ENGINEERING TOMORROW

Environmental **Product Declaration**

AK-CC55 Case Controllers including Accessories

EPD issued	2025-06-24
EPD expires	2030-06-24
EPD author	Danfoss Climate Solutions A/S
EPD type	Cradle-to-grave with options
Declared unit	One product over its Reference Service Life
Products included	Reference product used AK-CC55 Multi Coil Case Contr. Multi-pack. This EPD also covers range of AK-CC55 Case controllers including accessories such as AK-UI55 Bluetooth Display and AK-OB55 LON Module. Full list of codes covered in Annex 1.
Manufacturing Location	Nordborg, Denmark
Use Location	EU-27
Application	Refrigeration Control
Mass	0,416 kg without packaging 0,522 kg with packaging
Dimensions (H×W×D)	[50 x 180 x 113] mm without packaging
Verification	[ ] External [X] Internal [ ] None
Produced to	Danfoss Product Category Rules (2022-09)
Internal independent verifier	Danfoss Power Electronics and Drives A/S

Product Description

This Environmental Product Declaration (EPD) follows the Danfoss Product Category Rules (PCR) (2022-09-20). These rules provide a consistent framework for calculating and reporting the environmental performance of Danfoss' products and is aligned with relevant international standards, particularly ISO 14025:2006, EN 15804+A2:2019 and EN 50598-3:2015.

This document has been produced by Danfoss A/S following an internal verification process, but it is not a third-party verified document.

What is an EPD?

An EPD is a document used to communicate transparently, the quantified environmental impacts of a product over its lifecycle stages. This quantification is done by performing a Life Cycle Assessment (LCA) in line with a consistent set of rules known as a PCR (Product Category Rules).

An EPD provides:

- A product's carbon footprint together with other relevant environmental indicators, including air pollution, water use, energy consumption and waste, over its own life cycle (Modules A-C), as well as the expected benefits of reuse and recycling in reducing the impact of future products (Module D). See Table 1 for module descriptions.
- Environmental data allowing customers to calculate LCAs and produce EPDs for their own products.

Type of EPD

This EPD is of the type 'cradle-to-grave with options' and includes all relevant modules: production (A1-A3), shipping (A4) and installation (A5); operational energy use (B6); deconstruction (C1), waste collection and transport (C2), treatment (C3) and disposal (C4). It also includes potential net benefits to future products from recycling or reusing post-consumer waste (D). The codes in brackets are the module labels from EN 15804+A2. Modules concerning use, maintenance, repair, replacement, refurbishment (B1-B5) and operational water use (B7) are excluded, following the cut-off rules from EN 15804.

Table 1: Modules of the product's life cycle included in the EPD

Product stage			Installation		Use stage							End-of-life stage				Benefits
Raw materials	Transport	Manufacture	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-install.	Transport	Waste processing	Disposal	Benefits and loads outside system boundaries
A1	**A2**	**A3**	**A4**	**A5**	B1	B2	B3	B4	B5	**B6**	B7	**C1**	**C2**	**C3**	**C4**	**D**
X	**X**	**X**	**X**	**X**	MNR	MNR	MNR	MNR	MNR	**X**	MNR	**X**	**X**	**X**	**X**	**X**

(X = declared module; MNR = module not relevant)

Product Description

The product covered by this EPD is representative of AK-CC55 Case Controllers including Accessories. The production location is the Danfoss plant in Nordborg, Denmark. See more information on Danfoss Product Store.

AK-CC55 is a complete refrigeration appliance control with great flexibility to adapt to refrigeration appliances and cold storage rooms. AK-CC55 Single Coil, Compact, and Multi Coil controllers are optimized to control refrigerated display cases or cold rooms with electronic expansion valve type AKV.

The Danfoss AK-CC55 Multi Coil Case Controller is an advanced electronic controller designed for refrigeration applications. It offers precise temperature control for refrigeration units (display cases, cold rooms, evaporators), ensuring energy efficiency and optimal performance. It is designed to control a single PWM electronic expansion valve, as well as defrost heaters, lights, compressors and alarms. The controller continuously monitors the temperature within the refrigeration unit using connected sensors. It maintains the set temperature and provides alarm management for issues like temperature deviations, sensor faults, or functional failures, ensuring quick response to potential problems. Its robust design ensures reliability and durability in various refrigeration environments, making it suitable for supermarkets, convenience stores, and other commercial refrigeration systems.

Figure 1: AK-CC55 Multi Coil.

AK-CC55 Multi Coil is the reference product used for this EPD is representative for all controllers presented in Annex-1.

The EPD covers all products within the AK-CC55 product group, as the selected reference product is among the largest and most complex in terms of design. It also contains the majority of electronic components found in all lower-end controllers and is among the controllers with high use-phase energy consumptions similar to most in the group. Therefore, it represents a conservative scenario. This assumption is based on the product's design complexity, mass, material composition, and usage characteristics.

Additionally, two separate LCAs were conducted for the accessories based on reference products. These include the AK-UI55 Bluetooth Multipack (084B4075) for all Display accessories and the AK-OB55 LON (084B4070) for all AK-OB55 Modules. These reference products were chosen based on the product's design complexity, mass, material composition, and usage characteristics within their respective series.

To calculate the environmental impacts for each compressor covered by this EPD a conversion factor was calculated based on difference in mass and energy use. The conversion factors and an example of how to calculate the impacts is located in Annex 1.

Product Description

Reference Service Life

For the purpose of this EPD the reference service life (RSL) of the product is considered to be 10 years.

Intended market

The intended market of this study is EU-27, and the baseline scenario involves the distribution, installation, and end-of-life in EU-27. With regards to the use stage and the end-of-life stage, this EPD is not representative of regions other than EU-27.

Product Description

Table 2: Product composition

Product Composition	Mass (kg)	Share (%)
Plastics & Rubbers	**0,146**	**35,1%**
Plastic with no GF	0,146	35,1%
Natural materials	**0,027**	**6,4%**
Paper and cardboard	0,027	6,4%
Electrical/electronic	**0,243**	**58,5%**
PCBA	0,243	58,5%
Total product	**0,416**	**100,0%**
Paper and cardboard	0,103	97,2%
Polyethylene	0,003	2,8%
Total packaging	**0,106**	**100,0%**
Total product and packaging	**0,522**	

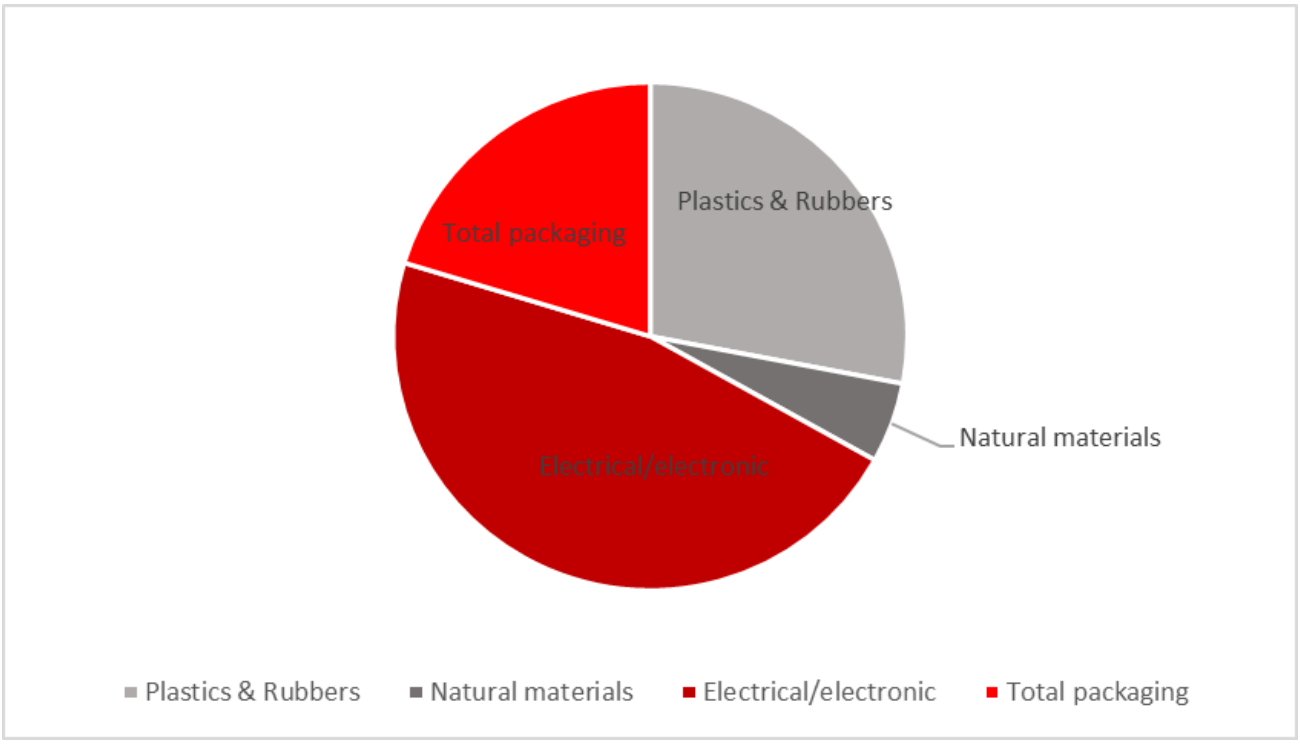

Figure 2: Material Composition Overview

Overview of LCA study

Data quality

Data quality of the selected data sets is generally assessed as good and very good in terms of geographical, time and technology representativeness and applicability. Background data is from *LCA for Experts*© database *version 2024.2*.

Allocation and cut-off criteria

The allocation is made in accordance with the provisions of EN 15804+A2. All major raw materials and all the essential energy are included. All hazardous materials and substances are considered in the inventory. Data sets within the system boundary are complete and fulfil the criteria for the exclusion of inputs and output criteria.

System boundaries

The results in this EPD are split into life cycle modules following EN 15804 (Figure 1): production (A1-A3), distribution (A4), installation (A5), use (B6) and the end of the product's life (C1-C4). Module D represents environmental benefits and loads that occur beyond the system boundary (i.e., in future products).

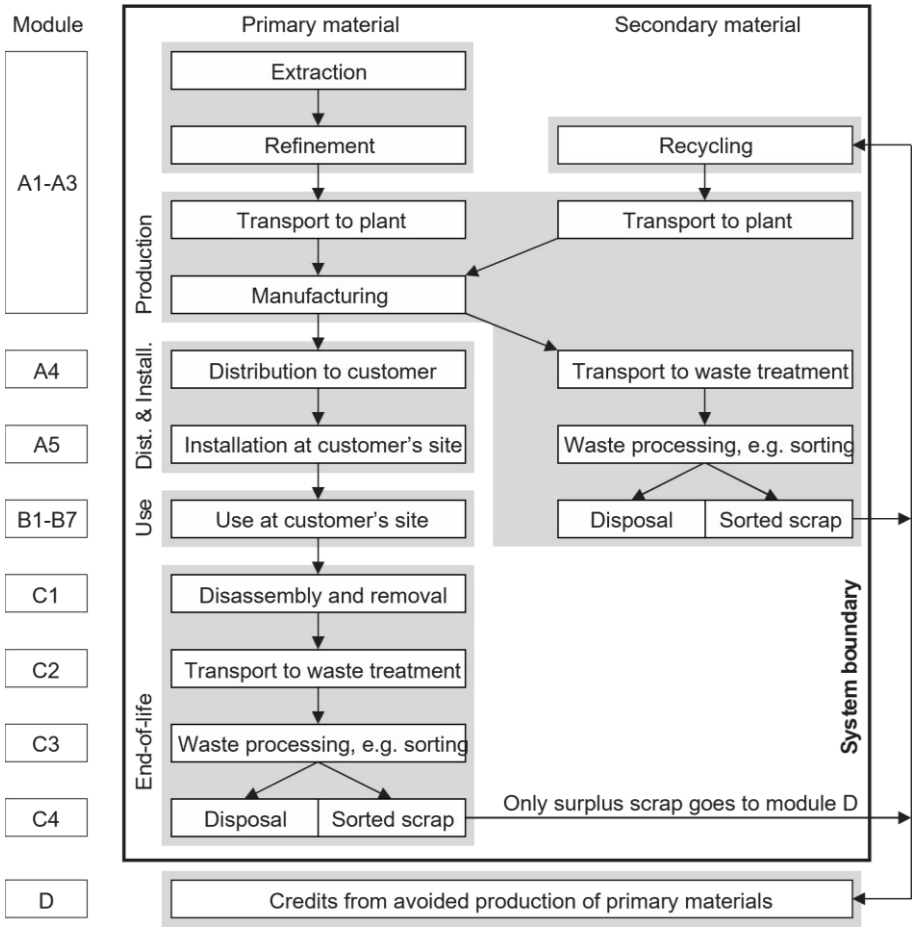

Figure 3: Modular structure used in this EPD (following EN 15804+A2)

Overview of LCA study

Product and packaging manufacture (A1-A3)

Final manufacturing occurs in the Nordborg plant, Denmark. Production data was collected for 2024. The facility is certified according to IATF 16949 (LoA), ISO 14001, ISO 45001, and ISO 9001. The Nordborg facility also uses green electricity for production (PPA) Where waste generated on-site is recyclable, it is separated and recycled. For further information, see here. The product is shipped in the packaging as described in Table 1. All packaging materials can be safely recycled or incinerated if appropriate local facilities are available.

Table 3: Biogenic carbon content in product and packaging

	Total (excluding recycling)
Biogenic carbon content in product [kg]	-
Biogenic carbon content in accompanying packaging [kg]	5,55E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2.

Shipping and installation (A4-A5)

Distribution is assumed to occur to customers within EU-27. Transportation at 2.000 km distance by truck is assumed between the factory and the final customer.

Module A5 includes disposal of packaging materials only, the benefits from e.g., energy recovered after plastic incineration are allocated to module D. The product is assumed to be installed by hand. Energy use in handheld tools during installation is not included as it falls under the cut-off criteria.

Use phase (B1-B7)

The AK-CC55 Multi Coil Case Controller is an advanced electronic controller specifically designed for demanding refrigeration applications. Built for reliability and longevity, the controller is engineered to operate continuously (24 hours a day, 7 days a week) throughout its estimated 10-year lifespan. Electricity consumption can vary based on the application scenario, but during normal or standard operation, the AK-CC55 Multi Coil will consume an average of approximately 2 W of power. This translates to an electricity consumption of 172 kWh over the entire use phase (B6) of its decade-long operational life.

The scope of this study is targeted for the EU-27 market; therefore, the product under study is sold and used in EU-27. Sales also occur outside of EU-27, which is important to note considering the impact the electricity grid mix can have on the emissions in the use phase. However, for the purpose of this assessment, an average EU-27 CO2 factor from *LCA for Experts*© database *version 2024.2*. is applied. This factor will differ, depending on the country and share of renewables and fossil energy sources in the corresponding local electricity grid.

The major limitation of the impact calculations for the use phase is that the electricity grid mix in use is assumed to remain at the same carbon intensity over time. Following the plans for the decarbonization of the grid across EU, the environmental impacts are expected to decrease over time within the course of the next 10 years. However, as decarbonization will occur in the future and as the pace of decarbonization is uncertain, the use of the emission intensity of today's grid should prove to be a "worst-case", conservative assumption.

Overview of LCA study

End-of-life (C1-C4)

The following end-of-life procedure has been applied:

- Manual dismantling is used to separate recyclable bulk materials, e.g. bulk metals and plastics.
- Shredding is used for the remaining parts, such as printed circuit board assemblies.
- Ferrous metals, non-ferrous metals and bulk plastics are recovered through recycling.
- The remaining materials go to either energy recovery or landfill.

In line with EN 15804+A2, only the 'net scrap' (i.e., the leftover recyclable materials remaining after inputs of recycled content required in the manufacturing phase are first satisfied) is used to calculate the benefits and loads beyond the system boundary (Module D).

For this EPD an average scenario with 50% of the product sent to recycling & 50% of the product sent to landfill (C3, C4, D) was used. This scenario is designed to represent an average end-of-life scenario.

For the EPD this average scenario was chosen as it is assumed that it represents the majority of cases on average.

1. Recycling scenario with 100% of the product sent to recycling at the end-of-life, excluding fractions that cannot be recycled or incinerated (e.g., glass reinforcing in glass-filled plastics) and are sent to landfill.

This scenario illustrates best case performance. It assumes a 100% collection rate and best available recycling technologies. Under this scenario electrical cables, and all metals, flat glass and unreinforced plastics found within the body and chassis of the product are recycled. Printed circuit board assemblies are incinerated, and the copper and precious metals (gold, silver, palladium, and platinum) are recycled.

2. Landfill scenario with 100% of the product sent to landfill.

This scenario assumes that the whole product, including its packaging, is landfilled. It is designed to represent a poor end of-life-route where valuable resources are lost.

Benefits and loads beyond the system boundary (D)

Module D considers the net benefit of recycling (including energy recovery) of materials in the product and packaging, taking account of losses in the recycling process and the recycled material used in the production of the product. Module D covers the two end-of-life scenarios, as described above. It does not cover energy recovery from incineration since the process used in LCA for Experts has an efficiency below 60%. Therefore, the impacts of this process are reported in module C4 and no benefits are claimed in module D.

Environmental performance

This section presents the environmental performance of one AK-CC55 Multi Coil Case Controller. Figure 4 presents the environmental impact of the AK-CC55 Multi Coil Case Controller across a number of environmental impact categories (following EN 15804+A2:2019) per life cycle stage, over its full 10-year life cycle, including Global Warming Potential.

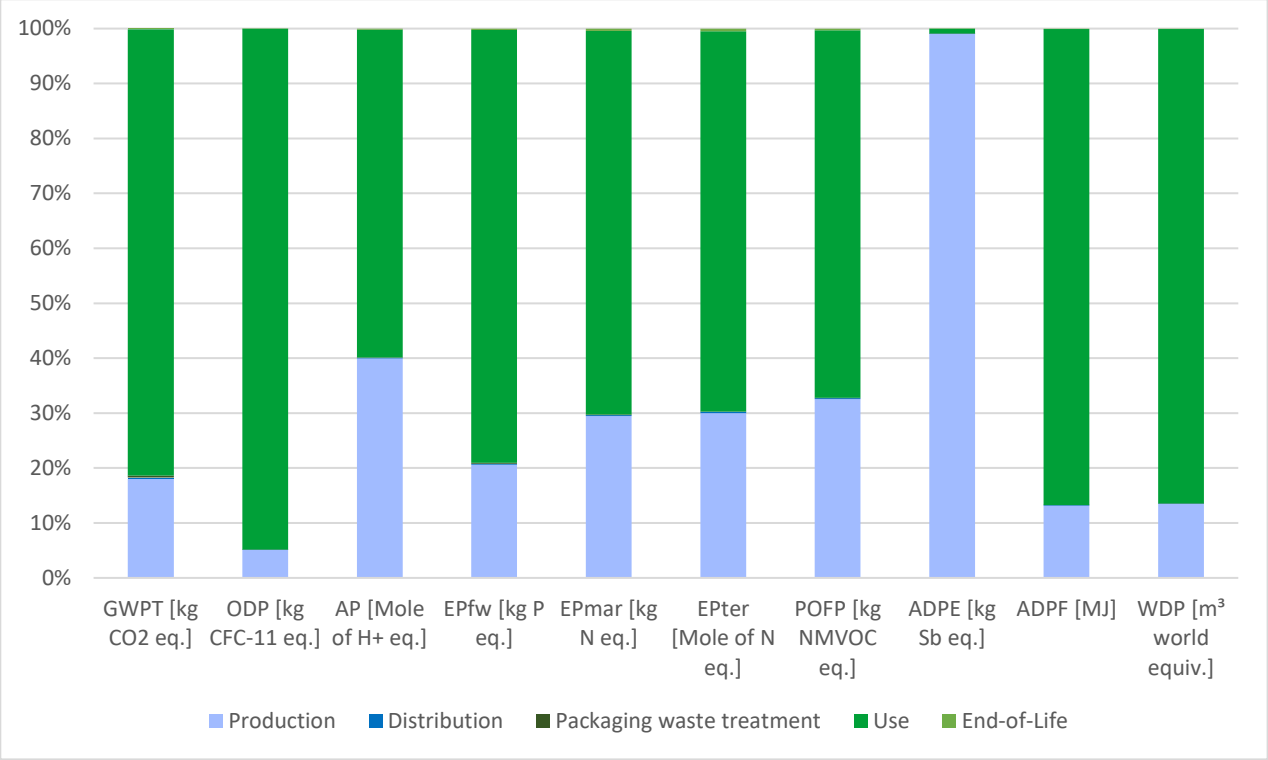

Figure 4: Breakdown of environmental impacts by life cycle stages (Average of Landfill and Recycling End-of-Life scenario) See Table 5 and 6 for descriptions of environmental impact indicators).

Environmental performance

Table 5: Environmental impact indicators

	Production	Distribution	Packaging waste treatment	Use	End-of-Life				(not included in Figure 4)
Life cycle stages based on EN 15804+A2	**A1-A3**	**A4**	**A5**	**B6**	**C1**	**C2**	**C3**	**C4**	**D**
Description / **Environmental Impact Indicators**	Manufacture of the product from 'cradle-to-gate'	Transport of the product to the customer	Installation of the product and disposal of used packaging	Use of the product over its lifetime e.g. 10 years	Deinstallation of the product from the site	Transport of the product to waste treatment	Processing waste for recycling	Disposal of waste that cannot be recycled (through landfill and incineration)	Potential benefits and loads beyond the system boundary due to reuse, recycling, and energy recovery
GWPT [kg CO2 eq.]	1,11E+01	9,04E-02	2,13E-01	4,96E+01	0,00E+00	4,18E-03	4,47E-02	3,52E-02	-6,58E-01
GWPF [kg CO2 eq.]	1,12E+01	8,90E-02	9,71E-03	4,92E+01	0,00E+00	4,18E-03	4,41E-02	3,51E-02	-6,58E-01
GWPB [kg CO2 eq.]	-2,03E-01	0,00E+00	2,03E-01	4,43E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWPLULUC [kg CO2 eq.]	1,07E-02	1,47E-03	9,33E-06	7,48E-03	0,00E+00	1,02E-07	6,15E-04	3,63E-05	-4,17E-04
ODP [kg CFC-11 eq.]	6,05E-11	1,29E-14	7,89E-15	1,12E-09	0,00E+00	4,94E-19	1,60E-13	2,72E-14	-5,56E-13
AP [Mole of H+ eq.]	6,35E-02	1,60E-04	5,41E-05	9,48E-02	0,00E+00	5,92E-06	2,46E-04	8,46E-05	-2,28E-02
EPfw [kg P eq.]	5,37E-05	3,74E-07	4,70E-07	2,05E-04	0,00E+00	9,16E-10	1,84E-07	4,09E-07	-2,74E-07
EPmar [kg N eq.]	1,00E-02	6,45E-05	2,90E-05	2,37E-02	0,00E+00	2,30E-06	1,18E-04	3,23E-05	-9,88E-04
EPter [Mole of N eq.]	1,07E-01	7,48E-04	2,65E-04	2,48E-01	0,00E+00	2,59E-05	1,31E-03	3,54E-04	-1,08E-02
POFP [kg NMVOC eq.]	3,05E-02	1,57E-04	7,30E-05	6,26E-02	0,00E+00	5,47E-06	2,31E-04	8,02E-05	-3,97E-03
ADPE [kg Sb eq.]	1,03E-03	7,64E-09	9,82E-10	9,20E-06	0,00E+00	1,51E-10	4,46E-09	5,70E-10	-9,43E-05
ADPF [MJ]	1,57E+02	1,15E+00	1,36E-01	1,03E+03	0,00E+00	6,11E-02	6,24E-01	1,62E-01	-9,32E+00
WDP [m^3 world equiv.]	2,10E+00	1,36E-03	6,42E-04	1,34E+01	0,00E+00	7,15E-06	2,42E-03	6,37E-03	-1,25E-01

How to read scientific numbers:

e.g. 2,05E02 = 2,05 x 10^2 = 2052, 04E-01 = 2,04 x 10^{-1} = 0,204

Environmental performance

Table 6: Environmental impact indicator descriptions

Acronym	Unit	Indicator
GWPT	kg CO_2 eq.	Carbon footprint (Global Warming Potential) – total
GWPF	kg CO_2 eq.	Carbon footprint (Global Warming Potential) – fossil
GWPB	kg CO_2 eq.	Carbon footprint (Global Warming Potential) – biogenic
GWPLULUC	kg CO_2 eq.	Carbon footprint (Global Warming Potential) – land use and land use change
ODP	kg CFC-11 eq.	Depletion potential of the stratospheric ozone layer
AP	Mole H+ eq.	Acidification potential
EPfw	kg P eq.	Eutrophication potential – aquatic freshwater
EPmar	kg N eq.	Eutrophication potential – aquatic marine
EPter	Mole of N eq.	Eutrophication potential – terrestrial
POFP	kg NMVOC eq.	Summer smog (photochemical ozone formation potential)
ADPE*	kg Sb eq.	Depletion of abiotic resources – minerals and metals
ADPF*	MJ	Depletion of abiotic resources – fossil fuels
WDP*	m^3 world eq.	Water deprivation potential (deprivation-weighted water consumption)

Results for module A1-A3 are specific to the product. All results from module A4 onwards should be considered as scenarios that represent one possible outcome. The true environmental performance of the product will depend on actual use.

The results in this section are relative expressions only and do not predict actual impacts, the exceeding of thresholds, safety margins, or risks. EPDs from others may not be comparable.

Carbon footprint

The total carbon footprint, cradle-to-grave, of the product is 6,11E+01 kg CO2-eq (A1-C4), based on the baseline use phase scenario. The carbon footprint of production of this product, cradle-to-gate, is 1,11E+01 kg CO2-eq (A1-A3).

Environmental performance

Table 7: Resource use

	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PERE [MJ]	4,23E+01	9,95E-02	9,07E-03	7,45E+02	0,00E+00	2,01E-04	1,45E-01	1,99E-02	-8,97E-01
PERM [MJ]	4,01E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT [MJ]	4,27E+01	9,95E-02	9,07E-03	7,45E+02	0,00E+00	2,01E-04	1,45E-01	1,99E-02	-8,97E-01
PENRE [MJ]	1,52E+02	1,15E+00	1,36E-01	1,03E+03	0,00E+00	6,11E-02	6,24E-01	1,62E-01	-9,32E+00
PENRM [MJ]	4,85E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT [MJ]	1,57E+02	1,15E+00	1,36E-01	1,03E+03	0,00E+00	6,11E-02	6,24E-01	1,62E-01	-9,32E+00
SM [kg]	7,79E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	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	0,00E+00	0,00E+00
FW [m3]	7,52E-02	1,11E-04	2,01E-05	5,68E-01	0,00E+00	3,23E-07	1,25E-04	1,54E-04	-3,88E-03

Table 7: Resource use indicator descriptions

Acronym	Unit	Indicator
PERE	MJ	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	MJ	Use of renewable primary energy resources used as raw materials
PERT	MJ	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)
PENRE	MJ	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	MJ	Use of non-renewable primary energy resources used as raw materials
PENRT	MJ	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)
SM	kg	Use of secondary material
RSF	MJ	Use of renewable secondary fuels
NRSF	MJ	Use of non-renewable secondary fuels
FW	m^3	Net use of fresh water

Environmental performance

Table 8: Waste categories and output flows

	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
HWD [kg]	3,91E-06	4,42E-11	2,05E-11	1,49E-06	0,00E+00	4,20E-13	2,24E-10	3,36E-11	-1,06E-07
NHWD [kg]	4,18E-01	1,89E-04	3,96E-02	8,51E-01	0,00E+00	6,12E-06	1,96E-04	3,63E-01	-1,07E-01
RWD [kg]	4,86E-03	2,10E-06	8,72E-07	1,64E-01	0,00E+00	6,54E-08	2,36E-05	1,91E-06	-7,86E-05
CRU [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,28E-01	0,00E+00
MER [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 9: Waste category and output flow descriptions

Acronym	Unit	Indicator
HWD	kg	Hazardous waste disposed
NHWD	kg	Non-hazardous waste disposed
RWD	kg	Radioactive waste disposed
CRU	kg	Components for reuse
MFR	kg	Materials for recycling
MER	kg	Materials for energy recovery
EEE	kg	Exported energy (electrical)
EET	kg	Exported energy (thermal)

Environmental performance

Table 10: Additional indicators*

	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PM [Disease incidences]	6,28E-07	1,43E-09	3,96E-10	7,92E-07	0,00E+00	3,51E-11	1,66E-09	8,70E-10	-1,94E-07
IRP [kBq U235 eq.]	5,40E-01	3,05E-04	1,16E-04	2,70E+01	0,00E+00	9,27E-06	3,87E-03	2,59E-04	-4,62E-03
ETPfw [CTUe]	8,48E+01	8,57E-01	1,04E-01	2,99E+02	0,00E+00	4,48E-02	3,99E-01	1,25E-01	-3,96E+00
HTPc [CTUh]	2,97E-09	1,73E-11	2,01E-12	1,68E-08	0,00E+00	8,23E-13	9,55E-12	3,62E-12	-3,21E-10
HTPnc [CTUh]	1,10E-07	7,77E-10	1,27E-10	2,57E-07	0,00E+00	2,69E-11	3,60E-10	1,67E-10	-6,90E-09
SQP [Pt]	3,98E+01	5,68E-01	2,12E-02	4,36E+02	0,00E+00	1,56E-04	2,97E-01	2,74E-02	-7,89E-01

Table 11: Optional indicator descriptions

Acronym	Unit	Indicator
PM	Disease incidence	Potential incidence of disease due to particulate matter emissions
IRP**	kBq U235 eq.	Potential human exposure efficiency relative to U235
ETPfw*	CTUe	Potential Comparative Toxic Unit for ecosystems (fresh water)
HTPc*	CTUh	Potential Comparative Toxic Unit for humans (cancer)
HTPnc*	CTUh	Potential Comparative Toxic Unit for humans (non-cancer)
SQP*	Dimensionless	Potential soil quality index

**Disclaimer for ADPE, ADPF, WDP, ETPfw, HTPc, HTPnc, SQP:* The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

***Disclaimer for ionizing radiation:* This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Environmental performance

ANNEX 1: Products covered by this EPD and their Global Warming Potential values

				AK-CC55 Case Controllers				
				kg CO_2 eq (10 year)				
				Factor (A1-C4)	GWPT without B6	Factor - Use Phase B6		GWPT [kg CO2 eq.]
Code number	Case Controllers	Packaging	Weight with packaging [kg]	Factor based on weight*	GWPT (A1-C4 without B6) Global Warming Potential Without Use Phase	Use Phase Energy (kWh)	Use Phase B6	GWPT (A1-C4 with B6)
084B4084	**AK-CC55 Multi Coil**	**Multipack**	**0,48**	**1,00**	**1,13E+01**	**1,72E+02**	**4,96E+01**	**6,09E+01**
084B4184	AK-CC55 Multi Coil	Industrial pack	0,39	0,80	9,06E+00	1,72E+02	4,96E+01	5,87E+01
084B4082	AK-CC55 Single Coil	Multipack	0,49	1,01	1,14E+01	1,72E+02	4,96E+01	6,10E+01
084B4182	AK-CC55 Single Coil	Industrial pack	0,40	0,81	9,22E+00	1,72E+02	4,96E+01	5,88E+01
084B4081	AK-CC55 Compact	Multipack	0,38	0,78	8,87E+00	1,52E+02	4,39E+01	5,27E+01
084B4181	AK-CC55 Compact	Industrial pack	0,30	0,61	6,94E+00	1,52E+02	4,39E+01	5,08E+01
084B4058	AK-CC55 Water Loop	Multipack	0,40	0,83	9,39E+00	1,72E+02	4,96E+01	5,90E+01
084B4158	AK-CC55 Water Loop	Industrial pack	0,32	0,66	7,52E+00	1,72E+02	4,96E+01	5,71E+01

* The factor based on weight is taken using (084B4084) AK-CC55 Multi Coil as the reference for all Case Controllers, (084B4075) AK-UI55 Bluetooth Multipack for all Display accessories and (084B4070) AK-OB55 LON for all AK-OB55 Modules. LCA (Life Cycle Assessment) analysis has been performed on reference units only.

Environmental performance

				AK-CC55 Case Controller Accessories				
				kg CO_2 eq (10 year)				
				Factor (A1-C4)	GWPT without B6	Factor - Use Phase B6		GWPT [kg CO2 eq.]
Code number	Case Controller Accessories	Packaging	Weight with packaging [kg]	Factor based on weight*	GWPT (A1-C4 without B6) Global Warming Potential Without Use Phase	Use Phase energy (kWh)	Use Phase B6	GWPT (A1-C4 with B6)
084B4075	**AK-UI55 Bluetooth**	**Multipack**	**0,04**	**1,00**	**3,30E+00**	**43,80**	**1,27E+01**	**1,60E+01**
084B4193	AK-UI55 Bluetooth	Industrial pack	0,04	0,82	2,70E+00	43,80	1,27E+01	1,54E+01
084B4076	AK-UI55 Set	Multipack	0,04	1,01	3,33E+00	43,80	1,27E+01	1,60E+01
084B4194	AK-UI55 Set	Industrial pack	0,03	0,73	2,40E+00	43,80	1,27E+01	1,51E+01
084B4077	AK-UI55 Info	Multipack	0,04	1,00	3,30E+00	43,80	1,27E+01	1,60E+01
084B4195	AK-UI55 Info	Industrial pack	0,04	0,82	2,70E+00	43,80	1,27E+01	1,54E+01
084B4070	**AK-OB55 LON**	**Multipack**	**0,05**	**1,00**	**2,73E+00**	**6,20**	**1,79E+00**	**4,52E+00**
084B4192	AK-OB55 LON	Industrial pack	0,03	0,68	1,86E+00	6,20	1,79E+00	3,65E+00
084B4071	AK-OB55 IP	Multipack	0,05	0,94	2,56E+00	5,60	1,62E+00	4,18E+00
084B4086	AK-OB55 Modbus TCP/IP	Multipack	0,05	0,94	2,56E+00	5,60	1,62E+00	4,18E+00

*The factor based on weight is taken using (084B4084) AK-CC55 Multi Coil as the reference for all Case Controllers, (084B4075) AK-UI55 Bluetooth Multipack for all Display accessories and (084B4070) AK-OB55 LON for all AK-OB55 Modules. LCA (Life Cycle Assessment) analysis has been performed on reference units only.

Environmental performance

To calculate the carbon product footprint of purchased products, simply combine the GWPT values for a controller and the corresponding accessories.

Example: 084B4083 AK-CC55 Single Coil UI (084B4082 AK-CC55 Single Coil & 084B4076 AK-UI55 Set)

Cradle to gate plus aditional modules: GWPT A1-C4 for AK-CC55 Single Coil UI = GWPT A1-C4 for AK-CC55 Single Coil + GWPT A1-C4 for AK-UI55 Set)

GWPT A1-C4 for AK-CC55 Single Coil UI = 6,10E+01kgCO2eq + 1,60E+01 kgCO2eq = **7,70E+01 kgCO2eq**

GWPT A1-C4 without B6 for AK-CC55 Single Coil UI = GWPT A1-C4 without B6 for AK-CC55 Single Coil + GWPT A1-C4 without B6 for AK-UI55 Set)

GWPT A1-C4 without B6 for AK-CC55 Single Coil UI = 1,14E+01 kgCO2eq + 3,30E+00 kgCO2eq = **1,47E+01kgCO2eq**

				AK-CC55 Case Controllers with Display		
				kg CO2 e (10 year)		
				GWPT without B6	GWPT B6	GWPT [kg CO2 eq.]
Code number	**Case Controllers with Display**	**Packaging**	**Weight with packaging [kg]**	**GWPT (A1-C4 without B6) Global Warming Potential Without Use Phase**	**Use Phase B6**	**GWPT (A1-C4 with B6)****
084B4083	AK-CC55 Single Coil UI	Multipack	0,52	1,47E+01	6,23E+01	7,70E+01
084B4183	AK-CC55 Single Coil UI	Industrial pack	0,42	1,16E+01	6,23E+01	7,39E+01
084B4057	AK-CC55 Single Coil UI (locked SW)	Multipack	0,52	1,47E+01	6,23E+01	7,70E+01
084B4157	AK-CC55 Single Coil UI (locked SW)	Industrial pack	0,42	1,16E+01	6,23E+01	7,39E+01

** Case Controllers with Display GWPT (Global Warming Potential Total) is a sum of GWPT of AK-CC55 Single Coil and the accessory AK-UI55 Info.

Additional environmental information

CEN (2015). *EN 50598-3:2015: Ecodesign for power drive systems, motor starters, power electronics and their driven applications – Part 3: Quantitative eco design approach through life cycle assessment including product category rules and the content of environmental declarations.* Brussels, Belgium: European Committee for Standardization.

CEN (2019). *EN 15804:2012+A2:2019: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.* Brussels, Belgium: European Committee for Standardization.

Danfoss (2022). *Danfoss Product Category Rules: Environmental Product Declarations for Danfoss Products.* Nordborg, Denmark: Danfoss A/S.

ISO (2006a). *ISO 14025:2006: Environmental labels and declarations – Type III environmental declarations – Principles and procedures.* Geneva, Switzerland: International Organization for Standardization.

ISO (2006b). *ISO 14040:2006: Environmental management – Life cycle assessment – Principles and framework.* Geneva, Switzerland: International Organization for Standardization.

ISO (2006c). *ISO 14044:2006: Environmental management – Life cycle assessment – Requirements and guidelines.* Geneva, Switzerland: International Organization for Standardization.