

Supplementary Operating Instructions
For
**Flow rate Controller/
Dosing Unit/Flow Counter**

Model: ZOK-E1/E2/E3/E4/E5



We don't accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

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2. General

These instructions must be read in addition to the ZOK-Zx Instruction Manual (or to the manual of the KOBOLD flowmeter, where the “ZOK-ExM” instrument is mounted), if you have purchased an ATEX I.S. certified ZOK-Ex series instrument and intend installing it in a hazardous environment for which it is approved.

The I.S. certified instrument may be stand alone (ZOK-Ex) or fitted to a KOBOLD flowmeter with pulse sensor (*Ex*).

3. Conforming Standards

The I.S. Ex/ZOK-Ex series instruments are certified in accordance with the ATEX directive. Prior to installation, review the certification marking on the instrument label to confirm if it is appropriately certified for your region, suits the site classification and complies with your hazardous area philosophy.

ATEX Directive

Complies with ATEX directive 2014/34/EC

Conforms to Standards: See certificate

Instruments have also been assessed against the Essential Health and Safety requirements (ESHR's) as defined in European Directive 2014/34/EU for

 II 2 G.

The instruments are certified for “ia” (intrinsically safe) protection suitable for gas group IIB and temperature class T1 to T4 in an ambient temperature of -20 to +60 deg C and are suitable for installation in Group II, Zone 1 and 2 areas.

The instruments have also been tested to IEC60529 and comply with a protection rating of IP66/67.

4. Overview

The certified ZOK-Ex series is an I.S. indicator providing a display of flowrate, accumulated total and resettable total. It can be loop powered, battery powered and/or dc powered via an approved associated apparatus such as an I.S. isolator. In addition, when externally powered the certified ZOK-Ex series (not ZOK-E1) provides one or two outputs (depending on model and configuration).

Dosing unit with one or two stage dosing using one or two opto-coupler outputs with switching function (model ZOK-E2)

Loop Powered 4-20 mA output proportional to flow rate (model ZOK-E3/E4)

The optional alarm and/or pulse outputs must be driven each by a separate associated device:

Low flow and high flow rate alarm (model ZOK-E5)

Scaled pulse output for remote totalisation (model ZOK-E5)

Note: ZOK-Ex electronics is not available with display backlight.

5. Mechanical Installation *(also refer to ZOK-Zx series Instruction manual)*

There are additional installation requirements to the Instruction Manual for certified ZOK-Ex series instruments in accordance with the ESHR's as defined in annex II of the ATEX directive 2014/34/EU.

The ambient temperature must be within the limits -20 to +60 °C.

The instruments must be installed to prevent mechanical and thermal stresses and to prevent an attack from existing or foreseeable aggressive substances.

The instrument case is not considered to be an electrostatic risk, however the equipment must not be installed in a position where it may be subjected to an excessive air flow or subjected to rubbing that may cause an electrostatic build up. In addition the instrument shall only be cleaned with a damp cloth.

In all installations appropriate local rules, regulations and directives governing instrument selection, installation practices and requirements must be followed.

6. Electrical Installation

Power supply options:

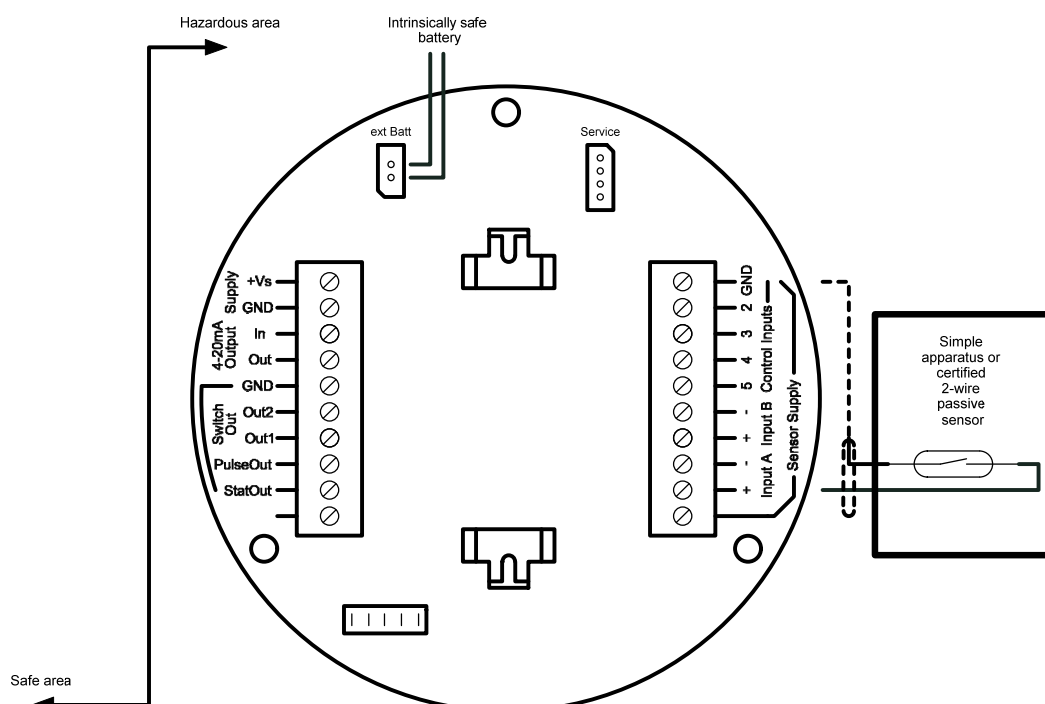
Most units can be driven through 3 different power options. The software of the ZOK-Ex units detects the power mode and enables / disables corresponding hard- and software functions.

- Battery powered** (using intrinsically safe ATEX Battery-see Section 12):
No electrical outputs, only unpowered sensors can be used (reed switch and induction coil sensor). This power option can only be used with ZOK-E1 and ZOK-E3).
- External supply** (powered by associated intrinsically safe power supply).
Powered or unpowered certified pulse sensors can be applied (hall sensor, reed switch, NAMUR proximity sensor, induction coil).
Electrical output 4-20mA (3-wire, ZOK-E3/ZOK-E4) or pulse output/switch output (ZOK-E5) or switching outputs for dosing (ZOK-Z2) can be used.
- External loop powered 4-20mA** (2-wire, passive, powered by associated intrinsically safe 4-20mA-transmitter). Only unpowered certified sensor can be connected (reed switch and induction coil). This power mode can be used with ZOK-E3 units.
- External loop powered 4-20mA with HART** protocol option. Same as c.) Including HART protocol functionality (ZOK-E4 units).

Input sensor options:

a. Unpowered inputs:

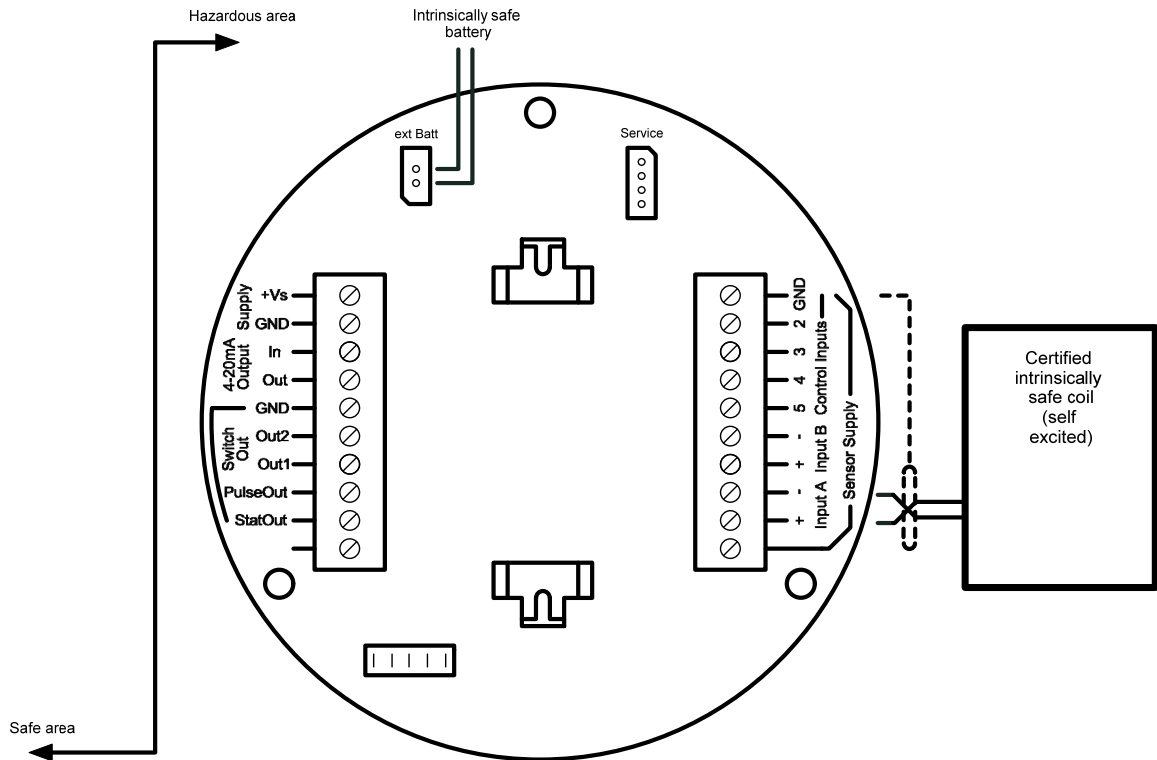
Reed switch inputs are defined as simple apparatus under the ATEX directive. A reed switch input can be wired directly into the ZOK instrument without further certification.



b. Self exciting inputs:

Non-amplified Pick off coils from turbine meters are examples of this type of input. Pick-off coils must be I.S. certified and the entity parameters of the coil must not be less than the entity parameters of the ZOK-Ex instrument being:

$$V_i = 28 \text{ VDC}, I_i = 100 \text{ mA}, P_i = 0.7 \text{ W}$$



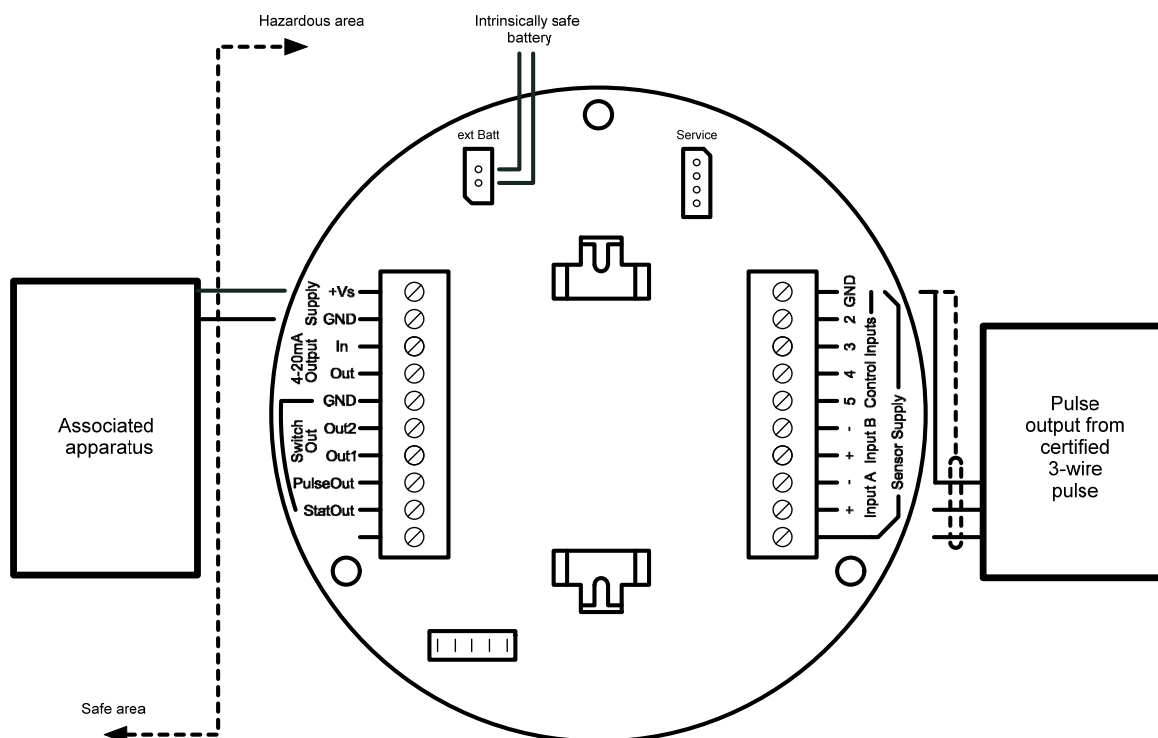
c. Inputs requiring power from the ZOK-Ex instrument:

Examples of this type of sensor are open collector output from a hall Sensor, pre-amplified coils from turbine meters or Namur proximity sensors. Examples are where the voltage required to power the sensor originates from the associated apparatus via the ZOK-Ex instrument. These sensors must be **certified** and the entity parameters of the sensor must not be less than the entity parameters of the ZOK-Ex instrument being:

$$V_i = 28 \text{ VDC}, I_i = 100 \text{ mA}, P_i = 0.7 \text{ W}$$

The power to the ZOK-Ex instrument must come from a certified source (*commonly known as associated apparatus*). The entity parameters of the associated apparatus must not exceed those of the ZOK-Ex instrument being:

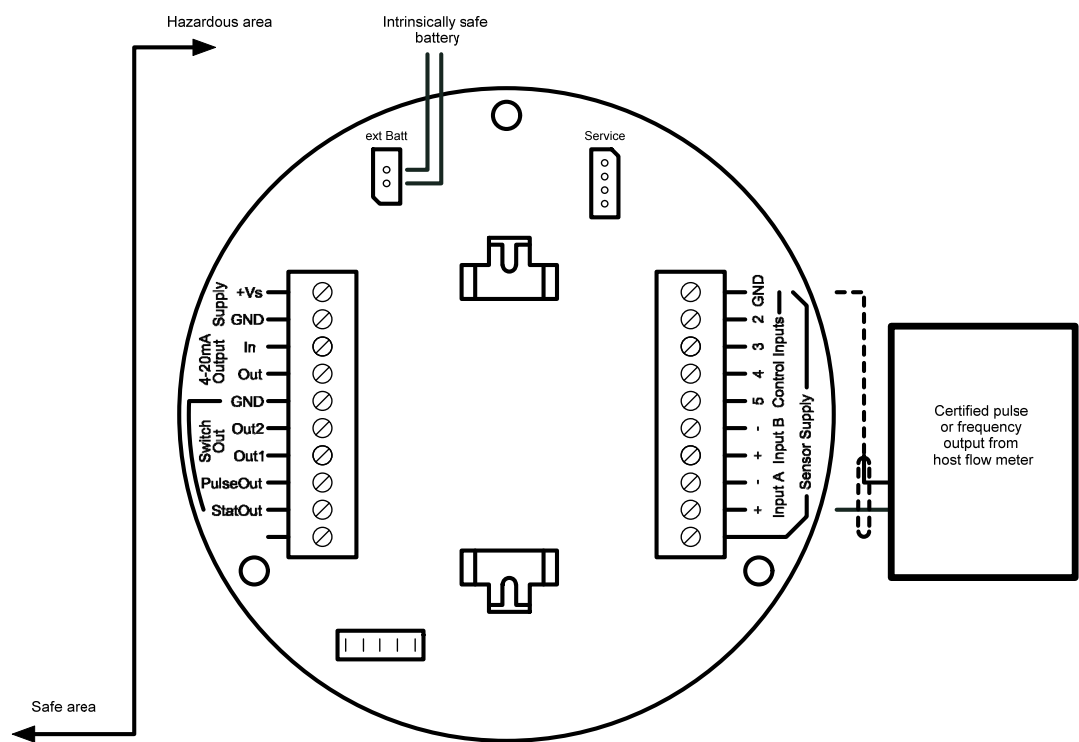
$$V_i = 28 \text{ VDC}, I_i = 100 \text{ mA}, P_i = 0.7 \text{ W}$$



d. Other inputs:

The ZOK-Ex units can also accept isolated pulse/frequency outputs from a powered device such as an open collector or voltage free contact from a mass or electromagnetic flowmeter. These devices must be appropriately **certified** and the pulse/frequency output **must be galvanic isolated** and have certified entity parameters not less than the entity parameters of the ZOK-Ex instrument being:

$V_i = 28 \text{ VDC}$, $I_i = 100 \text{ mA}$, $P_i = 0.7 \text{ W}$



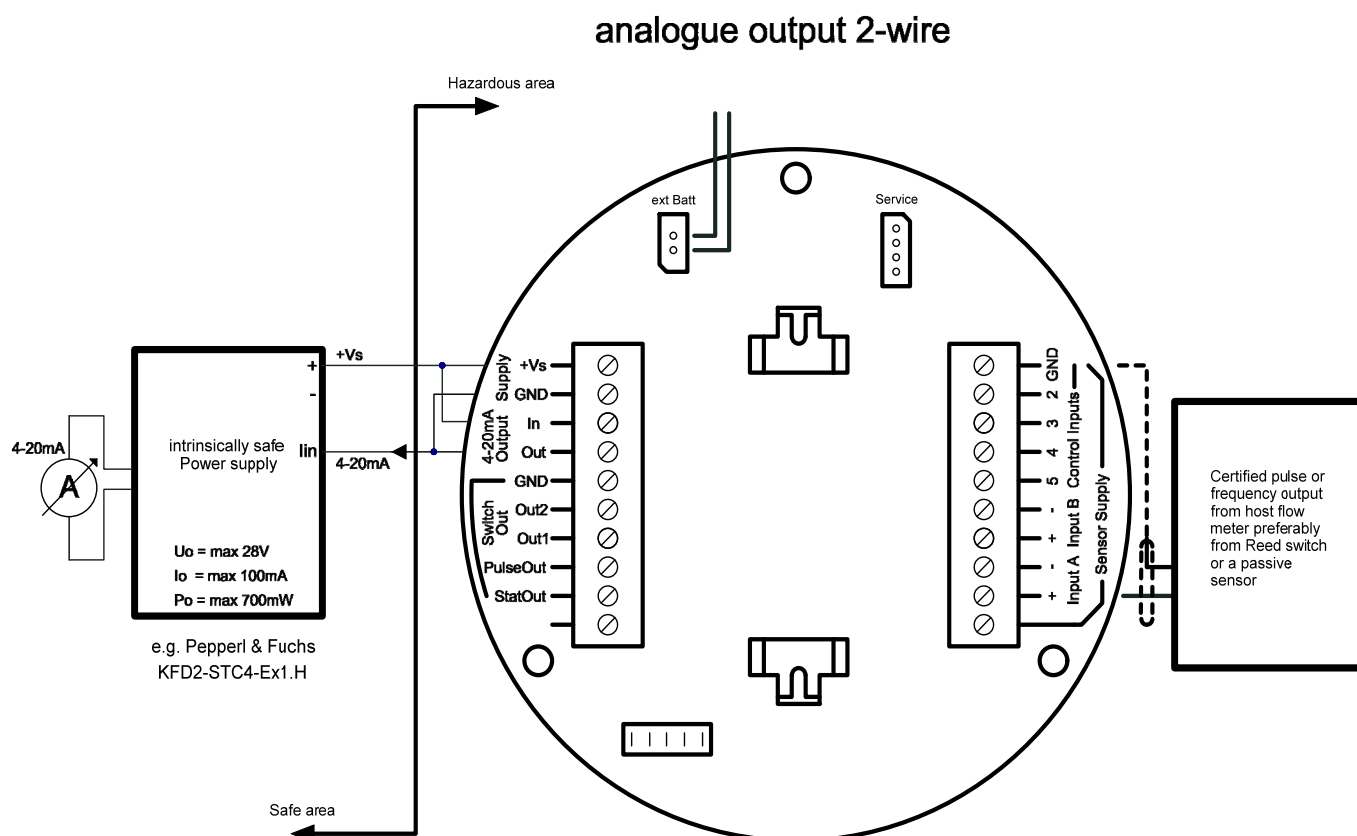
Outputs (only ZOK-E2/E3/E4/E5):

The ZOK-Ex instruments (except ZOK-E1) are certified to provide one (two) of the outputs i.e. Analogue, switching or pulse. To obtain an output, external power is required to be sourced from a **certified** associated apparatus located in the safe area. In all cases the entity parameters of the associated apparatus must not exceed those of the ZOK-Ex series instrument being:

$$V_i = 28 \text{ VDC}, I_i = 100 \text{ mA}, P_i = 0.7 \text{ W}$$

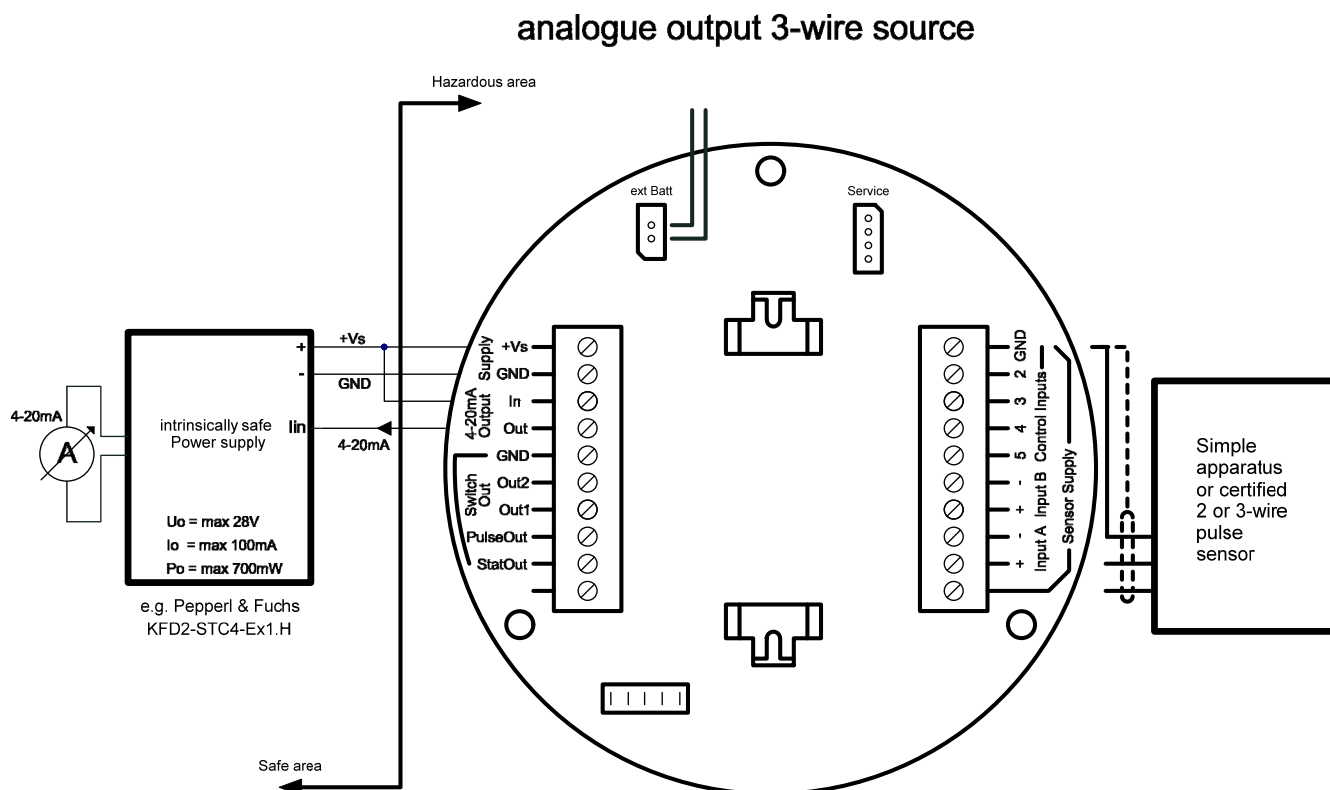
1. Two wire 4-20 mA loop powered output (ZOK-E3/E4):

The ZOK-Ex instrument can be powered from a two wire 4-20 mA loop, if the input sensor requires **no** power from the ZOK-Ex instrument (reed switch or certified induction coil sensor).



2. Three wire 4-20mA output (ZOK-E3/E4):

The ZOK-Ex instrument can be powered in a three wire 4-20 mA configuration, if the input sensor requires power from the ZOK-Ex instrument.

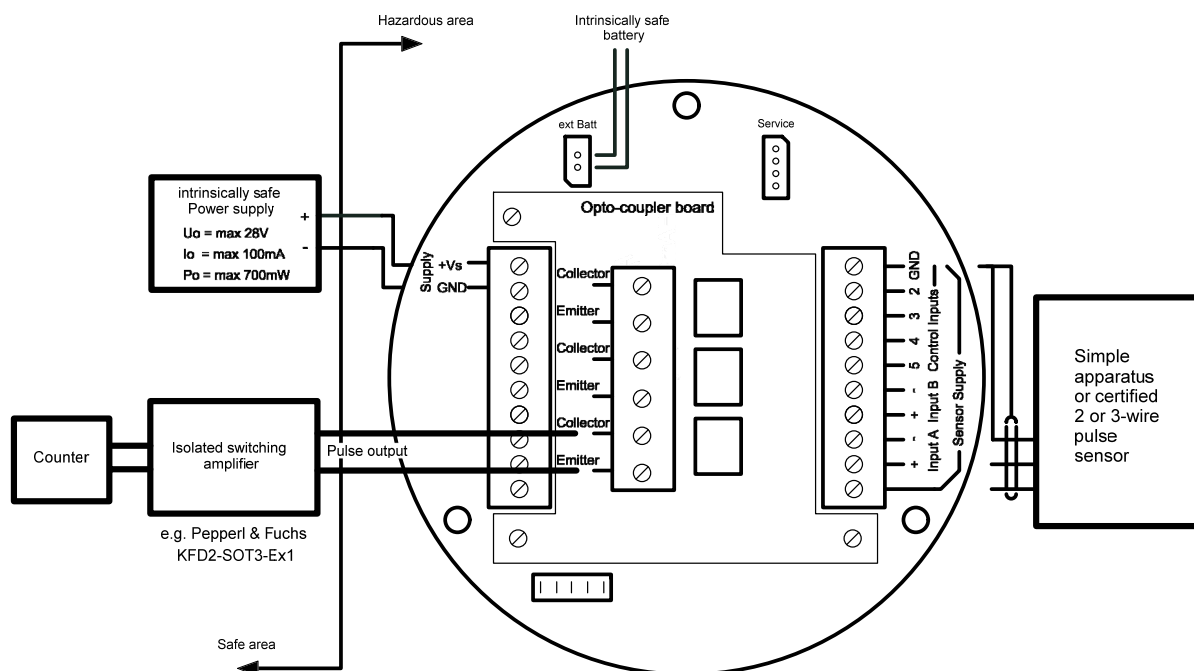


3. Dosing function/Pulse or flow alarm outputs (ZOK-E2/E5):

For ZOK-E2/E5 units the electronic assembly is equipped with an additional opto-coupler board. This board provides 3 isolated passive opto-coupler outputs for low flow / high flow alarm outputs and pulse output.

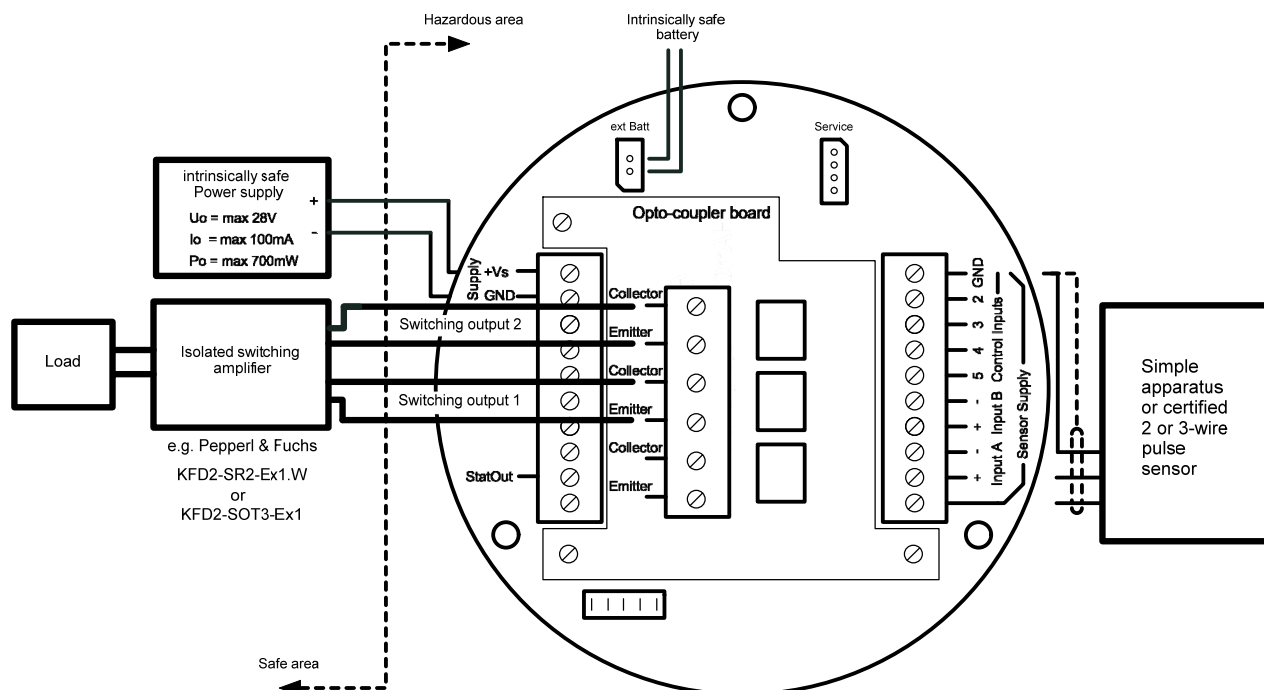
In this arrangement the switch outputs / pulse output connectors are electrically separated.

Pulse output



For ZOK-E5 with pulse output

Switching outputs



For ZOK-E2 with dosing function
or for ZOK-E5 with high and low flow alarm outputs

ZOK-Ex

Note: It is possible to use all 3 outputs (4-20 mA, pulse and switching outputs) or any two outputs at the same time but only with the help of different isolating amplifiers i.e. supplying all the I.S isolators separately from one another.

Associated Apparatus

All certified isolators with suitable entity parameters are permitted to be used with **ZOK-Ex** electronic options.

7. Wiring

In addition to the wiring requirements of the ZOK-Zx Instruction Manual, appropriate local rules, regulations and directives governing wiring practices for I.S. installations must be followed. These include but are not limited to cable lengths, segregation, routing and identification of I.S. cabling.

With regards to cable selection and allowable length the associated apparatus capacitance and inductance parameters must not be exceeded by the sum of the capacitances and the sum of the inductances within the loop.

When calculating allowable cable length use the capacitance and inductance values of the ZOK-Ex from Exi-certificate.

Certain regions such as Europe allow the inductance/resistance ratio of the cable to be used instead of the sum of the inductances. In this case the cable inductance/resistance ratio must be lower than the maximum inductance/resistance ratio permitted by the associated apparatus.

8. Programming

Refer to ZOK-Zx Instruction Manual for programming, parameterization.

9. Service

The only replaceable item within the instrument is the ATEX Battery and can be replaced as a complete unit. Only the certified I.S. battery assembly ERS-BATEX036 can be used and can be ordered through Kobold offices.

10. Repair

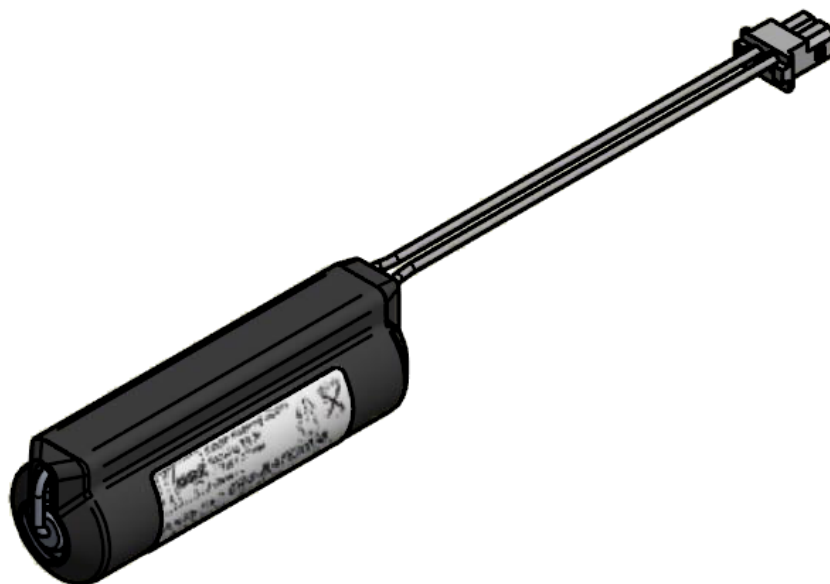
The ZOK-Ex series instruments must only be repaired by trained personnel using approved spares. Instruments requiring repair must therefore be returned to the manufacturer.

11. Label and ordering code

code	type	function	outputs	Identifying label
ZOK - E1M	meter mount versio n	Counter	none	 KOBOLD MESSRING GMBH, NORDRING 22-24 D-65719 HOFHEIM MADE IN GERMANY ZOK-ExM*F3** SN: Exxxxxxx LOM16ATEX2062X Yofm: 2016  II 2G Ex ia IIC T4 Gb (-20°C ≤ Ta ≤ 60°C)  IP67 0158
ZOK - E2M		Dosing unit	2 optocouple r outputs	
ZOK - E3M		Controller instrumen t	4-20 mA 2/3-wire	
ZOK - E4M			4-20 mA 2/3-wire HART	
ZOK - E5M			alarm outputs pulse output	
ZOK -E1K	stand alone versio n	Stand alone Counter	none	 KOBOLD MESSRING GMBH, NORDRING 22-24 D-65719 HOFHEIM MADE IN GERMANY ZOK-ExK*F3** SN: Exxxxxxx LOM16ATEX2062X Yofm: 2016  II 2G Ex ia IIC T4 Gb (-20°C ≤ Ta ≤ 60°C)  IP67 0158
ZOK -E2K		Dosing unit	2 optocouple r outputs	
ZOK -E3K		Stand alone Controller instrumen t	4-20 mA 2/3-wire	
ZOK -E4K			4-20 mA 2/3-wire HART	
ZOK -E5K			alarm outputs pulse output	

12. Replacement ATEX Battery

Replacement Battery Pack



I.S. battery assembly

KOBOLD Article No. ERS-BATEX036

Warning: KOBOLD Intrinsically safe battery assembly
P/No. ERS-BATEX036 only approved for
ZOK-Ex instruments mounted in a hazardous area.



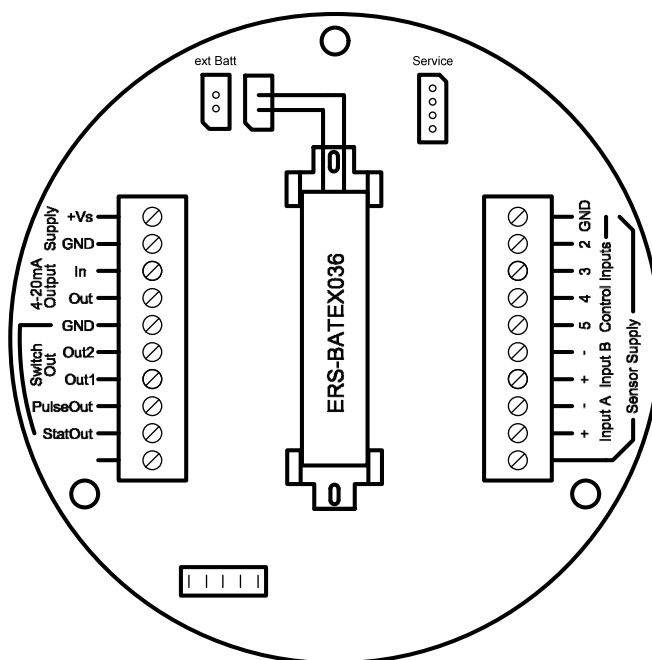
Label on ATEX Battery

Note: It is highly recommended to follow the instructions mentioned on the ATEX Battery label.

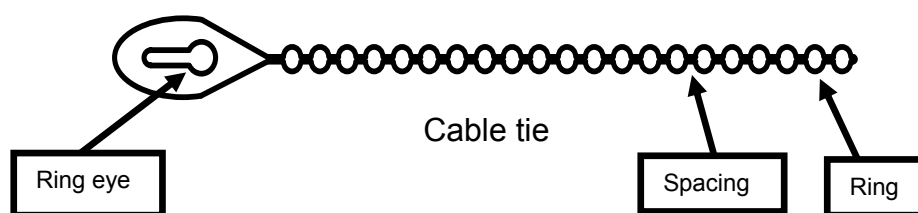
Mounting the ATEX Battery

In case if the ATEX Battery is ordered separately, following steps need to be taken to connect it:

1. The ATEX Battery should be plugged into the connector “ext Batt” on ZOK-Ex electronics and placed between the battery terminals as shown below:

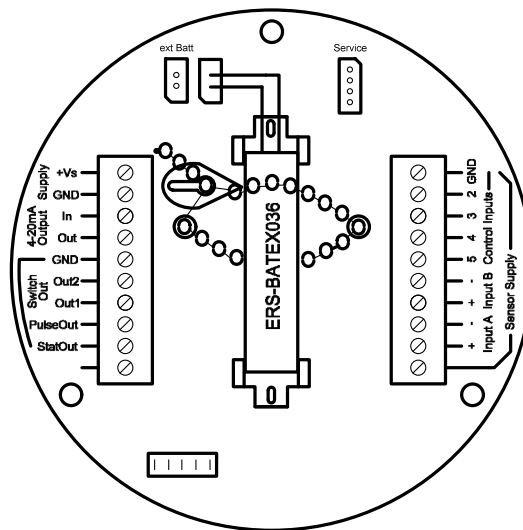


2. The ATEX Battery should then be fixed with the help of a detachable cable tie which will be available with the ATEX Battery. If the ZOK-Ex electronics is ordered together with the ATEX Battery, then the ATEX Battery will be fixed and connected from the factory.

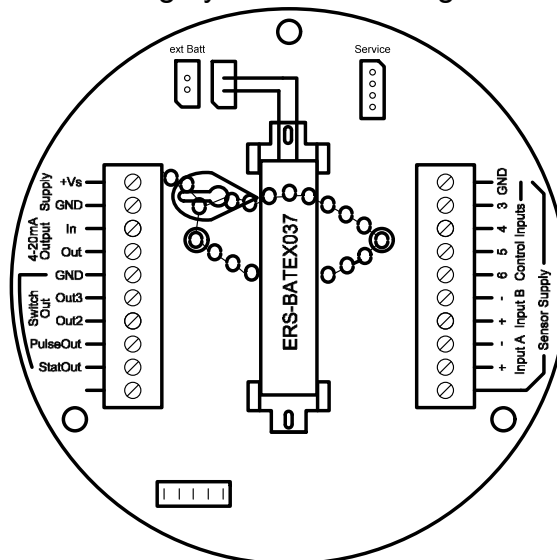


How to tie:

1. The cable tie is provided with rings over its body and one end of the cable tie has a ring eye. The open end of the cable tie is to be inserted in the bigger ring eye and should be pulled till the battery is completely fixed.



2. Once this is ensured, the spacing between the rings should be pushed into the narrow side of the ring eye. Hence locking the tie.



How to untie:

The above mentioned steps will be carried out in the reverse order to untie the cable tie i.e.

To open the cable tie, the spacing between the rings should be pulled out of narrow side of the ring eye. Hence the tie is unlocked. The rings can then be slid out of the bigger ring eye in order to demount and replace the ATEX battery.

13. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Flow Rate Totaliser/Controller

Model: ZOK-E1/E2/E3/E4/E5*

To which this declaration relates is in conformity with the standards noted below:

- | | |
|-------------------------|--|
| EN 60079-0:2014 | General Requirements |
| EN 60079-11:2012 | Intrinsically Safe Electronics (I.S.) |
| EN 60079-26:2015 | Equipment with equipment protection level (EPL) |
| EN 60529:2014 | Degrees of protection provided by enclosures (IP Code) |
| EN 61326-1:2013 | Electrical equipment for control, instrumentation technology and laboratory use – EMC requirements (Industrial area) |

Also the following EU guidelines are fulfilled:

- | | |
|-------------------|--|
| 2014/34/EU | Equipment and protective systems intended for use in a potentially explosive atmospheres |
| 2008/35/EC | Waste electrical & electronic equipment (WEEE) |
| 2014/30/EU | EMC directive |
| 2011/65/EU | RoHS |

Quality Management Production

Certificate number: BVS 09 ATEX ZOS/E110

Notified body: DEKRA EXAM GmbH

Identification number: 0158

Hofheim, 24. Febr. 2017



H. Peters
General Manager



M. Wenzel
Proxy Holder

14. Exi Certificate

			
LABORATORIO OFICIAL J. M. MADARIAGA			
1 EU-TYPE EXAMINATION CERTIFICATE			
2 Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 2014/34/UE			
3 EU-Type Examination Certificate Number		LOM 16ATEX2062 X issue 0	
4 Product		Counter / Flow controller Types ZOK-E*K*F3** and ZOK-E*M*F3**	
5 Manufacturer		Kobold Messring GmbH	
6 Address		Nordring 22-24 D-65719 Hofheim GERMANY	
7 This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.			
8 Laboratorio Oficial J.M. Madariaga (LOM), Notified Body number 0163, in accordance with Article 17 of Directive 2014/34/UE of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products 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. LOM 14.084 SP			
9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with: Standards EN 60079-0:2012 EN 60079-11:2012			
except in respect of those requirements listed at item 18 of the schedule.			
10 If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.			
11 This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.			
12 The marking of the product shall include the following:			
			
Getafe			
		FERNANDEZ RAMON, CARLOS (FIRMA) 2016.08.04 14:52:59 +02'00'	
RCPCR 25.7/2		Head of certification committee	
(This document may only be reproduced in its entirety and without any change)			
		UNIVERSIDAD POLITÉCNICA DE MADRID ENSAYOS E INVESTIGACIONES DE MATERIALES Y EQUIPOS PARA ATMÓSFERAS EXPLOSIVAS Y MINERÍA (Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29)	
Eric Kandel, T+28906 GETAFE (MADRID) • (34) 91 4421366 • (34) 91 4419933 • lom@lom.upm.es			



LABORATORIO OFICIAL J. M. MADARIAGA

13 SCHEDULE

14 EU-Type Examination Certificate number: **LOM 16ATEX2062 X**

15 Description of product

The electronic units ZOK-E... are designed to calculate, display and transmit volume and flow from flowmeters having pulse output or frequency. These units can display flow rate, accumulated flow and zeroing in engineering units as programmed by the user.

The ZOK-E... units are stand alone, or are designed for meter mounting on existing pulse output flowmeters.

ZOK-E3, ZOK-E4 and ZOK-E5 variants comprise a full flow controller including analog and pulse outputs, while ZOK-E1 variant is reduced to a counter function without signal output.

Variants and type codification

Counter/flow controller electronics for meter mount	
ZOK-E1M*F3**	Flow counter, battery and external powered, no outputs, reed switch sensor
ZOK-E3M*F3**	Flow controller, battery, external and loop powered, 4-20mA output, 2/3-wire, reed switch sensor.
ZOK-E4M*F3**	Flow controller, battery, external and loop powered, 4-20mA output with full HART functionality, 2/3-wire, reed switch sensor.
ZOK-E5M*F3**	Flow controller, battery or external powered, switching and pulse optocoupler outputs, reed switch sensor
	Outputs disabled during battery powering
Stand alone counter/flow controller electronics	
ZOK-E1K*F3**	Flow counter, battery and external powered, no outputs, 2x pulse signal input, wall and pipe mounting
ZOK-E3K*F3**	Flow controller, battery, external and loop powered, 4-20mA output, 2/3-wire, 2x pulse signal input
	Analog output disabled during battery powering
ZOK-E4K*F3**	Flow controller, battery, external and loop powered, 4-20mA output with fully HART functionality, 2x pulse signal input
	Analog output disabled during battery powering
ZOK-E5K*F3**	Flow controller, battery or external powered, switching and pulse optocoupler outputs, 2x pulse signal input
	Outputs disabled during battery powering

* = other constructional variants

The variants ZOK-E... support up to two external inputs pulses that can be:

- Potential-free contacts, simple electrical apparatuses

- Intrinsically safe devices powered from this equipment, and with appropriate certification

- Galvanically isolated intrinsically safe outputs from self-powered devices, and appropriate certification

Specific parameters of the type of protection

Power and 4-20 mA input terminals	U_i : 28 V	I_i : 100 mA	P_i : 0.7 W
Input terminals for external sensors	U_o : 8.2 V	I_o : 100 mA	P_o : 0.7 W
External power supply or from loop	C_o : 3 μ F	L_o : the same as the power supply	
Input terminals for external sensors	U_o : 3.9 V	I_o : 48 mA	P_o : 40 mW
Internal battery power supply	C_o : 1000 μ F	L_o : 15 mH	

Ambient temperature: $-20^\circ\text{C} \leq T_a \leq +60^\circ\text{C}$

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13 SCHEDULE

14 EU-Type Examination Certificate number: **LOM 16ATEX2062 X**

16 Report number **LOM 14.084 SP**

17 Specific conditions of use

Attention to electrostatic risk arising from the outer shell, made of plastic material, should be given. It must follow the safety instructions provided by the manufacturer.

Pulse inputs from intrinsically safe self-powered devices must have galvanic isolation from its internal power supplies.

Input specific parameters when the device is powered form a three wire connection correspond to the combination of the associated apparatuses.

18 Essential Health and Safety Requirements

Essential Health and Safety Requirements (EHSRs) are covered by the standards listed at item 9.

19 Drawings and documents

Number	Sheets	Issue	Date	Description
023.617	1	0	2013-07-31	Electronics housing base
023.615	1	0	2013-08-22	Electronics housing cover
023.616	1	0	2013-08-22	Electronics housing transparent cover
802.191	12	3	2016-05-10	PCB interface board
802.192	14	3	2016-05-10	PCB processor board
802.204	9	1	2016-04-21	PCB battery circuit
802.218	9	1	2016-04-15	PCB optocouplers board
904.049	1	1	2015-06-15	Electronic assembly documentation set
904.050	1	1	2015-06-15	Electronic assembly documentation set
904.058	4	2	2016-05-09	Electronic assembly documentation set
904.060	10	2	2016-05-09	Electronic assembly documentation set
904.061	10	2	2016-05-09	Electronic assembly documentation set
904.202	1	0	2014-01-28	EX-BatteriePack complete
304.213	1	3	2016-04-25	Block diagram
008.08x	1	0	2016-04-25	Marking labels
023.002	1	0	2013-11-01	Front label
Ex manual	0	0	2016-04-27	Manual

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