Zelio Logic
Smart relays

Product Environnemental Profile

Telemecanique

Product Environnemental Profile - PEP

Product overview

The main purpose of the Zelio Logic range is to provide automated control of small devices. The range consists of smart relays used in the industry and tertiary sectors:
■ *in industry:*
☐ *automated control of small finishing machines, manufacturing machines, assembly machines or packaging machines*
☐ *decentralised automated control of auxiliary equipment for large and average-size machines in the textiles, plastics and materials transformation fields*
☐ *automated control for agricultural machinery (irrigation, pumps, greenhouses, etc.).*
■ *in the tertiary sector:*
☐ *automated control of gates, roller shutters, automated access control*
☐ *automated lighting control*
☐ *automated control of compressors and air-conditioning.*
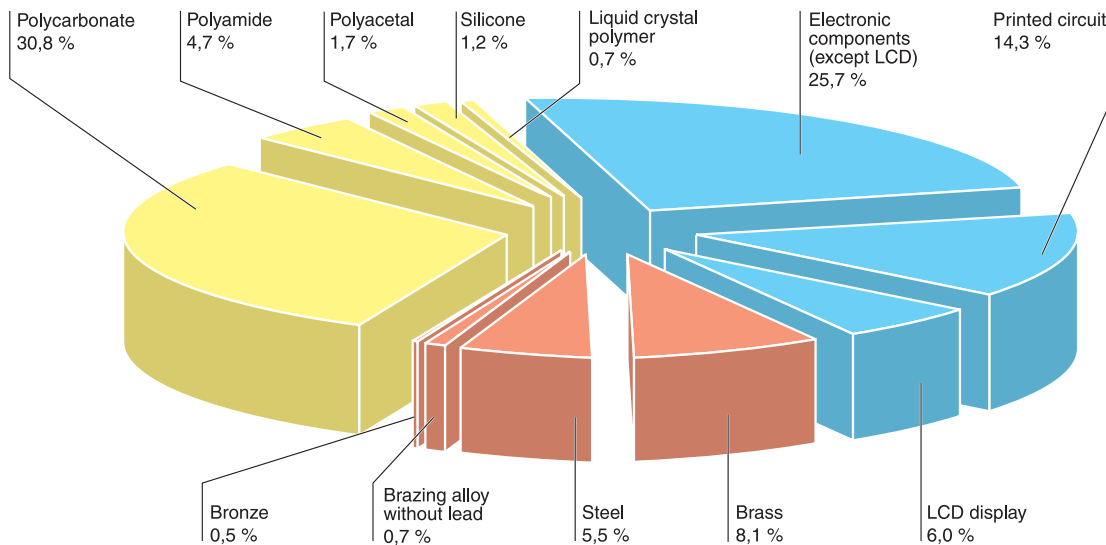The Zelio Logic product range consists of:
■ *compact smart relays with 10, 12 or 20 Inputs / Outputs, with or without a display unit*
■ *modular smart relays with 10 or 26 Inputs / Outputs*
■ *expansion modules with 4, 6, 10 or 14 Inputs / Outputs, communication expansion modules (Modbus, Ethernet, Modem interface, etc.)*
■ *accessories (serial cable, USB, memory module, Bluetooth, etc.).*
The product chosen for the environmental analysis of the Zelio Logic range is the modular logic module with a display unit, ref. SR3 B101FU (100 / 240 V AC). It is representative of all the products in the Zelio Logic range, which are all manufactured using the same process.
The environmental analysis was performed in conformity with ISO 14040 "Environmental management: Life cycle assessment – Principle and framework". This analysis takes all the stages in the life cycle of the product into account: extraction of raw materials and manufacture of materials, manufacture of the product, transportation, utilisation and end of life.

Constituent materials

The weight of the Zelio Logic module, ref. SR3 B101FU, is 206 g. The constituent materials are distributed as follows:

Polycarbonate 30,8 %
Polyamide 4,7 %
Polyacetal 1,7 %
Silicone 1,2 %
Liquid crystal polymer 0,7 %
Electronic components (except LCD) 25,7 %
Printed circuit 14,3 %
Bronze 0,5 %
Brazing alloy without lead 0,7 %
Steel 5,5 %
Brass 8,1 %
LCD display 6,0 %

All necessary steps are taken with our services, suppliers and subcontractors to ensure that our products do not contain any substances prohibited by the legislation in force [1] when they are put on the market.
(1) List available on request

Manufacturing

Zelio Logic modules are manufactured at a Schneider Electric production site operating an ISO 14001 certified environmental management system.

Distribution

The packaging was designed in compliance with the European Union's 94/62/EC packaging directive in order to reduce the weight and volume and consequently the environmental impact of the distribution phase of the life cycle of the product.
The total weight of the packaging of the representative logic module, ref. SR3 B101FU, is 40 g, which includes a cardboard box and a paper instruction leaflet, all of which are completely recyclable.
The product distribution flows have been optimised by setting up local distribution centres close to the market areas.

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Utilization

The products in the Zelio Logic range do not generate any environmental pollution requiring special precautionary measures (noise, emissions, etc.). The electrical power consumed depends on the conditions under which each product is implemented and used.
The consumption of the representative product is estimated at 7 VA.

End of life

Measures have been taken to make it easier to dismantle the smart relays at end of life and to send the various sub-assemblies to the appropriate treatment centres in order to facilitate recovery of the various constituent materials:

■ the electronic cards can easily be extracted and sent to a special recycling centre for used electronic cards; the small card containing the LCD screen can easily be separated from the motherboard to enable the LCD to be removed.

■ the plastic parts of the housings are clipped on and easy to remove; it is therefore particularly easy to extract the electronic cards; the plastic parts can be sent to the appropriate recovery centres, as indicated by their markings.

The representative product contains a lithium battery, which must be removed at end of life.

The recycling potential of the representative product, ref. SR3 B101FU, is greater than 45 % in terms of mass. This percentage includes:

■ Polycarbonate (PC) plastic parts; they contain no charges or brominated flame retardants and are all marked and easy to dismantle.

■ some metals in the electronic cards (mainly copper and precious metals). The energy recovery potential is greater than 30 % in terms of mass. This percentage includes the epoxy resin and fibreglass in the printed circuits, as well as the plastic materials in the terminal blocks and connectors.

The overall recovery potential at end of life is therefore greater than 75 %. The choices made in designing the plastic parts – recyclable materials and marked, easily removable parts - have made it possible to reduce the environmental impacts of the Zelio Logic smart relays at the end of life phase by optimising the material and energetic recovery capacity of the parts.

Environmental impacts

The EIME (Environmental Impact and Management Explorer) software, version 1.6, and its database, version 5.4, were used for the Life Cycle Assessment (LCA) of the product chosen as representative of the range.

The analysis focused on a smart relay, ref. SR3 B101FU.
For the purposes of the LCA, its estimated service life is 10 years, with a utilisation rate of 100 %. The European electrical power model was chosen for modelling the consumption.

The EIME software was used to model the environmental impacts on the Manufacturing phase (including the extraction of raw materials and processing of basic materials) and on the Distribution and Utilisation phases of the life cycle.
The results of the LCA performed with the EIME software are as follows:

Presentation of product environmental impacts

Environmental indicators	Unit	For a logic module, réf. SR3 B101FU			
		S = M + D + U	M	D	U
Raw Material Depletion	Y-1	$4.02 \ 10^{-14}$	$3.71 \ 10^{-14}$	$5.50 \ 10^{-18}$	$3.16 \ 10^{-15}$
Energy consumption	MJ	-	-	-	-
Water Depletion	dm^3	$6.31 \ 10^2$	88.1	1.66	$5.41 \ 10^2$
Global Warming	$g≈CO_2$	$2.71 \ 10^5$	$1.72 \ 10^4$	$3.26 \ 10^2$	$2.53 \ 10^5$
Ozone Depletion	$g≈CFC-11$	$4.93 \ 10^{-2}$	$3.01 \ 10^{-3}$	$6.12 \ 10^{-5}$	$4.62 \ 10^{-2}$
Photochemical Ozone Creation	$g≈C_2H_4$	$1.95 \ 10^2$	13.3	$5.48 \ 10^{-1}$	$1.81 \ 10^2$
Air Acidification	$g≈H^+$	47.8	3.50	$4.68 \ 10^{-2}$	44.3
Hazardous Waste Production	kg	3.99	$2.55 \ 10^{-1}$	$5.67 \ 10^{-5}$	3.74

In addition, the total energy consumed by the product during the utilisation phase is 400 kWh in 10 years of use.
The manufacturing and utilisation phases have the most significant environmental impacts.

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System approach

It is important to remember that the product environmental report must take into account the application or installation in which the product is incorporated: the environmental impact values given above are only valid within the context specified.

Glossary

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.

Energy Depletion (ED)

This indicator gives the quantity of energy consumed, whether it be from fossil, hydroelectric, nuclear or other sources.
This indicator takes into account the energy from the material produced during combustion. It is expressed in MJ.

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.

Global Warming Potential (GWP)

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.

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 methane (C_2H_4).

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^+.

Hazardous Waste Production (HWP)

This indicator calculates 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.

We are committed to safeguarding our planet by "Combining innovation and continuous improvement to meet the new environmental challenges".