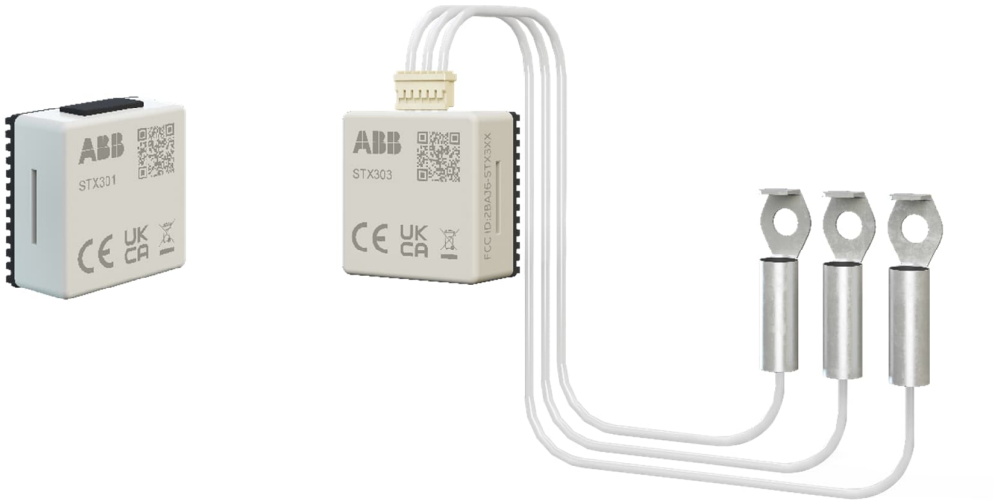
EPD

Environmental Product Declaration

STX300 Self-supplied wireless temperature sensors family

Production site: Xiamen, China



DOCUMENT KIND Environmental Product Declaration	IN COMPLIANCE WITH ISO 14025 and EN 50693			
PROGRAM OPERATOR The Norwegian EPD Foundation	PUBLISHER The Norwegian EPD Foundation			
REGISTRATION NUMBER OF THE PROGRAM OPERATOR NEPD-5028-4359-EN	ISSUE DATE 2023-09-19			
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OWNING ORGANIZATION ABB Switzerland Ltd, Group Technology Management	ABB DOCUMENT ID 2NG000087	REV. B	LANG. EN	PAGE 1/19

EPD Owner	ABB Switzerland Ltd, Group Technology Management		
Organization No.	CHE-101.538.426		
Manufacturer name and address	ABB Xiamen Switchgear Co., Ltd. No.885, FangShanXiEr Road, Xiang'an District, Xiamen, Fujian, 361101, P.R.China		
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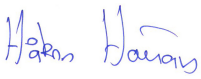
Program operator	The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo, Norway phone: +47 23 08 80 00, email: post@epd-norge.no		
Declared product	STX300 Self-supplied wireless temperature sensors family		
Product description	Continuously measures the temperature of critical connections in MV Switchgear and wirelessly transmits to the concentrator, with operation energy harvested from the electromagnetic energy around power transmission conductor.		
Functional unit	To measure the temperature of a single point, with a use rate of 100 %, during a service life of 20 years in Europe.		
Reference flow	A single STX301 device, including related accessories and packaging.		
CPC code	46 “Electrical machinery and apparatus”		
Independent verification	Independent verification of the declaration and data, according to ISO 14025:2010 ☐ INTERNAL ☒ EXTERNAL Independent verifier approved by EPD-Norge: Elisabet Amat Signature: 		
Approved by	Håkon Hauan, CEO EPD-Norge Signature: 		
Reference PCR	EN 50693:2019 – Product Category Rules for Life Cycle Assessments of Electronic and Electrical Products and Systems. EPDItaly007 – Electronic and Electrical Products and Systems, Rev. 3.0, 2023/01/13.		
Program instructions	The Norwegian EPD Foundation/EPD-Norge, General Programme Instructions 2019, Version 3.0, 2019/04/24.		
LCA study	This EPD is based on the LCA study described in the LCA report “LCA report for STX300 series self powerd sensor”,ID:2NGA000763		
EPD type	Specific Product		
EPD scope	Cradle-to-grave		
Product RSL	20 years		
Geographical representativeness	Raw Materials: Global	Manufacturing: China	Downstream: Europe
Reference year	2022		
LCA software	SimaPro 9.5 (2023)		
LCI database	Ecoinvent v3.9.1 (2022)		
Comparability	EPDs published within the same product category, though originating from different programs, may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible.		
Liability	The owner of the declaration shall be liable for the underlying information and evidence. EPD-Norge shall not be liable with respect to manufacturer, life cycle assessment data, and evidence.		

Contents

Sustainability at ABB

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation, and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels.

At ABB, we actively contribute to a more sustainable world, leading by example in our own operations and partnering with customers and suppliers to enable a low-carbon society, preserve resources, and promote social progress.

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General Information

The products declared in this Environmental Product Declaration include the following devices of the STX300 self-powered wireless smart sensor family, including related accessories and packaging:

- STX301 for single point temperature measurement (Classic TR protocol)
- STX303 for three points temperature measurement (Classic TR protocol)
- STX311 for single point temperature measurement (ZigBee Greenpower protocol)
- STX313 for three points temperature measurement (ZigBee Greenpower protocol)

Technical data of the main parts of STX300 series are presented below.

Parts	Item	Values
Main Unit	Width	26 mm
	Height	13 mm
	Depth	27 mm
	Weight	17.7 g
	Power Consumption	<2 mW
Buckle	Weight	2.68 g
Alloy Strap	Weight	5.25 g
Probe (STX303 and STX313)	Weight	13.5 g

The STX300 family is owned by ABB Xiamen Switchgear Co., Ltd. (ELDS division), which specializes in the production, sales, and service of 3.6kV – 40.5kV switchgears and circuit breakers and related intelligent components for smart systems and technologies for electrical distribution supplied to utilities, industrial, and tertiary sector customers.
ABB ELDS division, China adopts and implements for its own activities an integrated Quality/Environmental/Health Management System in compliance with the following standards:

- ISO 9001:2015 – Quality Management Systems
- ISO 14001:2015 – Environmental Management Systems
- ISO 45001:2018 – Occupational Health and Safety Management Systems

The STX300 family is manufactured by ABB supplier Yinruifeng Electronics which locates in Xiamen, China.

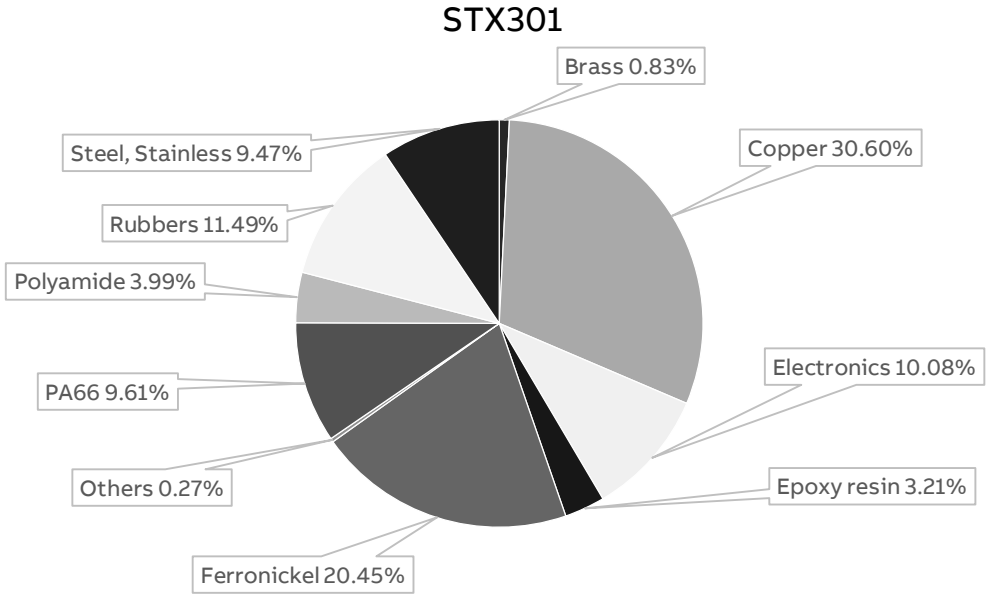
The manufacturing site is certified according to the following standards:

- ISO 9001:2015 – Quality Management Systems
- ISO 14001:2015 – Environmental Management Systems

Constituent Materials

The reference product STX301 has a main unit, accessories, and packaging material. Main unit of STX301 weighs 17.7g and the accessories weigh 7.93g. The constituent materials are presented below.

Row Labels	Weight[kg]	%
Main Unit	**1.77E-02**	**69.11%**
Brass	2.12E-04	0.83%
Copper	7.86E-03	30.60%
Electronics	2.59E-03	10.08%
Epoxy resin	8.24E-04	3.21%
Others	6.96E-05	0.27%
PA66	2.47E-03	9.61%
Polyamide	1.02E-03	3.99%
Rubbers	2.70E-03	10.52%
Accessory	**7.93E-03**	**30.89%**
Ferronickel	5.25E-03	20.45%
Rubbers	2.50E-04	0.97%
Steel, Stainless	2.43E-03	9.47%
Total	**2.57E-02**	**100.00%**



The packaging materials for STX301 weighs 1.74 g, and the constituent materials are presented below.

Description	Material	Weight [kg]	Weight %
Packaging box	Cardboard	1.53E-03	87.78%
Protective film	Polyethylene	2.13E-04	12.22%
Total		**1.74E-03**	**100%**

LCA Background Information

Functional Unit

The functional unit of this study is to measure the temperature of a single point, with a use rate of 100 %, during a service life of 20 years in Europe. The reference flow is a single STX301 device, including related accessories and packaging.

Note, the reference service life (RSL) of 20 years is a theoretical period selected for calculation purposes only – this is not representative for the minimum, average, nor actual service life of the product.

System Boundaries

The life cycle assessment of the STX300 sensor family, an EEPS (Electronic and Electrical Products and Systems), is a “cradle-to-grave” analysis. The table below shows the product life cycle stages and the information considered in the LCA.

MANUFACTURING STAGE	DISTRIBUTION STAGE	INSTALLATION STAGE	USE & MAINTENANCE STAGE	DE-INSTALLATION & END-OF-LIFE STAGE
Acquisition of raw materials **Transport to manufacturing site** **Components/parts manufacturing** **Assembly** **Packaging**	Transport to distributor/ logistic center Transport to place of use	Installation EoL treatment of generated waste (packaging)	Usage	De-Installation Collection and transport EoL treatment

The stages of the product life cycle and the information considered for the evaluation of the STX301 are:

a) The manufacturing stage, which includes the raw materials and production as well as transportation of semi-finished parts, components, and sub-assemblies from sub supplier to Yingruifeng. It also includes the utility consumption and waste generation as well as the production and use of packaging materials at Yingruifeng.
b) The distribution stage, which includes the transportation of the final product to the ABB factory for installation to ABB Switchgears
c) The installation stage, which includes the end of life of the packaging materials.
d) The use stage, which includes the energy consumption during the reference service life of the product. As the product is maintenance free, no maintenance activity is included.
e) The end-of-life stage, which includes all activities related to waste treatment and disposal of the product at the end of its service life.

As indicated in the EN 50693:2019, capital goods such as machinery, tools, buildings, infrastructure, packaging for internal transports, and administrative activities, which cannot be allocated directly to the production of the reference product, are excluded.

Infrastructures, when present, such as in processes deriving from the ecoinvent database, have not been excluded. Scraps for metal working and plastic processes are also included when already defined in ecoinvent.

Temporal and geographical boundaries

In terms of temporal boundaries, all primary data collected from ABB and Yingruifeng are from 2022, which is considered a representative production year. Secondary data are provided by ecoinvent database v3.9.1 which was released in 2022.

In terms of geographical boundaries, the materials and components used in the production of the STX300 series are globally sourced. The supply chains are often complex and can extend across multiple countries and continents. Therefore, materials and background processes with global representativeness are selected from ecoinvent. Thus, a conservative approach is adopted. ABB's supplier, Yingruifeng, manufactures the product in Xiamen, China. The product is then shipped to ABB Xiamen Switchgear Co., Ltd for shipment to real customer site, assumed to be in Europe. For the use stage of STX300 series products, the geographical boundaries of Europe have been considered.

Data quality

Both primary and secondary data are used. The main sources for primary data are the bill of materials and technical drawings. This information is extracted from: 1) SAP – the enterprise resource planning system, and 2) SmarTeam – the product data management system. Site specific foreground data are provided by ABB and Yingruifeng. The data quality, characterized by quantitative and qualitative aspects, is presented in Appendix I.

For all other processes for which primary data are not available, generic data originating from the ecoinvent v3.9.1 database, “allocation, cut-off by classification”, are used. The LCA software used for the calculations is SimaPro 9.5.0.0.

Environmental impact indicators

The information obtained from the inventory analysis is aggregated according to the effects related to the various environmental issues. In accordance with the PCR EPDItaly007, the environmental impact indicators are determined by using the characterization factors and impact assessment methods specified in EN 15804:2012+A2:2019.

Allocation rules

There are no co-products in this product system, so no allocation of inputs and outputs is necessary. No allocation is made for materials subject to recycling. For the input of recycled resources, the recycling process is included. Outputs subject to recycling are considered as inputs for the next life cycle.

For the end-of-life allocation, the “Polluter Pays” principle is adopted according to what is defined in the CEN/TR 16970 standard, as required by the PCR EPDItaly007. This means, waste treatment processes are allocated to the product system that generates the waste

until the end-of-waste state is reached. The environmental burdens of recycling and energy recovery processes are therefore allocated to the product system that generates the waste, while the product system that uses the exported energy and recycled materials receives it burden-free. However, the potential benefits and avoided loads from recovery and recycling processes are not considered because it is not required by EPDItaly007.

Cut-off criteria

No cut-off criteria were applied to exclude materials from the calculation.

Inventory Analysis

Manufacturing stage

As presented in chapter Constituent Materials, coppers and ferronickel are most frequently used materials in the product, followed by rubbers, electronics and PA66.

Using the ecoinvent database, copper is mainly modelled with *Copper, cathode {GLO}| market for | Cut-off, S* and ferronickel strap is mainly modelled with Ferronickel {GLO}| market for ferronickel | Cut-off, S. To account for the production activities of metal and plastic parts, *Metal working, average for copper product*, *Sheet rolling* for steel and *Injection molding* are the most frequently used processes. Surface treatments are also included, and the most common surface treatments are ecoinvent based customized *Gold plating* and *Silver plating* process.

Supply chain transport is added as far as data is available between Yingruifeng and sub-suppliers. Only primary suppliers are considered. The rest of the transports are assumed to already be included in ecoinvent's "market for"-processes. The selected ecoinvent process is *transport, freight, lorry 16-32 metric ton, EURO4 {Row}* for lorry.

The manufacturing site of STX300 is located in Xiamen (Yingruifeng). For the manufacturing site, which is considered in the core manufacturing stage, utility consumption and waste generation are allocated to the production of one STX300 sensor according to the defined allocation rules.

The packaging materials and accessories associated with the product are also considered in the core manufacturing stage.

Distribution

The transport distance from Yingruifeng to ABB's plant assumed to be 14 km transport by lorry, the distance is got from Google Maps. The selected ecoinvent process is *transport, freight, lorry 16-32 metric ton, EURO4 {RoW}*, and the scenario is representative for China. Transport from ABB's plant ABB Xiamen Switchgear Co. Ltd to European Switchgear factories is also included, it is assumed to be 14856.17 km by sea according to Sea Rates, and the selected ecoinvent process is *Transport, freight, sea, container ship {GLO}| market for transport, freight, sea, container ship | Cut-off, S*. Further transportation to customer site is outside the boundary of this calculation - this will be considered by LCA of switchgears as the sensors will be in the end installed to switchgears.

Installation

The installation stage only implies manual activities, and no energy is consumed. Therefore, this stage only considers the end-of-life of the packaging materials used.

The end-of-life scenario for packaging materials is based on *Packaging waste by waste management operations* by Eurostat (2020), which is representative for Europe (see table 9). The waste is assumed to be sorted by hand when disposed, and possible losses in the separation processes are assumed to be negligible. Finally, because the actual transportation of waste is unknown, a transport distance of 100 km is assumed with the ecoinvent process *transport, freight, lorry 16-32 metric ton, EURO4 {RER}*.

Use

The use stage considers the reference power consumption over the reference service life of 20 years as defined in the functional unit. According to the product specification, the sensor is self-powered with energy inducted from measured primary circuit, and during the normal operation it sends data package every 60 seconds with very small power and then goes to sleep for another 60 seconds to save power- according to product specification the power consumption is less than 2 mW.

$$E_{use}[kWh] = \frac{P_{use} * 8760 * RSL * \alpha}{1000} = \frac{2\,m\text{W} * 8760\ \text{hours} * 20\ \text{years} * 100\ \%}{1000000} = 0.3503\ kWh$$

Where:

- E_{use} = Total energy use over the reference service life
- P_{use} = Reference power consumption in watts
- RSL = Reference Service Life in years
- α = Use time rate
- 8760 is the number of hours in a year
- 1000 is the conversion factor from W to kW

Since these sensors are installed in switchboards installed in Europe, the latest energy mix of the European Union is adopted as suggested by the standard EN 5069：

Energy mix	Source	Amount	Unit
Electricity, medium voltage {RER}| market group for | Cut-off, S	Ecoinvent v3.9.1	0.368	kg CO_2-eq/kWh

Maintenance is not considered because the product is designed to be maintenance free.

End of life

Decommissioning of the product only implies manual activities, and no energy is consumed. Therefore, this phase only considers the end-of-life of the product.

The end-of-life scenario for the product is based on IEC/TR 62635 (Annex D.3), which is representative for Europe. A conservative approach is adopted by using the rates given for materials that go through a separation process, except for electronics for which selective treatment is assumed, and this includes the losses in the separation processes. A transport distance of 100 km by lorry is assumed as actual location of disposal is unknown.

Environmental Indicators

STX301

Impact Category	Unit	Total	Manufacturing	Distribution	Installation	Use and maintenance	End-of-life
GWP – total	kg CO_2 eq.	1.34E+00	1.20E+00	4.29E-03	8.76E-04	1.29E-01	9.16E-03
GWP – fossil	kg CO_2 eq.	1.33E+00	1.19E+00	4.29E-03	3.24E-04	1.24E-01	8.64E-03
GWP – biogenic	kg CO_2 eq.	1.20E-02	6.22E-03	-6.04E-07	5.52E-04	4.69E-03	5.15E-04
GWP – luluc	kg CO_2 eq.	2.36E-03	2.05E-03	3.26E-06	4.11E-08	3.05E-04	3.26E-06
ODP	kg CFC-11 eq.	4.22E-08	3.99E-08	6.36E-11	3.13E-12	2.19E-09	3.08E-11
AP	mol H+ eq.	1.66E-02	1.59E-02	1.23E-04	3.29E-07	6.12E-04	1.32E-05
EP – freshwater	kg P eq.	2.57E-03	2.46E-03	1.43E-07	8.00E-09	1.11E-04	8.22E-07
EP – marine	kg N eq.	2.31E-03	2.15E-03	3.08E-05	4.90E-07	1.09E-04	1.71E-05
EP – terrestrial	mol N eq.	2.63E-02	2.49E-02	3.41E-04	1.23E-06	9.59E-04	3.85E-05
POCP	kg NMVOC eq.	7.33E-03	6.92E-03	9.23E-05	4.74E-07	3.09E-04	1.18E-05
ADP – minerals and metals	kg Sb eq.	7.60E-04	7.59E-04	4.22E-09	2.79E-10	2.43E-07	1.93E-08
ADP – fossil	MJ, net calorific value	1.77E+01	1.48E+01	5.16E-02	8.77E-04	2.81E+00	3.04E-02
WDP	m^3 eq.	3.54E-01	3.25E-01	1.19E-04	1.52E-05	2.87E-02	5.11E-04

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; EP-marine: Eutrophication potential-marine compartment; EP-terrestrial: Eutrophication potential-accumulated exceedance; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for fossil resources potential; WDP: Water deprivation potential.

Resource use parameters	Unit	Total	Manufacturing	Distribution	Installation	Use and maintenance	End-of-life
PENRE	MJ, low cal. value	1.75E+01	1.47E+01	5.16E-02	8.77E-04	2.80E+00	3.04E-02
PERE	MJ, low cal. value	2.39E+00	1.85E+00	3.71E-04	2.67E-05	5.39E-01	2.78E-03
PENRM	MJ, low cal. value	1.79E-01	1.79E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ, low cal. value	1.96E-02	1.96E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, low cal. value	1.77E+01	1.48E+01	5.16E-02	8.77E-04	2.80E+00	3.04E-02
PERT	MJ, low cal. value	2.41E+00	1.87E+00	3.71E-04	2.67E-05	5.39E-01	2.78E-03
FW	m^3	1.32E-02	1.10E-02	4.21E-06	4.79E-07	2.19E-03	1.79E-05
MS	kg	4.00E-03	4.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

PENRE: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material; PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw material; PENRM: Use of non-renewable primary energy resources used as raw material; PERM: Use of renewable primary energy resources used as raw material; PENRT: Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); PERT: Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); FW: Net use of fresh water; MS: Use of secondary materials; RFS: Use of renewable secondary fuels; NRSF: Use of non-renewable secondary fuels.

Waste production Indicators	Unit	Total	Manufacturing		Distribution	Installation	Use and maintenance	End-of-life
HWD	kg	1.49E-04	1.45E-04	2.58E-07	4.17E-09	3.55E-06	1.16E-07	1.49E-04
NHWD	kg	2.13E-01	1.93E-01	1.78E-04	2.37E-04	7.70E-03	1.15E-02	2.13E-01
RWD	kg	5.15E-05	3.10E-05	5.75E-09	1.33E-09	2.04E-05	5.50E-08	5.15E-05
MER	kg	2.14E-03	0.00E+00	0.00E+00	2.20E-04	0.00E+00	1.92E-03	2.14E-03
MFR	kg	1.62E-02	1.65E-03	0.00E+00	1.32E-03	0.00E+00	1.32E-02	1.62E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	8.73E-03	0.00E+00	0.00E+00	1.62E-03	0.00E+00	7.12E-03	8.73E-03
EEE	MJ	4.85E-03	0.00E+00	0.00E+00	8.98E-04	0.00E+00	3.96E-03	4.85E-03

HWD: hazardous waste disposed; NHWD: non-hazardous waste disposed; RWD: radioactive waste disposed; MER: materials for energy recovery; MFR: material for recycling; CRU: components for reuse; ETE: exported thermal energy; EEE: exported electricity energy.

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Extrapolation rules

Due to the large variations in environmental impacts present within the series, extrapolation rules are established according to EN 50693.

STX300 series includes 4 variants: STX301, STX303, STX311 and STX313. There is no difference on HW between STX301 and STX311, the difference is only on communication protocol, which is pure SW, so the main unit of STX311 is exactly the same, and the above result is also valid for STX311.

Regarding to STX303 or STX313, there are two differences compared to STX301 or STX311, as mentioned in 2.4:

- The main unit of STX303 or STX313 doesn't include an NTC thermistor, this can be ignored, as mentioned above.
- STX303 or STX313 has a three-headed external probe, this has to be taken into consideration.

In order to calculate the correct result, it is necessary to remember that STX303/STX313 measures temperature of 3 different points with a single main unit and a probe, unlike STX301/STX311, which measures a single point temperature with a single main unit.

Since the functional unit of this study is to measure temperature at a single point, for STX3x3 sensors it is necessary to consider 1/3 of the main unit and 1/3 of the probe to refer to measurement for a single point.

It has to be pointed out that use of the probe doesn't has impact to the environmental impact of the main unit, so the extrapolation rule for STX303/STX313 at different stage is universal in formula:

$Value_{STX303/STX313} = (Value_{STX301} + \text{Value}_{Probe})/3$

Example for calculation of GWP-total for STX303 in different stages:
• GWP-total in manufacturing stage = (1.20E+00 + 9.22E-01)/3 = 0.707 kg CO2-eq
• GWP-total in use stage = (1.29E-01 + 0.00E+00)/3 = 0.043 kg CO2-eq

Environmental impacts of the probe at different stages are presented in tables below.

Impact Category	Unit	Total	Manufacturing	Distribution	Installation	Use and maintenance	End-of-life
GWP – total	kg CO_2 eq.	9.31E-01	9.22E-01	2.47E-03	3.06E-03	0.00E+00	3.26E-03
GWP – fossil	kg CO_2 eq.	9.27E-01	9.19E-01	2.47E-03	3.06E-03	0.00E+00	3.06E-03
GWP – biogenic	kg CO_2 eq.	2.27E-03	2.06E-03	-3.48E-07	-4.98E-07	0.00E+00	2.02E-04
GWP – luluc	kg CO_2 eq.	9.47E-04	9.43E-04	1.88E-06	2.31E-07	0.00E+00	1.72E-06
ODP	kg CFC-11 eq.	1.13E-05	1.13E-05	3.67E-11	2.42E-11	0.00E+00	1.65E-11
AP	mol H+ eq.	7.79E-03	7.71E-03	7.11E-05	1.46E-06	0.00E+00	6.53E-06
EP – freshwater	kg P eq.	1.70E-03	1.70E-03	8.27E-08	4.91E-08	0.00E+00	4.11E-07
EP – marine	kg N eq.	1.23E-03	1.20E-03	1.78E-05	1.76E-06	0.00E+00	1.60E-05
EP – terrestrial	mol N eq.	1.47E-02	1.45E-02	1.97E-04	5.38E-06	0.00E+00	1.80E-05
POCP	kg NMVOC eq.	3.77E-03	3.71E-03	5.32E-05	1.66E-06	0.00E+00	5.78E-06
ADP – minerals and metals	kg Sb eq.	5.86E-04	5.86E-04	2.43E-09	1.79E-09	0.00E+00	9.66E-09
ADP – fossil	MJ, net calorific value	6.79E+00	6.74E+00	2.97E-02	4.12E-03	0.00E+00	1.62E-02
WDP	m^3 eq.	1.86E-01	1.85E-01	6.86E-05	7.50E-05	0.00E+00	2.80E-04

GWP-fossil: Global Warming Potential fossil; GWP-biogenic: Global Warming Potential biogenic; GWP-luluc: Global Warming Potential land use and land use change; ODP: Depletion potential of the stratospheric ozone layer; AP: Acidification potential; EP-freshwater: Eutrophication potential-freshwater compartment; EP-marine: Eutrophication potential-marine compartment; EP-terrestrial: Eutrophication potential-accumulated exceedance; POCP: Formation potential of tropospheric ozone; ADP-minerals & metals: Abiotic Depletion for non-fossil resources potential; ADP-fossil: Abiotic Depletion for fossil resources potential; WDP: Water deprivation potential.

Resource use parameters	Unit	Total	Manufacturing		Distribution	Installation	Use and maintenance	End-of-life
PENRE	MJ, low cal. value	6.57E+00	6.52E+00	2.97E-02	4.12E-03	0.00E+00	1.62E-02	6.57E+00
PERE	MJ, low cal. value	7.56E-01	7.54E-01	2.14E-04	1.72E-04	0.00E+00	1.43E-03	7.56E-01
PENRM	MJ, low cal. value	2.23E-01	2.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-01
PERM	MJ, low cal. value	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ, low cal. value	6.79E+00	6.74E+00	2.97E-02	4.12E-03	0.00E+00	1.62E-02	6.79E+00
PERT	MJ, low cal. value	7.56E-01	7.54E-01	2.14E-04	1.72E-04	0.00E+00	1.43E-03	7.56E-01
FW	m^3	5.69E-03	5.67E-03	2.43E-06	2.23E-06	0.00E+00	9.48E-06	5.69E-03
MS	kg	1.25E-03	1.25E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-03
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

PENRE: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material; PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw material; PENRM: Use of non-renewable primary energy resources used as raw material; PERM: Use of renewable primary energy resources used as raw material; PENRT: Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); PERT: Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); FW: Net use of fresh water; MS: Use of secondary materials; RFS: Use of renewable secondary fuels; NRSF: Use of non-renewable secondary fuels.

Waste production Indicators	Unit	Total	Manufacturing		Distribution	Installation	Use and maintenance	End-of-life
HWD	kg	8.92E-05	8.90E-05	1.48E-07	1.30E-08	0.00E+00	6.01E-08	8.92E-05
NHWD	kg	6.28E-02	5.38E-02	1.02E-04	7.64E-04	0.00E+00	8.14E-03	6.28E-02
RWD	kg	1.41E-05	1.40E-05	3.31E-09	1.20E-08	0.00E+00	2.87E-08	1.41E-05
MER	kg	1.29E-03	0.00E+00	0.00E+00	8.69E-04	0.00E+00	4.22E-04	1.29E-03
MFR	kg	6.37E-03	1.34E-04	0.00E+00	8.58E-04	0.00E+00	5.38E-03	6.37E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	1.37E-02	0.00E+00	0.00E+00	1.05E-02	0.00E+00	3.22E-03	1.37E-02
EEE	MJ	7.63E-03	0.00E+00	0.00E+00	5.85E-03	0.00E+00	1.79E-03	7.63E-03

HWD: hazardous waste disposed; NHWD: non-hazardous waste disposed; RWD: radioactive waste disposed; MER: materials for energy recovery; MFR: material for recycling; CRU: components for reuse; ETE: exported thermal energy; EEE: exported electricity energy.

Additional Environmental Information

Recyclability potential

The recyclability potential of the STX300 sensor family is calculated by dividing “MFR: material for recycling” in the end-of-life stage by the total weight of the product. As a result, the recyclability potentials of the products are presented below:

	Recyclability potential
STX301/STX311	48.15 %
STX303/STX313	41.36%

Greenhouse gas emissions from the use of electricity in the manufacturing phase

Production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process.

Energy mix	Data source	Amount	Unit
Electricity, medium voltage {CN}| market group for | Cut-off, S	Ecoinvent v3.9.1	0.983	kg CO2-eq/kWh

Dangerous substances

The product contains no substances given by the REACH Candidate list.

Indoor environment

The product meets the requirements for low emissions.

Carbon footprint

Carbon footprint has not been worked out for the product.

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