ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Grundfos Holding A/S
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-GRU-20250340-CBA1-EN
Issue date	09/07/2025
Valid to	08/07/2030

ALPHA1 25,32-40 130,180, ALPHA1 GO 15,20,25,32-40 130,180

Grundfos Holding A/S

Institut Bauen und Umwelt e.V.

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General Information

Grundfos Holding A/S

Programme holder

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

Declaration number

EPD-GRU-20250340-CBA1-EN

This declaration is based on the product category rules:

Pumps for liquids and liquids with solids, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

09/07/2025

Valid to

08/07/2030

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

ALPHA1 25,32-40 130,180, ALPHA1 GO 15,20,25,32-40 130,180

Owner of the declaration

Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro
Denmark

Declared product / declared unit

One piece of ALPHA1 25,32-40 130,180, ALPHA1 GO 15,20,25,32-40 130,180 (Cast Iron)

Scope:

This declaration applies to 1 piece of ALPHA1 25,32-40 130,180, ALPHA1 GO 15,20,25,32-40 130,180 (Cast Iron)
This EPD is a Representative EPD (inventory A1-A3, A4-A5, C1-C4) based on salesvolume with specific EPD (inventory B6) elements.
The declaration covers the following variants:

ALPHA1 GO 15-40 130
ALPHA1 32-40 180
ALPHA1 25-40 180
ALPHA1 25-40 130
ALPHA1 GO 32-40 180
ALPHA1 GO 25-40 180
ALPHA1 GO 25-40 130
ALPHA1 GO 20-40 130

The product is assembled in Serbia.
The life cycle assessment is based on data collected from the ERP system of the manufacturer, including data from the manufacturing plant.

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

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

Mrs Kim Allbury,
(Independent verifier)

Product

Product description/Product definition

ALPHA 1 and ALPHA1 GO are high-efficiency variable speed circulator pumps fitted with an electronically commutated motor and designed for circulating liquids in heating and air conditioning systems.

ALPHA1 and ALPHA1 GO are equipped with intelligent controls and offers three control modes: constant pressure, proportional pressure and constant curve. Each mode has three adjustable speed settings.

Compliance:

For placing pumps on the EU/EFTA market, a CE-marking is required. According to their Declaration of Conformity, these pumps comply with the following Council Directives:
Machinery Directives: *2006/42/EC* and *2009/127/EC*
Radio Equipment Directive: *2014/53/EU*
RoHS Directives: *2011/65/EU* and *2015/863/EU*
EMC Directive: *2014/30/EU 2 3*

These pumps are designed to provide reliable, efficient, and sustainable solutions for various heating and cooling applications, ensuring optimal performance and reduced energy consumption.

ALPHA1 GO 25-40 180 has been selected as the representative variant.

The pumps covered in the EPD were treated together as they physically represent identical or very similar products in terms of materials, weights, and contents of electronics. A representative pump model was applied for assessing the impacts of the A, C, and D stages. This representative variant was selected based on its high sales volume and is in fact, among the highest in environmental impact due to its relatively large pump housing (also larger than the weighted average pumphouse could have been).
However, for the B stage, the individual impacts were considered. This entails impact calculation factors to be applied for B6, as outlined in the Results section. .

Application

ALPHA1 and APLHA1 GO pumps are advanced, high-efficiency circulator pumps designed for domestic heating applications.

Technical Data

The declared unit is represented by the pump variant whose technical data is provided in the Pump technical data table.

Pump technical data for ALPHA1 GO 25-40 180

Name	Value	Unit
Frequency	50/60	Hz
Voltage	220-240	V
Energy efficiency index (EEI)	0.20	-
Head max.	4	m
Flow range (max)	2.7	m^3/h
Max input power	0.027	kW
Power input Average (from load profile)	0.0111	kW

Performance data of the product according to the harmonised standards, based on provisions for harmonisation.

Base materials/Ancillary materials

Main constituents of the representative product

Name	Value	Unit
Cast iron	48.05	%
Aluminium	8.12	%
Carbon steel	12.48	%
Stainless Steel	5.83	%
Copper	3.63	%
Brass	0.05	%
Ceramics	1.19	%
Rubber	0.5	%
Polymers and composites	7.87	%
Injection Moulded Ferrite Magnet	1.28	%
Electronics	3.08	%
Paper	1.8	%
Cardboard	6.12	%

REACH
At least one partial article (component) of the covered products contains substances listed in the candidate list (date: 10.11.2024) exceeding 0.1 percentage by mass: Yes.

A list of respective substances of very high concern (SVHC) and their CAS-number is provided in the table below. Information on the concentration in the partial article(s) is available by searching for articles notified under the listed 'SCIP Number' in *ECHA's* SCIP-database: https://echa.europa.eu/scip-database.

SVHC	CAS-number	SCIP number
Lead	7439-92-1	40bd7915-698a-4450-8376-9bf70d7afd35

Reference service life

In agreement with the Europump (2024) guideline, a reference service life of 10 years was assumed for the purpose of this study, for estimating the energy consumption during the use stage of the pump.

LCA: Calculation rules

Declared Unit

The declared unit is a representative ALPA1 GO 25-40 180 Cast Iron pump variant whose mass including packaging is provided in the table.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Mass reference	2.179	kg/pce
conversion factor	2.179	-

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System boundary

This EPD is classified as a Cradle-to-Grave and module D. All major steps from the extraction of natural resources to the final disposal of the product are included in the scope of the study, following the modular approach of *EN 15804*.
Modules A1-A3 refer to the product stage and include raw materials extraction and processing, transportation, and the manufacturing process. The product stage is included in this study, and according to *EN 15804* the system boundary with nature is set to include those processes that provide the material and energy inputs into the system and the following manufacturing, transport up to the factory gate as well as the processing of waste arising from those processes. The assembly of the product, as well as the packaging, are included in A3. Wastes and losses are included in the modules where they occur according to the polluter pays principle and the modular approach of *EN 15804*.
Module A4 regards the transportation from the production site to the regional distribution center, and finally to the construction and product application site.
Module A5 refers to the installation process of the pump including the transportation of packaging waste to the treatment site and the waste treatment of packaging. The use of energy during installation is negligible for the selected functional unit.
Modules B1-B7 refer to the use stage. All use stage modules are assessed in the study, though B1, B2 and B7 are assessed to be zero. The modules B3, B4 and B5 are declared as "MNR" (module not relevant) according to the PCR-B. Module B6 regards energy use during the operation of the pump and includes the electricity consumption of the product. The total electricity consumption over the reference service lifetime is assessed by calculating the average power input using a specified load profile and multiplying by the number of running hours per year and the number of years of the RSL.
Modules C1-C4 refer to the End-of-life stage. A product reaches the end-of-life of its service life when it no longer provides any functionality. This life cycle stage includes all activities from the end-of-life of the pump until all materials and components are processed, reused, recycled, or disposed of.
C1 regards the dismantling of the pump, and this module is a manual activity. C2 regards the transport to waste processing, C3 refers to the processing (shredding) of waste for recycling, and C4 refers to waste disposal: landfilling and incineration. The End-of-Life assumption is that 95 % is collected as electronic waste, while 5 % goes to landfill.
Module D refers to the burdens and benefits beyond the system boundaries. According to *EN 15804*, module D includes the reuse, recovery and/or recycling potentials, expressed in net impacts and benefits. Contributions to module D come from waste incineration processes in A5 and C4 as well as material (metal) recycling in C3. The specific fractions and net flows are shown in the scenarios section of this declaration.

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

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 primary database used for background data is *Sphera*, while *Ecoinvent* served as a secondary database.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

In the declared net product, there is no biogenic carbon exceeding the minimal reporting requirement of 5% of the mass of the net product. Biogenic carbon in the packaging (corrugated board and wood) is reported below.

Information on biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product (manual)	0.017	kg C
Biogenic carbon content in accompanying packaging	0.057	kg C

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

In the following, technical scenario information is provided for modules A4, A5, B6, C1-C4, and D.

Transport from the gate to the site (A4)

Name	Value	Unit
Litres of fuel	1.7	l/100km
Transport distance	1900	km
Capacity utilisation (including empty runs)	61	%

Installation in building (A5)

Name	Value	Unit
Water consumption	-	m^3
Electricity consumption	-	kWh
Packaging waste for incineration	0.136	kg

Reference Service Life (RSL): For pump products like the declared unit, an RSL of 10 years can be assumed according to the guideline by *Europump* (2024). Therefore, to facilitate building reference calculations, an RSL of 10 years is declared. The pump running conditions during the service life are partially specified in the PCR-B: The number of running hours per year is assumed to be 3625 h according to the guideline *Europump* (2024). The pump load profile for calculating the average power input during operation is specified in the PCR-B according to the first two columns of the following table, while the third column results when scaling with the annual running hours:

Q in % of $Q_{100\%}$	H in % of $H_{100\%}$	Time in % of annual operating hours
100	100	6
75	87,5	15
50	75	35
25	62,5	44

Within Ecodesign for circulator pumps, 5.000 running hours per year is used to represent "continental Europe". Electricity consumptions are described in Table 9.

Reference service life

Name	Value	Unit
Life Span according to the manufacturer	10	a
Usage conditions: Operating hours per year	5000	h

Operational energy use (B6) and Operational water use (B7)

The electricity consumption per year results from the average power input according to the load profile (Pump technical data table) and the number of annual running hours (Reference Service life table).

For the calculation of the Use stage Operational energy use, a European Consumption (Technology) grid mix was applied.

Name	Value	Unit
Water consumption	-	m^3
Annual Electricity consumption	55.5	kWh

End of life (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	2.043	kg
Transportation distance (C2)	200	km
Aluminium for recycling	0.168	kg
Steel for recycling (incl. cast iron)	1.25	kg
Electronics for incineration w/energy	0.0637	kg
Copper for recycling (incl. brass)	0.076	kg
Stainless steel for recycling	0.121	kg
Plastics for incineration w/energy	0.1704	kg
Paper for incineration	0.0391	kg
Landfilling	0.1548	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

The net output flow of metals for recycling was calculated as the surplus from C3 Recycling after subtracting Secondary materials applied as input for A1-A3.

Name	Value	Unit
A5, Packaging incineration w/ energy recovery (Electricity)	0.306	MJ
A5, Packaging incineration w/energy recovery (Thermal energy)	0.555	MJ
C3, Aluminium for recycling (net output flow)	0.00338	kg
C3, Steel for recycling (net output flow)	0.477	kg
C3, Stainless Steel for recycling (net output flow)	0.0934	kg
C3, Copper for recycling (net output flow)	0.075	kg
C4, Waste incineration w/energy recovery (Electricity)	0.96	MJ
C4, Waste incineration w/energy recovery (Thermal energy)	1.73	MJ

LCA: Results

Characterization model: EN 15804, based on EF 3.1.
The indicator results for module B6 have been calculated for the entire RSL of 10 years.

B6 conversion factors are the following:
ALPHA1 25-40 130: 1.00
ALPHA1 25-40 180: 1.00
ALPHA1 32-40 180: 1.00
ALPHA1 GO 15-40 130: 1.00
ALPHA1 GO 20-40 130: 1.00
ALPHA1 GO 25-40 130: 1.00
ALPHA1 GO 25-40 180: 1.00
ALPHA1 GO 32-40 180: 1.00

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	X	X	X	X	MNR	MNR	MNR	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2:

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	1.04E+01	3.75E-01	2E-01	0	0	1.78E+02	0	0	3.7E-02	4.02E-02	5.6E-01	-1.59E+00
GWP-fossil	kg CO_2 eq	1.06E+01	3.69E-01	1.51E-02	0	0	1.75E+02	0	0	3.65E-02	3.97E-02	5.06E-01	-1.59E+00
GWP-biogenic	kg CO_2 eq	-2.41E-01	1.9E-03	1.84E-01	0	0	1.8E+00	0	0	1.87E-04	4.08E-04	5.41E-02	-7.03E-04
GWP-luluc	kg CO_2 eq	3.09E-02	3.93E-03	1.93E-05	0	0	5.79E-01	0	0	3.88E-04	1.31E-04	2.7E-05	-1.87E-03
ODP	kg CFC11 eq	1.76E-08	6.33E-14	2.69E-14	0	0	3.99E-09	0	0	6.25E-15	9.04E-13	5.55E-14	-3.18E-11
AP	mol H^+ eq	7.15E-02	2.4E-03	6.19E-05	0	0	3.84E-01	0	0	2.37E-04	8.69E-05	1.96E-04	-9.25E-03
EP-freshwater	kg P eq	4.59E-04	1.03E-06	8.45E-09	0	0	3.75E-04	0	0	1.02E-07	8.49E-08	2.25E-07	-1.14E-06
EP-marine	kg N eq	1.88E-02	1.19E-03	2.36E-05	0	0	9.21E-02	0	0	1.17E-04	2.08E-05	8.15E-05	-1.09E-03
EP-terrestrial	mol N eq	1.07E-01	1.29E-02	2.89E-04	0	0	1.03E+00	0	0	1.27E-03	2.34E-04	9.91E-04	-1.18E-02
POCP	kg NMVOC eq	3.03E-02	2.27E-03	5.96E-05	0	0	2.29E-01	0	0	2.24E-04	5.17E-05	2.15E-04	-3.62E-03
ADPE	kg Sb eq	6.96E-04	2.54E-08	3.95E-10	0	0	3.64E-05	0	0	2.5E-09	8.25E-09	7.97E-10	-2.2E-04
ADPF	MJ	1.69E+02	4.89E+00	7.64E-02	0	0	3.58E+03	0	0	4.83E-01	8.1E-01	1.91E-01	-1.64E+01
WDP	m^3 world eq deprived	5.32E+00	1.75E-03	2.43E-02	0	0	4.39E+01	0	0	1.72E-04	9.95E-03	5.78E-02	-1.95E-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:

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PERE	MJ	5.03E+01	3.69E-01	1.5E-01	0	0	2.45E+03	0	0	3.64E-02	5.53E-01	6.29E-01	-1.77E+00
PERM	MJ	7.2E-01	0	-1.33E-01	0	0	0	0	0	0	0	-5.87E-01	0
PERT	MJ	5.1E+01	3.69E-01	1.67E-02	0	0	2.45E+03	0	0	3.64E-02	5.53E-01	4.24E-02	-1.77E+00
PENRE	MJ	1.64E+02	4.89E+00	1.21E-01	0	0	3.58E+03	0	0	4.83E-01	8.1E-01	5.21E+00	-1.64E+01
PENRM	MJ	5.33E+00	0	-4.5E-02	0	0	0	0	0	0	0	-5.02E+00	0
PENRT	MJ	1.69E+02	4.89E+00	7.64E-02	0	0	3.58E+03	0	0	4.83E-01	8.1E-01	1.91E-01	-1.64E+01
SM	kg	1.5E+00	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	ND	0	0	0
FW	m^3	1.53E-01	1.82E-04	5.72E-04	0	0	1.9E+00	0	0	1.8E-05	4.3E-04	1.36E-03	-4.7E-03

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:

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
HWD	kg	3.31E-01	1.96E-10	3.15E-11	0	0	4.67E-06	0	0	1.94E-11	1.06E-09	7.93E-11	-5.81E-05
NHWD	kg	4.59E-01	6.83E-04	5.98E-03	0	0	2.77E+00	0	0	6.74E-05	6.27E-04	1.72E-01	1.47E-01
RWD	kg	1.26E-02	9.23E-06	3.07E-06	0	0	5.64E-01	0	0	9.11E-07	1.28E-04	7.09E-06	-3.05E-04
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	1.62E+00	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	3.06E-01	0	0	0	0	0	0	0	9.6E-01	0
EET	MJ	3.5E-02	0	5.55E-01	0	0	0	0	0	0	0	1.73E+00	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:

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	8.04E-07	1.05E-08	3.33E-10	0	0	3.17E-06	0	0	1.03E-09	7.18E-10	1.17E-09	-1.32E-07
IR	kBq U235 eq	3.1E+00	1.33E-03	4.81E-04	0	0	9.32E+01	0	0	1.31E-04	2.11E-02	1.08E-03	-5.35E-02
ETP-fw	CTUe	1.65E+02	6.36E+00	4.54E-02	0	0	6.04E+02	0	0	6.27E-01	1.66E-01	1.15E-01	-4.02E+00
HTP-c	CTUh	1.06E-07	8.58E-11	1.77E-12	0	0	5.69E-08	0	0	8.47E-12	3.27E-11	6.53E-12	-1.42E-08
HTP-nc	CTUh	1.37E-07	4.8E-09	3.86E-11	0	0	1.2E-06	0	0	4.73E-10	2.15E-09	2.04E-10	-6.75E-09
SQP	SQP	5.76E+01	2.16E+00	2.45E-02	0	0	1.43E+03	0	0	2.13E-01	3.24E-01	4.6E-02	-3.46E+00

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 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

STANDARDS

EN 15804
EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

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

Machinery Directives
2006/42/EC and 2009/127/EC

Radio Equipment Directive
2014/53/EU

RoHS Directives
2011/65/EU and 2015/863/EU EMC Directive: 2014/30/EU 2 3

FURTHER REFERENCES

Software: Sphera LCA for Experts, v. 10.9
Databases:
---- Sphera Professional database, v. 2024.2
---- Ecoinvent database, v. 3.10

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

PCR-A
Product Category Rules for Building-Related Products and Services, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, Version 1.4, 2024.

PCR-B
PCR Guidance-Text for Building-Related Products and Services, Part B: Requirements on the EPD for Pumps for liquids and liquids with solids. Version 4, 2023.

Data booklet
TP, TPD, TPE, TPED, TPE2, TPE2 D, TPE3, TPE3 D. Inline circulator pumps, 50 Hz. Grundfos Data Booklet. Available from Grundfos Product Center

Europump (2024)
Use Phase GHG Emissions from Pump Units. A Europump Guide. Europump, 2024, 18p. Available from Publications - www. europump.net

Publisher

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