

Safety

Safety assessments

Before using a unit it is necessary to perform a safety assessment in accordance with the Machinery Directive. The units as individual components guarantee functional safety, but not the safety of the entire application. You should therefore define the safety requirements for the plant as a whole, and also define how these will be implemented from a technical and organisational standpoint.

General safety requirements

Always ensure the following safety requirements are met:

- Only install and commission the unit if you are familiar with the information in the operating instructions or this system manual, as well as the relevant regulations concerning health and safety at work and accident prevention.
- Only use the unit for the purpose for which it is intended and comply with both the general and specific technical details.
- Transport, storage and operating conditions should all conform to the data specified in the general technical details.
- Sufficient fuse protection must be provided on all capacitive and inductive loads.
- Do **not** open the housing or make any unauthorised modifications.

You must observe the warning notes given in other parts of this manual. These are highlighted visually through the use of symbols.



NOTICE

Failure to keep to these safety regulations will render the warranty invalid.

Intended use

The intended use depends on the unit and is therefore explained in the chapter with the unit-specific descriptions.

Applications in accordance with EN 954-1, Category 4

Two loads may be connected to each safety output on a PNOZelog unit, even on Category 4 applications. Prerequisite: exclusion of shorts across contacts and external power sources (e.g. install in a control cabinet).

Safety distance

The following information is absolutely essential when using safety devices involved in area or access guarding: When the safety device is triggered, there is a delay before the machine comes to a standstill. The distance between the safety device and the nearest danger zone must be large enough for the hazardous movement to

come to a standstill before the operator can reach the danger zone. All access directions must be taken into account. According to EN 999, "Approach speed of parts of the body for the positioning of safety devices", this minimum distance is calculated using the following formula:

$$S = K \times T + C$$

S = Minimum distance from the danger zone to the detection point, detection line, detection plane or protected field

K = Approach speed of the body or parts of the body (depends on the detection capability)

T = System's overall stopping performance:
Machine's overrun time
+reaction time of the safety device
+reaction time of the safety relay (release time/response time when safety function is triggered)

C = Additional distance in millimetres, based on intrusion towards the danger zone prior to actuation of the safety device (depends on the detection capability (resolution), type and position of the safety device)

Example:

A machine has an overrun time of 500 ms. The danger zone is protected by a light guard with a reaction time of 20 ms and a detection capability of 30 mm. A PNOZe1.1p is used as the safety relay (release time 35 ms).

Calculating the safety distance between the machine and the outer edge of the safety mat:

Approach speed:	2000 mm/s
Machine's overrun time:	500 ms
Reaction time of safety device:	20 ms
Reaction time of safety relay:	35 ms
Detection capability:	d = 30 mm

$$S \geq 2000 \text{ mm/s} (0.5 \text{ s} + 0.02 \text{ s} + 0.035 \text{ s}) + 128$$

Safety distance $\geq 1.238 \text{ m}$

