

## Gastight Rectangular Shut-Off Damper, Type S



## Shut-off dampers with high tightness requirements

Krantz has developed the gastight, rectangular shut-off damper, type S, for use in ventilating systems with high requirements in regard to tightness, e.g. in nuclear facilities, laboratories, etc.

The requirements on tightness as laid down in the German standard DIN 25496 – Ventilating components in nuclear facilities- are more than satisfied.

Several decades of experience gathered in the operation of shut-off damper systems in nuclear facilities and labs have decisively influenced the design and shape.

Quite a number of references from various locations of shut-off damper installation have proved the high level of perfection attained by this component.

## Structural design and function

The shut-off damper consists of a damper housing, a hinged damper blade with the damper shaft as its bearings, and an actuating cylinder moving the damper blade by an actuating equipment.

A sealing profile made of silicone rubber is fastened to the damper blade by a leading bar. Upon closure of the damper, this sealing profile is pressed against the damper housing by means of an inflatable silicon tube which produces the sealing effect.

The sealing profile provided with two double lips allows the tight seat of the damper blade on the mounted shut-off damper to be checked.

The damper blade and the damper housing are made of stainless steel, the tube leading bars and profiles consists of aluminium.

The control unit is placed on the head of the actuating cylinder. The shut-off damper is actuated from a customer provided switch-board cabinet.

The media supplies needed by the control unit are electric energy as well as compressed air, 3 bar overpressure, oil free and waterless.

The shut-off damper is actuated by means of a double acting pneumatic cylinder. The control unit ensures the proper sequence of motions including tube inflation and venting, resp.

Special versions or special equipment on request.



Gastight rectangular shut-off damper, type S

### Quality and safety concept

- Tightness of housing and seat better than required by DIN 25496, table 3, for "gastight" dampers, leakage rate  $< 10 \text{ dm}^3 / (\text{m}^2 \cdot \text{h})$
- Tightness achieved by a special sealing profile and inflatable sealing tube
- External test of damper seat tightness possible by application of a portable leak test device, type LTD
- Component is capable for disinfection
- Gapeless and continuous welds; welding approvals and welders qualification in conformity with German codes and standards
- Calculated proofs for accommodation of the "external event"



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## Actuation

### Function

#### Closing

Electric signal switches solenoid valve **1** as shown in diagram. The following lines are under pressure:

- **2** line 1 and 2
- **3** line 2
- **4** line 1 and 2

that leads to the following operation:

**2** switches so pressure air can flow through line 3, passing **5** (fully opened) and press the cylinder **7** to close the damper blade. The air flowing off the cylinder passes **6** (throttled)

and via **3** line 3-1 and **1** line 4-5 to the open air. To throttle **6** causes a smooth movement of the actuating cylinder.

According to the adjusted time, **4** opens with delay to make sure the damper blade is closed. The air passes **8** (connection to open air closed when under pressure). The tube is inflated and the damper sealed gastight. The pressure has to be hold to keep the tube inflated.

#### Opening

Electric signal switches solenoid valve **1**.

Pressure breaks down at:

- **2** line 1
- **4** line 1

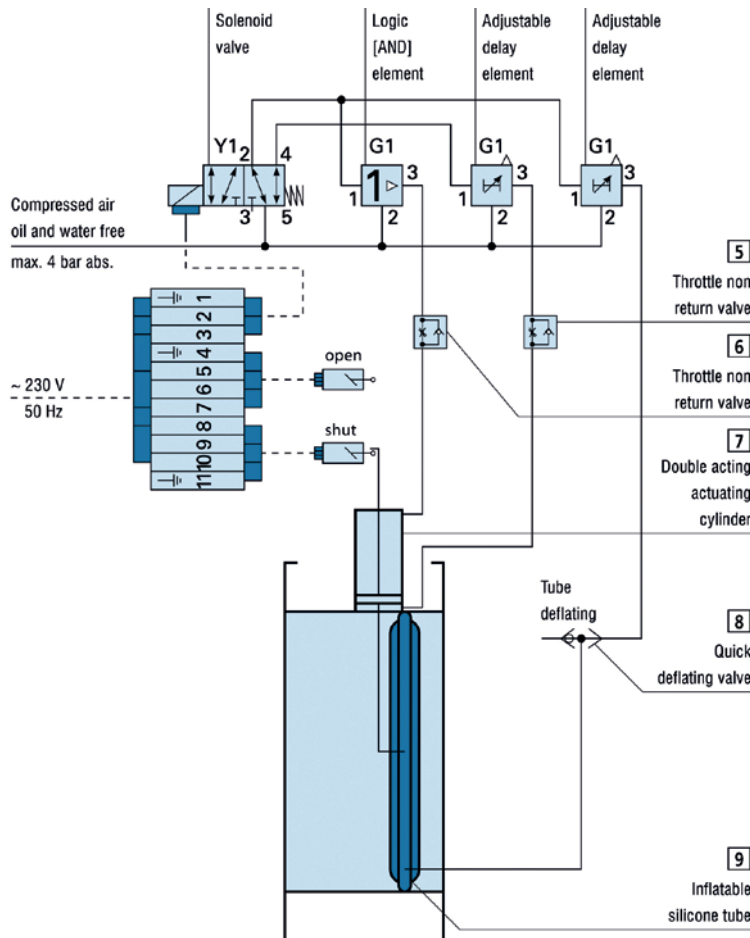
The following lines are under pressure::

- **2** line 2
- **3** line 1 and 2
- **4** line 2

that leads to the following operation:

By connection to open air in **1** line 2-3, pressure breaks down through **4** to **8**. **8** opens to the open air and the tube is quickly deflated

According to the adjusted time, **3** opens with delay to make sure the tube is deflated. The air passes **6** (fully opened) and presses the cylinder **7** to open the damper blade. The air flowing off the cylinder passes **5** (throttled) and via **2** line 3-1 and **1** line 2-3 to the open air. To throttle **5** causes a smooth movement of the actuating cylinder.



Electric and pneumatic circuit diagramm

Dimensions

Dimensions and ζ-Value

B / H [mm]	ζ-Value*)
355	0.45
400	0.35
450	0.30
500	0.25
560	0.22
630	0.18
710	0.16
800	0.13
900	0.11
1 000	0.10
1 120	0.08
1 250	0.07
1 400	0.06

\*) Depending on H, related to cross section

Width dimensions (B) can be combined with dimensions of height (H) in a wide range

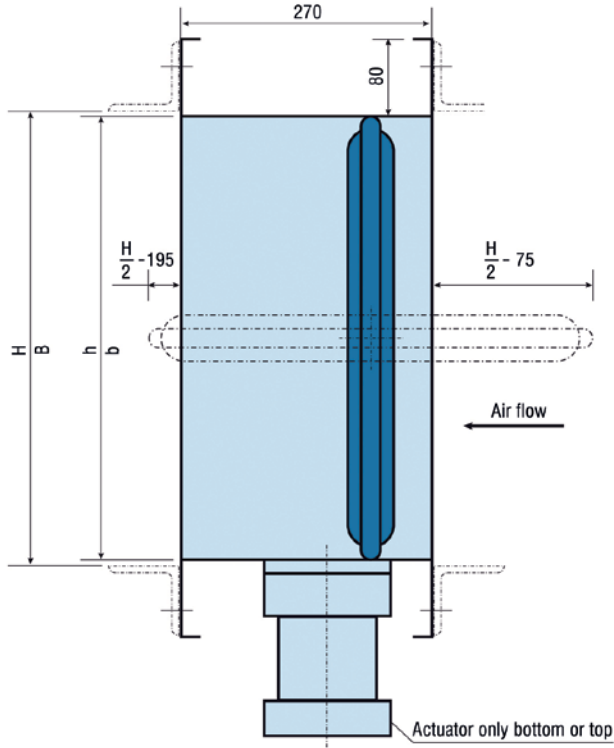


Table of dimensions

H \ B	355	400	450	500	560	630	710	800	900	1 000	1 120	1 250	1 400
355													
400		Type S, F1				Type S, F2						Type S, F3	
450		Type S, F1				Type S, F2						Type S, F3	
500		Type S, F1				Type S, F2						Type S, F3	
560		Type S, F1				Type S, F2						Type S, F3	
630		Type S, F1				Type S, F2						Type S, F3	
710		Type S, F1				Type S, F2						Type S, F3	
800		Type S, F1				Type S, F2						Type S, F3	
900		Type S, F1				Type S, F2						Type S, F3	
1 000		Type S, F1				Type S, F2						Type S, F3	
1 120		Type S, F1				Type S, F2					Type S, F4		
1 250		Type S, F1				Type S, F2					Type S, F4		
1 400		Type S, F1				Type S, F2					Type S, F4		

- Damper frame C 55 (one actuating cylinder) – details see page 6
- Damper frame C 70 (one actuating cylinder) – details see page 7
- Damper frame C 80 (one actuating cylinder) – details see page 8
- Damper frame C 80 (two actuating cylinders) – details see page 9

**Gastight Rectangular Shut-Off Damper, Type S, F1**

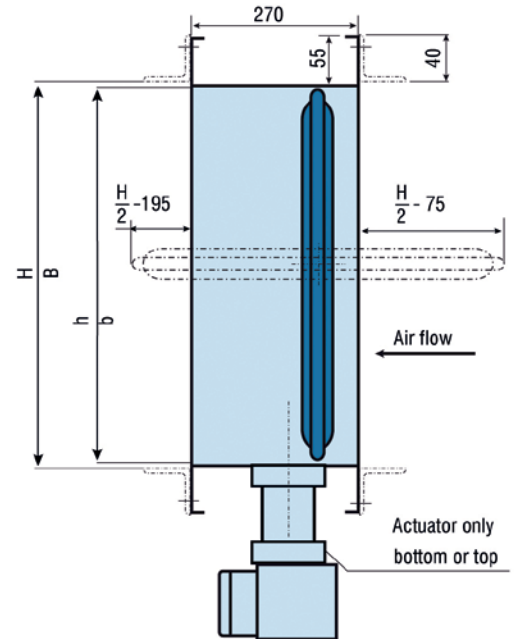
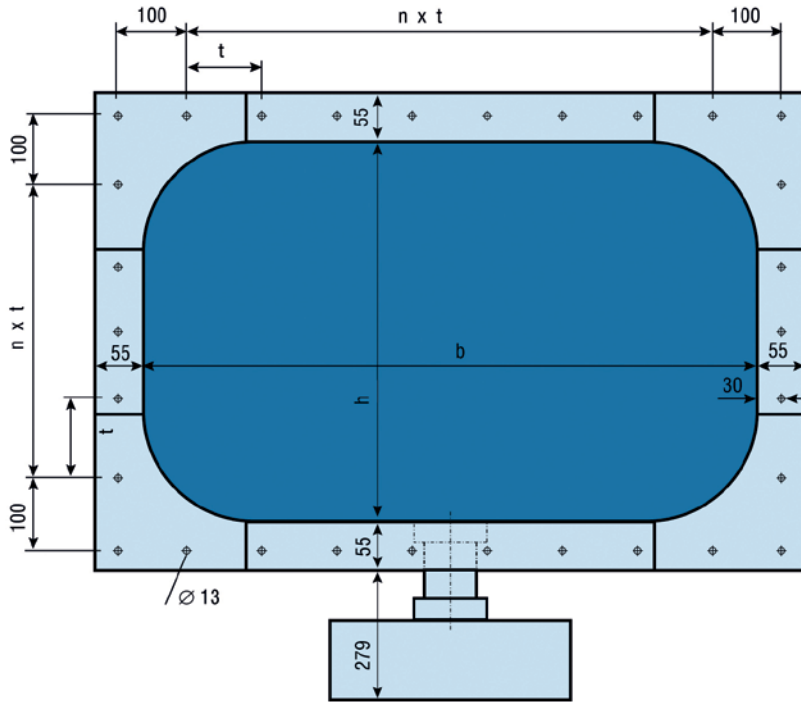


Table of frame dimensions

B / H [mm]	b / h [mm]	n x t [mm]	H \ B	355	400	450	500
355	340	2 x 100.0 → 200	355				
400	385	3 x 81.7 → 245	400				
450	435	3 x 98.3 → 295	450	<b>Type S, F1</b>			
500	485	4 x 86.3 → 345	500				

Possible combinations of width B and height H.

**Gastight Rectangular Shut-Off Damper, Type S, F2**

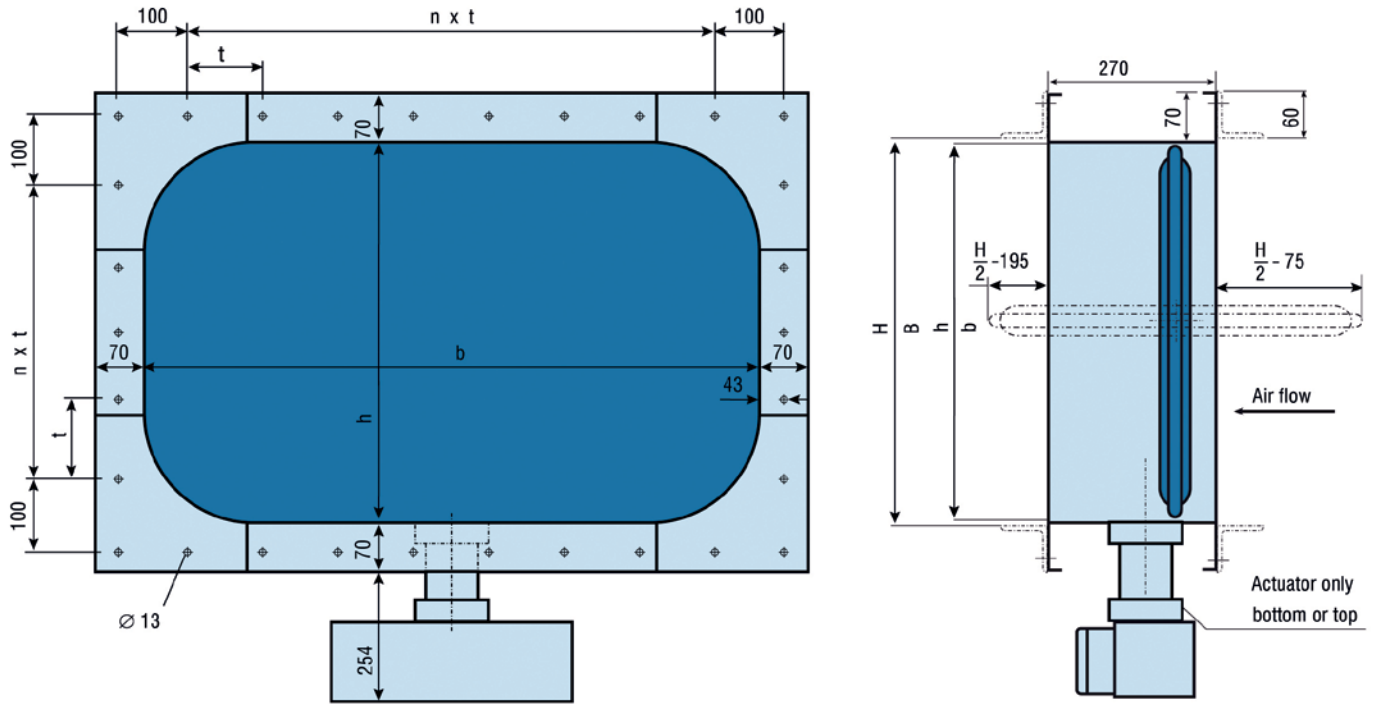


Table of frame dimensions

B / H [mm]	b / h [mm]	n x t [mm]
355	340	2 x 113,0 → 226
400	385	3 x 90,3 → 271
450	435	3 x 107,0 → 321
500	485	4 x 92,8 → 371
560	545	4 x 107,8 → 431
630	615	5 x 102,2 → 511
710	695	6 x 96,8 → 581
800	785	7 x 95,9 → 671
900	885	8 x 96,4 → 771
1 000	985	9 x 96,8 → 871

		B	355	400	450	500	560	630	710	800	900	1 000
H	355											
	400											
	450											
	500											
	560											
	630											
	710											
	800											
	900											
	1 000											

Type S, F2

Possible combinations of width B and height H

**Gastight Rectangular Shut-Off Damper, Type S, F3**

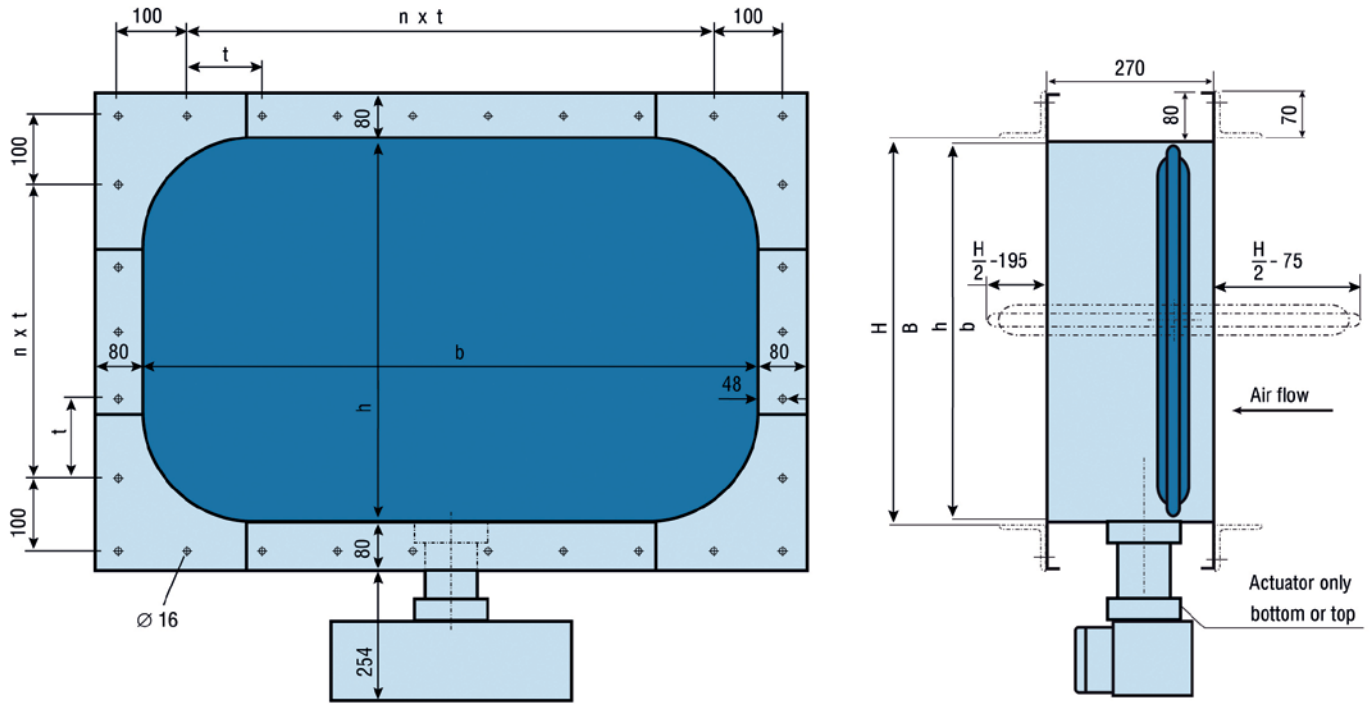


Table of frame dimensions

B / H [mm]	b / h [mm]	n x t [mm]	B	560	630	710	800	1 120	1 250	1 400
355	340	2 x 118.0 → 236	H							
400	385	3 x 93.7 → 281	355							
450	435	3 x 110.3 → 331	400							
500	485	4 x 95.3 → 381	450							
560	545	4 x 110.3 → 441	500							
630	615	5 x 102.2 → 511	560							
710	695	6 x 98.5 → 591	630							
800	785	7 x 97.3 → 681	710							
1 120	1 105	10 x 100.1 → 1 001	800							
1 250	1 235	11 x 102.8 → 1 131	1 120							
			1 250							

Type S, F3

Possible combinations of width B and height H



**Gastight Rectangular Shut-Off Damper, Type S, F4**

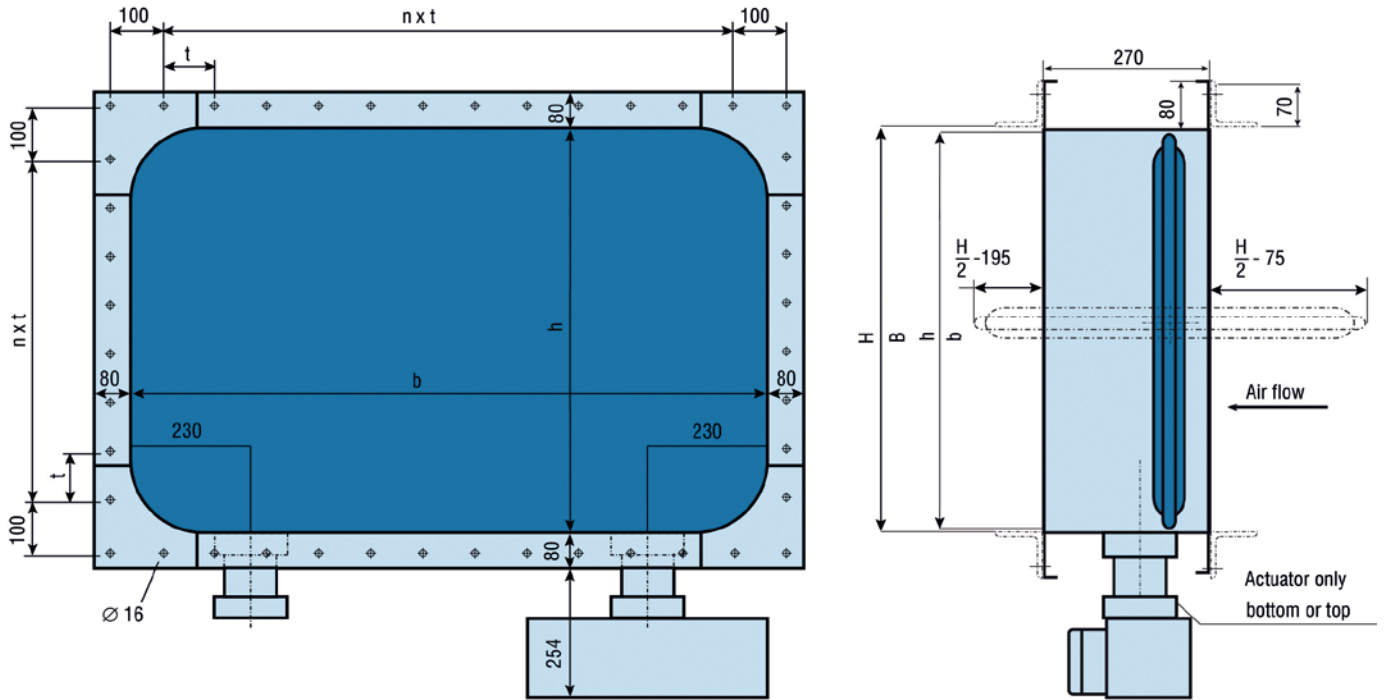


Table of frame dimensions

B / H [mm]	b / h [mm]	n x t [mm]
710	695	6 x 98.5 → 591
800	785	7 x 97.3 → 681
900	885	8 x 97.6 → 781
1 000	985	9 x 97.9 → 881
1 120	1 105	10 x 100.1 → 1 001
1 250	1 235	11 x 102.8 → 1 131
1 400	1 385	13 x 98.5 → 1 281

B \ H		B						
		710	800	900	1 000	1 120	1 250	1 400
H	710							
	800							
	900							
	1 000							
	1 120							
	1 250							
	1 400							

Type S, F4

█ Possible combinations of width B and height H

**Air consumption**

**Gastight Rectangular  
Shut-Off Damper, Type S**

Table of air consumption for closing  
and opening of damper blade [dm<sup>3</sup><sub>STP</sub>]  
Valid for operating pressure of 3 bar  
positive pressure

H \ B		355	400	450	500	560	630	710	800	900	1 000	1 120	1 250	1 400
355	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	close	5.1	5.4	5.8	6.1	6.5	7.0	7.5	8.1	8.8	9.5	10.3	11.2	12.2
400	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	close	5.4	5.7	6.1	6.4	6.8	7.3	7.8	8.4	9.1	9.8	10.6	11.5	12.5
450	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	close	5.8	6.1	6.4	6.7	7.1	7.6	8.2	8.8	9.4	10.1	10.9	11.8	12.8
500	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	close	6.1	6.4	6.7	7.1	7.5	7.9	8.5	9.1	9.8	10.4	11.3	12.1	13.2
560	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	close	6.5	6.8	7.1	7.5	7.9	8.4	8.9	9.5	10.2	10.9	11.7	12.5	13.6
630	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	close	7.0	7.3	7.6	7.9	8.4	8.8	9.4	10.0	10.7	11.3	12.1	13.0	14.0
710	open	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0
	close	7.5	7.8	8.2	8.5	8.9	9.4	9.9	10.5	11.2	11.9	12.7	13.6	16.7
800	open		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0
	close		9.4	8.8	9.1	9.5	10.0	10.5	11.1	11.8	12.5	13.4	16.3	17.3
900	open			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0
	close			9.4	9.8	10.2	10.7	11.2	11.8	12.5	13.3	16.1	16.9	18.0
1 000	open				2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0
	close				10.4	10.9	11.3	11.9	12.5	13.2	15.9	16.7	17.6	18.6
1 120	open					2.0	2.0	2.0	2.0	4.0	4.0	4.0	4.0	4.0
	close					11.7	12.1	12.7	13.3	16.1	16.7	17.5	18.4	19.4
1 250	open						2.0	2.0	4.0	4.0	4.0	4.0	4.0	4.0
	close						13.0	13.6	16.3	16.9	17.6	18.4	19.3	20.3
1 400	open							4.0	4.0	4.0	4.0	4.0	4.0	4.0
	close							16.7	17.3	18.0	18.6	19.4	20.3	21.3

**Normal** = Compressed air consumption at standard conditions (1.013 bar / 20 °C) for each closing in dm<sup>3</sup>

**Example for calculation**

B / H = 630 / 400  
 Compressed air consumption at standard conditions = 7.3 dm<sup>3</sup><sub>STP</sub>  
 Compressed air consumption at an overpressure of 3 bar = 7.3 dm<sup>3</sup> / 4 = 1.8 dm<sup>3</sup>

   Damper with one actuating cylinder  
   Damper with two actuating cylinders

**Weights**

**Gastight Rectangular  
Shut-Off Damper, Type S**

Table of weight [kg]

H \ B		355	400	450	500	560	630	710	800	900	1 000	1 120	1 250	1 400
355	kg	40	41	43	45	47	50	53	57	61	67	72	78	86
400	kg	42	44	46	48	50	53	56	61	66	71	76	83	91
450	kg	44	46	48	51	54	57	60	64	69	74	80	87	94
500	kg	46	48	51	53	56	59	63	68	73	78	84	90	98
560	kg	49	51	54	56	59	63	67	72	77	83	88	95	103
630	kg	53	55	58	60	64	67	72	77	82	87	94	101	109
710	kg	58	61	64	67	70	74	79	85	91	97	104	112	131
800	kg		65	68	72	75	80	85	90	97	103	111	129	139
900	kg			74	77	81	86	91	97	104	111	129	137	147
1 000	kg				82	86	91	96	103	110	127	136	145	155
1 120	kg					93	98	104	110	129	136	145	154	165
1 250	kg						105	111	129	137	145	154	164	176
1 400	kg							132	139	147	155	165	176	188

### Text for tender

in solid, maintenance free design

- Housing, damper seat and actuator insertion gastight. Allowable leakage rate  $10\text{l/h} \cdot \text{m}^2$  at a pressure difference of 20mbar acc. DIN 25496 Tab. 3
- Damper blade with sealing profile from silicone rubber. Tightness of the damper seat by means of inflating of a silicon tube which presses the sealing profile against the damper housing
- Sealing profile designed with double lips for testing the damper seat tightness from outside by means of a tight seat testing equipment
- Housing with connection frames on both sides
- Housing, damper blade, damper shaft and actuator rods made from stainless steel 1.4541
- Double-acting pneumatic cylinder for damper blade operation
- Two limit switches for signalization of damper position "open" and "close"
- Control unit for opening resp. closing the damper as well as for inflating resp. venting the silicon tube. The control unit is placed on the head of the pneumatic cylinder.

### Technical data

Fabricate:	Krantz
Type:	S
Admissable operating pressure for housing:	$\pm 10\,000$ Pa
Admissable differential pressure for damper blade in both directions :	$\pm 10\,000$ Pa
Design temperature:	-20 °C up to +120 °C
Admissable leakage rate (related to housing surface resp. damper cross section):	$10 \frac{\text{dm}^3}{\text{m}^2 \text{ h}}$ at $\Delta p = 2\,000$ Pa
Medium supply:	
Compressed air, oil free and waterless	positive pressure 3 bar
Current:	230 V, 50 Hz
Position indication "open" and "close":	
- Mechanical:	Position indicator
- Electrical:	2 limit switches
Actuator:	Pneumatic
Regulation time:	30 s, longer times adjustable
Material:	
- Housing	1.4541 (AISI/SAE 321 or B.S. 321 S12)
- Damper blade	1.4541 (AISI/SAE 321 or B.S. 321 S12)
- Damper sealing	Silicone

## Testing tightness of damper blade

### Accessory

- Portable leak test device, type LTD
- Tube for measurement with nipple for fast acting coupling
- Hand pump

### Procedure

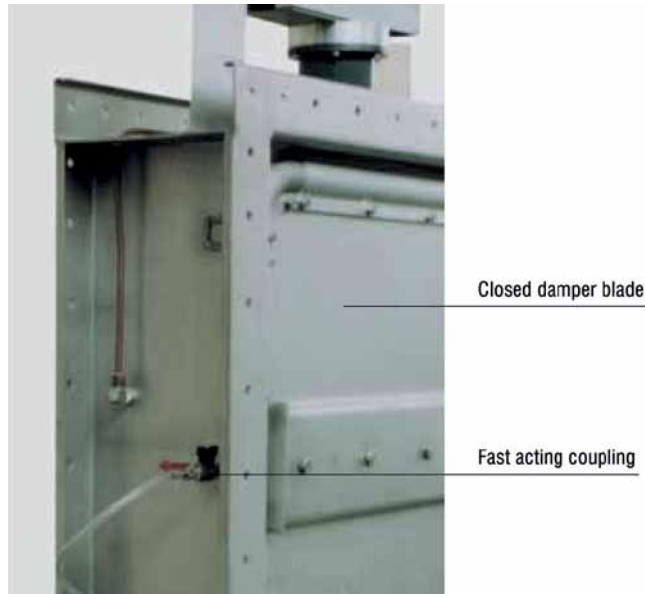
#### 1. Step

Closing the damper blade by actuating the switchboard cabinet.

- ▶ Distinguishable at the position indicator of the pneumatic actuator

#### 2. Step

Connect the leak test device by means of the fast acting coupling. (See separate manual for leak test device, type LTD.)



Gastight rectangular shut-off damper, type S



Leak test device, type LTD



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