



DK32 DK34 Supplementary instructions

Variable area flowmeter
with electrical built-ins



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1.1 General notes

These additional instructions apply to explosion-protected versions of variable area flowmeters with electrical built-ins and the marking Ex i. They complement the Installation and Operation Instructions for the non-explosion protected versions.

The information given in these Instructions contains only the data relevant to Category 2 explosion protection. The technical details given in the Installation and Operation Instructions for the non-explosion protected versions apply unchanged unless excluded or superseded by these Instructions.

1.2 NEPSI conformity

The DK32/34 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.

GYJ12.1499

This certification together with its boundary conditions is required to be observed without fail. The Ex marking is NOT acc. to the ATEX directive 94/9/EC (see also Attachment "Certificate"). Placing the product on the market of the EU for purpose of distribution and/or use in the EU is NOT permitted.

1.3 Security information

Assembly, installation, start-up and maintenance may only be performed by personnel trained in explosion protection!



CAUTION!

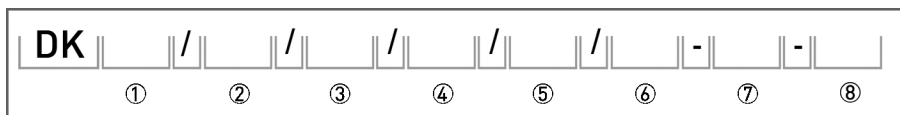
The operator respectively his agent is responsible to follow further standards, directives or laws if required due to operating conditions or place of installation. This applies particularly for the use of easy detachable process connections such as SMS or Clamp when measuring flammable mediums.

2.1 Device description

Variable area flowmeters measure and display the volume flow of flammable and non-flammable gases and liquids. The display houses one or two separately adjustable electrical limit switches.

2.2 Description code

The safety description code * consists of the following elements:

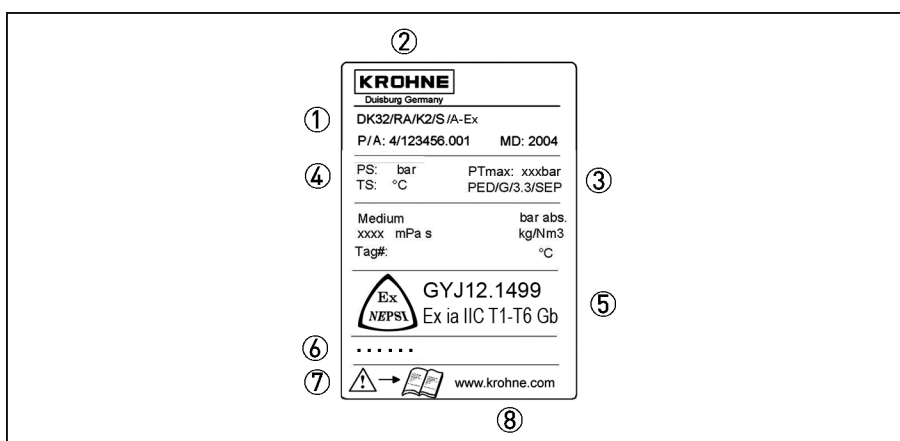


- ① 32 - with valve and horizontal connection / 34 without valve and vertical connection
- ② RE - inlet pressure regulator / RA - outlet pressure regulator
- ③ K1 - one limit switch / K2 - two limit switches
- ④ S - plug connector / L - cable gland incl. cable
- ⑤ HT - high-temperature version
- ⑥ A - Limit switch tested for EC type approval or IECEx tested
- ⑦ Ex - Explosion-protected equipment

* positions which are not needed are omitted (no blank positions)

2.3 Marking

The type marking of the instrument is realized visibly with the rating plate shown below. The interior of the display has an additional marking with the serial number (P/A).



- ① Device type
- ② Manufacturer
- ③ PED data
- ④ Sizing data: temperature & pressure rating
- ⑤ Ex-data
- ⑥ Built-in equipment
- ⑦ Note manual
- ⑧ KROHNE website

2.4 Flammable products

Atmospheric conditions:

An explosive atmosphere is a mixture of air and flammable gases, vapours, mists or dusts under atmospheric conditions. The following values define it

$T_{\text{atm}} = -20...+60^{\circ}\text{C} / -4...+140^{\circ}\text{F}$ and $P_{\text{atm}} = 0.8...1.1 \text{ bar}$.

Outside of this range, no key data are available as to ignition behaviour for most mixtures.

Installation conditions:

Variable area flowmeters operate outside of atmospheric conditions, which means that explosion protection – regardless of the zone assignment – is fundamentally not applicable due to the lack of key safety data for the interior of the measuring section.



WARNING!

Operation with flammable products is only permitted as long as no explosive fuel/air mixture builds up on the inside of the flowmeter under operating conditions. The operator is responsible for ensuring that the flowmeter is operated safely as regards the temperature and pressure of the products used. In case of operation with flammable products the measuring units must be included in the periodic pressure tests of the system. When using the device version H250/C... (PTFE-liner, nonconductive) the min. conductivity of the medium must be 10^{-8} S/m , in order to avoid the electrostatic charge.

2.5 Device category

Variable area flowmeters are designed according to GB 3836.1-2010 and GB 3836.4-2010

2.6 Types of protection

The variable-area flowmeter is designed in Intrinsic Safety type of protection, protection level “ia”.

The marking is: **Ex ia IIC T1-T6 Gb**

The marking contains the following information:	
Ex ia	Intrinsic Safety type, protection level “ia”
IIC	suitable for gas group IIC, IIB and IIA
T1-T6	suitable for temperature class T6 ... T1
Gb	EPL, suitable for zone 1

2.7 Ambient temperature / temperature classes

Due to the influence of the product temperature, variable area flowmeters with built-in electrical equipment (electric variants) are not assigned to any fixed temperature class. The temperature class of these devices is rather a function of the product temperature and ambient temperature that is present and the specific device version. Please see the following tables for the assignments.

The tables take into account the following parameters:

- Ambient temperature T_{amb} .
- Product temperature T_m



INFORMATION!

The maximum permissible product temperatures listed in the tables are valid under the following conditions:

- *The measuring device is installed and operated in accordance with the installation instructions in the installation and operating manual.*
- *It must be ensured that the flowmeter is not heated by the effects of additional heat radiation (sunshine, neighbouring system components) and thus operated above the permissible ambient temperature range.*
- *Insulation must be limited to the piping.
Unobstructed ventilation of the indicator part must be ensured.*

DK3.././././A–Ex permissible medium and ambient temperatures

Temperature class	Ambient temperature		Maximum permissible medium temperature with connector (S) or cable gland (L)			
			Type DK32		Type DK34	
	[°C]	[°F]	[°C]	[°F]	[°C]	[°F]
T6	-20...+40	-4...+104	75	167	80	176
	-20...+50	-4...+122	70	158	70	158
	-20...+60	-4...+140	60	140	60	140
T5	-20...+40	-4...+104	100	212	100	212
	-20...+50	-4...+122	95	203	100	212
	-20...+60	-4...+140	85	185	90	194
T4	-20...+40	-4...+104	135	275	135	275
	-20...+50	-4...+122	130	266	135	275
	-20...+60	-4...+140	120	248	130	266
	-20...+90	-4...+194	90	194	90	194
T3...T1	-20...+40	-4...+104	135	275	150	302
	-20...+50	-4...+122	130	266	140	284
	-20...+60	-4...+140	120	248	130	266
	-20...+90	-4...+194	90	194	90	194

2.8 Electrical data

The electronic signal output may only be connected to intrinsically safe circuits. Depending on the instrument design, the following maximum values apply per circuit:

Design DK3./.././../A-Ex

U_i	16 VDC
I_i	25 mA
P_i	64 mW

Irrespective of the instrument design the following values are to be observed for each intrinsically safe circuit in case of interconnection:

C_i	150 nF
L_i	150 μ H

3.1 Installation

Installation and setup must be carried out according to the applicable installation standards by qualified personnel trained in explosion protection. The information given in the Installation and Operation Instructions and the Supplementary Installation and Operation Instructions must always be observed.

Variable area flowmeters must be installed in such a way that

- There is no danger from mechanical impact effects.
- There are no external forces affecting the indicator part.
- The device is accessible for any visual inspections that are necessary, and can be viewed from all sides.
- The nameplate is clearly visible.
- It can be operated from a location with secure footing.



CAUTION!

The manufacturer is not liable for any damage resulting from improper use or use other than the intended purpose. This applies in particular to hazards due to insufficient corrosion resistance and suitability of the materials in contact with product.

4.1 General notes

For version DK3./../S../A-Ex (plug), the separate intrinsically safe signal circuits with level of protection "ia" or "ib" are electrically connected in the terminal compartment of the plug housing and for version DK3./../L../A-Ex (connecting cable) it is the connecting cable as illustrated in the connection diagram. Permissible maximum values (electrical data) must be observed.

Connecting cable

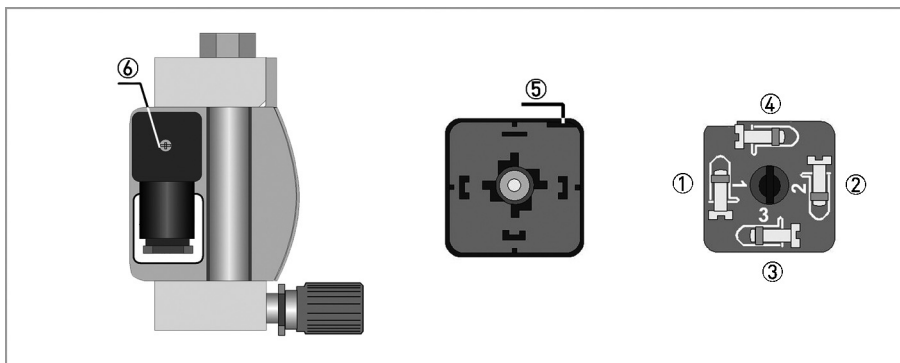
The connecting cables must be selected according to prevailing installation standards. The outer diameter of the connecting cable must be within the sealing range of the cable entry. The connecting cables must be fixed and laid in such a way as to be sufficiently protected against damage.

All cores that are not used must be securely connected to the earth potential of the hazardous area or carefully insulated against each other and against earth (test voltage $\geq 500 V_{eff}$).

Cable entries / Blanking plugs

The DK3./../S../A-Ex variable area flowmeter is equipped with a connector. The connector guarantees protection from foreign bodies and water (protection category) IP65. The cable entry is closed with a plug. The plug is to be replaced with a suitable connecting cable (nominal diameter range 6...9mm).

Connection diagrams

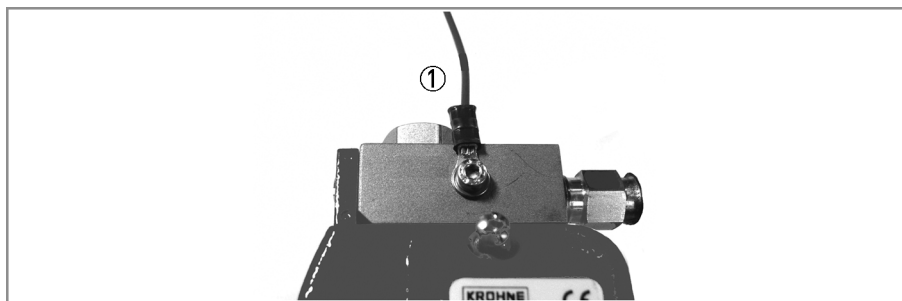


	Contact connection	Cable colors of assembled cable
①	Min minus	white
②	Min plus	yellow
③	Max minus	green
④	Max plus	brown
⑤	Lift slot	
⑥	Fastening screw of connection box	

4.2 Earthing and equipotential bonding

If the device is not sufficiently electrostatically grounded via the process cables, an additional earth connection must be established using the earth screw ①. The position of the ground terminal is illustrated below. The connection guarantees only an electrostatic connection of the device and does not comply with the requirements of an equipotential bonding connection.

DK32 - DK34



5.1 Start-up

Start-up is only permitted when the variable area flowmeter:

- is correctly installed in the system and connected.
- has been checked for the proper state with regard to its installation and connection requirements.

The user of the system must have it checked before start-up in compliance with the national regulations for checks before startup.

5.2 Operation

Setting of the limit switches may be carried out during operation. Remove the housing cover to this purpose. The housing cover has to be closed immediately after the limit switches have been set.

6.1 Maintenance

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

For systems in hazardous areas, regular tests are required in order to maintain the proper condition.

The following checks are recommended:

- Checking the housing, the cable entries and the feed lines for corrosion and/or damage.
- Checking the measuring unit and the piping connections for leakage.

The cover is to be closed following maintenance work on the display unit.

6.2 Dismantling

Replacing the display part

Due to the modular design of the variable area flowmeter, it is possible to replace a complete display with an identical spare part in accordance with safety guidelines.



CAUTION!

There may be a loss of measuring accuracy!

Exchanging the entire device

Removal and installation is the user's responsibility.

Any replacement and removal should take place in a de-energized state if possible. If that is not possible, the basic conditions for intrinsic safety (e.g. no grounding or connection of different intrinsically safe circuits to one another) must be observed during dismantling.



CAUTION!

- *Pressurized pipes must be depressurized before removing the measuring section.*
- *In the case of environmentally critical or hazardous products, appropriate safety precautions must be taken with regard to residual liquids in the measuring unit.*
- *New seals must be used when re-installing the device in the piping.*



EXPLOSION PROTECTION

CERTIFICATE OF CONFORMITY

Cert NO.GYJ12.1499

This is to certify that the product

All-metal Miniature Flowmeter

manufactured by KROHNE Messtechnik GmbH

(Address:Ludwig - Krohne Strasse 5, Duisburg, Germany)

which model is DK32 Series, DK34 Series

Ex marking Ex ia II C T1~T6 Gb

product standard /

drawing number ZZ 8144800100b

**has been inspected and certified by NEPSI, and that it conforms
to GB 3836.1-2010,GB 3836.4-2010**

This Approval shall remain in force until 2017.11.22

Remarks 1.Conditions for safe use are specified in the attachment to this certificate.
2.Model designation is specified in the attachment to this certificate.

Director

**National Supervision and Inspection Centre for
Explosion Protection and Safety of Instrumentation
Issued Date 2012.11.23**

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

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Edition 05

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

(GYJ12.1499)

(Attachment I)

Attachment I to GYJ12.1499

[Variation I]

DK32 Series & DK34 Series All-metal Miniature Flowmeter, manufactured by Krohne Messtechnik GmbH has been certified National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI).

All-metal Miniature Flowmeter accords with following standards:

GB 3836.1-2010 "Explosive atmospheres Part 1: Equipment-General requirements"

GB 3836.4-2010 "Explosive atmospheres Part 4: Equipment protection by intrinsic safety" i"

All-metal Miniature Flowmeter has the Ex-marking Ex ia IIC T1~T6 Gb.

Following products are covered by this certificate.

DK a / b / c / d / A

a: 32, 34

b: RE, RA

c: K1min, K1max, K2

d: L, S

1. Condition for safe use

1.1 The relation among temperature class, ambient temperature and maximum temperature of process medium is as following.

Temperature class	Ambient temp.	Maximum medium temp.	
		DK32 Series	DK34 Series
T6	(-20~+40) °C	75°C	80°C
	(-20~+50) °C	70°C	70°C
	(-20~+60) °C	60°C	60°C
T5	(-20~+40) °C	100°C	100°C
	(-20~+50) °C	95°C	100°C
	(-20~+60) °C	85°C	90°C
T4	(-20~+40) °C	135°C	135°C
	(-20~+50) °C	130°C	135°C
	(-20~+60) °C	120°C	130°C
T1~T3	(-20~+40) °C	135°C	150°C
	(-20~+50) °C	130°C	140°C
	(-20~+60) °C	120°C	130°C

1.2 Intrinsic safety parameters:

$U_i=16V$ $I_i=52mA$ $P_i=169mW$ $L_i=150\mu H$ $C_i=150nF$

1.3 All-metal Miniature Flowmeter shall be connected to associated apparatus before application in



(GYJ12.1499)

(Attachment I)

hazardous location. The connection shall comply with the instruction manual of all-metal miniature flowmeter and associated apparatus.

1.4 The cables between all-metal miniature flowmeter and associated apparatus should be shielded cables (the cables must have insulated shield). The shielded has to be grounded reliably.

1.5 End users is not permitted to change any components insides.

1.6 When installation, use and maintenance of All-metal Miniature Flowmeter, observe following standards.

GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13: Repair and overhaul for apparatus used in explosive gas atmospheres"

GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15: Electrical installations in hazardous area (other than mines)"

GB 3836.16-2006 "Electrical apparatus for explosive gas atmospheres – Part 16: Inspection and maintenance of electrical installation in hazardous areas (other than mines)"

GB 50257:1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"


2. Manufacturer's Responsibility

2.1 Special condition for safe use specified above should be included in the instruction manual.

2.2 Manufacturing should be done according to the documentation approved by NEPSI.

2.3 Any modification with influence on the type of protection should be submitted to NEPSI before application.

2.4 Following items should be added to the nameplate

- a) NEPSI log 
- b) Ex marking
- c) Number of certificate
- d) Ambient temperature range

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

Nov. 23th, 2012



KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Products and systems for the oil & gas industry
- Measuring systems for the marine industry

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