



ENVIRONMENTAL PRODUCT DECLARATION

SINAMICS S120 Booksize

Smart Line Module 10 kW

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.

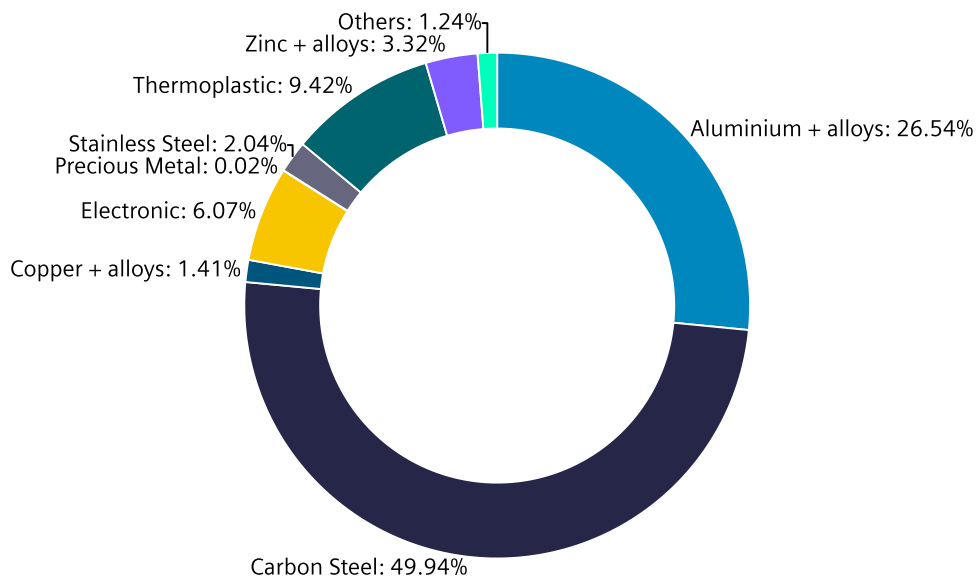
| | |
|---|---|
| Products | SINAMICS S120 Smart Line Modules, power range 5 to 55 kW at 380 ...480 V 3AC |
| Represented by the reference product | 6SL3130-6AE21-0AB1, 10 kW, 3AC 380V...480V |
| Product Description | The SINAMICS S120 Smart Line Modules is one of the components of SINAMICS S120 Booksize drive system. The Smart Line Module is a non-regulated infeed/regenerative feedback unit. The Smart Line Module supplies the Motor Module with a non-regulated DC voltage at the DC output. Input: 380-480V, 50/60HZ. Output: DC 600V, 17A, 10 kW. Internal air cooling, energy recovery capability, include control voltage adapter modules painted. |
| Functional Unit | A device that converts 380-480V 3AC power into DC power and feeds to the S120 Booksize Motor 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 4.8 kg adds up with packaging weight of 0.5 g to a total weight of 4.8 kg. Packaging consists of: Graphic paper.

Product Weight 4.8 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:
Europe (standard mix),
Germany (renewable mix),
China (renewable mix),
Germany (Thermal energy from biogas)

Transportation model:
Road Truck, 7.5t - 12t gross weight 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 EN15804+A2 (EF 3.1); LCA tool: Green Digital Twin Version 4.0, Database: One Siemens LCA Database (based on Sphera MLC CUP 2024.1).

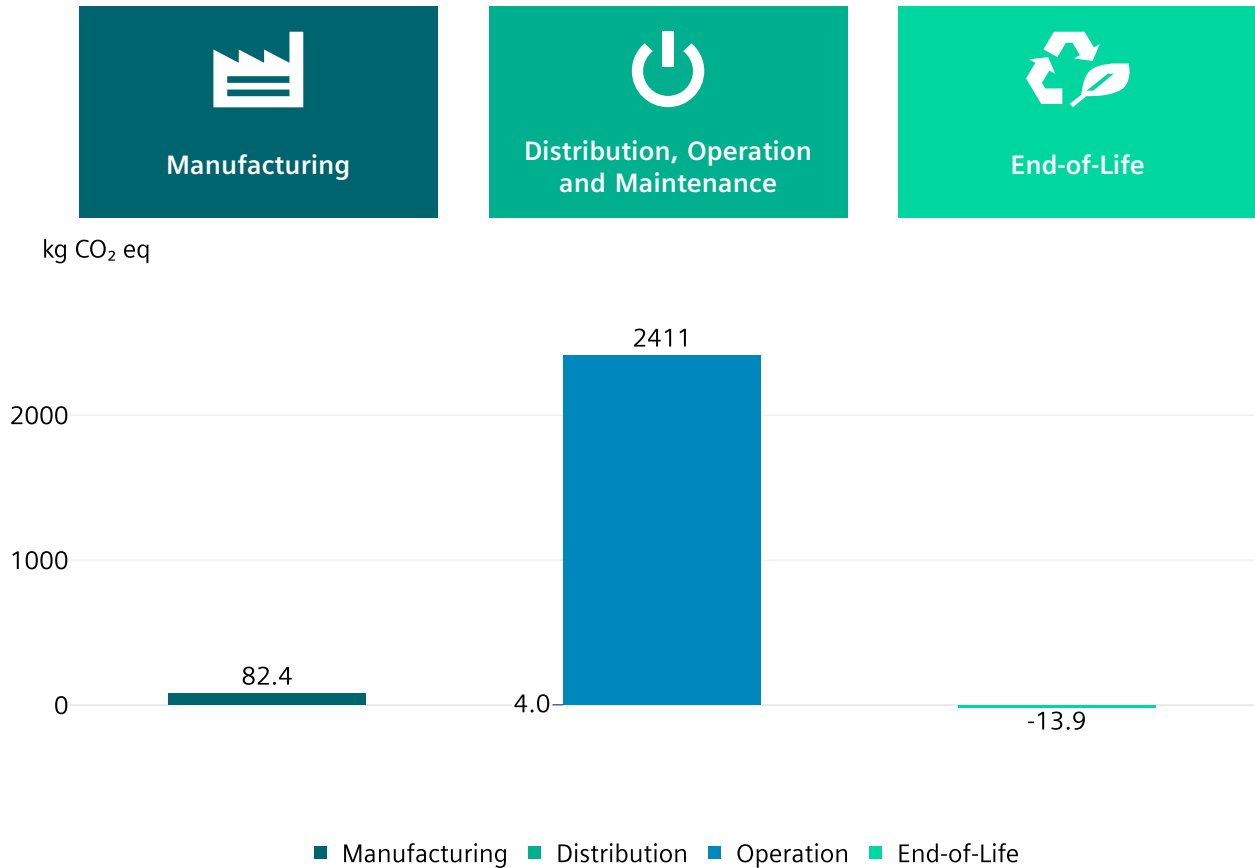
To ensure the high quality and completeness of the LCA results, primary data have been used whenever possible. Datasets for resources, such as electrical energy or natural gas, are chosen from the region where the device is produced and assembled. If primary data are not available, datasets reflecting 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 |
|--|--|---------|---------------|--------------|-----------|-------------|
| Climate change – total | kg CO ₂ eq | 2.48E+3 | 8.24E+1 | 3.97E+0 | 2.41E+3 | -1.39E+1 |
| Climate change – fossil | kg CO ₂ eq | 2.45E+3 | 6.67E+1 | 3.90E+0 | 2.39E+3 | -1.39E+1 |
| Climate change – biogenic | kg CO ₂ eq | 3.71E+1 | 1.56E+1 | 9.97E-3 | 2.15E+1 | 3.35E-4 |
| Climate Change, land use and land use change | kg CO ₂ eq | 5.03E-1 | 8.49E-2 | 6.58E-2 | 3.63E-1 | -1.13E-2 |
| Ozone depletion | kg CFC-11 eq | 6.21E-8 | 8.01E-9 | 5.77E-13 | 5.42E-8 | -7.50E-11 |
| Acidification | Mole of H+ eq | 5.02E+0 | 5.59E-1 | 5.98E-3 | 4.61E+0 | -1.53E-1 |
| Eutrophication, freshwater | kg P eq | 1.05E-2 | 5.60E-4 | 1.67E-5 | 9.96E-3 | -9.44E-6 |
| Eutrophication, marine | kg N eq | 1.22E+0 | 7.83E-2 | 2.26E-3 | 1.15E+0 | -1.22E-2 |
| Eutrophication, terrestrial | Mole of N eq | 1.28E+1 | 8.39E-1 | 2.67E-2 | 1.20E+1 | -1.31E-1 |
| Photochemical ozone formation, human health | kg NMVOC eq | 3.24E+0 | 2.34E-1 | 5.92E-3 | 3.04E+0 | -4.21E-2 |
| Resource use, mineral and metals | kg Sb eq | 1.59E-2 | 1.63E-2 | 3.41E-7 | 4.47E-4 | -8.09E-4 |
| Resource use, fossils | MJ | 5.09E+4 | 1.05E+3 | 5.16E+1 | 5.00E+4 | -1.75E+2 |
| Water use | m ³ world eq deprived water | 6.66E+2 | 1.75E+1 | 6.07E-2 | 6.51E+2 | -2.45E+0 |
| Particulate matter | Disease incidences | 4.42E-5 | 7.09E-6 | 6.57E-8 | 3.85E-5 | -1.46E-6 |
| Ionising radiation, human health | kBq U235 eq | 1.32E+3 | 4.04E+0 | 1.36E-2 | 1.31E+3 | -1.37E+0 |
| Ecotoxicity, freshwater – total | CTUe | 1.51E+4 | 5.96E+2 | 3.83E+1 | 1.45E+4 | -3.93E+1 |
| Human toxicity, cancer – total | CTUh | 9.97E-7 | 1.84E-7 | 7.73E-10 | 8.14E-7 | -2.55E-9 |
| Human toxicity, non-cancer – total | CTUh | 1.31E-5 | 6.56E-7 | 3.47E-8 | 1.25E-5 | -1.17E-7 |
| Land Use | dimensionless (pt) | 2.18E+4 | 6.38E+2 | 2.54E+1 | 2.12E+4 | -8.16E+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 separately in the chart due to its relatively small contribution to climate change and its impact is placed under 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:

- **product recyclability of up to 81%** mainly due to metal content
- **energy recoverability of up to 9%** from plastic materials
- **minimum disposal rate of 10%**

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 S120 Booksize system Smart Line Modules, the climate change impact (CC) in kg CO₂ eq. of the manufacturing, the 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 PR (LO) 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 SINAMICS S120 Smart Line Modules

| MLFB | Voltage | Power Rate | Manufact-uring Phase | Operatio-n Phase | End-of-Life Phase |
|--------------------|---------|------------|-----------------------|-----------------------|-----------------------|
| / | v | kW | kg CO ₂ eq | kg CO ₂ eq | kg CO ₂ eq |
| 6SL3130-6AE15-0AB1 | 380-480 | 5 | 80.8 | 1348 | -13.5 |
| 6SL3130-6AE21-0AB1 | 380-480 | 10 | 82.4 | 2411 | -13.9 |
| 6SL3130-6TE23-6AA3 | 380-480 | 36 | 170 | 6912 | -35.2 |
| 6SL3130-6TE25-5AA3 | 380-480 | 55 | 213 | 11331 | -59.6 |

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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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