



## ENVIRONMENTAL PRODUCT DECLARATION

# SINAMICS G120C

Compact converters for continuous motion

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



# 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. The applied use phase scenario including load profile is based on EN 50598-3:2015 Table 5.

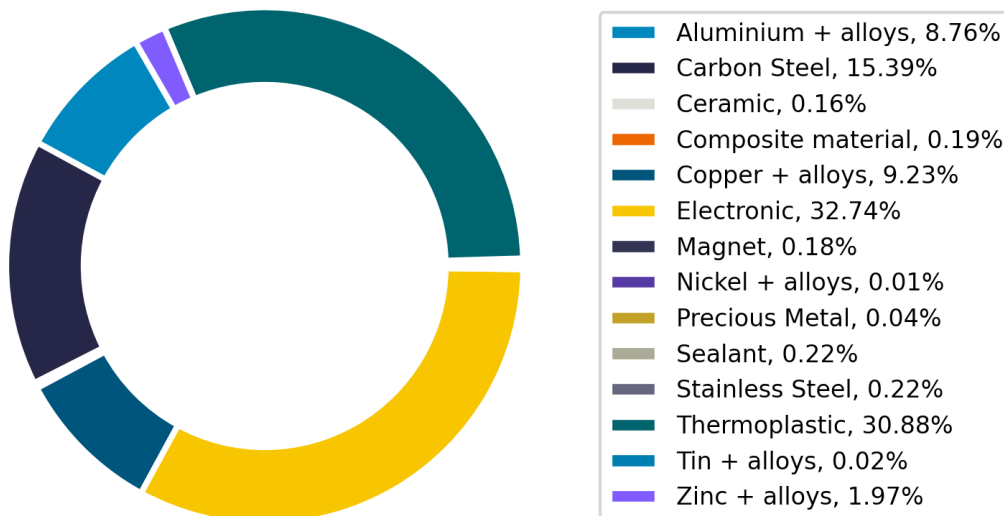
Siemens is dedicated to an environmentally conscious design of its products in line with IEC 62430 and has implemented an integrated management system according to ISO 9001, ISO 14001 and ISO 45001.

Products	<b>SINAMICS G120C in frame sizes FSAA, FSA, FSB, FSC, FSD, FSE and FSF, voltage class 380 V...480 V 3 AC (0.55 kW - 132 kW) in IP20 degree of protection</b>
Represented by	6SL3210-1KE15-8AF2, 2,2kW, 3AC 380-480V, Filter Class A, IP20, PROFINET
Product Description	SINAMICS G120C converter, safety, IP20, air cooling, PROFINET, USS/Modbus RTU, PROFIBUS DP
Functional Unit	Speed and torque control of asynchronous induction motors. 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

## Material composition

The following chart outlines the overall material composition of the calculated reference product. Product weight of 1.37 kg adds up with packaging weight of 0.27 kg to a total weight of 1.64 kg. Packaging consists of corrugated cardboard Box, plastic foil label and Paper.

### Product Weight 1.37 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



# Key environmental performance indicators

The following impact categories characterize the product's environmental footprint. The following impact categories characterize the product's environmental footprint. They have been calculated with LCIA methodology EF3.0; LCA tool: Green Digital Twin (GDT), Database: One Siemens LCA Database (based on MLC CUP 2023.2, formerly GaBi).

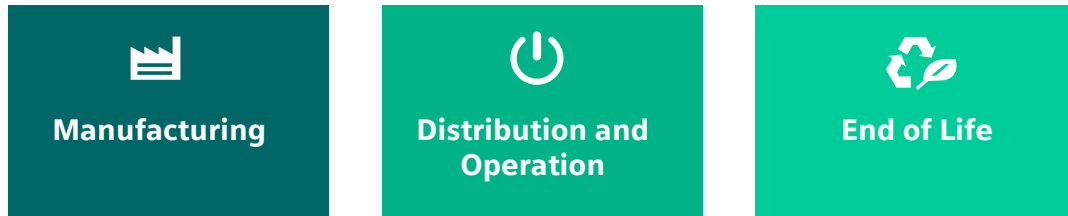
To ensure the high quality and completeness of the LCA results, Primary Data have been used whenever possible. Datasets for resources, such as electrical energy or natural gas, are chosen from the region where the device is produced and assembled. If primary data are not available, datasets reflecting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

For products belonging to the same homogeneous product family range the following extrapolation criteria (Annex) can be used to derive their climate change impact in kg CO<sub>2</sub> eq. The rest of the listed impacts will be determined in the following version of the EPD.:

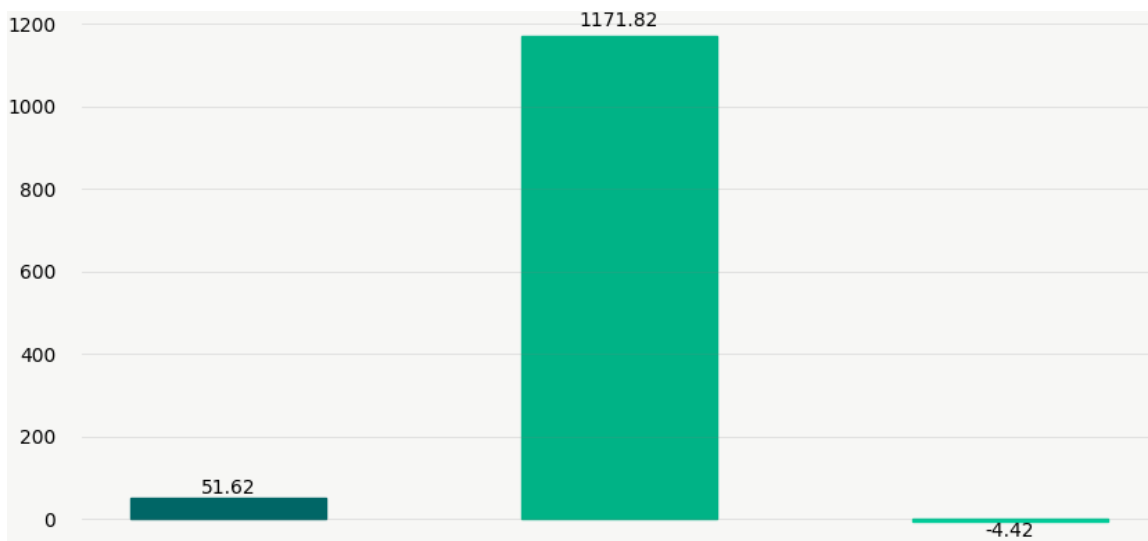
Impact Category	Unit	Total	Manufacturing	Distribution	Operation	End of Life
Acidification	Mole of H+ eq	2.79E+0	4.00E-1	6.25E-3	2.47E+0	-8.77E-2
Climate change – total	kg CO <sub>2</sub> eq	1.22E+3	5.16E+1	5.36E-1	1.17E+3	-4.42E+0
Climate change – fossil	kg CO <sub>2</sub> eq	1.21E+3	4.99E+1	5.32E-1	1.16E+3	-4.39E+0
Climate change – biogenic	kg CO <sub>2</sub> eq	1.19E+1	1.68E+0	1.12E-3	1.03E+1	-1.66E-2
Climate Change, land use and land use change	kg CO <sub>2</sub> eq	1.47E-1	2.71E-2	3.40E-3	1.27E-1	-6.97E-3
Ecotoxicity, freshwater – total	CTUe	7.30E+3	5.51E+2	5.02E+0	6.78E+3	-4.04E+1
Eutrophication, freshwater	kg P eq	1.13E-2	6.91E-3	1.38E-6	4.35E-3	-7.82E-6
Eutrophication, marine	kg N eq	6.65E-1	7.94E-2	1.59E-3	5.93E-1	-8.56E-3
Eutrophication, terrestrial	Mole of N eq	6.71E+0	5.89E-1	1.76E-2	6.20E+0	-9.37E-2
Human toxicity, cancer – total	CTUh	4.10E-7	5.26E-8	9.90E-11	3.59E-7	-1.98E-9
Human toxicity, non-cancer – total	CTUh	9.47E-6	3.84E-6	4.07E-9	5.72E-6	-9.30E-8
Ionising radiation, human health	kBq U235 eq	6.48E+2	4.56E+0	1.75E-3	6.43E+2	-1.25E-1
Land Use	dimensionless (pt)	9.96E+3	3.70E+2	2.10E+0	9.61E+3	-2.07E+1
Ozone depletion	kg CFC-11 eq	3.05E-8	9.07E-9	5.93E-14	2.14E-8	-1.69E-11
Particulate matter	Disease incidences	2.54E-5	5.28E-6	1.07E-7	2.08E-5	-7.66E-7
Photochemical ozone formation, human health	kg NMVOC eq	1.72E+0	1.64E-1	4.44E-3	1.58E+0	-2.72E-2
Resource use, fossils	MJ	2.50E+4	6.80E+2	7.04E+0	2.44E+4	-6.08E+1
Resource use, mineral and metals	kg Sb eq	2.78E-2	3.40E-2	2.59E-8	1.79E-4	-6.34E-3
Water use	m <sup>3</sup> water eq deprived water	2.51E+2	-1.97E+0	4.72E-3	2.55E+2	-2.91E+0

# Climate Change

This chart shows the overall impact of the product on climate change – total. 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, thus its impact is included in the operation bar.



kgCO<sub>2</sub>eq



## 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 36%** mainly due to metal content
- **an energy recoverability of up to 32%** from plastic materials
- **a minimum disposal rate of 33%**

**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

# 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.

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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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# Annex

For other MLFBs covered by this EPD under SINAMICS G120C homogenous product family, the climate change impact (CC) in kg CO<sub>2</sub> eq. can be calculated for the manufacturing and end of life phases using linear regression equations according to the weight in kg (m) of the assessed product.

The following equations based on linear regression is defined as:

$$y=m*x+b$$

where,

y....climate change in kgCO<sub>2</sub>eq.

m....scaling factor (without dimension)

x.... mass of the inverter in kg

b.... intercept (offset) in kg

Thus, the factors for the manufacturing phase are:

$$m = 14.552, b = 27.975 \text{ kg}$$

For END of Life:

$$m = -3.1017, b = 0.0757 \text{ kg}$$

For the operation phase, the climate change in kgCO<sub>2</sub>eq was derived for 400 V and rated power P<sub>R</sub> (LO) in kW for European standard energy mix, lifetime of 15 years, annual operation 5000h/year and three operation points.

OP1: 20% of time at 100% speed and 100% torque

OP2: 70% of time at 50% speed and 25% torque

OP3: 10% of time at 0% speed and 25% torque

Voltage	V	400	400	400	400	400	400	400	400
P <sub>R</sub> (LO)	kW	0.55	0.75	1.1	1.5	2.2	3	4	5.5
Climate change	kg CO <sub>2</sub> eq	688	706	818	960	1171	1493	1782	2226

Voltage	V	400	400	400	400	400	400	400	400
P <sub>R</sub> (LO)	kW	7.5	11	15	18.5	22	30	37	45
Climate change	kg CO <sub>2</sub> eq	2782	3854	4550	5299	7720	10558	11200	13378

Voltage	V	400	400	400	400	400
P <sub>R</sub> (LO)	kW	55	75	90	110	132
Climate change	kg CO <sub>2</sub> eq	16398	15546	19143	23030	45217