Supplementary Operating Instructions

for

Flow rate Controller/

Dosing Unit/Flow Counter

Model: ZOK-E1/E2/E3/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.

1. Contents

Manufactured and sold by:

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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/IECEx intrinsically safe certified ZOK-Ex series instrument and intend installing it in a hazardous environment for which it is approved.
The intrinsically safe certified instrument may be stand alone (ZOK-Ex) or fitted to a KOBOLD flowmeter with Ex-certified pulse sensor.

The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

3. Conforming Standards

The intrinsically safe units DON-1A…5A/ZOK-Ex are certified in accordance with the ATEX directive and IECEx scheme. 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/EU
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 2G.

The instruments are certified for “ia” (intrinsically safe) protection suitable for gas group IIB and temperature class 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 IEC 60529 and comply with a protection rating of IP66/67.

4. Overview

The certified ZOK-Ex series is an indicator providing a display of flowrate, accumulated total and resettable total for potentially explosive areas. It can be loop powered, battery powered and/or dc powered via an approved associated apparatus such as an intrinsically safety barrier.
In addition, when externally powered the certified ZOK-Ex series (not ZOK-E1) provides one or more outputs (depending on model and configuration).
Further options are:

- Dosing unit with one or two stage dosing using one or two opto-coupler outputs with switching function (model ZOK-E2)
- Supply via 4-20 mA current loop proportional to the flow (model ZOK-E3)

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: The background lighting is deactivated in all ZOK-Ex electronics.

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 electronic units must be installed in such a way that mechanical and thermal stresses are avoided.

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 installation's appropriate local rules, regulations and directives governing instrument selection, installation practices and requirements must be followed.

6. Electrical Installation

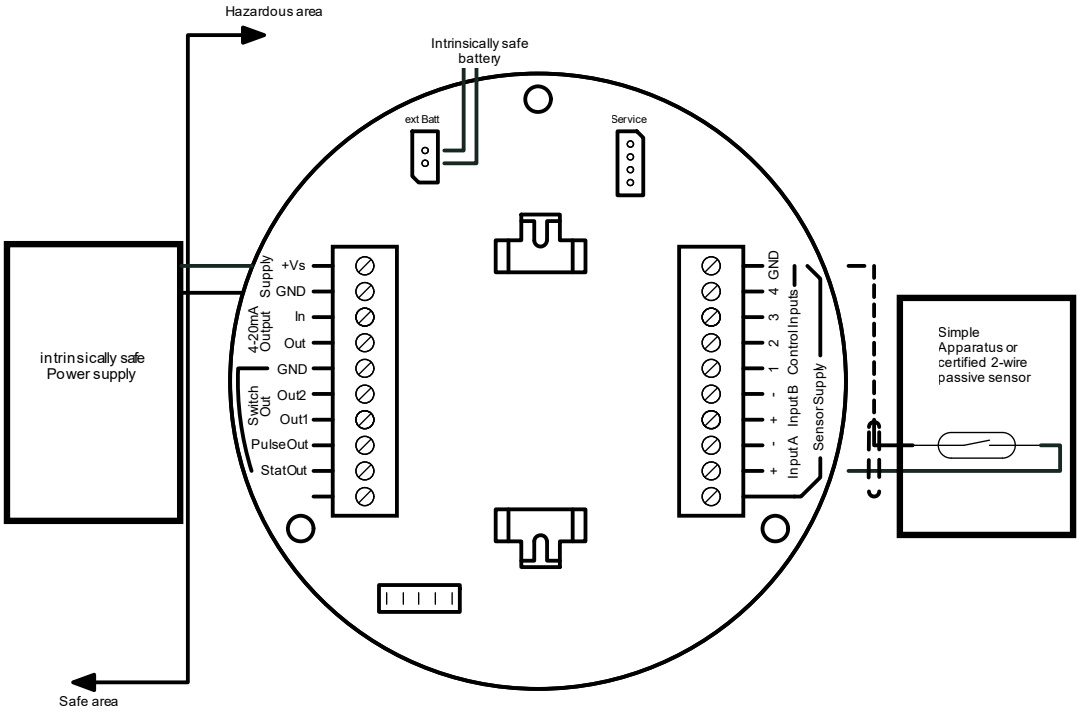
Power supply options:
Most units can be driven through 3 different power options. The software of the ZOK-Ex units detects the power mode and enables / disables corresponding hard- and software functions.

a. **Battery powered** (using intrinsically safe ATEX Battery-see Section 11): No electrical outputs, only unpowered sensors can be used (e.g. reed switch or certified induction coils). This power option can only be used with ZOK-E1 and ZOK-E3).
b. **External supply** (operated by an intrinsically safe power supply). In combination with an external supply, only passive 2-wire sensors (e.g. reed switches, certified induction coils, or certified NAMUR sensor) or certified 3-wire sensors, which are supplied by a separate safety barrier and sensor signal is galvanically separated, can be used.
   The electrical outputs 4-20 mA (3-wire, ZOK-E3) or Pulse output / switching output (ZOK-E5) or switching outputs for the Dosage (ZOK-E2) can be used here.
c. **External loop powered 4-20mA** (operated by intrinsically safe power supply). Only certified two-wire sensors without auxiliary power can be connected (reed switch as a simple device or certified induction coil). This wiring option can be implemented with ZOK-E3 devices.

Input sensor options:

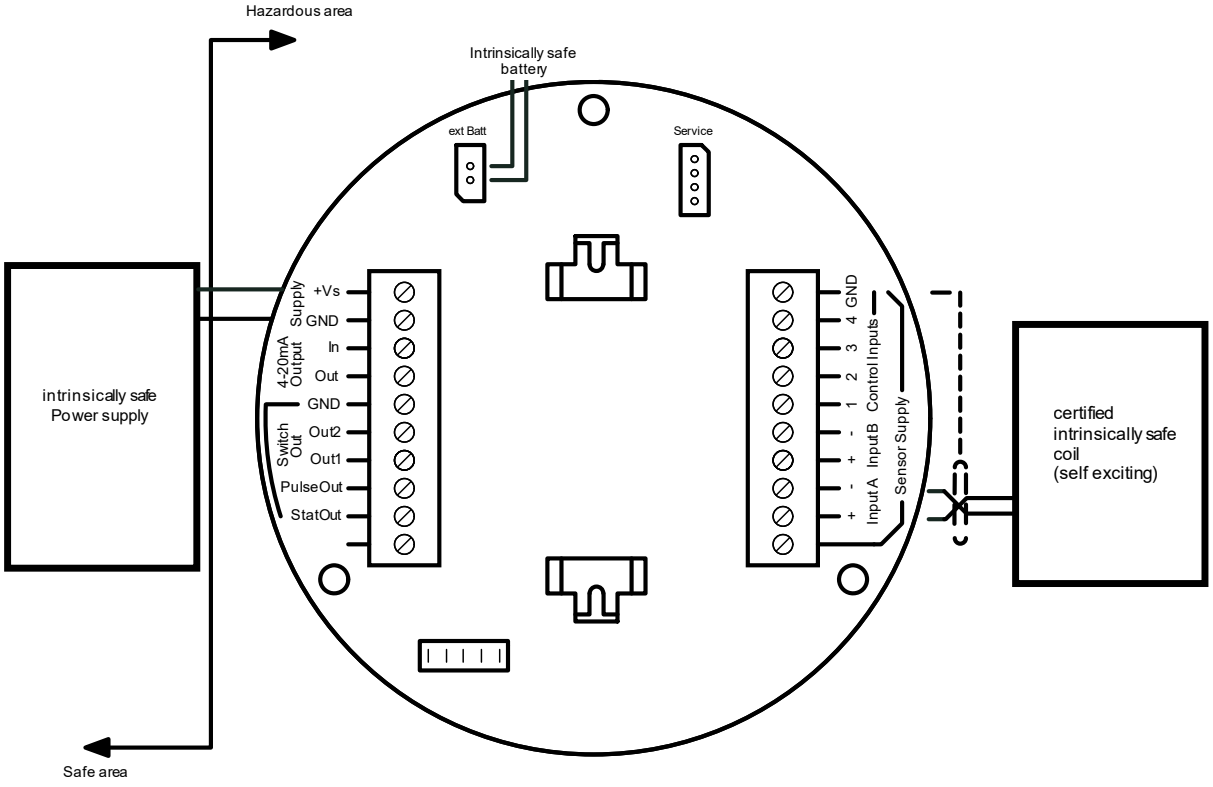
a. <u>Unpowered inputs:</u>

Reed switches are considered to be simple electrical equipment and can be used in EX zone 1, provided that the manufacturer has issued a conformity assessment or certification by a test authority. This applies to the reed switch sensor of the DON electronics option -HA.



b. <u>Self-excited two-wire sensor (induction coil)</u>
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:

Vi = 8.2 VDC, Ii = 100 mA, Pi = 0.7 W



c. Sensors that require auxiliary power:

Examples of this type of sensor are 3-wire sensors, pre-amplified coils of turbine knives or Namur proximity sensors. The voltage required to power the sensor comes from the approved power supply and flows through the ZOK-Ex device.
These sensors must be certified and the input parameters of the sensor must not be smaller than the unit parameters of the ZOK-Ex instrument:

Vi = 8.2 VDC, Ii = 100 mA, Pi = 0.7 W

The power supply of the ZOK-Ex instrument must come from a certified source (commonly known as an isolating switch amplifier). The output parameters of the amplifier must not be higher than those of the ZOK-Ex device:

Vi = 28 VDC, Ii = 100 mA, Pi = 0.7 W

Connection examples with the DON sensor options -HA/KA/GA/DA are shown in section 12.

d. Other sensors:

Certified sensors that cannot be fed from the ZOK-Ex electronics can also be connected to the ZOK-Ex devices. For this purpose, the corresponding sensor must be supplied separately from an intrinsically safe power supply and the sensor signal must be transferred to the ZOK-Ex electronics in an electrically isolated manner (e.g. via an optocoupler output).
In this case, the same connection diagram is recommended as for 3-wire sensors. (see c.)

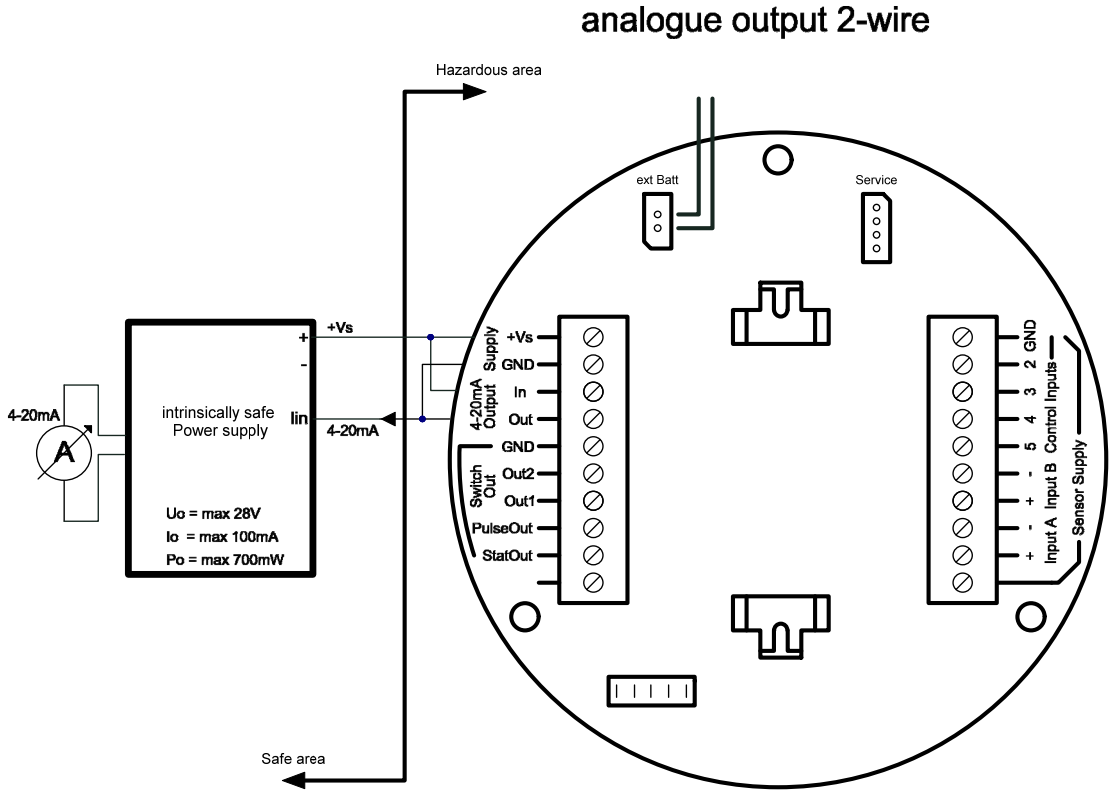
Electrical outputs (only ZOK-E2/E3/E5):

The ZOK-Ex electronics (except ZOK-E1) are certified to provide different output signals (analog, switching or pulse signal). In order to be able to use the outputs, they must be operated with a separately constructed intrinsically safe circuit.
In all cases, the output parameters of the associated power supply unit must not exceed the input parameters of the ZOK-Ex electronics:

Vi = 28 VDC, Ii = 100 mA, Pi = 0.7 W

1. <u>2-wire 4-20 mA current loop (ZOK-E3):</u>

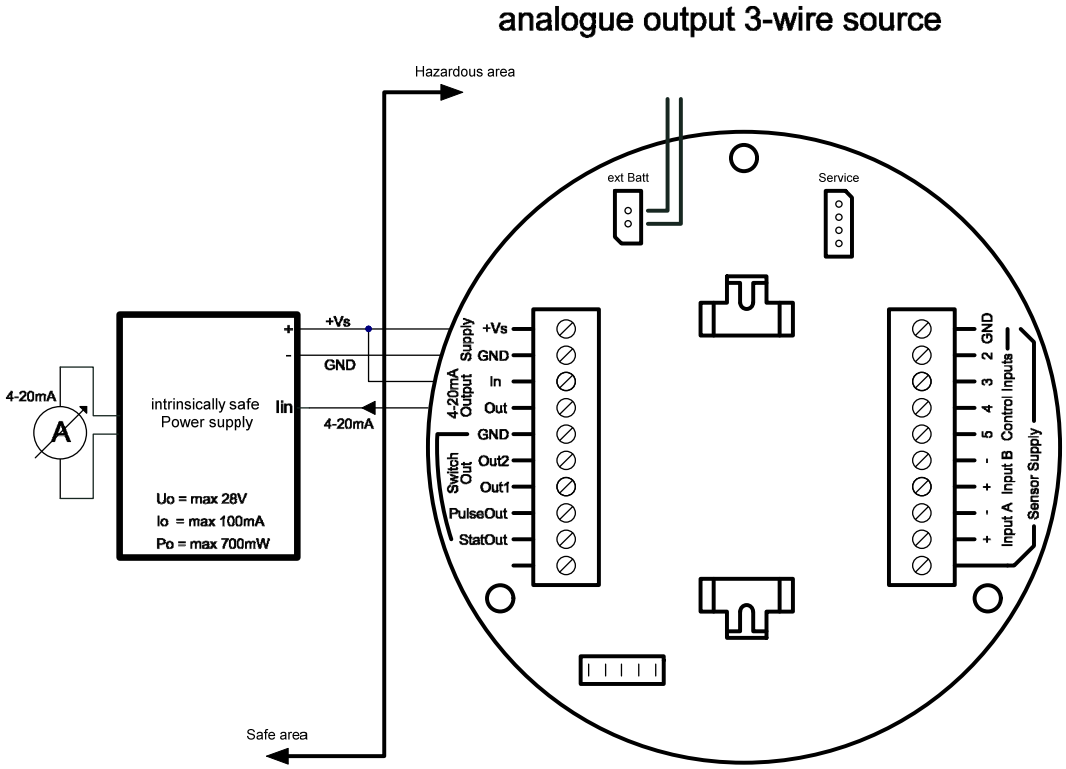
   The ZOK-Ex electronics can be supplied by a two-wire 4-20 mA loop if the input sensor does not require a power supply from the ZOK-Ex device (reed switch or certified induction coil sensor).



Connection examples with certified safety barrier can be found in section 12

2. <u>3-wire 4-20 mA output (ZOK-E3):</u>

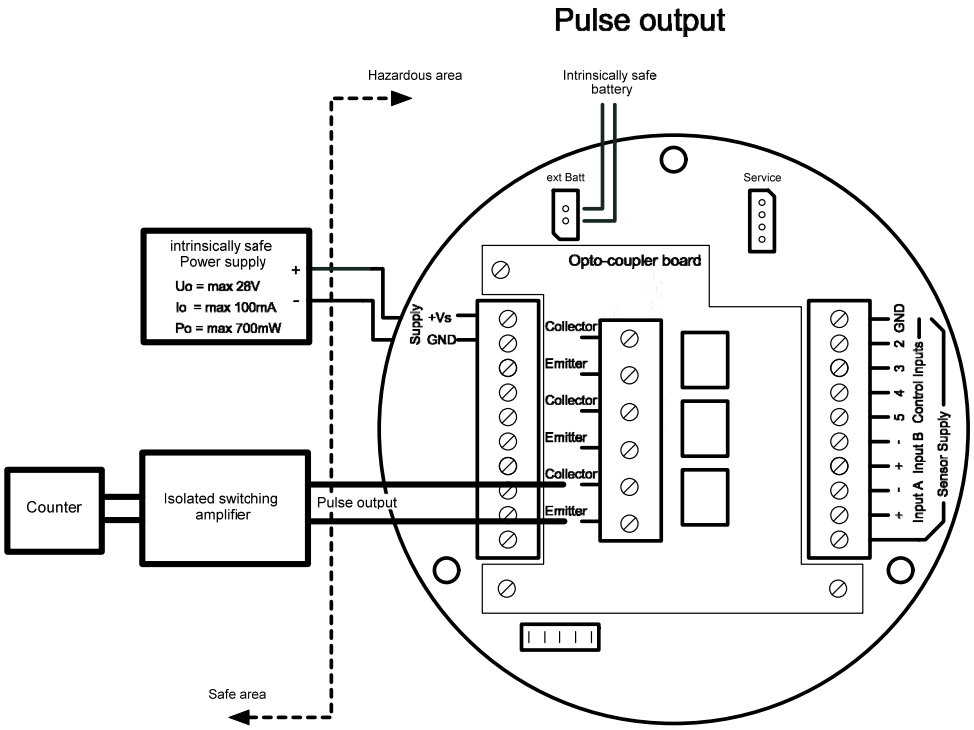
   The ZOK-Ex device can also be operated in a three-wire 4-20 mA configuration.



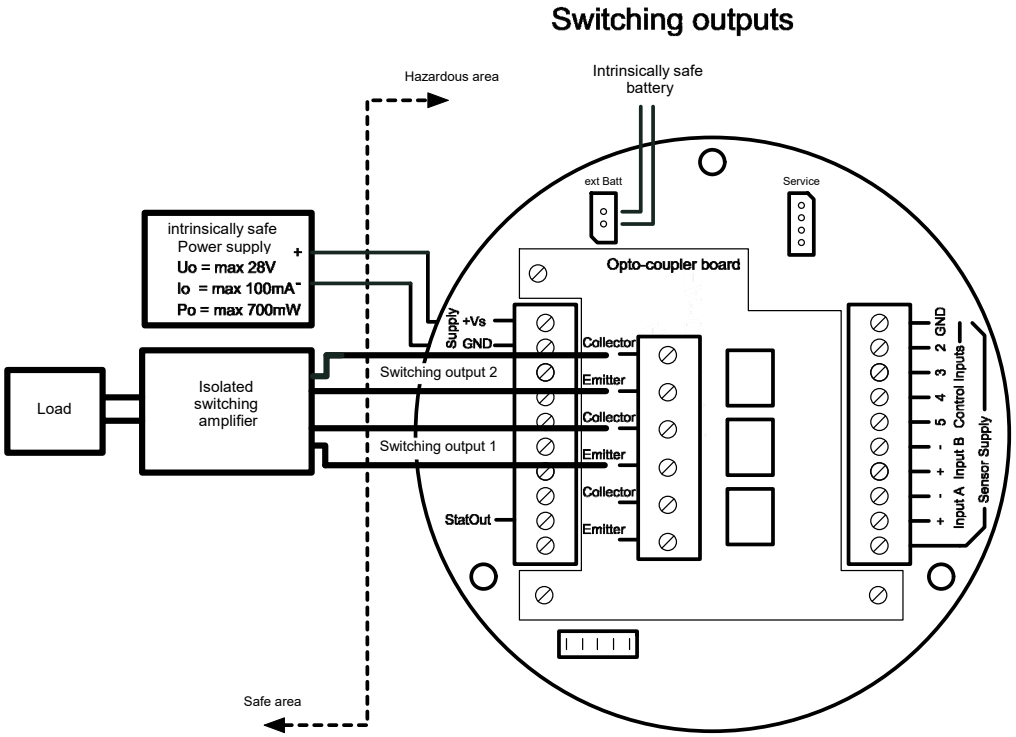
Detailed connection examples with certified safety barrier can be found in section 12

3. <u>Dosing function / pulse or flow alarm (ZOK-E2 / E5):</u>
   In the case of ZOK-E2 / E5 devices, the electronic assembly is equipped with an additional optocoupler board. This board offers 3 isolated passive optocoupler outputs for low-flow / high-flow alarm outputs and pulse output.

   In the ZOK-Ex versions, the standard connections for pulse and alarm outputs are deactivated, the signals are only output via the optocoupler outputs. The status output is not available for ZOK-Ex.



For ZOK-E5 with pulse output



For ZOK-E2 with dosing function
Or for ZOK-E5 with 2 independent alarm outputs

Detailed connection examples with certified safety barrier can be found in section 12

Note: All 3 outputs (4-20 mA, pulse and switching outputs) can be used at the same time if a separate intrinsically safe circuit is set up for each output signal with the aid of suitable certified safety barrier.

In addition to the wiring requirements of the ZOK-Ex operating instructions, the appropriate local rules, regulations and guidelines for wiring practices for intrinsically safe installations must be followed.

With regard to the cable selection and the permissible length, the associated device 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 the permissible cable length, use the capacitance and inductance values of the ZOK-Ex from the Exi certificate.

Certain regions like 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 device.

7. Programming

Refer to ZOK-Zx instruction manual for programming, parameterization.

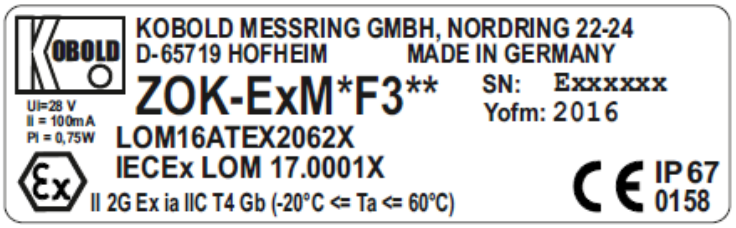
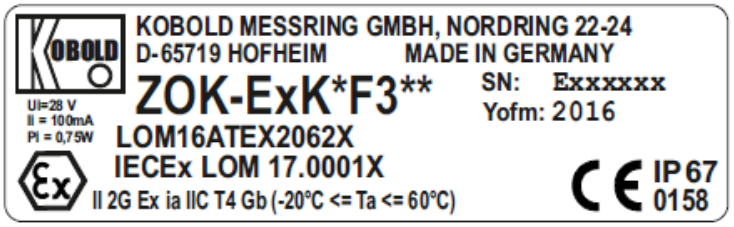
8. Service

The only replaceable item within the instrument is the EX battery pack and can be replaced as a complete unit. Only the certified intrinsically safe battery assembly ERS-BATEX036 may be used. This spare part can be ordered from the Kobold sales offices.

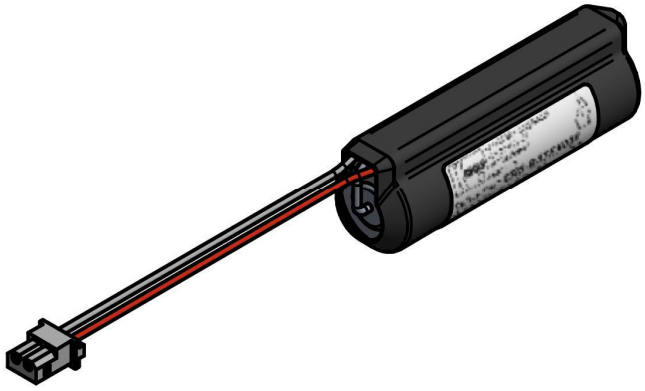
9. Repair

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.

10. Label and ordering code

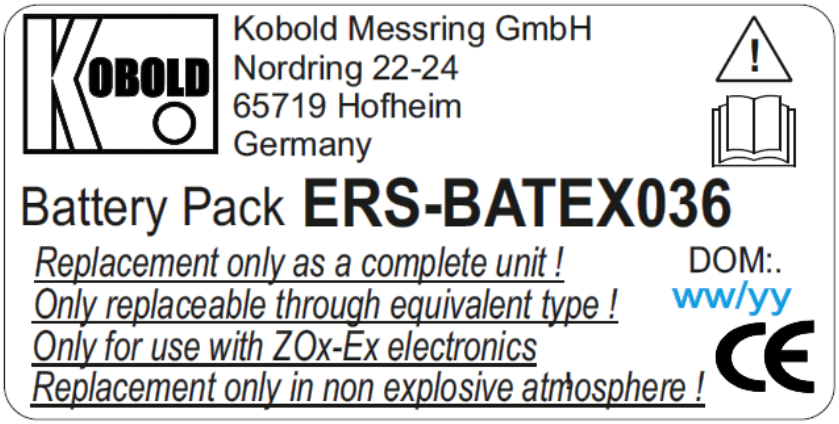
Code	Type	Function	Output	Identifying label
ZOK-E1M	version for retrofitting for DON	counter	none	
ZOK-E2M		dosing unit	2 optocoupler outputs	
ZOK-E3M		controller instrument	4-20 mA 2/3-wire	
ZOK-E5M			pulse and switching output	
ZOK-E1K	stand alone version	stand-alone counter	none	
ZOK-E2K		stand-alone dosing unit	2 optocoupler outputs	
ZOK-E3K		stand-alone control instrument	4-20 mA 2/3-wire	
ZOK-E5K			pulse and switching output	

11. Replacement ATEX Battery



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

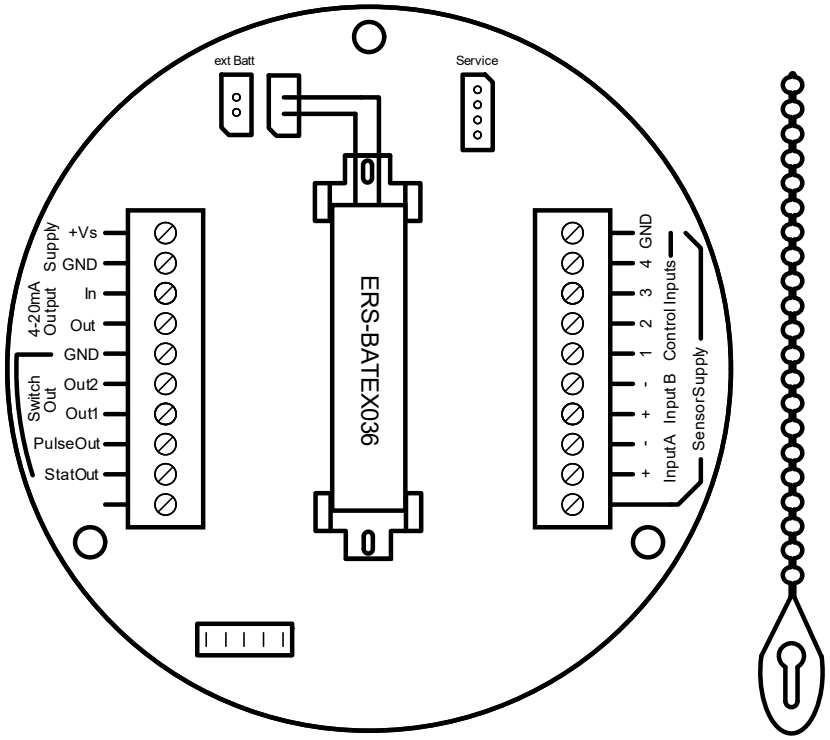
Note: It is highly recommended to follow the instructions mentioned on the ATEX Battery label.

Only the approved battery type ERS-BATEX036 may be used.
Emptied batteries must not be recharged.
Emptied batteries must be disposed of properly.

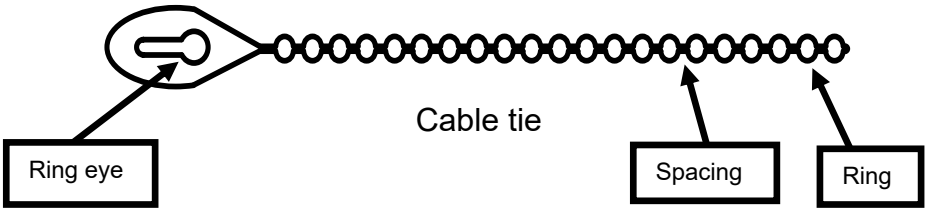
Mounting the ATEX Battery

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:

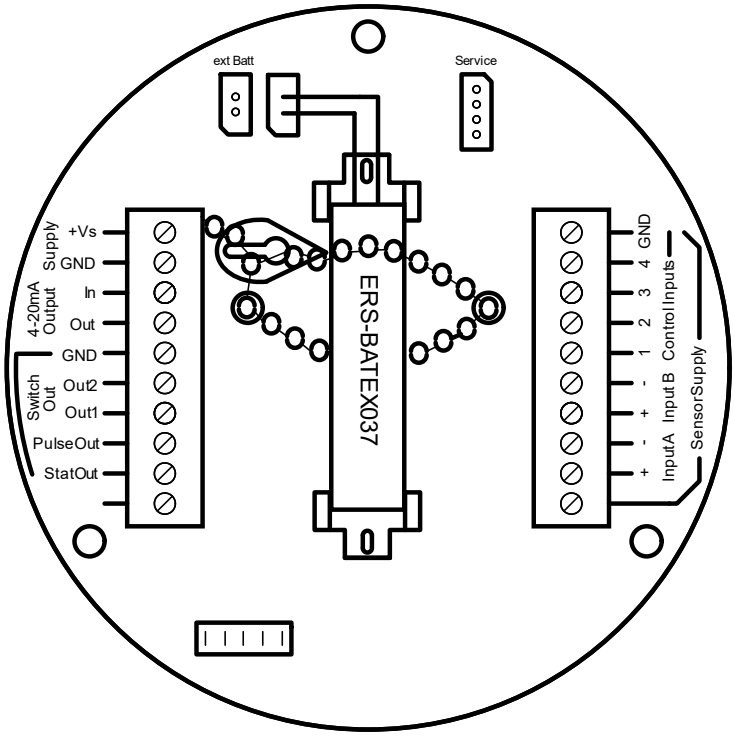


2. The ATEX Battery should then be fixed with the help of a pre-mounted detachable cable tie. If the ZOK-Ex electronics is delivered together with the ATEX Battery, then the ATEX Battery will be fixed and connected from the factory but without battery connector ‘EX Bat’ connected.

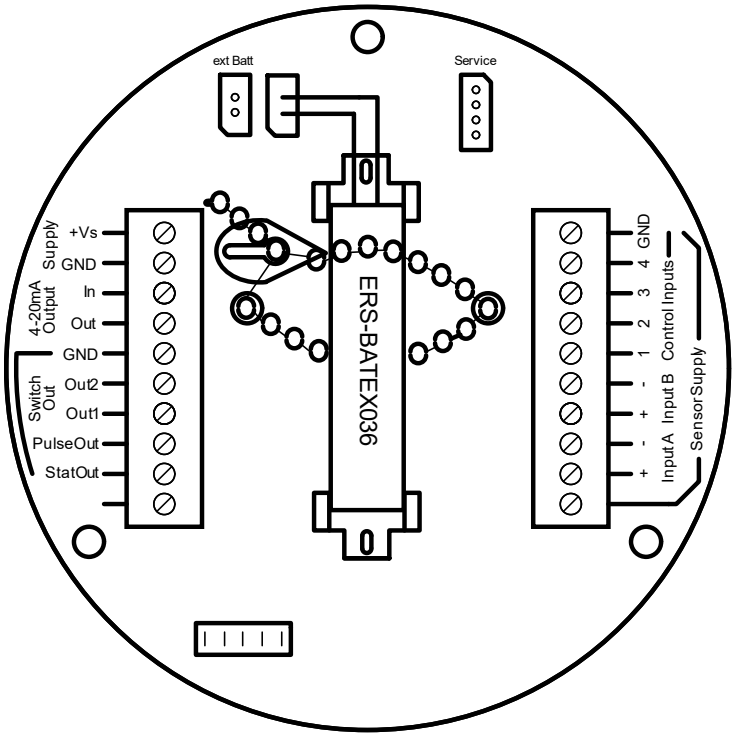


How to tie:

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.



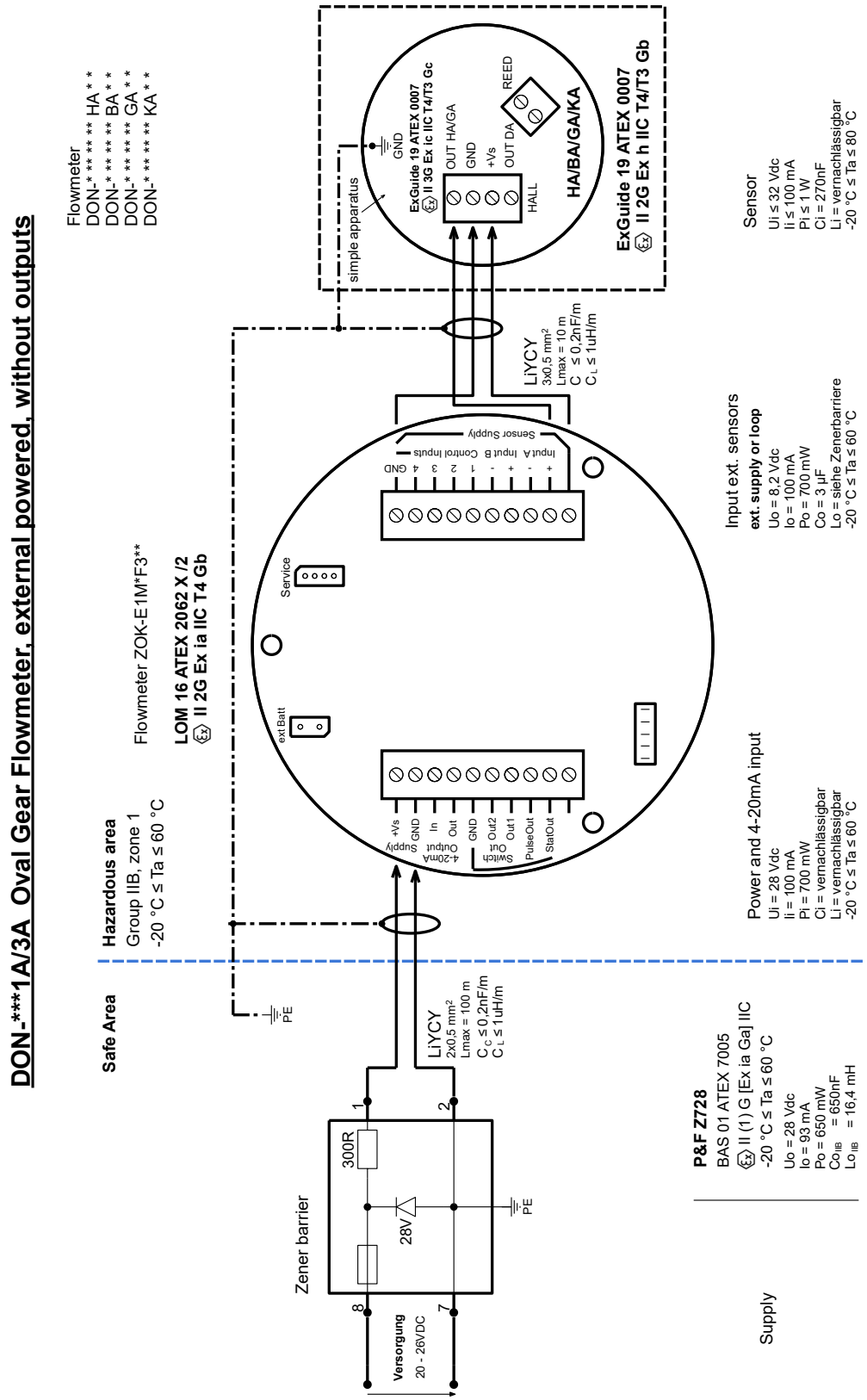
2. Once this is ensured, the spacing between the rings should be pushed into the narrow side of the ring eye. Hence locking the tie.

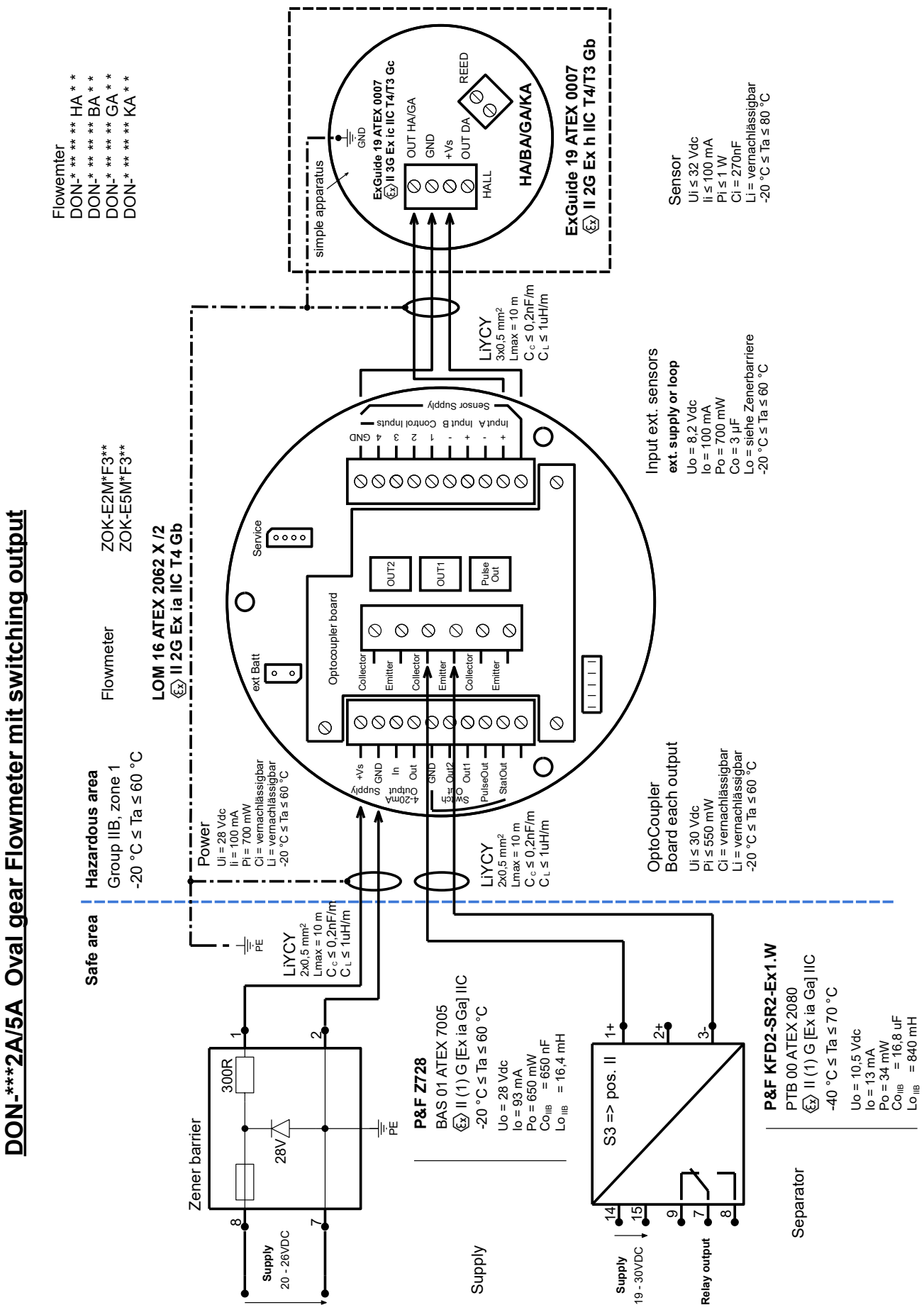


How to untie:
In order to release the cable tie, the latter is pushed out again from the slot of the ring eye and can then be withdrawn from the ring eye again and opened.

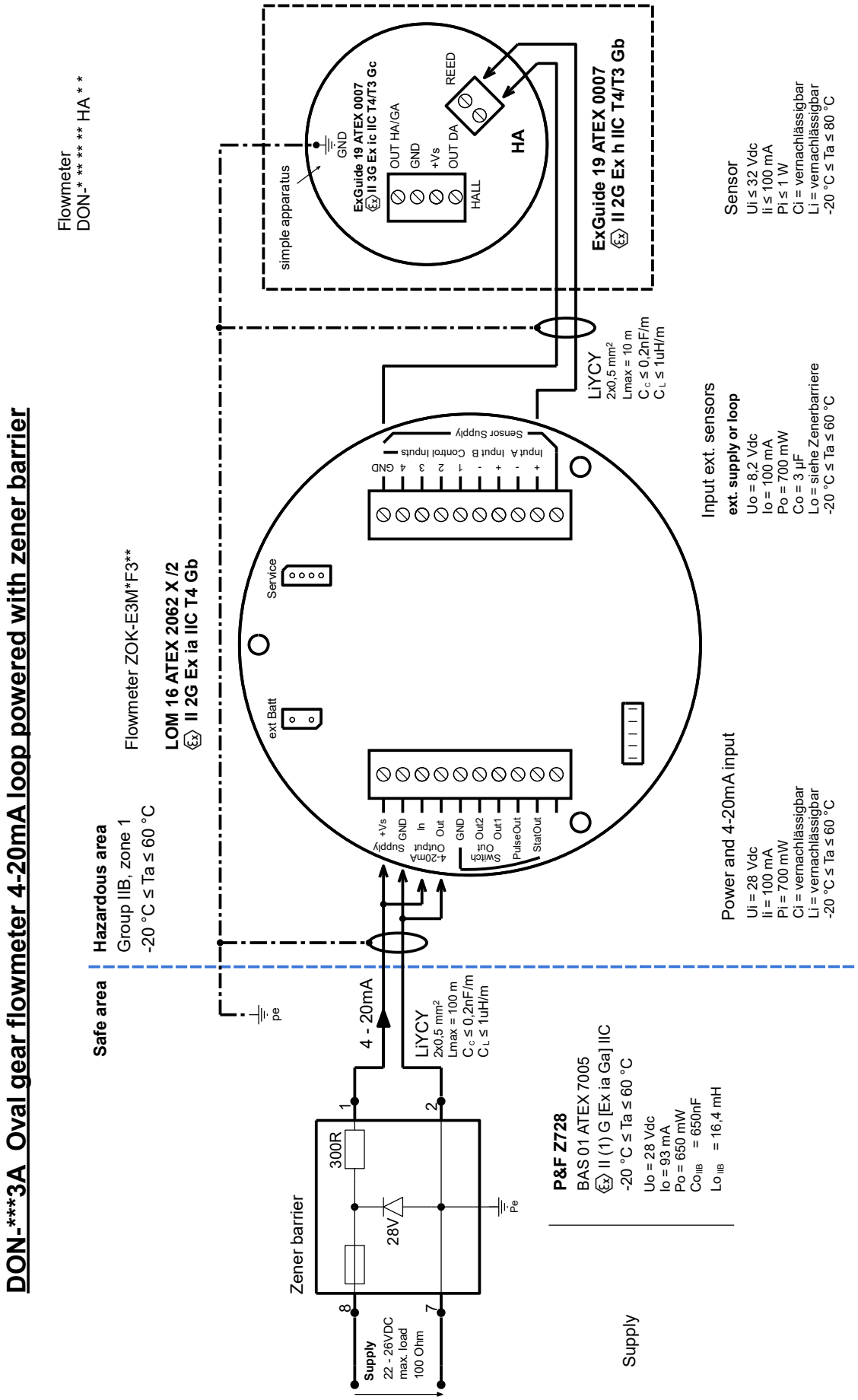
12. Wiring examples (control drawings)

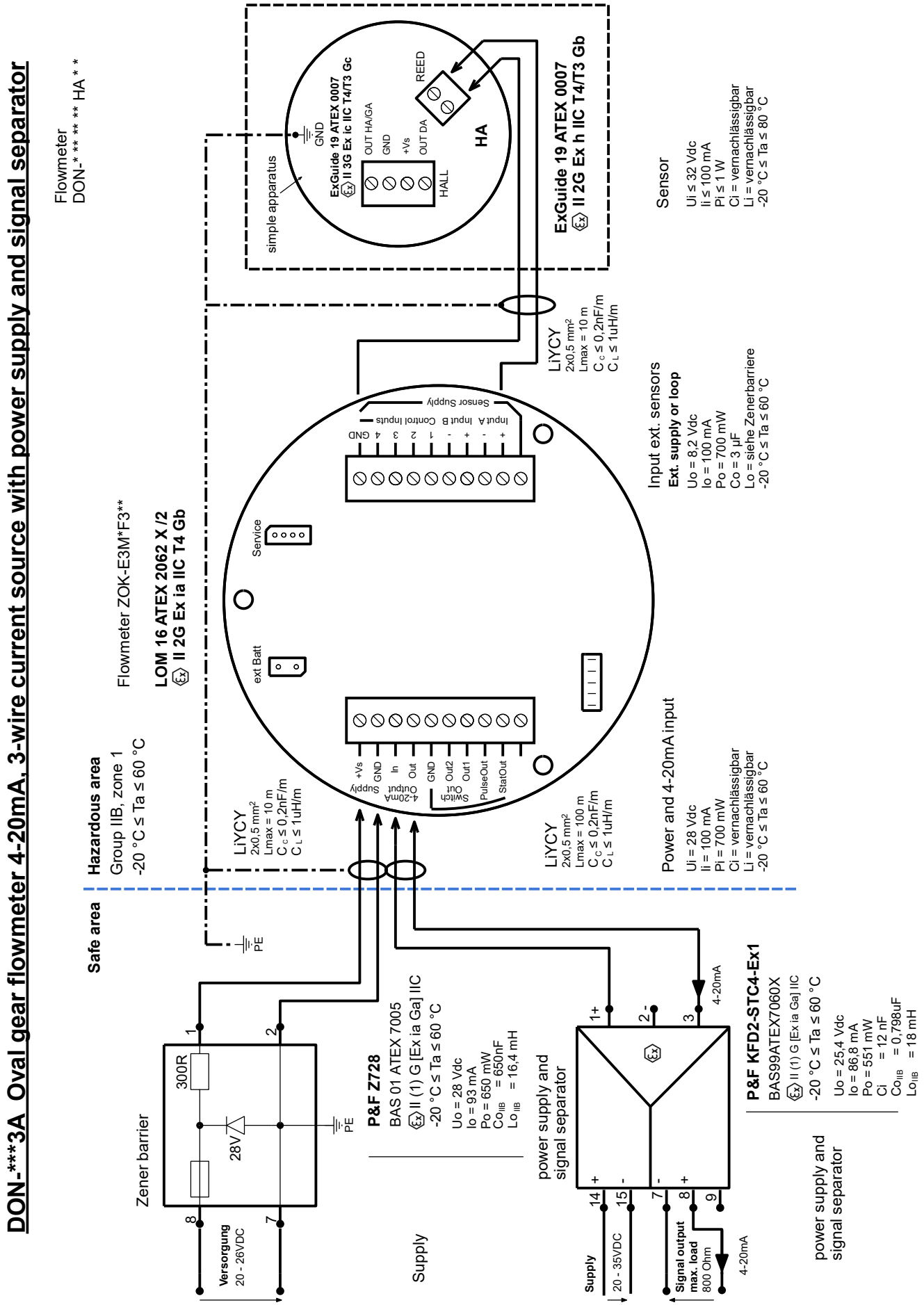
12.1 Usage in Zone 1, Group IIB

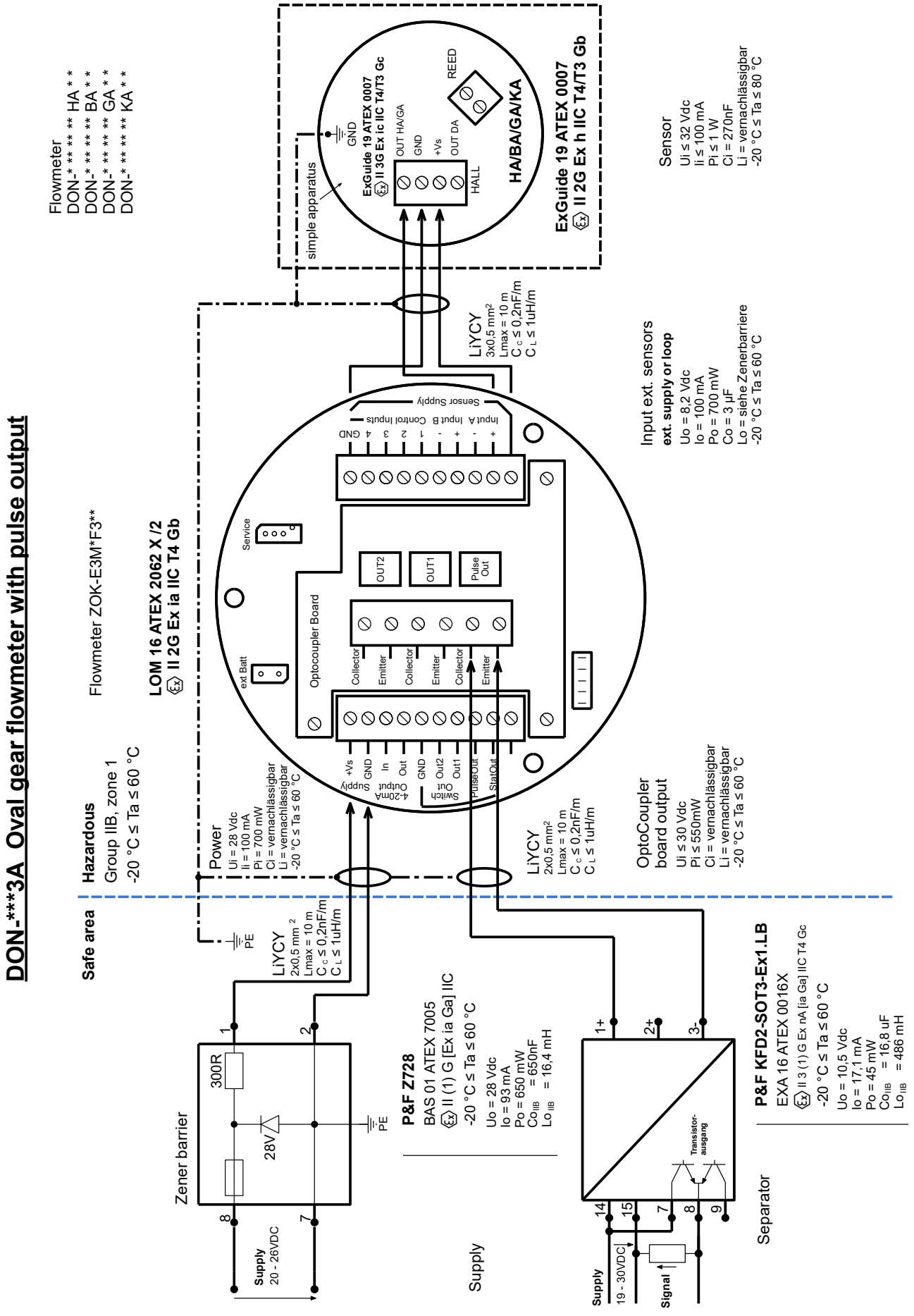



DON-***2A/5A Oval gear Flowmeter mit switching output
Flowemter
DON-* ** ** ** HA * *
DON-* ** ** ** BA * *
DON-* ** ** ** GA * *
DON-* ** ** ** KA * *
simple apparatus
GND
ExGuide 19 ATEX 0007
II 3G Ex ic IIC T4/T3 Gc
OUT HA/GA
GND
+Vs
OUT DA
REED
HALL
HA/BA/GA/KA
ExGuide 19 ATEX 0007
II 2G Ex h IIC T4/T3 Gb
Sensor
Ui ≤ 32 Vdc
Ii ≤ 100 mA
Pi ≤ 1 W
Ci = 270nF
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 80 °C
LiYCY
3x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Input ext. sensors
ext. supply or loop
Uo = 8,2 Vdc
Io = 100 mA
Po = 700 mW
Co = 3 µF
Lo = siehe Zenerbarriere
-20 °C ≤ Ta ≤ 60 °C
Sensor Supply
Input A
Input B
Control Inputs
GND
Service
ext Batt
Optocoupler board
OUT2
OUT1
Pulse Out
Collector
Emitter
Collector
Emitter
Collector
Emitter
+Vs
GND
In
Out
GND
Out2
Out1
PulseOut
StatOut
4-20mA Output Supply
Switch Output
OptoCoupler
Board each output
Ui ≤ 30 Vdc
Pi ≤ 550 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
Safe area
Hazardous area
Group IIB, zone 1
-20 °C ≤ Ta ≤ 60 °C
Flowmeter
ZOK-E2M*F3**
ZOK-E5M*F3**
LOM 16 ATEX 2062 X /2
II 2G Ex ia IIC T4 Gb
Power
Ui = 28 Vdc
Ii = 100 mA
Pi = 700 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
LiYCY
2x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
LiYCY
2x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
PE
PE
Zener barrier
300R
28V
1
2
8
7
Supply
20 - 26VDC
P&F Z728
BAS 01 ATEX 7005
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 28 Vdc
Io = 93 mA
Po = 650 mW
Co IIB = 650 nF
Lo IIB = 16,4 mH
Supply
S3 => pos. II
1+
2+
3-
14
15
9
7
8
Supply
19 - 30VDC
Relay output
Separator
P&F KFD2-SR2-Ex1.W
PTB 00 ATEX 2080
II (1) G [Ex ia Ga] IIC
-40 °C ≤ Ta ≤ 70 °C
Uo = 10,5 Vdc
Io = 13 mA
Po = 34 mW
Co IIB = 16,8 uF
Lo IIB = 840 mH

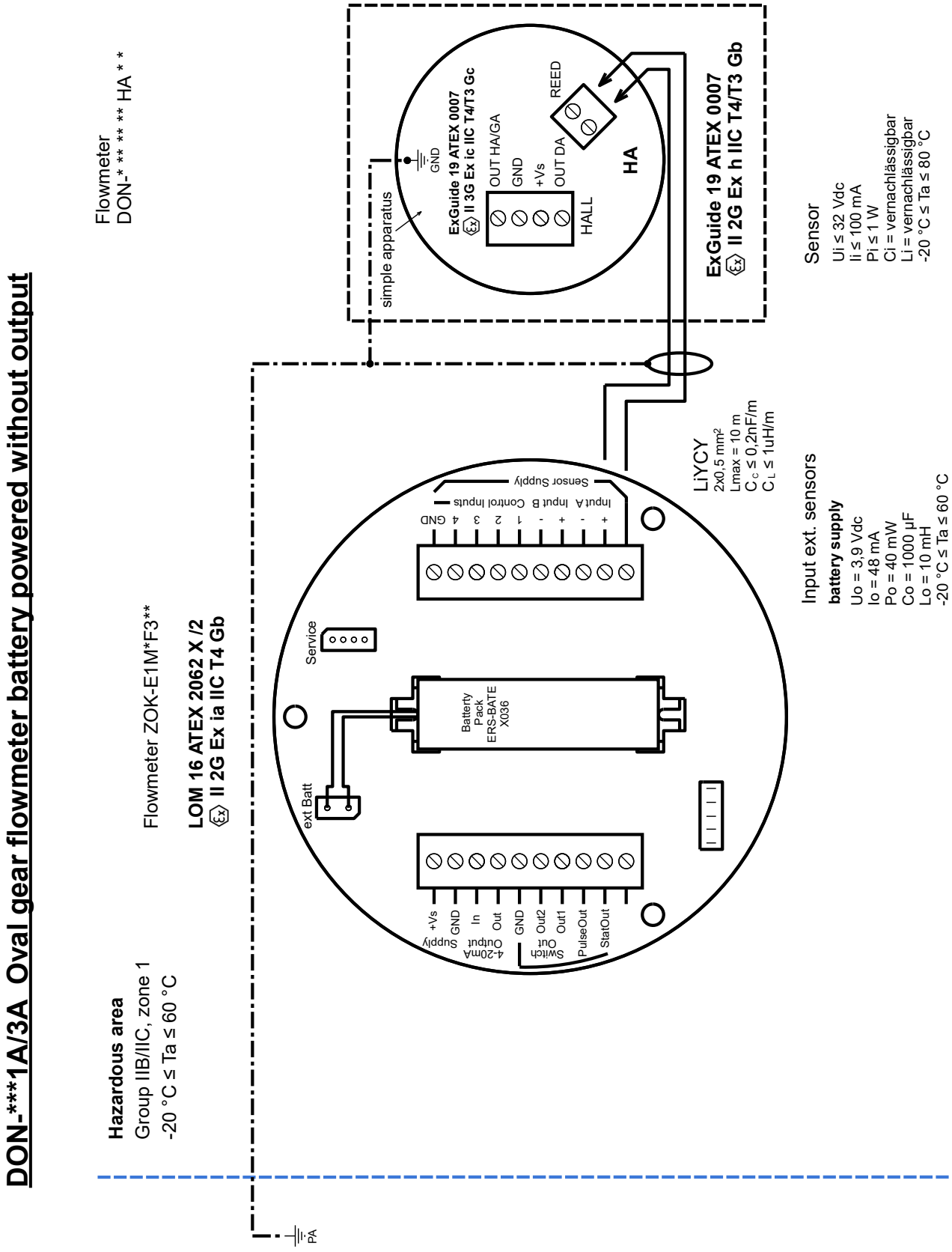
DON-***3A Oval gear flowmeter 4-20mA loop powered with zener barrier



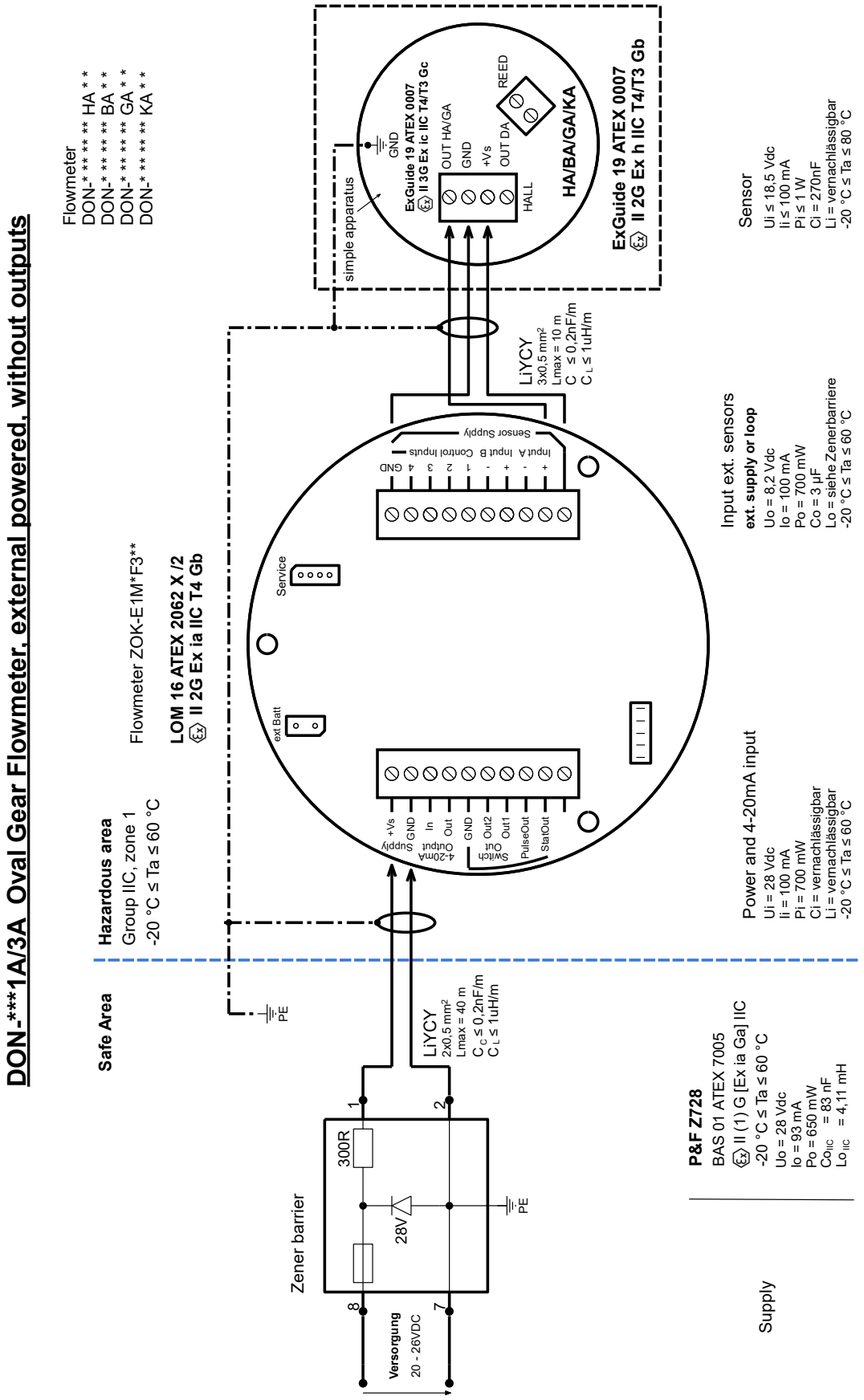

DON-***3A Oval gear flowmeter 4-20mA, 3-wire current source with power supply and signal separator
Flowmeter
DON-* ** ** ** HA * *
simple apparatus
ExGuide 19 ATEX 0007
II 3G Ex ic IIC T4/T3 Gc
GND
OUT HA/GA
GND
+Vs
OUT DA
HALL
REED
HA
ExGuide 19 ATEX 0007
II 2G Ex h IIC T4/T3 Gb
Sensor
Ui ≤ 32 Vdc
Ii ≤ 100 mA
Pi ≤ 1 W
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 80 °C
LiYCY
2x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Input ext. sensors
Ext. supply or loop
Uo = 8,2 Vdc
Io = 100 mA
Po = 700 mW
Co = 3 µF
Lo = siehe Zenerbarriere
-20 °C ≤ Ta ≤ 60 °C
Flowmeter ZOK-E3M*F3**
LOM 16 ATEX 2062 X /2
II 2G Ex ia IIC T4 Gb
Sensor Supply
Input A
Input B
Control Inputs
GND
Service
ext Batt
+Vs
GND
In
Out
GND
Out2
Out1
PulseOut
StatOut
4-20mA Output Supply
Switch Out
Safe area
Hazardous area
Group IIB, zone 1
-20 °C ≤ Ta ≤ 60 °C
LiYCY
2x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
LiYCY
2x0,5 mm²
Lmax = 100 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Power and 4-20mA input
Ui = 28 Vdc
Ii = 100 mA
Pi = 700 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
PE
PE
Zener barrier
300R
28V
PE
P&F Z728
BAS 01 ATEX 7005
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 28 Vdc
Io = 93 mA
Po = 650 mW
Co IIB = 650nF
Lo IIB = 16,4 mH
power supply and
signal separator
4-20mA
P&F KFD2-STC4-Ex1
BAS99ATEX7060X
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 25,4 Vdc
Io = 86,8 mA
Po = 551 mW
Ci = 12 nF
Co IIB = 0,798uF
Lo IIB = 18 mH
power supply and
signal separator
Versorgung
20 - 26VDC
Supply
Supply
20 - 35VDC
Signal output
max. load
800 Ohm
4-20mA


DON-***3A Oval gear flowmeter with pulse output
Safe area
Hazardous
Group IIB, zone 1
-20 °C ≤ Ta ≤ 60 °C
Flowmeter ZOK-E3M*F3**
LOM 16 ATEX 2062 X /2
II 2G Ex ia IIC T4 Gb
Flowmeter
DON-* ** ** ** HA * *
DON-* ** ** ** BA * *
DON-* ** ** ** GA * *
DON-* ** ** ** KA * *
simple apparatus
GND
ExGuide 19 ATEX 0007
II 3G Ex ic IIC T4/T3 Gc
OUT HA/GA
GND
+Vs
OUT DA
HALL
REED
HA/BA/GA/KA
ExGuide 19 ATEX 0007
II 2G Ex h IIC T4/T3 Gb
LiYCY
3x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Sensor
Ui ≤ 32 Vdc
Ii ≤ 100 mA
Pi ≤ 1 W
Ci = 270nF
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 80 °C
Input ext. sensors
ext. supply or loop
Uo = 8,2 Vdc
Io = 100 mA
Po = 700 mW
Co = 3 µF
Lo = siehe Zenerbarriere
-20 °C ≤ Ta ≤ 60 °C
Sensor Supply
Input A
Input B
Control Inputs
GND
Service
ext Batt
Optocoupler Board
OUT2
OUT1
Pulse Out
Collector
Emitter
Power
Ui = 28 Vdc
Ii = 100 mA
Pi = 700 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
4-20mA Output Supply
Switch Out
+Vs
GND
In
Out
GND
Out2
Out1
PulseOut
StatOut
LiYCY
2x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
OptoCoupler
board output
Ui ≤ 30 Vdc
Pi ≤ 550mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
PE
LiYCY
2x0,5 mm ²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Zener barrier
300R
28V
PE
Supply
20 - 26VDC
P&F Z728
BAS 01 ATEX 7005
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 28 Vdc
Io = 93 mA
Po = 650 mW
Co IIB = 650nF
Lo IIB = 16,4 mH
Supply
Separator
Transistor-ausgang
Supply
19 - 30VDC
Signal
P&F KFD2-SOT3-Ex1.LB
EXA 16 ATEX 0016X
II 3 (1) G Ex nA [ia Ga] IIC T4 Gc
-20 °C ≤ Ta ≤ 60 °C
Uo = 10,5 Vdc
Io = 17,1 mA
Po = 45 mW
Co IIB = 16,8 uF
Lo IIB = 486 mH

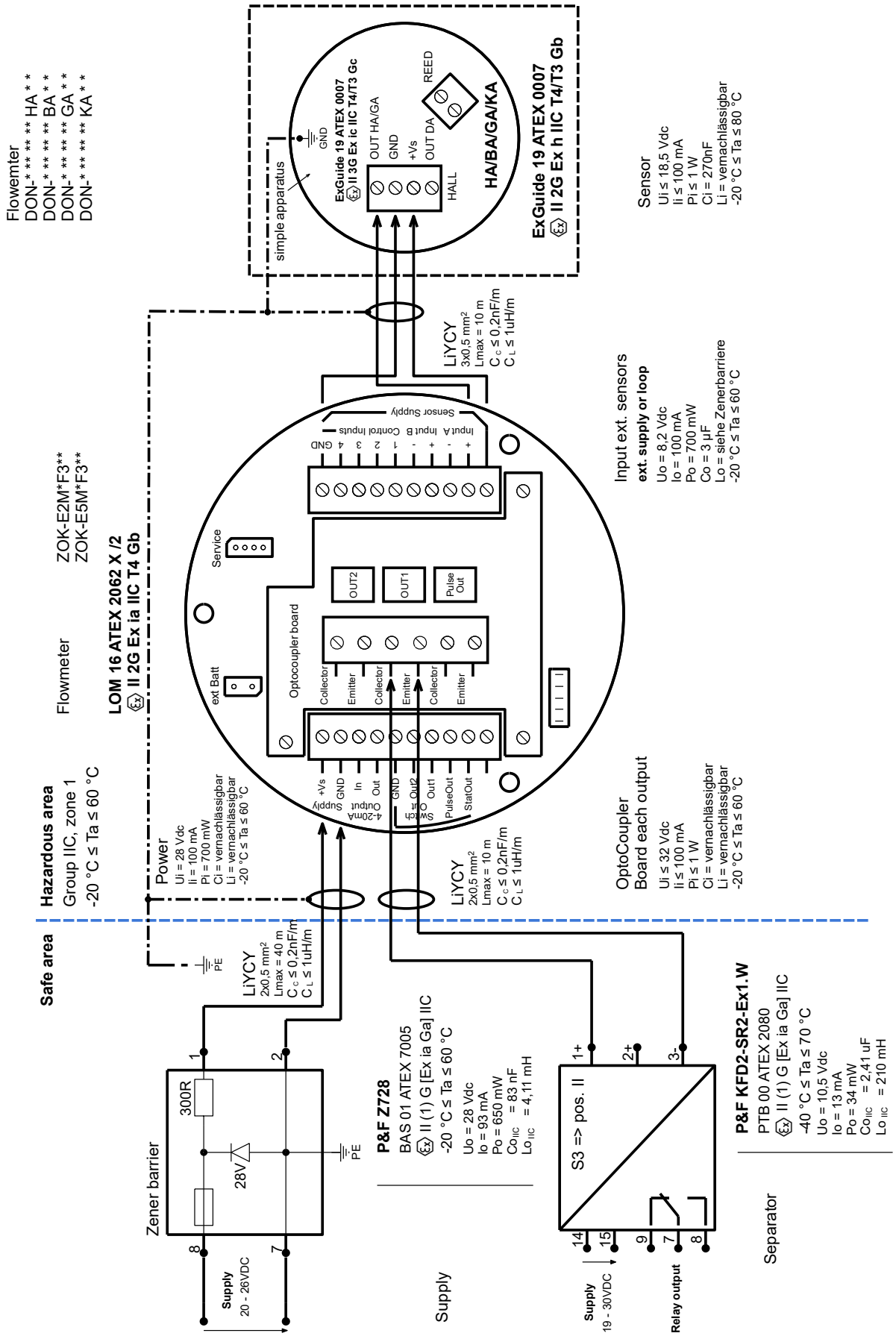
12.2 Usage in Zone 1, Group IIB/IIC

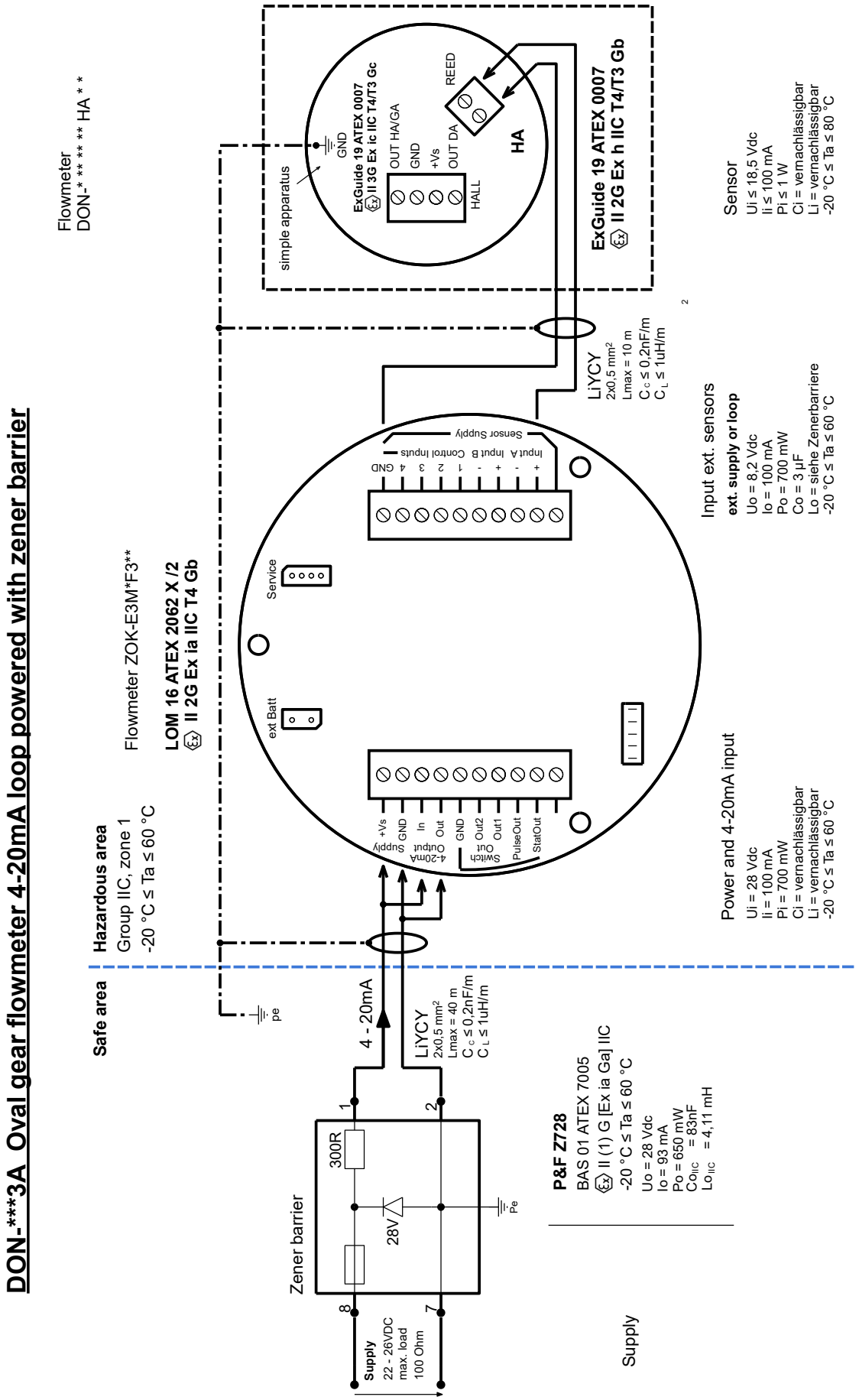


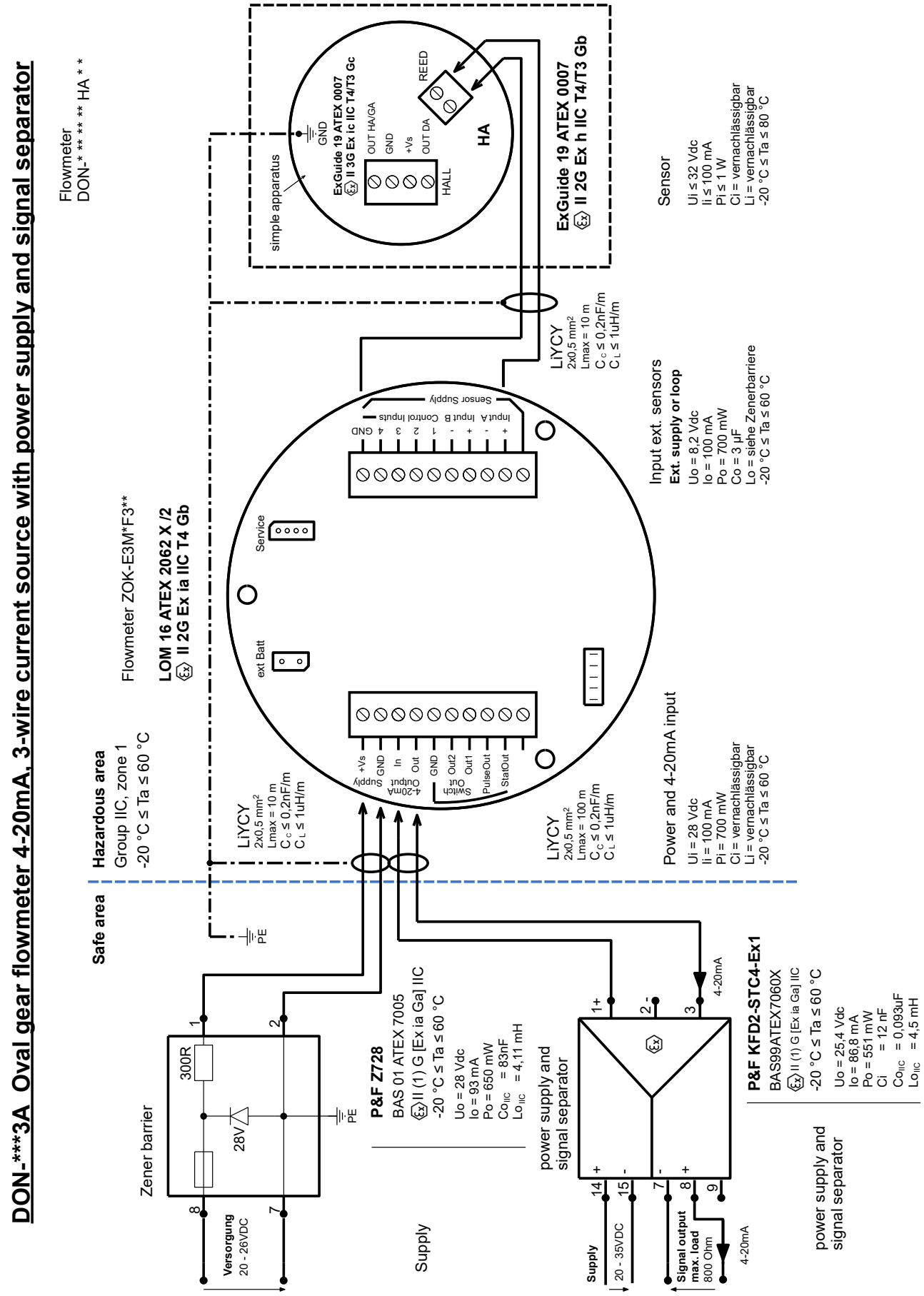
12.3 Usage in Zone 1, Group IIC

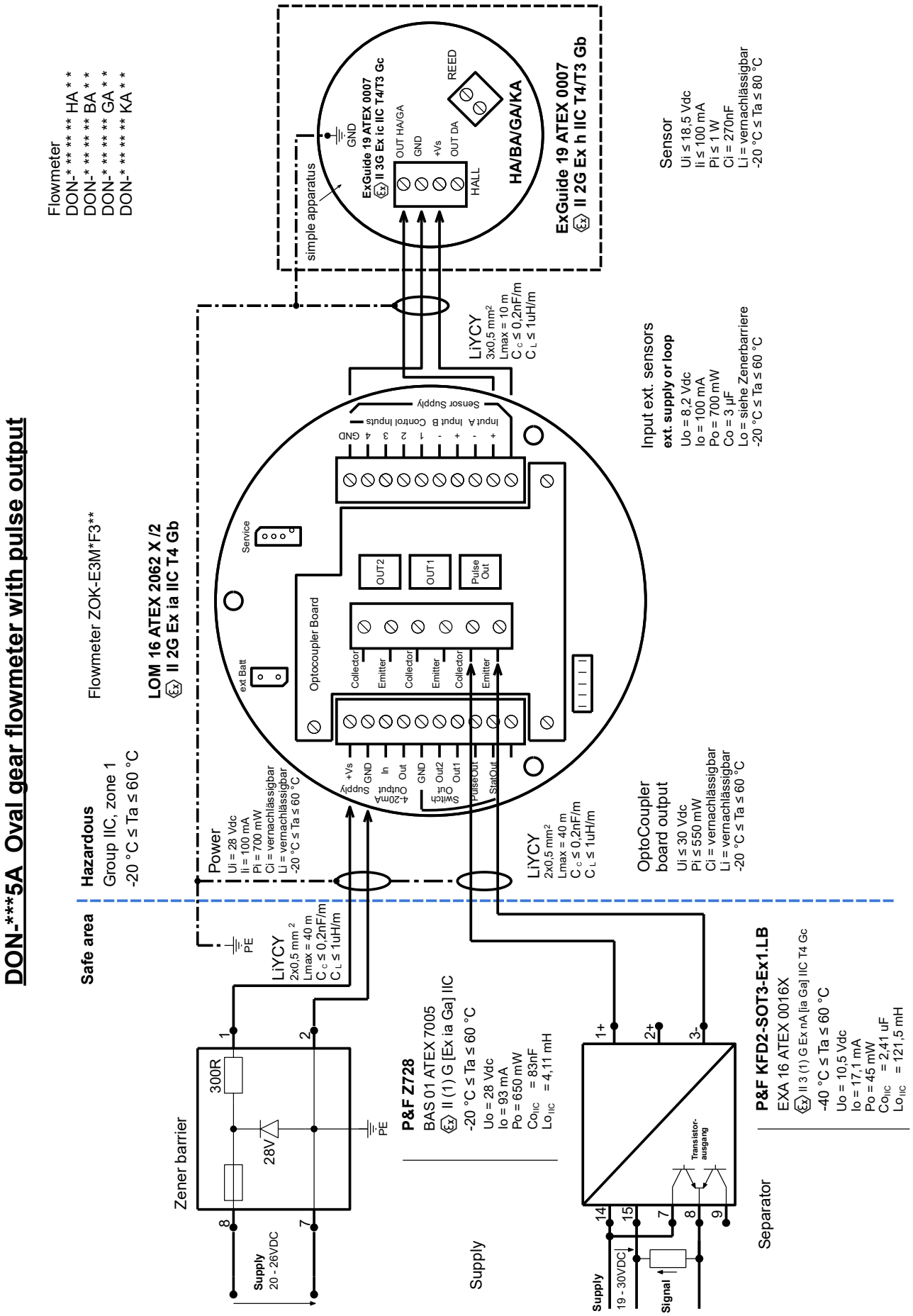


DON-***2A/5A Oval gear Flowmeter mit switching output




DON-***3A Oval gear flowmeter 4-20mA loop powered with zener barrier
Flowmeter
DON-* ** ** ** HA * *
simple apparatus
GND
ExGuide 19 ATEX 0007
II 3G Ex ic IIC T4/T3 Gc
OUT HA/GA
GND
+Vs
OUT DA
HALL
REED
HA
ExGuide 19 ATEX 0007
II 2G Ex h IIC T4/T3 Gb
Sensor
Ui ≤ 18,5 Vdc
Ii ≤ 100 mA
Pi ≤ 1 W
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 80 °C
LiYCY
2x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Input ext. sensors
ext. supply or loop
Uo = 8,2 Vdc
Io = 100 mA
Po = 700 mW
Co = 3 µF
Lo = siehe Zenerbarriere
-20 °C ≤ Ta ≤ 60 °C
Safe area
Hazardous area
Group IIC, zone 1
-20 °C ≤ Ta ≤ 60 °C
Flowmeter ZOK-E3M*F3**
LOM 16 ATEX 2062 X /2
II 2G Ex ia IIC T4 Gb
Service
ext Batt
Sensor Supply
Input A Input B Control Inputs
GND 4 3 2 1 - + - +
+Vs GND In Out GND Out2 Out1 PulseOut StatOut
4-20mA Output Supply
Switch Out
Power and 4-20mA input
Ui = 28 Vdc
Ii = 100 mA
Pi = 700 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
4 - 20mA
LiYCY
2x0,5 mm²
Lmax = 40 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
pe
Zener barrier
300R
28V
Pe
1
2
8
7
Supply
22 - 26VDC
max. load
100 Ohm
P&F Z728
BAS 01 ATEX 7005
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 28 Vdc
Io = 93 mA
Po = 650 mW
Co IIC = 83nF
Lo IIC = 4,11 mH
Supply


DON-***3A Oval gear flowmeter 4-20mA, 3-wire current source with power supply and signal separator
Flowmeter
DON-* ** ** ** HA * *
Safe area
Hazardous area
Group IIC, zone 1
-20 °C ≤ Ta ≤ 60 °C
Flowmeter ZOK-E3M*F3**
LOM 16 ATEX 2062 X /2
II 2G Ex ia IIC T4 Gb
simple apparatus
ExGuide 19 ATEX 0007
II 3G Ex ic IIC T4/T3 Gc
OUT HA/GA
GND
+Vs
OUT DA
HALL
REED
HA
ExGuide 19 ATEX 0007
II 2G Ex h IIC T4/T3 Gb
Sensor
Ui ≤ 32 Vdc
Ii ≤ 100 mA
Pi ≤ 1 W
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 80 °C
LiYCY
2x0,5 mm²
Lmax = 10 m
C C ≤ 0,2nF/m
C L ≤ 1uH/m
Input ext. sensors
Ext. supply or loop
Uo = 8,2 Vdc
Io = 100 mA
Po = 700 mW
Co = 3 µF
Lo = siehe Zenerbarriere
-20 °C ≤ Ta ≤ 60 °C
Service
ext Batt
Sensor Supply
Input A
Input B
Control Inputs
GND
+Vs
GND
In
Out
4-20mA Output
Supply
GND
Out2
Out1
Switch Out
PulseOut
StatOut
LiYCY
2x0,5 mm²
Lmax = 100 m
C C ≤ 0,2nF/m
C L ≤ 1uH/m
Power and 4-20mA input
Ui = 28 Vdc
Ii = 100 mA
Pi = 700 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
PE
Zener barrier
300R
28V
Versorgung
20 - 26VDC
P&F Z728
BAS 01 ATEX 7005
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 28 Vdc
Io = 93 mA
Po = 650 mW
Co IIC = 83nF
Lo IIC = 4,11 mH
Supply
power supply and
signal separator
1+
2-
3
4-20mA
Supply
20 - 35VDC
Signal output
max. load
800 Ohm
4-20mA
P&F KFD2-STC4-Ex1
BAS99ATEX7060X
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 25,4 Vdc
Io = 86,8 mA
Po = 551 mW
Ci = 12 nF
Co IIC = 0,093uF
Lo IIC = 4,5 mH
power supply and
signal separator


DON-***5A Oval gear flowmeter with pulse output
Safe area
Hazardous
Group IIC, zone 1
-20 °C ≤ Ta ≤ 60 °C
Flowmeter ZOK-E3M*F3**
LOM 16 ATEX 2062 X /2
II 2G Ex ia IIC T4 Gb
Flowmeter
DON-* ** ** ** HA * *
DON-* ** ** ** BA * *
DON-* ** ** ** GA * *
DON-* ** ** ** KA * *
simple apparatus
ExGuide 19 ATEX 0007
II 3G Ex ic IIC T4/T3 Gc
OUT HA/GA
GND
+Vs
OUT DA
HALL
REED
GND
HA/BA/GA/KA
ExGuide 19 ATEX 0007
II 2G Ex h IIC T4/T3 Gb
Sensor
Ui ≤ 18,5 Vdc
Ii ≤ 100 mA
Pi ≤ 1 W
Ci = 270nF
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 80 °C
LiYCY
3x0,5 mm²
Lmax = 10 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
Input ext. sensors
ext. supply or loop
Uo = 8,2 Vdc
Io = 100 mA
Po = 700 mW
Co = 3 µF
Lo = siehe Zenerbarriere
-20 °C ≤ Ta ≤ 60 °C
Power
Ui = 28 Vdc
Ii = 100 mA
Pi = 700 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
LiYCY
2x0,5 mm²
Lmax = 40 m
C c ≤ 0,2nF/m
C L ≤ 1uH/m
OptoCoupler
board output
Ui ≤ 30 Vdc
Pi ≤ 550 mW
Ci = vernachlässigbar
Li = vernachlässigbar
-20 °C ≤ Ta ≤ 60 °C
Sensor Supply
Input A
Input B
Control Inputs
GND
+
-
+
-
1
2
3
4
Optocoupler Board
Service
ext. Batt
OUT2
OUT1
Pulse Out
Collector
Emitter
Collector
Emitter
Collector
Emitter
+Vs
GND
In
Out
GND
Out2
Out1
PulseOut
StatOut
4-20mA Output Supply
Switch Out
PE
Zener barrier
300R
28V
PE
P&F Z728
BAS 01 ATEX 7005
II (1) G [Ex ia Ga] IIC
-20 °C ≤ Ta ≤ 60 °C
Uo = 28 Vdc
Io = 93 mA
Po = 650 mW
Co IIC = 83nF
Lo IIC = 4,11 mH
Supply
20 - 26VDC
Supply
1+
2+
3-
Transistor-ausgang
14
15
7
8
9
Supply
19 - 30VDC
Signal
Separator
P&F KFD2-SOT3-Ex1.LB
EXA 16 ATEX 0016X
II 3 (1) G Ex nA [ia Ga] IIC T4 Gc
-40 °C ≤ Ta ≤ 60 °C
Uo = 10,5 Vdc
Io = 17,1 mA
Po = 45 mW
Co IIC = 2,41 uF
Lo IIC = 121,5 mH

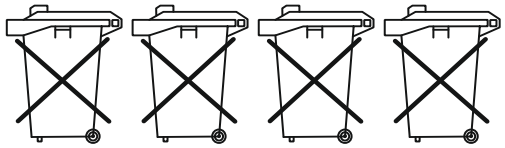
13. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

Batteries

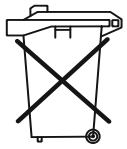
Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



Cd[1] Hg[2] Pb[3] Li[4]

1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



14. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, declare under our sole responsibility that the product:

Flow Rate Totaliser/Controller **Model: ZOK-E1/E2/E3/E5**

to which this declaration relates is in conformity with the following EU directives stated below:

2014/30/EU EMC directive
2011/65/EU RoHS
2015/863/EU Delegated Directive (RoHS III)

Additionally for devices with power supply option 0:

2014/35/EU Low Voltage Directive

Also, the following standards are fulfilled:

EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

EN 60529:2014 Degrees of protection provided by enclosures (IP Code)

EN IEC 61326-1:2021 Electrical equipment for control, instrumentation technology and laboratory use – EMC requirements, Industrial area

EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Hofheim, 14 Nov. 2023

H. Volz
General Manager

J. Burke
Compliance Manager

15. EU declaration of conformity (ATEX)

We, Kobold Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, hereby declare under our sole responsibility and with the aim of traceability that the product

Product type: **Flow Rate Totaliser/Controller**
Model: ZOK-E1/E2/E3/E5

EU type examination certificate: **LOM 16ATEX2062X**

Complies with all relevant requirements of the following directive(s):

2014/34/EU Equipment and Protective systems intended for use in potentially Explosive Atmospheres

The following harmonized standards were applied for conformity assessment:

EN IEC 60079-0:2018 Equipment – General requirements
EN 60079-11:2012 Device protection through intrinsic safety “i”

The above-mentioned product complies with Directive 2014/34/EU. New editions may have already replaced one or more of the standards mentioned in the EU type examination certificates. Kobold Messring declares that the product mentioned in this declaration of conformity either meets the requirements of the new editions or is not affected by the changes.

The notified body DEKRA Testing and Certification GmbH, identification number: 0158, was activated, in accordance with Article 17 of Directive 2014/34/EU, to monitor quality assurance related to the production process.

Certificate: BVS 21 ATEX ZQS/E110

Hofheim, 14 Nov. 2023

H. Volz
General Manager

J. Burke
Compliance Manager

16. ATEX Certificate

LABORATORIO OFICIAL J. M. MADARIAGA

EU-TYPE EXAMINATION CERTIFICATE

1 Equipment or protective systems Intended for use in Potentially Explosive Atmospheres – Directive 2014/34/EU

2 EU-Type Examination Certificate Number **LOM 16ATEX2062X** **Issue: 3**

3 Product: Counter / Flow controller
Types ZOK-E*K*F3** and ZOK-E*M*F3**

4 Manufacturer: Kobold Messring GmbH

5 Address: Nordring 22-24
D-65719 Hofheim
GERMANY

6 This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

7 Laboratorio Oficial J.M. Madariaga (LOM), Notified Body No. 0163, in accordance with Article 17 of the Directive 2014/34/EU 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 the confidential Report **LOM 22.481N**

8 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

- Standards **EN IEC 60079-0:2018** **EN 60079-11:2012**

Where additional criteria beyond those given here have been used, they are listed at item 18 in the Schedule.

9 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.

10 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.

11 The marking of the product shall include the following:

II 2G Ex ia IIC T4 Gb

Getafe,
Electronically signed by:

GARCIA TORRENT FRANCISCO JAVIER - 05356542A
2023.03.31 13:35:34 +02'00'

Certification Committee

RCPCER 25.7/7

UNIVERSIDAD POLITÉCNICA DE MADRID
(Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29)
Eric Kandel, 1 – 28906 GETAFE (MADRID) • (34) 910 679 825 • lom@lom.upm.es

LABORATORIO OFICIAL J. M. MADARIAGA

13 SHEDULE

14 EU-Type Examination Certificate Number **LOM 16ATEX2062X** **Issue: 3**

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, pulse signal input(s).
ZOK-E2M*F3**	Dosing unit, external powered, 2 optocoupler outputs, pulse signal input.
ZOK-E3M*F3**	Flow controller, battery, external or loop powered, 4-20mA output, 2/3-wire, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E4M*F3**	Flow controller, battery, external or loop powered, 4-20mA output with fully HART functionality, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E5M*F3**	Flow controller, external powered, 4-20mA output 3-wire, switching and pulse optocoupler outputs, pulse signal input(s).

Stand alone counter/flow controller electronics	
ZOK-E1K*F3**	Flow counter, battery and external powered, no outputs, pulse signal input(s).
ZOK-E2K*F3**	Dosing unit, external powered, 2 optocoupler outputs, pulse signal input.
ZOK-E3K*F3**	Flow controller, battery, external or loop powered, 4-20mA output, 2/3-wire, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E4K*F3**	Flow controller, battery, external or loop powered, 4-20mA output with fully HART functionality, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E5K*F3**	Flow controller, external powered, 4-20mA output 3-wire, switching and pulse optocoupler outputs, pulse signal input(s).

* = 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	*Ui*: 28 V *Ci*: 0 (negligible)	*Ii*:100 mA *Li*: 0 (negligible)	*Pi*: 0,7 W
Input terminals for external sensors External power supply or from loop	*Uo*: 8,2 V *Co*: 3 uF	*Io*:100 mA *Lo*: the same as the power supply	*Po*: 0,7 W
Input terminals for external sensors Internal battery power supply	*Uo*: 3,9 V *Co*: 1000 uF	*Io*: 48 mA *Lo*: 15 mH	*Po*: 40 mW
Optocoupler outputs	*Ui:* 30 V *Ci*: 0 (negligible)	*Pi:* 550 mW *Li*: 0 (negligible)	

LABORATORIO OFICIAL J. M. MADARIAGA

13 SHEDULE

14 EU-Type Examination Certificate Number **LOM 16ATEX2062X** **Issue: 3**

15 Description of product (continued)

Ambient temperature: -20 ºC ≤ Ta ≤ +60 ºC

Changes in this edition
To allow the use of two new types of primary lithium thionyl chloride battery cells.

16 Report **LOM 22.481N**

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 requirement

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	7	1.1	2017-01-25	PCB battery circuit
802.218	9	1	2016-04-15	PCB optocouplers board
904.049	1	1.2	2022-08-19	*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-Battery Pack 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
ZOK-Ex K10/0722	30	-	2022	*User Manual

*Note: An * is included before the description of documents that are new or revised*

20 History of variations

Issue	Date	Report number	Description
0	2016-09-26	LOM 14.084 SP	First certificate
1	2017-04-20	16.832K	Modification of the internal battery circuit The denomination and options of the different variants are modified. No other changes in the circuits
2	2021-11-05	LOM 21.486J	The intrinsic safety parameters corresponding to the optocoupled outputs are assigned

 Page 3/3

17. IECEx Certificate

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 LOM 17.0001X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 2	Issue 1 (2021-12-17) Issue 0 (2017-04-03)
Date of Issue:	2023-05-24		
Applicant:	**Kobold Messring GmbH** Nordring 22-24 D-65719 Hofheim **Germany**		
Equipment:	**Counter/Flow controller ZOK-E*K*F3** and ZOK-E*M*F3****		
Optional accessory:			
Type of Protection:	**"ia"**		
Marking:	Ex ia IIC T4 Gb -20 °C ≤ Ta ≤ +60 °C IECEx LOM 17.0001X		

Approved for issue on behalf of the IECEx Certification Body: **Javier García Torrent**

Position: **Certification Committee**

Signature:
(for printed version)

Date:
(for printed version)

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

Laboratorio Oficial J.M. Madariaga (LOM)
Fundación General Universidad Politécnica de Madrid
Calle Eric Kandel, 1
28906 Getafe (Madrid)
Spain

IECEx Certificate of Conformity

Certificate No.: **IECEx LOM 17.0001X** Page 2 of 4

Date of issue: 2023-05-24 Issue No: 2

Manufacturer: **Kobold Messring GmbH**
Nordring 22-24
D-65719 Hofheim
Germany

Manufacturing locations:

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 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

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:

ES/LOM/ExTR17.0001/00 ES/LOM/ExTR17.0001/01 ES/LOM/ExTR17.0001/02
ES/LOM/ExTR17.0001/03

Quality Assessment Report:

DE/BVS/QAR09.0001/12

IECEx Certificate of Conformity

Certificate No.: **IECEx LOM 17.0001X** Page 3 of 4

Date of issue: 2023-05-24 Issue No: 2

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

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

The units 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 appopriate certification.

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

SPECIFIC CONDITIONS OF USE: YES as shown below:
Attention to electrostatic risk arising from the outer shell, made of plastic material, should ge given. It must follow the safety instruction 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 from a three wire connection correspond to the combination of the associated apparatuses.

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
To allow the use of two new types of primary lithium thionyl chloride battery cells

Annex:

IECEx LOM 17.0001X_Annex_02._1.pdf

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Variants and type codification:

Counter/flow controller electronics for meter mount	
ZOK-E1M*F3**	Flow counter, battery and external powered, no outputs, pulse signal input(s).
ZOK-E2M*F3**	Dosing unit, external powered, 2 optocoupler outputs, pulse signal input.
ZOK-E3M*F3**	Flow controller, battery, external or loop powered, 4-20mA output, 2/3-wire, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E4M*F3**	Flow controller, battery, external or loop powered, 4-20mA output with fully HART functionality, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E5M*F3**	Flow controller, external powered, 4-20mA output 3-wire, switching and pulse optocoupler outputs, pulse signal input(s).

Stand alone counter/flow controller electronics	
ZOK-E1K*F3**	Flow counter, battery and external powered, no outputs, pulse signal input(s).
ZOK-E2K*F3**	Dosing unit, external powered, 2 optocoupler outputs, pulse signal input.
ZOK-E3K*F3**	Flow controller, battery, external or loop powered, 4-20mA output, 2/3-wire, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E4K*F3**	Flow controller, battery, external or loop powered, 4-20mA output with fully HART functionality, pulse signal input(s). Outputs disabled during battery powering.
ZOK-E5K*F3**	Flow controller, external powered, 4-20mA output 3-wire, switching and pulse optocoupler outputs, pulse signal input(s).

* = other constructional variants

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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	*Ui*: 28 V	*Ii*:100 mA	*Pi*: 0.7 W
	Ci: 0 (negligible)	*Li*: 0 (negligible)	
Input terminals for external sensors External power supply or from loop	*Uo*: 8.2 V	*Io*:100 mA	*Po*: 0.7 W
	Co: 3 uF	*Lo*: the same as the power supply	
Input terminals for external sensors Internal battery power supply	*Uo*: 3.9 V	*Io*: 48 mA	*Po*: 40 mW
	Co: 1000 uF	*Lo*: 15 mH	
Optocoupler outputs	*Ui:* 30 V	*Pi:* 550 mW	
	Ci: 0 (negligible)	*Li*: 0 (negligible)	