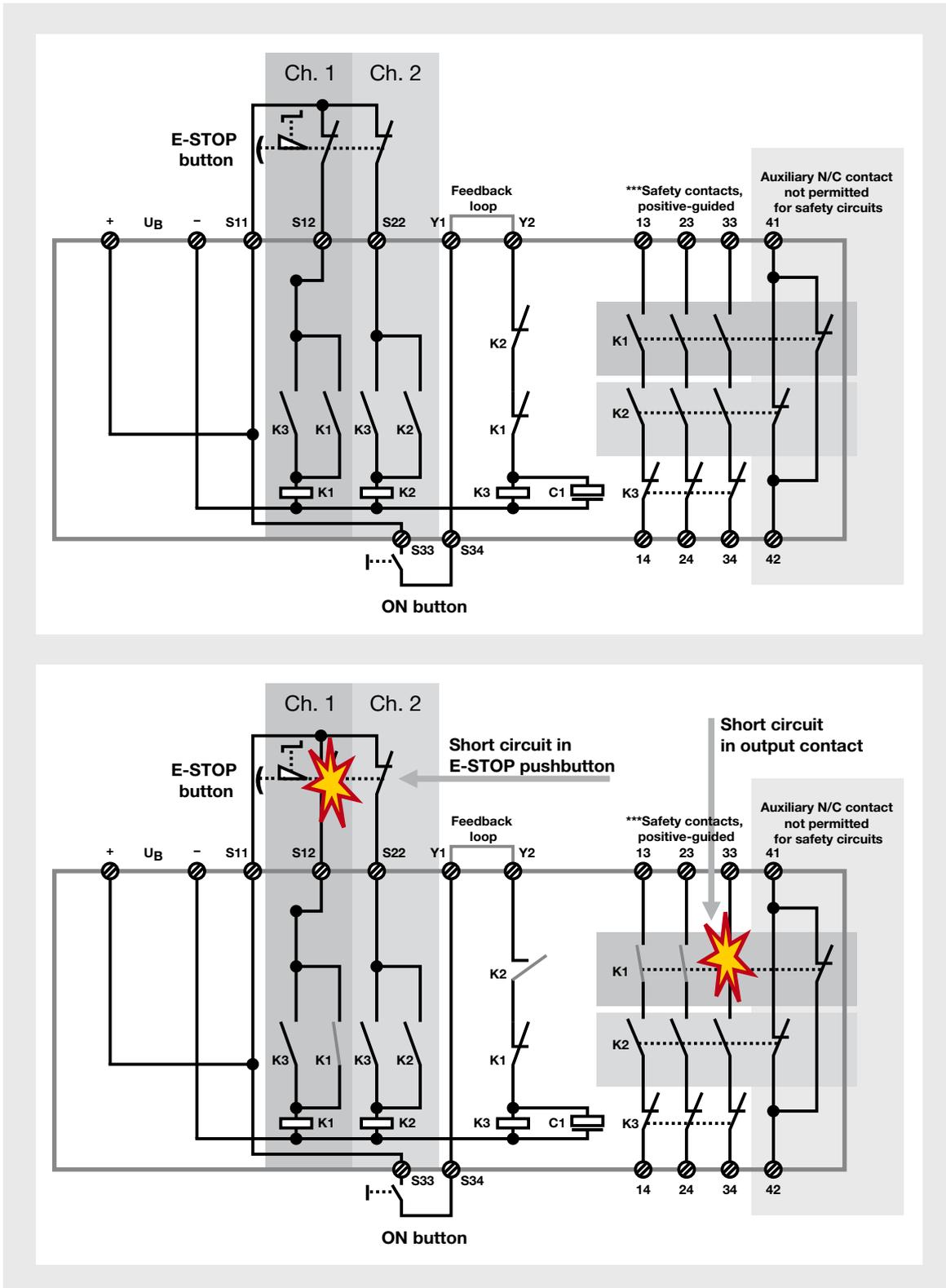


## ▶ 4.1 Safety relays



Structure and function of a safety relay.

## ▶ 4.1 Safety relays

The typical design of a first generation safety relay in relay technology is based on the classic 3 contactor combination. The redundant design ensures that wiring errors do not lead to the loss of the safety function. Two relays (K1, K2) with positive-guided contacts provide the safe switch contacts. The two input circuits CH1 and CH2 each activate one of the two internal relays. The circuit is started via the start relay K3. There is another monitoring circuit between the connection points Y1 and Y2 (feedback loop). This connection is used to check and monitor the position of actuators which can be activated or shut down via the safety contacts. The device is designed in such a way that any faults in the input circuit are detected, e.g. contact welding on an emergency off/emergency stop pushbutton or on one of the safety contacts on the output relay. The safety device stops the device switching back on and thereby stops the activation of relays K1 and K2.

### 4.1.3 Relays and electronics

The latest generation of safety relays operates using microprocessor technology. This technology is used in the PNOZsigma product series, for example, and offers further additional benefits over conventional relays. There is less wear and tear thanks to the use of electronic evaluation procedures and the diagnostic capability, plus the safety relays also reduce the number of unit types: One device can now be used for a variety of safety functions, e.g. for emergency stop, safety gate (contact-based switches as well as switches with semiconductor outputs), light beam devices, light curtains and two-hand control devices. As electronic safety relays have a more compact design, they take up much less space.

The reduced size enables more functions to be implemented in the same effective area. Selectable operating modes and times allow for flexible application of the devices. As a single device type can implement several different safety functions at once, savings can be made in terms of stockholdings, configuration, design and also when commissioning plant and machinery. Not only does this reduce the engineering effort in every lifecycle phase, it also simplifies any additions or adjustments that are required.



Electronic safety relays can be expanded in the simplest way possible. Whether you use additional contact blocks or function modules: Adapting to the specific requirements of the respective plant or machine is a simple, straightforward process, with contacts expanded via connectors. With just a single base unit, plus additional expansion units if required, users can fully implement all the classic functions.