



Proportional controlling element

VKP40...

Proportional controlling element designed for fitting between counter-flanges, for integration into gas trains.

- Wide modulation range
- Flanged connections ½...2"
- Angular rotation 90°
- Suited for use with gases of families I...III and air
- For use with actuators SQN13, SQN30, SQN72, SQM33, SQM4 or SQM5
- Can be attached to VGD2 double gas valves

The VKP40 and this Data Sheet are intended for use by OEMs which integrate the controlling elements in their products!

Use

Proportional controlling element for the control of gas or air volume in combustion plants with demanding requirements, such as ...

- proportional increase of volumetric flow across angular rotation of 0...90°
- small start volume/extremely small volume
- wide modulation range of >1:25
- high actuating cycle frequencies



Note!

For supplementary documentation, refer to *Accessories*.

| Product type | Type of documentation | Documentation number |
|--------------|-----------------------|-----------------------------|
| AGF10 | Mounting instructions | 74 319 0865 0 (M7631/M7646) |
| ASK33.1 | Mounting instructions | 74 319 0843 0 (M7646) |
| ASK33.2 | Mounting instructions | 74 319 0843 0 (M7646) |
| ASK33.3 | Mounting instructions | 74 319 0843 0 (M7646) |
| SQN13 | Data sheet | N7803 |
| SQN30 | Data sheet | N7808 |
| SQN72 | Data sheet | N7802 |
| SQM33 | Data sheet | N7813 |
| SQM40 | Data sheet | N7817 |
| SQM45 | Data sheet | N7814 |
| SQM50 | Data sheet | N7815 |
| VKP40 | Mounting instructions | 74 319 0843 0 (M7646) |
| VKP40 | User documentation | A7646 |

Warning notes



To avoid injury to persons, damage to property or the environment, the following warning notes must be observed!

Do not interfere with or modify the controlling element!

- All activities (mounting, installation and service work, etc.) must be performed by qualified personnel
- Fall or shock can adversely affect the safety functions. Such **controlling elements** must not be put into operation, even if they do not exhibit any damage
- The VKP40 must be used in connection with the actuators specified in this Data Sheet
- The VKP40 is only suited for the applications covered by this Data Sheet. If not observed, there is a risk of personal injury or damage to property
- The VKP40 is intended for exclusive use by OEMs/heating installers. If not observed, there is a risk of personal injury or damage to property

- Ensure that the relevant national safety regulations are complied with
- Proportional controlling element, actuator and mounting plate can be straightforwardly assembled on site. Special tools are not required
- The 0°-position of the VKP40 and the 0°-position of the actuator must correspond. In the case of types with 45° D-shafts, the VKP40 coupling is shifted by 45° – see accompanying Mounting Instructions M7646 / 74 319 0843 0
- When the actuator is in the correct position in relation to the fixing plate, first the coupling and then the actuator are tightened.
- Observe the direction of flow and the maximum permissible inlet pressure
- Refer also to the following Mounting Instructions

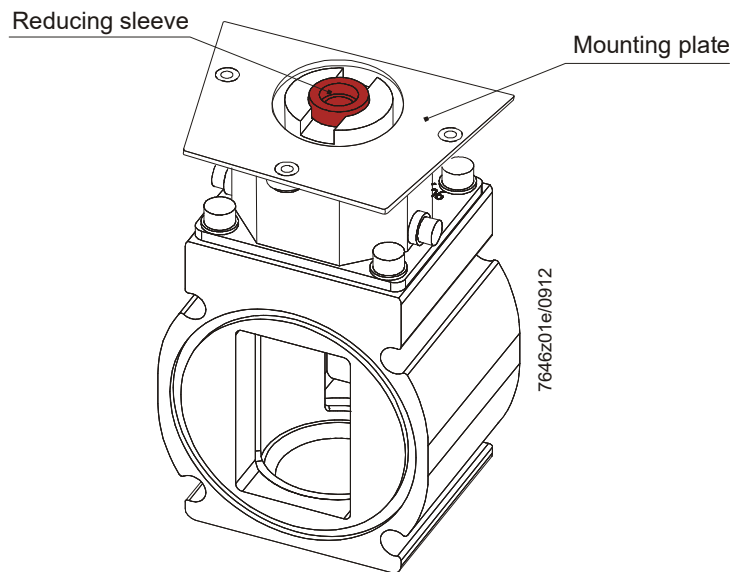
| | | |
|-------|-------------|---------------|
| AGF10 | M7631/M7646 | 74 319 0865 0 |
|-------|-------------|---------------|

| | | |
|-------|-------|---------------|
| VKP40 | M7646 | 74 319 0843 0 |
|-------|-------|---------------|

ASK33.1 If, in place of the SQN30 / SQN72 actuator (axis Ø8 mm), an SQM actuator (axis Ø10 mm) is used instead, the larger ASK33.1 mounting plate must be mounted and the inner part of the coupling (red reducing sleeve) must be removed.

ASK33.2 When using the SQN13 actuator in place of the SQN30 / SQN72, an additional mounting plate ASK33.2 must be mounted between VKP40 and SQN13 actuator

ASK33.3 If, in place of the SQN30 / SQN72 actuator, an SQM50 actuator with AGA58.5 is used instead, the larger ASK33.3 mounting plate must be mounted and the red reducing sleeve must be removed.



Commission the proportional controlling element only when mounting plate, flange and the respective actuator are correctly assembled.

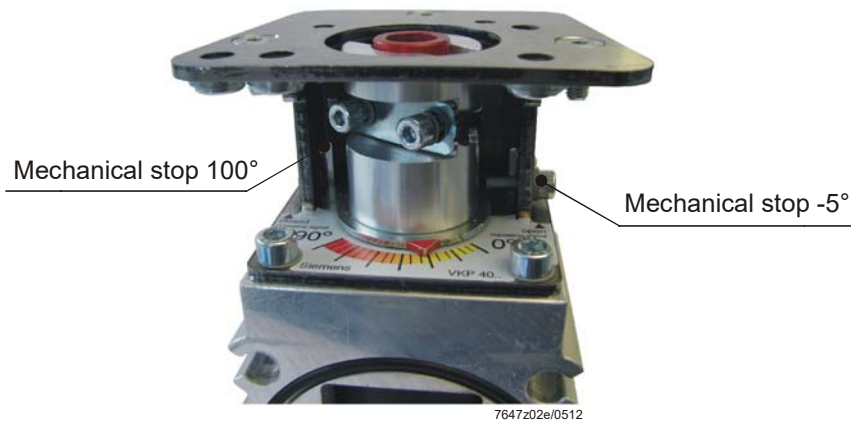


Note!

SQx position 0° corresponds to VKP40 position 0° (closed position).

Option when used in connection with burner management system LMV2/LMV3.

A screw can be fitted to provide a mechanical stop either at an angular position of approx. -5° (fully closed) or approx. 100° (fully open). The VKP40 is supplied with the mechanical stop at -5°. Depending on the position of the stop, the reference travel (LMV2/LMV3 parameters) predefined for the relevant actuator is prevented. Incorrectly fitted / connected or interchanged air or gas actuators can be detected (also refer to Basic Documentation LMV2/LMV3).



Note!

- ➔ Mechanical stop OPEN at -5° fully closed
- ➔ Mechanical stop CLOSED at 100° fully open



Note!

To fix the position of the control valve with a fixed linear controlling element setting (manual setting without actuator), the stop screw (M4) can be replaced with a 20 mm long screw.

Standards and certificates

VKP40 and AGF10



Applied directives:

- Gas Appliances Regulation (EU)

(EU) 2016/426

Compliance with the regulations of the applied directives is verified by the adherence to the following standards / regulations:

- Safety and control devices for gas burners and gas burning appliances
- DIN EN 13611
CE-0085

The relevant valid edition of the standards can be found in the declaration of conformity!



EAC Conformity mark (Eurasian Conformity mark)



ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007



China RoHS
Hazardous substances table:



Service notes

- The VKP40 is maintenance-free
- The VKP40 must be commissioned again when mounting plate and actuator are correctly fitted and coupling is fixed
- Check tightness when fitting or replacing flanges

Lifetime

The combination of the proportional controlling element and actuator have a designed lifetime* of

| Nominal size | Positioning cycles |
|--------------|--------------------|
| ½ to 2" | 500,000 |

when using gases according to EN 437 (or specification G260).

This is based on the endurance tests specified in the standard EN 161.
A summary of the conditions has been published by the European Control Manufacturers Association (Afecor)

The designed lifetime is based on use of the proportional controlling element and actuator according to the manufacturer's data sheet. After reaching the designed lifetime in terms of the number of burner startup cycles, or after the corresponding usage time, the proportional controlling element and actuator must be checked and/or replaced by authorized personnel.

* The designed lifetime is not the warranty time specified in the Terms of Delivery.

Disposal notes

Prior to disposal, the VKP40 must be dismantled and separated into its various materials. Local and currently valid legislation must be observed. The VKP40 does not contain electronic components.

Mechanical design

Proportional controlling
element VKP40

- Housing with rotation cylinder and coupling
- Basic mounting plate for actuator SQN30 / SQN72

Mounting plates
ASK33.x

In all cases, ASK33.x mounting plates are required to assemble the SQM4 / SQM5 / SQN1 actuator and the VKP40 (see *Accessories*).

AGF10 flange

2 AGF10 flanges are required to install the VKP40 in a gas pipe.

See Mounting Instructions 74 319 0865 0 (M7631/M7646).

Type summary

| Article no. | Type | Housing size | Nominal size of built-in rotation cylinder *) | Available flange sizes at AGF10 **) |
|---------------|-----------|--------------|---|-------------------------------------|
| BPZ:VKP40.15 | VKP40.15 | DN40 | 15 | 1/2" |
| BPZ:VKP40.20 | VKP40.20 | DN40 | 20 | 3/4" |
| BPZ:VKP40.25 | VKP40.25 | DN40 | 25 | 1" |
| BPZ:VKP40.32 | VKP40.32 | DN40 | 32 | 1 1/4" |
| BPZ:VKP40.40 | VKP40.40 | DN40 | 40 | 1 1/2" |
| BPZ:VKP40.50 | VKP40.50 | DN40 | 50 | 2" |
| BPZ:VKP40.50H | VKP40.50H | DN40 | 50 H | 2" |
| BPZ:VKP40.50S | VKP40.50S | DN40 | 50 S | 2" |

*) With flow rate / characteristic with corresponding flange size

**) Randomly combined

See Mounting Instructions 7431908430 (M7646).

| Suitable actuators | Shaft type | Required mounting plate | Degree of protection | Data Sheet |
|------------------------|-------------------------------|-------------------------|----------------------|------------|
| SQN13 ²⁾ | D-shape, 90°, 8 mm | ASK33.2 | IP54 | N7803 |
| SQN30 ³⁾ | D-shape, 45°, 8 mm | None | IP40 | N7808 |
| SQN70 ³⁾ | D-shape, 45°/90°, 8 mm | None | IP40 | N7804 |
| SQN72 ^{1) 3)} | D-shape, 45°/90°, 8 mm | None | IP54 | N7802 |
| SQM33 ²⁾ | D-shape, 90°, 10 mm | ASK33.1 | IP54 | N7813 |
| SQM40 | D-shape, 90°, 10 mm | ASK33.1 | IP66 | N7817 |
| SQM45 ²⁾ | D-shape, 90°, 10 mm | ASK33.1 | IP54 | N7814 |
| SQM50 | D-shape, 90°, 10 mm (AGA58.5) | ASK33.3 | IP54 | N7815 |

¹⁾ Required connectors for SQN72 are included in the VKP40 package

²⁾ System actuators for LMVx

³⁾ Conversion of the VKP40 coupling to a 45° position required. See User Documentation A7646

Ordering

Proportional controlling element, actuator and mounting plate, if required, must be ordered as individual items.

When ordering, please give quantities, descriptions and product nos.

Example:

- 1 proportional controlling element VKP40.50
- 2 flanges AGF10.50
- 1 mounting plate ASK33.1 (only if SQM33 or SQM4... is used)
- 1 actuator SQM40.245A21

Delivery

Proportional controlling element, actuator, mounting plate and flanges are packed and delivered as separate items.

Accessories



Mounting plate ASK33.1

Article no.: **BPZ:ASK33.1**

Larger mounting plate required to replace existing mounting plate when using actuators SQM33 or SQM4.

Refer to Mounting Instructions 74 319 0843 0 (M7646)



Note!

The screws required are included in the VKP40 basic package.



Mounting plate ASK33.2

Article no.: **BPZ:ASK33.2**

Additional mounting plate is required for mounting the actuator SQN13.

Refer to Mounting Instructions 74 319 0843 0 (M7646)



Note!

The screws required are included in the ASK33.2 package.



Mounting plate ASK33.3

Article no.: **BPZ:ASK33.3**

Larger mounting plate required to replace the existing mounting plate when mounting SQM5 actuators with AGA58.5

Refer to Mounting Instructions 74 319 0843 0 (M7646)



Note!

The screws required are included in the ASK33.3 package.



AGF10 flange to VKP40

- Order flanges individually
 - Flanges can be combined with the VKP40 as desired
- Refer to Mounting Instructions 74 319 0865 0 (M7631/M7646).

The following flange sizes and threads are available:

| Flange | | | | Nominal size (Rp) | Length in mm |
|--------------|----------|---------------|-----------|-------------------|--------------|
| Europe | | US / Canada | | | |
| Article no. | Type | Article no. | Type | | |
| BPZ:AGF10.15 | AGF10.15 | BPZ:AGF10.15U | AGF10.15U | ½" | 26 |
| BPZ:AGF10.20 | AGF10.20 | BPZ:AGF10.20U | AGF10.20U | ¾" | 26 |
| BPZ:AGF10.25 | AGF10.25 | BPZ:AGF10.25U | AGF10.25U | 1" | 26 |
| BPZ:AGF10.32 | AGF10.32 | BPZ:AGF10.32U | AGF10.32U | 1 ¼" | 26 |
| BPZ:AGF10.40 | AGF10.40 | BPZ:AGF10.40U | AGF10.40U | 1 ½" | 26 |
| BPZ:AGF10.50 | AGF10.50 | BPZ:AGF10.50U | AGF10.50U | 2" | 30 |

Note!

Scope of delivery:

- 1 O-ring
- 4 screws M8x27 (not required for assembly of the VKP40)
- 4 nuts M8
- 4 lock washers 8 mm dia.
- 1 Mounting Instructions



Double nipple

- Required for mounting the gas pressure switch QPL25
- Double nipple 1/8" to 1/4" (to be provided by supplied by thirds, if required)
- Gas pressure switch QPL15 can be mounted directly on the AGF10

Accessories (cont'd)

Fixing material

To fix the controlling element to a VGD2 double gas valve and to fit the flanges and secure the actuator, the VKP40 is supplied with the following material:

| Accessories | Number of | Size | Mounting location | Remarks | Type of package |
|--------------------------------|-----------|------------------------|----------------------------------|--|--|
| Hexagon socket screws | 4 | M5 x 16 | Mounting plate ASK33.1 | 3 screws for mounting the SQN72 4 screws for mounting the SQM33 or SQM4 | Supplied in a plastic bag inside the VKP40 basic package |
| | 3 | M5 x 40 | Mounting plate ASK33.1 | 3 screws for mounting the SQN30 | |
| Screws for mounting the flange | 4 | M8 x 95 | AGF10 flange and VGD2 attachment | For mounting on/attaching to VGD20 | |
| Spacer washers for M8 screws | 4 | To M8 (10 mm long) | Directly fixed to VGD2 | For screws M8, to be fitted under the head | |
| Stelvio plug connector | 2 | 1x CuF4/5 1x CuF5/5 | Plug connector for SQN72 | Not included in the scope of delivery of the SQN72 | |
| Double-O-ring | 1 | Ø 66.34 x 5.24 mm | Directly fixed to VGD2 | To be fitted between VGD2 and VKP40 | Individually in plastic bag |
| Mounting Instructions | 1 | A7 | --- | --- | Folded, immediately underneath cardboard cover |

Technical data

| | | |
|-----------------------------|------------------------------|---|
| General unit data | Types of gas | Gases of families I...III or air Max. 0.1% H ₂ S |
| | Operating pressure | Max. 70 kPa |
| | Mounting positions | Optional |
| | Leakage rate | Inside, in the fully closed position max. 0.7 m ³ /h / Δp 5 kPa |
| | Angular rotation | 90° |
| | CLOSED position to reopening | 0...-5° |
| | OPEN position to reclosing | 90...95° |
| | Mechanical stop | Optionally at approx. -5° / approx. 100° Factory mounted at -5° |
| | Weight | See <i>Dimensions</i> |
| | Internal volume | 106 cm ³ |
| | Material | Non ferrous metals |
| | Number of control cycles | 500,000 OPEN/CLOSED |
| Environmental conditions | Storage | DIN EN 60721-3-1 |
| | Climatic conditions | Class 1K3 |
| | Mechanical conditions | Class 1M2 |
| | Temperature range | -20...60 °C |
| | Humidity | <85% r.h. |
| | Transport | DIN EN 60 721-3-2 |
| | Climatic conditions | Class 2K3 |
| | Mechanical conditions | Class 2M2 |
| | Temperature range | -20...60 °C |
| | Humidity | <85% r.h. |
| | Operation | DIN EN 60 721-3-3 |
| | Climatic conditions | Class 3K3 |
| | Mechanical conditions | Class 3M2 |
| | Temperature range | -20...60 °C |
| | Humidity | <85% r.h. |
| | Installation altitude | Max. 2,000 m above sea level |



Caution!
Formation of ice and ingress of water are not permitted!

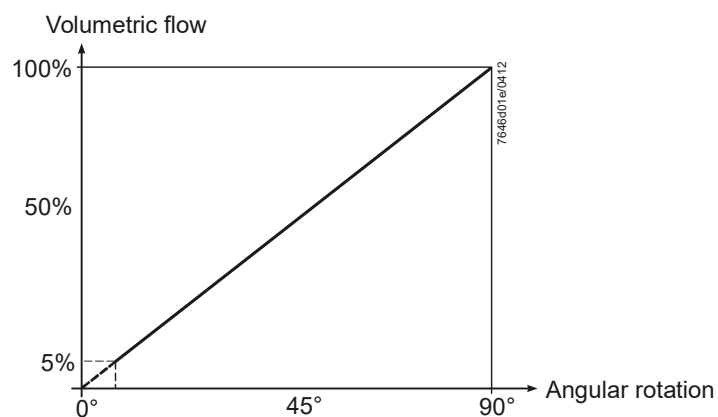
Flow chart

Positioning characteristic

The differential pressure Δp_{VKP} should be such that positioning characteristic will be as linear as possible.

Δp_{VKP} with rotation cylinder fully open (90°) = $0.2 \dots 0.4 \cdot \text{prepressure}$.

Idealized positioning characteristic:

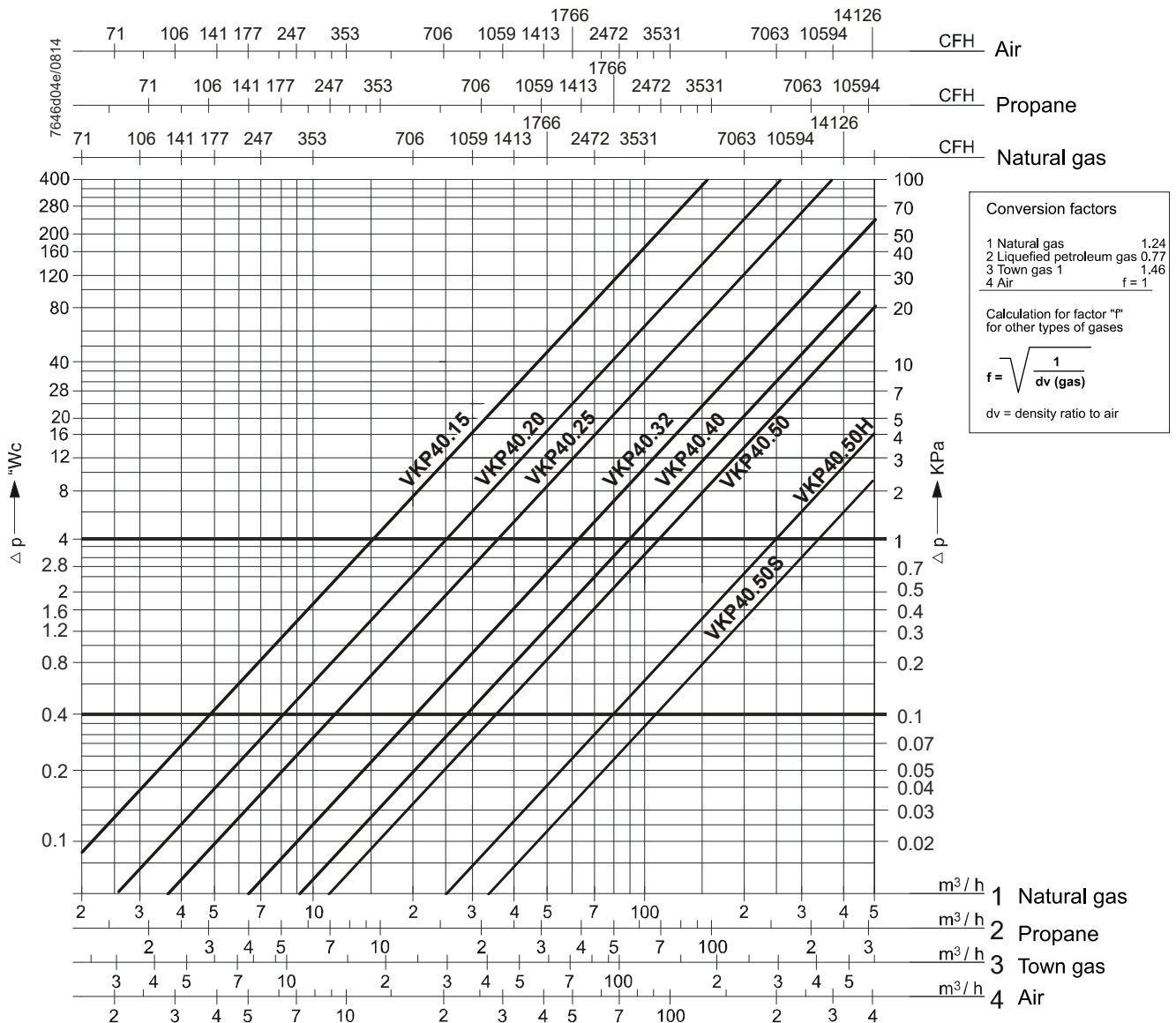


Flow characteristic with rotation cylinder fully open (90°):

| Product no. | Connection | Flanges fitted to both sides | Air-volumetric flow m ³ /h at Δp 1 kPa when fully open |
|-------------|------------|------------------------------|---|
| VKP40.15 | 1/2" | AGF10.15 | 11 |
| VKP40.20 | 3/4" | AGF10.20 | 20 |
| VKP40.25 | 1" | AGF10.25 | 28 |
| VKP40.32 | 1 1/4" | AGF10.32 | 50 |
| VKP40.40 | 1 1/2" | AGF10.40 | 69 |
| VKP40.50 | 2" | AGF10.50 | 88 |
| VKP40.50H | 2" | AGF10.50 | 200 |
| VKP40.50S | 2" | AGF10.50 | 270 |

Flow chart (cont'd)

Flow characteristic



Legend

— Maximum flow rates



Caution!

- If the gas pressure exceeds the maximum permissible operating pressure, reduce the gas pressure with a pressure controller
- The pressure drop (curves of maximum flow) is based on a fully open rotation cylinder

Conversion of air flow rate to a corresponding gas flow rate (natural gas):

Basis for scale

| Abscissa | Medium volumetric flow (QG) in m³/h | Density ratio (dv) to air | Conversion factor $f = \sqrt{\frac{1}{dv}}$ |
|----------|-------------------------------------|---------------------------|---|
| 1 | Air | 1 | 1 |
| 2 | Natural gas | 0.61 | 1.28 |
| 3 | Propane | 1.562 | 0.8 |
| 4 | Town gas | 0.46 | 1.47 |

Conversion to air (m³/h) from other types of gases:

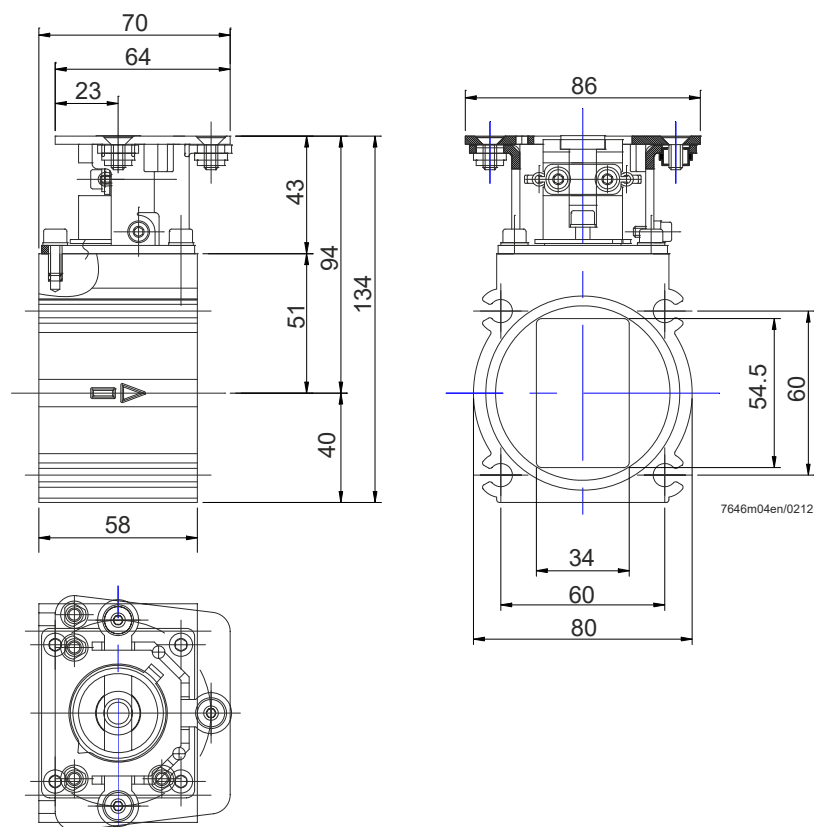
$$Q_L = \frac{Q_G}{f}$$

Q_L = air volume in m³/h that produces the same pressure drop as Q_G

Dimensions

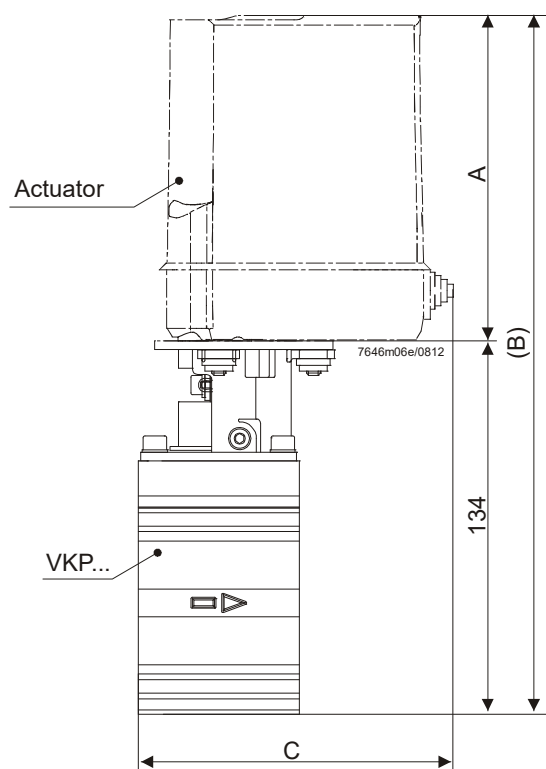
Dimensions in mm

VKP40



| Type | Weight [kg] |
|-----------|-------------|
| VKP40.15 | 1.2 |
| VKP40.20 | 1.2 |
| VKP40.25 | 1.2 |
| VKP40.32 | 1.2 |
| VKP40.40 | 1.2 |
| VKP40.50 | 1.2 |
| VKP40.50H | 1.2 |
| VKP40.50S | 1,2 |

VKP40 with actuator (Example shows illustration with SQN72)

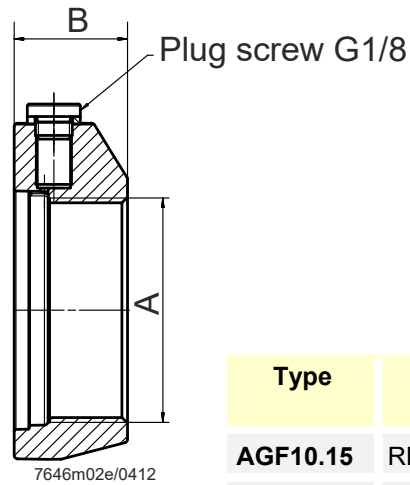
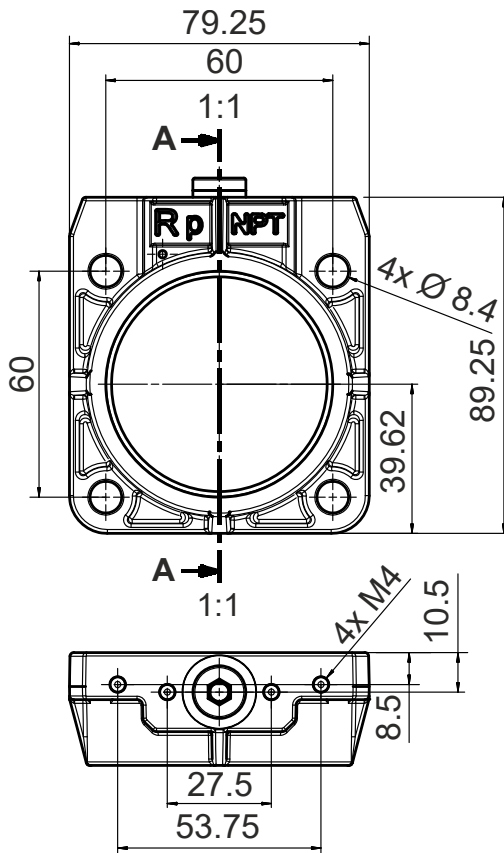


| Type | A | B | C approx. |
|-------------|------------------|------------------|-----------|
| SQN13... | 74 | 208 | 90 |
| SQN30... *) | 110 or 125 | 244 or 254 | 101 |
| SQN72 | 134 | 251 | 100 |
| SQM33... | 116 | 233 | 130 |
| SQM40... | 149 | 266 | 150 |
| SQM45... | 116 | 233 | 130 |
| SQM50... | 175 | 310 | 120 |

*) Depending on type

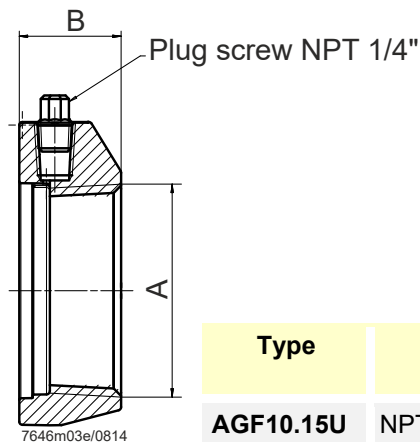
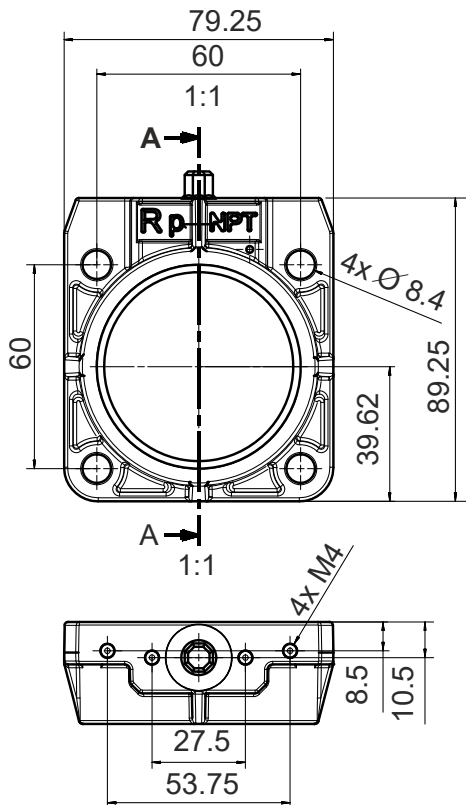
Dimensions in mm

AGF10 (Europe)



| Type | A | B [mm] | Total weight |
|----------|----------|--------|--------------|
| AGF10.15 | RP1/2" | 25 | 274 g |
| AGF10.20 | RP3/4" | 26 | 272 g |
| AGF10.25 | RP1" | 26 | 269 g |
| AGF10.32 | RP1 1/4" | 26 | 264 g |
| AGF10.40 | RP1 1/2" | 26 | 261 g |
| AGF10.50 | RP2" | 30 | 271 g |

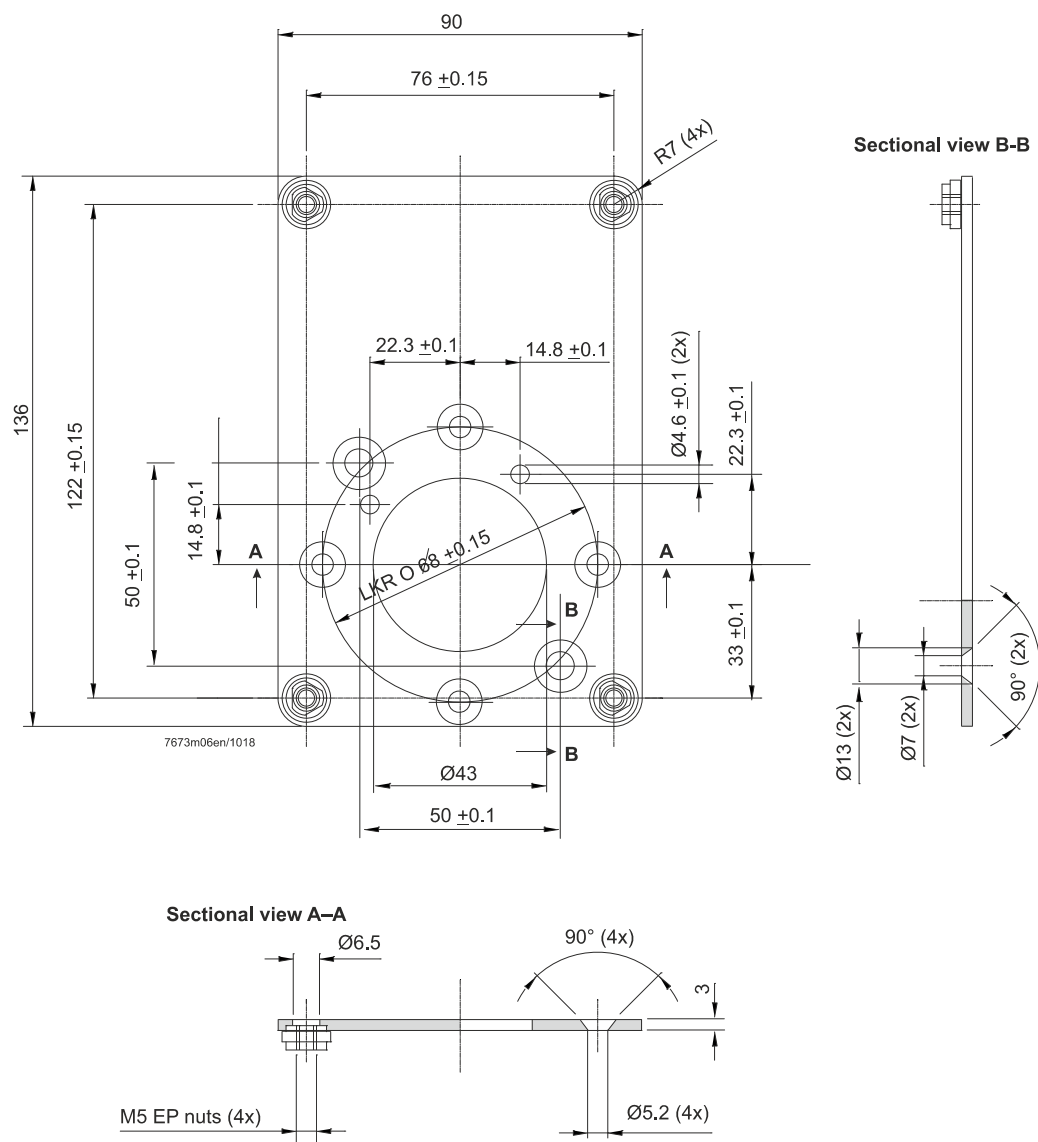
AGF10 (US)



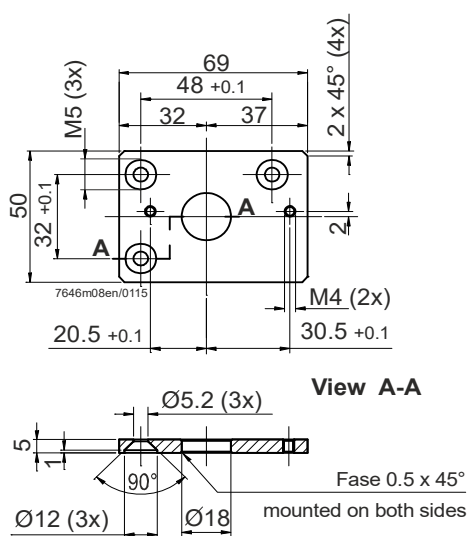
| Type | A | B [mm] | Total weight |
|-----------|-----------|--------|--------------|
| AGF10.15U | NPT1/2" | 25 | 274 g |
| AGF10.20U | NPT3/4" | 26 | 272 g |
| AGF10.25U | NPT1" | 26 | 269 g |
| AGF10.32U | NPT1 1/4" | 26 | 264 g |
| AGF10.40U | NPT1 1/2" | 26 | 261 g |
| AGF10.50U | NPT2" | 30 | 271 g |

Dimensions in mm

ASK33.1



ASK33.2



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Subject to change!

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ASK33.3

Technical drawing of a mechanical part, ASK33.3, showing a top view and two sectional views (A-A and B-B).

Top View Dimensions:

- Overall width: 120
- Overall height: 115
- Central hole diameter: $\text{LKR } \text{Ø}68 \pm 0.1$
- Distance from top edge to center line: 100 ± 0.15
- Distance from left edge to center line: 50 ± 0.1
- Distance from top edge to first hole center: 44.5
- Distance from center line to first hole center: 22.3 ± 0.1
- Distance from center line to second hole center: 14.8 ± 0.1
- Distance from bottom edge to first hole center: 55.5
- Distance from center line to second hole center: 14.8 ± 0.1
- Distance from right edge to first hole center: 7.5
- Distance from right edge to second hole center: 22.3 ± 0.1
- Distance from right edge to third hole center: 7.5
- Distance from right edge to fourth hole center: 22.3 ± 0.1
- Distance from right edge to fifth hole center: 7.5
- Distance from right edge to sixth hole center: 22.3 ± 0.1
- Distance from right edge to seventh hole center: 7.5
- Distance from right edge to eighth hole center: 22.3 ± 0.1
- Distance from right edge to ninth hole center: 7.5
- Distance from right edge to tenth hole center: 22.3 ± 0.1
- Distance from right edge to eleventh hole center: 7.5
- Distance from right edge to twelfth hole center: 22.3 ± 0.1

Sectional view A-A:

- Section line A-A
- Angle: 90°
- Chamfer: 45°
- Material: 7673m07en/1018

Sectional view B-B:

- Section line B-B
- Angle: 90°
- Chamfer: 45°
- Material: 7673m07en/1018

Material: 7673m07en/1018