

RELION[®] PROTECTION AND CONTROL

611/615/620 series End of Life Instructions Enabling responsible recycling and disposal



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For your safety

- Ensure that no cables are connected to the device and that the device is de-energized before starting the disassembly.
- Ensure that the disassembly environment is suitable for carrying out this activity.
- Verify that all operations of disassembly are carried out by qualified personnel with adequate knowledge of the disassembly and disposal process.
- Ensure compliance with safety regulations and laws throughout all disassembly operations.
- Verify that the personnel conducting the disassembly activity has this instruction manual and the necessary information available for proper operation.
- Follow this manual thoroughly.



Critical messages:

Pay special attention to the information indicated in the manual with the following symbol.

Scope of application

The purpose of this manual is to provide safe and specific instructions for proper disassembly of the product. At the same time, it explains how the constituent materials of the product can be separated and sorted for a better recyclability potential. The manual is intended for customers and recycling companies that wish to achieve a more responsible end of life operation.

You will also find information about the raw materials, weight, EWC code of each component, energy consumption and an estimation of the greenhouse gas emissions emitted during this process. This manual does not include and describe how to de-install the product from the installation site. Instructions how to securely take the product out of use are available in the cyber security deployment guideline. After decommissioning, the relay can be de-installed according to the installation manual.



Before disassembly, be sure to read and follow this manual.

1. Construction characteristics

The Relion 611/615/620 series of protection and control relays offer a compact and flexible solution for power distribution in utility and industrial applications. The 611/615/620 series are available in ready-made standard configurations for fast and easy setup but can also be tailored to meet customer-specific requirements. The 611/615/620 relays are used in utility, industrial, transport and infrastructure applications for protection, control, measurement, and supervision of power distribution systems.

Front view and relay hardware of the products



Table 1 Overall dimensions

Description		611	615	620
Width	Frame	177 mm	177 mm	262.2 mm
width	Case	164 mm	164 mm	246 mm
Unight	Frame	177 mm	177 mm	177 mm
Height	Case	160 mm	160 mm	160 mm
Depth	With connectors	201 mm	201 mm	201 mm
Weight	Complete relay	max 4.1 kg	max 4.1 kg	max 5.5 kg
(excl. packaging)	Plug-in unit only	max 2.1 kg	max 2.1 kg	max 3.0 kg

Due to the resemblance of the 611, 615 and 620 devices a common guide is provided for all of them. The disassembly procedure of these products is similar, and the instructions can be used with all product types. A comprehensive reference product is therefore used to show the disassembly procedure.

These instructions are suitable for the following devices of the Relion 611, 615 and 620 series of protection and control relays:

•	REB611	•	REU615
•	REF611	•	REV615
•	REM611	•	REC615
•	REU611	•	RER615
•	RED615	•	SMU615
•	REF615	•	REF620
•	REG615	•	RET620
•	REM615	•	REM620
•	RET615	•	RER620

The relay has mandatory and optional slots. A mandatory slot always contains a module, but an optional slot may be empty, depending on the configuration ordered. The reference configuration is REF620 relay which has all module slots filled.

Slot	Description	Module
X000	Communication module	COM0037
X100	Power supply module	PSM0004
X105	Binary input/output module	BIO0005
X110	Binary input/output module	BIO0005
X115	Binary input/output module	BIO0005
X120	Analogue input module	AIM0016
X130	Analogue input module	AIM0006
XBPL	Backplane	BPL0002
XCPU	CPU	CPU0006
XDIS	Display	DIS0009

Table 2 Reference configuration module information (REF620)

Hazardous substances

According to SCIP (Substances of Concern In Products), the identification of the ECHA Candidate List substances is sufficient to allow safe use of the article throughout the disassembly and recycling stage. Information about REACH and RoHS substances can be found in ABB Library. By following this manual, a safe disassembly is ensured, and hazardous substances have no impact on the procedure or the handler. Table 3 SCIP numbers for the Relion 611, 615 and 620 devices

Device	SCIP number
611	9696f56d-9ecb-4b25-b06a-8d5b630b9ba4
615	36831bf2-49e2-4279-a40f-a374b434e74a
620	004799a8-e107-4e59-8ce3-46eddf506375

Critical Raw Materials

Based on EU Taxonomy 4, 2023, the presence and weights of the following critical raw materials in the product are informed. The figures are determined using our best knowledge and data available. However, due to variable information and incomplete data coverage of certain parts or components, the results may not be 100 % accurate.

Table 4 Critical raw materials of the reference product

Substance	Presence	Weight [g]	CAS Number
Copper	Yes	280,99	7440-50-8
Nickel – battery grade	Yes	22,34	7440-02-0
Manganese – battery grade	Yes	10,48	7439-96-5
Silicon metal	Yes	9,35	7440-21-3
Titanium metal	Yes	3,68	7440-32-6
Magnesium metal	Yes	0,34	7439-95-4
Cobalt	Yes	0,15	7440-48-4
Palladium	Yes	0,12	7440-05-3
Gallium	Yes	0,10	7440-55-3
Tungsten	Yes	0,02	7440-33-7
Bismuth	Yes	0,02	7440-69-9
Boron – metallurgy grade	Yes	0,0009	7440-42-8
Germanium	Yes	0,0002	7440-56-4
Lithium – battery grade	No	0	7439-93-2
Natural graphite – battery grade	No	0	7782-42-5
Iridium	No	0	7439-88-5
Platinum	No	0	7440-06-4
Rhodium	No	0	7440-16-6
Ruthenium	No	0	7440-18-8
Neodymium	No	0	7440-00-8
Praseodymium	No	0	7440-10-0
Terbium	No	0	7440-27-9
Dysprosium	No	0	7429-91-6
Gadolinium	No	0	7440-54-2
Samarium	No	0	7440-19-9
Cerium	No	0	7440-45-1

2. Personal protective equipment (PPE)

To perform disassembly activities safely, the following PPE must be used throughout the process.

No.	Name	Standard	lcon
1	Cut-protection gloves	EN388:2016 Protection levels: abrasion 4, cut re- sistance 3, tear resistance 4, punc- ture resistance 2, cut resistance B	
2	Safety footwear	EN ISO 20345:2011 Protection level: S1P	
3	Safety glasses	EN166	

3. Tools needed

The following tools are needed to perform disassembly activities.

No.	Name	Application	lcon
1	Electrical or regular screwdriver TX10	Removing of screws	
2	Electrical or regular screwdriver TX20	Removing of screws	
3	Wrench 7 mm	Removing of guiding pin	J <u></u> O
4	Small flathead screw- driver	Lifting parts	
5	Hex key 2.5 mm	Removing of hex screws	

4. Exploded-view diagram

620 relay



5. Disassembly procedure

Follow this step-by-step procedure to disassemble the product and optimize the recycling process.

COM and AIM modules

a) Remove the 4 finger screws from the side modules (COM & AIM) by hand.



b) Take out the two modules by lifting them.



c) Remove the 2 screws with TX10 screwdriver and take off the metal plate. Do this for both modules.



d) Loosen the 2 screws with a small flathead screwdriver and remove the connector from the AIM module.



e) Remove the 2 dust caps from the COM module.



Note! In this reference product all the slots are filled with modules but in case of an empty module slot, remove the cover plate and recycle it as low-alloyed steel.

Plug-in unit

a) Remove the dust cover.



b) Remove the plug-in unit by lifting the handle and pulling it out from the enclosure.



Connectors

a) Remove the 8 screws with TX10 screwdriver.



b) Remove the 4 signal connectors by lifting them.



c) Remove the current connector from the enclosure. This might require some force. Use a flathead screwdriver to help with removal.



Enclosure

a) Remove the groove gasket from the case by pulling it out.



b) Remove the 5 grounding screws with TX20 screwdriver.



c) Remove the 4 card guides. Use a flathead screwdriver to help with removal. Press with screwdriver and lift.



Modules

a) Take the plug-in unit and turn it upside down. Release the 4 clips with a flathead screwdriver. Take the 4 modules out by lifting them.



b) To take the last module out, stretch the sides of the plug-in unit to release the lock mechanism and lift the module.



Frame

a) Remove the 4 screws with a TX20 screwdriver.



b) Lift to remove the frame from the LHMI. The frame is connected to the LHMI's DIS module with a cable which can be removed by pulling it away from the circuit board.



c) Remove the cable also from the DIS module.



d) Remove the 2 grounding springs from the case using a flathead screwdriver.



Heat sink

a) Remove the 4 screws with TX10 screwdriver and lift to remove the heat sink.



b) Peel off the heat pads.



Note! This step applies only to 620 series relays. 611 and 615 devices do not have a heat sink.

CPU module

a) Remove the 1 screw with TX10 screwdriver and lift the CPU module.



BPL module

a) Remove the 10 screws with TX10 screwdriver and lift to remove the BPL module.



b) Lift to remove the metal strip.



Heat spreader

e) Remove the heat spreader from the frame. Use a small flathead to help with removal. Peel off the heat pad from the metal plate.



Note! This step applies only to the 620 series relays. 611 and 615 devices do not have a heat spreader.

DIS module

a) Remove the 5 screws with TX10 screwdriver.



b) Snap off the cable and remove the DIS module.



LHMI

a) Remove the 2 screws, one from each side, with TX20 screwdriver and take off the 2 locking parts.



b) Remove the guiding pin with 7 mm wrench.



c) Remove the membrane keypad. Press the screen first from the inside and then it can be peeled off from the outside.



d) Use a 2.5 mm hex key to remove the 2 hex screws and take off the handle.



e) Remove the seal screw with a small flathead screwdriver and take off the lock pin, compression spring and washer.



f) Remove the gasket.



6. Material composition

The reference configuration weighs 5.15 kg, including the maximum of 7 slots in terms of hardware. Electronics are typically composed of various plastics, copper, and precious metals.

Device	Material	Single recyclable	Weight kg	Weight %
	Electronics	Yes	2.21	43
	Steel, low alloyed	Yes	1.31	27
		No	0.07	27
	Aluminum	Yes	0.93	18
	Polycarbonate (PC)	Yes	0.32	6
620	Steel, stainless	Yes	0.18	3
	Brass	Yes	0.02	<1
	Zinc	No	0.04	<1
	Rubber	Yes	0.05	<1
	Silicone-based	Yes	0.02	<1
	Total		5.15	100

Table 5 Material composition of the reference product

Relion 620 Series Reference Product



Material composition of the reference product

7. Recyclability and recovery potential

The recyclability and recovery potential of the reference configuration and HMI are calculated using the end of life scenario given by IEC/TR 62635, Annex D.3, which is representative for Europe. The dismantling of single recyclable materials is considered, which result in a higher recyclability potential. After recycling, the materials are assumed to go through energy recovery and finally, sent for residue disposal. Table 6 shows the recyclability and recovery potential of the products, where recovery includes both recycling and energy recovery.

Table 6 Recyclability and recovery potential of the reference configuration

Product	Scenario	Recyclability potential	Recovery potential
620	IEC/TR 62635 (EU) with PC recycling	60 %	79 %
620	IEC/TR 62635 (EU)	54 %	73 %

According to IEC/TR 62635, almost all components of the relay can be sent for recycling. However, due to recycling issues with plastics containing flame retardant additives, polycarbonate parts might be non-recyclable. In theory, polycarbonate is recyclable and with developing techniques and controlled waste stream it is possible, but in practice it usually goes directly to energy recovery. For that reason, two different scenarios are presented for the recyclability potential of the device. Rubber and silicone-based materials are not considered recyclable due to lack of data and can be sent directly for energy recovery. The non-recyclable materials including polycarbonate are 0.39 kg and represent 7.6 % of the total reference product of 5.15 kg.

8. Calculation of CO2 emissions

Energy consumption and the CO_2 equivalent emissions are calculated for the disassembly process. CO_2 emissions are caused by the energy consumption of the electrical screwdriver. When using manual screwdriver, CO_2 emissions are 0 kg CO_2 -eq. The energy consumption of the disassembly process is calculated using the following formula:

 $E_{use} = n_{screws} * P_{screwdriver} * t_{screwing} = 43 * 5.4 W * 1.5 s / 3600 = 9.68 * 10^{-5} kWh$

For calculating the global warming potential (GWP), an emission factor (EF) of 0.40 kg CO_2 -eq/kWh is assumed, which is representative for Europe:

GWP = $E_{use} * EF = 9.68 * 10^{-5} \text{ kWh} * 0.40 \text{ CO}_2 - \text{eq/kWh} = 3.87 * 10^{-5} \text{ kg CO}_2 - \text{eq}$

Table 7 Energy consumption and CO2 emissions of the disassembly process

	Value
Energy consumption	9.68 * 10⁻⁵ kWh
CO₂ emissions	3.87 * 10 ⁻⁵ kg CO ₂ -eq

9. List of all parts

In the table 8 you can find listed all the parts disassembled in the instructions. Waste classification is based on EWC (European Waste Catalogue).



Waste management regulations vary depending on the region. Check your local regulations to ensure proper recycling.

Table 8 Component information of the reference product

No.	Name	Material	EWC code	Weight [kg]	lcon
1	Enclosure	Steel, low-alloyed	19 12 02	1.31	
2	Frame	Polycarbonate	19 12 04	0.30	
3	CPU module (CPU0006)	Electronics	16 02	0.05	
4	Backplane (BPL0002)	Electronics	16 02	0.04	
5	COM mod- ule (COM0037)	Electronics	16 02	0.13	
6	PSM module (PSM0004)	Electronics	16 02	0.35	
7	BIO module (BIO0005)	Electronics	16 02	0.43 (3 pcs)	
8	AIM module (AIM0016)	Electronics	16 02	0.41	

No.	Name	Material	EWC code	Weight [kg]	Icon
9	AIM module (AIM0006)	Electronics	16 02	0.07	
10	DIS module (DIS0009)	Electronics	16 02	0.13	
11	Heat sink	Aluminum	19 12 03	0.11	
12	Heat spreader	Aluminum	19 12 03	0.02	
13	Thermal pads	Silicone-based	19 12 12	0.02	
14	Connector	Electronics	16 02	0.05	
15	Signal con- nector	Electronics	16 02	0.18 (4 pcs)	
16	Current con- nector	Electronics	16 02	0.30	
17	Grounding bridge	Steel, stainless	19 12 02	0.02	The same of
18	Front plate	Steel, low-alloyed Zinc	19 12 02 19 12 03	0.05	
19	Front plate	Steel, low-alloyed Zinc	19 12 02 19 12 03	0.06	

No.	Name	Material	EWC code	Weight [kg]	lcon
20	Finger screw	Brass	19 12 03	0.02 (4 pcs)	19 19 19 19 19 19
21	Membrane keypad	Electronics	16 02	0.05	
22	HMI Frame	Aluminum	19 12 03	0.63	l I
23	Handle	Aluminum	19 12 03	0.17	1
24	Lock	Steel, stainless	19 12 02	0.12 (2 pcs)	
25	Guiding pin	Steel, stainless	19 12 02	0.004	
26	Card guide	Polycarbonate	19 12 04	0.02 (4 pcs)	
27	COM mod- ule dust caps	PC-ABS	19 12 04	0.002 (2 pcs)	ΠΠ
28	Dust cover	Silicone	19 12 12	0.003	•••
29	Groove gas- ket	Rubber	19 12 04	0.04	
30	LHMI's gas- ket	Rubber	19 12 04	0.01	

No.	Name	Material	EWC code	Weight [kg]	lcon
31	Round Shielded Flat Cable Assembly	Copper cable	16 02	0.02	\checkmark
32	Grounding spring	Steel, stainless	19 12 02	0.002 (2 pcs)	84
33	Lock pin	Brass	19 12 03	0.002	p
34	Compres- sion spring	Steel, low-alloyed	19 12 02	0.000	ana
35	Seal screw	Steel, low-alloyed	19 12 02	0.002	ji ka
36	Screws, nuts, and washers	Steel, stainless	19 12 02	0.03 (46 pcs)	TTP D T TTP D T TTP D TTP T TP TTP T TP TTP T TP TTP T TP TTP T

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