



ENVIRONMENTAL PRODUCT DECLARATION

SINAMICS S200

Single-axis Servo Drive

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 servo converters is described according to the reference scenario (Supplementary document for EPD).

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.

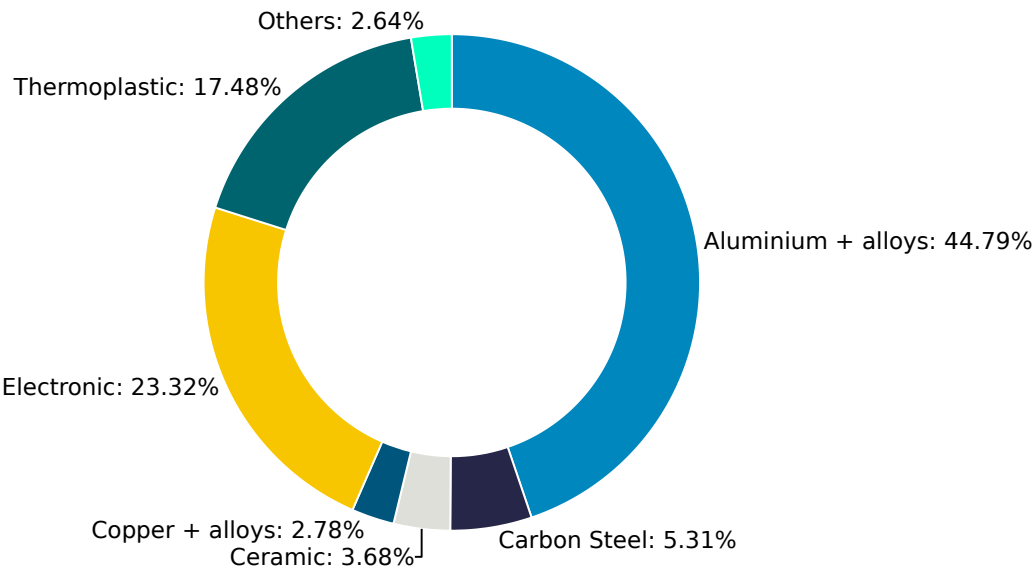
Products	SINAMICS S200 Basic servo-converters, power range 0.1 to 1 kW at 200 ... 240 V 1 AC / 3 AC SINAMICS S200 servo-converters, power range 0.1 to 1 kW at 200 ... 240 V 1 AC / 3 AC and 0.2 to 7 kW at 380 ... 480 V 3 AC
Represented by the reference product	6SL5510-1BB10-4AF0, 0.4 kW (Standard), 1AC/3AC 200V...240V IP20, PROFINET
Product Description	SINAMICS S200 servo drive, safety & security integrated (only Standard version equipped), IP20, and digital I/Os, PROFINET.
Functional Unit	Speed, torque and position control of SIMOTICS S-1FL2 servo motor. 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 1.03 kg adds up with packaging weight of 0.17 kg to a total weight of 1.2 kg. Packaging consists of: Graphic paper, EPS-Foam, Corrugated box (average composition).

Product Weight 1.03 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

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.
Energy model used: Germany (standard mix), Japan (standard mix), China (standard mix) Transportation model: Truck (7.5 t-12 t) 1000km	Energy model used: Europe (standard mix) Distribution scenario: Truck (7.5 t-12 t) 1000 km Use Scenario: Operation profile is defined by 4 operational points (OP): OP1 : 10% of time at 50% speed and 200% torque OP2: 5% of time at 100% speed and 50% torque OP3: 60% of time at 50% speed and 50% torque OP4: 25% of time at 0% speed and 0% torque Lifetime 15 years and 5000h/year	Energy model used: APAC 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).

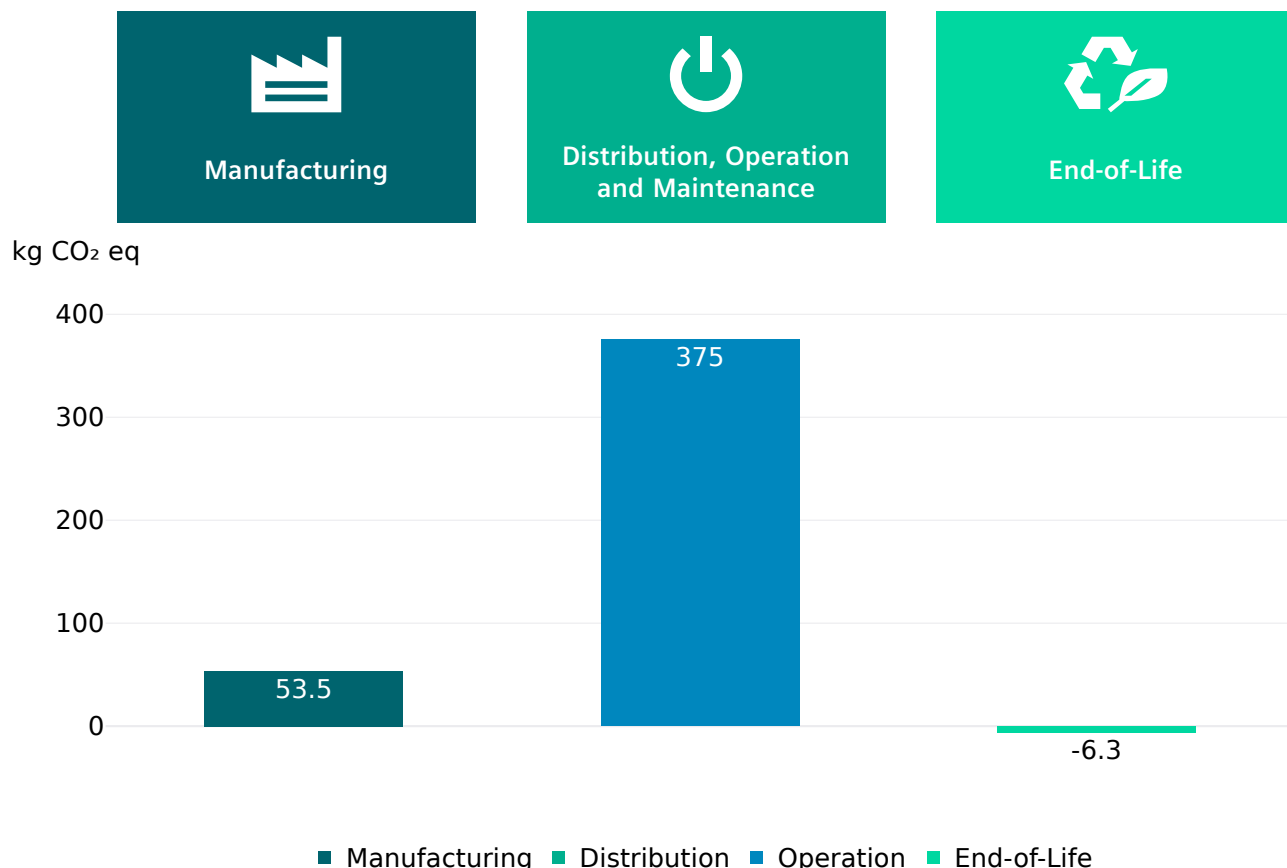
To ensure the high quality and completeness of the LCA results, Primary Data have been used whenever possible. Datasets for resources, such as electrical energy or natural gas, are chosen from the region where the device is produced and assembled. If primary data are not available, datasets reflecting 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	1.04E+0	3.49E-1	3.90E-4	7.92E-1	-1.03E-1
Climate change – total	kg CO ₂ eq	4.23E+2	5.35E+1	2.69E-1	3.75E+2	-6.27E+0
Climate change – fossil	kg CO ₂ eq	4.19E+2	5.33E+1	2.66E-1	3.72E+2	-6.25E+0
Climate change – biogenic	kg CO ₂ eq	3.38E+0	1.09E-1	7.24E-4	3.29E+0	-1.56E-2
Climate Change, land use and land use change	kg CO ₂ eq	7.67E-2	4.08E-2	2.50E-3	4.05E-2	-4.61E-3
Ecotoxicity, freshwater – total	CTUe	2.41E+3	2.71E+2	2.63E+0	2.17E+3	-3.92E+1
Eutrophication, freshwater	kg P eq	1.62E-3	2.36E-4	9.85E-7	1.39E-3	-7.24E-6
Eutrophication, marine	kg N eq	2.30E-1	5.00E-2	1.39E-4	1.90E-1	-1.01E-2
Eutrophication, terrestrial	Mole of N eq	2.42E+0	5.40E-1	1.66E-3	1.98E+0	-1.11E-1
Human toxicity, cancer – total	CTUh	1.32E-7	1.92E-8	5.33E-11	1.15E-7	-2.52E-9
Human toxicity, non-cancer – total	CTUh	2.43E-6	6.80E-7	2.37E-9	1.83E-6	-8.16E-8
Ionising radiation, human health	kBq U235 eq	2.08E+2	2.32E+0	1.03E-3	2.06E+2	-4.10E-1
Land Use	dimensionless (pt)	3.21E+3	1.46E+2	1.53E+0	3.08E+3	-1.22E+1
Ozone depletion	kg CFC-11 eq	7.35E-9	5.08E-10	3.51E-14	6.87E-9	-2.91E-11
Particulate matter	Disease incidences	1.01E-5	4.47E-6	3.39E-9	6.67E-6	-9.88E-7
Photochemical ozone formation, human health	kg NMVOC eq	6.29E-1	1.54E-1	3.39E-4	5.06E-1	-3.21E-2
Resource use, fossils	MJ	8.38E+3	6.51E+2	3.67E+0	7.81E+3	-8.10E+1
Resource use, mineral and metals	kg Sb eq	2.17E-3	7.42E-3	1.79E-8	5.75E-5	-5.30E-3
Water use	m ³ water eq deprived water	9.35E+1	1.44E+1	3.26E-3	8.18E+1	-2.70E+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 was modelled by shredding of the device, followed by sorting and material separation process.



It leads to:

- an overall **product recyclability of up to 63%** mainly due to metal content
- an **energy recoverability of up to 22%** from plastic materials
- a **minimum disposal rate of 15%**

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 S200 homogenous product family, the climate change impact (CC) in kg CO₂ eq. can be calculated for the manufacturing and end of life phases using linear regression equations according to the weight (Mass) in kg of the assessed product.

The following equations shall be used:

$$y = m \times x + b$$

Where,

Y climate change in kgCO₂eq.

m scaling factor (without dimension)

x mass of the inverter in kg

b intercept (offset) in kg

Voltage/V	Version	MLFB	Power Rating(kW)	Mass(kg)
200	Standard	6SL5510-1BB10-1AF0	0.1	0.76
200		6SL5510-1BB10-2AF0	0.2	0.81
200		6SL5510-1BB10-4AF0	0.4	1.03
200		6SL5510-1BB10-8AF0	0.75	1.74
200		6SL5510-1BB11-0AF0	1	1.74
200	Basic	6SL5610-1BB10-1AF0	0.1	0.76
200		6SL5610-1BB10-2AF0	0.2	0.76
200		6SL5610-1BB10-4AF0	0.4	0.96
200		6SL5610-1BB10-8AF0	0.75	1.74
200		6SL5610-1BB11-0AF0	1	1.74
400	Standard	6SL5510-1BE10-2AF0	0.2	1.52
400		6SL5510-1BE10-4AF0	0.4	1.52
400		6SL5510-1BE10-8AF0	0.75	1.91
400		6SL5510-1BE11-0AF0	1	1.91
400		6SL5510-1BE11-5AF0	1.75	2.01
400		6SL5510-1BE12-5AF0	2.5	2.01
400		6SL5510-1BE13-5AF0	3.5	4.52
400		6SL5510-1BE15-0AF0	5	4.52
400		6SL5510-1BE17-0AF0	7	4.52

Manufacturing:

$$CC_{Manuf} = 22.71 \times x + 30.72$$

End of Life:

$$CC_{EOL} = -3.30 \times x - 2.96$$

For the operation phase, the climate change in kgCO₂eq was derived for 230 V and 400 V and rated power *PR* (LO) in kW for Europe standard energy mix, lifetime of 15 years and annual operation 5000h/year and four operational points.

OP1 : 10% of time at 50% speed and 200% torque

OP2: 5% of time at 100% speed and 50% torque

OP3: 60% of time at 50% speed and 50% torque

OP4: 25% of time at 0% speed and 0% torque

Version	Basic & Standard					
Voltage	V	230	230	230	230	230
Pr (LO)	kW	0.1	0.2	0.4	0.75	1
Climate change	kg CO ₂ eq	228	271	375	553	553

Version	Standard									
Voltage	V	400	400	400	400	400	400	400	400	400
Pr (LO)	kW	0.2	0.4	0.75	1	1.75	2.5	3.5	5	7
Climate change	kg CO ₂ eq	347	347	525	603	970	1364	2199	2499	2613

Legal Disclaimer

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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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