



**ZB32-32 Overload relay**

<b>Representative product</b>	ZB32-32 (278454) (Overload Thermal Relay) Product Category: Other Equipment (Passive product – Non-Continuous Operation)																												
<b>Description of the product</b>	Eaton Moeller® Series offers a robust solution for motor protection with its ZB32 Thermal Overload Relay. The ZB32 relay is designed to safeguard motors operating within a current range of 0,16 A to 32 A. It features bimetallic overload protection and is equipped with one normally open (N/O) and one normally closed (N/C) contact configuration. This relay is intended for direct mounting, making it compatible with Eaton’s DILM contactors, and it comes with an IP20 protection rating, ensuring safe handling and installation. The ZB32 relay is ideal for industrial applications requiring reliable thermal overload protection, and it complies with international standards for motor protection. The representative product selected for this study is Eaton Moeller® Series ZB32-32 Thermal Overload Relay with a current rating range of 24 A to 32 A.																												
<b>Homogeneous Product Family</b>	PEP covers the following part numbers under homogenous family <table border="1" data-bbox="381 1312 1567 1638"> <tr> <td>278431</td> <td>278440</td> <td>278442</td> <td>278451</td> </tr> <tr> <td>278432</td> <td>278441</td> <td>278443</td> <td>278452</td> </tr> <tr> <td>278433</td> <td>290168</td> <td>278444</td> <td>278448</td> </tr> <tr> <td>278434</td> <td>278437</td> <td>278445</td> <td>278453</td> </tr> <tr> <td>278435</td> <td>278438</td> <td>278446</td> <td>112474</td> </tr> <tr> <td>278436</td> <td>278439</td> <td>278447</td> <td>278449</td> </tr> <tr> <td></td> <td></td> <td></td> <td>278450</td> </tr> </table>	278431	278440	278442	278451	278432	278441	278443	278452	278433	290168	278444	278448	278434	278437	278445	278453	278435	278438	278446	112474	278436	278439	278447	278449				278450
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278436	278439	278447	278449																										
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<b>Functional unit</b>	To protect an electric motor against overload and phase failure in an industrial application, for a rated current of 32 A, at a voltage up to 690 V AC, over a reference service life of 20 years																												
<b>Company information</b>	Eaton Industries GmbH Schemmener Str. 30, Gummersbach, Germany, 51647 Email: <a href="mailto:productstewardship-es@eaton.com">productstewardship-es@eaton.com</a>																												

Constituent Materials of			
Reference Product:	<b>2.12E-01 (With Packaging)</b>		
Materials	Category PEP Material	Mass (kg)	Percentage (%)
Others	Cardboard	5.26E-02	24.8%
Plastics	Polyamide with Glass fiber	3.83E-02	18.1%
Metals	Copper	3.06E-02	14.4%
Plastics	Polybutylene terephthalate (PBT)	2.54E-02	12.0%
Metals	Brass	1.73E-02	8.2%
Metals	Steel	1.30E-02	6.1%
Others	Paper	8.34E-03	3.9%
Others	Glass fiber	7.91E-03	3.7%
Metals	Stainless steel with chrome	6.66E-03	3.1%
Plastics	Polyethylene low density (LDPE)	4.77E-03	2.2%
Plastics	Phenolic resin	2.76E-03	1.3%
Others	Glue	1.03E-03	0.5%
Metals	Manganese	1.01E-03	0.5%
Metals	Silicon	6.42E-04	0.3%
Plastics	Polyamide	6.20E-04	0.3%
Others	Miscellaneous	1.11E-03	0.5%
	<b>Total</b>	<b>2.12E-01</b>	<b>100.0%</b>

Additional Environmental Information	
<b>Manufacturing</b>	The reference product is assembled at an Eaton plant holding management system certifications according to ISO 14001 standards.
<b>Distribution</b>	Eaton is committed to minimizing weight and volume of product and packaging with focus to optimize transport efficiency.
<b>Installation</b>	During installation of the product only standard tools are needed, which do not require any additional energy source and no waste other than the obsolete product packaging is generated during this step.
<b>Use</b>	The product does not have maintenance during operation.
<b>End of life</b>	Product disposed of with WEEE guidelines.

Environmental Impacts	
<p>The calculation of the environmental impacts is the result of the Product's Life Cycle Analysis in accordance with ISO 14040/44, covering the entire lifecycle, i.e., "Cradle-to-Grave" including the following life cycle phases: production, distribution, installation, use and end of life. System modelling was carried out using the commercial LCA software EIME v6.3 with database version CODDE-2025-04.</p> <p>Indicators Set used: PEF EF 3.1 (Compliance: PEP ed.4, EN15804+A2) v1.0</p>	
<b>Manufacturing Phase</b>	The product is assembled as well as packed at Eaton plant in Germany. Energy model used: Europe
<b>Distribution Phase</b>	Distribution of the product in its packaging from the Eaton's last logistics platform to the installation place in United States is considered as per PCR rules.
<b>Installation Phase</b>	Only treatment of packaging waste is considered in this phase.

	Energy model used for treatment of packaging: Europe
<b>Use Phase</b>	PSR Product Category: Other Equipment (Scenario: Passive product - Non-Continuous Operation) Reference lifetime: 20 Years Energy model used: Germany Usage profile: The product has 32 A rated current, 30% use rate, 30% loading rate and Heat dissipation of 6 W, Resulting in total losses of 28.38 kWh over 20 years. Products do not require any maintenance/replacement during useful life.
<b>End of life Phase</b>	Product disposed of with WEEE guidelines. Energy model used: Europe
<b>Module-D</b>	Module D is calculated according to PCR-ed4-EN-2021 09 06 based on the materials recycled and the modelled end-of-life scenario. It expresses the net benefits and loads beyond the boundaries of the system and are not to be included in the life cycle totals.

### Environmental Impact for Functional Unit

#### Environmental Impact Indicators: Mandatory

Mandatory environmental impact indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B1-B7-Use (B6 Only)*	C1-C4 - End of life	Module D
Climate change - total	kg CO2 eq.	1.39E+01	7.66E-01	1.10E-02	6.58E-02	1.30E+01	9.22E-02	-1.36E-01
Climate change - fossil fuels	kg CO2 eq.	1.36E+01	7.84E-01	1.10E-02	2.45E-02	1.27E+01	9.01E-02	-1.31E-01
Climate change - biogenics	kg CO2 eq.	3.25E-01	-1.85E-02	4.52E-08	4.13E-02	3.00E-01	2.12E-03	-5.15E-03
Climate change - land use and land use transformation	kg CO2 eq.	9.97E-08	5.77E-08	1.67E-08	3.91E-10	0.00E+00	2.49E-08	0.00E+00
Ozone depletion	kg eq. CFC-11	1.58E-07	7.79E-08	1.34E-10	3.99E-10	7.37E-08	5.51E-09	-3.15E-08
Acidification (AP)	mole of H+ eq.	1.06E-01	1.20E-02	1.74E-05	8.00E-05	9.30E-02	5.43E-04	-4.62E-03
Freshwater eutrophication	kg P eq.	1.86E-05	8.75E-06	4.12E-08	2.88E-07	8.74E-06	7.76E-07	-3.41E-07
Marine aquatic eutrophication	kg of N eq.	1.07E-02	6.40E-04	3.16E-06	3.16E-05	9.89E-03	9.10E-05	-1.12E-04
Terrestrial eutrophication	mole of N eq.	1.61E-01	7.02E-03	3.47E-05	2.46E-04	1.53E-01	1.17E-03	-1.30E-03
Photochemical ozone formation	kg of NMVOC eq.	3.52E-02	3.15E-03	1.12E-05	5.52E-05	3.17E-02	2.85E-04	-6.65E-04
Depletion of abiotic resources - elements	kg eq. Sb	2.39E-04	2.34E-04	3.94E-09	1.50E-09	4.38E-06	1.54E-08	-1.29E-04

Depletion of abiotic resources - fossil fuels	MJ	2.49E+02	1.85E+01	1.96E-01	2.61E-01	2.28E+02	1.61E+00	-2.45E+00
Water scarcity	m3 of eq.. deprivation worldwide	2.05E+00	8.30E-01	3.97E-04	1.92E-03	1.20E+00	1.43E-02	-3.47E-01

\***Note:** B6 (energy requirements during the use stage) is considered. Other sub modules in the use stage (B1-B5, B7) are equal to zero. So, it is not listed in the result tables.

### Inventory Flow Indicators: Mandatory

Mandatory environmental impact indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B1-B7-Use (B6 Only)*	C1-C4 - End of life	Module D
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	7.18E+01	1.04E+00	6.18E-04	3.34E-02	7.06E+01	1.25E-01	-1.93E-01
Use of renewable primary energy resources used as raw materials	MJ	9.47E-01	9.47E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	7.27E+01	1.99E+00	6.18E-04	3.34E-02	7.06E+01	1.25E-01	-1.93E-01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	2.47E+02	1.65E+01	1.96E-01	2.61E-01	2.28E+02	1.61E+00	-2.45E+00
Use of non-renewable primary energy resources used as raw materials	MJ	2.06E+00	2.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.49E+02	1.85E+01	1.96E-01	2.61E-01	2.28E+02	1.61E+00	-2.45E+00
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m3	4.80E-02	1.94E-02	9.25E-06	1.41E-04	2.81E-02	4.06E-04	-8.09E-03
Hazardous waste disposed of	kg	8.34E+00	7.66E+00	4.62E-05	4.21E-03	5.05E-01	1.79E-01	-4.60E+00

Non-hazardous waste disposed of	kg	2.47E+00	1.86E-01	1.02E-03	7.03E-03	2.19E+00	8.60E-02	-8.06E-02
Radioactive waste disposed of	kg	2.97E-04	4.69E-05	8.11E-07	1.51E-06	2.38E-04	1.06E-05	-2.49E-05
Components for re-use	kg	0.00E+00						
Materials for recycling	kg	7.47E-02	1.37E-02	0.00E+00	1.55E-02	0.00E+00	4.55E-02	0.00E+00
Materials for energy recovery	kg	0.00E+00						
Exported energy	MJ by energy vector	2.40E-05	2.40E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the product	kg of C.	0.00E+00						
Biogenic carbon content of the associated packaging	kg of C.	2.60E-02	2.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

\***Note:** B6 (energy requirements during the use stage) is considered. Other sub modules in the use stage (B1-B5, B7) are equal to zero. So, it is not listed in the result tables.

### Environmental Impact Indicators: Optional

Optional Environmental impact indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B1-B7-Use (B6 Only)*	C1-C4 - End of life	Module D
Emission of fine particles	incidence of diseases	6.48E-07	8.76E-08	1.50E-10	4.86E-10	5.56E-07	3.60E-09	-5.61E-08
Ionizing radiation, human health	kBq of U235 eq.	2.19E+01	1.69E+01	3.90E-04	3.88E-03	4.90E+00	3.19E-02	-8.26E-02
Ecotoxicity, fresh water	CTUe	4.86E+02	4.55E+02	3.22E-01	3.71E-01	2.85E+01	1.61E+00	-1.33E+00
Human toxicity, cancer effects	CTUh	1.16E-07	1.11E-07	2.16E-12	2.27E-09	1.79E-09	6.98E-11	-1.86E-07
Human toxicity, non-cancer effects	CTUh	2.16E-07	1.56E-07	4.12E-11	8.40E-11	5.83E-08	9.84E-10	-6.00E-08
Impacts related to land use/soil quality	-	2.69E-01	3.81E-03	4.72E-05	1.24E-04	2.64E-01	1.80E-03	-2.73E-05
Total use of primary energy during the life cycle	MJ	1.38E+04	2.05E+01	1.97E-01	2.95E-01	1.38E+04	1.74E+00	-2.65E+00

\***Note:** B6 (energy requirements during the use stage) is considered. Other sub modules in the use stage (B1-B5, B7) are equal to zero. So, it is not listed in the result tables.

To evaluate the environmental impact of other products covered by this PEP, multiply the impact figures by

**Multiplying factors for homogeneous family products:**

Product Number	Product name	Manufacturing	Distribution	Installation	Use-B6	End of Life
278454 (Ref)	ZB32-32	1.00	1.00	1.00	1.00	1.00
278442	ZB32-0,16	1.00	1.00	1.00	0.90	1.00
278443	ZB32-0,24	1.01	1.01	1.00	0.90	1.01
278444	ZB32-0,4	1.00	1.00	1.00	0.90	1.00
278445	ZB32-0,6	1.01	1.01	1.00	0.80	1.01
278446	ZB32-1	1.01	1.01	1.00	1.15	1.01
278447	ZB32-1,6	1.01	1.01	1.00	0.95	1.01
278451	ZB32-10	1.03	1.03	1.00	1.00	1.03
278452	ZB32-16	1.03	1.03	1.00	0.90	1.04
278448	ZB32-2,4	1.01	1.01	1.00	0.95	1.01
278453	ZB32-24	1.03	1.03	1.00	1.00	1.03
112474	ZB32-38	1.03	1.03	1.00	1.00	1.03
278449	ZB32-4	1.03	1.03	1.00	1.00	1.03
278450	ZB32-6	1.02	1.02	1.00	0.85	1.02
278431	ZB12-0,16	1.02	1.02	1.00	0.90	1.02
278432	ZB12-0,24	1.02	1.02	1.00	0.90	1.02
278433	ZB12-0,4	1.02	1.02	1.00	0.90	1.02
278434	ZB12-0,6	1.02	1.02	1.00	0.80	1.02
278435	ZB12-1	1.02	1.02	1.00	1.15	1.02
278436	ZB12-1,6	1.02	1.02	1.00	0.95	1.02
278440	ZB12-10	1.02	1.02	1.00	1.00	1.02
278441	ZB12-12	1.02	1.02	1.00	1.15	1.02
290168	ZB12-16	1.02	1.02	1.00	0.90	1.02
278437	ZB12-2,4	1.02	1.02	1.00	0.95	1.02
278438	ZB12-4	1.02	1.02	1.00	1.00	1.02
278439	ZB12-6	1.02	1.02	1.00	0.85	1.02

## Disclaimer

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<i>Registration number:</i>	EATO-00458-V01.01-EN	<i>Drafting rules</i>	PCR-ed4-EN-2021 09 06
<i>Verifier accreditation number:</i>	VH53	Supplemented by	PSR-0005-ed3.1-EN-2023 12 08
<i>Date of issue</i>	10-2025	<i>Information and reference documents</i>	<a href="http://www.pep-ecopassport.org">www.pep-ecopassport.org</a>
		<i>Validity period</i>	5 years
Independent verification of the declaration and data, in compliance with ISO 14025: 2006			
Internal	X	External	
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain) PEPs are compliant with XP C08-100-1:2016 and EN 50693:2019 The components of the present PEP may not be compared with components from any other program.			
Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"			