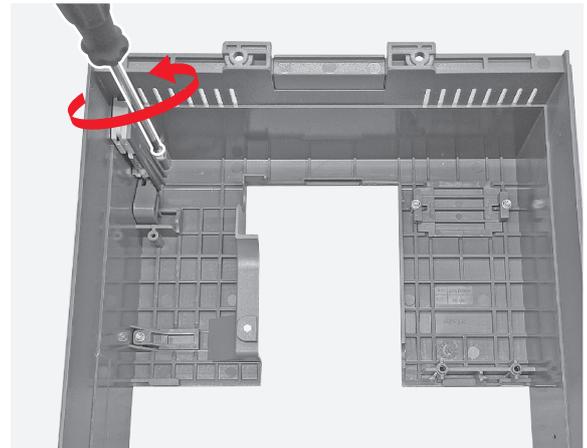
- 8**
By means of the cross screwdriver unscrew the 2 screws located in the lower part of the circuit breaker fixing the circuit breaker front cover to the circuit breaker main structure.



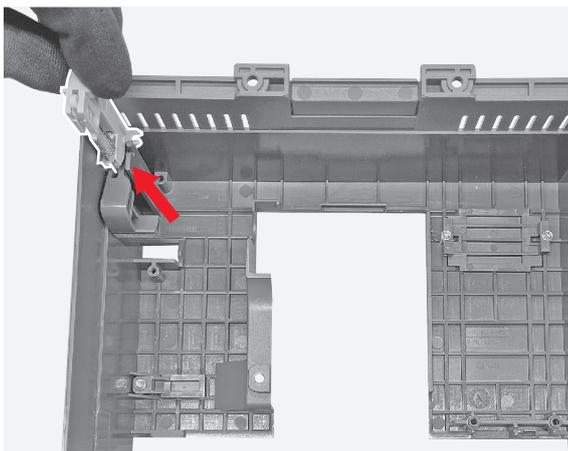
- 9**
Manually lift the circuit breaker front cover to complete the removal.



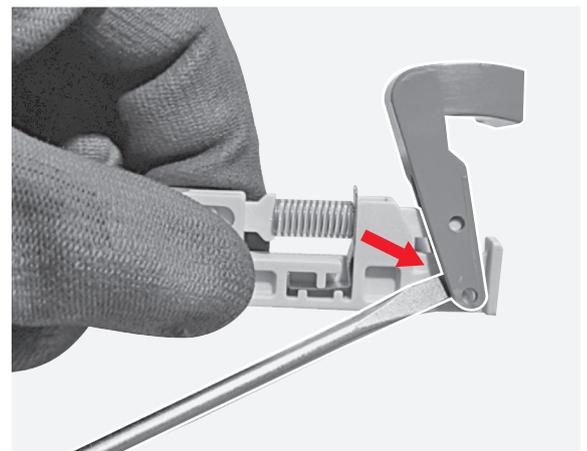
- 10**
By means of the cross screwdriver unscrew the screw fixing the T.U. reset group to the circuit breaker front cover.



- 11**
Manually lift the T.U. reset group and complete the removal.

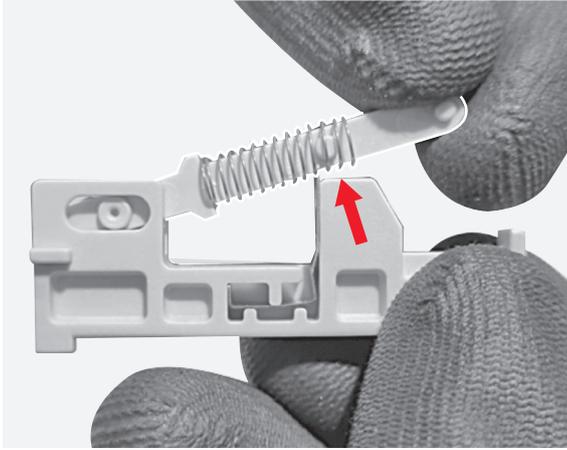


- 12**
By means of the flat screwdriver unhook the reset lever from the reset support of the T.U. reset group.

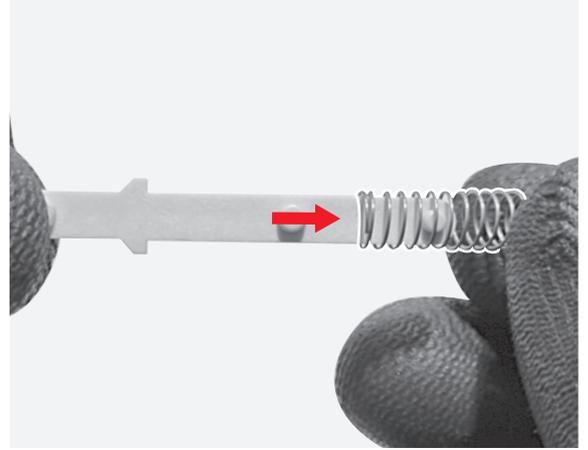


13

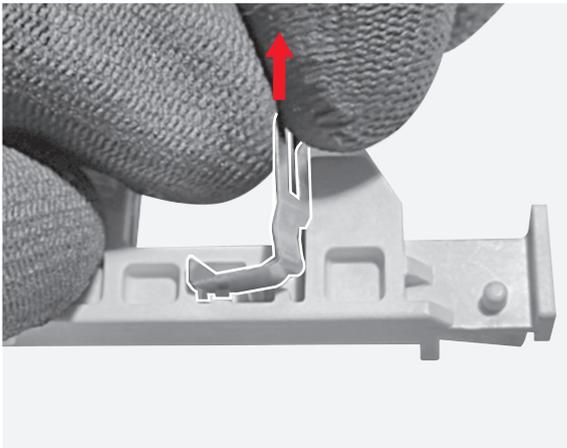
Manually separate the lever support and the lever.

**14**

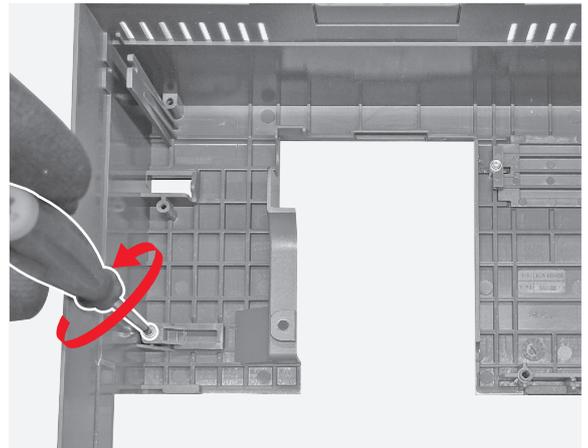
Manually remove the spring from the lever.

**15**

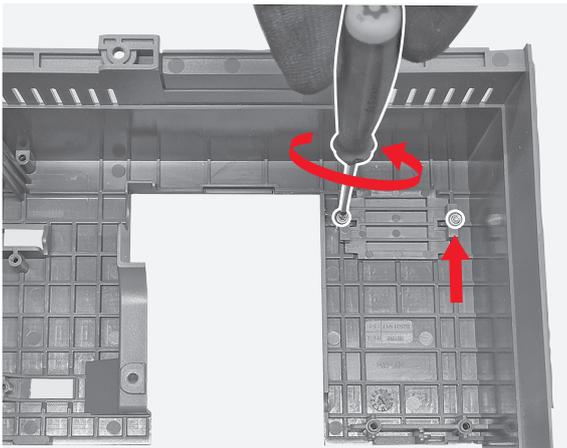
Manually remove the reset spring from the lever support.

**16**

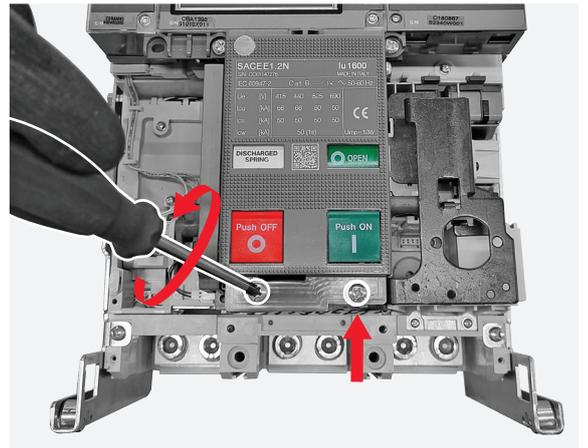
By means of the tork key remove the screw fixing the operation counter cap to the circuit breaker front cover and after manually remove the operation counter cap.

**17**

By means of the tork key remove the 2 screws fixing the front cap to the circuit breaker front cover and after manually remove the front cap.

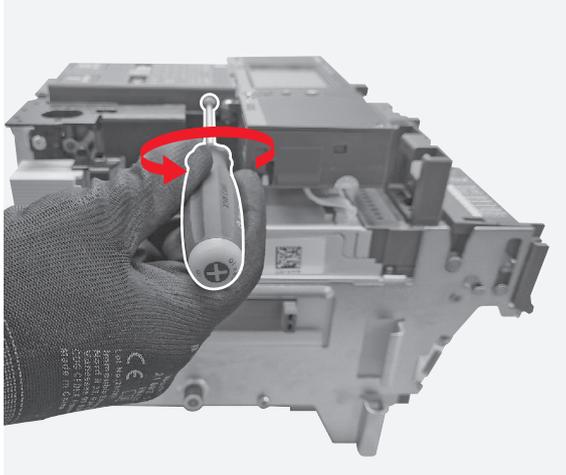
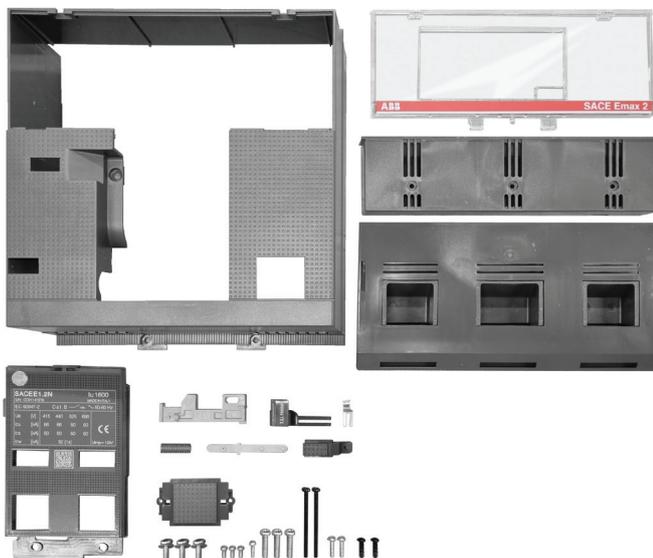
**18**

By means of the cross screwdriver unscrew the 2 screws located in the lower part of the operating mechanism cover fixing the operating mechanism cover to the circuit breaker main structure.



19

By means of the cross screwdriver unscrew the screw located on the right of the operating mechanism cover fixing the operating mechanism cover to the circuit breaker main structure and manually complete the removal of the operating mechanism cover.

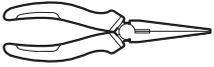
**Disassembled parts**

- 1 trip unit transparent protection (Plastic)
- 1 cover (Plastic)
- 1 withdrawable terminals cover (Plastic)
- 3 + 1 + 2 + 2 + 2 + 1 + 1 + 2 screws (Metal)
- 1 reset lever (Plastic)
- 1 lever (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 spring (Metal)
- 1 lever support (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 spring reset (Metal)
- 2 screws and related washers (Metal)
- 1 circuit breaker front cover (Plastic)
- 1 operation counter cap (Plastic)
- 1 front cap (Plastic)
- 1 operating mechanism cover (Plastic)

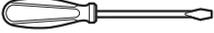
6.2 PHASE 2 – SLIDING CONTACTS BLOCK

Tools

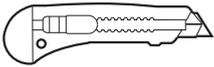
Pliers



Flat screwdriver



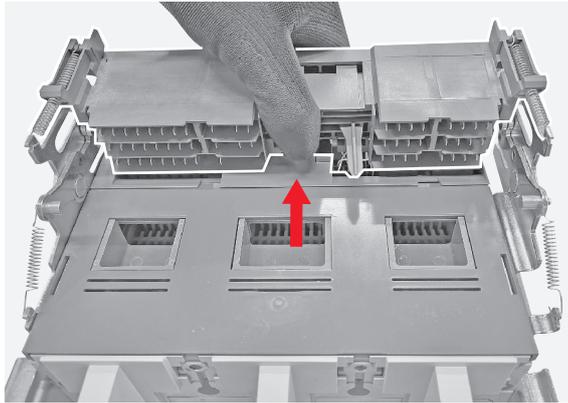
Cutter



Actions to be performed

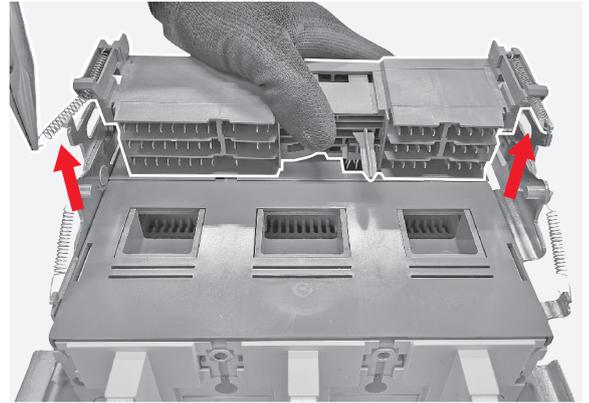
20

Manually push the sliding contacts block as indicated by the arrow.



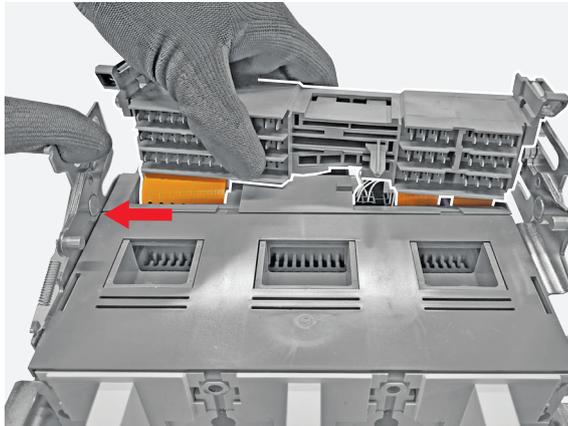
21

By means of the pliers unhook the 2 springs mounted at the extreme sides of the sliding contacts block, keeping them mounted on the sliding contacts block.



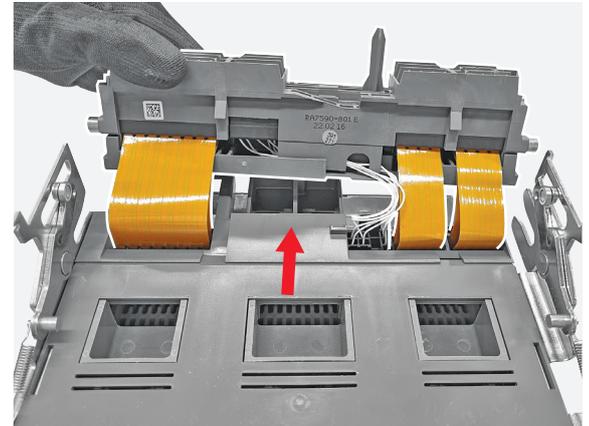
22

Using one hand manually slightly push as indicated by the arrow the right shoulder and using the other hand unhook the sliding contacts block from main circuit breaker structure.



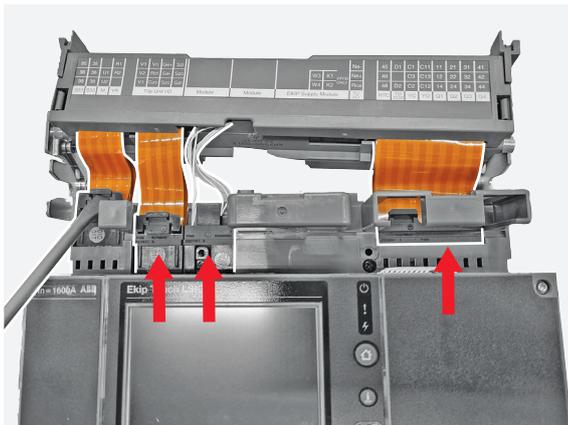
23

After completion of previous operation, sliding contacts block must be put as indicated in picture here below.



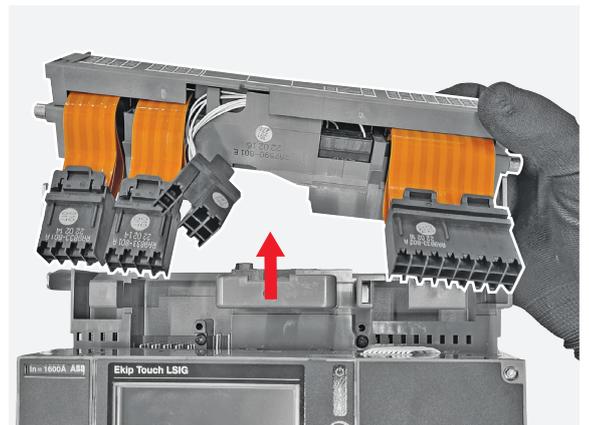
24

By means of the flat screwdriver unhook the 3 flat cables assemblies and the connector cables assembly.



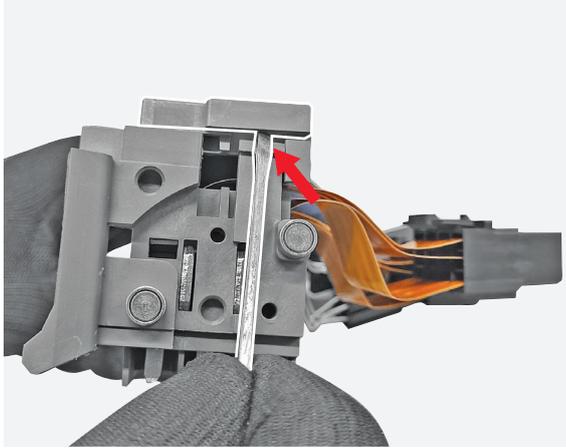
25

Manually complete the removal of the sliding contacts block from the circuit breaker main structure.



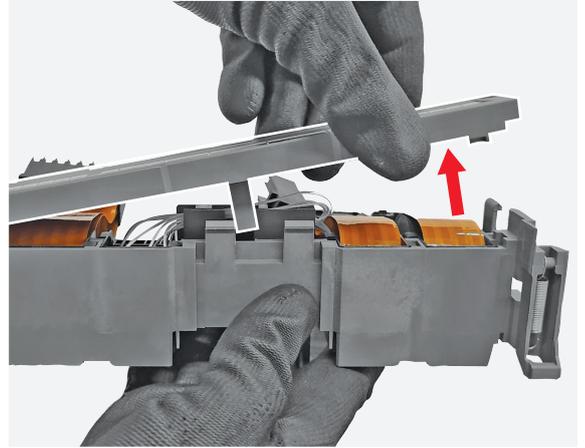
26

By means of the flat screwdriver unhook the right side wall from the sliding contacts block main assembly.



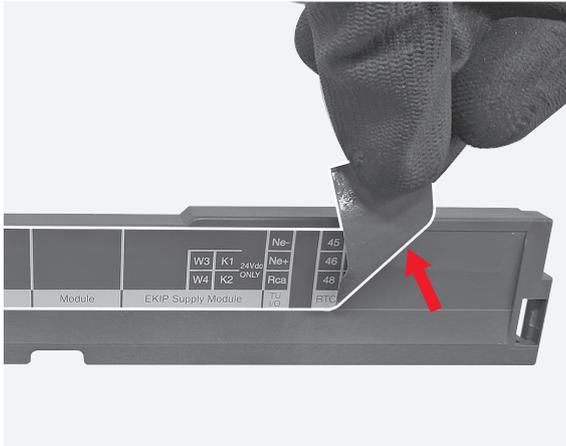
27

Manually complete the removal of the right side wall.



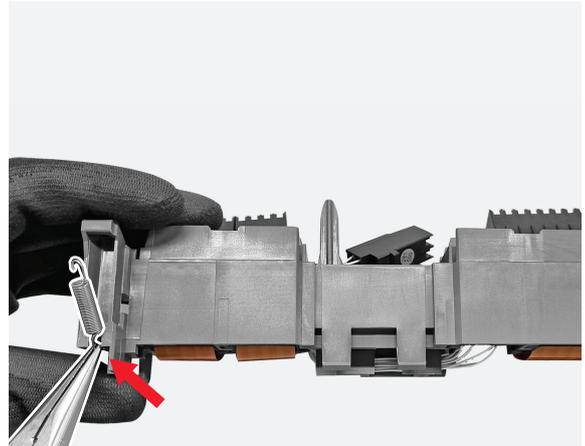
28

By means of the cutter start removing the sliding contacts label located on the right side wall and manually complete the operation.



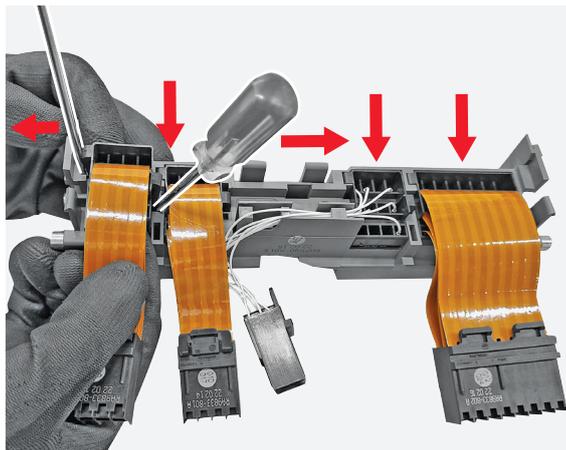
29

By means of the pliers remove the 2 springs from the sliding contacts block.



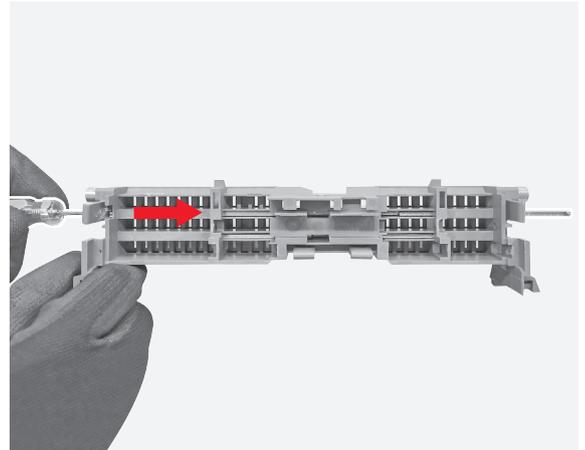
30

Insert 2 flat screwdrivers at the sides of each block, slightly push them as indicated by the arrow and complete the removal of the 3 flat cables assemblies and of the connector cables assembly manually pulling them.



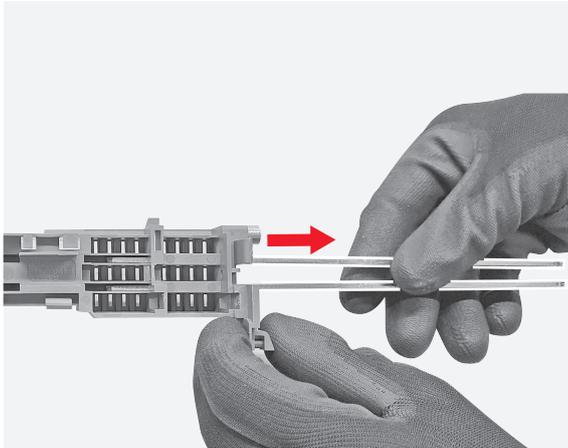
31

By means of the flat screwdriver push as indicated by the arrow the 2 bars mounted inside the sliding contacts block.

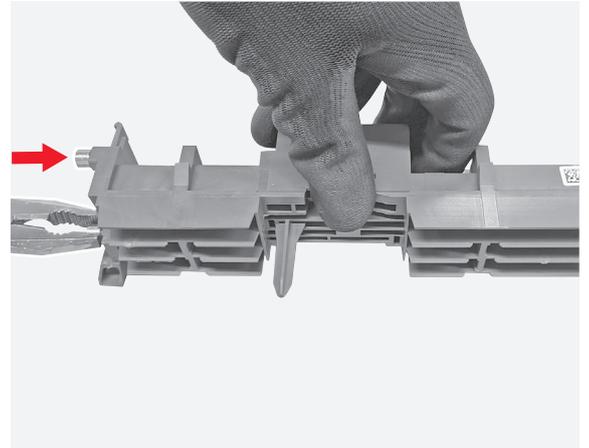
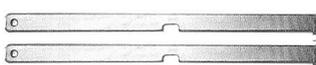
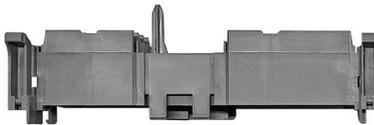


32

Manually complete the removal of the 2 bars.

**33**

By means of the pliers remove the 4 pins and the related nuts mounted at both sides of the sliding contact base.

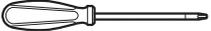
**Disassembled parts**

- 1 right side wall (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 sliding contacts label (Adhesive paper)
- 2 springs (Metal)
- 3 flat cables assemblies (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 connector cables assembly (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 2 bars (Metal)
- 4 pins and related nuts (Metal)
- 1 sliding contacts base (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

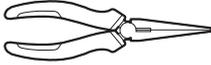
6.3 PHASE 3 – SHOULDERS

Tools

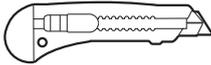
Cross screwdriver



Pliers

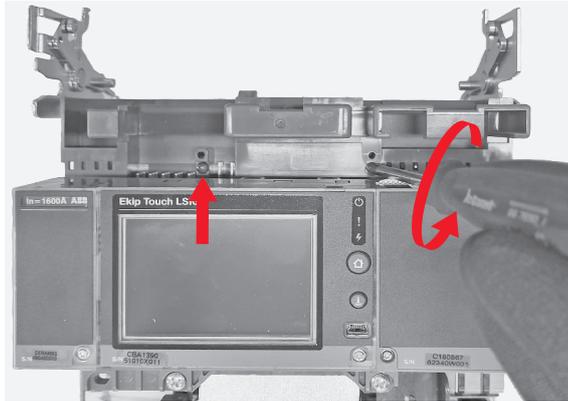


Cutter

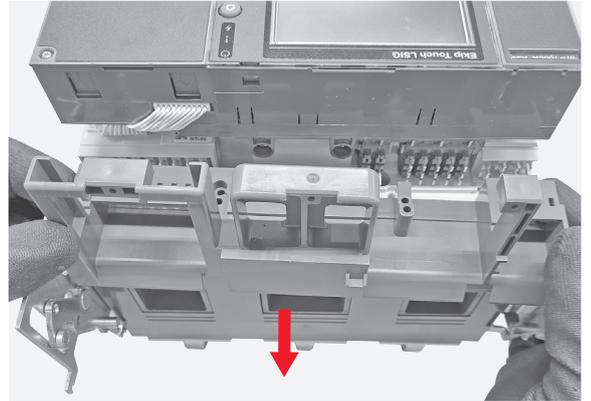


Actions to be performed

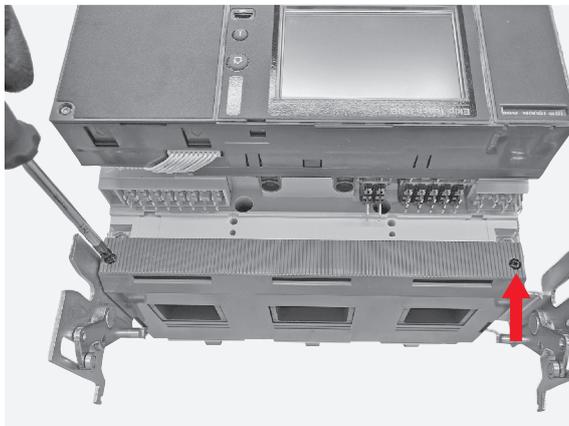
34
By means of the cross screwdriver unscrew the 2 screws fixing the cover to the circuit breaker main structure.



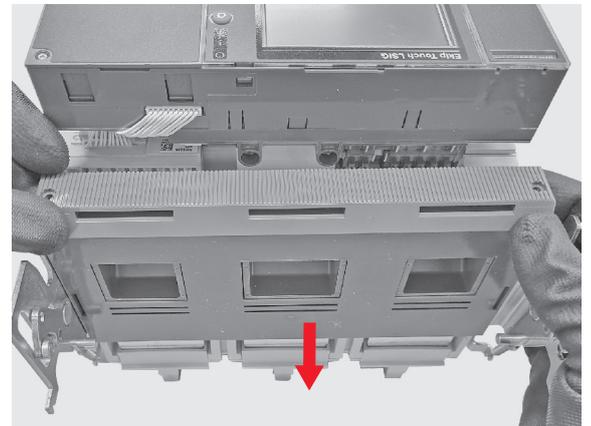
35
Manually complete the removal of the cover.



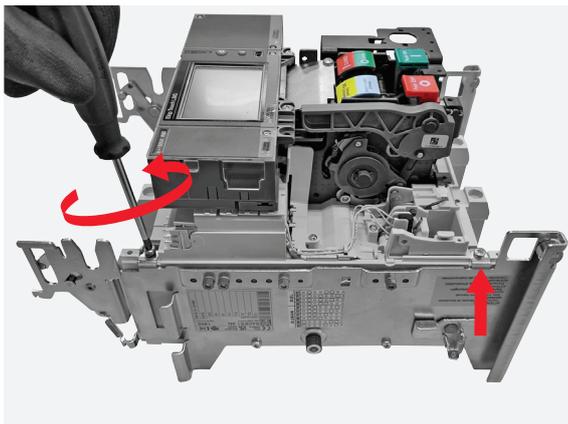
36
By means of the cross screwdriver unscrew the 2 screws fixing the withdrawable terminals cover to the circuit breaker main structure.



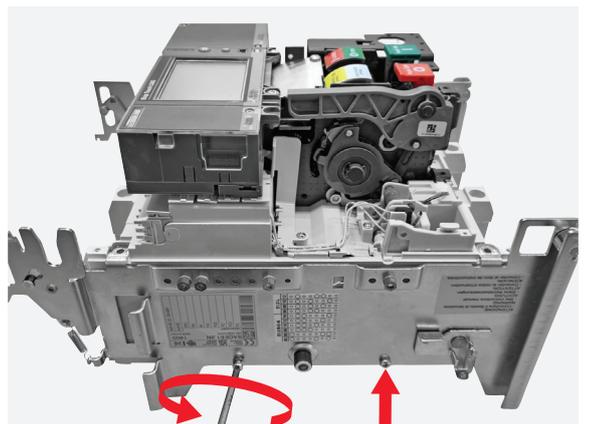
37
Manually complete the removal of the withdrawable terminals cover.



38
By means of the cross screwdriver unscrew the 2 screws fixing the left shoulder to the circuit breaker main structure.

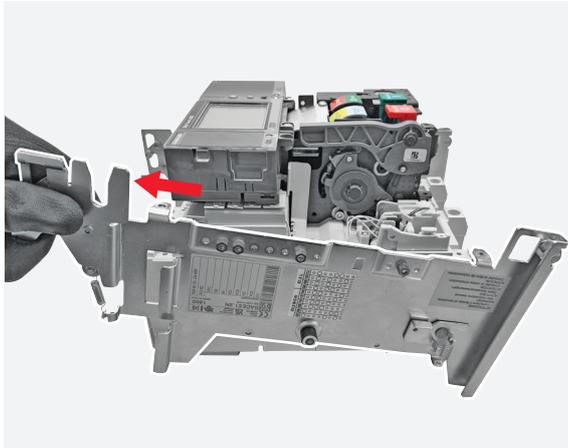


39
By means of the cross screwdriver unscrew the 2 screws fixing the left shoulder to the circuit breaker main structure and collect the 2 nuts mounted behind the 2 screws

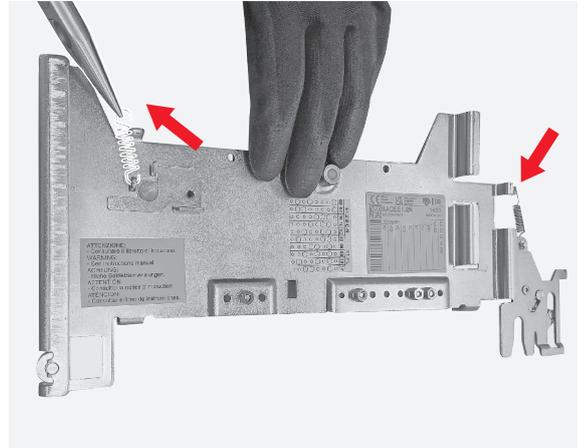


40

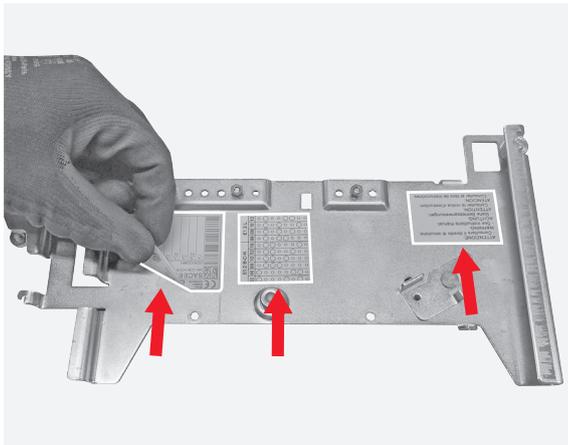
Manually remove the left shoulder.

**41**

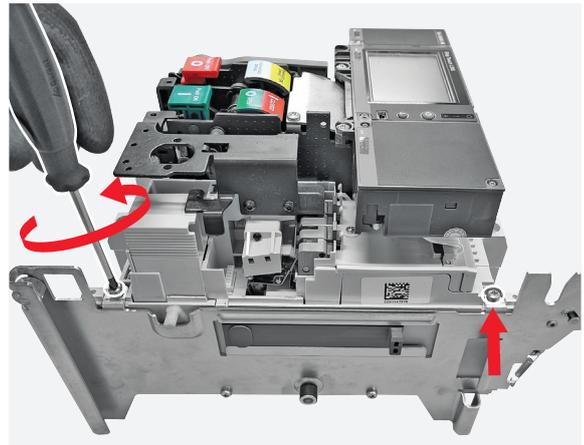
By means of the pliers remove the 2 springs mounted on the left side support.

**42**

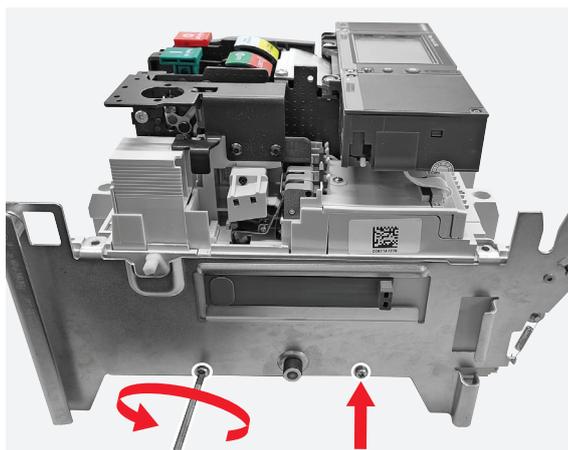
By means of the cutter start removing the 3 labels located on the left shoulder and manually complete the operation.

**43**

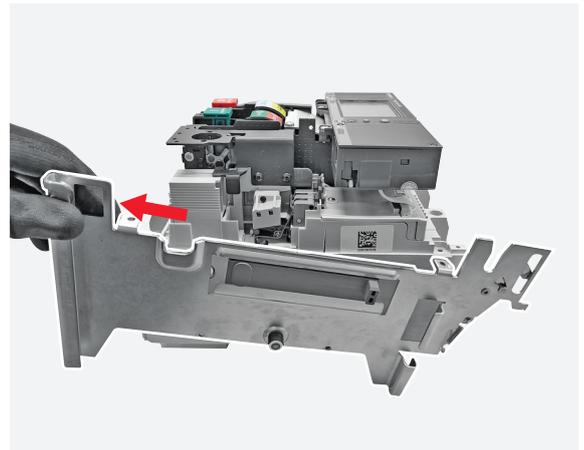
By means of the cross screwdriver unscrew the 2 screws fixing the right shoulder to the circuit breaker main structure.

**44**

By means of the cross screwdriver unscrew the 2 screws fixing the right shoulder to the circuit breaker main structure and collect the 2 nuts mounted behind the 2 screws.

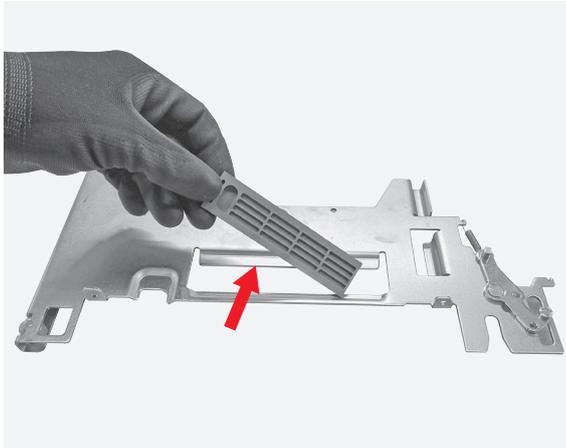
**45**

Manually remove the right shoulder.

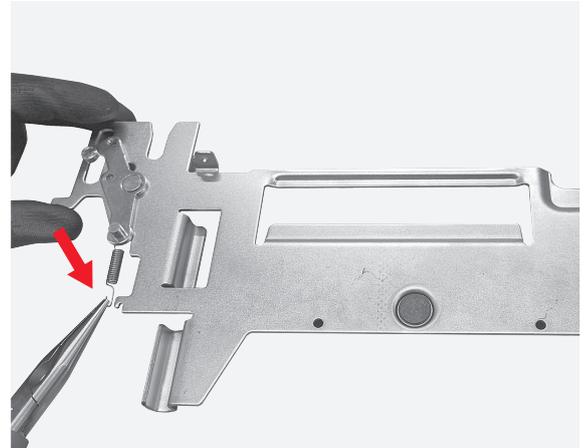
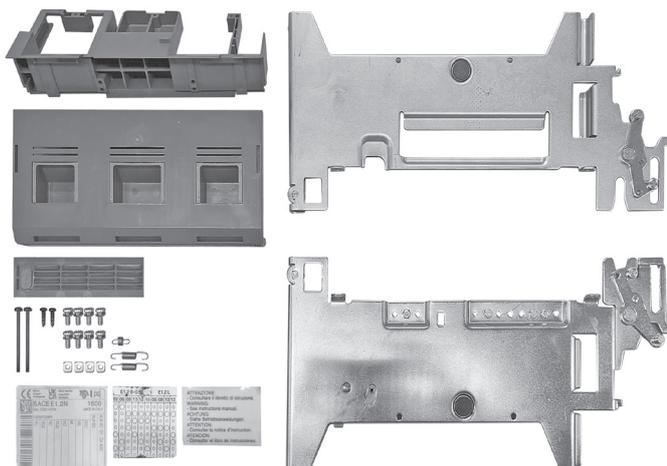


46

Manually remove the slide mounted on the right shoulder.

**47**

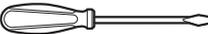
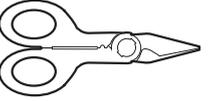
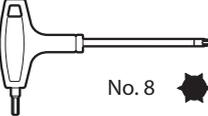
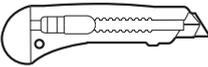
By means of the pliers remove the spring mounted on the right shoulder.

**Disassembled parts**

- 2 + 2 + 2 + 2 + 2 + 2 screws (Metal)
- 1 cover (Plastic)
- 1 withdrawable terminals cover (Plastic)
- 2 + 2 nuts (Metal)
- 2 shoulders (Metal)
- 2 + 1 springs (Metal)
- 3 labels (Adhesive paper)
- 1 slide (Plastic) SEPARATE TREATMENT
(Thermoplastics containing brominated flame retardants)

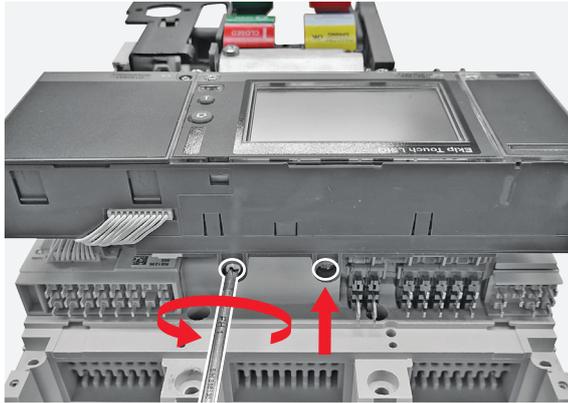
6.4 PHASE 4 – TRIP UNIT

Tools

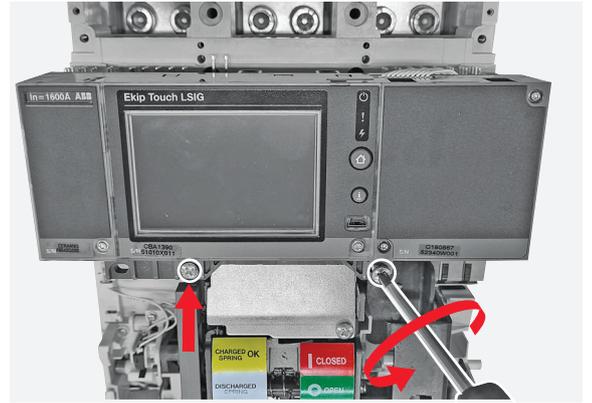
- Cross screwdriver 
- Flat screwdriver 
- Scissors 
- Torx key  No. 8 
- Cutter 
- Pliers 

Actions to be performed

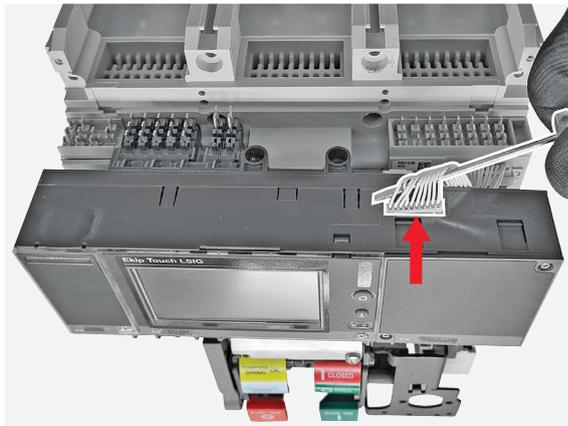
48 By means of the cross screwdriver unscrew the 2 screws located in the upper part of the circuit breaker fixing the trip unit to the circuit breaker main structure.



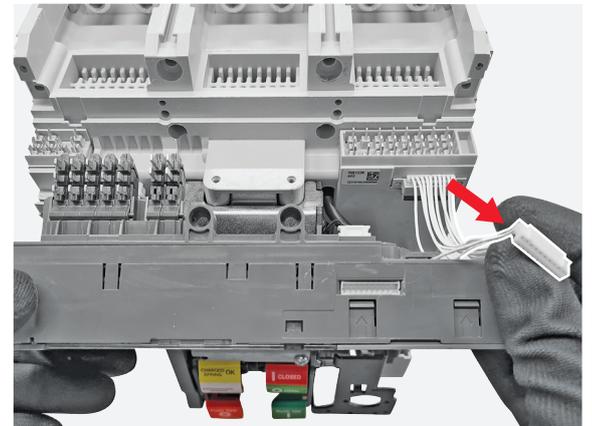
49 By means of the cross screwdriver unscrew the 2 screws located on the front of the circuit breaker fixing the trip unit to the circuit breaker main structure.



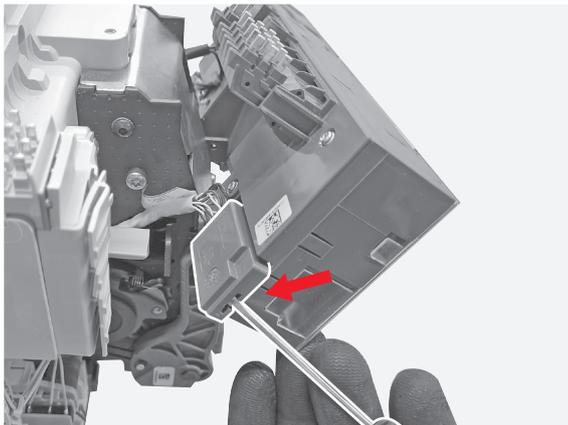
50 By means of the flat screwdriver unhook the white connector from the trip unit.



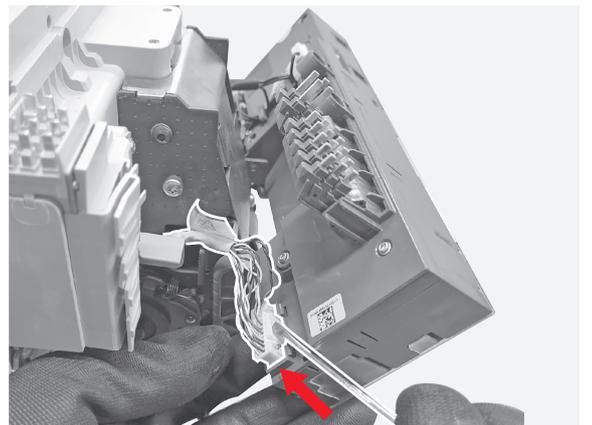
51 Manually complete the removal of the white connector.



52 By means of the flat screwdriver unhook the cable protection from the trip unit and after manually complete the removal.

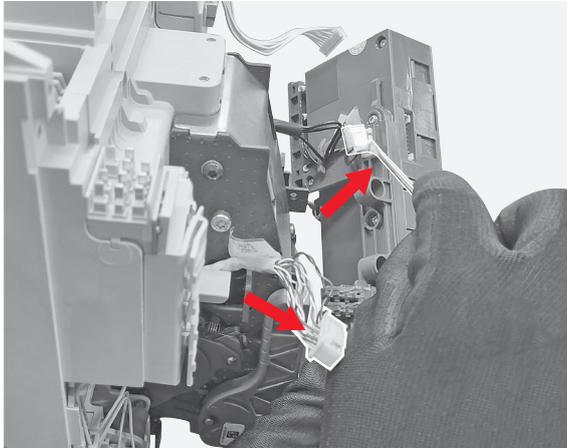


53 By means of the flat screw driver unhook the white connector from the trip unit.

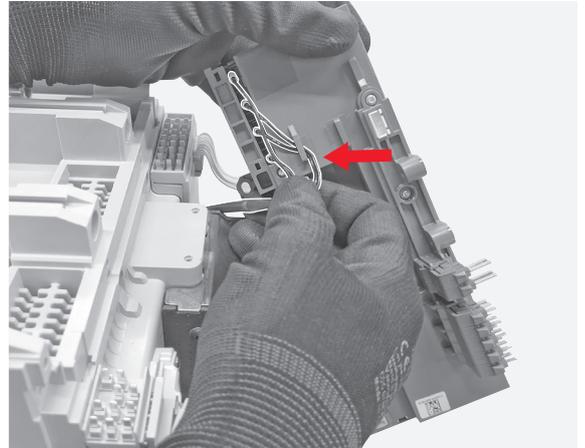


54

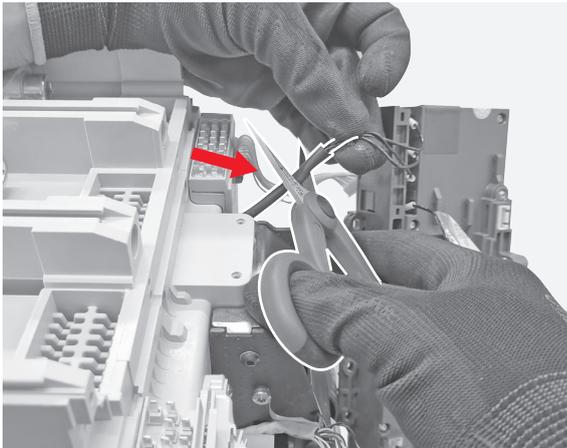
By means of the flat screw driver unhook the white connector from the trip unit.

**55**

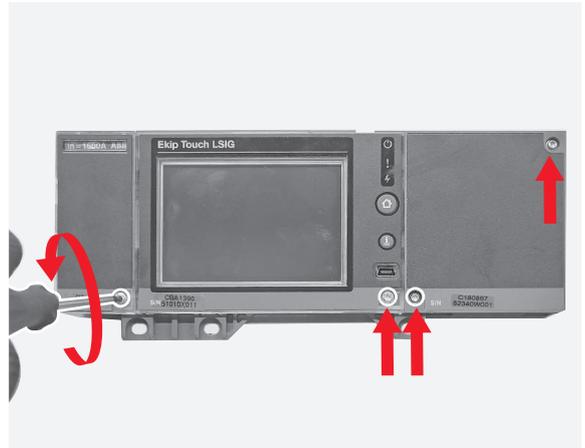
Manually unhook the last cabling connecting the trip unit to the circuit breaker main structure.

**56**

By means of the scissors cut the cabling completing the removal of the trip unit from the circuit breaker main structure.

**57**

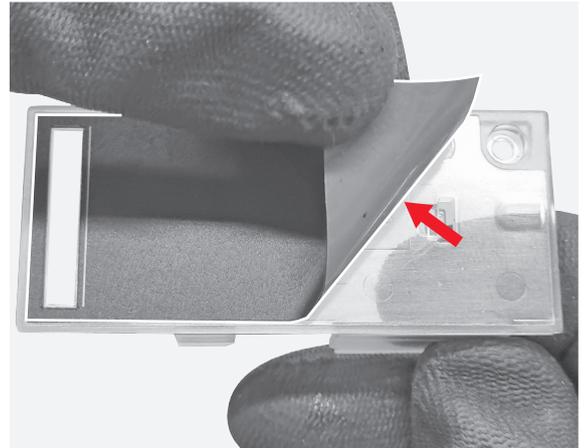
By means of the torx key unscrew the 4 screws fixing the 2 plugs to the trip unit.

**58**

Manually remove the plug mounted on the left part of the trip unit.

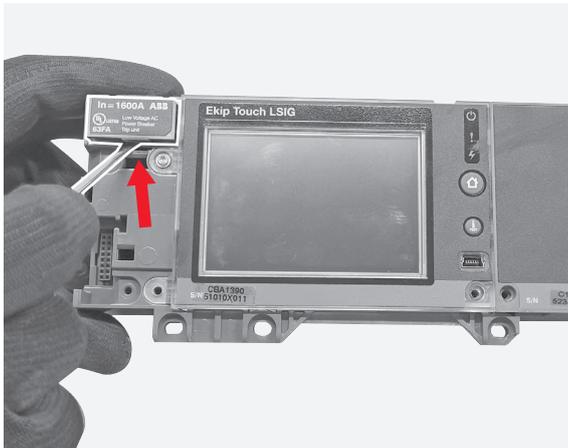
**59**

By means of the cutter start removing the label mounted over the plug removed at step before and manually complete the removal operation.

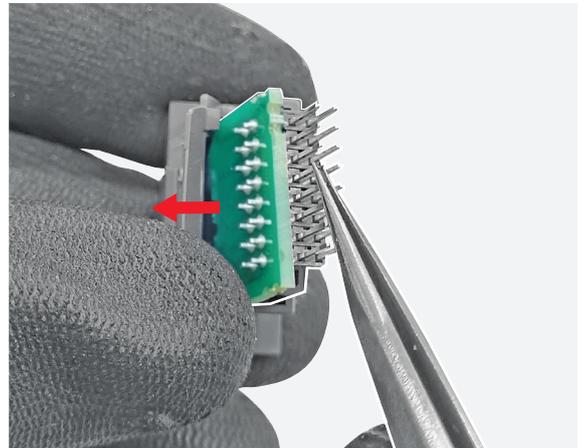


60

By means of the flat screwdriver remove the rating plug from the trip unit.

**61**

Manually push the rating plug case appendix as indicated by the arrow and by means of the pliers remove the rating plug printed circuit board.

**62**

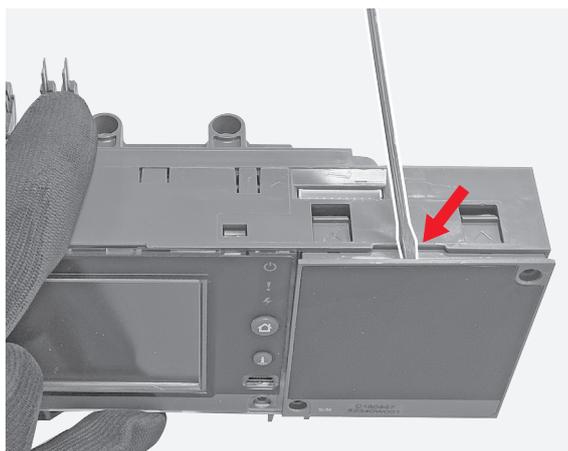
By means of the cutter start removing the label located on the front of the rating plug case and by means of the pliers complete the operation.

**63**

By means of the cutter start removing the rating plug data matrix label located on the rating plug case and by means of the pliers complete the operation.

**64**

By means of the flat screwdriver unhook the Ekip measuring blind plug from the trip unit.

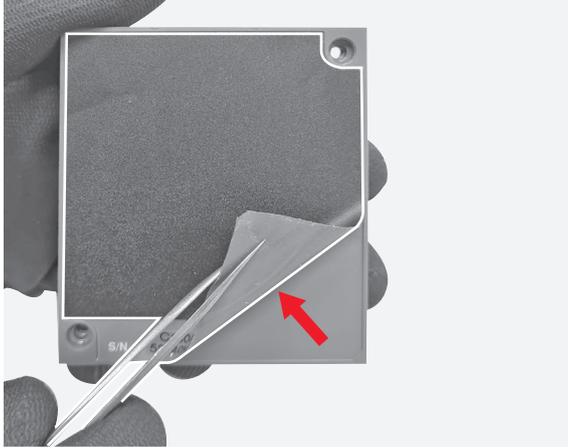
**65**

Manually complete the removal of the Ekip measuring blind plug.

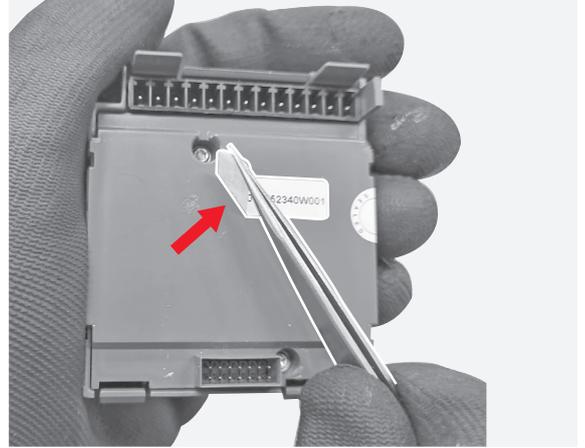


66

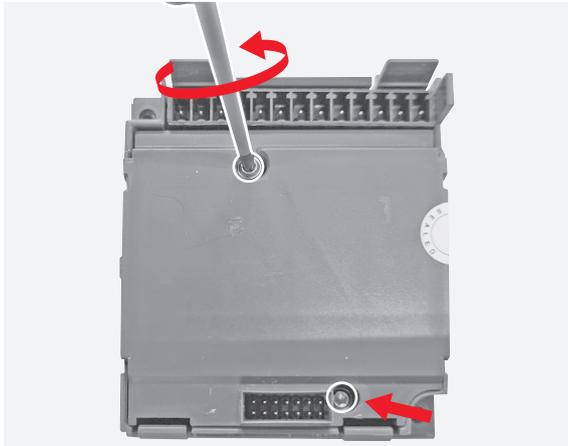
By means of the cutter start removing the label located on the Ekip measuring blind plug and by means of the pliers complete the operation.

**67**

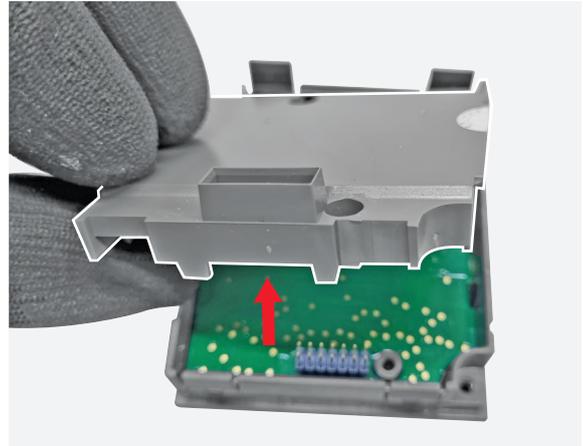
By means of the cutter start removing the data matrix label located in the back part of the Ekip measuring blind plug and by means of the pliers complete the operation.

**68**

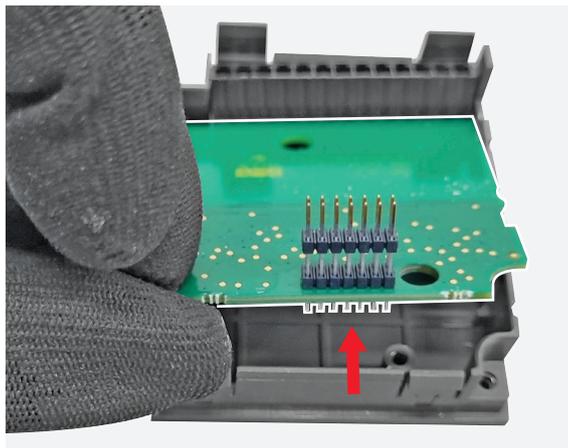
By means of the torx key unscrew the 2 screws fixing the Ekip measuring blind case to the Ekip measuring blind cover.

**69**

Manually remove the Ekip measuring blind case.

**70**

Manually remove the printed circuit board from the Ekip measuring blind cover.

**71**

By means of the torx key unscrew the screw fixing the display to the trip unit main structure.



72

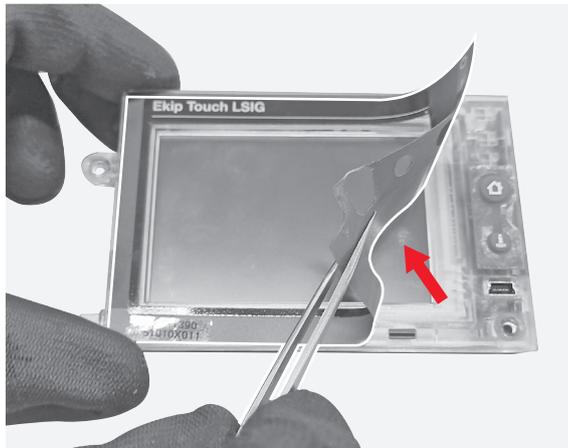
By means of the flat screwdriver unhook the display from the trip unit main structure.

**73**

Manually complete the removal of the display.

**74**

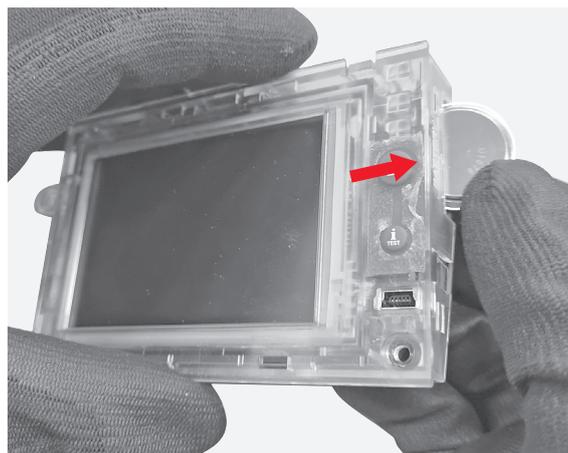
By means of the cutter start removing the trip unit front label and by means of the pliers complete the operation.

**75**

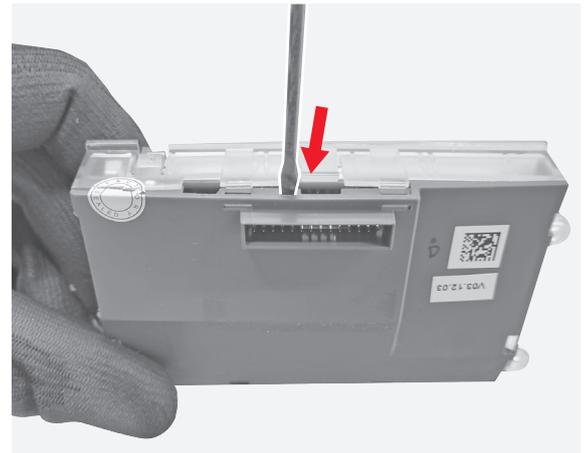
By means of the flat screwdriver remove the battery cover on the right side of the display.

**76**

Manually remove the battery.

**77**

By means of the flat screwdriver unhook the HMI box from the display.



78

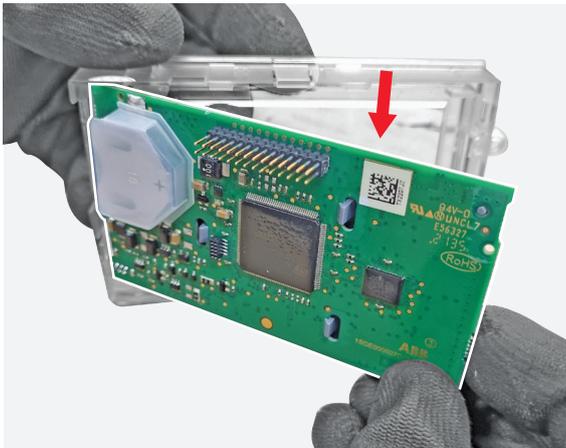
Manually complete the removal of the HMI box.

**79**

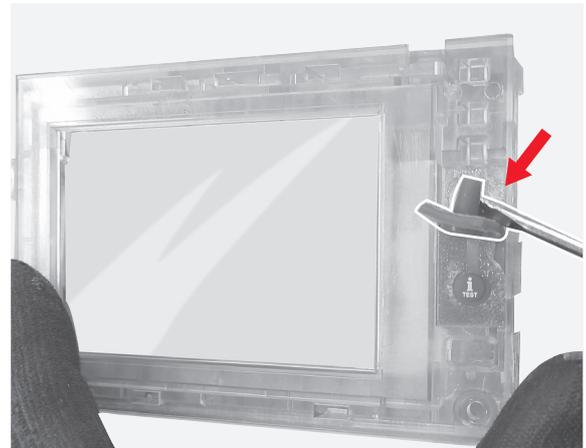
By means of the cutter start removing the 2 data matrix labels located in the back part of the HMI box and by means of the pliers complete the operation.

**80**

Manually separate the display and the HMI LCD cover.

**81**

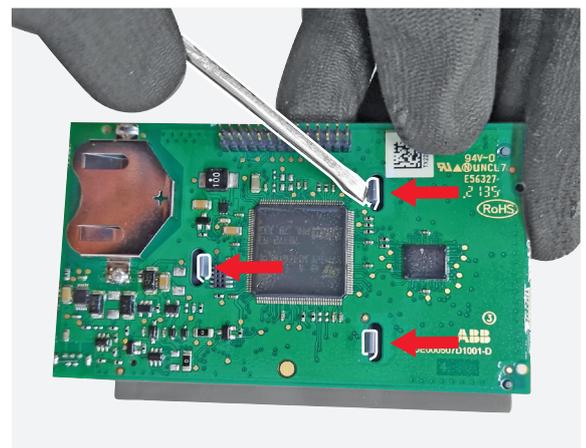
By means of the flat screwdriver remove the "i TEST" pushbutton from the HMI LCD cover.

**82**

Manually remove the battery gasket.

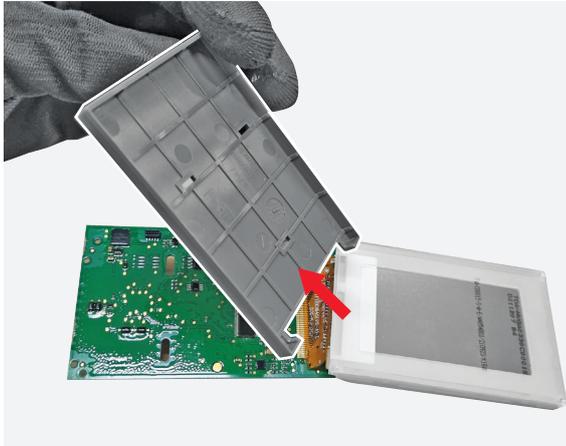
**83**

By means of the flat screwdriver unhook the display printed circuit board from the display support.

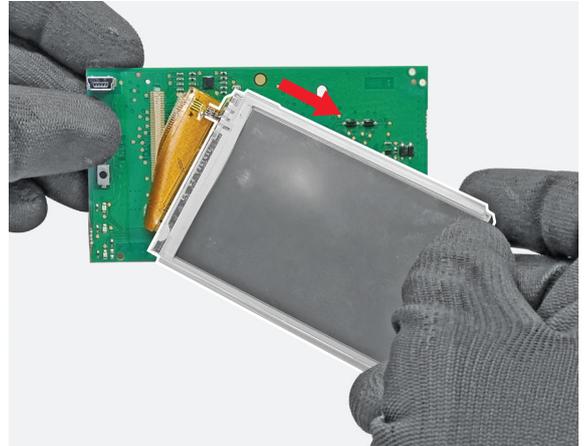


84

Manually remove the display support.

**85**

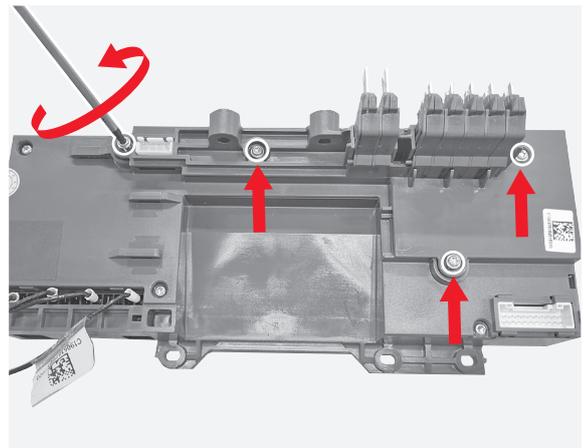
Manually separate the display from its printed circuit board.

**86**

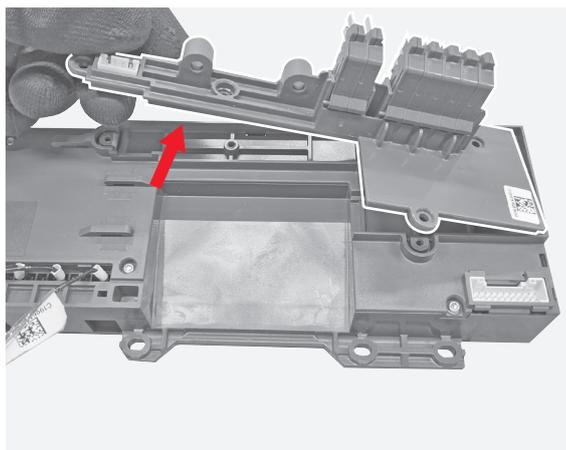
Manually separate the gasket from the display.

**87**

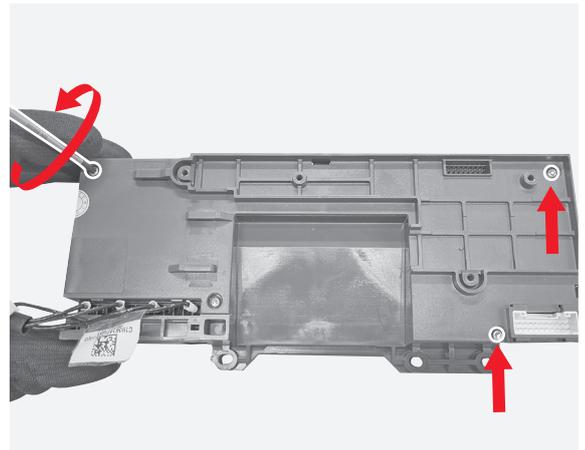
By means of the torx key unscrew the 4 screws fixing the backplane to the trip unit main structure.

**88**

Manually complete the removal of the backplane.

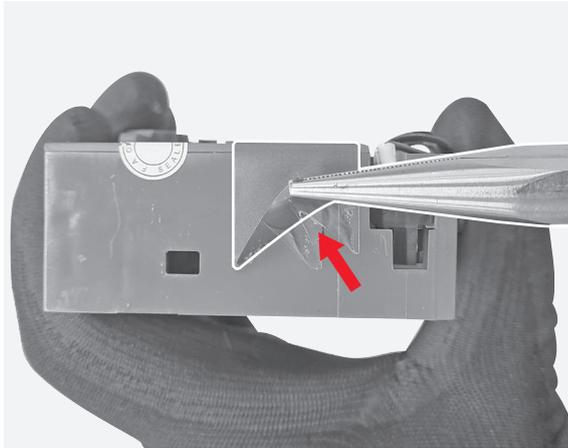
**89**

By means of the torx key unscrew the 4 screws fixing the trip unit case to the trip unit back cover.

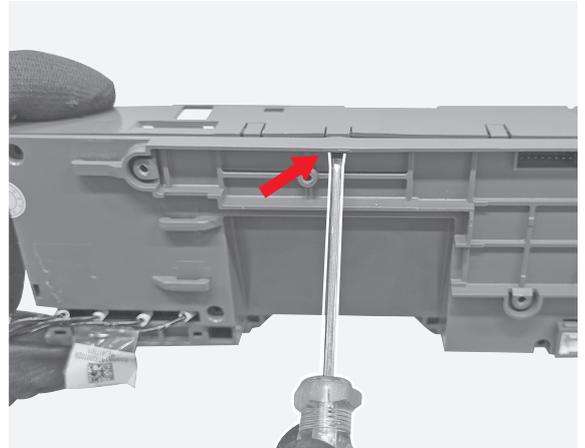


90

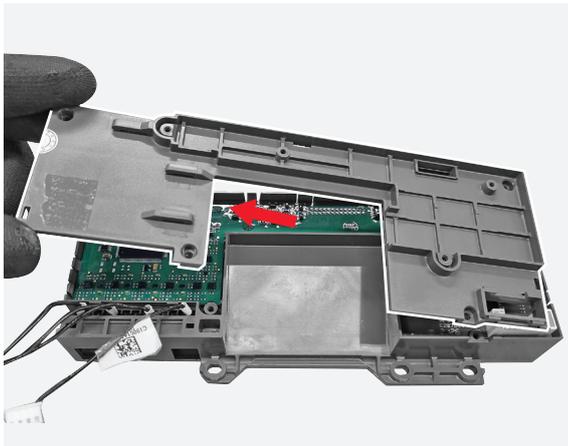
By means of the cutter start removing the blind label located on the side of the trip unit main structure and by means of the pliers complete the operation.

**91**

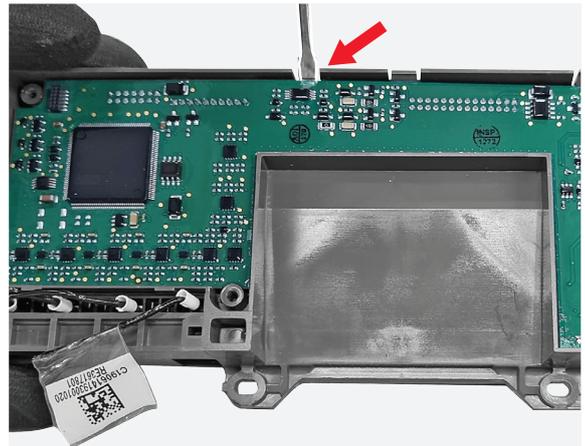
By means of the flat screwdriver unhook the trip unit case from the trip unit back cover.

**92**

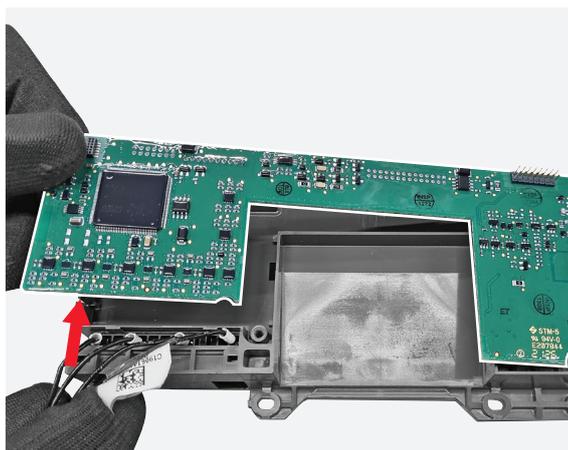
Manually complete the removal of the trip unit back cover.

**93**

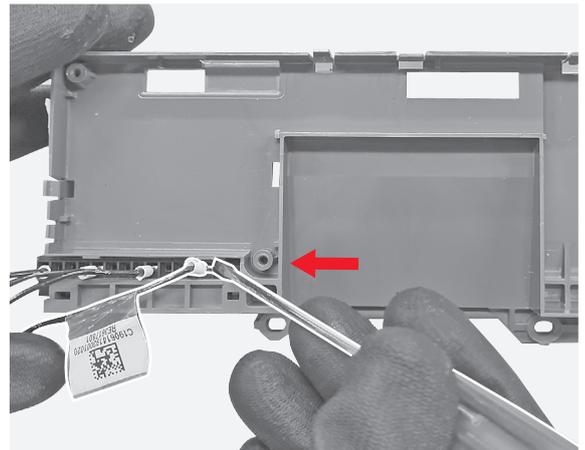
By means of the flat screwdriver unhook the trip unit printed circuit board.

**94**

Manually complete the removal of the trip unit printed circuit board.

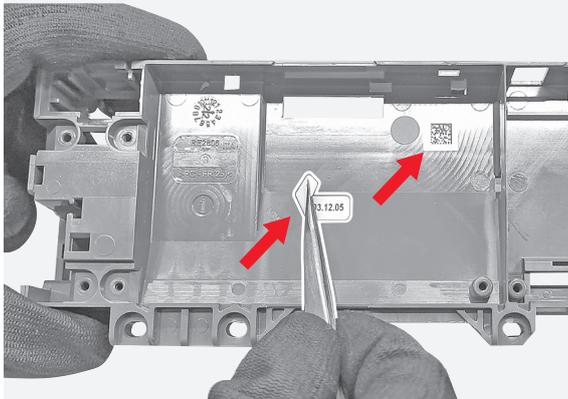
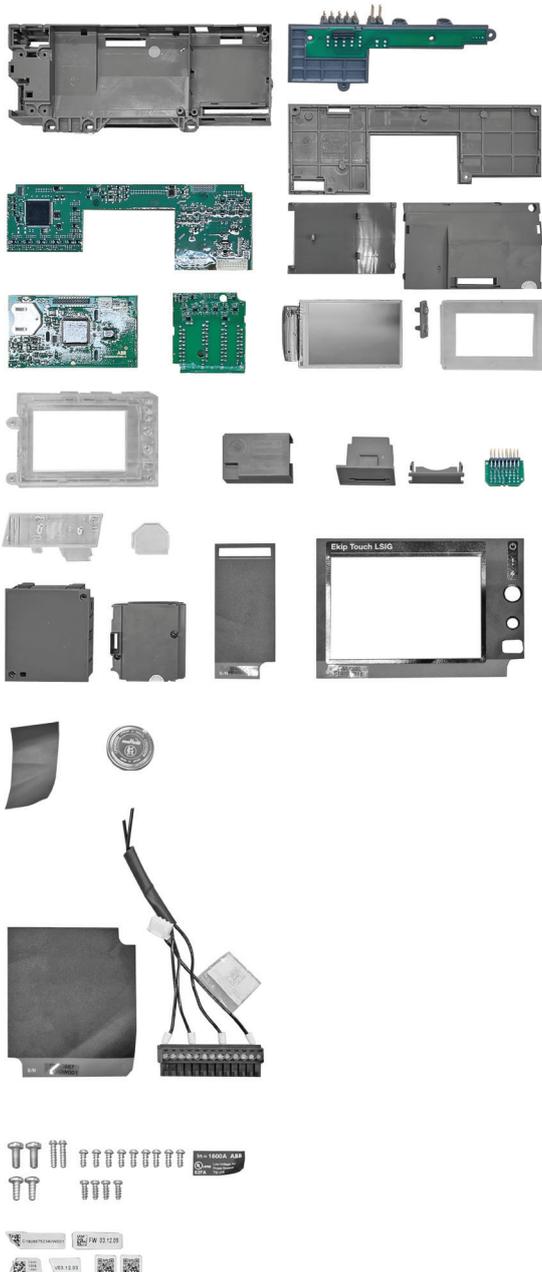
**95**

By means of the flat screwdriver push as indicated by the arrow the cables and manually remove them.



96

By means of the cutter start removing the 2 labels located on the trip unit back cover and by means of the pliers complete the operation.

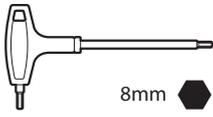
**Disassembled parts**

- 2 + 2 + 4 + 2 + 1 + 4 + 4 screws (Metal)
- 1 cables protection (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 plug (Plastic)
- 1 plug label (Adhesive paper)
- 1 rating plug printed circuit board (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 rating plug case (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 rating plug label (Adhesive paper)
- 1 Ekip measuring blind plug (Plastic)
- 1 Ekip measuring blind plug label (Adhesive paper)
- 1 Ekip measuring blind case (Plastic)
- 1 Ekip measuring blind printed circuit board (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 Ekip measuring blind cover (Plastic)
- 1 HMI box (Plastic)
- 1 trip unit front label (Adhesive paper)
- 1 battery cover (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 battery (Battery) SEPARATE TREATMENT (Battery)
- 1 HMI LCD cover (Plastic)
- 1 "i Test" pushbutton (Rubber)
- 1 battery gasket (Rubber)
- 1 display support (Plastic)
- 1 display printed circuit board (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 display (Liquid crystal display) SEPARATE TREATMENT (Liquid crystal display)
- 1 gasket (Silicon)
- 1 backplane (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 blind label (Adhesive paper)
- 1 trip unit case (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 trip unit back cover (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 trip unit printed circuit board (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 measuring module connector (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 6 labels (Adhesive paper)

6.5 PHASE 5 – TERMINALS AND CLAW CONTACTS

Tools

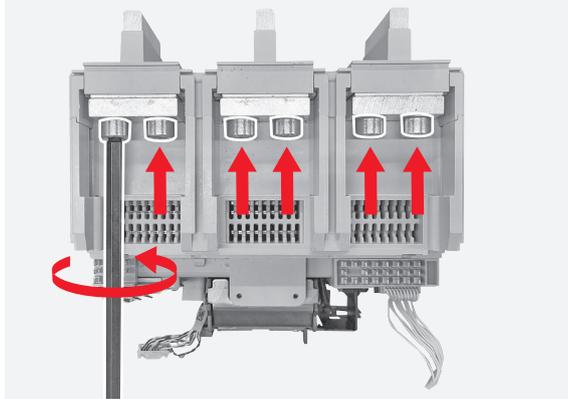
Allen key



Actions to be performed

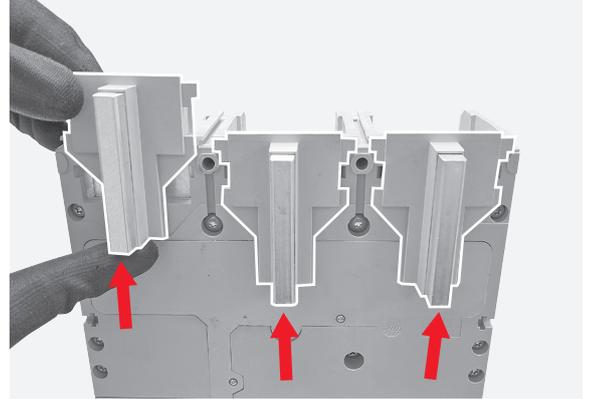
97

By means of the allen key unscrew the screws fixing the terminals to the circuit breaker main structure.



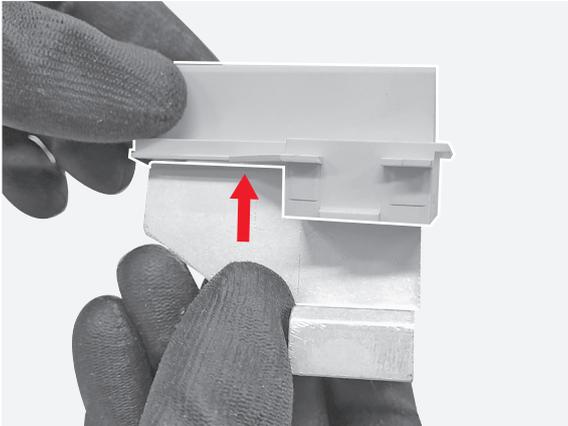
98

Push as indicated by the arrow the terminals and the related protections and manually remove the 2 parts.

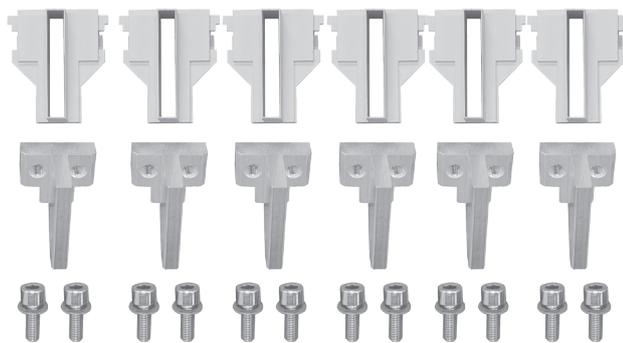


99

Manually separate the terminals from their protections.



Disassembled parts



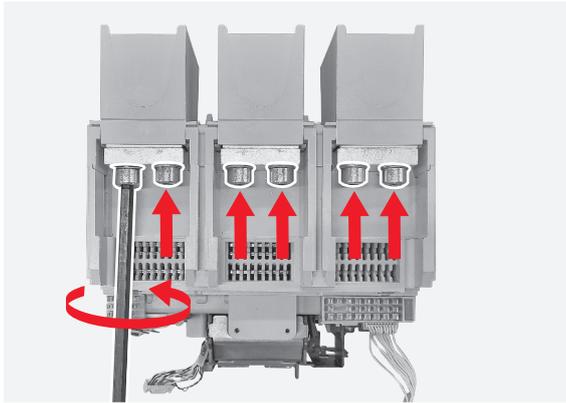
- 12 screws and related washers (Metal)
- 6 terminals (Metal)
- 6 protections (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

Circuit breakers in UL version show significant differences at level of this disassembly phase, consequently here below an analogous section is provided for these circuit breakers.

Actions to be performed

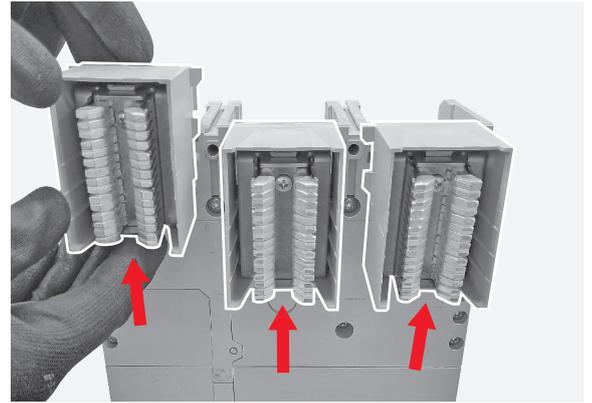
97 UL

By means of the allen key unscrew the screws fixing the claw contacts to the circuit breaker main structure.



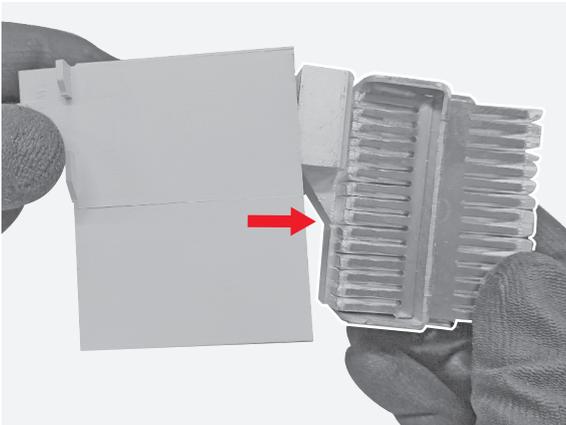
98 UL

Push as indicated by the arrow the claw contacts and the related protections and manually remove the 2 parts.

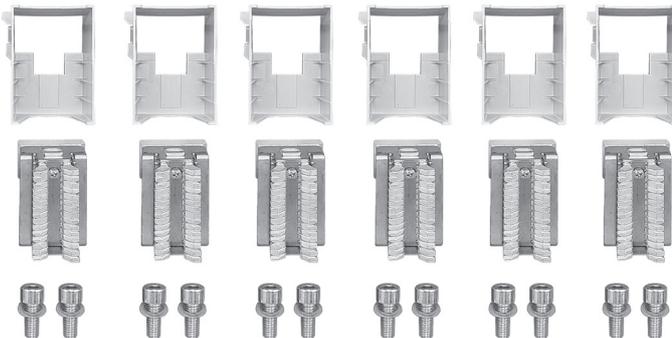


99 UL

Manually separate the claw contacts from their protections.



Disassembled parts



- 12 screws and related washers (Metal)
- 6 claw contacts (Metal)
- 6 protections (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

6.6 PHASE 6 – ASSEMBLIES MOUNTED ON CIRCUIT BREAKER LEFT SIDE

Tools

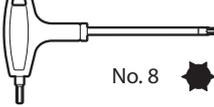
Cross screwdriver



Flat screwdriver

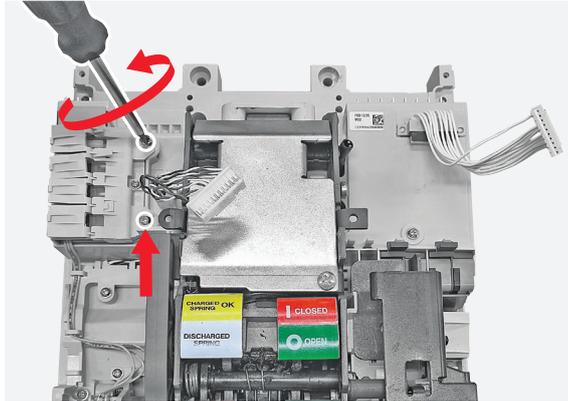


Torx key

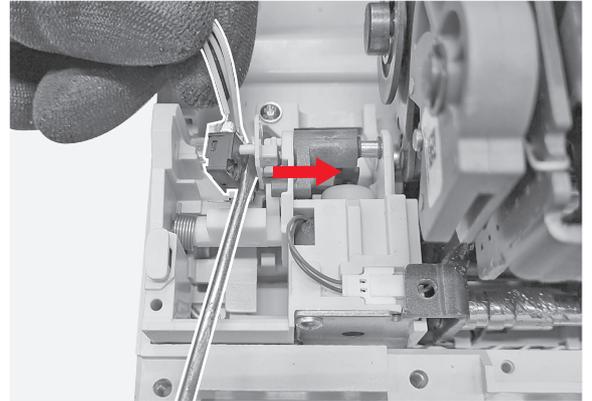


Actions to be performed

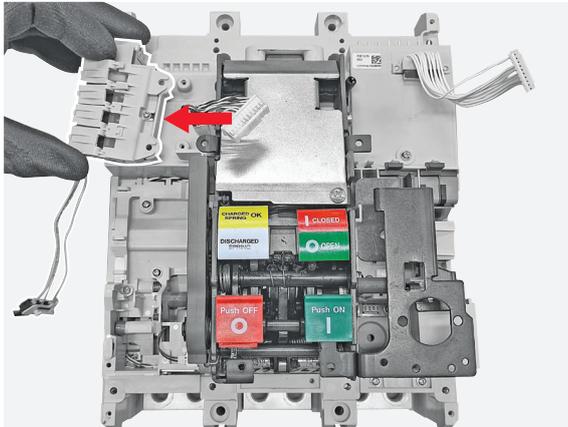
100
By means of the cross screwdriver unscrew the 2 screws fixing the motor PCS support to the circuit breaker main structure.



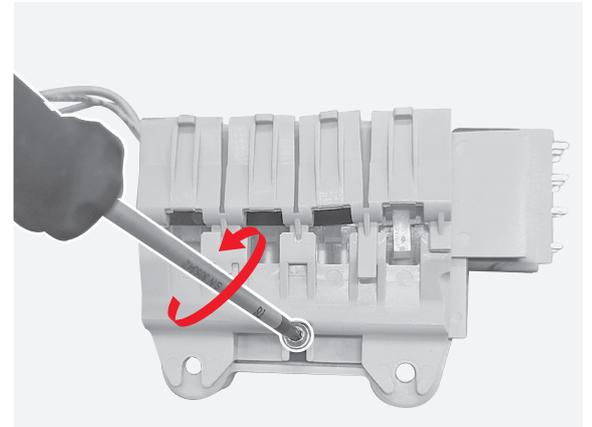
101
By means of the flat screwdriver slightly push the appendix as indicated by the arrow in order to unhook the microswitch and after manually remove the microswitch support.



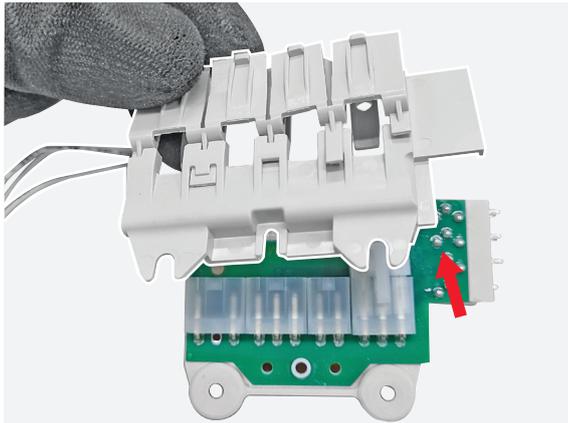
102
Manually complete the removal of the motor PCS support from the circuit breaker main structure.



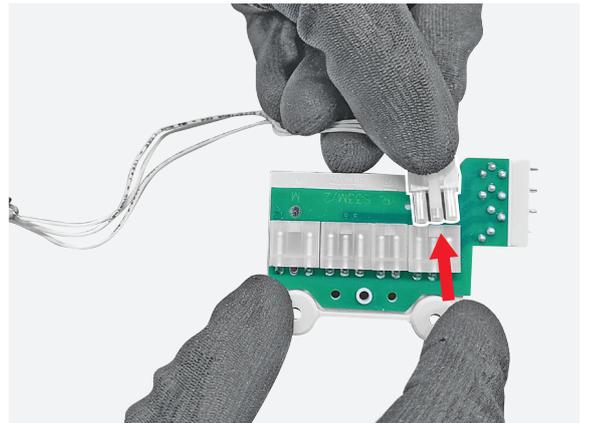
103
By means of the torx key unscrew the screw fixing the PCS cover to motor PCS support.



104
Manually separate the the PCS cover and the motor PCS support.

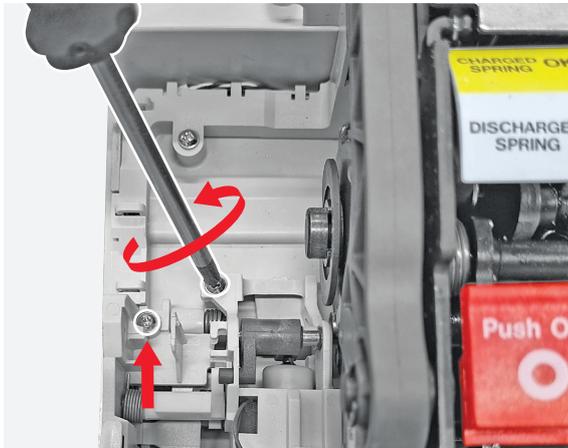


105
Manually separate the S51 signal assembly from the motor PCS support.

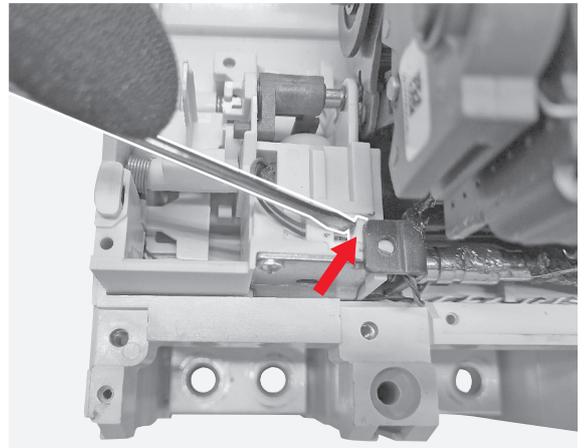


106

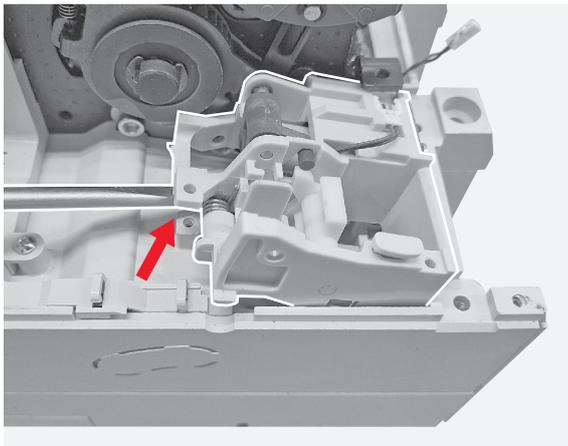
By means of the cross screwdriver unscrew the 2 screws fixing the trip coil group to the circuit breaker main structure.

**107**

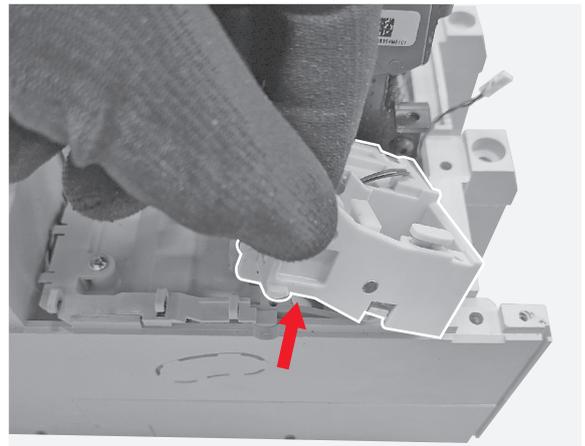
By means of the flat screwdriver unhook the connector from the trip coil group.

**108**

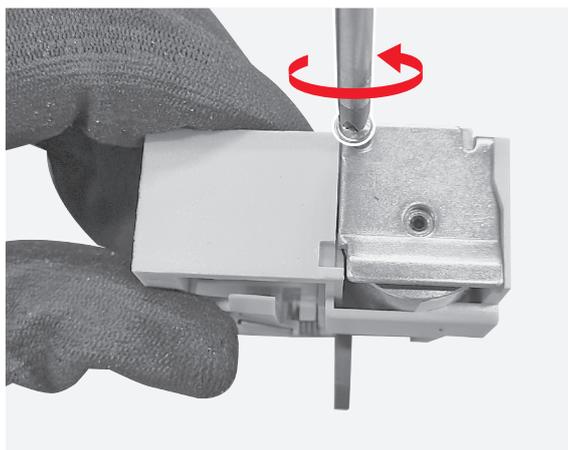
By means of the flat screwdriver lift the trip coil group.

**109**

Manually remove the trip coil group.

**110**

By means of the cross screwdriver unscrew the screw fixing the lower plate to the trip coil.

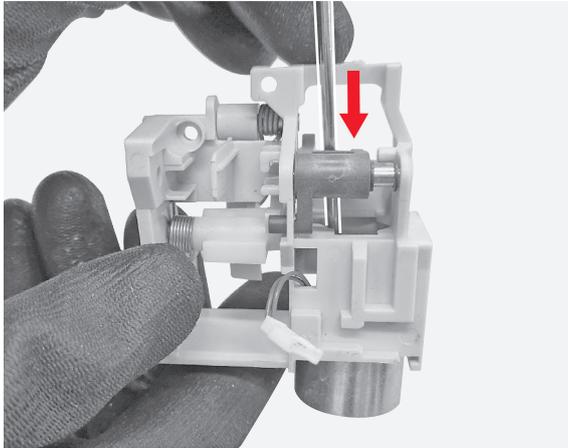
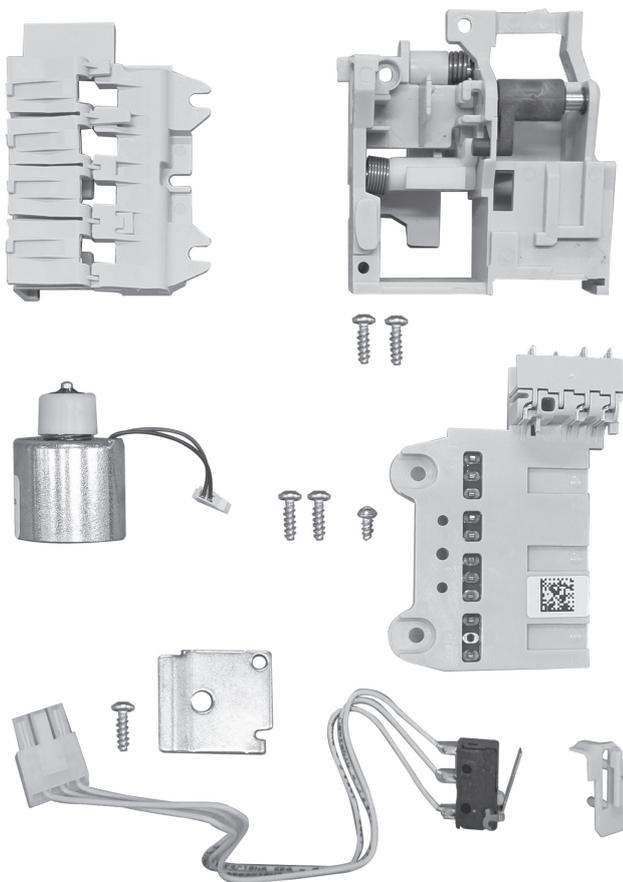
**111**

Manually push the lower plate as indicated by the arrow in order to complete the removal.



112

By means of the flat screwdriver push out from the trip coil group the trip coil.

**Disassembled parts**

2 + 1 + 2 + 1 screws (Metal)

1 PCS cover (Plastic)

1 motor PCS support (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)

1 microswitch support (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

1 S51 signal (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

1 lower plate (Metal)

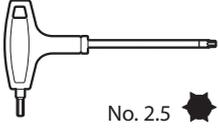
1 trip coil (Plastic, Metal and Magnets) SEPARATE TREATMENT (Magnets)

1 trip coil group (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

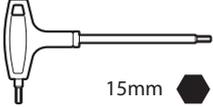
6.7 PHASE 7 – ASSEMBLIES ON CIRCUIT BREAKER RIGHT SIDE

Tools

Torx key



Allen key



Cross screwdriver



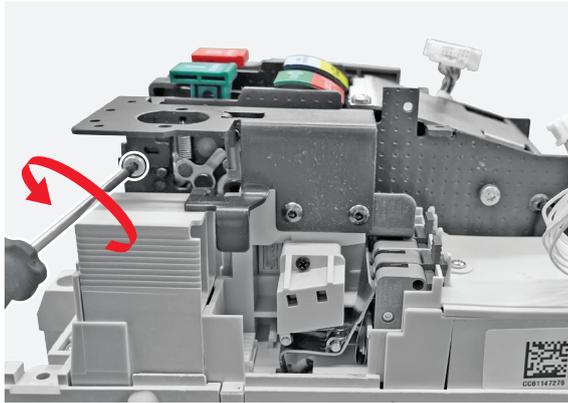
Flat screwdriver



Actions to be performed

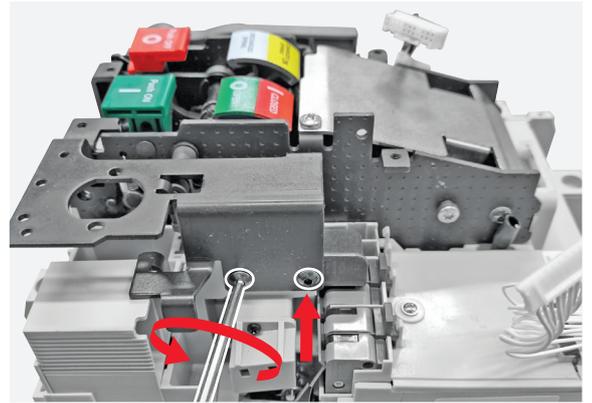
113

By means of the torx key unscrew the screw fixing the support key block over the MID to the operating mechanism.



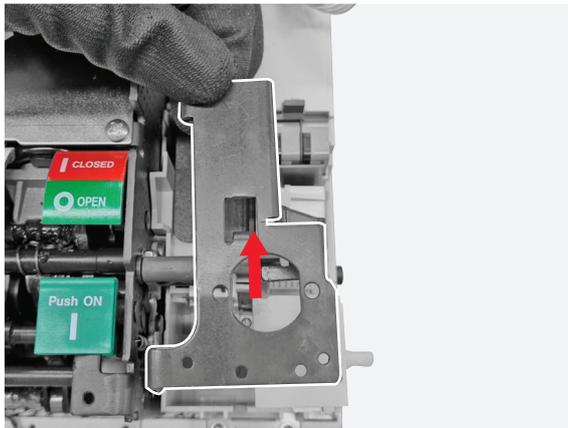
114

By means of the allen key unscrew the 2 screws fixing the support key block over the MID to the operating mechanism.



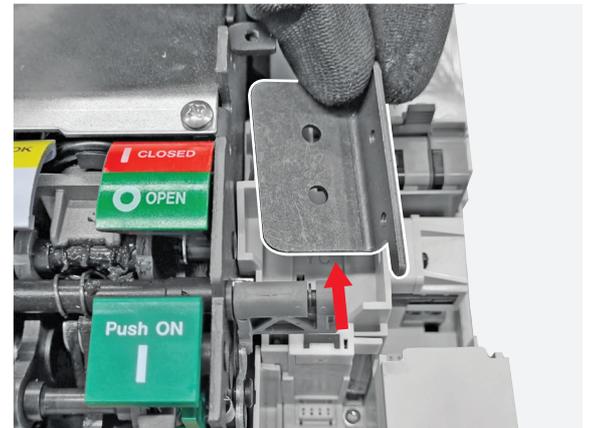
115

Manually remove the support key block.



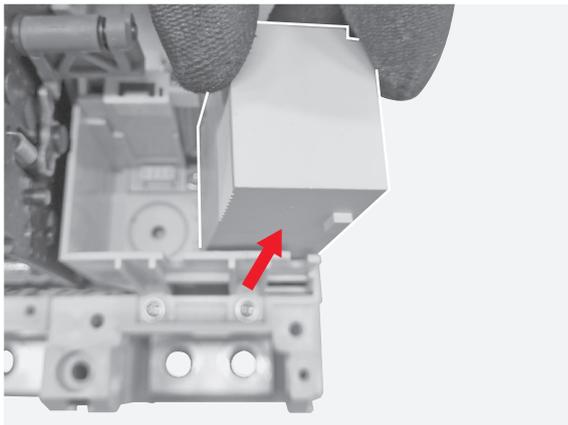
116

Manually remove the key lock support present below the support key block.



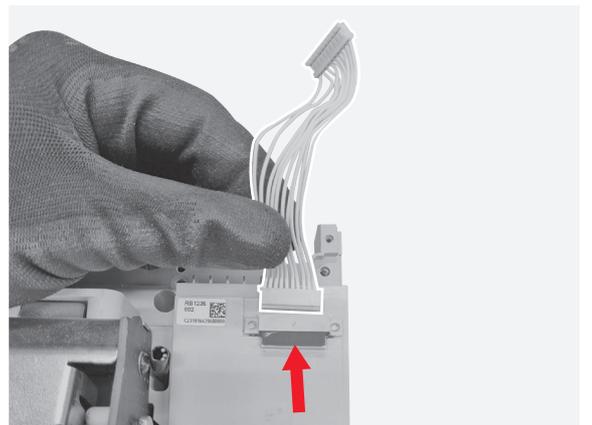
117

Manually lift and remove the shunt opening release plug.



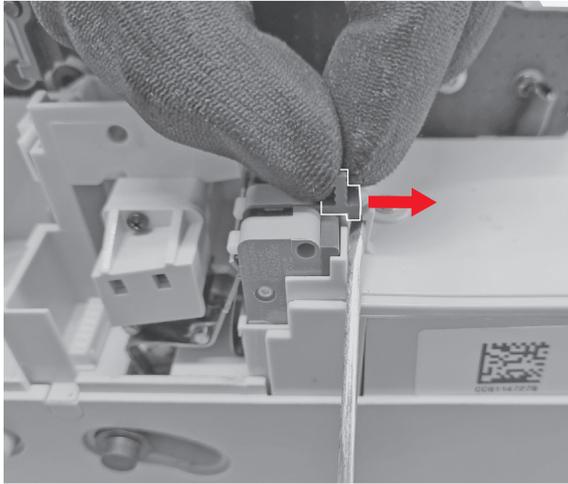
118

Manually remove the connector located in the upper part of the MID.

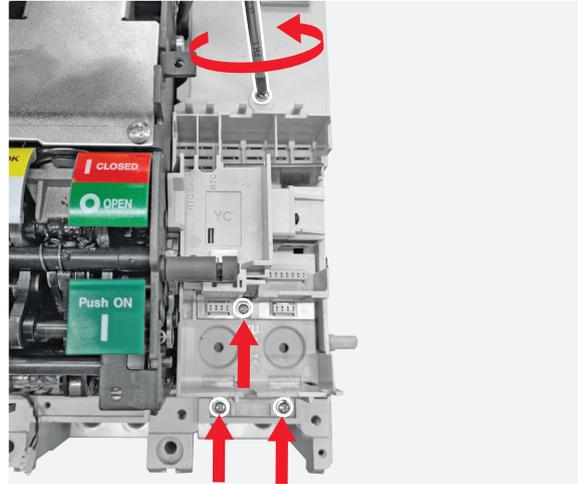


119

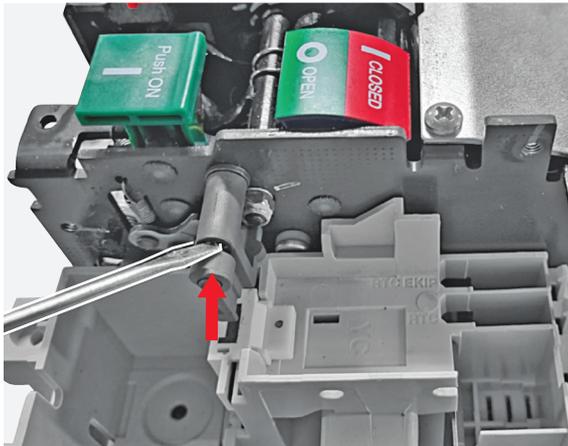
By means of the flat screwdriver push the appendix as indicated by the arrow and after manually remove the 2 couples of auxiliary contacts lifting them up.

**120**

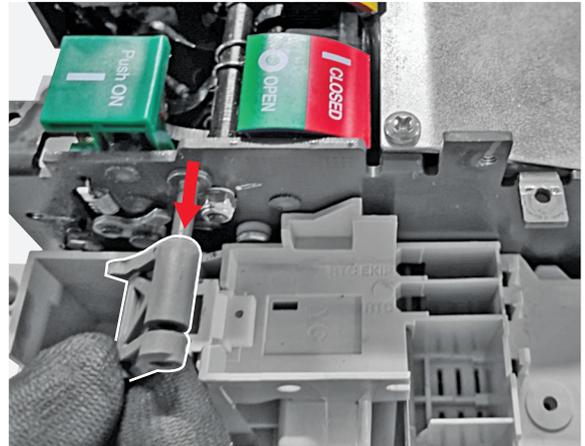
By means of the cross screwdriver unscrew the 4 screws fixing the MID to the circuit breaker main structure.

**121**

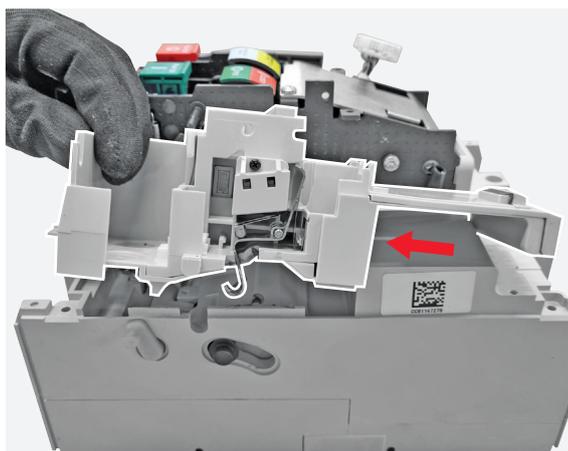
By means of the flat screwdriver remove the benzene mounted on the lever present on the right side of the operating mechanism.

**122**

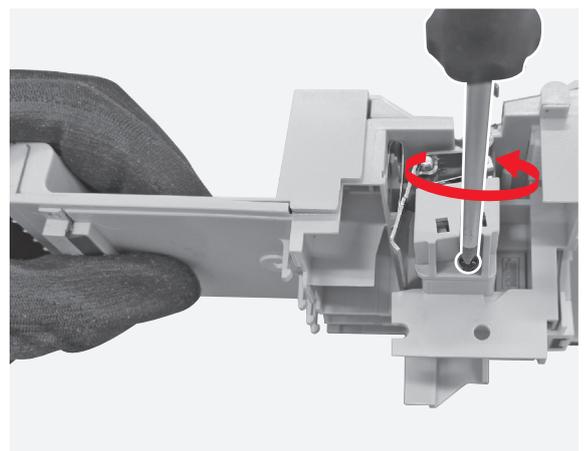
Manually remove the lever pulling it as indicated by the arrow.

**123**

Manually remove the MID.

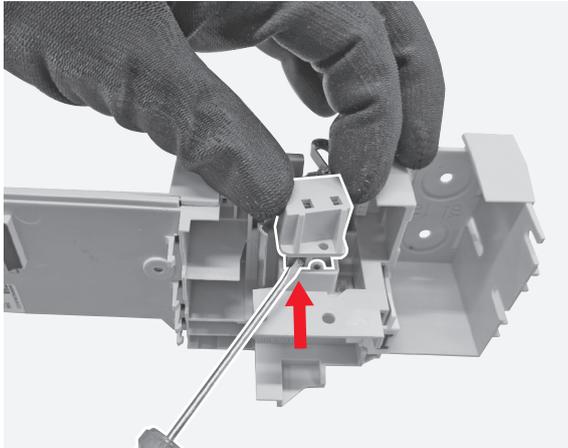
**124**

By means of the cross screwdriver unscrew the screw fixing the microswitch I/O assembly to the MID.

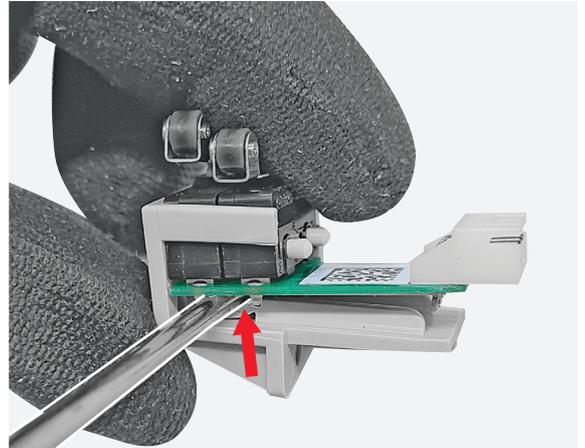


125

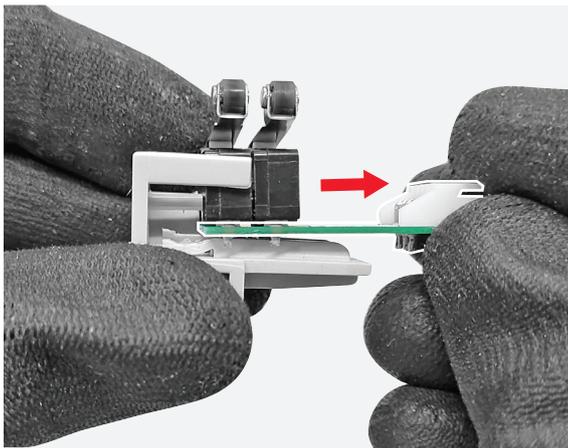
By means of the flat screwdriver push as indicated by the arrow the microswitch I/O assembly and manually remove it.

**126**

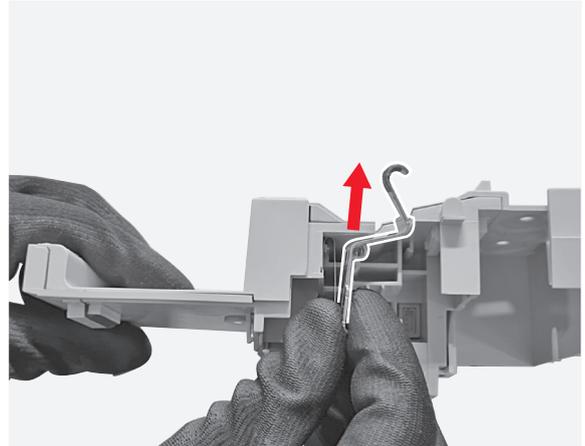
By means of the flat screwdriver unhook the printed circuit board mounted inside the microswitch I/O assembly.

**127**

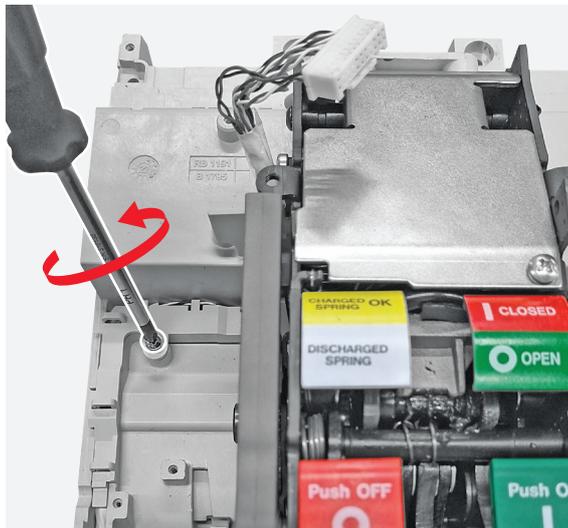
Manually remove the printed circuit board.

**128**

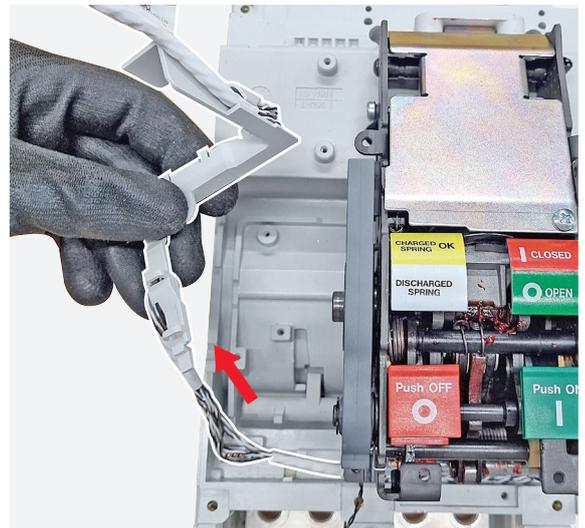
Manually remove the auxiliary contacts lever mounted on the MID.

**129**

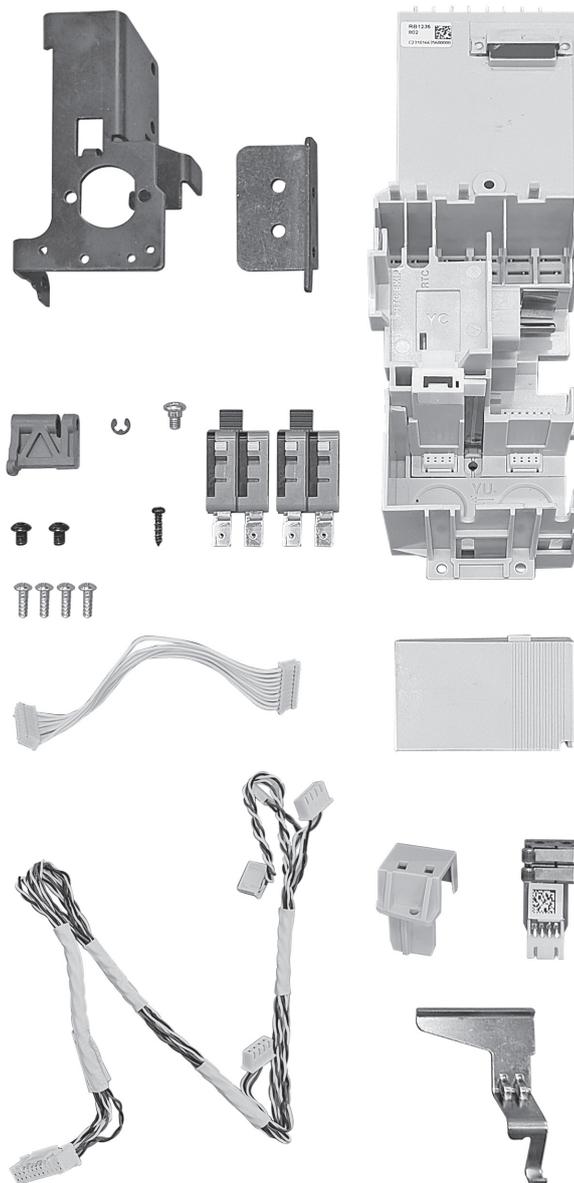
By means of the cross screwdriver unscrew the screw fixing the wires cover to the circuit breaker main structure.

**130**

Manually remove the wires cover and the wiring.



Disassembled parts

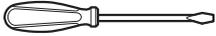


- 1 + 2 + 4 + 1 + 1 screws (Metal)
- 1 support key block (Metal)
- 1 key lock support (Metal)
- 1 shunt opening release plug (Plastic)
- 1 connector (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 2 + 2 auxiliary contacts (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 benzing (Metal)
- 1 lever (Plastic)
- 1 microswitch I/O printed circuit board (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 microswitch I/O assembly support (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 MID (Plastic, Metal and Electronic components) SEPARATE TREATMENT (Printed circuit board)
- 1 auxiliary contact lever (Metal)
- 1 wires cover (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 wiring (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)

6.8 PHASE 8 – OPERATING MECHANISM

Tools

Flat screwdriver



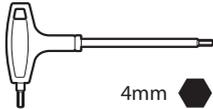
Cutter



Pliers

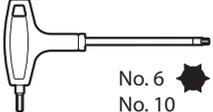


Allen key



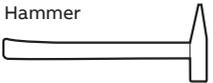
4mm

Torx key



No. 6
No. 10
No. 15
No. 20
No. 25

Hammer



Rod Ø5mm

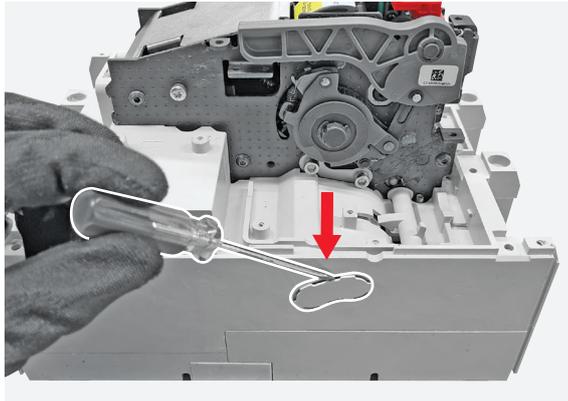


Min. 200mm

Actions to be performed

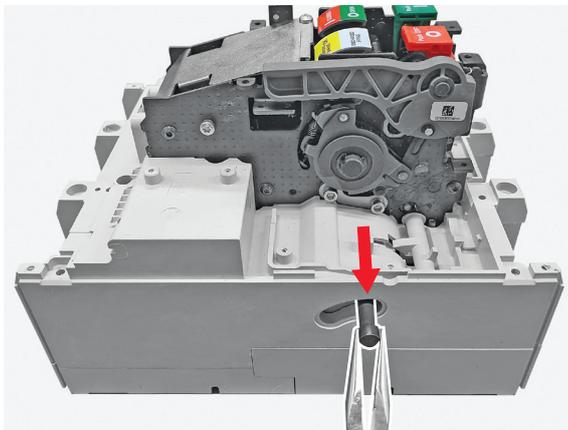
131

By means of the flat screwdriver remove the cover cap on the left side of the circuit breaker.



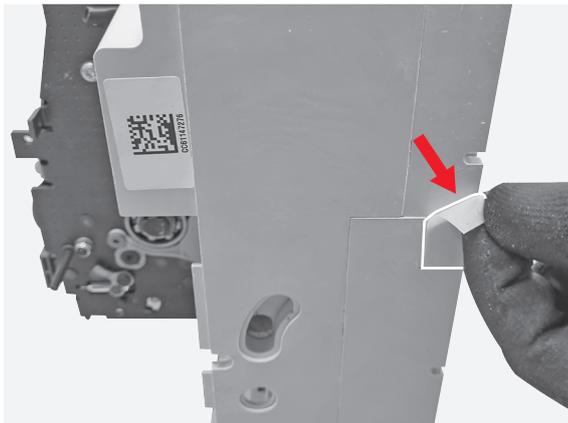
133

By means of the pliers remove the pin located in hole left by the cap cover.



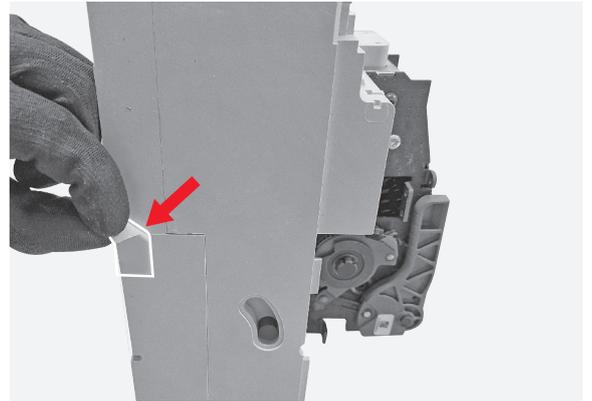
135

By means of the cutter start removing the protection plate located on the right side of circuit breaker and manually complete the operation.



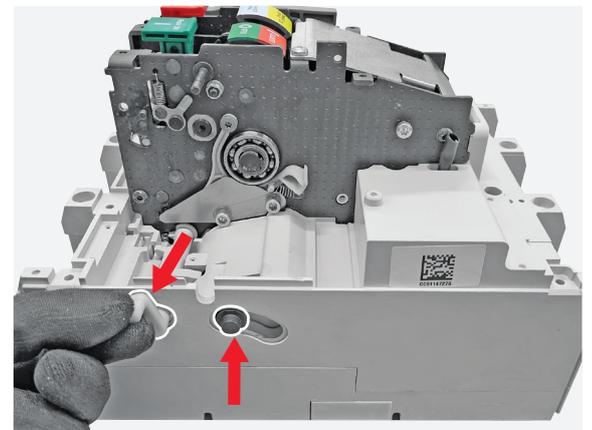
132

By means of the cutter start removing the protection plate located on the left side of circuit breaker and manually complete the operation.



134

Manually remove the open lever and the withdrawable pin located on the right side of the circuit breaker.



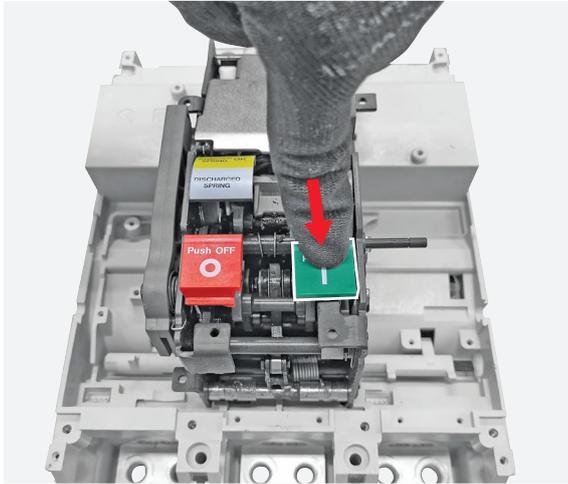
136

Manually charge circuit breaker springs.

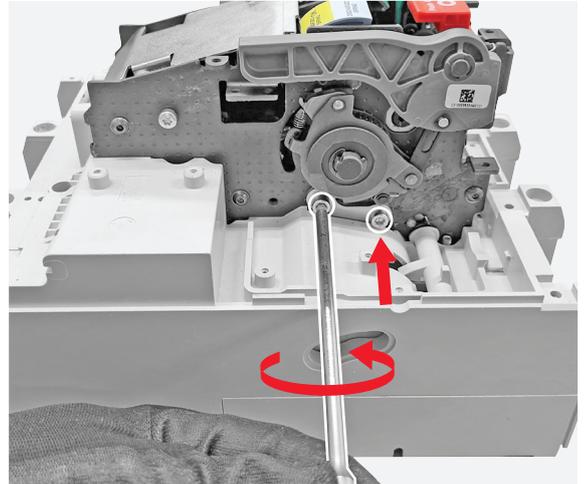


137

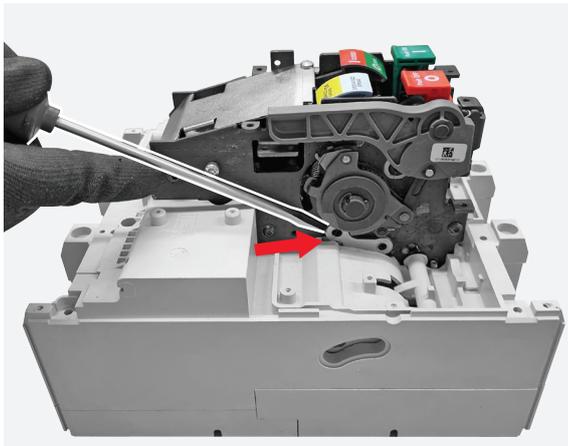
Close the circuit breaker pushing the close button.

**138**

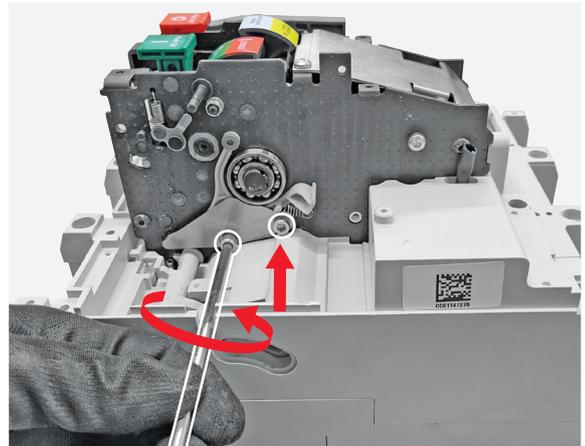
By means of the allen key unscrew the 2 screws located on the left side of the operating mechanism.

**139**

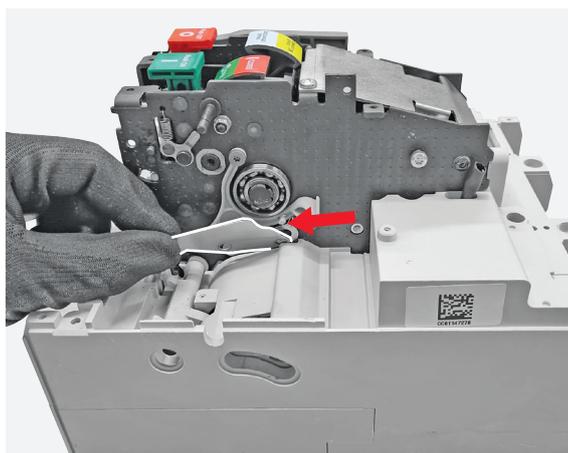
By means of the flat screwdriver push the shaft support as indicated by the arrow.

**140**

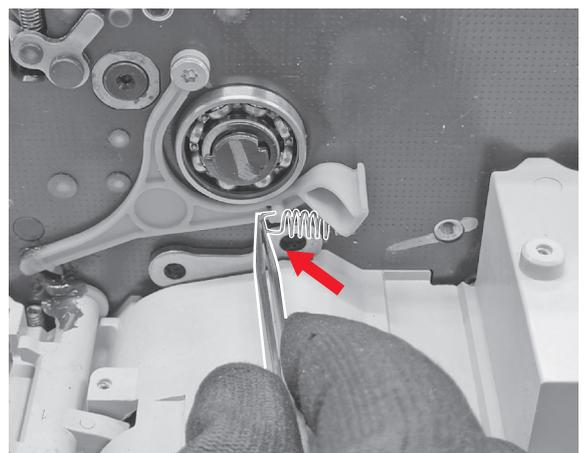
By means of the allen key unscrew the 2 screws located on the right side of the operating mechanism.

**141**

Manually remove the plate located in the place where the 2 screws had been unscrewed at step before.

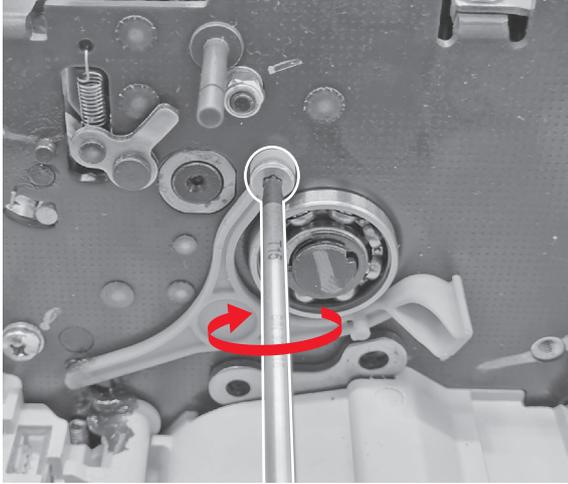
**142**

By means of the pliers remove the spring.

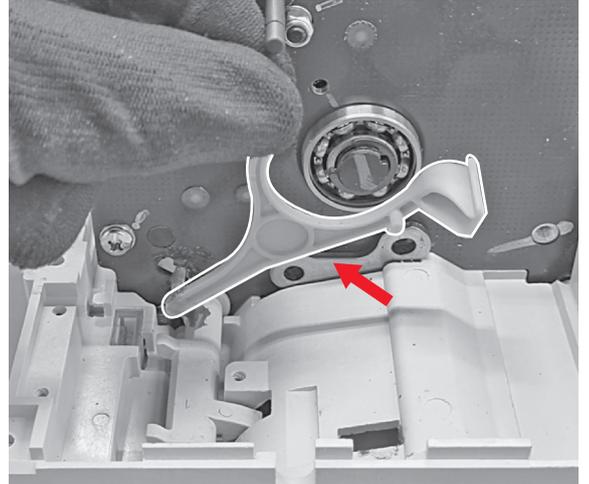


143

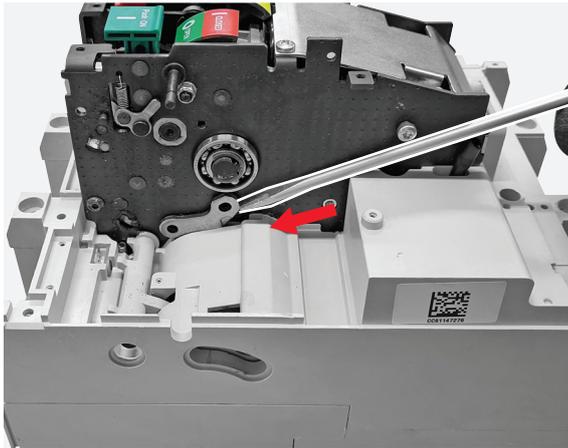
By means of the torx key (size 15) unscrew the screw fixing the RTC lever to the operating mechanism.

**144**

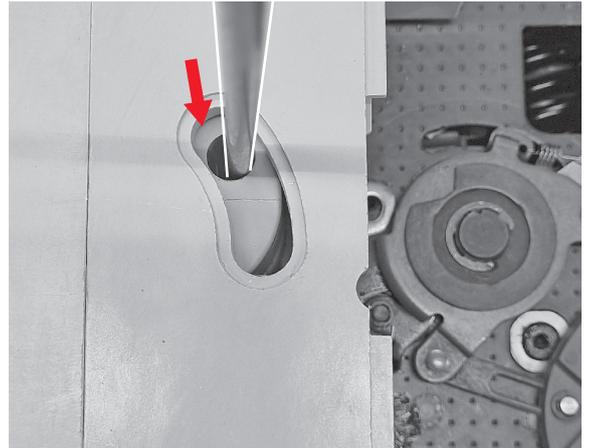
Manually remove the RTC lever.

**145**

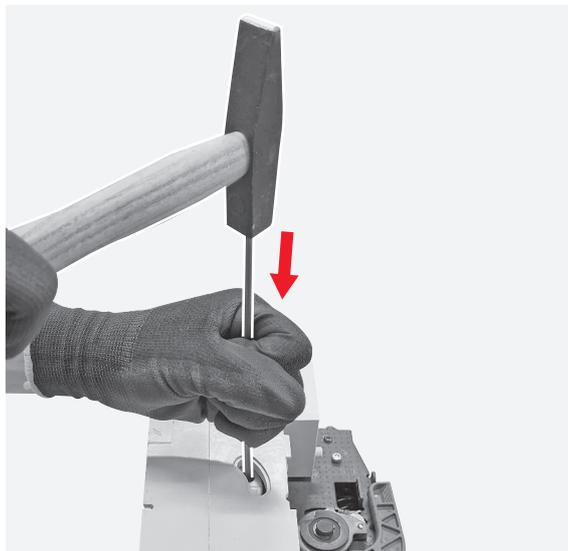
By means of the flat screwdriver push the shaft support as indicated by the arrow.

**146**

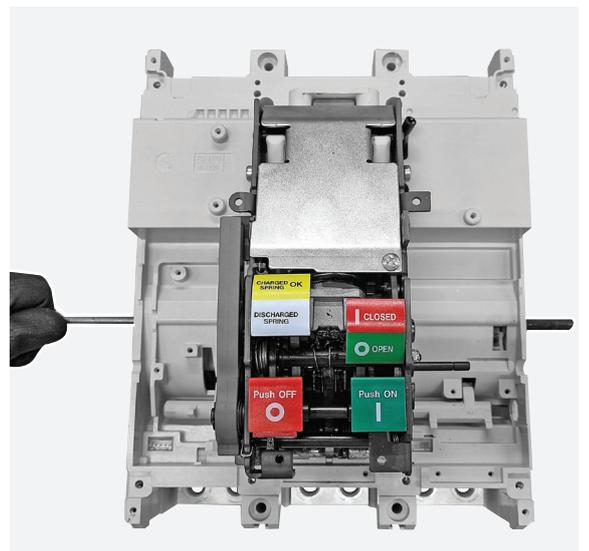
Put the circuit breaker with the left side up and insert the rod in the hole left by the cover cap.

**147**

Push down the rod using the hammer.

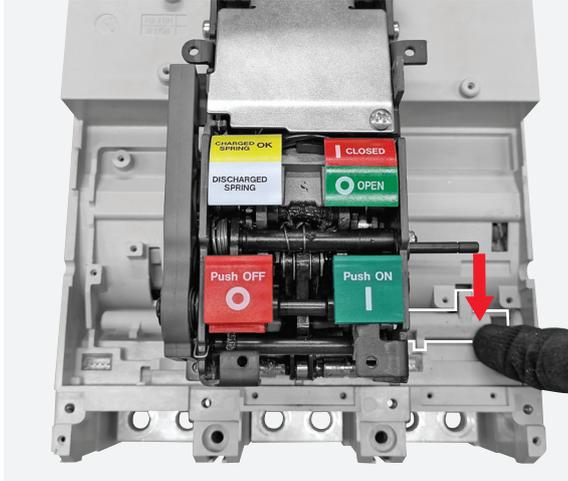
**148**

Put the circuit breaker with front up and push the rod as indicated by the arrow until the pin comes out from the hole left by the cover cap on the right side of the circuit breaker and after remove the rod.

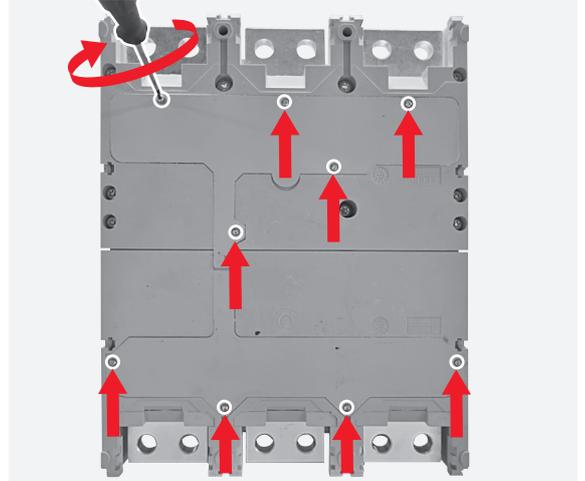


149

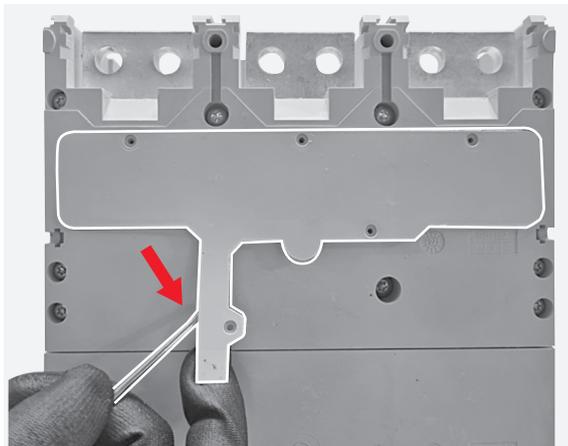
Manually push the lever mounted on the bottom right part of the circuit breaker main structure.

**150**

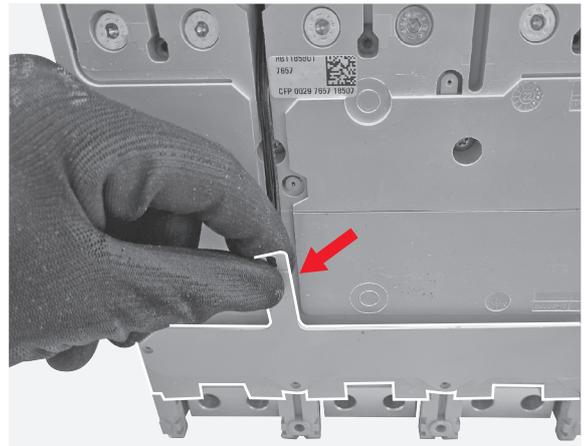
By means of the torx key (size 6) unscrew the 9 screws fixing the 2 rear plates mounted on the back part of the circuit breaker.

**151**

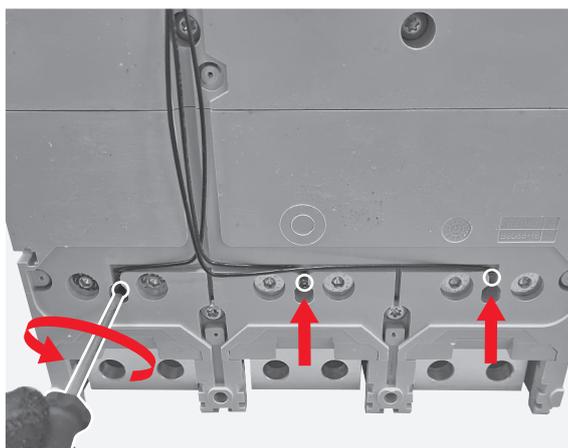
By means of the flat screwdriver remove the rear plate mounted on the upper part of the circuit breaker.

**152**

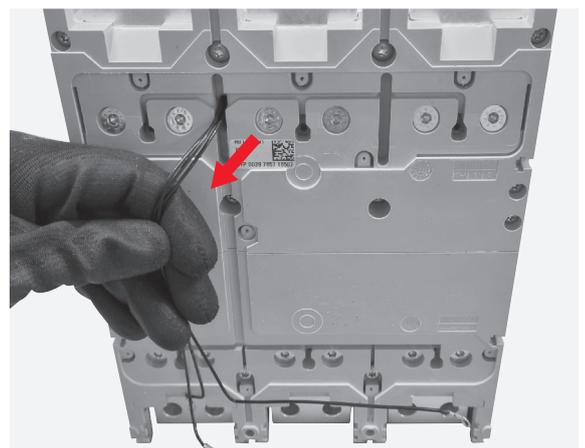
Manually remove the rear plate mounted on the lower part of the circuit breaker.

**153**

By means of the torx key (size 10) unscrew the 3 screws fixing the wires.

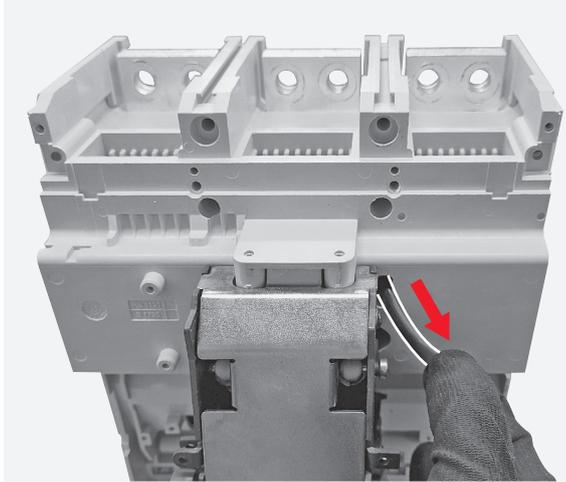
**154**

Manually pull the 3 wires located on the back part of the circuit breaker main structure.

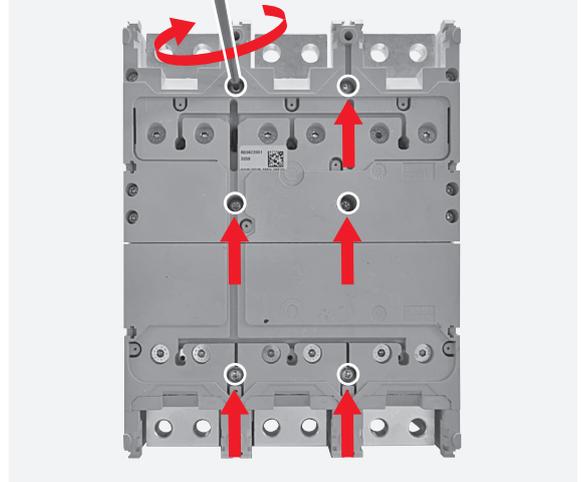


155

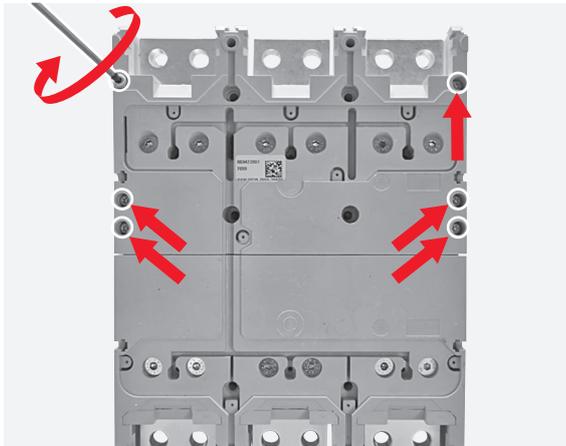
Manually pull the conduit on the front part of the circuit breaker main structure.

**156**

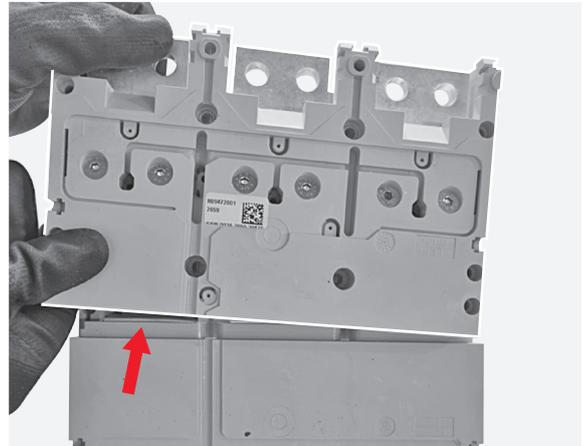
By means of the torx key (size 25) unscrew the 6 screws located in the back part of the circuit breaker.

**157**

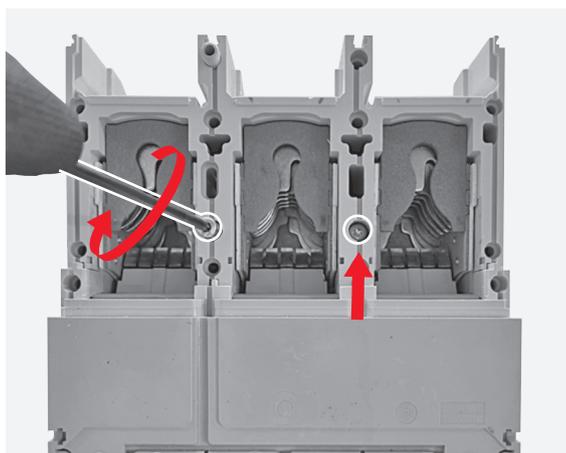
By means of the torx key (size 20) unscrew the 6 screws located in the back part of the circuit breaker.

**158**

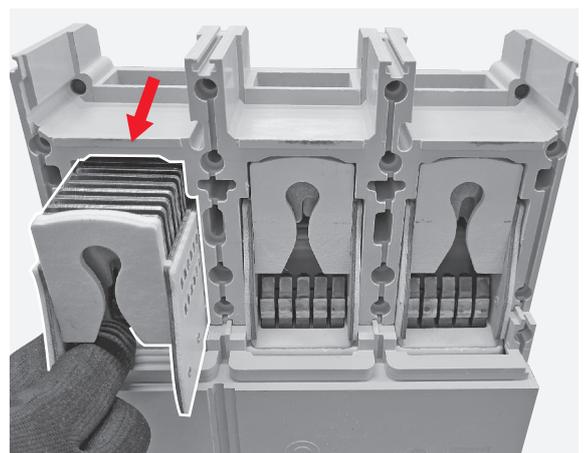
Manually remove the upper case assembly.

**159**

By means of the torx key (size 25) unscrew the 2 screws located in the back part of the circuit breaker.

**160**

Manually remove the 3 arching chambers.

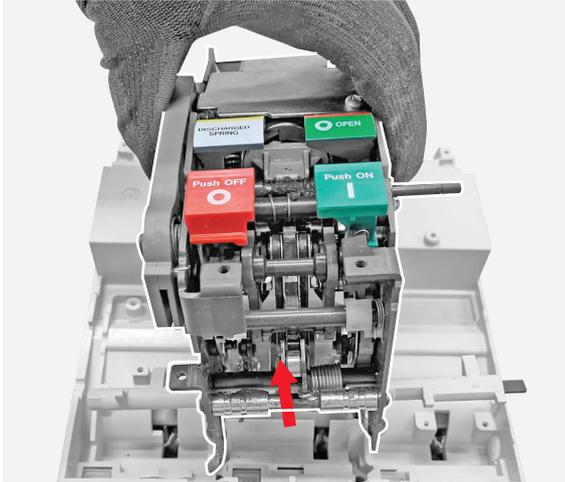




Operating mechanism contains springs: their removal constitutes a potential hazard if not performed in the proper way and using dedicated tools. Based on this ABB indication is not to remove them from the operating mechanism and to manage the assembly with the maximum level of attention during disassembly and dismantle phases.

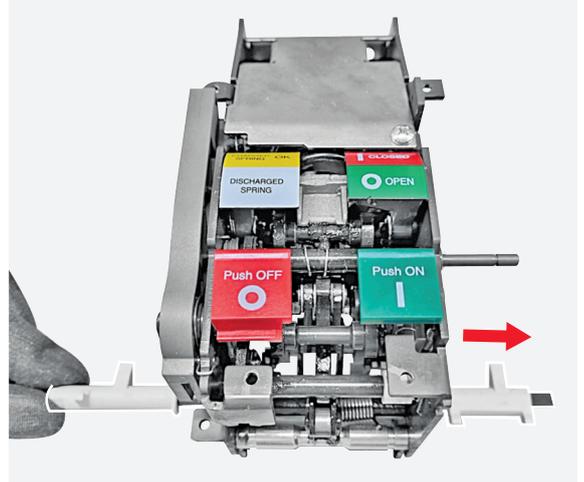
161

Manually lift the operating mechanism and remove it from circuit breaker main structure.



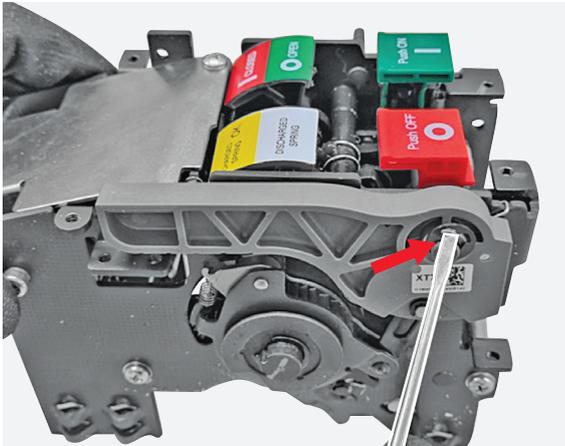
162

Manually remove the 2 unlocking shafts mounted on the pin of the operating mechanism.



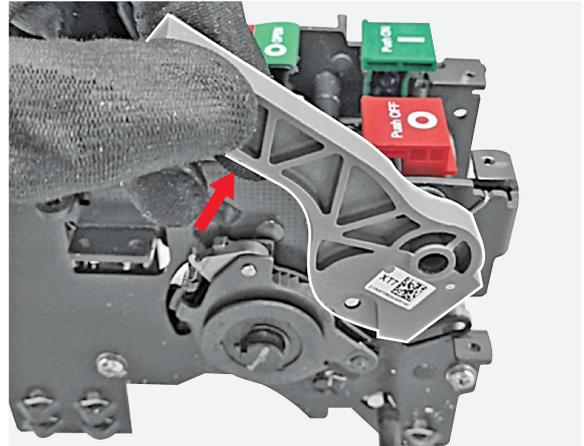
163

By means of the flat screwdriver unhook the 2 benzings fixing the springs charging lever to the operating mechanism.



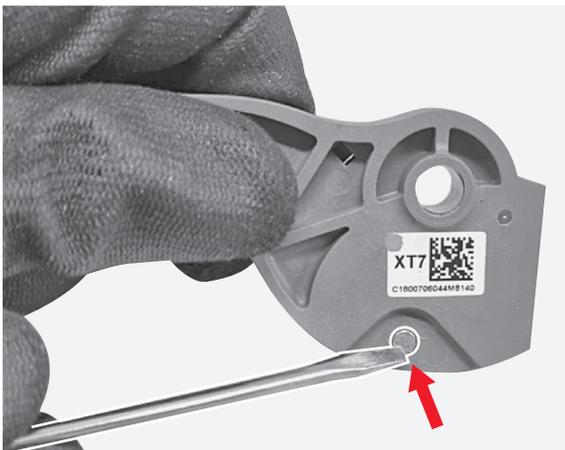
164

Manually remove the springs charging lever.



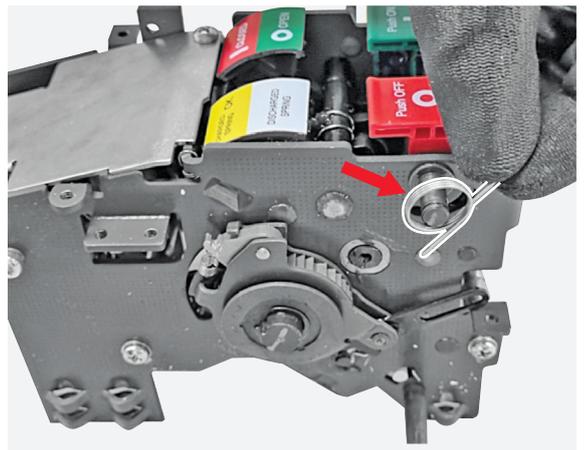
165

By means of the flat screwdriver remove the pin mounted on the springs charging lever.

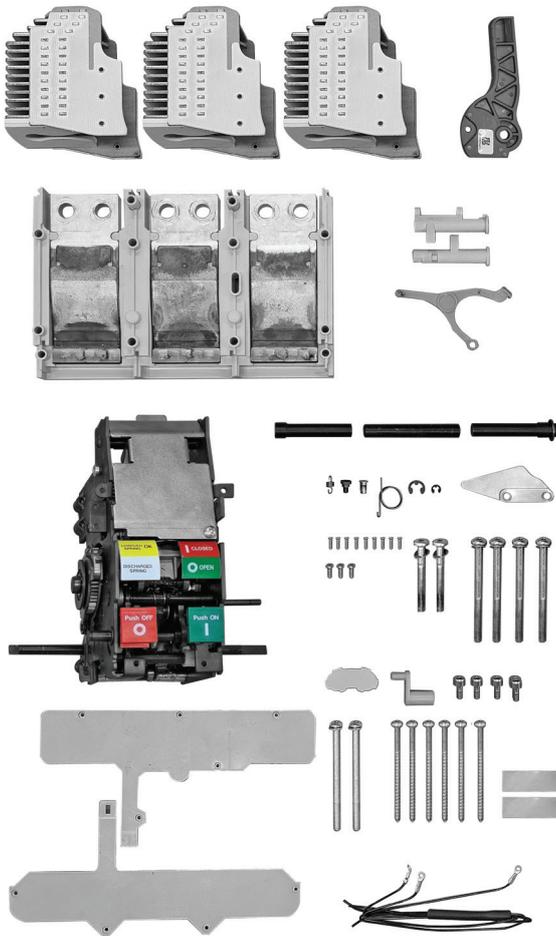


166

Manually remove the spring located on the operating mechanism.



Disassembled parts



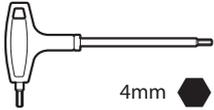
- 1 cover cap (Plastic)
- 2 protection plate (Polyester tape)
- 1 + 1 + 1 pin (Metal)
- 1 open lever (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 withdrawable pin (Metal)
- 2 + 2 + 1 + 9 + 3 + 6 + 6 + 2 screws (Metal)
- 1 plate (Metal)
- 1 + 1 springs (Metal)
- 1 RTC lever (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 2 rear plates (Plastic)
- 1 upper case assembly (Plastic and Metal) *
- 3 wires (Plastic and Metal)
- 1 conduit (Thermoplastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 operating mechanism (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 3 arching chambers (Plastic and Metal)
- 2 unlocking shafts (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 springs charging lever (Plastic and Metal) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 1 + 1 benzings (Metal)

*Upper case assembly will be furtherly disassembled (see phase 6.7).

6.9 PHASE 9 – UPPER CASE ASSEMBLY AND UPPER FIXED CONTACTS

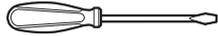
Tools

Allen key



4mm

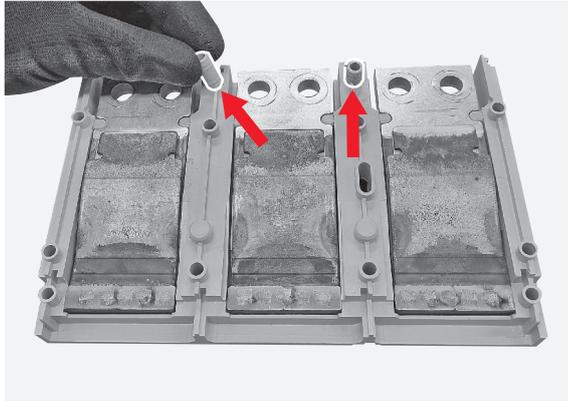
Flat screwdriver



Actions to be performed

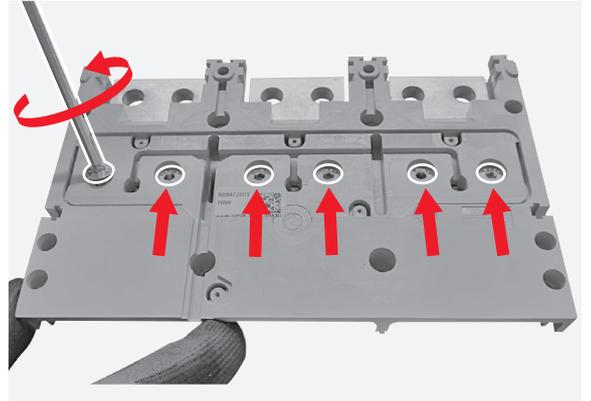
167

Manually remove the 2 protections located in the upper part of the upper case assembly.



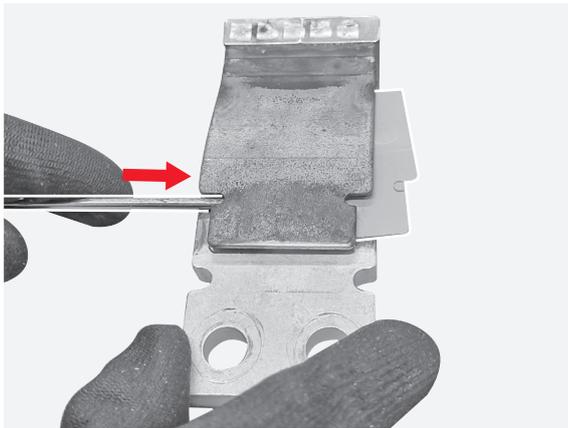
168

By means of the allen key unscrew the 6 screws fixing the fixed contacts and make them fall down by gravity.

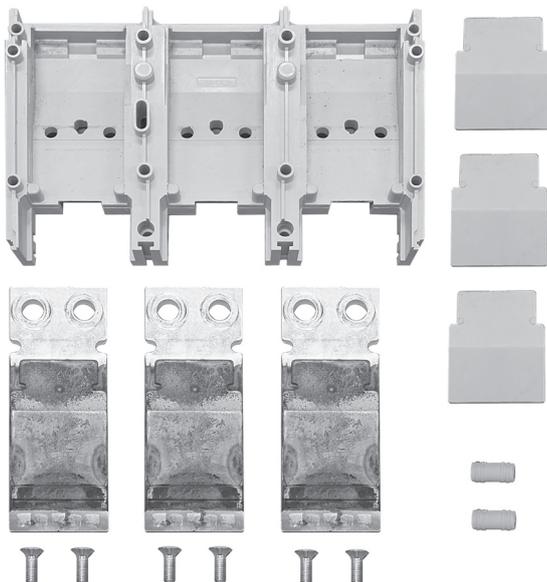


169

By means of the flat screwdriver remove the plastic part from the upper fixed contacts.



Disassembled parts

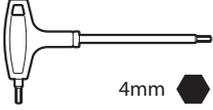


- 2 protections (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 6 screws (Metal)
- 3 plastic parts (Plastic) SEPARATE TREATMENT (Thermoplastics containing brominated flame retardants)
- 3 fixed contacts (Plastic and Metal)
- 1 upper case assembly (Plastic)

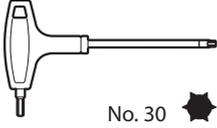
6.10 PHASE 10 – LOWER CASE ASSEMBLY, MOVING CONTACTS ASSEMBLY AND SENSORS

Tools

Allen key



Torx key



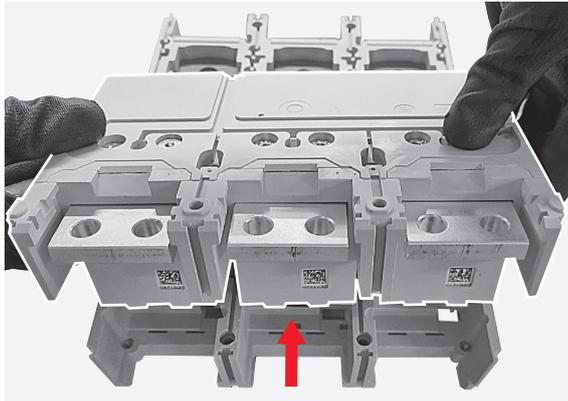
Flat screwdriver



Actions to be performed

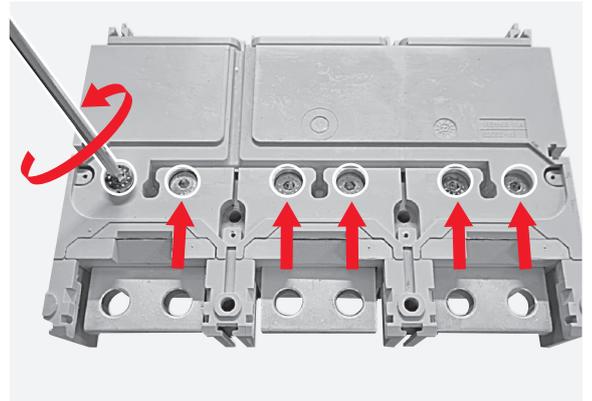
170

Manually lift the lower case assembly and complete the removal.



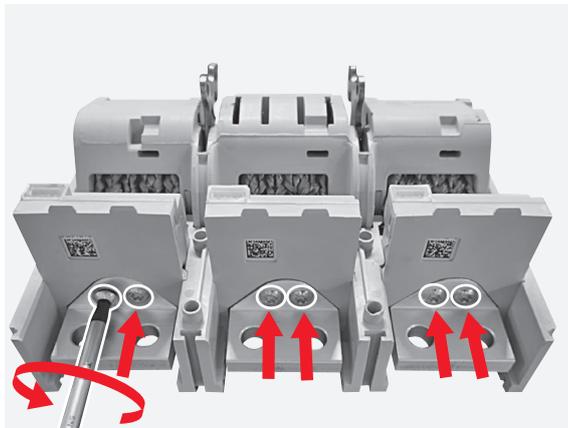
171

By means of the allen key unscrew the 6 screws located in the back part of the lower case assembly.



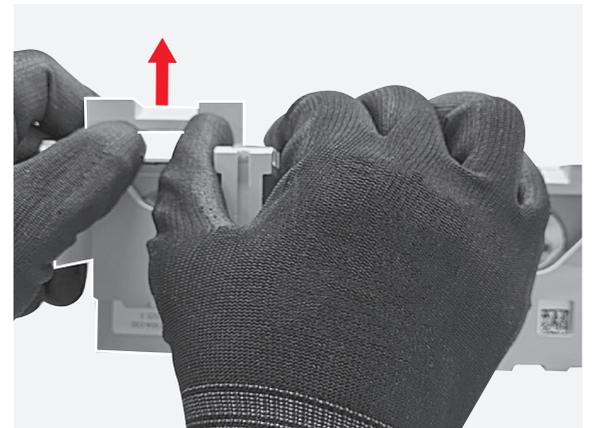
172

By means of the torx key unscrew the 6 screws fixing the fixed contacts to the lower case assembly and after manually complete the removal operation.



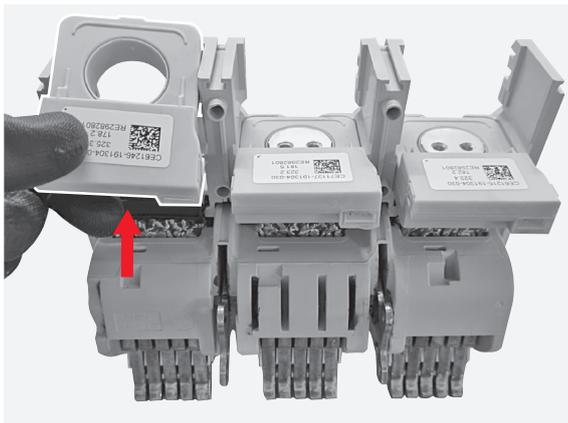
173

Manually push the cover mounted below the sensors as indicated by the arrow.



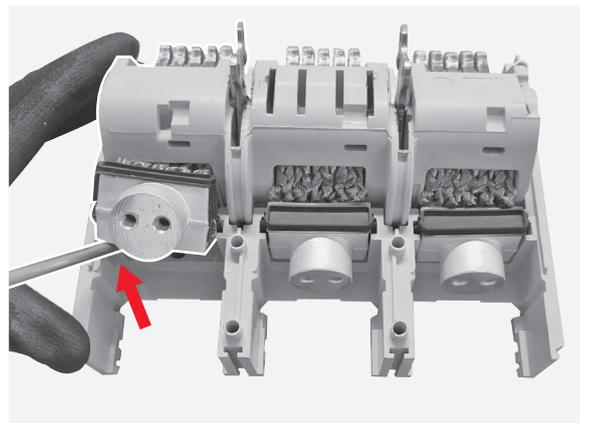
174

Manually remove the sensors.



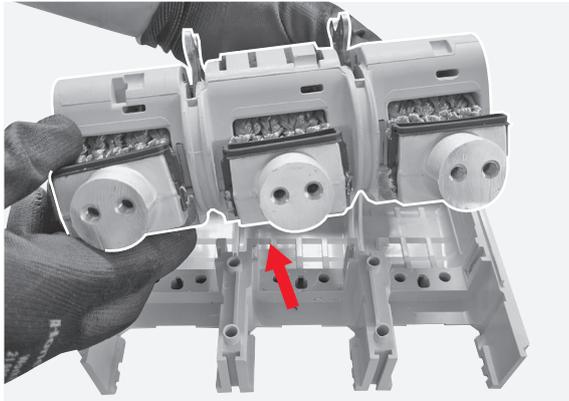
175

By means of the flat screwdriver lift the moving contacts assembly until it's unhooked from the lower case.



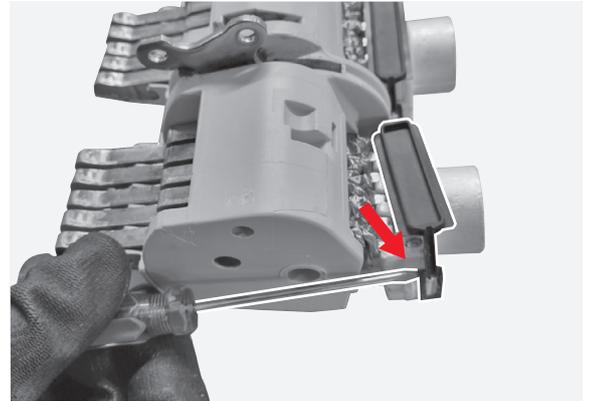
176

Manually remove the moving contacts assembly.

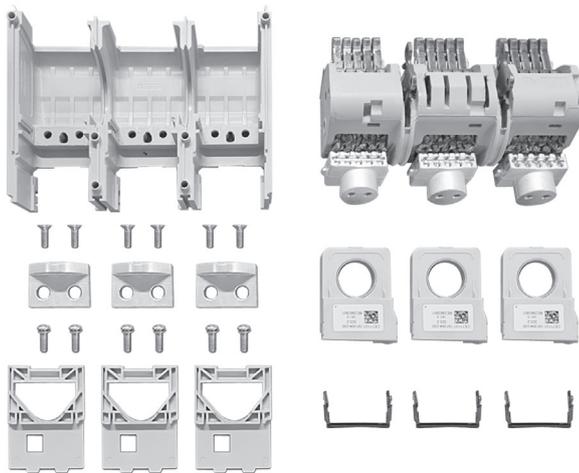


177

By means of the flat screwdriver unhook from both sides the insulation protection and after manually complete the removal.



Disassembled parts

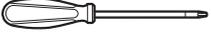


- 6 screws (Metal)
- 6 screws and related washers (Metal)
- 3 fixed contacts (Metal)
- 3 covers (Plastic) SEPARATE TREATMENT (Thermoplastics containing bromintated flame retardants)
- 3 sensors (Plastic and Mixture) SEPARATE TREATMENT (Thermoplastics containing bromintated flame retardants)
- 1 moving contacts assembly (Plastic and Metal)
- 3 insulation protections (Thermoplastic rubber) SEPARATE TREATMENT (Thermoplastics containing bromintated flame retardants)
- 1 lower case assembly (Plastic)

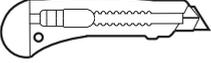
6.11 PHASE 11 –CIRCUIT BREAKER COVER

Tools

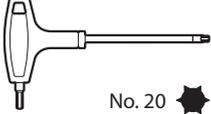
Cross screwdriver



Cutter

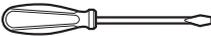


Torx key



No. 20

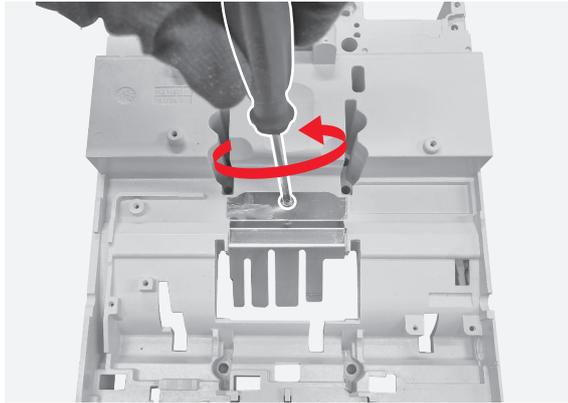
Flat screwdriver



Actions to be performed

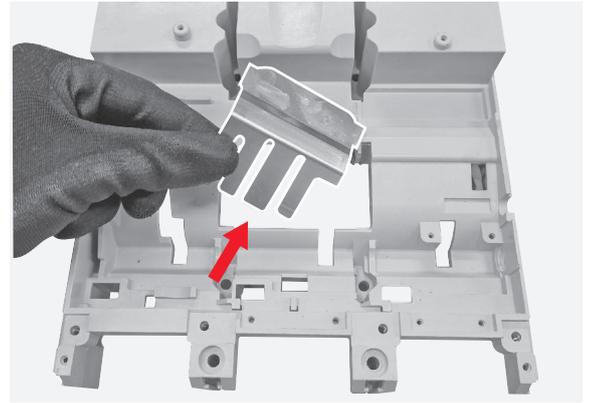
178

By means of the cross screwdriver unscrew the screw fixing the metallic command protection to the circuit breaker cover.



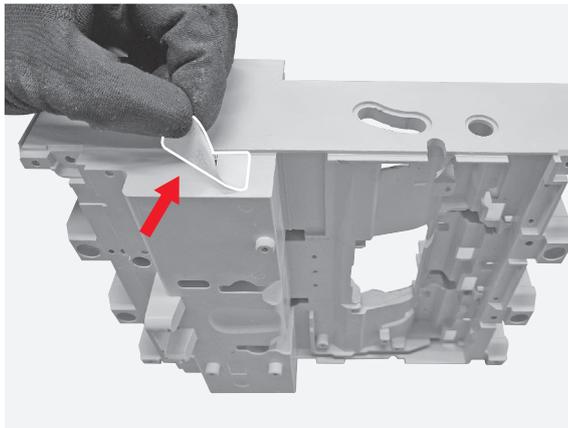
179

Manually complete the removal of the command protection.



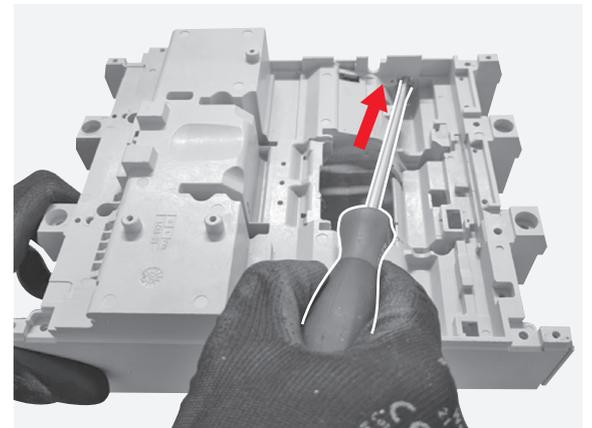
180

By means of the cutter start removing the label located on the right side of the circuit breaker cover and manually complete the operation.

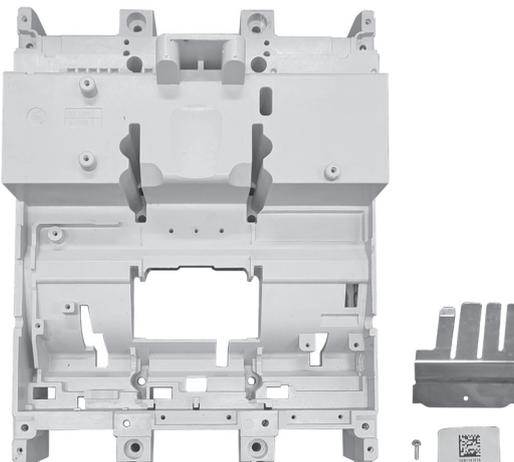


181

By means of the flat screwdriver remove the plug from the circuit breaker cover.



Disassembled parts



- 1 screw (Metal)
- 1 command protection (Metal)
- 1 label (Adhesive paper)
- 1 plug (Plastic)
- 1 circuit breaker cover (Plastic)

7. ENERGY CONSUMPTION FOR CIRCUIT BREAKERS DISASSEMBLY

Since all disassembly operations illustrated in this document are manual, the CO₂ equivalent emissions can be considered null/negligible.



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