



## Double valves for biogases and recycling gases

VRD4...

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- Valve (class A) for installation in gas trains
  - Safety shutoff valves in connection with actuators (conforming to EN 161)
  - Suited for use with slightly aggressive biogases and recycling gases and for air
  - Valves in connection with actuators open slowly and close rapidly
  - 2-port valves with flange connection of the normally closed type
  - DN40...DN150
  - Driven by actuator type SKP..., SKL... or SAX31...
  - Supplementary Data Sheet on actuators (see Mechanical Design)

The VRD4... and this Data Sheet are intended for use by OEMs which integrate the valves in their products.

- Functionally, the valves correspond to Siemens gas valves in accordance with EN 161. They are also designed for use with slightly aggressive and dry gases
- For maximum 60 °C
  - Gases to G262 like:  
Biogases, waste gases, digester gases, other recycling gases, process gases and air
  - The valves are designed for special use (processes) in industrial companies.

The valve is used as:

- Shutoff valve (in connection with SKP1...)
- Control valve with shutoff function (in connection with SKP2..., SKP5... or SKP7...)  
SKP... with pressure regulation function (SKP2..., SKP5... and SKP7...) must be looked at in consultation with Siemens with regard to suitability for use with the relevant type of recycling gases.

The chemical composition and aggressiveness of each type of biogas or recycling gas is different, not constant and depends on several factors.

Aggressiveness of the gas augments especially

- as the hydrogen sulfide content H<sub>2</sub>S increases
- as the moisture content of the gas increases. Condensation in the valve is not permitted.

The user must decide after consultation with Siemens whether the valve materials are suited for the relevant type of recycling gas.

The composition of the gases and the concentration of the components may vary.

It is therefore impossible to give a guarantee for any information provided regarding life expectancy.

An assessment should be carried out to determine the suitability of the gas used

For safety reasons, we strongly recommend to

- install a valve proving device
- visually inspect the valves at 6- to 12-month intervals
- the used of SKPx5... with valve closure contact

All types of valves can be combined with any of these actuators.

## Warning notes



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

- Do not open, interfere with or modify the valves
- All activities (mounting, installation and service work, etc.) must be performed by qualified staff. If this is not observed, there is a risk of loss of safety functions
- In connection with SAX31... or SKL... actuators, the valves must **not** be used as safety devices. No closing in accordance with EN 161 takes place
- Fall or shock can adversely affect the safety functions. Such valves must not be put into operation, even if they do not exhibit any damage
- Not suitable gases or gas components causes loss of the safety shutoff function
- It may not join contaminant / particles in the valve, because that could adversely affect the safety shutoff function
- Gases with concentrations >1% for H<sub>2</sub>S and NH<sub>3</sub> and condensation are not permitted. If not observed, there is a risk of impairment of safety functions

## Mounting notes

- Ensure that the relevant national safety regulations are complied with
- The actuator can be mounted or replaced while the valve is under gas pressure
- Refer also following Mounting Instructions:

AGA66	M7643.2	74 319 0421 0
VRD4...	M7631.1	74 319 0244 0

### Sealing/tightness

- Check to make certain that the bolts of the flanges are properly tightened and afterwards check to ensure that the valve is tight when all components are connected
- Check to ensure that the gaskets between the flanges and the valve must be fitted
- Recommendation when exposed to humidity from outside: Gasket kit AGA66 (IP65 kit)

### Mounting position

The permissible mounting positions of the used actuator must be observed, (refer to the relevant Data Sheet).

### Direction of flow

The direction of gas flow must be in accordance with the direction of the arrow on the valve body.

### Function

The inactive valve is closed and opens when the actuator opens.  
It is recommended to install a SKPx5.xxx1xx to report the CLOSED position of the valve.

## Standards and certificates



Conformity to EEC directives  
- Directive for pressure devices

97/23/EEC



ISO 9001: 2008  
Cert. 00739



ISO 14001: 2004  
Cert. 38233

## Service notes

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- Each time a valve has been replaced, check to ensure that the valve operates correctly as well as the internal and external tightness
- Siemens valves may only be repaired by Siemens Repair Centers

## Life cycle

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The combination valve and actuator have a designed lifetime\* of 100,000 burner startup cycles which, under use of gases to EN 437 (or specification G260).

This lifetime is based on the endurance tests in the standard EN 161. A summary of the conditions has been published by the European Control Manufacturers Association (Afecor) ([www.afecor.org](http://www.afecor.org)).

The designed lifetime is based on use of the valve and actuator according to the manufacturer's Data Sheet. After reaching the designed lifetime in terms of the number of burner startup cycles, or the respective time of usage, the valve and actuator are to be replaced by authorized personnel.

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

The use of gases outside of EN 437 / G260, such as G262, may lead to a limited life cycle.

## Disposal notes

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Local and currently valid legislation must be observed.

## Mechanical design

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### VRD4...

The valves are in connection with actuator normally closed.

### Strainer

A strainer made of stainless steel is fitted in the valve's inlet and protects the valve, the seat and flap as well as downstream devices against dirt.

### Actuators

The valves can be combined with the following types of actuators:

- SKP15... (refer to Data Sheet N7643)
- Other actuators (SKP2..., SKP5... and SKP7...) following tests on gas suitability



#### Note!

Option for all SKPx5.xx1xx with valve closing contact to report the CLOSED position of the valve.

## Type summary (other types of valves on request)

DN (mm)	Type reference	Perm. operating pressure kPa	Air flow rate m <sup>3</sup> /h at $\Delta p = 1$ kPa	Number of test points Rp ¼ <sup>1)</sup>	Number of pilot gas connections G ¼ <sup>2)</sup>
40	VRD40.040	100	85	3	1
50	VRD40.050	100	100	3	1
65	VRD40.065	70	160	3	1
80	VRD40.080	70	250	3	1
100	VRD40.100	70	400	3	1
125	VRD40.125	70	630	3	1
150	VRD40.150	70	800	3	1

<sup>1)</sup> Both sides, inlet and outlet side

<sup>2)</sup> Inlet side

## Ordering

When ordering, please give complete valve type reference.  
Actuator and valve are supplied as single packs.

### Example:

- 1 VRD40.080 (double flange valve DN80 for biogas)
- 2 SKP15.000E2 (actuator OPEN/CLOSED)

## Accessories



- Pilot gas connecting plate** for VRD4...  
- Spare part (kit incl. grommet and gaskets)  
- See Mounting Instruction M7631.1 (4 319 2142 0)

**AGA40.40**



- Pressure switch connecting plate** for VRD4...  
- Spare part (kit incl. grommet and gaskets)  
- See Mounting Instruction M7631.1 (4 319 2142 0)

**AGA40.41**



- Manual adjuster**

**AGA61**



- Adapter** for actuators SAX31.....  
Consisting of 2 stem parts and one connecting flange.

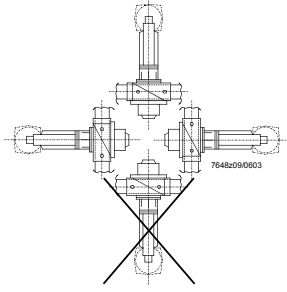
**AGA60**



- Gasket kit** to SKP.../SKL25...  
- Between actuator SKP.../SKL25... and valve VRD4...  
- For increasing of degree of protection from IP54 up to IP65  
- Refer to Mounting Instruction M7643.2 (74 319 0421 0)  
- recommended for installation in humid environments

**AGA66**

## Technical data

General unit data	Valve class in connection with actuator	A conforming to EN 161 (except with SAX31.../SKL...)
	Group	2 (EN161)
	Perm. medium temperature	0...60 °C
	Weight	See Dimensions
	Connecting flanges	PN16 to ISO 7005-2
	Required flow rate	See Flow chart
	Perm. mounting position	
		See Mounting notes
	Operating pressure	See Type summary
	Types of gases	Suitable for biogases and recycling gases - up to maximum 1 vol.% H <sub>2</sub> S, dry - up to maximum 1 vol.% NH <sub>3</sub> , dry  Nonferrous (except in extremely small quantities bound in plastic components)  For more information see <i>Use</i> .
Strainer	Built-in, mesh size 0.9 mm	
Environmental conditions	<b>Storage</b>	DIN EN 60721-3-1
	Climatic conditions	Class 1K3
	Mechanical conditions	Class 1M2
	Temperature range	-20...+60 °C
	Humidity	<95% r.h.
	<b>Transport</b>	DIN EN 60721-3-2
	Climatic conditions	Class 2K2
	Mechanical conditions	Class 2M2
	Temperature range	-15...+60 °C
	Humidity	<95% r.h.
	<b>Operation</b>	DIN EN 60721-3-3
	Climatic conditions	Class 3K5
Mechanical conditions	Class 3M2	
Temperature range	-10...+60 °C	
Humidity	<95% r.h.	



### Warning!

Condensation in the valve is not permitted!

If this is not observed, there is a risk of loss of safety functions.

## Technical data (cont'd)

Permissible gas pressures / volumes

Type reference	Static pressure (perm. inlet pressure with double gas valve fully closed) kPa	Dynamic pressure (perm. operating pressure) kPa	Volume between V1/V2 (liters)
VRD40.040	150	100 (70)*	0.8
VRD40.050	150	100 (70)*	0.8
VRD40.065	150	70	1.3
VRD40.080	150	70	1.5
VRD40.100	150	70	3
VRD40.125	150	70	5.2
VRD40.150	150	70	8.7

\* Only for use in Australia

VRD4...

The valves are designed to withstand gas pressures up to 150 kPa in burner standby mode. At a pressure of 150 kPa, the valve remains safely shut or will safely close when shutdown is initiated by an upstream pressure signal. Proper functioning and outer tightness will not be affected.

Note

Owing to the internal design of the valves, increasing inlet pressure causes the valve to close (class «A» conforming to EN 161).

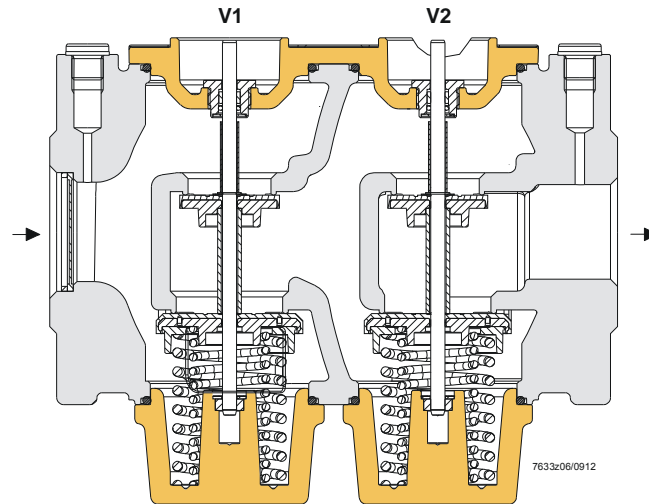
This means that safety shutoff or venting devices that – in addition to the high-pressure regulator – are normally used for protecting the gas valve on the burner are no longer required if the following conditions are satisfied:

- If, in the event the high-pressure regulator upstream of the valve fails, 150 kPa at the inlet of the valve are not exceeded and,
- in the event the permissible pressure of the valve is exceeded (DN 65...150: 70 kPa or DN 40...50: 100 kPa) a shutoff device (e.g. gas pressure switch) causes the valve to close.

## Function

VRD4...

Sectional view of VRD4... valve



Closing springs

Each double seat uses one pair of springs. The spring forces act separately as closing forces on the individual valve seats.

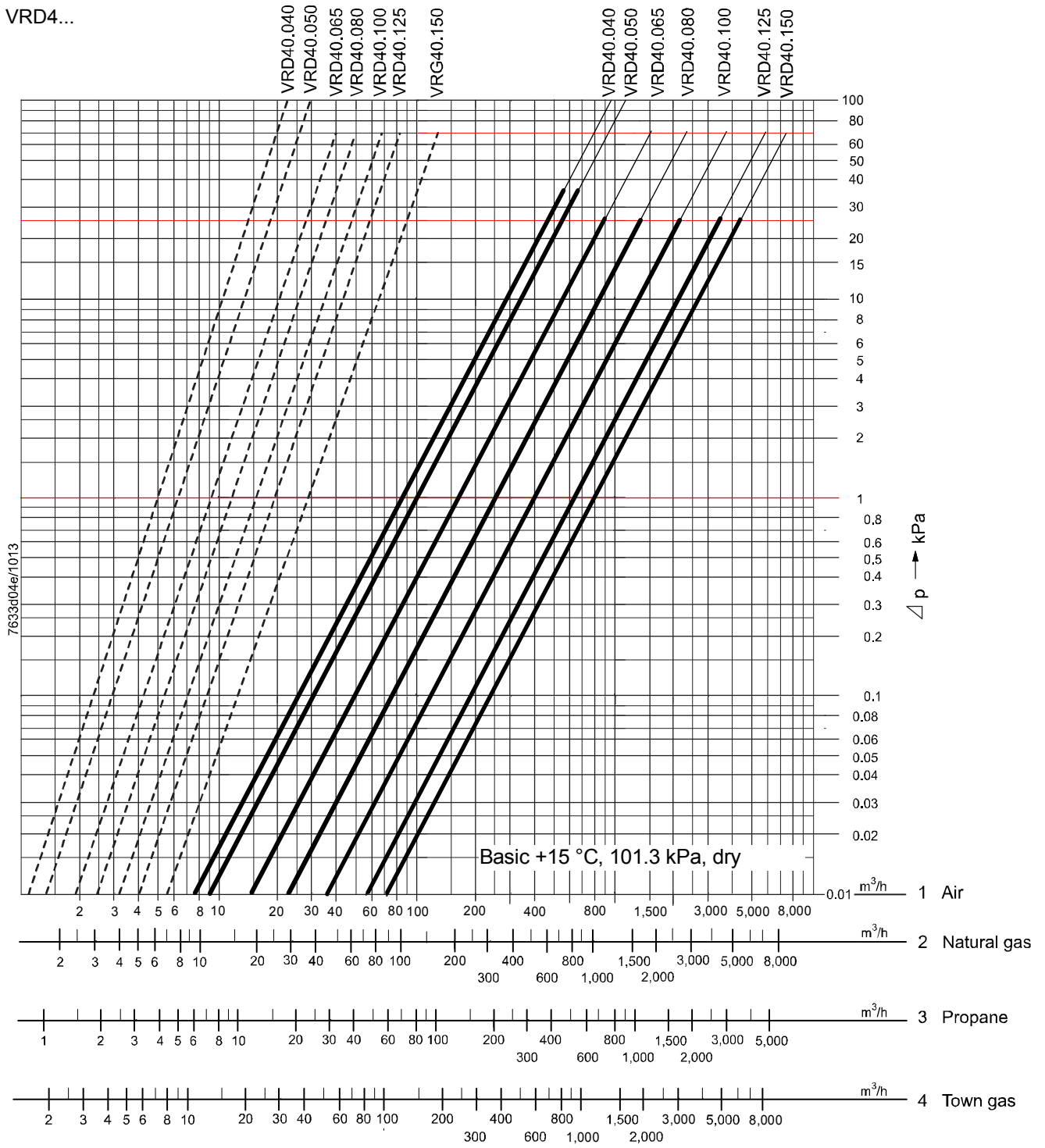
Application example

VRD40.080 with SKP15... (mounted on valve **V1** and **V2**).



**Flow chart (only for fully open valves)**

VRD4...



Legend

— Line of maximum flow (valve fully open)

## Flow chart (only for fully open valves) (cont'd)

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Determination of pressure drop for gases with a density ratio **dv** other than that of the chart scales above:

Required variables      p(gas)      Gas density in kg/m<sup>3</sup>  
                                 V(gas)      Gas volume in m<sup>3</sup>/h

Procedure                    – Calculate the gas density ratio [dv(gas)]:

$$dv(\text{gas}) = \frac{\text{Density (gas) in kg/m}^3}{1.22 \text{ kg/m}^3 \text{ (= density of air)}}$$

– Determine the air volume [V(air)] that produces the same pressure drop  $\Delta p$  as gas volume [V(gas)]

$$V(\text{air}) = \frac{V(\text{gas) in m}^3/\text{h}}{\sqrt{dv(\text{gas})}}$$

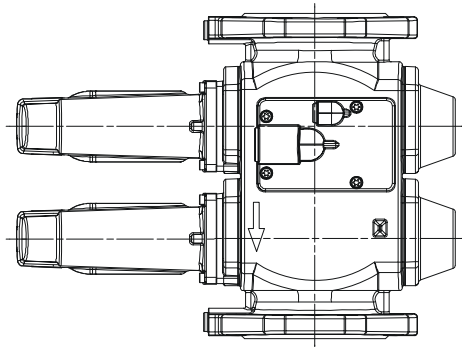
– Determine the gas pressure drop  $\Delta p$  with the help of the flow chart, based on the calculated volume of air [V(air)] of the chart scale.

Practical experience shows that applications outside the range confined by the bold characteristics could produce significant noise

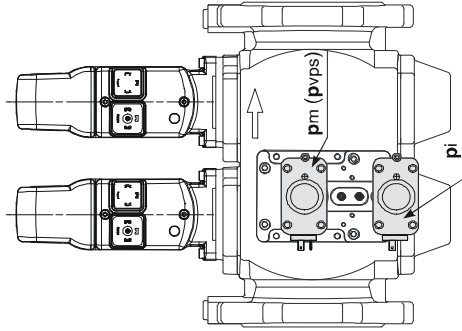
### Attention!



- **When used in connection with burners having a small low-fire rate, the selected nominal valve size should not be too large (refer to Data Sheet on actuators).**
- **If the available gas pressure exceeds the maximum permissible operating pressure, lower it with a pressure controller fitted upstream of the valve.**
- **The pressure drop (lines of maximum flow) is based on a fully open valve.**

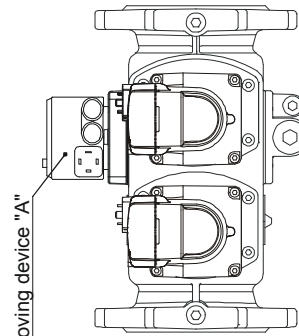


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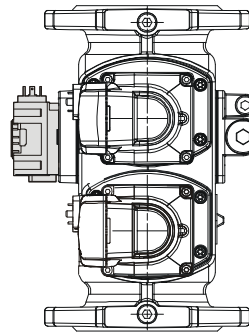
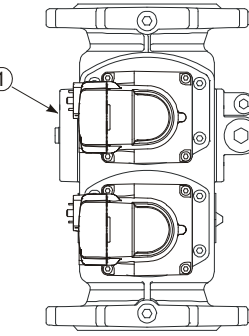
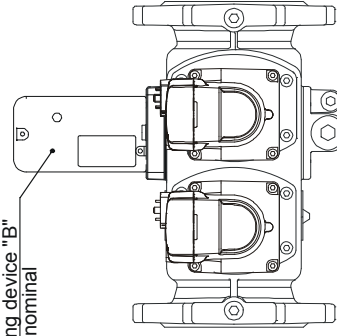
**Ancillary unit options** (use of different types of valve proving systems on request):

Valve proving device "A" and pressure switch (PI)



Valve proving device "A"

Valve proving device "B"  
(only up to nominal size 100)



(Some of the ancillary units are not component of the Siemens product range)

Pressure switch plate ① facilitates attachment of a number of commercially available pressure switches or valve proving devices.  
Pilot gas flange ② and pressure switch plate can be fitted on either side of the valve.

## Dimensions

(not to scale)

VRD4...

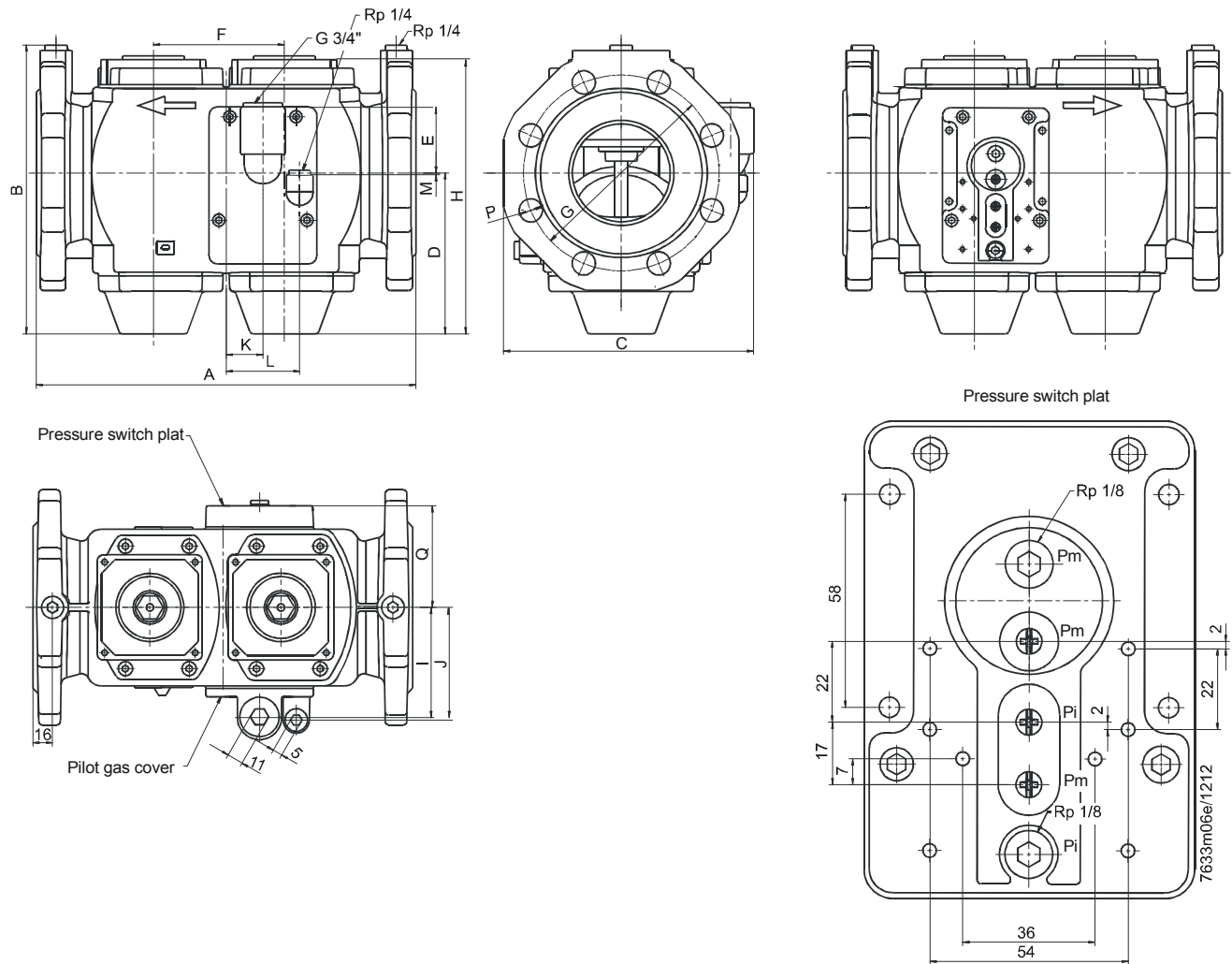


Table of dimensions

Type	DN <sup>1)</sup>	A	B	C	D	E	F	G	H	I	J	K	L	M	P	Q	R	kg
<b>VRD40.040</b>	40	240	195	168	115	58	88	110	194	77	79	20	50	2	19	70	4	7.0
<b>VRD40.050</b>	50	240	202	174	115	58	88	125	194	77	79	20	50	2	19	70	4	7.2
<b>VRD40.065</b>	65	290	215	194	118	60	102	145	200	87	90	30	60	4	19	81	4	8.4
<b>VRD40.080</b>	80	310	236	204	132	54	107	160	224	90	92	30	60	2	19	88	8	9.6
<b>VRD40.100</b>	100	350	259	227	145	43	131	180	255	105	108	41	71	13	19	99	8	12.9
<b>VRD40.125</b>	125	400	305	255	175	31	150	210	303	119	122	41	71	25	19	113	8	18.2
<b>VRD40.150</b>	150	480	335	293	188	20	168	240	333	140	143	39	69	36	23	134	8	24.1

- 1) Flanges to ISO 7005-2
- DN Nominal width, dimension connection of medium)
- R Number of boreholes in the flange