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**Supplementary Installation and
Operating Instruction
All-metal
miniature flowmeters
DK37/M8./../..**



Ex ia

Variable area flowmeters

Vortex flowmeters

Flow controllers

Electromagnetic flowmeters

Ultrasonic flowmeters

Mass flowmeters

Level measuring instruments

Communications technology

Engineering systems & solutions

Switches, counters, displays and recorders

Heat metering

Pressure and temperature

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1 General safety information

These additional "Ex" Instructions apply to the explosion protected versions of the variable-area flowmeter DK37/M8./../.. with the marking Ex ia IIC T1...T6. They are supplementary to the Installation and Operating Instructions for the non- explosion protected versions.

The information given in these Instructions contains only the data relevant to explosion protection. The technical details given in the Installation and Operating Instructions for the non-explosion protected version apply unchanged unless excluded or superseded by these Instructions.

The DK37/M8./../.. variable-area flowmeters series has been approved by NEPSI (National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation in China) under Certification No.

GYJ05326

This certification together with its boundary conditions is required to be observed without fail (see also Annex A.1 "Certificate").

The Ex marking is NOT acc. to the ATEX directive 94/9/EC. Placing the product on the market of the EU for the purpose of distribution and/or use in the EU is NOT permitted.

Warning!

Installation, construction, commissioning and servicing must only be undertaken by

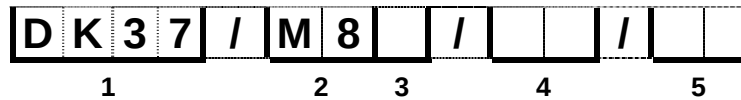


authorised personnel. Maintenance that is considered relevant to safety in regard to explosion protection must only be carried out by the manufacturer, his agents or under the supervision of experts.

Note!

For processes involving combustible and highly flammable products, easily removable threaded connections; SMS; TriClamp; are not allowed.

Variable-area flowmeters with DK37 measuring sections are identified by the following description code 1) :



- 1 Series measuring section **DK37**
- 2 Series indicator part **M8**
- 3 Indicator version
 - M** mechanical indicator
 - E** electronic indicator and signal output 4-20mA
- 4 Difference pressure regulators
 - RE** Inlet pressure regulators
 - RA** Outlet pressure regulators
- 5 Limit switch (only at mechanical display)
 - K1** Version with one limit switch
 - K2** Design with two limit switch

1) places for items not needed may be omitted from the description code.

3 Main safety characteristics

3.1 Category / Zone

Indicator units and measuring tubes for variable-area flowmeters are invariably designed for use in Zone 1. The measuring tube is also permitted to be filled with flammable liquids, provided a potentially explosive atmosphere is not permanently or for prolonged periods present in the measuring tube.

3.2 Atmospheric conditions

Potentially Explosive Atmosphere“ is defined as a mixture of air and combustible gases, vapour, mist or dust under atmospheric conditions. Such conditions are defined with values $T_{atm} = -20^{\circ}\text{C}$ to $+60^{\circ}\text{C}$ and $P_{atm} = 0.8$ bar to 1.1 bar. Outside this range, safety parameters for most ignition sources are not available.

As a rule, variable-area flowmeters operate under field conditions that are outside the atmospheric conditions of 0.8 bar to 1.1 bar so that, for want of safety parameters, explosion protection – irrespective of the zone classification – is basically not applicable to the inside of the measuring tube.

Operation with combustible products is therefore only allowed if a potentially explosive air mixture is not formed inside the flowmeter. Where this condition is not met, the operator will need to assess the ignition hazard in each individual case and give due consideration to existing parameters (e.g. pressure, temperature, process product, materials of construction).

3.3 Static electricity

In variable-area flowmeters, it is possible under field conditions for charge separation to occur in the measuring tube due to the transport of non-conductive fluids and/or when the flow comes into contact with non-conductive internals (e.g. liners, floats). In all-metal devices, the measuring tube and the welded process connections together form a shield (Faraday cage), from which the electric field cannot emerge.

For that reason, variable-area flowmeters must be permanently grounded by the operator by way of the process connections in order to discharge electrostatic build-up. The operator is also responsible for extending the ground continuity of the process pipeline.

If grounding cannot be made via the process connections (plastic process connections, the flowmeter must be connected to the local ground potential via the connection to ground described in Section 5.5. This connection only ensures electrostatic grounding of the device and does not meet the requirements for equipotential bonding.

3.4 Types of protection

The circuits of the limit switches and of the electronic signal output are designed in Type of protection "Intrinsic Safety", Category "ia" and "ib" respectively.

3.5 Temperature classes

The variable-area flowmeters are approved, subject to device version, Temperature class and Ambient Temperature $T_{amb.}$, for the Process Temperatures T_m listed in Table 1 and 2. Temperature classification is dependent upon the type of the measuring section and on the construction of the indicator section. It applies independent of the selected flow measuring range. No distinction is made between indicators with one or two contacts.

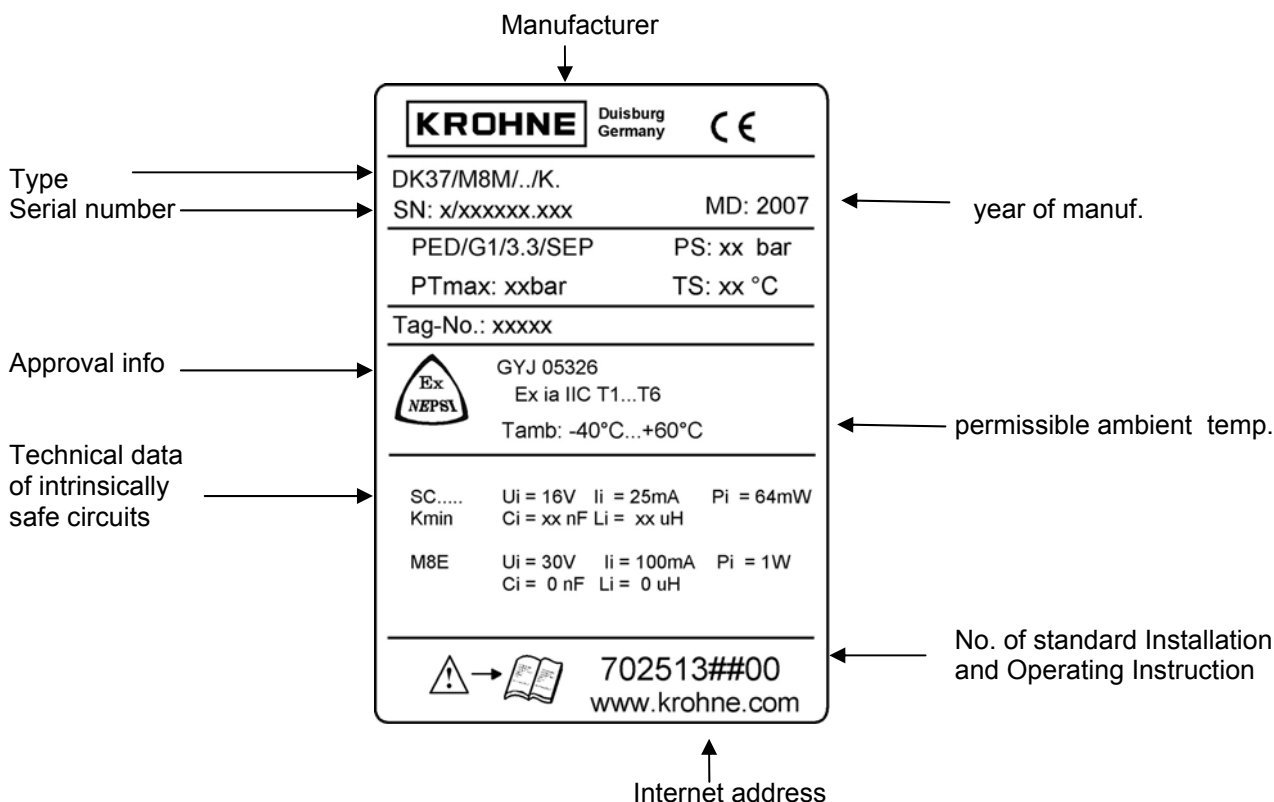
Temperature class	$T_{amb.}$ up to [°C]	T_m up to [°C] for version with	
		DK37/M8E/..	DK37/M8M/..K.
T6	40	60	85
	50	---	85
	60	---	70
T5	40	100	100
	50	85	100
	60	60	100
T4	40	135	135
	50	130	135
	60	(115) ¹ 90	135
T3 ... T1	40	145	200
	50	130	200
	60	(115) ¹ 90	(200) ¹ 140

Table 1 DK37/M8/.../.. , permissible process and ambient temperatures

- ¹ Process temperature without brackets: heat-resistant cable ≥ 70 °C
 Process temperature with brackets: heat-resistant cable ≥ 80 °C

4 Marking

The device type designation is clearly visible on the nameplate, illustrated below, attached to the cover of the indicator. A description of the description code is given in Section 2.



5 Mounting and installation

Mounting and installation shall be carried out in accordance with the valid wiring standards for hazardous areas (e.g. IEC 60079-14) by specialist personnel trained in explosion protection.

Please observe the notices given in the standard Installation and Operating Instruction.

Verify suitability of the variable-area flowmeters for the application in question by checking the information given on the nameplate. Check compatibility of process product with the wetted parts against the data specified in the order.

Apart from the temperature data of Table 1 pay attention to the max. temperature values of the name plate.

Pay special attention to the following points when installing.

5.1 Electrical connection, DK37/M8E/..

The electronic signal output may only be connected to intrinsically safe circuits. Please comply with the following maximum values:

Peak values

$U_i = 30 \text{ V}$

$I_i = 100 \text{ mA}$

$P_i = 1000 \text{ mW}$

$C_i \sim 0$

$L_i \sim 0$

5.2 Electrical connection DK37/M8M/..JK.

The limit switches may only be connected to separated intrinsically safe circuits. Please comply with the following maximum values for each circuit:

Peak values

$U_i = 16 \text{ V}$

$I_i = 25 \text{ mA}$

$P_i = 64 \text{ mW}$

Version with limit switch type SC 2-NO...

$C_i = 165 \text{ nF}$

$L_i = 150 \text{ }\mu\text{H}$

Version with limit switch type SJ 2-SN...

$C_i = 45 \text{ nF}$

$L_i = 100 \text{ }\mu\text{H}$

Version with limit switch type SJ 2-S1N...

$C_i = 45 \text{ nF}$

$L_i = 100 \text{ }\mu\text{H}$

5.3 Terminal assignment

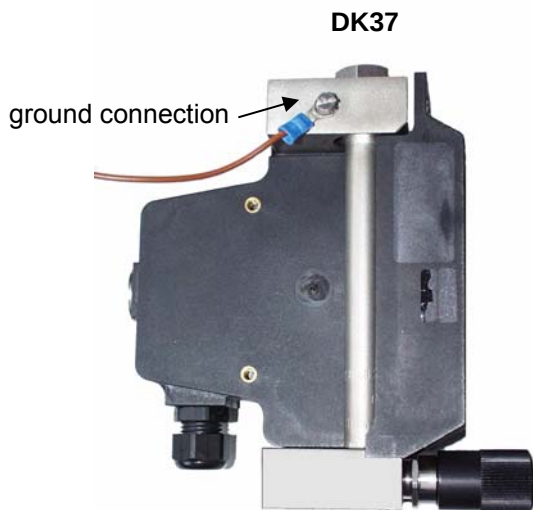
The electrical connection of the limit switches and the electronic signal output is carried out in the terminal compartment of the indicator housing. Take note of the polarities given.

5.4 Connecting cable

The connecting cables for the intrinsically safe circuits to be selected according to the valid wiring standard (e.g. IEC 60079-14). Make sure that no residual current can form between different intrinsically safe circuits. Install sufficiently distance to the surface of the measuring section.

5.5 Grounding

If the device is not adequately grounded electrostatic via the process piping, make an additional ground connection by way of the grounding screw.



This connection only ensures electrostatic grounding of the device and does not meet the requirements for equipotential bonding.

6 Start-up

Check the following points before (initial) start-up:

- Suitability of the materials used for the measuring cone and for the gaskets for adequate resistance to corrosion from the process product.
- Correct connection of the electrical equipment.

7 Operation

The limit switches (and the electronic signal output) can be set during operation. For this purpose, remove the housing cover and close it again immediately after the limit switches have been set.

8 Preventive maintenance

8.1 Indicator

The indicator section does not require any maintenance under normal operating conditions and when used for the intended purpose.

Within the scope of checks required to be carried out in hazardous areas to maintain systems in proper working order, the following visual inspections should be carried out at regular intervals:

- Inspection of the housing, cable entries and incoming cables for signs of corrosion and damage.

8.2 Measuring section

The measuring section does not require any maintenance under normal operating conditions and when used for the intended purpose.

Within the scope of checks required to be carried out in hazardous areas to maintain systems in proper working order, the following should be carried out at regular intervals:

- Inspection of the measuring section, and if applicable the needle valve, for leakages,
- inclusion of the flowmeter in the periodic pressure testing of the process piping.

Depending on application, however, the measuring function may in unfavourable cases become impaired through soiling of the measuring cone or the float. The measuring section should be cleaned as described in the Installation and Operating Instruction for the non-explosion protected versions. The measuring section must be dismantled before it can be cleaned.

In this connection, refer to the notes on replacement of the complete flowmeter (see Sect. 9.2).

9 Dismantling

9.1 Replacement of indicator section

The indicator and, if applicable, any electronic equipment built into the indicator, can be replaced by identical spares thanks to the modular structure of the variable-area flowmeters. The measuring tube need not be removed and can remain in the pipeline. This also applies to pressurized pipes.

Replacement and removal should, if possible, be carried out when the device is disconnected from supply. If not possible, observe the boundary conditions for Intrinsic Safety (e.g. no grounding or interconnection between the various intrinsically safe circuits) when dismantling.

9.2 Replacement of complete flowmeter



Caution:

Pressurized pipes to be depressurized before removing the measuring section.

Avoid uncontrolled discharge of residual liquid from the measuring section.

Where environmentally critical substances are concerned, carefully decontaminate the wetted parts of the measuring tube after dismantling.

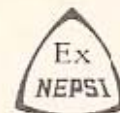
Removal and installation are the responsibility of the operator.

10 Maintenance

Maintenance work of a safety-relevant nature within the meaning of explosion protection may only be carried out by the manufacturer, his authorized representative or under the supervision of authorized inspectors.

11 Attachment

Attachment A.1 Certificate GYJ05326



EXPLOSION PROTECTION

CERTIFICATE OF CONFORMITY

Cert No. GYJ05326

This is to certify that the product

Rotameter

manufactured by Krohne Messtechnik GmbH & Co. KG
(Address: 47058 Duisburg, Deutschland)

which model is DK37/M8E/□; DK37/M8M/□/□

Ex marking Ex ia II CT1~T6

product standard /

drawing number ZZ 8157870100、ZZ 8157870300

has been inspected and certified by NEPSI, and that it conforms
to GB3836.1-2000 GB3836.4-2000

This Approval shall remain in force until 2010.08.31

Remarks Type details and the note for safe use specified in the attachment I to this
certificate.

Director

National Supervision and Inspection Centre for
Explosion Protection and Safety of Instrumentation

Issued Date 2005.09.01

This Certificate is valid for products compatible with the documents and samples approved by NEPSI

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Shanghai 200233, China<http://www.nepsi.org.cn>
Email: nepsi@online.sh.cnTel: 0086 21 64368180
Fax: 0086 21 64844580



防 爆 合 格 证

证号: GYJ05326

由 科隆公司
(地址: 47058 Duisburg, Deutschland)

制造的产品:

名 称 金属管转子流量计

型号规格 DK37/M8E/□; DK37/M8M/□/□

防爆标志 Ex ia II CT1~T6

产品标准 /

图样编号 ZZ 8157870100、ZZ 8157870300

经图样及技术文件的审查和样品检验, 确认上述产品
符合 GB3836.1-2000、GB3836.4-2000 标准,
特颁发此证。有效期自颁发日期起伍年内有效。

备注 产品认可型号及使用注意事项见本证书附件 I。

站 长

国家级仪器仪表防爆安全监督检验站

颁发日期 二〇〇五年九月一日



本证书仅对与认可文件和样品一致的产品有效。

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国家级仪器仪表防爆安全监督检验站

National Supervision and Inspection Centre for
Explosion Protection and Safety of Instrumentation

(GYJ05326)

(Attachment I)

GYJ05326防爆合格证附件 I

由德国科隆公司生产的DK37/M8E/□、DK37/M8M/□/□型金属管转子流量计，经国家级仪器仪表防爆安全监督检验站(NEPSI)检验，符合GB3836.1-2000和GB3836.4-2000防爆标准规定的要求，产品防爆标志为Ex ia II CT1~T6，防爆合格证号为GYJ05326。

产品允许的最低使用环境温度为-40℃（带SJ2-S1N型P+F接近开关时为-25℃）。

一、产品使用注意事项

1. 本证书认可的产品型号规格如下：

DK37/M8E / ① : DK37/M8M / ① / ②

①: RE, RA

②: K1, K2

2. 产品的温度组别、最高允许环境温度和介质温度的关系如下表所示：

温度组别	最高允许环境温度 (℃)	最高允许介质温度 (℃)	
		DK37/M8E/□	DK37/M8M/□/K
T6	40	60	85
	50	—	85
	60	—	70
T5	40	100	100
	50	85	
	60	65	
T4	40	135	135
	50	130	
	60	(115) 90	
T3~T1	40	145	200
	50	130	200
	60	(115) 90	(200) 140

不带括号的介质温度：管道耐热温度70℃

带括号的介质温度：管道耐热温度80℃



3. 产品的安全参数如下:

● DK37/M8E/□

电源信号电路

 $U_i=30V$ $I_i=100mA$ $P_i=1W$ $C_i \approx 0$ $L_i \approx 0$

● DK37/M8M/□/K

接近开关电路的本安输入参数:

 $U_i=16V$ $I_i=25mA$ $P_i=64mW$

开关型号	最大内部电容	最大内部电感
SC2-NO	$C_i=165nF$	$L_i=150\mu H$
SJ2-SN	$C_i=45nF$	$L_i=100\mu H$
SJ2-S1N	$C_i=45nF$	$L_i=100\mu H$

4. 本产品与相应的关联设备构成本安防爆系统时, 必须同时满足下列要求:

 $U_o \leq U_i$ $I_o \leq I_i$ $P_o \leq P_i$ $C_o \geq C_i + C_c$ $L_o \geq L_i + L_c$ (注: C_c 和 L_c 分别代表连接电缆的分布电容和电感)

5. 金属管转子流量计与关联设备之间的连接电缆为二芯屏蔽电缆(电缆必须有绝缘护套), 芯线截面积 $> 0.5mm^2$, 其屏蔽层在非危险场所接地, 并与产品外壳绝缘, 电缆布线应尽可能排除电磁干扰的影响。

6. 关联设备须安装于安全场所, 其安装、使用和维护须严格遵守其使用说明书。

7. 用户不得自行随意更换产品的内部电气零部件。

8. 产品的安装、使用和维护应同时遵守产品说明书、GB3836.13-2000“爆炸性气体环境用电气设备 第13部分: 爆炸性气体环境用电气设备的检修”、GB3836.15-2000“爆炸性气体环境用电气设备 第15部分: 危险场所电气安装(煤矿除外)”及GB50257:1996“电气装置安装工程爆炸和火灾危险环境电气装置施工及验收规范”的有关规定。

二、制造厂责任

1. 产品制造厂必须将上述使用注意事项纳入该产品使用说明书;
2. 制造厂必须严格按照NEPSI认可的文件资料生产;
3. 产品铭牌中应至少包括下列内容:

3.1 NEPSI认可标志 (见防爆合格证书)

3.2 产品防爆标志

3.3 防爆合格证号

3.4 本安参数说明

3.5 使用环境温度

国家级仪器仪表防爆安全监督检验站

二〇〇五年九月四日

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