PRODUCTS FAMILY DECLARATION FOR M1M 20/30 SERIES POWER METER OF ABB

PEP ecopassport®

Environmental Product Declaration

Document in compliance with ISO 14025: 2006 "Environmental labels and declarations. Type III environmental declarations"

ORGANIZATION	CONTACT INFORMATION
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STATUS	SECURITY LEVEL	REGISTRATION NUMBER	REV.	LANG.	PAGE
Approved	Public	PEP ecopassport® ABBG-00336-V01.01-EN	1	en	1/13

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ABB Purpose & Embedding Sustainability

ABB is committed to continually promoting and embedding sustainability across its operations and value chain, aspiring to become a role model for others to follow. With its ABB Purpose, ABB is focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior.

More information on the topic about Sustainability strategy 2030 — ABB Group see the website: “https://global.abb/group/en/sustainability/sustainability-strategy-2030”

General Information

Reference product	The reference product is one unit of the M1M 20/30 – POWER METER produced by ABB, the representative product is M1M 20 IO.
Description of the product	The products are the M1M series of Power Meter which is an easy solution for any standard application in buildings and industry, offering exactly what is needed to monitor the electrical system and analyze the power quality in a single device, such as voltage, current, harmonics, frequency, power factor, energy, etc. The electricity meter series can help users accurately monitor energy efficiency while meeting their cost control requirements. All electricity meters are equipped with displays to simplify access to equipment and comply with international standards for energy metering and monitoring accuracy.
Functional unit of the representative product	To measure energy consumption for the application in buildings and industry, operating with aux supply 100-230 V AC/DC, using LCD screen to display and equipped with Modbus RTU communication during 10 years. This function is ensured in accordance with the following technical parameter for the product: Auxiliary Power Supply Type: Single-phase Voltage: 100-230 V AC/DC±15% Frequency: 50-60 Hz Power consumption: 5VA max Installation category: CAT III 300V class per IEC 61010-1 edition 3 Protection fuse: T1 A-277 V AC Voltage Measurement Input Voltage Range: 80-265 V AC (L-N) Type: Single-phase, three-phase (3P, 3P+N) Rated frenquency: 50 Hz or 60 Hz Protection fuse: T1 A-277 V AC Current Measurement Input Current input mode: Indirect insertion with CT Rated current at secondary side of transformer: 1A or 5A Range without accuracy derating: 50mA-6A Digital output Number of output channels: 2 Voltage range: 5-48 V DC Current range: 2-100 mA Digital intput Intput channels: 2 Voltage: 24 V DC
Products concerned	The products covered by this PEP are: M1M 20, M1M 20 Modbus, M1M 20 I/O, M1M 20 I/O – S, M1M 20 Modbus (BP), M1M 20 Modbus – S, M1M 20 Modbus -S (BP), M1M 20 Modbus - S (MP), M1M 20 I/O Pro, M1M 20 Ethernet, M1M 20 Ethernet – S, M1M 30 Ethernet, M1M 30 Ethernet – S, M1M 30 Modbus, M1M 30 I/O, M1M 30 Modbus – S, M1M 30 I/O Pro

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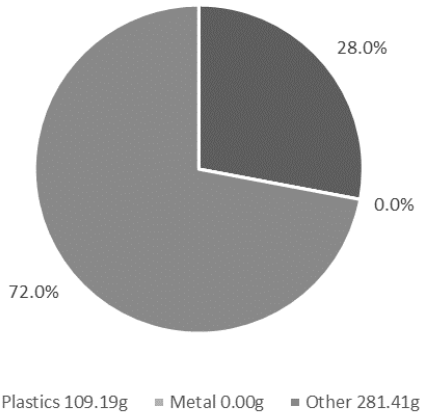
Constituent materials



Total weight of Reference product	Net weight of the product is 279.91 g. Gross weight of packaged product is 390.6g (including product packaging and transportation packaging).

Components	**Mass (g)**	**Product weight, incl. product pack (g)**	**Product weight, incl. product pack and transportation pack (g)**
Product	279.91		
Product packaging	77.81	357.72	390.60
Transportation packaging	32.88		

Plastics as % of weight		**Metals as % of weight**		**Other as % of weight**	
Name and CAS number	Weight-%	Name and CAS number	Weight-%	Name and CAS number	Weight-%
PC	15.7	/	/	PCBA	45.8
ABS	6.3	/	/	Paper	21.4
Other plastics	6.0	/	/	Wood	4.8

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Additional Environmental Information

Manufacturing	Manufacturing takes place in ABB plant of Beijing. The plant has the ISO 14001, ISO9001 certification
Distribution	/
Installation	For the installation of the product, only standard tools (electric screw) are needed.
Use	This product requires no servicing, no maintenance or additional products.
End of life	The reference product is assumed to be partly recovery, incineration and landfilled.
Benefits and loads beyond the system boundaries	/

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Environmental impacts

Reference lifetime	10 years.
Product category	Power Meter, PSR-0005-ed3-EN-2023 06 06 3.15 Other equipment categories 2: active product
Installation elements	Electric screw is used for installation, not other material is needed.
Use scenario	Operation for 10 years, Stand Use rate: 100 % of the RLT The duration of the operating modes: OFF: 0%, Standby: 99.5%, ON: 0.5%
Geographical representativeness	The representative product is produced in China and 99% used in Chinese Mainland and 1% used in other districts in year 2022.
Technological representativeness	In the manufacturing stage, specific data was collected to calculate the environmental impact caused by the manufacturing process. For the production of raw materials and parts, datasets from Ecoinvent 3.8 were used. During the dataset selection, the tech-nological representation was considered carefully. Datasets with the same production processes were preferred. If not available, datasets with similar production processes were chosen.
Time representativeness	The generic data were extracted from databses (mainly Ecoinvent). Furthermore, there reference years of these data are between 2011 – 2021 and is valid until 2022 meaning that no data used in the model are older than 10 years.
Software and database used	SimaPro version 9.4.0.4 & databases ecoinvent 3.8 & EF3.0

Energy model used

Manufacturing	Materials and parts production: Global electricity mix Product assembly: Electricity mix of China
Installation	Global electricity mix
Use	Average electricity mix of China, Egypt, India, Singapore, Brazil, United States
End of life	Global electricity mix

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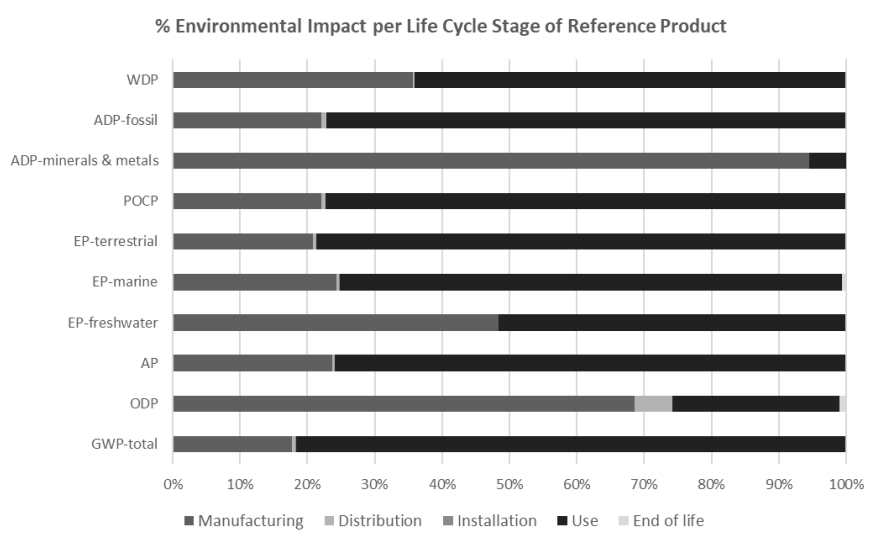
Common base of mandatory indicators



Environmental impact indicators

Indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
GWP-total	**kg CO2 eq**	7.61E+01	1.35E+01	3.60E-01	1.32E-01	6.20E+01	1.11E-01	/
GWP-fossil	**kg CO2 eq**	7.57E+01	1.35E+01	3.60E-01	1.99E-02	6.17E+01	1.11E-01	/
GWP-biogenic	**kg CO2 eq**	3.91E-01	-4.99E-02	6.17E-04	1.12E-01	3.28E-01	1.91E-04	/
GWP-luluc	**kg CO2 eq**	3.00E-02	1.75E-02	1.53E-04	1.75E-06	1.22E-02	4.52E-05	/
GWP-fossil = Global Warming Potential fossil fuels GWP-biogenic = Global Warming Potential biogenic GWP-luluc = Global Warming Potential land use and land use change								
ODP	**kg CFC11 eq**	1.36E-06	9.30E-07	7.64E-08	5.33E-10	3.36E-07	1.36E-08	/
ODP = Depletion potential of the stratospheric ozone layer								
AP	**mol H+ eq**	4.28E-01	1.02E-01	1.50E-03	2.97E-05	3.24E-01	4.15E-04	/
AP = Acidification potential, Accumulated Exceedance								
EP-freshwater	**kg P eq**	2.24E-02	1.08E-02	2.70E-05	4.87E-07	1.15E-02	1.44E-05	/
EP-marine	**kg N eq**	9.18E-02	2.23E-02	4.45E-04	1.40E-05	6.85E-02	5.73E-04	/
EP-terrestrial	**mol N eq**	9.29E-01	1.93E-01	4.85E-03	1.25E-04	7.30E-01	1.02E-03	/
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment EP-terrestrial = Eutrophication potential, Accumulated Exceedance								
POCP	**kg NMVOC eq**	2.45E-01	5.42E-02	1.44E-03	3.19E-05	1.89E-01	3.16E-04	/
POCP = Formation potential of tropospheric ozone								
ADP-minerals & metals	**kg Sb eq**	3.43E-03	3.24E-03	1.38E-06	1.26E-08	1.87E-04	8.45E-07	/
ADP-fossil	**MJ**	7.09E+02	1.57E+02	5.14E+00	4.07E-02	5.46E+02	1.20E+00	/
ADP-minerals & metals = Abiotic depletion potential for non-fossil resources ADP-fossil = Abiotic depletion for fossil resources potential								
WDP	**m3 world eq. depr.**	1.01E+01	3.61E+00	1.78E-02	3.49E-03	6.48E+00	1.44E-02	/
WDP = Water Deprivation potential								

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Common base of mandatory indicators

Inventory flows indicator - Resource use indicators

Indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
PERE	**MJ**	7.33E+01	1.64E+01	6.20E-02	1.20E-03	5.68E+01	3.77E-02	/
PERM	**MJ**	1.34E+00	1.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	/
PERT	**MJ**	7.46E+01	1.78E+01	6.20E-02	1.20E-03	5.68E+01	3.77E-02	/
PENRE	**MJ**	7.06E+02	1.54E+02	5.14E+00	4.07E-02	5.46E+02	1.20E+00	/
PENRM	**MJ**	3.36E+00	3.36E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	/
PENRT	**MJ**	7.09E+02	1.57E+02	5.14E+00	4.07E-02	5.46E+02	1.20E+00	/

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

Inventory flows indicator - Indicators describing the use of secondary materials, water, and energy resources

Indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
SM	**kg**	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	/
NRSF	**MJ**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	/
FW	**M^3**	2.70E-01	1.08E-01	5.74E-04	1.15E-04	1.61E-01	4.00E-04	/

SM = Use of secondary material

RSF = Use of renewable secondary fuels

NRSF = Use of non-renewable secondary fuels

FW = Use of net fresh water

Inventory flows indicator – Waste category indicators

Indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
Hazardous waste disposed	**kg**	4.55E-03	4.43E-03	1.37E-05	9.77E-08	1.05E-04	7.21E-06	/
Non-hazardous waste disposed	**Kg**	7.26E+00	1.46E+00	1.99E-01	8.08E-02	5.03E+00	4.94E-01	/
Radioactive waste disposed	**Kg**	6.96E-04	3.36E-04	3.32E-05	1.79E-07	3.21E-04	5.97E-06	/

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Common base of mandatory indicators

Inventory flows indicator – Output flow indicators

Indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
Components for reuse	**kg**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	/
Materials for recycling	**Kg**	4.92E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.92E-03	/
Materials for energy recovery	**Kg**	4.79E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-02	/
Exported energy	**MJ**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	/

Note: In manufacturing stage, the recycled content of raw materials is 0, and scrap value is 30% according to PSR. In EoL stage, recovery rate and disposal rate is based on PCR.

Inventory flow indicator – other indicators

Indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
Biogenic carbon content of the product	**kg of C**	0.00E+00	/	/	/	/	/	/
Biogenic carbon content of the associated packaging	**kg of C**	4.40E-02	/	/	/	/	/	/

Note: As no biogenic carbon in the product, thus, only the biogenic carbon in the packaging was calculated. Of the product packaging and packaging for transportation, the materials containing biogenic carbon are wood pallet and paper board.

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Family of Products Extrapolation Rules

To determine the environmental impact of a product covered by the PEP other than the representative product, the following rules apply:

1) Manufacturing stage

The impact for this phase of a product covered by the PEP other than the representative product is proportional to weight of the product, thus, the impacts should be calculated by multiple the coefficients factor_1 in Table 5 by the environmental impact for this phase of the representative product.

2) Distribution

The impact for this phase of a product covered by the PEP other than the representative product is proportional to the packaged product weight, thus, the impacts should be calculated by multiple the coefficients factor_2 in Table 5 by the environmental impact for those phases of the representative product.

3) Installation

The impact for this phase of a product covered by the PEP other than the representative product is proportional to weight of the product packaging, thus, the impacts should be calculated by multiple the coefficients factor_3 in Table 5 by the environmental impact for those phases of the representative product.

4) Use

The environmental impact for B1-B6 stage of a product covered by the PEP other than the representative product is proportional to the amount of the electricity used in use stage, thus, the impacts should be calculated by multiple the factor_4 in Table 5 by the environmental impact for this phase of the representative product.

5) End of life phases

The impact for this phase of a product covered by the PEP other than the representative product is proportional to weight of the product, thus, the impacts should be calculated by multiple the coefficients factor_1 in Table 5 by the environmental impact for this phase of the representative product.

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Extrapolation rules for Manufacturing, Distribution, Installation, Use and End of life phases

Phases	Manufacturing	Distribution	Installation	Use	End of life
Factors	**Factor_1**	**Factor_2**	**Factor_3**	**Factor_4**	**Factor_1**
M1M 20	0.97	0.98	0.99	0.91	0.97
M1M 20 Modbus	0.99	0.99	0.99	0.95	0.99
M1M 20 I/O	1.00	1.00	1.00	1.00	1.00
M1M 20 I/O – S	1.00	1.00	1.00	1.00	1.00
M1M 20 Modbus (BP)	0.99	1.21	2.03	0.95	0.99
M1M 20 Modbus - S	0.99	0.99	0.99	0.95	0.99
M1M 20 Modbus -S (BP)	0.99	1.21	2.03	0.95	0.99
M1M 20 Modbus - S (MP)	0.99	1.21	2.03	0.95	0.99
M1M 20 I/O Pro	1.12	1.09	0.99	2.36	1.12
M1M 20 Ethernet	1.05	1.04	0.99	3.48	1.05
M1M 20 Ethernet - S	1.05	1.04	0.99	3.48	1.05
M1M 30 Ethernet	1.07	1.05	0.99	3.51	1.07
M1M 30 Ethernet - S	1.07	1.05	0.99	3.51	1.07
M1M 30 Modbus	1.01	1.00	0.99	1.03	1.01
M1M 30 I/O	1.02	1.02	0.99	1.06	1.02
M1M 30 Modbus - S	1.01	1.00	0.99	1.03	1.01
M1M 30 I/O Pro	1.14	1.11	0.99	2.36	1.14

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Environmental Impact Indicator Glossary

Impact indicators

Indicator	Description	Distribution
Global warming potential (GWP) - total	Indicator of potential global warming caused by emissions to air contributing to the greenhouse effect. The total global warming potential GWP-total) is the sum of three sub-categories of climate change. GWP-total = GWP-fossil + GWP-biogenic + GWP- land use and land use change	kg CO_2 eq.
Ozone depletion (ODP)	Emissions to air that contribute to the destruction of the stratospheric ozone layer	kg CFC-11 eq.
Acidification of soil and water (A)	Acidification of soils and water caused by the release of certain gases to the atmosphere, such as nitrogen oxides and sulphur oxides	H+ eq.
Eutrophication (E)	Indicator of the contribution to eutrophication of water by the enrichment of the aquatic ecosystem with nutritional elements, e.g. industrial or domestic effluents, agriculture, etc. This indicator is divided to three: freshwater, marine and terrestrial.	kg P eq., kg N eq., mole N eq.
Photochemical ozone creation (POCP)	Indicator of emissions of gases that affect the creation of photochemical ozone in the lower atmosphere (smog) because of the rays of the sun.	kg NMVOC eq.
Depletion of abiotic resources − elements (ADPe)	Indicator of the depletion of natural non-fossil resources	kg Sb eq.
Depletion of abiotic resources − fossil fuels (ADPf)	The use of non-renewable fossil resources in an unsustainable way (e.g. from material to waste)	MJ (lower heating value)
Water Deprivation potential (WDP)	Deprivation-weighted water consumption. Assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived.	m^3 world eq. depr.

Resource use indicators

Indicator	Description	Distribution
Total use of primary energy	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) + Total use of renewable primary energy re-sources (primary energy and primary energy resources used as raw materials)	MJ (lower heating value)

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Registration number:	**Drafting Rules:** *PCR-ed4-EN-2021 09 06*
ABBG-00336-V01.01-EN	**Supplemented by:** *PSR-0005-ed3-EN-2023 06 06*
Verifier accreditation number: VH50	**Information and reference documents:** www.pep-ecopassport.org
Date of issue: 09-2023	**Validity period:** 5 years
Internal: ☐	External: ☒
Independent verification of the declaration and data, in compliance with ISO 14025: 2006	
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain)	
PEP are compliant with XP C08-100-1: 2016 or EN 50693:2019 The components of the present PEP may not be compared with components from any other program.	
Document in compliance with ISO 14025: 2006, Environmental labels and declarations. Type III environmental declarations	

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