ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	Wildeboer Bauteile GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-WIL-20210233-ICA1-EN
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Valid to	18.11.2026

Round VRE and VR volume flow controllers
Wildeboer Bauteile GmbH

Institut Bauen und Umwelt e.V.

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1. General Information

Wildeboer Bauteile GmbH

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-WIL-20210233-ICA1-EN

This declaration is based on the product category rules:
Volume flow controllers and volume flow limiters for ventilation systems, 11.2017
(PCR checked and approved by the SVR)

Issue date
19.11.2021

Valid to
18.11.2026

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

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

Round VRE and VR volume flow controllers

Owner of the declaration
Wildeboer Bauteile GmbH
Marker Weg 11
DE-26826 Weener

Declared product / declared unit
1 volume flow controller with optional accessories

Scope:
This document relates to manufacture, transportation, installation, operation and disposal of volume flow controllers with (VRE, DN 100, comprising the components casing, electrical damper blade, measuring cell and actuator) for ventilation and air conditioning systems. The products are produced exclusively in Germany, at the Weener plant, in which the production data for the year 2020 was gathered.

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+A1*. 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 14025:2010*
☐ internally ☒ externally

Matthias Klingler
(Independent verifier)

2. Product

2.1 Product description/Product definition

VRE electronic volume flow controller for constant and variable volume flow rates are maintenance Pipelines and suitable for installation in any position in the pipelines for supply air and exhaust air of ventilation and air conditioning systems. They are adjusted at the factory for the entire volume flow range. The measuring method uses the differential pressure and the damper blade position to measure and control the volume flow. Simultaneously, an efficiency signal on energy-saving optimisation of the system operating pressure is supplied. The measuring principle makes for the high control accuracy of ± 5 % to ± 15 % at all pressures in the volume flow ranges of approx. 1:10. The pipe casing and the centrally supported damper blade are made up of galvanised sheet steel with a stainless steel bearing shaft in special bearing bushes, and the drive housing is made of plastic. The operating modes "constant", "variable" and "4-point", and the overrides "damper blade open" and "damper blade closed" are available. The operating mode "variable" provides the modes 0 - 10 V, 2 - 10 V and 2 - 8 V. Parallel operation and sequential circuits are possible.

Constant mechanical VR volume flow controllers are maintenance-free mechanical controllers that operate without an auxiliary power supply to maintain volume flows in ventilation and air conditioning systems constant. They are installed in supply and exhaust air ventilation ducts and are not position-sensitive. The casing and control mechanism are made of galvanized sheet steel. The damper blade which controls the volume flow, is supported centrally and guided with stainless steel bearing shafts in special bearing bushes. The adjustment device is equipped with rotary pointer, dial and locking device. The volume flow setpoints can be set within the volume flow ranges Vmin to Vmax either manually or with a motor. The special control mechanism ensures a high degree of control accuracy with a deviation of only approx. ± 5 % to ± 10 %. Accordingly, the volume flow is kept constant at variable pressures throughout the entire pressure range. Optionally, the VR is available with motorised setting to two volume flow

setpoints, or with constant motor setting to any desired volume flow setpoints.

Refer to the *manufacturer's documents* for further information. See also chapter 7 for information on hygiene.

The respective national regulations at the location of use apply for use of the product. In Germany, for example, the building code of the federal states and the technical conditions based on these regulations.

2.2 Application

Volume flow controller for controlling constant and variable volume flow rates in ventilation and air conditioning systems, and for shutting off ventilation ducts.

2.3 Technical Data

The requirements as per the harmonised standards for CE markings on electromagentic compatibility (EMC) as per EU Directive *2014/30/EU*, the performance rating as per *EN 12589* and the associated requirements as per *ISO 5135*, *ISO 3741*, *ISO 5167-1* and *EN 1751* are met.

Constructional data

The following data relates to the VRE electronic volume flow controller based on a worst case approach. Refer to the manufacturer's documents for further data, including on the constant mechanical VR volume flow controller.

Name	Value	Unit
supply voltage	24	V
Static Pressure range	20 - 1000	Pa
Permissible flow velocity	12	m/s
Flow range	34 - 5430	m^3/h
control voltage	0 - 10	V
control voltage	2-8	V
control voltage	2-10	V
Runtime for 90 ° rotation of the damper blade, approx.	90	s
power rating at rest	0.5	W
power consumption controlling	1.5	W
Sealing class class of the casing as per EN 1751	C	-
Sealing class class of the casing as per EN 1751	C	-
Protection type IP	50 - 54	-
Housing shape (circular/rectangular)	rund	-

2.4 Delivery status

The following size variants are available: VR1 from DN 80 to DN 315, length 326 to 454 mm. VRE1 from DN 100 to DN 400, length 326 to 551 mm. An electrical setpoint setter, lip seals and acoustic insulation are available as optional accessories. Each volume flow controller is adjusted in the factory for high and continuous control accuracy.

2.5 Base materials/Ancillary materials

Percent by weight, all specifications are approx. specifications

VRE - Casing, damper blade, measuring cell (without actuator)
Galvanized steel: 82 % to 98 %
Plastic: 1 % to 6 %
Electronic components: < 1 %
Stainless steel: < 1 % to 10 %

VRE - Actuator
Galvanized steel: 30 %
Plastic: 26 %
Electronic components (printed circuit boards etc.): 17 %
Steel, manganese phosphate: 16 %
Stainless steel: 8 %
Brass: 2 %
Machining steel (turning steel): 1 %

VRE - Acoustic insulation
Galvanized steel: 79 % to 84 %
Insulation: 16 % to 21 %

VR - Casing, damper blade, setpoint setting
Galvanized steel: 88 % to 95 %
Plastic: 2 % to 5 %
Stainless steel: 2 %
Machining steel (turning steel): 1 % to 5 %

VR - Electric setpoint adjuster
Galvanized steel: 30 %
Plastic: 26 %
Electronic components (printed circuit boards etc.): 17 %
Steel, manganese phosphate: 16 %
Stainless steel: 8 %
Brass: 2 %
Machining steel (turning steel): 1 %

VR - Acoustic insulation
Galvanized steel: 80 % to 82 %
Insulation: 18 % to 20 %

The product contains substances on the ECHA list of substances which, for approval, may be regarded as substances of very high concern (SVHC) (date 08/07/2021) in quantities of more than 0.1 mass %: no.

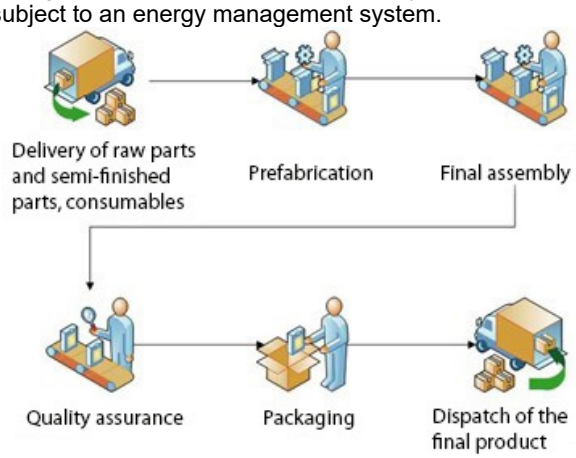
The product contains further CMR substances of category 1A or 1B which are not on the candidate list, in quantities of more than 0.1 mass % in at least one sub-assembly.: no.

Biocidal products have been added to the construction product or it has been treated with biocidal products (it is regarded as treated goods as per the Biocidal Products Regulation (EU) No. 528/2012): no.

2.6 Manufacture

Production is performed at a location in the factory in Weener. The necessary raw parts and semi-finished parts, auxiliary parts and consumables are supplied by suppliers and enter into production. The production of semi-finished parts is performed in prefabrication with standard production methods. Metal parts are punched and chamfered or milled into shape. Plastic parts are produced on injection moulding machines. Pre-cut parts are optimised accordingly in order to avoid waste. Waste which is generated nevertheless is collected and recycled as far as possible by appropriate companies, or disposed of as domestic waste and burned. Lubricants are predominantly collected, treated and re-used in production. Dust and vapours are extracted and collected on site. The parts from prefabrication are installed in final assembly together with purchased part to construct the volume

flow controllers, inspected, packaged and dispatched within the scope of quality assurance as per *ISO 9001*. Each volume flow controller is adjusted in the factory for high and continuous control accuracy. Operation is subject to an energy management system.



2.7 Environment and health during manufacturing

No measures going beyond the legally stipulated occupational health and safety measures are required at any time during the entire manufacturing process. Waste is prevented using optimised pre-cut parts, lubricants are re-used by way of recycling measures.

2.8 Product processing/Installation

The *manufacturer's documents*, manuals, installation regulations and operating instructions of **Wildeboer Bauteile GmbH** must be observed. Moreover, the safety and processing regulations, for example those for ventilation system engineering and for electrical work, and the legal occupational health and safety regulations must be observed.

2.9 Packaging

The products are transported on reusable pallets, and packaged in polyethylene (PE) film. Alternatively, transportation is cartons made of recycled paper is possible. Disposal, with the exception of the pallets, is performed by local recycling companies. Pallets are reused within the exchange pool. Only the necessary amount of packaging material is used. Packaging is performed in an optimised manner.

2.10 Condition of use

The material composition does not change during use. This does not apply in case of exceptional effects, such as extremely salty air or chemical effects, which can result in changes.

2.11 Environment and health during use

No negative effects on the environment or health are to be expected during use. Due to the maintenance-free nature of the products, lubrication is not required during use. There are no deposits of soiling resulting from the construction. A hygiene certificate is available (see chapter 7).

2.12 Reference service life

The duration of the functionality of volume flow controllers depends on the respective construction, the materials used and the ambient conditions. If used properly, the service life is an average of 20 years.

2.13 Extraordinary effects

Fire

Not relevant.

Fire protection

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

Water

Not relevant.

Mechanical destruction

Nicht relevant.

2.14 Re-use phase

After use of the volume flow controllers, they can be removed and theoretically can be re-used. Given the composition of the volume flow controllers, the metal and electronic components can be recycled. The remaining components (e.g. plastics) can be used for heat reclamation.

2.15 Disposal

Disposal can be classified in accordance with the reference values of the European List of Wastes Regulation as per the List of Wastes *LoW*: Steel (17 04 05), packing material (17 06 04), plastic (17 02 03), electrical (20 01 36).

2.16 Further information

www.wildeboer.de/en

3. LCA: Calculation rules

3.1 Declared Unit

The declaration relates to the manufacture of a single DN 100 VRE volume flow controller, including actuator and electric control unit. The eco-balance results of variants or varying dimensions of the declared product can be provided by **Wildeboer Bauteile GmbH** on request.

Declared unit VRE

Name	Value	Unit
Declared unit	1	pce.
Mass reference	1.92	kg/pce
conversion factor [Mass/Declared Unit]	1.92	-
conversion factor to 1 kg	1,92	-

3.2 System boundary

The system limit of the EPD of the type "cradle to the grave" follows a modular structure as per *EN 15804*. The eco-balance of the observed products takes into consideration modules A, B, C and D:

Product stage (A1-A3)
Provision of raw materials and transportation of the raw materials by truck to the factory. Production outlay including packaging material. Treatment of non-metallic production waste. Metallic production waste reaches the end of the waste property directly after generation, and is exported as per module D.

Stage of construction of the building structure (A4-A5)
Transportation by truck to the construction site (100 km). The transportation distance can be adjusted to building level as necessary (e.g. in case of an actual transportation distance of 200 km: multiplication of the eco-balance values by a factor of 2).
Module A5: Packaging treatment. Any resultant credits in module D. Power consumption for installation (any use of manual machines) has not been considered.

Stage of use (B1-B5):
No emissions are released during use of the product (B1). Servicing (B2) and repair (B3) or replacement of individual components (B4) is not relevant during the observed service life (maintenance-free). According to the manufacturer's information, renovation of the product (B5) is not necessary during the service life. Modules B1 to B5 are therefore declared as "0".

Stage of use – Operation of the building (B6-B7):
The required electrical energy for operation of the product with an electric drive motor, and the electrical energy for set point adjustments.

Disposal stage (C1-C4)
Manual removal (unencumbered) and transportation by truck to waste processing location (50 km). The transportation distance can be adjusted to building level as necessary (e.g. in case of an actual transportation distance of 100km: multiplication of the eco-balance values by a factor of 2). The end-of-waste status of the motors is reached after treatment or sorting of the contained material fractions. The outlay for treatment has been disregarded in the product life cycle.
Module C3: thermal treatment of raw materials with calorific value.
Module C4: Disposal of raw materials without calorific value.

Credits and debits outside the system limit (D)
Debits and credits from material recycling of metals (including processing) and credits for substituted thermal energy and electricity which has been exported from modules A1-A3, A5 and C3.

3.3 Estimates and assumptions

In the absence of suitable background data, estimates have been made for a few raw materials with a mass fraction of less than 1% each of the overall product.

3.4 Cut-off criteria

All data from the capture of operating data, i.e. all basic materials used as per the recipe, and the electricity and water requirement were considered in the assessment. Transportation costs were taken into account for all considered inputs, with the exception of packaging material.
The end-of-waste status of the motors is reached after treatment or sorting of the contained material fractions. The outlay for treatment has been disregarded in the product life cycle.
Thus, as per PCR Part A, material and energy flows with a fraction of < 1 percent were also considered.

3.5 Background data

GaBi databases service pack 40 were used for calculation of the eco-balance.

3.6 Data quality

The data quality can be regarded as high. The manufacture of the products has been modelled with primary data of Wildeboer Bauteile GmbH. Appropriate background datasets were available in the *GaBi database* for all the relevant primary products used. The last revision of the data used took place within the last 5 years.

3.7 Period under review

Data capture for the volume flow controller is carried out at **Wildeboer Bauteile GmbH** at the Weener (Germany) site for the year 2020.

3.8 Allocation

No by-products are generated during production. Therefore, no allocation has been used.

3.9 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 used background database has to be mentioned

4. LCA: Scenarios and additional technical information

The following technical information is the basis for the declared modules, or can be used for the development of specific scenarios in the context of building evaluation if modules are not declared (MND).

The eco-balance results of variants or varying dimensions of the declared product can be provided by **Wildeboer Bauteile GmbH** on request.

The declared products are maintenance-free. Therefore, there is no scenario data for modules B1 - B5.

Transportation to the construction site (A4)

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation in the building (A5)

Name	Value	Unit
Output substances following waste treatment on site	0.347	kg

Reference service life

Name	Value	Unit
Service life as per manufacturer indication	20	a

Operating energy (B6) VRE

Name	Value	Unit
Power consumption, at rest	0,5	W
Operating time, at rest	8668,75	h / Year
Power consumption, controlling	1,5	W
Operating time, controlling	91,25	h / Year

The data on environmental effects due to energy usage during the service life (module B6) is stated in relation to one year, and, if necessary, must be multiplied by the scheduled service life (in years) at building level.

End of the service life (C1-C4) VRE

Name	Value	Unit
Collected separately	1.92	kg
Recycling	1.45	kg
Energy recovery	0.467	kg
Landfilling	0.003	kg

5. LCA: Results

The following illustrates the results of the indicators of the impact assessment, of resource usage and on waste and other output flows in relation to one type VRE volume flow controller [1.92 kg/unit]. The data can be requested from the manufacturer for calculation (scaling) of other volumes, any accessories used and the VR controller.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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	X	X	X	X	X	X	X	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 VRE volume flow controller with 1.92 kg/unit

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	1.91E+1	1.13E-2	6.47E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.51E+0	0.00E+0	0.00E+0	5.65E-3	9.55E-1	4.09E-5	-3.80E+0
ODP	[kg CFC11-Eq.]	1.39E-9	3.74E-18	1.02E-16	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.04E-13	0.00E+0	0.00E+0	9.24E-19	2.66E-16	2.25E-19	-5.16E-16
AP	[kg SO_2-Eq.]	1.09E-1	7.59E-6	5.98E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.97E-3	0.00E+0	0.00E+0	4.41E-6	3.56E-4	2.60E-7	-1.09E-2
EP	[kg $(PO_4)^3$-Eq.]	6.61E-3	1.42E-6	1.29E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.87E-4	0.00E+0	0.00E+0	8.11E-7	9.06E-5	2.92E-8	-7.75E-4
POCP	[kg ethene-Eq.]	7.26E-3	-1.95E-7	5.04E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.45E-4	0.00E+0	0.00E+0	-1.90E-8	2.34E-5	1.97E-8	-1.01E-3
ADPE	[kg Sb-Eq.]	2.19E-3	9.51E-10	1.27E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.71E-7	0.00E+0	0.00E+0	4.14E-10	3.11E-9	4.13E-12	-1.20E-4
ADPF	[MJ]	2.52E+2	1.51E-1	1.16E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.50E+1	0.00E+0	0.00E+0	7.66E-2	3.08E-1	5.80E-4	-3.86E+1

Caption	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

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 VRE volume flow controller with 1.92 kg/unit

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	3.80E+1	8.84E-3	6.01E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.82E+1	0.00E+0	0.00E+0	4.31E-3	5.72E-2	7.82E-5	-3.38E+0
PERM	[MJ]	5.99E+0	0.00E+0	-5.99E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	4.40E+1	8.84E-3	2.52E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.82E+1	0.00E+0	0.00E+0	4.31E-3	5.72E-2	7.82E-5	-3.38E+0
PENRE	[MJ]	2.66E+2	1.52E-1	7.61E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.17E+1	0.00E+0	0.00E+0	7.68E-2	1.09E+1	5.97E-4	-4.05E+1
PENRM	[MJ]	1.12E+1	0.00E+0	-6.26E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.05E+1	0.00E+0	0.00E+0
PENRT	[MJ]	2.77E+2	1.52E-1	1.35E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.17E+1	0.00E+0	0.00E+0	7.68E-2	3.43E-1	5.97E-4	-4.05E+1
SM	[kg]	5.67E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m³]	8.57E-2	7.93E-6	1.56E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.85E-3	0.00E+0	0.00E+0	5.00E-6	2.65E-3	1.51E-7	-2.01E-2

Caption	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+A1: 1 VRE volume flow controller with 1.92 kg/unit

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	8.06E-6	5.68E-9	9.40E-11	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.13E-8	0.00E+0	0.00E+0	3.58E-9	8.37E-10	9.10E-12	-9.47E-8
NHWD	[kg]	6.73E-1	2.67E-5	4.49E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.44E-2	0.00E+0	0.00E+0	1.18E-5	6.36E-2	3.00E-3	-1.58E-1
RWD	[kg]	9.66E-3	1.60E-7	7.74E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.65E-3	0.00E+0	0.00E+0	9.52E-8	1.37E-5	6.78E-9	-7.04E-4
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	3.88E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.45E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	9.61E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.25E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	1.72E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.07E+0	0.00E+0	0.00E+0

Caption	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

6. LCA: Interpretation

The two most important phases of the life cycle are the manufacturing and use phases.

In relation to the manufacturing phase, the upstream chain processes of control electronics (printed circuit board) dominate all indicators, with the exception of ODP. In particular the upstream chain processes for rare earth metals and precious metals are notable essential drivers of the eco-balance. The indicator ODP is dominated by a plastic component made of acrylonitrile butadiene styrene (ABS). Relevant debits in all indicators, with the exception of ODP, also originate in the upstream chain of steel. Low to negligible environmental effects originate from the components or processes display screen, stainless steel, electricity consumption during manufacture and packaging. All other phases of the life cycle, processes and materials have low to very low relevance for the product system.

When observing a typical service life of 20 years, the environmental effects identified in relation to one unit and year accumulate accordingly for operation (energy consumption) of the products. The associated environmental effects are accordingly significantly as a result of this energy consumption for the indicators GWP, EP and ADPF.

7. Requisite evidence

7.1 Hygiene

A *certificate of the hygiene conformity test for the VRE* and a *certificate of the hygiene conformity test for the VR* as per assessment no. W-330340-20-AB and assessment no. W-330339-20-AB are available. The hygienic requirements as per *VDI 6022-1*, *VDI 3803-1*, *DIN 1946-4*, *DIN EN 16798-3*, *SWKI VA105-01*, *SWKI VA104-01*, *ÖNORM H 6020* and *ÖNORM H 6021* are met.

This includes certification on the metabolic potential, i.e. the damage to materials as a result of microorganisms, and resistance to cleaning agents and disinfectants in case of normal use.

8. References

Standards

EN 15804
EN 15804: 2019-04+A2, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO 14025
DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

Further literature

LoW (AVV)
Ordinance on the List of Wastes (LoW) of 10 December 2001 (BGBl. I page 3379) which was most recently amended with article 1 of the ordinance from 30 June 2020 (BGBl. I page 1533)

DIN 1946
DIN 1946-4: 2018-09, Ventilation and air conditioning – Ventilation in buildings and rooms of health care

EN 1751
DIN EN 1751:2014-06, Ventilation for buildings - Air terminal devices - Aerodynamic testing of damper and valves

EN 12589
DIN EN 12589: 2002-01, Ventilation for buildings - Air terminal units - Aerodynamic testing and rating of constant and variable rate terminal units; German version EN 12589:2002-01

EN 16798-3
DIN EN 16798-3: 2017-11, Ventilation of non-residential buildings - Performance requirements for ventilation, air conditioning systems and room-cooling systems

ISO 5135
DIN EN ISO 5135: 2020-12, Acoustics - Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation test room

ISO 3741

DIN EN ISO 3741: 2011-01, Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for reverberation test rooms

ISO 5167-1

DIN EN ISO 5167-1: 2004-01, Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 1: General principles and requirements

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

ÖNORM H 6020
ÖNORM H 6020: 2019-06-01, Ventilation and air conditioning plants for locations for medical use - Design, construction, operation, maintenance, technical and hygiene inspections

ÖNORM H 6021
ÖNORM H 6021: 2016-08-15, Ventilation and air conditioning plants - Specifications keeping them clean and cleaning

SWKI VA105-01
SWKI VA105-01: 2015-08, Air-conditioning systems in rooms used for medical purposes (planning, implementation, qualification, operation)

SWKI VA104-01
SWKI VA104-1: 2019-01, Hygiene requirements for air conditioning systems and devices

VDI 3803-1
VDI 3803-1: 2020-05, Air-conditioning - Structural and technical principles - Central air conditioning systems (VDI Ventilation Code of Practice)

VDI 6022-1
VDI 6022-1: 2018-01, Hygiene requirements for ventilation and air-conditioning systems and units

GaBi
GaBi 9.5 2020: Sphera Solutions GmbH, GaBi 9.5: software system and database for complete assessment. Copyright, TM, Stuttgart, Leinfelden-Echterdingen,
1992-2020

IBU 2021
Institut Bauen und Umwelt e.V.: General EPD programme instructions of the Institut Bauen und Umwelt e.V. (IBU). Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021.
www.ibu-epd.com.

Manufacturer's documents
Manufacturer's documents on the VRE and VR volume flow controllers in the respective current version, here:
VRE user manual 3.3 (2021-07)
Operating instructions - Electronic volume flow controllers VRE1 and VKE1 (2016-01)
VR user manual 3.1 (2018-06)

Hygiene conformity test
Certificate of the hygiene conformity test for VRE , no. W-330340-20-AB, Hygieneinstitut des Ruhrgebietes Gelsenkirchen
Certificate of the hygiene conformity test for VR, no. W-330339-20-AB, Hygieneinstitut des Ruhrgebietes Gelsenkirchen

ECHA
ECHA list: 2021-07

2014/30/EU
DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL from 26 February 2014 for harmonisation of the legal regulations of member states on electromagnetic compatibility (new version)

PCR Part A
Product category rules for building-related products and services Part A: Calculation rules for the eco-balance and requirements of the background report, version 1.0, Institut Bauen und Umwelt e.V., www.ibu-epd.com, 2021

PCR: Volume flow controller and volume flow limiter for ventilation systems
Product category rules for building-related products and services Part B:Requirements for EPD for volume flow controllers and volume flow
limiters for ventilation systems, version 1.0, Institut Bauen und Umwelt e.V., www.ibu-epd.com, 2017

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