Maintenance-free

FR90 fire dampers

- Sizes ∅ 100 mm to ∅ 800 mm
- For universal use with a wide range of applications
- Fire classification: EI 30/60/90/120 (v_e - h_o, i ↔ o) S C_{10ooo}
- Hygiene certificate
- Environmental Product Declaration according to ISO 14025 and EN 15804

FR90 fire dampers

Features and characteristics

Single-piece sheet steel casing
galvanized - longitudinal seam welded - extremely robust
airtight, smoke-proof
Leak tightness class C
according to EN 1751

Option: Epoxy resin powder coating

Nominal sizes [mm]

DN 100 to DN 800

Lip seals

Break-resistant
damper blade
with elastomer lip seal
airtight, leak tightness class 3
according to EN 1751

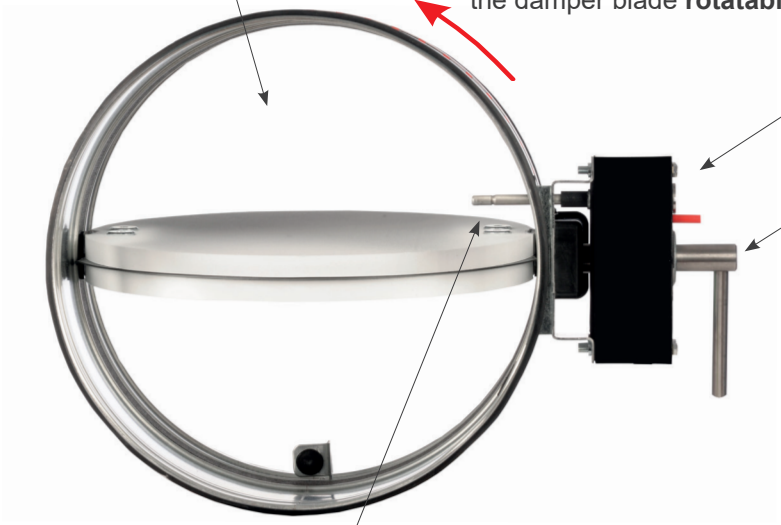
Options:
- Metal cover made of galvanized steel
- Metal cover made of 1.4301 stainless steel

Two control openings (inspection openings)
for viewing both sides of the damper blade

Large free cross-section
Maximum volume flows
Minimum pressure drop
Extremely low sound power level

Fully enclosed:
- **Operation unit**
- **Release mechanism**
- **Release element**

Release mechanism and axis of the damper blade **rotatable 360°**



Thermal-mechanical
release mechanism
for single handed operation

Option:
Electric actuators, also explosion-protected

All-round enclosed
thermal release elements 70°C or 95°C

Option:
Corrosion-resistant release element 70°C

FR90 fire dampers

Description

Maintenance-free **FR90 fire dampers according to EN 15650**

Fire classifications: **EI 30/60/90/120 (v_e - h_o, i ↔ o) S C_{10000}**

Declaration of performance: **DoP no.: CPR/FR90/003**

EU Declaration of Conformity according to Directive 2014/34/EU for **use in potentially explosive atmospheres**

Environmental Product Declaration ISO 14025, EN 15804:
EPD-WWB-20180132-ICC1-DE

Additional national certificates and general design approvals in Germany:

- Building materials:
  Certificate MPA-BS 6000/593/18
  FR90 fire dampers are essentially made from non-combustible building materials.
- Air transfer applications: Z-6.50-2133

All-round single-piece galvanized sheet steel casing. Casing tightness class C according to EN 1751.

Moulded push-fit connections with lip seals for spiral duct according to DIN 24145, for flexible pipe and for similar ducts of ventilation and air conditioning systems. All-round press-moulded beading over the whole length of casing ensures necessary strength and free movement of the damper blade even with large dimensions. Low pressure drop and a very low noise level are thus achieved.

Replaceable damper blade made of high-temperature-resistant, abrasion-proof calcium silicate with wear-resistant elastomer seals. Damper blade leak tightness class 3 according to EN 1751.

Option: Casing with powder coating. ⇒ see page 6

Option: Damper blade with metal cover (not replaceable) made of galvanized steel or 1.4301 stainless steel.

Enclosed, maintenance-free drive mechanism in the area of the casing wall as a self-locking transmission for break-proof torque transmission. Sealed drive axles made of stainless steel, with red metal bearings. Thermal release mechanisms for 70°C or 95°C nominal temperature. The operation units can be actuated manually or electrically. ⇒ see pages 4 and 5

Release mechanisms, operation units and electric actuators are enclosed and with a spring return. They are maintenance-free, can be connected in a form-locking or force-fitting manner, are easy to replace and can be easily retrofitted as required.

For installation with horizontal or vertical damper blade axles and in intermediate positions. Air flows are possible from each connection side.

Connection to ventilation ducts made from non-combustible or combustible materials is possible, also protective grille.

Installation spacings from 15 mm possible.

Nominal sizes [mm] DN:

100 - 125 - 140 - 160 - 180 - 200 - 224 - 250 - 280 - 315 - 355 - 400 - 450 - 500 - 560 - 630 - 710 - 800

FR90 fire dampers in these sizes achieve fire resistance periods of up to 120 minutes if they are installed in accordance with the following stipulations. Installation types in, on or remote from rigid walls and ceilings or metal stud walls, in wooden walls and ceilings and in ceilings with steel frames with a minimum thickness and fire resistance period. If the walls, ceilings have a fire resistance period of less than 120, 90 or 60 minutes, the fire resistance period of the FR90 fire dampers is reduced accordingly; partly if the minimum thickness is lower.

Options:

- Circular **installation subframe RR** (RR100, RR150) for simplified installation in circular installation openings. Only up to DN 315! ⇒ see pages 7, 8, 13, 14, 22, 43 to 45
- Rectangular **installation subframe RE** (RE100, RE150) for simplified installation in rigid walls and ceilings and in metal stud walls with cladding on both sides. ⇒ see pages 7, 8, 13, 14, 20 to 22, 43 to 45
- With rectangular **installation subframe RH** (RH100, RH150) for installation in wooden walls and wooden ceilings. ⇒ see pages 7, 8, 28 to 31, 43 to 45
- Rectangular **installation subframe RH150** for installation in ceilings with steel frames. ⇒ see pages 7, 8, 33, 34, 43 to 46
- **Mounting frame AE** for mounting on rigid walls and ceilings and walls with cladding on one side and with or without metal studs. ⇒ see pages 7, 8, 15, 26, 27, 35, 43, 44
- **Installation subframe ER6** for sliding ceiling connections with drops of up to 40 mm in metal stud walls with cladding on both sides. ⇒ see pages 7, 8, 23 to 25, 43, 44
- **Mounting frame RV** including connecting frame (1 pc) for installation remote from rigid walls and ceilings and remote from metal stud walls with cladding on both sides, with ventilation ducts with cladding on 4 sides. ⇒ see pages 7, 8, 36 to 39, 43 to 46
- **Connecting frames** (2 pcs) for installation remote from rigid walls and remote from metal stud walls with cladding on both sides, with ventilation ducts with cladding on 2 and 3 sides. ⇒ see pages 7, 36 to 40, 43 to 45

FR90 fire dampers

Release mechanisms and actuators (1)

FR90 fire dampers, series FR92, are fitted with maintenance-free thermal-mechanical release mechanisms or with thermal-electrical release mechanisms on the spring return actuators. **Release** occurs at a nominal temperature of **70°C** or **95°C**. Coated release elements provide increased corrosion protection.

Electric spring return actuators also close the fire dampers if the supply voltage is interrupted. They reopen the fire dampers as soon as the voltage is present again.

Release mechanisms and operation units can be replaced on site!

Thermal-mechanical release mechanism - Standard - with 70°C release element, protection class IP54.

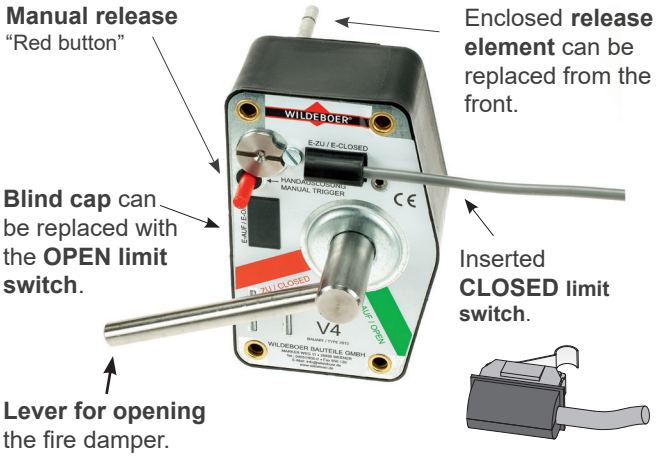
Option: with coated 70°C release element.

Option: with coated 95°C release element.

Option: with **limit switch**

E Changeover with gold-plated contacts for 5 A at 250 V AC or 24 V DC; protection class IP67; 1 m silicone free connection cable 3 x 0.34 mm².

One or two can be plugged in for the CLOSED and/or OPEN position indicator instead of blind caps.



Option: with additional **remote release** based on the:

closed circuit principle. The fire dampers must be opened manually, and close after the electrical supply voltage is interrupted.

GU24 with magnetic clamp 24 V DC; 1.6 W; 100% duty cycle; IP42.

WU220 with magnetic clamp 230 V AC; 4 VA; 100% duty cycle; IP42.

Open circuit principle. The fire dampers must be opened manually, and close by means of electrical or pneumatic stimulus.

G24 with lifting solenoid 24 V DC; 3.5 W; 100% duty cycle; IP42.

W220 with lifting solenoid 230 V AC; 5.5 VA; 100% duty cycle; IP42.

P with lift cylinder 4 to 8 bar.

P2 with lift cylinder 1.2 to 8 bar.

Release mechanism and **remote release** with lift cylinder

Option: **Electric spring return actuator** - Standard up to DN 315 - only for sizes **DN ≤ 315 mm**

with 70°C release element; protection class IP54.

M220-10/F 230 V AC; 6.5 VA / 3 W; $I_{max \le 5\ ms}$ = 4 A

M24-10/F 24 V AC/DC; 4 VA / 2.5 W; $I_{max \le 5\ ms}$ = 8.3 A

Runtime: Opening < 60 s, closing ≈ 20 s

CLOSED/OPEN position indicators via limit switches for 0.5 A at ≤ 250 V AC or for 1 mA up to 3 A at 5 up to 250 V DC.

Halogen-free connection cable; 1 m long; 2 x 0.75 mm² and 6 x 0.75 mm². The AMP connector plugs are detachable.

Option: with 95°C release element.

Figure shows M220-10/F or M24-10/F.

FR90 fire dampers

Release mechanisms and actuators (2)

Option: **Electric spring return actuator**

- Standard from DN 355 -

with 70°C release element; protection class IP54.

M220-9/H 230 V AC; 9,2 VA; $I_{max \le 2\,ms}$ = 0.27 A.

M24-9/H 24 V AC/DC; 6.1 VA / 3.5 W; $I_{max \le 2\,ms}$ = 3.5 A.

Runtime: Opening ≈ 60 s, closing ≈ 21 s.

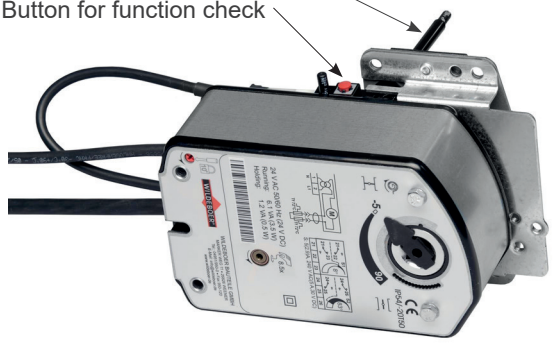
CLOSED/OPEN position indicators via limit switch for 5 A at ≤ 240 V AC.

Halogen-free connection cable; 0.9 m long; 2 x 0.75 mm² and 6 x 0.75 mm². The AMP connector plugs are detachable.

Option: with 95°C release element.

Enclosed **release element**

Button for function check

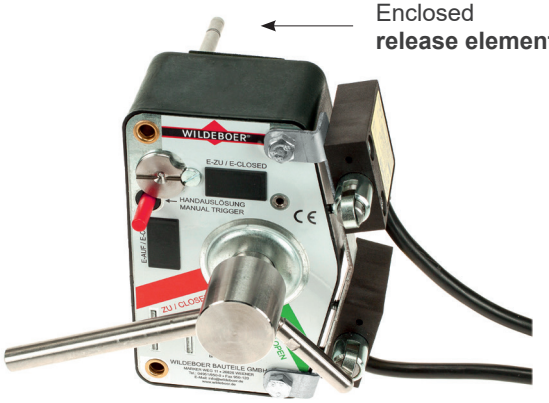


- designs

Thermal-mechanical release mechanism

with 70°C release element; protection class IP54.

Option: with coated 70°C release element.



Option: with **explosion-protected limit switch**

E-Ex with normally open contact and normally closed contact for 6 A at ≤ 250 V AC or 0.25 A at ≤ 230 V DC; protection class IP65; 2 m connection cable 4 x 0.75 mm².

One or two can be attached for the CLOSED and/or OPEN position indicator.

Option: **Electric spring return actuator**

with 70°C release element and terminal box.

EM-1 10 Nm
EM-2 15 Nm
RM-1 10 Nm

} 24 to 240 V AC/DC; protection class IP66.

Power consumption up to 20 W including heating; $I_{nominal} \le 0.7$ A; $I_{max \le 1\,s} \approx 2.5$ A

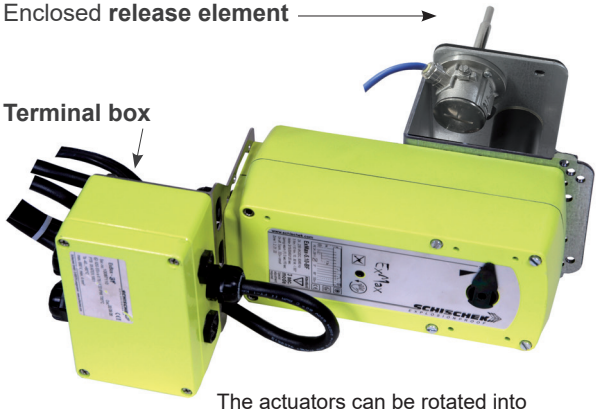
Runtime: Opening ≈ 30 s, closing ≈ 10 s.

CLOSED and OPEN position indicators via limit switches for ≤ 3 A at 24 V AC/DC and ≤ 0.25 A at 250 V AC/DC;at least 5 V, 10 mA.

The 12 x 0.5 mm² halogen-free connection cable must be wired in the terminal box! All of the contained voltages must be the same!

Enclosed **release element**

Terminal box



The actuators can be rotated into suspended and vertical positions on site.

Use of explosion-protected designs

Building area where a dangerous, potentially explosive atmosphere may occur in normal operation...		... as a mixture of air and combustible gases, mists or vapours...		... in the form of a cloud of combustible dust contained in the air...	
		... can form occasionally.	... occurs temporarily or not at all.	... can form occasionally.	... occurs temporarily or not at all.
Zone		1	2	21	22
Identification of the fire damper		II 2 G c IIc T6/T5	II 3 G c IIc T6/T5	II -/2 D c T80°C/T95°C	II -/3 D c T80°C/T95°C
Thermal-mechanical release mechanism with or without **explosion-protected limit switch**		X	X *)	X	X *)
Motor drive	**EM-1** or **EM-2**	X	X *)	X	X *)
	RM-1	-	X	-	X
Ambient temperatures: -20 … +40°C for T6 and T80°C/-20 … +50°C for T5 and T95°C				*) Also to be used in this zone!	

FR90 fire dampers

Powder coating/hygiene/installation positions

Option: **Powder coating**

For FR90 fire damper casings with inner and outer **epoxy resin coating**

- damper blades with **metal cover made of 1.4301 stainless steel**
- thermal-mechanical release mechanisms with **corrosion-resistant** (coated) **release element 70°C**

should be used. This allows for additional corrosion protection for higher stresses.

FR90 fire dampers

- meet the **hygiene requirements** according to VDI 6022-1, VDI 3803-1, DIN 1946-4, DIN EN 13779
- **do not promote the growth of microorganisms** [1] **(fungi, bacteria)**. This reduces the risk of infection for people and also the necessary cleaning and disinfection work!
- are **resistant to disinfectants** [2]
- are suitable for use in hospitals and similar facilities!
- permanently **perform** their **function under high corrosion conditions.** Tested according to EN 15650, annex B with 20% saline solution.

www.HYG.de
Geprüfte Qualität
Hygiene-Institut
des Ruhrgebiets
Institut für Umwelthygiene und Toxikologie
HY geprüft
Nur gültig in Verbindung mit zugehörigem Zertifikat unter www.wildeboer.de!

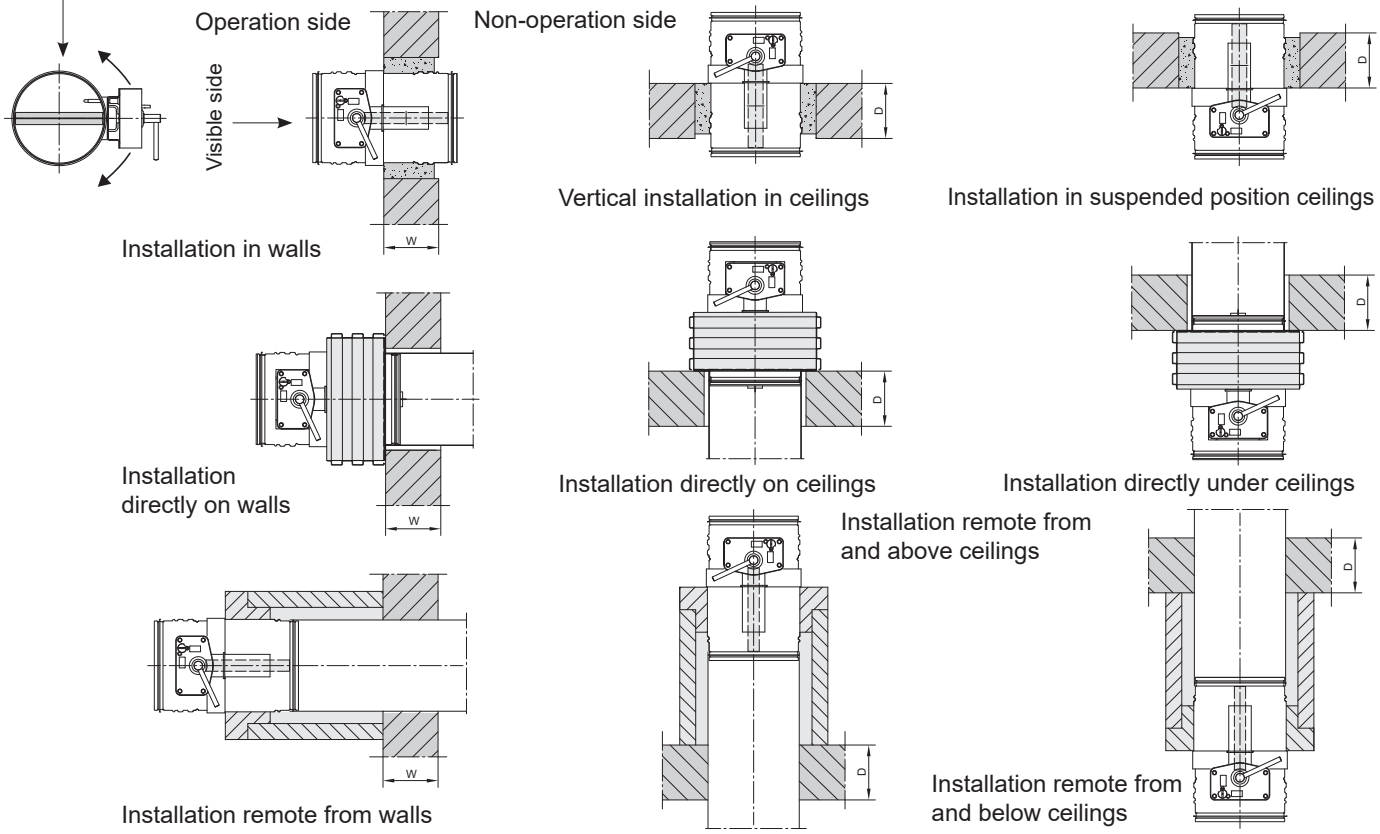
[1] The corresponding **resistance of the materials to fungi and bacteria** has been verified by testing the microbial metabolic potential according to DIN EN ISO 846 for all materials in the FR90 fire dampers.

[2] The **resistance to disinfectants** of the materials in the FR90 fire dampers was tested with the disinfectant groups of active ingredients **alcohol** and **quaternary compounds**. These disinfectants are on the list by the Robert Koch Institute, and were used in accordance with the specifications in the list of disinfectants by the Disinfectants Commission in the German Association for Applied Hygiene (VAH). It has been verified that FR90 fire dampers can withstand normal use of disinfectants and disinfection methods.

Installation positions

Damper blade axle and drive can be installed to rotate up to 360°!

Horizontal installation positions W = wall **Vertical installation positions** D = ceiling



FR90 fire dampers

Installation subframes/mounting frames

With circular **installation subframe RR100** or **RR150** for simplified installation in circular openings such as core holes in rigid walls and ceilings or holes in metal stud walls with cladding on both sides.

Only up to DN 315!

⇒ see pages 8, 13, 14, 22, 43 to 45

Rectangular **installation subframe RE100** or **RE150** made of calcium silicate for simplified – also multiple – installation in rigid walls and ceilings and in metal stud walls with cladding on both sides.

⇒ see pages 8, 13, 14, 20 to 22, 43 to 45

With rectangular **installation subframe RH100** or **RH150** made of calcium silicate **for dry installation** in **wooden walls** and **in wooden ceilings**

⇒ see pages 8, 28 to 31, 43 to 46

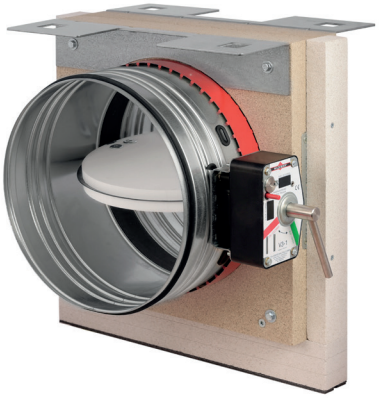
With rectangular **installation subframe RH150** for installation in ceilings with steel frames.

⇒ see pages 8, 33, 34, 43 to 46

With **installation subframe ER6** made from calcium silicate for **sliding ceiling connections** with a drop of up to 40 mm in metal stud walls with cladding on both sides.

The drop can be single or recurring (settlement and changing loads).

⇒ see pages 8, 23 to 25, 43, 44



With **mounting frame AE** made of calcium silicate for mounting on rigid walls and ceilings and on walls with cladding on one side (shaft walls) and with and without metal studs.

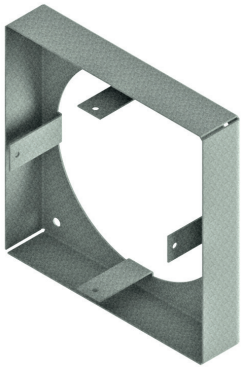
⇒ see pages 8, 15, 26, 27, 35, 43 and 45

With **mounting frame RV** for installation remote from rigid walls and ceilings and from metal stud walls with cladding on both sides, with ventilation ducts with fire-resistant cladding on 4 sides.

⇒ see pages 8, 36 to 39, 43 to 46

Connecting frame for installation remote from rigid walls and ceilings and from metal stud walls with cladding on both sides, with ventilation ducts with fire-resistant cladding.

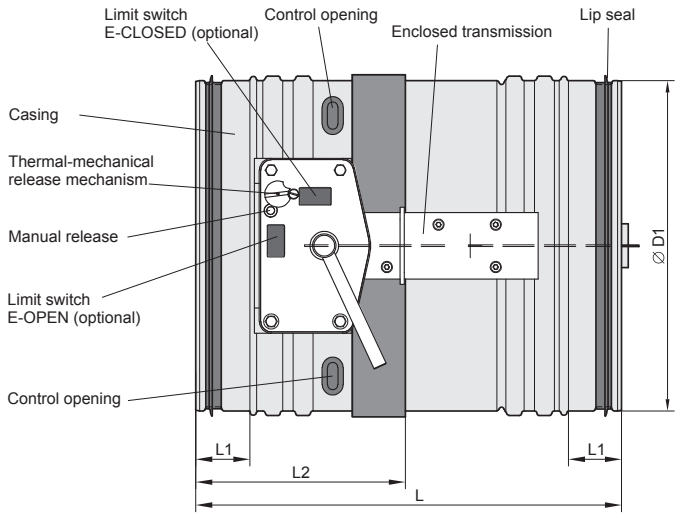
⇒ see pages 36 to 40, 43, 44

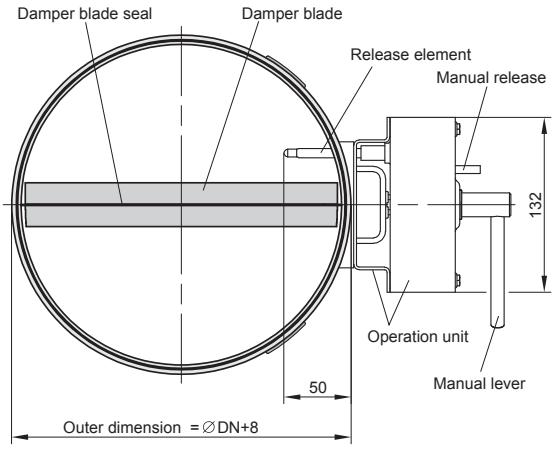


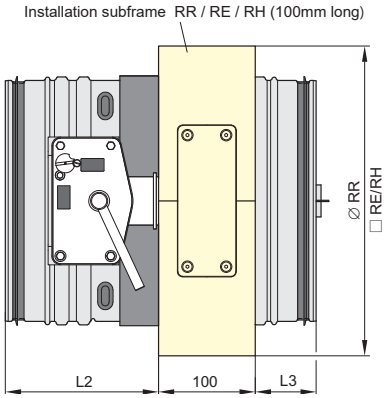
Featured: Size for DN ≤ 315

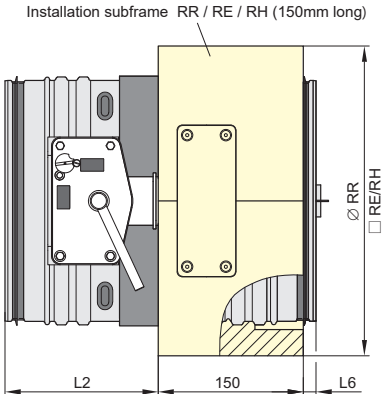
FR90 fire dampers

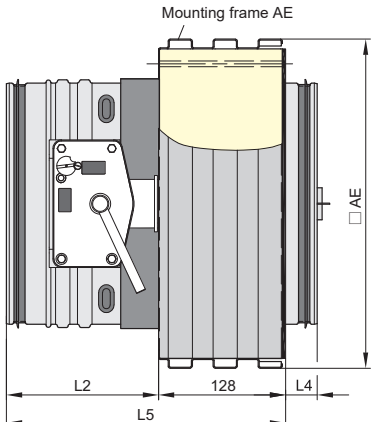
Data sheet (1)











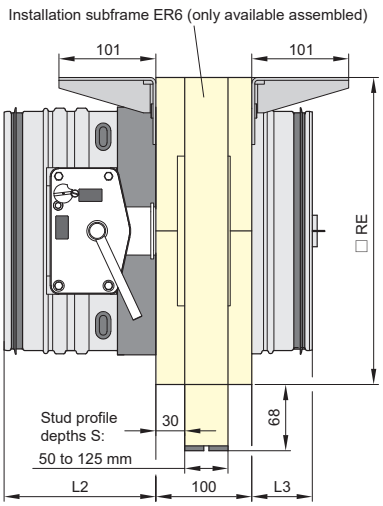
With **installation subframe RR100, RR150** (circular) or **RE100, RE150, RH100, RH150** (rectangular)

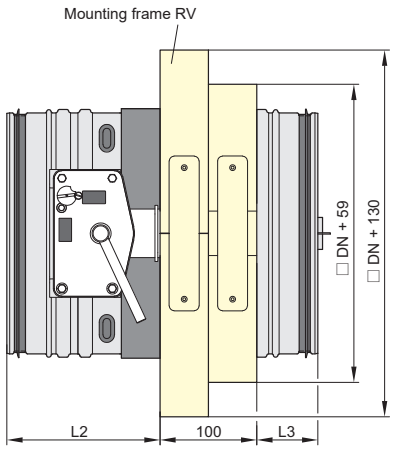
Installation lengths 100 mm and **150 mm.**

⇒ see pages 3, 7, 13, 14, 20 to 22, 28 to 34, 44 to 46

With **mounting frame AE**

⇒ see pages 3, 7, 15, 26, 27, 35, 44 to 46





DN from to	100 315	355 800
Ø D1	DN - 1	DN - 1
Ø RR	DN + 99	-
□ RE/RH	DN + 89	DN + 99
□ AE	DN + 110	DN + 120
L	320	340
L1	40	50
L2	155	160
L3	65	80
L4	37	52
L5	283	288
L6	15	30

With **installation subframe ER6**

⇒ see pages 3, 7, 23 to 25, 44, 45

With **mounting frame RV**

⇒ see pages 3, 7, 36 to 39, 43 to 46

All dimensions in mm

FR90 fire dampers

Data sheet (2)

Maximum excess lengths of mechanical and electrical equipment parts.

Additional space must be provided for assembly, electrical connections and maintenance; observe the cable entry points!

In addition to the **"T" measurement**, it is recommended that a distance of 400 mm be kept from adjacent walls, ceilings or other fire dampers, in order to ensure that the release mechanisms and actuators can be accessed for operational purposes.

Damper blade

Operation side: X

Non-operation side: Y

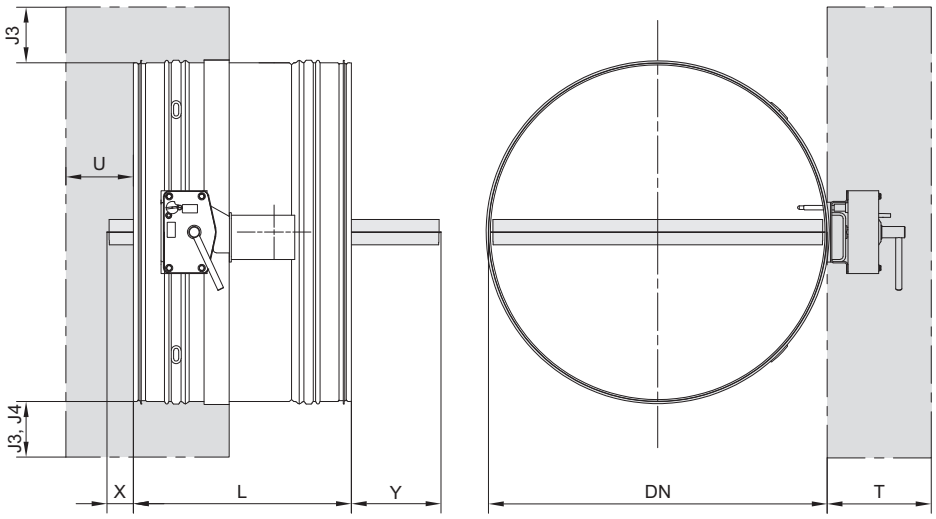
Actuators

U Horizontal (delivery condition)

J Vertical

J3 EM-1, RM-1, EM-2
Rotated to vertical or suspended position

J4 M220-11/H, M24-11/H
rotated to suspended position



Size-independent excess lengths

	T	U
Thermal-mechanical release mechanism	130	-
with: • W220, WU220	155	
• G24, GU24	155	-
• P, P2	140	-
• E-Ex limit switch	140	-
M220-9/H, M24-9/H	125	60
M220-10/F, M24-10/F	85	80
M220-11/H, M24-11/H	110	110
EM-1, EM-2, RM-1	310	216

Size-dependent excess lengths

DN	Ø D1	L	J3	J4	X	Y
100	99	320	220	160	-	-
125	124	320	210	150	-	-
140	139	320	200	140	-	-
160	159	320	190	130	-	-
180	179	320	180	120	-	-
200	199	320	170	110	-	-
224	223	320	160	100	-	-
250	249	320	150	90	-	10
280	279	320	130	70	-	25
315	314	320	115	55	-	43
355	354	340	95	35	-	52
400	399	340	70	10	-	75
450	449	340	45	-	12	100
500	499	340	20	-	37	126
560	559	340	-	-	68	156
630	629	340	-	-	104	192
710	709	340	-	-	144	233
800	799	340	-	-	190	279

Operating area, closing and opening

- FR90 fire dampers are quick-closing, apart from the versions with electric actuators. Due to the flow dynamics, if the fire damper is triggered at high inflow velocities, this may cause pressure surges accompanied by multiplication of operating pressures, which in turn may lead to considerable damage to the ventilation and air conditioning system. When shut-off dampers are closed, the volume flows are distributed to other parallel dampers that are still open. This may lead to excessive stress, in particular at high operating pressures, large volume flows and large cross-sections. Electric actuators should be used under such conditions. They close fire dampers relatively slowly. In addition, the fan switch-off can also be triggered via the OPEN limit switch.
- The application limits marked in the nomograms must be complied with! ⇒ see page 9
- For large fire dampers that are subjected to an unfavourable flow, actuators with large torques may be necessary in order to open the fire dampers when the fan is running and there are very large volume flows. These actuators are available on request. Alternatively, it is also possible to switch on the fans once the fire dampers are fully open.
- It must be ensured that the inflows and outflows are as equal as possible.
- FR90 Fire dampers with electric actuator can be used for OPEN/CLOSED volume flow control.

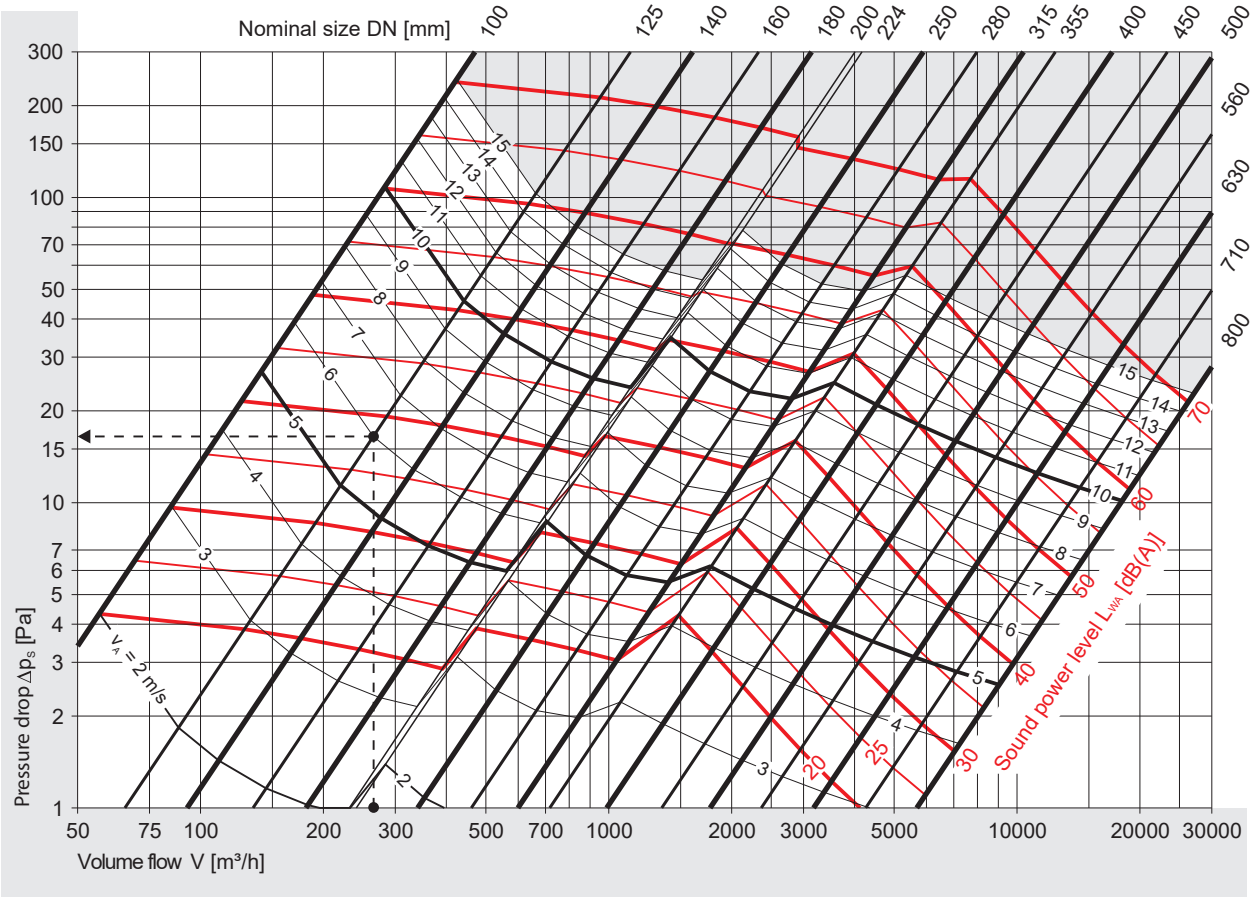
Thermal-mechanical release mechanisms are marked with V3-1, V4, V5-1. The allocations dependent on DN nominal sizes must not be changed!

DN	
≤ 200	V5-1
≥ 224 up to ≤ 315	V3-1
≥ 355	V4

All dimensions in mm

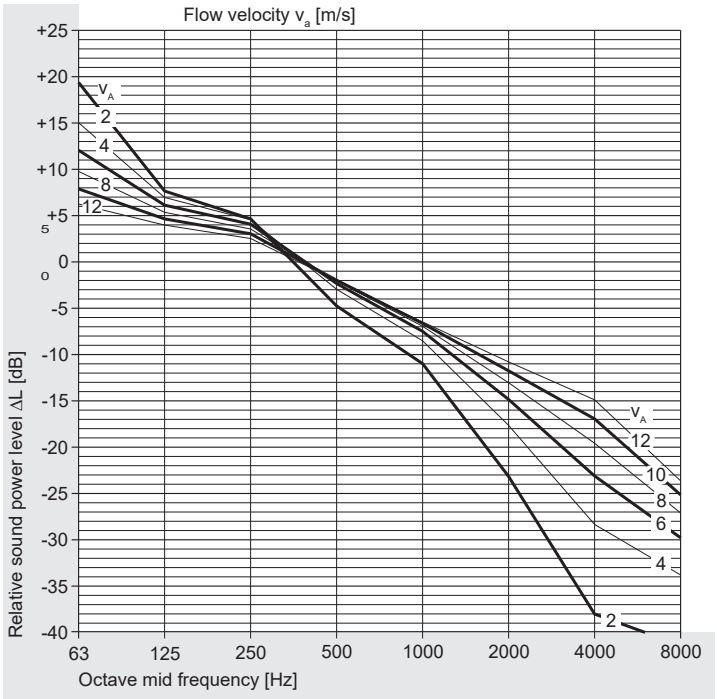
FR90 fire dampers

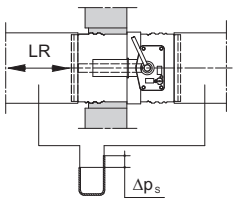
Dimensioning (1) pressure drop, sound power level with ventilation duct connection on both sides



FR90 fire dampers can be used up to 15 m/s velocity in the inflow cross-section A_A and up to 2500 Pa operating pressure.

Relative sound power level





Example: Both sides with ventilation duct connection

V	=	265	m³/h
DN	=	125	mm
v_A	=	6	m/s
Δp_s	=	16	Pa
L_{WA}	=	38	dB(A)

Sound power level $L_{W\text{-}Oct}$ for the octave mid frequencies

f	[Hz]	63	125	250	500	1000	2000	4000	8000
L_{WA}	[dB(A)]	38	38	38	38	38	38	38	38
$\Delta L_{6\ m/s}$	[dB]	+12	+6	+4	-2	-7	-15	-23	-30
$L_{W\text{-}Oct}$	[dB]	50	44	42	36	31	23	-	-

Nomenclature ⇒ see page 11

FR90 fire dampers

Dimensioning (2) Free cross-sections, weights, nomenclature

Free cross-sections A_{free} [m²], **weights** [kg]

DN	A_{free}	Fire damper	Installation subframe				Mounting frame	Installation subframe	Mounting frame
	[m²]		**RE100**	**RE150**					
[m²]	**FR90**	**FR90**	**RH100**	**RH150**	**RR100**	**RR150**	**AE**	**ER6**	**RV**
100	0.0047	2.4	2.0	3.0	1.4	2.2	3.5	4.9	2.1
125	0.0082	2.6	2.4	3.6	1.7	2.5	4.1	5.7	2.5
140	0.0108	2.7	2.6	3.9	1.8	2.7	4.5	6.1	2.7
160	0.0149	2.9	3.0	4.5	2.0	3.0	5.0	6.8	3.1
180	0.0195	3.1	3.3	5.0	2.2	3.3	5.5	7.4	3.4
200	0.0248	3.3	3.7	5.5	2.4	3.6	6.1	8.1	3.8
224	0.0298	3.7	4.1	6.2	2.7	4.0	6.8	8.2	4.2
250	0.0383	4.0	4.7	7.0	2.9	4.4	7.6	9.0	4.8
280	0.0494	4.5	5.3	7.9	3.2	4.8	8.5	9.9	5.4
315	0.0642	4.9	6.0	9.0	3.6	5.3	9.6	11.0	6.1
355	0.0806	7.5	7.6	11.4	-	-	11.8	14.3	7.0
400	0.1051	8.5	8.7	13.1	-	-	13.4	16.2	8.1
450	0.1356	10.0	10.0	15.1	-	-	15.3	18.5	9.4
500	0.1702	11.4	11.5	17.2	-	-	17.3	20.9	10.7
560	0.2169	12.9	13.3	19.9	-	-	19.9	23.9	12.4
630	0.2786	17.9	15.5	23.2	-	-	23.0	27.7	14.6
710	0.3584	21.2	18.2	27.3	-	-	26.8	32.3	17.2
800	0.4603	25.8	21.5	32.3	-	-	31.3	37.9	20.3

The weight of the fire dampers must factor in the weight of the

- installation subframes RE, RH, RR, ER6, the mounting frame AE or the mounting frame RV;
- for the version with actuator, the following weight supplements must be added:
  - M220-10/F; M24-10/F: 0,3 kg
  - M220-9/H; M24-9/H: 1,3 kg
  - M220-11/H; M24-11/H: 0,8 kg
  - EM-1, RM-1; EM-2: 41 kg

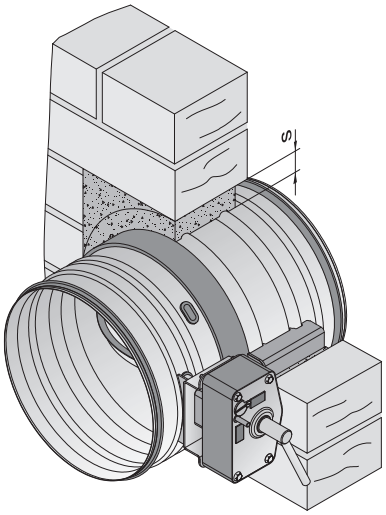
Nomenclature

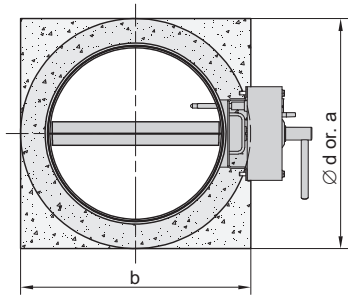
DN	[mm]	Nominal size
A_A	[m²]	Inflow cross-section
A_{free}	[m²]	Free cross-section
V	[m³/h]	Volume flow
v_A	[m/s]	Flow velocity in inflow cross-section (inflow velocity)
Δp_s	[Pa]	Static pressure drop
$L_{W\text{-}Oct}$	[dB]	Octave sound power level $L_{W\text{-}Oct} = L_{WA} + \Delta L$
ΔL	[dB]	Relative sound power level to L_{WA}
f	[Hz]	Octave mid frequency
L_{WA}	[dB(A)]	A-weighted, area-corrected sound power level

FR90 fire dampers

Installation in rigid walls and ceilings (1)

Installation without installation subframe (standard installation)





Installation opening a x b or ∅ d

a ≥ DN + 30 mm, b ≥ DN + 75 mm,

d ≥ DN + 75 mm

Clearance between FR90 fire dampers≥ 15 mm.

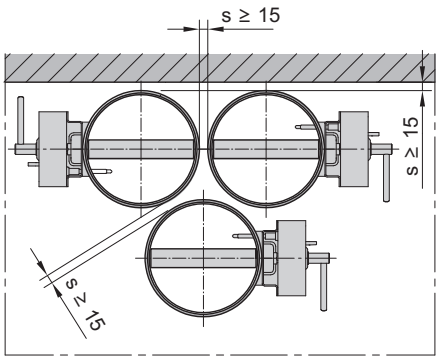
Installation does not require a specific opening when the wall or ceiling is built.

The rigid walls and ceilings can be made of concrete, lightweight concrete, porous concrete (aerated concrete) or plaster. They can be a masonry or wallboard construction and must have a bulk density of ≥ 450 kg/m³. Walls can also be fire walls, shaft walls, shafts or ducts.

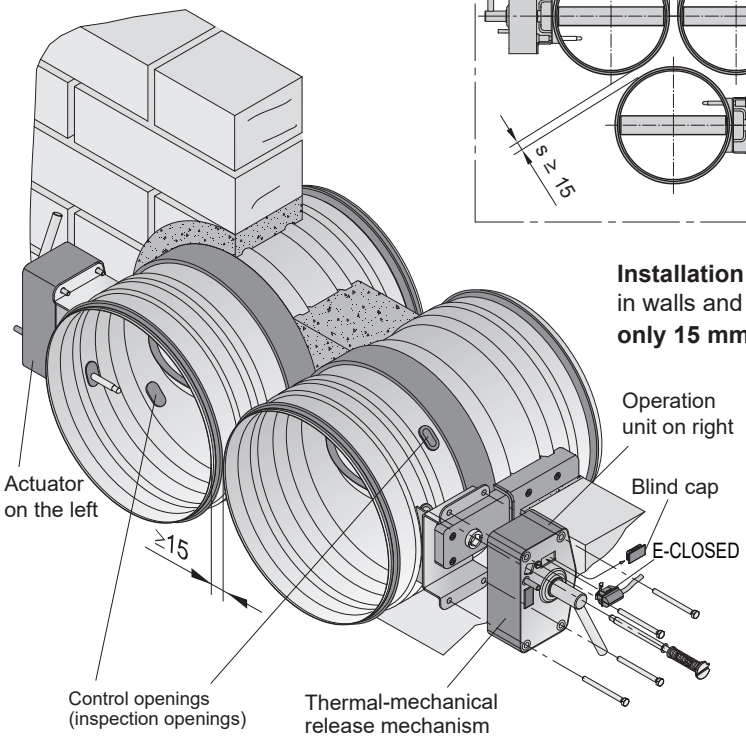
The all-round ≥ 15 mm wide **gap "s"** should be filled ≥ 100 mm deep with **mortar** of group II or III according to DIN 1053 or classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire-protection mortar or gypsum mortar.

To install the FR90 fire dampers in rigid walls and ceilings, **the minimum thicknesses W, D [mm]** are required:

Fire resistance period in minutes	30 60 **90**	30 60 90 **120**
Rigid walls	**95**	
Rigid ceilings	**100**	**115**



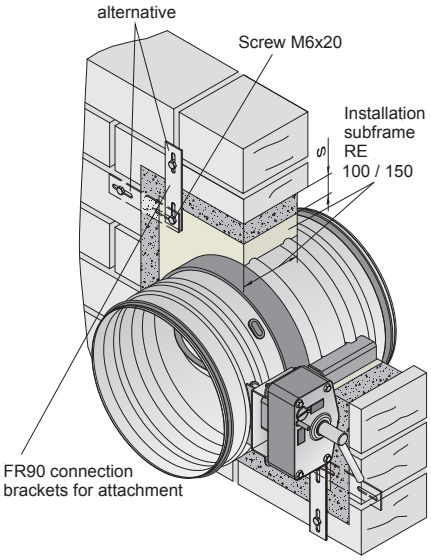
Installation with mortar in walls and ceilings with **only 15 mm spacing.**



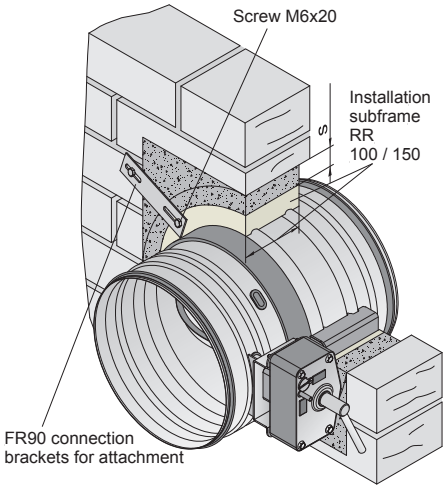
FR90 fire dampers

Installation in rigid walls and ceilings (2)

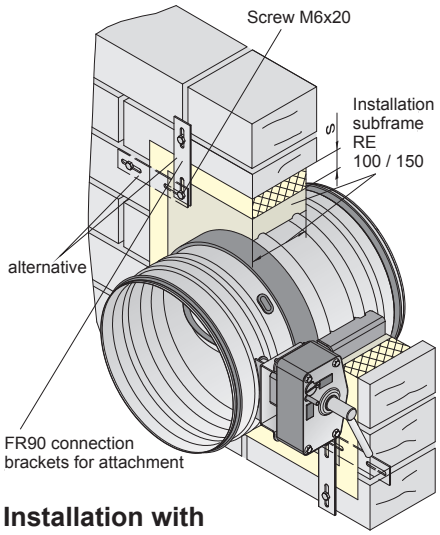
Installation with rectangular installation subframes RE100, RE150

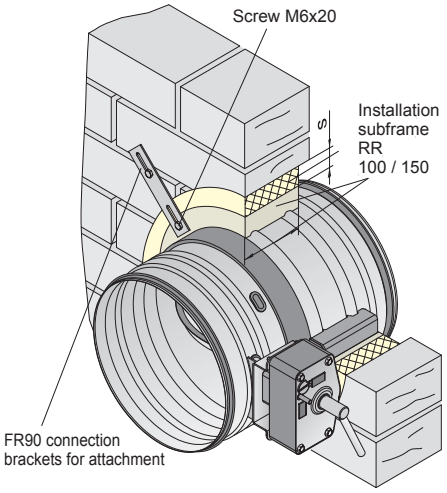


Installation with circular installation subframes RR100, RR150 (only DN ≤ 315 mm)

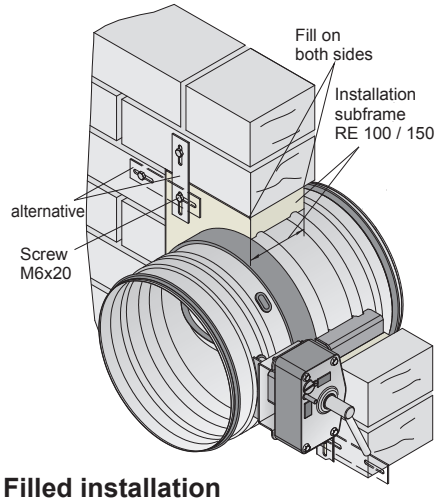


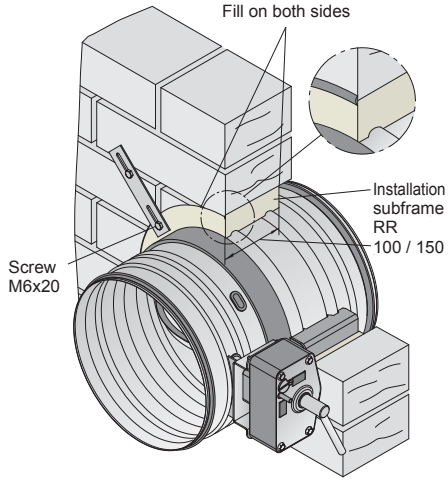
Installation with mortar





Installation with mineral wool



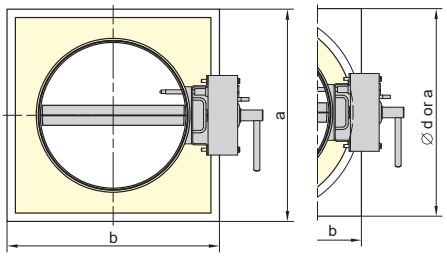


Filled installation

For installation in rigid walls and ceilings, **the minimum thicknesses W, D [mm]** are required:

Fire resistance period in minutes	30 **60**	30 60 **90**
Rigid walls	**70*)**	**100**
Rigid ceilings	**-**	**100**

*) This installation must **be performed with installation subframe RE100** or **RR100.**



Installation openings

- **Installation with mortar**

  DN ≤ 315: a x b = DN + 120 to 190

  DN ≥ 355: a x b = DN + 130 to 200

  DN ≤ 315: ∅ d = DN + 130 to 170

  DN ≤ 200: a x b = DN + 130

  Fill **gap s** with **mortar**! ⇒ see page 12

  Mortaring in ceilings must be secured from falling out by roughening the reveals or using mortar anchors!

- **Installation with mineral wool**

  DN ≤ 315: a x b = DN + 110 to 130

  DN ≥ 355: a x b = DN + 120 to 140

  DN ≤ 315: ∅ d = DN + 120 to 140

  Design **gap s ≤ 20 mm** and fill with **mineral wool**! ⇒ see page 14

  Mineral wool must be prevented from falling out by using a non-combustible **adhesive**! A sheet metal cover is recommended when using mineral wool!

- **Filled installation**

  DN ≤ 315: a x b = DN + 93 mm

  DN ≥ 355: a x b = DN + 103 mm

  DN ≤ 315: ∅ d = DN + 103 mm

  Joints must be designed approx. 2 mm and sealed on both sides of the wall or ceiling with **gypsum filler** or with non-combustible **adhesive!**

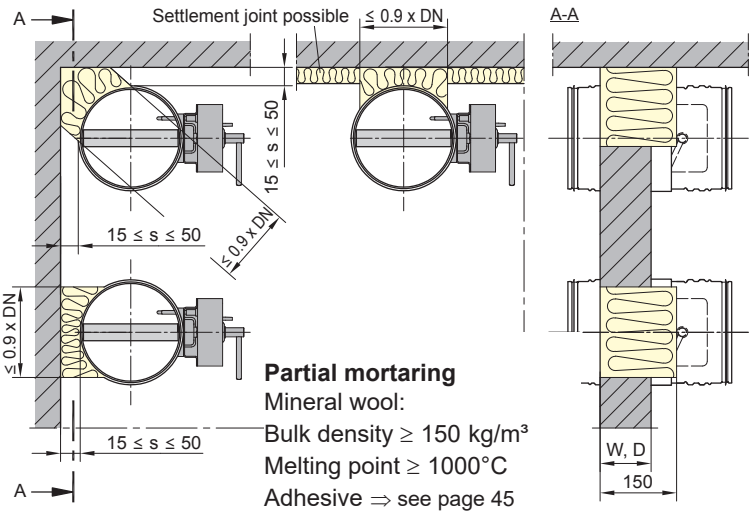
  Adhesive ⇒ see page 45

All dimensions in mm

FR90 fire dampers

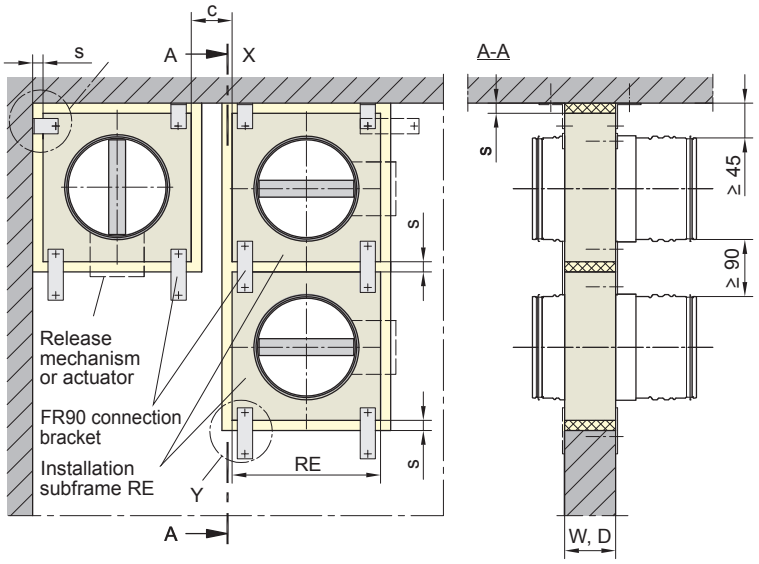
Installation in rigid walls and ceilings (3)

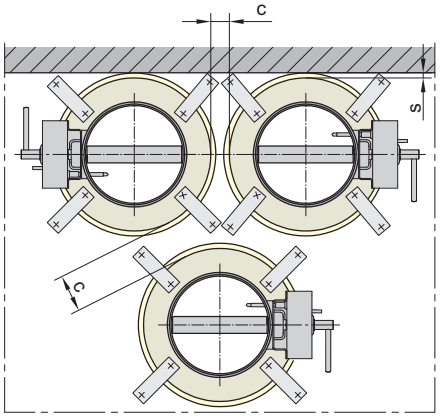
In hard-to access corners and directly **on walls and ceilings**, gaps "s" on FR90 fire dampers without installation subframe can be filled with two layers and 150 mm deep with **mineral wool** "Knauf Insulation TPD" or equivalent. They must be secured with non-combustible adhesive. A sheet metal cover is recommended when using **insulation wool**. Mortaring **in ceilings** must be prevented from falling out by roughening the reveals or using mortar anchors!



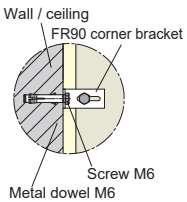
Partial mortaring
Mineral wool:
Bulk density ≥ 150 kg/m³
Melting point ≥ 1000°C
Adhesive ⇒ see page 45

Multiple installation of up to 4 x FR90 fire dampers of the same size side-by-side, above each other or in a combined manner is possible without any weight restriction. Assembly of frames RE ⇒ see page 21

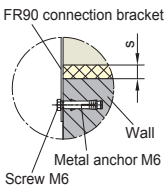




Detail X



Detail Y

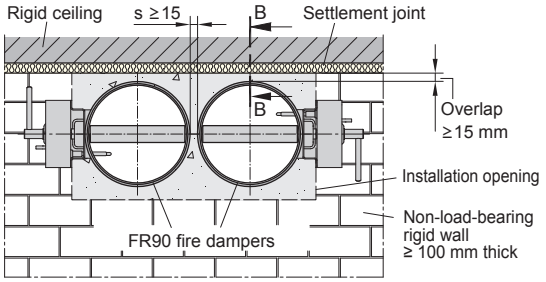


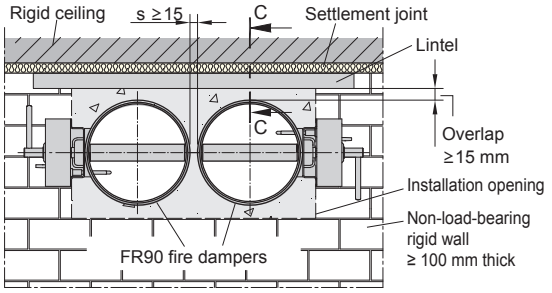
For installation in rigid walls and ceilings, **the minimum thicknesses W, D [mm]** are required**:**

Fire resistance period in minutes	30 60 **90**
Rigid walls	**100**
Rigid ceilings	**100**

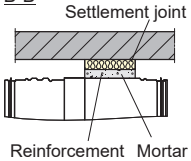
Types of walls and ceilings
⇒ see page 12

Settlement joints (sliding ceiling connection) above non-load-bearing rigid walls and under ceilings are filled on site, with mineral wool for example. The illustration shows the installation of FR90 fire dampers immediately under such settlement joints. A reinforcement should be inserted into the mortar bed or a lintel to prevent cracks from forming later.

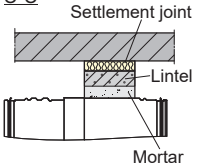




B-B



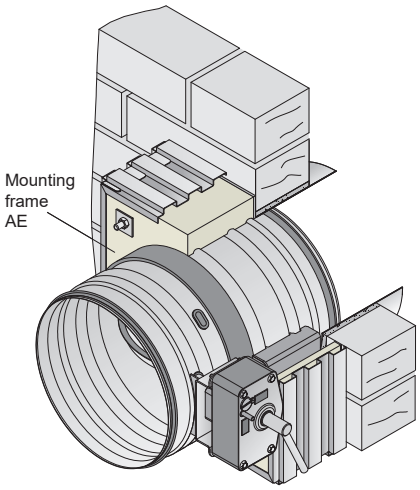
C-C



Spacings c between subframes RE or RR that are not directly next to each other depend on the structural properties of the wall or ceiling. C ≥ 50 mm is normally sufficient. For installation in walls, 4 x **FR90 connection brackets** or **FR90 corner brackets** are required on one side; for installation in ceilings, they are necessary on both sides (8 x).

FR90 fire dampers

Mounting on rigid walls and ceilings



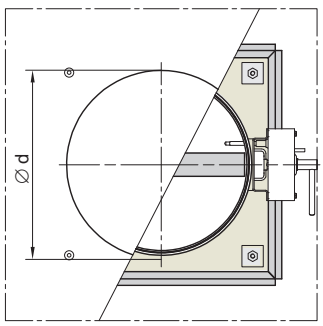
Mounting on masonry (example)

Mounting frames AE should be secured with threaded rods which pass through the wall or ceiling, and washers and nuts on both sides.

Dowels with verification of fire protection suitability can be used in suitable walls and ceilings.

Factory-produced holes in the mounting frames AE indicate the number of the fastenings.

DN [mm]	pc per corner	pc in total
≤ 315	1	4
≥ 355	2	8



Installation opening

∅d = DN + 10 to 15 mm

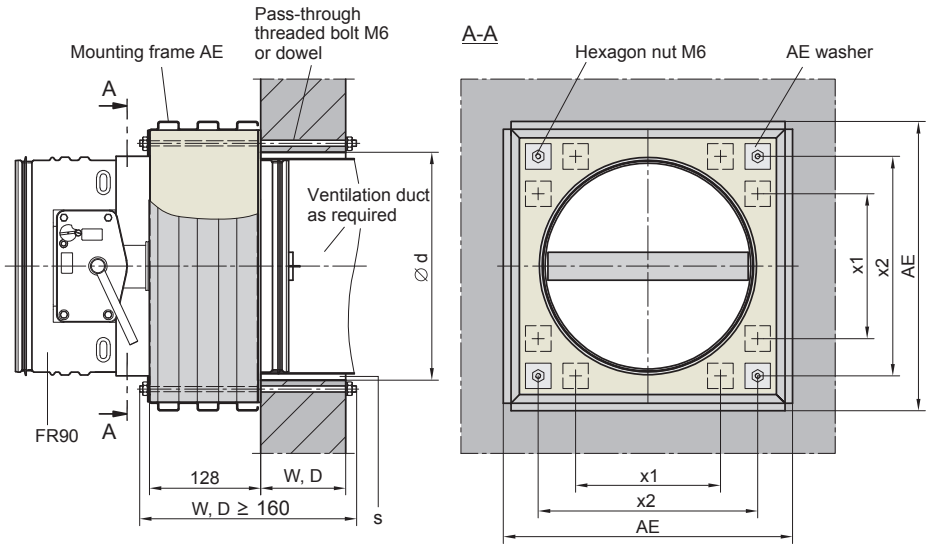
The gap between ventilation duct and wall or ceiling does not need to be filled.

Mounting with mounting frame AE

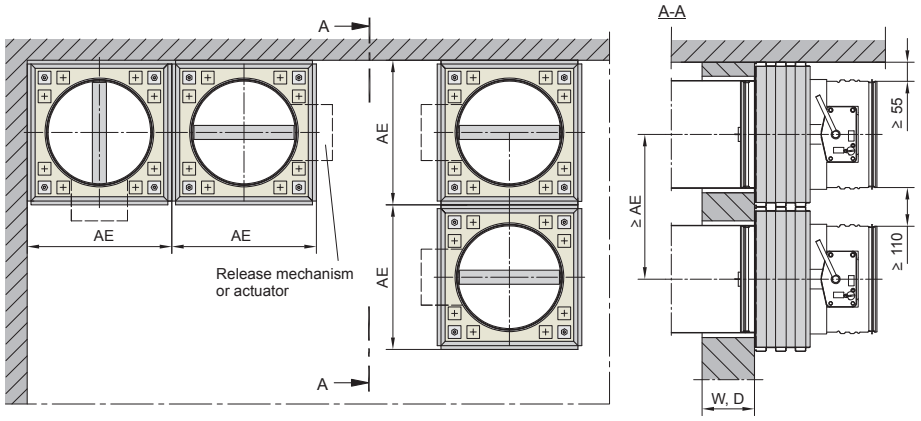
Types of walls and ceilings ⇒ see page 12

To mount the FR90 fire dampers, the opposite **Minimum thickness W, D [mm]** is required:

Fire resistance period in minutes	30 60 **90**
Rigid walls and ceilings	**100**



DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
AE	210	235	250	270	290	310	334	360	390	425	475	520	570	620	680	750	830	920
x1	-	-	-	-	-	-	-	-	-	-	228	250	275	300	330	365	405	450
x2	120	145	160	180	200	220	244	270	300	335	385	430	480	530	590	660	740	830



Spacing between the mounting frames AE of the FR90 fire dampers and from the adjacent walls and ceilings is not required.

Ventilation ducts on the non-operation side of the FR90 fire damper can be fed through the wall or ceiling and should lie flush. The connection of the FR90 fire damper on the non-operation side can be fully inserted in these.

Connections can be made to the casing of missing fire dampers if it is ensured that the damper blade can move freely! ⇒ see page 9

All dimensions in mm

FR90 fire dampers

Installation in metal stud walls (1a) General

Wall types

The walls, shaft walls, facings, fire walls etc. must be produced according to the manufacturer's specifications or technical standards. General building authority test certificates (AbP) must be observed in Germany.

Consideration must be given to specifications for design, fire resistance period and fire safety classification, specified wall widths, wall heights and wall thicknesses, and dimensionings for studding and cladding.

- Flexible walls of the "metal stud wall" type can be clad on one side or both sides. The cladding may be single-layer or multi-layer, depending on the fire resistance period.

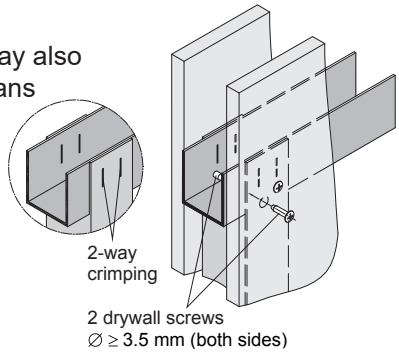
  In general, shaft walls and facings should be clad on one side. Shaft walls without metal studs should only be fastened at the side. ⇒ see pages 26 to 27

  Fire walls and safety partition walls are metal stud walls with multi-layer cladding on both sides, and can contain inlays made from sheet steel. ⇒ see page 35
- Metal stud walls can be produced with or without mineral wool between the metal studs.
- Cladding made of DF type gypsum boards according to EN 520 or equivalent cladding material (fire-resistant plasterboards, cement-bound boards, calcium silicate boards, etc.) must be fixed in a manner appropriate to the wall in question.

  In the perimeter area of the FR90 fire dampers, cladding must be secured with drywall screws of a suitable length and ≥ 3.9 in diameter at spacings of ≤ 200 mm or ≤ 150 mm. ⇒ see pages 18 to 27 and 35
- Profiles for metal stud walls are described by DIN 18182 and EN 14195, and constructions by DIN 18183.
- FR90 fire dampers may be installed in metal stud walls with **up to 1000 mm metal stud spacing** (span), and have been tested accordingly.
- The required bay rails and stiffeners should be used for installing FR90 fire dampers in metal stud walls so as to produce circumferential frames. Intersections must be connected with two blind rivets made from steel with diameters of 4 to 5 mm or with drywall screws with diameters of ≥ 3.5 mm and lengths of ≥ 10 mm.

  Two-way prefixing may also be performed by means of clinching (**crimping**), as is typical in dry construction. Two joint points should be used.

  In addition, the claddings must be connected to the metal framework at the intersections using double-connected screw fastenings.



The following **minimum thickness W [mm]** is required for installing FR90 fire dampers:

Fire resistance period in minutes		30 **60**	30 60 **90**	30 60 90 **120**
Metal stud walls with cladding on both sides	≥ 1-layer cladding	**70**	-	-
	≥ 2-layer cladding	-	**95**	**95**
Shaft walls made of wall boards, at least 2-layer	with metal studs	-	**90**	-
	without metal studs	-	**40**	-

Details according to wall types ⇒ see pages 18 to 27

- **Fillings** suitable for **gap "s"**:

  Openings in the **gap "s"** can be filled manually or mechanically with **mortar** of group II or III according to DIN 1053 or classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar.

  The minimum thickness W of the wall is generally sufficient as the depth of mortaring.

  "Knauf Insulation TPD" **mineral wool** or equivalent with bulk density ≥ 150*) kg/m³, building material class A according to DIN 4102 or according to EN 13501-01 and melting point ≥1000°C must be used; darning wool as well.

  Mineral wool should be fixed to prevent it falling out by using a non-combustible **adhesive**.

  Adhesive ⇒ see page 45

  In the case of **installation subframes RE** in metal stud walls, the gap can also be filled with cladding panels made of wall-building materials, construction boards made from calcium silicate, mats made of calcium-magnesium silicate or with ceramic fibre; the building material class A and ≥ 1000°C melting point is always required.

*) Lower bulk densities are possible for shorter fire resistance periods of less than 90 minutes! ⇒ see page 19

FR90 fire dampers

Installation in metal stud walls (1b) Metal framework

Installation openings for FR90 fire dampers require cutouts in cladding, and trimmers or particular arrangements may be required in metal studs.

Sub-structures of metal stud walls consist of CW profiles as supports. These should be set on the floor and on the ceiling in UW profiles fastened to the floor and ceiling. Supports adjoining rigid walls are then attached to these profiles.

Installation openings for FR90 fire dampers should be produced, as described above, as circumferentially sealed frames made of profiles. Sealed profile webs are possible, if required, using box-shaped nesting. These are adjoined by fillings made of mineral wool or mortar or installation subframes RE of the fire dampers. Exceptions are possible with installation openings which have an accurate fit.

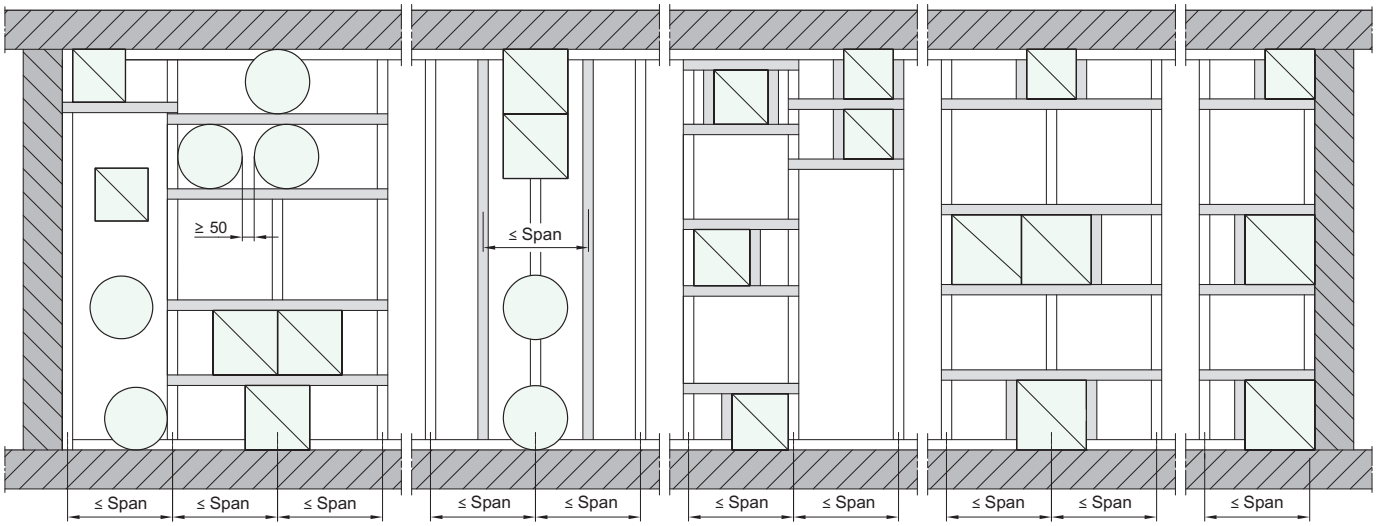
Severed supports will require trimmers which can simultaneously serve as the frame for the installation openings.

Trimmers are needed for installation openings with widths larger than the spans.

Examples of installation openings

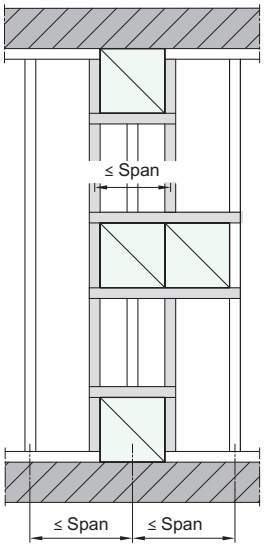
Installation **with installation subframes** in wall thicknesses ≤ 150 mm

Installation **with mortar, mineral wool, installation subframe**

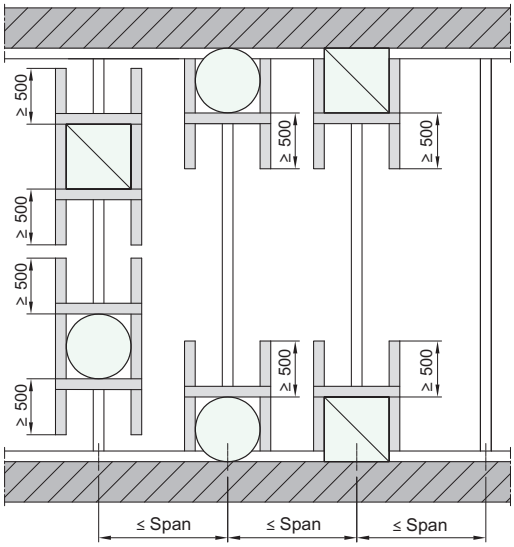


Depending on the type of wall, suitable connections can be used to **interrupt profiles on ceilings and floors** for the purpose of installing FR90 fire dampers. ⇒ see pages 18 to 22, 26 to 27

Trimmers, as shown for retroactive installation, require additional metal studs on the left and right. These should be set in the floor and ceiling profiles.



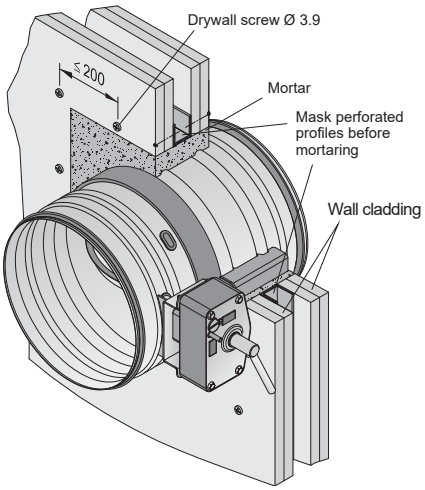
For this purpose, the wall can be cut and new openings created. New claddings must then be attached to the added and existing studs, making sure to maintain the necessary overlaps. Surplus studs can be removed as long as the intended spans are not exceeded.

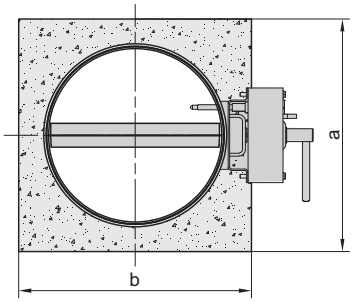


For **H trimmers** with horizontal profiles above and below the installation opening and with vertical profiles on the right and left edge, non-adjacent vertical profiles must be ≥ 500 mm longer. Cladding for these profiles must be screwed on with spacing of ≤ 200 mm.

FR90 fire dampers

Installation in metal stud walls (2) Installation with mortar

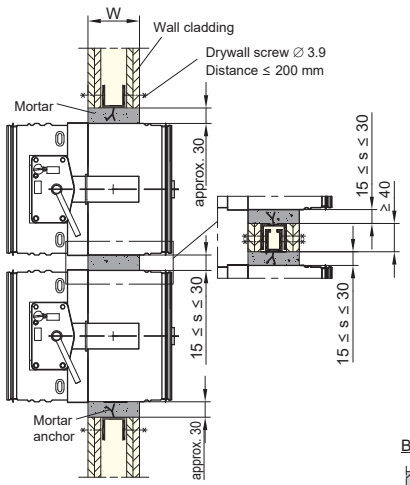




Installation openings

a x b or ∅d ≥ DN + approx. 60 mm

Connections within the wall



Partial mortaring

(up to fire resistance class EI 90)

Gap "s" = 15 mm to 50 mm should be filled 150 mm deep with mineral wool in two-layer cut-outs from boards and fixed in place to prevent falling out using non-combustible adhesive. A sheet metal cover is recommended when using mineral wool!

Installation with mortar

Types of metal stud walls with cladding on both sides ⇒ see pages 16 and 17

The **minimum thicknesses W [mm]** shown opposite are required for installing the FR90 fire dampers:

Fire resistance period in minutes	30 60 90 **120**
Walls with ≥ 2-layer cladding on both sides	**95**

Weight limit

FR90 fire dampers with a total weight **of ≤ 90 kg including mortar (approx. 2200 kg/m³)** may be installed between two metal studs!

Total weight [kg] of fire damper incl. mortar with W = 100 mm*)

DN	100	125	140	160	180	200	224	250	280
[kg]	6	7	8	9	10	11	13	14	16
DN	315	355	400	450	500	560	630	710	800
[kg]	19	24	28	33	37	44	52	62	75

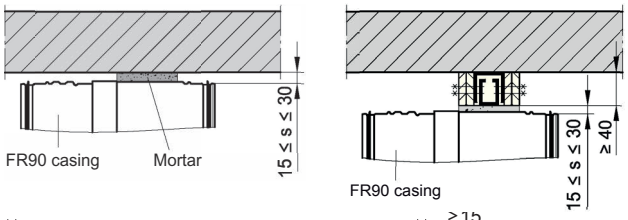
*) the weights should be multiplied by 1.35 for W = 150 mm.

The table applies for installation openings of the size DN+ 60 mm.

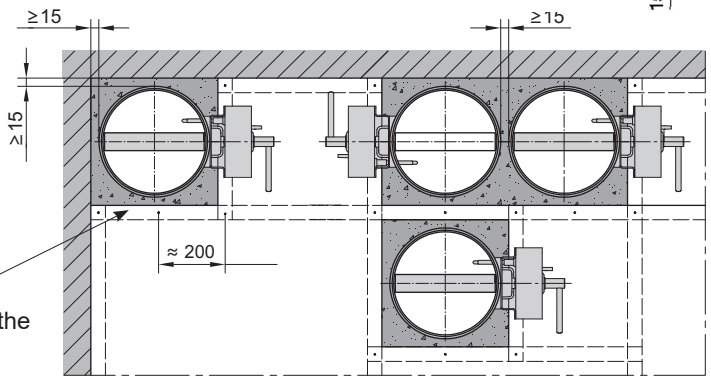
Mortar anchors made from, for example, riveted perforated tape must be attached to the **metal profiles** of the wall, at least 1 piece per side, with approx. 200 mm spacing.

Openings in perforated metal profiles must be masked with adhesive film before mortaring.

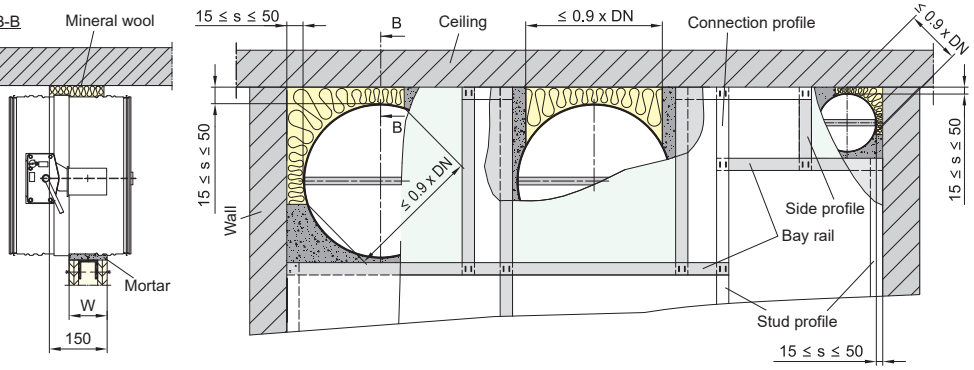
Connections to rigid walls, ceilings, floors:



Distances between FR90 fire dampers and adjacent walls and ceilings



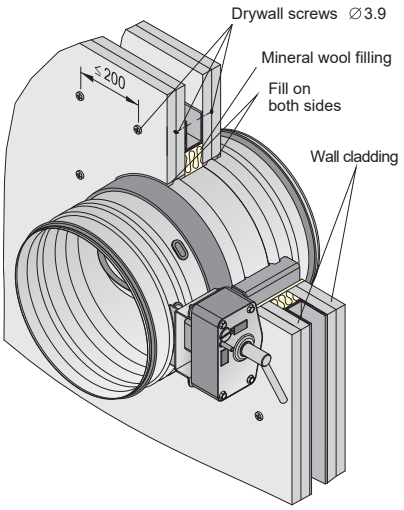
Bay rail between the fire dampers

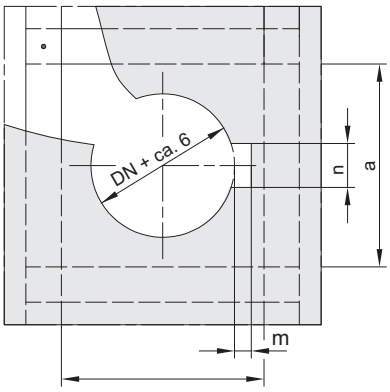


Mortar, mineral wool ⇒ see page 16 **Adhesive** ⇒ see page 45

FR90 fire dampers

Installation in metal stud walls (3) Installation with mineral wool





Installation openings

- **Metal studs**
  a x b ≥ DN + approx. 60 mm
- **Cladding**
  The notch m x n is required on the operation side. On the non-operation side it is only needed if the dimension "o" on the non-operation side is greater than the wall thickness (W), minus the thickness of the cladding.

	m	n	o
DN ≤ 315	26	62	107
DN ≥ 355	31	98	116

- **Mineral wool filling**
  The bulk density of the mineral wool filling around the casing of the FR90 fire damper for a fire resistance period of 90 minutes must be ≥ 150 kg/m³; for 60 minutes ≥ 100 kg/m³ is sufficient and for 30 minutes ≥ 50 kg/m³ is sufficient.

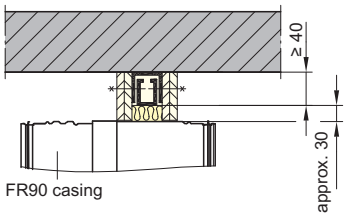
Installation with mineral wool

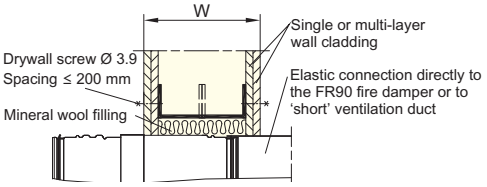
Types of metal stud walls with cladding on both sides ⇒ see pages 16 and 17

The **minimum thickness W [mm]** shown opposite is required for installing the FR90 fire dampers:

Fire resistance period in minutes	30 60 90 **120**
Walls with ≥ 2-layer cladding on both sides	**95**

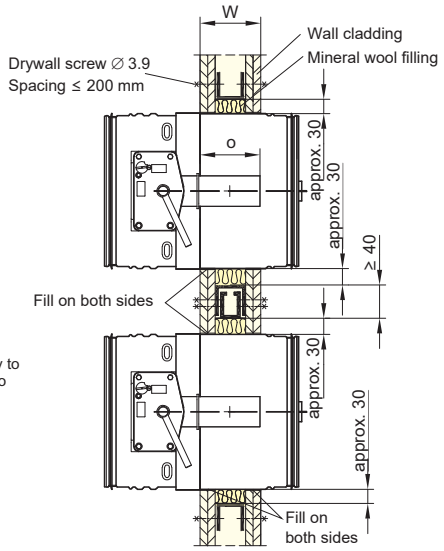
Connection to rigid walls, ceilings, floors



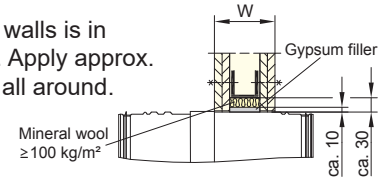


Example for thicker wall

Connection within the wall



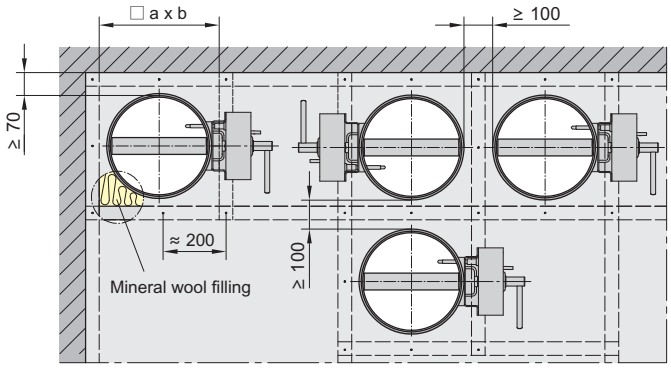
Installation in EI 120 walls is in principle unchanged. Apply approx. 10 mm gypsum filler all around.



Distances

between FR90 fire dampers and adjacent walls and ceilings

⇒ see page 14



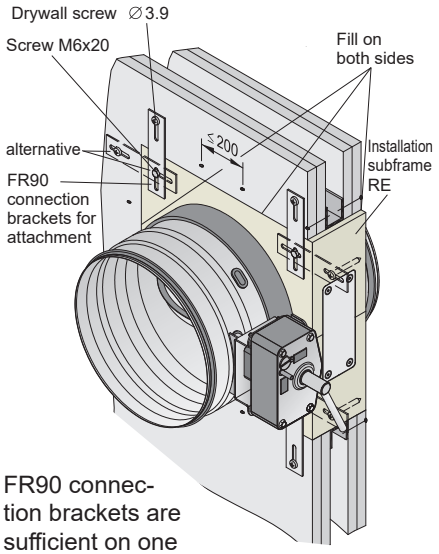
Installation recommendation

- Construct metal stud wall with an installation opening and apply cladding on the one side.
- Fill installation opening with mineral wool and apply a second cladding.
- Cut installation opening in claddings and mineral wool filling and chamfer them all around.
- Insert and align fire damper.
- Seal remaining joints with gypsum filler or equivalent.

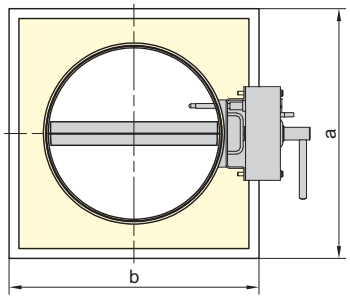
All dimensions in mm

FR90 fire dampers

Installation in metal stud walls (4a) Installation with installation subframe

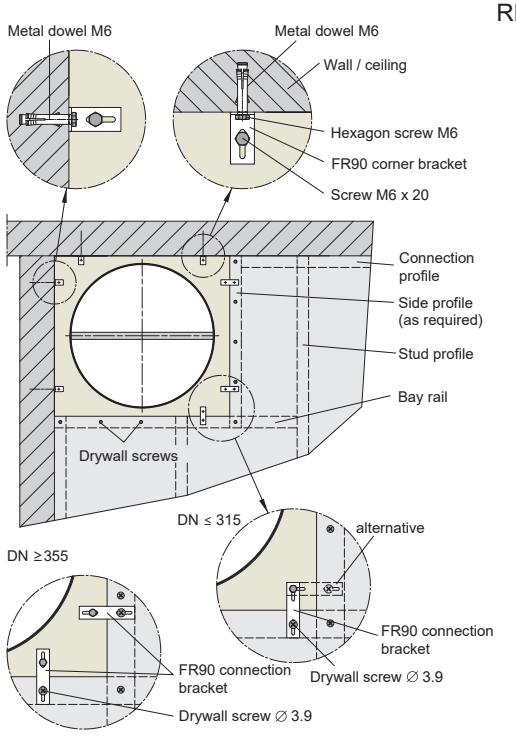


FR90 connection brackets are sufficient on one side of the wall.



Installation opening

- DN ≤ 315: a x b = DN + 91^{+3} mm
- DN ≥ 355: a x b = DN +101^{+3} mm



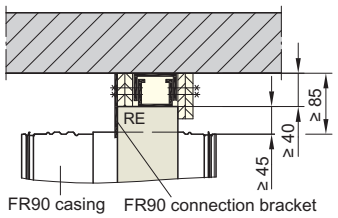
Installation with rectangular installation subframe RE

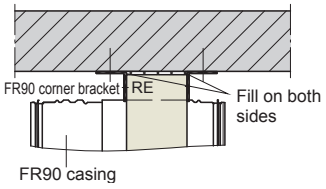
Types of metal stud walls with cladding on both sides ⇒ see pages 16 and 17

The minimum thicknesses W [mm] shown opposite **are required for installing the** FR90 fire dampers:

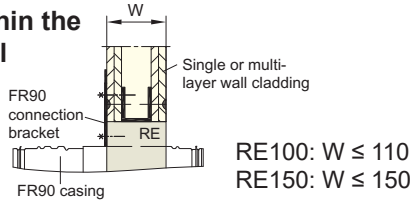
Fire resistance period in minutes		30 **60**	30 60 **90**
Walls with cladding on both sides	≥ 1-layer cladding	**70**	-
	≥ 2-layer cladding	-	**95**

Connections to rigid walls, ceilings, floors

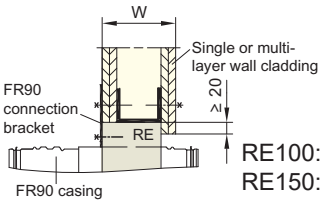




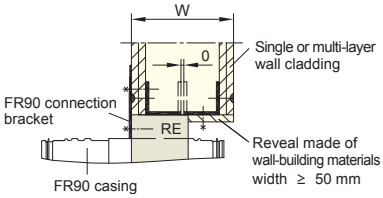
Connections within the wall



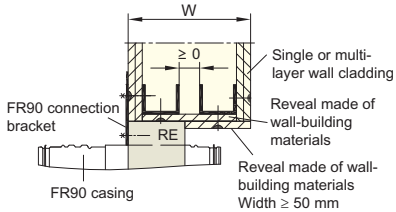
RE100: W ≤ 110
RE150: W ≤ 150



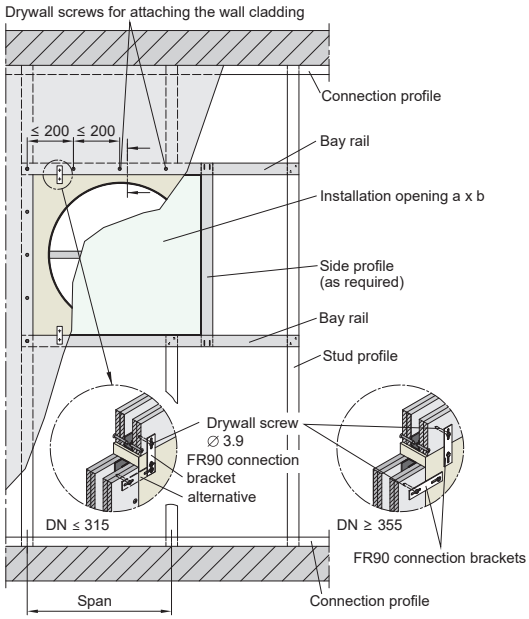
RE100: W = 125
RE150: W = 175

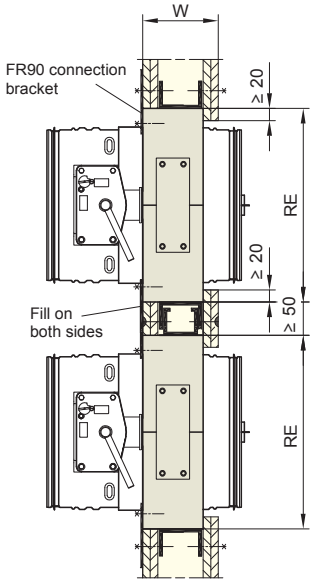


RE100: W ≥ 150
RE150: W ≥ 200



RE100: W ≥ 150
RE150: W ≥ 200





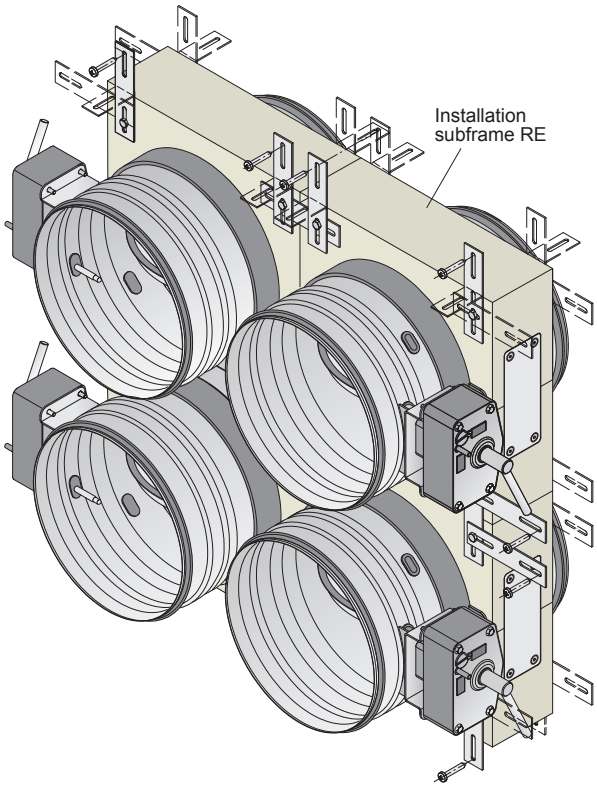
≥ 50 mm spacing is required between the frames of the FR90 fire dampers.

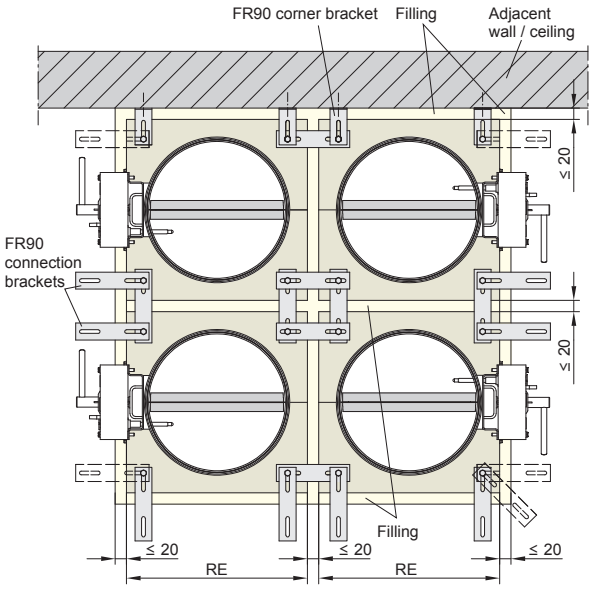
Fire walls and safety partition walls ⇒ see page 35

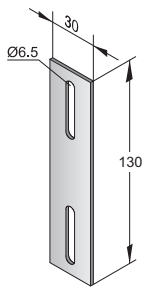
All dimensions in mm

FR90 fire dampers

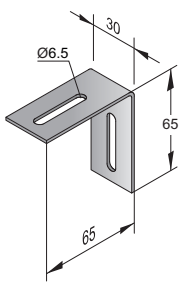
Installation in metal stud walls (4b) Multiple installation







FR90 connection bracket



FR90 corner bracket

Multiple installation with rectangular installation subframe RE

Types of metal stud walls with cladding on both sides
⇒ see pages 16 and 17

The following **minimum thickness W [mm]** shown is required for installing the FR90 fire dampers**:**

Fire resistance period in minutes	30 60 **90**
Walls with ≥ 2-layer cladding on both sides	**95**

Up to 4 of the same nominal sizes may be **installed** side-by-side, above each other or in a combined manner.

They should be connected together using FR90 connection brackets and screws M6 x 20. They should be screwed on both sides of the installation subframe into the factory-produced threaded sockets provided.

Reveals of the installation subframe must be **filled** with **gypsum filler** or non-combustible **adhesive**; **mineral wool** is possible! ⇒ see page 16

Accordingly, there are **spacings of ≤ 2 mm or ≤ 20 mm** between the installation subframes.

- Installation with circumferential metal profiles ⇒ see page 20

  Weight limit ≤ 90 kg

  Installation possible together:

Pc:	2	3	4
RE100	≤ DN 800	≤ DN 560	≤ DN 450
RE150	≤ DN 630	≤ DN 500	≤ DN 400

- Installation without circumferential metal profiles ⇒ see page 22

  Weight limit ≤ 50 kg

  Installation possible together:

Pc:	2	3	4
RE100	≤ DN 500	≤ DN 355	≤ DN 315
RE150	≤ DN 400	≤ DN 315	≤ DN 280

FR90 connection brackets are used for fastening in metal stud walls, and FR90 corner brackets are used for fastening to adjoining rigid walls and ceilings. Factory-produced threaded sockets in the installation subframes are provided for the M6 x 20 screws.

Assembled multiple fire dampers should be installed in the same way as a single fire damper. This and the other fastening is given under the wall type, as well as the sealing of the reveal. ⇒ see page 20

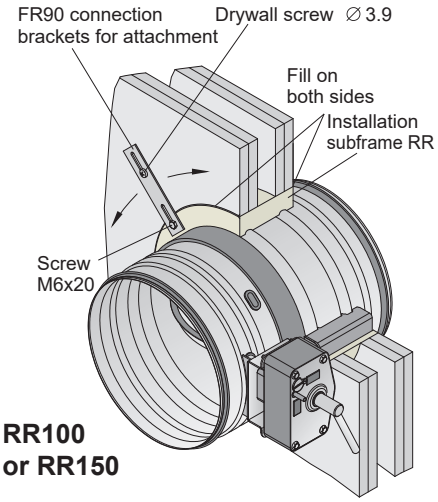
Installation subframes RE can be installed immediately next to each other. Other installation spacings depend on the thickness of the filling used.

Adhesive ⇒ see page 45

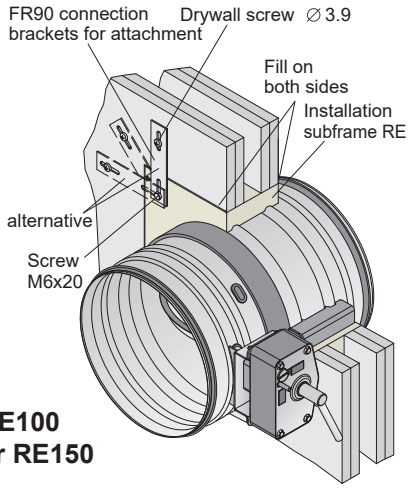
All dimensions in mm

FR90 fire dampers

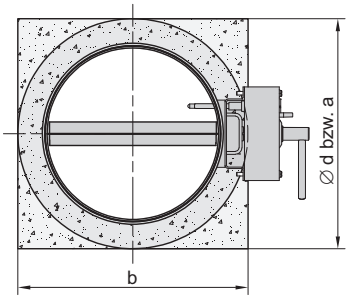
Installation in metal stud walls (5) Installation with installation subframe without all-round profiles



RR100 or RR150



RE100 or RE150



Installation opening

- DN ≤ 315: ∅ d = DN + 101^{+3} mm
  a x b = DN + 91^{+3} mm
- DN ≥ 355: a x b = DN + 101^{+3} mm

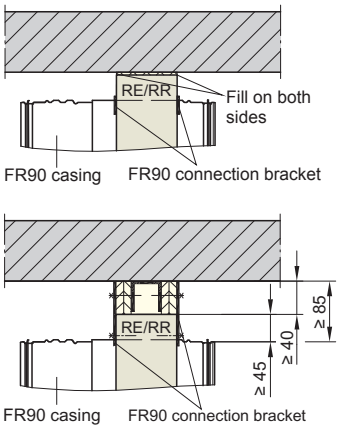
Installation with circular installation subframes RR (DN ≤ 315 mm) **and with rectangular installation subframes RE.** ***No profiles are required circumferentially in the wall.***

Types of metal stud walls with cladding on both sides ⇒ see pages 16 and 17

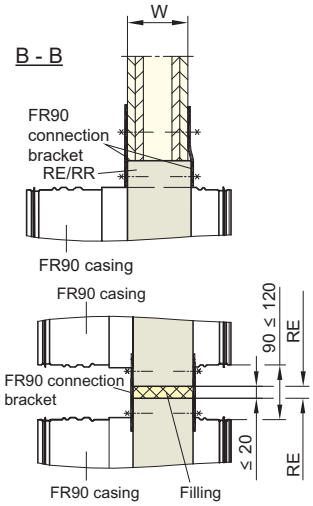
The **minimum thickness W [mm]** shown opposite is required for installing the FR90 fire dampers:

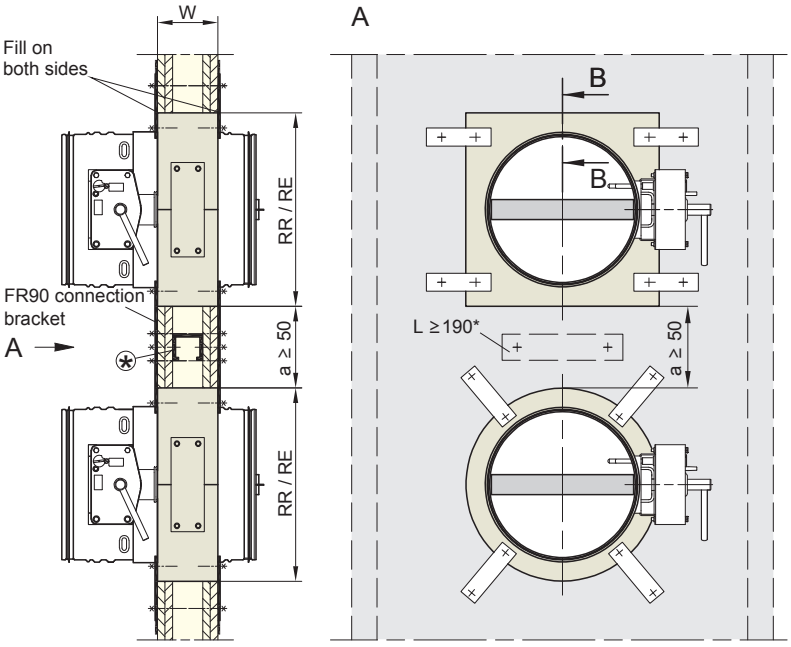
Fire resistance period in minutes	30 60 **90**
Walls with ≥ 2-layer cladding on both sides	**95**

Connections to rigid walls, ceilings, floors



Connections within the wall





Installation

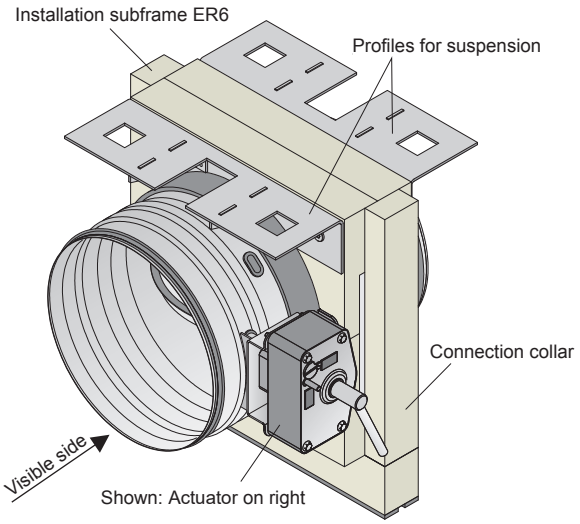
- The thickness of the installation subframes RR or RE (100 or 150 mm) should always be chosen equal to or larger than the wall thickness!
- An installation opening should be cut through the clad wall.
- The damper should be inserted and fastened with FR90 connection brackets on both sides.
- Remaining joints should be sealed on both sides with gypsum filler as usual for this type of wall.

(*) Spacings a = 50 mm to 100 mm between installation subframes RR and RE require a ≥ 190 mm long stud profile in the wall for stiffening. It is inserted via the installation openings into the wall cavity and fastened to the claddings with two drywall screws.

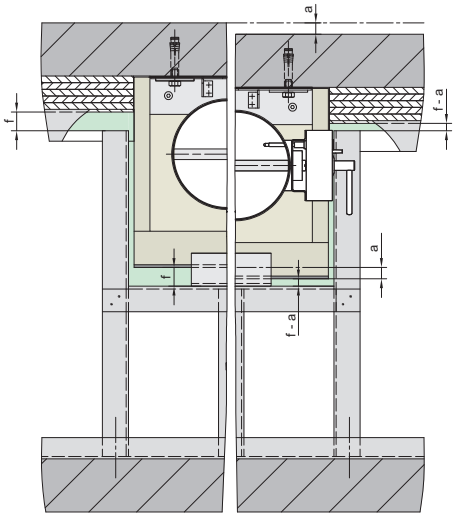
All dimensions in mm

FR90 fire dampers

Installation in metal stud walls (6a) Sliding ceiling connection



FR90 fire damper with installation subframe ER6



Function and installation principle

The half-sections show the installed state on the left, and a state lowered by a dimension a ≤ f ≤ 40 mm on the right.

Installation with ER6 installation frame for sliding ceiling connection.

Types of metal stud walls with cladding on both sides
⇒ see pages 16 and 17

The following **minimum thickness W [mm]** shown is required for installing the FR90 fire dampers**:**

Fire resistance period in minutes	30 60 **90**
Walls with ≥ 2-layer cladding on both sides	**95**

- Sliding ceiling connections are required where a ceiling drop of f ≥ 10 mm is expected.

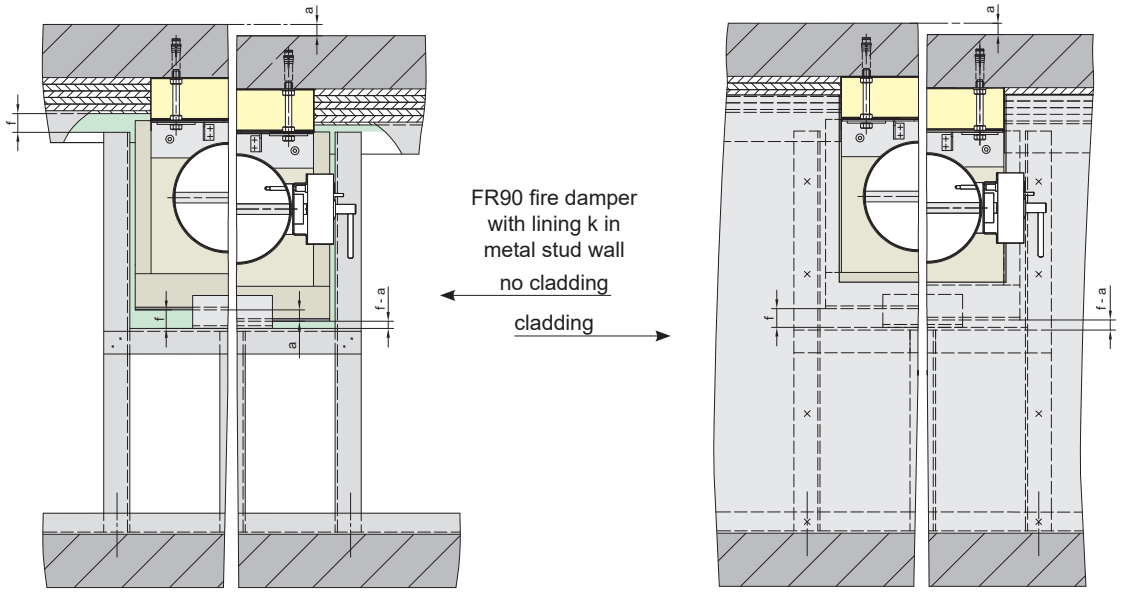
  The designs of the expansion joints are described in DIN 4102-4 for a drop of f ≤ 20 mm. Designs for f ≤ 40 mm, for instance, include general building authority test certificates (AbP). Conventional installation of fire dampers is only possible in a wall area that is far below the ceiling connections of up to 200 mm in height.
- FR90 fire dampers with installation subframes ER6, on the other hand, can be fitted directly below rigid ceilings, or with a clearance of 30 mm to 80 mm. They guide the sliding ceiling connection around the FR90 fire damper. This is fastened in such a way that it lowers together with the ceiling and the ventilation ducts. As shear forces can also be absorbed, the ventilation ducts do not have to be flexibly connected with the elastic supports.
- Order information:

  "Actuator on left", "Actuator on right" (shown), "Actuator below"

  Stud profile depths S = 50, 60, 75, 85, 100, 125 mm

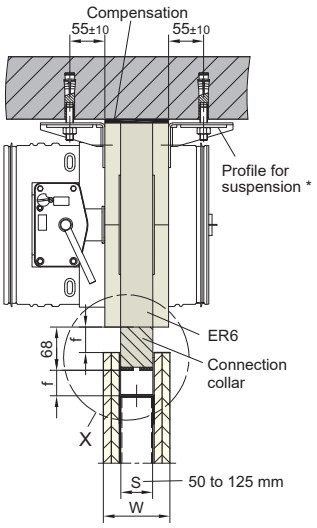
  ⇒ see pages 7, 8, 24 and 25

Installation with lining k of up to 80 mm in thickness underneath a rigid ceiling.

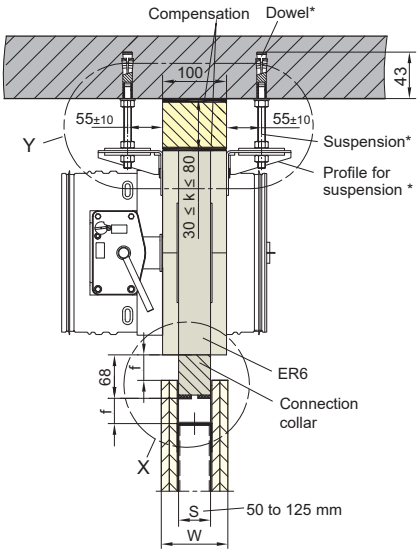


FR90 fire dampers

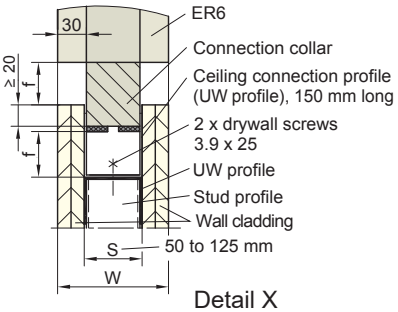
Installation in metal stud walls (6b) Sliding ceiling connection



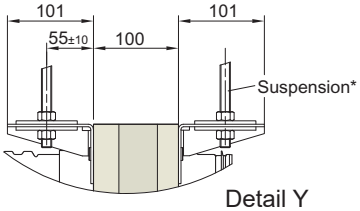
Installation without lining



Installation with lining
k = 30 to 80 mm
(including compensation)



Detail X

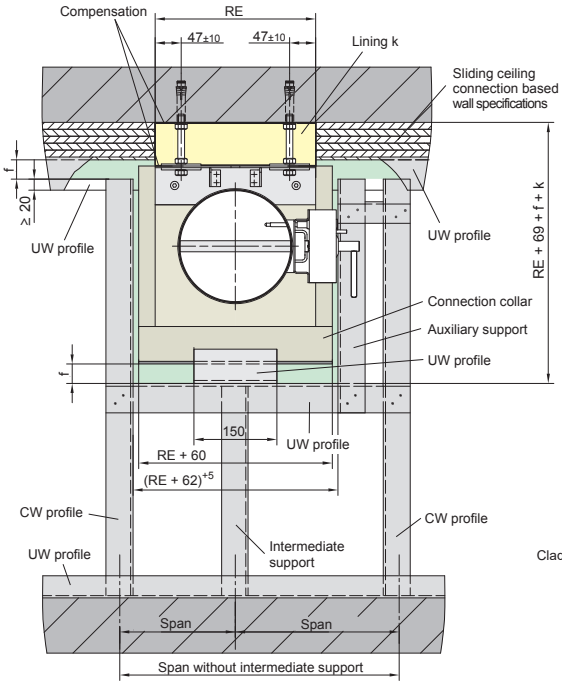


Detail Y

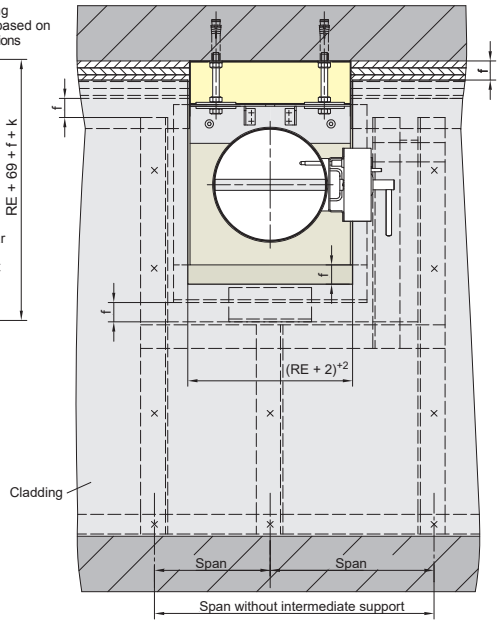
*) Supplied together with installation subframe ER6. The installation instructions for the plugs must be observed! The Zykon drills with drive-in mandrels needed for installation can be supplied as optional items.

Installation

- Installation subframes ER6 must fit the stud profile depth "S" of the metal studs.
- Installation subframes ER6 can be installed directly below rigid ceilings or with a space of 30 to 80 mm. The space must be sealed with a lining k attached to the ceiling and made from 100 mm wide strips of calcium silicate board with a bulk density of ≥ 500 kg/m³.
- **The surfaces of the ceilings must be smooth and even!** If required, levelling work should also be performed (plastering, smoothing etc.). Gaps and joints between the installation subframe ER6, the lining k and the ceiling must be levelled out and sealed in a manner appropriate to the wall in question. Any gaps remaining in the reveal between the connection collar and ceiling connection profiles must be sealed; either using strips made of wallboard and/or gypsum filler or with mineral wool strips (melting point ≥ 1000°C and ≥ 80 kg/m³ bulk density) and non-combustible adhesive.
- Fire dampers with installation subframes ER6 should be screwed onto the rigid ceiling using the M12 suspension components provided, and should then be aligned.
- The metal studs can then be positioned, whereby intermediate supports and lateral auxiliary supports must be fitted underneath the FR90 fire dampers if required due to the spans.
  There must also be clearances for incorporating the planned ceiling drop below the attached FR90 fire dampers in the area of the CW profiles, any CW intermediate supports, UW profiles and claddings.
- Wall claddings must be attached according to general building authority test certificates and technical standards.



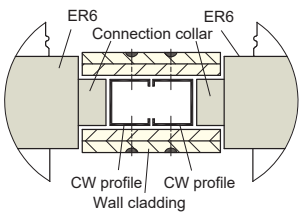
Installation and arrangement of the metal studs

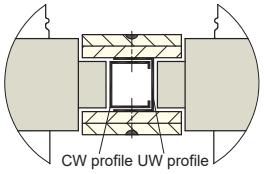


Cladded wall

Examples for installation of two fire dampers next to each other

- one installation opening is required for each fire damper.
- The respective profiles can be interleaved.





All dimensions in mm

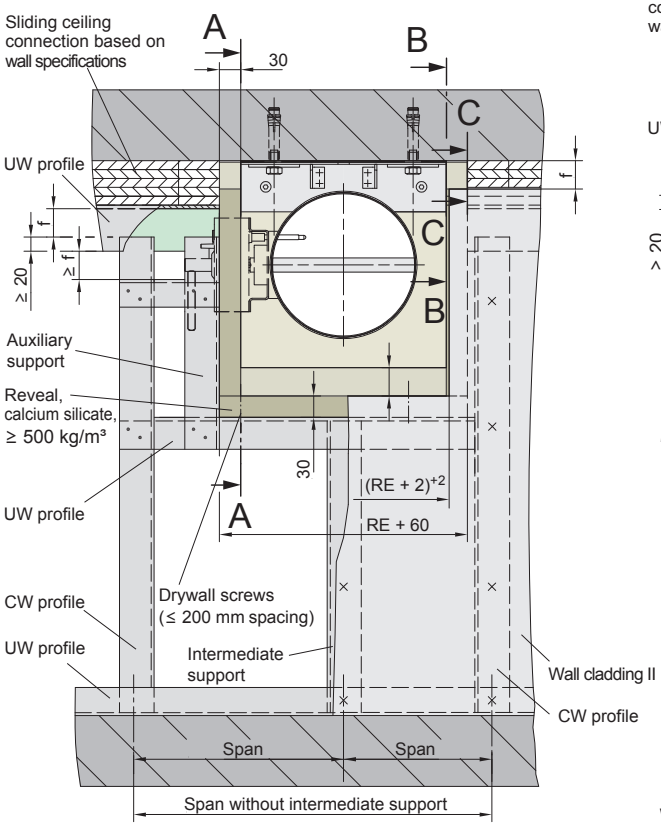
FR90 fire dampers

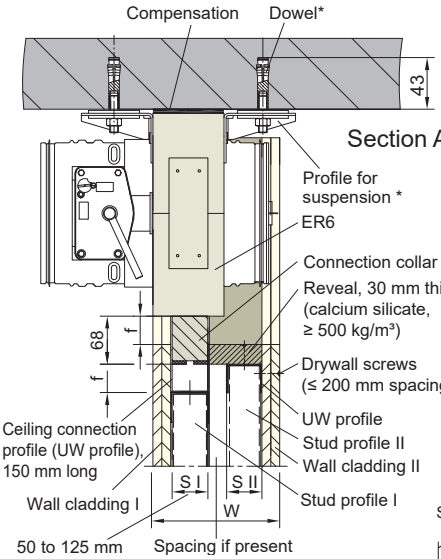
Installation in metal stud walls (6c) Sliding ceiling connection

These views relate to the back of the wall or the non-operation side of the FR90 fire damper!

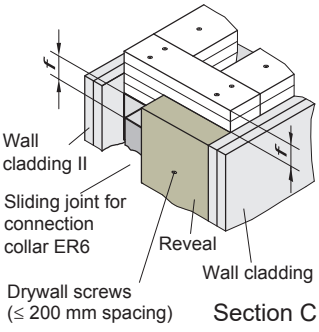
Installation in double-studded walls

- **Directly underneath ceilings**

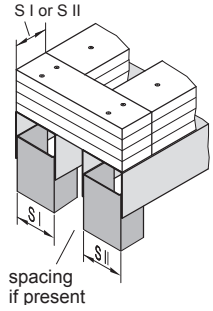




*) Supplied together with installation subframe ER6.

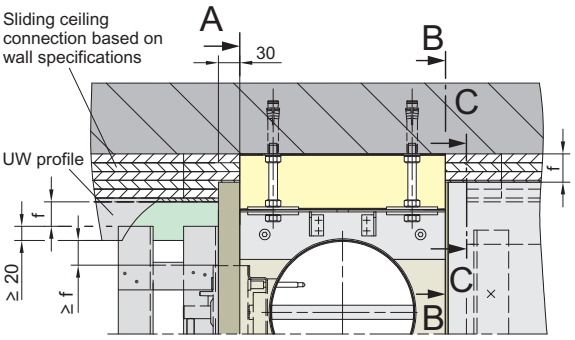


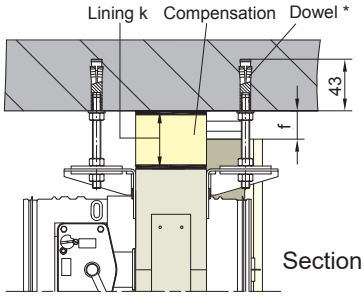
Section C - C



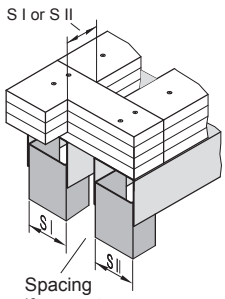
Section B - B
shown without connection collar

With lining for spacing of ≤ 80 mm from ceilings

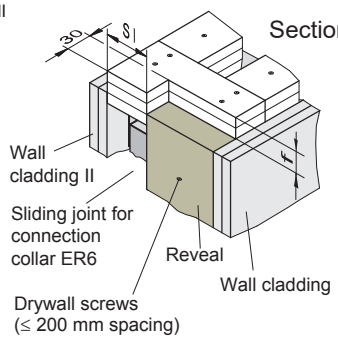




Section A - A



Section B - B
shown without connection collar



Section C - C

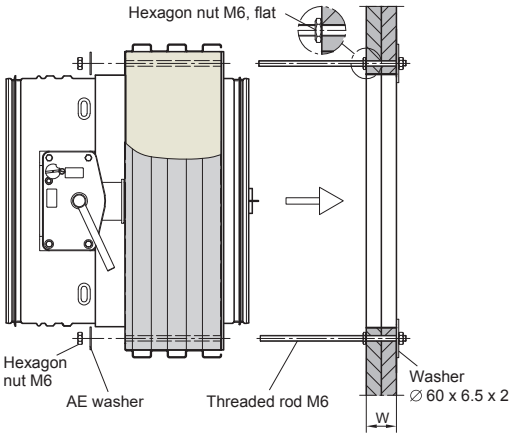
- The installation of FR90 fire dampers is in principle unchanged.
⇒ see page 24

- Installation subframes ER6 must fit the stud profile depth S I of the metal studs I, which should have profiles with the corresponding stud profile depths.
- The metal studs II contain a recess that is framed by the wall profiles. Accordingly, the strips of wall cladding material (e.g. plasterboard) attached to the ceiling are severed and sealed at the front (section C - C).
- The profiles surrounding the recess on the metal studs II are given a reveal made from 30 mm thick calcium silicate board. These are held up to the ceiling up leaving a gap f for the drop (section B - B) and are attached to the metal stud profiles using drywall screws at spacings of ≤ 200 mm.
- If the metal studs have claddings on both sides, then the sliding joint for the connection collar of the installation subframe ER6 will lie between cladding I and the reveal adjoining cladding II (section B - B).
- Joints should be filled as usual for this type of wall.

All dimensions in mm

FR90 fire dampers

Mounting on shaft walls with and without metal studs (1)



The illustration shows installation on a shaft wall without metal studs.

Mounting with mounting frame AE

Types of walls ⇒ see page 16

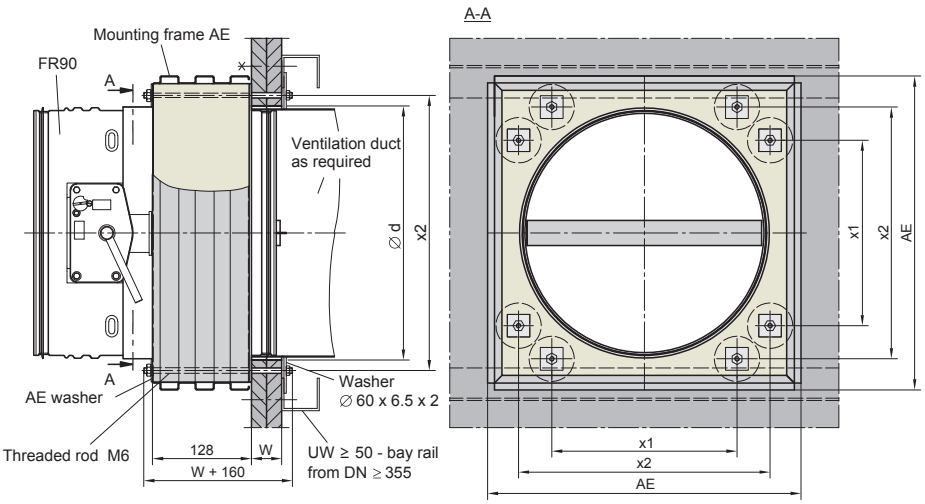
The **minimum thicknesses W [mm]** shown opposite are required for installing the FR90 fire dampers:

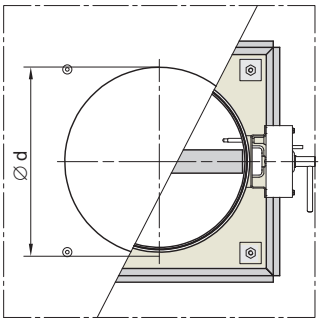
Fire resistance period in minutes		30 60 **90**
Shaft walls made of wall boards, at least 2-layer	with metal studs	**90**
	without metal studs	**40**

Mounting frames AE must be attached with threaded rods which pass through the wall, and washers and nuts on both ends.

Factory-produced holes in the mounting frames AE indicate the number of the fastenings.

DN [mm]	pc per corner	pc in total
≤ 315	1	4
≥ 355	2	8



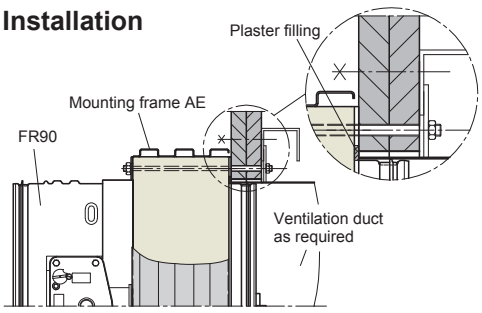


DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
AE	210	235	250	270	290	310	334	360	390	425	475	520	570	620	680	750	830	920
x1	-	-	-	-	-	-	-	-	-	-	228	250	275	300	330	365	405	450
x2	120	145	160	180	200	220	244	270	300	335	385	430	480	530	590	660	740	830

Installation opening

∅d = DN + 6 to 8 mm

Installation



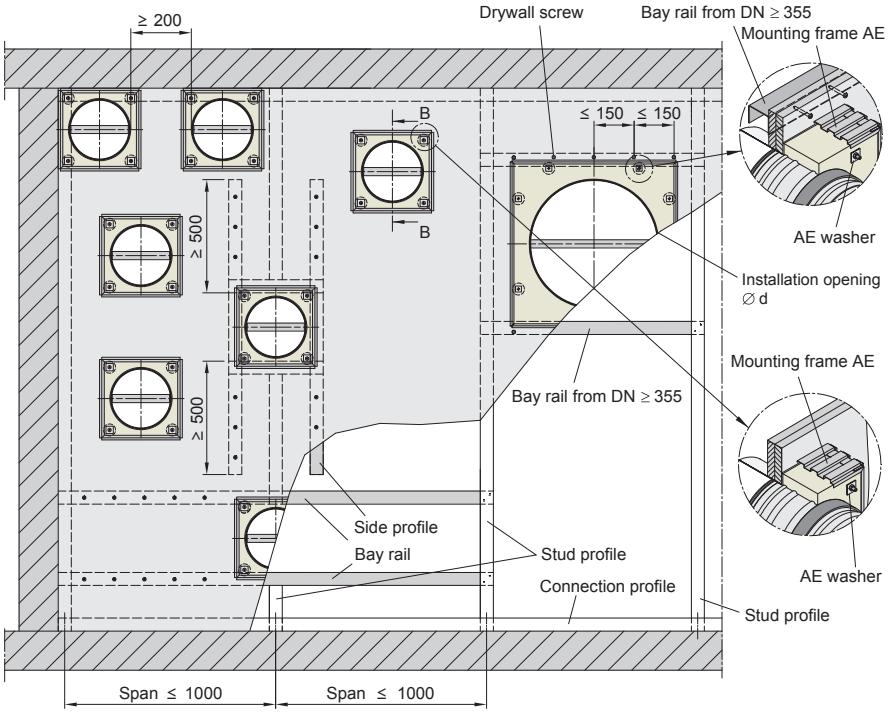
The **spacing** between two FR90 fire dampers must be ≥ 200 mm. No spacing is required with respect to adjacent walls or ceilings.

All dimensions in mm

FR90 fire dampers

Mounting on shaft walls with and without metal studs (2)

Mounting on shaft walls with metal studs (example)

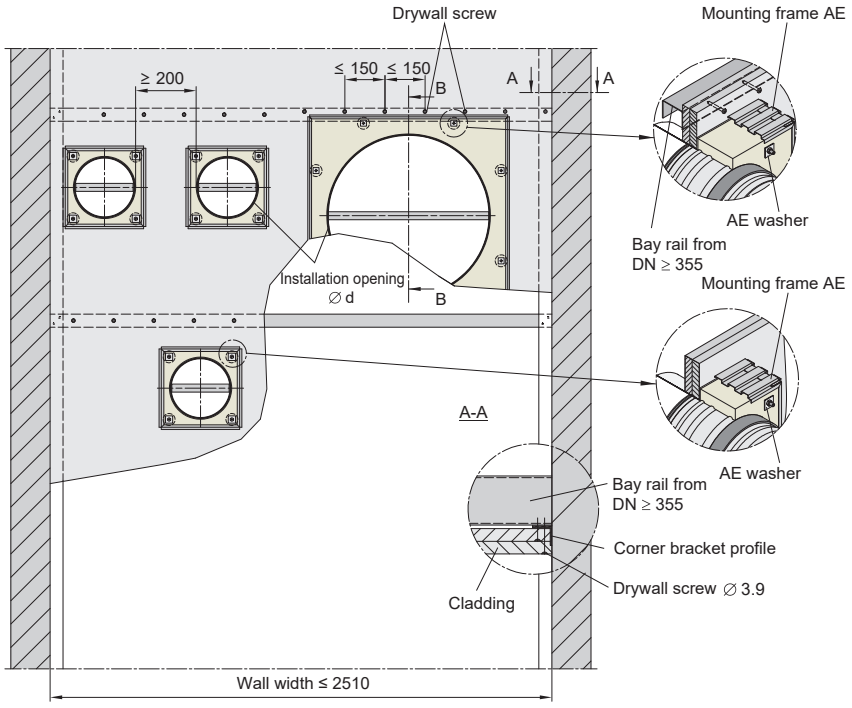


If the spans of the studding are smaller than the installation opening, they require bay rails and lateral profiles with a 500 mm excess length. If smaller dimensions are available, then the side profiles should be butted up against the connection profiles and secured as usual for this type of wall. Stud profiles (supports) can replace side profiles.

For installation openings with dimensions within the span of the studding, the bay rails should be connected to the stud profiles as usual for this type of wall.

Bay rails made from UW profiles with stud profile depth of ≥ 50 mm are required for installing FR90 fire dampers of sizes DN ≥ 355. They should be installed in such a way that the washers Ø 60 mm grip over the UW profiles and clamp them. These bay rails should be screwed to the wall cladding with spacing of ≤ 150 mm.

Mounting on shaft walls without metal studs (example)



Walls without studding laterally adjoin rigid walls and ceilings. The two-layer wall material, which can be free-span, is fastened to these with connection profiles (angle profiles). There may also be bay rails.

Bay rails made from UW profiles with stud profile depth of ≥ 50 mm are required for installing FR90 fire dampers of sizes DN ≥ 355. They should be installed in such a way that the washers Ø 60 mm grip over the UW profiles and clamp them. These bay rails should be screwed to the wall cladding with spacing of ≤ 150 mm.

Connection profiles on walls, ceilings and floors must not be cut or severed.

All dimensions in mm

FR90 fire dampers

Installation in wooden walls and ceilings (1) General information

Walls and ceilings in timber construction

- Solid timber construction is a type of construction which generally makes use of large-format, solid wall and ceiling elements made from wood, usually cross-laminated timber. The laminated layers can be glued and connected with wooden dowels or wire nails. Claddings with gypsum boards are possible.
- Timber frame construction is a construction method with wooden studs and crossbeams in walls or with wooden beams in ceilings. Claddings are generally implemented using gypsum boards, reinforcements with wooden material boards. Spaces can be filled with insulating materials.

The walls and ceilings are manufactured in accordance with the technical approvals and the European Technical Assessments (ETA) or in accordance with general building control approvals (AbZ) and test certificates (AbP).

For claddings, DF gypsum boards according to EN 520 or gypsum board fire safety panels are generally used.

The installation of fire dampers for ventilation ducts requires fire classification together with the timber frame construction walls and ceilings. The respective test certificates, declarations of performance and CE markings are available for FR90 fire dampers, series FR92.

Dry installation with installation subframes and wet installation with mortar are possible. This way, the reveals of the installation openings are protected from increased combustion. Additional reveals in walls and ceilings are possible, but are only required for FR90 fire dampers for specific requirements (e.g. in double-stud walls).

The fire resistance period of the fire dampers is up to 120 minutes; it is reduced to the fire resistance period of the wall or ceiling if one is lower. The following table specifies the minimum dimensions:

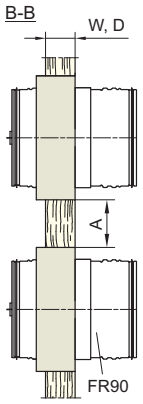
Type of	Building material of the wall/ceiling	Cladding of the wall/ceiling	Minimum thickness of the (clad) wall/ceiling	Minimum dimension Wooden studs Width x depth	Fire resistance period of the wall/ceiling/fire damper in minutes
Wall	Solid boards made of cross-laminated timber ≥ 350 kg/m³	without	95 mm	-	30/60
		on both sides with 1 x 15 mm gypsum boards	124 mm	-	30/60/90
Ceiling		without	145 mm	-	30/60/90
Wall	Wooden stud framework/wooden beam framework with insulation material fillings	on both sides with 1 x 12.5 mm gypsum boards	85 mm	40 mm x 60 mm	30/60
		on both sides with 2 x 12.5 mm gypsum boards	110 mm	60 mm x 60 mm	30/60/90/120
Ceiling		on the underside with 2 x 12.5 mm gypsum boards	100 mm	60 mm x 60 mm	30/60/90

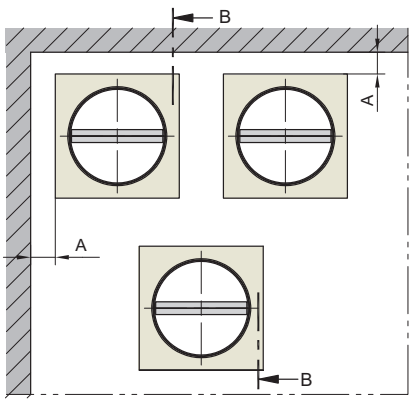
- Gaps "A" between the FR90 fire dampers and adjacent walls and ceilings are only necessary in case of specific requirements, for example, to install fastenings.
- Measures must be taken on site to make sure that the walls and ceilings meet the structural requirements and fire safety requirements. Installation openings must be arranged accordingly.

In general dry installation - **no mortar - is required.** The installation openings for this purpose must be made to fit exactly. Sawing should be performed mechanically on the manufacturer's premises wherever possible.

Otherwise gaps remain which have to be sealed with mortar or suitable sealing compounds.

⇒ Please send us an enquiry as necessary.



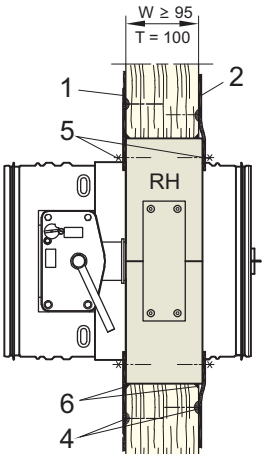


FR90 fire dampers

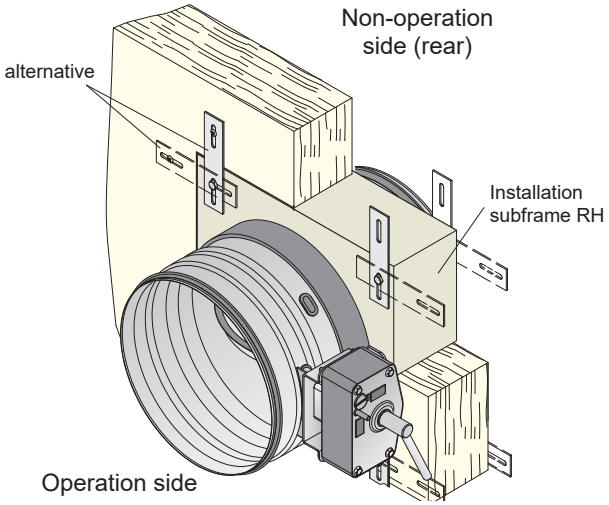
Installation in solid timber frame construction walls and ceilings (2a)

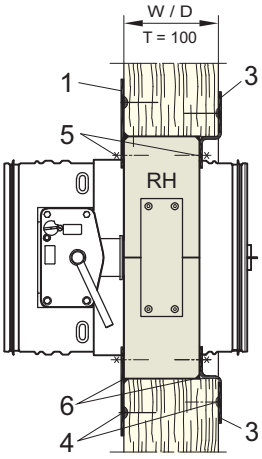
Installation with rectangular installation subframe RH

Walls and ceilings without cladding

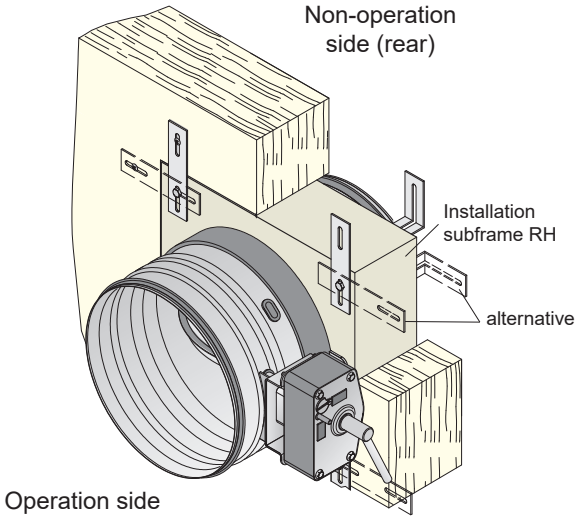


Installation example for W ≥ 95 mm
W = 95 mm is shown
Frame depth T = 100 mm

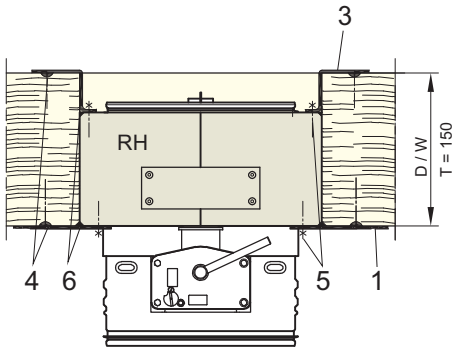




Installation example for walls and ceilings with W/D ≥ 100 mm
W = 145 mm is shown
Frame depth T = 100 mm

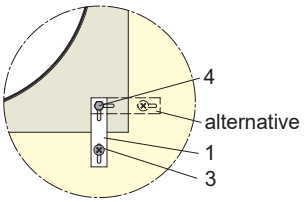


Parts list ⇒ see page 30

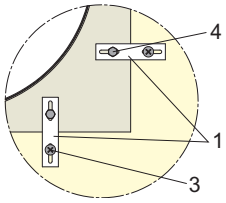


Installation example in wooden ceilings
D = 200 mm, frame depth D = 150 mm and actuator underneath the ceiling is shown.

Fastening with FR90 brackets in wooden walls and ceilings



DN ≤ 315



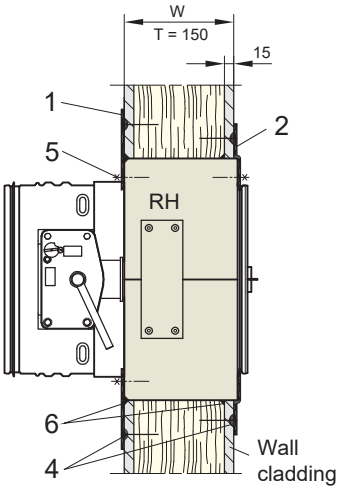
DN ≥ 355

FR90 fire dampers

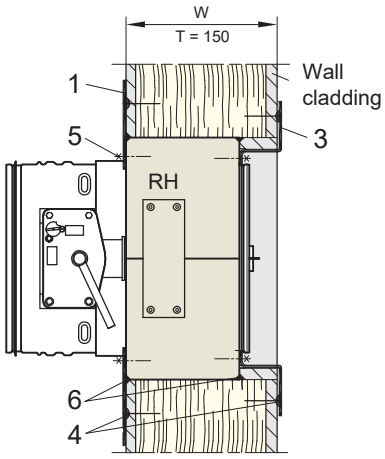
Installation in solid timber frame construction walls and ceilings (2b)

Installation with rectangular installation subframe RH

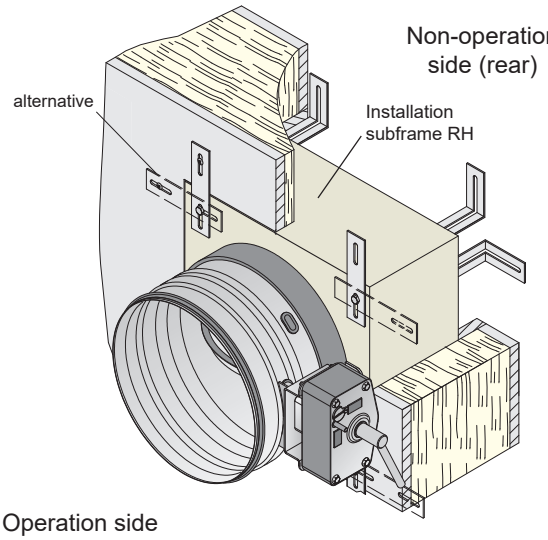
Cladded walls



Installation example
for W = 145 mm
Frame depth T = 150 mm



Installation example
for W = 200 mm
Frame depth T = 150 mm



Operation side

FR90 fire dampers, series FR92, are suitable for dry installation in solid timber walls and timber ceilings.

The fastenings on both sides of the wall or ceiling are implemented using special brackets and hexagon screws (5) in factory-installed threaded sockets M6.

FR90 brackets (1) have to be used on the operation side. They are required on the non-operation side if the thickness of the wall or ceiling matches the frame depth 100 mm or 150 mm.

RH brackets (2) must be used on the non-operation side for walls or frames which protrude up to around 5 mm; for example with 100 mm deep frames and a wall thickness of 95 mm.

Pre-shaped RH corner brackets (3) must not be used on the non-operation side for 100 mm deep frames in walls or ceilings with a thickness of ≥ 105 mm, or 150 mm deep frames in walls or ceilings with a thickness of ≥ 155 mm.

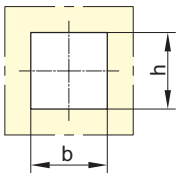
RH corner brackets (3) can be adapted to the thicknesses of the walls or ceilings and possible claddings in the reveal on site. The necessary bending of the corner brackets and brackets requires a little specialist knowledge.

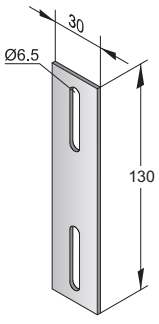
Remaining joint gaps between the frame and wall or ceiling must be sealed to a depth of around 10 mm with fireproof sealant (6).

Claddings for the wooden walls and wooden ceilings must be fastened correctly. They are normally implemented with spacing of ≤ 250 mm with drywall screws, ≥ 35 mm in length, with a diameter of ≥ 3.5 mm.

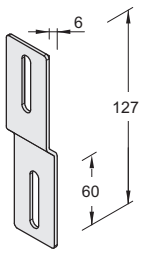
Installation openings for installation subframe RH

DN ≤ 315: b x h = DN + 93^{+2} mm
DN ≥ 355: b x h = DN + 103^{+2} mm

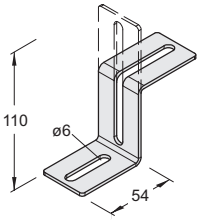




FR90 bracket (1)



RH bracket (2)



RH corner bracket (3)

Parts list on pages 29 to 32

1 FR90 bracket for operation and non-operation side *)
2 RH bracket for the non-operation side *)
3 RH corner bracket for the non-operation side *)
4 Drywall screw 3.9 x 55 DIN 18182-2 *)
5 Hexagon screw M6 x 20 DIN 933 *)
6 Promaseal® Mastic Brandschutzkitt (fireproof sealant) **)
7 Insulating material (specific to wall/ceiling)
8 Wooden material board density ≥ 600 kg/m³ or equivalent, specific to wall or ceiling

*) Items 1 to 5 are included as an accessory kit with the scope of delivery of the fire damper with installation subframe RH; it may therefore be surplus, depending on the fastening material installation situation.

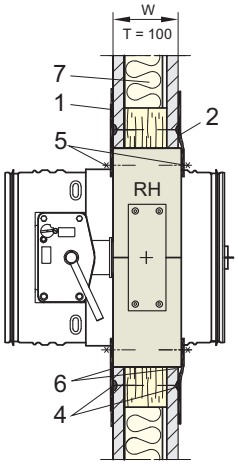
) **Item 6 is not included in the scope of delivery and must be ordered **separately** as **required!**
⇒ see page 46

All dimensions in mm

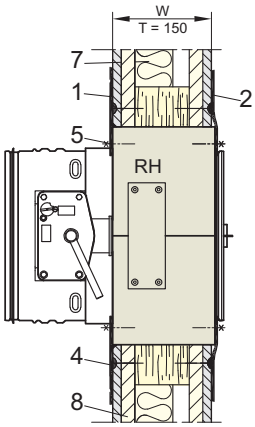
FR90 fire dampers

Installation in timber frame construction walls and ceilings (3a)

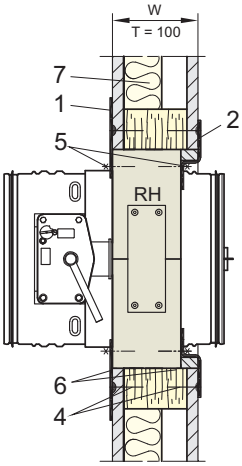
Installation with rectangular installation subframe RH



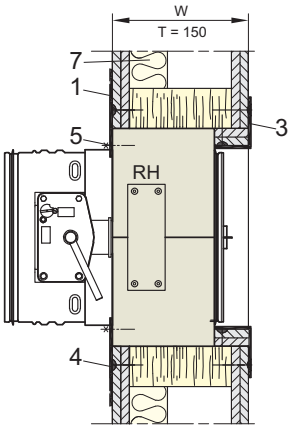
Installation example
for W = 95 mm
Frame depth D = 100 mm



Installation example
for W = 145 mm
Frame depth D = 150 mm

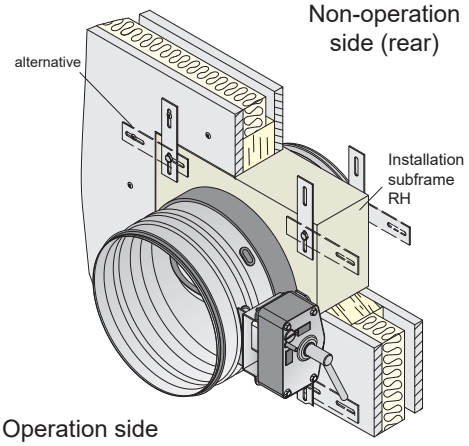


Installation example
for W = 145 mm
Frame depth D = 100 mm

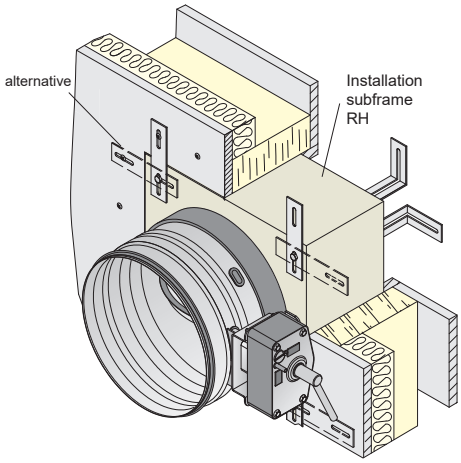


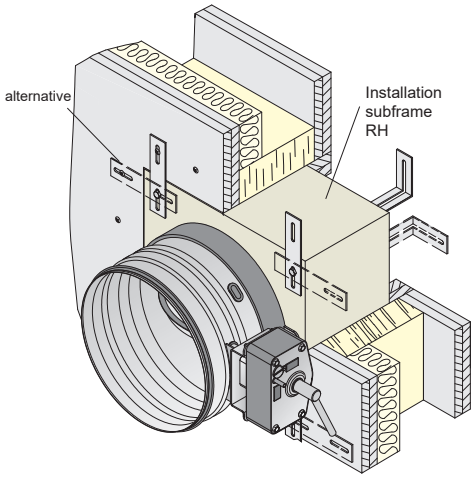
Installation example
for W = 200 mm
Frame depth D = 150 mm

Non-operation side (rear)

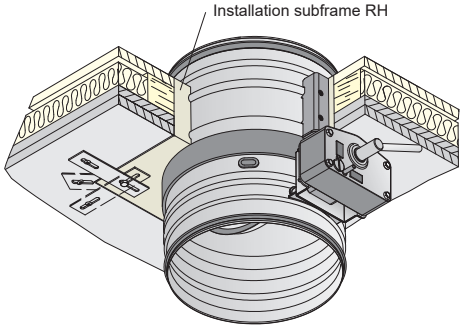


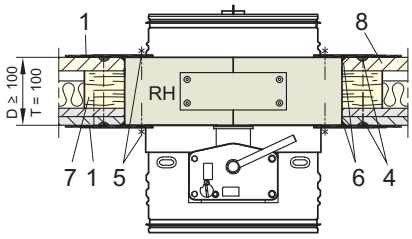
Operation side





Optionally, the reveals can be lined with wall building materials.



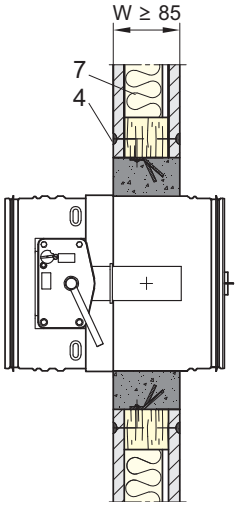


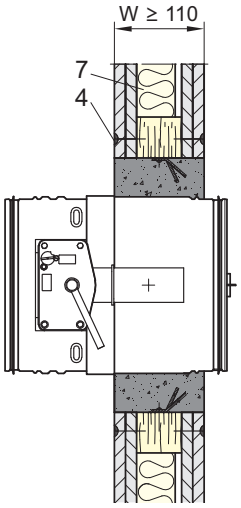
Installation example in wooden ceilings with D ≥ 100 mm
D = 100 mm, frame depth D = 100 mm and actuator underneath the ceiling is shown.

FR90 fire dampers

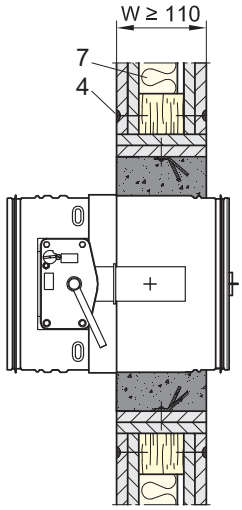
Installation in timber frame construction walls and ceilings (3b)

Installation with mortar in walls

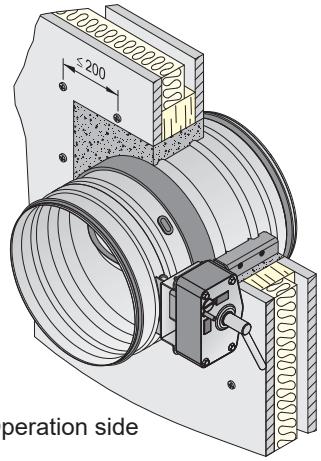




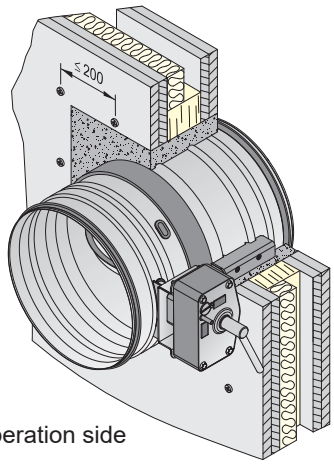
Installation examples



Installation example with additional reveal made of wall building materials

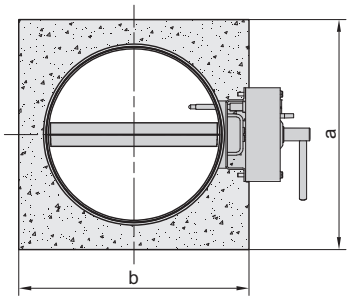


Operation side



Operation side

- Fillings or gaps must be implemented with mortar of group II or III according to DIN 1053 or classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar.
- Mortar fillings require a bond with the wooden profiles, e.g. using mortar anchors.
- Walls with a double-studded structure with a gap require reveals made from wall building materials.
  Larger wall thicknesses reduce the required depth of mortaring to 100 to 120 mm, thereby also bringing about reductions in weight.

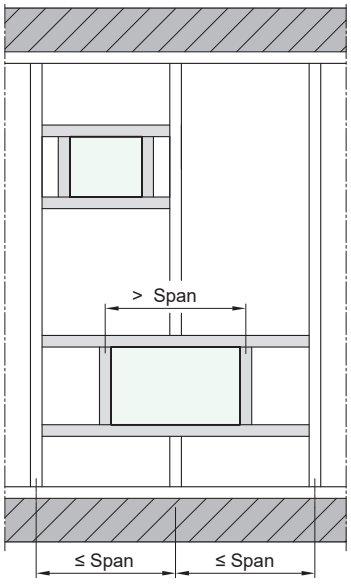


Installation opening for mortar installation

b x h or ∅d ≥ DN + approx. 60 mm

Details on timber frame construction for walls and ceilings

- Stud spacing in walls or beam spacing in ceilings ≤ 625 mm (span)
- Minimum dimensions for studs and beams:
  ⇒ see table on page 28
- Installation of fire dampers with installation subframe RH ⇒ see pages 29 to 31
- Installation openings are required with all-round frame made of wooden building materials.
- Installation openings can additionally be provided with reveals made of wall building materials, e.g. if the classification of the wall requires it, or if the installation opening is to be reduced in size subsequently. A suitable bond with the frame must be provided to prevent the reveal from pushing out.
- Walls can be constructed with single-studded or double-studded framework.
- Further details: ⇒ see page 28



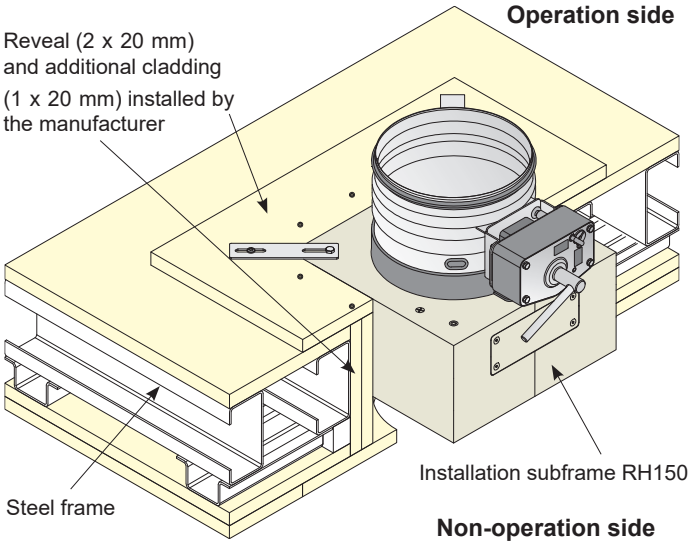
Example for installation openings in wooden stud framework

FR90 fire dampers

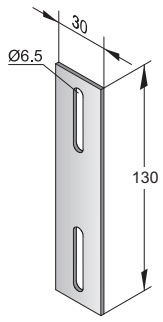
Installation in ceilings with steel frames (1)

Installation in ceiling and roof constructions

- Manufacturer:
  KLEUSBERG GmbH & Co. KG,
  DE-06184 Kabelsketal-Dölbau.
- Classification report: KB 3.2/17-006-2

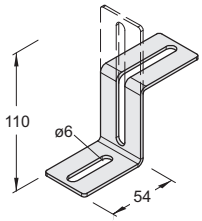


FR90 bracket (1)



Install on the
operation side

RH corner bracket (2)



Install on the
non-operation side

Parts list on pages 33 and 34

1 FR90 bracket for the operation side *)
2 RH corner bracket for the non-operation side *)
3 Drywall screw Ø 3.9 x 55 - DIN 18182-2 *)
4 Hexagon screw M6 x 20 DIN 933 *)
5 Tapping screw Ø ≥ 3.9 x 25 with washers or equivalent made of steel
6 Insulating material for roof constructions
7 Promaseal® Mastic Brandschutzkitt (fireproof sealant) **)

*) The items 1 to 4 are included as an accessory kit with the scope of delivery of the FR90 fire dampers with installation subframe RH150; they may therefore be surplus, depending on the installation of fastening material.

**) Item 7 must be ordered separately as required!

The **modular system from KLEUSBERG** is made up of steel frames with cladding and is installed as a building.

FR90 fire dampers with installation subframe RH150 can be installed. They are inserted into installation openings which are clad all round with reveals made of fire protection boards, and fastened with FR90 brackets (1) and RH corner brackets (2).

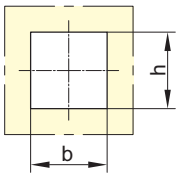
The operation side of the fire dampers can be arranged above or below the ceilings.

The following **minimum thickness D [mm]** is required for installing the FR90 fire dampers:

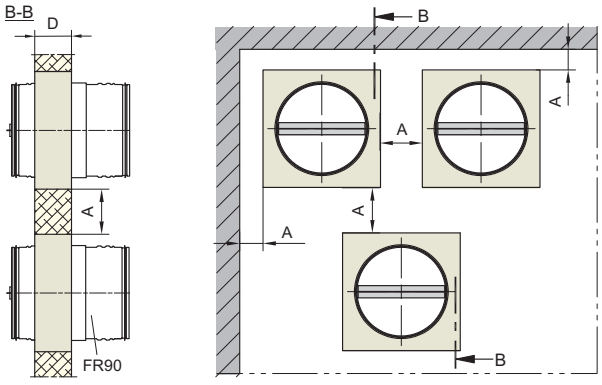
Fire resistance period in minutes	30 60 **90**
Ceiling and roof construction	**222**

Installation openings for installation subframe RH150

DN ≤ 315: b x h = (DN + 91^{+4} mm)
DN > 315: b x h = (DN + 101^{+4} mm)



Installation gaps

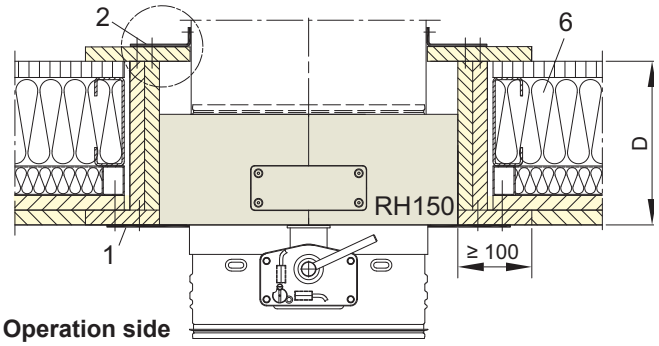


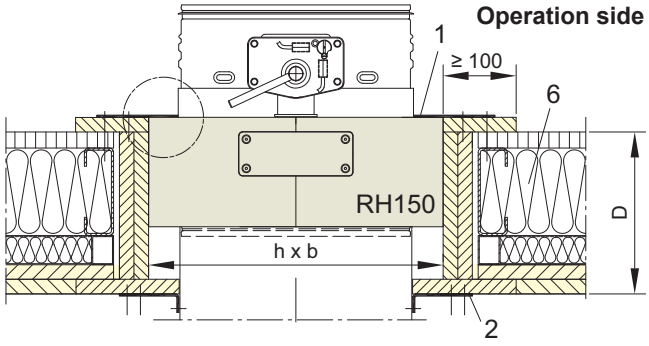
- Installation gaps "A" between the FR90 and adjacent walls and ceilings are only necessary in case of specific requirement, for example, to install reveals and fastenings.
- Measures must be taken on site to make sure that the ceilings meet the structural requirements and fire safety requirements. Installation openings must be arranged accordingly.

FR90 fire dampers

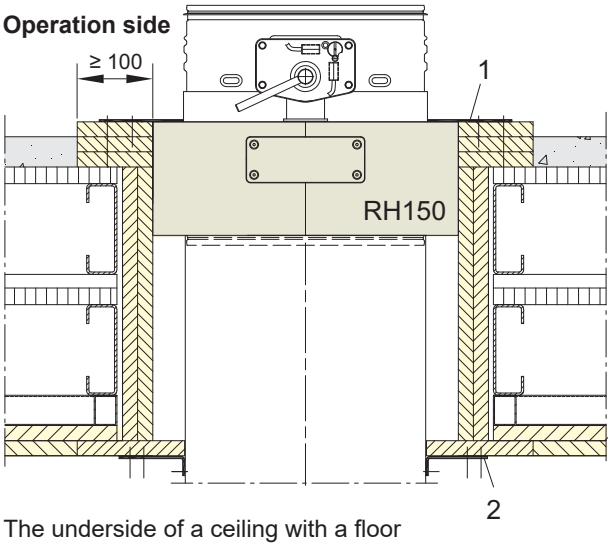
Installation in ceilings with steel frames (2)

Installation in roof constructions





Installation in ceiling constructions

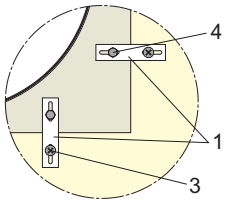


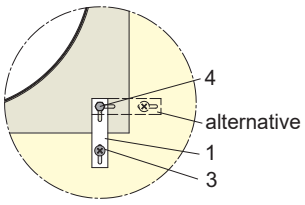
The underside of a ceiling with a floor above it and a formwork aid made of fire protection boards for screed installation is shown.

Installation notes

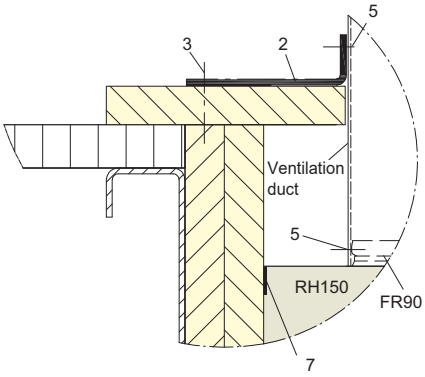
- The ceiling and roof constructions must be fastened on both sides.
- Joints between installation subframes RH150 and reveals in ceiling and roof constructions must be sealed on both sides with fireproof sealant (item 7) to a depth of around 10 mm.
- Alternatively, fireproof sealant (item 7) can be applied to the installation subframe RH150 for the fire damper all round before insertion into the installation opening.
- The excess lengths for mechanical and electrical components must be observed.
- Fire dampers installed in or on roof constructions require weather protection which also ensures accessibility.

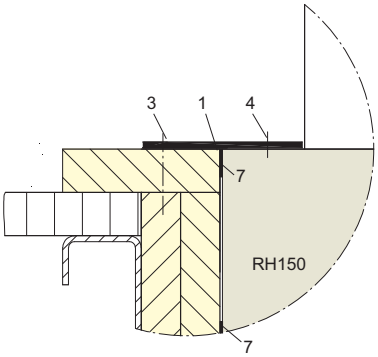
FR90 brackets and **RH corner brackets** are screwed to the installation subframes RH150 with the specified number of hexagon screws (item 4): DN ≤ 315: 4 pc, DN > 315: 8 pc.





The ceiling claddings are fastened with drywall screws (item 3). On the flange of the fire damper casing or on the ventilation ducts, this is performed with tapping screws (item 5).



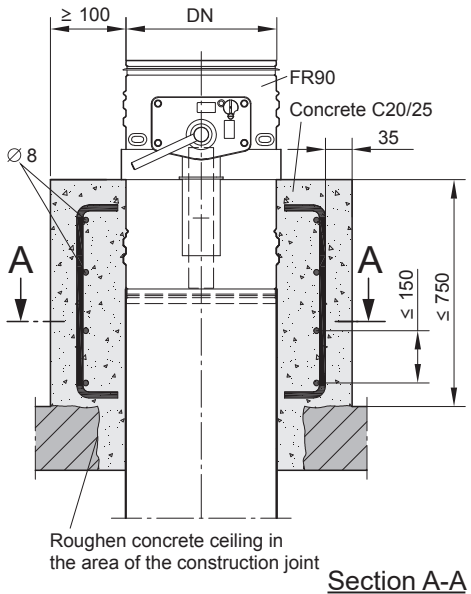


Parts list ⇒ see page 33

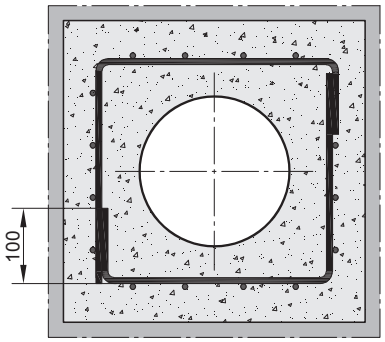
FR90 fire dampers

Base installation on rigid ceilings/metal stud walls as fire walls

Installation remote from and on rigid ceilings in ventilation ducts made of concrete



Section A-A

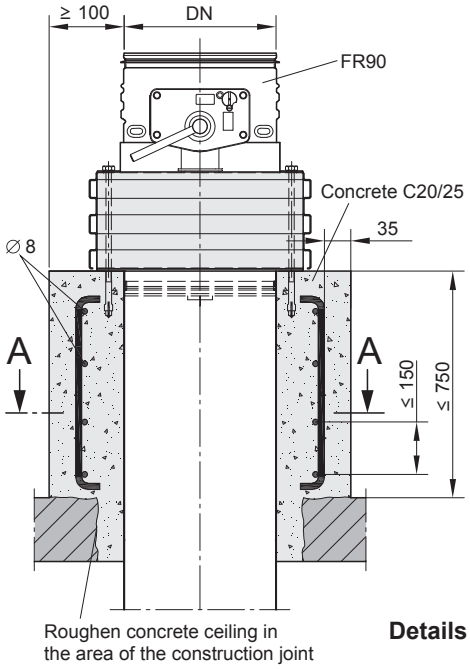


Details ⇒ see page 12

The following **minimum thickness D [mm]** is required for installing the FR90 fire dampers**:**

Fire resistance period in minutes	30 60 **90**
Solid concrete ceilings	**100**

Mounting on ventilation ducts made from concrete with mounting frame AE



Details ⇒ see page 15

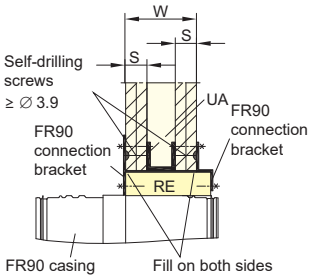
Production according to general construction rules. Dimensioning according to DIN 1045 and DIN 4102-4.

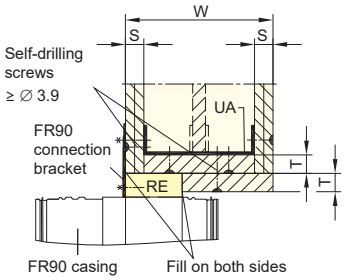
- Cover made of concrete C 20/25, ≥ 100 mm thick, ≤ 750 mm high.
- Reinforcement made of reinforcing steel Ø ≥ 8 mm. Vertical spacing ≤ 150 mm, sealed all round horizontally ≤ 150 mm. Alternative: welded steel wire mesh Q 335 A
- Reinforcing steel overlap C_{nom} ≥ 35 mm for environments with up to moderate humidity (exposure class XC3).
- To bond the concrete, it is generally necessary to roughen the concrete ceiling and, where applicable, the reveal.

Installation with installation subframe RE in metal stud walls as fire walls or safety partition walls with cladding on both sides ⇒ see pages 16, 17, 20

The walls should be classified as EI 60-M or higher according to DIN EN 13501-2, or be designed in accordance with a general building authority test certificate (AbP). Claddings must be applied on both sides with at least 2 layers, and may contain sheet steel inserts. The following are required:

- W ≥ 100 mm wall thickness
- Wall height ≤ 5000 mm.
- The studs, bay rails and reinforcements adjacent to the FR90 fire dampers must be produced from UA profiles.





Wall connections
Reveals with T ≥ 20 mm thick calcium silicate boards or with T ≥ S thick boards made from wall cladding materials!

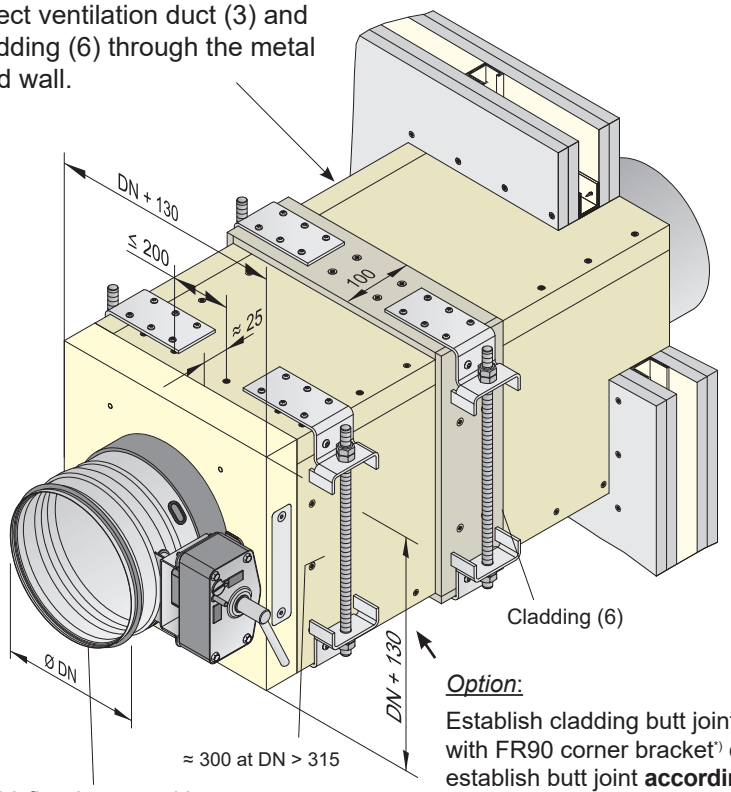
FR90 fire dampers

Installation remote from (1) rigid walls and ceilings and metal stud walls

Installation of FR90 fire dampers with mounting frame RV on ventilation duct with fire resistance period.

Example:

Direct ventilation duct (3) and cladding (6) through the metal stud wall.



FR90 fire damper with mounting frame RV (1)

Option:

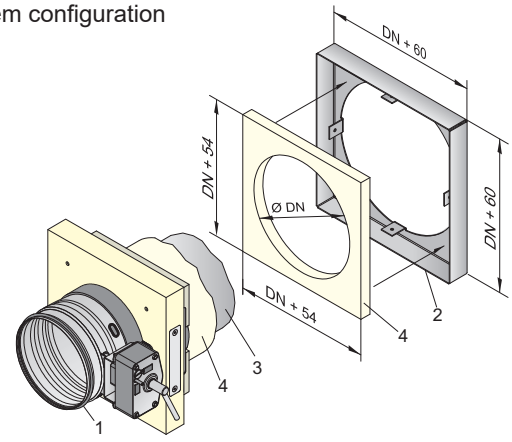
Establish cladding butt joint with FR90 corner bracket*) or establish butt joint **according to Promat® worksheet 478**

*) available for delivery as accessories
⇒ see page 46

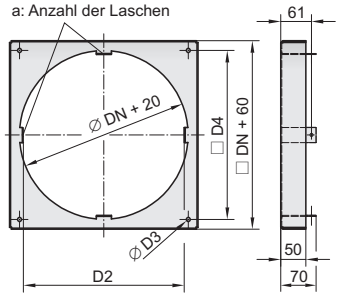
Fire resistance period in minutes		30 60 **90**
required **minimum thicknesses W, D [mm]**	Rigid walls and ceilings	**100**
	Metal stud walls with ≥ 2 layer cladding on both sides	**95**

- **Details** on walls and ceilings ⇒ see pages 12, 16, 17
- **Fire damper with mounting frame RV** (1) and with connecting frame (2) ⇒ see pages 7, 8

System configuration

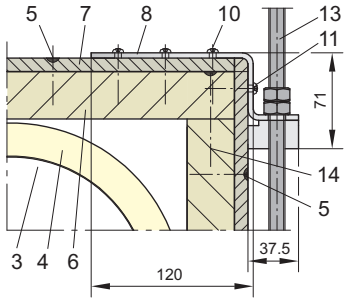


Connecting frame dimensions (2)



Sizes DN	100 up to 140	160 up to 315	355 up to 800
D2	DN + 6	DN + 4	DN + 6
∅ D3	9	9	13
□ D4	DN + 20	DN + 20	DN - 20
a	4	4	8

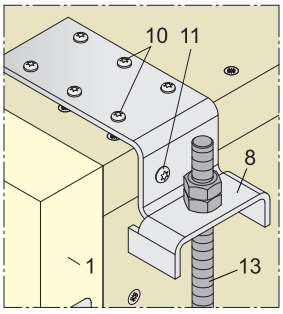
Suspension with threaded rods (13)



FR90 fire dampers installed remote from walls are generally suspended using steel threaded rods arranged in pairs. They must be attached in accordance with the fire resistance period. Threaded rods that end above the ceilings can be secured there with nuts and washers made of steel. If plugs are used for fastening to ceilings, follow the manufacturer's specifications. End plates can be used to distribute the load acting on the threaded rod across multiple fastenings.

Threaded rods of up to 1.50 m in length can be left unclad. Cladding is required for longer threaded rods (e.g. according to Promat worksheet 478).

With FR90 fire dampers installed remote from ceilings, the weight forces are transferred into the ceiling via the sheet steel ventilation duct.



Permissible weights for 90-minute fire resistance periods for suspensions with **steel threaded rods**

Size	A_s [mm²]	Weight G [kg] For 1 unit	For 1 pair
M8	36.6	22	44
M10	58.0	35	70
M12	84.3	52	104
M14	115	70	140
M16	157	96	192
M18	192	117	234
M20	245	150	300

A_s tensile stress cross-section according to DIN 13

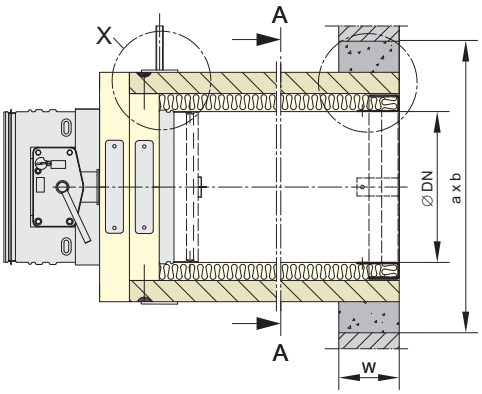
Weight [kg] of FR90 fire dampers ⇒ see page 11
Weights of the suspension, ventilation duct, insulation, cladding, etc. must be factored in.

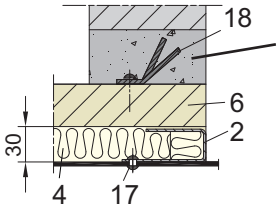
Parts list ⇒ see page 37

FR90 fire dampers

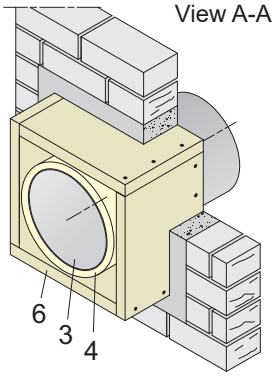
Installation remote from (2) rigid walls and ceilings and metal stud walls

Direct the cladding (6) of the ventilation duct (3) through solid walls





View A-A



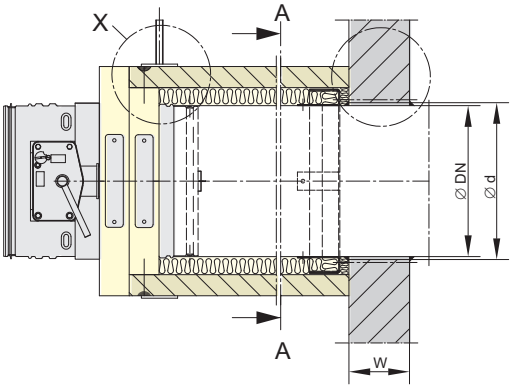
Installation opening:

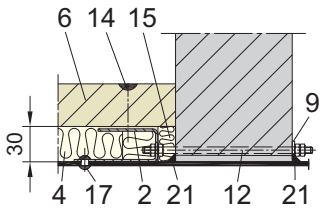
a x b ≈ DN + 135 mm

+ mortar gaps as required.

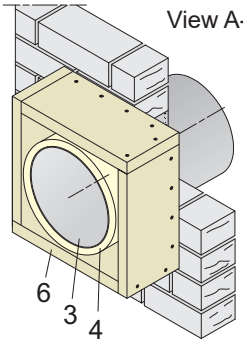
Mortar anchors or suitable concrete screws must be inserted with spacing of≤ 200 mm.

Connect the cladding (6) of the ventilation duct (3) through solid walls





View A-A



Installation opening:

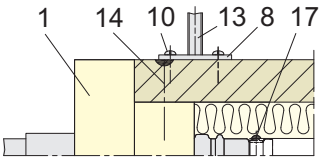
∅ d ≈ DN + 5 mm

Fasten the connecting frame (2) to the wall in suitable manner.

Seal remaining joints with Promaseal® Mastic fireproof sealant ⇒ see page 46

If the top installation side is inaccessible, the FR90 corner brackets, connection frames and RV frames do not have to be screwed to the cladding on this side.

Detail X for fastening



Parts list for pages 36 and 37

1 FR90 fire damper with mounting frame RV.
2 Connecting frame[1].
3 Ventilation duct made from sheet steel.
4 Mineral wool, 30 mm, ≥ 40 kg/m³, melting point >1000°C, clad with aluminium foil.
5 Drywall screw 3.9 x 35 mm.
6 Cladding made of 35 mm Promatect® LS fire protection boards. **Produce according to Promat® worksheet 478.**
7 100 mm wide additional cladding made of 10 mm Promatect® H boards. Bond to (6) with Promat® K84 adhesive and screw in place with (5).
8 FR90 corner bracket [1) 2)].
9 Washer for RV [1) 2)].
10 Round head chipboard screw 4 x 45 mm [1) 2)].
11 Round head chipboard screw 5 x 70 mm [1) 2)].
12 Threaded rods for fastening with secured nuts [3)]. 4 x M8 with DN ≤ 315, otherwise 4 x M12.
13 Threaded rods for suspending with secured nuts [3)].
14 Chipboard screws 4 x 60 mm. Pre-drill a Ø3 mm hole in (2).
15 Sealing with mineral wool (4). They must be compressed to around 12 mm.
17 Circumferentially arranged steel sealed rivets 4.8 mm or tapping screws, 4 x if DN ≤ 315, otherwise 8 x.
18 Mortar anchors or concrete screws.
21 Sealings with Promaseal® Mastic fireproof sealant. ⇒ see page 46

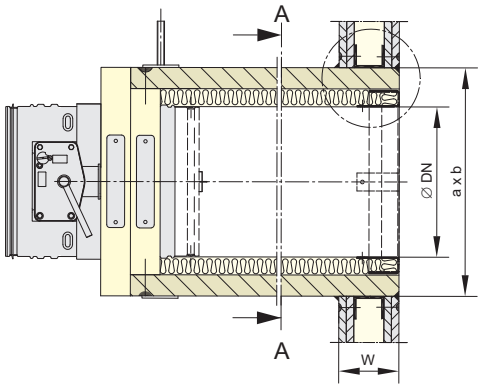
1) Supplied together with FR90 fire dampers with mounting frame RV. ⇒ see pages 43 and 44
2) Order additional FR90 / FK90K corner brackets. ⇒ see page 46
3) or all-steel lock nuts

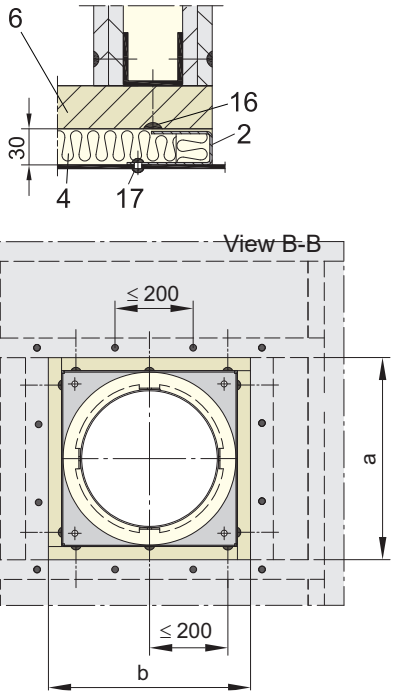
Screws, mortar anchors and rivets should in general be installed at ≤ 200 mm centres.

FR90 fire dampers

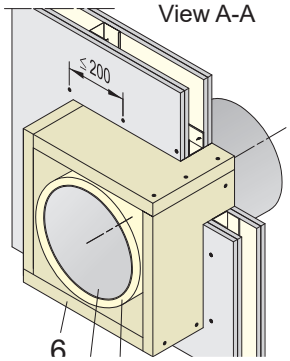
Installation remote from (3) metal stud walls

Direct the cladding (6) of the ventilation duct (3) through metal stud walls

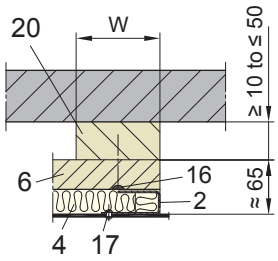




Installation opening a x b ≈ DN + 135 mm

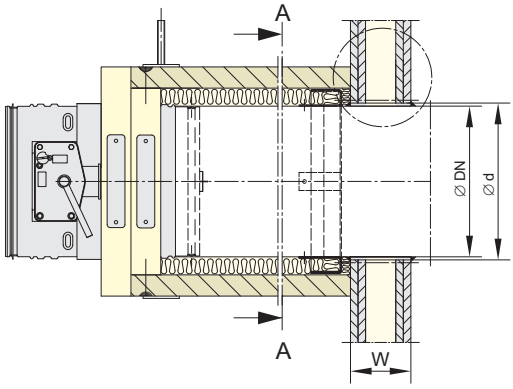


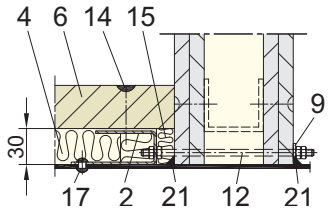
Option: Installation under rigid ceilings



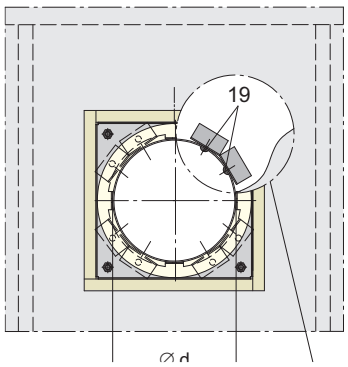
Fasten calcium silicate board (20) ≥ 500 kg/m³ to rigid ceiling.

Connect the cladding (6) of the ventilation duct (3) to metal stud walls

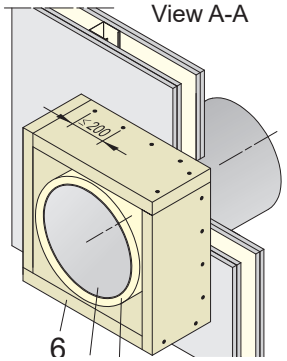




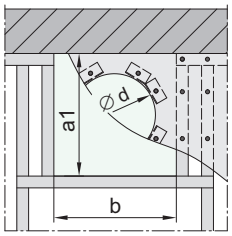
View B-B



Installation opening ∅ d ≈ DN + 5 mm

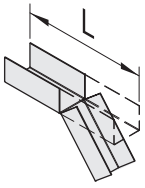


Option: Installation under rigid ceilings



a1 ≈ DN + 135 mm + Ceiling spacing
b ≈ DN + 135 mm
∅ d ≈ DN + 5 mm + Ceiling spacing

Reinforcement on all sides of the installation opening in the metal stud wall with segments made of UW profiles.



Fasten UW profiles from DN > 200 to the ventilation duct (3) which passes through the wall with tapping screws (19) ≥ 4.2 mm.

Cutting lengths of UW profiles:

Sizes DN	100 to 200	224 to 315	355 to 800
L	110	175	210

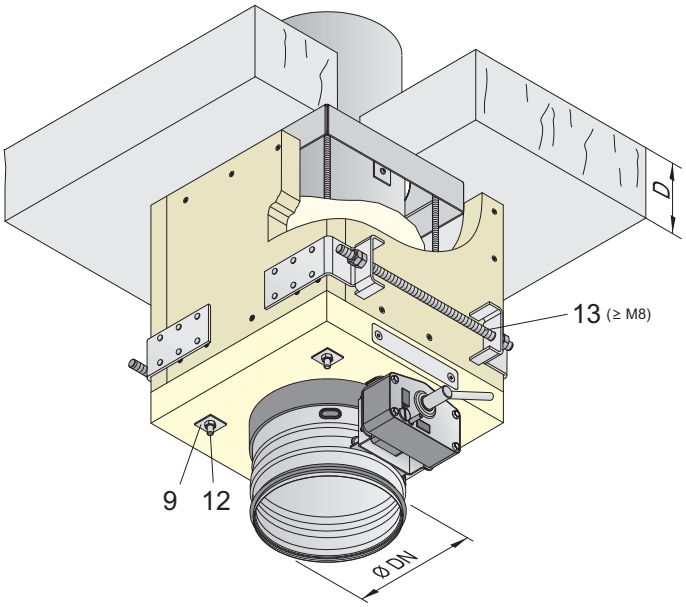
Parts list ⇒ see page 39

FR90 fire dampers

Installation remote from (4) rigid ceilings

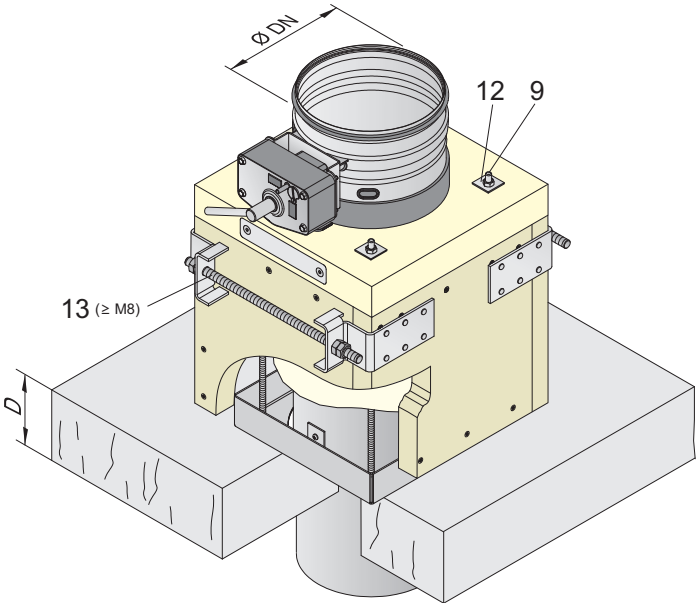
Example:

Suspended installation under rigid ceilings

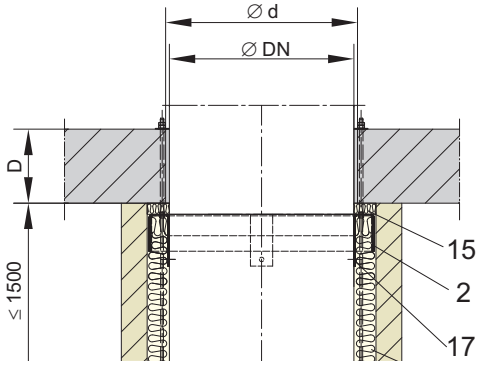


Example:

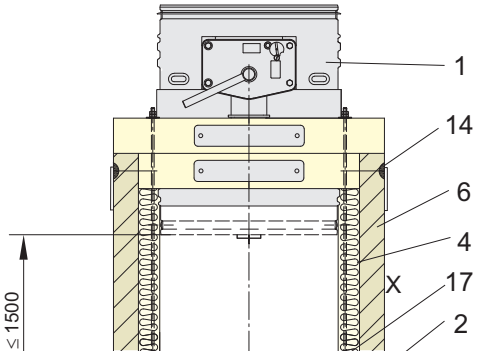
Vertical installation on rigid ceilings



Installation openings ∅ d ≈ DN + 5 mm

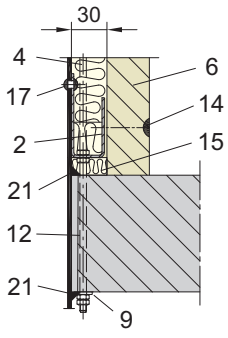


Suspended fastening on rigid ceilings



Vertical fastening on rigid ceilings

Detail X



Parts list for pages 38 and 39

1 FR90 fire damper with mounting frame RV.
2 Connecting frame.[1)]
3 Ventilation duct made from sheet steel.
4 Mineral wool, 30 mm, ≥ 40kg/m³, melting point >1000°C, clad with aluminium foil.
6 Cladding made of 35 mm Promatect® LS fire protection boards. **Produce according to Promat® worksheet 478.**
9 Washer for RV [1) 2)].
12 Threaded rods for fastening with secured nuts [3)]. 4 x M8 with DN ≤ 315, otherwise 4 x M12.
13 Threaded rods for suspending with secured nuts [3)].
14 Chipboard screws 4x60mm. Pre-drill a Ø3 mm hole in (2).
15 Sealing with mineral wool (4). They must be compressed to around 12 mm.
16 Drywall screw 3.9 x 55 mm.
17 Circumferentially arranged steel sealed rivets 4.8 mm or tapping screws, 4 x if DN ≤ 315, otherwise 8 x.
18 Mortar anchor or concrete screws.
19 Only if DN > 200: Tapping screw ≥ 4.2 mm.
20 Calcium silicate boards fastened to ceiling ≥ 500 kg/m³.
21 Sealings with Promaseal® Mastic fireproof sealant. ⇒ see page 46

1) Supplied together with FR90 fire dampers with mounting frame RV. ⇒ see pages 43 and 44

2) Available as accessories. ⇒ see page 46

3) Secure nuts or use all-steel lock nuts.

Screws, mortar anchors and rivets must generally be installed with spacings of ≤ 200 mm.

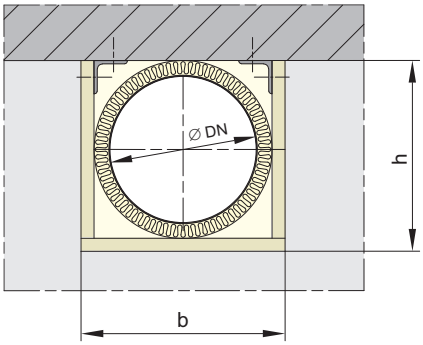
FR90 fire dampers

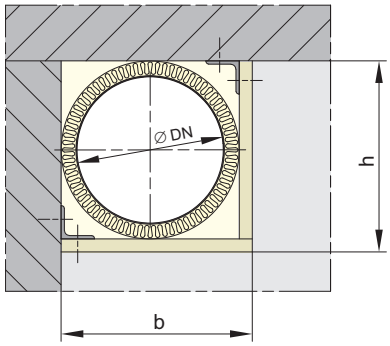
Installation remote from (5) rigid walls and ceilings and metal stud walls

Installation remote from rigid walls or metal stud walls, with adjacent rigid walls or ceilings partially replace fire-resistant claddings (6) of the ventilation ducts (3):

Fire-resistant claddings (6) on ventilation ducts (3) then

remain U-shaped (3-sided) or angular (2-sided)





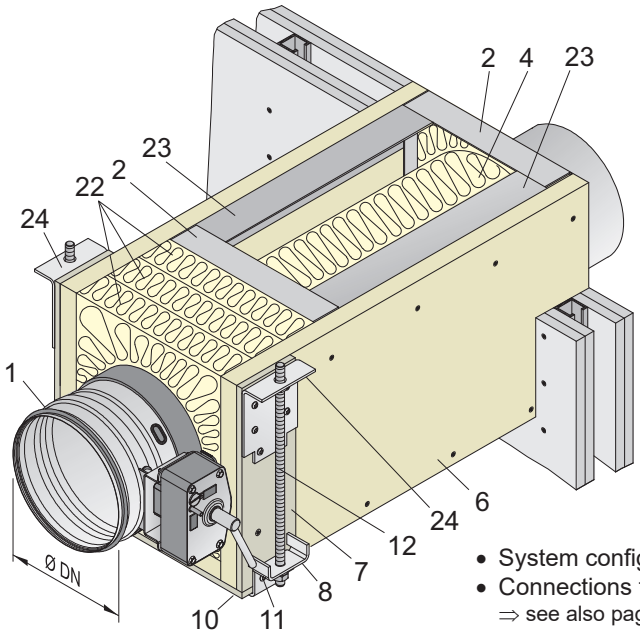
Installation openings for claddings (6) through the wall being protected:

b x h ≈ (DN + 134) x (DN + 99) b x h ≈ (DN+ 99) x (DN + 99)

+ mortar gaps as required for rigid walls

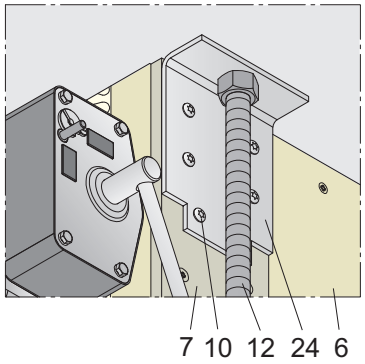
Installation openings for claddings (6) through the wall or ceiling being protected:

⌀ d ≈ DN + 5

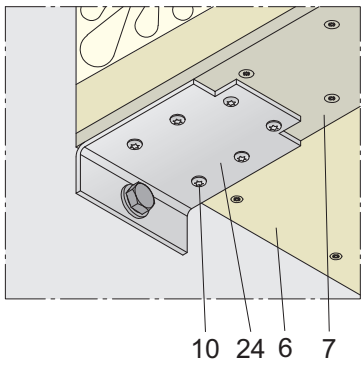


- System configuration ⇒ see page 36
- Connections to walls and ceilings ⇒ see also pages 36 to 39

Suspension from rigid ceilings



Fastening to rigid walls



Parts list

1 FR90 fire damper.
2 Connection frame.
3 Ventilation duct made from sheet steel.
4 Mineral wool, 30 mm, ≥ 40 kg/m³, melting point >1000°C, clad with aluminium foil.
6 Cladding made of 35 mm Promatect® LS fire protection boards. **Produce according to Promat® worksheet 478.**
7 100 mm wide additional cladding made of 10 mm Promatect® H boards. Bond to (6) with Promat®K84 adhesive and screw in place with (5).
8 FR90 corner bracket [1].
10 Round head chipboard screw 4 x 45 mm [1].
11 Round head chipboard screw 5 x 70 mm [1].
12 Threaded rods for fastening with secured nuts [2]. 4 x M8 with DN ≤ 315, otherwise 8 x.
22 Mineral wool, 50 mm, ≥ 140kg/m³
23 Angle steel ≥ 40 x 40 mm x 3 mm DIN EN 10056 or equivalent. Fastenings according to **Promat® worksheet 478**.
24 Suspension bracket [1]

[1] Is included in the scope of delivery of the FR90 fire damper with connecting frame and available as accessories. ⇒ see pages 43, 44 and 46

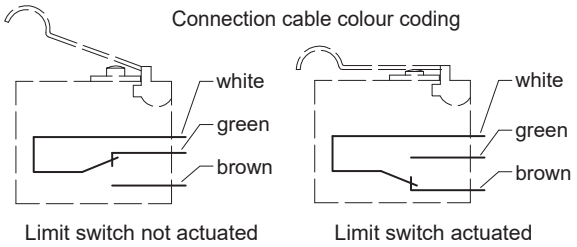
[2] Secure nuts or use all-steel lock nuts.

FR90 fire dampers

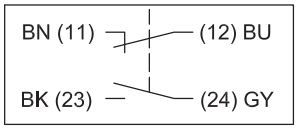
Electrical connections

Limit switches on thermal-mechanical release mechanisms

The CLOSED limit switches are actuated when the fire damper is closed, and the OPEN limit switches are actuated when the fire damper is open.

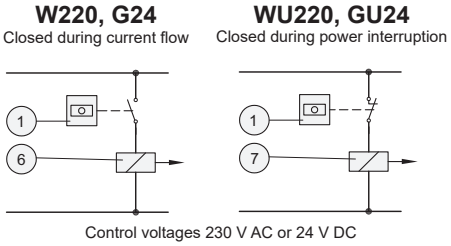


E-Ex limit switch



Limit switch not actuated

Remote release



1 Thermostats, smoke detectors and switches must only be installed if required. On site delivery.

2 Thermal-electric release element 70°C or 95°C inside the fire damper casing; EM-1, EM-2 und RM-1 only 70°C!

3 Temperature cut-off approx. 70°C outside the fire damper casing.

4 Electric actuator with limit switches for OPEN-CLOSED position indicator.

The illustration shows the de-energised operating position where the fire dampers are closed.

- The switches on the connection cables can be removed if they are not being used.
- Due to their in-built thermal release elements, all actuators must be stored at temperatures not exceeding 50°C!

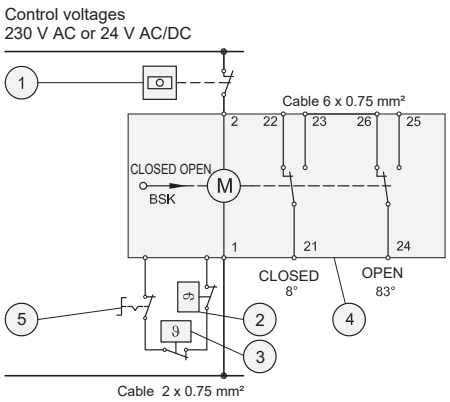
5 Button for function check

6 Lifting solenoid

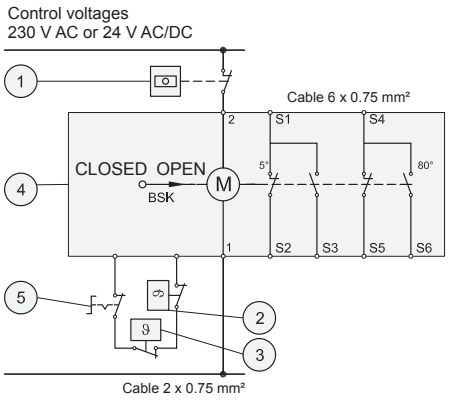
7 Magnetic clamp

The right to allow for delivery variations from the versions shown remains reserved.

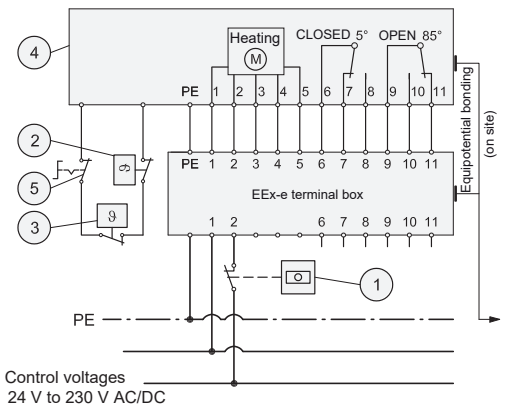
Actuators M220-9/H, M24-9/H



Actuators M220-10/F, M24-10/F, M220-11/H, M24-11/H



Actuators EM-1, EM-2 and RM-1



Connection box for fire dampers with electric spring return actuators M220-10/F, M24-10/F, M220-9/H, M24-9/H, M220-11/H, M24-11/H

⇒ see pages 46 and 48

FR90 fire dampers

Installation/functional test and servicing/maintenance-free

Installation

- FR90 fire dampers must be installed based on the instructions in this user manual.

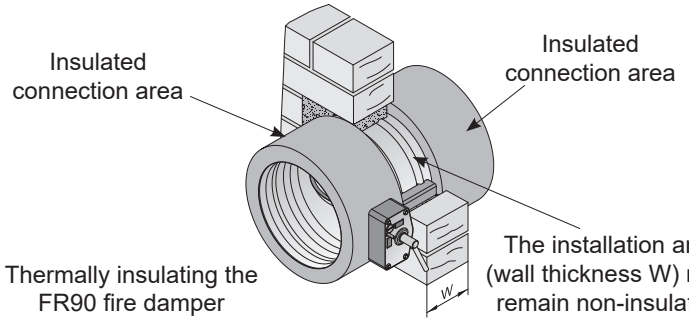
  Structural requirements in terms of the walls, ceilings, ventilation ducts etc. must be met on site.

  The general technical regulations and national statutory regulations must be observed during installation.

  In Germany, this specifically relates to the "Guideline on fire protection requirements pertaining to ventilation systems" (Lüftungsanlagenrichtlinie - LüAR).
- FR90 fire dampers may be connected to ventilation ducts made from non-combustible and combustible materials, as well as to flexible connectors.

  Thermal expansions must not exert significant forces in the event of fire. If required, compensatory measures must be taken for this purpose, for example, suitable line laying or the installation of flexible connectors made from combustible materials or from "Aluflex".
- In Germany, **release mechanisms** for a nominal temperature of 95°C are permitted for hot air heating and for building areas with sprinkler systems in some cases.
- **FR90 fire dampers**
  - Do not need spacing to separate them from combustible materials.
  - Are suitable for all installation positions.
  - Can be installed with a minimum spacing of 15 mm, also in metal stud walls.
  - May be installed in air transfer applications.

    ⇒ See user manual 5.11 and general design approval Z-6.50-2133 for details.
- **Electric wiring** must be performed on site.
- **Potential equalisation conductors** to bridge flexible connectors on fire dampers can be fastened with metal screws if they are made of copper and have a cross section of up to 6 mm², or if they are made of aluminium.
- Fire dampers installed in **explosive atmospheres** must be grounded in accordance with the regulations.
- Connection areas of the FR90 fire dampers can be **thermally insulated** , for example, to protect from **condensation** in external air inlets. Flame-retardant, closed-cell foam can be used, for example Armaflex. Otherwise laminated mineral wool must be used.



Functional testing and servicing

- Fire dampers must be serviced by the owner and tested periodically for correct functioning. The intervals largely depend on the system operation. The relevant regulations should be followed.
- Functional tests are limited to the release and re-opening of the FR90 fire dampers. This can be performed by remote control with an electrical actuator.
- Repairs or service work are required in the event of malfunctions.

  Original spare parts must be used for this.
- Cleaning work required in ventilation systems for hygiene reasons must be performed in an operation-dependent manner, and also includes the fire dampers.

Feature: Maintenance-free

- FR90 fire dampers, series FR92, are maintenance-free due to fully enclosed components, corrosion-resistant materials and precise manufacture.

  The drive mechanism is made of stainless steels and housed in enclosed casings, which means it is not directly in the air stream. The release mechanisms and actuators are also configured accordingly.

  There is no need for regular cleaning and lubrication, which would otherwise be necessary.

  Damper blades are break-proof (⇒ see page 9)

  Sealants and all other materials are designed durably and for a long service life.
- The reliability of the FR90 fire dampers is due to the special drive mechanism with dead-centre positions in the opened and closed positions. This allows the final positions to be closed and locked securely, and displayed reliably.

  This is the only way to carry out remote-controlled functional checks and automation reliably.
- Manual functional checks are limited to the closing and opening of the FR90 fire dampers.
- Two control openings are provided for inspecting the interior of the fire dampers; one above and one below the damper blade. The position and size of these openings are specially adapted to the FR90 fire dampers and are fully adequate.

  FR90 fire dampers are largely insensitive to dust and dirt.

The **operating instructions** for FR90 fire dampers are available to download online at www.wildeboer.de.

FR90 fire dampers

Order data (1) for FR90 fire dampers (series FR92)

FR92 - - - - - - - - -

Nominal sizes [mm] DN
100 - 125 - 140 - 160 - 180
200 - 224 - 250 - 280 - 315 - 355
400 - 450 - 500 - 560 - 630 - 710 - 800

Option: **Frame** [1)]

- **RE100 and RE150** for rigid walls and ceilings and metal stud walls.
- **RH100 and RH150** for wooden walls and ceilings **RH150** for ceilings with steel frames**RR100 and RR150** (only available for ≤ DN 315) for rigid walls and ceilings and metal stud walls.

- **AE** for mounting on rigid walls and ceilings and on metal stud walls (shaft walls) with cladding on one side.
- **ER6** for sliding ceiling connection
  Stud profile depths: 50 / 60 / 75 / 85 / 100 / 125 [9)]
  Actuator: left / right / bottom
- **RV** (including 1 x connecting frame) for installation remote from rigid walls, ceiling and metal stud walls with connection of 4 sides.
- **Connecting frame** (2 x) for installation remote from rigid walls and remote from metal stud walls with connection on 2 and 3 sides.

Option: **Damper blade** with

- Metal cover made of galvanized steel [2)]
- Metal cover made from 1.4301 stainless steel

⇒ see pages 2, 3 and 6

Option: **Casing design**

- Casing with inner and outer epoxy resin coating [3)]

⇒ see pages 2, 3 and 6

Option: **Nominal temperature**

- 95°C [4)]
- 70°C corrosion-protected [5)]

⇒ see pages 2, 3 and 6

Option:
OR32 (FR) smoke detector

- R0 / L0 / U0 (standard)
- R2 / L2 / U2 (with MC and relay module)

The scope of delivery includes factory-mounted AS and NAS extensions. The smoke detector with casing OR32 (FR) is inserted into extension AS and wired with an electrical connection to the control unit.[9)]

The operating voltage of 24 V AC or 24 V DC must be provided and connected on site for actuators M24-9/H and M24-10/H and M24-11/H.
⇒ see user manual 5.11 (circuit diagram)

Option: **Remote release** [5)]
mounted onto the mechanical release mechanism.

- GU24, WU220 } Magnetic clamps
- G24, W220 } Lifting solenoids
- P, P2 } Pneumatic cylinders

Option: **Explosion-protected**[5)]

Option: **Electric actuators** [6)]

- M220-10/F, M24-10/F } Standard up to DN 315
- M220-9/H, M24-9/H } Standard from DN 355 [7)]
- M220-11/H, M24-11/H } [8)]

Option: **Electric explosion-protected actuators** [6)]

- EM-1, RM-1 } Standard, 10 Nm
- EM-2 } 15 Nm

⇒ see pages 4 and 5

Option: **Limit switch** [5)]

- E-CLOSED, E-OPEN } also E-CLOSED together with E-OPEN and with remote releases

Option: **Explosion-protected limit switch** [5)]

- EX-CLOSED, EX-OPEN } also EX-CLOSED together with EX-OPEN

1) Scope of delivery and page references ⇒ see page 44
2) For DN 100; 125; 160; 200; 250; 315; 355; 400.
3) For DN 100; 125; 160; 200; 250; 315; 355; 400 in combination with standard damper blade. For all DN in combination with 1.4301 stainless steel damper blade.
4) Not for the actuators EM-1, RM-1, EM-2.
5) Only for thermal-mechanical release mechanisms.
6) Actuators with thermal-electrical release mechanisms and limit switches.
7) Also as a special actuator for smaller sizes.
8) Special actuator for all sizes.
9) It is not possible to install the OR32 (FR) smoke detector or extensions AS and NAS on FR90 fire dampers with AE, ER6 or RV frames in the factory. Installation must be performed on site.

FR90 fire dampers

Order data (2) for FR90 fire dampers (series FR92)

Installation subframes RE100 / RE150
factory-mounted or for retrofitting on site.

Delivery with the required FR90 brackets, FR90 corner brackets and screws M6 x 20 and with drywall screws 3.9 x 55 for screwing the FR90 brackets to metal stud walls.

Screws M6 and metal anchors must be provided by the customer for screwing the FR90 connection brackets and FR90 corner brackets to rigid walls or ceilings. ⇒ see pages 3, 7, 8, 13, 14 and 20 to 22

Installation subframe RH100 / RH150
factory-mounted or for retrofitting on site.

Delivery with the required FR90 brackets, RH corner brackets, RH brackets, drywall screws 3.5 x 55, hexagon screws M6 x 20 and with drywall screws 3.9 x 55 mm for screwing the RH brackets to wooden walls and ceilings and ceilings with steel frames (RH150 only).

Promaseal® Mastic fireproof sealant must be provided on site. ⇒ see pages 3, 7, 8 and 28 to 34

Installation subframe RR100 / RR150
factory-mounted or for retrofitting on site. Available in sizes DN 100 to DN 315.

Delivery with the required FR90 brackets, FR90 corner brackets and screws M6 x 20 and with drywall screws 3.9 x 55 for screwing the FR90 brackets to metal stud walls.

Screws M6 and metal anchors must be provided by the customer for screwing the FR90 connection brackets and FR90 corner brackets to rigid walls or ceilings. ⇒ see pages 3, 7, 8, 13, 14 and 22

Mounting frame AE
factory-mounted or for retrofitting on site.

Supplied with the maximum required washers Ø 60 x 6.5 x 2 mm and AE washers.

The customer needs to provide the M6 threaded rods, nuts and washers to screw the mounting frame AE to rigid walls, ceilings or shaft walls. ⇒ see pages 3, 7, 8, 15, 26, 27 and 35

Installation subframes ER6 are only supplied factory-assembled.

Delivery includes screws and plugs for fastening. ⇒ see pages 3, 7, 8 and 23 to 25

Mounting frame RV
factory-assembled or for retrofitting on site.

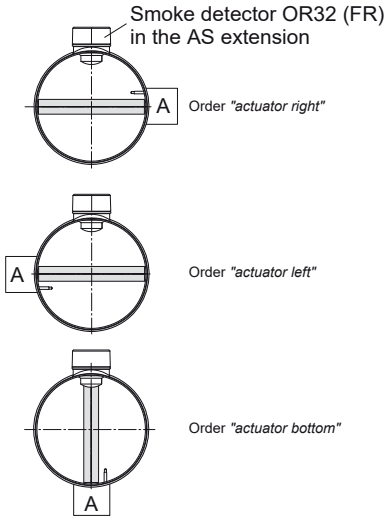
Supplied with FR90 corner brackets, RV washers, chipboard screws and connecting frame.

The customer needs to provide threaded rods, nuts and metal anchors. ⇒ see pages 3, 7, 8 and 36 to 39

Connecting frame
2 x not installed.

Supplied with FR90 corner brackets, suspension brackets and chipboard screws.
The customer needs to provide threaded rods, nuts and metal anchors. ⇒ see pages 3, 7 and 36 to 40

Installation positions of the actuator on the FR90 fire damper

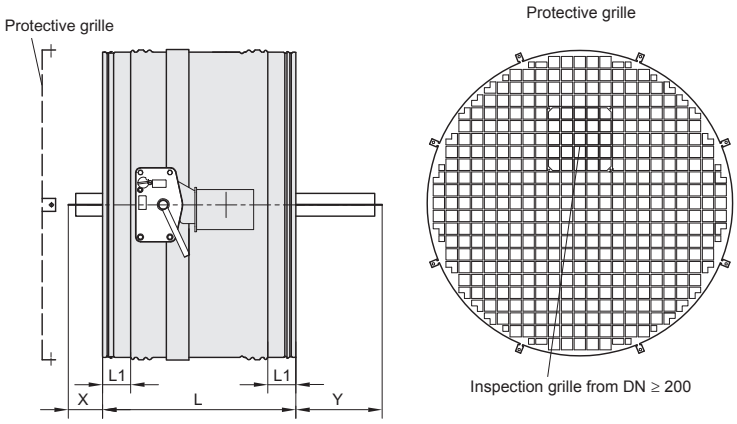


	Actuator position			Standard	MC and relay module
	right	left	bottom		
R0	x			x	
R2	x			x	x
L0		x		x	
L2		x		x	x
U0			x	x	
U2			x	x	x

FR90 fire dampers

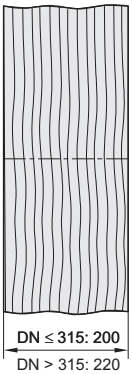
Accessories (1)

Protective grille stamped from ≥ 1 mm thick galvanized sheet steel, 20 mm mesh size, ≈ 70% free cross-section. Available in nominal sizes DN.



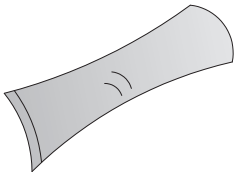
- A permanent spacing from the protective grille must be provided to allow for free movement of the damper blade. ≥ 50 mm is recommended. The length must be added to the damper blade excess lengths X and Y.
  ⇒ see table on page 9: "Size-dependent excess lengths"
- For L1 ⇒ see table on page 8

Flexible connectors made from PVC-coated polyester fabric, cadmium-free, 100 mm expansion compensation. With hygiene certificate. Building material class B1 DIN 4102.
Temperature-resistant: -20°C to +70°C.
Delivery includes 2 pipe clamps.
Available in nominal sizes DN.



- The connecting pieces can be installed stretched and directly to the FR90 fire damper. Otherwise, the free movement of the damper blade has to be established by lengthening with ventilation duct parts on site.

Mineral, sodium-silicate-based adhesive for bonding and joining installation subframes and mounting frames and for mineral insulating materials. Non-combustible, building material class A1 DIN 4102.



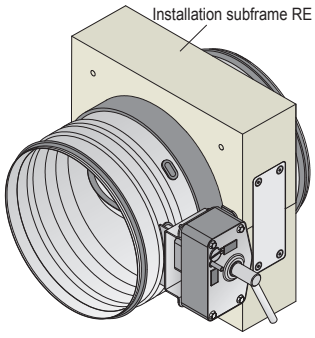
Pack: 2 x 300 g bags

Adhesive for on-site mounting of separately ordered installation subframes RR100, RR150, RE100, RE150, RH100, RH150, mounting frames AE and **mounting frames RV** on FR90 fire dampers is included.

If adhesive is ordered in addition, approximately the following quantity is required:

DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
[g]	150	165	175	185	200	210	225	245	260	285	310	340	370	400	440	480	530	590

⇒ see pages 13 to 15, 20 to 22, 26, 27, 29 to 39



Adhesive for filling installation subframes on site and for adhesive bonding of surfaces should always be ordered separately!

- Quantities for filling **installation subframe RE** on both sides:

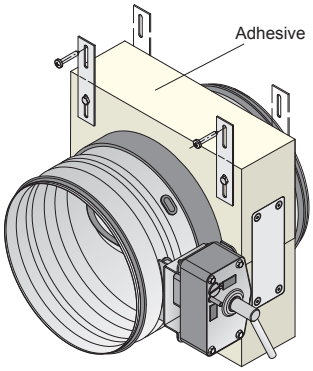
DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
[g]	150	170	185	200	215	230	250	270	300	325	365	400	440	480	530	585	650	720

⇒ see pages 13, 14, 16, 20 to 22

- Quantities for filling **installation subframe RR** on both sides:

DN	100	125	140	160	180	200	224	250	280	315
[g]	125	140	150	160	175	190	205	220	240	260

⇒ see pages 13, 14, 22



- Quantity for **adhesive bonding of surfaces** between assembled installation subframes RE: approx. 1 kg/m² of the area to be bonded.

FR90 fire dampers

Accessories (2)

Promaseal® Mastic Brandschutzkitt (fireproof sealant)

The following approximate quantities are required for sealing mounting frames RV on both sides:

DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
[ml]	16	20	23	26	29	32	36	40	45	50	57	64	71	79	89	100	112	126

⇒ see parts list pages 37 and 39, item 21

Pack:
Cartridge 310 ml

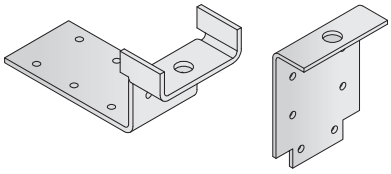
The following approximate quantities are required for sealing FR90 fire dampers with installation subframe RH on both sides:

DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
[ml]	30	35	40	40	45	50	55	55	60	65	75	80	90	100	110	120	130	145

⇒ see parts list page 30, item 6 and page 33, item 7

FR90 corner brackets and suspension brackets for suspending claddings of the ventilation ducts to butt joints on site.

Pack of 4 x for corner connections,
2 x suspension brackets for installation directly on or under rigid walls or ceilings, including screws.



⇒ see parts lists, pages 37 and 40, items 8 and 24

Simplified electrical connection

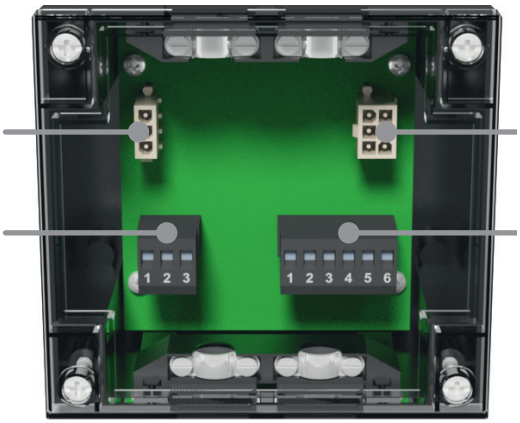
Connection box for fire dampers with spring return actuator.
The electrical connections are made in the connection box using plug-in screw terminals. Motor connection lines are fitted with AMP connectors as standard and cannot be accidentally reversed.

Plastic casing 140 mm x 110 mm, 67 m (L x W x H), protection class II, protection rating IP40.

Actuator connection plug
3-pin AMP connector

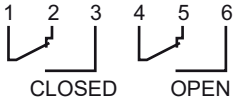
Mains connection
Plug-in screw terminals

24 V AC/DC
or
230V AC



Limit switch connector plug
6-pin AMP connector

Redirection limit switch
Plug-in screw terminals



The illustration shows the de-energised operating position where the fire dampers are closed.

AB-01 for spring return actuators M24-10/F, M24-9/H, M24-11/H

AB-02 for spring return actuators M220-10/F, M220-9/H, M220-11/H

Communication system Wildeboer-Net

⇒ see information on the back page and user manual 7.1

FR90 fire dampers

Specification text

Maintenance-free fire dampers according to EN 15650 with up to 120-minute fire resistance period and fire classifications EI 30/60/90/120 (ve - ho, i ↔ o) S C 10000. Air-tight casing, class C according to EN 1751, made of galvanized sheet steel with moulded plug connections for spiral lockseam duct, flexible pipe and for similar circular ventilation ducts or air conditioning systems. Casing with lip seals and epoxy resin powder coating on both sides. **Replaceable damper blade made of abrasion-proof calcium silicate, with wear-resistant elastomer lip seals** / with metal cover made of galvanized steel or 1.4301 stainless steel. **Fully enclosed, maintenance-free slider crank transmission in the area of the casing wall, as a self-locking drive mechanism for break-proof torque transmission. Sealed drive axles made of stainless steel, with red metal bearings. Suitable for installation with minimum spacing and with any damper blade axle position in, on and remote from rigid walls and ceilings, in hard-to-access installation openings also with mineral wool, in and remote from metal stud walls and on shaft walls with and without metal studs, in solid timber and timber frame construction walls and ceilings and in ceilings with steel frames. Direct connection to ventilation ducts made of non-combustible or combustible materials, or with protective grilles.**

Enclosed, maintenance-free thermal release 70°C / 95°C

- For manual, single-handed operation
  - Corrosion-resistant release element 70°C
  - With (two) electrical limit switch(es) for signalling the damper blade positions CLOSED, OPEN, CLOSED AND OPEN
  - With remote release via magnetic clamp 230 V AC or 24 V DC / lifting solenoid 230 V AC or 24 VDC / pneumatic cylinder 4 to 8 bar / 1.2 to 8 bar.
- With electric actuator 230 V AC or 24 V AC/DC for remote control and functional checks
- Explosion-protected for zones 1, 2, 21, 22
  - With (two) electric explosion-protected limit switch(es) for signalling the damper blade positions CLOSED / OPEN.
  - With explosion-protected electric actuator for 24 V to 240 V AC/DC.
- with
  - Installation subframe RE100 / RE150 for installation in rigid walls, ceilings and in metal stud walls.
  - Installation subframe RH100 / RH150 for installation in wooden walls and ceilings
  - Installation subframe RH150 for installation in ceilings with steel frames.
  - Installation subframe RR100 / RR150 for installation in rigid walls, ceilings and in metal stud walls.
  - Mounting frame AE for mounting on rigid walls and ceilings and on walls with cladding on one side (shaft walls) and with and without metal studs.
  - Installation subframe ER6 for sliding ceiling connections in metal stud walls.
  - Mounting frame RV and connecting frame (1 x) for installation remote from rigid walls and ceilings and remote from metal stud walls with connection on 4 sides.
  - Connecting frames (2 x) for installation remote from rigid walls and from metal stud walls with cladding on both sides, with ventilation ducts with cladding on 2 and 3 sides.

Select texts not highlighted in bold as required!

Tested according to EN 15650, annex B, with 20% saline solution, for verification of permanent functioning under highly corrosive conditions.
In order to comply with the hygiene requirements according to DI 6022-1, VDI 3803-1, DIN 1946-4, DIN EN 13779, verification of the necessary resistance of all materials to microorganisms (fungi, bacteria) and disinfectant resistance.
With Environmental Product Declaration according to ISO 14025 and EN 15804.

FR90 fire dampers

Specification text: Accessories

..... pc Diameter DN: ..... mm
Volume flow: ..... m³/h
Pressure drop: ..... Pa
Sound power level: ..... dB(A)
Manufacturer: WILDEBOER
Type/series: FR90/FR92 deliver: .....
install: .....

Protective grille for fire dampers without connecting ducts for protecting flow-through openings. Stamped with 20 mm mesh size made of at least 1 mm thick galvanized sheet steel.

..... pc Diameter DN: ..... mm
Manufacturer: WILDEBOER deliver: .....
install: .....

Flexible connectors for fire dampers, made from polyester with a cadmium-free coating, with connection frame. Stretched length around 210 mm, at least 100 mm axial expansion absorption, building material class B1 according to DIN 4102. With hygiene conformity certificate as proof of compliance in accordance with VDI 6022-1, VDI 3803-1, DIN 1946-1, DIN EN 13779, ÖNorm H 6021, ÖNorm H 6020, SWKI VA 104-01, SWKI VA 105-01.

..... pc Diameter DN: ..... mm
Manufacturer: WILDEBOER deliver: .....
install: .....

Connection box for spring return actuators with AMP connector on connecting lines for transmission via plug-in screw terminals to on-site line. Plastic casing IP40.

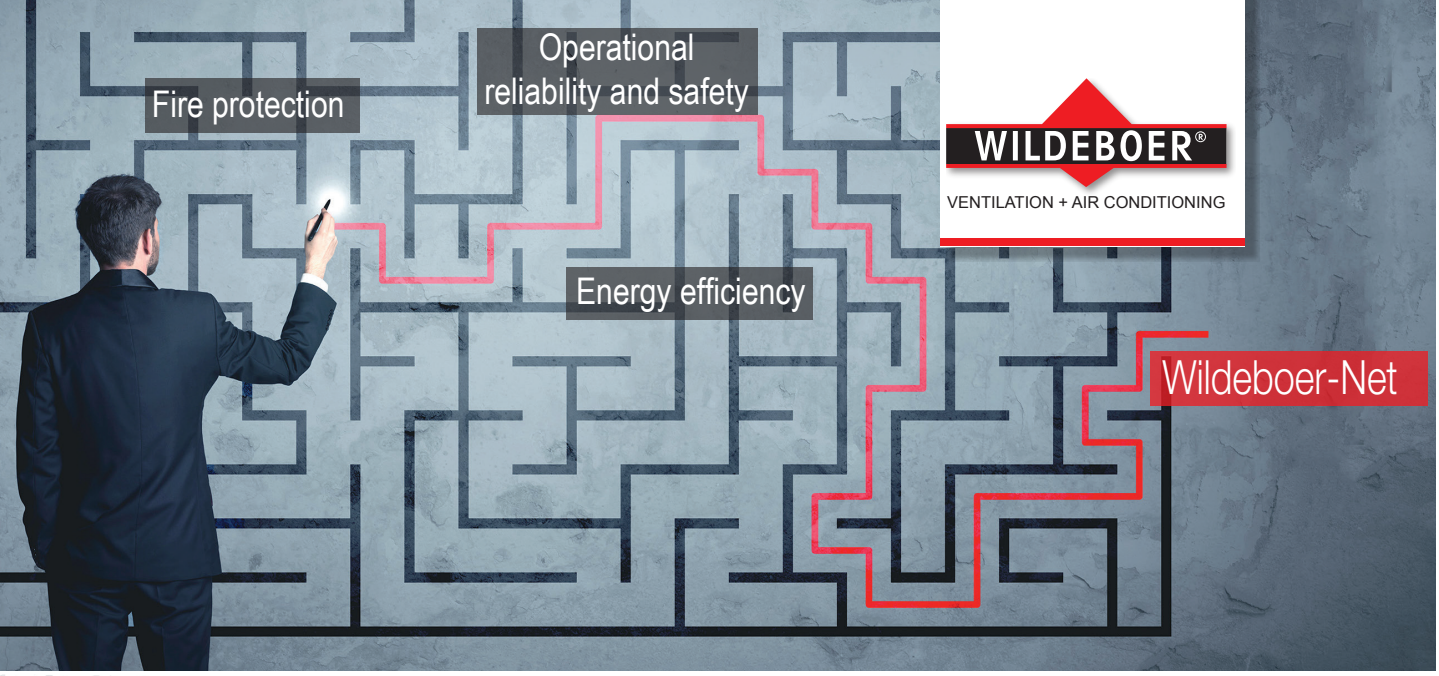
..... pc AB-01 for 24 V AC/DC
Manufacturer: WILDEBOER deliver: .....
install: .....

..... pc AB-02 for 230 V AC
Manufacturer: WILDEBOER deliver: .....
install: .....

Select texts not highlighted in bold as required!

FR90 fire dampers

Contents



WILDEBOER®
VENTILATION + AIR CONDITIONING

Communication system Wildeboer-Net

Link up fire protection and air distribution and reduce the cost of planning, installation and operation of fire dampers, volume flow and pressure controllers considerably. The communication system Wildeboer-Net lays all the groundwork for you. Don't miss out on the benefits. Further information can be found in the user manual of the Wildeboer-Net communication system. If you need advice, please do not hesitate to contact us.

Existing problems:

The system design, installation, programming and commissioning of conventional control systems in buildings is complex.

Fire dampers have to operate reliably. Changes in the building control system always require new operating principle testing.

Recurring functional tests are time-consuming, affect operation and incur high costs.

Preventing smoke spreading is a challenge.

Our response:

- Special plug-and-play functionality allows control systems for fire dampers to be designed, built and connected in parent hierarchy without any measuring and control expertise.
- Wildeboer-Net, which operates independently of the higher-level building management system, ensures that changes to the building control do not affect the safety-related area of the fire protection.
- Wildeboer-Net makes it possible to carry out scheduled, automatic functional checks within a few minutes.
- When smoke is detected, flexible release groups close the relevant fire dampers in an operationally reliable and safe manner and in good time. The integration of volume flow and pressure controllers provides additional protection against cold smoke transfer.

Watch explanatory video on YouTube
wildeboer.eu/youtube

WILDEBOER® Net
VENTILATION + AIR CONDITIONING

Communication system Wildeboer-Net

- Optimum system solution combined with our maintenance-free fire dampers

Wildeboer Bauteile GmbH
Ptolemaeuslaan 52 | 3528 BP Utrecht | +49 4951 950-0 | +31 30 7670150
info@wildeboer.eu | www.wildeboer.de