



Maintenance-free

FK90 fire dampers

- Sizes 200 x 200 to 1500 x 800 or up to 1000 x 1000 in 5 mm increments
- For universal use with a wide range of applications
- Fire classification: EI 30/60/90/120 ($v_e - h_o, i \leftrightarrow o$) S C₁₀₀₀₀
- Hygiene certificate
- Environmental Product Declaration according to ISO 14025 and EN 15804

FK90 fire dampers

Features and characteristics

Single-piece sheet steel casing

Galvanized - pressure-joined - extremely stable

Airtight, minimum leak tightness class C according to EN 1751

Option: Epoxy resin powder coating

Dimensions B and H in 5 mm increments

Nominal width B: 200 mm to 1500 mm

Nominal height H: 200 mm to 1000 mm

Lengths: 400 mm and 500 mm

Short lengths: 346 mm and 355 mm

Break-resistant damper blade

for vertical or horizontal installation, with galvanized metal frame and attached elastomer lip seal

- frictionless sealing -
- replaceable -

Options:

Metal cover made of galvanized steel

Metal frame made from 1.4301 stainless steel

Metal frame and metal cover

made of 1.4301 stainless steel

Large free cross-section

Maximum volume flow

Minimum pressure drop

Extremely low sound power level



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

Fully enclosed:

- Operation unit
- Release mechanism
- Release element

Thermal-mechanical **release mechanism** for single handed operation

Option:

Electric actuators, also explosion-protected

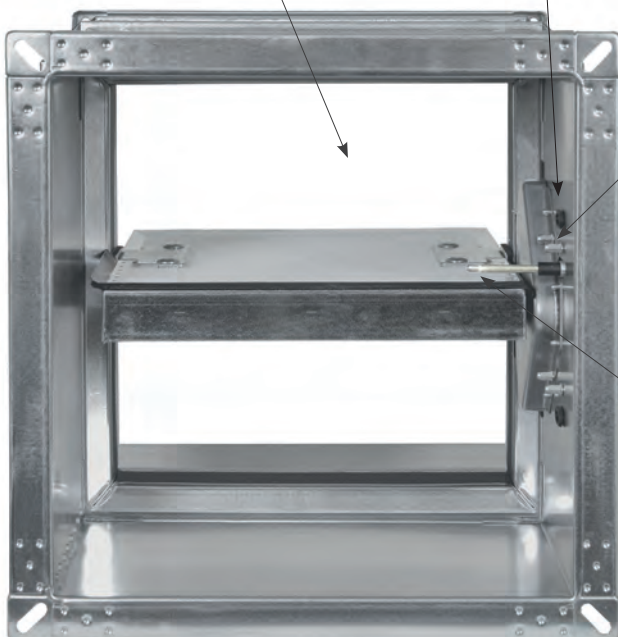
All-round enclosed **thermal release elements**

70°C or 95°C

Option:

Corrosion-resistant release element 70°C

Connection holes for profiles from 20 mm in height



FK90 fire dampers

Description

Maintenance-free **FK90** fire dampers according to **EN 15650**

Fire classifications: **EI 30/60/90/120 (v_e - h_o, i ↔ o) S C₁₀₀₀₀**

Fire resistance period: 30, 60, 90 minutes and 120 minutes

Declaration of performance: **DoP no.: CPR/FK90/003**

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-20180133-ICC1-DE**

Additional national certificates and approvals in Germany:

- Building materials: MPA-BS 6000/593/18 certificate
FK90 fire dampers are essentially made from non-combustible building materials.
- Air transfer applications:
Z-6.50-2132

Pressure-joined casing with all-round single-piece design, made of galvanized sheet steel, leak tightness class C according to EN 1751. Moulded connection flanges, outer beading and tapered inner beading ensure stability, freedom of damper blade movement, minimum pressure drop and low noise level.

Replaceable damper blade made from high temperature resistant, abrasion proof and corrosion resistant calcium silicate with galvanized metal frame and folded, wear resistant elastomer lip seals.

Option: Casing with powder coating. ⇒ see page 6

Options: Damper blade with metal frame made of 1.4301 stainless steel/damper blade with metal cover made of galvanized steel/damper blade with metal cover made of 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.

Thermal release mechanisms at 70°C or 95°C nominal temperature. The operation units can be actuated manually or electrically. ⇒ see pages 5 and 6

Release mechanisms, operation units and electric actuators are enclosed and fitted 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. Air inflow from any connection side. Connection to ventilation ducts made of non-combustible or combustible materials, including protective grilles.

Option: Additional openings on the operation side in the casing. ⇒ see page 48

Widths B: 200 mm to **1500 mm** and **Heights H:** 200 mm to **800 mm**

200 mm to **1000 mm** and **Heights H:** 200 mm to **1000 mm**

Intermediate dimensions are available in 5 mm increments.

Lengths L: **400 mm** and **500 mm**

Short lengths: 346 mm and 355 mm

⇒ see pages 7 and 8

FK90 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 FK90 fire damper is reduced accordingly; partly if the minimum thickness is lower.

Options for heights H of up to 800 mm; fire resistance periods of up to 90 minutes:

- **Installation subframe ER1** for simplified dry installation in metal stud walls with cladding on both sides and in shaft walls with and without metal studs.
⇒ see pages 7, 8, 23 to 25, 29 to 31
- **Installation subframe ER2** for rigid walls and ceilings.
⇒ see pages 7, 8, 17
- **Installation subframe ER3** for metal stud walls with cladding on both sides and for shaft walls with and without metal studs. ⇒ see pages 7, 8, 23, 24, 29 to 31
- **Installation subframe ER4** for sliding ceiling connections with drops of up to 40 mm in metal stud walls with cladding on both sides. ⇒ see pages 7, 8 and 26 to 28
- **Installation subframe ER8** for dry installation in wooden walls and wooden ceilings and for ceilings with steel frames. ⇒ see pages 7, 8 and 32 to 38
- **Mounting frame AR1** for direct mounting onto rigid walls and ceilings. ⇒ see pages 7, 8, 18, 39
- **Mounting frame AR2** for installation remote from rigid walls and ceilings and from metal stud walls with cladding on both sides. ⇒ see pages 7, 8 and 40 to 46

FK90 fire dampers

Release mechanisms and actuators (1)

FK90 fire dampers, series FK92, 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.

Option: **Electric spring return actuator - Standard** - with 70°C release element; protection class IP54.

M220-9/H 230 V AC; 9.2 VA; $I_{\max \leq 2 \text{ ms}} = 0.27 \text{ A}$.

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

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.

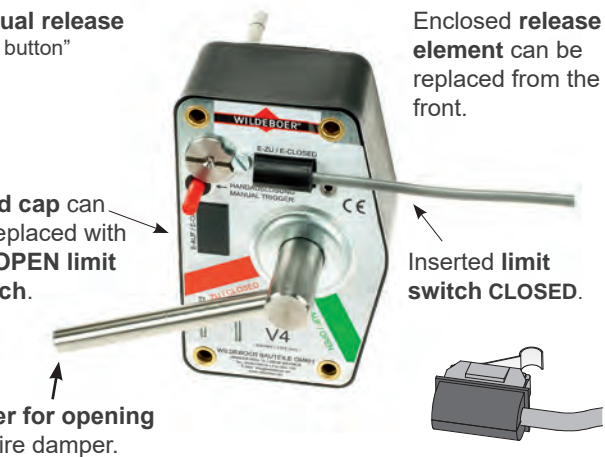
Manual release "Red button"

Enclosed **release element** can be replaced from the front.

Blind cap can be replaced with the **OPEN limit switch**.

Inserted **limit switch CLOSED**.

Lever for opening the fire damper.



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.

Option: **Electric spring return actuator - Standard** - with 70°C release element; protection class IP54.

M220-9/H 230 V AC; 9.2 VA; $I_{\max \leq 2 \text{ ms}} = 0.27 \text{ A}$.

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

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.



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

Button for **function check**

Enclosed **release element**



FK90 fire dampers

Release mechanisms and actuators (2)

Option: Electric spring return actuator

with 70°C release element; protection class IP54.

M220-11/H 230 V AC; 9 VA / 4.5 W; $I_{\max \leq 5 \text{ ms}} = 4 \text{ A}$.

M24-11/H 24 V AC/DC; 6 VA / 4 W; $I_{\max \leq 5 \text{ ms}} = 8.3 \text{ A}$.

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 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.

Option: Electrical spring return actuator for sizes B ≤ 800 mm and H ≤ 450 mm only, otherwise as above.

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

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

Ex - 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 } 24 to 240 V AC/DC;
EM-2 15 Nm } protection class IP66.
RM-1 10 Nm }

Power consumption up to 20 W including heating;

$I_{\text{nominal}} \leq 0.7 \text{ A}$; $I_{\max \leq 1 \text{ s}} \approx 2.5 \text{ A}$

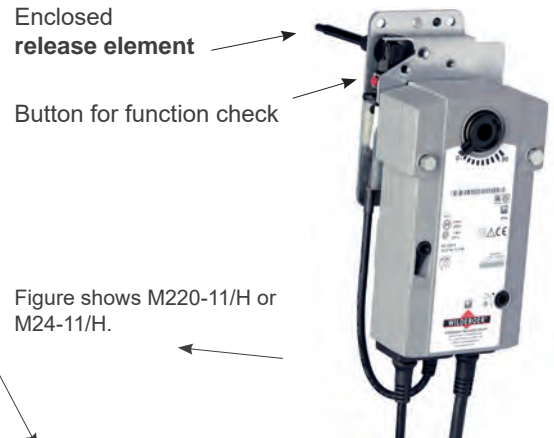
Runtime: Opening ≈ 30 s, closing ≈ 10 s.

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!

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 *)
	RM-1	-	X	X
Ambient temperatures: -20 ... +40°C at T6 and T80°C / -20 ... +50°C at T5 and T95°C			*) Also to be used in this zone!	

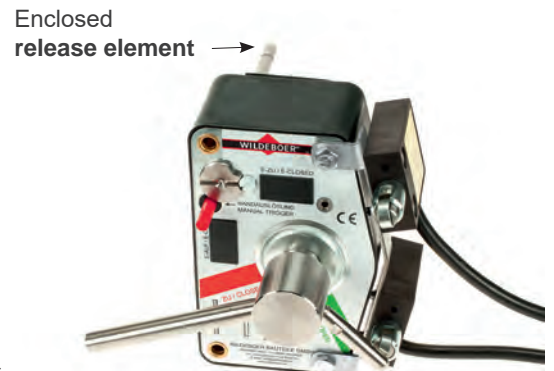


Enclosed release element

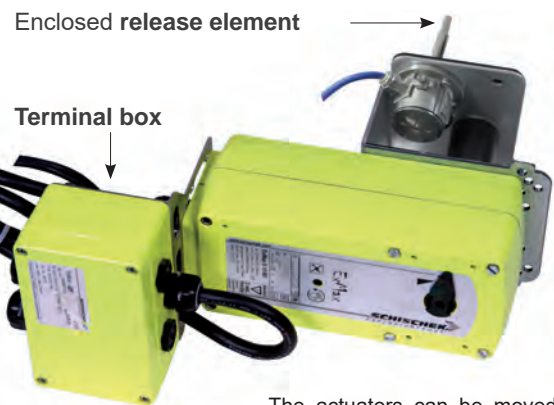
Button for function check

Figure shows M220-11/H or M24-11/H.

An additional console is required for the horizontal position! => see page 51



Enclosed release element



Enclosed release element

Terminal box

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

FK90 fire dampers

Powder coating/hygiene/installation positions

Option: Powder coating

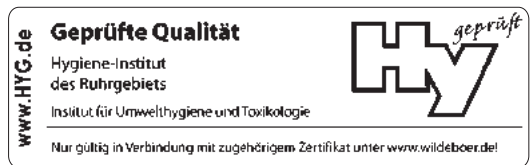
Casing for the FK90 fire dampers, with inner and outer **epoxy resin coating**. The installation subframe ER2 and the connection frames for the installation subframe ER3 are included. Metal frames made of **1.4301 stainless steel** should be used for the damper blades; damper blades with metal cover where appropriate.

The use of thermal-mechanical release mechanisms with **corrosion resistant (coated) release elements 70°C** is recommended.

These combinations allow for extended corrosion protection for higher stresses.

FK90 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.



¹⁾ The corresponding **resistance of the materials to fungi and bacteria** was verified by testing the microbial metabolic potential according to DIN EN ISO 846 for all materials in the FK90 fire dampers.

²⁾ The **resistance to disinfectants** of the materials in the FK90 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 FK90 fire dampers can withstand normal use of disinfectants and disinfection methods.

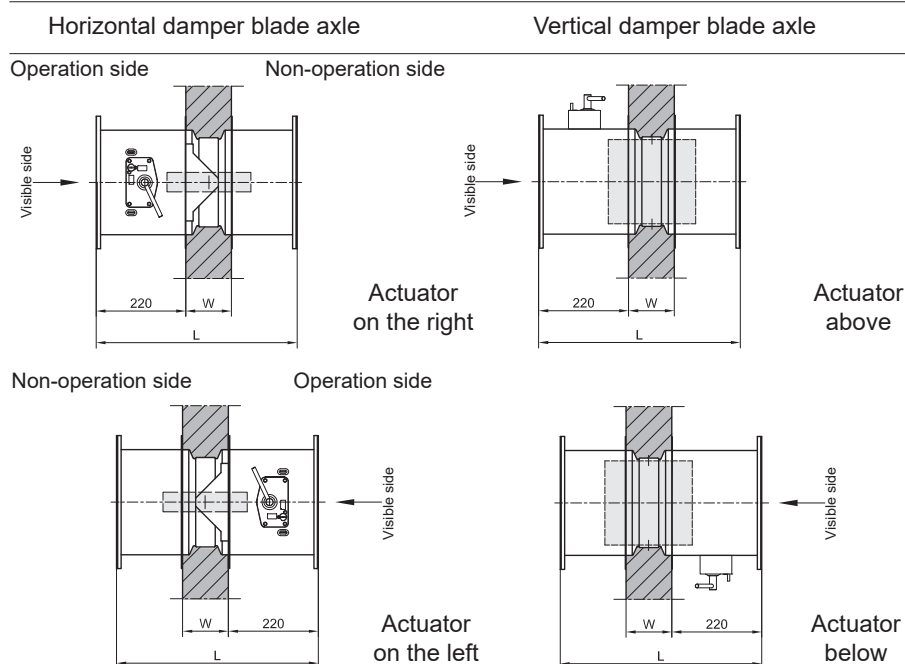
Installation positions

For all lengths L in walls and ceilings ⇒ see pages 3, 16, 17, 19 to 38

For installation types outside of walls and ceilings. ⇒ see pages 18 and 39 to 46

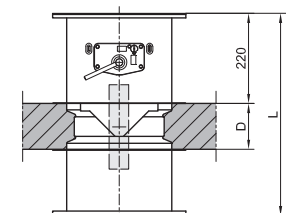
Horizontal installation positions

The operation unit positions of right, left, up and down all relate to the visible side.

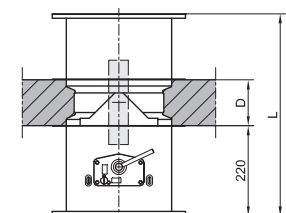


Vertical installation positions

Horizontal damper blade axle



Actuator above the ceiling



Actuator underneath the ceiling

The release mechanisms and actuators are always located to the H-side on the casing of the fire dampers. ⇒ see page 8

FK90 fire dampers

Installation subframe/mounting design/insertion design - Heights H up to 800 mm -

With **installation subframe ER1** made from calcium silicate for **simplified dry installation** in metal stud walls with cladding on both sides and shaft walls with and without metal studs.

Lengths L = 400 mm and 500 mm

⇒ see pages 8, 23 to 25, 29 to 31



With **installation subframe ER4** 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.

Length L = 500 mm

⇒ see pages 8 and 26 to 28



Installation subframe ER8 made from calcium silicate for **dry installation** in **wooden walls** and **wooden ceilings** and for **ceilings with steel frames**.

Lengths L = 400 mm and 500 mm

⇒ see pages 8 and 32 to 38

With **mounting frame AR1** made from calcium silicate for screwing to rigid walls and ceilings.

Length L = 346 mm

Particularly well-suited for restoring missing fire dampers.

⇒ see pages 8, 18, 39



With **mounting frame AR2** made from calcium silicate for connection to ventilation ducts with fire resistance period.

Lengths L = 400 mm and 500 mm

Particularly for installation remote from rigid walls and ceilings and from metal stud walls with cladding on both sides.

⇒ see pages 8, 40 to 46



Short length L = 355 mm for insertion into:

Installation subframe ER2

made from sheet steel for rigid walls and ceilings.

⇒ see pages 8, 17



Installation subframe ER3

made from calcium silicate for metal stud walls with cladding on both sides and for shaft walls with and without metal studs.

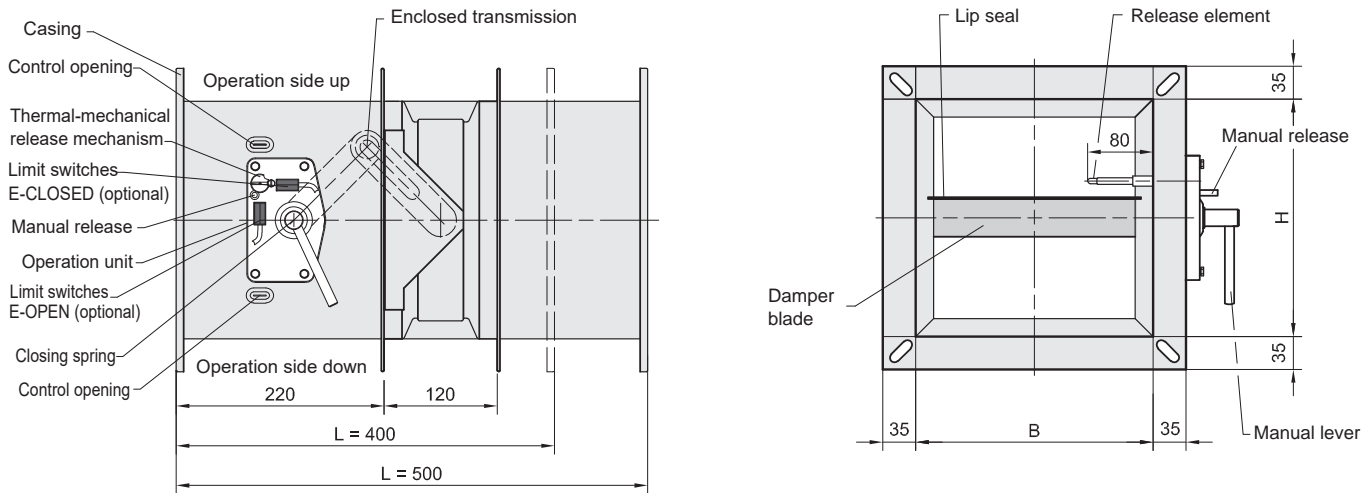
⇒ see pages 8, 23, 24, 29 to 31



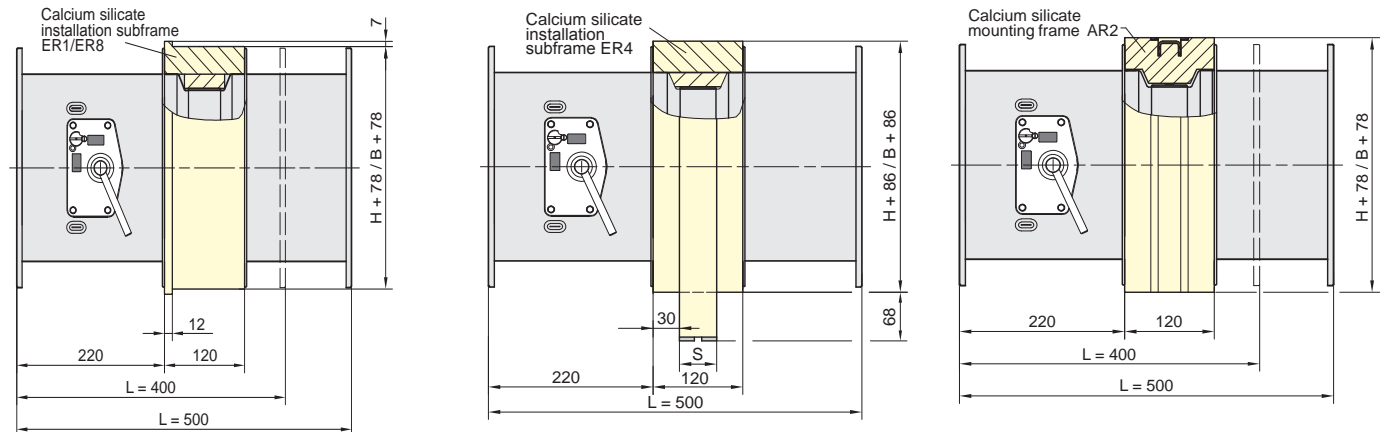
FK90 fire dampers

Data sheet (1)

Version in lengths L = 400 mm and 500 mm without installation subframe



Lengths L = 400 mm and 500 mm with installation subframe ER1, ER8, ER4 and with mounting frame AR2



ER1 → see pages 23 to 25, 29 to 31

ER8 → see pages 32 to 38

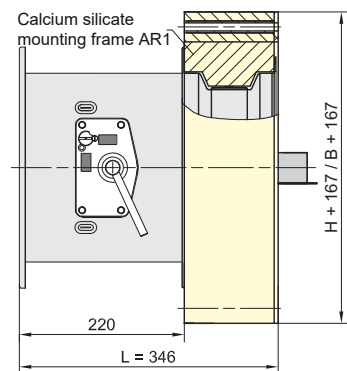
ER4 → see pages 26 to 28

Only length L = 500 mm is available!

Stud profile depths s = 50 mm to 125 mm.

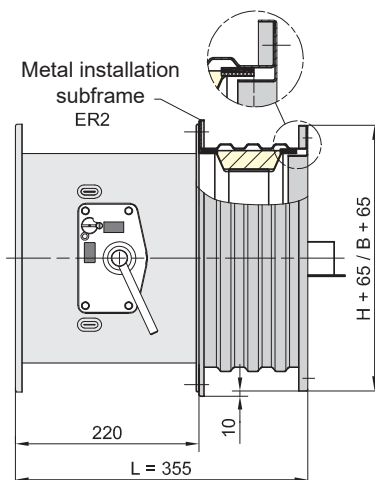
AR2 → see pages 40 to 46

Short length with mounting frame AR1

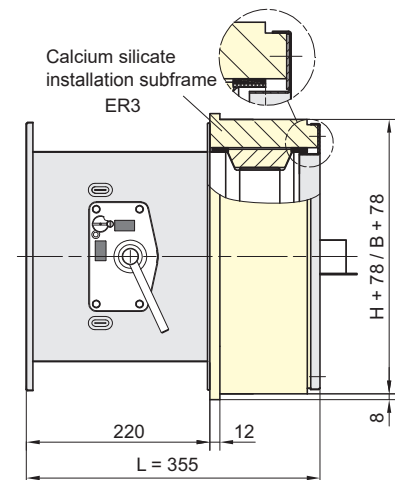


AR1 → see pages 18, 39

Short length with installation subframes ER2 and ER3



ER2 → see pages 9, 17



ER3 → see pages 9, 23, 24, 29 to 31

FK90 fire dampers

Data sheet (2)

Maximum excess lengths of mechanical and electrical equipment parts.

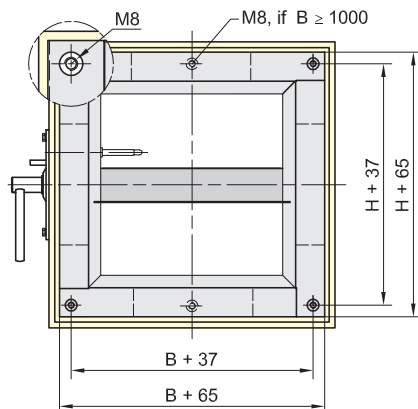
Additional space must be provided for assemblies, electrical connections and maintenance; observe the cable entry points!

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.

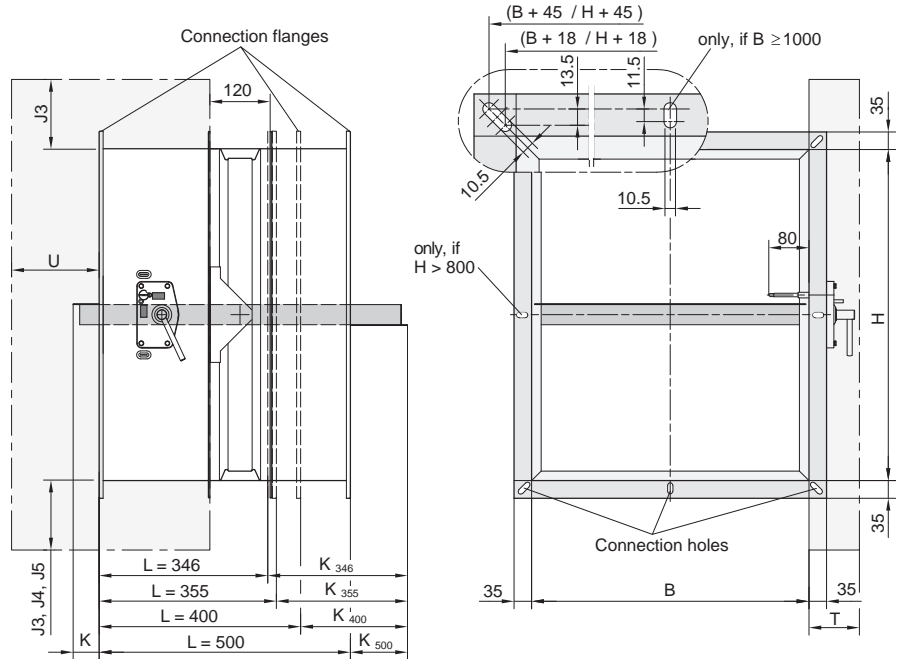
Connection flanges are fitted with connection holes. If additional holes are required for duct connection, these can be added on site!

Height-dependent excess lengths

H	J3	J4	J5	K	K ₄₀₀	K ₅₀₀	K ₃₅₅	K ₃₄₆
200	170	40	60	-	-	-	16	25
225	160	30	50	-	-	-	28	37
250	145	15	35	-	-	-	41	50
275	135	5	25	-	4	-	53	62
300	120	-	10	-	17	-	66	75
325	110	-	-	-	29	-	78	87
350	95	-	-	-	42	-	91	100
375	85	-	-	-	54	-	103	112
400	70	-	-	-	67	-	116	125
450	45	-	-	-	92	-	141	150
500	20	-	-	-	117	17	166	175
550	-	-	-	-	142	42	191	200
600	-	-	-	7	167	67	216	225
650	-	-	-	32	192	92	241	250
700	-	-	-	57	217	117	266	275
750	-	-	-	82	242	142	291	300
800	-	-	-	107	267	167	316	325
850	-	-	-	132	292	192	-	-
900	-	-	-	157	317	217	-	-
950	-	-	-	182	342	242	-	-
1000	-	-	-	207	367	267	-	-



Rear frame connection ER2 and ER3
⇒ see page 8



Damper blade

- Operation side: K
- Non-operation side: K₄₀₀, K₅₀₀, K₃₅₅, K₃₄₆
- L = 400 and L = 500
- L = 355 short length for insertion
- L = 346 mounting length with mounting frame AR1

Thermal-mechanical release mechanisms are labelled with **V1**, **V2**, **V4** and are mounted based on width B and height H. The size-dependent allocations must not be changed on site!

H/B	≤ 400	> 400 to ≤ 750	> 750
≤ 300	V2	V4	V1
> 300 to ≤ 1000			

All dimensions in mm

Operating area, closing and opening

- FK90 fire dampers are quick-closing, except for the electric actuator versions. Due to the fluid dynamics, release at high inflow velocities may bring about pressure surges with multiplication of the operating pressures, which in turn may lead to damage to ventilation and air conditioning systems. When shut-off dampers are closed, the volume flows are distributed around other parallel dampers that remain open. This may lead to excessive stress, in particular at high operating pressures, large volume flows and larger cross-sections. Electric actuators should be used under such conditions. These actuators close the fire dampers relatively slowly, and fan switch-off can also be triggered via the OPEN limit switch.
- The application boundaries marked in the nomograms must be complied with.
⇒ see pages 10 to 13
- 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 fully when the fan is running. These actuators are available on request. Alternatively, it is also possible to switch on the fans once the fire dampers are fully open.
- Whenever possible, it must be ensured that the inflows and outflows at the fire dampers are the same.
- FK90 fire dampers with electric actuator can be used for OPEN/CLOSED volume flow control.

Excess lengths with electric actuators

- U Horizontal
- J Vertical
- J3 EM-1, RM-1, EM-2
- J4 M220-10/H; M24-10/H (delivery condition)
- J5 M220-11/H; M24-11/H (delivery condition)

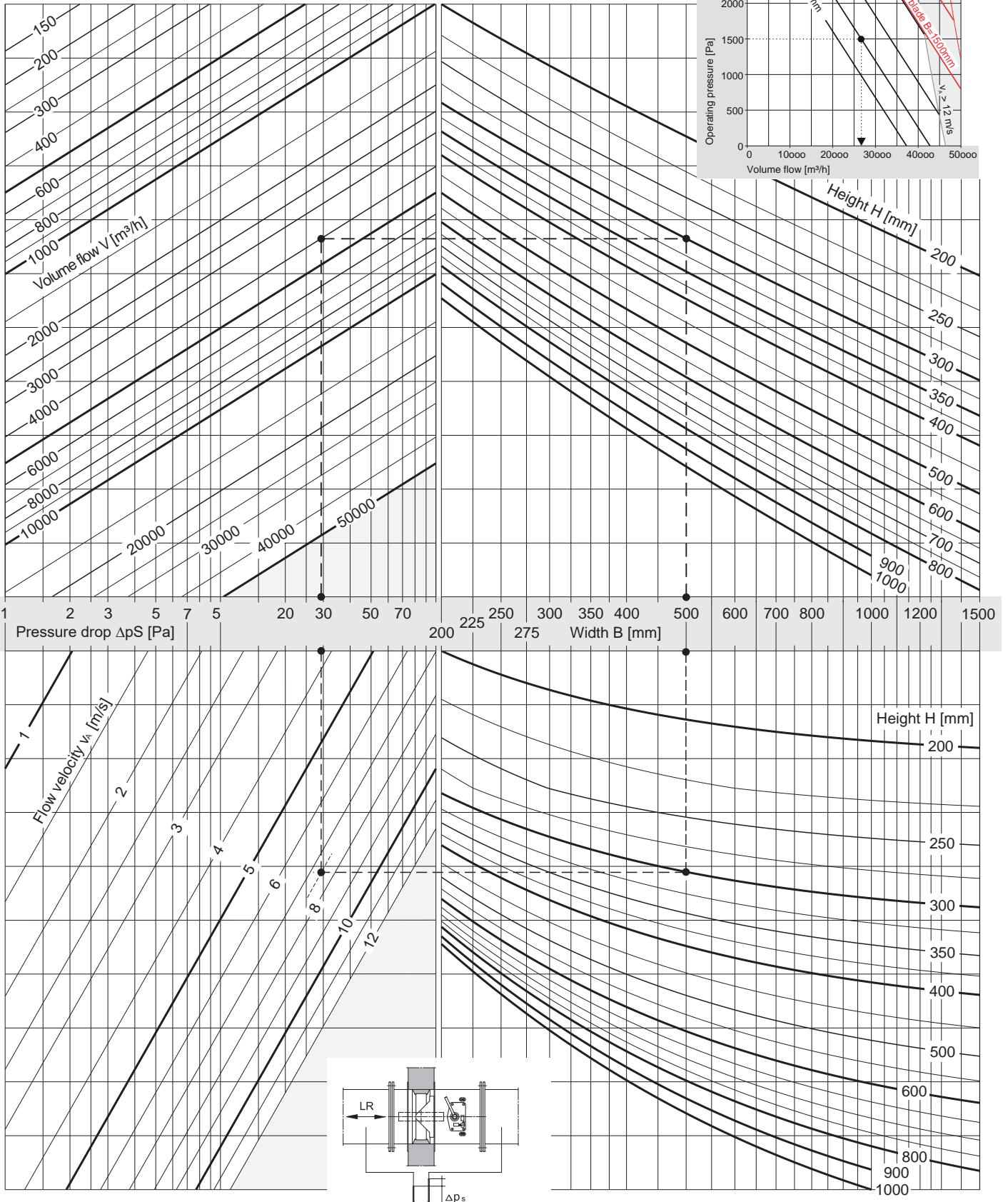
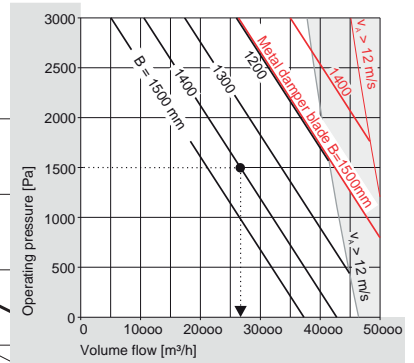
Excess lengths	T	U	J
Thermal-mechanical release mechanism	95	-	-
with: • W220, WU220	120	-	-
• G24, GU24	120	-	-
• P, P2	105	-	-
• E-Ex limit switch	105	-	-
M220-9/H, M24-9/H	90	-	-
M220-10/H, M24-10/H	75	-	J4
Mounted horizontally	95	20	-
M220-11/H, M24-11/H	80	-	J5
Mounted horizontally	100	35	-
EM-1, EM-2, RM-1	245	150	-
Mounted vertically	245	-	J3

FK90 fire dampers

Dimensioning (1) Pressure drop with ventilation duct connection on both sides

FK90 fire dampers can be used in the area of the nomograms. With large dimensions, restrictions should be taken into account depending on operating pressure and volume flow.

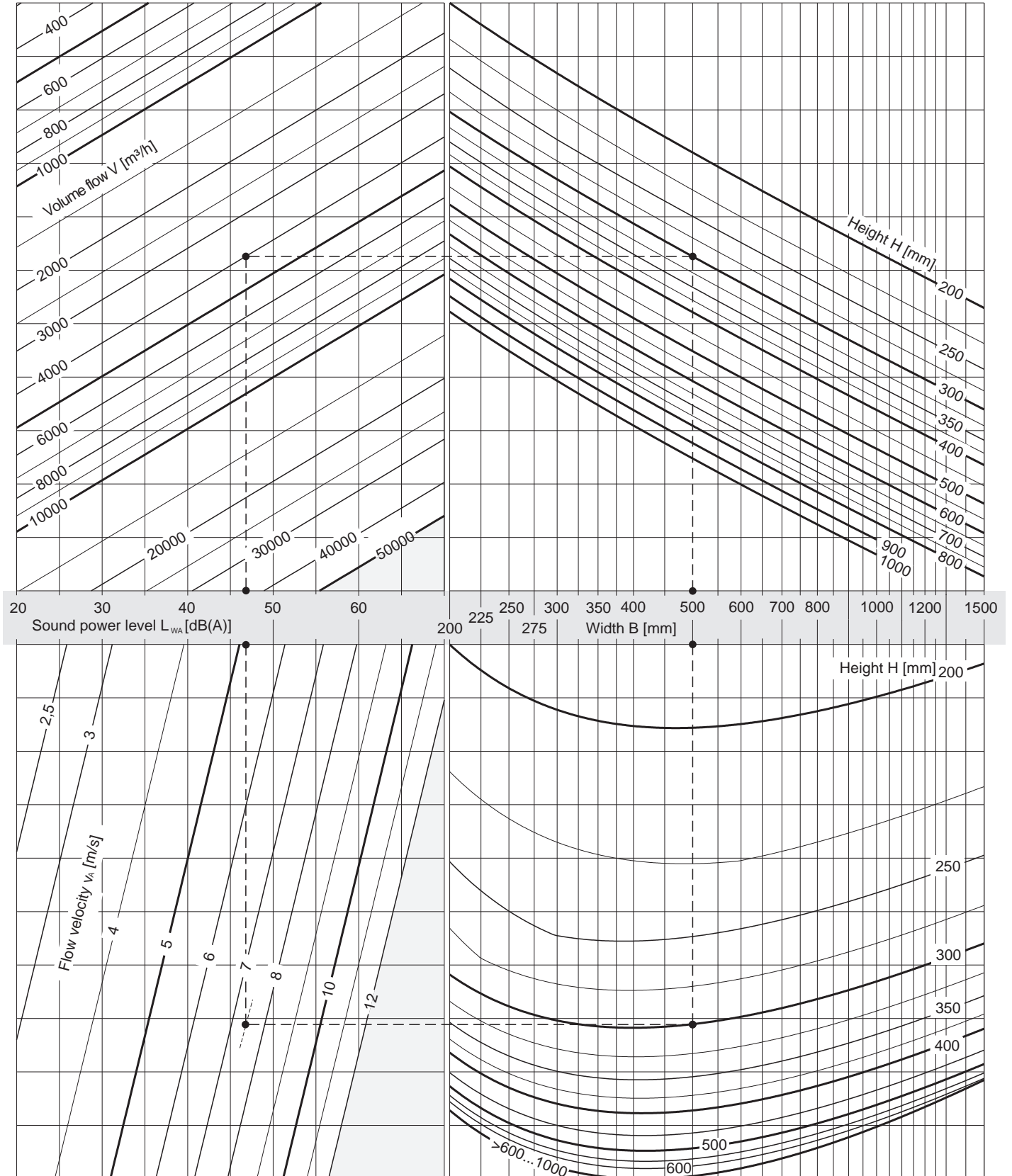
Example: At an operating pressure of 1500 Pa and a width of 1400 mm, the permissible volume flow is 26475 m³/h. This may increase if the width is smaller or if the damper blade has a metal cover, or if an electric drive version is being used.



FK90 fire dampers

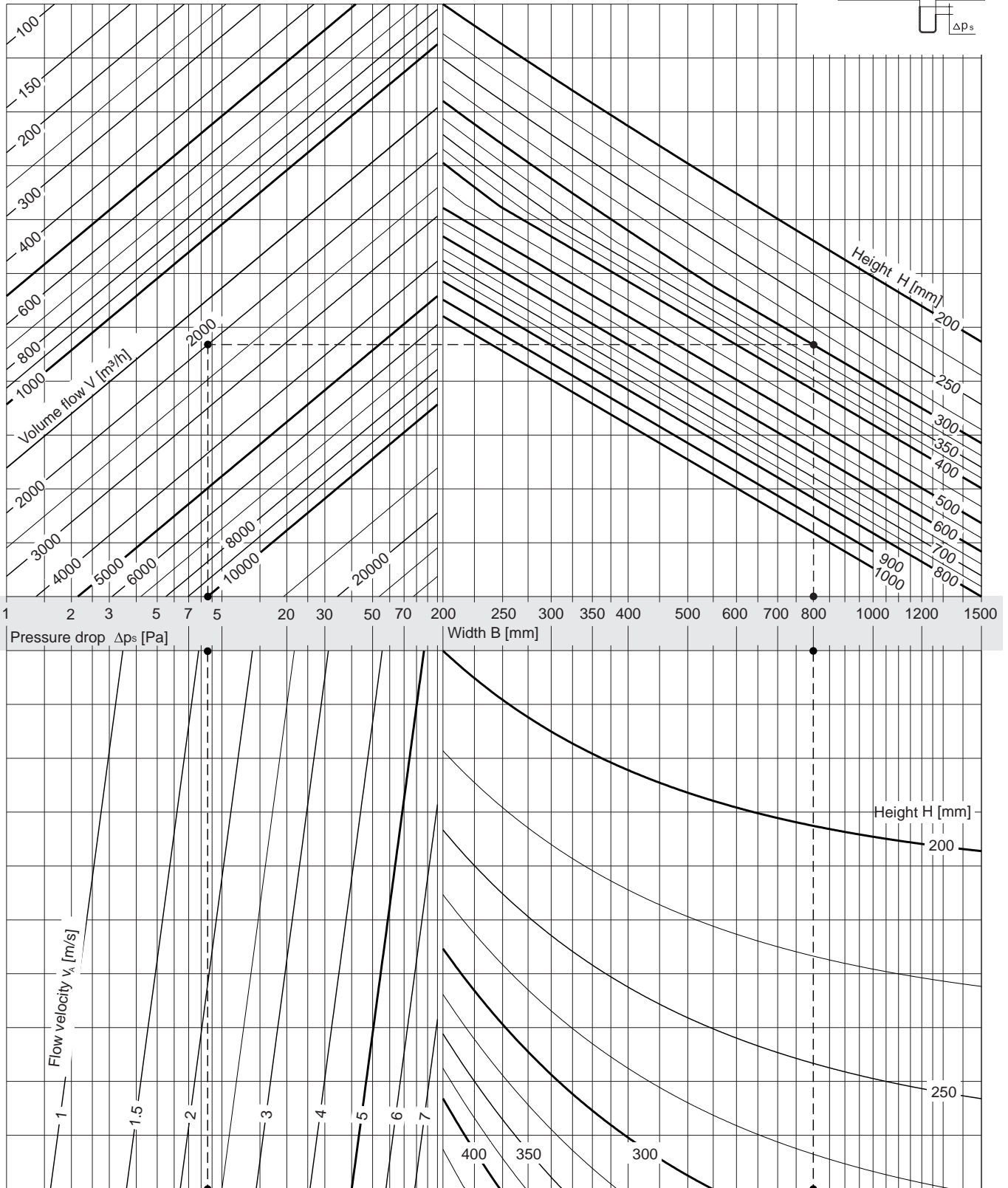
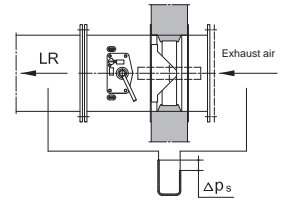
Dimensioning (2) Sound power level with ventilation duct connection on both sides

Example: ⇒ see page 14



FK90 fire dampers Dimensioning (3)

Pressure drop with ventilation duct connection on one side, and free incoming flow with protective grille

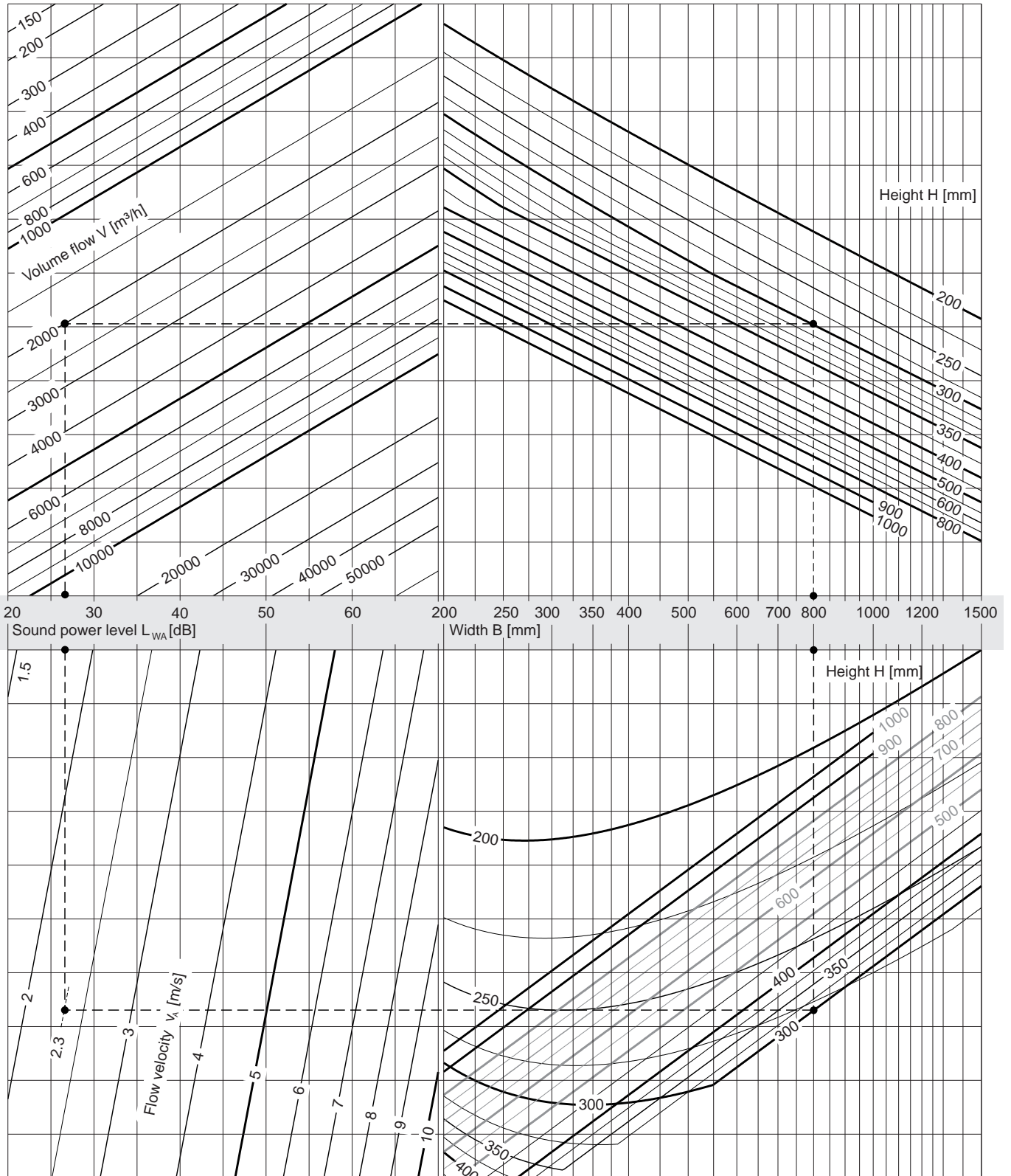


Line applies to all other heights

FK90 fire dampers Dimensioning (4)

Sound power level with ventilation duct connection on one side, and free incoming flow with protective grille

Example: → see page 14

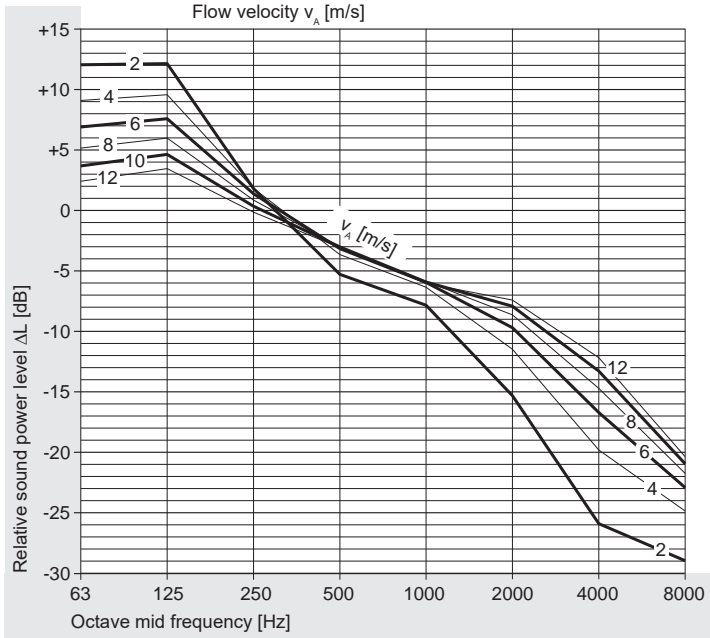


FK90 fire dampers

Dimensioning (5) Relative sound power level, nomenclature, examples

Relative sound power level

- With ventilation duct connection on both sides



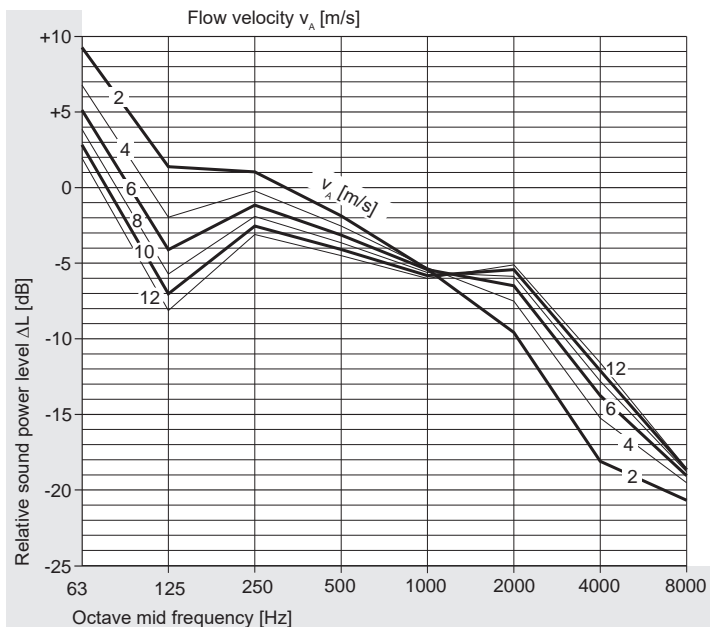
Example: Both sides with ventilation duct connection

V	=	4000	m ³ /h
B	=	500	mm
H	=	300	mm
A _A	=	0,150	m ²
A _{free}	=	0,098	m ²
Δp _s	=	29	Pa
v _A	=	7.4	m/s
L _{WA}	=	47	dB(A)

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

f [Hz]	63	125	250	500	1000	2000	4000	8000
L _{WA} [dB(A)]	47	47	47	47	47	47	47	47
ΔL _{7.4 m/s} [dB]	5	6	1	-3	-6	-9	-15	-22
L _{W-Oct} [dB]	52	53	48	44	41	38	32	25

- With ventilation duct connection on one side, and free incoming flow with protective grille



Example: Free incoming flow with protective grille

V	=	2000	m ³ /h
B	=	800	mm
H	=	300	mm
A _A	=	0,240	m ²
A _{free}	=	0,163	m ²
Δp _s	=	8.6	Pa
v _A	=	2.3	m/s
L _{WA}	=	26	dB(A)

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

f [Hz]	63	125	250	500	1000	2000	4000	8000
L _{WA} [dB(A)]	26	26	26	26	26	26	26	26
ΔL _{2.3 m/s} [dB]	9	1	1	-2	-5	-9	-17	-20
L _{W-Oct} [dB]	35	27	27	24	21	17	9	6

Nomenclature

B [mm]	Width	v _A [m/s]	Flow velocity in inflow cross-section (inflow velocity)	L _{W-Oct} [dB]	Octave sound power level
H [mm]	Height				L _{W-Oct} = L _{WA} + ΔL
A _A [m ²]	Inflow cross-section B x H	Δp _s [Pa]	Static pressure drop	ΔL [dB]	Relative sound power level to L _{WA}
A _{free} [m ²]	Free cross-section	L _{WA} [dB(A)]	A-weighted, area-corrected sound power level	f [Hz]	Octave mid frequency
V [m ³ /h]	Volume flow				

FK90 fire dampers

Dimensioning (6) Free cross-sections, weights

Free cross-sections A_{free} [m²]

B/H	200	225	250	275	300	350	400	450	500	550	600	650	700	750	800	900	1000
200	0.018	0.022	0.026	0.030	0.034	0.041	0.049	0.057	0.065	0.073	0.080	0.088	0.096	0.104	0.112	0.127	0.143
225	0.021	0.026	0.030	0.035	0.039	0.048	0.057	0.066	0.075	0.084	0.093	0.102	0.111	0.121	0.130	0.148	0.166
250	0.024	0.029	0.034	0.039	0.044	0.055	0.065	0.075	0.086	0.096	0.106	0.117	0.127	0.137	0.147	0.168	0.189
275	0.027	0.033	0.038	0.044	0.050	0.061	0.073	0.085	0.096	0.108	0.119	0.131	0.142	0.154	0.165	0.188	0.212
300	0.030	0.036	0.042	0.049	0.055	0.068	0.081	0.094	0.106	0.119	0.132	0.145	0.158	0.170	0.183	0.209	0.234
325	0.033	0.040	0.047	0.054	0.061	0.075	0.089	0.103	0.117	0.131	0.145	0.159	0.173	0.187	0.201	0.229	0.257
350	0.035	0.043	0.051	0.058	0.066	0.081	0.097	0.112	0.127	0.143	0.158	0.173	0.188	0.204	0.219	0.250	0.280
375	0.038	0.047	0.055	0.063	0.071	0.088	0.105	0.121	0.138	0.154	0.171	0.187	0.204	0.220	0.237	0.270	0.303
400	0.041	0.050	0.059	0.068	0.077	0.095	0.112	0.130	0.148	0.166	0.184	0.201	0.219	0.237	0.255	0.290	0.326
450	0.047	0.057	0.067	0.078	0.088	0.108	0.128	0.149	0.169	0.189	0.209	0.230	0.250	0.270	0.291	0.331	0.372
500	0.053	0.064	0.076	0.087	0.098	0.121	0.144	0.167	0.190	0.212	0.235	0.258	0.281	0.304	0.326	0.372	0.418
550	0.059	0.071	0.084	0.097	0.109	0.135	0.160	0.185	0.210	0.236	0.261	0.286	0.312	0.337	0.362	0.413	0.463
600	0.064	0.078	0.092	0.106	0.120	0.148	0.176	0.203	0.231	0.259	0.287	0.315	0.342	0.370	0.398	0.454	0.509
650	0.070	0.085	0.101	0.116	0.131	0.161	0.191	0.222	0.252	0.282	0.313	0.343	0.373	0.404	0.434	0.494	0.555
700	0.076	0.092	0.109	0.125	0.142	0.174	0.207	0.240	0.273	0.306	0.338	0.371	0.404	0.437	0.470	0.535	0.601
750	0.082	0.100	0.117	0.135	0.152	0.188	0.223	0.258	0.294	0.329	0.364	0.400	0.435	0.470	0.505	0.576	0.647
800	0.088	0.107	0.125	0.144	0.163	0.201	0.239	0.277	0.314	0.352	0.390	0.428	0.466	0.503	0.541	0.617	0.692
850	0.093	0.114	0.134	0.154	0.174	0.214	0.255	0.295	0.335	0.376	0.416	0.456	0.496	0.537	0.577	0.658	0.738
900	0.099	0.121	0.142	0.163	0.185	0.228	0.270	0.313	0.356	0.399	0.442	0.484	0.527	0.570	0.613	0.698	0.784
950	0.105	0.128	0.150	0.173	0.196	0.241	0.286	0.332	0.377	0.422	0.467	0.513	0.558	0.603	0.649	0.739	0.830
1000	0.111	0.135	0.159	0.183	0.206	0.254	0.302	0.350	0.398	0.445	0.493	0.541	0.589	0.637	0.684	0.780	0.876
1050	0.117	0.142	0.167	0.192	0.217	0.268	0.318	0.368	0.418	0.469	0.519	0.569	0.620	0.670	0.720		
1100	0.122	0.149	0.175	0.202	0.228	0.281	0.334	0.386	0.439	0.492	0.545	0.598	0.650	0.703	0.756		
1150	0.128	0.156	0.184	0.211	0.239	0.294	0.349	0.405	0.460	0.515	0.571	0.626	0.681	0.737	0.792		
1200	0.134	0.163	0.192	0.221	0.250	0.307	0.365	0.423	0.481	0.539	0.596	0.654	0.712	0.770	0.828		
1250	0.140	0.170	0.200	0.230	0.260	0.321	0.381	0.441	0.502	0.562	0.622	0.683	0.743	0.803	0.863		
1300	0.146	0.177	0.208	0.240	0.271	0.334	0.397	0.460	0.522	0.585	0.648	0.711	0.774	0.836	0.899		
1400	0.157	0.191	0.225	0.259	0.293	0.361	0.428	0.496	0.564	0.632	0.700	0.767	0.835	0.903	0.971		
1500	0.169	0.205	0.242	0.278	0.314	0.387	0.460	0.533	0.606	0.678	0.751	0.824	0.897	0.970	1.042		

Weights [kg] for the standard version with thermal-mechanical release mechanism

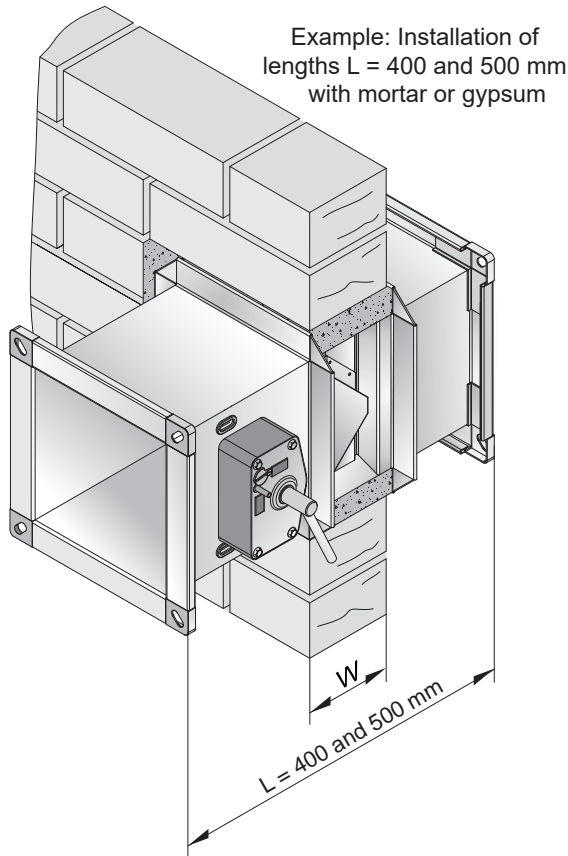
B/H	200	225	250	275	300	350	400	450	500	550	600	650	700	750	800	900	1000
200	10	11	11	12	12	13	14	15	15	16	17	18	19	19	20	22	24
225	11	11	12	12	13	13	14	15	16	17	18	19	19	20	21	23	24
250	11	12	12	13	13	14	15	16	17	17	18	19	20	21	22	24	25
275	12	12	13	13	13	14	15	16	17	18	19	20	21	22	23	24	26
300	12	13	13	13	14	15	16	17	18	19	20	21	22	22	23	25	27
325	12	13	13	14	14	15	16	17	18	19	20	21	22	23	24	26	28
350	13	13	14	14	15	16	17	18	19	20	21	22	23	24	25	27	29
375	13	14	14	15	15	16	17	19	20	21	22	23	24	25	26	28	30
400	14	14	15	15	16	17	18	19	20	21	22	23	24	26	27	29	31
450	15	15	16	16	17	18	19	20	21	23	24	25	26	27	28	30	33
500	15	16	17	17	18	19	20	21	23	24	25	26	27	29	30	32	35
550	16	17	17	18	19	20	21	23	24	25	26	28	29	30	31	34	36
600	17	18	18	19	20	21	22	24	25	26	28	29	30	32	33	36	38
650	18	19	19	20	21	22	23	25	26	28	29	30	32	33	35	37	40
700	19	19	20	21	22	23	24	26	27	29	30	32	33	35	36	39	42
750	19	20	21	22	22	24	26	27	29	30	32	33	35	36	38	41	44
800	20	21	22	23	23	25	27	28	30	31	33	35	36	38	39	42	46
850	21	22	23	24	24	26	28	29	31	33	34	36	38	39	41	44	48
900	22	23	24	24	25	27	29	30	32	34	36	37	39	41	42	46	49
950	23	24	25	25	26	28	30	32	33	35	37	39	41	42	44	48	51
1000	24	24	25	26	27	29	31	33	35	36	38	40	42	44	46	49	53
1050	24	25	26	27	28	30	32	34	36	38	40	42	43	45	47		
1100	25	26	27	28	29	31	33	35	37	39	41	43	45	47	49		
1150	26	27	28	29	30	32	34	36	38	40	42	44	46	48	50		
1200	27	28	29	30	31	33	35	37	39	42	44	46	48	50	52		
1250	28	29	30	31	32	34	36	38	41	43	45	47	49	51	54		
1300	28	30	31	32	33	35	37	40	42	44	46	49	51	53	55		
1400	30	31	32	34	35	37	40	42	44	47	49	51	54	56	58		
1500	32	33	34	35	37	39	42	44	47	49	52	54	57	59	62		

For other versions the following weight supplements must be added:

- Damper blade with metal cover 10%
- Installation subframes ER1, ER3 and ER8 40%
- Installation subframe ER4 85%
- Mounting frames AR1 and AR2 100%
- Actuators:
 - M220-9/H; M24-9/H 1.3 kg
 - M220-10/H; M24-10/H 0.5 kg
 - M220-11/H; M24-11/H 0.8 kg
 - EM-1; RM-1; EM-2 4.1 kg

FK90 fire dampers

Installation in rigid walls and ceilings (1) - without installation subframe - Heights H up to 1000 mm -



To install FK90 fire dampers in rigid walls and ceilings you require **minimum thicknesses W, D [mm]:**

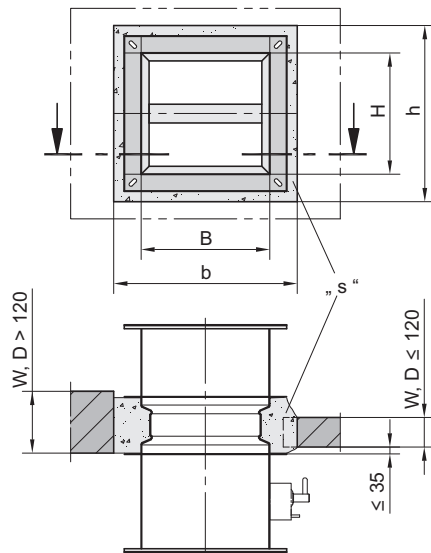
Fire resistance period in minutes		30 60	30 60 90	30 60 90 120
Rigid walls made of:	Masonry, concrete or equiv.	70	95	100
	Gypsum wallboards according to EN 12859 (formerly DIN 18163) for FK90 fire dampers H ≤ 800 and L = 400 or 500 mm	-	-	80
Rigid ceilings for FK90 fire dampers H ≤ 800		-	100	115
Rigid ceilings for FK90 fire dampers B ≤ 1000		-	-	

- To install in rigid walls and ceilings made from concrete, lightweight concrete, porous concrete (aerated concrete) with ≥ 450 kg/m³ raw density you require mortar of group II or III according to DIN 1053 or classes M2.5, M5, M10 or M20 according to EN 998-2; or the appropriate fire protection mortar or gypsum mortar must be used.
- To install in rigid walls made from gypsum wallboards without hollow spaces and with a raw density of ≥ 850 kg/m³, filling gypsum or frame gypsum according to EN 13279-1 must be used.

Walls can be designed as fire walls, shaft walls or shafts; walls and ceilings can also be designed as ducts.

Installation can be performed on adjacent walls or ceilings or directly next to each other.

Installation opening:



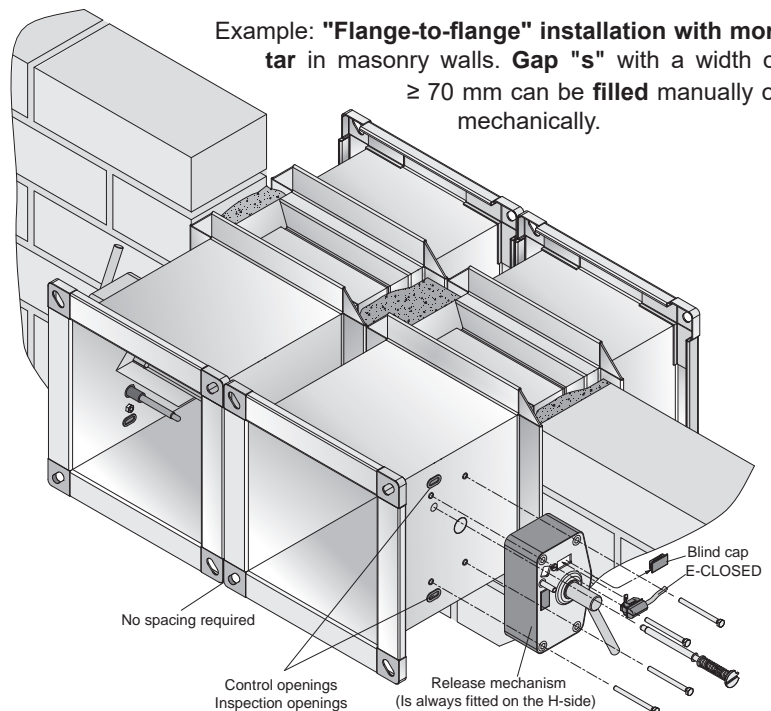
Size of the installation opening at least

$$b \times h = (B + 75 \text{ mm}) \times (H + 75 \text{ mm})$$

Openings which are 50 mm larger are recommended to simplify mortaring.

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

Example: "Flange-to-flange" installation with mortar in masonry walls. Gap "s" with a width of ≥ 70 mm can be filled manually or mechanically.



FK90 fire dampers

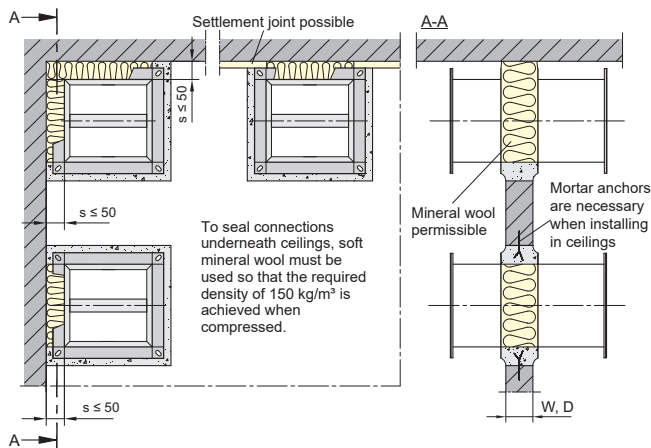
Special installation in rigid walls and ceilings (2) - Heights H up to 800 mm -

In corners which are difficult to access and for direct installation on walls and ceilings, FK90 fire dampers can be also installed as **partial mortaring** in rigid walls and ceilings with **minimum thicknesses W, D [mm]** as per the table.

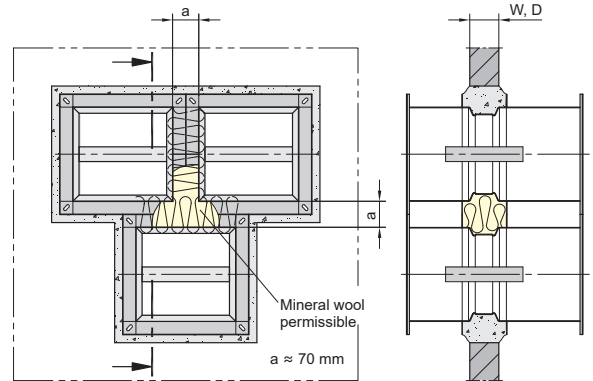
The gaps "s" have to be filled with 120 mm wide strips of **mineral wool** "Conlit® Steelprotect Board", "Knauf Insulation TPD" or equivalent and secured not with non-flammable adhesive.

In **ceilings**, mortaring must be prevented by roughening the reveals or using mortar anchors.

Fire resistance period in minutes	30	30
	60	90
Rigid walls	70	95
Rigid ceilings	-	100



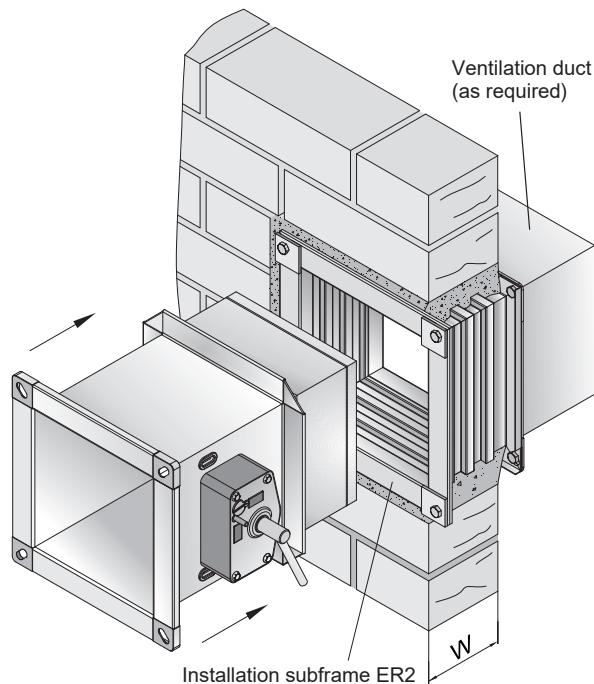
With **"flange-to-flange"** casings of between 400 mm and 500 mm, fillings with mineral wool are also possible, as above.



Short length L = 355 mm with installation subframe ER2

Insert installation subframe into wall or ceiling with mortar, as above.

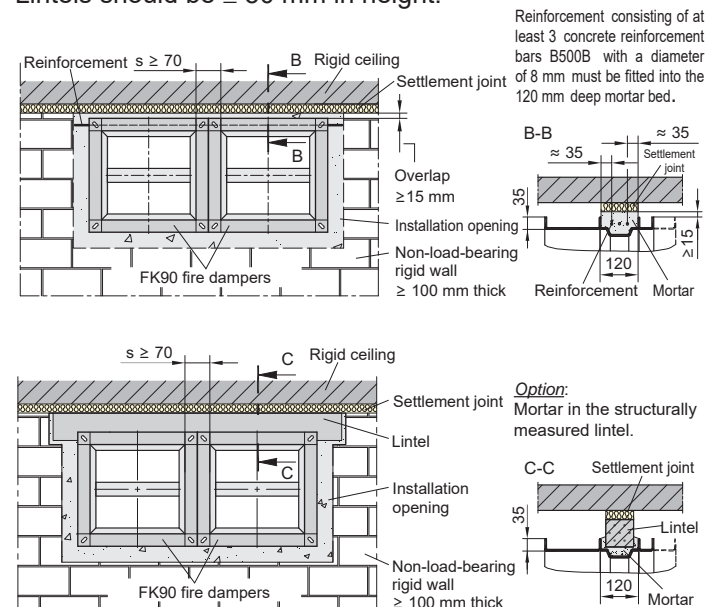
Insert the fire damper and fasten it with the corresponding brackets.



Settlement joints (sliding ceiling connection) above non-load-bearing rigid walls and under ceilings are filled on site, with, for example, mineral wool.

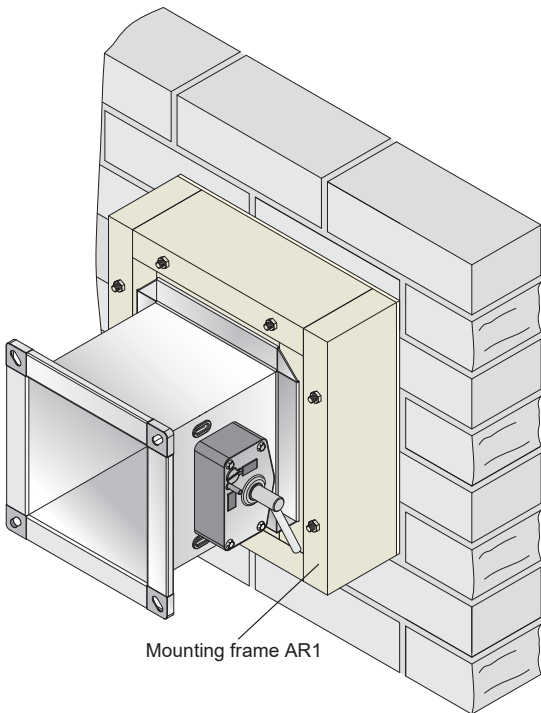
The illustration shows the installation of FK90 fire dampers immediately under such settlement joints. A reinforcement should be inserted into the mortar bed or a lintel to prevent cracks from forming later.

Lintels should be ≥ 50 mm in height.



FK90 fire dampers

Mounting on rigid walls and ceilings - Heights H up to 800 mm -



Short mounting length 346 mm with mounting frame AR1

For types of rigid walls and ceilings ⇒ see pages 16, 17

The following **minimum thickness W, D [mm]** is required for mounting the FK90 fire dampers:

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

- Screws or threaded rods M10, washers and nuts must be used for fastening.
- Dowels with verification of fire protection suitability can be used in suitable walls and ceilings.
- Otherwise, pass-through fastenings must be used.
- Factory-produced holes in the frame indicate the quantity and positioning of the fastenings.
- Screws, threaded rods, washers, nuts and dowels must be provided on site.

Ventilation ducts on the non-operation side of the FK90 fire damper can be guided until they are in the reveal of the wall or ceiling being protected. They must lie flush, and must be fastened or supported to protect against denting. Freedom of damper blade movement must be guaranteed. ⇒ see pages 9 and 50

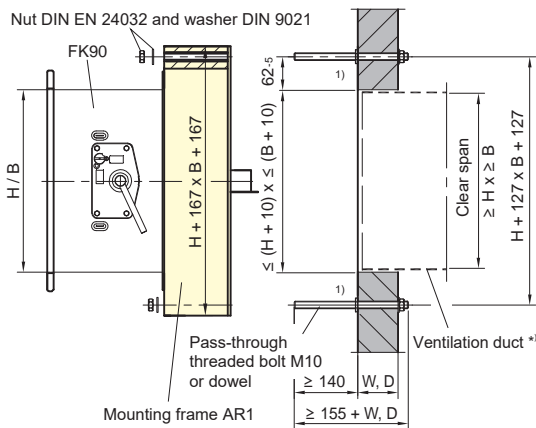
Restorations: The ventilation ducts may be the casings of "old" fire dampers. There are no requirements in terms of mortaring these in the wall or ceiling.

Alternatively, the ventilation duct can be screwed onto the wall or ceiling being protected.

All diagrams apply accordingly to mounting onto or underneath rigid ceilings.

Mounting frames AR1 can be installed directly next to one another and on adjacent walls or ceilings, and in corners.

Mounting onto rigid walls



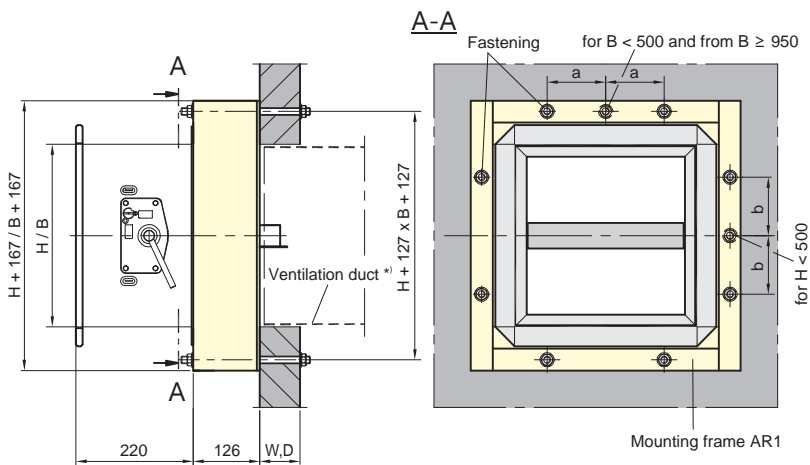
1) The flat **fixing nuts** are included with delivery and facilitate installation.

They must only be used in the position on the threaded rods shown in the diagram.

All dimensions in mm

Number of fastenings per side and spacings

B/H	Quantity B/H	a	b
up to 499	1 / 1	0	0
from 500	2 / 2	104	136
from 550	2 / 2	113	143
from 600	2 / 2	138	148
from 650	2 / 2	163	173
from 700	2 / 2	178	198
from 750	2 / 2	203	193
from 800	2 / 2	228	218
from 850	2 / 2	243	
from 900	2 / 2	268	
from 950	3 / 2	322	
from 1000	3 / 2	331	
from 1050	3 / 2	356	
from 1100	3 / 2	381	
from 1150	3 / 2	396	
from 1200	3 / 2	421	
from 1250	3 / 2	436	
from 1300	3 / 2	461	
from 1400	3 / 2	500	
up to 1500	3 / 2	550	



*) Ventilation duct if present.

FK90 fire dampers

Installation in metal stud walls (1a) General information - Heights H up to 1000 mm -

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 30 and 31

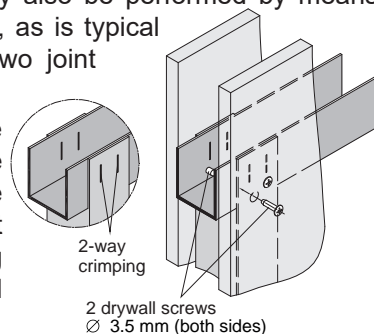
Fire walls and safety partition walls are made of metal studs with several layers of cladding on both sides and may contain sheet metal inlays. ⇒ see page 29

- 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 FK90 fire dampers, cladding must be secured with drywall screws of a suitable length and a diameters of ≥ 3.5 mm at spacings of ≤ 200 mm or ≤ 150 mm. ⇒ see pages 21 to 31, 40, 42, 45, 46
- Profiles for metal stud walls are described by DIN 18182 and EN 14195, and constructions by DIN 18183.
- FK90 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 FK90 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 FK90 fire dampers:

Fire resistance period in minutes		30	30	30
		60	60	90
Metal stud walls with cladding on both sides	≥ 1-layer cladding	70	-	-
	≥ 2-layer cladding	-	95 100	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 21 to 31, 40, 42, 45, 46

- Installation openings without the use of installation subframes must be filled with a suitable filling:

Openings can be **filled** 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. Mechanical filling may be carried out thanks to the all-round design of the gaps.

It is also possible to use mineral wool as panel strips of approx. 120 mm in width, using "Conlit® Steelprotect Board" or "Knauf Insulation TPD", with an overall thickness of approx. 60 mm. The thickness can be achieved using several layers. Darning wool can also be used, with a density of ≥ 180 kg/m³ and a melting point of ≥ 1000°C.

Gypsum mortar can also be used, as can filler made from wall-building materials, together with the associated joint filler.

- For "partial mortaring", 120 mm wide strips of mineral wool must be used; e.g. "Conlit® Steelprotect Board", "Knauf Insulation TPD" or insulation wool with ≥ 150 kg/m³ density and ≥ 1000°C melting point. Gaps must be designed so that s ≤ 50 mm. Mineral wool thickness s + 5 mm plus 20 mm for filling the beading.

FK90 fire dampers

Installation in metal stud walls (1b) Metal framework - Heights H up to 1000 mm -

Installation openings for FK90 fire dampers require cut-outs in the cladding. In the metal studs, trimmers or special arrangements may be necessary.

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 FK90 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 ER1 or ER 3 of the fire dampers. Exceptions are possible with installation openings which have an accurate fit.

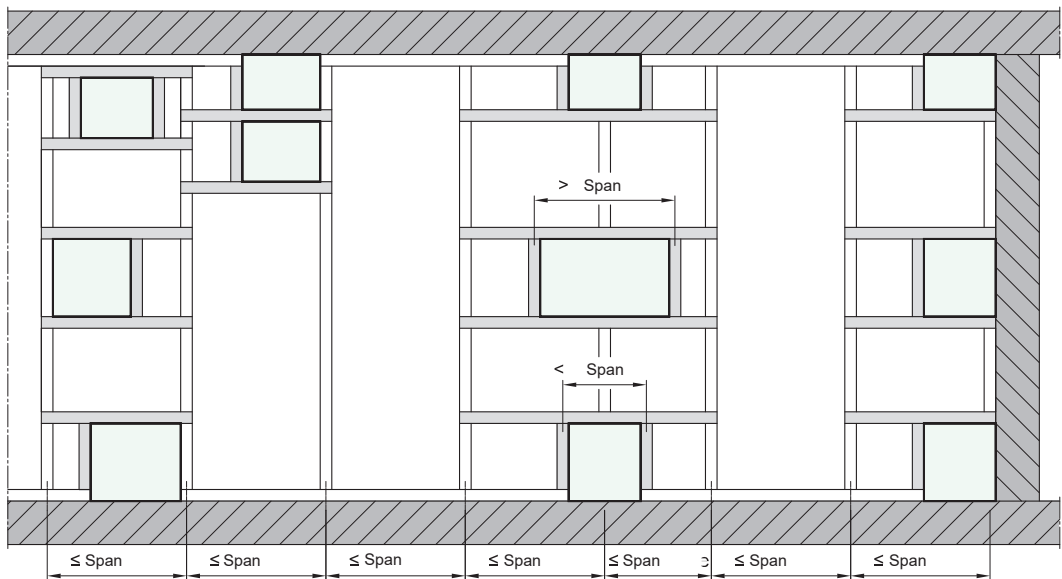
Severed supports will require trimmers which can simultaneously serve as the frame for the installation openings. Trimmers are needed for installation openings with widths larger than the spans.

In walls with cladding on both sides, it is possible to install two fire dampers in the same installation opening without a trimmer.

⇒ see page 25

Depending on the type of wall, suitable connections can be used to **interrupt profiles on ceilings and floors** in order to install the FK90 fire dampers.

⇒ see pages 21 to 25, 30 and 31



Installation between supports.

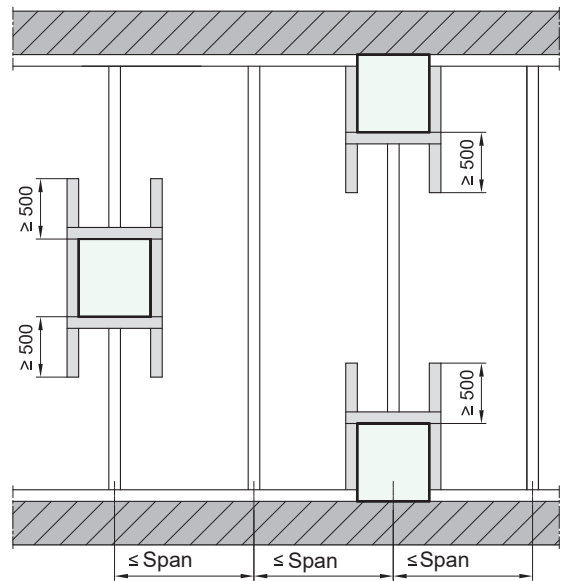
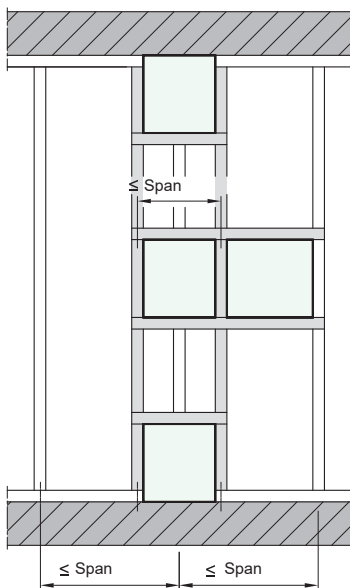
Trimmer due to a support being interrupted.

Trimmer due to a support being interrupted on the connecting wall.

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.

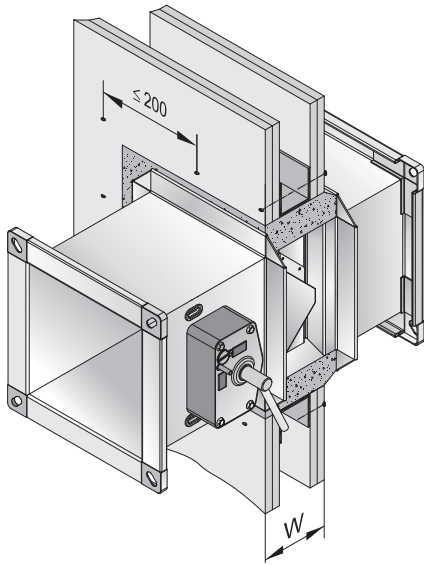
Surplus studs can be removed as long as the intended spans are not exceeded.



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 spacings of ≤ 200 mm.

FK90 fire dampers

Installation in metal stud walls (2) Installation with mortar - Heights H up to 1000 mm and 800 mm -



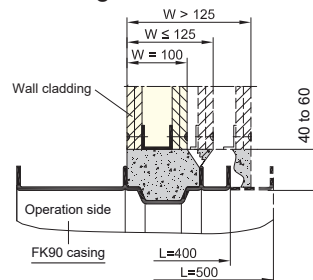
Installation of lengths 400 mm and 500 mm with mortar

Types of metal stud walls with cladding on both sides ⇒ see pages 19 and 20

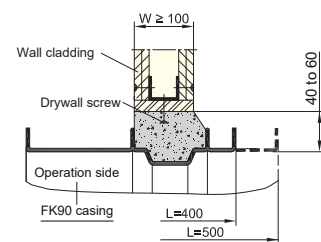
The **minimum thicknesses W [mm]** shown opposite are required for installing the FK90 fire dampers:

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

Installation opening without reveals Mortaring over wall thickness W



Installation opening with reveals Mortaring 100 mm to 120 mm deep



• Enlarged installation openings:

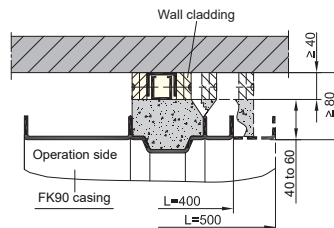
$$b \times h = (B + 80^{+40} \text{ mm}) \times (H + 80^{+40} \text{ mm})$$

Perforations in the circumferential profiles for the purpose of surrounding the installation openings can be covered with film. Mortar fillings need to be bonded with the wall profiles in order to prevent unintentional sliding out; this can be achieved using the beading in CW profiles or using a mortar anchor made of perforated tape, for example. In reveals, drywall screws protruding by around 5 mm will suffice.

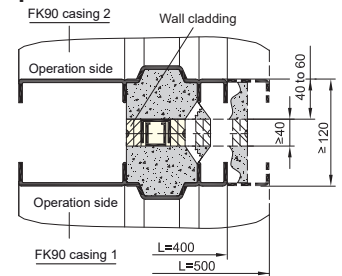
- Walls with a double-studded structure with a gap (e.g. installation walls) require suitable reveals made from wall-building materials. Large wall thicknesses reduce the required depth of mortaring to 100 to 120 mm, thereby also bringing about reductions in weight.
- Structural wall requirements must be met on site.
- Mortar filling ⇒ see page 19
- Mineral wool ⇒ see page 19
- Crimping the metal studs ⇒ see page 19

Installation H ≤ 800 mm
in corners and directly on rigid walls and ceilings as "**partial mortaring**" for up to 90 minutes fire resistance period.

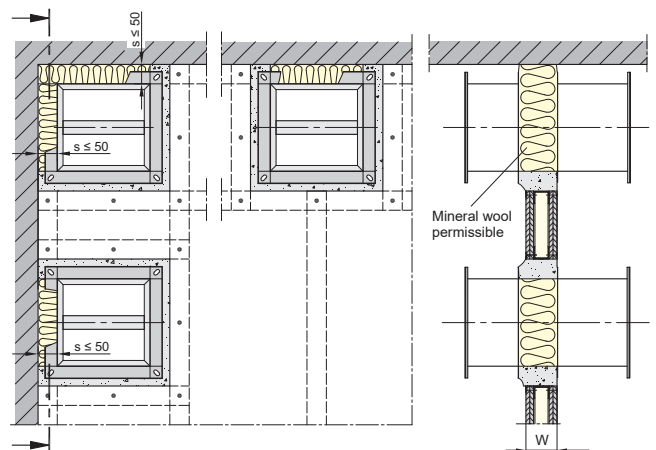
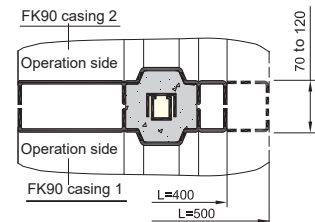
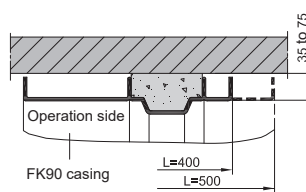
Connections directly on rigid walls, ceilings or floors



Installation next to each other or one on top of the other



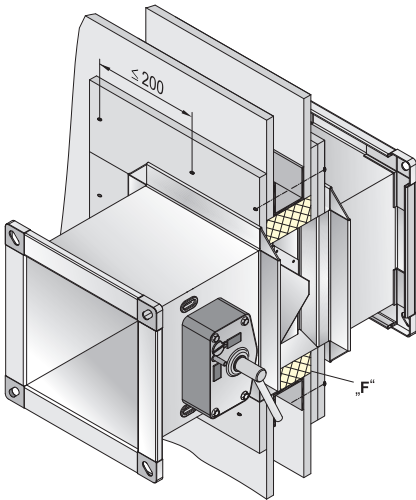
Alternative installation variations in walls of 100 mm to 125 mm in thickness without reveals, or in walls of ≥ 100 mm in thickness with 2-sided or 3-sided reveals.



All dimensions in mm

FK90 fire dampers

Installation in metal stud walls (3) Installation with fillings - Heights H up to 800 mm -



Installation of lengths 400 mm and 500 mm with fillings

Types of metal stud walls with cladding on both sides → see pages 19 and 20

The **minimum thicknesses W [mm]** shown opposite are required for installing the FK90 fire dampers:

Fire resistance period in minutes	30	30
	60	60
	90	90
Metal stud walls with cladding on both sides	≥ 1-layer cladding	70
	≥ 2-layer cladding	100

• Wall thicknesses W of up to 120 mm:

Add additional cladding if $W < 110$ mm so that $E1 \approx 120$, or at least $E1 = 110$ mm. Wall thicknesses $W > 120$ mm bridge the beading on the non-operation side. Additional cladding can be added to walls so that $E2 \ge 130$ mm if required; Special example for $W = 125$ mm.

Metal studs in walls with wall thicknesses of > 125 mm should ideally be designed with **reveals** made from wall-building materials!

Walls of other thicknesses should be designed correspondingly!

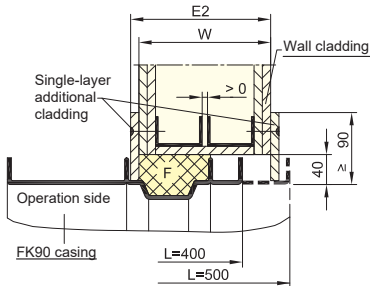
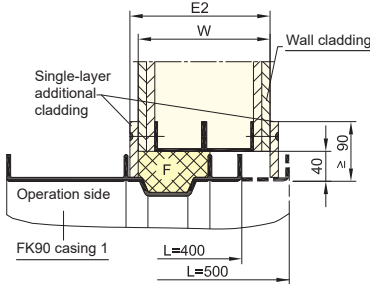
• Butt joints and additional cladding on the claddings are possible and can be fitted in combination with one another.

• "F" = filling → see page 19

• Crimping the metal studs → see page 19

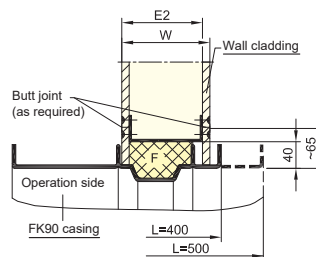
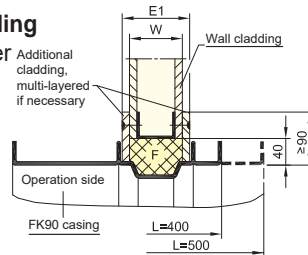
Double-studded walls

- Installation walls-

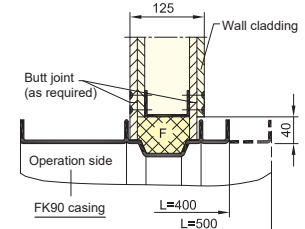
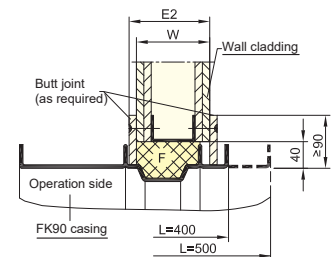
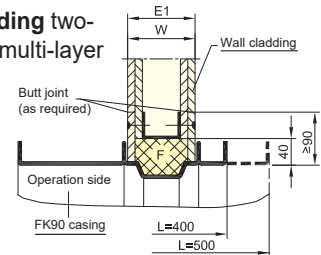


Wall cladding

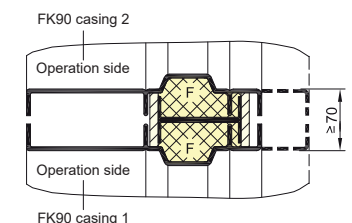
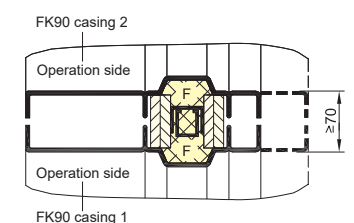
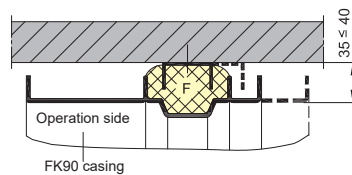
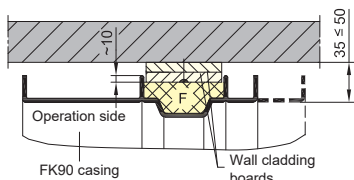
Single-layer



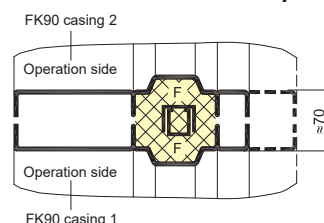
Wall cladding two-layer and multi-layer



Connections directly on rigid walls, ceilings (floors)



Installation with short spacings

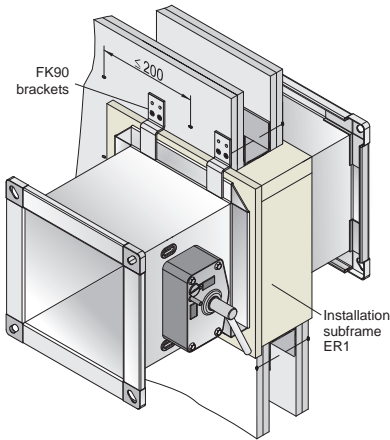


All dimensions in mm

FK90 fire dampers

Installation in metal stud walls (4a) Installation with installation subframe - Heights H up to 800 mm -

With installation subframe ER1



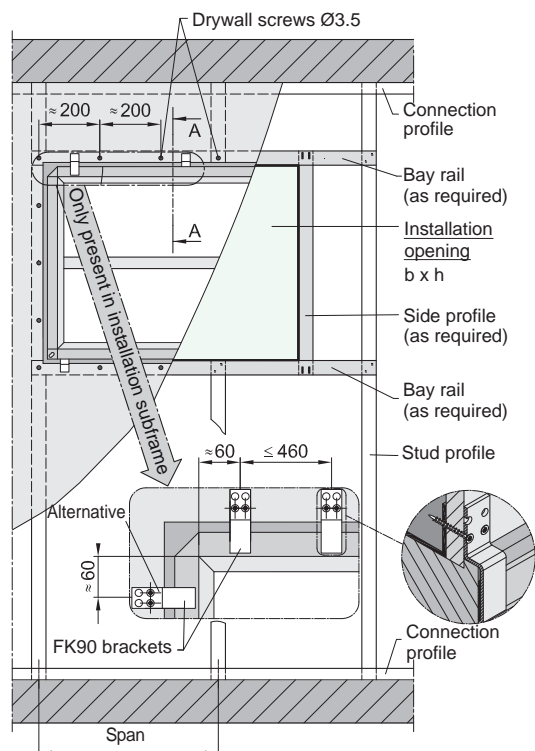
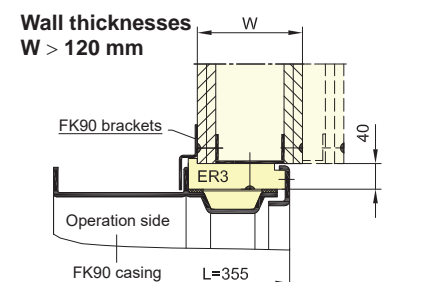
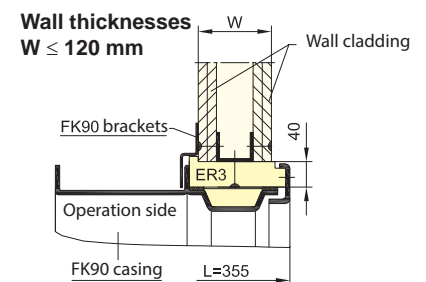
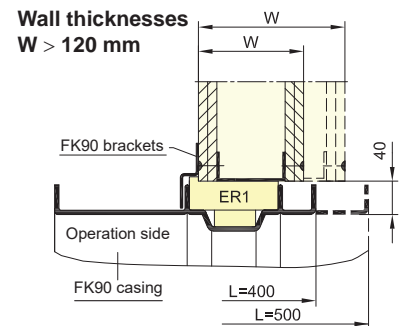
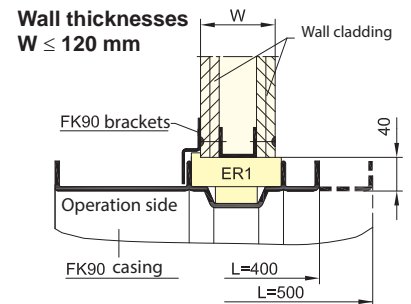
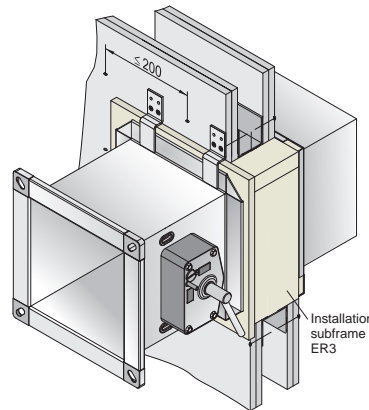
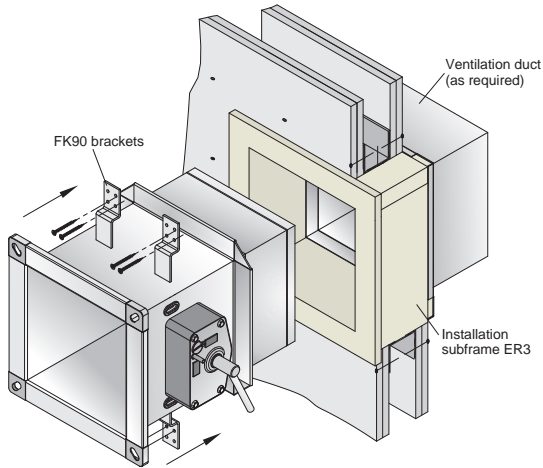
Installation of lengths 400 mm and 500 mm with installation subframe ER1 and 355 mm short length with installation frame ER3

Types of metal stud walls with cladding on both sides → see pages 19 and 20

The **minimum thicknesses W [mm]** shown below are required for installing the FK90 fire dampers:

Fire resistance period in minutes		30	30 60 90	Installation subframe
Metal stud walls with cladding on both sides	≥ 1-layer cladding	70	-	ER1
	≥ 2-layer cladding	-	95	
	≥ 2-layer cladding	-	100	ER3

With installation subframe ER3

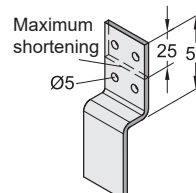


Cross-sections A-A should be designed based on the wall type and the connection.
→ see page 24

Installation openings

$$b \times h = (B + 80^{+3} \text{ mm}) \times (H + 80^{+3} \text{ mm})$$

Fastening with FK90 brackets



FK90 brackets can be shortened on site by max. 25 mm!

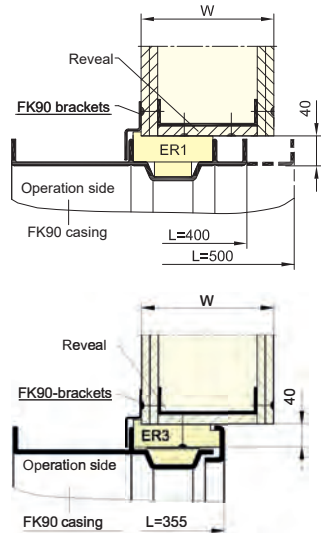
All dimensions in mm

FK90 fire dampers

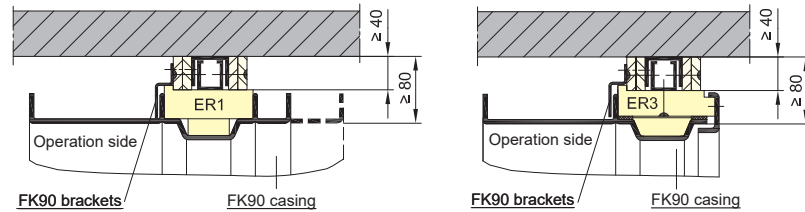
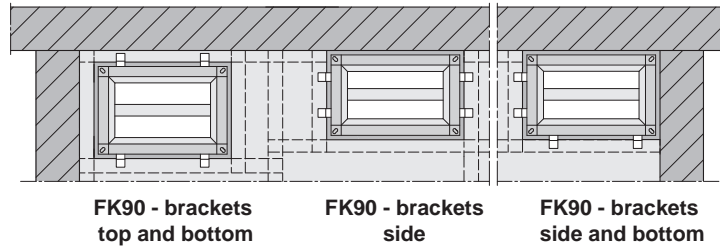
Installation in metal stud walls (4b) Installation with installation subframe - Heights H up to 800 mm -

Additional installation examples

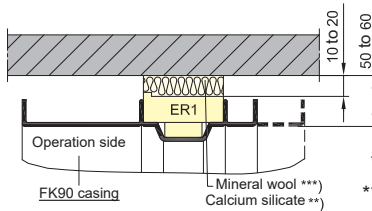
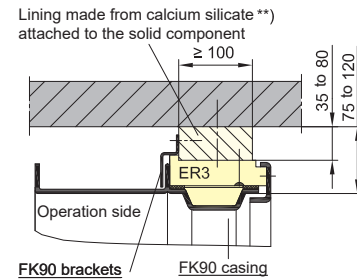
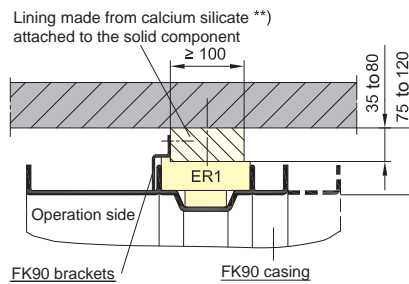
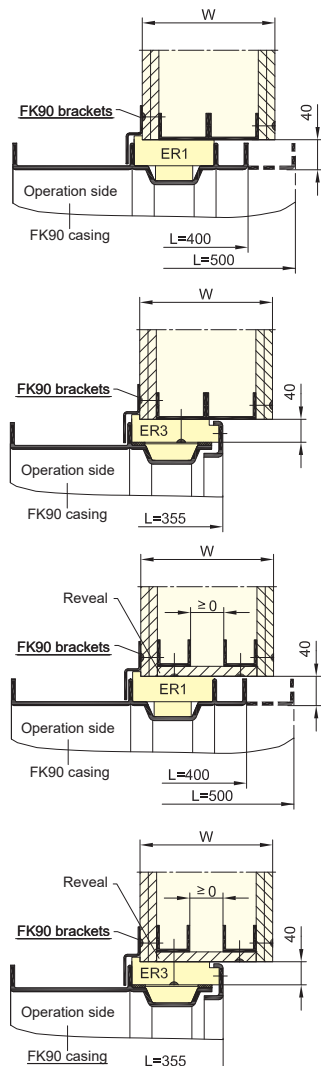
Especially for wall thicknesses $W > 120$ mm



Connections directly on rigid walls, ceilings (floors)

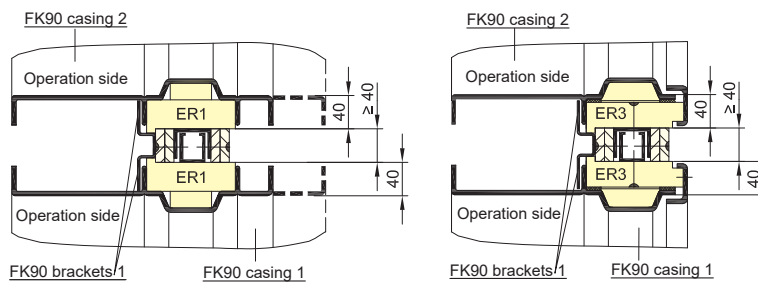


Double-studded walls (installation walls)



***) Calcium silicate boards ≥ 500 kg/m³
 ***) Mineral wool filling \rightarrow see page 19

Installation with short spacings



- The diagram shows 2-layer claddings; adjust accordingly for 1-layer or other claddings.
- The thickness of the **reveals** should correspond to at least one cladding layer.

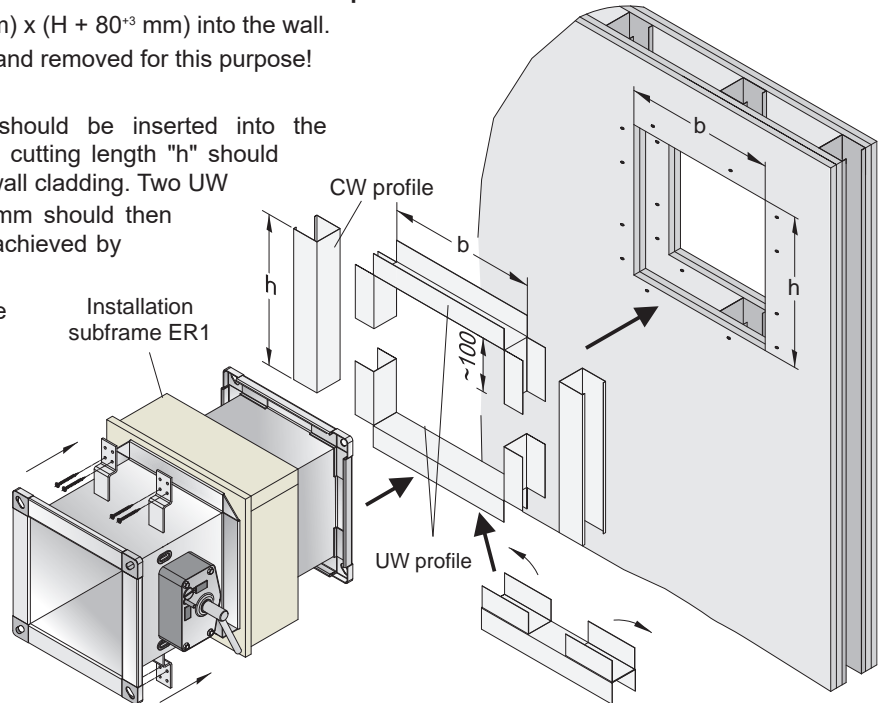
All dimensions in mm

FK90 fire dampers

Installation in metal stud walls (4c) Special installation - Heights H up to 800 mm -

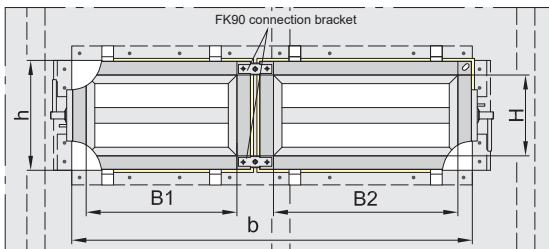
Installation of lengths 400 mm and 500 mm with installation subframe ER1 in retroactively produced installation openings

- For walls with $W \geq 95$ mm thickness and with a 90-minute fire resistance period.
- Cut installation opening $b \times h = (B + 80^{+3} \text{ mm}) \times (H + 80^{+3} \text{ mm})$ into the wall.
Two adjacent metal studs may be severed and removed for this purpose!
⇒ see pages 19 and 20
- Reinforcing frames of the same size should be inserted into the installation opening. Two CW profiles with cutting length "h" should be fitted at the side and screwed onto the wall cladding. Two UW profiles with cutting length "b" + 2 x 100 mm should then be inserted and screwed on. This can be achieved by firstly bending the profile ends 180°.
- The ends of the severed metal studs must be slid into the UW profiles of the reinforcing frames and screwed to the claddings.
- Screwing into the wall claddings must be performed at spacings of ≤ 200 mm, using drywall screws of a suitable length and diameters of ≥ 3.5 mm! ⇒ see page 19
Wall profile overlaps must be at least double-screwed.
- Slide FK90 fire damper with installation subframe ER1 into the installation opening and secure with FK90 brackets as specified. ⇒ see page 23

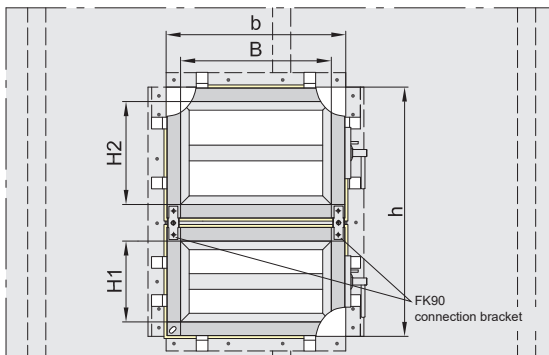


Double installation in a single installation opening

- Create installation opening $b \times h$ ⇒ see page 20, or retroactively cut into the wall ⇒ see above.

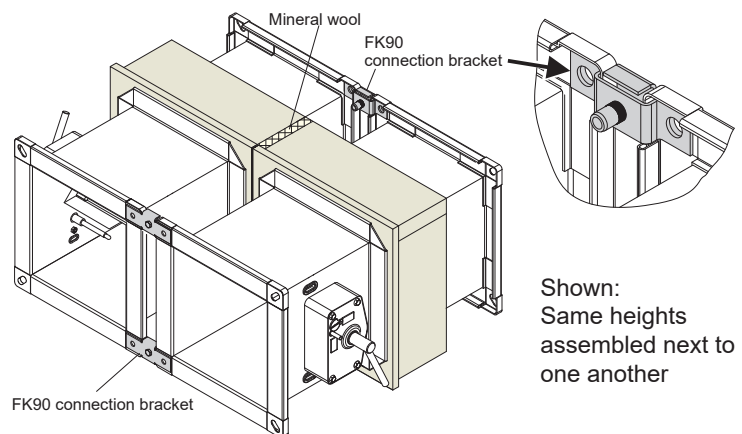


- Same heights H next to each other:
 $b \times h = (B1 + B2 + 175^{+3} \text{ mm}) \times (H + 80^{+3} \text{ mm})$
Restriction: (Width B1 + width B2) ≤ 920 mm



- Same widths B one on top of the other:
 $b \times h = (H1 + H2 + 175^{+3} \text{ mm}) \times (B + 80^{+3} \text{ mm})$
Restrictions: (Height H1 + height H2) ≤ 920 mm
Width $W \leq 1020$ mm

- Frames for installation openings ⇒ see pages 23 and 24
- Reinforcing frames ⇒ see above
- Assemble FK90 fire dampers with 4 x FK90 connection brackets. The spacing between the two ER1 installation subframes must be filled with mineral wool of 20 mm in thickness, 100 mm in width and with a length that corresponds to the b or h dimensions.

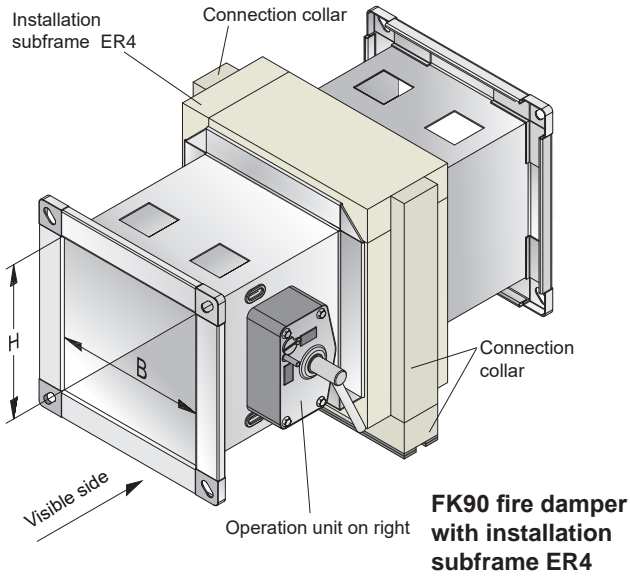


- Slide assembled FK90 fire dampers with installation subframes ER1 into the installation opening and secure with FK90 brackets as specified. ⇒ see page 23

- Mineral wool ⇒ see page 19
- FK90 - connection brackets ⇒ see page 50

FK90 fire dampers

Installation in metal stud walls (5a) Sliding ceiling connection - Heights H up to 800 mm -



Installation of the length 500 mm with installation subframe ER4 for sliding ceiling connection.

Types of metal stud walls with cladding on both sides

⇒ see pages 19 and 20

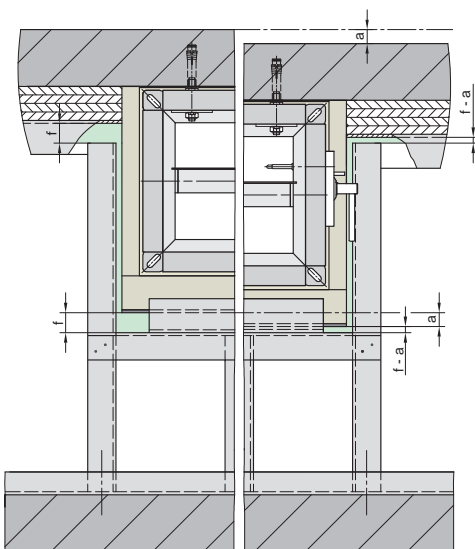
The following **minimum thickness W [mm]** is required for installing the FK90 fire dampers:

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 $f \geq 10$ mm is expected.

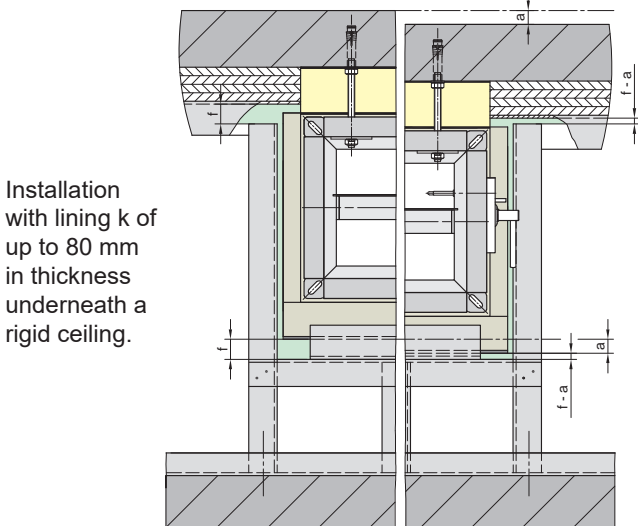
The designs of the expansion joints for drops of $f \leq 20$ mm are described in DIN 4102-4. Designs for drops of $f \leq 40$ mm can be made based on the specifications for the walls in question. The conventional installation of fire dampers can only be performed in a wall area that is far below the ceiling connections of up to 200 mm in height.

- FK90 fire dampers can be fitted below rigid ceilings, either directly or at a distance of up to 80 mm. The installation subframes ER4 guide the sliding ceiling connection around the FK90 fire dampers, with these attached such that they lower together with the ceiling and the ventilation ducts. As shear forces can also be absorbed, the ventilation ducts do not need to be flexibly connected.
- FK90 fire dampers with widths of up to $B = 800$ mm can also be installed in an upright position with "actuator down".
- Order information: "Actuator left", "actuator right" (shown), "actuator down" ⇒ see page 6
- Stud profile depths $S = 50, 60, 75, 85, 100, 125$ mm
⇒ see pages 8, 27 and 28

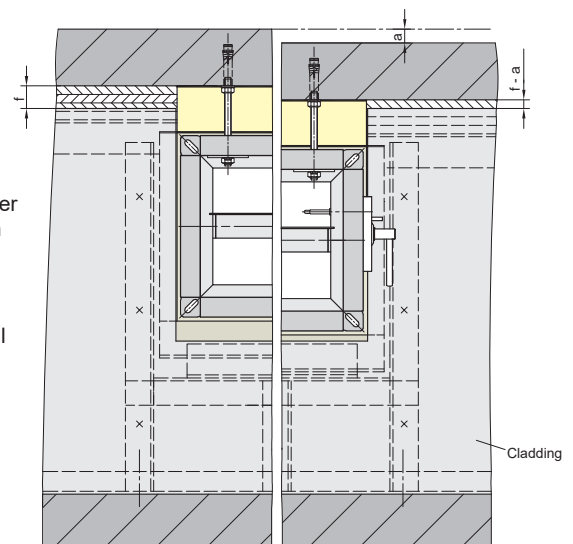


Function and installation principle

The half-sections show the installed state on the left, and an example of a state lowered by a dimension $a \leq f \leq 40$ mm on the right.

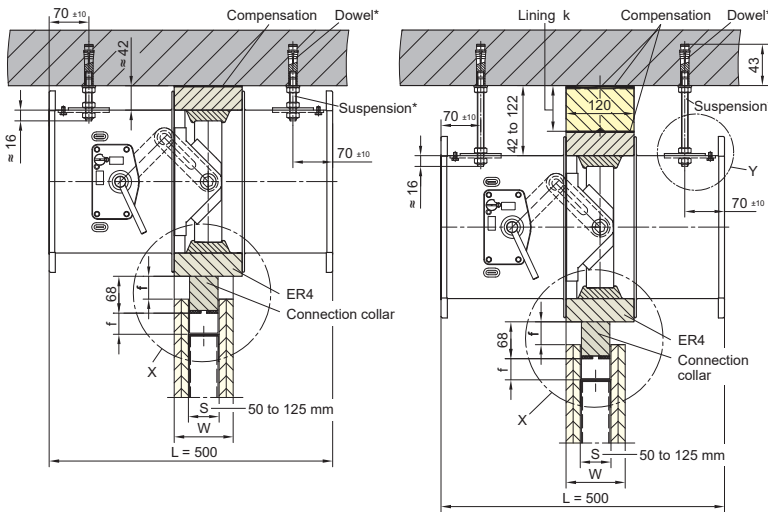


FK90 fire damper with lining k in
 uncladded ←
 cladded →
 Metal stud wall



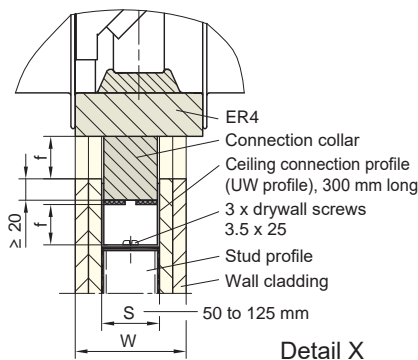
FK90 fire dampers

Installation in metal stud walls (5b) Sliding ceiling connection - Heights H up to 800 mm -

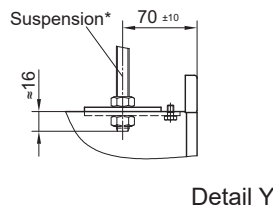


Installation without lining

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



Detail X

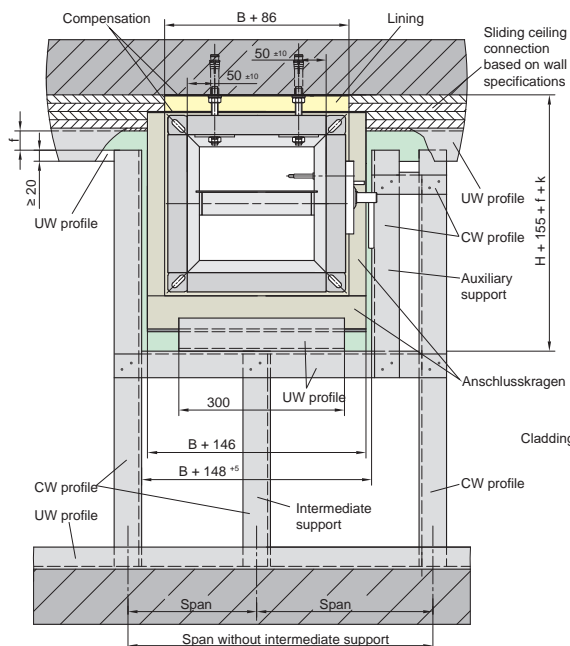


Detail Y

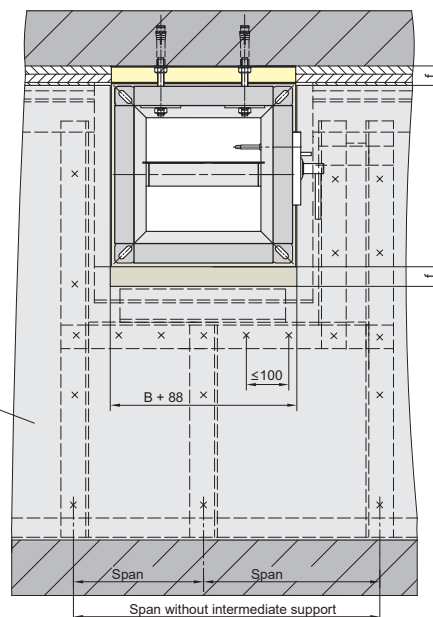
*) Supplied together with installation subframe ER4. The installation instructions for the plugs must be observed! The Zykon drills with drive-in mandrels needed for installation can be supplied as optional items.

Installation

- Installation subframes ER4 must fit the web height "S" of the metal studs.
 - Installation subframes ER4 can be assembled directly underneath rigid ceilings or at a distance of up to 80 mm. The space must be sealed with a lining k attached to the ceiling and made from 120 mm wide strips of calcium silicate board with a bulk density of $\geq 500 \text{ kg/m}^3$.
 - **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 ER4, 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 $\geq 1000^\circ\text{C}$ and $\geq 80 \text{ kg/m}^3$ bulk density) and non-combustible adhesive.
 - Fire dampers with installation subframes ER4 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 FK90 fire dampers if required due to the spans.
- There must also be clearances for incorporating the planned ceiling drop below the attached FK90 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.
 - Additional details \Rightarrow see page 8



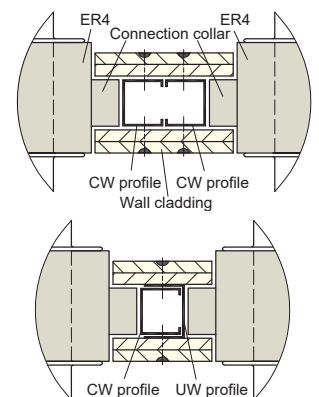
Installation and arrangement of the metal studs



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.



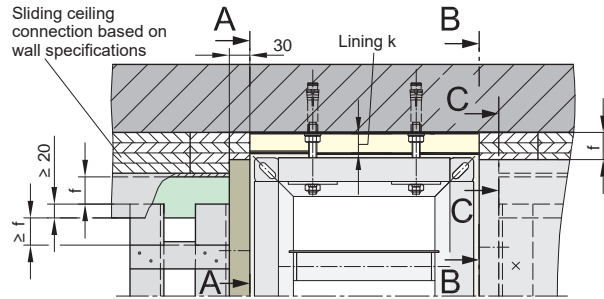
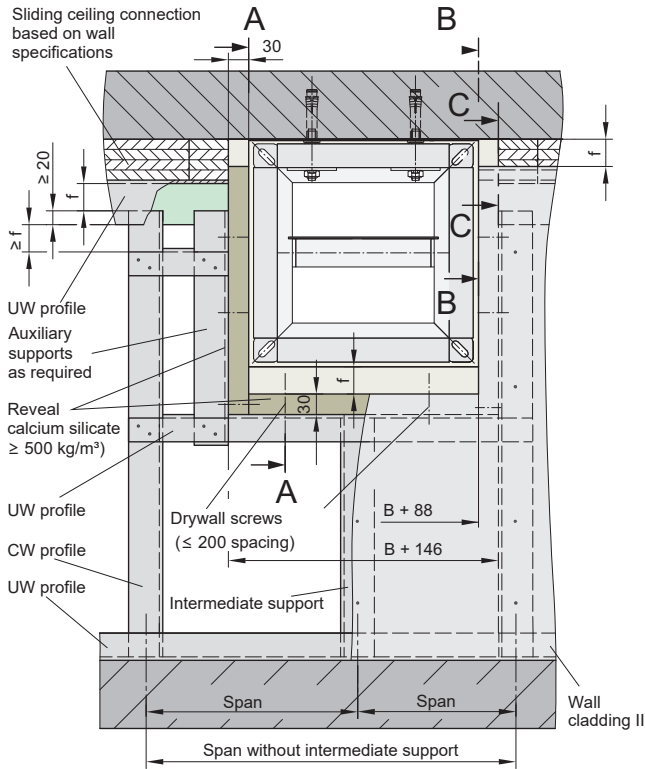
All dimensions in mm

FK90 fire dampers

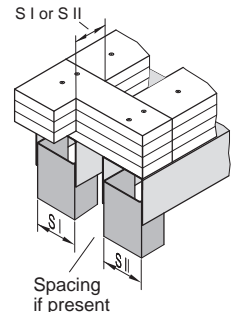
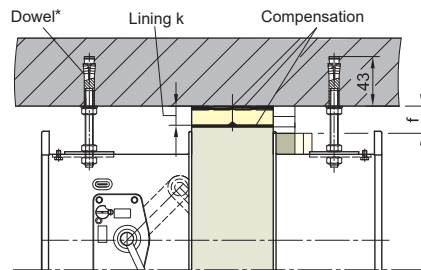
Installation in metal stud walls (5c) Sliding ceiling connection - Heights H up to 800 mm -

• in double-studded walls directly underneath ceilings

• in double-stud walls with lining for spacing of ≤ 80 mm from ceilings

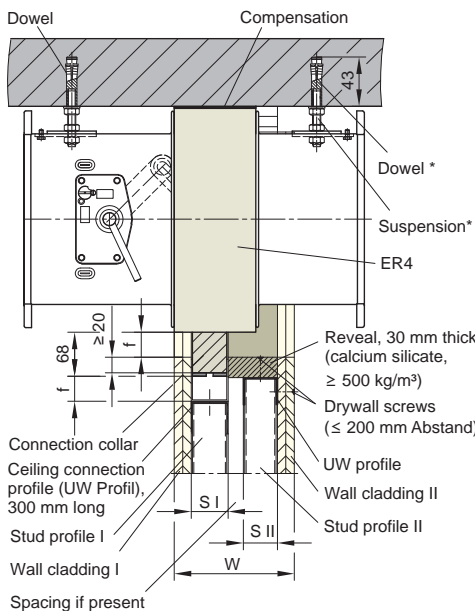
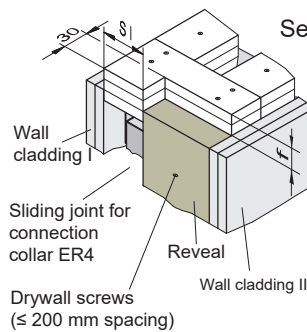


Section A-A



Section B-B shown without connection collar

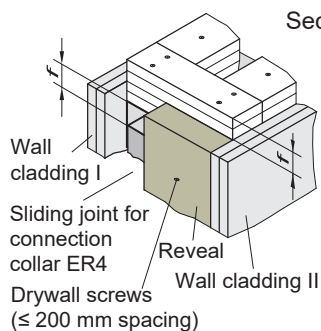
Section C-C



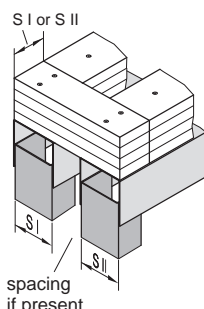
Section A-A

*) Supplied together with installation subframe ER4.

Section B-B shown without connection collar



Section C-C



• The installation of FK90 fire dampers is in principle unchanged. \Rightarrow see page 27

- Installation subframes ER4 must match 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 interrupted and sealed at the front (section C-C).
- The profiles surrounding the recess on the metal studs II have reveals made from 30 mm thick calcium silicate boards. These are guided to the ceiling up to the spacing f from 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 ER4 will lie between cladding I and the reveal attached to cladding II (section B-B).
- Joints should be filled as usual for this type of wall
- Additional details \Rightarrow see page 8

All dimensions in mm

FK90 fire dampers

Installation in metal stud walls (6) Fire walls/safety partition walls - Heights H up to 800 mm -

Metal stud walls as fire walls or safety partition 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).

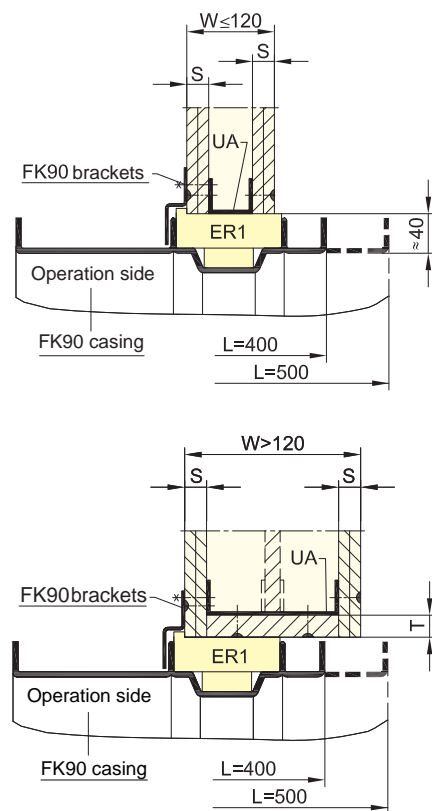
Claddings must be applied on both sides with at least 2 layers, and may contain sheet steel inserts.

The studs, bay rails and reinforcements adjacent to FK90 fire dampers must be made up of UA profiles.

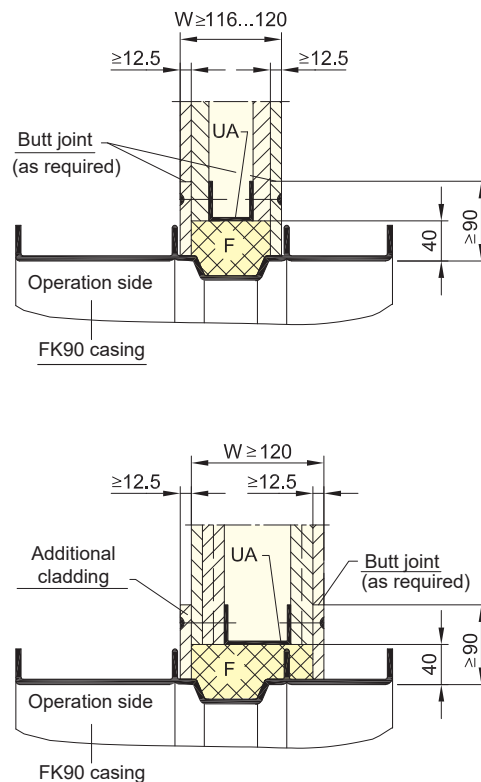
For structural reasons, further reinforcements may be necessary for wall heights of > 5 m.

Fire resistance period in minutes	30 60 90
Minimum thickness W [mm] of the metal stud walls	105

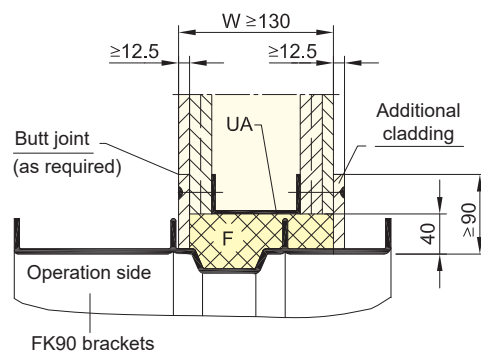
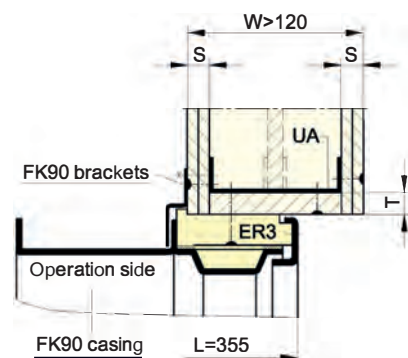
Installation subframe ER1



Installation without installation subframe



Installation subframe ER3



- Clad reveals with $T \geq 20$ mm thick calcium silicate boards or with $T \geq S$ thick boards made from wall cladding materials.

- Filling areas "F" must be filled with wall cladding materials and with joint filler.
⇒ see pages 19, 20, 22

All dimensions in mm

FK90 fire dampers

Installation in shaft walls with and without metal studs (1) - Heights H up to 800 mm -

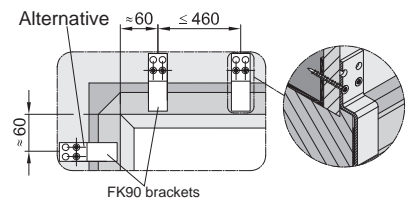
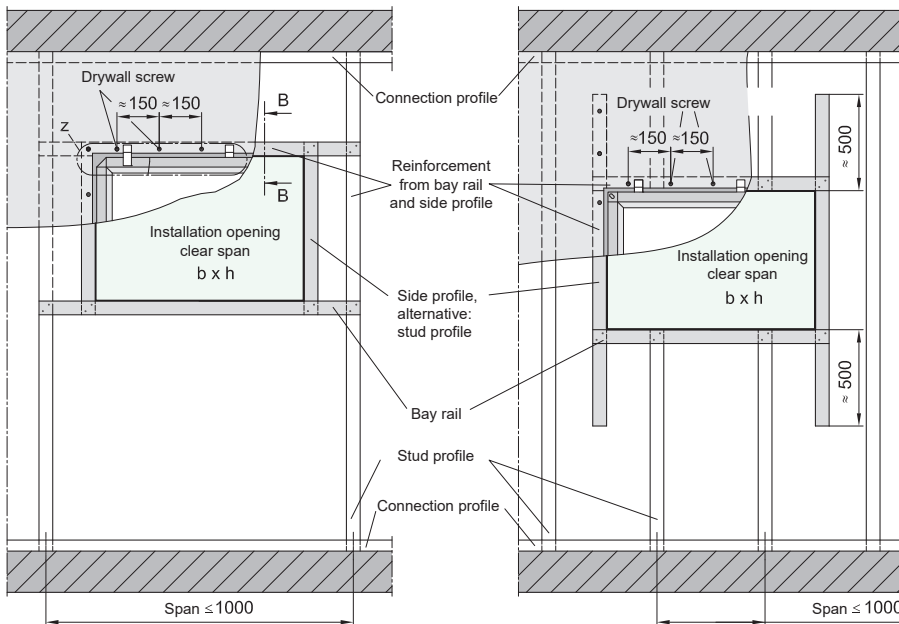
Installation in installation subframes ER1 and ER3 in walls with cladding on one side

Types of metal stud walls with cladding → see pages 19 and 20

The **minimum thicknesses W [mm]** shown opposite are required for installing the FK90 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

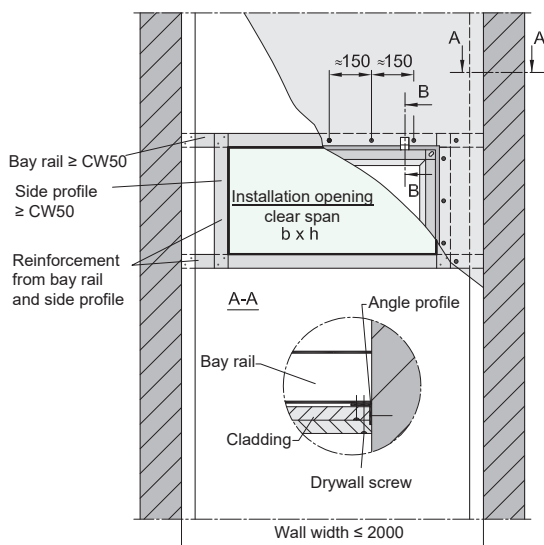
• with metal studs (metal stud walls with cladding on one side)



Detail Z
Valid for all installation diagrams

For installation, installation openings $b \times h = (B + 80^{+3} \text{ mm}) \times (H + 80^{+3} \text{ mm})$ are required. These are produced right when the walls are being built, but they can in part also be cut in afterwards.

• without metal studs



• Width and height of the shaft walls:

	Width	Height
with metal studs	unlimited	According to manufacturer
without metal studs	limited to $\leq 2 \text{ m}$, otherwise according to manufacturer	According to manufacturer

Limited dimensions can be found in the manufacturer's specifications. They depend on the profiles for the studding or on the boundary fixations, and are based on the type and thickness of the cladding.

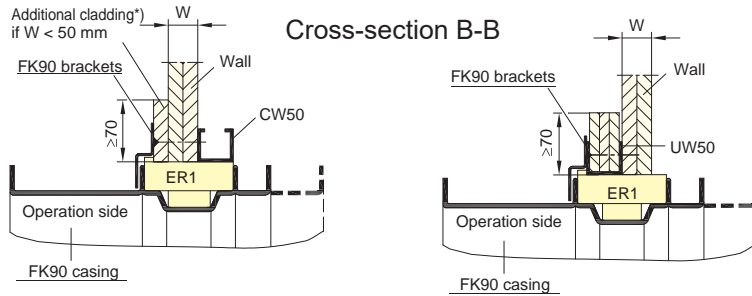
- If the span of the studding is smaller than the width of the fire damper (with a horizontal axis, or the height with a vertical axis), then the side profiles should be fitted with a 500 mm excess length (top right-hand image). If smaller dimensions are available, then the side profiles should be guided up to the connection profiles (top left-hand image) and then attached according to standard practice in wall construction. Stud profiles (supports) can replace side profiles.
- For FK90 fire dampers with dimensions within the span of the studding, the bay rails should be connected to the stud profiles according to standard practice in wall construction.
- Walls without framework require laterally adjacent rigid walls with angle profiles, onto which the freely spanned, multi-layer wall cladding and extended bay rails of the circumferential frame of the FK90 fire dampers should be attached.
- Fixing by means of 2-way crimping → see page 19

All dimensions in mm

FK90 fire dampers

Installation in shaft walls with and without metal studs (2) Details - Heights H up to 800 mm -

- Installation of lengths 400 mm and 500 mm with installation subframe ER1 in walls with cladding on one side, with or without metal studs

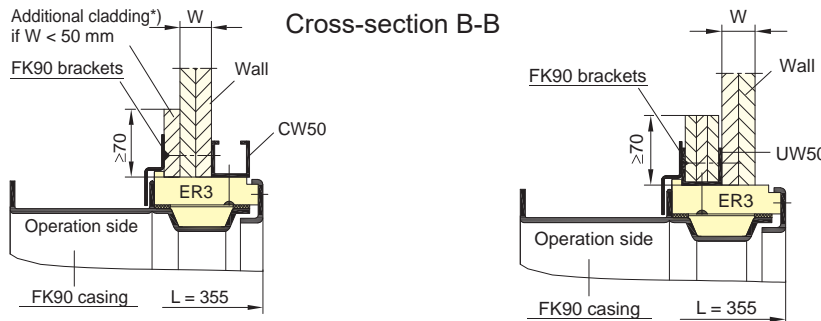


Left-hand cross-sections B-B show the installation of FK90 fire dampers with the operation side on the visible side of the wall.

Right-hand cross-sections B-B show the installation of FK90 fire dampers with the operation side on the shaft side of the wall. The UW profiles of the circumferential frame must be completely filled ≥ 70 mm high with strips of wall cladding material, or with construction boards made from calcium silicate, ≥ 500 kg/m³. FK90 brackets must be attached.

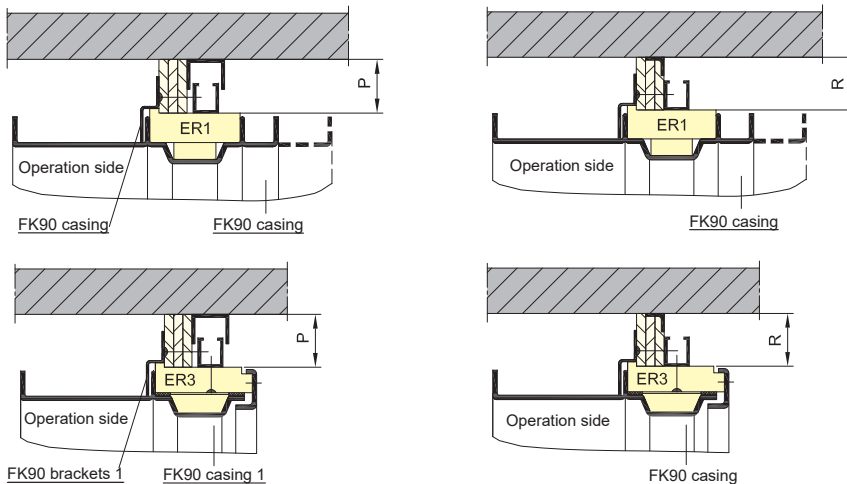
All **joints** should be filled as usual for this type of wall.

- Installation of 355 mm short length with installation subframe ER3 in walls with cladding on one side, with or without metal studs



*) **Wall thicknesses W < 50 mm** must be ≥ 70 mm in width and **increased to ≥ 60 mm** in thickness.

- Connections directly on rigid walls and ceilings (floors)



Minimum spacings [mm]

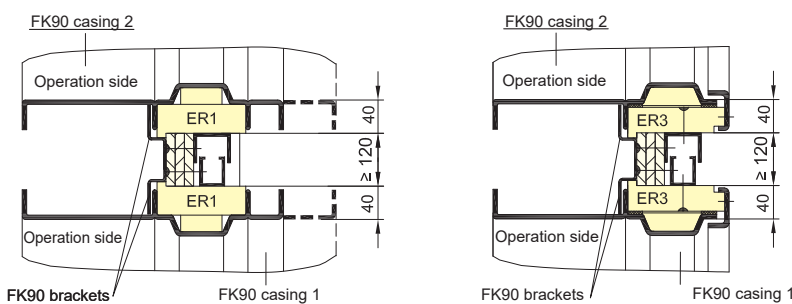
Wall thickness	P	R
< 50 mm*)	≥ 70	≥ 70
≥ 50 mm	≥ 40	≥ 35

*) Add additional cladding accordingly.

FK90 brackets can be shortened by max. 25 mm in order to maintain the minimum spacings. \Rightarrow see page 23

Joints should be filled as usual for this type of wall.

- Installation with short spacings



When **installing** FK90 fire dampers with the **operation side** on the uncladded wall side (metal stud side), the **profiles, which are circumferential at the rear, must be filled** with wall cladding materials. \Rightarrow see cross sections B-B

FK90 fire dampers

Installation in wooden walls and ceilings (1) General information - Heights H up to 800 mm -

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 construction walls and ceilings. The respective test certificates, declarations of performance and CE markings are available for FK90 fire dampers, series FK92.

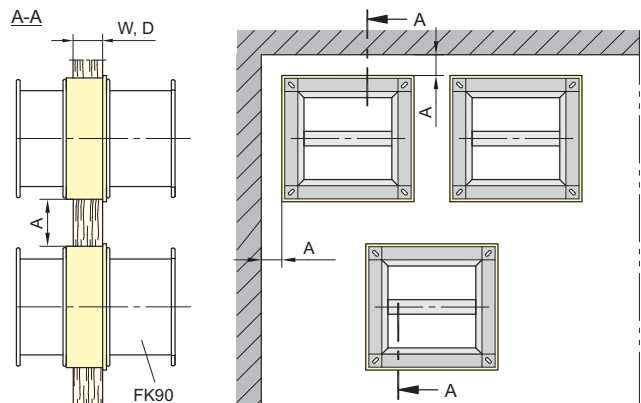
Dry installation with installation subframes and wet installation with mortar are possible. This way, the reveals of the installation openings are protected from increased combustion. Additional reveals in walls and ceilings are possible, but are only required for specific requirements (e.g. in double-stud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

The fire resistance period of the fire dampers is 90 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 of wooden studs Width x depth	Fire resistance period of the wall/ceiling/fire damper in minutes
Wall	Solid boards made of cross-laminated timber $\geq 350 \text{ kg/m}^3$	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
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 FK90 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.

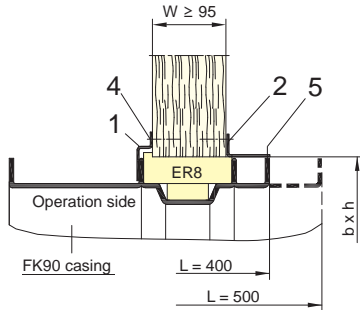
In general dry installation - no mortar - is required.
 - The installation openings for this purpose must be made to fit exactly. Sawing should be performed mechanically on the manufacturer's premises wherever possible.
 Otherwise gaps remain which have to be sealed with mortar or suitable sealing compounds.
 ⇒ Please send us an enquiry as necessary.



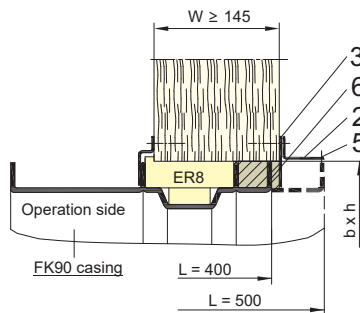
FK90 fire dampers

Installation in solid timber construction walls and ceilings (2a) - Heights H up to 800 mm -

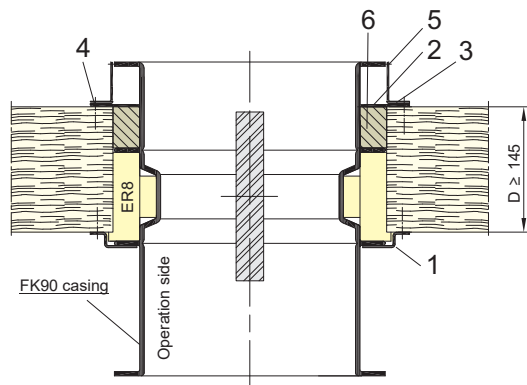
Installation of lengths 400 mm and 500 mm with installation subframe ER8 in walls and ceilings without cladding



Installation example for $W \geq 95$ mm
 $W = 95$ mm is shown

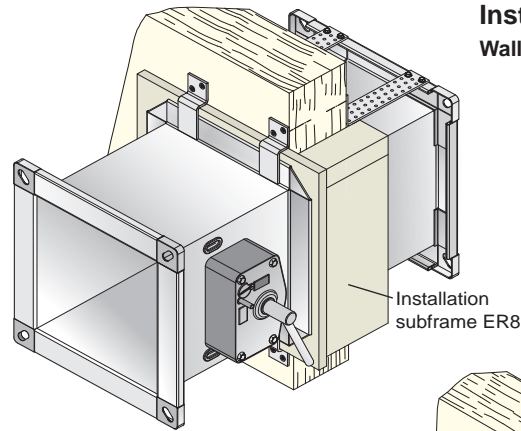


Installation example for $W \geq 145$ mm
 $W = 200$ mm is shown



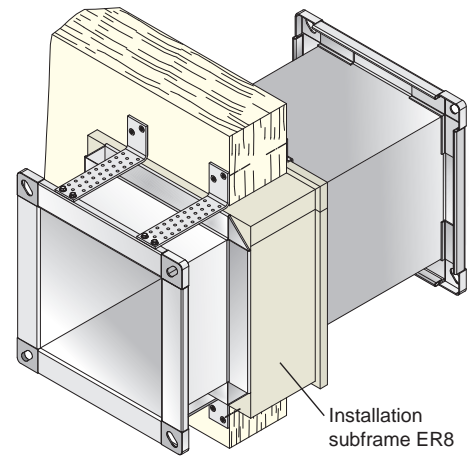
Installation example in wooden ceilings
 with $D \geq 145$ mm
 $D = 200$ mm and actuator underneath the ceiling is shown.

Installation example
 Wall thickness $W = 95$ mm



Operation side

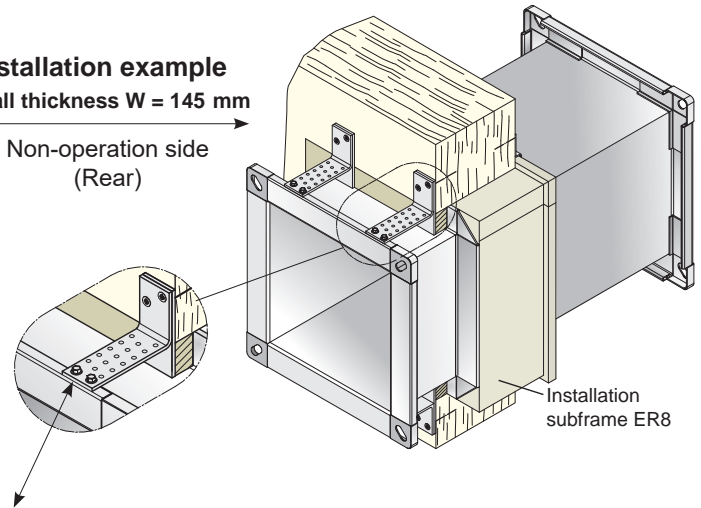
Non-operation side
 (Rear)



Installation subframe ER8

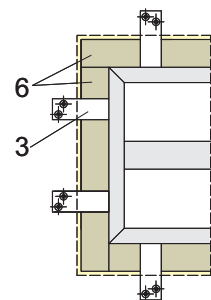
Installation example
 Wall thickness $W = 145$ mm

Non-operation side
 (Rear)



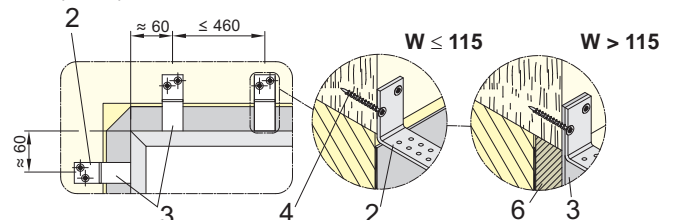
Installation subframe ER8

Fastening with brackets



Bracket arrangement

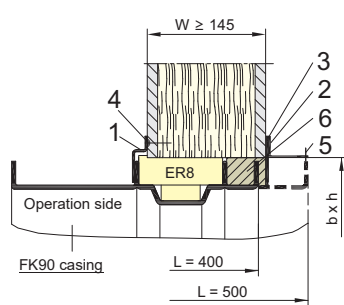
Non-operation side
 (Rear)



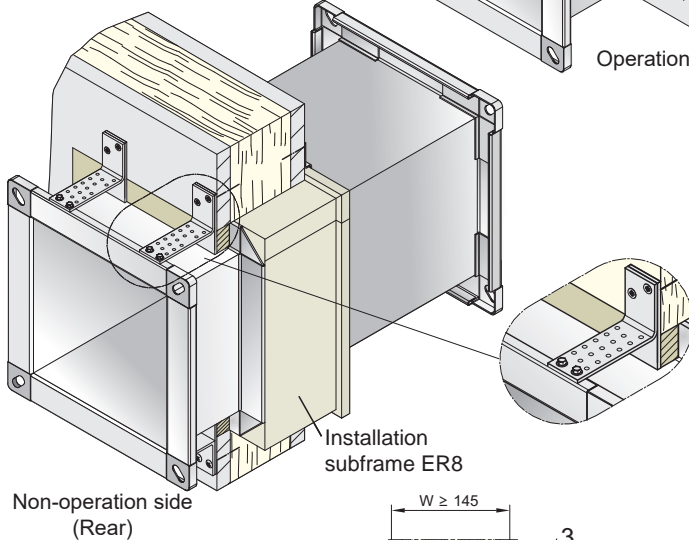
FK90 fire dampers

Installation in solid timber construction walls and ceilings (2b) - Heights H up to 800 mm -

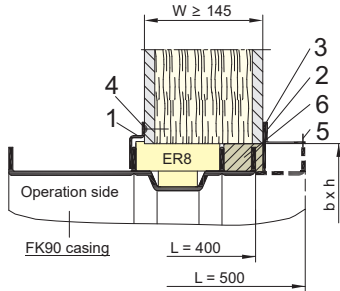
Installation of lengths 400 mm and 500 mm with installation subframe ER8 in walls and ceilings with cladding



Installation example
for $W \geq 124$ mm
 $W = 124$ mm is shown



Non-operation side
(Rear)



Installation example for $W \geq 145$ mm
 $W = 200$ mm is shown

Parts list on pages 33 to 36

- 1 ER8 bracket for the operation side *)
- 2 ER8 corner bracket for the non-operation side *)
- 3 ER8 stop plate for the non-operation side *)
- 4 Drywall screw 3.9 x 45 DIN 18182-2 *)
- 5 Drilling screw 3.9 x 25 DIN 7504 shape K *)
- 6 Filling made of Promatect® LS fire protection boards or gypsum fire protection boards
- 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 ER8; it may therefore be surplus, depending on the fastening material installation situation.

FK90 fire dampers, series FK92, are suitable for dry installation in solid timber walls and timber ceilings.

Special brackets are used for fastening on both sides of the wall or ceiling with spacing of ≤ 460 mm.

They are included as an accessory kit in the scope of delivery of the fire dampers with installation subframe ER8 for $B \leq 580$ mm and for $B > 580$ mm.

Brackets can be distributed over the H sides, especially if $H > W$.

ER8 brackets (1) have to be used on the operation side. If the depth of the frame is smaller than the wall thickness, protection for the exposed reveals may

be necessary on the non-operation side, especially for walls and ceilings with cladding.

Fillings (6) for this purpose on the non-operation side are held by two ER8 stop plates (3) on the B side and H side. They are screwed jointly or separately to the ER8 corner brackets (2).

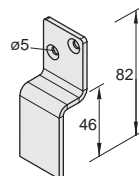
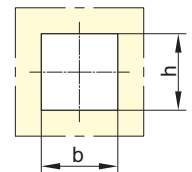
Drywall screws (4) have to be used for ER8 brackets (1) and ER8 corner brackets (2)!

ER8 corner brackets (2) on the non-operation side have to be shortened to the required length and fastened to the flange of the fire damper casing with two drilling screws (5) each.

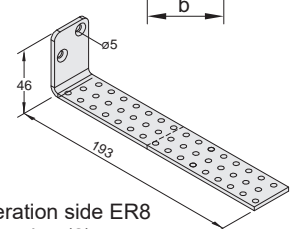
Claddings for the wooden walls and wooden ceilings must be fastened correctly. This is normally performed using drywall screws with a length of ≥ 35 mm and a diameter of ≥ 3.5 mm, spaced at ≤ 250 mm.

Installation openings for installation subframe ER8

$$b \times h = (B + 82^{+2} \text{ mm}) \times (H + 82^{+2} \text{ mm})$$

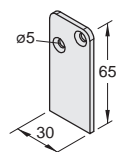


Operation side
ER8 bracket (1)



Non-operation side ER8
corner bracket (2)

ER8 stop plate (3)

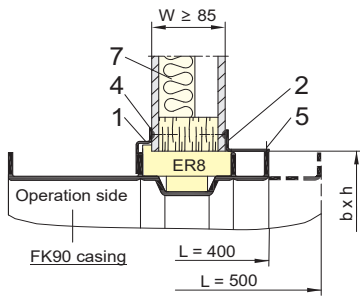


All dimensions in mm

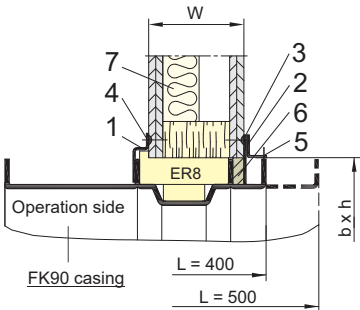
FK90 fire dampers

Installation in timber frame construction walls and ceilings (3a) - Heights H up to 800 mm -

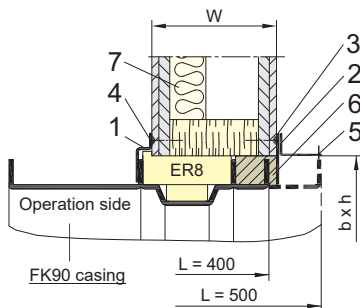
Installation of lengths 400 mm and 500 mm with installation subframe ER8 in walls and ceilings with cladding



Installation example
for $W \geq 85$ mm
 $W = 85$ mm is shown



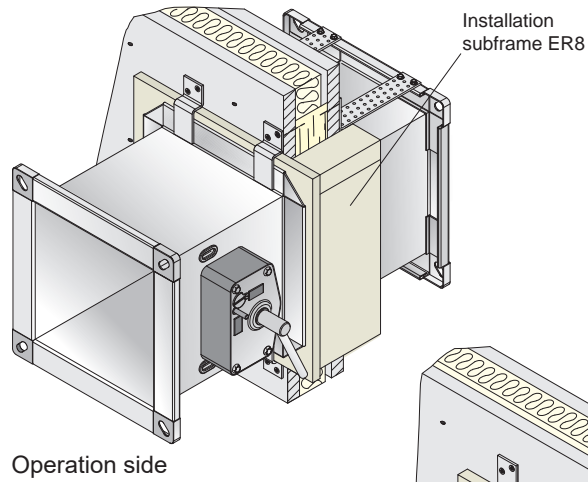
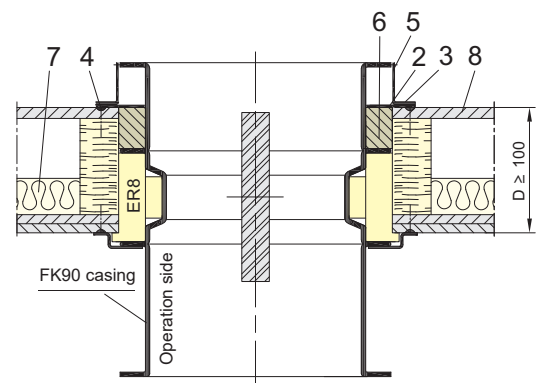
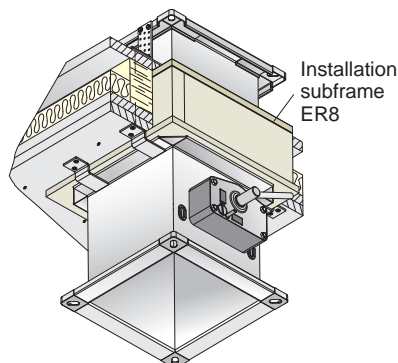
Installation example for $W = 125$ mm



Installation example for $W = 200$ mm

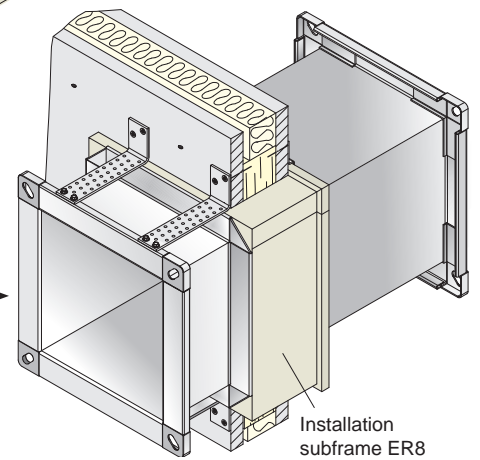
Optionally, the reveals can be lined with wall building materials.

Installation example in wooden ceilings with $D \geq 100$ mm
 $D = 200$ mm and actuator underneath the ceiling is shown.



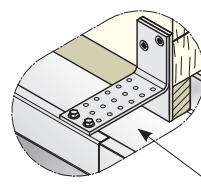
Installation example
Wall thickness
 $W = 85$ mm

Non-operation side
(Rear)

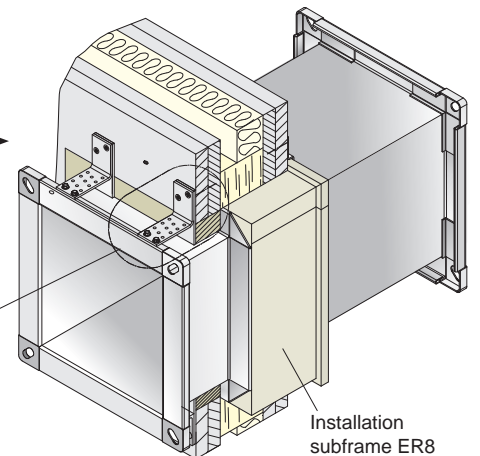


Installation example
Wall thickness
 $W = 145$ mm

Non-operation side
(Rear)



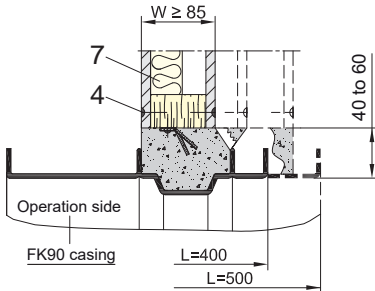
Bracket arrangement, fastenings and parts list
⇒ see pages 33, 34



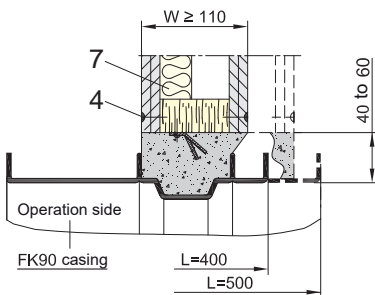
FK90 fire dampers

Installation in timber frame construction walls and ceilings (3b) - Heights H up to 800 mm -

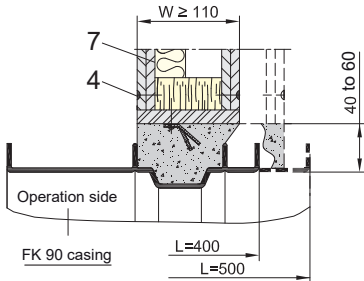
Installation of lengths 400 mm and 500 mm with mortar in walls with cladding



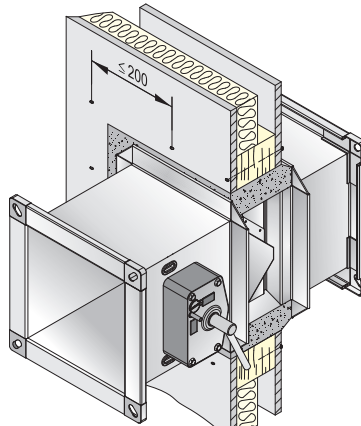
Installation example for $W \geq 85$ mm
 $W = 85$ mm is shown



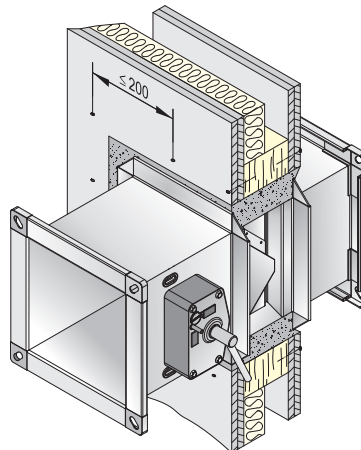
Installation example for $W \geq 110$ mm
 $W = 110$ mm is shown



Shown with additional reveal made of wall building materials



Operation side

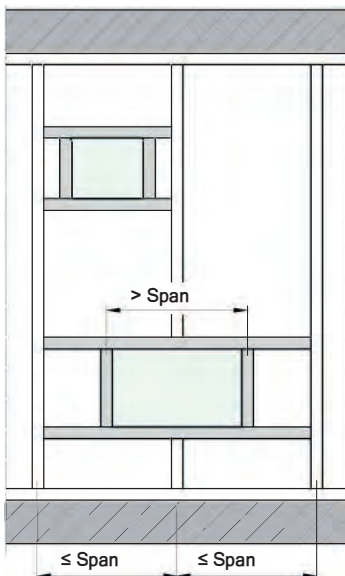
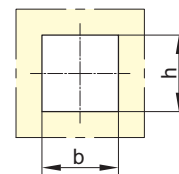


Operation side

- The gaps must be filled 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 appropriate 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 suitable 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

$$b \times h = (B + 80^{+40} \text{ mm}) \times (H + 80^{+40} \text{ mm})$$



Example for installation openings in wooden stud framework

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: \Rightarrow see table on page 32
- Installation of the fire dampers with installation subframe ER8 \Rightarrow see page 35
- 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: \Rightarrow see page 32

FK90 fire dampers

Installation in ceilings with steel frame (1) - Heights H up to 800 mm -

Installation of lengths 400 mm and 500 mm in ceiling and roof constructions

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

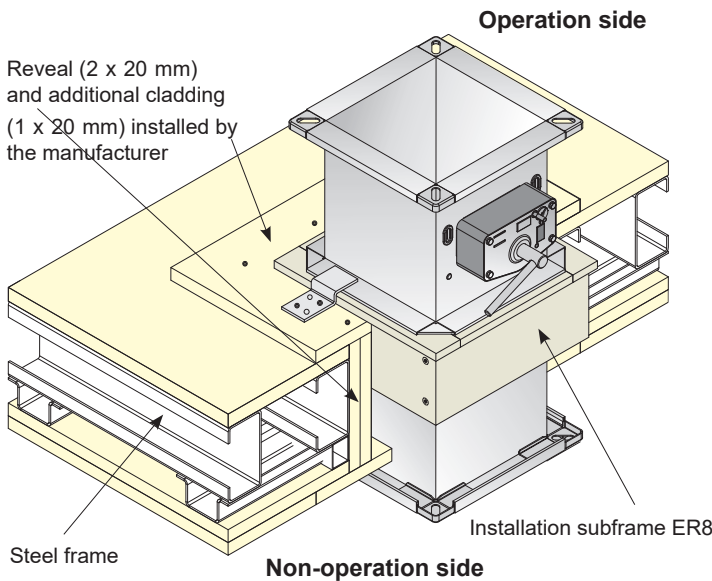
The **modular system from KLEUSBERG** is made up of steel frames with cladding and is installed as a building.

FK90 fire dampers with lengths of 400 mm or 500 mm can be installed with installation subframe ER8. They are inserted into installation openings which are clad all round with reveals made of fire protection boards, and fastened with ER8 brackets (1) and ER8 angle brackets (2).

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

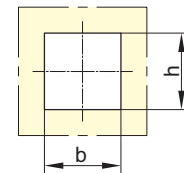
The following **minimum thickness D [mm]** is required for installing the FK90 fire dampers:

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

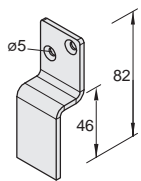


Installation openings for installation subframe ER8

$$b \times h = (B + 80^{+4} \text{ mm}) \times (H + 80^{+4} \text{ mm})$$

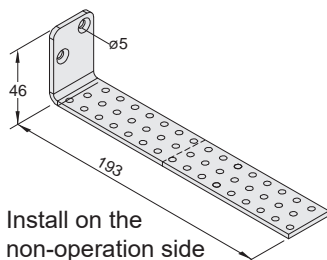


ER8 bracket (1)



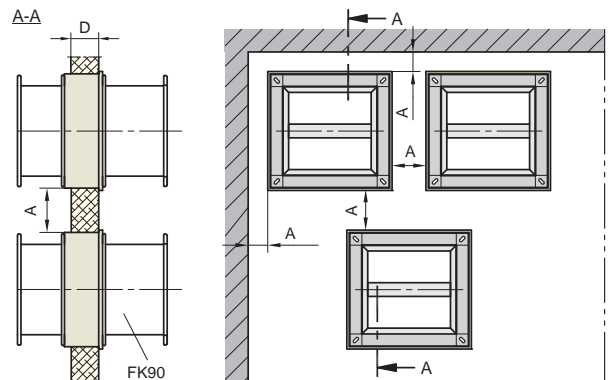
Install on the operation side

ER8 corner bracket (2)



Install on the non-operation side

Installation gaps



- Installation gaps "A" between the FK90 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.

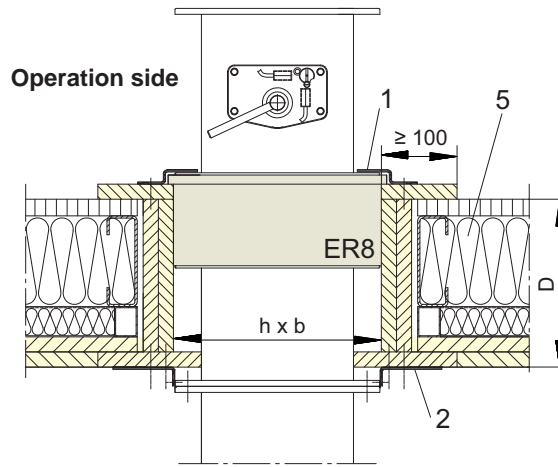
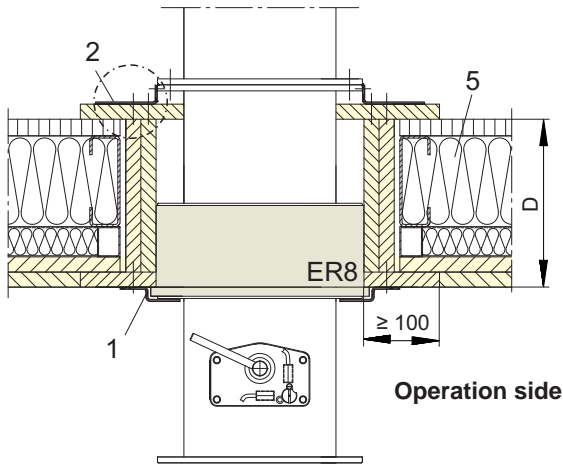
Parts list on pages 37 and 38

- 1 ER8 bracket for the operation side ¹⁾
 - 2 ER8 corner bracket for the non-operation side ¹⁾
 - 3 Drywall screw Ø 3.9 x 45 - DIN 18182-2 ¹⁾
 - 4 Drilling screw Ø 3.9 x 25 DIN 7504 shape K ¹⁾
 - 5 Insulating material for roof constructions
- ¹⁾ The items 1 to 4 are included as an accessory kit with the scope of delivery of the FK90 fire dampers with installation subframe ER8; they may therefore be surplus, depending on the installation of fastening material.

FK90 fire dampers

Installation in ceilings with steel frame (2) - Heights H up to 800 mm -

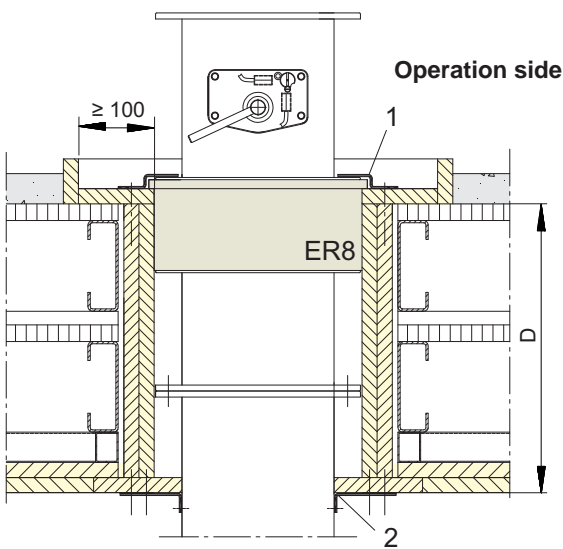
Installation in roof constructions



Installation notes

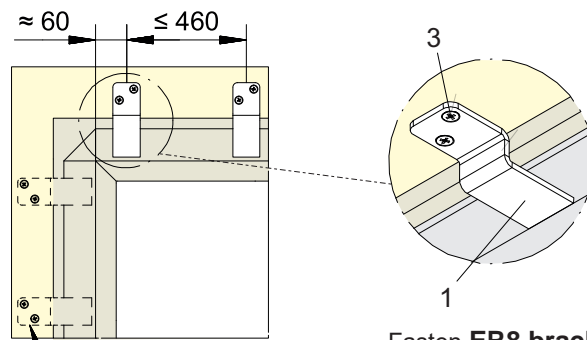
- The ceiling and roof constructions must be fastened on both sides.
- The excess lengths for mechanical and electrical components must be observed.
- Fire dampers installed in or on roof constructions require weather protection which also ensures accessibility.

Installation in ceiling constructions



ER8 brackets and **ER8 corner brackets** must be arranged with spacing of ≤ 460 mm. B-side fastenings are preferred. H side if H is $> B$. Mixed B-side and H-side arrangements are also possible.

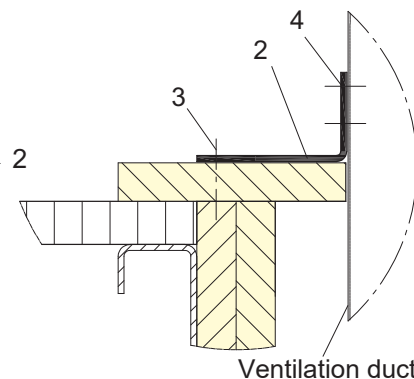
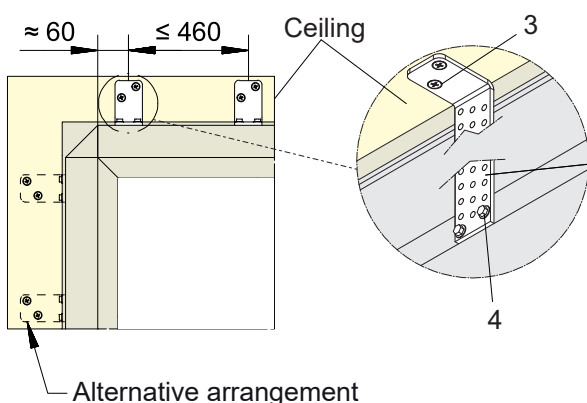
On ceiling claddings, the fastening has to be implemented with drywall screws with a diameter of 3.9 x 45 mm. On the flange of the fire damper casing, drilling screws with a diameter of 3.9 x 25 mm have to be used, and on ventilation ducts as well.



Fasten **ER8 brackets** to the ceiling claddings on the operation side with drywall screws (item 3).

Alternative arrangement

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



Fasten **ER8 corner brackets** to the flange of the fire damper casing or to the ventilation duct on the non-operation side with drilling screws (item 4).

To do so, ER8 angle brackets can be shortened to the necessary lengths.

All dimensions in mm

FK90 fire dampers

Base - Installation on rigid ceilings - Heights H up to 800 mm -

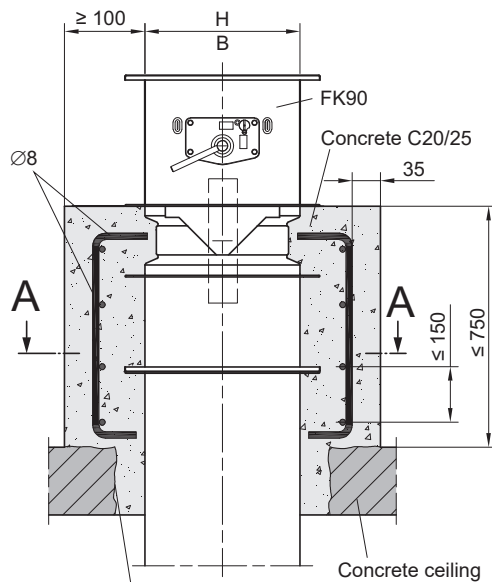
The following **minimum thickness D [mm]** is required for installation of the FK90 fire dampers:

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

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

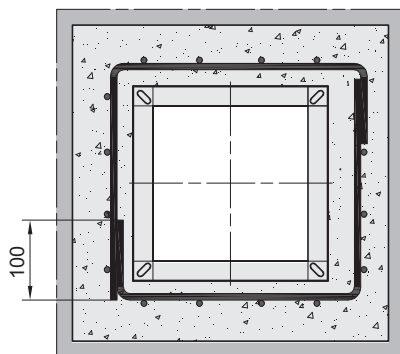
Mounting with mounting frame AR1 on ventilation ducts made of concrete

Lengths 400 mm and 500 mm

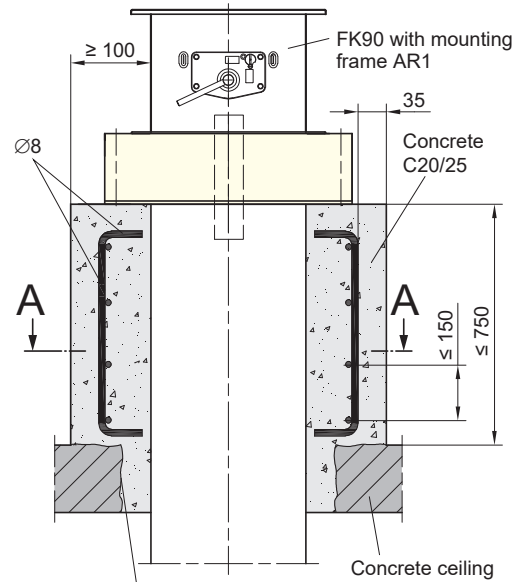


Roughen concrete ceiling in the area of the construction joint

Section A-A

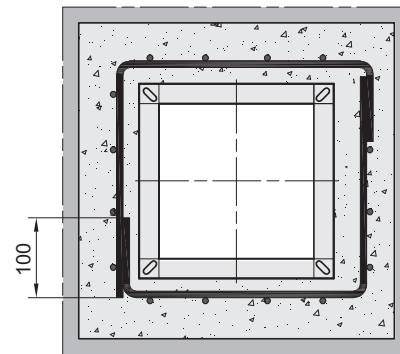


346 mm mounting length



Roughen concrete ceiling in the area of the construction joint

Section A-A



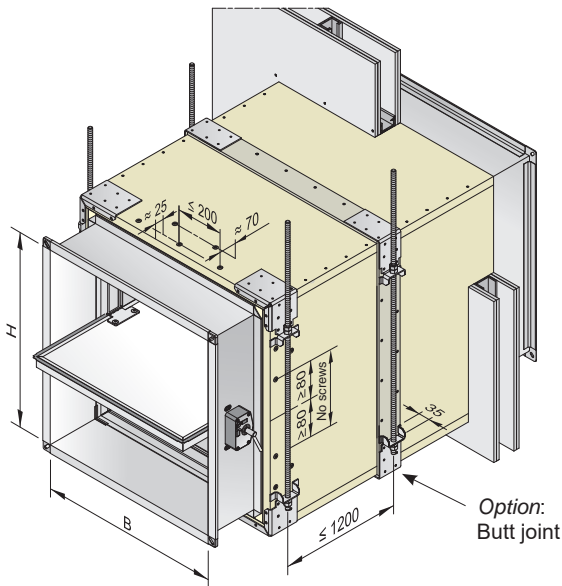
Production according to general construction rules.

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 $\varnothing \geq 8$ mm. Vertical spacing ≤ 150 mm, sealed all round horizontally ≤ 150 mm. Alternative: welded steel wire mesh Q 335 A
- Reinforcing steel overlap $C_{nom} \geq 35$ 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.

FK90 fire dampers

Installation remote from (1) walls and ceilings - Heights H up to 800 mm -



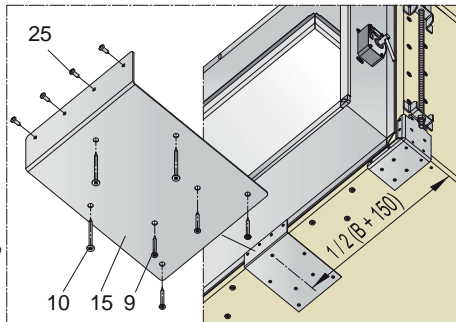
Installation with mounting frame AR2 on ventilation ducts with a fire resistance period remote from rigid walls and ceilings and metal stud walls.

The following **minimum thicknesses W, D [mm]** are required for installing the FK90 fire dampers:

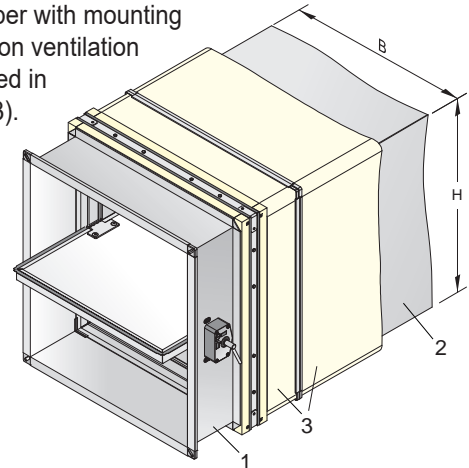
Fire resistance period in minutes	30
	60
	90
Rigid walls and ceilings	100
Metal stud walls with ≥ 2-layer cladding on both sides	95

Details on wall types and ceilings ⇒ see pages 16, 17, 19 and 20.

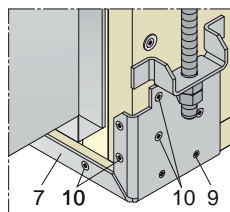
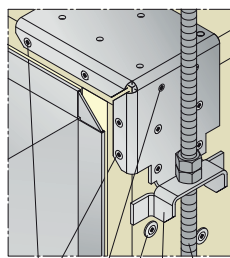
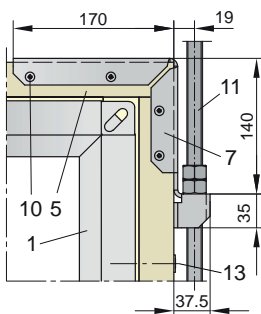
FK90 support brackets (15) should be fitted to the underside of the FK90 fire dampers when installation is performed horizontally and remote from walls, and when the width B is ≥ 740 mm.



FK90 fire damper with mounting frame AR2 (1) on ventilation duct (2) wrapped in mineral wool (3). Shown without claddings or suspension.

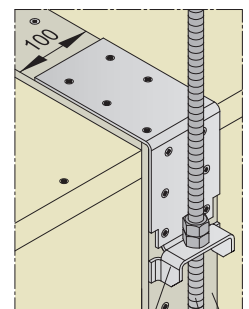


Suspension



Parts list ⇒ see page 41

FK90 fire dampers installed remote from walls are generally suspended using steel threaded rods arranged in pairs. These should be attached to ceilings according to 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.



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

Size	A _s [mm ²]	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 as per DIN 13

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

With FK90 fire dampers installed remote from ceilings, the weight forces are transferred into the ceiling via the sheet steel ventilation duct.

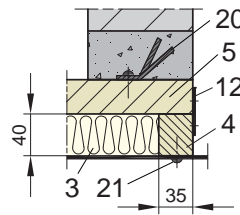
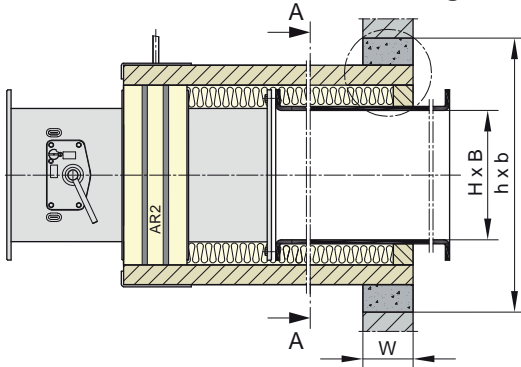
Weight [kg] of FK90 fire dampers ⇒ see page 15.

Weights of the suspension, ventilation duct, insulation, cladding, etc. should be factored in.

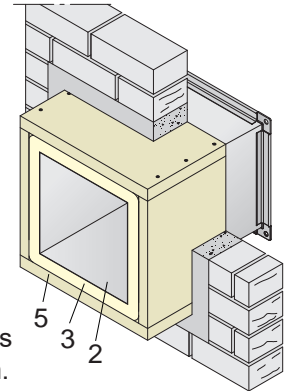
FK90 fire dampers

Installation remote from (2) rigid walls and ceilings - Heights H up to 800 mm -

Route ventilation duct with cladding through rigid walls



View A-A

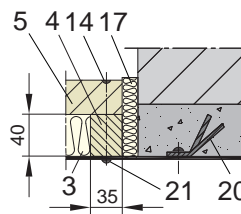
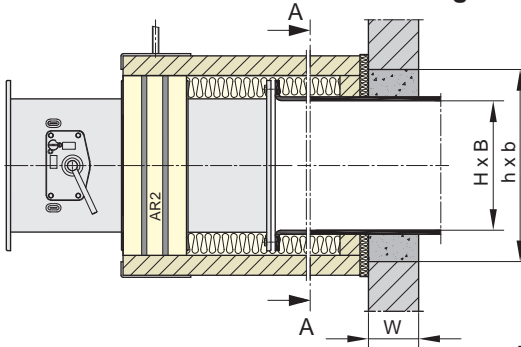


Installation opening:

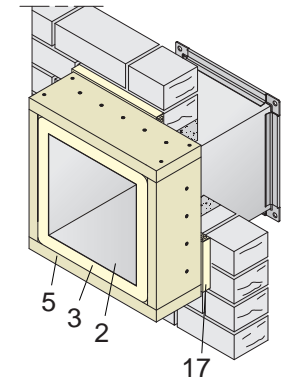
$$b \times h \approx (B + 155) \times (H + 155) + \text{mortar gap as required.}$$

Mortar anchors or suitable concrete screws (20) should be inserted with spacing ≤ 200 mm.

Attach ventilation duct with cladding to rigid walls



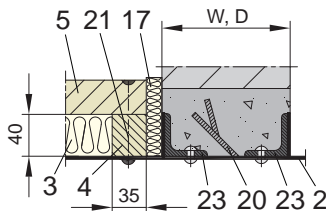
View A-A



Installation opening:

$$b \times h \approx (B + 5) \times (H + 5) + \text{mortar gap as required.}$$

Mortar anchors or suitable concrete screws (20) should be inserted with spacing ≤ 200 mm.



Alternative installation of the ventilation duct (2) with angular steel frame (23) in rigid walls and ceilings.

Parts list on pages 40 to 46:

- | | | |
|---|---|---|
| 1 Fire damper with mounting frame AR2. | 7 FK90 suspension bracket AR2 *). | 18 Drywall screw 3.9 x 35 mm. |
| 2 Ventilation duct made from sheet steel. | 8 Suspension bracket AW.
⇒ Accessories on page 50 | 19 Drywall screw ≥ 3.5 mm. |
| 3 Mineral wool clad in aluminium foil, 40 mm, ≥ 40 kg/m ³ , > 1000°C melting point. | 9 Round head chipboard screw 4 x 45 mm*). | 20 Mortar anchor or concrete screws. |
| 4 Frame made of 35 mm Promatect® LS fire protection boards for connecting the cladding (5) to the ventilation duct (2). To do so, glue (4) and (5) with Promat® K84 adhesive. | 10 Round head chipboard screw 5 x 70 mm*). | 21 Drilling screw 3.9 x 25 mm. |
| 5 Cladding made of 35 mm thick Promatect® LS fire protection boards. Cladding must be produced according to the Promat® worksheet 478. | 11 Threaded rod with secured nuts | 22 Drywall screw 3.9 x 55 mm. |
| 6 100 mm wide additional cladding made from Promatect H boards, 10 mm thick. Bond to (5) with Promat® | 12 Bracket*) with screws (21)* for connecting (4) and (5)
Number of brackets per B-side:
2 x 1 piece if B ≥ 250 mm;
2 x 2 pieces, if B ≥ 500 mm. | 23 Attach angular steel frame $\geq 30 \times 30 \times 4$ with 4.8 mm solid rivets or with screws M6 to (2). |
| | 13 Chipboard screws 4.5 x 70 mm with DIN 9021 washers. | 24 Filling attached to the ceiling, consisting of calcium silicate boards, density ≥ 500 kg/m ³ . |
| | 14 Chipboard screws 4 x 60 mm. | 25 Tapping screw 4.2 x 13 mm*). |
| | 15 FK90 support brackets for W ≥ 740 mm*). | 26 Screw connection M10. |
| | 16 Mounting brackets *). | |
| | 17 Sealing with mineral wool (3). It should be compressed to around 16 mm. | |

*) Included as an accessories kit with delivery of the FK90 fire dampers with mounting frame AR2.

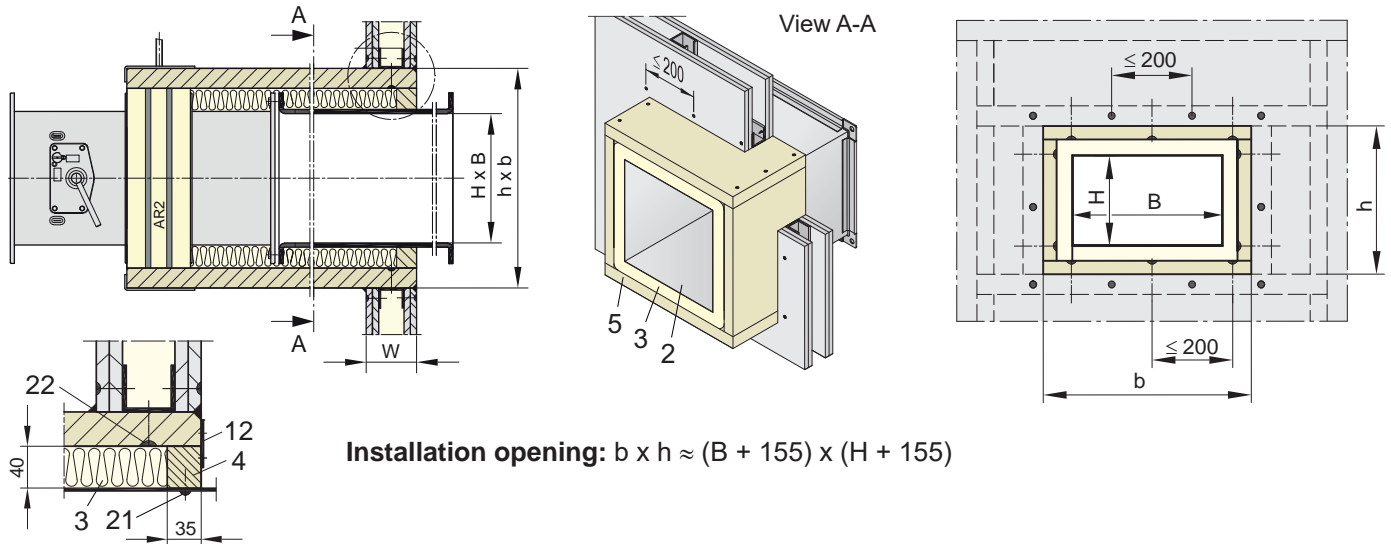
Screws, mortar anchors and rivets should in general be installed at ≤ 200 mm centres. Dimensions should be synchronised on site. Connection joints should be sealed in a suitable manner.

FK90 fire dampers

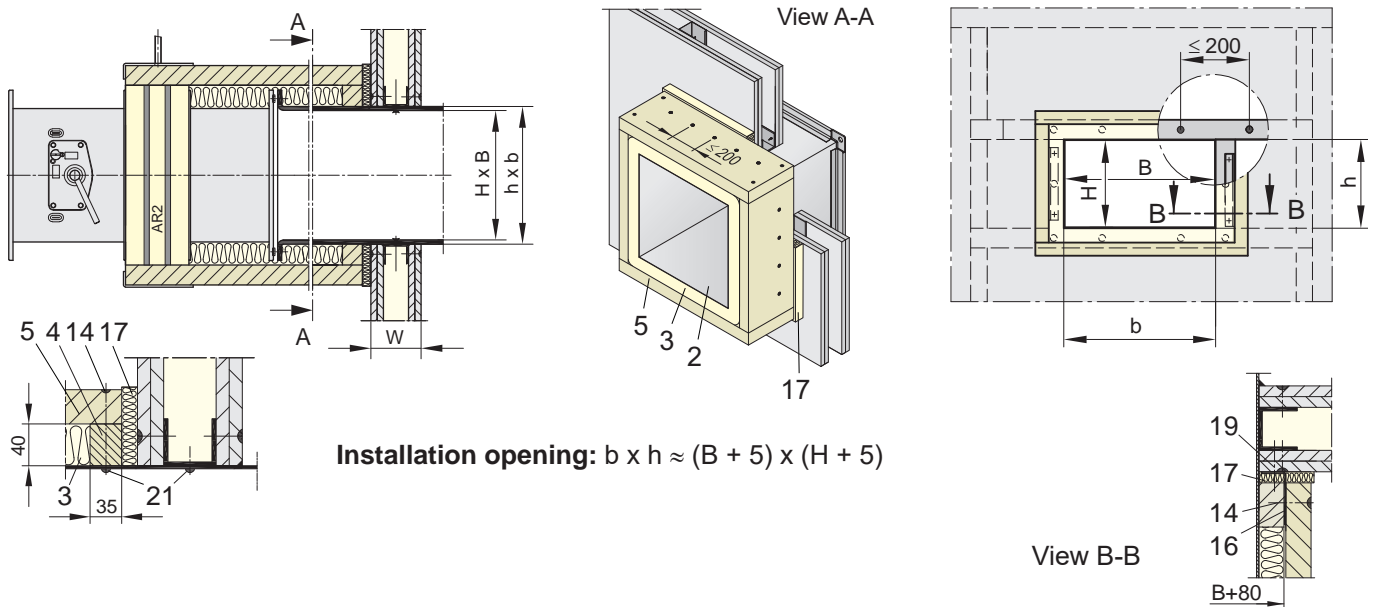
Installation remote from (3) metal stud walls - Heights H up to 800 mm -

Metal stud walls must be clad with at least 2 layers of 12.5 mm DF gypsum boards according to EN 520, and can be filled with or without mineral wool. The installation openings $b \times h$ feature circumferential frames consisting of wall profiles, which should be connected to the wall stud profiles (CW profiles). → See page 19 for details

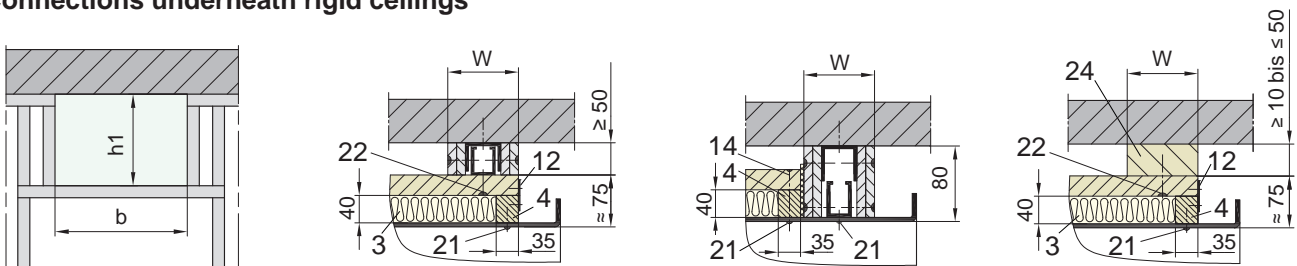
Route ventilation duct with cladding through metal stud walls



Attach ventilation duct with cladding to metal stud walls



Connections underneath rigid ceilings



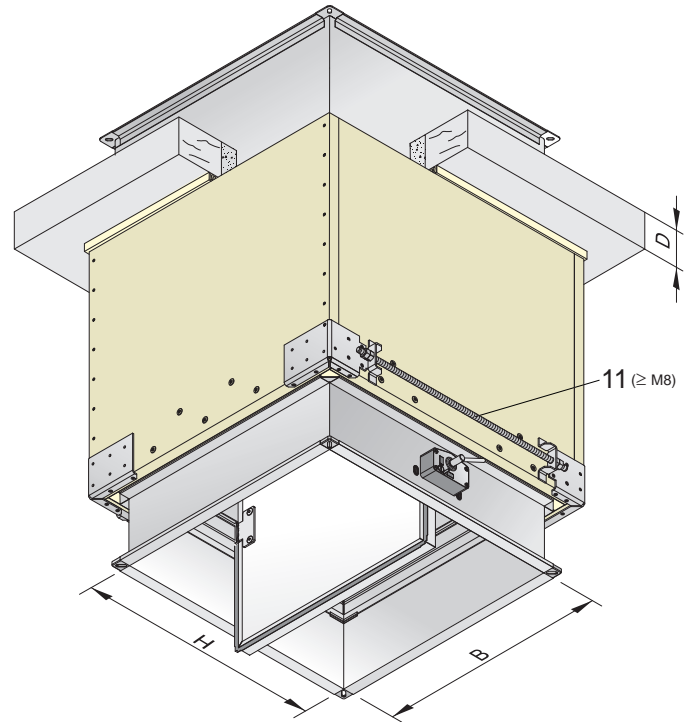
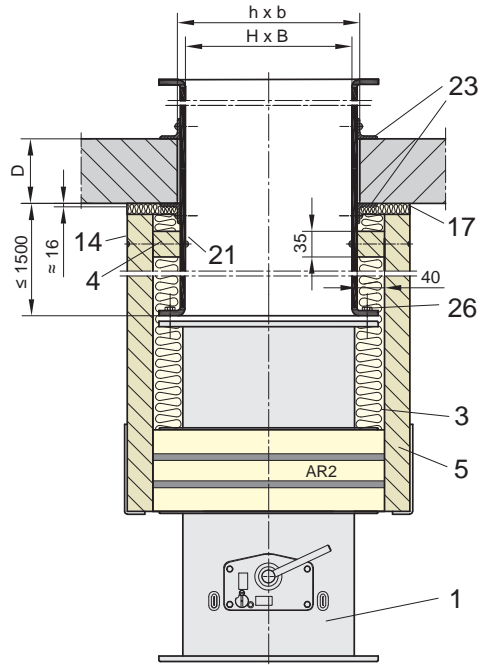
Parts list → see page 41

Installation opening: $b \times h_1 \approx (B + 155) \times (H + 155 + \text{ceiling spacing})$

FK90 fire dampers

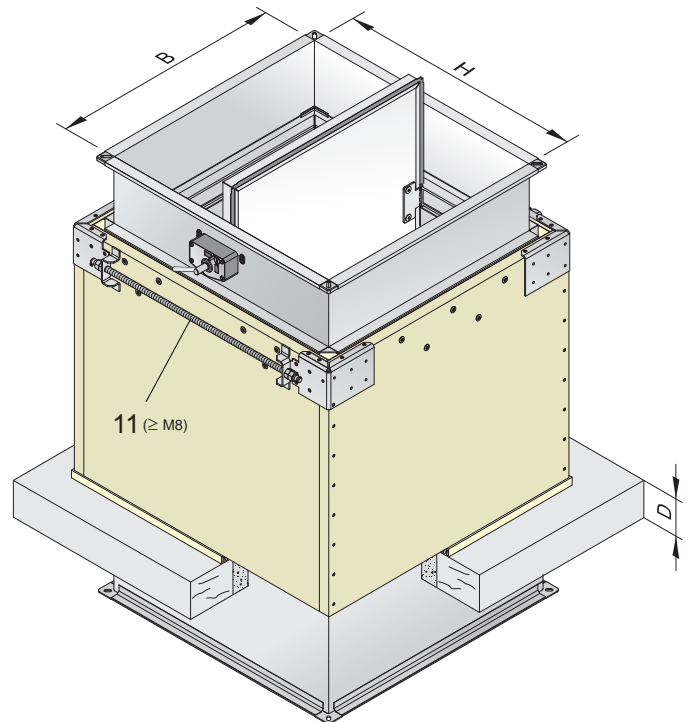
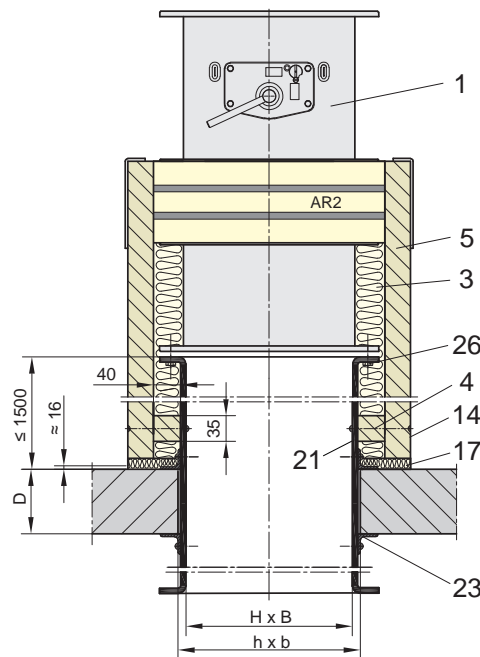
Installation remote from (4) rigid ceilings - Heights H up to 800 mm -

FK90 fire damper below the ceiling



Installation opening: $b \times h \approx (B + 5) \times (H + 5)$

FK90 fire damper above the ceiling



Installation opening: $b \times h \approx (B + 5) \times (H + 5)$

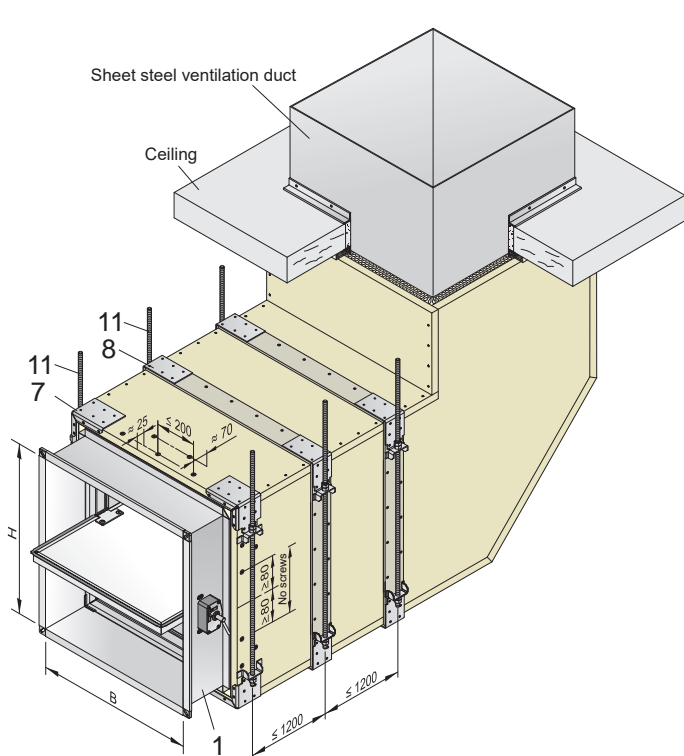
Alternative installation of the ventilation duct (2) with angular steel frame (23) in rigid ceilings ⇒ see page 41

Parts list ⇒ see page 41

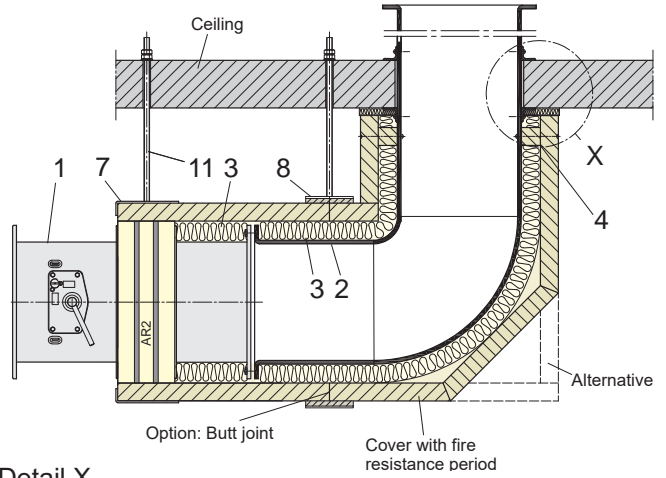
FK90 fire dampers

Installation remote from (5) rigid ceilings - Heights H up to 800 mm -

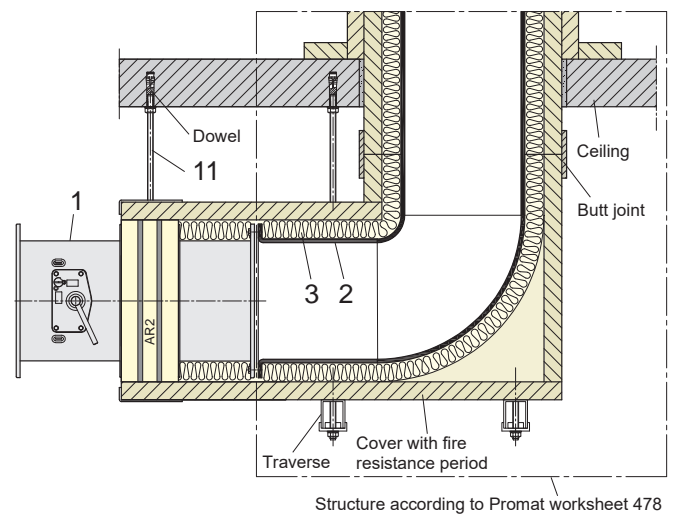
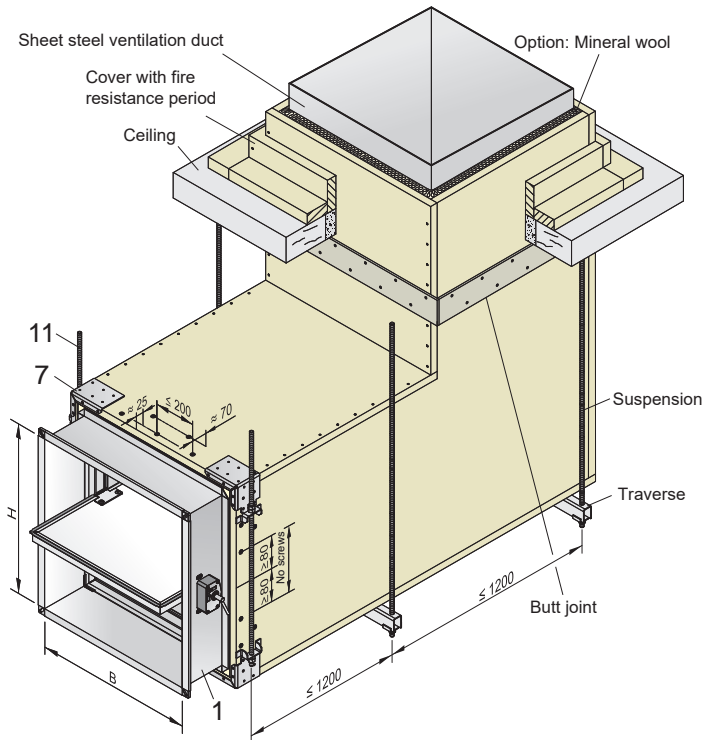
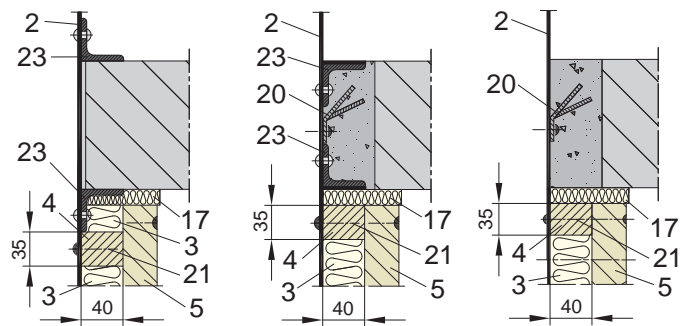
FK90 fire damper suspended horizontally underneath a rigid ceiling



Installing FK90 fire dampers with mounting frame AR2
 ⇒ see pages 40 to 42



Detail X
 Ceiling connections



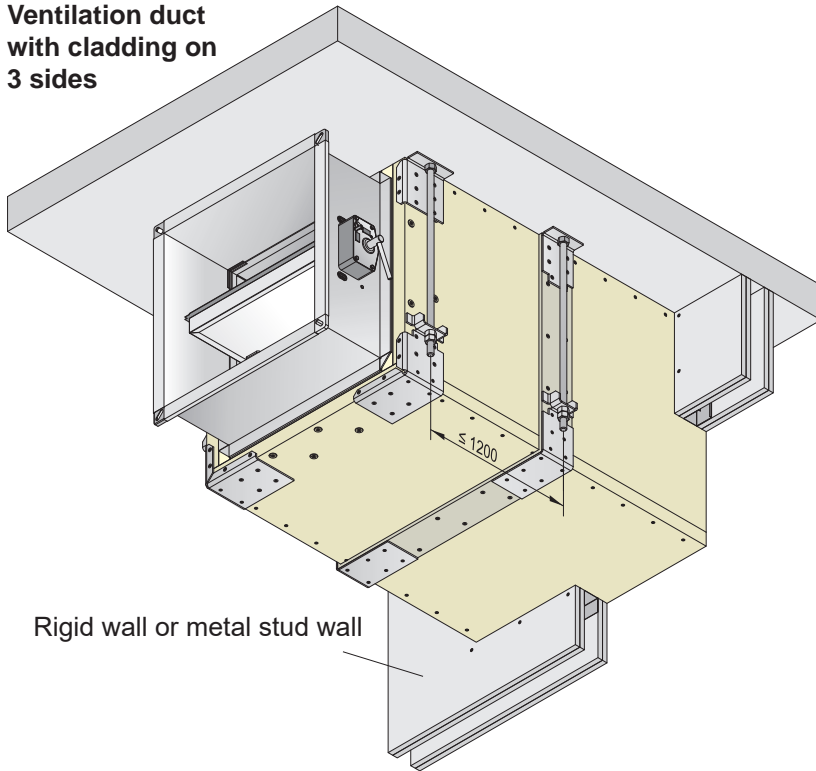
Ventilation ducts, claddings, suspensions, fastenings, and penetrations through ceilings can also be designed in accordance with the manufacturer's specifications; for example, the Promat® worksheet 478.

Parts list ⇒ see page 41

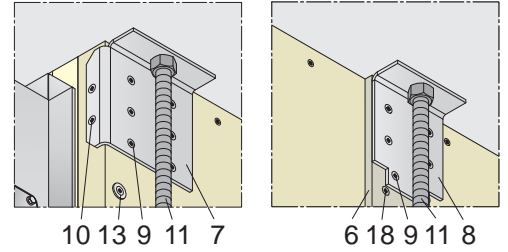
FK90 fire dampers

Installation remote from (6a) walls under rigid ceilings - Heights H up to 800 mm -

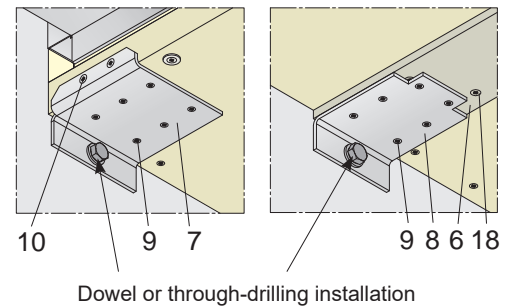
Ventilation duct with cladding on 3 sides



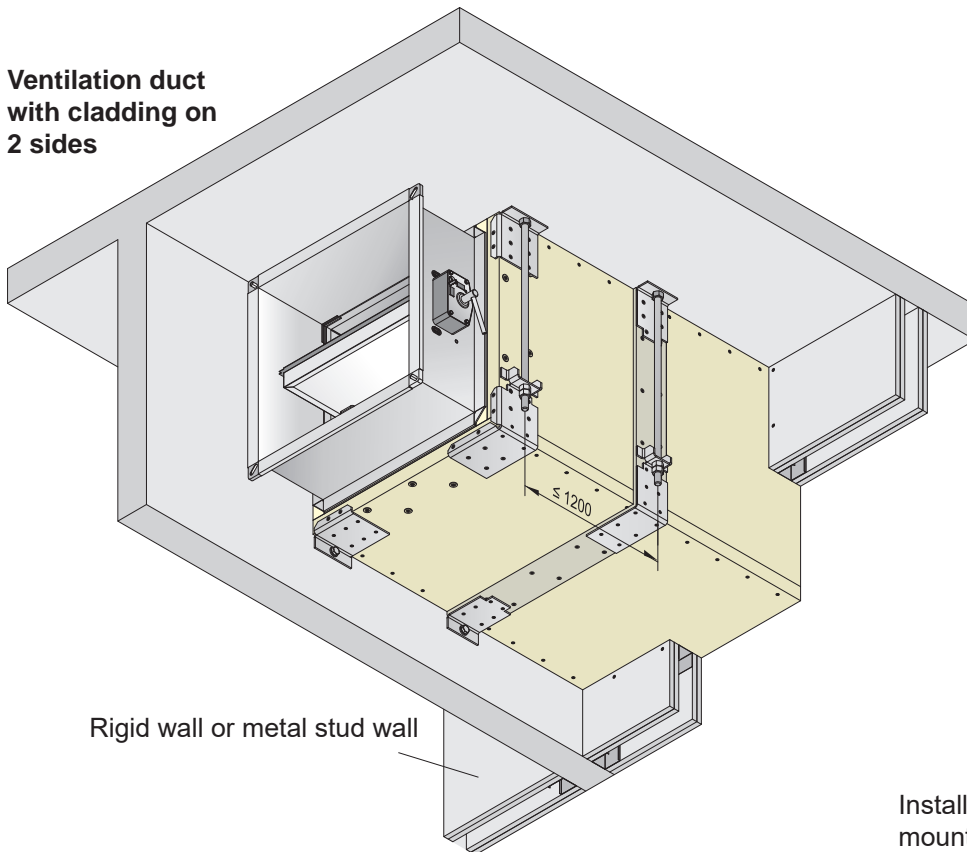
Suspension from rigid ceilings



Fastening to rigid walls



Ventilation duct with cladding on 2 sides



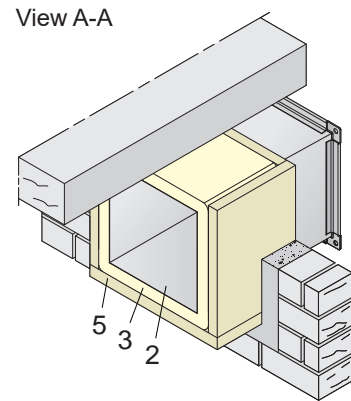
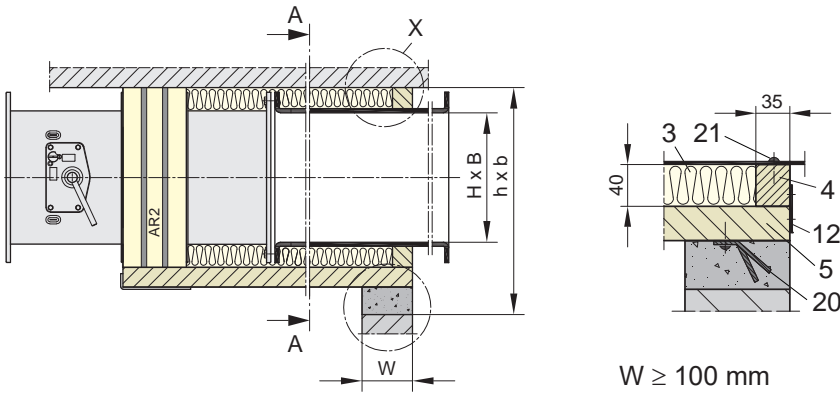
Installing FK90 fire dampers with mounting frame AR2 ⇒ see pages 40 to 42

Parts list ⇒ see page 41

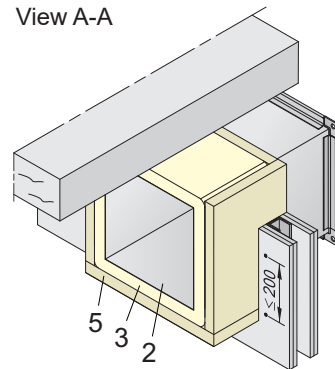
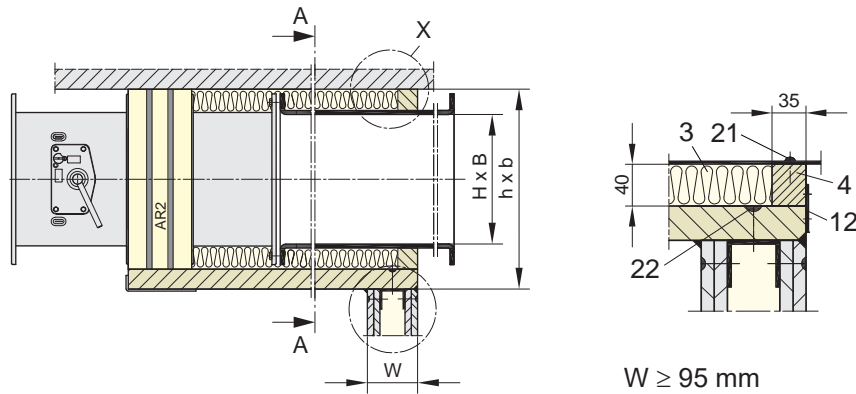
FK90 fire dampers

Installation remote from (6b) walls under rigid ceilings - Heights H up to 800 mm -

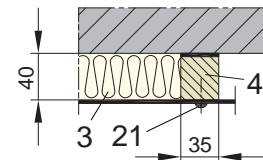
Route ventilation duct with cladding through rigid walls



Route ventilation duct with cladding through metal stud walls

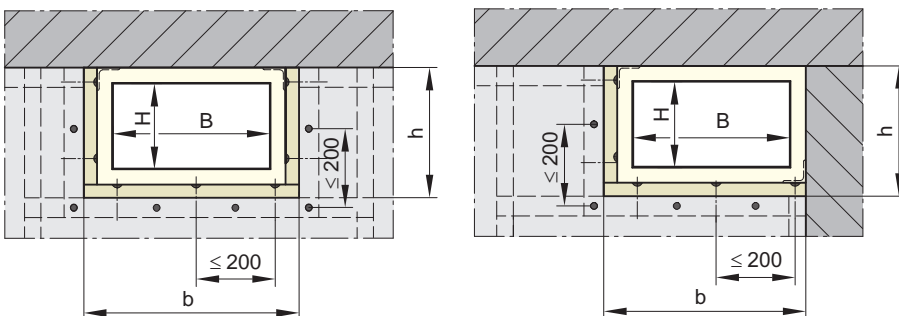


Detail X



The metal stud walls must be fitted with cladding of at least 2 layers, with 12.5 mm DF gypsum boards according to EN 520. They can be filled with or without mineral wool. The installation openings $b \times h$ feature circumferential frames consisting of wall profiles, which should be connected to the wall stud profiles (CW profiles). → See page 20 for details

Connections underneath rigid ceilings (floors) and to a rigid wall

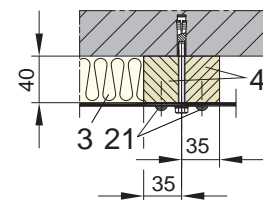


Installation opening:
 $b \times h \approx (B + 155) \times (H + 118)$

Installation opening:
 $b \times h \approx (B + 118) \times (H + 118)$

Alternative ceiling fastening

From a width B of $> 500 \text{ mm}$, supports must be installed in the ventilation duct according to DIN 4102-4. Freedom of damper blade movement must be ensured. → see page 9



Parts list → see page 41

FK90 fire dampers

Installation/functional test and servicing/maintenance-free

Installation

- FK90 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).

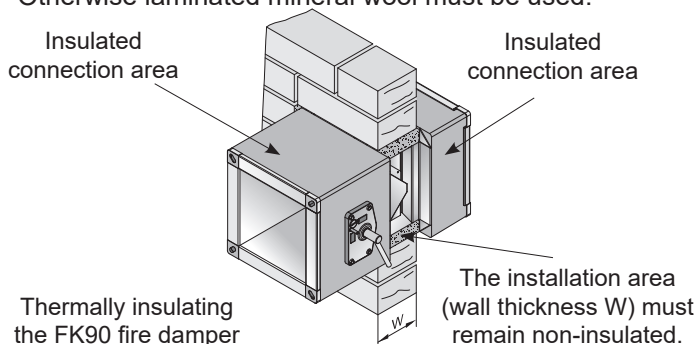
- FK90 fire dampers may be connected to ventilation ducts made from non-combustible and combustible materials, as well as to flexible connectors.

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.

- 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.

• FK90 fire dampers

- Do not need spacing to separate them from combustible materials.
- Are suitable for all installation positions.
- May be installed "flange-to-flange", even in metal stud walls.
- May be installed in air transfer applications with smoke detectors. ⇒ User manual 5.11
- **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 FK90 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 FK90 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

- FK90 fire dampers, series FK92, 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 FK90 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 FK90 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 FK90 fire dampers and are fully adequate.

FK90 fire dampers are largely insensitive to dust and dirt.

The **operating instructions** for FK90 fire dampers are available to download online at www.wildeboer.eu.

FK90 fire dampers

Order data (1) for FK90 fire dampers (series FK92)

Size

B [mm] x H [mm] x L [mm]
 ⇒ see pages 3 and 7

Installation subframe / mounting frame ¹⁾

Option for L = 400 mm and L = 500 mm:

- ER1 for metal stud walls
- ER8 for wooden walls and ceilings and for ceilings with steel frames
- AR2 for remote from walls and ceilings

Option for L = 500 mm:

- ER4 for sliding ceiling connection

Stud profile depths: 50/60/75/85/100/125

Operation unit: left/right/bottom

Always required for L = 355 mm:

- ER2 for rigid walls and ceilings
- ER3 for metal stud walls

Special construction type for L = 346 mm:

- AR1 for mounting on rigid walls and ceilings.

Option: **Damper blade with**

- Metal frame made from 1.4301 stainless steel
- Galvanized metal cover
- Metal frame and metal cover made of 1.4301 stainless steel

Metal frames/metal covers made from 1.4301 stainless steel should be used with casings with epoxy resin coating.

Option: **Casing design**

- Casing with inner and outer epoxy resin coating, including installation subframes ER2 and ER3 where applicable.

⇒ see pages 3 and 6

Option: **Additional casing openings**

- 132 mm Ø with cover.
Installation position: top/bottom/top + bottom
- 90 mm Ø for installation of the OR32 (FK) smoke detector ²⁾³⁾

Option: **Nominal temperature**

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

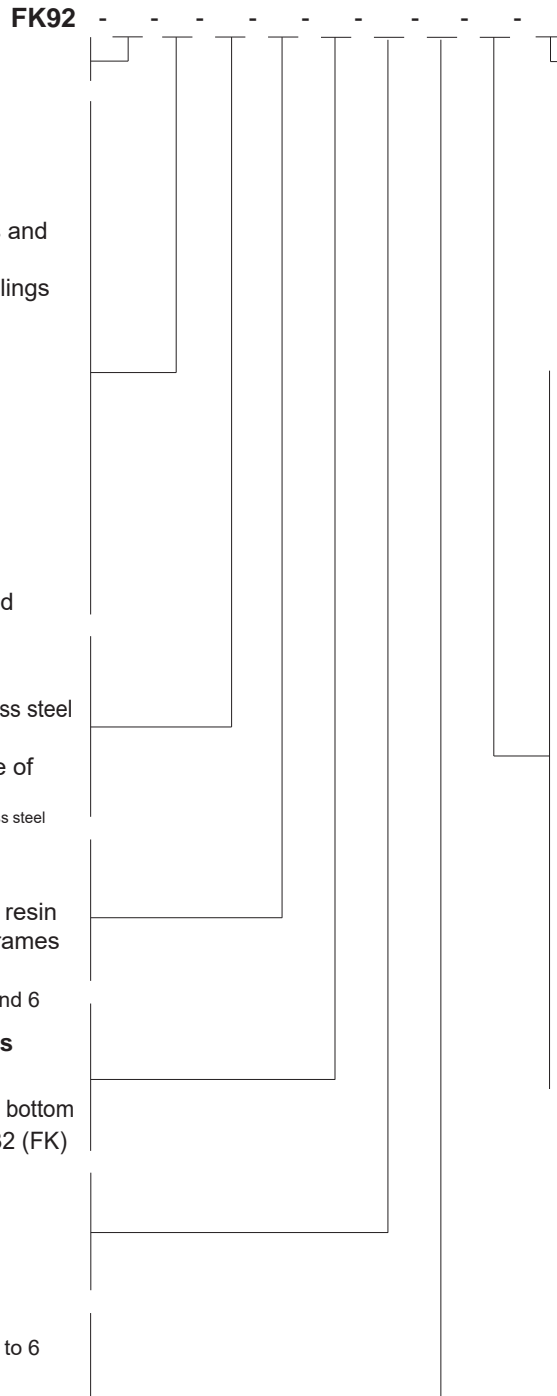
⇒ see pages 2, 4 to 6

Option: **Limit switch ⁵⁾**

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

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

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



Option:

OR32 (FK) smoke detector

- N0 (standard)
- N2 (with MC and relay module)

Inserted into the FK90 fire damper together with the smoke detector, and electrically wired.

The prerequisites are actuators M220-9/H, M24-9/H, M220-10/H, M24-10/H or M220-11/H, M24-11/H and the 90 mm casing opening with installation base.

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

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

Option: **Explosion-protected ⁵⁾**

Option: **Electric actuators ⁶⁾**

- M220-9/H } Standard
- M24-9/H }
- M220-11/H
- M24-11/H
- M220-10/H } up to max. B= 800 and
- M24-10/H } H = 450

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

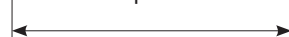
- EM-1 } Standard, 10 Nm
- RM-1 }
- EM-2 } 15 Nm

⇒ see pages 4 and 5

Standard widths B and heights H
 Intermediate dimensions are available in 5 mm increments.

200	550	1050
225	600	1100
250	650	1150
275	700	1200
300	750	1250
325	800	1300
350	850	1350
375	900	1400
400	950	1450
450	1000	1500

Heights H up to 1000 mm can be combined with widths B up to 1000 mm



Heights H up to 800 mm can be combined with widths B up to 1500 mm



¹⁾ Scope of delivery and page references ⇒ see page 49.
²⁾ Installation positions ⇒ see page 49.
³⁾ Not possible together with the ER4 installation subframe.
⁴⁾ Not for actuators EM-1, RM-1, EM-2.
⁵⁾ Only for thermal-mechanical release mechanisms.
⁶⁾ Actuators with thermal-electrical release mechanisms and limit switches.

FK90 fire dampers

Order data (2) for FK90 fire dampers (series FK92)

All installation subframes and mounting frames can be used with heights H of up to 800 mm and for fire classifications of up to 90 minutes.

Installation subframe ER1

factory-assembled or for retrofitting on site.

Delivery with the required FK90 brackets and with drywall screws 3.9 x 45 for screwing the FK90 brackets to the metal stud walls.

⇒ see pages 3, 7, 8, 23 to 25, 29 to 31

Installation subframe ER2

factory-assembled or for retrofitting on site.

⇒ see pages 3, 7, 8, 17

Installation subframe ER3

factory-assembled or for retrofitting on site.

Delivery with the required FK90 brackets and with drywall screws 3.9 x 45 for screwing the FK90 brackets to the metal stud walls.

⇒ see pages 3, 7, 8, 23, 24, 29 to 31

Installation subframe ER4

are only supplied factory-assembled.

Delivery includes screws and plugs for fastening.

⇒ see pages 3, 7, 8, 26 to 28

Installation subframe ER8

factory-assembled or for retrofitting on site.

Delivery with the required ER8 brackets, ER8 corner brackets, ER8 stop plates, drilling screws 3.9 x 25 and with drywall screws 3.9 x 45 for screwing the ER8 brackets to wooden walls and ceilings and ceilings with steel frames.

⇒ see pages 3, 4, 7, 32 to 38

Mounting frames AR1

are only supplied factory-assembled.

Delivery with the maximum required flat securing nut M10 for securing threaded rods.

Screws, threaded rods, washers, nuts and dowels must be provided by the client.

⇒ see pages 3, 7, 8, 18, 39

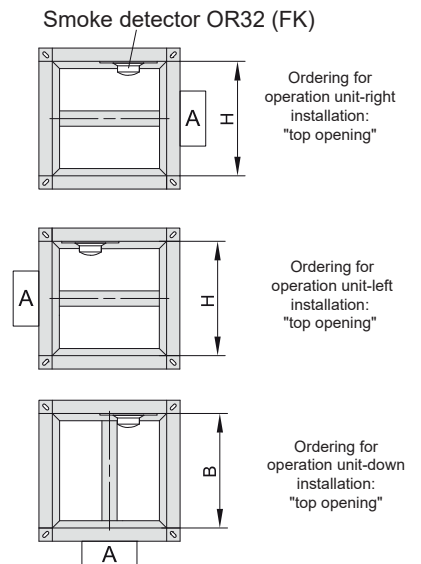
Mounting frames AR2

are only supplied factory-assembled.

Delivery with the required suspension brackets AR2, FK90 suspension brackets AW, brackets, FK90 support brackets for $B \geq 740$, mounting brackets and fastening screws.

⇒ see pages 3, 7, 8, 40 to 46

Installation positions, 90 mm casing opening

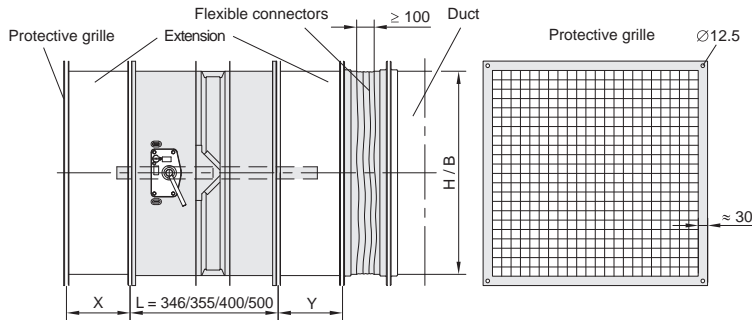


⇒ See user manual 5.11 for details

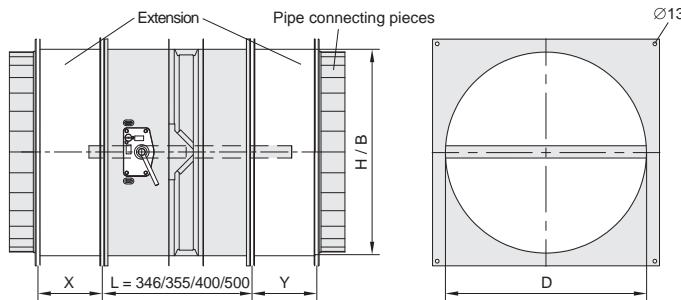
FK90 fire dampers

Accessories (1)

Flexible connectors made of PVC-coated polyester fabric, cadmium-free, at least 100 mm expansion absorption, 210 mm stretched length, with galvanized connection frame with 33 mm high V10 profile. With hygiene certificate. Building material class B1 DIN 4102. Temperature-resistant: -20°C to +70°C. Available dimensions: B up to 1500 mm x H up to 800 mm



Extensions made from galvanized steel to bridge large thicknesses in walls and ceilings, and to guarantee freedom of damper blade movement with cover grilles, connecting pieces for circular ducts and flexible connection pieces. Length 175 mm. Also available with epoxy resin coating. Available dimensions: B up to 1500 mm x H up to 800 mm

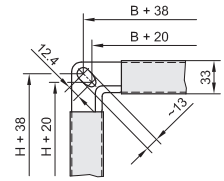


Minimum construction lengths [mm] for extensions when fitting:

H	Protective grilles					Pipe connecting pieces					Flexible connectors				
	X	Y ₄₀₀	Y ₅₀₀	Y ₃₅₅	Y ₃₄₆ ^{*)}	X	Y ₄₀₀	Y ₅₀₀	Y ₃₅₅	Y ₃₄₆ ^{*)}	X	Y ₄₀₀	Y ₅₀₀	Y ₃₅₅	Y ₃₄₆ ^{*)}
200	-	17	-	66	75	-	-	-	31	40	-	-	-	36	45
225	-	29	-	78	87	-	-	-	43	52	-	-	-	48	57
250	-	42	-	91	100	-	7	-	56	65	-	12	-	61	70
275	-	54	-	103	112	-	19	-	68	77	-	24	-	73	82
300	-	67	-	116	125	-	32	-	81	90	-	37	-	86	95
325	-	79	-	128	137	-	44	-	93	102	-	49	-	98	107
350	-	92	-	141	150	-	57	-	106	115	-	62	-	111	120
375	-	104	4	153	162	-	69	-	118	127	-	74	-	123	132
400	-	117	17	166	175	-	82	-	131	140	-	87	-	136	145
450	-	142	42	191	200	-	107	7	156	165	-	112	12	161	170
500	7	167	67	216	225	-	132	32	181	190	-	137	37	186	195
550	32	192	92	241	250	-	157	57	206	215	2	162	62	211	220
600	57	217	117	266	275	22	182	82	231	240	27	187	87	236	245
650	82	242	142	291	300	47	207	107	256	265	52	212	112	261	270
700	107	267	167	316	325	72	232	132	281	290	77	237	137	286	295
750	132	292	192	341	350	97	257	157	306	315	102	262	162	311	320
800	157	317	217	366	375	122	282	182	331	340	127	287	187	336	345
850	182	342	242	391	400	147	307	207	356	365	152	312	212	361	370
900	207	367	267	416	425	172	332	232	381	390	177	337	237	386	395
950	232	392	292	441	450	197	357	257	406	415	202	362	262	411	420
1000	257	417	317	466	475	222	382	282	431	440	227	387	287	436	445

The dimensions X, Y₄₀₀, Y₅₀₀, Y₃₅₅, Y₃₄₆ include 50 mm for freedom of damper blade movement. ⇒ see page 9
^{*)} The actual necessary Y₃₄₆ dimension may be smaller depending on the specific thickness of the wall or ceiling!

Connection frame profile on flexible connectors.

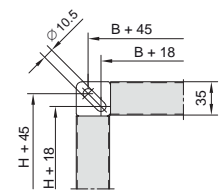


Protective grille, pressed from 1 mm thick galvanized sheet steel, 20 mm mesh size, ≈ 70% free cross-section. Available dimensions: B up to 1500 mm x H up to 800 mm

Pipe connecting pieces in galvanized steel. Available dimensions: B x H

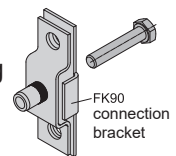
Connecting piece diameter D [mm]	B x H		
	158	200 x 200	
198	200 x 200	225 x 225	
248	250 x 250	275 x 275	
298	300 x 300	325 x 325	
313	325 x 325	350 x 350	
353	375 x 375		

Connection frame profile on extensions.



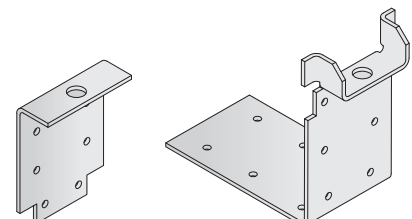
B x H are available in 5 mm increments.

FK90 - connection brackets for assembling two FK90 fire dampers. Pack of 4, including screws.



Suspension bracket AW for suspension on butt joints.

Pack of 4 pieces for corner connections, 2 pieces for mounting directly under ceilings, including screws.



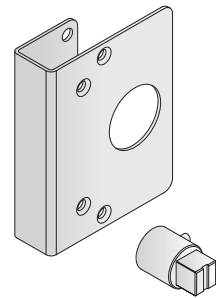
FK90 fire dampers

Accessories (2)

Additional console for actuators M220-10/H, M24-10/H, M220-11/H and M24-11/H for the horizontal actuator position, over the flange.

Pack including additional console, shaft extension and screws.

⇒ see pages 5 and 9

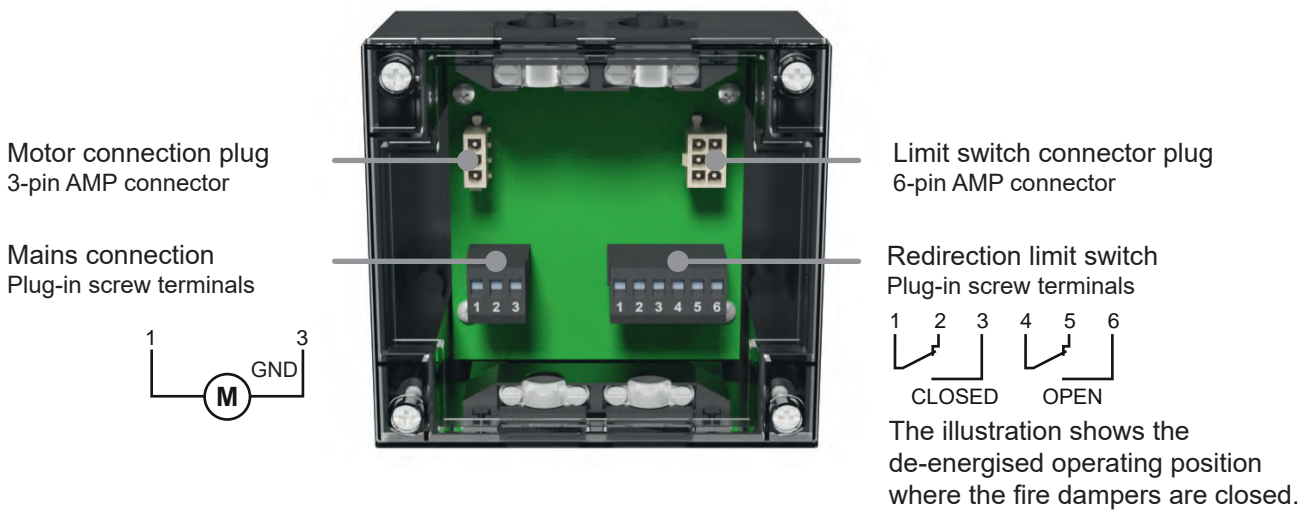


Simplified electrical connection

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 mm high, protection class II, protection rating IP40.



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

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

Communication system Wildeboer-Net

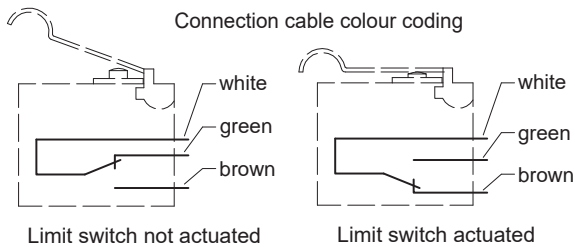
⇒ see information on the back page and User Manual 7.1

FK90 fire dampers

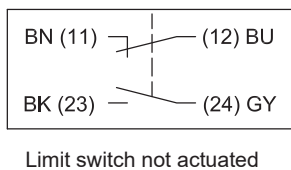
Electrical connections

Limit switches on thermal-mechanical release mechanisms

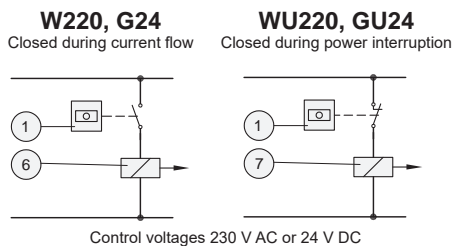
The CLOSED limit switches are actuated when the fire damper is closed, and the OPEN limit switches are actuated when the fire damper is open.



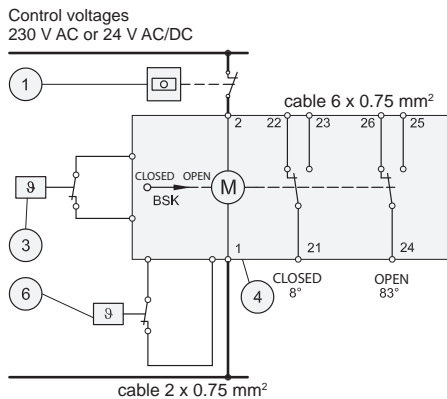
E-Ex limit switch



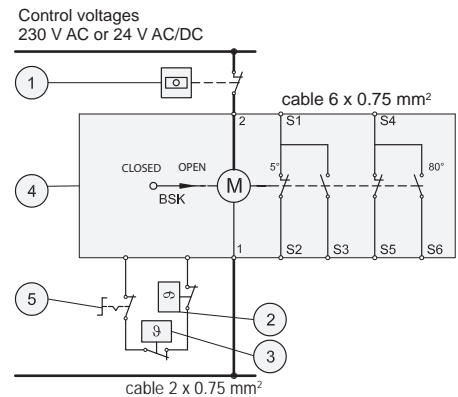
Remote release



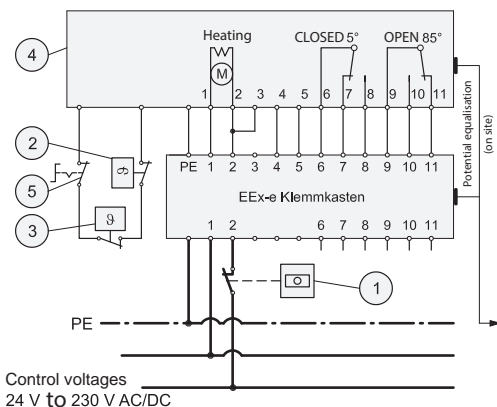
Actuators M220-9/H, M24-9/H



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



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



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

2 Thermal-electrical release element 70°C or 95°C; EM-1, EM-2 and RM-1 70°C only.

3 Thermal cut-off approx. 70°C

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.

Connection boxes for fire dampers with electric spring return actuators

**M220-9/H, M24-9/H,
M220-10/H, M24-10/H,
M220-11/H, M24-11/H**

⇒ see pages 51 and 54

FK90 fire dampers

Specification text

Maintenance-free fire dampers according to EN 15650 with up to 120-minute fire resistance period, fire classification EI 30/60/90/120 (ve - ho,i ↔ o) SC 10000. Air-tight casing, leak tightness class C according to EN 1751, made of galvanized steel with single-piece circumferential edging and pressure-joining, tapered inner beading for freedom of damper blade movement, outer beading to ensure comprehensive stability, and connection flanges. Casing with epoxy resin powder coating. Replaceable damper blade made of abrasion-proof calcium silicate, with folded, wear-resistant elastomer lip seals on a profile frame made of galvanized steel/stainless steel and full cover made of galvanized steel/stainless steel. Fully enclosed, maintenance-free drive mechanism in the area of the casing walls, with self-locking slider crank for break-proof torque transmission. Sealed drive axles made of stainless steel, with red metal bearings. Suitable for installation without minimum spacings and with horizontal or vertical damper blade axles in, on and remote from rigid walls and ceilings, in and remote from metal stud walls and in shaft walls with and without metal studs, in solid timber and timber frame construction walls and ceilings, in ceilings with steel frame, with hard-to-access installation openings or for flange-to-flange installation, also with mineral wool. 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
 - With remote release via magnetic clamp 230 V AC or 24 V DC / lifting solenoid 230 V AC or 24 V DC / 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 ER1 for installation in metal stud walls and shaft walls with and without metal studs
 - Installation subframe ER4 for sliding ceiling connections in metal stud walls
 - Installation subframe ER2 as short version for installation in rigid walls and ceilings
 - Installation subframe ER3 as short version for installation in metal stud walls and shaft walls with and without metal studs
 - Installation subframe ER8 for installation in wooden walls and ceilings and in ceilings with steel frames
 - Mounting frame AR1 for mounting onto rigid walls and ceilings
 - Mounting frame AR2 for installation remote from rigid walls and ceilings and metal stud walls

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 VDI 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.

..... pc	Width:	.....	mm	
	Height:	.....	mm	
	Length:	400, 500, 355, 346	mm	
	Volume flow:	.....	m ³ /h	
	Pressure drop:	.....	Pa	
	Sound power level:	.....	dB (A)	
	Manufacturer:	WILDEBOER		
	Type/series:	FK90/FK92		
				deliver:
				install:

Select texts not highlighted in bold as required!

FK90 fire dampers

Specification text: Accessories

Casing extensions for fire dampers for bridging larger wall thicknesses or for producing freedom of damper blade movement with protective grilles, connecting pieces for circular ducts and flexible connection pieces. Made from galvanized steel with epoxy resin powder coating 175 mm in length.

```
..... pc      Width:           .....    mm
               Height:          .....    mm
               Manufacturer:    WILDEBOER
                                   deliver: .....
                                   install:  .....
```

Circular pipe connecting pieces for fire dampers for connecting round ducts to the angular casing cross-section. Made from galvanized steel.

```
..... pc      Width:           .....    mm
               Height:          .....    mm
               Tube Ø:          .....    mm
               Manufacturer:    WILDEBOER
                                   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 steel.

```
..... pc      Width:           .....    mm
               Height:          .....    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 1946-4, DIN EN 13779, ÖNorm H 6021, ÖNorm H 6020, SWKI VA 104-01, SWKI VA 105-01.

```
..... pc      Width:           .....    mm
               Height:          .....    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:  .....
```

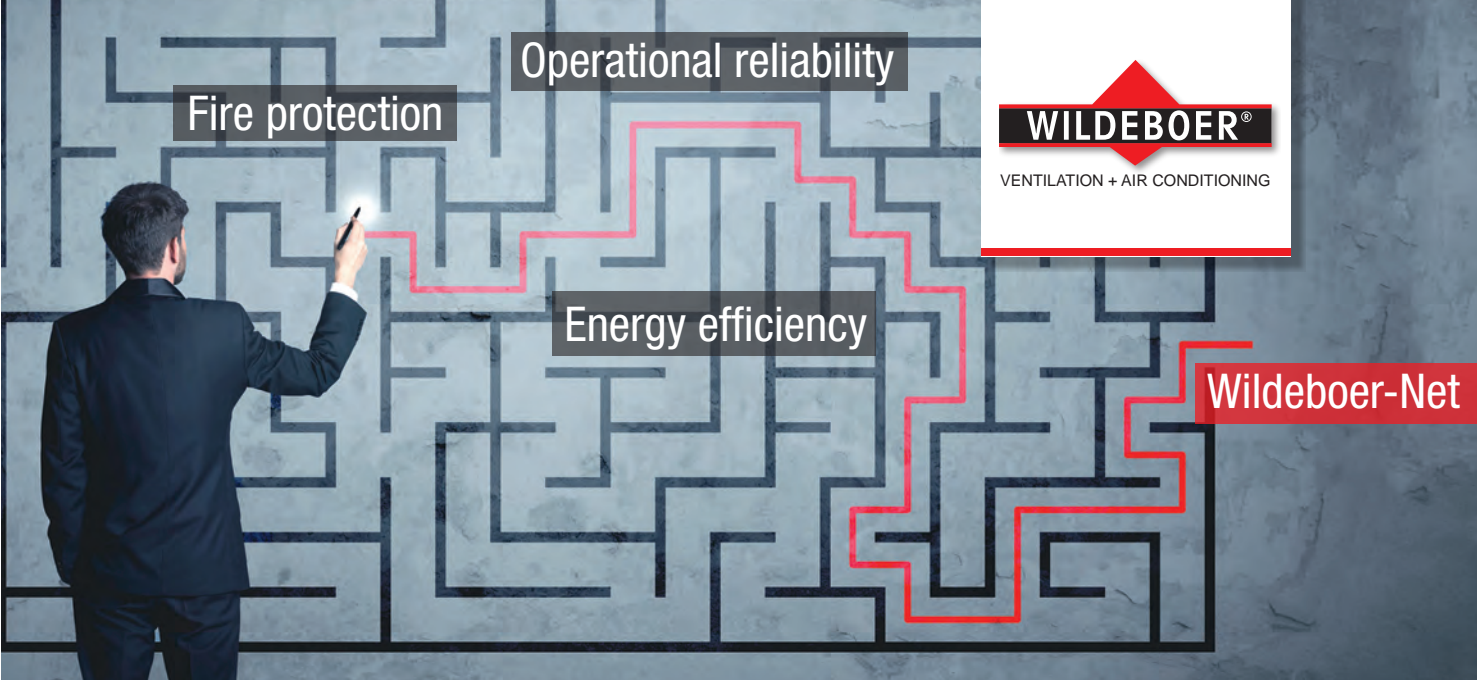
Select texts not highlighted in bold as required!

FK90 fire dampers

Contents

	Page
Features and characteristics	2
Description	3
Release mechanisms and actuators	4, 5
Powder coating/hygiene/installation positions	6
Installation subframe/insertion design/mounting design	7
Data sheet	8, 9
Dimensioning	10, 11, 12, 13, 14, 15
Free cross-sections	15
Weights	15

	Heights H up to [mm]	Fire resistance period in minutes	
Installation in rigid walls and ceilings			
(1) without installation subframe	1000	120	16
(2) with partial mortaring/flange-to-flange/with installation subframe	800	90	17
Mounting onto rigid walls and ceilings	800	90	18
Installation in metal stud walls			
(1a) General information	1000	120	19
(1b) Metal framework	1000	120	20
(2) Installation with mortar	1000 / 800	120 / 90	21
(3) Installation with fillings	800	90	22
(4a + b) Installation with installation subframe	800	90	23, 24
(4c) Special installation	800	90	25
(5a + b) Sliding ceiling connection	800	90	26, 27
(5c) Sliding ceiling connection in double-studded walls	800	90	28
Fire walls and safety partition walls	800	90	29
Installation in shaft walls with and without metal studs	800	90	30, 31
Installation in wooden walls and ceilings			
(1) General information	800	90	32
(2a + 2b) Installation in solid timber construction walls and ceilings	800	90	33, 34
(3a + 3b) Installation in timber frame construction walls and ceilings	800	90	35, 36
Installation in ceilings with steel frames	800	90	37, 38
Base - installation on rigid ceilings	800	90	39
Installation remote from			
(1) Walls and ceilings	800	90	40
(2) Rigid walls and ceilings	800	90	41
(3) Metal stud walls	800	90	42
(4 + 5) Rigid ceilings	800	90	43, 44
(6a + 6b) Walls under rigid ceilings	800	90	45, 46
Installation/functional test and servicing / maintenance-free			47
Ordering data for FK90 fire dampers (series FK92)			48, 49
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Installation with smoke detectors in air transfer applications in walls and ceilings ⇒ see user manual 5.11			



Wildeboer-Net

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 communication system Wildeboer-Net. 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, volume flow and pressure controllers to be designed, built and connected in parent hierarchy without any measuring and control know-how.



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.de/youtube



Communication system Wildeboer-Net

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

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