



ENVIRONMENTAL PRODUCT DECLARATION

SINAMICS S220 Booksize

Smart Line Module
16 kW Type D

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



SIEMENS

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 environmental labelling"). 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. The use phase for line module is described according to the reference scenario in the Table 1 of the Appendix.

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.

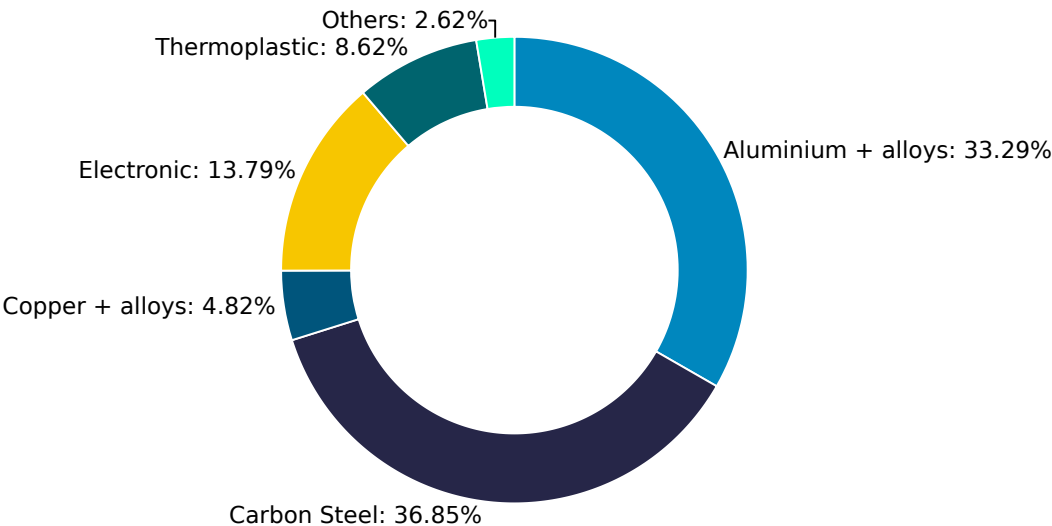
Products	SINAMICS S220 Booksize system Smart Line modules in C and D Type, voltage classes 380V...480V 3AC , power classes 16 and 24 kW in IP20 degree of protection.
Represented by the reference product	6SL5130-6UE21-6AD0, SLM 16 kW D-type, 3AC 380V...480V
Product Description	The SINAMICS S220 Smart Line Modules is one of the components of SINAMICS S220 booksize system. The S220 SLM input: 380-480 V 3AC, 29 to 43 A output: 495-720 V DC, 16 and 24 kW design: booksize C and D type IP20, internal air cooling.
Functional Unit	A device that converts 380-480V 3AC power into DC power to 16 and 24 kW and feeds to the SINAMICS S220 MoMo module. Calculation of the environmental impacts is based on 15 years of product service lifetime. This value cannot be equated with the minimum, average or individual life time. ¹

¹ The lifetime value used for calculation is a reference value and does not equate with the minimum, average or real life time.

Material composition

The following chart outlines the overall material composition of the calculated reference product without packaging. Product weight of 8.2 kg adds up with packaging weight of 0.75 kg to a total weight of 8.95 kg. Packaging consists of: Graphic paper, Corrugated box (average composition).

Product Weight 8.2 kg



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 transportation.	 Distribution and Operation This stage covers the product's distribution, installation, use, and maintenance. Different operating conditions can lead to deviations from the reference scenario.	 End-of-Life This stage covers the disassembly or shredding and material recycling of all recyclable materials, as well as energy recovery, thermal treatment and the disposal of all other materials.
Scenarios		
Energy model used: Germany (standard mix), Japan (renewable mix), Europe (standard mix), Thailand (standard mix), Japan (standard mix), Germany (Thermal energy from natural gas), China (standard mix), Germany (Thermal energy from biogas) Transportation model: Truck (7.5 t-12 t) 1000km	Energy model used: Europe (standard mix) Distribution scenario: Truck (7.5 t-12 t) 3500 km Use Scenario: Definition of the operational points are: OP1: 61% of time at 100% Infeed Load OP2: 19% of time at 50% Infeed Load OP3: 8% of time at 25% Infeed Load OP4: 12% of time at 0% Infeed Load Lifetime 15 years and 5000h/year	Energy model used: EMEA End-of-Life methodology: Avoided burden (net-scrap calculation)

Key environmental performance indicators

The following impact categories characterize the product's environmental footprint. They have been calculated with LCIA methodology EF3.1; LCA tool: Green Digital Twin (GDT), Database: One Siemens LCA Database (based on MLC CUP 2023.2, formerly GaBi).

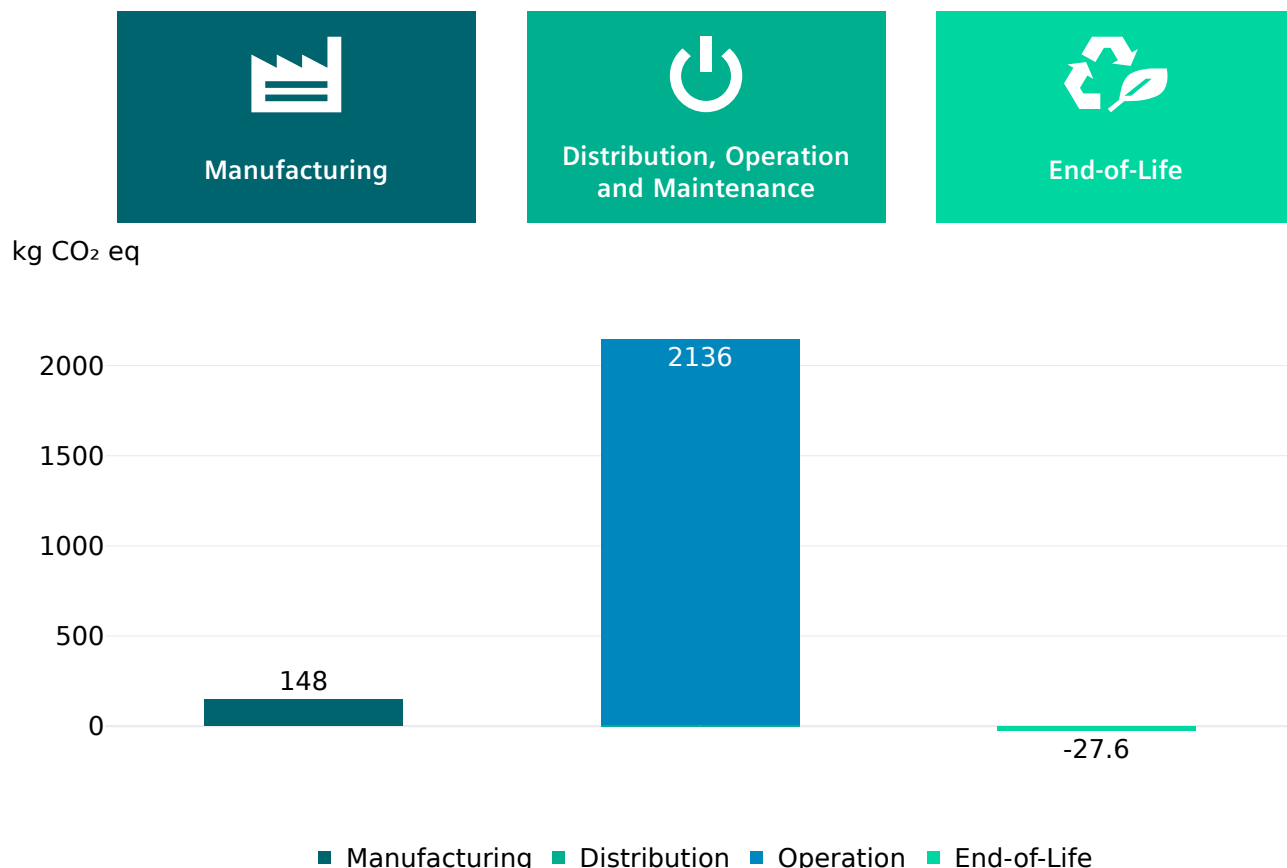
To ensure the high quality and completeness of the LCA results, Primary Data have been used whenever possible. Datasets for resources, such as electrical energy or natural gas, are chosen from the region where the device is produced and assembled. If primary data are not available, datasets reflecting state-of-the-art manufacturing technology are considered.

For products belonging to the same homogeneous product family range the following extrapolation criteria (Appendix) can be used to module their climate change impact in kg CO₂ eq. The rest of the listed impacts will be determined in the following version of the EPD.

Impact Category	Unit	Total	Manufacturing	Distribution	Operation	End of life
Acidification	Mole of H+ eq	5.21E+0	9.13E-1	1.02E-2	4.51E+0	-2.28E-1
Climate change – total	kg CO ₂ eq	2.26E+3	1.48E+2	7.01E+0	2.14E+3	-2.76E+1
Climate change – fossil	kg CO ₂ eq	2.24E+3	1.47E+2	6.93E+0	2.12E+3	-2.76E+1
Climate change – biogenic	kg CO ₂ eq	1.99E+1	1.17E+0	1.89E-2	1.87E+1	-1.05E-2
Climate Change, land use and land use change	kg CO ₂ eq	3.17E-1	9.88E-2	6.50E-2	2.31E-1	-1.27E-2
Ecotoxicity, freshwater – total	CTUe	1.33E+4	9.17E+2	6.85E+1	1.24E+4	-9.73E+1
Eutrophication, freshwater	kg P eq	8.87E-3	9.25E-4	2.57E-5	7.93E-3	-1.45E-5
Eutrophication, marine	kg N eq	1.20E+0	1.44E-1	3.64E-3	1.08E+0	-2.56E-2
Eutrophication, terrestrial	Mole of N eq	1.26E+1	1.55E+0	4.33E-2	1.13E+1	-2.76E-1
Human toxicity, cancer – total	CTUh	7.20E-7	7.04E-8	1.39E-9	6.54E-7	-6.07E-9
Human toxicity, non-cancer – total	CTUh	1.20E-5	1.77E-6	6.19E-8	1.04E-5	-2.40E-7
Ionising radiation, human health	kBq U235 eq	1.18E+3	9.44E+0	2.68E-2	1.17E+3	-2.86E+0
Land Use	dimensionless (pt)	1.83E+4	7.47E+2	4.00E+1	1.75E+4	-3.35E+1
Ozone depletion	kg CFC-11 eq	6.91E-8	3.02E-8	9.14E-13	3.91E-8	-1.65E-10
Particulate matter	Disease incidences	4.61E-5	1.07E-5	8.83E-8	3.80E-5	-2.62E-6
Photochemical ozone formation, human health	kg NMVOC eq	3.23E+0	4.24E-1	8.84E-3	2.88E+0	-8.17E-2
Resource use, fossils	MJ	4.62E+4	1.96E+3	9.57E+1	4.45E+4	-3.44E+2
Resource use, mineral and metals	kg Sb eq	1.20E-2	1.59E-2	4.66E-7	3.27E-4	-4.25E-3
Water use	m ³ water eq deprived water	4.86E+2	2.57E+1	8.48E-2	4.66E+2	-5.63E+0

Climate change

This chart shows the overall impact of the product on climate change – total. The operations phase is the lifecycle phase with the biggest overall impact. Different operating conditions can lead to deviations from the reference scenario. The distribution stage of the reference product is not shown in the chart due to its relatively small contribution to climate change and its impact is included in the operation bar.



End-of-Life results



The end-of-life stage considers the recyclability rates of metal, plastics contents and minimum disposal rates according to the guidelines IEC TR 62635:2012 for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment.

It leads to:

- an overall **product recyclability of up to 76%** mainly due to metal content
- an **energy recoverability of up to 10%** from plastic materials
- a **minimum disposal rate of 13%**

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 recommended for environmental reasons. Observe all local and applicable laws.

Appendix

For other MLFBs covered by this EPD under SINAMICS S220 Booksize system Smart Line Module, the climate change impact (CC) in kg CO2 eq. of the manufacturing, the distribution and operation phase and the end of life phase are listed in the Table 1.

For the operation phase

The climate change in kgCO2eq was derived for 400V and rated power in kW for European standard energy mix, lifetime of 15 years, annual operation 5000h/year and 4 operational points. The climate change values for operation phase are described in Tab.1.

Definition of **the operational points** are:

OP1: 61% of time at 100% Infeed Load

OP2: 19% of time at 50% Infeed Load

OP3: 8% of time at 25% Infeed Load

OP4: 12% of time at 0% Infeed Load

Tab.1 Climate change results of SINAMIC S220 Smart Line Modules

MLFB	Voltage	Power Rate	Type	Mass	Manufact-urign Phase	Distributi-on	Operation Phase	End-of-Life
/	V	kW	/	kg	kg CO2eq	kg CO2eq	kg CO2eq	kg CO2eq
6SL5130-6UE21-6AC0	380-480	16	C	8.2	148	7	2136	-28
6SL5130-6UE22-4AC0	380-480	24	C	8.2	148	7	3207	-28
6SL5130-6UE21-6AD0	380-480	16	D	8.2	148	7	2136	-28
6SL5130-6UE22-4AD0	380-480	24	D	8.2	148	7	3207	-28

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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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