KROHNE Variable Area Flowmeters
Consolidated Product Know-How

**Glass devices**
- Very low priced
- Fluid is visible
- Up to max. 10 bar/145 psig and 100°C / 212°F
- Change of glass possible
- Optional limit switches
- Use in hazardous areas

**Metal devices**
- For extreme process conditions
  - High/low temperature
  - High pressure
  - Aggressive fluids
- Limit switches, current output, totalizer, communication interfaces
- Use in hazardous areas
Why using Variable Area Flowmeters?

- Need for flow indicators or flow switches rather than flowmeters
- Need for cost-effective solutions rather than high accurate measurement
- Need for very compact meters for integration e.g. into analyser and purge systems
- Limited alternatives for low-flow, low-pressure gas applications
- Easy realisation of high pressure metal devices (no sensor feedthrough)

Necessary data for selecting the right VA meter:

For sizing

- Density and viscosity of the medium, or alternatively
- Name of the liquid or gas. Missing medium properties can be achieved from the database of the selection and calculation tool.
- Measuring range including physical units
- Operating temperature
- Operating pressure

For completion of the specification:

- Maximum pressure and temperature
- Material requirements for wetted parts
- Requirements for optional signal outputs or approvals
DK46/47/48/800
Low-flow meters / Purge meters (glass)

The DK46, DK47, DK48 and DK800 variable area flowmeters feature glass cones of varying lengths for different accuracy requirements. The medium is visible and the flow value of the gas or liquid can be read directly off the scale at the height of the float. It is easy to change the measuring glass, which is protected by a plastic cover, without disassembling the fitting.

For precise setting of the flow value, all devices are equipped with a needle valve.

Highlights

- Simple, low-cost measuring principle without auxiliary power
- Stainless steel, brass or PVDF fittings
- Needle valve (top or bottom)
- Option for panel mounting
- Process temperatures: -5°C to +100°C / 23 to +212°F
- Operating pressure up to 10 bar / 145 psig
- Full scale value for liquids: 0.4 to 160 l/h / 0.1 to 42 GPH
- Full scale value for gases: 5 to 5,000 l/h / 0.17 to 176 SCFH
- 2 optional limit switches
- Accuracy: 1.0 - 4.0 % of MV (depending on length of cone)
- Turndown ratio 10:1
- Use in hazardous areas (ATEX)
- Different fittings

The devices are especially well suited to measuring carrier gases in gas chromatography, for display, monitoring and dosing of gases in production processes as well as measuring liquids and gases in laboratories and pilot installations.

Blinds and supports are available for panel mounting. By using a lab support, the flowmeters can be converted into a desktop unit. KROHNE also supplies fully assembled, customer-specific purge panels.

Differential pressure / flow regulators

It is possible to directly connect a differential pressure / flow regulator in order to ensure constant flow in case of fluctuating operating pressure.

The smallest flowmeter DK46, is available with the type designation DKR46. It has been combined with an inlet pressure regulator into a compact device.
The DK32 and DK34 variable area flowmeters are versatile and can be used for gases and liquids.

The sturdy all-metal design ensures high resistance to pressure, temperature and media and stands up to extreme application and environmental conditions.

The position of the float is magnetically transmitted to an analog indicator to display the measured value. No power supply is necessary.

**Highlights**

- Simple and low-cost measuring principle without auxiliary power
- Materials in contact with the medium: Stainless steel, optional: Hastelloy, Monel, Titanium
- Needle valve (top or bottom)
- Process temperatures from -80°C to +200°C / -112 to 392°F
- Operating pressure up to 130 bar / 1885 psig or special 400 bar / 5800 psi
- Full scale value for liquids: 1.6 to 150 l/h / 0.4 to 40 GPH
- Full scale value for gases: 16 to 4,800 l/h / 0.6 to 170 SCFH
- Accuracy: 4.0 % of MV
- Turndown ratio 10:1
- Many different process connections from ¼ NPT to flange adapter
- 2 optional limit switches (SIL compliant)
- Approved for hazardous areas in accordance with ATEX, IECEx, FM, NEPSI, INMETRO, CCOE/PESO

The DK32 flowmeter features horizontal connections and a standard bottom or top needle valve. The DK34 flowmeter, on the other hand, features vertical process connections and no valve.

**Differential pressure / flow regulators**

It is possible to directly connect a differential pressure / flow regulator in order to ensure constant flow in case of fluctuating operating pressure.
DK37
Advanced Low-flow meters / Purge meters (metal)

The DK37 variable area flowmeters can either be equipped with a mechanical or electronic indicator and are suitable for measuring gases and liquids.

They are sturdy, versatile all-metal measuring devices. All devices are fitted with a metering valve to accurately set the flow value.

Highlights

- Materials in contact with the medium: Stainless steel, optional: Hastelloy, Monel, Titanium
- Process temperatures: -80 to +150°C / -112 to 302 °F respectively
  -25 to +135°C / -13 to 275°F for electronic indicator
- Operating pressure up to 130 bar / 1885 psig
- Full scale value for liquids: 1.6 to 250 l/h / 0.4 to 65 GPH
- Full scale value for gases: 16 to 4,800 l/h / 0.6 to 280 SCFH
- 2 optional limit switches or 4-20mA/HART 5 output
- Turndown ratio 10:1
- Accuracy: 2.5 % of MV
- PPS housing as standard, stainless steel housing as option
- Approved for hazardous areas in accordance with ATEX, IECEx, QPS (US and Canada), NEPSI, EAC, CCOE/PESO
- Many different process connections

Mechanical indicator (M8M)

Without auxiliary power, the flow-dependent position of the float in the measuring cone is transmitted by a magnetic coupling to the pointer inside the indicator housing. Both adjustable limit values of the transmitters are also displayed on the scale.

Electronic indicator (M8E)

The electronic version with bargraph indicator features state-of-the-art magnetic sensors which detect the position of the float without contact or hysteresis. Standard system operation is with a linear analog output in 2-wire technology (4 to 20 mA / HART).

Differential pressure / flow regulators

It is possible to directly connect a differential pressure / flow regulator in order to ensure constant flow in case of fluctuating operating pressure.
**H250 with M40 indicator**

*Intelligent modularity meets universal Ex concept*

The H250 M40 flowmeters have set a new standard in variable area flowmeter technology. They combine tried and tested flow measurement with latest communication capabilities like Foundation Fieldbus. The functionality of the devices is modular extendable. The innovative construction allows a free choice of intrinsically safe or explosion-proof design. The H250 M40 is the standard solution for the process industry when costs and reliability are a factor.

**Highlights indicator/transmitter M40**

- Simple, low-cost installation: Measure and display without auxiliary power supply
- Unique modularity/serviceability
  - Limit switches (NAMUR, 3-wire transistor, reed switch)
  - 2-wire analog output 4…20mA with HART 7.4
  - Foundation Fieldbus or Profibus PA interface
  - 11 digit totalizer with graphical LC display and limit switches and pulse output
- Universal ex-concept: Explosion proof and intrinsically safe
- Optional stainless steel housing for corrosive atmospheres
- SIL 2 compliant limit switches, SIL 1 compliant current output
- Ingress protection IP66 and IP68 / NEMA4X and NEMA6, IP69K optional
- International approvals for use in hazardous areas (Ex-i, Ex-nA, Ex-d, Ex t / IS, NI, XP, DIP acc. to ATEX, IECEx, cFMus, NEPSI, KGS, CCOE/PESO, EAC, INMETRO and nuclear power plants (N/NPT stamp)
Highlights H250 M40 measuring cone

- Closed tube construction for high operating pressure up to several hundred bar and high process temperatures from -200°C to +300°C / -328 to 572°F, special +400°C / 752°F
- Special materials Hastelloy, Monel, Titanium, 6Mo or Inconel 625
- Optional heating jacket for measuring cone
- Full scale value for liquids: 10 to 120,000 l/h / 5 – 32,000 GPH
- Full scale value for gases: 0.7 to 2800 m³/h / 25 to 100,000 SCFH
- Turndown ratio 10:1 (optional 100:1)
- Accuracy: 1.6 % of MV
- Many different process connections
  - Flanges as per EN (DN15-DN150), ASME (1/2”-6”) and JIS
  - Screw and clamp connections, welding ends et al.
- Special design for the food and pharmaceutical industry with EHEDG approval

Further options (also for retrofit)

- Magnetic filters, if the medium contains particles which can be magnetically influenced
- Float damping for pulsating flows or low operating pressure (especially for gas service)
- Display damping ensures measured value is easy to read

H250 application-specific versions

H250H and H250U for special installation directions

Variable area flowmeters generally feature a vertically measuring tube with bottom to top flow. KROHNE offers special versions H250H for horizontal or H250U for reverse installation position (from top to bottom).

- Accuracy: 2.5 % of MV
- Process temperature $T_{\text{max}} = 100^\circ\text{C}/212^\circ\text{F}$ (St. steel spring)
- Process temperature $T_{\text{max}} = 200^\circ\text{C}/396^\circ\text{F}$ (Hastelloy spring)

H250C with PTFE liner for aggressive media

All wetted components are made of PTFE or ceramics, which means they can be used for virtually all acids and alkalis.

- Process temperature $T_{\text{max}} = 70^\circ\text{C}/158^\circ\text{F}$ (PTFE/PTFE)
- Process temperature $T_{\text{max}} = 150^\circ\text{C}/302^\circ\text{F}$ (PTFE/ceramics)
- Process temperature $T_{\text{max}} = 250^\circ\text{C}/482^\circ\text{F}$ (TFM/ceramics)
- Accuracy: 2.5 % of MV

H250 (100:1) with increased turndown ratio

With the use of devices with an extended measuring range more information is available about the process: From low-flow measurement to maximum flow.

- Increased turndown ratio 100:1 instead of 10:1 due to additional spring, that acts as additional reset force starting from 10% in addition to the gravitational force
- Accuracy: 2.5 % of MV
Specials for Food & Pharmaceutical industry

EHEDG approved H250F

The H250F flowmeter is a further development of the tried and tested all-metal instrument and was especially designed for use in the food and pharmaceutical industry.

It is used to measure liquids and gases. It features a hygienic surface with a surface finish of Ra < 0.8 µm (optional < 0.6 µm), as well as a design free of dead spaces.

The measuring instruments can be cleaned (CIP) and sterilized (SIP) while in place. There are suitable connections and FDA conforming materials for the food and pharmaceutical industry.

Technical features

- All-metal stainless steel flowmeter featuring design devoid of dead spaces
- Surface roughness Ra < 0.8 µm (optional < 0.6 µm)
- CIP and SIP compatible (200°C/392°F)
- FDA compliant materials
- Meets EU directive 1935/2004 and 2023/2006 for materials intended to come into food contact
- Clamp connections, male thread, SMS, hygienic flange, etc.
- Optional heating jacket
- Optional stainless steel housing
- EHEDG approval

Specials for Oil & Gas industry

With a range of small purge meters and ½” to 6” flanged process meters KROHNE covers the special requirements on specification and documentation of the Oil&Gas industry for measuring corrosion-, scale- and hydrate- inhibitors, demulsifiers, Methanol, MEG, Fuel Gas or Nitrogen.

Technical features

- NACE MR0175/MR0103 compliant 316L standard material
- Optional NORSOK compliance of material and/or welding
- Optional Hastelloy, Monel, Inconel, 6Mo, Titanium
- Stainless steel housing
- Optional offshore protective coating of measuring tube and/or housing
- Typically used on injection packages/skids or analyser systems
- Up to Class 2500 flanges, even higher pressure ratings for NPT threaded connections
Specials for analyser systems for chemical/petrochemical industry

KROHNE glass tube meters DK46/47/48/800 and metal tube meters DK32/34/37 with integrated needle valve are the best fit solution for adjusting, measuring and monitoring (MIN flow alarm in case of interruption) the sample flow to all kind of process analysers. The compact and simple design as well as special mounting options allow a fast and cost effective integration into the analyser system.

Technical features

- Use in hazardous areas
- Flow adjustment with top or bottom needle valve
- Direct flow reading on the scale
- Flow monitoring with limit switch for MIN flow alarm
- Optional stainless steel surface passivation SilcoNert to avoid adsorption of H2S or other active compounds for ppm/ppb analysers
- DK32 HT: Use in heated analyser box up to ambient temperatures of 200°C/ 392°F

Special purge panel solutions

- Complete purge panel solutions according custom requirements for dosing of rinsing agents to clean pipings, orifice plates and measuring systems
- Panel mounted VA meters
- Including pressure gauges, pressure reducers, flow controllers, manifolds etc.

From universal to one-of-a-kind

At KROHNE, it is the modular design on the one hand and the flexible production structure on the other that form the basis for application and customer-related special variants. From universal to one-of-a-kind: The variable area flowmeters from KROHNE cover the entire range of requirements in the process industry.
The VA 40 variable area flowmeters are suitable for measuring liquids and gases.

The standardized device design is available with various connections. The glass measuring cone, protected by a metal sleeve with a viewing glass, makes it easy to read the flow directly and observe the medium.

The suitability for measuring the flow of gases in accordance with the DVGW G260 process sheet has been certified by the DVGW testing station at the Gas Fired Thermal Institute in Essen.

**Highlights**

- Simple, low-cost measuring principle without auxiliary power
- Stainless steel fittings: other materials optional
- Thread, flange, hose or clamp connection
- Process temperatures: -20°C to +100°C / -4°C to 212 °F
- Operating pressure up to 7-10 bar / 101-145 psig, depending on nominal size
- Full scale value for liquids: 0.4 to 10,000 l/h / 0.1 to 2,650 GPH
- Full scale value for gases: 7 to 310,000 l/h / 0.25 to 11,000 SCFH
- 2 optional limit switches
- 2-wire 4…20mA float position sensor
- Accuracy: 1.0 % of MV
- Turndown ratio 10:1
- Use in hazardous areas (ATEX)
- Special food and pharmaceutical variant

**Food and pharmaceutical design**

Smooth stainless steel surfaces featuring a surface roughness of the components in contact with the medium of < 0.8 µm make it difficult for deposits to form and are easy to clean. Combined with a design devoid of dead spaces and stagnation zones, microorganisms cannot stick and multiply. There are suitable connections and FDA conforming materials for the food and pharmaceutical industry.

**VA40/WIM**

4…20mA float position sensor

VA40 devices with size DN25 / 1", DN40 / 1½" or DN50 / 2" can be equipped with a float position sensor in order to provide a 4…20mA output signal. The non-linear correlation between 4…20mA and the flow rate can be taken from the provided calibration curve. Use in ATEX hazardous areas is possible.
Mechanical differential pressure / flow regulators for DK instruments

Flow regulators are used in particular when measuring gases in order to ensure constant flow rates in the case of fluctuating inlet or outlet pressure. Minimum pressure levels are necessary to operate the regulators. Flow regulators are not pressure reducing valves. The regulators are available in brass or stainless steel.

<table>
<thead>
<tr>
<th>Inlet pressure regulator (P_Outlet = const)</th>
<th>Outlet pressure regulator (P_Inlet = const)</th>
<th>Max. Flow</th>
<th>Max. Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE-1000</td>
<td>RA-1000</td>
<td>40 l/h water</td>
<td>11 GPH water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000 Nl/h air</td>
<td>37 SCFH air</td>
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<tr>
<td></td>
<td></td>
<td>Pmin = 0.5 bar</td>
<td>Pmin = 7.25 psig</td>
</tr>
<tr>
<td>RE-4000</td>
<td>RA-4000</td>
<td>160 l/h water</td>
<td>42 GPH water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4000 Nl/h air</td>
<td>150 SCFH air</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pmin = 1.0 - 2.0 bar</td>
<td>Pmin = 14.5 - 29 psig</td>
</tr>
<tr>
<td>NRE-100 (Low pressure)</td>
<td>NRA-800 (Low pressure)</td>
<td>2.5 l/h water</td>
<td>0.6 GPH water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 Nl/h air</td>
<td>3.7 SCFH air</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pmin = 0.1 bar</td>
<td>Pmin = 1.45 psig</td>
</tr>
<tr>
<td>NRE-800 (Low pressure)</td>
<td>NRA-800 (Low pressure)</td>
<td>25 l/h water</td>
<td>6 GPH water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800 Nl/h air</td>
<td>30 SCFH air</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pmin = 0.1 - 0.4 bar</td>
<td>Pmin = 1.45 - 5.8 psig</td>
</tr>
</tbody>
</table>

**Example inlet pressure regulator**
- current flow: 1000 l/h air
- Outlet pressure p2 constant (Atmosphere: 1.013 bar abs.)
- The flow rate remains constant in the device in the case of fluctuating inlet pressure p1 greater than 1 bar.

**Example outlet pressure regulator**
- current flow: 800 l/h air
- Inlet pressure regulator p1 constant: 6 bar
- The flow rate in the device is constant in the case of a fluctuating outlet pressure p2 of 0 to 5.5 bar.
Float measuring principle

Variable area flowmeters feature an upright tapered measuring tube, wider end up, in which a specially shaped float moves freely up and down.

The medium flows through the tube from bottom to top. In so doing, it raises the float until there is an annular gap between the wall of the tube and the float and equilibrium of the forces applied to the float has been achieved.

Three main forces act on the float:

- **The lifting force** $A$, which is dependent on the density of the medium and the volume of the float. It is constant (at constant density).
- **The gravity force** $G$, which is dependent on the mass of the float. Floats can be manufactured out of stainless steel, aluminium, titanium or hard rubber, for example.
- **The flow force** $S$: The flow force changes transitionally with a change in the flow until a new state of equilibrium has been achieved.

Different measurement ranges are realized through variations in:

- Nominal size of the cones e.g. DN 15 (1/2’’), DN 25 (1’’)
- Cone shapes (pitch, length etc.)
- Float shapes (form drag)
- Float materials (mass)

Every flow value corresponds to a defined annular gap resulting from the conical form of the measuring tube and the specific position of the float. With glass cones, the flow value can be read directly from a scale at the level of the float reading line. With metal cones, the float position is transmitted to an indicator by magnetic means.

The VDI/VDE 3513 sheet 1 guideline describes the procedure for converting the scales of variable area flowmeters. It takes into account all material and flow parameters including density, viscosity, pressure and temperature.

This method can also be used for scale conversions to accommodate changed operating conditions. KROHNE provides you with its own software for this.
Accuracy of variable area flowmeters

With the 2008 version of directive VDI/VDE 3513 sheet 2 the definition of accuracy for variable area flowmeters has been revised. The accuracy of variable area flowmeters is no longer specified by accuracy classes but by 2 new parameters \( G \) and \( q_G \).

- Permissible error \( G \): Constant, permissible error in % of measured value applicable above the linearity limit \( q_G \).
- Linearity limit \( q_G \): Flow limit value in % of full scale. Above this limit, the permissible, relative error is constant.
- Below the limit value \( q_G \) the permissible error increases towards lower flow rates inversely proportional.

With given parameters \( G \) and \( q_G = 50\% \) the maximum permissible, relative error according to VDI/VDE 3513 Sheet 2 (08/2008) can be determined as follows:

\[
\begin{align*}
F_\% &= G & \text{for } q_\% \geq 50\% \\
F_\% &= G \times 50\% / q_\% & \text{for } q_\% < 50\%
\end{align*}
\]

\( F_\% \): Maximum permissible error
\( q_G \): Linearity limit = 50\% for KROHNE VA meters
\( q_\% \): Actual flow rate in percent of full scale
\( F_\% \): Relative error in percent of actual measured value

\[
\text{Note}
\]

Instead of specifying the accuracy of VA meters according to VDI 3513-2 sometimes percent of full scale (\%F.S.) is used. Please note that e.g. 1.6\% F.S. is much worse than 1.6\% VDI.

\[
\begin{align*}
1.6\% \text{ F.S.} &\rightarrow 1.6\% \times 100\% / q_\% \rightarrow 16\% \text{ allowed error @ 10\%, 3.2\% @ 50\%} \\
1.6\% \text{ VDI} &\rightarrow 1.6\% \times 50\% / q_\% \rightarrow 8\% \text{ allowed error @ 10\%, 1.6\% @ 50\%-100\%}
\end{align*}
\]
<table>
<thead>
<tr>
<th>Overview Approvals</th>
<th>DK46/47/48/800</th>
<th>VA40</th>
<th>DK32 DK34</th>
<th>DK37</th>
<th>H250 M40</th>
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<tbody>
<tr>
<td>ATEX mechanical</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>I12G, I12D &amp; I1IC TX</td>
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<tr>
<td>ATEX I12G (Gas zone 1)</td>
<td></td>
<td></td>
<td>Ex-i</td>
<td>Ex-i</td>
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<td>ATEX I13G (Gas zone 2)</td>
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<td>Ex-nA</td>
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<td>Ex-nA</td>
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<tr>
<td>ATEX I12D (Dust zone 21)</td>
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<td>Ex-i as special</td>
<td>Ex-i</td>
<td>Ex-t</td>
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<tr>
<td>IECEx I12G (Gas zone 1)</td>
<td></td>
<td></td>
<td>Ex-i</td>
<td>Ex-i</td>
<td>Ex-i</td>
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<tr>
<td>IECEx I13G (Gas zone 2)</td>
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<td>Ex-nA</td>
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<td>IECEx I12D (Dust zone 21)</td>
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<td>Ex-t</td>
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<td>FM Class I, Div 1</td>
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<td>IS</td>
<td>Pending</td>
<td>IS XP</td>
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<td>FM Class I, Div 2</td>
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<td>NI</td>
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<tr>
<td>FM Class II/III, Div 1</td>
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<td>DIP</td>
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<tr>
<td>NEPSI Gas zone 1</td>
<td>Ex-i</td>
<td>Ex-i</td>
<td>Ex-i</td>
<td>Ex-i</td>
<td>Ex-i</td>
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<tr>
<td>NEPSI Gas zone 2</td>
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<td>Ex-nA</td>
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<td>Ex-nA</td>
</tr>
<tr>
<td>NEPSI Dust zone 21</td>
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<td>Ex-t</td>
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<tr>
<td>CCOE/PESO India</td>
<td>Ex-i</td>
<td>Ex-i</td>
<td>Ex-i</td>
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<td>Ex-i/Ex-d</td>
<td>Ex-i/Ex-t</td>
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<td>INMETRO Brazil</td>
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<td>Ex-i</td>
<td>Ex-i/Ex-d</td>
<td>Ex-i/Ex-t</td>
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</table>

Note: Some approvals have an expire date! Check on www.krohne.com.
<table>
<thead>
<tr>
<th></th>
<th>DK 46/47/48/800</th>
<th>VA40</th>
<th>DK 32/34</th>
<th>DK 37</th>
<th>H250</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cone material</strong></td>
<td>Glass</td>
<td>Glass</td>
<td>Metal</td>
<td>Metal</td>
<td>Metal</td>
</tr>
<tr>
<td><strong>Process connections</strong></td>
<td>Female ⅜” NPT, G ¼, screw and hose adapters</td>
<td>Female ⅜” - 2” NPT or G, flanges, clamp, hose</td>
<td>Female ⅜”, ⅜” NPT, G ¼, screw and adapters, flange adapter</td>
<td>⅛”, ⅛” NPT, G ¼, screw and adapters, flange adapter</td>
<td>flanges (EN, ASME, JIS), clamp, NPT, G</td>
</tr>
<tr>
<td><strong>FS range liquids</strong></td>
<td>0.4 - 160 l/h</td>
<td>0.4 - 10000 l/h</td>
<td>1.6 – 150 l/h</td>
<td>3 – 250 l/h</td>
<td>10 - 120000 l/h</td>
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<tr>
<td></td>
<td>0.1 - 42 GPH</td>
<td>0.1 to 2,650 GPH</td>
<td>0.4 - 40 GPH</td>
<td>0.4 - 40 GPH</td>
<td>5 - 32000 GPH</td>
</tr>
<tr>
<td><strong>FS range gases</strong></td>
<td>5 - 5000 Nl/h</td>
<td>7 - 310000 Nl/h</td>
<td>16 – 4800 Nl/h</td>
<td>16 – 8000 Nl/h</td>
<td>0.7 – 2800 Nm³/h</td>
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<tr>
<td></td>
<td>0.17 - 176 SCFH</td>
<td>0.25 - 11000 SCFH</td>
<td>0.6 - 170 SCFH</td>
<td>0.6 - 300 SCFH</td>
<td>25 - 100000 SCFH</td>
</tr>
<tr>
<td><strong>Max. Operating pressure</strong></td>
<td>10 bar/145 psig</td>
<td>7-10 bar</td>
<td>130 bar</td>
<td>130 bar</td>
<td>400 bar - 1000 bar</td>
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<tr>
<td></td>
<td>PV/4 bar/58 psig</td>
<td>101-145 psig</td>
<td>1885 psig</td>
<td>1885 psig</td>
<td>5800 - 15000 psig</td>
</tr>
<tr>
<td><strong>Process Temperature</strong></td>
<td>-5...100°C</td>
<td>-20...100°C</td>
<td>-80...150°C</td>
<td>-40/-80...135/150°C</td>
<td>-200...300°C</td>
</tr>
<tr>
<td></td>
<td>23...212°F</td>
<td>-4...212°F</td>
<td>-112...302°F</td>
<td>-13/-112...275/302°F</td>
<td>-328...572°F</td>
</tr>
<tr>
<td><strong>Accuracy acc. VDI/VDE3513-2 (dₚ = 50%)</strong></td>
<td>DK46: 4.0%</td>
<td>VA40: 1.0%</td>
<td>4.0%</td>
<td>2.5%</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>DK47/800: 2.5%</td>
<td>VA45: 2.5%</td>
<td>(M8M/M8E)</td>
<td>(M8M/M8E)</td>
<td>(M8M/M8E)</td>
</tr>
<tr>
<td><strong>Limit switches</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes (DK37M8M)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Current output</strong></td>
<td>Yes (≥DN25)</td>
<td></td>
<td>Yes (DK37M8E)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
<td></td>
<td></td>
<td>HART</td>
<td>HART / PA / FF</td>
</tr>
</tbody>
</table>