

APRIL 2021



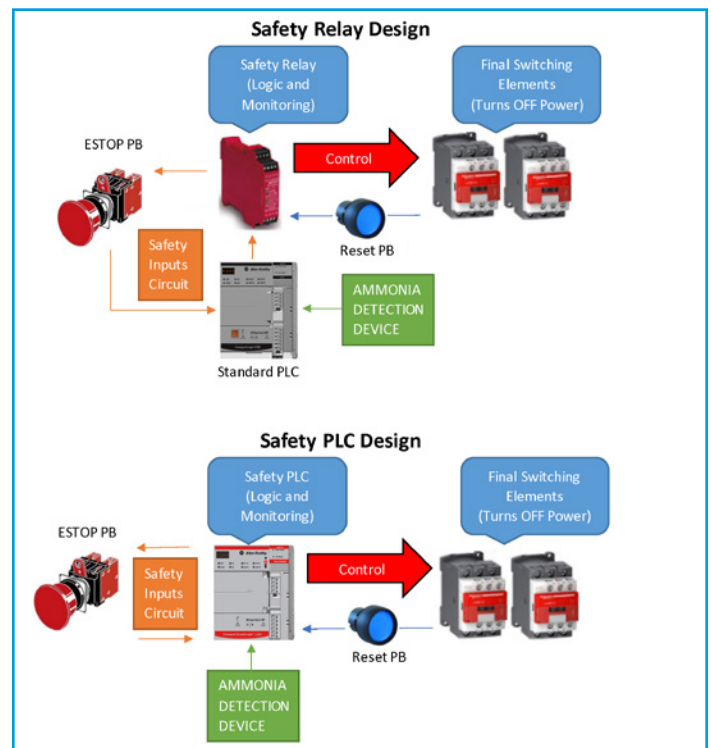
# From Experience

## Four Considerations When Comparing Safety PLCs vs Safety Relays

A proper Safety Control System (SCS) is a key element in keeping personnel and property safe from harm. A system analysis determines the Safety Structure (See Experience in Brief) required to provide a proper SCS, and this structure in turn determines the Probability of Failure per Hour (PFHd). The more frequent the danger and severity of damage, the safer the structure required.

Regardless of the required SCS Safety Structure, it can be achieved by using either a Safety Relay(s) or a Safety PLC(s) (see Figure). Essentially, a Safety PLC combines the Safety Relay and PLC. However, depending on the customer's specification or the system analysis conclusion, a SCS design can quickly become inappropriate for the end user. Consider the following when comparing the two SCS types:

1. Installation Costs. A Safety PLC can eliminate the need for extra sets of contacts and wiring. These savings are typically minimal though, especially on smaller systems.
2. Hardware Costs. Safety PLCs and associated safety Input/Output (I/O) can cost several times their non-safety counterparts. This cost is partially offset by the reduced cost associated with the Safety Relays.



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### EXPERIENCE IN BRIEF

#### Safety Structure Elements

- PL: Performance Level value, ISO 13849 analysis approach
- SIL: Safety Integrity Level rating, IEC 62061 analysis approach
- Category, ISO 13849 description of system architecture

In those systems, the number of relays is related to the structure and the number of safety functions required. A general rule of thumb: If your system has more than three safety functions, consider using a Safety PLC.

3. Troubleshooting. Is one method easier to troubleshoot? The answer depends on resources available at the plant. Safety Relays have more terminations and a higher potential for termination issues. However, Safety PLCs require someone with training using the PLC software and familiar with the PLC program for problem resolution.
4. Flexibility. A Safety PLC is certainly more flexible. If changes are required to the physical system, it is easier to add new safety functions to PLC I/O than modifying hardwired relay systems. Plus, since the safety shutdown system is composed of PLC programmed logic, changes are simply a matter of updating the PLC code.

Both the Safety Relay and Safety PLC system designs can provide a proper SCS. Keep these factors in mind when selecting your next system.

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