

## Supplementary Installation and Operating Instruction

# VA40/./../K.

## Variable area flowmeter



**Category  
II 2 G**



### 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

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These additional "Ex" instructions apply to the explosion protected versions of the variable-area flowmeter VA40/././K. . 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the Installation and Operating Instructions for the non-explosion protected version apply unchanged unless excluded or superseded by these Instructions.

In compliance with European Directive 94/9/EC (ATEX 100a), variable-area flowmeters of the VA40/././K. series are certified in conformity with European Standards EN 50XXX by the Physikalisch-Technische Bundesanstalt (PTB) for use in hazardous areas under

**PTB 05 ATEX 2026 X**

The EC-Type Examination Certificate is available at downloadcenter [www.krohne.com](http://www.krohne.com).

### **Important information, be sure to observe!**

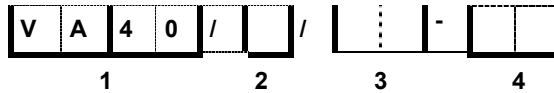
- In addition to the regulations for heavy-current installations (VDE 0100), in particular the regulations in **EN 60079-14 "Electrical Installations in hazardous areas"**
- Installation, mounting, commissioning and maintenance may only be carried out by **"personnel trained in explosion protection"**!

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## 2 Safety-relevant description code

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Variable-area flowmeters with VA40 measuring sections are identified by the following description code: 1)



1 : Device series

**VA40** Flowmeter with tapered glass tube

2 : Type of connection

**V** Screw connection

**S** Tube socket

**F** Flange connection

**A** Aseptic connection, conforming to food standards

3 : Material of the connection

**ST** Steel, electroplated and chromized

**R** Stainless steel 1.4404 (316 L)

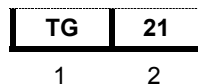
**PV** Plastics PVDF

4 : Limit switches

**K1** One limit switch

**K2** Two limit switches

Safety-relevant description code for limit switch TG21 1)



1 : Measuring principle

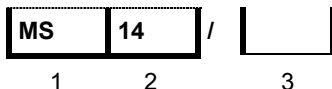
**TG** Inserting limit switch

2 : Version

**21** Version

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Safety-relevant description code for limit switch MS14/. 1)



1 : Type

MS          Magnetic switch

2 : Device type

14          reed cartridge 14

3 : Connection type

without      Limit switch with connected cable

A              Limit switch with terminal box (standard)

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

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### 3 Main safety characteristics

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#### 3.1 Category / Zone

The variable-area flowmeters are basically designed in Category 2 in accordance with the Directive 94/9/EC and according to EN60079/14 for use in Zone 1.

#### 3.2 Atmospheric conditions, inflammable liquids

In accordance with EN 1127, para. 3.17, a "Potentially Explosive Atmosphere" is defined as a mixture of air and combustible gases, vapour, mist or dust under atmospheric conditions. Such conditions are defined in EN 13463-1, para. 1, 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).

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### **3.3 Static electricity**

#### **3.3.1 Flow-induced charges**

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 glass devices, it is basically possible for the electrostatic field generated inside the measuring tube to pass through to the outside of the device.

For that reason, variable-area flowmeters and level meter 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 or undefined connections), the flowmeter must be connected to the local ground potential via the connection to ground described in Section 5.7. This connection only ensures electrostatic grounding of the device and does not meet the requirements for equipotential bonding.

Ignition hazard due to electrostatic build-up in connection with the flow measurement of uncontaminated gases or fluids is not to be expected, provided the conductivity of the fluid does not drop below 1000 pS/m and the flow rate does not exceed 5 times the nominal flow rate. On no account may the max. allowed operating pressure PS imprinted on the nameplate be exceeded!

#### **3.3.2 Charge build-up caused by cleaning**

There is a basic danger of charge build-up of non-conductive viewing glass caused e.g. by maintenance work and cleaning under atmospheric conditions. Prefer practical method e.g. wet cleaning with water.

### **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 of type VA40/././K. with limit switch TG21 are dependent on Temperature class, the Process Temperatures  $T_m$ , the Ambient temperature  $T_{amb}$ . and power rating of the supply unit (table 3).

Temperature classification see Table 1.

Temperature classification for version with limit switch MS14/. see table 2.

The permitted lower Ambient temperature for all versions is  $-20^{\circ}\text{C}$ .

To help determine the permissible temperature class, the tables include the following parameters:

- built-in equipment
- max. allowable power loss  $P_i$  (for K)
- ambient temperature  $T_{amb}$
- process temperature  $T_m$

VA meter with limit switches	Supply unit								
	Type1			Type2			Type3		
	Max. permitted ambient / process temperature [ $^{\circ}\text{C}$ ] for temperature class <sup>1</sup>								
	T6	T5	T4 .. T1	T6	T5	T4..T1	T6	T5	T4 .. T1
TG21	70	85	95	60	75	95	35	50	70

Table 1 Max. permitted ambient / process temperature [ $^{\circ}\text{C}$ ] for TG21

VA meter with limit switches	Max. permitted ambient / process temperature [ $^{\circ}\text{C}$ ] for temperature class <sup>1</sup>
	T6
MS14/.	85

Table 2 Max. permitted ambient / process temperature [ $^{\circ}\text{C}$ ] for MS14/.

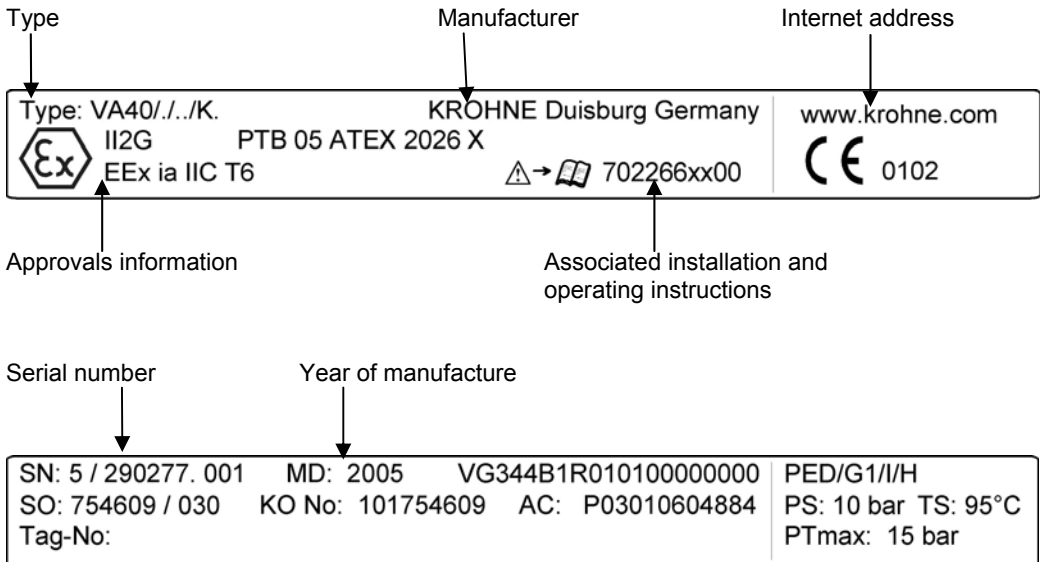
<sup>1</sup> A limitation of these value can be given in the standard installation and operating instruction. Follow these max. values.

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## 4 Marking

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The device type identification is as shown in the following nameplate, which is located on the indicator housing.

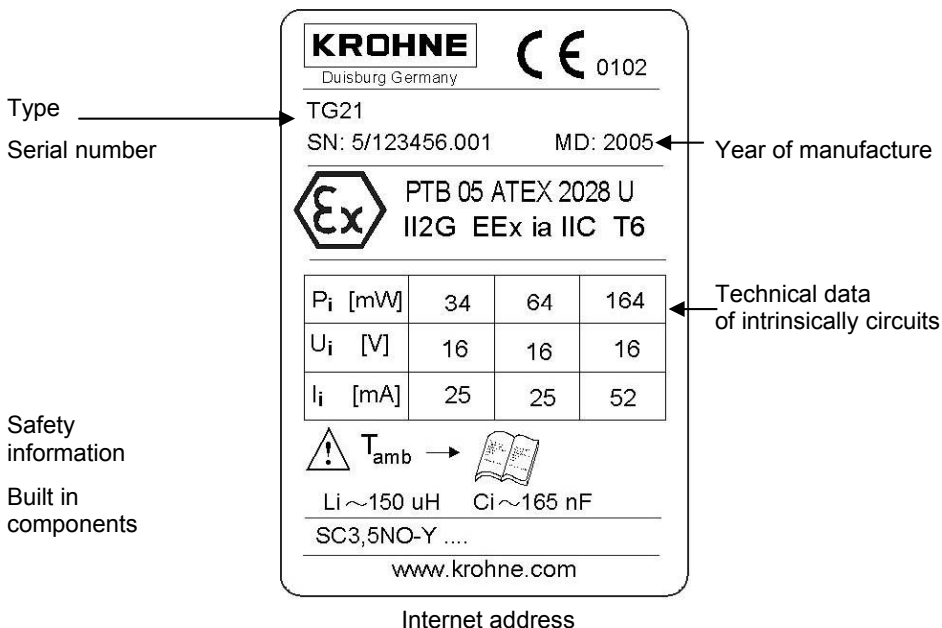


### Warning notices

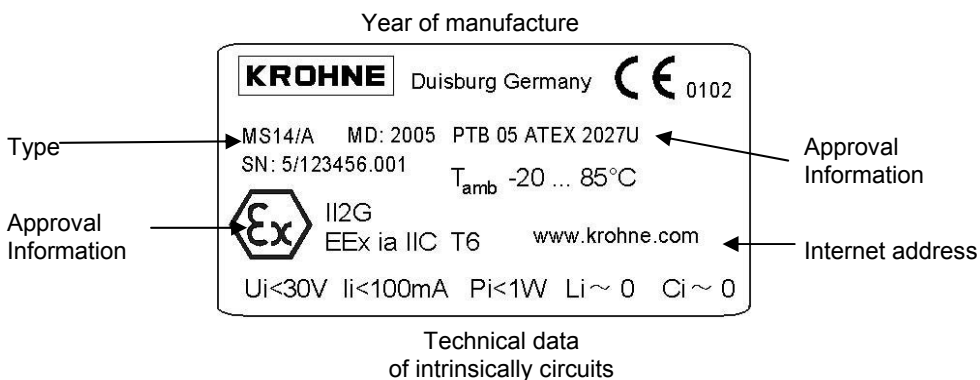
Achtung!  
Gefahr elektrostatischer  
Aufladung!  
Nicht reiben!  
CAUTION!  
DANGER OF  
ELECTROSTATIC CHARGE!  
DO NOT RUB!

The name plates of the limit switches (MS14/A and TG21) are on the roundly housing.

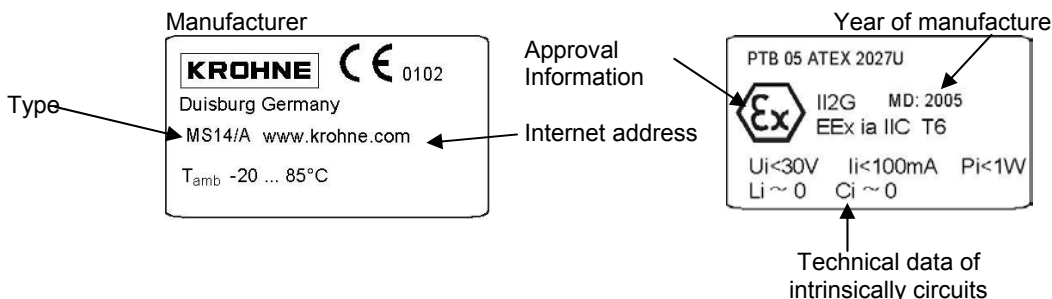
## Nameplate of the limit switch TG21



## Nameplate limit switch MS14



## Nameplate of limit switch MS14/A



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## 5 Mounting and installation

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Mounting and installation shall be carried out in accordance with the valid wiring standards for hazardous areas (e.g. EN 60079-14 / VDE 0165) 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 and Table 2 pay attention to the max. temperature values of the name plate.

Pay special attention to the following points when installing in zone 1 and zone 2.

### 5.1 Mounting limit switch

Note: Do not damage the limit switch housing of MS14/.

### 5.2 Electrostatic grounding of the limit switch

The mounting elements assure a conductive connection to the housing of the VA meter. The terminal box of the MS14/A is electrostatic connected via the fastening elements. Connect the VA meter effectively to ground.

### 5.3 Electrical connection MS14/.

The limit switches may only be connected to separated intrinsically safe circuits with following peak values:

$$\begin{aligned} P_i &= 1W \\ U_i &= 30 V \\ I_i &= 100 mA \end{aligned}$$

When interconnecting, allow for the following values for each intrinsically safe circuit:

- $C_i \sim 0$
- $L_i \sim 0$

### 5.4 Electrical connection of TG21

The limit switches TG21 may only be connected to separated intrinsically safe circuits according to DIN 19234.

Please comply with the following maximum values:

Supply unit	Max. values of each circuit		
	$P_i$ in mW	$U_i$ in V	$I_i$ in mA
Type1	34	16	25
Type2	64	16	25
Type3	169	16	52

Table 3 Max. values of the supply unit

When interconnecting, allow for the following values for each intrinsically safe circuit:

- $C_i$  165 nF
- $L_i$  150  $\mu$ H

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## 5.5 Terminal assignment

The electrical connection of the limit switch TG21 and the electronic signal output is carried out in the terminal compartment of the indicator housing. Take note of the polarities given.

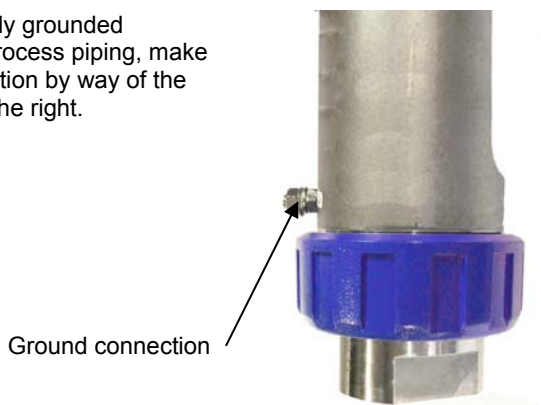
## 5.6 Connecting cable

The connecting cables for the intrinsically safe circuits to be selected according to the valid wiring standard (e.g. EN 60079-14 / VDE 0165). Make sure that no residual current can form between different intrinsically safe circuits. Install sufficiently distance to the surface of the measuring section.

To avoid damaging of the cable by hot surfaces lay the cable with a sufficient distance.

## 5.7 Ground connection

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



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## 6 Start-up

The following tests are to be carried out before start-up:

- Testing of the materials used in the measuring cone and the sealing material used for suitability with regard to sufficient resistance to corrosion from the medium.
- Correct connection of the limit switches
- Correct setting of the limit switches.
- Electrostatic grounding of the instrument.

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## 7 Operation

Setting of the limit switches may be carried out during operation. For this unscrew the mounting equipment.

After setting the limit switch unit to the switchpoint fix it with the fastening screw.

Additionally the switching behavior of the limit switch TG21 is to adjust in its terminal box. The switching function of the MS14 is determined by the fitting position of the reed contact. A changing of the position during operation is permitted. Close the unit immediately.

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## **8 Preventive maintenance**

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### **8.1 Indicator**

Under normal conditions and conventional applications the flowmeter doesn't need any maintenance.

Within the scope of required controls and visual inspection of hazardous locations following checks are made:

- check of housing, cable entries and damageing of cable.
- checking the measuring unit, leakages and damages at the class cone.
- inclusion of the VA meter in periodic pressure controls of the pipes

Dependent on application a contamination of the float or the cone can appear. Cleaning of the measuring section is described in the installation and operation instruction for non explosion protected devices. Follow the dismantling notes of section 9.

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## **9 Dismantling**

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### **9.1 Electrical connection**

Replacement and removal may only be carried out when the device is disconnected from the supply or the presence of a potentially explosive atmosphere can be positively ruled out.

### **9.2 Process connection**

#### **Caution!**

Pressurized pipes to be depressurized before removing the measuring section.

Avoid uncontrolled discharge of residual liquid from the measuring section.

In the case of environmentally critical substances, carefully decontaminate the wetted parts of the measuring tube after dismantling.

Removal and installation are the responsibility of the operator.

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## **10 Maintenance**

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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.

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## Notes

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## Notes

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## Return a device for testing or repair to KROHNE

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This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

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

Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, KROHNE may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.

This means that KROHNE can only service this device if it is accompanied by the following certificate confirming that the device is safe to handle.

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

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

We cannot service this device unless accompanied by such a certificate.

<b>SPECIMEN certificate</b>
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Company: ..... Address: .....

Department: ..... Name: .....

Tel.-No.: ..... Fax-No.: .....

The enclosed device

Type: .....

KROHNE Order No. or Series No.: .....

has been operated with the following liquid:.....

Because this liquid is  
water-hazardous / toxic / caustic / flammable

we have

- checked that all cavities in the device are free from such substances
- flushed out and neutralized all cavities in the device \*

We confirm that there is no risk to humans or environment through any residual liquid contained in this device.

Date: ..... Signature: .....

Company stamp: