ENVIRONMENTAL PRODUCT DECLARATION

SIRIUS

Contactor AC-1, 3RT233, with AC-Coil

Type II according to ISO 14021 including life cycle impact assessment (LCIA)
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General information

This environmental product declaration (EPD) is based on the international standard ISO 14021 (“Environmental labels and declarations – Self declared environmental claims – Type II”). The data in this EPD has been evaluated on a full-scale life cycle assessment (LCA) study according to ISO 14040/44, taking into account the product category rules (PCR) for electronic and electrotechnical products and systems defined in EN 50693, as well as product specific rules (PSR) for low-voltage switchgear and controlgear equipment in IEC TS 63058 ED1.0.

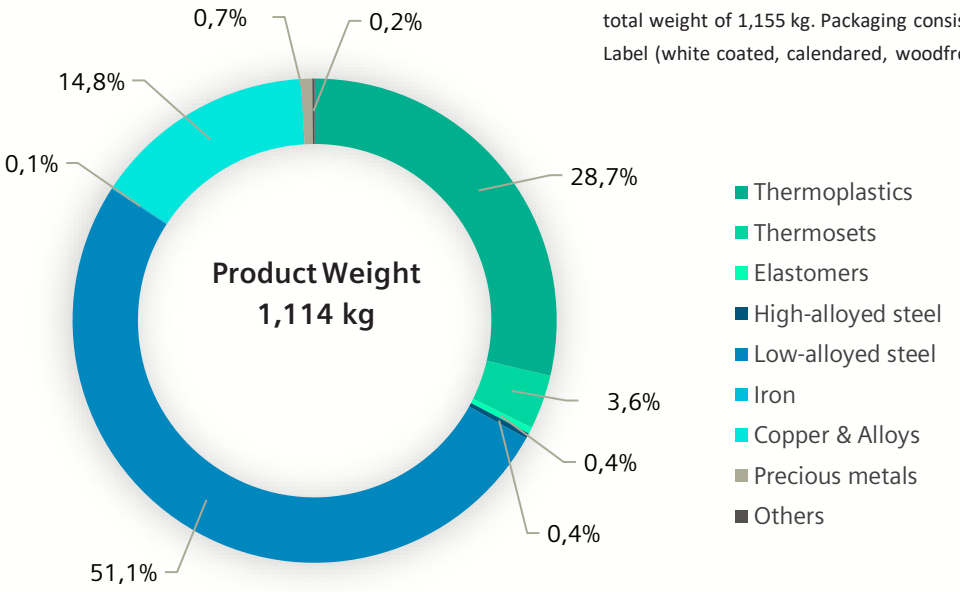
Siemens is dedicated to an environmentally conscious design of its products in line with IEC 62430 and has implemented an integrated management system according to ISO 9001, ISO 14001 and ISO 45001.

Products	All variants in the range of contactor AC-1, 3RT233, with AC-coil
Represented by	3RT2326-1AV60
Product Description	contactor AC-1, 60 A, 400 V / 40 °C, 4-pole, 24 V AC, 50 Hz, auxiliary contacts: 1 NO + 1 NC, screw terminal
Functional Unit	To make, carry and break currents at rated operation voltages U_e and for the utilization categories and N operations according to IEC 60947-4-1 by a remotely operated switching device. To provide galvanic opening of a circuit. To withstand short-circuit currents for specified co-ordination type(s).

Material composition

The following chart outlines the overall material composition of the calculated reference product.

Product weight of 1,114 kg adds up with packaging weight of 40,6 g to a total weight of 1,155 kg. Packaging consists of triplex cardboard ~40 g and Label (white coated, calendared, woodfree paper, FSC certified, ~0,62 g).



Substance assessment

At Siemens, we are committed to the development and production of environmentally sound and sustainably produced equipment. This includes avoiding hazardous substances in our products without compromising their benefits for our customers. Please visit the following website to learn more about how we comply with product-related environmental regulations like RoHS, REACH, WEEE and others: Product Related Environmental Protection

Life cycle stages and reference scenarios

Manufacturing

This stage covers the extraction of natural resources, production of raw materials, manufacturing, packaging and transport distances.

Operation

This stage covers the product's installation, use and maintenance. Different operating conditions can lead to deviations from the standard scenario.

End-of-life

This stage covers the disassembly, material recycling and thermal treatment of all recyclable materials as well as the disposal of all other materials.

Scenarios

Energy model used:
EU-28: Electricity grid mix

Transportation model used:
100 km default distance,
GLO: Truck-trailer, Euro IV

Energy model used:
EU-28: Electricity grid mix

Use scenario:
18,72 W full load,
50% loading rate of I_n: 60A,
50% service uptime;
20 years reference lifetime

Energy model used:
EU-28: Electricity grid mix

Key environmental performance indicators

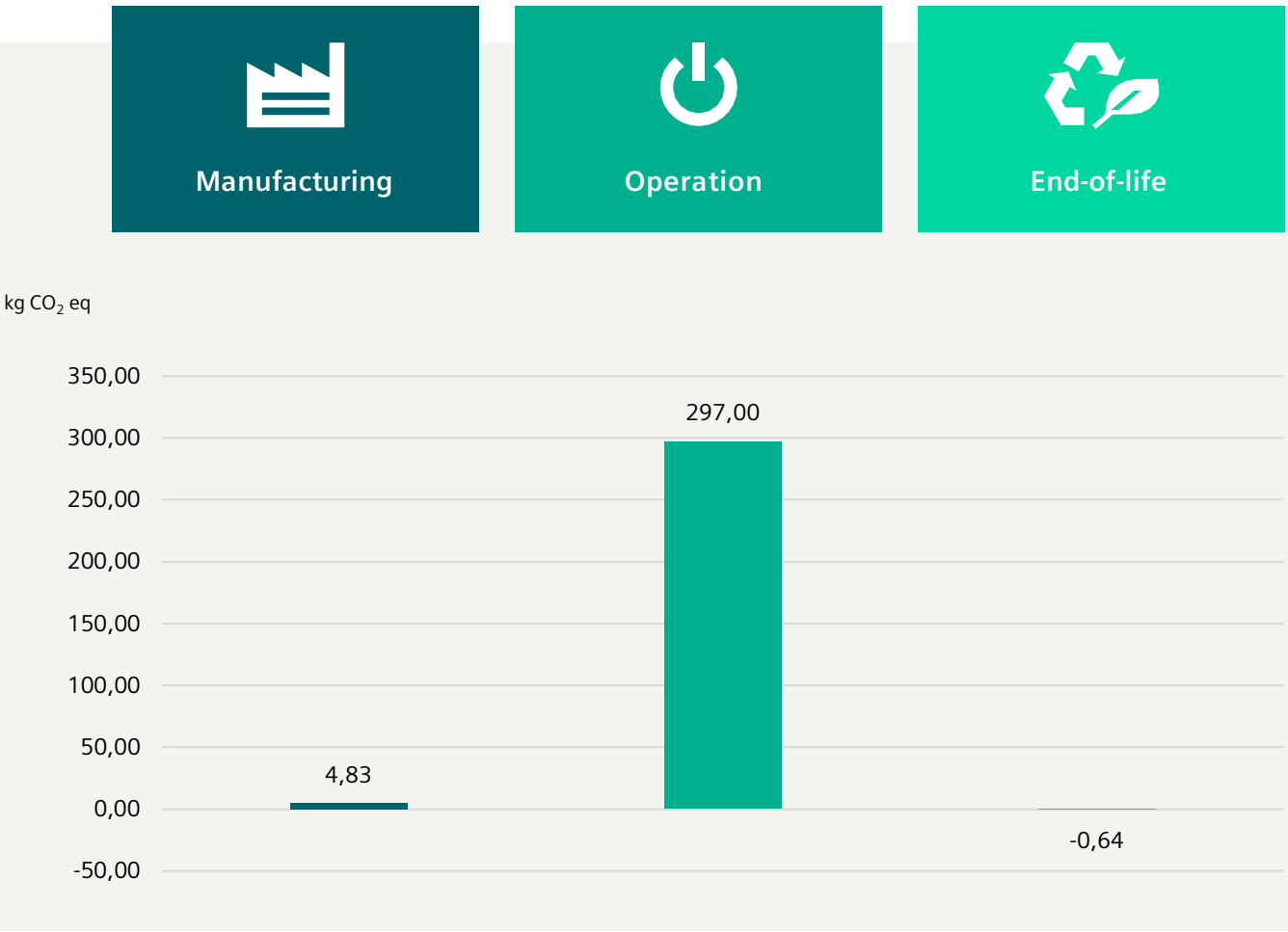
The following impact categories characterize the product's environmental footprint. They have been calculated with LCIA methodology EF3.0 and *EN 15804+A2; LCA tool: GaBi 10.6.2, Database: GaBi Professional & Extensions, 2020.
For extrapolation rules for all variants declared in the title of this EPD please refer to the Annex Extrapolation Rules.

Impact category	Unit	Total	Manufacturing	Operation	End-of-life**
Acidification	Mole of H+ eq	6,49E-01	7,98E-02	6,47E-01	-7,80E-02
Global warming potential	kg CO_2 eq	3,02E+02	4,83E+00	2,97E+02	-6,40E-01
Ecotoxicity, freshwater – total	CTUe	2,37E+03	3,19E+01	2,34E+03	-5,32E+00
Eutrophication, freshwater	kg P eq	8,73E-04	1,37E-05	8,60E-04	-6,33E-07
Eutrophication, marine	kg N eq	1,47E-01	3,02E-03	1,45E-01	-1,13E-03
Eutrophication, terrestrial	Mole of N eq	1,54E+00	3,23E-02	1,52E+00	-1,17E-02
Human toxicity, cancer – total	CTUh	7,39E-08	9,29E-09	6,73E-08	-2,68E-09
Human toxicity, non-cancer – total	CTUh	2,51E-06	1,82E-07	2,46E-06	-1,40E-07
Ionising radiation, human health	kBq U235 eq	1,45E+02	2,94E-01	1,45E+02	1,87E-01
Land Use	dimensionless (pt)	1,94E+03	1,78E+01	1,93E+03	-3,88E+00
Ozone depletion	kg CFC-11 eq	1,43E-08	7,90E-09	4,31E-09	2,13E-09
Particulate matter	Disease incidences	5,45E-06	5,37E-07	5,36E-06	-4,49E-07
Photochemical ozone formation	kg NMVOC eq	3,98E-01	1,39E-02	3,92E-01	-7,82E-03
Resource use, fossils	MJ	5,40E+03	7,08E+01	5,35E+03	-1,40E+01
Resource use, mineral and metals	kg Sb eq	9,96E-05	8,19E-04	8,04E-05	-8,00E-04
Water scarcity	m^3 world eq	6,76E+01	6,67E-01	6,72E+01	-2,29E-01
*Use of non-renewable primary energy	MJ	5,40E+03	7,09E+01	5,35E+03	-1,41E+01
*Use of renewable primary energy	MJ	2,98E+03	1,11E+01	2,97E+03	-4,88E-01
*Net use of fresh water	m^3	2,85E+00	2,58E-02	2,83E+00	-4,96E-03
*Hazardous waste disposed	kg	4,80E-07	1,81E-08	4,63E-07	-1,09E-09
*Non-hazardous waste disposed	kg	4,33E+00	2,64E-01	4,03E+00	3,66E-02
*Radioactive waste disposed	kg	8,57E-01	1,93E-03	8,55E-01	2,80E-04

** Avoided burden method used

Global warming potential

This chart shows the overall global warming potential of the product. The operations phase is the lifecycle phase with the biggest overall impact. Different operating conditions can lead to deviations from the standard scenario.



End-of-life scenario

The end of life stage was modelled by shredding of the device, followed by sorting and material separation process. It leads to

- an overall product recyclability of up to 60% mainly due to high metal content
- an energy recoverability of up to 34% from plastic materials
- a minimum landfill rate of 8%

The exact final values depend on the used recycling process and add up to 100%.

Note: The device should not be disposed of as unsorted municipal waste. Special treatment for specific components may be mandated by law or ecologically sensible. Observe all local and applicable laws.

Annex Legal Disclaimer

This Environmental Product Declaration (EPD) is for information purposes only. It is based upon the standards mentioned above.

This EPD does not warrant or guarantee the composition of a product or that the product will retain a particular composition for a particular period. Therefore, all warranties, representations, conditions, and all other terms of any kind whatsoever implied by statute or common law are – to the fullest extent permitted by applicable law – excluded.

Siemens THEREFORE DOES NOT ASSUME ANY LIABILITY FOR ANY ERROR OR FOR ANY CONSEQUENCE WHICH MAY ARISE FROM THE USE OF THIS INFORMATION TO THE MAXIMUM EXTENT UNDER THE LAW.

Please be aware that the data of this EPD cannot be compared with data calculated based upon product category rules (PCRs) other than the standards mentioned above. The values given are only valid within the context specified and cannot be used directly to draw up the environmental assessment of an installation.

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Annex Extrapolation Rules

The extrapolation rules have been defined as follows:
LCAs have been performed on several representative products in the range of contactor AC-1, 3RT233, with AC-coil.
According to this environmental analysis, proportionality rules may be used to evaluate the impacts of all variants in this range.
To extrapolate the impact from the reference product **3RT2336-1AB00** to another product from the range,
apply the following extrapolation rules to key environmental performance indicator (i) per life cycle stage:

MANUFACTURING(i) = Mass of (product) / Mass of (reference product) * manufacturing indicator (i) of the reference product

OPERATION (i) =(P_P*0,25+P_{vP}*cos phi $_P$)*0,11 W^{-1} *operation indicator (i) of the reference product
P_P: Power loss [W] at AC in hot operating state per pole (product)
P_{vP}: apparent holding power [VA] of magnet coil at AC at 50 Hz (product)
cos phi $_P$: inductive power factor with the holding power of the coil at 50 Hz (product)

END OF LIFE (i))= Mass of (product) / Mass of (reference product) * end-of-life indicator (i) of the reference product

TOTAL (i) = Σ Life Cycle Stages (i)

Data Sources:
Mass of product in the product catalog
Product specific electrical data in the technical data sheets