

PRODUCT ENVIRONMENTAL PROFILE

Harmony 3 Phase Voltage Monitoring Relay



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Company Information

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General Information

Representative product	RM10TE00N – Harmony 3 Phase Voltage Monitoring Relay
Description of the product	A Harmony 3 Phase Voltage Monitoring Relay continuously assesses the quality and stability of electrical power, detecting anomalies like voltage fluctuations or phase imbalances to protect equipment from potential damage. It ensures reliable operation by triggering alarms or corrective actions if power supply issues arise.
Functional unit	To monitor and ensure proper operation of a 3-phase electrical system by detecting overvoltage, undervoltage, and phase failure conditions, and to switch on or off connected devices accordingly, for a period of 10 years under specified operating conditions. The usage profile taken into account is 80% active and 20% off in use phase.

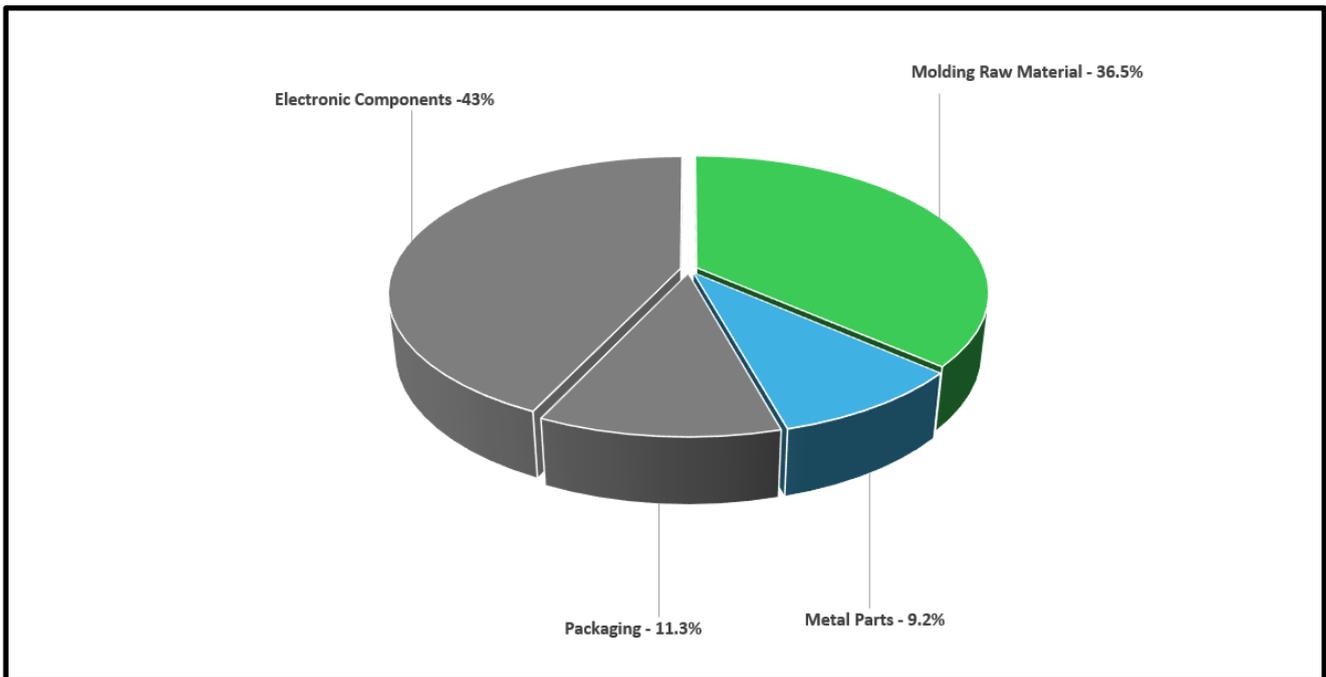
Product's Key Features

Supply Voltage	208 to 480 VAC, 3P3W (-12% to +10%)
Supply Frequency	47 Hz to 63 Hz
Power Consumption	4.5 VA Max
Contact Rating	1 C/O, SA (Res.) @ 250 VAC / 30 VDC
Operating Temperature	-15°C to +60°C
Setting Accuracy	±5% of full scale
Under Voltage	-5% to -25% of nominal voltage
Over Voltage	+5% to +25% of nominal voltage
Power On Delay	5 seconds (fixed)

Constituent Materials

Reference product mass 85 g including product raw materials and its packaging

Material category	%
Metals	9.2
Plastic	36.5
Other	54.3



Details of life cycle stages

Manufacturing	Distribution	Installation	Use	End-of-life	Benefits beyond life cycle
<ul style="list-style-type: none"> -Acquisition of raw materials -Transportation to manufacturing site -Manufacturing, assembly and packaging - EoL treatment of generated waste 	<ul style="list-style-type: none"> -Transportation to distributor/ logistic center 	<ul style="list-style-type: none"> - Installation - EoL treatment of generated waste (Packaging) 	<ul style="list-style-type: none"> - Usage 	<ul style="list-style-type: none"> - Deinstallation - Collection and transport - EoL treatment (disposal) 	<ul style="list-style-type: none"> - Benefits from recyclable material

Additional details:**a) Manufacturing stage-**

This stage includes raw material extraction, its transport to the manufacturing site and the manufacturing process. Some material after the products use can be recycled but is not reused in product manufacturing. Hence, the recycled content is 0%. The waste generated during manufacturing is considered under non-hazardous waste. The transportation of manufacturing waste is also considered in this stage and is assumed to be 100 km. Raw material packaging is also considered with an assumption of an average packaging content of 5% of the reference product mass which shall be treated as 100% incineration without heat recovery. No packaging material is reused on site. The Indian (western grid) energy mix is used in this phase. The emission due to manufacturing and packaging waste (polycarbonate and packaging plastic) which is scraped is considered. The scrap rate is considered based on default values from PSR. The treatment considered for the scrap is 100% incineration.

b) Distribution stage-

This stage includes finished product transport from manufacturing site to implementation site and a global database is considered for the same. There is no electricity consumption in this phase.

c) Installation stage-

This stage includes the emissions during installation. Also, end of life of packaging and its transportation is included. The transportation is assumed to be 100 km by truck and the packaging waste is treated as 100% incineration without heat recovery. There is no electricity consumption in this phase.

d) Use stage-

This stage includes the electricity consumption during the use of the product. The delay timer consumes around 1.41 W electricity. Considering the 10 years of service life; 80% of which is active and 20% off (inactive), the total electricity is 98.813 kWh. The global energy mix is used in this phase.

e) End of life and module D stage-

This stage includes emissions caused due to disposal scenario considered and benefits achieved beyond the life cycle. In this case, 30% of the material is assumed to be disposed to landfill and 70% of the total product material is assumed to be recyclable. There is no electricity consumption in this phase.

Additional Environmental Information

Design	The product is designed as per IEC/ EN standard and complies to UL, CCC
Manufacturing	All the manufacturing is done on site in India which is ISO 9001, ISO14001, ISO 45001 certified.
Distribution	The product outreach is all over the world majorly Asia-Pacific, Europe and USA.
Installation	The product does not require any installation operations.
Use	The product does not require any maintenance operations.
End of life	This product contains steel, plastic and various electronic components which should be separately disposed for recovery of materials which is assumed to be around 70%.

Environmental Impacts

Reference service life	10 years	
Use scenario	The product is in active phase for 80% of the time and off for the rest 20% of the time with a electricity consumption of 1.41 W.	
Time representativeness	Data collection regarding manufacturing of the Harmony 3 Phase Voltage Monitoring Relay is done in Jan 2023- Dec 2023	
Geographical representativeness	Global	
Technological representativeness	The Harmony 3 Phase Voltage Monitoring Relay manufacturing process involves raw material inspection, component preparation, PCB assembly with automated and manual soldering, testing, and final assembly, including casing and marking. The finished product undergoes inspection before packing for distribution.	
Software usage	SimaPro v 9.6.0.1	
Secondary database	Ecoinvent v3.10	
Energy model used	Manufacturing	Use
	Market energy for Indian region Electricity, high voltage {IN-Western grid} market for electricity, high voltage Cut-off, U	Market energy for global region Electricity, high voltage {GLO} market group for electricity, high voltage Cut-off, U

Compulsory Indicators								
Indicators	Unit	Manufacturing	Distribution	Installation	Use	End of life	Total	Benefits beyond life cycle
Acidification	mol H+ eq	6.75E-02	1.18E-04	7.47E-07	3.40E-01	2.00E-02	4.28E-01	-4.67E-02
Climate change	kg CO2 eq	7.94E+00	6.03E-03	3.26E-04	7.04E+01	2.26E+00	8.07E+01	-5.27E+00
Climate change - Biogenic	kg CO2 eq	2.83E-03	-1.15E-06	9.51E-09	9.39E-02	5.48E-04	9.73E-02	-1.28E-03
Climate change - Fossil	kg CO2 eq	7.93E+00	6.02E-03	3.26E-04	7.03E+01	2.26E+00	8.05E+01	-5.27E+00
Climate change - Land use and LU change	kg CO2 eq	1.01E-02	2.90E-06	1.32E-07	9.46E-02	2.99E-03	1.08E-01	-6.99E-03
Ecotoxicity, freshwater - part 1	CTUe	3.69E+01	1.20E-02	8.95E-04	1.21E+02	1.01E+01	1.68E+02	-2.36E+01
Ecotoxicity, freshwater - part 2	CTUe	1.80E+02	4.26E-03	3.34E-04	4.11E+01	5.41E+01	2.76E+02	-1.26E+02
Ecotoxicity, freshwater - inorganics	CTUe	2.04E+02	9.39E-03	8.05E-04	1.45E+02	6.03E+01	4.09E+02	-1.41E+02
Ecotoxicity, freshwater - organics - p.1	CTUe	4.82E+00	6.43E-03	4.00E-04	1.62E+01	1.43E+00	2.24E+01	-3.34E+00
Ecotoxicity, freshwater - organics - p.2	CTUe	8.26E+00	4.50E-04	2.37E-05	1.32E+00	2.48E+00	1.21E+01	-5.78E+00
Particulate matter	disease inc.	4.49E-07	2.76E-10	2.43E-11	3.06E-06	1.34E-07	3.64E-06	-3.12E-07
Eutrophication, marine	kg N eq	1.11E-02	2.92E-05	1.73E-07	6.86E-02	3.27E-03	8.30E-02	-7.62E-03

Eutrophication, freshwater	kg P eq	1.01E-02	2.94E-07	2.58E-08	3.03E-02	3.00E-03	4.34E-02	-7.00E-03
Eutrophication, terrestrial	mol N eq	1.22E-01	3.24E-04	1.87E-06	6.90E-01	3.59E-02	8.48E-01	-8.37E-02
Human toxicity, cancer	CTUh	2.02E-08	2.76E-11	1.71E-12	7.16E-08	6.01E-09	9.79E-08	-1.40E-08
Human toxicity, cancer - inorganics	CTUh	3.81E-09	7.69E-13	2.38E-14	4.27E-09	1.13E-09	9.21E-09	-2.63E-09
Human toxicity, cancer - organics	CTUh	1.64E-08	2.68E-11	1.69E-12	6.73E-08	4.88E-09	8.87E-08	-1.14E-08
Human toxicity, non-cancer	CTUh	3.23E-07	3.06E-11	2.87E-12	3.58E-07	9.46E-08	7.76E-07	-2.21E-07
Human toxicity, non-cancer - inorganics	CTUh	3.11E-07	2.87E-11	2.70E-12	3.44E-07	9.08E-08	7.45E-07	-2.12E-07
Human toxicity, non-cancer - organics	CTUh	1.29E-08	1.95E-12	1.73E-13	1.40E-08	3.86E-09	3.07E-08	-9.00E-09
Ionising radiation	kBq U-235 eq	8.54E-01	4.69E-05	3.80E-06	9.67E+00	2.55E-01	1.08E+01	-5.95E-01
Land use	Pt	3.81E+01	2.22E-02	2.77E-03	1.34E+02	1.13E+01	1.83E+02	-2.64E+01
Ozone depletion	kg CFC11 eq	3.49E-07	8.75E-11	4.83E-12	4.17E-07	1.05E-07	8.71E-07	-2.44E-07
Photochemical ozone formation	kg NMVOC eq	3.73E-02	9.15E-05	1.05E-06	2.04E-01	1.10E-02	2.53E-01	-2.58E-02
Resource use, fossils	MJ	1.00E+02	7.77E-02	4.58E-03	9.12E+02	2.95E+01	1.04E+03	-6.87E+01
Resource use, minerals and metals	kg Sb eq	2.93E-03	1.08E-08	1.06E-09	2.47E-05	8.78E-04	3.83E-03	-2.05E-03
Water use	m3 depriv.	2.11E+00	2.48E-04	2.09E-05	1.10E+01	6.27E-01	1.37E+01	-1.46E+00

Note: All the results are at product level.

Optional Indicators: Resource use								
Indicators	Unit	Manufacturing	Distribution	Installation	Use	End of life	Total	Benefits beyond life cycle
PERE	MJ	1.11E+01	7.17E-04	5.79E-05	1.28E+01	-1.00E+00	2.29E+01	-5.46E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.11E+01	7.17E-04	5.79E-05	1.28E+01	-1.00E+00	2.29E+01	-5.46E+00
PENRE	MJ	9.74E+01	7.74E-02	4.54E-03	1.03E+03	-8.74E+00	1.12E+03	-4.77E+01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	9.74E+01	7.74E-02	4.54E-03	1.03E+03	-8.74E+00	1.12E+03	-4.77E+01
SM	kg	0.00E+00	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	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	6.13E-02	6.32E-06	5.56E-07	1.04E-01	-5.51E-03	1.60E-01	-3.00E-02
<p>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</p>								

Optional Indicators: Waste								
Indicators	Unit	Manufacturing	Distribution	Installation	Use	End of life	Total	Benefits beyond life cycle
Hazardous waste disposed	kg	4.21E-04	4.26E-07	2.90E-08	4.48E-03	-3.78E-05	4.86E-03	-2.06E-04
Non-hazardous waste disposed	kg	6.42E-01	1.61E-03	2.23E-04	1.27E+00	-5.66E-02	1.86E+00	-3.14E-01
Radioactive waste disposed	kg	2.15E-04	1.13E-08	9.23E-10	1.19E-05	-1.93E-05	2.07E-04	-1.05E-04

*The use phase is the life cycle phase which has greatest impact on majority of the indicators.

Optional Indicators: Output flow								
Indicators	Unit	Manufacturing	Distribution	Installation	Use	End of life	Total	Benefits beyond life cycle
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total primary energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Optional Indicators: Biogenic		
Indicators	Unit	Total
Biogenic carbon content of the product	kg	1.83E-02
Biogenic carbon content of the product	kg	-1.65E-02

References

- ISO (2006a), ISO 14025:2006, Environmental labels and declarations – Type III- environmental declarations – Principles and procedures
- ISO (2006b), ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework
- ISO (2006c), ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines
- EN50693:2019 – Product category rules for life cycle assessments of electronic and electrical products and systems
- PCR “Electrical, Electronic and HVAC-R products (PEP-PCR-ed4-EN-2021 09 06)”
- PSR “Electrical switchgear and control gear solutions (PSR-0005-ed3.1-EN-2023 12 08).”
- www.se.com
- SimaPro version 9.6.0.1
- Ecoinvent database version 3.10