

FUNCTIONAL SAFETY

MANOCOMB®

Switch, Monitor and (Safety-) Limiter
for Pressure, Vacuum and Differential Pressure

SIL

VdTÜV

DGR

DVGW

ATEX

GOST





FUNCTIONAL SAFETY - 1000 YEARS - WHEN SAFETY COUNTS!

The IEC 61508 (Functional safety of electrical/electronic/programmable electronic safety-related systems) defines the requirements of the safety systems in plants independently of the application.

The new standard for "Functional Safety" describes the demand to the "Safety Instrumented Systems" (SIS) and divides these into "Safety Integrity Levels" (SIL 1 - 4).

This presupposes however that the whole of all process instruments (field instruments and controllers, regulations or controls and actuators) must be examined on safety risks.

Sometimes safety-relevant components and non-safety-relevant components have to be interconnected within a plant.

For the SIS thereby only the safety-relevant components are taken into consideration.

The design principles result from the desired safety integrity level, in order to minimize the risk of malfunctions.

For the first time international standards require the implementation of documented values in order to reduce risks in the process industry.

A new understanding of safety for human beings and machines has arisen.

The approved safety and functional reliability of the MANOCOMB® precision pressure switch, manufactured by PINTER, and the long-time experience in the process industry are the foundation for the examination and confirmation according to SIL.

Crucial for the employment into safety-critical controls, as for example in power stations, chemical plants, medical equipment or mines are also numerous other approvals.

The MANOCOMB® is an approved and certified pressure monitor and safety pressure limiter according to Pressure Equipment Directive 97/23/EC (Modules B+D), VdTÜV Druck 100/1, TRD604, TRB403, DIN DVGW, Gas Appliances Directive 90/396/EEC, ATEX-Directive 94/9/EC and GOST-R.



Based on the friction-free bellows measuring system the precision pressure switch is available with either 1 or 2 change-over contacts.

Optionally equipped with an integrated pressure gauge (accuracy class 1.0), as well as with an integrated analogue output (e.g. 4 – 20 mA) the MANOCOMB® simplifies the design of the measuring point, saves space and minimizes installation and maintenance costs.

As a single device, the MANOCOMB® precision pressure switch reaches classification SIL 2. In a combination of 2 devices the safety system also reaches classification SIL 3.

The results are summarized in the test report issued by TÜV:

For the supposed test intervals up to 5 years, the probability of a malfunctioning (PFD_{AVG}), lies far below the maximally permissible value for a SIL3-classification of $PFD_{SIL3, max} < 10^{-3}$.

The result, the “Safe Failure Fraction” (SFF), that indicates the portion of harmless and safe errors, which do not lead to malfunctions, was confirmed with 98%.

This means that 98 of 100 theoretically possible errors of the equipment are insignificant for its safe function.

According to the IEC 61508 a minimum value of 90% is necessary for utilizing devices in safety-relevant systems according to classification SIL 3. The required value is obviously exceeded.

Based on the analysis by TÜV, the possibility might exist that a combination of 2 MANOCOMB® precision pressure switches could have just one safety-critical malfunction in 1000 years!

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