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1. Warning

The use of mechanical operation counter is suggested to ease the planning and scheduling of periodical maintenance of the product.

Maintenance and periodical checks are intended to be performed by trained and qualified people. Read this document and the instruction manual carefully before attempting to install, operate or service any circuit breaker of this family.

Use only original and authorized spare parts and accessories.

Keep this documents available for the installation, operation and maintenance of this equipment.

The use of these instructions will facilitate proper maintenance of the equipment.

Before to start, please follow the safety recommendations listed below:

- Disconnect device from its supply. Any device part has not to be under voltage (power or auxiliary circuitry); please verify insulation.
- Breaker must be in OPEN status, with its spring discharged (OFF- DISCHARGED).
- Be sure that the breaker has no residual heating to avoid injuries.
- Make safe in compliance with current laws.

For correct device handling, please refer to device instruction sheets.

Injuries and serious damages to devices could arise if previous indications will not be followed. During maintenance activities described in this manual, people in charge of the work must ensure the safety for people and devices, using every tool and procedure needed for that.

Before to start, please verify that:

- All connections are tightened with the appropriate torque.
- All protective covers are mounted in the right way. Do not remove covers, open doors or work on equipment unless all circuits have been deenergized, and after making sure of that with a suitable measuring instrument.

- The breaker is in OFF-DISCHARGED status.

Note

It's recommended to use the original maintenance kit. It's recommended to save and store every maintenance action done on every device.

In any circumstance, Legrand will never be considered responsible on device damages in case of periodical maintenance carried out not following indications and timings illustrated in this manual.

2. Frequency of maintenance

Service intervals shall have to be assessed accordingly in case of non-standard (different than the relevant product standard indications) environmental and operation conditions.

It's recommended to plan and schedule a periodical maintenance (according to this manual), in order to:

- Verify product goodness.

- Identify damaged parts and/or accessories.

- Organize preventive actions to avoid emergencies. It's recommended to save and store every maintenance action done on every device. In the following it will be possible to find all Level 1 and Level 2 maintenance actions and suggested frequency.

In particular, Level 1 actions (completely explained in this manual) can be performed by trained technicians or qualified staff who are thoroughly familiar with the equipment.

For Level 2 actions, please contact Legrand Service support.

Even circuit-breakers that remain OPEN or CLOSED for long periods or lightly loaded/operated should be subject to the maintenance programme.

Level 1 Maintenance - Explained in this maintenance guide

	Frequency-time		Frequency-cycles		
Check	1 year	2 years	at In	Without current	Procedure
Mechanism					MCH
- Correct working and lubricating	•		3000	5000	MCH-I
- Check the seals	•		3000	5000	MCH-II
Arc chutes	•		3000	-	CTS
Main contacts					MNC
- Visual	•		3000	5000	MNC-I
Draw-out system *					DWT
- Check the correct working	•		3000	5000	DWT-I
- Insulation shutter		•	3000	5000	DVVT-II
- Cluster contacts		•	3000	5000	DWT-III
- Sliding aux contacts		•	3000	5000	DWT-IV
- Lubrication of draw-out chassis		•	3000	5000	DWT-V
- Draw-out mechanism		•	3000	5000	DVVT-VI
Terminals	•		3000	5000	TRM
Aux contacts					AXL
- Visual check	•		3000	5000	AXL-I
- Functional Test:		•	3000	5000	AXL-II
Motor drive CC ST UVR					ECSR
- Functional test	•		3000	5000	ECSR-I
- Lubricating of motor gear		•	3000	5000	ECSR-11
Mechanical Accessories					MCSR
- Open position lock	•		-	-	MCSR-I
- Draw-out shutter lock	•		-	-	MCSR-II
Mechanical interlock		•	-	-	NTK
Trip Unit	•		-	-	PRT

Level 1 Maintenance

Maintenance intended to be used by trained and qualified customer technicians who are familiar with safety standards requirements for circuit

breaker and distribution system. These level 1 procedures are explained in this maintenance guide

* must be checked after 200 "draw-out/draw-in" cycles

Level 2 Maintenance

Level 2 Maintenance

Maintenance intended to be used only by LEGRAND service or by certified/qualified Company. For this reason the explanation of these second level procedures is not included in this maintenance guide. Level 2 maintenance is suggested with a 4 years frequency for the various checks and verifications made available by LEGRAND service and/or certified/qualified Company.

The maintenance frequency must be intended with following operating and environment condition:

Normal operating and environment conditions			
Load	$\leq \ln$		
Temperature	-5°C -40°C, Average annual temperature <35°C		
Dust	Low level, or with panel-board IP40		
Relative humidity	<50% (40°C)		
Pollution Degree	3 grade		
Salt environment	None (IEC 60068-2-52)		
Vibration	None (IEC 60068-2-6)		

If real operating and environment condition are more severe than Normal one (described in previous table):

- The level 1 maintenance frequency must be reduced by half, but anyway never less than 1 year

- The level 2 maintenance doesn't change its frequency

Excessive vibrations, extreme atmospheric conditions or polluted atmosphere may anyway shorten the device life for the application. Consult LEGRAND.

Unless otherwise specified in the maintenance procedures, all operations must be carried out without supply (power and aux circuit) and with breaker in position OFF-DISCHARGED.

If in procedure there are different indications, at the end of procedure the breaker must anyway be in the safe condition: no supply in power and aux circuit and OFF-DISCHARGED



discharged

Check the compatibility between electrical acces-

Disconnect the breaker from the supply, both the

0

discharged

Draw-out

version

sories and the voltage used

power and auxiliary circuit

Perform a close/open cycle

Fixed version

3. Preliminary work

- front covers and IP protection

identification labels

Check the general condition of breaker, if there

are broken parts, ageing or damaged parts

- Protection Unit display and enclosure

In case of draw-out breaker, remove the breaker from chassis

0



Remove the front cover



4. Maintenance procedures 4.1 MCH - Mechanism

Necessary tools:

- Cross screw drivers
- Spanner n.8
- Lubricant



4.1.1 MCH-I - Correct working and Lubricating

Close the breaker and charge the spring manually.

• Check the correct working

Do at least n°1 charge/close/open Cycle

0	discharged
0	charged
I	discharged
0	discharged

The main contacts must remain in closed position. If breaker open (see the ON-OFF indication) \rightarrow contact LEGRAND.

At the end get the breaker in open position with springs discharged





• Lubricating

Clean the mechanism with dry air compressed Lubricate (Rheolube 361F) the parts as shown in pictures. After lubricating do a cycle charge/close/open.





4.1.2 MCH-II - The seals

• Visual check

Check the integrity of seals as shown in pictures. If the seals are broken, follow the instructions in the next paragraph.



• **Screws tightening** In case of broken seals: tighten the screws as shown in pictures.



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4.2 CTS - Arc Chutes

Necessary tools:

- Cross screw drivers
- Ohmmeter
- Allen key (hexagonal wrench) 3mm

• Visual and cleaning

Remove the arc chutes.

Check presence of broken or damaged parts. In case of broken parts \rightarrow replace the arc chute (spare part).

Fixed version:

Check the presence of copper dust or traces of melted copper Clean with dry compressed air. If necessary replace the arc chute (spare part).

• Check the insulating between arc chute plates Clean with dry compressed air.

By using an ohmmeter check the insulating between arc chutes plates.

If necessary replace the arc chute (spare part).



Draw-out version:



4.3 MNC - Main contacts

Necessary tools: - Cross screw drivers



4.3.1 MNC-I - Visual

• **Presence of dust, etc** If necessary clean with dry cloth and alcohol

• **Condition of main contacts surface** In case of damaging surface treat it with glass-paper (n°320). Clean with dry compressed air

If the main contacts are excessively worn please \rightarrow contact LEGRAND



4.4 DWT - Draw-out system

Necessary tools:

- Cross screw drivers

- Lubricant

- Allen key (hexagonal wrench) 4mm



Operate the draw-out system only with a breaker present. Operating it without breaker may damage permanently the draw-out cell.



4.4.1 DWT-I - Correct working of draw-out system

• Check the correct working of draw-out system

- Insert the breaker in the draw-out chassis
- Get the breaker in inserted position test position drawout position



- Verify that:

In TEST and INSERTED POSITION is possible to operate the breaker (close and open) It is possible close and lock the shutter with padlock (drawout position) Check key lock if present (see MCSR-II)

- <u>Get the breaker in middle (not definite) position</u> <u>and verify</u>



it is NOT possible to close the breaker. it is NOT possible close and lock the shutter with padlock

Check key lock if present (see MCSR-II)

At the end get again the breaker in open position with springs discharged

discharged

In case of Inserted/test/draw-out contacts see the procedure "AXL"



4.4.2 DWT-II - Insulation shutter

• Check the correct working of insulation shutter

Cluster contacts inspection remove space, simulate the insertion of a D/O breaker: the shutters must get completely up.



• Visual check of insulation shutter

If there are some parts damaged, replace those damaged parts (Spare parts)



4.4.3 DWT-III - Cluster contacts

• Visual check and cleaning

Open insulation shutter for cluster contact



If necessary (dust, oxidation, blackened, etc.) clean the cluster contacts with dry clothe. If necessary remove the cluster contacts.

• Check the presence of damaging and replacement

If cleaning is not enough or there are traces of damaging, remove insulation shutters and replace the cluster contacts (spare parts).



4.4.4 DWT-IV - Sliding Aux contact

• Visual

Check the right position of sliding contacts Check damaged parts



• Clean and lubricate

In presence of dust clean with dry cloth the parts highlighted in pictures Lubricate (Nyogel 760G) the parts as shown in pictures



In presence of damaged aux terminals, replace them (spare parts).



4.4.5 DWT-V - Cleaning and Lubrication of draw-out chassis

Vacuum the dust on bottom of draw-out chassis. Clean the parts indicate in picture with dry cloth. Lubricate (Rheolube 361F) the parts as shown in pictures: guide rail.



4.4.6 DWT-VI - Draw-out mechanism

Clean with dray cloth the worm screw of mechanism. Lubricate (Rheolube 361F) the worm screw of mechanism.



4.5 TRM - Power Terminals

Necessary tools:

- Allen key (hexagonal wrench) T5



• Visual / Seals

Check the integrity of seals as shown in pictures



• Visual / Screws tightening

In case of broken seals: tighten the screws with 8Nm as shown in pictures.



If is not possible to tighten the screw please \rightarrow contact LEGRAND

• Status

Check the status and color of power terminals

If there is a change in color (which indicates an abnormal temperature rise) \rightarrow check the seals and tightening of power terminals (Check the connection bars tightening too)

If there is oxidation \rightarrow clean the power terminal (if necessary clean the connection bars too)

4.6 AXL - Auxiliary contacts

Necessary tools: - Ohmmeter

4.6.1 AXL-I - Visual and wiring check

• Auxiliary terminal block

Check presence of broken parts. Check the good connection of cables in terminals. Check the presence of cables warping or sings of overheating.



If necessary replace the Aux terminal (spare parts)

• Inserted/test/drawout contacts

Check presence of broken parts. Check the good connection of cables.

Check the right path of cables and the presence of protective tube.

Check the presence of cables warping or sings of overheating.



If necessary, replace the cables and inserted/test/draw-out contacts.

4.6.2 AXL-II - Functional test

• O/C contacts



With breaker closed:

check continuity between terminals: (101 - 104); (111-114); (121-124); (131-134)

With breaker open:

check continuity between terminals: (101 - 102); (111-112); (121-122); (131-132)

If additional O/C contact are present, they must be checked as well In case of wrong working replace O/C contacs.

At the end get again the breaker in open position with springs discharged.

discharged

• RC-SC contacts

Get the breaker in open with springs charged

Ocharged

Check the continuity between (241-244); (231-234)

Close the breaker and charge the springs

charged

Check the continuity between (231-234)

At the end get again the breaker in open position with springs discharged

Odischarged

If necessary replace RC-SC contacts



• Trip Contact

Perform procedure PRT (Trip Unit) and within trip test, check the continuity between (51-54)



If trip contacts doesn't work, verify the MAN-AUT selector for trip reset button.

• Inserted/test/drawout contacts

Check the correct working of the contacts. Check the continuity with ohmmeter: test position: continuity between T11-T12.

Inserted position: continuity between P11-P12. Draw-out position: continuity between W11-W12. If necessary, replace the contacts.



4.7 ECSR - Motor, UVR, CC, ST

Necessary tools:

- Cross screwdriver



4.7.1 ECRS-I - Functional tests

• Motor

Supply the motor at Vn (terminals M1-M2)

The motor operator charge the springs and stop automatically.

If motor doesn't work:

- check the connectors

- check the supply voltage

- check the fuse

If the problem is still present → replace the motor drive. At the end get again the breaker in open position with springs discharged



• CC

Charge the springs

Ocharged

Supply the CC (C3-C4) and verify the breaker is closed. At the end get again the breaker in open position with springs discharged.

discharged

• **ST**

Close the breaker

discharged

Supply the ST (C1-C2) and verify the breaker is opened.

• UVR

Supply UVR (D1-D2): Close the breaker.

discharged

Cut off the supply of UVR and verify the breaker is opened. Let UVR without supply and verify it is not possible to close the breaker. At the end get again the breaker in open position with springs discharged.





4.8 MCSR - Mechanical accessories

Necessary tools:

- None

4.8.1 MCSR-I - Open position lock

• Functional

- Open the breaker
- Push the open push button and activate the "open position lock"
- Verify it is not possible activate "open position lock" without open the breaker and keeping pushed the open pushbutton



4.8.2 MCSR-II - Draw-out shutter key lock

• Functional

- Get the breaker in inserted position - test position - drawout position

Verify that only in Draw-out position it is possible to lock the shutter and extract the key.



- Get the breaker in middle (not definite) positionVerify is NOT possible close and extract the key



4.9 NTK - Mechanical interlock

Necessary tools:

- Standard spanner n°8
- Allen key (hexagonal wrench) T3; T4
- Lubricant

• Visual

Check the right path, correct fixing and minimum radius of cables. Check the integrity of cables and their sheath.



• Tightening check

Check the tightening concerning fixing of mechanical interlock plate to breaker. Check the tightening of fixing of cables to mechanical interlock plate. If necessary restore the correct tightening torque.



• Functional test

Check the adjustment of mechanical interlock on the base of the truth-table in pictures below.

Example of interlock type A: If one breaker is closed, the second one cannot be closed

If necessary readjust the mechanical interlock (see the mechanical interlock instruction sheet)

At the end get again the breaker in open position with springs discharged





4.10 PRT - Trip Unit

Necessary tools:

- None

• Adjustments

Check the adjustment of Protection Unit: see Protection Unit manual in order to navigate inside menu. Check that on display appear "state" "OPEN" if the breaker is opened.

Check the integrity of seals on the top screw of PU and on the connector between PU and resistor as shown in picture. In case of detection of a tampering contact LEGRAND.



• Test button

Turn on the trip Unit (push one of push buttons)

Get the reset button in position MAN

- Push the test button for more than 2 seconds
- Verify the breaker trip and appear on display "Trip Test"
- Verify the "reset pin" is came out
- Verify is not possible to switch on the breaker
- Check the trip contact: check continuity between terminals (51-54) (procedure AUX-II)
- Push the "reset pin"
- Close the breaker
- Verify disappear the indication "Trip Test"



5. Troubleshooting

Problem	Possible causes	Checkup & resolution	Notes
	Reset button is not reset	Push the reset button	
	The mechanism is not charged	Charge the springs	
	UVR not supplied	Check its power supply circuit. If the problem persists, replace the UVR	
	Electrical interlock	Check the electrical interlock	
	Shunt trip remains energized	Check its power supply circuit	
	Closing coils remains energized	Check its power supply circuit	
It's not possible to close the breaker	Closing coil doesn't work	Check its power supply circuit. Check the fitting on breaker seat. If the problem persists, replace the closing coil	
	Wrong fitting of contact RC-SC	Fit the accessory properly	
	The breaker is not completely inserted inside the chassis	Insert properly the breaker inside the chassis	
	OPEN position Key lock is enabled	Disable the key lock	
	Mechanical interlock enabled	Check the logic of interlock	
	The spring of opening pushbutton (O) is out of seat	Get the spring on correct position	

Problem	Possible causes	Checkup & resolution	Notes
It's not possible to close	The spring of "springs charging indicator" is out of seat	Get the spring in correct position	
the breaker	Mechanism jammed	Follow the mechanism maintenance procedures MCH. If the problem persists, contact LEGRAND	
	Shunt trip doesn't work	Check its power supply circuit. Check the fitting on breaker seat. If the problem persists, replace the shunt trip	
It's not possible to open the breaker	UVR doesn't work	Check its power supply circuit. Check the fitting on breaker seat. If the problem persists, replace the UVR	
	Mechanism jammed	Follow the mechanism maintenance procedures MCH. If the problem persists, contact LEGRAND	
	Motor operator doesn't work	Check its power supply circuit	
It's not possible to electrically charge the springs	The supply voltage on motor operator terminals is correct but the motor doesn't work	Check the integrity of motor operator and its protection fuse. If necessary, replace the fuse. If the problem persists, replace the motor	
It's not possible to charge manually the springs	Check the springs are not charged yet	Try to close the breaker and check the correct indication on springs charged	

Problem	Possible causes	Checkup & resolution	Notes
It's not possible to charge manually the springs. The handle doesn't	The springs charging gear is damaged. The spring charging gears is missing or is not properly hooked on the seat.	Check the integrity of the lever and the gears. If necessary replace it (spare parts). If the problem persists, contact LEGRAND	
come back to rest position after operating it.	Mechanism jammed	Follow the mechanism maintenance procedures MCH. If the problem persists, contact LEGRAND	
	Trip for real overcurrent	Check the type of trip event by consulting the display of Protection Unit	
Unexpected trips	Trip by UVR or Shunt Trip	Check their power supply circuit. Check UVR is supplied with U>0,85Un	
	Wrong settings of protection unit	Set correctly the protection values of PU	
	Malfunctioning of protection unit	Contact LEGRAND	
The breaker doesn't trip in case of over-current or does not show coherent values for line currents.	Disconnection between CT and trip Unit	The breaker must be able to trip by test button. Check that PU shows correct current on display. Check the CT integrity from the back of the breaker and also for overheating and if necessary replace them (spare parts).	
	Defect of electronic Trip Unit	Check if PU can be turned on with correct supply. Then do a trip by test button. If the problem persists contact LEGRAND	

Problem	Possible causes	Checkup & resolution	Notes
It's not possible to insert the draw-out crank	Keylock of draw-out is enabled	Disable the keylock of draw-out	
The draw-out crank doesn't rotate: it's not possible to extract the breaker	Draw-out mechanism faulty or damaged	Check the integrity of the draw-out mechanism following the mechanism maintenance procedure DVVT-VI.	
Keylock in OPEN position doesn't work:	The keylock is not fitted properly	Fit the accessory properly as showed on instruction sheet	
breaker even if the lock is enabled	The keylock has some part broken or damaged	Replace the keylock	
The draw-out shutter	In case of padlock, check the minimum cross section permitted (refer to instruction sheet)	Use a proper padlock	
it's possible to open the shutter even if the lock is enabled	The keylock is not fitted properly	Fit the accessory properly as showed on instruction sheet	
	The keylock has some part broken or damaged	Replace the keylock	
The breaker doesn't trip	The breaker is already opened	Close the breaker.	
by pushing of trip test " button "T"	Defect of electronic trip unit	Check the power up of the protection unit. If the problem persists contact LEGRAND	

If problem cannot be solved with indications in troubleshooting table, contact LEGRAND.

Notes



Notes



