VortexMaster FSV430, FSV450
SwirlMaster FSS430, FSS450

Vortex and Swirl flowmeter

Information about functional safety

Device firmware version:

- 03.00.xx (HART)

Measurement made easy

VortexMaster
FSV430 / FSV450

SwirlMaster
FSS430 / FSS450

Introduction

The robust VortexMaster FSV4x0 vortex flowmeter by ABB is a high-performance and reliable tool, which is especially suited for the measurement of liquids, gas, and steam.

The SwirlMaster FSS4x0 swirl flowmeters combine the measuring dynamics of turbine flowmeters with the robustness and reliability of Vortex flowmeters and require only very short inlet and outlet sections.

Equipped with digital signal processing (DSP) and advanced filtering techniques, these innovative flowmeters allow for excellent flow signal detection and provide measurement immunity from the effects of hydraulic noise and pipe vibration.

Additional 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 this code:

FSV430 FSV450 FSS430 FSS450

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1 Product identification

Note
This document is valid for VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450 with the partial model number 'H5 — HART digital communication and 4 to 20 mA and contact output' and 'CS — SIL2 certified in accordance with IEC 61508'.

Each device design has a specific model number. The parts of the model number relevant to the SIL design are listed in the following table. The complete key to model numbers is described in the device data sheet.
This model number can be found on the device name plate. Devices in SIL design are additionally marked with an SIL logo on the transmitter housing.

Base model - main ordering information								
VortexMaster FSV430 swirl flowmeter	**FSV430**	**XX**	**XX**	**XXXXXX**	**XX**	**XX**	**XX**	**H5**
VortexMaster FSV450 intelligent swirl flowmeter	**FSV450**	**XX**	**XX**	**XXXXXX**	**XX**	**XX**	**XX**	**H5**
SwirlMaster FSS430 swirl flowmeter	**FSS430**	**XX**	**XX**	**XXXXXX**	**XX**	**XX**	**XX**	**H5**
SwirlMaster FSS450 intelligent swirl flowmeter	**FSS450**	**XX**	**XX**	**XXXXXX**	**XX**	**XX**	**XX**	**H5**
Explosion protection								
Device design								
Process connection / pipe nominal diameter / connection nominal diameter								
Nominal pressure								
Temperature range sensor								
Housing material / Cable connection								
Output signal								
HART digital communication and 4 ... 20 mA and contact output								H5

Additional ordering information	**XX**
VortexMaster FSV430 swirl flowmeter	**CS**
VortexMaster FSV450 intelligent swirl flowmeter	**CS**
SwirlMaster FSS430 flowmeter	**CS**
SwirlMaster FSS450 intelligent flowmeter	**CS**
Certificates	
SIL2 certified in accordance with IEC61508	CS

2 Acronyms and abbreviations

Abbreviation	Marking	Description
HFT	Hardware Fault Tolerance	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.
MTBF	Mean Time Between Failures	Mean time between failures.
MTTR	Mean Time To Restoration	Mean time between the occurrence of an error in a unit or in a system and its repair.
PFD	Probability of Dangerous Failure on Demand	Probability of hazardous failures for a safety function on demand.
PFDAVG	Average Probability of Dangerous Failure on Demand	Average probability of hazardous failures for a safety function on demand.
SIL	Safety Integrity Level	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.
SFF	Safe Failure Fraction	Amount of safe failures, i.e. the amount of failures without potential, which shifts the safety-related system into a dangerous or unacceptable functional condition.
Low Demand Mode	Low Demand Mode of operation	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.
DCS	Distributed Control System	Control system used in industrial applications to monitor and control decentralized units.
HMI	Human Machine Interface	In this case, the HMI is a combined module consisting of an LCD display with or without a local keyboard.
DTM	Device Type Manager	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.
LRV	Device Configuration	Lower Range Value of the measurement range
URV	Device Configuration	Upper Range Value of the measurement range
Multidrop	Multidrop mode.	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.

3 Standards and definitions of terms

Standard IEC 61508 (2010) (Edition 2), Part 1 to 7

- English
  Functional safety of electrical / electronic / programmable electronic safety-related systems (Target group: Manufacturers and Suppliers of Devices).
- German
  Funktionale Sicherheit sicherheitsbezogener elektrischer / elektronischer / programmierbarer elektronischer Systeme (Zielgruppe: Hersteller und Lieferanten von Geräten).

Dangerous failure

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

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., alarm signalling unit) and valve form a safety-related system.

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

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.

Document name	Document type
CI/FSV/FSS/430/450	Commissioning Instruction
OI/FSV/FSS/430/450	Operating Instruction
DS/FSV430/450	Data Sheet VortexMaster FSV430, FSV450
DS/FSS430/450	Data Sheet SwirlMaster FSS430, FSS450

5 Determine the Safety Integrity Level (SIL)

The transmitter generates an analog signal proportional to the volume flow rate (4 to 20 mA). The entire range of the output signal must be configured with a minimum value of 3.8 mA and a maximum value of 20.5 mA (at the factory).
The safety-related function of the transmitter is the safe monitoring of flow rate within a range of ±2 % (±2 % of 16 mA). In a safe state, the output current is less than 3.6 mA or more than 21 mA.

Alarm response and current output

If critical disturbances are discovered, the configured alarm current is generated which supplies the downstream logic unit, such as a DCS, and breaches of the defined maximum value are monitored. There are two selectable modes for the alarm current:

- HIGH (max. alarm current)
- LOW (min. alarm current). This is the factory setting.

The minimum alarm current can be adjusted between 3.5 and 3.6 mA, whereby the factory setting is 3.55 mA.
The maximum alarm current can be adjusted between 21.0 mA and 22.6 mA, whereby the factory setting is 22.0 mA.
The reaction time after the occurrence of a critical error until the output of the alarm current amounts to ≤ 40 min.

No matter what the configured alarm current, an internal CPU error triggers a minimum alarm. Other errors are immediately signaled with the configured alarm current within the min. and max. alarm range.

… 5 Determine the Safety Integrity Level (SIL)

… Alarm response and current output

Note
To ensure accurate error monitoring, the following conditions must be fulfilled:

- The MIN. ALARM must be configured to a value ≤ 3.6 mA.
- The MAX. ALARM must be configured to a value ≥ 21 mA.
- The DCS must be able to recognize the configured max. and min. alarms as detectors of a malfunction.
- Safe operation of the current output requires a connection voltage of 12 to 42 V on the device.

The DCS control circuit must be capable of providing the required voltage level even when the current output is running with the configured max. alarm.

The device does not meet safety requirements under the following conditions:

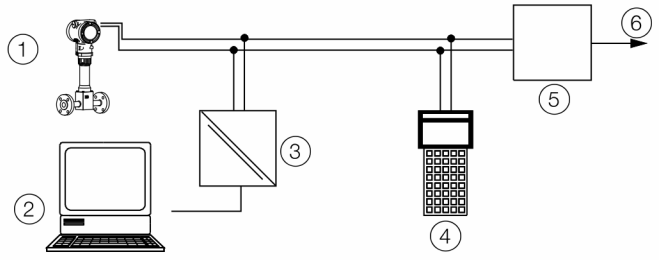
- During configuration
- If the HART® Multidrop mode is active
- During the simulation
- During a test of the safety function

The amount of errors which does not potentially cause any dangerous state on the device is provided in the SFF value in **Device-specific data related to functional safety** on page 7an.

Overall safety accuracy

The defined value of the ‘overall safety accuracy’ of the safety function of the device is ±2 % of span (±2 % of 16 mA), but this scope does not include the situation when the device is working with any filter algorithms from menu field optimization enabled.

6 The Flowmeter as part of the safety function system



1 SwirlMaster or VortexMaster	4 Handheld Terminal
2 Notebook configuration tool such as SMART VISION	5 Automation system, logic unit, PLC, alarm signalling unit, etc.
3 FSK modem	6 Actuator

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

The flowmeter transmitter generates an analog signal (4 to 20 mA) proportional to the flow rate. 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 analog output signal (4 to 20 mA) of the flowmeter transmitter.
All safety functions refer exclusively to this analog output.

Device-specific data related to functional safety

Approved hardware / firmware-versions		Transmitter	Sensor
Rev. A	Hardware Version	01.03.00	01.05.00
	Firmware Version	01.04.00	01.04.02
Rev. B	Hardware Version	01.03.00	01.06.00
	Firmware Version	01.05.00	01.04.04
Rev. C	Hardware Version	01.03.00	01.06.00
	Firmware Version	02.00.02	01.04.15

Characteristic curve in accordance with IEC 61508	Value
Type of Assessment	Complete assessment in accordance with IEC 61508
SIL	2
Systematic capacity	2
HFT	0
Component Type	B
Measuring mode	Low Demand Mode
SFF*	97.07%
PVDAvg after 1 year**	$1.24E^{-03}$
PVDAvg after 2 years** ***3)	$2.47E^{-03}$
PVDAvg after 3 years**	$3.71E^{-03}$
PVDAvg after 4 years**	$4.94E^{-03}$
PVDAvg after 5 years**	$6.18E^{-03}$
Λsd*	$1.52E^{-06}$
Λsu*	$2.73E^{-06}$
Λdd*	$5.08E^{-06}$
Λdu*	$2.82E^{-07}$

* Calculated at an ambient temperature of 100 °C in accordance with Siemens SN29500

** The maintenance cycle time can be adjusted accordingly in the diagnosis menu, e.g. 8760h for 1 year, 17520 h for 2 years, 26280 h for 3 years, 35040h for 4 years or 43800h for 5 years operation time without proof test.

*** Recommended proof test time, default maintenance cycle time.

7 Proof Test

General

In accordance with IEC61508, 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:

There are different proof test methods possible which lead to different proof test coverage levels. The most enhanced and recommended one is the full test which lead to 100 % proof test coverage.

	Proof test method	**Proof test coverage**
1	Full proof test incl. re-calibration as described below	100 %
2	Reduced proof test as described below, but without re-calibration (15.).	90 %

Testing the device can be performed in the following steps:

Testing the device

To check the safety function of the device, proceed as follows:

1. Bridge the safety DCS or take other suited measures to make sure the alarm is not triggered unintentionally.
2. Deactivate write protection (see **Configuration** on page 9).
3. Check the current output accuracy:
   Set the current output of the transmitter using the buttons on the LCD indicator or via HART communication (through DTM with DAT200 (Asset Vision Basic) or the Field Information Manager (FIM-Tool)) in simulation mode (menu path: Diagnostics / Simulation Mode / Current Out) to following values and check the results with a suitable test device: 3.55 mA, 4 mA, 12 mA, 20 mA and 22 mA. The deviation should not exceed 0.65 % of reading.
4. Exit simulation mode after the output simulation is complete!
5. Back-up the device settings for the alarm settings (Iout at Alarm) to ensure, that the original settings can be restored after the test.
6. Check the low alarm signalization:
   a Set the alarm setting to low alarm (menu path: Input/Output / Current Out / Iout at Alarm).
   b Check the low alarm set-up for the desired value (default = 3.55 mA)
   c Simulate Error ‘Vbr.Sensor Fault’ (menu path: Diagnostics / Alarm Simulation).
   d Compare the current output value against the desired value
   e Simulate Error ‘Transmitter NV Error’ (menu path: Diagnostics / Alarm Simulation).
   f Compare the current output value against the desired value.
   g Exit alarm simulation mode (set Alarm Simulation to ‘off’)
7. Check the high alarm signalization:
   a Set the alarm setting to high alarm (menu path: Input/Output / Current Out / Iout at Alarm).
   b Check the high alarm set-up for the desired value (default = 22 mA)
   c Simulate Error ‘Vbr.Sensor Fault’ (menu path: Diagnostics / Alarm Simulation).
   d Compare the current output value against the desired value
   e Simulate Error ‘Transmitter NV Error’ (menu path: Diagnostics / Alarm Simulation).
   f Compare the current output value against the desired value.
   g Exit alarm simulation mode (set Alarm Simulation to ‘off’)
8. Restore the setting for ‘Iout at Alarm’ back to the settings before.
9. Check the Front-End-Parameter storage: Go to menu ‘Device Setup / Plant/Customized / Field optimization / Vibration Compensa.’, read and note the setting and change the setting from ‘on’ to ‘off’ or vice versa.
10. Check the CB-parameter storage: Go to menu ‘Display’, select sub menu ‘Contrast’ and change the contrast value to a new value.
11. Wait for 1 min, then restart the device by switching the power supply off and back on.
12. Check the setting of the vibration compensation and the display contrast, after confirmation set them back to the original values.
13. Wait for 1 min, then restart the device by switching the power supply off and back on.
14. Check the values a 2nd time for correct storage of the original setting.

15. Check the device accuracy: Compare the measured values at three to five measuring points with a secondary standard of an installed device. This can be a calibrated reference device, a mobile calibration rig or a calibration rig in the plant. The measured values of the secondary standard and the device to be tested (Device Under Test, DUT) must be compared. The deviation between the measured flow rate and the set point may not up-scale the measured error specified for the safety function.
16. Activate write protection (see **Configuration** on page 9) and wait 10 seconds.
17. Remove the bridge from the safety DCS or use another method to restore the standard operating condition.
18. Once the test has been performed, the results must be documented and saved in a suited manner.

Note
During this test procedure, up to 98 % (PTC = 0.98) of dangerous unknown errors are detected. Systematic errors of safety functions, e.g. due to medium characteristics, operating conditions, deposits or corrosion are not fully taken into account by the test.

- If one of the test criteria of the test procedure described above are not fulfilled, the device may no longer be used as a part of a protection system.
- Take actions aimed at reducing systematic errors.

Extended service life of components used

The used failure rates of the components are valid within the workable service life in accordance with IEC 61508-2, section 7.4.9.5, notice 3

8 Configuration

The device has been configured and tested in accordance with the customer order. Nonetheless, the configuration of this device can be made via the local operating interface or the DTM via a HART® interface. Other configuration tools such as handheld terminals are not described in this instruction. Safe operation of the device cannot be guaranteed during this configuration.

Checklist before safe operation

Important checks need to be conducted here before you can proceed with safety operation:

- Before the first start-up of the device as a part of the safety functions, check whether the configuration of the device corresponds to the safety functions of the system.
- Check whether the correct device has been installed at the correct measuring point.
- After any changes are made to the device which is a part of the safety functions, e.g. change of the installation position of the device or change of the configuration, the safety function of the device must be tested.
- Once the safety function has been tested, operation of the device must be locked, since changes to the measuring system or the parameters can affect the safety function.

Write protection must be activated before power-up if it needs to run in safety operating mode.

Activating/Deactivating write protection

The device must be write-protected for the safety operation. This can be done by performing the following steps (see **DIP switch on the HART-communication board** on page 10):

1. Change SW1 for write protection to ‘read/write’ mode.
2. Use HART command 133. Slot 0 to activate write protection on the software.
3. Change SW1 for write protection to ‘read only’ mode.

… 8 Configuration

Configuring the Max./Min. Alarm

VortexMaster FSV430, FSV450 SwirlMaster FSS430, FSS450 provides two methods to configure the alarm condition. The DIP switch of the hardware (SW4) determines which source is used for the configuration (see **DIP switch on the HART-communication board** on page 10).

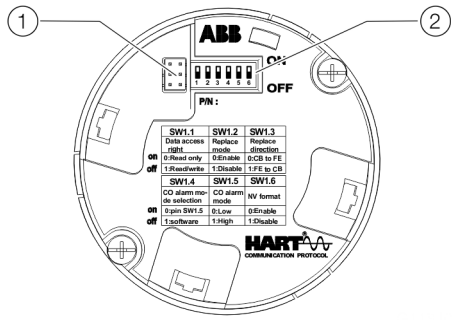
If SW4 has been configured as status 'ON', the alarm condition of SW5 is defined. If SW4 is configured to 'OFF', software objects determine the alarm condition. The 'alarmSelection' software object is a configuration object of the software which can be configured through HART command 131, slot 2 to the 'Max. Alarm' or 'Min. Alarm' mode. This object is saved to the non-volatile memory.

Reconfiguration of the device

If the end user wants to reconfigure a device which has been configured for safety operation, this can be done by performing the following steps:

1. Change SW1 for write protection to 'read/write' mode.
2. Use HART command 185 to deactivate write protection on the SW.
3. Change the configuration of the parameters.
4. Perform the steps listed in chapters **Checklist before safe operation** on page 9 and **Checklist before safe operation** on page 9.

DIP switch on the HART-communication board



(1) Interface for LCD indicators and service port (2) DIP switch

Figure 2: HART communication board / 4 to 20 mA

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.

DIP switch	Function
SW 1.1	Write protection switch On: Write protection active Off: Write protection deactivated
SW 1.4	Selection 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.

Possible error messages

The error messages are divided into four groups in accordance with the NAMUR classification scheme. Depending on the model variant (HART-/Modbus communication), not all error messages are always available.

Errors

Error no. / Range	Text on the LCD display	Cause	Remedy	Current output
F217.041 / Electronics	CO Readback High	Incorrectly calibrated current output or faulty electronics.	Contact ABB Service.	High Alarm
F216.042 / Electronics	CO Readback Low	Incorrectly calibrated current output or faulty electronics.	Contact ABB Service.	Low Alarm
F215.020 / Electronics	Sensor Comm Error	Communication errors between sensor and transmitter.	Check electrical connections between sensor and transmitter.	High Alarm or Low Alarm, depending on the alarm configuration (see **Activating/Deactivating write protection** on page 9).
F214.019 / Electronics	Sync. Signal Error	Error in frontend board	Switch transmitter off and back on again. If the error remains, contact ABB Service.	
F213.000 / Sensor	Sig. Sensor Fault	Errors in sensor self-test. Signal errors from Piezo sensor.	Contact ABB Service.	
F212.001 / Sensor	Int. T Sensor Fault	Errors in internal temperature sensor.	Contact ABB Service.	
F211.002 / Sensor	Vbr.Sensor Fault	Errors in sensor self-test. Signal errors from Piezo sensor.	Contact ABB Service.	
F210.016 / Electronics	Bad SNR	Signal-to-noise ratio for the sensor signal is outside of the set limit values.	Increase the flow rate. Check the setting in the ‘Process Alarm / Alarm Limits’ menu and adjust if necessary.	
F209.017 / Electronics	Sensor NV Error	Frontend board defective.	Replace the frontend board or contact ABB Service.	
F208.044 / Electronics	Sensor RAM Fault	Frontend board defective.	Replace the frontend board or contact ABB Service.	
F207.023 / Electronics	Transmitter NV Error	Faulty communication board.	Replace the communication board or contact ABB Service.	
F203.040 / Electronics	Current Output Fault	Current output errors.	Contact ABB Service.	

Note

CPU-internal errors are not displayed on the LCD indicator and always set the current output to ‘Low Alarm’, no matter how the alarm configuration is set.

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.

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10 Appendix

SIL 2 certificate

Certificate

Functional Safety

TÜVRheinland CERTIFIED

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ID 0600000000

No.: 968/FSP 1070.02/19

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		IEC 61326-3-1:2017
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 2024-02-22

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1070.02/19 dated 2019-02-22.
This certificate is valid only for products which are identical with the product tested.

Köln, 2019-02-22

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln
Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Thomas Steffens

TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, 51105 Köln / Germany
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www.fs-products.com
www.tuv.com

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Precisely Right.

Page 2 of Certificate No. 968/FSP 1070.02/19

TÜVRheinland®
Precisely Right.

Safety function: Measuring of the flow rate and output of 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 with a tolerance of ±4% of the span (16 mA). The safe 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.

Characteristics as per IEC 61508	**Value**
SIL	SIL 2 (single-channel architecture 1oo1, HFT = 0)
HFT	0
Device Type	B
Mode of operation	Low demand mode
SFF	CB board 94.3 % FE board 97.7 % Total: 97.07 %
Recommended time interval for proof-testing T1	2 years
PFD_{avg} for T1 = 2 years	CB board 1.00 E-03 10 % of SIL 2 FE board 1.46 E-03 14.6 % of SIL 2 Total: 2.47 E-03 24.7 % of SIL 2
λ_{sd}	1520 FIT
λ_{su}	2730 FIT
λ_{dd}	5080 FIT
λ_{du}	282 FIT
λ_{tot}	9612 FIT

1 FIT = 1 E-09 1/h

Remark: Failure rates of the electronic components as per Siemens SN 29500, calculated based upon an ambient temperature of 100 °C.

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:	Email:

Device details:

Type:	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	☐ explosive	☐ 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

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/flow

3KXF300003R4801

SM/FSV/FSS/430/450/SIL-EN Rev. C 01.2022