



JFZ with actuator

# Tunnel dampers

## JFZ



### For the ventilation of and smoke extract from underground transport systems

Tunnel dampers are safety components specially designed for underground transport systems and meet special requirements

- Certified construction and manufacturing according to ISO 9001
- Temperature resistance up to 400 °C over 120 min
- Construction: Galvanised steel
- Side seals made of sprung stainless steel compensate for the longitudinal expansion of the blades at high temperatures
- Parallel or opposed action blades
- Operation via electric actuators, including heat-insulating protective enclosure (optional)
- Casing air leakage to EN 1751, class C
- Low differential pressure and sound power level
- Installation orientation is independent of the airflow direction

Optional equipment and accessories

- Installation subframe for assembly
- Support structure for installation of multiple dampers into walls

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## General information

### Application

- Specially designed for underground transport systems
- For opening and closing smoke extract ducts
- Component of ventilation and smoke extract systems in underground transport systems
- Can also be used as shut-off dampers for fans

### Classification

- Test report no. 15/11160-2708 – Applus (Spain)
- Casing air leakage to EN 1751, class C
- Test report no. 210006732-02 – MPA NRW (Germany)
- Long-term testing: 10.000 open/close cycles

### Constructions

#### Standard sizes

- B = 400 – 2000 mm
- H = 345 – 1995 mm

#### Intermediate sizes

- B (width) and H (height) dimensions available in each millimetre increment
- Large dimensions can be implemented using units consisting of several dampers and a support structure

#### Optional equipment

- Installation subframe
- Support structure
- Terminal plates

### Accessories

- Actuator
- Encasing
- Hold open device

### Special features

- Low differential pressure and sound power level
- Aerofoil blades
- Low maintenance construction
- No parts with silicone
- Closed blade air leakage at a differential pressure of 40 Pa = 200 m<sup>3</sup>/h per m<sup>2</sup>
- Remote control with actuator (optional)

### Parts and characteristics

- Frame
- Blade
- Actuator
- External linkage
- Travel stop (angle section), side B
- Side seal, side H
- Electric open/close actuator or spring return actuator including limit switches

### Construction features

- Rectangular welded casing, material thickness 1.25 mm
- Blades, material thickness 1 mm, counter-rotating or parallel coupled
- Flanges on both sides, suitable for duct connection, with flange holes
- Arrangement of the actuator on the second blade (independent of size)
- External linkage, robust and durable, consisting of the coupling rod and horizontal arms
- Damper blade shafts, Ø12 mm, with a notch for marking the damper blade position
- The tunnel damper is remotely operated via an actuator, which is additionally protected by a heat-insulating enclosure depending on the application
- Side seals between the regular blades and the frame
- Travel stop (angle section) ensures tight closure of the top and bottom blades

### Materials and surfaces

- Casing, blades and travel stop (angle section) made of formed galvanised sheet steel; flanges on both sides with corner holes
- Blade shafts, drive arm and external linkage made of galvanised steel
- Side seal made of stainless steel
- Brass bearings

### Installation and commissioning

- Installation position is independent of the airflow direction
- With horizontal blades
- Between ducts
- Torsion-free installation
- After installation the damper must remain accessible for inspection, cleaning and repair
- Connected ducts must have an inspection access

### Standards and guidelines

- German 'Bau- und Prüfgrundsätze' [Principles of Construction and Testing], 2/84 edition
- Maintenance standards DIN 31051 and EN 13305

### Maintenance

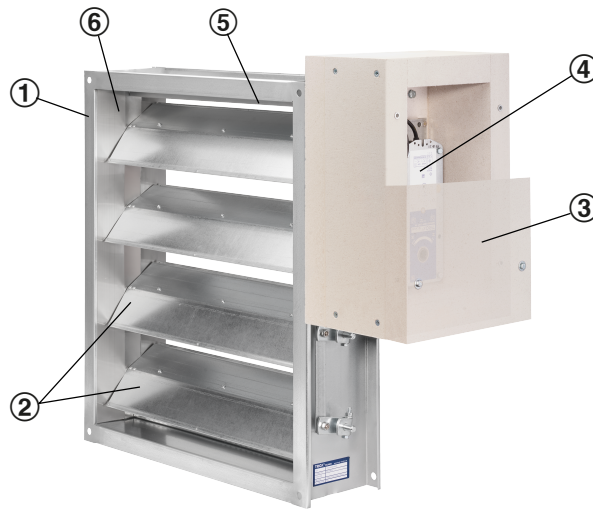
- Tunnel dampers must be maintained regularly and must be operational at all times
- The maintenance standards DIN 31051 and EN 13305 must be observed in order to maintain and, if necessary, restore the desired condition.
- Tunnel dampers must be serviced at least once a year
- A maintenance report must be created; documents must be kept for reference
- Maintenance-free as construction and materials are not subject to wear

## Function

Tunnel dampers with a linkage have same or opposed action. An external linkage transfers the synchronous rotational movement from the drive arm to the individual blades. Even large dampers can be safely opened and closed with this type of linkage.

Opposed action blades close at different angular velocities due to the transverse link. As a result, the closing properties are better and the air leakage is low when the damper is closed.

### Schematic illustration of JFZ



- ① Casing
- ② Parallel blades
- ③ Enclosure
- ④ Actuator
- ⑤ Locating bracket
- ⑥ Side sealing plate

## Schematic illustration of JFZ with opposed action blades and spring return actuator



- ① Casing
- ② Opposed blades
- ③ Spring return actuator
- ④ Side sealing plate
- ⑤ Locating bracket

## Technical data

Nominal sizes	357 × 345 – 2000 × 1998 mm
Volume flow rate range	200 – 40,000 l/s or 720 – 143,640 m <sup>3</sup> /h
Maximum static differential pressure	Up to 3000 Pa
Operating temperature	-20 – 150 °C in normal operation, 400 °C, 120 min in the event of a fire

### Free area [m<sup>2</sup>], standard sizes of tunnel damper JFZ

H	B							
	400	600	800	1000	1200	1400	1600	1800
345	0.11	0.17	0.23	0.28	0.34	0.40	0.45	0.51
510	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75
675	0.22	0.33	0.44	0.55	0.66	0.77	0.88	0.99
840	0.27	0.41	0.55	0.69	0.82	0.96	1.10	1.23
1005	0.33	0.49	0.66	0.82	0.98	1.15	1.31	1.47
1170	0.38	0.57	0.76	0.95	1.14	1.33	1.52	1.72
1335	0.43	0.65	0.87	1.09	1.30	1.52	1.74	1.96
1500	0.49	0.73	0.98	1.22	1.47	1.71	1.95	2.20
1665	0.54	0.81	1.08	1.36	1.63	1.90	2.17	2.44
1830	0.60	0.89	1.19	1.49	1.79	2.08	2.38	2.68
1995	0.65	0.97	1.30	1.62	1.95	2.27	2.60	2.92

Intermediate sizes: Interpolate values between widths.

### Maximum permissible static differential pressure [Pa] with closed tunnel damper

Construction	B						
	800	1000	1200	1400	1600	1800	2000
Standard construction	3000	2500	2200	1950	1750	1600	1500

The pressures given are independent of the height of the tunnel damper.

## Quick sizing

Quick sizing tables provide a good overview of the sound power levels and differential pressures that can be expected. Approximate intermediate values can be interpolated.

### Quick sizing, differential pressure and sound power level JFZ with damper blade position $\alpha$

v [m/s]	OPEN/0°		20°		40°		60°		80°	
	$\Delta p_{st}$ [Pa]	LWA [dB(A)]	$\Delta p_{st}$ [Pa]	LWA [dB(A)]	$\Delta p_{st}$ [Pa]	LWA [dB(A)]	$\Delta p_{st}$ [Pa]	LWA [dB(A)]	$\Delta p_{st}$ [Pa]	LWA [dB(A)]
0.5	<5	<30	<5	<30	<5	<30	22	44	255	67
1	<5	<30	<5	<30	8	38	85	59	1010	82
2	<5	31	<5	35	28	53	335	74	>2000	>90
4	<5	46	10	50	110	68	1395	89	>2000	>90
6	<5	55	22	59	250	77	>2000	>90	>2000	>90
8	8	61	40	65	440	83	>2000	>90	>2000	>90
10	14	66	60	70	690	88	>2000	>90	>2000	>90

### Sound power level with closed tunnel damper JFZ according to surface area $B \times H$ [m<sup>2</sup>].

$\Delta p_{st}$ [Pa]	0,14	0,2	0,4	0,6	0,8	1,2	2	4
	LWA [dB(A)]							
100	57	58	61	63	64	64	68	71
200	63	65	68	69	71	71	75	78
500	71	72	76	78	79	79	85	87
1000	78	80	82	84	85	85	89	>90
1500	81	82	86	88	89	89	>90	>90
2000	84	86	89	>90	>90	>90	>90	>90

## Specification text

This specification text describes the general properties of the product. Texts for variants can be generated with our Easy Product Finder design program.

### Specification text

Specially designed safety component. Units consist of a casing, movable blades and linkage. Special side seals take up and compensate for the longitudinal expansion of the component at temperatures up to 400 °C for 120 minutes.

### Special features

- Low differential pressure and sound power level
- Aerofoil blades
- Low maintenance construction
- No parts with silicone
- Closed blade air leakage at a differential pressure of 40 Pa = 200 m<sup>3</sup>/h per m<sup>2</sup>
- Remote control with actuator (optional)

### Materials and surfaces

- Casing, blades and travel stop (angle section) made of formed galvanised sheet steel; flanges on both sides with corner holes
- Blade shafts, drive arm and external linkage made of galvanised steel
- Side seal made of stainless steel
- Brass bearings

### Constructions

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Intermediate sizes

- B (width) and H (height) dimensions available in each millimetre increment
- Large dimensions can be implemented using units consisting of several dampers and a support structure

Optional equipment

- Installation subframe
- Support structure
- Terminal plates

### Technical data

- Nominal sizes: 357 × 345 – 2000 × 1998 mm
- Volume flow rate range: 200 to 40,000 l/s or 720 to 143,640 m<sup>3</sup>/h
- Permissible static differential pressure: up to 3000 Pa
- Operating temperature: -20 – 150 °C in normal operation, 400 °C 120 min in the event of a fire

### Sizing data

- $q_v$  (m<sup>3</sup>/h)
- $\Delta_{pst}$  [Pa]

Air-regenerated noise

- $L_{PA}$  [dB(A)]

## Order code

**JFZ** – **S** – **R** / **1000×1200** / **BE24** / **P** / **NO**  
 |     |     |     |     |     |     |  
 1    2    3    4    5    6    7

**1 Type**
**JFZ** Tunnel and industrial damper

**2 Function**

No entry required: Opposed action

**S** Opposed action

**P** Same action

**3 Linkage-to-actuator connection**

No entry required: Right

**L** Left

**4 Nominal size [mm]**

B × H

**5 Attachments**

No entry required: No actuator

**B24** Belimo BE24-12 (24 V AC/DC, 40 Nm)

**B230** Belimo BE230-12 (230 V AC, 40 Nm)

**R230-58** Rotork RCEL006 (230 V AC, 58 Nm)

**R400-58** Rotork RCEL006 (400 V AC, 58 Nm)

**R230-88** Rotork RCEL009 (230 V AC, 88 Nm)

**R400-88** Rotork RCEL009 (400 V AC, 88 Nm)

**BC24** Bernard SQ4 (24 V AC, 50 Nm)

**BC230** Bernard SQ4 (230 V AC, 50 Nm)

Spring return actuator (power off to close)

**B24MF** Belimo EF24A-S2 (24 V AC/DC, 30 Nm)

**B230MF** Belimo EF230A-S2 (230 V AC, 30 Nm)

**SIF** Schischek InMax-50-SF-S9 (24 – 240 V AC/DC, 50 Nm)

**LD** Hold open device

**6 Temperature resistant enclosure**

No entry required: None

**P** Enclosure (for Belimo or Schischek)

**T** Thermal bag (for Rotork and Bernard actuators)

**7 Damper blade position, safety function only with spring return actuator**
**NO** Power off to OPEN (standard)

**NC** Power off to CLOSE

**Order example: JFZ-S-L/1000×1500/B24**
**Function**

Opposed action

**Linkage-to-actuator connection**

Left

**Nominal size B × H**

1000 × 1500 mm

**Attachments**

Belimo BE24-12



## Variants

JFZ with actuator and enclosure, operating side open



JFZ with actuator and enclosure



JFZ with spring return actuator



Attachments

**OPEN/CLOSE actuator BE24-12-ST TR**

**JFZ with open/close actuator**

- Opening and closing of JFZ tunnel dampers
- With integral limit switches for capturing the end positions
- Operation of the tunnel damper with an OPEN/CLOSED actuator enables remote control and/or release by suitable release mechanisms
- Ambient temperature in normal operation -30 – 50 °C
- Two integral limit switches with volt-free contacts can indicate the damper blade position (OPEN and CLOSED)

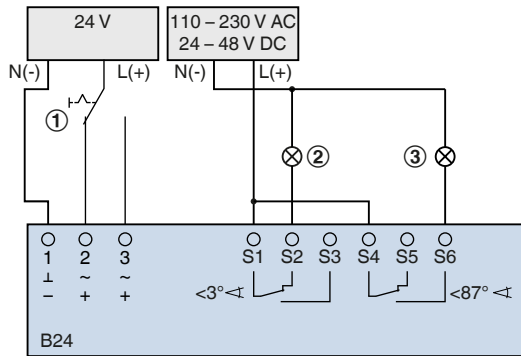
**Installation information**

- The electrical connecting cable is fed through the side wall of the actuator enclosure via a precisely fitting drilled hole.
- A wire clamping bracket is required
- For details on maintenance and inspection, refer to the installation and operating manual.

Supply voltage		24 V AC ± 20 %, 50/60 Hz or 24 V DC -10 %/+20 %
Power rating	Operation	12 W
	Rating	0.5 W
Torque		40 Nm
Run time for 90°		< 60 s
Limit switch	Type of contact	2 changeover contacts
	Switching voltage	250 V AC/5 V DC
	Switching current	1 mA – 6 A
IEC protection class		III (protective extra-low voltage)
Protection level		IP 54
EC conformity		EMC to 89/336/EEC, 92/31/EEC, 93/68/EEC
Connecting cable	Length / cross section	On actuator = 1 m, 3 (6 *) × 0.75 mm <sup>2</sup> (halogen-free)

\* Limit switch

**B24 connecting cable core identification**



- 1: Ground, neutral
- 2: Control voltage for direction OPEN
- 3: Control voltage for direction CLOSE
- ① Switch for opening and closing, to be provided by others
- ② Indicator light for CLOSED position, to be provided by others
- ③ Indicator light for OPEN position, to be provided by others

**Open/close actuator BE230-12 TR**

**JFZ with open/close actuator**

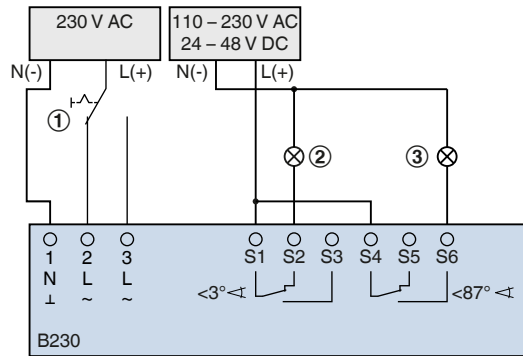
- Opening and closing of JFZ tunnel dampers
- With integral limit switches for capturing the end positions
- Operation of the tunnel damper with an OPEN/CLOSED actuator enables remote control and/or release by suitable release mechanisms
- Ambient temperature in normal operation -30 – 50 °C
- Two integral limit switches with volt-free contacts can indicate the damper blade position (OPEN and CLOSED)

**Installation information**

- The electrical connecting cable is fed through the side wall of the actuator enclosure via a precisely fitting drilled hole.
- A wire clamping bracket is required
- Notes regarding maintenance, inspection and servicing

Supply voltage		230 V AC ± 14%, 50/60 Hz
Power rating	Operation	8 W
	Rating	1.5 W
Torque		40 Nm
Run time for 90°		< 60 s
Limit switch	Type of contact	2 changeover contacts
	Switching voltage	250 V AC/5 V DC
	Switching current	1 mA – 6 A
IEC protection class		II (protective insulation)
Protection level		IP 54
EC conformity		EMC to 2004/108/EU, low voltage to 2006/95/EU
Connecting cable	Length / cross section	On actuator = 1 m, 3 (6 *) × 0.75 mm <sup>2</sup> (halogen-free)

\* Limit switch

**B230 connecting cable core identification**


1 ⊥: Ground, neutral

2 ~: Control voltage for direction OPEN

3 ~: Control voltage for direction CLOSE

① Switch for opening and closing, to be provided by others

② Indicator light for CLOSED position, to be provided by others

③ Indicator light for OPEN position, to be provided by others

**Spring return actuator EF24A-S2**

**JFZ with spring return actuator**

- Operation of the tunnel damper with a spring return actuator enables remote control and/or release by suitable release mechanisms
- Spring return actuator 24 V for open/closed switchover
- Ambient temperature in normal operation -30 – 50°C
- Two integral limit switches with volt-free contacts can indicate the damper blade position (OPEN and CLOSED)

**Safety function**

- NO: Power off to OPEN
- NC: Power off to CLOSE

**Parts and characteristics**

- 24 V AC/DC supply voltage
- 1-wire control (2-point)
- Mechanical stops
- Direction of action can be reversed
- Crank handle for manual operation

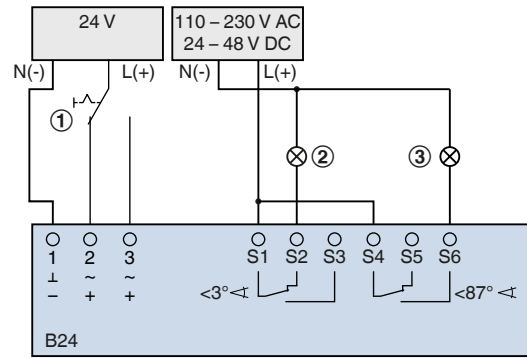
Supply voltage (AC)	24 V AC ± 20 %, 50/60 Hz
Supply voltage (DC)	24 V DC ±10 %
Power rating (AC)	16 VA max.
Power rating (DC)	Max. 9.5 W
Torque	30 Nm
Actuator run time for 90°	< 75 s
Spring return time	20 s (for < -20 °C up to 60 s)
Control input signal	Supply voltage on/off
Auxiliary switch: type of contact	2 changeover contacts *
Maximum switching voltage (AC voltage)	250 V AC
Maximum switching current (AC voltage)	3 A (resistive load); 0.5 A (inductive load)
Maximum switching voltage (DC voltage)	110 V DC
Maximum switching current (DC voltage)	0.5 A (resistive load); 0.2 A (inductive load)
Connecting cable – actuator	2 × 0.75 mm <sup>2</sup> , length 1 m
Connecting cable – auxiliary switch	6 × 0.75 mm <sup>2</sup> , length 1 m
IEC protection class	III (protective extra-low voltage)
Protection level	IP 54
EC conformity	EMC to 2014/30/EU, RoHS 2011/65/EU
Operating temperature	-30 to 50 °C
Weight	4.4 kg

\* Use both auxiliary switches only with the same switching voltages.

Actuator EF24A-S2



B24 connecting cable core identification



- 1: Ground, neutral
- 2: Control voltage for direction OPEN
- 3: Control voltage for direction CLOSE
- ① Switch for opening and closing, to be provided by others
- ② Indicator light for CLOSED position, to be provided by others
- ③ Indicator light for OPEN position, to be provided by others

**Spring return actuator EF230A-S2**

**JFZ with spring return actuator**

- Operation of the tunnel damper with a spring return actuator enables remote control and/or release by suitable release mechanisms
- Spring return actuator EF230A-S2
- Spring return actuator 230 V for open/closed switchover
- Ambient temperature in normal operation -30 – 50 °C
- Two integral limit switches with volt-free contacts can indicate the damper blade position (OPEN and CLOSED)

**Safety function**

- NO: Power off to OPEN
- NC: Power off to CLOSE

**Parts and characteristics**

- Supply voltage 100 to 240 V AC
- 1-wire control (2-point)
- Mechanical stops
- Direction of action can be reversed

Supply voltage (AC)	100 – 240 V AC ±10 %, 50/60 Hz
Power rating (AC)	21 VA max.
Torque	30 Nm
Actuator run time for 90°	< 75 s
Spring return time	20 s (< -20 °C up to. 60 s)
Control input signal	Supply voltage on/off
Auxiliary switch: type of contact	2 changeover contacts *
Maximum switching voltage (AC voltage)	250 V AC
Maximum switching current (AC voltage)	3 A (resistive load); 0.5 A (inductive load)
Maximum switching voltage (DC voltage)	110 V DC
Maximum switching current (DC voltage)	0.5 A (resistive load); 0.2 A (inductive load)
Connecting cable – actuator	2 × 0.75 mm <sup>2</sup> , length 1 m
Connecting cable – auxiliary switch	6 × 0.75 mm <sup>2</sup> , length 1 m
IEC protection class	II (protective insulation)
Protection level	IP 54
EC conformity	EMC according to 2014/30/EU, low voltage according to 2014/35/EU, RoHS according to 2011/65/EU
Operating temperature	-30 to 50 °C
Weight	4.6 kg

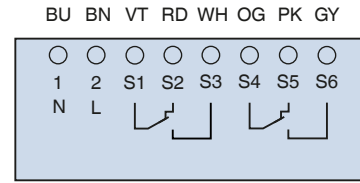
\* Use both auxiliary switches only with the same switching voltages.



Actuator EF230A-S2



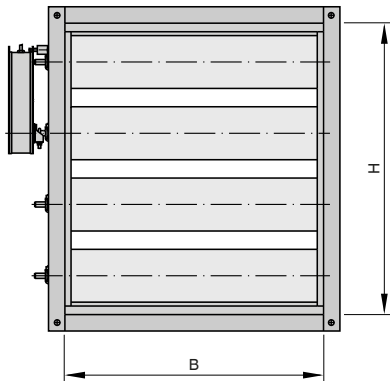
Spring return actuators 100 – 240 V AC with auxiliary switches, connecting cable core identification



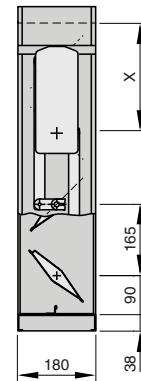
- 1 N, -: Earth, neutral
- 2 L: Control voltage, direction of rotation 1
- S1: Common contact
- S2: Travel stop 1 < x
- S3: Travel stop 1 > x
- S4: Common contact
- S5: Travel stop 2 < y
- S6: Travel stop 2 > y
- x: 10 %
- y: 10 – 90 %

## Dimensions

**JFZ, standard sizes, front view**



**JFZ, standard sizes, side view**



Tunnel damper with spring return actuator, operating side right

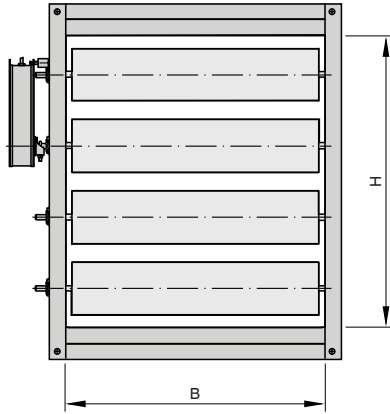
**Weights (including B24 actuator) according to width B [mm]**

H	400	600	800	1000	1200	1400	1600	1800	2000
	kg								
345	13	15	17	20	22	24	26	29	31
510	15	18	21	24	27	30	32	35	38
675	18	21	25	28	32	35	38	42	45
840	20	24	28	33	37	42	46	51	55
1005	22	27	32	37	43	48	53	58	64
1170	24	30	36	42	48	54	60	66	72
1335	27	33	40	46	53	60	66	73	79
1500	28	35	42	49	56	64	71	78	85
1665	30	38	46	54	62	70	77	85	93
1830	32	40	49	57	66	74	83	91	100
1995	34	43	52	61	71	80	89	99	108

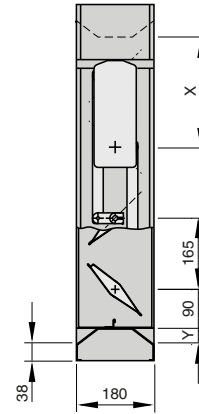
**JFZ, standard sizes**

H	Number of blades	Drive position	
		X [mm]	Blades
345	2	255	2
510	3	255	2
675	4	255	2
840	5	255	2
1005	6	255	2
1170	7	255	2
1335	8	255	2
1500	9	255	2
1665	10	255	2
1830	11	255	2
1995	12	255	2

JFZ, intermediate sizes, front view



JFZ, intermediate sizes, side view

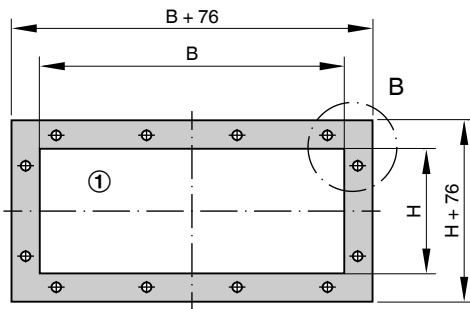


Tunnel damper with spring return actuator, operating side right

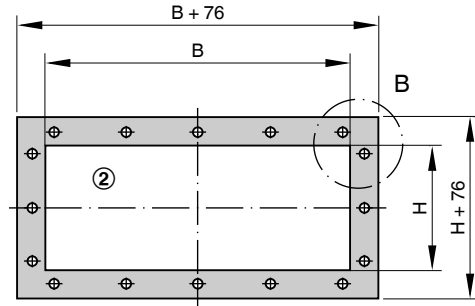
JFZ, intermediate sizes

H	Number of blades	X [mm]	Drive position	
			Blades	Y [mm]
348 – 508	2	255	2	1,5 – 81,5
1833 – 1993	11	255	2	1,5 – 81,5
1995	12	255	2	1,5
513 – 673	3	255	2	1,5 – 81,5
678 – 838	4	255	2	1,5 – 81,5
843 – 1003	5	255	2	1,5 – 81,5
1008 – 1168	6	255	2	1,5 – 81,5
1173 – 1333	7	255	2	1,5 – 81,5
1338 – 1498	8	255	2	1,5 – 81,5
1503 – 1663	9	255	2	1,5 – 81,5
1668 – 1828	10	255	2	1,5 – 81,5

Flange holes, tunnel dampers

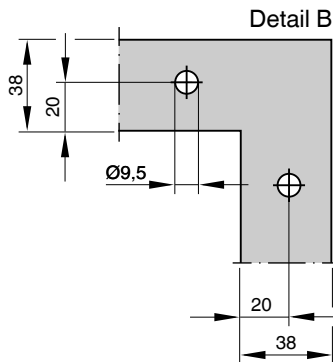


Flange holes, tunnel dampers



① Even number of holes (hole pitch = 250 mm)

② Odd number of holes (hole pitch = 250 mm)



Number of flange holes per side according to width B

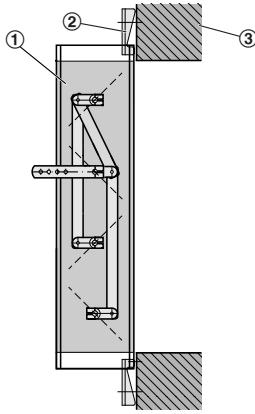
B	n
400 – 537	2
538 – 787	3
788 – 1037	4
1038 – 1287	5
1288 – 1437	6
1538 – 1787	7
1788 – 2000	8

Number of flange holes per side according to height H

H	n
345 – 461	2
462 – 711	3
712 – 961	4
962 – 1211	5
1212 – 1461	6
1462 – 1711	7
1712 – 1961	8
1962 – 1995	9

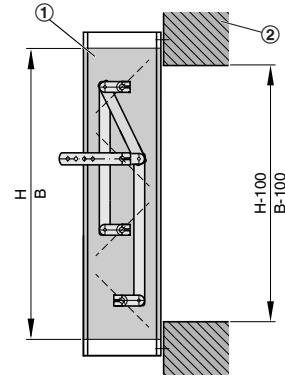
## Installation details

### Wall mounting with wall bracket



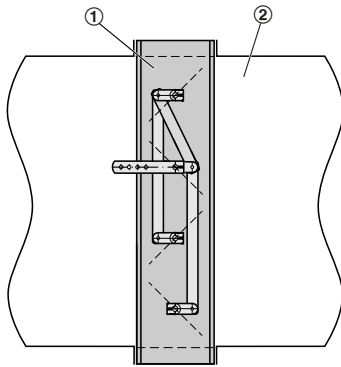
- ① JFZ
- ② Clamping plate
- ③ Wall

### Wall installation with screw connection



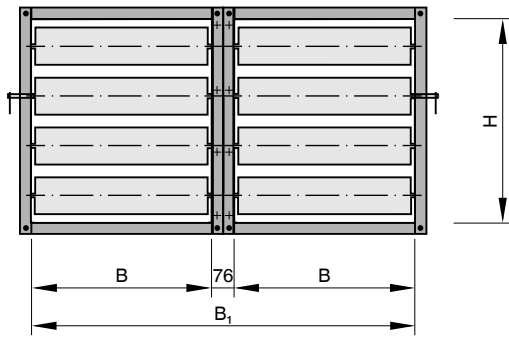
- ① JFZ
- ② Wall

### Duct installation

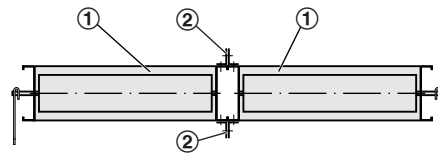


- ① JFZ
- ② Duct

JFZ, width subdivided, front view



JFZ, width subdivided, side view

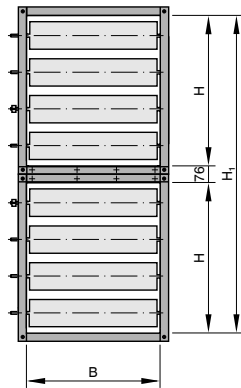


- ① JFZ
- ② Connecting bracket

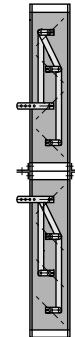
Width subdivided, width

B <sub>1</sub>	B
2550	1200
2950	1400
3350	1600
3750	1800
4150	2000

JFZ, height subdivided, front view



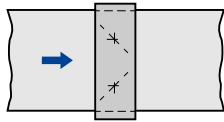
JFZ, height subdivided, side view



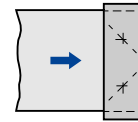
Height subdivided, height

H <sub>1</sub>	H
2086	1005
2416	1170
2746	1335
3076	1500
3406	1665
3736	1830
4066	1995

**Installation type A**



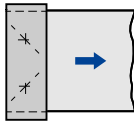
**Installation type B**



Ducts on both sides

Air discharge

**Installation type C**



Air intake