The partners in brief

TÜV NORD
offers a comprehensive spectrum of consulting, testing and services for process control engineering, automation systems, hardware and software especially for the energy and chemical industries. **www.tuev-nord.de**

PHOENIX CONTACT
develops and manufactures industrial electrical and electronic technology products that power, protect, connect and automate systems and equipment for a wide range of industries. **www.phoenixcontact.com**

SAMSON
is a world leader in measurement and control technologies for use in chemical plants, refineries, oil and gas applications, food and pharmaceutical processes as well as in district heating and the HVAC sector. **www.samson.de**

KROHNE
develops, produces and sells products and solutions in the field of flow, level, temperature, analysis and pressure measuring technology. KROHNE is one of the market leaders in industrial process instrumentation.
www.krohne.com

Homepage of KROHNE Academy online

Where to find the eLearning modules

The ten "Functional Safety" eLearning modules are available on the KROHNE Academy Online learning platform, which is completely free of charge and focuses on topics relevant to the process industry. It provides electronic learning material which is product neutral and commercial-free.

Registration and usage is free of charge and available at academy-online.krohne.com

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Functional safety (SIL) in the process industry

Ten eLearning modules for the use of IEC 61508/61511 in safety-related systems

Functional safety

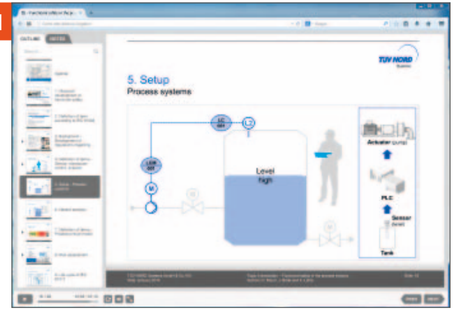
Every system planner and operator of industrial process plants and furnaces is legally obliged to minimise risk by implementing the use of available state-of-the-art technology where possible.

To ensure maximum effectiveness of these measures, a comprehensive system approach is used which considers the entire safety life cycle forming the basis of internationally harmonised standards such as IEC 61508 (basic standard), IEC 61511 (process technology) and IEC 50156 (furnaces).

First-hand knowledge from strong cooperation partners

The companies TÜV NORD, KROHNE, SAMSON and PHOENIX CONTACT have created, in close cooperation, ten practical eLearning modules on the topic of "Functional safety in the process industry".
These modules provide an overview of the key concepts and methods of functional safety, which are explored through many illustrative examples taken from the field. The eLearning modules are therefore suitable for system planners and operators in all areas of industry, in which system components carry a potential risk. At the end of a module you have the opportunity to check the knowledge gained by completing a short questionnaire.

01



Introduction – Functional safety in the process industry

This eLearning module is intended as an introduction to the topic of functional safety and conveys key concepts and methodological requirements of functional safety based on the international harmonised standard IEC 61511 "Functional safety – Safety instrumented systems for the process industry sector".

02

Hazard and risk assessment

This module provides an overview of the requirements for process-control safety instrumented systems and conveys a method for risk identification and analysis. A simple example will show how the safety level for an overfill protection device is determined using a risk graph.

03

Safety requirements specification for the SIS

44% of protection circuits malfunction is based on errors in the safety specification. Module 3 provides an overview of safety planning as well as change management and shows a practical example for the creation of a safety specification.

04

Aspects of engineering and design

In this module you will learn how the structure of a safety structure can be defined, particularly in regard to the required redundancy and its constructional implementation. A component selection is based primarily on failure probabilities specified by the manufacturer and the so-called operational proof.

05

Generic data in safety-related systems

If no manufacturer's data exists for calculating the failure rates, so-called generic failure rates can be used. The data sources of NAMUR NE 130, VDI/VDE 2180, SINTEF and Exida are presented in detail and the concepts compared with each other.

06

Special requirements for sensor technology

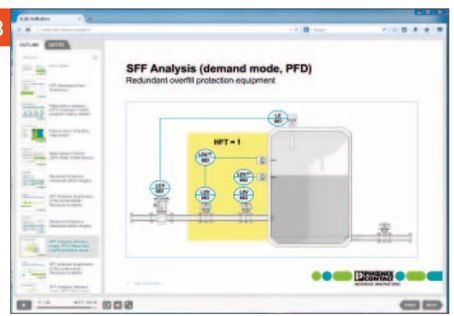
This learning module highlights the special requirements of measuring technology for safety instrumented systems (SIS). The characteristics and requirements for temperature, pressure, level and flow measurement technology are explained in detail using practical examples.

07

Special requirements placed on final elements

Pneumatic actuators used in valves of various designs, are typical in safety instrumented systems for the process industry. In this module you will learn which factors are critical for their function and where potential sources of error can be found. Operational proof is the primary key verifying the suitability of an actuator.

08



SIL verification

This module builds on module 2 and on the requirements for process-control safety instrumented systems and the structural (HFT, SFF) and mathematical proof (PFD) of an overfill protection device.

09

Calculation examples

Based on five practical examples, this module shows in detail how the calculation of safety instrumented systems (SIS) is carried out. All areas are covered from the basic idea of the safety function, to risk analysis and the determination of proof test intervals.

10

Start-up and modifications

For a smooth start-up, you should test the function of the system according to the specifications as early as possible. In module 10, you will learn about different test methods such as FAT, loop check and SAT, in which you can track failures at an early stage and rectify before start-up.