

ENERGIS 8 Channel Managed PDU

Risk Assessment (EN ISO 12100)

Author	David Sipos
Document number:	ENE-LDOC-RA-100
Document name:	ENE-LDOC-RA-100-Risk-Assessment-EN-ISO-12100

Revision:	1.0.0
Status:	Released
Date:	13.12.2025

Document status:	Internal - CE Technical File
-------------------------	------------------------------

Revision History

A revision is a new edition of the document and affects all sections of this document.

Version	Date	Responsible	Modification
1.0.0	12.12.2025	David Sipos	Initial creation of the document

Contents

1. Introduction and Scope	3
2. Applicable Documents	3
3. Reference Documents	3
1. Product Description.....	4
2. Intended Use	4
3. Reasonably Foreseeable Misuse.....	4
4. Hazard Identification and Risk Reduction	5
4.1 Electrical Shock Hazard	5
4.2 Overcurrent and Fire Hazard	5
4.3 Thermal Hazard	5
4.4 Mechanical Hazard	6
4.5 Electromagnetic Disturbance.....	6
4.6 Software and Control Failure.....	6
5. Information for Use.....	7
6. Residual Risks.....	7
7. Overall Conclusion	7

1. Introduction and Scope

This document provides the risk assessment for the ENERGIS 8 Channel Managed PDU, Hardware Revision 1.1.0. The scope of this assessment is limited to hazards arising from the intended use, reasonably foreseeable misuse, and normal operation of the product as described in the accompanying documentation. This risk assessment is performed to support conformity with applicable EU directives and does not claim compliance with functional safety standards.

2. Applicable Documents

The following documents are applicable to this risk assessment and define requirements or constraints for the ENERGIS product.

ID	Document Identifier	Title	Version
LDOC-001	ENE-LDOC-DOC-100	EU Declaration of Conformity	1.0.0
LDOC-002	ENE-LDOC-RA-100	Risk Assessment (EN ISO 12100)	1.0.0
UDOC-001	ENE-UDOC-UM-100	User Manual ENERGIS 8 Channel Managed PDU	1.0.0

3. Reference Documents

The following documents were used as reference material during the preparation of this risk assessment.

ID	Document Identifier	Title	Version
TDOC-001	ENE-TDOC-Schematics-110	Electrical schematics - HW Rev 1.1.0	1.1.0
TDOC-004	ENE-TDOC-EMTR-100	EMC & Emission Test Report	1.0.0
TDOC-005	ENE-TDOC-RHSC-100	RoHS Compliance Evidence (PCB & BOM based)	1.0.0

4. Product Description

ENERGIS 8 Channel Managed PDU is a rack-mounted, microcontroller-controlled AC power distribution unit. It provides eight independently switchable AC output channels with integrated voltage, current, power, and energy monitoring.

The device is controlled via:

- Front-panel buttons
- Ethernet (HTTP API, SNMP)
- USB serial console

The product operates from 230 V AC mains power and is intended for fixed indoor installation.

5. Intended Use

- Distribution, switching, and monitoring of AC mains power
- Installation in technical racks, laboratories, and test environments
- Operation by technically competent persons

6. Reasonably Foreseeable Misuse

- Operation outdoors or in damp environments
- Exceeding rated current or voltage limits
- Removal of protective earth
- Opening the enclosure while connected to mains
- Use by untrained or unauthorized persons

7. Hazard Identification and Risk Reduction

7.1 Electrical Shock Hazard

Hazard: Contact with hazardous mains voltage.

Initial risk level: High

Risk reduction measures:

- Fully enclosed conductive metal housing
- Protective earth connection bonded to enclosure
- Insulated internal wiring and creepage distances compliant with EN 62368-1
- No accessible live parts during normal operation
- Mechanical fixation requiring tools for enclosure access
- Warning information in documentation

Residual risk: Low

7.2 Overcurrent and Fire Hazard

Hazard: Excessive current draw leading to overheating or fire.

Initial risk level: High

Risk reduction measures:

- Firmware-enforced global current limit
- Per-channel current measurement
- Automatic relay shutdown in overcurrent conditions
- Visual fault indication on the front panel
- Default-safe state on reset or fault

Residual risk: Medium (dependent on connected external loads)

7.3 Thermal Hazard

Hazard: Elevated surface or internal temperatures during sustained high load.

Initial risk level: Medium

Risk reduction measures:

- Internal temperature monitoring
- Power dissipation within component ratings
- Passive heat dissipation via enclosure
- Defined operating temperature limits in documentation

Residual risk: Low

7.4 Mechanical Hazard

Hazard: Injury from sharp edges or mechanical failure during installation.

Initial risk level: Low

Risk reduction measures:

- Deburred enclosure edges
- No moving mechanical parts
- Rack-mount installation with standard fasteners

Residual risk: Low

7.5 Electromagnetic Disturbance

Hazard: Emission or susceptibility causing malfunction of nearby equipment.

Initial risk level: Medium

Risk reduction measures:

- Shielded metal enclosure
- Filtered mains input
- EMC-conscious PCB layout
- Compliance testing according to EN 55032 and EN 55035

Residual risk: Low (final verification pending completion of EMC testing)

7.6 Software and Control Failure

Hazard: Unexpected switching behavior due to firmware malfunction.

Initial risk level: Medium

Risk reduction measures:

- Deterministic firmware architecture
- Watchdog supervision
- Defined startup and reset states
- Manual local control available

Residual risk: Low. Software functions contribute to risk reduction but are not the sole means of ensuring electrical safety.

8. Information for Use

- Installation, operation, and safety instructions are provided in the User Manual
- Electrical ratings and limitations are clearly documented
- Warning against enclosure opening is stated

9. Residual Risks

All residual risks are considered acceptable when the device is used according to its intended purpose and documentation.

10. Overall Conclusion

Based on the performed risk analysis, the ENERGIS 8 Channel Managed PDU does not present unacceptable risks. All identified hazards have been reduced to an acceptable level through design measures, protective features, and user information.