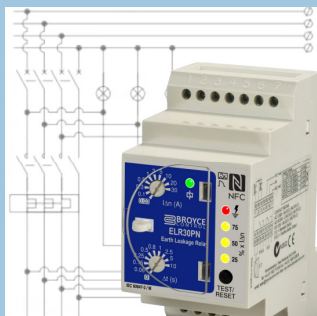




Understanding Earth Leakage Relay Outputs - Positive Safety Output vs Standard Output

Modern earth leakage protection systems often need to perform more than one function. Broyce Earth Leakage Relays provide two dedicated relay outputs to support both safety-critical protection and system monitoring. A Positive Safety output de-energises on earth leakage or loss of supply to ensure reliable circuit disconnection, while Standard output energises on trip for signalling and control purposes.

Why Output Operation Matters for Safety and System Design

Which Output Do I Use?

Typically, on Broyce Earth Leakage Relays that offer user adjustable or programmable settings, they are equipped with two dedicated relay outputs, each designed to support different protection and control philosophies: a **Positive Safety (fail-safe) output** and a **Standard output**. While both outputs can be used to initiate protective actions, they differ in how they behave during normal operation, earth leakage conditions and loss of control power.

Positive Safety Output (Fail-Safe)

The Positive Safety output is **energised during healthy operation** and **de-energises on an earth leakage trip or loss of control supply**. This fail-safe behaviour ensures that any fault condition — including loss of auxiliary power or internal failure — results in a safe outcome.

This output is typically used to operate devices that must disconnect power under all fault conditions, including:

- Shunt trip coils
- Undervoltage releases
- Safety-rated contactors

Because the output de-energises on both trip and power loss, it provides the highest level of protection and is preferred for **safety-critical and compliance-driven applications**.

Standard Output (Energise-on-Trip)

The Standard output is **de-energised during normal operation** and **energises when an earth leakage trip occurs**. This output is commonly used for signalling and control functions where a change of state is required only during a fault condition.

Typical applications include:

- Alarms and indicators
- PLC or SCADA inputs
- Auxiliary control circuits

The Standard output **may also be used to operate a shunt trip**, as its contacts close on an earth leakage trip condition. However, this relies on **control power being available at the time of the fault**. In the event of a loss of auxiliary supply, the output cannot energise and the shunt trip will not operate.

For this reason, Standard outputs are generally suitable where:

- Control power integrity is assured
- Fail-safe operation on power loss is not required

Why Two Dedicated Outputs?

Providing both output types allows the Earth Leakage Relay to:

- Support **fail-safe disconnection** using the Positive Safety output
- Provide **signalling, monitoring, or auxiliary control** via the Standard output

In many installations, both outputs are used simultaneously — one to safely isolate the protected circuit and the other to provide indication or system feedback — ensuring flexibility without compromising safety.

Selection Guidance

Use the **Positive Safety (fail-safe) output** where automatic disconnection is required on **earth leakage, loss of control power, or internal fault**. This output is recommended for safety-critical applications and for operating shunt trips, undervoltage releases, and safety-rated contactors.

Use the **Standard output** where an output is required **only during an earth leakage trip** and where control power is assured. This output is well suited to alarms, PLC or SCADA inputs, and may also be used to operate a shunt trip when fail-safe operation on power loss is not required.

Requirement	Recommended Output
Fail-safe disconnection	Positive Safety Output
Compliance with safety standards	Positive Safety Output
Alarm or monitoring only	Standard Output
Control of shunt trip or UV release	Positive Safety Output
PLC or SCADA signalling	Standard Output

Summary

- **Positive Safety Output:**
Energised in healthy conditions, **de-energises on trip or power loss**
→ Ideal for safety-critical disconnection
- **Standard Output:**
De-energised in healthy conditions, **energises on trip**
→ Ideal for alarms, PLCs, and monitoring

Conclusion

Selecting the correct relay output ensures your [Earth Leakage](#) Protection system operates **safely, reliably and as intended**.

