Flame Arrestors Series FA

Instruction Manual
ESSENTIAL INSTRUCTIONS
READ THIS PAGE BEFORE PROCEEDING!

Emerson Process Management (Rosemount Analytical) designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you MUST properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions MUST be adhered to and integrated into your safety program when installing, using and maintaining Emerson Process Management (Rosemount Analytical) products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- **Read all instructions** prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, **contact your Emerson Process Management (Rosemount Analytical) representative** for clarification.
- **Follow all warnings, cautions, and instructions** marked on and supplied with the product.
- **Inform and educate your personnel in the proper installation, operation, and maintenance of the product.**
- **Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes.** Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, **use qualified personnel** to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson Process Management (Rosemount Analytical). Unauthorized parts and procedures can affect the product’s performance, place the safe operation of your process at risk, and VOID YOUR WARRANTY. Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- **Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.**

The information contained in this document is subject to change without notice.

3rd Edition 2009-10

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PREAMBLE

This instruction manual provides information about FA series flame arrestors concerning functions, procedures, installation, operation and maintenance. This instruction manual covers several FA series flame arrestor variations and therefore may describe configurations and/or options not part of your arrestor.

DEFINITIONS

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout this publication.

**WARNING**

Highlights an operation or maintenance procedure, practice, condition, statement, etc.

If not strictly observed, could result in injury, death, or long-term health hazards of personnel.

**CAUTION**

Highlights an operation or maintenance procedure, practice, condition, statement, etc.

If not strictly observed, could result in damage to or destruction of equipment, or loss of effectiveness.

**NOTE**

Highlights an essential operating procedure, condition or statement.
IMPORTANT

Safety Instructions

The following safety instructions apply specifically to all EU member states. They should be strictly adhered to in order to assure compliance with the applicable directives for equipment to be used in hazardous areas. Non-EU states should also comply with the following unless superseded by local or National Standards.

1. Where equipment or covers are marked with the symbol to the right, refer to the Instruction Manual for instructions.

2. Further graphical symbols used in this product:

- Explosion Hazard!
- Harmful (to Health)!
- Toxic!

All graphical symbols used in this product are from one or more of the following standards: EN61010-1, IEC417, and ISO3864.

Operating and Maintaining this Component

This component has left the factory in compliance with all applicable safety regulations. To maintain this operating condition, the user must strictly follow the instructions and consider the warnings in this manual or provided on the component.

Substances hazardous to health may emerge from the component’s exhaust. Please pay attention to the safety of your operation personnel. Protective measures must be taken, if required.
INTENDED USE STATEMENT

FA series flame arrestors are intended to be used as flame arrestors for industrial purposes. They must not be used in medical, diagnostic or life support applications nor as safety devices, and no independent agency certifications or approvals are to be implied as covering such applications!

SAFETY SUMMARY

To avoid loss of life, personal injury and damage to this equipment and on-site property, do not operate or service this equipment before reading and understanding this instruction manual and receiving appropriate training. Save these instructions.

WARNING

EXPLOSION HAZARD!

This component must be used in compliance with the conditions given in a later section of this manual!

WARNING

DANGER TO LIFE! EXPLOSION HAZARD!

Verify all gas lines are connected as described within this manual and tight!

Improper gas connections may cause explosion, serious injury or death!

Do not operate the flame arrestors outside the conditions, specified in the Operating Conditions section of this manual.

- Exhaust lines must be installed in a descending way, need to be pressureless, frost-protected and in compliance with applicable legislative requirements!
Safety Instructions

Changes within this manual, compared to the 06/2006 edition

• New EC Certificate of Compliance
• New definition of how to carry out pressure drop test
1 Operating Conditions, Installation, Maintenance

1-1 Use

The volume flame arrestors of type FA 01/02/03 comply with the standard EN 12874:2001 - "Flame Arrestors - Performance requirements, test methods and limits for use".

The general suitability as a deflagration flame arrestor when used with flammable gas/air mixtures of the explosion group IIC (maximum gap < 0,5 mm) has been verified by tests executed by FTZU (FYZIKÁLNÉ TECHNICKÝ ZKUŠEBNÍ ÚSTAV) in Czech, European ATEX Notified Body no. 1026. The results are confirmed by the issued EC Type Examination Certificate FTZU 06 ATEX 0164.

Conditions for use

The following limits have to be considered when using these flame arrestors:

- maximum operational pressure: 110 kPa abs.
- maximum operational temperature: 60 °C.

The basic safety requirements as given in the directive 94/9/EC have been confirmed by issuing the Declaration of Conformity, shipped together with each flame arrestor as part of this documentation.

The flame arrestor must only be installed and operated in compliance with the conditions for use given in the EC Type Examination Certificate, any use outside these conditions is prohibited.

1-2 Construction

The flame arrestors of type FA 01/02/03 are made of 2 parts: one inner massive cylinder with three sections and a surrounding outer tube. Both parts together form an annular gap, meeting the specifications for gas group IIC, and are welded together.

Gas fittings (¾" or ⅜") provided at both ends of the flame arrestors support connecting it to stainless steel tubings with outer diameters of 6,35 mm or 3,18 mm. ¾" fittings may optionally be supplied with clamping rings for pipes of 6 mm diameter.

Three different variations of flame arrestors are available, differing by the attached gas fittings:
- FA 01: one side ¾", the other side ⅜"
- FA 02: both ¾"
- FA 03: both ⅜"

Note! ¾" fittings may optionally be supplied with a clamping ring for pipe diameters of 6 mm.

When not in use (e.g. during transport) the fittings have to be sealed to protect the inside from moisture and contamination.
1-3 Markings

The flame arrestors are marked with the following information:

Company Name:
Emerson Process Management, Industriestrasse 1, D-63594 Hasselroth

Type:
FA 01 or FA 02 or FA 03, depending on configuration

Serial Number
Year of manufacturing

EC Type Examination:

\[\text{CE} \ 0035 \text{ Ex II G IIC}
\]

FTZU 06 ATEX 0164

Standard: EN 12874:2001

1-4 Operating Conditions

The basic operating conditions are:

Operating Temperature: \(-20\) °C to \(+60\) °C

Operating Pressure: \(80\ \text{kPa} \leq p_0 < 110\ \text{kPa}\)

Gas group: IIC acc. EN 12874

Not for gases and gas mixtures affecting stainless steel (e.g. by corrosion).

There are no orientation limits for installation.

Each fitting may either be used as inlet or outlet.

The use as volume flame arrestors is limited to type X-STREAM gas analyzers, manufactured by EMERSON PROCESS MANAGEMENT GmbH & Co. OHG, Germany.
1-5 Installation

Consider all applicable rules when arranging and installing type FA flame arrestors.
Before connecting a pipe line remove the sealing plug.
Depending on the flame arrestor model the following pipe diameters are supported:
   - FA 01: one side \( \frac{3}{8} \)", other side \( \frac{1}{2} \)"
   - FA 02: both sides \( \frac{1}{2} \)"
   - FA 03: both sides \( \frac{3}{8} \)"

Note!
\( \frac{1}{4} \)" fittings may optionally be supplied with a clamping ring for pipe diameters of 6 mm.
Installation of the FA is independent from the direction of the in-coming flame (bi-directional flame arrester).
When thightening the fitting counterhold the flame arrester with a wrench placed at the hexagon (items 5 of fig. 1) next to the cap nut (items 1, 4) to be tightened.

Always counterhold the flame arrester while thightening fittings; otherwise the flame arrester may be damaged!

Vertical as well as horizontal mounting position is permitted.
The flame arrester can be mounted into a female threat of M18 by means of its outside threat. An o-ring seals the threat against the enclosure. Place the wrench at hexagon item 6 of fig. 1. Insert the flame arrester from the enclosure’s outside into the threat to protect it against ambient (o-ring to come placed on the enclosure’s outside; fig. 2).

Tools required for installing a FA:
- \( \frac{3}{8} \)" fitting: Wrench sizes \( \frac{3}{16} \)"
- \( \frac{1}{4} \)" fitting: Wrench sizes \( \frac{1}{2} \)" and \( \frac{3}{16} \)"
- Enclosure hexagon: Wrench size 17 mm

Exhaust lines must be installed in a descending way, need to be pressureless, frost-protected and in compliance with applicable legislative requirements!
1-6 Maintenance

WARNING

EXPLOSION HAZARD AND HAZARD FROM GASES!

Maintaining the FA shall be carried out considering all applicable safety and legislative rules. Maintenance should be carried out by instructed and trained personnel only!

Before opening gas paths they must be purged with ambient air or neutral gas (N₂) to avoid hazards caused by toxic, flammable, explosive or harmful to health sample gas components!

Maintenance is limited to performing visual inspections, leak testing and pressure drop tests on at least a regular basis. The time interval has to be operator defined, considering operating conditions and composition of supplied gases.

The flame arrestor is completely welded, no inner parts are user accessible. Therefore the flame arrestor has to be replaced by a new one, if
- a fire occurred on the flame arrestor element
- the housing or the fittings show visible mechanical damages
- contamination of inner elements is detected (e.g. by pressure drop test)
- the flame arrestor did not pass leak testing

1-6-1 Leak Testing

The following procedure describes how to perform a leak test with the flame arrestor installed at the instrument.

Required tools
- Manometer for max. 7.25 psi (500 mbar)
- Stop valve

Procedure
- Connect the manometer to the analyzer's sample gas outlet to the flame arrestor's outlet fitting (disconnect external gas lines).
- Install the stop valve between gas inlet fitting and a Nitrogen (N₂) supply.
- Open the stop valve until the internal gas path is under pressure of approx. 0.725 psi/50 mbar (corresponding to approx. 19.7 inch/500 mm water column)
- Close the stop valve. After a short time for the pressure to balance, the level must not change over a time period of approx. 5 minutes!

When using a water filled u-tube manometer prevent water from entering backwards into the flame arrestor!

Don't exceed the maximum pressure applicable to the analyzer as specified in its instruction manual!
1-6-2 Pressure Drop Test

To measure the pressure drop at a flame arrestor

- disconnect internal and external gas lines
- connect a flow meter in series to the flame arrestor
- connect an air or nitrogen supply to the flow meter
- connect a manometer in a way to measure the pressure at the flame arrestor inlet against the outlet
- adjust the flow to 1 l/min and compare the resulting pressure drop to the following reference value: \((5.1 ± 1)\) hPa.

Replace the flame arrestor if the measured pressure value differs more than 10% from the reference value given above.
EC-Type Examination Certificate

Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres
Directive 94/9/EC

EC-Type Examination Certificate Number:
FTZÚ 06 ATEX 0164

Equipment: Volume bi-directional static flame arrester, Type FA 91 or FA 92, FA 03
Manufacturer: Emerson Process Management GmbH & Co. OHG
Address: Industriestraße 1, D-63594 Hasselroth, Germany

This equipment or protective system and any of acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

The Physical Technical Testing Institute, notified body number 1026 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No 08/0164 dated August 2006

Compliance with Essential Health and safety requirements has been assured by compliance with EN 12874:2001

If the sign ‘X’ is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

The EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and testing of the specified equipment or protective system in accordance to the directive 94/9/EC.

Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

The marking of the equipment or protective system shall include following:

This EC-Type Examination Certificate is valid till: 31.08.2011

Responsible person:
Dipl. Ing. Sindler Jaroslav
Head of certification body

Date of issue: 25.06.2006

Number of pages: 1/3

This certificate is granted subject to the general conditions of the Physical Technical Testing Institute. This certificate may only be reproduced in its entirety and without any change, schedule included.

FTZÚ, Plzeňská 7, 716 07 Ostrava Radnice, tel: +420 598 231 111, fax: +420 598 232 672, e-mail: ftzu@ftzu.cz
Physical Technical Testing Institute
Ostrava-Radvanice

Schedule

EC-Type Examination Certificate N° FTZÚ 06 ATEX 0164

(16) Description of Equipment or Protective System:
The deflagration static flame arrester type FA 01 or FA 02 or FA 03 gas group IIC is designed as volume arrester – for application in analyser enclosure type X-STREAM FD. The flame arrester consists of body, which forms an external part of flameproof joint. Inside part of cylindrical flameproof joint is a compact flame arrester element with continuous gap. The flame arrester element is forced in flame arrester body and welded. Difference between variants FA 01 or FA 02 or FA 03 is only in dimension and type of input and output screwed fitting.

(16) Report No.: 06/164 ... 8 pages

(17) Special conditions for safe use: --

(18) Essential Health and Safety Requirements:
18.1 Service temperature and pressure (absolute) \(p_0\) are restricted in temperature range:
\[-20 ^\circ\text{C} \leq T_0 \leq 60 ^\circ\text{C}\]
\[0,8 \times 10^5 \, \text{Pa} \leq p_0 \leq 1,1 \times 10^5 \, \text{Pa}\]
18.2 During the installation and service of arrester the manufacturer’s instruction for use issued on 09/2009 and requirements of EN 12874-2001, cl. 8.4.3; 12.1 must be fullfil.

Responsible person: ____________________________
Dipl. Ing. Sindler Jaroslav
Head of certification body

Date of issue: 28.08. 2006
Number of pages: 2/3

This certificate is granted subject to the general conditions of the Physical Technical Testing Institute. This certificate may only be reproduced in its entirety and without any change, schedule included.

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Emerson Process Management GmbH & Co. OHG

1-7
1-7 Certificate

Physical Technical Testing Institute
Ostrava-Radvanice

Schedule

EC-Type Examination Certificate N° FTZÚ 06 ATEX 0164

LIST OF DOCUMENTATION

- Drawings No. 4.271-6625/3 on 16.02.2006
- Drawings No. 4.271-6623/3 on 16.02.2006
- Drawings No. 4.271-6622/3 on 16.02.2006
- Drawings No. 4.271-6638/4 on 16.02.2006
- Drawings No. 4.271-0539/4 on 15.02.2006
- Drawings No. 4.271-0740/4 on 09.02.2006
- Description on 09.06.2006
- Instruction for use on 09/2006
EC DECLARATION OF CONFORMITY

Document number: RAEEA - ATEX E2
Date: February 2003

We, Emerson Process Management GmbH & Co. OHG
located at Industriestrasse 1, D-63594 Haselroth, Germany
declare under our sole responsibility that the above mentioned types
FA 01, FA 02, FA 03,
approved for service in hazardous locations and marked
CE with H 2 G
Ex II G E
FTZU 96 ATEX 0164

conform to the provisions of the following European Directive:

94/9/EC Equipment and protective systems in potentially explosive atmospheres
with the application of the harmonized standard:
EN 13876:2001 Flame Arresters - Performance requirements, test methods
and limits for use
Production is monitored according to VDI by:
TEV RHEINLAND INDUSTRIE SERVICE GmbH
Am Grünen Stein, D-51165 Köln, Germany
Notified Body of the European Union under directive 94/9/EC, identification no. 0035

Haselroth, February 2003

(Signature)

Andre Konig
(Vice President)

ROSEMOUNT Analytical
EMERSON Process Management