



SIL-DECLARATION of CONFORMITY
SIL-DICHIARAZIONE DI CONFORMITA'

EN 50402 ; EN 61508

SENSITRON S.r.l., Viale della Repubblica 48, IT-20010 Cornaredo MI, Italy, hereby declares under its own responsibility that the gas detection units

Model MULTISCAN ++S2 — Central unit with input and output modules
Two closed BUS-loops for high availability

Are assembled and delivered in accordance to the cited Compliance Statement and Report from GWW to comply with the following European Standards for Functional Safety:

EN 50402:2005 + A1:2008 ; EN/IEC 61508:2010 parts 1 to 7

The Functional Safety Assessment was carried out by GWW GasWarn Dr. Wenker GmbH in cooperation with Sensitron see the enclosed Compliance Statement CST2719 of GWW dated September 13th 2011. The results are given in the Report FSR2738 specifying the following data for the use of single channel (1 out of 1) or redundant (1 out of 2) use of the central unit.

To achieve the claimed SIL-compliance for the Multiscan++ the conditions for use overleaf have to be obeyed.

Function 1: CPU + STG/OUT16-S

Function 2: CPU + STG/OUT16-S with STG/8REL

Function 3: CPU + STG/IN8-S + STG/OUT16-S

Function 4: CPU + STG/IN8-S + STG/OUT16-S with STG/8REL

Functions 1 and 2 for connection of digital detectors only ; Functions 3 and 4 if also analogue detectors are used.

	Single channel use of Multiscan ++				Redundant use of Multiscan ++			
	Function 1	Function 2	Function 3	Function 4	Function 1	Function 2	Function 3	Function 4
Safety function	Open collector or relay output of alarm				Open collector or relay output of alarm			
Measuring range	0-100% LEL ; 0-XX %Vol. ; 0-XXX PPM				0-100% LEL ; 0-XX %Vol. ; 0-XXX PPM			
SIL Capability Hardware	2				3			
SIL Capability Software	3				3			
Type of device	B				B			
Proof test interval	1 year				1 year			
MTTR	72 h				72 h			
SFF	97,49%	95,57%	98,04%	96,49%	97,49%	95,57%	98,04%	96,49%
HFT	0				1			
β Factor	-				5%			
PDF	$2,34 \times 10^{-4}$	$3,99 \times 10^{-4}$	$2,64 \times 10^{-4}$	$4,28 \times 10^{-4}$	$1,18 \times 10^{-5}$	$2,01 \times 10^{-5}$	$1,33 \times 10^{-5}$	$2,17 \times 10^{-5}$
λ_{du} (per h)	$3,69 \times 10^{-9}$	$7,21 \times 10^{-9}$	$3,77 \times 10^{-9}$	$7,29 \times 10^{-9}$	$3,69 \times 10^{-9}$	$7,21 \times 10^{-9}$	$3,77 \times 10^{-9}$	$7,29 \times 10^{-9}$
λ_{ld} (per h)	$9,71 \times 10^{-7}$	$1,08 \times 10^{-6}$	$1,33 \times 10^{-6}$	$1,44 \times 10^{-6}$	$9,71 \times 10^{-7}$	$1,08 \times 10^{-6}$	$1,33 \times 10^{-6}$	$1,44 \times 10^{-6}$
λ_{su} (per h)	$4,02 \times 10^{-7}$	$4,14 \times 10^{-7}$	$4,90 \times 10^{-7}$	$5,05 \times 10^{-7}$	$4,02 \times 10^{-7}$	$4,14 \times 10^{-7}$	$4,90 \times 10^{-7}$	$5,05 \times 10^{-7}$
λ_{sd} (per h)	$6,20 \times 10^{-9}$	$6,23 \times 10^{-9}$	$6,20 \times 10^{-9}$	$6,23 \times 10^{-9}$	$6,20 \times 10^{-9}$	$6,23 \times 10^{-9}$	$6,20 \times 10^{-9}$	$6,23 \times 10^{-9}$

Cornaredo Date: September 13th, 2011

Dott. Giacomo Frigo
(General Director / Amministratore Unico)

SENSITRON s.r.l. 20010 Cornaredo (MI) Italy – Viale della Repubblica, 48 - TEL. +39 0293548155 - FAX +39 0293548089

<http://www.sensitron.it> - E-Mail: sales@sensitron.it

C.F. e P.I. 09204090154 - C.C.I.A.A. MI 1278620 - ISCR. TRIB. MI 281774 - VOL. 7216 - FASC. 24 - CAP. SOC. € 100.000,00 I.V.



Closed loop Bus structure of type S2 for high availability

In the gas detection system Multiscan ++S2 modules and digital detectors on the BUS are controlled by the central unit via two closed loops. If one of the BUS-lines is interrupted a fault will be indicated but all units on the BUS still are available by the one or the other direction via the loop. The loop is then no longer fail safe because a second interruption will cause the loss of connection to some units.

This closed loop BUS-structure guarantees high availability for all units but in functional safety for the failure rates there is no difference to an open loop structure because in open loop structure all interruptions will be detected and the fault will be indicated. For the rules of functional safety also the open loop system goes to a safe state but the connection to some units on the BUS will be lost.

Conditions for use

The values for the SIL-Capability of the Multiscan ++ central unit and the determined failure rates are valid only if the following conditions for use will be obeyed (responsibility of the user).

The environmental parameters (e.g. the ranges for temperature, humidity and pressure) specified in the users manual have to be observed and followed for the Multiscan ++ and the detectors connected.

Analogue 4 – 20 mA detectors to be connected to the input module Rio-In have to comply with the requirements for SIL 2 and the following interface specification:

Below 3 mA:	Fault Low Level	will be interpreted as detector fault
between 3 mA and 4 mA	Under-Scale	when gas signal is indicated negative
4 mA:	Zero Level	when gas signal is zero.
20 mA:	Full Scale	when the gas signal is 100% of measuring range
between 20 mA and 21 mA	Over-Range	when gas signal is above measuring range
Above 21 mA:	Fault High Level	will be interpreted as detector fault

When detectors from Sensitron will be used Sensitron is responsible to choose the appropriate types of detectors.

Digital detectors from Sensitron have to be used because the detectors connected have to comply with the Sensitron-specific high safety data protocol from Multiscan ++ .

The detectors connected have to be placed at a position suitable for the measuring application, to be connected correctly to the Multiscan ++ and the whole system has to be put into operation by Sensitron or an authorized installer company.

The proof test has to be carried out minimum once per year. As proof test a regular calibration of all detectors connected using a certified calibration gas mixture has to be carried out. The correct indication of measuring values has to be confirmed at the Multiscan ++ . All safety related output functions have to be tested for correct operation including the switching of the relays to detect the presence of faulty relays.