Information about functional safety

Measurement made easy
Short product description
Vortex and Swirl Flowmeter for flow measurement of liquid and
gaseous measuring media.

Devices firmware version:
— 02.00.00 (HART)

Further information
Additional documentation on VortexMaster FSV430, FSV450
SwirlMaster FSS430, FSS450 is available for download free of
charge at www.abb.com/flow.
Alternatively simply scan these codes:

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Contents

1  Product identification ................................................................. 4

2  Acronyms and abbreviations ................................................. 5

3  Standards and definitions of terms ....................................... 6
   3.1  Standard IEC 61508 (2010) (Edition 2), Part 1 to 76 ...
   3.2  Dangerous failure ................................................................. 6
   3.3  Safety-related system ............................................................. 6
   3.4  Safety function ................................................................. 6

4  Other applicable documents and papers ............................ 6

5  Determine the Safety Integrity Level (SIL) ....................... 6
   5.1  Alarm response and current output .................................. 6
   5.2  Overall safety accuracy ..................................................... 7

6  The Flowmeter as part of the safety function system ... 7
   6.1  Device specific data related to functional safety .... 7

7  Proof Test ................................................................................ 8
   7.1  Test of the device ................................................................. 8
   7.2  Expected service life of components used ................ 8

8  Configuration ........................................................................ 9
   8.1  Checklist before safety operation ................................. 9
   8.2  Enabling/Disabling the write locking ......................... 9
   8.3  High/Low alarm configuration ...................................... 9
   8.4  Reconfiguration device .................................................. 9
   8.5  Possible error messages ................................................. 11
   8.5.1  Errors ........................................................................ 11

9  Repair .................................................................................. 12

10 Appendix ............................................................................ 13
    10.1  SIL 2 certificate ............................................................... 13
    10.2  Return form ................................................................. 15
1 Product identification

NOTICE
This document is valid for Vortex and Swirl Flowmeters VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450 with type designation "H5 — HART digital communication, 4 ... 20 mA + digital contact output" and "CS — SIL2 - certified acc. to IEC 61508".

Each device design has a specific type designation. The parts of the model number relating to the SIL approval are listed in the following table. The complete key to model numbers is described in the device data sheet.

The type designation is located on the name plate of the device.

Devices applicable for SIL are marked with a SIL logo on the transmitter housing.

<table>
<thead>
<tr>
<th>Basic model - Main ordering information</th>
</tr>
</thead>
<tbody>
<tr>
<td>VortexMaster FSV430 Vortex Flowmeter</td>
</tr>
<tr>
<td>VortexMaster FSV450 Intelligent Vortex Flowmeter</td>
</tr>
<tr>
<td>SwirlMaster FSS430 Swirl Flowmeter</td>
</tr>
<tr>
<td>SwirlMaster FSS450 Intelligent Swirl Flowmeter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explosion Protection Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Design</td>
</tr>
<tr>
<td>Process Connection Type / Meter Size / Connection Size</td>
</tr>
<tr>
<td>Pressure Rating</td>
</tr>
<tr>
<td>Temperature Range of Measuring Medium</td>
</tr>
<tr>
<td>Housing Material / Cable Glands</td>
</tr>
<tr>
<td>Output Signal</td>
</tr>
<tr>
<td>HART digital communication, 4 ... 20 mA + digital contact output H5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional ordering information</th>
</tr>
</thead>
<tbody>
<tr>
<td>VortexMaster FSV430 Vortex Flowmeter</td>
</tr>
<tr>
<td>VortexMaster FSV450 Intelligent Vortex Flowmeter</td>
</tr>
<tr>
<td>SwirlMaster FSS430 Swirl Flowmeter</td>
</tr>
<tr>
<td>SwirlMaster FSS450 Intelligent Swirl Flowmeter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certificates</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL2 - certified acc. to IEC61508</td>
</tr>
</tbody>
</table>
## 2 Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Designation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFT</td>
<td>Hardware Fault Tolerance</td>
<td>Hardware fault tolerance of the unit. Ability of a functional unit (hardware) to continue to perform a required function when faults or errors are prevailing.</td>
</tr>
<tr>
<td>MTBF</td>
<td>Mean Time Between Failures</td>
<td>Mean time between failures.</td>
</tr>
<tr>
<td>MTTR</td>
<td>Mean Time To Restoration</td>
<td>Mean time between the occurrence of an error in a unit or in a system and its repair.</td>
</tr>
<tr>
<td>PFD</td>
<td>Probability of Dangerous Failure on Demand</td>
<td>Probability of hazardous failures for a safety function on demand.</td>
</tr>
<tr>
<td>PFD&lt;sub&gt;Avg&lt;/sub&gt;</td>
<td>Average Probability of Dangerous Failure on Demand</td>
<td>Average probability of hazardous failures for a safety function on demand.</td>
</tr>
<tr>
<td>SIL</td>
<td>Safety Integrity Level</td>
<td>The international standard IEC 61508 defines four discrete Safety Integrity Levels (SIL 1 to SIL 4). Each level corresponds to a range of probability for the failure of a safety function. The higher the Safety Integrity Level of the safety-related systems, the lower the probability that they will not perform the required safety function.</td>
</tr>
<tr>
<td>SFF</td>
<td>Safe Failure Fraction</td>
<td>Proportion of non-hazardous failures; in other words, the proportion of failures without the potential to put the safety-related system in a hazardous or impermissible state.</td>
</tr>
<tr>
<td>Low Demand Mode</td>
<td>Low Demand Mode of operation</td>
<td>Measurement type with low request rate. Measurement type for which the request rate for the safety-related system is not more than once a year and not greater than twice the frequency of the retest.</td>
</tr>
<tr>
<td>DCS</td>
<td>Distributed Control System</td>
<td>Control system used in industrial applications to monitor and control decentralized units.</td>
</tr>
<tr>
<td>HMI</td>
<td>Human Machine Interface</td>
<td>In this case, the HMI is a combined module consisting of an LCD display with or without a local keyboard.</td>
</tr>
<tr>
<td>DTM</td>
<td>Device Type Manager</td>
<td>A DTM is a software module that supports specific functions for accessing device parameters, the setup and the operation of devices, and diagnostics. The DTM is not executable software. It requires an FDT container program in order to be activated.</td>
</tr>
<tr>
<td>LRV</td>
<td>Device Configuration</td>
<td>Lower Range Value of the measurement range</td>
</tr>
<tr>
<td>URV</td>
<td>Device Configuration</td>
<td>Upper Range Value of the measurement range</td>
</tr>
<tr>
<td>Multidrop</td>
<td>Multidrop Mode</td>
<td>In Multidrop Mode, up to 15 field devices are connected in parallel to a single wire pair. The analog current signal simply serves to supply power to the devices in two-wire technology with a fixed current of ≤ 4 mA.</td>
</tr>
</tbody>
</table>
3 Standards and definitions of terms

   — English
   Functional safety of electrical / electronic / programmable
electronic safety-related systems (Target group: Manufacturers and Suppliers of Devices).
   — German

3.2 Dangerous failure
A failure that has the potential to place the safety-related system in a dangerous state or render the system inoperative.

3.3 Safety-related system
A safety-related system performs the safety functions that are required to achieve or maintain a safe condition, e.g., in a plant.
Example: pressure meter, logics unit (e.g., limit signal generator) and valve form a safety-related system.

3.4 Safety function
A specified function that is performed by a safety-related system with the goal, under consideration of a defined hazardous incident, of achieving or maintaining a safe condition for the plant.
Example: limit pressure monitoring

5 Determine the Safety Integrity Level (SIL)
The transmitter produces an analog signal (4 ... 20 mA) proportional to the volume flow rate. The total valid range of the output signal shall be configured to a minimum of 3.8 mA and a maximum of 20.5 mA (Factory Default).
The safety related function of the transmitter is the safe monitoring of the volume flow rate within a range of ±4 % of span (±4 % of 16 mA). The safety state is that the output current is lower than 3.6 mA or greater than 21 mA.

5.1 Alarm response and current output
In case of detected critical faults the configured alarm current will be produced - this is fed to a subsequent logic unit, e.g. a DCS and monitored for violation of a defined maximum value. There are two selectable modes for this alarm current:
   — HIGH (Max Alarm current)
   — LOW (Min Alarm current) which is the factory default setting.

The low alarm current is configurable from 3.5 ... 3.6 mA with a factory default setting to 3.55 mA.
The high alarm current is configurable from 21.0 mA ... 22.6 mA with a factory default setting 22.0 mA.
The reaction time after the occurrence of a critical error until the output of the alarm current amounts to ≤ 40 min.

CPU internal faults will result in the LOW alarm independent from the configured alarm current. Other failures will be immediately signalled within the LOW or HIGH alarm range in line with the configured alarm current.

4 Other applicable documents and papers

The following documentation must be available for the flowmeter. These documents include details about functional specifications of the analog output and how to operate and configure the device.

<table>
<thead>
<tr>
<th>Document name</th>
<th>Document type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI/FSV/FSS/430/450</td>
<td>Commissioning Instruction</td>
</tr>
<tr>
<td>OI/FSV/FSS/430/450</td>
<td>Operating Instruction</td>
</tr>
<tr>
<td>DS/FSV430/450</td>
<td>Data Sheet VortexMaster FSV430, FSV450</td>
</tr>
<tr>
<td>DS/FSS430/450</td>
<td>Data Sheet SwirlMaster FSS430, FSS450</td>
</tr>
</tbody>
</table>
NOTE
For a safe fault monitoring the following conditions must be fulfilled:
— The LOW ALARM must be configured with a value \( \leq 3.6 \) mA.
— The HIGH ALARM must be configured with a value \( \geq 21 \) mA.
— The DCS must be capable of recognizing the configured High Alarms or Low Alarms as a malfunction detection.
— For a safe current output operation the terminal voltage at the device must be given from 12 \( \ldots \) 42 V.

The DCS loop must be capable to provide the required voltage level even if the current output operates on the configured HIGH alarm.

The device is not safety compliant during the following conditions:
— During Configuration
— If the HART Multidrop mode is activated
— During Simulation
— During Test of the safety function

The fraction of failures without the potential to put the device into a dangerous function status is given by the SFF value shown in chapter "Device specific data related to functional safety" on page 7.

5.2 Overall safety accuracy
The defined value for the "Total Safety Accuracy" of the safety function of this device is: \( \pm 4 \% \) of span (\( \pm 4 \% \) of 16 mA).

6 The Flowmeter as part of the safety function system

Fig. 1: Safety function (e.g. min / max flowrate monitoring) with flowmeter as a sub-system

1 SwirlMaster or VortexMaster 2 Notebook with configuration Tool such as SMART VISION 3 FSK-Modem 4 Handheld-Terminal 5 Automation System, Logic-Unit, PLC, limit signal generator, etc. 6 Actuator

The Flowmeter transmitter generates an analog signal (4 \( \ldots \) 20 mA) proportional to the flowrate. The analog signal is fed to a downstream logics unit such as a PLC or a limit signal generator, and is monitored for exceeding a specified maximum or minimum value.

NOTE
The safety-related signal is the 4 \( \ldots \) 20 mA analog output signal of the flowmeter transmitter.
All safety functions refer exclusively to this analog output.

6.1 Device specific data related to functional safety

<table>
<thead>
<tr>
<th>Characteristic as per IEC 61508</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid frontend board software version</td>
<td>1.4.2</td>
</tr>
<tr>
<td>Valid communication board software version</td>
<td>1.4.0</td>
</tr>
<tr>
<td>Valid frontend board hardware version</td>
<td>1.5.0</td>
</tr>
<tr>
<td>Valid communication board hardware version</td>
<td>1.3.0</td>
</tr>
<tr>
<td>Type of assessment</td>
<td>Full IEC 61508 assessment</td>
</tr>
<tr>
<td>SIL</td>
<td>2</td>
</tr>
<tr>
<td>Systematic capability</td>
<td>2</td>
</tr>
<tr>
<td>HFT</td>
<td>0</td>
</tr>
<tr>
<td>Component Type</td>
<td>B</td>
</tr>
<tr>
<td>Measuring mode</td>
<td>Low demand mode</td>
</tr>
<tr>
<td>Recommended time interval for proof testing T1</td>
<td>2 years</td>
</tr>
<tr>
<td>SFF(^1)</td>
<td>97.07%</td>
</tr>
<tr>
<td>PFDAVG for T [Proof] = 2 year 1</td>
<td>2.47E-03</td>
</tr>
<tr>
<td>( \lambda_{sd} )^(^1)</td>
<td>1.52E-06</td>
</tr>
<tr>
<td>( \lambda_{su} )^(^1)</td>
<td>2.73E-06</td>
</tr>
<tr>
<td>( \lambda_{dq} )^(^1)</td>
<td>5.08E-06</td>
</tr>
<tr>
<td>( \lambda_{du} )^(^1)</td>
<td>2.82E-07</td>
</tr>
</tbody>
</table>

\(^1\) Calculated at ambient temperatures 100 °C based on Siemens SN29500
7 Proof Test

In accordance with IEC 61508, the safety function of the measuring device must be checked at appropriate time intervals. The operator must determine the checking interval and take this into account when determining the probability of failure PFD$_{avg}$ of the flowmeter. The test must be carried out in such a way that it verifies correct operation of the device. Testing the device can be performed in the following steps:

7.1 Test of the device

For check the safety function of the device proceed as follows:

1. Bridge the safety DCS or take other appropriate measures to prevent inadvertent triggering of alarms.
2. Deactivate the write lock (see Chapter "Configuration" on page 9).
3. Set the current output of the transmitter to a HIGHALARM value by means of the push buttons of the LCD-display, HART communication by using a DTM in combination with DAT200 (Asset vision basic) or with the Field Information Manager (FIM-Tool) using simulation function (Menu: Diagnostics / Simulation Mode / Current Out).
4. Check whether the current output signal reaches this value.
5. Set the current output of the transmitter to a LOW-ALARM value by means of the push buttons of the LCD-display, HART communication by using a DTM in combination with DAT200 (Asset vision basic) or with the Field Information Manager (FIM-Tool) using simulation function (Menu: Diagnostics / Simulation Mode / Current Out).
6. Check whether the current output signal reaches this value.
7. Terminate the simulation mode after finishing the output simulation!
8. Activate the write lock (see Chapter "Configuration" on page 9) and wait 10 seconds.
9. Restart the device by power down.
10. Check at 3 to 5 measuring points the measured values against a secondary standard on an installed device which could be a calibrated reference device, a mobile calibration rig or on a factory calibration rig. The measured values of the secondary standard and the device under test (DUT) have to be compared. The amount of deviation between the measured flow rate and the set point must not exceed the measured error specified for the safety function.
11. Remove the bridging of the safety DCS or restore normal operation in another way.
12. After the test has been performed, the results must be documented and stored in a suitable manner.

**NOTICE**

By using this test method least 98 % (PTC = 0.98) of dangerous, undetected failures are detected. The influence of systematic errors like e.g. medium properties, operating conditions, build-up or corrosion on the safety function is not fully covered by the test.

- If one of the test criteria from the test procedure described above is not fulfilled, the device may no longer be used as part of a protective system.
- Take measures to reduce systematic errors.

7.2 Expected service life of components used

The applied failure rates of the components are valid within the usable service life according to IEC 61508-2 section 7.4.9.5 note 3.
8 Configuration

This device is configured and tested as specified by the customer order. Nevertheless this device can be configured by the local HMI or DTM via HART® Interface. Other configuration tools like Handheld Terminals are not described in this manual. During this configuration a safe operation of the device shall not be granted.

8.1 Checklist before safety operation
Here lists important checks before safety operation:
— Before the first start-up of the device as a part of a safety function check that the device configuration fulfills the safety function of the system.
— Check that the right device is installed on the right measuring point.
— After every change to the device as a part of a safety function, such as a change to the installation position of the device or configuration, the safety function of the device shall be checked.
— After the safety function has been checked, the operation of the device must be locked because a change to the measuring system or parameters can compromise the safety function.

The write protection shall be enabled before power up when want to go into safe operation.

8.2 Enabling/Disabling the write locking
The device must be write-protected for the safety operation. This could be realized in the following steps (see chapter "DIP switch on communication board" on page 10):
1. Change the SW1 write-protection to be Read/write mode.
2. Use HART command 133, slot 0 to change the software write protection to be enabled.
3. Change the SW1 write-protection to be Read only mode.

8.3 High/Low alarm configuration
The VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450 has two methods to configure the alarm state. Hardware dip-switch (SW4) decides which source is used for the configuration (see chapter "DIP switch on communication board" on page 10). If SW4 is configured as “ON” state, then alarm state is decided by SW5. If SW4 is switched to “OFF”, then alarm state is decided by software objects. The object "alarmSelection" is the software configure object, which can be configured by HART command 131, slot 2 to “High” or "Low" alarm mode. This object is stored in non-volatile memory.

8.4 Reconfiguration device
If the end user want to reconfigure the device which is configured for safety operation, this could be realized in the following steps:
1. Change the SW1 write-protection to be Read/write mode.
2. Use HART command 185 to change the SW write protection to be disabled.
3. Change parameters configuration.
4. Fulfill steps listed in chapter Checklist before safety operation and Enabling/Disabling the write locking.
DIP switch on communication board

![Communication board diagram]

**Fig. 2: Communication board**
1. Interface for LCD indicator and service port
2. DIP switches

The communication board is located behind the front housing cover. The LCD indicator may have to be removed to provide access to the DIP switches.

The DIP switches are used to configure specific hardware functions. The power supply to the transmitter must be briefly interrupted in order for the modified setting to take effect. The interface for the LCD indicator is also used as the service port for device configuration.

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>Function</th>
</tr>
</thead>
</table>
| SW 1.1     | Write protection switch  
            | On: Write protection active  
            | Off: Write protection deactivated |
| SW 1.4     | Selection as to whether the alarm function is configured via software or DIP switch.  
            | On: Selection of alarm current via SW 1.5  
            | Off: Selection of alarm current via the "Input/Output / Iout at Alarm" menu. |
| SW 1.5     | Selection of alarm current  
            | On: Low Alarm (3.5 ... 3.6 mA)  
            | Off: High Alarm (21.0 ... 22.6 mA) |

**Write protection switch**

When write protection is activated, device parameterization cannot be changed via HART or the LCD indicator. Activating and sealing the write protection switch protects the device against tampering.

**Status of the current output**

DIP switches SW 1.4 and SW 1.5 can be used to configure the status of the current output in the event of an alarm / error.

If the current in the event of an alarm is selected via DIP switch SW 1.5, the setting can no longer be changed using HART or the LCD indicator.
8.5 Possible error messages
The error messages are divided into four groups in accordance with the NAMUR classification scheme.

### 8.5.1 Errors

<table>
<thead>
<tr>
<th>Error no. / Range</th>
<th>Text on the LCD display</th>
<th>Cause</th>
<th>Remedy</th>
<th>Error no. / Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>F217.041 / Elektronik</td>
<td>CO Readback High</td>
<td>Incorrectly calibrated current output or faulty electronics.</td>
<td>Contact ABB Service.</td>
<td>High Alarm</td>
</tr>
<tr>
<td>F216.042 / Elektronik</td>
<td>CO Readback Low</td>
<td>Incorrectly calibrated current output or faulty electronics.</td>
<td>Contact ABB Service.</td>
<td>Low Alarm</td>
</tr>
<tr>
<td>F215.020 / Elektronik</td>
<td>Sensor Comm Error</td>
<td>Communication errors between sensor and transmitter.</td>
<td>Check electrical connections between sensor and transmitter.</td>
<td>High Alarm / Low Alarm, depends on the Alarm configuration (see chapter &quot;High/Low alarm configuration&quot; on page 9)</td>
</tr>
<tr>
<td>F214.019 / Elektronik</td>
<td>Sync. Signal Error</td>
<td>Synchronous fail. Frontend board circuit faults.</td>
<td>Switch transmitter off and back on again. If the error remains, contact ABB Service.</td>
<td></td>
</tr>
<tr>
<td>F213.000 / Sensor</td>
<td>Sig. Sensor Fault</td>
<td>Errors in sensor self-test. Signal errors from Piezo sensor.</td>
<td>Contact ABB Service.</td>
<td></td>
</tr>
<tr>
<td>F212.001 / Sensor</td>
<td>Int. T Sensor Fault</td>
<td>Errors in internal temperature sensor.</td>
<td>Contact ABB Service.</td>
<td></td>
</tr>
<tr>
<td>F210.016 / Elektronik</td>
<td>Bad SNR</td>
<td>Signal-to-noise ratio for the sensor signal is outside of the set limit values.</td>
<td>Increase the flow rate. Check the setting in the &quot;Process Alarm / Alarm Limits&quot; menu and adjust if necessary.</td>
<td></td>
</tr>
<tr>
<td>F209.017 / Elektronik</td>
<td>Sensor NV Error</td>
<td>Faulty frontend board.</td>
<td>Replace frontend board or contact ABB Service.</td>
<td></td>
</tr>
<tr>
<td>F208.044 / Elektronik</td>
<td>Sensor RAM Fault</td>
<td>Faulty frontend board.</td>
<td>Replace frontend board or contact ABB Service.</td>
<td></td>
</tr>
<tr>
<td>F207.023 / Elektronik</td>
<td>Transmitter NV Error</td>
<td>Faulty communication board.</td>
<td>Replace the communication board or contact ABB Service.</td>
<td></td>
</tr>
<tr>
<td>F203.040 / Elektronik</td>
<td>Current Output Fault</td>
<td>Current output errors.</td>
<td>Contact ABB Service.</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

CPU internal faults will result in the LOW alarm independent from the configured alarm current, and will not be shown on LCD display.
9 Repair

To ensure the safety related function, repairs have to be performed by ABB.
Replacing modular components by original ABB spare parts is permitted if personnel was trained by ABB for this purpose.
The “Declaration of contamination and cleaning” must be enclosed when returning the defective device.
Refer to instruction manual for further details.

Adress:

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Appendix

10.1 SIL 2 certificate

Certificate

No.: 968/FSP 1070.01/16

Product tested: Vortex/Swirl Flow Meter
Certificate holder: ABB Engineering (Shanghai) Ltd.
No. 4528, Kangxin Highway
Pudong New District
Shanghai, 201319
P.R. China

Type designation:
VortexMaster FSV450 / FSV430 (with output signal H5)
SwirlMaster FSS450 / FSS430 (with output signal H5)

Codes and standards:
IEC 61508 Parts 1-7:2010
EN 50178:1997
EN 61326-3-1:2008

Intended application:
Flow measuring of gas, steam and liquids in pipes as part of a Safety Instrumented System (SIS).
The flow meter complies with the requirements for SIL 2 / SC 2 acc. to IEC 61508 and can be used in a SIS up to SIL 2 acc. to IEC 61508 / IEC 61511.
Further details see page 2 of certificate.

Specific requirements:
The instructions of the associated Installation and Operating Manual shall be considered.

Valid until 2021-04-14

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1070.01/16 dated 2016-04-14.
This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

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Dipl.-Ing. Thomas Stellens

Köln, 2016-04-14

www.fs-products.com
www.tuv.com
Safety function: Measuring of the flow rate and output of an analog signal 4 – 20mA proportional to the volume flow rate. The total valid range of the output signal shall be configured to a minimum of 3.6 mA and a maximum of 20.5 mA (Factory Default). The safety related function of the transmitter is the safe monitoring of the volume flow rate with a tolerance of ±4% of the span (16mA). The safety state is that the output current is lower than 3.6 mA or greater than 21 mA. The downstream safety device must be configured to recognize the configured high alarms or low alarms as a malfunction detection.

<table>
<thead>
<tr>
<th>Characteristics as per IEC 61508</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL</td>
<td>SIL 2 (single-channel architecture 1oo1, HFT = 0)</td>
</tr>
<tr>
<td>HFT</td>
<td>0</td>
</tr>
<tr>
<td>Device Type</td>
<td>b</td>
</tr>
<tr>
<td>Mode of operation</td>
<td>Low demand mode</td>
</tr>
<tr>
<td>SFF</td>
<td>CB board: 94.3 %, FE board: 97.7 %, Total: 97.07 %</td>
</tr>
</tbody>
</table>

**Recommended time interval for proof-testing T1**

<table>
<thead>
<tr>
<th>PFD_{avg} for T1 = 2 year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CB board</td>
<td>1.00 E-03</td>
</tr>
<tr>
<td>FE board</td>
<td>1.46 E-03</td>
</tr>
<tr>
<td>Total</td>
<td>2.46 E-03</td>
</tr>
</tbody>
</table>

\[ \lambda_{sd} = 1520 \text{ FIT} \]
\[ \lambda_{su} = 2730 \text{ FIT} \]
\[ \lambda_{sd} = 5080 \text{ FIT} \]
\[ \lambda_{du} = 262 \text{ FIT} \]
\[ \lambda_{tot} = 9612 \text{ FIT} \]

1 FIT = 1 E-09 1/h

**Remark:** Failure rates of the electronic components as per Siemens CN 20500, calculated based upon an ambient temperature of 100 °C.
10.2 Return form
Statement on the contamination of devices and components

Repair and / or maintenance work will only be performed on devices and components if a statement form has been completed and submitted. Otherwise, the device / component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:
Company:
Address:
Contact person: Telephone:
Fax: E-Mail:

Device details:
Typ: Serial no.:
Reason for the return/description of the defect:

Was this device used in conjunction with substances which pose a threat or risk to health?
☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items)?

- Biological ☐
- Corrosive / irritating ☐
- Combustible (highly / extremely combustible) ☐
- Toxic ☐
- Explosiv ☐
- Other toxic substances ☐
- Radioactive ☐

Which substances have come into contact with the device?
1. 
2. 
3. 

We hereby state that the devices / components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date Signature and company stamp
Note
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Original instruction

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