IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx FME 13.0004X**

Page 1 of 4

Status: **Current**

Issue No: 11

Date of Issue: 2024-02-15

Applicant: **ABB Engineering (Shanghai) Limited**
No 4528 KangXin Highway
KangQiao Town
Pudong NewDistrict
Shanghai 201319
China

Equipment: **FSV430 / 450 VortexMaster and FSS430 / 450 SwirlMaster Flow Meters**

Optional accessory:

Type of Protection: **Intrinsic safety, Flameproof, Non-sparking & Dust protection by enclosure**

Marking: See Annex to IECEx FME 13.0004X issue No.:11

IP66/67

Certificate history:

Issue 10 (2022-07-20)
Issue 9 (2021-11-01)
Issue 8 (2019-07-04)
Issue 7 (2018-08-17)
Issue 6 (2018-05-04)
Issue 5 (2017-02-22)
Issue 4 (2016-04-12)
Issue 3 (2015-10-13)
Issue 2 (2014-06-13)
Issue 1 (2014-03-04)

Approved for issue on behalf of the IECEx Certification Body: **Andrew Was**

Position: **Certification Manager**

Signature:
(for printed version)

Date:
(for printed version)

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FM Approvals Ltd
Voyager Place
Maidenhead
Berkshire
SL6 2PJ
United Kingdom

IECEx Certificate of Conformity

Manufacturer: **ABB Engineering (Shanghai) Limited**
No 4528, KangXin Road
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Manufacturing locations:

ABB Engineering (Shanghai) Limited
No 4528, KangXin Road
KangQiao Town
Pudong New District
Shanghai. 201319.
P.R. China
China

ABB Automation GmbH
Schillerstraße 72
32425 Minden
Germany

ABB Inc.
125 East County Line Road
Warminster, PA 18974
United States of America

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Edition:7.0	Explosive atmospheres - Part 0: Equipment - General requirements
IEC 60079-1:2014 Edition:7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-11:2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-31:2013 Edition:2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
IEC 60079-7:2017 Edition:5.1	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
IEC TS 60079-47:2021 Edition:1.0	Explosive atmospheres – Part 47: Equipment protection by 2-wire intrinsically safe Ethernet concept (2-WISE)

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

GB/FME/ExTR13.0006/00	GB/FME/ExTR13.0006/01	GB/FME/ExTR13.0006/02
GB/FME/ExTR13.0006/03	GB/FME/ExTR13.0006/04	GB/FME/ExTR13.0006/05
GB/FME/ExTR13.0006/06	GB/FME/ExTR13.0006/07	GB/FME/ExTR13.0006/08
GB/FME/ExTR13.0006/09	GB/FME/ExTR13.0006/10	GB/FME/ExTR13.0006/11

Quality Assessment Reports:

DE/TUN/QAR06.0012/08	GB/FME/QAR10.0007/13	NO/PRE/QAR17.0003/04

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EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The FSV430 / 450 VortexMaster and FSS430 / 450 SwirlMaster Flow Meters are used for measuring the flowrate of gasses, steam, and liquids. An option is available for direct temperature measurements. These temperature measurements can be used to monitor the fluid temperature or for the measurement of saturated steam in mass units. These products utilize piezo technology to measure flow.

The flow measuring system is designed as a 2-wire instrument with the supply power and the current output signal (4-20 mA) using the same pair of connection leads. A separate contact output can be assigned for any one of the following functions: Pulse output, minimum, or maximum alarm (temperature or flow rate or system alarm). In addition to the HART communications configuration an optional Fieldbus and Profibus communications and a 2-WISE option is available

The electronics enclosure is mounted directly to the flowmeter. This enclosure has a tool secured access door. The enclosure is either epoxy painted aluminium or stainless steel and has the ability for conduit connections. The converter can be mounted remotely from the flowmeter when it is installed in a location difficult to access or when the ambient conditions at the flowmeter are extreme. A special cable is utilized to interconnect the flowmeter and the converter. After the installation has been completed, the cable can be cut to the length required to reach the remote flowmeter.

The enclosure has a rating of IP66/67.

Operation Temperature Ranges:

The ambient operating temperature range of the SwirlMaster or VortexMaster is -40 °C to 85 °C. Process temperature range is -200 °C to 400 °C.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. When the manufacturer of the equipment has not identified the type of protection on the label, the user shall, on installation, mark the label with the type of protection used.
2. The painted surface of the FSS/FSV may store electrostatic charge and become a source of ignition in applications with a low relative humidity <~30% relative humidity where the painted surface is relatively free of surface contamination such as dirt, dust, or oil. Guidance on protection against the risk of ignition due to electrostatic discharge can be found in IEC TS 60079-32-1. Cleaning of the painted surface should only be done with a damp cloth.
3. Provision shall be made external to the equipment, to provide the transient protection device to be set at a level not exceeding 140 % of the peak rated voltage value of 45 V.
4. For option f (housing material) equals A1 or B1 the enclosure contains aluminium and is considered to present a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
5. For option h = G4 - Enhanced EMC Protection, the barriers chosen shall be galvanically isolating types.
6. Consult the manufacturer if dimensional information on the flameproof joints is necessary.
7. For “P1/F1” Output Option: PA/FF output, remote version, the barriers shall be galvanically isolating Barriers.
8. The temperature classification is dependent on the input parameters and the process temperature. See drawing 3KXF065215U0109.

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
Addition of new Front End and RCB board.

Mechanical changes to the internal arrangement for the Ex d version

Update to 'ec' from 'nA'

Annex:

Annex to IECEx FME 13.0004X issue 11.pdf

FM Approvals Ltd.
Voyager Place, Maidenhead, Berkshire, SL6 2PJ UK
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Ex ec IIC T6…T4 Gc Ta = -40°C to *
Ex ic IIC T6…T4 Gc Ta = -40°C to *
Ex tc IIIC T95°C Dc Ta = -40°C to 85°C
*see Description

Electrical data:
U = 42 V
I = 4…20 mA

Operation Temperature Ranges:
The ambient operating temperature range of the SwirlMaster or VortexMaster is between -40°C and 85°C depending on the Temperature Class and fluid temperature as detailed in the tables below.
Process temperature range is -200°C to 400°C.

FSV/FSS 430/450 without Display option

Temperature Class	Ambient Temperature	Maximum fluid temperature
T4	≤ 85 °C	90 °C
	≤ 82 °C	180 °C
	≤ 81 °C	280 °C
	≤ 79 °C	400 °C
T5	≤ 56 °C	90 °C
	≤ 53 °C	180 °C
	≤ 52 °C	280 °C
	≤ 50 °C	400 °C
T6	≤ 44 °C	90 °C
	≤ 41 °C	180 °C
	≤ 40 °C	280 °C
	≤ 38 °C	400 °C

FSV/FSS 430/450 with Display option L1

Temperature Class	Ambient Temperature	Maximum fluid temperature
T4	≤ 85 °C	90 °C
	≤ 82 °C	180 °C
	≤ 81 °C	280 °C
	≤ 79 °C	400 °C
T5	≤ 40 °C	90 °C
	≤ 37 °C	180 °C
	≤ 36 °C	280 °C
	≤ 34 °C	400 °C
T6	≤ 40 °C	90 °C
	≤ 37 °C	180 °C
	≤ 36 °C	280 °C
	≤ 34 °C	400 °C

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FSV/FSS 430/450 with Display option L2

Temperature Class	Ambient Temperature	Maximum fluid temperature
T4	≤ 60 °C	90 °C
	≤ 57 °C	180 °C
	≤ 56 °C	280 °C
	≤ 54 °C	400 °C
T5	≤ 56 °C	90 °C
	≤ 53 °C	180 °C
	≤ 52 °C	280 °C
	≤ 50 °C	400 °C
T6	≤ 44 °C	90 °C
	≤ 41 °C	180 °C
	≤ 40 °C	280 °C
	≤ 38 °C	400 °C

FSV430abcdefgh – Vortex Flow Transmitter – Integral Sensor
a = Explosion Protection Certification; N1, N8 or N9****
b = System Design; C1, C2, C3 or C4.
c = Process Connection Type / Meter Size / Connection Size: Not relevant to Ex product safety
d = Pressure Rating; Not relevant to Ex product safety.
e = Temperature Range of Measuring Medium; A1, B1, B2 or C1.
f = Housing Material / Cable Glands; A1, B1, S1, or T1.
g = Output Signal; A1***, F1***, H1, H5, M4** or P1***
h = Additional Options; (Any of the following) C*, CG2, CG3, G1, G2, G4, G5, GC* L1, L2, LD, LE, M*, N*, P*, RR, R5, S1, SD*, SM1, SM2, SM3, SM4, SM5, SM6, SM7, SM8, SP0, SP1, SP2, SP3, TC1, TCC, TCZ, TCS, TA4, TA5, U1, U2, NL*, NG* and/or NS*.
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Ex db ia IIC T6 Gb/Ga Ta = -40°C to +75°C
Ex tb IIIC T85°C Db Ta = -40°C to +75°C

Electrical data: U ≤ 42Vdc and the current output signal (4-20 mA)

U_m = 45 V

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T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700
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h = Additional Options; (Any of the following) C*, CG2, CG3, CT*, CU1, G1, G2, G4, G5, GC*, L1, L2, LD, LE, M*, N*, P*, RR, R5, S1, SC2, SC4, SC6, SM1, SD*, SM2, SM3, SM4, SM5, SM6, SM7, SM8, SP0, SP1, SP2, SP3, TC1, TCC, TCZ, TCS, TA4, TA5, U1, U2 , NC*, NL*, NG* and/or NS*.
* = Any single character – Not relevant to safety.
** = For Ex db ia; Ex tb; versions only.
**** N9 not applicable for Front End board version 20.

FSS450abcdefgh – Intelligent Swirl Flow Transmitter – Integral Sensor
a = Explosion Protection Certification; N3 or N9.****
b = System Design; C1, C2, C3 or C4.
c = Process Connection Type / Meter Size / Connection Size; Not relevant to Ex product safety
d = Pressure Rating; Not relevant to Ex product safety
e = Temperature Range of Measuring Medium; A1, B1, B2 or C1
f = Housing Material / Cable Glands; A1, B1, S1, or T1
g = Output Signal; A1, F1, H1, H5, M4** or P1
h = Additional Options; (Any of the following) C*, CG2, CG3, CT*, CU1, G1, G2, G4, G5, GC*, L1, L2, LD, LE, M*, N*, P*, RR, R5, S1, SM1, SD*, SM2, SM3, SM4, SM5, SM6, SM7, SM8, SP0, SP1, SP2, SP3, TC1, TCC, TCZ, TCS, TA4, TA5, U1, U2 , NC*, NL*, NG* and/or NS*.
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e = Temperature Range of Measuring Medium; A1, B1, B2 or C1
f = Housing Material / Cable Glands; A1, B1, S1, or T1
g = Output Signal; A1, F1, H1, H5, M4** or P1.
h = Additional Options; (Any of the following) C*, CG2, CG3, CT*, CU1, G1, G2, G4, G5, GC*, L1, L2, LD, LE, M*, N*, P*, RR, R5, S1, SC2, SC4, SC6, SM1, SD*, SM2, SM3, SM4, SM5, SM6, SM7, SM8, SP0, SP1, SP2, SP3, TC1, TCC, TCZ, TCS, TA4, TA5, U1, U2 , NC*, NL*, NG* and/or NS*.
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Ex ia IIC T6…T4 Ga Ta = -40 °C to *
Ex ia IIIC T95°C Db Ta = -40 °C to 85°C
FISCO Field Device
2-WISE Power Load
* see Description

Electrical data:

FM Approvals Ltd.
Voyager Place, Maidenhead, Berkshire, SL6 2PJ UK
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www.fmapprovals.com

FSV/FSS 430/450 without Display option – Output signal = H1 or H5
FSV/FSS 430/450 with Display option LD or LE – Output signal = H1 or H5

Power Supply – Ci = 17 nF Li = 10 µH

Temperature Class	Ambient Temperature	Maximum input current	Maximum input voltage	Maximum input power	Maximum fluid temperature
T4	≤ 85 °C	100 mA	30 V	0.75 W	90 °C
	≤ 82 °C				180 °C
	≤ 81 °C				280 °C
	≤ 79 °C				400 °C
T4	≤ 70 °C	160 mA	30 V	1.0 W	90 °C
	≤ 67 °C				180 °C
	≤ 66 °C				280 °C
	≤ 64 °C				400 °C
T5	≤ 56 °C	100 mA	30 V	1.4 W	90 °C
	≤ 53 °C				180 °C
	≤ 52 °C				280 °C
	≤ 50 °C				400 °C
T6	≤ 44 °C	50 mA	30 V	0.4 W	90 °C
	≤ 41 °C				180 °C
	≤ 40 °C				280 °C
	≤ 38 °C				400 °C

FSV/FSS 430/450 with Display option L2 – Output signal = H1 or H5
Power Supply Circuit Terminals: PWR+/PWR- EXT
Power Supply – Ci = 17 nF Li = 10 µH

Temperature Class	Ambient Temperature	Maximum input current	Maximum input voltage	Maximum input power	Maximum fluid temperature
T4	≤ 60 °C	100 mA	30 V	0.75 W	90 °C
	≤ 57 °C				180 °C
	≤ 56 °C				280 °C
	≤ 54 °C				400 °C
T4	≤ 60 °C	160 mA	30 V	1.0 W	90 °C
	≤ 57 °C				180 °C
	≤ 56 °C				280 °C
	≤ 54 °C				400 °C
T5	≤ 56 °C	100 mA	30 V	1.4 W	90 °C
	≤ 53 °C				180 °C
	≤ 52 °C				280 °C
	≤ 50 °C				400 °C
T6	≤ 44 °C	50 mA	30 V	0.4 W	90 °C
	≤ 41 °C				180 °C
	≤ 40 °C				280 °C
	≤ 38 °C				400 °C

FSV/FSS 430/450 with Display option L1 – Output signal = H1 or H5
Power Supply Circuit Terminals: PWR+/PWR- EXT
Power Supply – Ci = 17 nF Li = 10 µH

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Temperature Class	Ambient Temperature	Maximum input current	Maximum input voltage	Maximum input power	Maximum fluid temperature
T4	≤ 85 °C	100 mA	30 V	0.75 W	90 °C
	≤ 82 °C				180 °C
	≤ 81 °C				280 °C
	≤ 79 °C				400 °C
T4	≤ 70 °C	160 mA	30 V	1.0 W	90 °C
	≤ 67 °C				180 °C
	≤ 66 °C				280 °C
	≤ 64 °C				400 °C
T5	≤ 40 °C	100 mA	30 V	1.4 W	90 °C
	≤ 37 °C				180 °C
	≤ 36 °C				280 °C
	≤ 34 °C				400 °C
T6	≤ 40 °C ≤ 37 °C	50 mA	30 V	0.4 W	90 °C 180 °C
	≤ 36 °C				280 °C
	≤ 34 °C				400 °C

FSV/FSS 430/450 - Output signal = P1 and F1
Power Supply Circuit Terminals: PWR+/PWR- EXT
Ui = 24 Vdc
Ii = 250 mA
Pi = 1,2 W
Ci < 5 nF
Li < 10 µH

FSV/FSS 430/450 - Output signal = P1 and F1 with FISCO
Power Supply Circuit Terminals: PWR+/PWR- EXT
Ui = 17.5 Vdc
Ii = 380 mA
Pi = 5.32 W
Ci < 5 nF
Li < 10 uH

FSV/FSS 430/450 - Output signal = A1 with 2-WISE/FISCO
Power Supply Circuit Terminals: PWR+/PWR- EXT
Ui = 17.5 Vdc
Ii = 380 mA
Pi = 5.32 W
Ci < 5 nF
Li < 10 µH

FSV/FSS 430/450 - Output signal = A1 (resistively limited associated apparatus)
Power Supply Circuit Terminals: PWR+/PWR- EXT
Ui = 17.5 Vdc
Ii = 380 mA
Pi = 2.1 W
Ci < 5 nF
Li < 10 µH

Output Parameters from the FSV/FSS 430/450 Remote Transmitter – Output signal = H1 or H5
Terminals: /M/R, HS, RX, DX, GND and VDD
Uo = 6.0 V

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Io = 160 mA
W = 1.75 W
Co = 23.23 nF
Lo = 0

Output Parameters from the FSV/FSS 430/450 Remote Transmitter – Output signal = F1 or P1
Terminals: /M/R, HS, RX, DX, GND and VDD
Uo = 5.36 V
Io = 380 mA
W = 128.2 mW
Co = 36.3 µF
Lo = 69 µH

FSV/FSS 450 Contact Output and Analogue Input parameters

Analogue input circuit
Terminals: AI+, AI-
Analogue input circuit – Ci = 7 nF Li = 0

Temperature Class	Ambient Temperature Options other than Display Option = L1	Ambient Temperature Integrated display option = L1 only	Maximum input current	Maximum input voltage	Maximum input power	Maximum fluid temperature
T4	≤ 85 °C	≤ 60 °C	100 mA	30 V	0.75 W	90 °C
	≤ 82 °C	≤ 57 °C				180 °C
	≤ 81 °C	≤ 56 °C				280 °C
	≤ 79 °C	≤ 54 °C				400 °C
T4	≤ 70 °C	≤ 60 °C	160 mA	30 V	1.0 W	90 °C
	≤ 67 °C	≤ 57 °C				180 °C
	≤ 66 °C	≤ 56 °C				280 °C
	≤ 64 °C	≤ 54 °C				400 °C
T5	≤ 40 °C	≤ 56 °C	100 mA	30 V	1.4 W	90 °C
	≤ 37 °C	≤ 53 °C				180 °C
	≤ 36 °C	≤ 52 °C				280 °C
	≤ 34 °C	≤ 50 °C				400 °C
T6	≤ 40 °C	≤ 44 °C	50 mA	30 V	0.4 W	90 °C
	≤ 37 °C	≤ 41 °C				180 °C
	≤ 36 °C	≤ 40 °C				280 °C
	≤ 34 °C	≤ 38 °C				400 °C

Contact Output Circuit
Terminals: DO+, DO-
Contact Output Circuit – Ci = 7 nF Li = 0

Temperature Class	Maximum input current	Maximum input voltage	Maximum input power
T4	30 mA	30 V	1.0 W
T5	30 mA	30 V	1.0 W
T6	30 mA	30 V	1.0 W

FSV430abcdefgh – Vortex Flow Transmitter – Integral Sensor
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c = Process Connection Type / Meter Size / Connection Size: Not relevant to Ex product safety
d = Pressure Rating; Not relevant to Ex product safety.
e = Temperature Range of Measuring Medium; A1, B1, B2 or C1.
f = Housing Material / Cable Glands; A1, B1, S1, or T1.
g = Output Signal; A1, F1, H1, H5 or P1.
h = Additional Options; (Any of the following) C*, CG2, CG3, CT*, CU1, G1, G2, G4, G5, GC*, L1, L2, LD, LE, M*, N*, P*, RR, R5, S1, SM1, SD*, SM2, SM3, SM4, SM5, SM6, SM7, SM8, SP0, SP1, SP2, SP3, TC1, TCC, TCZ, TCS, TA4, TA5, U1, U2 , NC*, NL*, NG* and/or NS*.
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