ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	BELIMO Automation AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-BEL-20240037-IBA1-EN
Issue date	25.09.2024
Valid to	24.09.2029

Energy Valve EV..R2+BAC

BELIMO Automation AG

Institut Bauen und Umwelt e.V.

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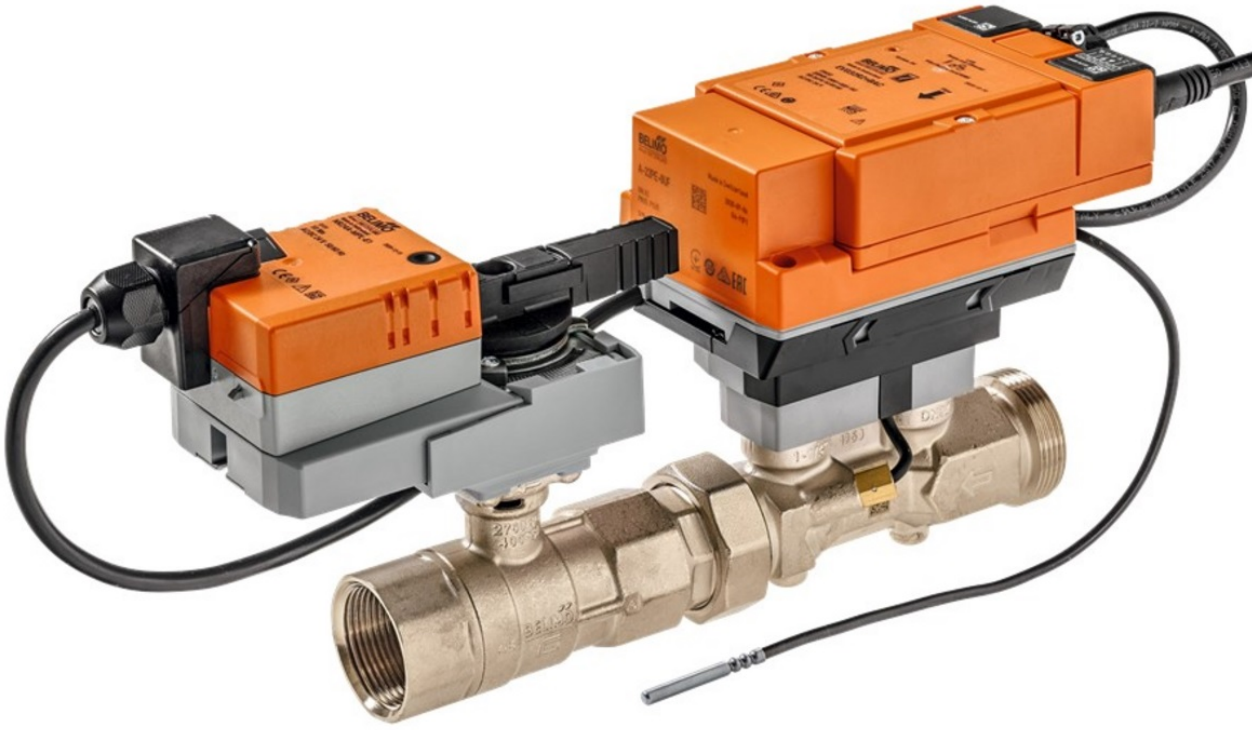
ECO PLATFORM EPD VERIFIED



1. General Information

BELIMO Automation AG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-BEL-20240037-IBA1-EN

This declaration is based on the product category rules:

control valves , 01.06.2023
(PCR checked and approved by the SVR)

Issue date

25.09.2024

Valid to

24.09.2029

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Energy Valve EV..R2+BAC

Owner of the declaration

BELIMO Automation AG
Brunnenbachstrasse 1
8340 Hinwil
Switzerland

Declared product / declared unit

In this EPD, the results were calculated for a representative Energy Valve EV050R2+BAC.

Scope:

The subject of this EPD is the Belimo Energy Valve EV050R2+BAC HVAC actuator from BELIMO Automation AG.
The EPD takes into account the production, transport and recycling of the packaging and the energy consumption in the utilisation phase as well as the disposal of the HVAC control unit.
The product is manufactured at the plant in Hinwil, Switzerland. The production data relates to the 2022 financial year.
The results of this EPD are based on the product with the greatest environmental impact and are representative of a product group.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Matthias Schulz,
(Independent verifier)

2. Product

2.1 Product description/Product definition

This EPD contains calculations for the representative model EV050R2+BAC, which has the greatest environmental impact within the product series and is therefore valid for the following types:

- EV015R2+BAC
- EV020R2+BAC
- EV025R2+BAC
- EV032R2+BAC
- EV040R2+BAC
- EV050R2+BAC

Brief description:

Characterised control valve with thermal energy meter, sensoroperated flow or power control, power and energy monitoring function, 2-way, internal and external thread, PN 25 (nominal pressure rating)

- Nominal voltage AC/DC 24 V
- Control modulating, communicative, hybrid
- For closed cold and hot water systems
- For water-side modulating control of airhandling and heating systems
- Ethernet 10/100 Mbit/s, TCP/IP, integrated web server
- Communication via BACnet, Modbus, MP-Bus from Belimo or conventional control
- PoE (Power over Ethernet) supply possible
- Conversion of sensor signals

Operating mode

The HVAC control unit (heating, ventilation, air conditioning) consists of four components: Characterised control valve (CCV), measuring pipe with flow sensor, temperature sensors and the actuator. The set maximum flow rate (V'max) is assigned to the maximum control signal DDC (typically 10 V / 100%). Alternatively, the control signal DDC can be assigned to the valve opening angle or the power required at the heat exchanger (see power control).

The HVAC actuator can be controlled communicative or analogue. The fluid is detected by the sensor in the measuring pipe and is available as a flow value. The measured value is balanced with the setpoint value. The actuator adjusts the deviation by changing the valve position. The angle of rotation α varies depending on the differential pressure across the actuator.

Control characteristics

The specially designed control parameters in conjunction with the precise velocity sensor ensure a stable control quality. However, the device is not suitable for rapid control processes, such as domestic hot water control.

Power control

Q'nom is the maximum possible power output at the heat exchanger. Q'max is the maximum power output at the heat exchanger with the largest control signal DDC. Q'max can be set between 1% and 100% of Q'nom. Q'min 0% (cannot be changed)

Flow control

V'nom is the maximum possible flow rate. V'max is the set maximum flow rate with the largest control signal DDC. V'max can be set between 25% and 100% of V'nom.

Position control

In this setting, the control signal is assigned to the opening angle of the valve (e.g. Y = 10 V α = 90°). The result is pressuredependent operation as with a conventional valve. The running time of the motor in this mode is 90 s for 90°.

Power and energy monitoring function

The HVAC control unit is equipped with two temperature sensors. One sensor (T2) is already installed on the thermal energy meter and the second sensor (T1) must be installed by the customer on the other side of the water circuit. Both sensors are supplied pre-wired with the system. The sensors record the fluid temperatures of the supply and return of the consumer (heating/cooling coil). As the quantity of water is also known thanks to the flow measurement integrated in the system, the power delivered by the consumer can be calculated. By analysing the power over time, the heating/cooling energy is also determined automatically. The current data such as temperatures, flow volumes, energy consumption of exchangers etc. can be recorded and can be read out at any time using a web browser or communication.

Communication

Control options: Control signal inversion, hydronic balancing, delta T manager, combination analogue - communicative (hybrid operation). Parametrisation can be carried out via the integrated web server (RJ45 connection to web browser) or via communication. Further information on the integrated web server can be found in the separate documentation.

With conventional control using an analogue DDC control signal, the integrated web server as well as BACnet, Modbus or MP-Bus can be used for communicative feedback.
The following EU harmonisation legislation(s) apply(s) to the placing on the market of the product in the EU/EFTA (with the exception of Switzerland):

- *2014/35/EU (LVD)*
- *2014/30/EU (EMC)*
- *2011/65/EU (RoHS)*

and their standard(s) harmonised on this basis:

- *SN EN 60730-1:2016-07, Automatic electrical controls - Part 1: General requirements*
- *DIN EN 55032:2015, Electromagnetic compatibility of multimedia equipment - Emission requirements (class B)*
- *SN EN IEC 61000-6-3:2021-03, Electromagnetic compatibility (EMC) - Part 6-3: Generic standards Emission from environments appliances in residential*
- *EN 300 330 Version 2.1.1:2017-02, Short-range devices (SRD) - Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz -Harmonised Standard covering essential requirements of article 3.2 of EU Directive 2014/53/EU*
- *DIN EN 61000-6-2:2019-11, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards Immunity standard for industrial environments*

The CE marking is affixed to the product in compliance with the proof of conformity with the following harmonised standards on the basis of the harmonisation legislation mentioned:

- *DIN EN 60730-1: 2021-06, Automatic electrical controls - Part 1: General requirements*
- *SN EN 55032:2015-07, Electromagnetic compatibility of multimedia equipment - Emission requirements (class B)*
- *DIN EN IEC 61000-6-3:2022-06, Electromagnetic compatibility (EMC) - Part 6-3: Generic standards*

Emission standard for equipment in residential environments

- *DIN EN 300330:2017-05, Short-range devices (SRD) Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz - Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU*
- *SN EN IEC 61000-6-2:2019-02, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards Immunity standard for industrial environments*

The respective national regulations apply for use.

The use of the product is subject to the respective national regulations at the place of use, in Germany for example the building regulations of the federal states, and the technical regulations based on these regulations.

2.2 Application

This appliance is designed for use in stationary heating, ventilation and air conditioning systems and must not be used for applications outside the specified area of use, in particular not in aircrafts or any other means of air transport.

2.3 Technical Data

The product fulfils the requirements of the following standards and directives:

- Low Voltage Directive: CE according to *2014/32/EU*
- Pressure equipment directive: CE according to *2014/68/EC*
- EMC: CE according to *2014/30/EC*
- IEC/EN certification: *IEC/EN 60730-1*
- Quality standard: *ISO 9001*

Structural data

The data listed in the table refers to the reference product. Further technical data can be found in the technical data sheets (available at www.belimo.com).

Name	Value	Unit
Nominal diameter of the connections	50	DN
Maximum valve capacity, Kvs	30.4	[m³/h]
Flow range	0.15 - 15	m^3/h
Maximum differential pressure Δpmax	350	kPa
Closing pressure ∆ps	1400	kPa
Permissible flow velocity	2	m/s
Temperature range of the fluid	10...120	°C
Temperature range of the environment	-30...50	°C
Runtime for 90 ° rotation des Kugelhahns	90	s
Voltage supply	AC/DC 24	V
Power consumption for wire sizing	7.5	VA
Power consumption in operation	5	W
Power consumption in rest position	3.9	W
Degree of protection of the logic module	IP54	-
Degree of protection of the sensor module	IP65	-
Protection type	IP54	-
Housing shape (round/angular)	angular	-
Number of connections	2	-
Runtime for rotation (AUF/ZU)	90	s

Performance values of the product in accordance with the requirements of the other harmonisation legislation listed harmonised standards:
- Reference to the table above, which contains the corresponding performance values.
Standards to which the product is subject:

EN 60730-1:2011, Automatic electrical controls for household and similar use - Part 1: General requirements

EN 60730-2-14:1997+A2:2008, Automatic electrical controls for household and similar use - Part 2-14: Particular requirements for electric actuators

2.4 Delivery status

The products are sold as individual products or in multipacks. The multipack is transported on a reusable pallet and packaged in polyethylene (PE) film. A single product is delivered in a recyclable cardboard box, which weighs a total of 0.497 kilograms.

2.5 Base materials/Ancillary materials

The product/at least one part of the product contains substances of the *ECHA list* Candidate List of Substances of Very High Concern (SVHC) for Authorisation (date 14.06.2023) above 0.1 mass %: yes.

Partial product	Quantity	Fabric	Cas. No.	Concentration	Safety instructions
Distance valve, drive	8	Lead in steel	7439-92-1	0.2...0.35%	Not necessary
Motor, drive	1	Lead	7439-92-1	1...10%	Not necessary
Motor, drive	1	2-Methylimidazoles	693-98-1	0.1...3%	Not necessary
Pinion, drive	1	Lead in copper alloy	7439-92-1	2.5...3.5%	Not necessary
Electronics, drive	6	Lead	7439-92-1	1...10%	Not necessary
Electronics, drive	4	Lead monoxide	1317-36-8	0.1...0.3%	Not necessary
Ultrasonic transducer, sensor	2	Lead	7439-92-1	20...100%	Not necessary
Threaded bushing, sensor	2	Lead in copper alloy	7439-92-1	1.6...2.5%	Not necessary
Electronics, sensor	>10	Lead monoxide	1317-36-8	0.1...0.3%	Not necessary
Electronics, sensor	1	Lead	7439-92-1	1...10%	Not necessary
Electronics, logic module	>10	Lead monoxide	1317-36-8	0.1...0.3%	Not necessary
Electronics, logic module	>10	Lead	7439-92-1	1...10%	Not necessary
Electronics, PoE module	>10	Lead monoxide	1317-36-8	0.1...10%	Not necessary
Electronics, PoE module	>10	Lead	7439-92-1	1...10%	Not necessary
Electronics, PoE module	>10	Diboron trioxide	1303-86-2	0.3...10%	Not necessary
Body, control ball valve	1	Lead in copper alloy	7439-92-1	1.6...2.5%	Not necessary
Silicone spout	1	Octamethylcyclotetrasiloxane	556-67-2	0.1...0.5%	Not necessary
Silicone spout	1	Decamethylcyclopentasiloxane	541-02-6	0.1...0.5%	Not necessary
Silicone spout	1	Dodecamethylcyclohexasiloxane	540-97-6	0.1...0.5%	Not necessary

The product/at least one sub-product contains other CMR substances of category 1A or 1B that are not on the *candidate list*, above 0.1% by mass in at least one sub-product: no.

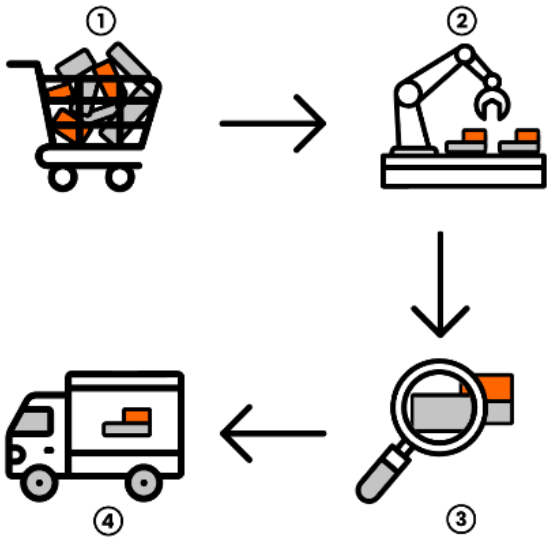
Biocidal products have been added to this building product or it has been treated with biocidal products (it is therefore a treated product within the meaning of the Biocidal Products Regulation (EU) No. 528/2012): no.

2.6 Manufacture

Belimo follows a four-stage process in the provision of its products, ranging from the selection and testing of supplier components to quality control.

1. Material and component procurement: selection and testing of supplier components.
2. Assembly: The various components are assembled at our specialised sites, with the main assembly site in Hinwil.
3. Quality control: Multi-stage quality checks are carried out, all in accordance with the *ISO 9001* quality

management system.
4. Delivery: After successful quality control, the products are securely packaged and prepared for delivery to the customer or warehouse.



This approach ensures that all Belimo products fulfil the standards for quality, reliability and performance. It serves as the basis for all our product lines and can be customised according to specific requirements.

2.7 Environment and health during manufacturing

In the course of manufacturing Belimo products, all statutory health and safety regulations are complied with without the need for additional measures. The amount of waste is minimised through optimised material cuts, and lubricants are reused through efficient recycling processes.

2.8 Product processing/Installation

Before starting the installation, it is essential to observe the user manuals, installation instructions, operating instructions, declarations of performance and approvals. Likewise, all relevant safety, processing and statutory health and safety regulations, both for electrical installations and for hydronic systems.

1. Installation position: Installation according to the recommended accessibility and flow direction.
2. Adapt pipework: Adaptation and cleaning of the pipes for the connection.
3. Fit the valve: Tighten the connections to prevent leaks.
4. Electrical connections: Ensure connection in accordance with the installation instructions.
5. System pressure: Activate the system and check for leaks.
6. Function test: Checking the correct reaction to control signals.
7. Set parameters: Configuration based on application requirements.

2.9 Packaging

The products are sold as individual products or in multipacks. The multipack is transported on a reusable pallet, packed in polyethylene (PE) film and in a cardboard box. Disposal is carried out by local recycling companies.

2.10 Condition of use

The material composition of Belimo products remains stable during use, provided there are no extreme influences such as salty liquids or chemical reactions. Our products are generally maintenance-free.

2.11 Environment and health during use

During the use of Belimo products, whether for air or hydronic systems, no negative effects on the environment or health are to be expected. The maintenance-free design eliminates the need for lubrication and frequent inspections. All actuator and control mechanisms are designed so that they have no direct contact with air or fluid flows, eliminating the risk of contamination or deposits.

2.12 Reference service life

Belimo products are designed for a service life of 20 years when used properly. This specification is the result of thorough testing procedures and quality control mechanisms. It should be noted that the specified service life is only valid for standardised operating and environmental conditions. Deviating conditions, such as extreme temperatures or humidity, can have a negative impact on the product service life. The service life refers specifically to the technical and functional integrity of the product and does not take into account any special application scenarios.

2.13 Extraordinary effects

Fire

Fire protection

The topic of fire and the associated values are not relevant for the product, as it is not subject to any fire protection-specific regulations.

Name	Value
Building material class	-
Burning droplets	-
Smoke gas development	-

Water

If the specified IP protection rating is exceeded due to exposure to water, immediate or long-term failure of the product is possible, which would make replacement necessary. During installation, transport and storage, it must therefore be ensured that the product is protected from unauthorised exposure to water.

Mechanical destruction

Not relevant.

2.14 Re-use phase

Not relevant.

2.15 Disposal

For proper disposal of the products, the following disposal methods must be taken into account:

1. Recycling: In accordance with the waste codes (EWC) 16 06 05, 16 02 13 and 17 04 01, the various components such as batteries, sensors, actuators, flow bodies and valves can be recycled separately.
2. Proper disposal: If recycling is not an option, the products should be disposed of in accordance with the locally applicable laws for the disposal of electrical products.

Waste codes according to the European Waste Catalogue (EWC):

- Built-in battery: 16 06 05
- Sensor and actuator: 16 02 13 (due to the built-in battery)

- Flow body and valve (if disposed of separately): 17 04 01 (brass)

The locally applicable laws and regulations for the disposal of electrical products must be observed.

2.16 Further information

Additional information, technical documentation and detailed specifications as well as further resources can be found on the manufacturer's website (www.belimo.com).

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 piece of Energy Valve EV050R2+BAC as a representative EPD, which covers smaller product variants using a 'worst-case' approach. The results of this EPD are based on the product with the greatest environmental impact and are representative of a product group.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Mass reference	5.391	kg/pce
Packaging materials	0.501	kg/Stk

Other declared units are permitted if the conversion is presented transparently.

3.2 System boundary

Type of EPD: from the cradle to the factory gate with options, modules C1-C4 and module D (A1-A3 + C + D and additional modules A5 & B6.)

A1-A3

For modules A1-A3, the system boundaries include all raw material extraction processes, the production of components and transport, both for the material and for the energy flows that occur during the manufacture of products from the cradle to the factory gate. Production waste is recognised until it is fully treated or until it reaches end-of-waste (EoW) status.

A5

Module A5 analyses the recycling of packaging. The resulting material and energy flows are assigned to module D. The product is installed manually using a spanner.

B6

Module B6 balances the energy used to operate the product. Two scenarios are assumed for module B6 'Energy use for operation'. The first scenario (shown as B6 in the analysis) is a reference scenario according to the valid PCR for control valves of the IBU. The second scenario (shown as B6/1 in the analysis) is the product-specific scenario according to the manufacturer's specifications.

C1-C4

Module C1 describes the expenses for dismantling or demolishing the product from the building after the end of the product's life. In Module C1 'De-construction/demolition', there are no environmental impacts for the product under consideration, as the disassembly of the product using hand tools. Module C2 looks at the transport to the disposal processes. Module C3 contains the necessary processes for waste treatment at the end of the product life cycle. The loads for waste treatment are mapped here until the end of the waste property is reached. Emissions are assigned to module C3. The resulting material and energy flows are assigned to module D. Module C4 describes the expenses for the disposal of the product or its components if material or energy recovery or reuse is not possible. No landfill processes are modelled for the products under consideration. The results in Module C4 are therefore given as "0".

D

The output flows resulting from waste treatment in A5 and C3, which can be used for a downstream product system, are shown in Module D.

3.3 Estimates and assumptions

For the environmental impact, the use of green electricity was calculated taking into account the residual electricity mix for the remaining electricity. The proportion of the total electricity requirement covered by green electricity is 100 %.

3.4 Cut-off criteria

The cut-off rules for taking into account the use of primary energy and mass in accordance with *EN 15804* (< 1 % each, < 5 % in total) were complied.

3.5 Background data

The background database used is *Sphera Managed LCA Content* version 2023.1. *ecoinvent 3.9* data records were used in some cases.

3.6 Data quality

The data quality of the background data was assessed as good in terms of technical, geographical and temporal representativeness. The individual data records are all no more than three years old.

3.7 Period under review

Production data was collected for the 2022 financial year.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 Allocation

All raw materials, intermediate products and operating resources required for the production process could be allocated to the declared product. There are no by-products.

Benefits and burdens from the recycling and thermal utilisation of packaging waste and the dismantled product are reported in Module D.

The cut-off approach was selected for secondary materials. This means that they enter the system in modules A1-A3 without any loads and leave the system without being considered in module D.

To determine the energy requirement for production, an allocation was carried out based on the appliances produced in 2022 and the total energy requirement in 2022 in relation to the number of units.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken

into account. The background database used is Sphera *Managed LCA Content* version 2023.2. *ecoinvent 3.9* data sets were used in some cases.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on the description of the biogenic carbon content at the plant gate

Name	Value	Unit
Biogenic carbon content in product	< 5 %	kg C
Biogenic carbon content in accompanying packaging	0.23	kg C

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

Installation in the building (A5)

Name	Value	Unit
Output substances following waste treatment on site	0.501	kg

Reference useful life

Name	Value	Unit
Life Span according to manufacturer	20	a

Operational energy (B6)

Consumption values are given per year

Name	Value	Unit
Electricity consumption (scenario B6)	18.3	kWh
Electricity consumption (scenario B6/1)	17.9	kWh

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type	5.391	kg
Recycling	4.2	kg
Energy recovery	1.191	kg

5. LCA: Results

The results for energy consumption in the use phase in module B6 refer to a service life of 10 years and in module B6/1 to a service life of 20 years.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	X	MND	MND	MNR	MNR	MNR	X	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 Stück Energie Valve EV050R2+BAC

Parameter	Unit	A1-A3	A5	B6	B6/1	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	2.67E+01	8.36E-01	6.07E+01	1.19E+02	0	5.62E-02	2.49E+00	0	-2.46E+00
GWP-fossil	kg CO_2 eq	2.74E+01	1.13E-02	6E+01	1.18E+02	0	5.55E-02	2.49E+00	0	-2.45E+00
GWP-biogenic	kg CO_2 eq	-7.27E-01	8.25E-01	7.13E-01	1.4E+00	0	2.04E-04	2.99E-04	0	-7.47E-03
GWP-luluc	kg CO_2 eq	1.86E-02	4.55E-05	6.45E-03	1.26E-02	0	4.9E-04	1.83E-05	0	-1.56E-03
ODP	kg CFC11 eq	3.75E-09	9.36E-16	1.1E-09	2.14E-09	0	7.74E-15	3.11E-13	0	-9.35E-12
AP	mol H^+ eq	1.91E-01	2.17E-05	1.27E-01	2.48E-01	0	2.88E-04	1.03E-03	0	-7.89E-03
EP-freshwater	kg P eq	9.47E-05	1.8E-08	2.21E-04	4.33E-04	0	1.93E-07	1.09E-07	0	-3.8E-06
EP-marine	kg N eq	2.12E-02	1E-05	3.03E-02	5.94E-02	0	1.39E-04	4.67E-04	0	-1.3E-03
EP-terrestrial	mol N eq	2.29E-01	1.14E-04	3.17E-01	6.2E-01	0	1.54E-03	5.56E-03	0	-1.34E-02
POCP	kg NMVOC eq	6.85E-02	1.95E-05	8.09E-02	1.58E-01	0	2.67E-04	1.21E-03	0	-4.05E-03
ADPE	kg Sb eq	3.53E-03	3.26E-10	9.2E-06	1.8E-05	0	3.64E-09	2.28E-09	0	-8.5E-04
ADPF	MJ	4.02E+02	6.77E-02	1.25E+03	2.44E+03	0	7.46E-01	9.06E-01	0	-3.5E+01
WDP	m^3 world eq deprived	5.56E+00	6.37E-04	1.32E+01	2.59E+01	0	6.25E-04	2.56E-01	0	-7.6E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 Stück Energie Valve EV050R2+BAC

Parameter	Unit	A1-A3	A5	B6	B6/1	C1	C2	C3	C4	D
PERE	MJ	9.52E+01	8.41E+00	7.46E+02	1.46E+03	0	5.38E-02	1.8E-01	0	-9.36E+00
PERM	MJ	8.41E+00	-8.41E+00	0	0	0	0	0	0	0
PERT	MJ	1.04E+02	5.06E-03	7.46E+02	1.46E+03	0	5.38E-02	1.8E-01	0	-9.36E+00
PENRE	MJ	3.73E+02	1.55E-01	1.25E+03	2.45E+03	0	7.48E-01	3.13E+01	0	-3.52E+01
PENRM	MJ	3.05E+01	-8.68E-02	0	0	0	0	-3.04E+01	0	0
PENRT	MJ	4.03E+02	6.79E-02	1.25E+03	2.45E+03	0	7.48E-01	9.06E-01	0	-3.52E+01
SM	kg	3.59E+00	0	0	0	0	0	0	0	6.21E-01
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m^3	1.75E-01	1.89E-05	6.03E-01	1.18E+00	0	5.8E-05	6.03E-03	0	-2.13E-02

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 Stück Energie Valve EV050R2+BAC

Parameter	Unit	A1-A3	A5	B6	B6/1	C1	C2	C3	C4	D
HWD	kg	3.46E-06	2.25E-13	-9.77E-08	-1.91E-07	0	2.21E-12	3.89E-11	0	-3.75E-08
NHWD	kg	1.85E+00	3.51E-05	9.15E-01	1.79E+00	0	1.14E-04	1.47E-01	0	-2.99E-01
RWD	kg	1.72E-02	1.71E-07	1.99E-01	3.89E-01	0	1.36E-06	3.33E-05	0	-2.13E-03
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	4.2E+00	0	0
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	1.34E-02	0	0	0	0	4.66E+00	0	0

EET	MJ	0	2.38E-02	0	0	0	0	8.37E+00	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 Stück Energie Valve EV050R2+BAC

Parameter	Unit	A1-A3	A5	B6	B6/1	C1	C2	C3	C4	D
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND	ND

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

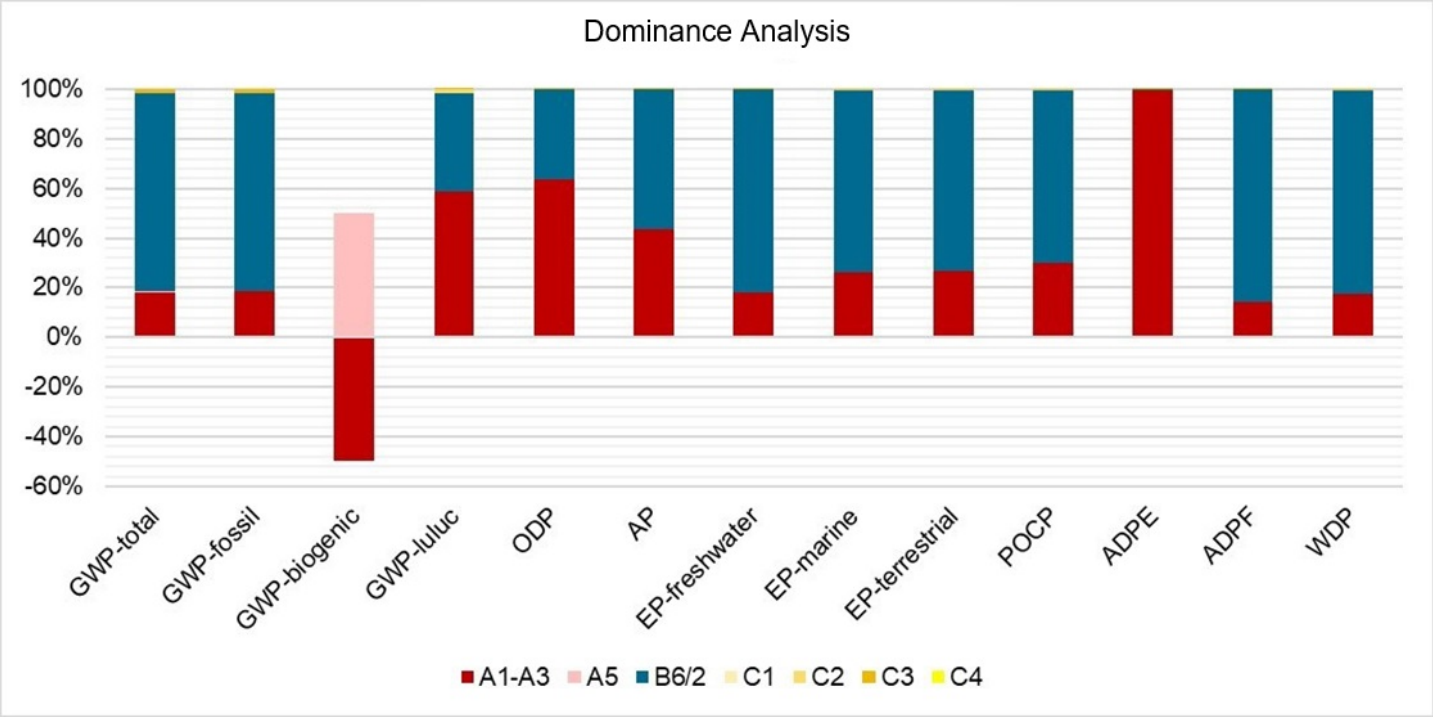
Disclaimer 1 - applies to the indicator 'Potential Human exposure efficiency relative to U235'.

This impact category mainly deals with the possible effect of low-dose ionising radiation on human health in the nuclear fuel cycle. It does not take into account effects due to possible nuclear accidents and occupational exposure, nor the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.

Disclaimer 2 - applies to the indicators: 'Abiotic depletion potential for non-fossil resources'; 'Abiotic depletion potential for fossil resources'; 'Water (user) deprivation potential'

The optional environmental impact indicators are not declared because the uncertainties in these results are high or because there is only limited experience with the indicator.

6. LCA: Interpretation



The dominance analysis presented here refers to the manufacturer scenario.
The dominance analysis shows that energy consumption in the benefit phase (B6) dominates in most of the categories analysed.

The dominance analysis shows that the energy consumption in the use phase (B6 and B6/1) in most of the analysed categories dominates. This is due to the electrical energy consumed during the use phase, which comes from the European electricity mix. The indicators depletion potential of the stratospheric ozone layer (ODP), Abiotic depletion potential for non-fossil resources (ADPE), Global warming potential biogenic (GWP-biogenic) and Global warming potential luluc (GWP-luluc) are an exception. GWP-biogenic results from the cardboard packaging and is therefore offset when the packaging is recycled in module A5.

The dominance analysis also shows that the production phase A1-A3 dominates in the categories depletion potential of the stratospheric ozone layer (ODP) and potential for abiotic depletion of non-fossil resources (ADPE). In the production

phase (modules A1-A3), the printed circuit boards in particular, including assembly, have a significant influence on the environmental impacts analysed.

7. Requisite evidence

No evidence is relevant for the declared product. According to the manufacturer, no information on leaching can be provided for the declared product, as this does not affect the product.

8. References

Standards

ISO 9001
DIN EN ISO 9001:2015-11, Quality management systems - Requirements.

ISO 14025
ISO 14025:2006-07, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

EN 15804
DIN EN 15804:2022-03, Sustainability of construction works - Environmental product declarations - Core rules for the product category construction products.

EN 55032
DIN EN 55032:2015, Electromagnetic compatibility of multimedia equipment - Emission requirements.

EN 60730-1
SN DIN EN 60730-1:2011, Automatic electrical controls for household and similar use - Part 1: General requirements.

EN 61000-6-2
DIN EN 61000-6-2:2019-11, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments.

EN 61000-6-3
SN EN IEC 61000-6-3+A1:2011-09, Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments.

EN 300 330 V2.1.1
EN 300 330 V2.1.1:2017-02, Short-range devices (SRD) - Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz - Harmonised EN covering the essential requirements under Article 3.2 of EU Directive 2014/53/EU.

Further references

2011/65/EU (RoHS)
DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the Restriction of the use of certain hazardous substances in electrical and electronic equipment.

2014/30/EU (EMC)
DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the Harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast).

2014/32/EU
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2014/35/EU (LVD)
DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the Harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

2014/68/EC
Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment (recast).

EWC
European Waste Catalogue, Waste Catalogue Ordinance of 10 December 2001 (Federal Law Gazette I page 3379), which was last amended by Article 3 of the Ordinance of 17 July 2017 (Federal Law Gazette I page 2644).

ECHA list
Candidate List of Substances of Very High Concern for Authorisation (ECHA Candidate List), dated 14.06.2023, published in accordance with Article 59(10) of the REACH Regulation. Helsinki: European Chemicals Agency.

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ecoinvent, Allocation, cut-off by classification, ecoinvent database version 3.9 (2022).

Managed LCA Content
Managed LCA Content. Content Version 2023.1. Leinfelden-Echterdingen: Sphera Solutions GmbH.

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Product Category Rules for Building-Related Products and Services. Part A: Calculation rules for the life cycle assessment and requirements for the project report, Version 1.3. Berlin: Institut Bauen und Umwelt e.V. (ed.), 31 August 2022.

PCR: Control valves
PCR guidance texts for building-related products and services. Part B: Requirements for the EPD for control valves. Berlin: Institut Bauen und Umwelt e.V. (ed.), 18 January 2024.

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