

## Operating instructions

### Pressure switches for gas

#### DG..H, DG..N

#### Pressure switch for gas DG..I



Cert. version 11.17

## Contents

### Pressure switches for gas

#### DG..H, DG..N

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## Safety

### Please read and keep in a safe place



Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at [www.docuthek.com](http://www.docuthek.com).

### Explanation of symbols

■, 1, 2, 3... = Action

▷ = Instruction

### Liability

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

### Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

#### ⚠ DANGER

Indicates potentially fatal situations.

#### ⚠ WARNING

Indicates possible danger to life and limb.

#### ! CAUTION

Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

### Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts.

## Changes to edition 07.17

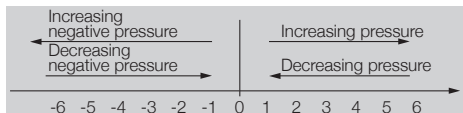
The following chapters have been changed:

- Installation
- Technical data
- Declaration of conformity

## Checking the usage

### DG..H, DG..N, DG..I

For monitoring increasing and decreasing gas or air pressure.



	Positive pressure	Negative pressure
DG..H, DG..N	Gas, air, flue gas	Air, flue gas
DG..I	Air, flue gas	Gas, air, flue gas

DG..H switches and locks off with rising pressure, DG..N switches and locks off with falling pressure. They can be unlocked using the manual reset.

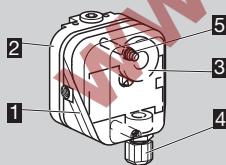
This function is only guaranteed when used within the specified limits – see page 7 (Technical data).

Any other use is considered as non-compliant.

### Type code

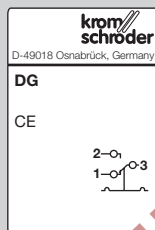
Code	Description
<b>DG</b>	Pressure switch for gas
<b>1,5 – 500</b>	Max. setting in mbar
<b>H</b>	Locks off with rising pressure
<b>N</b>	Locks off with falling pressure
<b>I</b>	Negative pressure for gas
<b>G</b>	With gold-plated contacts
	Electrical connection
<b>-3</b>	via screw terminals
<b>-4</b>	via screw terminals, IP 65
<b>-5</b>	4-pin plug, without socket
<b>-6</b>	4-pin plug, with socket
<b>-9</b>	4-pin plug, with socket, IP 65
<b>K2</b>	Red/green pilot LED for 24 V DC/AC
<b>T</b>	Blue pilot lamp for 230 V AC
<b>T2</b>	Red/green pilot LED for 230 V AC
<b>N</b>	Blue pilot lamp for 120 V AC
<b>A</b>	External adjustment

### Part designations



- 1** Upper housing section with cover
- 2** Lower housing section
- 3** Hand wheel
- 4** M16 cable gland
- 5** DG..H, DG..N with manual reset

## Type label



Max. inlet pressure  $p_{max}$  = withstand pressure, mains voltage, ambient temperature, enclosure: see type label.

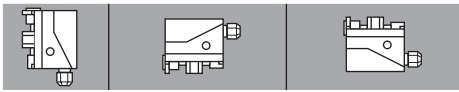
## Installation

### ! CAUTION

Please observe the following to ensure that the DG is not damaged during installation and operation:

- Continuous operation with gases containing more than 0.1 %-by-vol.  $H_2S$  or ozone concentrations exceeding  $200 \mu g/m^3$  accelerate the ageing of elastomer materials and reduce the service life.
- Dropping the device can cause permanent damage. In this event, replace the entire device and associated modules before use.
- Use approved sealing material only.
- Check max. ambient temperature – see page 7 (Technical data).
- When using silicone tubes, only use silicone tubes which have been sufficiently cured.
- Vapours containing silicone can adversely affect the functioning of electrical contacts.
- Condensation must not be allowed to get into the housing. At subzero temperatures malfunctions/failures due to icing can occur.
- When installing outdoors, place the DG in a roofed area and protect from direct sunlight (even IP 65 version). To avoid condensation, a cover with pressure equalization element (see page 6 (Pressure equalization element)) can be used.
- Avoid strong impact on the unit.
- In case of highly fluctuating pressures, install a restrictor orifice (see page 6 (Restrictor orifice)).

- ▷ The DG must not be in contact with masonry. Minimum clearance 20 mm.
- ▷ Ensure that there is sufficient installation space.
- ▷ Ensure unobstructed view of the hand wheel.
- ▷ Installation position as required, preferably with vertical diaphragm. Then the switching point  $p_S$  corresponds to the scale value SK set on the hand wheel. In other installation positions, the switching point  $p_S$  will change and no longer correspond to the scale value SK set on the hand wheel. Check the switching point.



DG..H, DG..N

$p_S = SK$  |  $p_S = SK + 0.18 \text{ mbar}$  |  $p_S = SK - 0.18 \text{ mbar}$

DG 1,5I

$p_S = SK$	$p_S = SK + 0.4 \text{ mbar}$ e.g. $SK = 1.2$ : $p_S = 1.2 + 0.4 = 1.6 \text{ mbar}$	
	e.g. $SK = -1.2$ : $p_S = -1.2 + 0.4 = -0.8 \text{ mbar}$	

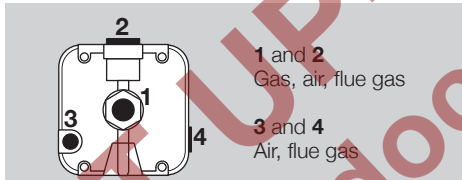
DG 12I

$p_S = SK$	$p_S = SK + 0.5 \text{ mbar}$ e.g. $SK = 5$ : $p_S = 5 + 0.5 = 5.5 \text{ mbar}$	
	e.g. $SK = -10$ : $p_S = -10 + 0.5 = -9.5 \text{ mbar}$	

DG 18I, DG 120I, DG 450I

$p_S = SK$	DG 18I: $p_S = SK + 0.5 \text{ mbar}$ e.g. $SK = -10$ : $p_S = -10 + 0.5 = -9.5 \text{ mbar}$	
	DG 120I, DG 450I: $p_S = SK + 0.2 \text{ mbar}$	

## Connection facilities



- ▷ Ports **3** and **4** are suitable for air and flue gas only.
- ▷ If the electrical contacts in the DG could be soiled by dirt particles in the surrounding air or in the medium, use a filter pad (see page 6 (Filter pad set)) at port **3/4**. On IP 65 units, the filter pad is fitted as standard, see type label.

**1** Disconnect the system from the electrical power supply.

**2** Shut off the gas supply.

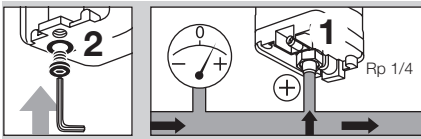
**3** Ensure that the pipeline is clean.

**4** Purge the pipe.

## Installing DG..H, DG..N

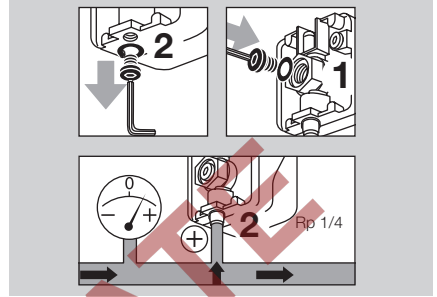
### Positive pressure measurement at port 1

**5** Seal port **2**.



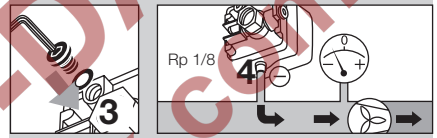
### Positive pressure measurement at port 2

**5** Seal port **1**.



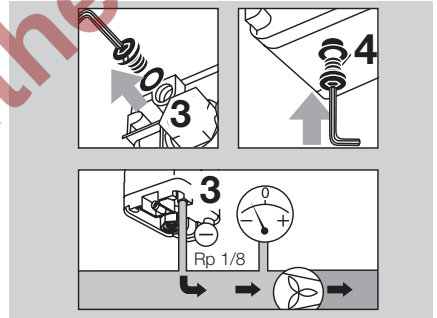
### Negative pressure measurement at port 4

**5** Seal port **3**.



### Negative pressure measurement at port 3

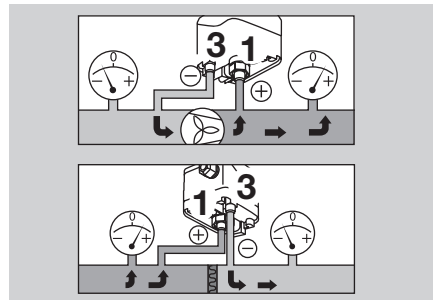
**5** Seal port **4**.



## Differential pressure measurement

- ▷ Use port **1** or **2** for the higher absolute pressure and port **3** or **4** for the lower absolute pressure.

**5** Seal the remaining ports.

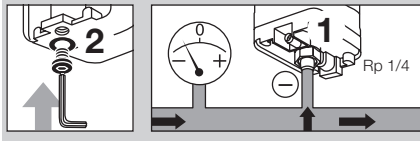


## Installing DG..I

- ▷ It is recommended that the port which is best protected from dirt and water be left open.

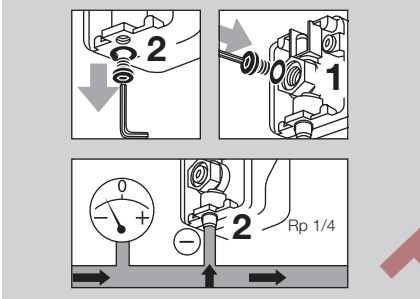
## Negative pressure measurement at port 1

- 5 Seal port 2.



## Negative pressure measurement at port 2

- 5 Seal port 1.



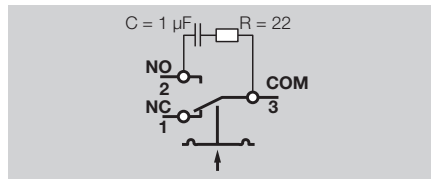
## Wiring

- ▷ If the DG..G has switched a voltage  $> 24\text{ V}$  and a current  $> 0.1\text{ A}$  at  $\cos \varphi = 1$  or  $> 0.05\text{ A}$  at  $\cos \varphi = 0.6$  once, the gold plating on the contacts will have been burnt through. It can then only be operated at this power rating or higher power rating.
- ▷ Pressure switch DG can be used in Zone 1 (21) and 2 (22) hazardous areas if an isolating amplifier is installed upstream in the safe area as "Ex-i" equipment pursuant to EN 60079-11 (VDE 0170-7):2012.
- ▷ DG as "simple electrical equipment" pursuant to EN 60079-11:2012 corresponds to the Temperature class T6, Group II. The internal inductance/capacitance is  $L_I = 0.2\text{ }\mu\text{H/Ci} = 8\text{ pF}$ .

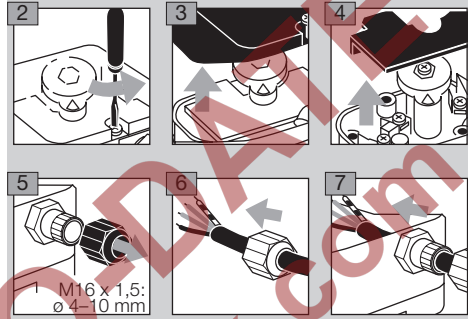
## ! CAUTION

To ensure that the DG is not damaged during operation, note the switching capacity, see page 7 (Technical data).

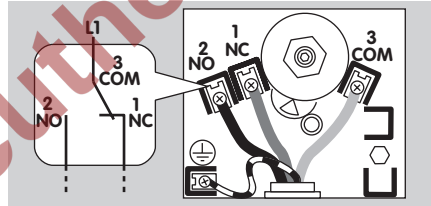
- ▷ In the case of low switching capacities, such as  $24\text{ V}$ ,  $8\text{ mA}$ , for example, we recommend using an RC module ( $22\text{ }\Omega$ ,  $1\text{ }\mu\text{F}$ ) in air containing silicone or oil.



- 1 Disconnect the system from the electrical power supply.

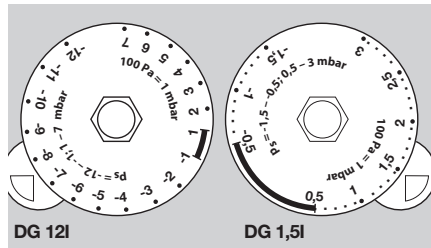


- ▷ Contacts 3 and 2 close when subject to increasing pressure. Contacts 1 and 3 close when subject to falling pressure.

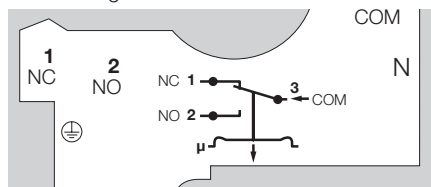


## DG 1,5I and DG 12I

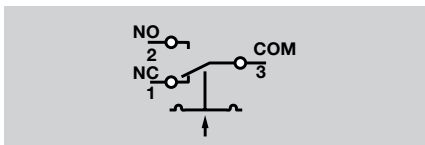
- ▷ The connection of DG 1,5I and DG 12I depends on the positive or negative adjusting range.



- ▷ In the negative adjusting range, the template which can be found in the unit displays the connection diagram.



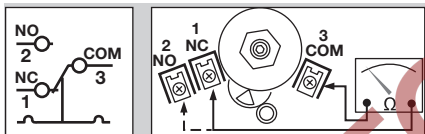
- ▷ In the positive adjusting range, remove the template and wire the unit as shown in the engraved connection diagram.



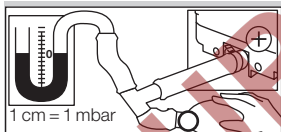
## Adjustment

- ▷ The switching point is adjustable via hand wheel.

- 1 Disconnect the system from the electrical power supply.
- 2 Detach the housing cover, see page 7 (Technical data).
- 3 Connect an ohmmeter.



- 4 Set the switching point using the hand wheel.
- 5 Connect a pressure gauge.



- 6 Apply pressure. In doing so, monitor the switching point on the ohmmeter and the pressure gauge.

Type	Adjusting range* [mbar]	Reset pressure** [mbar]	Max. inlet pressure $p_{\max}$ [mbar]
DG 10H, DG 10N	1–10	0.4–1	600
DG 50H, DG 50N	2.5–50	1–2	
DG 150H, DG 150N	30–150	2–5	
DG 500H, DG 500N	100–500	4–17	

Type	Adjusting range* [mbar]	Switching differential*** [mbar]	Max. inlet pressure $p_{\max}$ [mbar]
DG 1,5l	-1.5 to -0.5 and +0.5 to +3	0.2–0.5	±100
DG 12l	-12 to -1 and +1 to +7	0.5–1	±100
DG 18l	-2 to -18	0.5–1.5	±100
DG 120l	-10 to -120	4–11	±600
DG 450l	-80 to -450	10–30	±600

\* Adjusting tolerance = ± 15% of the scale value.

\*\* Difference between switching pressure and possible reset.

\*\*\* Mean switching differential at min. and max. setting.

- ▷ Deviation from the switching point during testing pursuant to EN 1854:

Gas pressure switches: ± 15%.

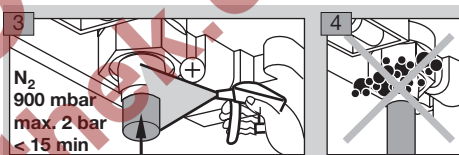
Air pressure switches:

	Deviation
DG..H, ..N, ..l	± 15%
DG 1,5l	± 15% or ± 0.4 mbar
DG 12l	± 15% or ± 0.5 mbar
DG 18l	± 15% or ± 0.5 mbar

- ▷ If the DG does not trip at the desired switching point, correct the adjusting range using the hand wheel. Relieve the pressure and repeat the process.

## Tightness test

- 1 Shut off the downstream gas pipeline close to the valve.
- 2 Open the valve and the gas supply.
- ▷ Check all used ports for tightness.



## Maintenance

In order to ensure smooth operation: check the tightness and function of the DG every year, or every six months if operated with biogas.

- ▷ A function check can be carried out in case of decreasing pressure control e.g. with the PIA.
- ▷ After carrying out the maintenance work, check for tightness, see page 5 (Tightness test).

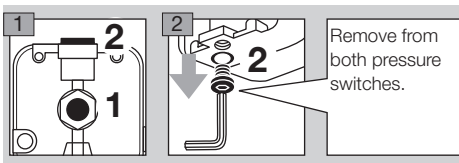
## Accessories

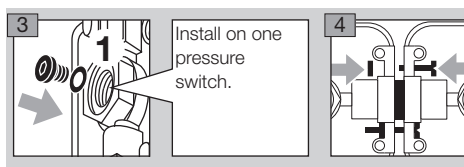
### Connecting set

For monitoring a minimum and maximum inlet pressure  $p_u$  with two pressure switches attached to one another.



Order No.: 74912250





### Filter pad set

To protect the electrical contacts in the DG from dirt particles in the surrounding air or in the medium, use a filter pad at the 1/8" negative pressure port. As standard on IP 65 units.

5-piece filter pad set, Order No.: 74916199

### Weather protection cover

Protection against condensation and weathering. Order No.: 74924909.

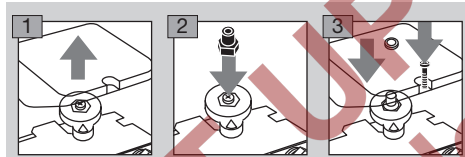
Further information can be found in Technical Information bulletin DG (D, GB, F) – [www.docuthek.com](http://www.docuthek.com).

### External adjustment

In order to set the switching pressure from the outside, the cover for external adjustment (6 mm Allen key) for DG..I can be retrofitted.

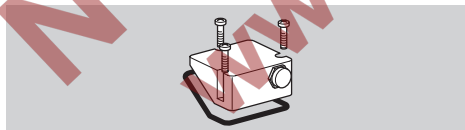


Order No.: 74916155



### Pressure equalization element

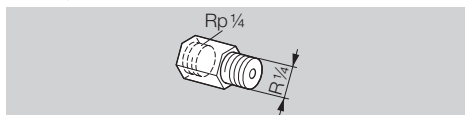
To avoid the formation of condensation, the cover with pressure equalization element can be used. The diaphragm in the screw connector is designed to ventilate the cover, without allowing water to enter.



Order No.: 74923391

### Restrictor orifice

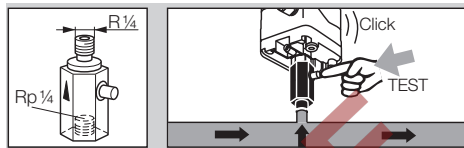
In the case of high pressure fluctuations, we recommend using a restrictor orifice (contains non-ferrous metals).



Hole diameter 0.2 mm, Order No.: 75456321,  
hole diameter 0.3 mm, Order No.: 75441317.

### Test key PIA

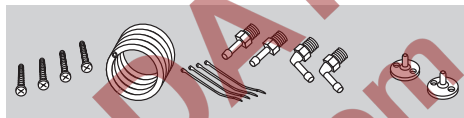
To test the min. pressure switch, the DG can be vented in its switched state using the PIA test key (contains non-ferrous metals).



Order No.: 74329466

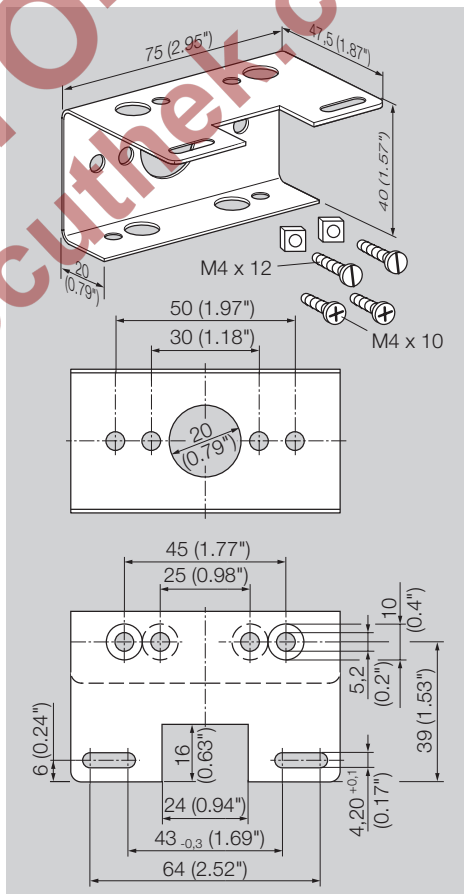
### Tube set

To be used with air only.



Order No.: 74912952

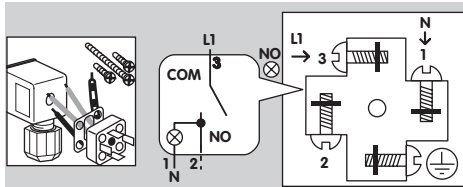
### Fastening set with screws, U-shape bracket



Order No.: 74915387

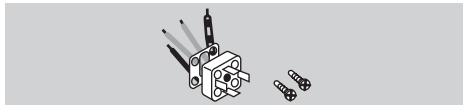


## Standard socket set



Order No.: 74915388

## Standard coupler plug



Order No.: 74920412

## Pilot lamp set, red or blue



Pilot lamp, red:

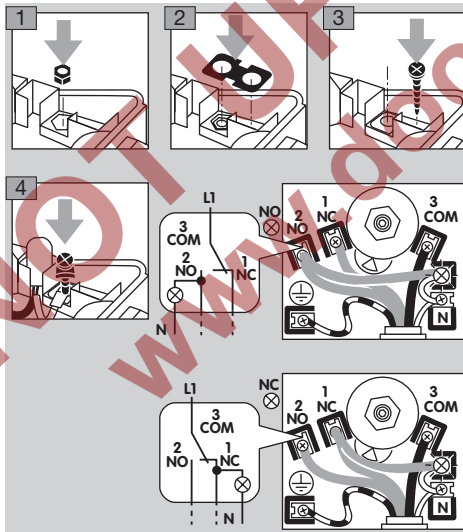
110/120 V AC,  $I = 1.2$  mA, Order No.: 74920430;

220/250 V AC,  $I = 0.6$  mA, Order No.: 74920429.

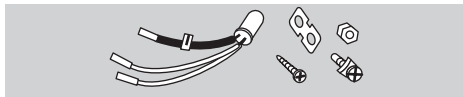
Pilot lamp, blue:

110/120 V AC,  $I = 1.2$  mA, Order No.: 74916121;

220/250 V AC,  $I = 0.6$  mA, Order No.: 74916122.



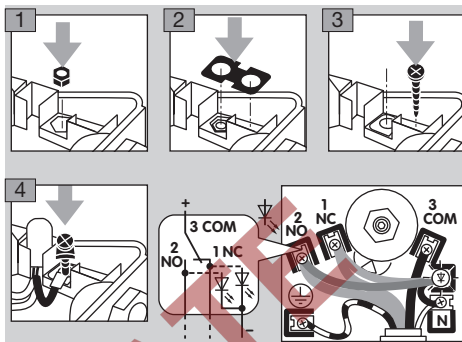
## LED set, red/green



24 V DC,  $I = 16$  mA; 24 V AC,  $I = 8$  mA,

Order No.: 74921089;

230 V AC,  $I = 0.6$  mA, Order No.: 74923275.



## Technical data

Gas type: natural gas, town gas, LPG (gaseous),  
flue gas, biogas (max. 0.1 %-by-vol.  $H_2S$ ) and air.  
Max. inlet pressure  $p_{max}$  = withstand pressure, see  
page 5 (Adjustment).

Max. test pressure for testing the entire system:  
temporarily  $< 15$  minutes 2 bar.

Switching capacity:

	U	$I (\cos \varphi = 1)$	$I (\cos \varphi = 0,6)$
DG	24 – 250 V AC	0.05 – 5 A	0.05 – 1 A
DG..G	5 – 250 V AC	0.01 – 5 A	0.01 – 1 A
	5 – 48 V DC	0.01 – 1 A	

Maximum medium and ambient temperatures:

DG..H, DG..N: -15 to +60°C,

DG..I: -20 to +80°C.

Storage temperature: -20 to +40°C.

Long-term use in the upper ambient temperature  
range accelerates the ageing of the elastomer ma-  
terials and reduces the service life (please contact  
manufacturer).

Diaphragm pressure switch, silicone-free.

Diaphragm: NBR.

Housing: glass fibre reinforced PBT plastic with  
low gas release.

Lower housing section: AISi 12.

Enclosure: IP 54 or IP 65.

Safety class: 1.

Line diameter: 0.5 to 1.8 mm (AWG 24 to  
AWG 13).

Line entrance: M16 x 1.5, clamping range: diam-  
eters of 4 to 10 mm.

Type of connection: screw terminals.

Max. tightening torque, see Technical Information  
bulletin DG (D, GB, F) – [www.docuthek.com](http://www.docuthek.com).

Weight: 270 to 320 g depending on equipment.

Safety information, see Safety manual DG (D, GB) –  
[www.docuthek.com](http://www.docuthek.com).

## Designed lifetime

This information on the designed lifetime is based on  
using the product in accordance with these operating  
instructions. Once the designed lifetime has been  
reached, safety-relevant products must be replaced.

Designed lifetime (based on date of manufacture) in accordance with EN 13611, EN 1854 for pressure switches:

Medium	Designed lifetime	
	Switching cycles	Time [years]
Gas	50,000	10
Air	250,000	10

You can find further explanations in the applicable rules and regulations and on the afecor website ([www.afecor.org](http://www.afecor.org)).

This procedure applies to heating systems. For thermoprocessing equipment, observe local regulations.

## Logistics

### Transport

Protect the unit from external forces (blows, shocks, vibration). On receipt of the product, check that the delivery is complete, see page 2 (Part designations). Report any transport damage immediately.

### Storage

Store the product in a dry and clean place.  
Storage temperature: see page 7 (Technical data).  
Storage time: 6 months before using for the first time.  
If stored for longer than this, the overall service life will be reduced by the corresponding amount of extra storage time.

### Packaging

The packaging material is to be disposed of in accordance with local regulations.

### Disposal

Components are to be disposed of separately in accordance with local regulations.

## Certification

### Declaration of conformity

We, the manufacturer, hereby declare that the product DG with product ID No. CE-0085AP0467 complies with the requirements of the listed Directives and Standards.

Directives: 2009/142/EC – GAD (valid until 20 April 2018), 2014/35/EU – LVD

Regulation: (EU) 2016/426 – GAR (valid from 21 April 2018)

## Contact

If you have any technical questions, please contact your local branch office/agent. The addresses are available on the Internet or from Elster GmbH.

We reserve the right to make technical modifications in the interests of progress.

Standards: EN 13611:2015+AC:2016, EN 1854:2010  
The relevant product corresponds to the tested type sample.

The production is subject to the surveillance procedure pursuant to Directive 2009/142/EC Annex II paragraph 3 (valid until 20 April 2018) and to Regulation (EU) 2016/426 Annex III paragraph 3 (valid from 21 April 2018).

Elster GmbH

Scan of the Declaration of conformity (D, GB) – see [www.docuthek.com](http://www.docuthek.com)

### SIL, PL

The pressure switches are suitable for single-channel systems (HFT = 0) up to SIL 2/PL d, and up to SIL 3/PL e when two redundant pressure switches are installed in a double-channel architecture (HFT = 1), provided that the complete system complies with the requirements of EN 61508/ISO 13849. The safety function value which is actually achieved is derived by taking all components into account (sensor – logic – actuator). For this, the demand rate and structural measures to avoid/detect nonconformity are to be observed (e.g. redundancy, diversity, monitoring).

**Characteristic values for SIL/PL: HFT = 0 (1 device), HFT = 1 (2 devices), SFF > 90, DC = 0, type A/category B, 1, 2, 3, 4, high demand mode, CCF > 65, B ≥ 2.**

$$PFH_D = \lambda_D = \frac{1}{MTTF_d} = \frac{0.1}{B_{10d}} \times n_{op}$$

U	I	B <sub>10d</sub> value
24 V DC	10 mA	6,689,477
230 V AC	4 mA	
24 V DC	70 mA	4,414,062
230 V AC	20 mA	
230 V AC	2 A	974,800

**RoHS compliant, Eurasian Customs Union, AGA approved**



**Directive on the restriction of the use of hazardous substances (RoHS) in China**

Scan of the Disclosure Table China RoHS2 – see certificates at [www.docuthek.com](http://www.docuthek.com)

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