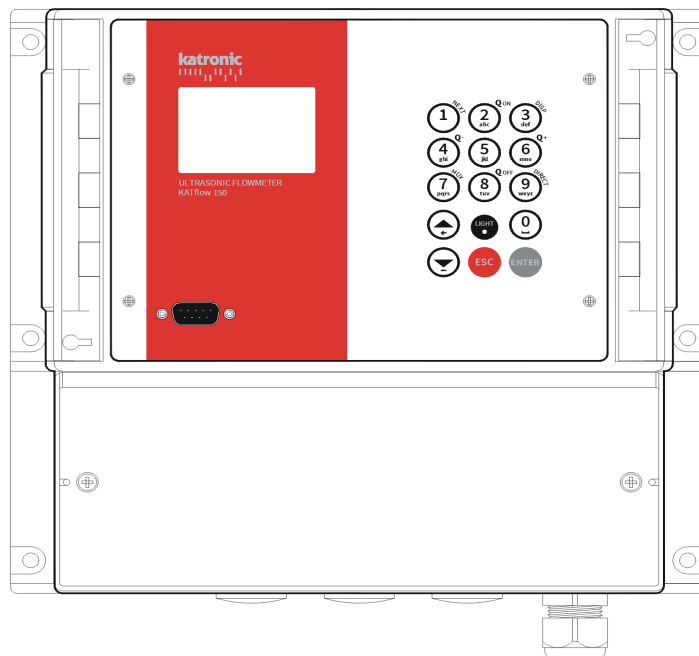




## Supplement ATEX Safety Instructions



## **KATflow 150** **Ultrasonic Flowmeter**

including type K1Ex and K4Ex transducers  
for use in Zone 1 and 2 hazardous areas

**Note:** These instructions are an extension to the  
KF150 Operating Instructions

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**Supplement Safety Instructions**  
**KATflow 150 and K1Ex/K4Ex**  
Version V14EN\_160420  
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# KATflow 150 and K1Ex/K4Ex Supplement Safety Instructions

## Table of Contents

	Page
<b>1 Safety instructions</b> .....	<b>4</b>
1.1 Symbols used in these operating instructions.....	4
1.2 Safety instructions for the operator.....	5
1.3 Languages/translations.....	5
1.4 Warranty.....	5
1.5 Return policy.....	5
1.6 Legislative requirements.....	6
<b>1 Introduction</b> .....	<b>7</b>
1.1 System configurations.....	7
1.2 Approvals.....	8
1.2.1 <i>Clamp-on ultrasonic sensors</i> .....	8
1.2.2 <i>Flowmeter</i> .....	9
1.3 Temperature Limits.....	9
1.3.1 <i>Clamp-on ultrasonic sensors</i> .....	9
1.3.2 <i>Flowmeter</i> .....	10
1.4 Special conditions of safe use.....	10
1.5 EC type examination certificates.....	10
<b>2 Installation</b> .....	<b>11</b>
2.1 Sensor installation in the hazardous area.....	11
2.2 Flowmeter installation in the safe area.....	11
2.3 Flowmeter installation in the hazardous area.....	11
<b>3 Electrical installation</b> .....	<b>12</b>
3.1 Cabling and junction box.....	13
3.1.1 <i>Signal cable parameters</i> .....	14
3.2 Cable glands.....	14
3.3 Equipotential bonding.....	14
3.3.1 <i>Clamp-on ultrasonic sensors</i> .....	14
3.3.2 <i>Flowmeter</i> .....	14
3.4 Process inputs/outputs.....	14
<b>4 Maintenance</b> .....	<b>15</b>
4.1 Opening/closing KF150-Exd door.....	15
4.2 Service/Repair.....	15
4.3 Customer Return Note (CRN).....	16
<b>5 Technical data</b> .....	<b>17</b>
5.1 K1Ex and K4Ex clamp-on ultrasonic sensors.....	17
5.2 KF150 flowmeter.....	17
<b>6 Certificate of Conformity</b> .....	<b>18</b>

# 1 Safety instructions

## 1.1 Symbols used in these operating instructions



### Danger

This symbol represents an immediate hazardous situation which could result in **serious injury, death** or **damage to the equipment**. Where this symbol is shown, do not use the equipment further unless you have fully understood the nature of the hazard and have taken the required precautions.



### Danger

This warning refers to an immediate danger when using the equipment in a hazardous area.



### Attention

This symbol indicates important instructions which should be respected in order to avoid damaging or destroying the equipment. Follow the the precautions given in these instructions to avoid the hazard. Call our service team if necessary.



### Call service

Where this symbol is shown call our service team for advice if necessary.



### Note

This symbol indicates a note or detailed set-up tip.



Information point.



Operator keys are printed in bold typeface and placed in pointed brackets.

## 1.2 Safety instructions for the operator

These supplementary instructions are provided in addition to the KF150 Operating Instructions and are only applicable for sensor and, optionally, transmitter installations in hazardous areas.



- Do not install, operate or maintain this flowmeter without reading, understanding and following the operating instructions, otherwise injury or damage may result.
- Study these operating instructions carefully before the installation of the equipment and keep them for future reference.
- Observe all warnings, notes and instructions as marked on the packaging of the equipment and detailed in the operating instructions.
- Do not change or alter the sensors or the transmitter. Unauthorized changes may affect the explosion safety of the equipment.
- The special conditions of use as described in the EC type examination certificate must be followed. In addition, all given electrical specifications must be met.
- The electrical installation must be in accordance with applicable national standards (equivalent to IEC 364) in addition to the requirements for installation in hazardous areas according to EN 60079-14 "Electrical installations in hazardous locations" or equivalent national standards.
- Installation, operation, service and maintenance of the equipment must only be performed by authorised and trained personnel with the necessary knowledge and qualifications in explosion safety.
- If the product does not operate normally, please refer to the service and troubleshooting instructions, or contact KATRONIC for help.

## 1.3 Languages/translations

These safety instructions are compiled in English. If English is not your native language and you have difficulties understanding the content of these instructions, please contact KATRONIC and/or your authorised local distributor for a translation of this text.

## 1.4 Warranty

- Any product purchased from KATRONIC is warranted in accordance with the relevant product documentation and as specified in the sales contract provided it has been used for the purpose for which it has been designed and operated as outlined in the operating instructions. Misuse of the equipment will immediately revoke any warranty given or implied.
- Responsibility for suitability and intended use of this ultrasonic flowmeter rests solely with the user. Improper installation and operation of the flowmeter may lead to a loss of warranty.
- Please note that there are no operator-serviceable parts inside the equipment. Any unauthorised interference with the product will invalidate the warranty.

## 1.5 Return policy

If the flowmeter has been diagnosed to have a problem, it can be returned to KATRONIC for repair using the Customer Returns Note (CRN) included in this manual. KATRONIC regret that for safety reasons we cannot accept the return of the equipment unless accompanied by the completed CRN.

## 1.6 Legislative requirements

### **CE marking**

The flowmeter is designed to meet the safety requirements in accordance with sound engineering practice. It has been tested and has left the factory in a condition in which it is safe to operate. The equipment is in conformity with the statutory requirements of the EC directive and complies with applicable regulations and standards for electrical safety EN 61010, hazardous area equipment 2014/34/EU and electro-magnetic compatibility EN 61326. A CE Declaration of Conformity has been issued in that respect, a copy of which can be found in chapter 6 of these operating instructions.

### **WEEE Directive**

The Waste Electrical and Electronic Equipment Directive (WEEE Directive) aims to minimise the impact of electrical and electronic goods on the environment by increasing re-use and recycling and by reducing the amount of WEEE going to landfill. It seeks to achieve this by making producers responsible for financing the collection, treatment, and recovery of waste electrical equipment, and by obliging distributors to allow consumers to return their waste equipment free of charge.



KATRONIC offers its customers the possibility of returning unused and obsolete equipment for correct disposal and recycling. The Dustbin Symbol indicates that when the last user wishes to discard this product, it must be sent to appropriate facilities for recovery and recycling. By not discarding this product along with other household-type waste, the volume of waste sent to incinerators or landfills will be reduced and natural resources will be conserved. Please use the Customer Return Note (CRN) in chapter 4.3 for return to KATRONIC.

### **RoHS Directive**

All products manufactured by KATRONIC are compliant with the relevant aspects of the RoHS Directive.

# 1 Introduction

## Clamp-on transit-time flowmeter

The KATflow 150 is a fixed installation ultrasonic flowmeter employing clamp-on sensors for the measurement of liquids in full, enclosed pipes. Flow measurements can be undertaken without interruption of the process or interference with the integrity of the pipeline. The clamp-on sensors are attached to the outside of the pipes. The KATflow 150 uses ultrasonic signals for measurement of the flow, employing the transit-time method. The sensors of type K1Ex and K4Ex have been specifically designed for use in hazardous areas. The flow transmitter KF150 is available in different enclosure formats for installation in safe or in hazardous areas.

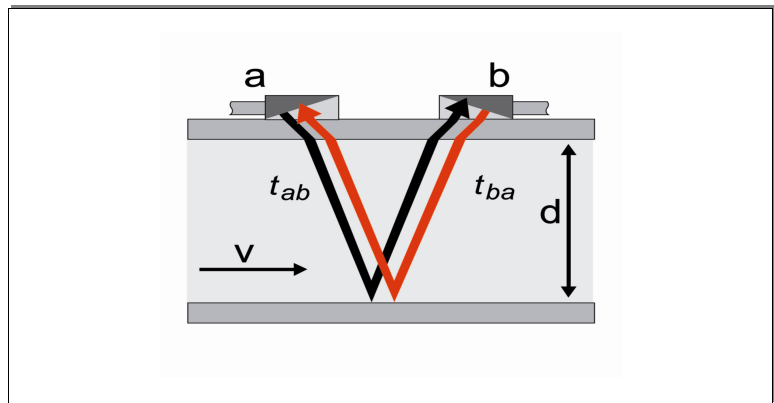


Illustration 1: Clamp-on ultrasonic flowmeter principle



### 1.1 System configuration

Only sensors of type K1Ex and K4Ex can be installed in Zone 1 or 2 hazardous areas. The KATflow 150 flow transmitter with the standard ABS housing must be located in the safe area.

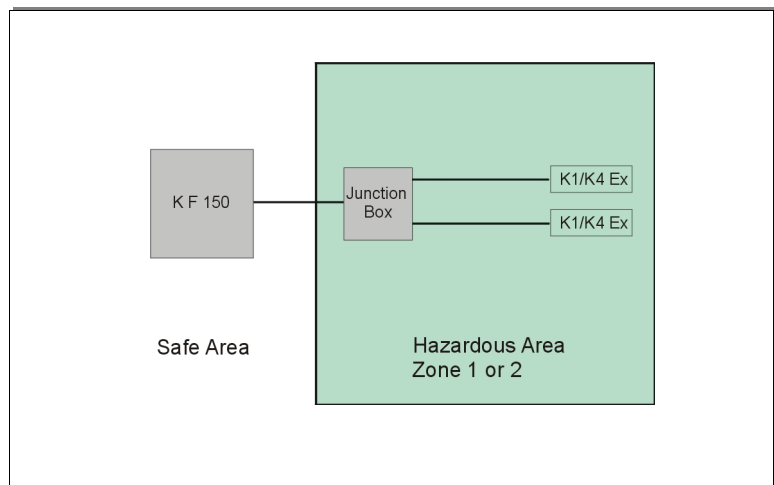


Illustration 2: Configuration of Ex-sensors and KF150 in safe area

If the KATflow 150 flow transmitter is housed in a explosion-proof enclosure type CCFE, then the transmitter can be installed in hazardous areas 1 or 2.

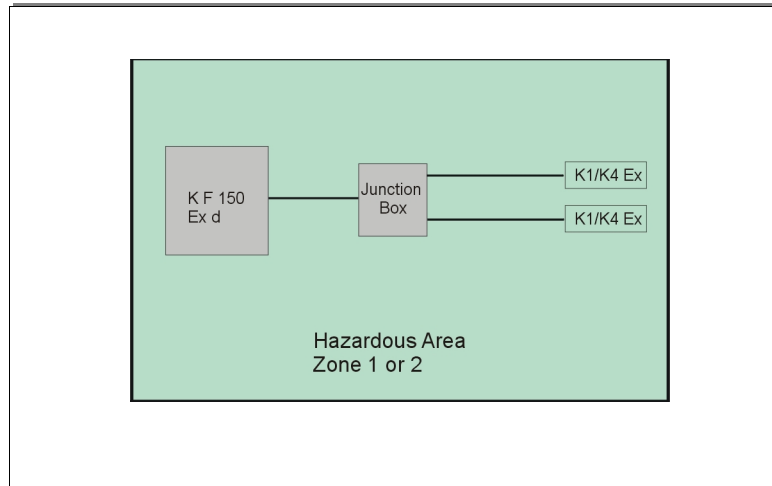


Illustration 3: Configuration of Ex-sensors and KF150-Exd in hazardous area

## 1.2 Approvals

### 1.2.1 Clamp-on ultrasonic sensors

The clamp-on ultrasonic sensors are manufactured according to European Directive 2014/34/EU. The equipment is approved for installation and use in hazardous classified areas of Zone 1 and 2 by the certification agency TRaC (ATEX notified body identification 0891). The protection concept for the sensors is “encapsulation” as per EN 60079-18.

The K1Ex, K4Ex transducers meet the requirements of the following standards:

Standard	Description
EN 60079-0	Electrical equipment for use in explosive atmosphere – General requirements
EN 60079-18	Electrical equipment for use in explosive atmosphere – Encapsulation “m”
EN 61241-0	Electrical equipment for use in the presence of combustible dust – General requirements
EN 61241-18	Electrical equipment for use in the presence of combustible dust – Protection by enclosures “tD”

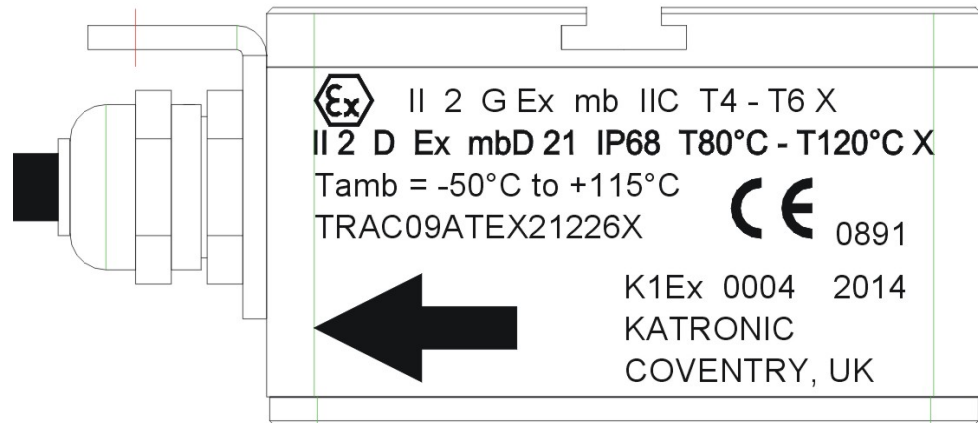


Certificate number of the sensors

K1Ex and K4Ex ultrasonic sensors

**TRAC 09 ATEX 21226 X**

Certification label (K1 shown)

**1.2.2 Flowmeter**

The KATflow 150 in its standard ABS enclosure format **must be placed in the safe area**. K1Ex and K4Ex sensors which are located in the hazardous area Zone 1 or 2 are connected to the KATflow 150 transmitter either directly or through an Ex certified junction box with cables provided by KATRONIC.

The KATflow 150 electronics can be mounted in an Ex d certified explosion-proof housing in which case the installation of the transmitter is allowed in hazardous areas classified as Zone 1 and 2. The protection concept for the KF150-Exd version is “explosion-proof” as per EN 60079-1.

Certificate of the Ex d control unit (KF150-Exd)

KATflow 150

in CCFE-3B-1510 type Ex d enclosure

**CESI 01 ATEX 027****1.3 Temperature Limits****1.3.1 Clamp-on ultrasonic sensors**

The K1Ex and K4Ex clamp-on ultrasonic sensors can be used for the following process temperatures depending on the Temperature Class specified for the application:

Gas groups:

Temperature Class	Process temperature range
T6	-50 ... +75 °C
T5	-50 ... +90 °C
T4	-50 ... +115 °C

### Dust groups:

The ambient temperature is the limiting factor but cannot exceed +115 °C therefore the max. temperature designation is T80°C - T120°C.

### **1.3.2 Flowmeter**

For the standard KF150 in the safe area the ambient temperature range is -10 ... 60 °C.

The KF150-Exd for installation in hazardous area zones 1 and 2 can be used at ambient temperatures between -20 ... 40 °C.

### **1.4 Special conditions of safe use**



- The transducer must only be used in conjunction with a transmitter unit (e.g. KF150) which conforms to the signal parameters and thermal protection conditions as outlines in the special conditions of safe use.
- The transducer must be securely fixed to the pipe to protect the PEEK surface of the sensors from mechanical impact and electrostatic charging.
- Where the connecting cable may be subject to mechanical damage then the user shall provide additional mechanical protection.
- Clause 7.9.2.1, EN60079-18: The transmitting circuitry must be protected from a mains transient fault by fuses and they shall be rated in accordance with IEC 60127 or ANSI/UL 248-1, the fuse time-current characteristic shall ensure that the COT of the encapsulating compound and T class are not exceeded and shall have a breaking capacity greater than 1500 A. In addition, the fuses shall be non-resettable and shall only be replaced by opening the enclosure. The separation distance across the fuse shall meet Table 5 of EN60079-11.
- Clause 10, EN60079-18: The pulsed supply to the transducers must not exceed 330 at a maximum frequency of 4 MHz.

### **1.5 EC type examination certificates**

*See ATEX documentation pack, copies attached.*



### 3 Electrical installation

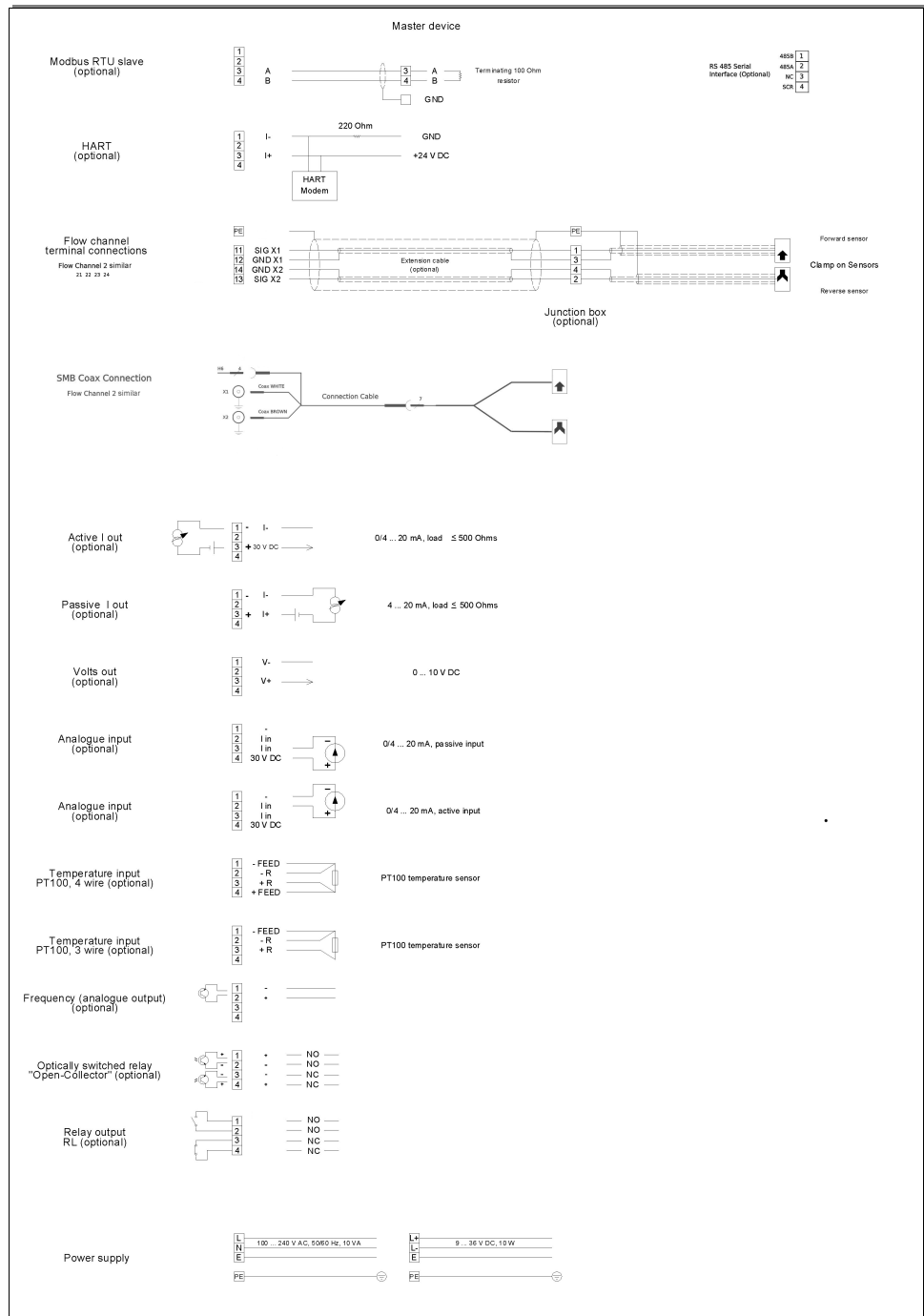
The wiring of the equipment must be in accordance with the requirements as specified in the relevant national or international standard for electrical installations in hazardous areas, e.g. EN 60079-14. Section 9 (wiring systems) of this standard applies to all protection concepts. Section 10 (additional requirements for protection concept "d" - explosion-proof enclosures) and section 11 (additional requirements for protection concept "e" - increased safety).

Please note that in order to supply the unit with MAINS POWER, the equipment must be protected by suitable switches and circuit breakers.

#### *Electrical wiring*



100 ... 200 V AC, 50/60 Hz	10 W
9 ... 36 V DC	10 W



Drawing 1: Electrical connection diagram for the KATflow 150 flowmeter

### 3.1 Cabling and junction box

The hazardous area sensors K1Ex and K4Ex are manufactured with a standard cable length of 5 m. If this cable length is sufficient for the application, then the sensors can be connected directly to the flow transmitter (direct cable connection).

For installations requiring longer cable lengths, the sensors are terminated at an Ex e (increased safety) certified junction box with approved terminals.

The electrical connection between the junction box and the flow transmitter (signal cabling) is established using special dual coax cable type KAT01. The cable ends of the coaxial cables must be terminated with suitable sized ferrules. The signal cable is provided with the system. The max. recommended signal cable length is 100 m.



**DANGER**

*Where the connecting sensor and/or signal cable may be subject to mechanical damage then the user shall provide additional mechanical protection.*

### 3.1.1 Signal cable parameters

The signal cable supplied with the instrument has the following parameters:

Total attenuation	0.021 dB/m
Capacitance (core/screen)	107 pF/m
Inductance (core/screen)	0.24 µH/m

### 3.2 Cable glands

The KF150-Exd housing features 2 x M20 cable entries for the sensor/signal cabling and 3 x M25 cable entries for power supply and process input/output connections.



The KF150-Exd transmitter housing is supplied with plastic dust caps. The temporary plugs are only intended for sealing the equipment against entry of dust, moisture or other possible ingress during transport, handling and storage. These dust caps must be replaced by suitable Ex d approved cable glands, stopping plugs or conduit adapters with respective sealing before the flowmeter is put into operation.

The installer is responsible for the correct sizing and selection of the Ex d approved cable glands for the explosion-proof box. Unused cable entries must be closed with suitable Ex d blind plugs.

Ex d approved cable glands/blind plugs are not part of the standard delivery package and must be provided by the customer or explicitly ordered from KATRONIC.

### 3.3 Equipotential bonding

#### 3.3.1 Clamp-on ultrasonic sensors

The K1Ex and K4Ex sensors feature a terminal connection which must be used to connect the transducers to the equipotential bonding system locally.



#### 3.3.2 Flowmeter

The KATflow 150 flowmeter is designed to use equipotential bonding. For this purpose it must be connected to the internal U-clamp screw terminal inside the wall mounted enclosure. The explosion-proof box KF150-Exd additionally features a screw terminal outside the housing, which should be earthed locally.

The earthing conductor must be at least 4 mm<sup>2</sup> (11 AWG) or 2.5 mm<sup>2</sup> (14 AWG) in case it is mechanically protected as per IEC 364-4-41.

### 3.4 Process inputs/outputs

If the process inputs/outputs are to be terminated in the hazardous area, the associated equipment must be certified accordingly.



## 4 Maintenance

The KATflow 150 flowmeters are maintenance free concerning the flow measurement functions. Within the scope of periodic inspections required for electrical equipment installed in hazardous areas, regular inspection for signs of damage or corrosion is recommended for the transducers, the junction box if installed, and the explosion-proof transmitter housing.

### 4.1 Opening/closing KF150-Exd door

**DANGER**

*The following instructions must always be carefully followed if opening the housing of the KF150-Exd transmitter. Ensure similar care is taken to close it when work is complete.*

Before opening:

- Make absolutely sure that there is no explosion hazard.
- A gas-free certificate and a valid work permit must be obtained before commencing work.
- Make sure that all connecting cables are safely isolated from all external sources.
- Allow the electronics to de-energize before opening the electronics compartment of the explosion-proof housing. Wait at least 10 minutes before opening.
- When the instructions above have been strictly followed, the door of the explosion-proof housing may be opened. Unscrew the head screws with suitable Allen keys until the door can be opened.


Closing:

- Screw the head screws back and tighten them firmly with a suitable Allen key. Make sure the door is closed properly.


### 4.2 Service/Repair

The KATflow 150 flowmeter has been carefully manufactured and tested. If installed and operated in accordance with the operating instructions, no problems are usually experienced.

Should you nevertheless need to return a device for inspection or repair, please pay attention to the following points:

- 
- Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.
  - This means that the manufacturer can only service this device if it is accompanied by a Customer Return Note (CRN) confirming that the device is safe to handle.

If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

- 
- to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,
  - to enclose a certificate with the device confirming that it is safe to handle and stating the product used.

### 4.3 Customer Return Note (CRN)

#### Customer Return Note (CRN)



Company  Address   
Name   
Tel. No.   
E-mail

Instrument model  Katronic contract no.   
Serial number  (if known)

Sensor type(s)   
Sensor serial number(s)

The enclosed instrument has been used in the following environment (please  $\surd$ ):

Nuclear radiation   
Water-endangering   
Toxic   
Caustic   
Biological   
Other (please specify)

We confirm (\* delete if not applicable)

- that we have checked the instrument and sensors are free of any contamination\*,
- neutralised, flushed and decontaminated all parts which have been in contact with hazardous substances and/or environments\*,
- that there is no risk to man or environment through any residual material.

Date   
Signature   
Company stamp



## 5 Technical data

### 5.1 K1Ex and K4Ex clamp-on ultrasonic sensors

Manufacturer	Katronic Technologies Ltd. Earls Court Warwick Street, Earlsdon Coventry CV5 6ET UNITED KINGDOM
Marking	<i>Gas groups</i> II 2 G Ex mb II T6 - T4 X  <i>Dust groups</i> II 2 D Ex mbD 21 IP68 T80°C - T120°C X
Certificate number	TRAC09ATEX21226X
Degree of protection	IP68 according to EN 60529
Temperature limits	Temperature class T4: -50 ... +115 °C Temperature class T5: -50 ... +90 °C Temperature class T6: -50 ... +75 °C

### 5.2 KF150 flowmeter

Safe area use	Model KF150
Hazardous area use	Model KF150-Exd
Manufacturer	<i>KF150</i> Katronic Technologies Ltd. Earls Court Warwick Street, Earlsdon Coventry CV5 6ET UNITED KINGDOM  <i>KF150-Exd</i> A-Belco Group Jubilee Industrial Estate Ashington Northumberland NE63 8UG United Kingdom
Marking	<i>Gas groups</i> II 2 G EEx d IIB T6
Certificate number	CESI 01 ATEX 027
Degree of protection	IP66 according to EN 60529
Temperature limits	Temperature class T6: -20 ... +40 °C

## 6 Certificate of Conformity



### Declaration of Conformity

We, Katronic Technologies Ltd., declare under our sole responsibility that the products listed below to which this declaration relates are in conformity with the EEC directives:

EMC Directive 2014/30/EU for Electromagnetic Compatibility  
 Low Voltage Directive 2014/35/EU for Electrical Safety

Description of products:

Ultrasonic flowmeters: KATflow 100, 150, 170, 200, 210 and 230 with associated KATRONIC transducers

The mentioned products are in conformity with the following European Standards:

Class	Standard	Description
<u>EMC Directive</u>	BS EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use - EMC requirements
<u>Immunity</u>	BS EN 61326-1:2013	Electrical equipment for continuous unattended use
	BS EN 61000-4-2:2009	Electrostatic discharge
	BS EN 61000-4-3:2006	RF field
	BS EN 61000-4-4:2012	Electric fast transient/burst
	BS EN 61000-4-5:2014	Surge
	BS EN 61000-4-6:2014	RF conducted
	BS EN 61000-4-11:2004	AC mains voltage dips and interruption
<u>Emission</u>	BS EN 61326-1:2013	Electrical equipment Class B
	BS EN 55022:2010	Disturbance voltage Class B
<u>Low Voltage Directive</u>	BS EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control and laboratory use

Coventry, 20<sup>th</sup> April 2016  
 For and on behalf of Katronic Technologies Ltd.

Andrew Sutton  
 Managing Director

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