

Product Environmental Profile

Quantum Automation Platform



Product Environmental Profile – PEP

Product overview

The main purpose of the Modicon Quantum PLC range is to provide a modular, flexible architecture and an extensive range of networks and fieldbus communication devices. This combines to make the Modicon Quantum an ideal automation platform for continuous or semi-continuous industrial processes, as well as for large infrastructures.

The product of more than 25 years experience in the field of redundancy systems, Modicon Quantum is the perfect solution for applications that require high control system availability. This offer is therefore inherently suited to critical applications, such as petrochemicals, metals, cements, energy, tunnels, airports and water treatment. It can be used in many fields from Food & Beverage to the pharmaceutical industry.

Certified by TÜV Rheinland Group and IEC61508 compliant, some modules of the Modicon Quantum can be used in applications where functional safety is necessary. A configuration which combines functional safety and redundancy is also available.

This automation platform provides unrivalled treatment capacity together with an expandable memory size. It can receive the complete project, deal with very complex data structures, time and date stamping of diagnostics information as well as storage of recipes and traceability of information.

A Modicon Quantum automation platform configuration uses the following product families: Rack, Power supply, Central processing unit, Communication, Input/Output, Analogue, and Metering.

This range consists of describe the scope and limits of the range to which the document applies.

The representative product used for the analysis is a selected configuration built of the following 15 modules mounted on a 16 slots rack:

140XBP01600: 140CPU67160, 140CPS11420, 140ACI04000, 140ACO02000, 140ACO13000, 140ATI03000, 140CRP93200, 140DAI54000, 140DDI35300, 140DDI84100, 140DDO35300, 140DRA84000, 140ERT85410, 140NOE77101, 140XBE10000 and ten terminal blocks 140XTS00200.

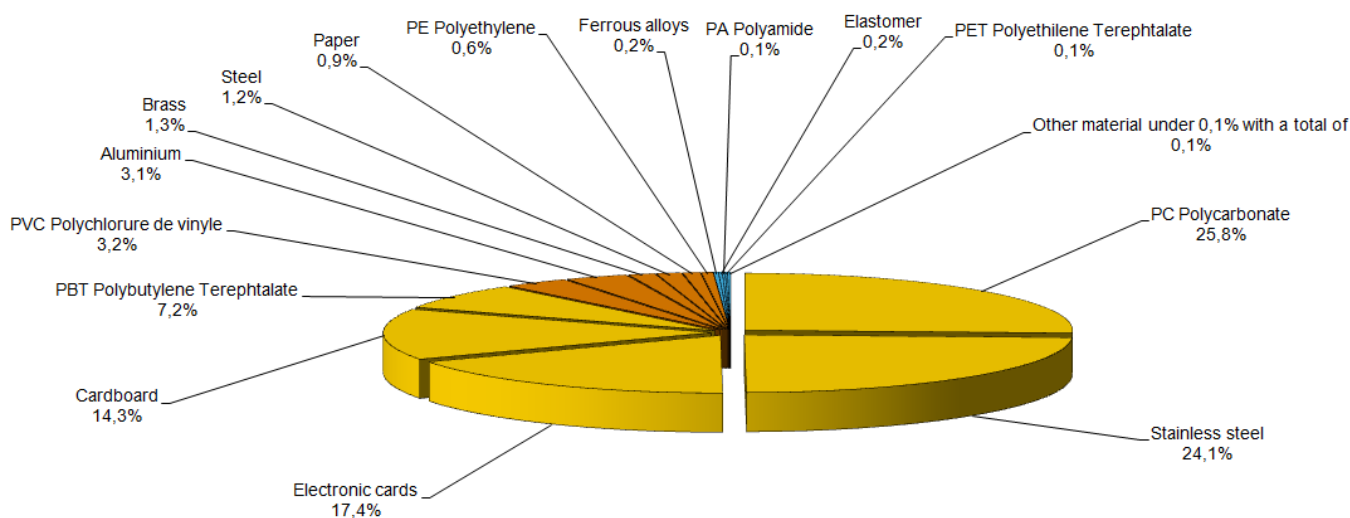
Hereafter, it is called “Modicon Quantum”.

The environmental impacts of this referenced product are representative of the impacts of the other products of the range which are developed with a similar technology.

The environmental analysis was performed in conformity with ISO 14040.

Constituent materials

The mass of the product range is from 1000g and 14200g including packaging. It is 13210 g for the Modicon Quantum. The constituent materials are distributed as follows:



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Substance assessment

Products of this range are designed in conformity with the requirements of the European RoHS Directive 2011/65/EU and do not contain, or only contain in the authorised proportions, lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls - PBB, polybrominated diphenyl ethers - PBDE) as mentioned in the Directive

Details of ROHS and REACH substances information are available on the Schneider-Electric [Green Premium website](http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page) . (<http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page>)

Manufacturing

The Modicon Quantum product range is manufactured at a Schneider Electric production site on which an ISO14001 certified environmental management system has been established.

Distribution

The weight and volume of the packaging have been optimized, based on the European Union's packaging directive.

The Modicon Quantum packaging weight is 3336 g. It mainly consists of cardboard and paper, which are 100 % recyclable.

The product distribution flows have been optimised by setting up local distribution centres close to the market areas.

Use

The products of the Modicon Quantum do not generate environmental pollution (noise, emissions) requiring special precautionary measures in standard use.

The electrical power consumption depends on the conditions under which the product is implemented and used. The electrical power consumed by the Quantum range is between 7 W and 60 W. It is 54 W in active mode.

The product range does not require special maintenance operations.

End of life

At end of life, the products in the Modicon Quantum have been optimized to decrease the amount of waste and allow recovery of the product components and materials.

Modicon Quantum contains battery and electronic boards that should be separated from the stream of waste so as to optimize end-of-life treatment by special treatments, and a LCD display (< 100cm²). The location of these components and other recommendations are given in the End of Life Instruction document which is available for this product range on the Schneider-Electric Green Premium website [Green Premium website](http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page) (<http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page>).

The recyclability potential of the products has been evaluated using the “ECO DEEE recyclability and recoverability calculation method” (version V1, 20 Sep. 2008 presented to the French Agency for Environment and Energy Management: ADEME).

According to this method, the potential recyclability ratio without packaging is: **31%**.

As described in the recyclability calculation method this ratio includes only metals and plastics which have proven industrial recycling processes.

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Environmental impacts

Life cycle assessment has been performed on the following life cycle phases: Materials and Manufacturing (M), Distribution (D), Installation (I) Use (U), and End of life (E).

Modeling hypothesis and method:

- The calculation was performed on above described configuration of Modicon Quantum.
- Product packaging is included.
- Installation components: no special components included.
 - Scenario for the Use phase: this product range is included in the Category 2 (Energy consuming product)
 - Assumed service lifetime is 10 years
 - Use scenario is 54W, 34 % service uptime
- The geographical representative area for the assessment is European and the electrical power model used for calculation is European model.
- End of life impacts are based on a worst case transport distance to the recycling plant (1000 km)

Presentation of the product environmental impacts

Environmental indicators	Unit	For representative Modicon Quantum					
		S = M + D + I + U + E	M	D	I	U	E
Air Acidification (AA)	kg H+ eq	3,97E-01	7,74E-02	2,46E-03	0*	3,17E-01	1,30E-05
Air toxicity (AT)	m ³	4,70E+08	9,82E+07	3,28E+06	0*	3,68E+08	1,93E+04
Energy Depletion (ED)	MJ	3,51E+04	5,24E+03	6,09E+01	0*	2,98E+04	9,85E-01
Global Warming Potential (GWP)	kg CO ₂ eq.	1,86E+03	3,84E+02	4,54E+00	0*	1,47E+03	6,99E-02
Hazardous Waste Production (HWP)	kg	1,10E+01	1,08E+01	5,15E-06	0*	2,52E-01	8,65E-08
Ozone Depletion Potential (ODP)	kg CFC-11 eq.	3,82E-04	4,71E-05	7,95E-09	0*	3,35E-04	1,32E-10
Photochemical Ozone Creation Potential (POCP)	kg C ₂ H ₄ eq.	1,97E-01	1,05E-01	1,25E-03	0*	9,08E-02	1,56E-05
Raw Material Depletion (RMD)	Y-1	4,47E-12	4,45E-12	8,84E-17	0*	1,98E-14	1,43E-18
Water Depletion (WD)	dm ³	6,27E+03	2,44E+03	4,41E-01	0*	3,83E+03	7,26E-03
Water Eutrophication (WE)	kg PO ₄ ³⁻ eq.	4,10E-02	2,70E-02	8,07E-06	0*	1,40E-02	1,30E-07
Water Toxicity (WT)	m ³	7,42E+02	8,56E+01	1,85E+00	0*	6,54E+02	2,99E-02

(0*) means negligible

Life cycle assessment has been performed with the EIME software (Environmental Impact and Management Explorer) version 5.5 and with its database version 2013-02.

The Use phase is the life cycle phase which has the greatest impact on the majority of environmental indicators, except HWP, RMD and WE.

According to this environmental analysis, proportionality rules may be used to evaluate the impacts of other configurations of this range.

Impacts of AA, AT, ED, GWP, ODP, WD and WT indicators of other functional units in this family may be proportionally extrapolated by energy consumption values.

Impacts of RMD, HWP, POCP and WE indicators may be proportionally extrapolated by mass of the product.

System approach

As the products of the range are designed in accordance with the European RoHS Directive 2011/65/EU, they can be incorporated without any restriction in an assembly or an installation subject to this Directive.

Please note that the values given above are only valid within the context specified and cannot be used directly to draw up the environmental assessment of an installation.

Glossary

Air Acidification (AA)	The acid substances present in the atmosphere are carried by rain. A high level of acidity in the rain can cause damage to forests. The contribution of acidification is calculated using the acidification potentials of the substances concerned and is expressed in mode equivalent of H ⁺ .
Air Toxicity (AT)	This indicator represents the air toxicity in a human environment. It takes into account the usually accepted concentrations for several gases in the air and the quantity of gas released over the life cycle. The indication given corresponds to the air volume needed to dilute these gases down to acceptable concentrations.
Energy Depletion (ED)	This indicator gives the quantity of energy consumed, whether it is from fossil, hydroelectric, nuclear or other sources. It takes into account the energy from the material produced during combustion. It is expressed in MJ.
Global Warming (GW)	The global warming of the planet is the result of the increase in the greenhouse effect due to the sunlight reflected by the earth's surface being absorbed by certain gases known as "greenhouse-effect" gases. The effect is quantified in gram equivalent of CO ₂ .
Hazardous Waste Production (HWP)	This indicator quantifies the quantity of specially treated waste created during all the life cycle phases (manufacturing, distribution and utilization). For example, special industrial waste in the manufacturing phase, waste associated with the production of electrical power, etc. It is expressed in kg.
Ozone Depletion (OD)	This indicator defines the contribution to the phenomenon of the disappearance of the stratospheric ozone layer due to the emission of certain specific gases. The effect is expressed in gram equivalent of CFC-11.
Photochemical Ozone Creation (POC)	This indicator quantifies the contribution to the "smog" phenomenon (the photochemical oxidation of certain gases which generates ozone) and is expressed in gram equivalent of ethylene (C ₂ H ₄).
Raw Material Depletion (RMD)	This indicator quantifies the consumption of raw materials during the life cycle of the product. It is expressed as the fraction of natural resources that disappear each year, with respect to all the annual reserves of the material.
Water Depletion (WD)	This indicator calculates the volume of water consumed, including drinking water and water from industrial sources. It is expressed in dm ³ .
Water Eutrophication (WE)	Eutrophication is a natural process defined as the enrichment in mineral salts of marine or lake waters or a process accelerated by human intervention, defined as the enrichment in nutritive elements (phosphorous compounds, nitrogen compounds and organic matter). This indicator represents the water eutrophication of lakes and marine waters by the release of specific substances in the effluents. It is expressed in grams equivalency of PO ₄ ³⁻ (phosphate).
Water Toxicity (WT)	This indicator represents the water toxicity. It takes into account the usually accepted concentrations for several substances in water and the quantity of substances released over the life cycle. The indication given corresponds to the water volume needed to dilute these substances down to acceptable concentrations.

PEP achieved with Schneider-Electric TT01 V9 and TT02 V20 procedures in compliance with ISO14040 series standards

PEP in line with PEP ecopassport PCR : PEP-PCR- ed 2.1-EN-2012 12 11

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