Panel mount purge set with DK32 flowmeter
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1 Safety instructions 5

1.1 Intended use ................................................................. 5
1.2 Certifications ................................................................. 5
1.3 Safety instructions from the manufacturer .................. 6
  1.3.1 Copyright and data protection ................................ 6
  1.3.2 Disclaimer .............................................................. 6
  1.3.3 Product liability and warranty .................................. 7
  1.3.4 Information concerning the documentation ............ 7
  1.3.5 Warnings and symbols used .................................... 8
1.4 Safety instructions for the operator ............................. 8

2 Device description 9

2.1 Scope of supply ......................................................... 9
2.2 Purge set elements .................................................... 10
2.3 Nameplate DK32 ....................................................... 11
2.4 Description code ...................................................... 11

3 Installation 12

3.1 Notes on installation .................................................. 12
3.2 Storage ........................................................................ 12
3.3 Installation requirements ........................................... 12

4 Electrical connections 13

4.1 Safety instructions ..................................................... 13
4.2 Electrical connection of limit switches ......................... 14
4.3 Setting the limit switch .............................................. 15
4.4 Ground connections .................................................. 16
4.5 Protection category ................................................... 16

5 Start-up 17

5.1 Start-up purge set ...................................................... 17

6 Service 18

6.1 Maintenance ............................................................. 18
6.2 Spare parts availability .............................................. 19
6.3 Availability of services .............................................. 19
6.4 Returning the device to the manufacturer ................. 19
  6.4.1 General information ............................................. 19
  6.4.2 Form (for copying) to accompany a returned device . 20
6.5 Disposal ................................................................. 20
7 Technical data

7.1 Operating principle................................................................. 21
7.2 Technical data........................................................................ 22
7.3 Dimensions........................................................................... 25
7.4 Flow table DK32................................................................. 26
7.5 Differential pressure regulators............................................. 29
1.1 Intended use

The variable area flowmeters manufactured by KROHNE Messtechnik GmbH are suitable for measuring gases, vapors and liquids.

These flowmeters are particularly suitable for measuring:

- Liquids
- Hydrocarbons
- Water
- Chemicals with low corrosiveness
- Saturated steam
- Superheated steam
- Industrial gases

**DANGER!**

In case of instruments which are used in explosive endangered areas please consider the supplementary installation and operating instructions mentioned in the Ex-manual.

**WARNING!**

The operator shall bear sole responsibility for the use of the flowmeters with regard to suitability, intended use and corrosion resistance of the materials used to the process product. The manufacturer shall not be liable for any damage resulting from improper use or use for other than the intended purpose.

Do not use any abrasive or highly viscous process products.

1.2 Certifications

CE marking

The flowmeter meets the statutory requirements of the following EC directives:

- Pressure Equipment Directive 97/23/EC
- EMC Directive 89/336/EC for instruments with electrical options
- ATEX Directive 94/9/EC for instruments in Ex-areas

KROHNE Messtechnik GmbH certifies successful testing of the product by applying the CE mark.
1.3 Safety instructions from the manufacturer

1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer’s documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.
1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation and operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.
1 SAFETY INSTRUCTIONS

1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

**DANGER!**
This information refers to the immediate danger when working with electricity.

**DANGER!**
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

**DANGER!**
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

**DANGER!**
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator’s plant.

**WARNING!**
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator’s plant.

**CAUTION!**
Disregarding these instructions can result in damage to the device or to parts of the operator’s plant.

**INFORMATION!**
These instructions contain important information for the handling of the device.

**LEGAL NOTICE!**
This note contains information on statutory directives and standards.

• **HANDLING**
This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

• **RESULT**
This symbol refers to all important consequences of the previous actions.

1.4 Safety instructions for the operator

**WARNING!**
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel. This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.
2.1 Scope of supply

INFORMATION!
Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Check the packing list to check if you received completely all that you ordered.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

Figure 2-1: Scope of supply
1. Purge set in the ordered version (acc. to Dwg. ANG 40075001)
3. Certificates, calibration certificate (supplied to order only)
2.2 Purge set elements

The purge set consists of following elements:

1. DK32 - Variable-area flowmeter with metering valve
2. Ball valve (on - off)
3. Inlet NPT ½" - max 270° rotatable
4. Outlet NPT ½" - max 270° rotatable
5. Needle valve for setting the required flow rate
6. 2" mounting pipe (not included in delivery)
7. Poppet check valve [¼""]
8. Tube: 10x1.5mm (0.39x0.059"")
9. Mounting plate incl. 2x U-bolt hanger (for 2" pipe installation)
2.3 Nameplate DK32

INFORMATION!
Before installing the flowmeter, make sure that the information given on the nameplate corresponds to the ordering data.

Additional markings on the flowmeter:
- SO - sales order / item
- KO - KROHNE order
- Vx - product configurator code
- AC - article code

2.4 Description code

The description code consists of the following elements*:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. 32 - with valve and horizontal 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 EC type-tested
7. EX - Explosion-protected equipment
8. SK - SIL2 compliance of limit switches acc. to IEC 61508

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

3.1 Notes on installation

INFORMATION!
Inspect the cartons carefully for damage or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Check the packing list to check if you received completely all that you ordered.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Storage

- Store the flowmeter in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the flowmeter in its original packaging.
- The permissible storage temperature is from -40 to +80°C for standard meters.

3.3 Installation requirements

CAUTION!
When installing the flowmeter in the piping please observe the following points:
- The variable area flowmeter must be installed vertically (measuring principle). The flow direction must be from bottom to top. For installation recommendations please refer also to VDI/VDE Directive 3513 Sheet 3.
- Before connecting, blow or flush out the pipes leading to the flowmeter.
- Pipes for gas flow need to be dried before the flowmeter is installed.
- Use connectors suitable for the particular version of the flowmeter.
- Align the pipes axially with the connections on the flowmeter so that they are free of stresses.
- If necessary, the piping has to be supported to prevent vibrations being transmitted to the flowmeter.
- Do not lay signal cables directly next to cables for the power supply.
- If several instruments are installed side by side, a minimum distance between these devices is required (see Technical Data).
Electrical connections

4.1 Safety instructions

**DANGER!**
All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

**DANGER!**
Observe the national regulations for electrical installations!

**DANGER!**
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**WARNING!**
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.
4.2 Electrical connection of limit switches

The electrical connections for limit switches is effected:
- DK../../S - in the plug connector
- DK../../L - using a preassembled cable.

The following procedures must be performed (DK../../S):
- Slacken screw ⑥ of the connector plug
- Pull out the plug
- Remove screw ⑥ completely from the plug
- Insert a screwdriver in the marked opening ⑤ (Lift) and remove the terminal block.
- Thread the connecting cable through the cable gland.
- Insert the cable (max. 1.5mm²) and screw down.

Contact connection  | Cable colors of assembled cable
---|---
① Min minus       | white
② Min plus        | yellow
③ Max minus       | green
④ Max plus        | brown

Figure 4-1: Electrical connection of limit switches
⑥ - Lift slot
⑥ - Fastening screw of terminal box
4.3 Setting the limit switch

Set the pointers to the desired limit values as a min. contact and max. contact using a slip coupling along the scale.

Adjusting the limit switch with reed contact:

- Slacken nut
- Set reed cartridge to the required value
- Secure with nut

Comment

The reed contact is actuated directly by the float magnet. The desired operating point can only be determined in measuring mode. A reference to the scale and/or pointer cannot be established.
4.4 Ground connections

Ground connections DK32

Figure 4-4:

- Earth connection on the measuring section (M4 threaded hole)

**DANGER!**
The earth conductor must not transfer any interference voltage. Do not use this earth conductor to ground any other items of electrical equipment.

4.5 Protection category

**DANGER!**
After all servicing and maintenance work on the flowmeter, the specified protection category IP65 has to be ensured again.

Therefore it is essential to observe the following points:

- Use only original gaskets. They must be clean and free of any damage. Defective gaskets have to be replaced.
- The electrical cables used must be undamaged and must comply with regulations.
- The cable has to be laid with a loop upstream of the flowmeter to prevent water from getting into the housing.
- The cable glands have to be firmly tightened.
- Close the unused cable glands using blanking plugs.
- Do not remove the specified outer sheath from the cable gland.

1. The cable glands have to be firmly tightened.
2. Close the unused cable glands using blanking plugs.
3. The cable has to be laid with a loop.
5.1 Start-up purge set

**CAUTION!**
When starting up the device, the following points must be observed:

- Compare the actual operating pressure and the product temperature of the system with the specifications on the nameplate (PS and TS). These specifications may not be exceeded.
- Make sure materials are compatible.
- Slowly open the shut-off valve 2.
- When measuring gases, increase pressure slowly.
- Avoid float impact (e.g. caused by solenoid valves), as this is likely to damage the measuring unit or float.

![Diagram of DK32 - Variable-area flowmeter with metering valve](image)
6.1 Maintenance

Within the scope of routine maintenance of the system and pipelines, the flowmeter should also be inspected for signs of fouling, corrosion, mechanical wear and leaks, as well as damage to the measuring tube and indicator.

We advise that inspections be carried out at least once a year.

The device must be removed from the piping before cleaning.

**CAUTION!**

Pressurized pipes must be depressurized before removing the device. In the case of flowmeters used for measuring aggressive or hazardous products, appropriate safety precautions must be taken with regard to residual liquids in the measuring section. Always use new gaskets when reinstalling the flowmeter in the pipeline.

**CAUTION!**

Under certain circumstances the valve packing gland may have to be adjusted during its service life. This means that the union nut ① has to be retightened. If necessary, press the retaining pin ② against its internal spring. Apply a tightening torque of not more than 5Nm.

**CAUTION!**

Valves that have not been actuated for a longer period of time may exhibit a higher initial actuation torque.
6.2 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

6.3 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!
For more precise information, please contact your local representative.

6.4 Returning the device to the manufacturer

6.4.1 General information

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

CAUTION!
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, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.
• This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.

CAUTION!
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.
### 6.4.2 Form (for copying) to accompany a returned device

<table>
<thead>
<tr>
<th>Company:</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Department:</td>
<td>Name:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Tel. no.:</td>
<td>Fax no.:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturer's order no. or serial no.:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The device has been operated with the following medium:

<table>
<thead>
<tr>
<th>This medium is:</th>
<th>water-hazardous</th>
<th>toxic</th>
<th>caustic</th>
<th>flammable</th>
</tr>
</thead>
<tbody>
<tr>
<td>We checked that all cavities in the device are free from such substances.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We have flushed out and neutralized all cavities in the device.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stamp:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### 6.5 Disposal

**CAUTION!**

Disposal must be carried out in accordance with legislation applicable in your country.
7.1 Operating principle

The flowmeter operates on the float measuring principle.

The measuring section consists of a metal cone in which a float can move freely up and down. The medium flows through the flowmeter from bottom to top.

The float adjusts itself so that the buoyancy force $A$ acting on it, the form drag $W$ and its weight $G$ are in equilibrium: $G = A + W$.

For the DK32, DK34 and DK37/M8M $\text{1}$ the flow-dependent height of the float in the measuring section is transmitted by means of a magnetic coupling and displayed on a scale.

For the DK37/M8E $\text{2}$ the flow-dependent height of the float in the measuring section is transmitted to the electronic display by means of a magnetic coupling on sensors S1 and S2.
7.2 Technical data

**INFORMATION!**
- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).

**DK32 Flowmeter**

**Measuring system**

<table>
<thead>
<tr>
<th>Application range</th>
<th>Flow measurement of liquids, gases and vapors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating method / measuring principle</td>
<td>Float measuring principle</td>
</tr>
</tbody>
</table>

**Measured value**

<table>
<thead>
<tr>
<th>Primary measured value</th>
<th>Float position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary measured value</td>
<td>Operating and standard volumetric flow</td>
</tr>
</tbody>
</table>

**Measuring accuracy**

<table>
<thead>
<tr>
<th>Directive</th>
<th>VDI / VDE Code 3513 Sheet 2 (qG = 50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK32</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

**Operating conditions**

<table>
<thead>
<tr>
<th>Max. operating temperature TS</th>
<th>-40...+150°C / -112...+302°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating pressure PS</td>
<td>Pressure Equipment Directive 97/23/EC</td>
</tr>
<tr>
<td>Test pressure PT</td>
<td>Pressure Equipment Directive 97/23/EC and AD 2000-HP30</td>
</tr>
<tr>
<td>Max. allowable operating pressure PS</td>
<td>130 bar standard (1)</td>
</tr>
</tbody>
</table>

**Installation conditions**

<table>
<thead>
<tr>
<th>Inlet / outlet run</th>
<th>non</th>
</tr>
</thead>
</table>

**Weights**

<table>
<thead>
<tr>
<th></th>
<th>DK32</th>
<th>DK32 with differential pressure regulator</th>
<th>complete purge set</th>
<th>complete with differential pressure regulator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.7 kg (1.54 lb)</td>
<td>2.5 kg (5.51 lb)</td>
<td>3.5 kg (7.72 lb)</td>
<td>5.3 kg (11.7 lb)</td>
</tr>
</tbody>
</table>

**Connection**

<table>
<thead>
<tr>
<th>Inlet - Outlet</th>
<th>NPT ½” female</th>
</tr>
</thead>
</table>

**Check valve**

| Max. flow-coefficient | 0.67 |
| Nom. cracking pressure | 0.03 bar (1/3 psi) |
| Downstream pressure at 20°C (70°F) | 68.9 bar (1000 psi) |

(1) Higher pressures on request.
### Materials

<table>
<thead>
<tr>
<th>DK32</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Head piece, foot piece, cone</td>
<td>CrNi steel 1.4404 / 316 L</td>
<td></td>
</tr>
<tr>
<td>upper plug</td>
<td>CrNi steel 1.4404 / 316 L</td>
<td></td>
</tr>
<tr>
<td>Standard float</td>
<td>CrNi steel 1.4404 / 316 L or titanium</td>
<td></td>
</tr>
<tr>
<td>Metering unit</td>
<td>CrNi steel 1.4571 / 316 Ti</td>
<td></td>
</tr>
<tr>
<td>Valve spindle</td>
<td>CrNi steel 1.4404 / 316 L</td>
<td></td>
</tr>
<tr>
<td>Valve plug gasket</td>
<td>FPM</td>
<td></td>
</tr>
<tr>
<td>Metering unit gasket</td>
<td>FPM and PTFE</td>
<td></td>
</tr>
<tr>
<td>Indicator IP65</td>
<td>GD-Al / aluminium diecast (powder coated)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Purge set</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube fittings</td>
<td>CrNi steel 1.4401 / 316</td>
<td></td>
</tr>
<tr>
<td>Threaded connection</td>
<td>CrNi steel 1.4401 / 316</td>
<td></td>
</tr>
<tr>
<td>Mounting plate</td>
<td>CrNi steel 1.4301 / 304</td>
<td></td>
</tr>
<tr>
<td>Tube</td>
<td>CrNi steel 1.4404 / 316L</td>
<td></td>
</tr>
<tr>
<td>U-bolt pipe hanger</td>
<td>CrNi steel 1.4571 / 316Ti</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On off ball valve Swagelok® SS-43GF4</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>CrNi steel 1.4401 / 316</td>
<td></td>
</tr>
<tr>
<td>Packing</td>
<td>Modified PTFE/D1710 type 1, Grade 1, Class B or UHMWPE/B4220</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Poppet check valve Swagelok® SS-4C4-1/3</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>CrNi steel 1.4401 / 316</td>
<td></td>
</tr>
<tr>
<td>Gasket</td>
<td>PTFE coated CrNi steel 1.4401 / 316</td>
<td></td>
</tr>
<tr>
<td>O-ring</td>
<td>FKM fluorocarbon</td>
<td></td>
</tr>
</tbody>
</table>

1: other gasket materials on request

### Temperatures

<table>
<thead>
<tr>
<th></th>
<th>°C</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. process temperature at $T_{amb.}$ &lt; 40°C / 104°F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DK32 with valve</td>
<td>-40...+150</td>
<td>-40...+302</td>
</tr>
<tr>
<td>DK32 with limit switches</td>
<td>-25/-40...+145</td>
<td>-13/-40...+293</td>
</tr>
<tr>
<td>Max. ambient temperature $T_{amb.}$</td>
<td>-25...+70</td>
<td>-13...+158</td>
</tr>
</tbody>
</table>
TECHNICAL DATA

DK32

DK32 - Indicator with limit switches

<table>
<thead>
<tr>
<th>Cable fitting DK32/Kx/S</th>
<th>M16 x 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable diameter DK32/Kx/L</td>
<td>7 ... 8mm</td>
</tr>
<tr>
<td>Clamp connection DK32/Kx/S</td>
<td>1.5mm²</td>
</tr>
</tbody>
</table>

Limit switch:
- SJ2-N0 (752000-0-N)
- SJ2-SN (1)
- SJ2-S1N (1)

Type:
- 2-wire NAMUR
- 2-wire NAMUR
- 2-wire NAMUR

Switch element function:
- Normally closed
- Normally closed
- Normally open

Nominal voltage $U_0$:
- 8VDC
- 8VDC
- 8VDC

Pointer shaft not read:
- ≤3mA
- ≤3mA
- ≤1mA

Pointer shaft read:
- ≥3mA
- ≥3mA
- ≥1mA

DK32 with reed contact:
- Switching type: bistable
- Switching reproducibility: <5% of full scale value
- Breaking capacity: 12VA (2)
- Max. supply voltage: 30VDC (2)
- Max. current: 0.5A (2)

Approvals

<table>
<thead>
<tr>
<th>Standard</th>
<th>Indicator</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATEX</td>
<td>DK32</td>
<td>II2GD IIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>II3GD IIC</td>
</tr>
<tr>
<td>DK32</td>
<td>mechanical</td>
<td></td>
</tr>
<tr>
<td>IEC Ex</td>
<td>DK32</td>
<td>Ex ia IIC T6</td>
</tr>
<tr>
<td>FM</td>
<td>DK32</td>
<td>ISA/1/1/ABCD:T6</td>
</tr>
<tr>
<td>Nopsi</td>
<td>DK32</td>
<td>Ex nL IIC T1-T6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ex nA II T1-T6</td>
</tr>
</tbody>
</table>

1 safety oriented
2 reduced values for Ex version
7.3 Dimensions

<table>
<thead>
<tr>
<th>dimensions</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>[mm]</td>
<td>363</td>
<td>122</td>
<td>180</td>
<td>188</td>
<td>303</td>
<td>max. 195</td>
<td>54</td>
</tr>
<tr>
<td>[&quot;]</td>
<td>14.3</td>
<td>4.8</td>
<td>7.1</td>
<td>7.4</td>
<td>11.9</td>
<td>max. 7.7</td>
<td>2.1</td>
</tr>
</tbody>
</table>
7.4 Flow table DK32

Measuring span: 10 : 1
Declaration of flow: Values = 100%
Air: 20°C [68°F], 1,2 bar abs. [17.4 psia]

<table>
<thead>
<tr>
<th>Cones</th>
<th>Air flow rate [l/h]</th>
<th>Pressure drop [mbar]</th>
<th>[psig]</th>
</tr>
</thead>
<tbody>
<tr>
<td>K 005</td>
<td>16 (1)</td>
<td>14</td>
<td>0.21</td>
</tr>
<tr>
<td>K 005</td>
<td>50</td>
<td>31</td>
<td>0.46</td>
</tr>
<tr>
<td>K 010</td>
<td>70 (1)</td>
<td>66</td>
<td>0.97</td>
</tr>
<tr>
<td>K 010</td>
<td>100</td>
<td>66</td>
<td>0.97</td>
</tr>
<tr>
<td>K 015</td>
<td>150</td>
<td>19</td>
<td>0.28</td>
</tr>
<tr>
<td>K 040</td>
<td>400</td>
<td>27</td>
<td>0.40</td>
</tr>
<tr>
<td>K 080</td>
<td>800</td>
<td>55</td>
<td>0.81</td>
</tr>
<tr>
<td>K 125</td>
<td>1250</td>
<td>42</td>
<td>0.62</td>
</tr>
<tr>
<td>K 200</td>
<td>2000</td>
<td>85</td>
<td>1.25</td>
</tr>
<tr>
<td>K 300</td>
<td>2500</td>
<td>117</td>
<td>1.72</td>
</tr>
<tr>
<td>K 340</td>
<td>3400</td>
<td>166</td>
<td>2.44</td>
</tr>
</tbody>
</table>

1: with titanium float

**INFORMATION!**
The operating pressure should be at least twice the pressure loss for liquids, and at least 5 times the pressure loss for gases! The specified pressure drops are valid for water and air at maximum flow rate. Other flow ranges on request. Conversion of other media or operating data (pressure, temperature, density, viscosity) is performed using the calculation method in accordance with VDI/VDE Directive 3513

Reference condition for gas measurements:
The flow measurement of gases are refered to
Nl/h or Nm³/h: Volume flow in Normal state 0°C, 1,013 bar abs. [DIN 1343]
SCFM or SCFH: Volume flow in Standard state 15°C, 1,013 bar abs. [ISO 13443]
DK32 Valves

Measuring span: 10 : 1
Declaration of flow: Values = 100%
Air: 20°C (68°F), 1,2 bar abs. [17.4 psia]

<table>
<thead>
<tr>
<th>Cones</th>
<th>Valve spindle</th>
<th>Max. low rate Qv</th>
<th>Valve characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Φ [mm]</td>
<td>Φ [&quot;]</td>
<td>[l/h] [SCFH] [m³/h]</td>
</tr>
<tr>
<td>K 005 - K 010</td>
<td>1</td>
<td>0.039</td>
<td>100</td>
</tr>
<tr>
<td>K 015 - K 040 - K 080</td>
<td>2.5</td>
<td>0.98</td>
<td>1000</td>
</tr>
<tr>
<td>K 125 ... K 340</td>
<td>4.5</td>
<td>1.77</td>
<td>4000</td>
</tr>
</tbody>
</table>

Valve characteristics

Spindle 1.0mm - 0.039"

Spindle 2.5mm - 0.098"

Spindle 4.5mm - 0.177"

1 Flow, air
2 Flow, water
3 Spindle rotation n
**On - Off valve** Swagelok®

**INFORMATION!**
Swagelok® ball valves are designed to be used in a fully open or fully closed position.
Valves that have not been cycled for a period of time may have a higher initial actuation torque.
Packing adjustment may be required during the service life of the valve to prevent leakage.

**Flow Data at 20°C (70°F)**

<table>
<thead>
<tr>
<th>Flow Coefficient ($C_v$)</th>
<th>Pressure Drop to Atmosphere ($\Delta p$), psi (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 (0.68)</td>
</tr>
<tr>
<td></td>
<td>50 (3.4)</td>
</tr>
<tr>
<td></td>
<td>100 (6.8)</td>
</tr>
<tr>
<td><strong>Air Flow std ft³/min (std L/min)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>10 (280)</td>
</tr>
<tr>
<td></td>
<td>27 (760)</td>
</tr>
<tr>
<td></td>
<td>48 (1300)</td>
</tr>
</tbody>
</table>

**Check valve**

**INFORMATION!**
For valves not actuated for a period of time, initial cracking pressure may be higher than the set cracking pressure.
Check valves are designed for directional flow control only. Swagelok check valves should never be used as code safety relief devices.
### 7.5 Differential pressure regulators

Differential pressure regulators are used (DK32 and DK37 only) to help maintain constant flow rates in the case of fluctuating inlet or outlet pressures. Minimum pressure levels are required to permit operation of the regulators (see Regulator characteristics).

Differential pressure regulators are not pressure reducing valves!

1. **Inlet pressure regulators, types RE, NRE**
   
The regulators maintain a constant flow rate at variable inlet pressure and constant outlet pressure.

   **Example:** Inlet pressure regulator RE-1000:
   - Current flow rate: 1000 l/h air
   - Constant outlet pressure $p_2$: 1.013 bar abs.

   With a variable inlet pressure greater than 0.5 bar the flow rate in the device is constant.

2. **Outlet pressure regulators, types RA, NRA**
   
The regulators maintain a constant flow rate at constant inlet pressure and variable outlet pressure.
   
   In order to function, there must be pressure difference between the inlet pressure and the outlet pressure. The inlet pressure $p_1$ must always be greater than the outlet pressure $p_2$.

   **Example:** Outlet pressure regulator NRA-800:
   - Current flow rate: 800 l/h air
   - Constant outlet pressure: 6 bar

   With a variable outlet pressure of 0...5.5 bar the flowrate in the device remains constant.

### Regulator characteristics

1. **Inlet pressure regulators, types RE and NRE**

2. **Outlet pressure regulators, types RA and NRA**
Inlet pressure regulator

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Air</th>
<th>Min. inlet pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[l/h]</td>
<td>[GPH]</td>
<td></td>
</tr>
<tr>
<td>RE-1000</td>
<td>.40</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.1000</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>RE-4000</td>
<td>.80</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.2000</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.140</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.4000</td>
<td>.150</td>
<td></td>
</tr>
<tr>
<td>NRE-100</td>
<td>.25</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.100</td>
<td>.3</td>
<td>0.1 1.45</td>
</tr>
<tr>
<td>NRE-800</td>
<td>-</td>
<td>-</td>
<td>0.1 1.45</td>
</tr>
<tr>
<td></td>
<td>.255</td>
<td>.60</td>
<td>0.4 5.8</td>
</tr>
</tbody>
</table>

Outlet pressure regulator

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Air</th>
<th>Min. pressure diff. *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[l/h]</td>
<td>[GPH]</td>
<td></td>
</tr>
<tr>
<td>RA-1000</td>
<td>.40</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.1000</td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>RA-4000</td>
<td>.100</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.2000</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.140</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.4000</td>
<td>.150</td>
<td></td>
</tr>
<tr>
<td>NRA-800</td>
<td>.1</td>
<td>.025</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.250</td>
<td>.9</td>
<td>0.05 0.73</td>
</tr>
<tr>
<td></td>
<td>.500</td>
<td>.19</td>
<td>0.1 1.45</td>
</tr>
<tr>
<td></td>
<td>.800</td>
<td>.30</td>
<td>0.2 2.9</td>
</tr>
<tr>
<td></td>
<td>.25</td>
<td>.66</td>
<td>0.4 5.8</td>
</tr>
</tbody>
</table>

Table 7-1: * Pressure difference between inlet and outlet pressure

Technical data, differential pressure regulator

<table>
<thead>
<tr>
<th>Standard connections</th>
<th>1/4” NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>Serto, Ermeto 6 or 8, tube nozzle 6mm or 8mm, Dilo, Gyralok, Swagelok, G 1/4</td>
</tr>
<tr>
<td>Max. operating gauge pressure [at 20°C]</td>
<td>64 bar / 928psig</td>
</tr>
<tr>
<td>Medium temperature</td>
<td>150°C / 302°F</td>
</tr>
<tr>
<td>Material</td>
<td>CrNi-Steel 1.4404</td>
</tr>
<tr>
<td>Gasket</td>
<td>PTFE</td>
</tr>
<tr>
<td>Membrane</td>
<td>PTFE filled with carbon / graphite</td>
</tr>
<tr>
<td>O-ring</td>
<td>FPM</td>
</tr>
</tbody>
</table>

other connections and materials, higher temperatures and pressures on request.
Dimensions with differential pressure regulators

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>[mm]</td>
<td>[°]</td>
<td>[mm]</td>
<td>[°]</td>
</tr>
<tr>
<td>approx. 230</td>
<td>approx. 9,1</td>
<td>approx. 163</td>
<td>approx. 6,4</td>
</tr>
<tr>
<td>70</td>
<td>2,8</td>
<td>23</td>
<td>0,91</td>
</tr>
</tbody>
</table>

DK32 with inlet pressure regulator

DK32 with outlet pressure regulator
KROHNE product overview

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

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Fax: +49 (0)203 301 10389
info@krohne.de

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www.krohne.com