



FIRE PROTECTION AND SMOKE EXTRACTION

FR90

Fire damper



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1 Product overview

The round FR90 fire dampers of the FR92 series meet the requirements of the European product standard EN 15650, and are tested according to EN 1366-2. FR90 fire dampers are connected to ventilation ducts in separating elements or installed in air transfer applications, and thus separate fire compartments from each other in the event of a fire. FR90 fire dampers have a large free cross section and thus facilitate high flow rates with minimum pressure drops and a low sound power level. The casing of the fire damper is airtight and is made of galvanized steel, combined with a hard-wearing calcium silicate damper blade. The enclosed release element triggers the mechanism at a nominal temperature of 70 °C or 95 °C. The operation units can be actuated manually, pneumatically or electrically, and are also available in an explosion-protected design.

With a protective grille on both sides in conjunction with an OR4/OR32 smoke detector, the FR90 fire damper can also be used to seal air transfer applications (Ü-FR).

For more details on Ü-FR air transfer applications and OR4/OR32 smoke detectors, see:

- ▶ 5.14 OR4 smoke detector user manual
- ▶ 5.11 OR32 smoke detector user manual



- Nominal sizes: DN100 ... DN800
- Length: 320 mm, 340 mm (depending on the nominal size)
- Declaration of performance: DoP No. CPR/FR90/003
- Reaction to fire certificate: MPA-BS 6000/593/18
- Environmental product declaration: EPD-WIL-20240382-ICC1-DE
- Hygiene certificate: Issued by the Ruhr District Institute of Hygiene
- General type approval for air transfer applications: Z-6.50-2133
- Max. flow rate: 27143 m³/h
- Inflow velocity: 0 ... 15 m/s
- Power supply to the actuators: 24 V AC/DC | 230 V AC
- With all-round enclosed thermal release element: 70 °C (also with corrosion protection), 95 °C
- Approved for use in explosive atmospheres (in accordance with Directive 2014/34/EU)
- With thermal-mechanical release mechanism or electric actuators, also explosion-protected
- Maintenance-free: The operation unit, release mechanism and release element are fully enclosed, meaning that no cleaning, regular lubrication or adjustment is needed to maintain function. Simple functional check by opening/closing, also remote-controlled (▶ [page 74](#))
- Installation position rotatable 360°
- Options:
 - With powder coating for increased corrosion protection

Classification:

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

EI 30/60/90/120 30/60/90/120 minutes fire resistance period (depending on the installation scenario)

v_e Vertical alignment – designed for installation in walls

h_o Horizontal alignment – designed for installation in ceilings

i ↔ o Fire exposure – verified on both sides

S Smoke leakage

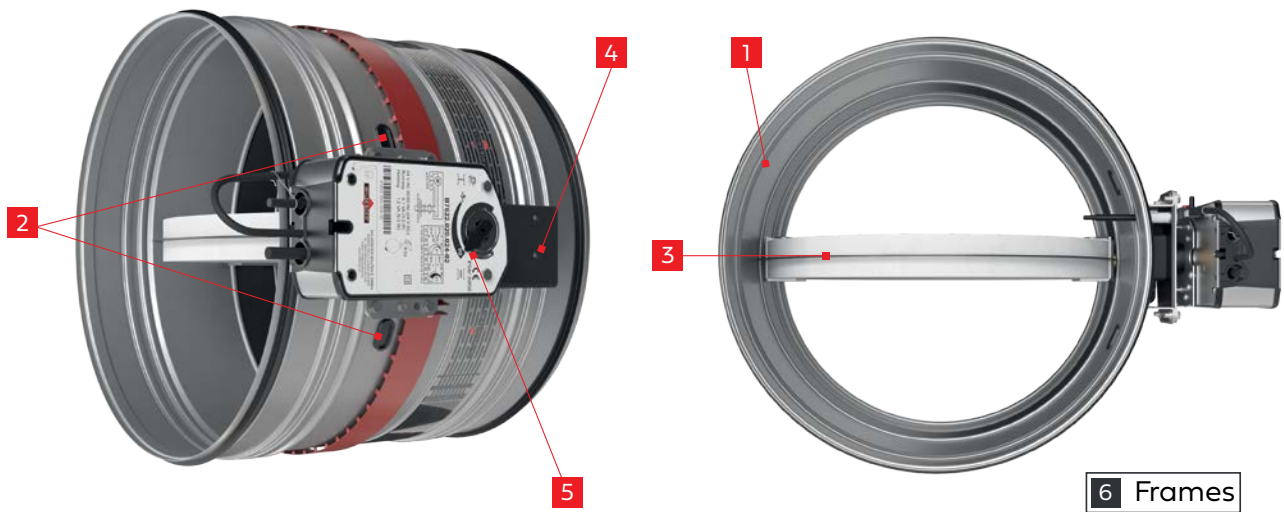
C₁₀₀₀₀ Operational safety – the test is performed with 10000 cycles (opening and closing)

Further information ▶ [page 8](#).

Product features

FR90 fire damper

2 Product features



Dimensions

Lengths (L): 320 mm, 340 mm (depending on the nominal size)

Nominal sizes (DN): 100, 125, 140, 160, 180, 200, 224, 250, 280, 315, 355, 400, 450, 500, 560, 630, 710, 800

1 Casing

Single-piece airtight and smoke-tight sheet steel casing, galvanized, with welded longitudinal seam and extremely stable. Leak tightness class C according to EN 1751. With lip seal on both sides on the plug-in connection for spiral ducts, flexible pipes and the same type of pipelines for ventilation and air conditioning systems. Optional version with epoxy resin powder coating.

2 Control openings/inspection openings

Make it possible to view the damper blade from both sides.

3 Damper blade

Replaceable, break-resistant damper blade made of temperature-resistant, abrasion-proof calcium silicate with wear-resistant elastomeric gasket for airtight seal. Leak tightness 3 according to EN 1751. Optional version with metal cover made of galvanized steel (only for DN 100, 125, 160, 200, 250, 315, 355 and 400) or stainless steel 1.4301 (not replaceable).

4 Operation unit, enclosed

Fully enclosed drive mechanism with self-locking gear unit, sealed drive axles made of stainless steel and gunmetal bearings.

5 Release mechanisms and actuators

Thermal-mechanical release mechanism (TMA) for manual single-handed operation



- Protection rating IP54 (fully enclosed)

Release element (standard 70 °C)

Optional:

- Coated 95 °C
- Coated 70 °C

Limit switch (standard without)

Optional:

- E-AUF with limit switch OPEN
- E-ZU with limit switch CLOSED

Details on thermal-mechanical release mechanism ► [page 9](#).

Product features

FR90 fire damper



Option:
TMA with explosion-protected design

Optional with: **Limit switch with explosion protection**

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

One individual or two explosion-protected limit switches can be attached for the position indicators OPEN and/or CLOSED.



Option:
TMA with remote release in accordance with the **open circuit principle**

- **G24** with lifting solenoid 24 V DC, 3.5 W; 100 % ED; IP42
- **W220** with lifting solenoid 230 V AC, 5.5 VA; 100 % ED; IP42
- **P** with lift cylinder 4 ... 8 bar
- **P2** with lift cylinder 1.2 ... 8 bar



Option:
TMA with remote release in accordance with the **closed circuit principle**

- **GU24** with magnetic clamp 24 V DC, 1.6 W; 100 % ED; IP42
- **WU220** with magnetic clamp 230 V AC, 4 VA; 100 % ED; IP42

Electric spring return actuators (shown as drive units including bracket for mounting)



M220-9/H and M24-9/H
(Standard from DN 355)

- 230 V AC, 9.2 VA; $I_{\max \leq 2 \text{ ms}} = 0.27$ A or 24 V AC/DC, 6.1 VA; $I_{\max \leq 2 \text{ ms}} = 3.5$ A
- Torque 8 Nm
- Protection rating IP54
- Runtime: Opening ≈ 60 s, closing ≈ 21 s
- CLOSED/OPEN position indicators via limit switches for 5 A at ≤ 240 V AC
- Halogen-free connection cable 0.9 m in length, 2 x 0.75 mm² and 6 x 0.75 mm²
- The AMP connector plugs are detachable
- 70 °C release element (standard)

Optional:

- 95 °C release element



M220-11/H and M24-11/H
(Special actuator for all sizes)

- 230 V AC, 5 W; 10 VA; $I_{\max \leq 5 \text{ ms}} = 4$ A or 24 V AC/DC, 4 W; 6 VA; $I_{\max \leq 5 \text{ ms}} = 8.3$ A
- Torque 9 Nm
- Protection rating IP54
- Runtime: Opening ≈ 60 s, closing ≈ 20 s
- Halogen-free connection cable 1 m in length, 2 x 0.75 mm² and 6 x 0.75 mm²
- The AMP connector plugs are detachable
- 70 °C release element (standard)

Optional:

- 95 °C release element



M220-10/F and M24-10/F
(Standard up to DN 315)

Only for sizes DN ≤ 315 mm

- 230 V AC, 6.5 VA; 3.5 W; $I_{\max \leq 5 \text{ ms}} = 4$ A or 24 V AC/DC, 4 VA; 2.5 W; $I_{\max \leq 5 \text{ ms}} = 8.3$ A
- Torque 4 Nm
- Protection rating IP54
- Runtime: Opening ≈ 60 s, closing ≈ 20 s
- OPEN/CLOSED position indicators via limit switches for 0.5 A at ≤ 250 V AC or for 1 mA up to 3 A at 5 up to 250 V DC
- Halogen-free connection cable 1 m in length, 2 x 0.75 mm² and 6 x 0.75 mm²
- The AMP connector plugs are detachable
- 70 °C release element (standard)

Optional:

- 95 °C release element



Explosion-protected design:
EM-1/RM-1 (standard)/ EM-2

- 24 to 240 V AC/DC, 20 W (incl. heater); $I_{\text{Nom}} \approx 0.7$ A $I_{\max \leq 1 \text{ ms}} \approx 2.5$ A
- Torque 10 Nm (EM-1/RM-1), 15 Nm (EM-2)
- Protection rating IP66
- Runtime: Opening ≈ 30 s, closing ≈ 10 s
- CLOSED/OPEN position indicators via limit switches for ≤ 3 A at ≤ 24 V AC and ≤ 0.25 A at 250 V DC, at least 5 V, 10 mA
- Halogen-free connection cable 12 x 0.5 mm². The cable must be wired in the terminal box. All of the contained voltages must be the same
- 70 °C release element
- Terminal box

Further information on electric spring return actuators ► [page 9](#).

Wiring of the electric spring return actuators ► [page 80](#).

Details on use of the explosion-protected versions ► [page 10](#).

Product features

FR90 fire damper

6 Frames



RR

Circular installation subframe (RR100, RR150) for simplified installation in round installation openings in rigid walls and ceilings or metal stud walls with cladding on both sides.

- Delivery factory-assembled or for retrofitting on site
- Scope of delivery: required FR90 brackets, FR90 corner brackets and screws M6 x 20 and drywall screws 3.9 x 55 for screwing the FR90 brackets to metal stud walls
- To be provided by the user: M6 screws and metal anchors for screwing the FR90 brackets and FR90 corner brackets to rigid walls or ceilings (see "Installation" for further details)
- Up to DN 315 only

Dimensions ► [page 75](#)

Installation ► [page 24 ff.](#) and [page 41 ff.](#)



RE

Rectangular installation subframe (RE100, RE150) for simplified and even multiple installation in rigid walls and ceilings and in metal stud walls with cladding on both sides.

- Delivery factory-assembled or for retrofitting on site
- Scope of delivery: required FR90 brackets, FR90 corner brackets and screws M6 x 20 and drywall screws 3.9 x 55 for screwing the FR90 brackets to metal stud walls
- To be provided by the user: M6 screws and metal anchors for screwing the FR90 brackets and FR90 corner brackets to rigid walls or ceilings (see "Installation" for further details)

Dimensions ► [page 75](#)

Installation ► [page 24 ff.](#) and [page 38 ff.](#)



RH

Rectangular installation subframe for dry installation in wooden walls and wooden ceilings (RH100, RH150) and for installation in ceilings with steel frames (RH150).

- Delivery factory-assembled or for retrofitting on site
- Scope of delivery: required FR90 brackets, RH corner brackets, RH brackets, drywall screws 3.5x55, hexagon screws M6x20 and drywall screws 3.9x55 mm for screwing the RH brackets to walls and ceilings made of wood, and to ceilings with steel frame (RH150 only)
- To be provided by the user: Promaseal® Mastic fireproof sealant (further details ► [page 13](#))

Dimensions ► [page 75](#)

Installation ► [page 52 ff.](#)



RV

Rectangular **mounting frame** including connecting frame (1 pc.) for installation remote from rigid walls and ceilings and remote from metal stud walls with ventilation ducts with 4-sided cladding.

- Delivery factory-assembled or for retrofitting on site
- Scope of delivery: FR90 corner bracket, RV washers, chipboard screws and connecting frame
- To be provided by the user: Threaded rods, nuts and metal anchors (see "Installation" for further details)

Dimensions ► [page 75](#)

Installation ► [page 65 ff.](#)

Product features

FR90 fire damper



ER6

Rectangular installation subframe for sliding ceiling connection with a drop of up to 40 mm in metal stud walls with cladding on both sides.

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

- Factory-mounted
- Scope of delivery: Screws and plugs for fastening

Dimensions ► [page 75](#)

Installation ► [page 44 ff.](#)



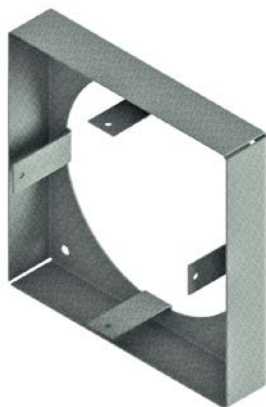
AE

Rectangular mounting frame for mounting on rigid walls and ceilings and on walls with cladding on one side (shaft walls) and with and without metal studs.

- Delivery factory-assembled or for retrofitting on site
- Scope of delivery: maximum required washers Ø 60 x 6.5 x 2 mm and AE washers
- To be provided by the user: M6 threaded rods, nuts and washers to screw the mounting frame AE to rigid walls, ceilings or shaft walls (see "Installation" for further details)

Dimensions ► [page 75](#)

Installation ► [page 28 ff.](#), [page 30](#) and [page 47 ff.](#)



Connecting frame

(2 pcs. not assembled) for installation remote from rigid walls and remote from metal stud walls with cladding on both sides and with ventilation ducts with fire-resistant cladding on 2 and 3 sides.

- Scope of delivery: FR90 corner brackets, suspension brackets and chipboard screws
- To be provided by the user: Threaded rods, nuts and metal anchors (see "Installation" for further details)

Installation and use ► [page 65 ff.](#)

3 Product description

Maintenance-free FR90 fire damper according to EN 15650	
Classification	EI 30/60/90/120 ($v_e - h_o - i \leftrightarrow o$) S C ₁₀₀₀₀
Fire resistance period	30, 60, 90 or 120 minutes
Declaration of performance DOP no.	CPR/FR90/003
Environmental Product Declaration according to ISO 14025, EN 15804	EPD-WIL-20240382-ICCE-DE
Hygiene certification in accordance with	VDI 6022-1, VDI 3803-1, DIN 1946-4
EU Declaration of Conformity in accordance with Directive 2014/34/EU for use in potentially explosive atmospheres	

Supplementary national certificates and general type approval in Germany:

- Reaction to fire:
Certificate MPA-BS 6000/593/18
FR90 fire dampers are essentially made from non-combustible building materials
- Air transfer applications:
General type approval: Z-6.50-2133

All-round single-piece casing made of galvanized sheet steel. Casing tightness class ATC 3 per DIN EN 1751.

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

Replaceable damper blade made of temperature-resistant, abrasion-proof calcium silicate with wear-resistant elastomeric gaskets. Flap tightness class 3 according to EN 1751.

Enclosed drive mechanism in the area of the casing wall as a self-locking transmission for break-proof torque transmission. Sealed drive axles made of stainless steel, with gunmetal bearings. Thermal release mechanisms for 70 °C or 95 °C nominal temperature. The operation units can be actuated manually, electrically or pneumatically (► [page 4 ff.](#)).

Release mechanisms, operation units and electric actuators are enclosed and equipped with a spring return. They can also be connected in a form-locking or force-fitting manner, are easy to replace and can be easily retrofitted as required. Thanks to the enclosure and suitable materials, the fire dampers are maintenance-free, i.e. there is no requirement for cleaning or regular lubrication or adjustment to maintain function. Installation with horizontal or vertical damper blade axles and in intermediate positions possible. Incoming air flows are possible from every connection side. Connection to ventilation ducts made of non-combustible or combustible materials, or with protective grilles, is possible. Installation spacings from 15 mm are possible.

FR90 fire dampers permanently perform their function under highly corrosive conditions. This was tested according to EN 15650, annex B with 20% saline solution.

Option: Damper blade with metal cover (non-replaceable) made of galvanized steel or 1.4301 stainless steel.

Option: Casing with powder coating

FR90 fire dampers can be powder coated on the inside and outside with epoxy resin. In combination with the standard damper blade, this is only possible for the sizes DN 100, 125, 160, 200, 250, 315, 355 and 400. Otherwise, using

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

is recommended for additional corrosion protection for higher exposures for all DN sizes.

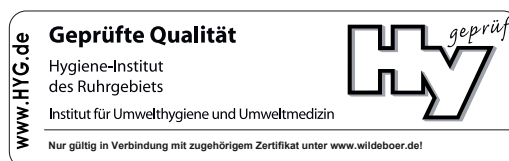
Hygiene

FR90 fire dampers

- meet the hygiene requirements according to VDI 6022-1, VDI 3803-1, DIN 1946-4
- do not promote the growth of microorganisms¹⁾ (fungi, bacteria). This reduces the risk of infection for people and also the necessary cleaning and disinfection work
- are resistant to disinfectant²⁾
- are suitable for use in hospitals and comparable facilities

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 FR90 fire dampers.

²⁾ The resistance to disinfectants of the materials in the FR90 fire dampers was tested with the disinfectant groups of active ingredients alcohol and quaternary compounds. These disinfectants are on the list by the Robert Koch Institute, and were used in accordance with the specifications in the list of disinfectants by the Disinfectants Commission in the German Association for Applied Hygiene (VAH). Verification was provided that FR90 fire dampers are resistant to typical use of disinfectant and disinfectant processes.



Product description

FR90 fire damper

Release mechanisms and actuators

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

Electric spring return actuators close the fire dampers even when the voltage supply is interrupted. With the prerequisite that the release element is intact, the spring return actuator opens the fire damper as soon as the voltage supply is restored.

Release mechanisms and actuators can be replaced on site.

i In Germany, release mechanisms for a nominal temperature 95 °C are admissible for warm air heating systems, and also for building areas with sprinkler systems in some cases.

Thermal-mechanical release mechanism (TMA)

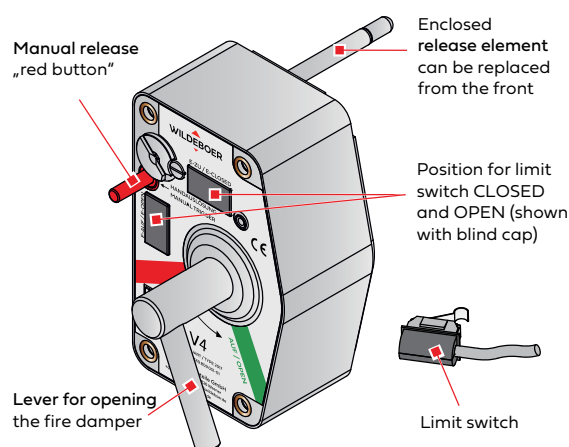
Optionally, in place of the blind caps, one or two limit switches for indicating the position OPEN and/or CLOSED can be inserted in the thermal-mechanical release mechanism. The limit switches have a protection rating of IP67, have a changeover with gold-plated contacts for 5 A at 250 V AC or 24 V DC, and have a 1 m-long silicone-free connection cable 3 x 0.34 mm².

Thermal-mechanical release mechanisms can be equipped with an optional additional remote release. Depending on the application, one of two different operating modes can be selected:

- **Closed circuit principle:** The fire damper must be opened manually. A magnetic clamp holds the lever of the release mechanism in the opened position. The fire damper closes as soon as the electric voltage supply of the magnet is interrupted, ► [page 5](#).
- **Open circuit principle:** The fire damper must be opened manually. It closes as soon as a lifting solenoid is actuated by an electrical impulse or a lift cylinder is actuated by a pneumatic impulse, respectively, in order to move the lever of the release mechanism into the closed position, ► [page 5](#).

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

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

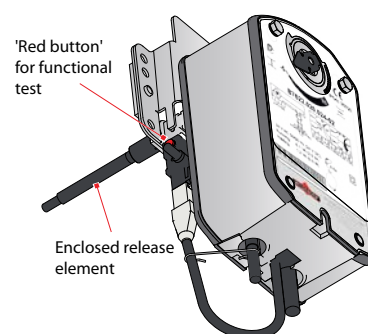


Electric spring return actuator

When the nominal temperature is reached on the release element, the electric spring return actuator closes the fire damper. A functional check can be performed by pressing a button on the casing of the actuator. Moreover, electric spring return actuators can also be integrated into a building management system. That way, the fire damper can also be controlled remotely to carry out a functional check, for example, and can open and close automatically. The spring in the actuator casing guarantees that the flap is moved into the "closed" safety position in case of power failure.

The design of the actuator depends on the size of the FR90 fire damper.

DN	Standard design
≤ 315 mm	M220-10/F, M24-10/F
≥ 355 mm	M220-9/H, M24-9/H



Further information on electric spring return actuators ► [page 5](#).

3.1 Information on use

i For use of the FR90 fire damper, the national statutory regulations must be observed.

Information on inflow and operating range

FR90 fire dampers are quick-closing, except for the electric actuator designs. 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 considerable damage to ventilation and air conditioning systems. When shut-off dampers are closed, the volume flows are distributed to other parallel dampers that are still open. This may lead to excessive stress, in particular at high operating pressures, large volume flows and larger cross-sections. Electric actuators should be used under such conditions. They close fire dampers relatively slowly, and optionally allow for the fans to be shut off using the OPEN limit switch.

Moreover, the following points must be observed:

- The application limits marked in the nomograms must be observed ► [page 77 ff.](#)
- For large fire dampers that are subjected to an unfavourable flow, the use of actuators with large torques can be necessary in order to open the fire dampers when the fan is running and there are very large volume flows. These actuators are available on request. Alternatively, it is also possible to switch on the fans once the fire dampers are fully open.
- It must be ensured that the inflows and outflows at the fire dampers are as even as possible.

Further possible applications

Volumetric flow control

FR90 fire dampers with electric actuator can be used to regulate the flow rate in sections. To do so, the damper blade is either moved into the OPEN or into the CLOSED position.

Sealing air transfer applications

When combined with an OR4 or OR32 smoke detector, FR90 fire dampers can be used to seal air transfer applications in the event of a fire. It is not possible to attach the OR32 (FR) smoke detector or the extensions OS and NOS to FR90 fire dampers with ER6 installation subframes in the factory. Assembly must be performed by the operating company.

For more details on air transfer applications (Ü-FK/Ü-FR) and smoke detectors, see:

- 5.14 OR4 smoke detector user manual
- 5.11 OR32 smoke detector user manual

Areas with explosion protection

FR90 fire dampers are also available with a design with explosion protection. A suitable declaration of conformity for use in areas with explosion protection is available. They can be ordered with a mechanical release mechanism or an electric spring return actuator. The following table contains further information.

Building area in which a dangerous, potentially explosive atmosphere ...		... 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.	... does not occur or only briefly occurs.	... can form occasionally.	... does not occur or only briefly occurs.
Zone		1	2	21	22
Identification of the fire damper		II 2 G Ex h IIC T6 / T5	II 3 G Ex h IIC T6 / T5	II -/2 D Ex h IIIC T80 °C / T95 °C	II -/3 D Ex h IIIC T80 °C / T95 °C
Thermal-mechanical release mechanism without or with explosion protection limit switch		X	X ¹⁾	X	X ¹⁾
Motor drive	EM-1 or EM-2	X	X ¹⁾	X	X ¹⁾
	RM-1	-	X	-	X

Ambient temperatures: -20 °C ... +40 °C for T6 and T80 °C / -20 °C ... +50 °C for T5 and T95 °C

¹⁾ Can also be used in this zone

Explosive atmospheres are classified in the respective zones depending on the frequency and duration of occurrence of the dangerous explosive atmosphere. The operating company is responsible for determining the Ex zone.

Product description

FR90 fire damper

3.2 Accessories

Wildeboer-Net communication system

Communication system for control and monitoring of interconnected fire dampers and smoke protection dampers, and electronic flow rate and pressure controller in ventilation and air conditioning systems.

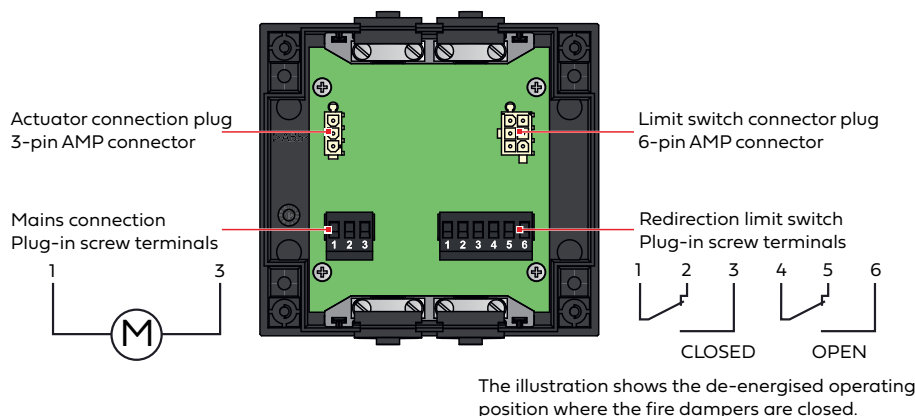
Further information at www.wildeboer.de.

AB-01 | AB-02 connection box

Connection box for simplified connection of fire dampers with electric spring return actuator (factory-mounted or as loose accessories).

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 (W x H x D) 140 x 110 x 67 mm, protection class II, protection rating IP40.

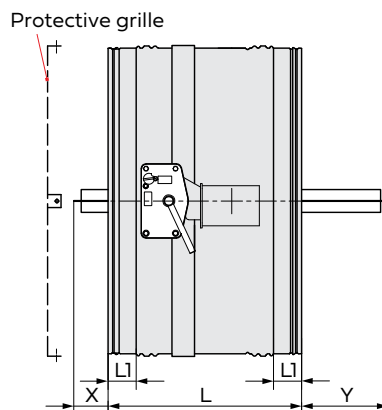
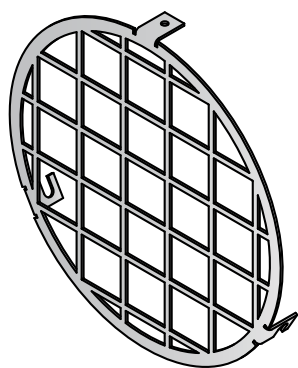


- AB-01 for spring return actuators M24-9/H, M24-10/F, M24-11/H
- AB-02 for spring return actuators M220-9/H, M220-10/F, M220-11/H

Protective grille

For fire dampers without connecting ducts for protecting flow-through openings. Punched from 1 mm thick galvanized sheet steel, 20 mm mesh size, ≈ 70 % free cross-section.

Available in DN nominal sizes.



- A sufficiently large gap between the protective grille and the damper blade must be guaranteed at all times so that it can open and close unhindered. ≥ 50 mm is recommended. The length should be added to the damper blade excess lengths X and Y ▶ [table "Size-dependent excess lengths" on page 19](#).
- Information on L1 ▶ [table on page 75](#).

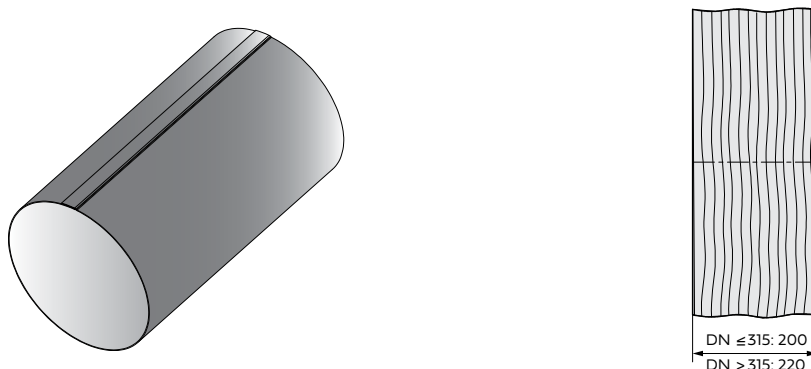
Product description

FR90 fire damper

Flexible connectors

Flexible connectors made of PVC-coated polyester fabric, cadmium-free, at least 100 mm expansion absorption. Building material class B1 according to DIN 4102. Temperature-resistant: -20 to +70 °C. Delivery includes 2 pcs. clips. As a compensating element for the thermal expansion of the ventilation duct. Available for delivery in the different nominal sizes of the FR90 fire damper.

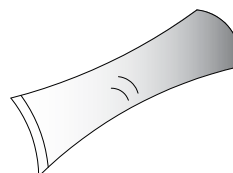
The connecting pieces can be installed stretched and directly on the FR90 fire damper. Otherwise, the free movement of the damper blade has to be established by lengthening with ventilation duct parts on site.



Mineral sodium-silicate-based adhesive

For bonding and joining installation subframes, connecting frames and mounting frames and for mineral insulating materials. Non-combustible, building material class A1 in accordance with DIN 4102

Packing unit: 2 x bags of 300 g each



The adhesive for on-site installation of separately ordered RR100, RR150, RE100, RE150, RH100 or RH150 installation subframes, AE connecting frames and RV mounting frames on FR90 fire dampers is included in the scope of delivery.

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

Consumption quantities (approximate specifications in [g])

Assembly of the installation subframes (additional order)																		
DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
RR ¹⁾ , RE, RH, AE, RV	150	165	175	185	200	210	225	245	260	285	310	340	370	400	440	480	530	590

Filling of installation subframe on both sides ²⁾																		
DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
RE	150	170	185	200	215	230	250	270	300	325	365	400	440	480	530	585	650	720
RR	125	140	150	160	175	190	205	220	240	260	-	-	-	-	-	-	-	-

¹⁾ RR100 and RR150 installation subframes only available for delivery in the sizes DN100 ... DN315.

²⁾ Adhesive for filling installation subframes on site and for adhesive bonding of surfaces must always be ordered separately.

- Consumption quantity for adhesive bonding of surfaces between assembled RE installation subframes:
Approx. 1 kg per m² of area for bonding

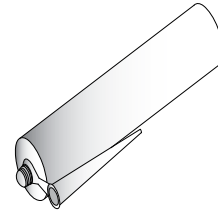
Product description

FR90 fire damper

Promaseal® Mastic fireproof sealant

Fireproof sealant with intumescent features for sealing gaps around RV mounting frames and FR90 fire dampers with RH installation subframes on both sides.

Packing unit: 1 x cartridge of 310 ml



Consumption quantities (approximate specifications in [ml])

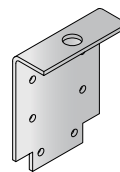
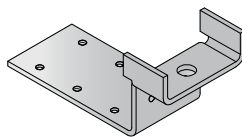
DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
RV	16	20	23	26	29	32	36	40	45	50	57	64	71	79	89	100	112	126
FR90 with RH	30	35	40	40	45	50	55	55	60	65	75	80	90	100	110	120	130	145

FR90 corner brackets and AW suspension brackets

Corner brackets and suspension brackets for suspending claddings of the ventilation ducts on butt joints on site.




















Packing unit:

- 4 x corner brackets
- 2 x suspension brackets for mounting directly on or underneath rigid walls or ceilings, including screws



4 Installation overview















Rigid walls and ceilings

Type of installation	Wall/ceiling type	Installation material	Minimum thickness [mm]	Fire resistance period	Details
In	Rigid wall		95	120	► Page 20
			70 / 100	60 / 90	► Page 23
			100	90	► Page 22
			100	90	► Page 26
			70 / 100	60 / 90	► Page 24
			70 / 100	60 / 90	► Page 24
In	Non-load-bearing rigid wall underneath settlement joint		100	90	► Page 22
Directly on	Rigid wall		100	90	► Page 28
Remote from	Rigid wall		100	90	► Page 67
Remote from	Rigid wall underneath rigid ceiling		100	90	► Page 70
In	Rigid ceiling		100 / 115	90 / 120	► Page 20
			100	90	► Page 23
			100	90	► Page 26
			100	90	► Page 24
			70 / 100	60 / 90	► Page 24
Directly on	Rigid ceiling		100	90	► Page 28
On	Rigid ceiling with concrete base		100	90	► Page 30
			100	90	► Page 30
Remote from	Rigid ceiling		100	90	► Page 69

Installation overview

FR90 fire damper

Metal stud walls including fire and safety partition walls and shaft walls with and without metal studs
























Type of installation	Wall/ceiling type	Installation material	Minimum thickness [mm]	Fire resistance period	Details
In	Metal stud wall with 1-layer cladding on both sides		70	60	► Page 38
	Metal stud wall with 2-layer cladding on both sides		94	120	► Page 33
			94	120	► Page 36
			94	90	► Page 38
			100	90	► Page 42
	Metal stud wall with 2-layer cladding on both sides without all-round profiles	 	94	90	► Page 41
In	Metal stud wall underneath sliding ceiling connection		95	90	► Page 44
Remote from	Metal stud wall	 	95	90	► Page 71
Remote from	Metal stud wall underneath rigid ceiling	 	95	90	► Page 73
On	Shaft wall with 2-layer cladding on one side and with metal studs		90	90	► Page 47
	Shaft wall with 2-layer cladding on one side and without metal studs		40	90	► Page 48

► Overview continued on the following page.

Installation overview

FR90 fire damper










Wooden walls and wooden ceilings

Type of installation	Wall/ceiling type	Installation material	Minimum thickness [mm]	Fire resistance period	Details
In	Rigid wooden wall		90 / 95	60 / 90	► Page 51
		 	90 / 110	60 / 90	► Page 52
		  	90 / 110	60 / 90	► Page 54
	Rigid wooden wall with 1-layer cladding on both sides		124	90	► Page 53
In	Rigid wooden ceiling		100 / 130	60 / 90	► Page 51
		 	100 / 130	60 / 90	► Page 52
		  	100 / 130	60 / 90	► Page 54
In	Wall with timber frame construction		85 / 110	60 / 120	► Page 55
		 	85 / 110	60 / 120	► Page 56
In	Ceiling with wooden beam construction		85 / 110	60 / 120	► Page 55
		 	100	90	► Page 56
In	Historical wooden beam ceiling		100	60	► Page 63
In	Wall with timber frame construction with clay panel cladding		104 / 124	60 / 90	► Page 58
			104 / 124	60 / 90	► Page 59
			104 / 124	60 / 90	► Page 60

Ceilings with steel frames

Type of installation	Wall/ceiling type	Installation material	Minimum thickness [mm]	Fire resistance period	Details
In	Ceiling construction with steel frame on both sides		222	90	► Page 61

Nomenclature

Installation material					
	Mortar		Clay plaster mortar		Fire batt system
	Installation subframe/mounting frame/connecting frame		Filling with gypsum filler		Connecting frame
	Mineral wool		Fireproof sealant		Fireproof foam

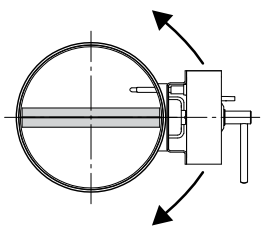
5 Installation

FR90 fire dampers achieve a fire resistance period of up to 120 minutes if they are installed in accordance with the following specifications. Installation types in, on and remote from rigid walls and ceilings or metal stud walls and shaft walls with and without metal studs, in walls and ceilings made of wood, in walls with clay construction boards, in ceilings with steel frames and in historical wooden beam ceilings with a minimum thickness and fire resistance period are possible.

If the fire resistance period of the walls or ceilings is under 120, 90, 60 or 30 minutes, the fire resistance period of the FR90 fire damper is reduced accordingly.

- FR90 fire dampers must be installed based on the instructions in this user manual.
Structural requirements in terms of the walls, ceilings, ventilation ducts etc. must be met on site.
The general technical regulations and national statutory regulations must be observed during installation.
In Germany, this relates specifically to the "Guideline on fire protection requirements pertaining to ventilation systems" (*Lüftungsanlagenrichtlinie - LÜAR*).
- FR90 fire dampers can be connected to ventilation ducts made from combustible and non-combustible materials, as well as to flexible connectors.
Thermal expansions must not exert significant forces in the event of fire. Compensatory measures must be provided as required, for example, using suitable routing of ducts or by installing flexible connectors made of combustible material.
- FR90 fire dampers
 - do not need spacing to separate from combustible materials.
 - are suitable for all installation positions.
 - must be installed with a minimum spacing of 15 mm between them, even in metal stud walls.
 - must be installed with smoke detectors in air transfer applications (Ü-FR). For more details see:
 - ▶ 5.14 OR4 smoke detector user manual
 - ▶ 5.11 OR32 smoke detector user manual

5.1 Installation positions



Damper blade axle and actuator can be installed rotated by up to 360°.

Horizontal installation position (wall)	
Operation side	Non-operation side
A cross-section diagram of a fire damper installed in a wall. The damper is oriented horizontally. Labels include 'Visible side' with an arrow pointing to the front face, 'Operation side' at the top, 'Non-operation side' at the bottom, and 'Wall' at the bottom with a double-headed arrow indicating the wall thickness.	
In walls	
A cross-section diagram showing the damper mounted directly on a wall. The damper is oriented horizontally, and the wall is shown on both sides.	
Directly on walls	
A cross-section diagram showing the damper installed in a wall, but with a gap between the damper and the wall on one side, labeled 'Remote from walls'.	
Remote from walls	

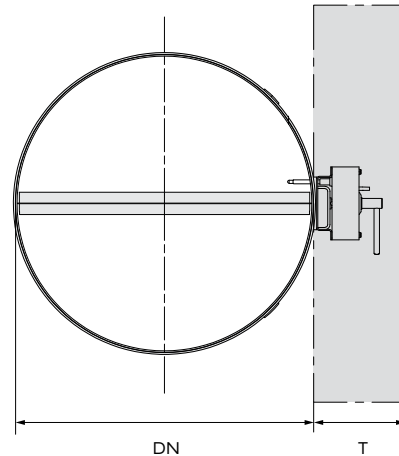
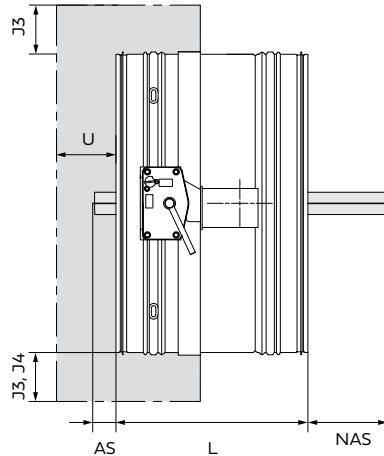
Vertical installation position (ceiling)	
A cross-section diagram of a fire damper installed in a ceiling. The damper is oriented vertically, with the actuator pointing upwards. A label 'Ceiling' with a double-headed arrow indicates the ceiling thickness.	A cross-section diagram of a fire damper installed in a ceiling. The damper is oriented vertically, with the actuator pointing downwards. A label 'Ceiling' with a double-headed arrow indicates the ceiling thickness.
In an upright position in ceilings	Suspended in ceilings
A cross-section diagram showing the damper mounted directly on a ceiling. The damper is oriented vertically, and the ceiling is shown on both sides.	A cross-section diagram showing the damper mounted directly underneath a ceiling. The damper is oriented vertically, and the ceiling is shown on both sides.
Directly on ceilings	Directly underneath ceilings
A cross-section diagram showing the damper installed in a ceiling, but with a gap between the damper and the ceiling on one side, labeled 'Remote from and above ceilings'.	A cross-section diagram showing the damper installed in a ceiling, but with a gap between the damper and the ceiling on one side, labeled 'Remote from and below ceilings'.
Remote from and above ceilings	Remote from and below ceilings

Installation

FR90 fire damper

5.2 Maximum excess lengths of mechanical and electrical equipment parts

Additional space must be provided for assembly, electrical connections and servicing; pay attention to 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.



Excess lengths of actuators (not dependent on size)

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

Actuators

U = Horizontal (condition on delivery)

J = Vertical

- J3 = EM-1, RM-1, EM-2
rotated in an upright position or suspended
- J4 = M220-11/H, M24-11/H
rotated suspended

T = Excess length to the side

Damper blade

OS = Operation side

NOS = Non-operation side

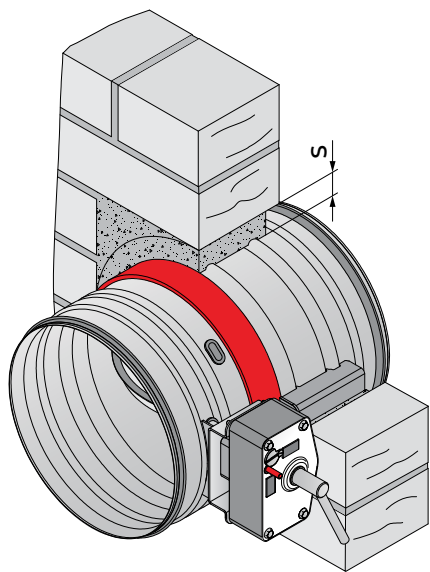
Size-dependent excess lengths

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

All dimensions in mm

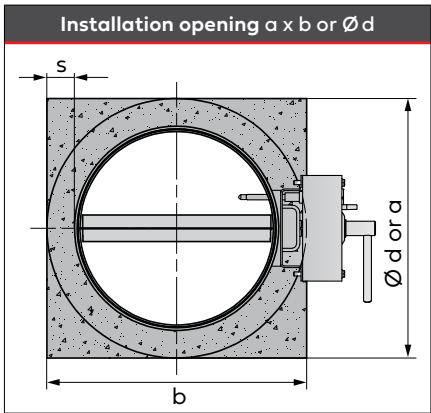
5.3 Rigid walls and ceilings

5.3.1 Wet installation with mortar



Minimum thicknesses Wall/Ceiling [mm]		
Description of the wall/ceiling	Fire resistance period	
	30 min	30 min
	60 min	60 min
	90 min	90 min 120 min
Rigid wall	95	
Rigid ceiling	100	115

- Rigid walls and ceilings can be made of concrete, lightweight concrete, porous concrete (aerated concrete) or plaster. They can be constructed as masonry or from wallboards and must have bulk densities $\geq 450 \text{ kg/m}^3$.
- Walls can be designed as fire walls, shaft walls or shafts, walls and ceilings can also be designed as ducts.
- Installation can be performed with a minimum gap of 15 mm to adjacent walls or ceilings.
- The all-round gap "s" of $\geq 15 \text{ mm}$ in width must be filled manually or mechanically with mortar of group II or III according to DIN 1053 or with the classes M2.5, M5, M10 or M20 according to EN 998-2 or with the corresponding fire protection mortar or gypsum mortar.



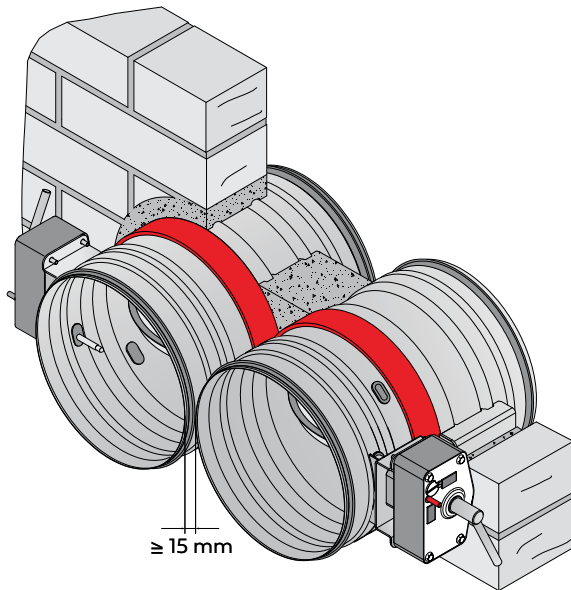
- Installation opening:
a = DN+30 ... 450 mm
b = DN+75 ... 450 mm
Ø d = DN+65 ... 450 mm
- Gap dimension:
s = 15 ... 225 mm

Installation when creating the wall does not require any specific installation opening.

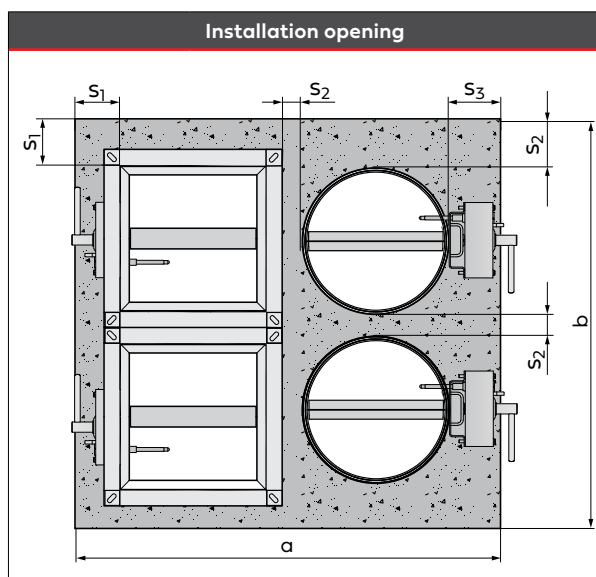
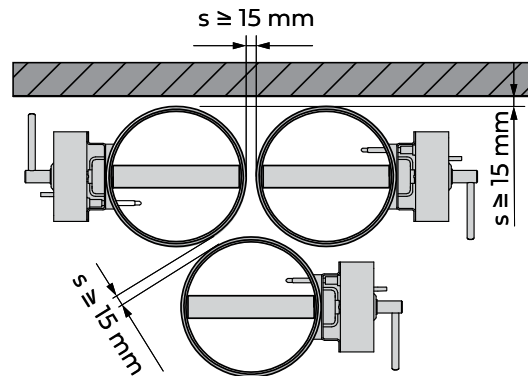
Installation

FR90 fire damper

5.3.1.1 Multiple installation with mortar

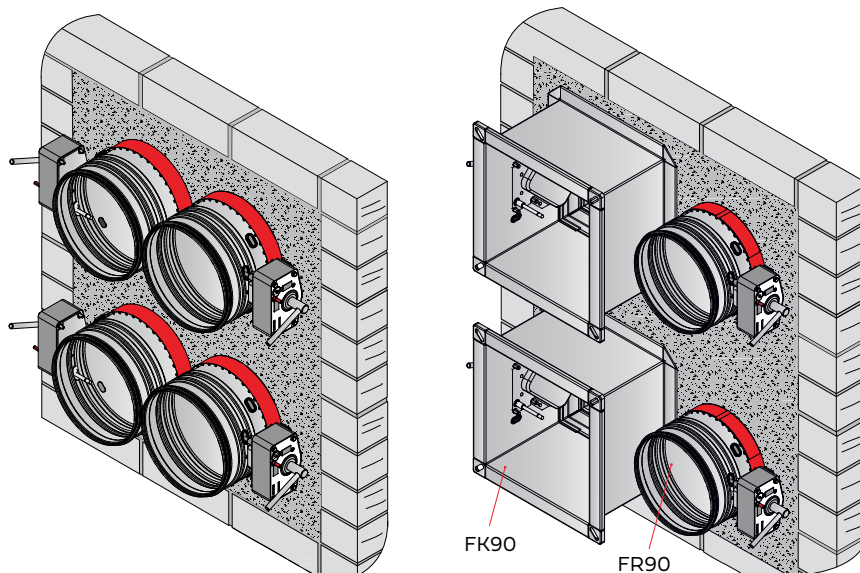


- Multiple installation of up to 4 pcs. FR90 fire dampers of the same size side-by-side, above each other or combined with FK90 fire dampers is possible.
- If multiple FR90 fire dampers are to be installed next to each other in walls and ceilings, when installing with mortar between the individual fire dampers, a minimum gap $s \geq 15 \text{ mm}$ must be observed.



- Installation opening:
 $a \times b = \text{max. } 4,2 \text{ m}^2$
- Gap dimensions:
All-round gap in relation to all installed fire dampers = max. 225 mm
 - $s_1 \geq 37,5 \text{ mm}$
 - $s_2 \geq 15 \text{ mm}$
 - $s_3 \geq 50 \text{ mm}$

Installation example



5.3.1.2 Installation in rigid walls and ceilings in corners which are difficult to access, and directly on walls and ceilings

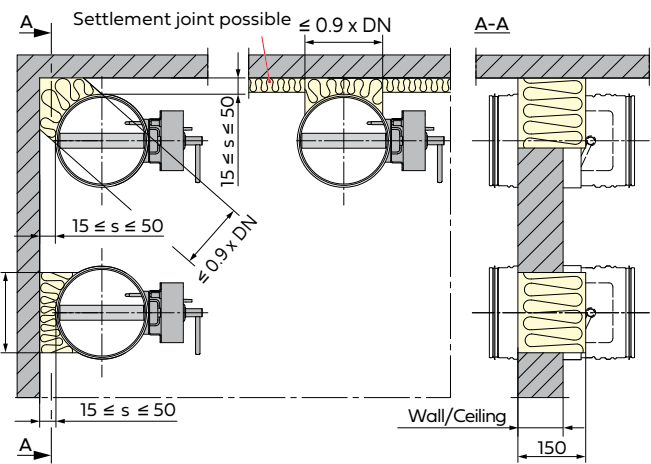


Table with 2 columns: Description of the wall and ceiling, Fire resistance period. It lists requirements for rigid wall/ceiling with fire resistance periods of 30 min, 60 min, and 90 min, all requiring a minimum thickness of 100 mm.

Designs of rigid walls and ceilings -> page 20.
In corners which are difficult to access and directly on walls and ceilings, the gap "s" of FR90 fire dampers without installation subframe can be filled with two layers and 150 mm in depth with "Knauf Insulation TPD" mineral wool or equivalent. They must not be secured with combustible adhesive. A sheet metal cover is recommended when using insulation wool. Mortaring in ceilings must be prevented from falling out by roughening the reveals or using mortar anchors.
Partial mortaring
Mineral wool:
• Bulk density ≥ 150 kg/m³
• Melting point ≥ 1000 °C
• Adhesive -> page 12

5.3.1.3 Installation in rigid walls with settlement joints underneath rigid ceilings

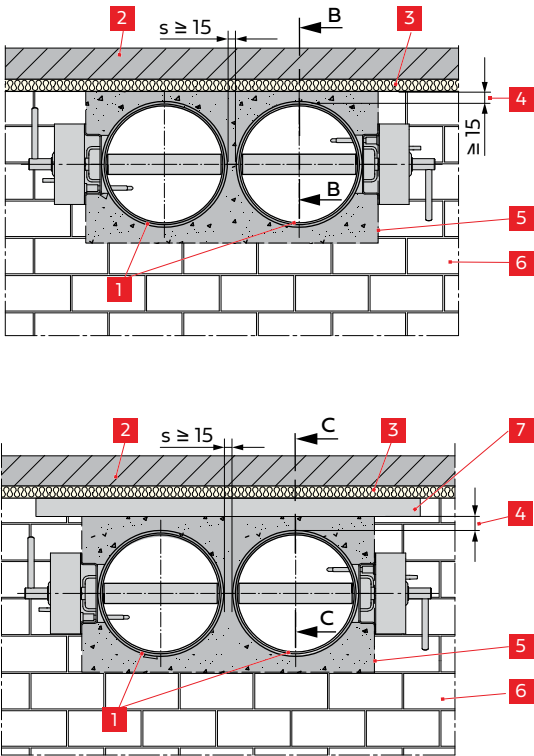
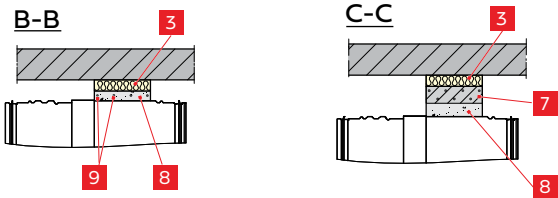


Table with 2 columns: Description of the wall, Fire resistance period. It lists requirements for rigid wall with fire resistance periods of 30 min, 60 min, and 90 min, all requiring a minimum thickness of 100 mm.

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 FR90 fire dampers immediately under such settlement joints. To prevent cracking, a reinforcement is introduced into the mortar bed or a structurally measured lintel is inserted above the mortar bed.
A reinforcement consisting of at least 3 pcs. concrete reinforcement bars B500B with a diameter of 8 mm must be inserted into the mortar bed.



Nomenclature

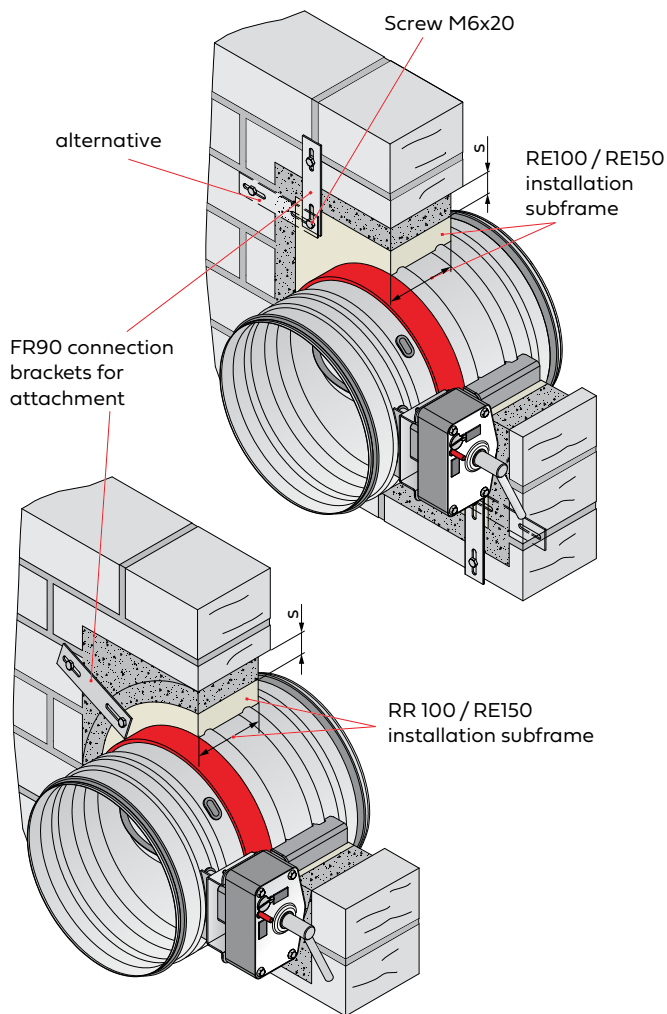
Table with 2 columns: No., Description. It lists components and materials used in the installation, including FR90 fire damper, rigid ceiling, settlement joint, overlap, installation opening, non-load-bearing rigid wall, lintel, mortar, and reinforcement.

All dimensions in mm

Installation

FR90 fire damper

5.3.2 Wet installation with installation subframe

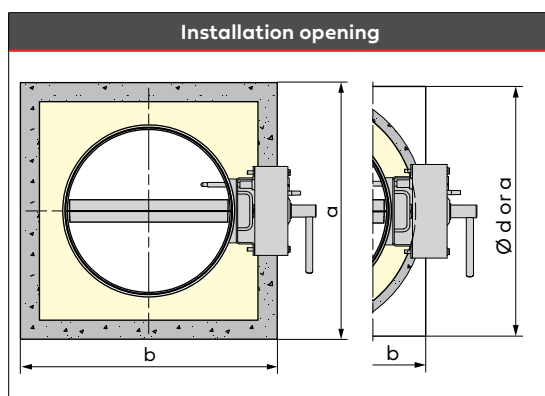


Description of the wall and ceiling	Minimum thicknesses Wall/Ceiling [mm]	
	30 min 60 min	30 min 60 min 90 min
Rigid wall	70 ¹⁾	100
Rigid ceiling	-	100

¹⁾ This installation must be performed with RE100 or RR100 installation subframes.

i Designs of rigid walls and ceilings ► [page 20](#).

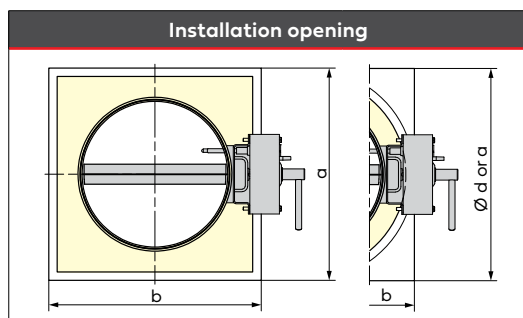
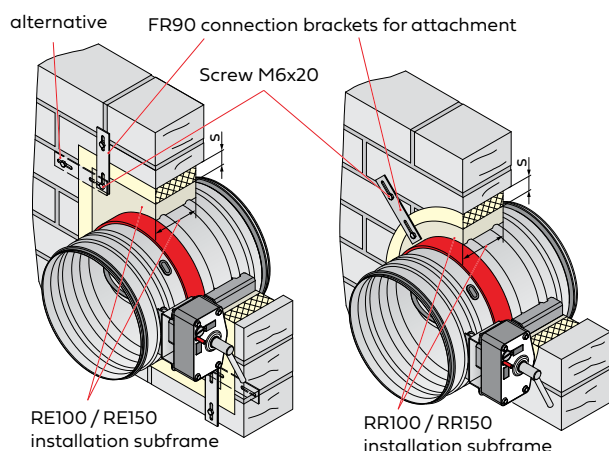
- Secure the mortaring in ceilings to prevent it from falling out by roughening the reveals or using mortar anchors.
- Fill gap *s* with mortar ► [page 20](#).
- Installation with round RR100/RR150 installation subframe only possible with $DN \leq 315$ mm.
- FR90 connection brackets are sufficient on one side of the wall ($DN \leq 315$: 4 pcs., $DN \geq 355$: 8 pcs.).



- **Installation opening:**
 $DN \leq 315$: $a \times b = DN + 120 \dots 190$ mm
 $DN \geq 355$: $a \times b = DN + 130 \dots 200$ mm
 $DN \leq 315$: $\varnothing d = DN + 130 \dots 170$ mm
 $DN \leq 200$: $a \times b = DN + 130$ mm

5.3.3 Dry installation with installation subframe

5.3.3.1 With mineral wool



Description of the wall and ceiling	Minimum thicknesses Wall/Ceiling [mm]		
	Fire resistance period		
	30 min	60 min	90 min
Rigid wall	70 ¹⁾	100	100
Rigid ceiling	-	100	100

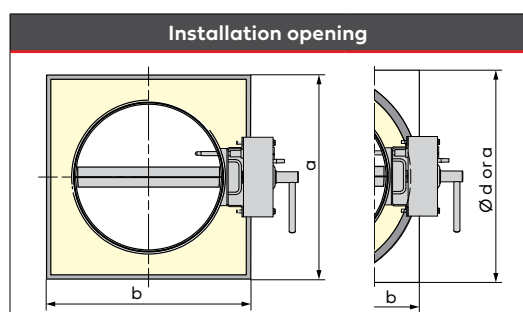
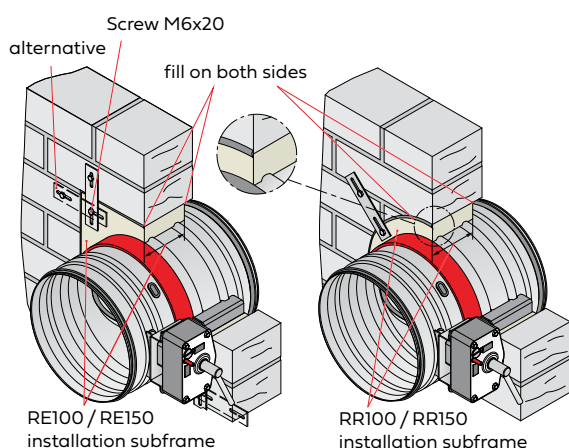
¹⁾ This installation must be performed with RE100 or RR100 installation subframes.

i Designs of rigid walls and ceilings ▶ [page 20](#).

- Make gap $s \leq 20$ mm and fill with mineral wool (▶ [page 22](#)).
- Mineral wool should be prevented from falling out by using a non-combustible adhesive. A sheet metal cover is recommended when using insulation wool.
- Installation with round RR100/RR150 installation subframe only possible with $DN \leq 315$ mm.
- FR90 connection brackets are sufficient on one side of the wall ($DN \leq 315$: 4 pcs., $DN \geq 355$: 8 pcs.).

- Installation opening:
 $DN \leq 315$: $a \times b = DN + 110 \dots 130$ mm
 $DN \geq 355$: $a \times b = DN + 120 \dots 140$ mm
 $DN \leq 315$: $\varnothing d = DN + 120 \dots 140$ mm

5.3.3.2 With filled installation subframe



Description of the wall and ceiling	Minimum thicknesses Wall/Ceiling [mm]		
	Fire resistance period		
	30 min	60 min	90 min
Rigid wall	70 ¹⁾	100	100
Rigid ceiling	-	100	100

¹⁾ This installation must be performed with RE100 or RR100 installation subframes.

i Designs of rigid walls and ceilings ▶ [page 20](#).

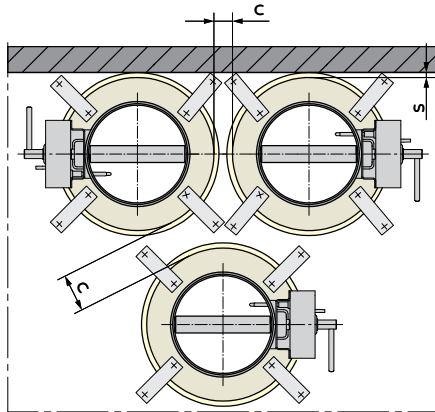
- Make joints approx. 2 mm and seal them with gypsum filler or non-combustible adhesive on both sides of the wall or ceiling (adhesive ▶ [page 12](#)).
- Installation with round RR100/RR150 installation subframe only possible for $DN \leq 315$ mm.
- FR90 connection brackets are sufficient on one side of the wall ($DN \leq 315$: 4 pcs., $DN \geq 355$: 8 pcs.).

- Installation opening:
 $DN \leq 315$: $a \times b = DN + 93$ mm
 $DN \geq 355$: $a \times b = DN + 103$ mm
 $DN \leq 315$: $\varnothing d = DN + 103$ mm

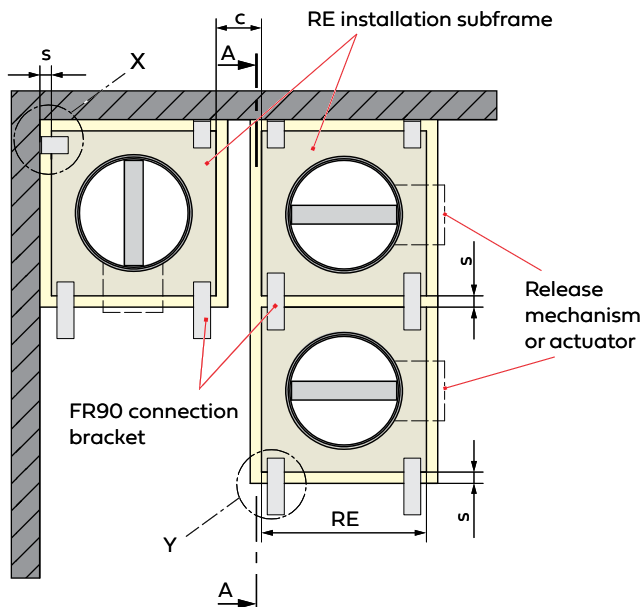
Installation

FR90 fire damper

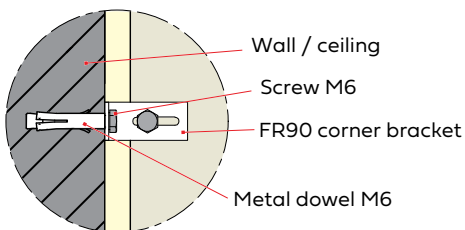
5.3.3.3 Multiple installation with installation subframes



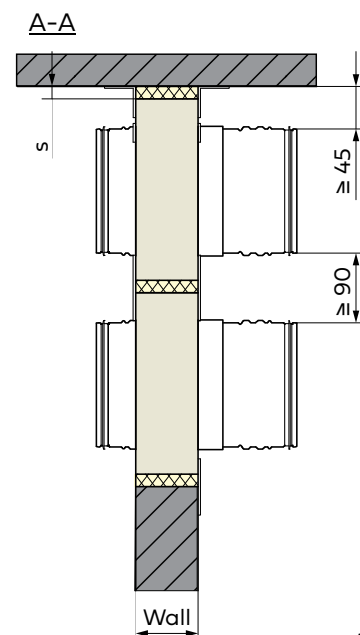
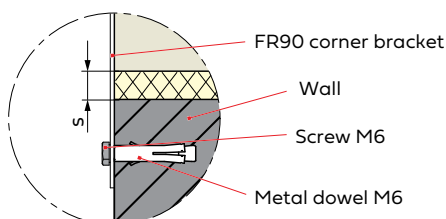
- Gaps c between RE or RR installation subframes which are not installed immediately next to each other, depend on the structural properties of the wall or ceiling. $c \geq 50$ mm is generally sufficient. For installation in walls, 4 pcs. FR90 connection brackets or FR90 corner brackets are required on one side. When installing in ceilings, they must be arranged on both sides (8 pcs.).
- Assembly of the RE installation subframes ► [page 40](#).
- Multiple installation of up to 4 pcs. FR90 fire dampers of the same size side-by-side and above each other is possible without any weight restriction.



Detail X

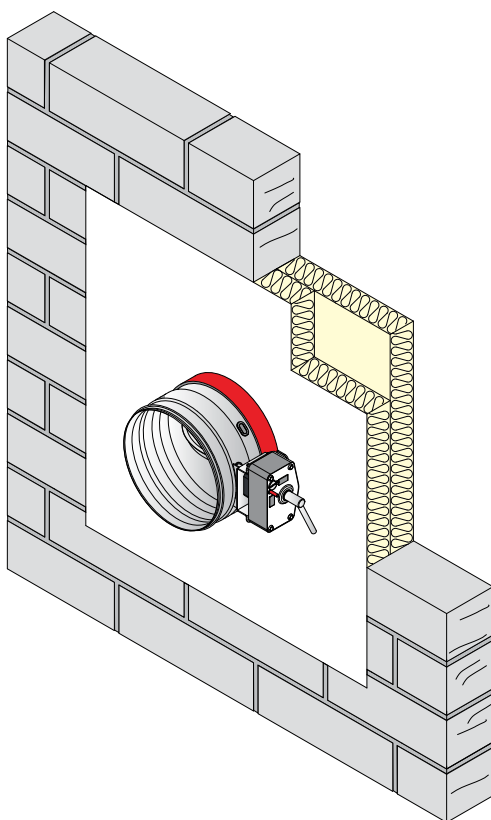


Detail Y



All dimensions in mm

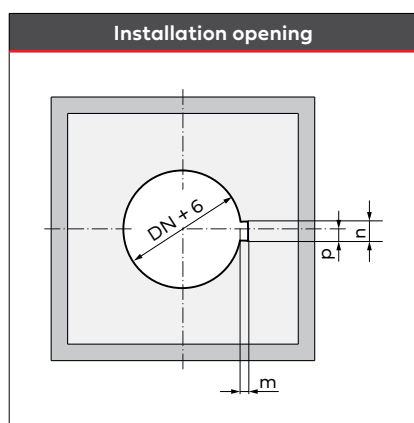
5.3.4 Dry installation with fire batt system



Minimum thicknesses Wall/Ceiling [mm]	
Description of the wall and ceiling	Fire resistance period
	30 min
	60 min
	90 min
Rigid wall/ceiling	100

i Designs of rigid walls and ceilings ▶ [page 20](#).

- The fire damper is suspended on both sides using the suspension of the connected ventilation duct. Special fire protection fastenings or suspensions for the fire damper are not required.
- The weight of the fire damper (size-dependent weight table ▶ [page 76](#)) must also be borne by the connected ventilation duct.
- When using flexible connectors or without a ventilation duct connection, suspension can also be performed directly on the fire damper, e.g. using ventilation pipe clips.



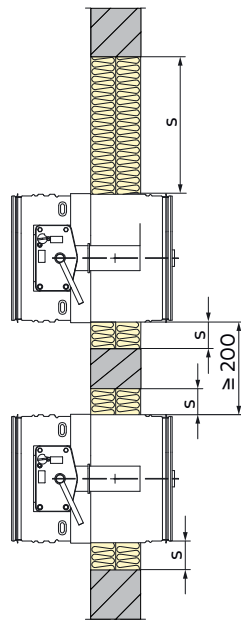
Nominal size	m	n	p
DN ≤ 315	26 mm	56 mm	28 mm
DN ≥ 355	31 mm	77 mm	47 mm

Installation

The board material must be cut to size to suit the installation opening and contour of the fire damper so that it rests firmly in place after installation. Coated edges must be chamfered. The cut surfaces of the board material and the reveal in the installation opening must be brushed with the coating putty or the filler of the specific system. Insert the first layer of board material, make sure that the surface coated in the factory faces outwards. Insert the second layer of board material. In this case, too, have the coated surface face outwards, and arrange the butt joints offset from one another. Seal all butt joints, including those on supporting structures and the fire damper, completely on both sides of the wall with the coating putty or filler and brush them with the fire safety coating.

Installation

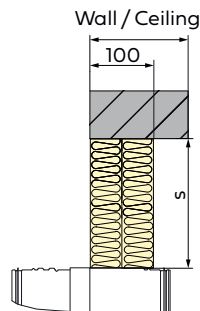
FR90 fire damper



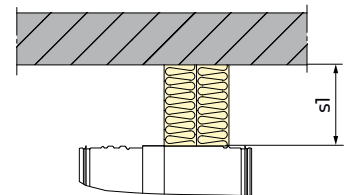
- Only one fire damper may be installed per fire batt system.
- Clearance between FR90 fire dampers ≥ 200 mm (Austria: ≥ 100 mm according to ÖNORM H 6025).

s	s1	s1 (Austria)
50 ... 600 mm	75 ... 600 mm	20 ... 600 mm

Installation example for walls and ceilings with wall/ceiling ≥ 100 mm (shown wall/ceiling = 150 mm and fire batt system = 100 mm)



Installation directly on walls or ceilings



Overview of fire batt systems

Manufacturer	Fire safety coating	Fire safety sealing compound	Board material
FLAMRO®	Flammotect®-A paint	Flammotect®-A filler	Flammotect®-A precoated mineral fibre board
	Flamro® BML / BMA	Flamro® BMS	Coated mineral fibre board (BMA)
Hensel®	Hensomastik® 5 KS viscose	Hensomastik® 5 KS viscose	Hensomastik® 5 KS precoated mineral fibre board
Hilti®	Hilti® CFS-CT	Hilti® CFS-S ACR	Hilti® CFS-CT B
	Hilti® CP 673	Hilti® CP 673	Hilti® CP 673
OBO Bettermann®	Pyrocoat® ASX paint	Pyrocoat® ASX filler	According to manufacturer's instructions
Promat®	Promastop® -CC	Promastop® -CC	Promat® mineral wool board, precoated, type CC
	Promastop® -CA	Promastop® -CA	Promat® mineral wool board, precoated, type CC
SVT®	Pyro-Safe® Flammotect®-A paint	Pyro-Safe® Flammotect®-A filler	Pyro-Safe® Flammotect®-A mineral fibre board
	BML/BMA	BMS	BMA coated mineral fibre board
Würth®	Würth® ablation coating 1	Würth® ablation coating 1	Würth® mineral fibre board AB, precoated

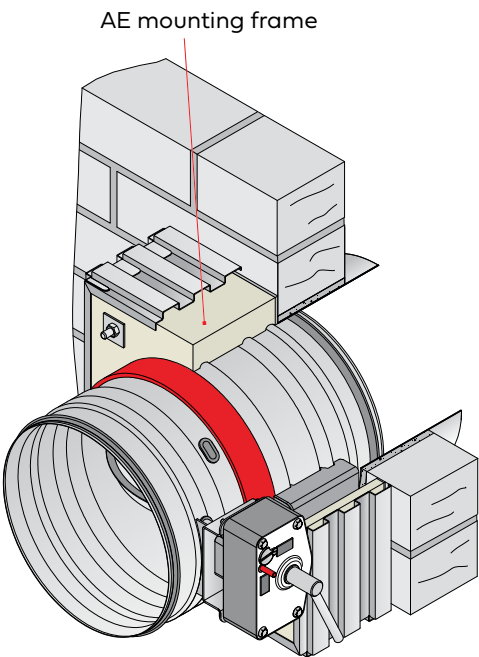
The material stipulated by the respective manufacturer must be used.

In addition, all fire batt systems can be used with ablative coatings if they meet the following requirements:

- Board material non-combustible, melting point ≥ 1000 °C, minimum thickness 50 mm
- Density of the board material at least 140 kg/m^3
- Ablative coating, reaction to fire at least class E, in accordance with EN 13501-1
- Test certificate according to EN 1366-3 (submission of a valid ETA is sufficient as proof of suitability as long as the required specifications are observed). The user is responsible for verifying the suitability of the fire batt systems in relation to fire resistance.


All dimensions in mm

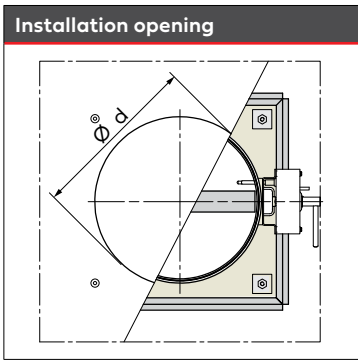
5.3.5 Mounting on rigid walls and ceilings



Minimum thicknesses Wall/Ceiling [mm]	
Description of the wall and ceiling	Fire resistance period
	30 min
	60 min
	90 min
Rigid wall/ceiling	100

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

-  Designs of rigid walls and ceilings ▶ [page 20](#).
- AE mounting frames must be secured with threaded rods which pass through the wall or ceiling, and washers and nuts on both sides.
- Plugs with verification of fire protection suitability can be used in suitable walls and ceilings.
- Ventilation ducts on the non-operation side of the FR90 fire damper can be fed through the wall or ceiling and should lie flush. The connection of the FR90 fire damper on the non-operation side can be fully inserted in these.
- Connections can be made to the casing of missing fire dampers if it is ensured that the damper blade can move freely (▶ [page 19](#)).



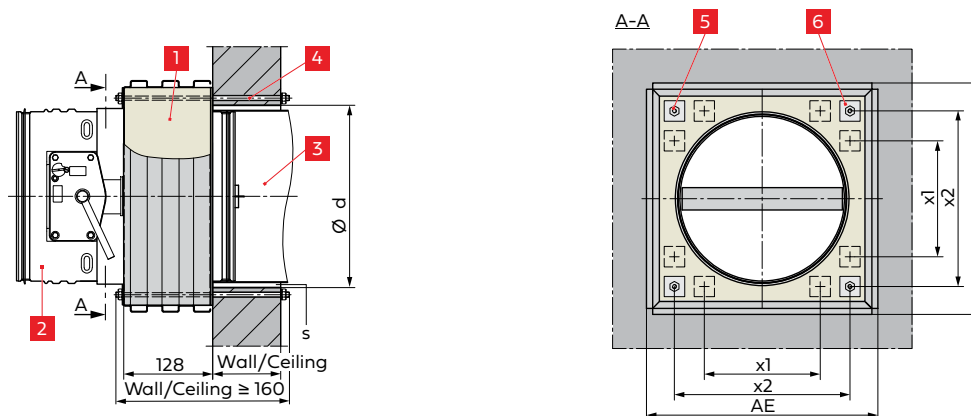
- Installation opening:
Ø d = DN + 10 ... 15 mm
- The gap between ventilation duct and wall or ceiling does not need to be filled.

The number of fastenings is predetermined by the drilled holes in the AE mounting frames made in the factory:

Nominal size	Quantity per corner	Total quantity
DN ≤ 315	1	4
DN ≥ 355	2	8

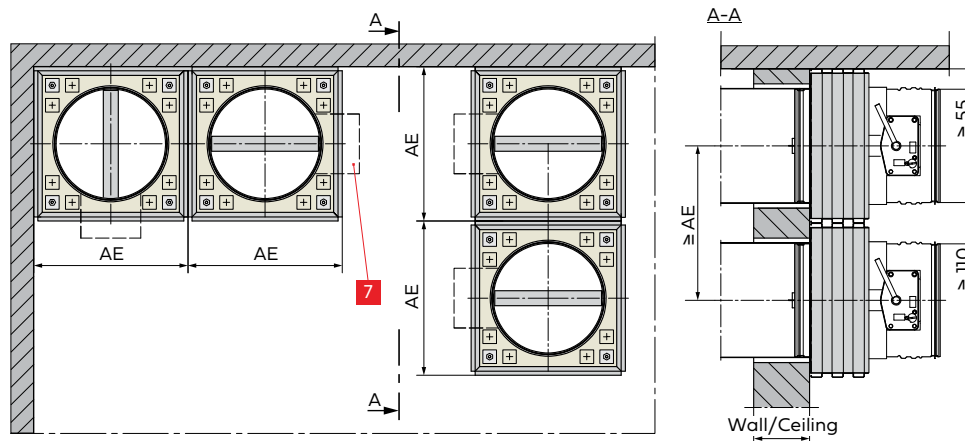
Installation

FR90 fire damper



Drilled hole spacing for the fastening

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



Spacings between mounting frames

It is not necessary to adhere to spacings between the individual AE mounting frames of the FR90 fire dampers, or between the AE mounting frames and adjacent walls or ceilings.

Nomenclature

No.	Description	No.	Description
1	AE mounting frame	5	Hexagon nut M6
2	FR90 fire damper	6	AE washer
3	Ventilation duct as required	7	Release mechanism or actuator
4	Continuous threaded bolt M6 or plug		

All dimensions in mm

5.3.6 Wet installation in base on rigid ceilings

Installation example with two FR90 fire dampers

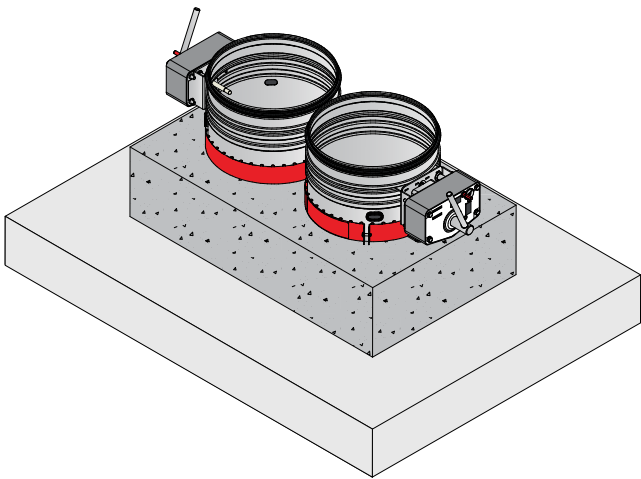


Table with 2 columns: Description of the ceiling, Fire resistance period. Row 1: Rigid concrete ceiling, 100.

- Manufacture in accordance with the general rules of structural engineering. Dimensioning according to DIN 1045 and DIN 4102-4.
- Cover made of concrete C 20/25, ≥ 100 mm in thickness, ≤ 750 mm in height.
- Reinforcement made of reinforcing steel Ø ≥ 8 mm. Vertical spacing ≤ 150 mm, horizontal circumferentially sealed spacing ≤ 150 mm. Alternative: welded steel wire mesh Q 335 A.
- Reinforcing steel overlap C_{nom} ≥ 35 mm for environments with up to moderate humidity (exposure class XC3).
- To bond the concrete, it is generally necessary to roughen the concrete ceiling and, where applicable, the reveal.

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

Section A-A

Mounting with AE mounting frame on ventilation duct made of concrete

Technical drawings showing cross-sections of the installation with dimensions and labels like DN, FR90, Concrete C20/25, Ø8, A, 15, 100, 35, 150, 750.

Roughen concrete ceiling in the area of the construction joint

Details on the mounting frame ▶ page 28.

All dimensions in mm

5.4 Metal stud walls

The walls, shaft walls, facings, fire walls etc. must be manufactured in accordance with the manufacturer's specifications and the valid standards. General building authority test certificates (abP) must be observed in Germany.

The stipulations for the design, fire resistance period and fire safety classification, specified wall widths, wall heights and wall thicknesses, and also dimensioning for the framework and cladding must be observed.

- Flexible walls with a metal stud wall design can feature cladding 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 are only fastened at the side ▶ [page 47 ff.](#)
- Fire walls and safety partition walls are metal stud walls with multi-layer cladding on both sides, and can contain inlays made from sheet steel. The walls must 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). For structural reasons, further reinforcements can be necessary for wall heights > 5000 mm. Metal stud walls can be produced with or without mineral wool between the metal studs.

i The details on installation specified in the following sections also apply to fire walls and safety partition walls. For fire walls and safety partition walls, studs, bay rails and reinforcements adjacent to the FR90 fire dampers can be produced from UA profiles. The manufacturer's specifications regarding this installation must be observed.

- Claddings made of gypsum boards DF according to EN 520 or equivalent boards (gypsum board fire safety panels, cement-bound boards, calcium silicate boards or gypsum plasterboard etc.) must be fastened to suit the specific wall.

In the perimeter area of the FR90 fire dampers, claddings must be secured with

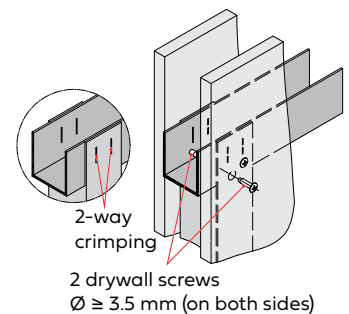
drywall screws of a suitable length and 3.9 mm in diameter at spacings of ≤ 200 mm or ≤ 150 mm. ▶ [page 33 ff.](#)

- Profiles for metal stud walls are described in DIN 18182 and EN 14195, constructions in DIN 18183.
- FR90 fire dampers may be installed in metal stud walls with up to 1000-mm metal stud spacing (span), and have been tested accordingly.

- The required bay rails and stiffeners should be used for installing FR90 fire dampers in metal stud walls so as to produce circumferential frames. Intersections must be connected with two blind rivets made from steel of 4 mm to 5 mm diameter or with drywall screws of ≥ 3.5 mm diameter and ≥ 10 mm length.

Prefixing can also be performed using clinching (crimping), as is typical in dry construction.

Furthermore, the claddings in the intersections must be connected to the metal studding using the usual double-connected screw fastenings.



- The gap "s" must be filled manually or mechanically with mortar of group II or III according to DIN 1053 or with the classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar. The minimum thickness of the wall is generally sufficient as the depth of mortaring.
- "Knauf Insulation TPD" or an equivalent product with a raw density ≥ 150 kg/m³ which meets the requirements of building material class A according to DIN 4102 or according to EN 13501-1, and has a melting point of ≥ 1000 °C, must be used as mineral wool. Insulation wool can also be used. Lower bulk densities are possible for shorter fire resistance periods of less than 90 minutes ▶ [page 36.](#)
- Mineral wool must be secured to prevent it falling out by using a non-combustible adhesive. Adhesive ▶ [page 12.](#)
- In the case of RE installation subframes in metal stud walls, gaps can also be filled with cladding panels made from wall-building materials, calcium silicate boards, calcium magnesium silicate mats or ceramic fibre. Building material class A and a melting point of ≥ 1000 ° are always required.

Minimum thicknesses [in mm] of metal stud walls for the installation of FR90 fire dampers				
Description of the wall		Fire resistance period		
		30 min 60 min	30 min 60 min 90 min	30 min 60 min 90 min 120 min
Metal stud walls with cladding on both sides	≥ 1 -layer cladding	70	-	-
	≥ 2 -layer cladding	-	94	94
Shaft walls made of wall boards, at least 2-layer	with metal studs	-	90	-
	without metal studs	-	40	-

Installation

FR90 fire damper

Installation openings for FR90 fire dampers require cutouts in the cladding. Trimmers or special arrangements can be required in metal studs.

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

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

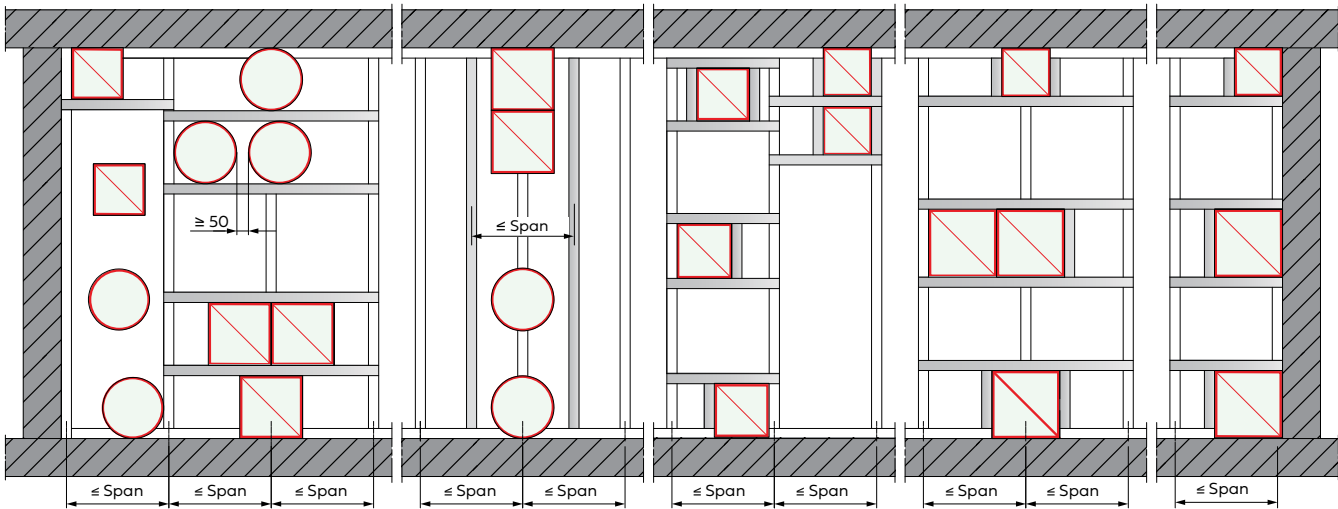
Severed supports will require trimmers which can simultaneously serve as the frame for the installation openings.

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

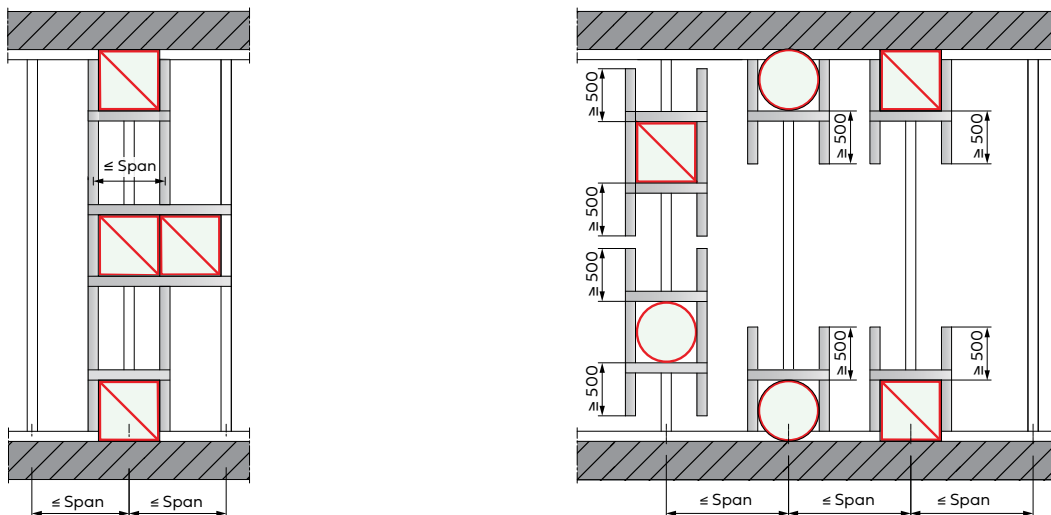
Examples of installation openings

Installation with installation subframes in walls ≤ 150 mm thick

Installation with mortar, mineral wool, installation subframe



Depending on the wall in question, suitable connections are possible in order to break up profiles on ceilings and floors for the purpose of installing FR90 fire dampers ► [page 33 ff.](#)

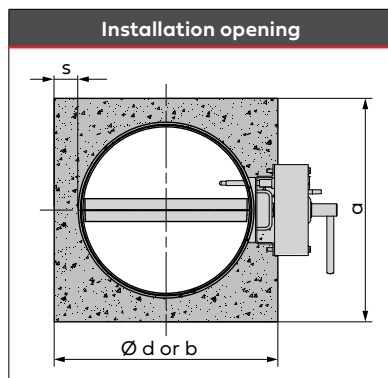
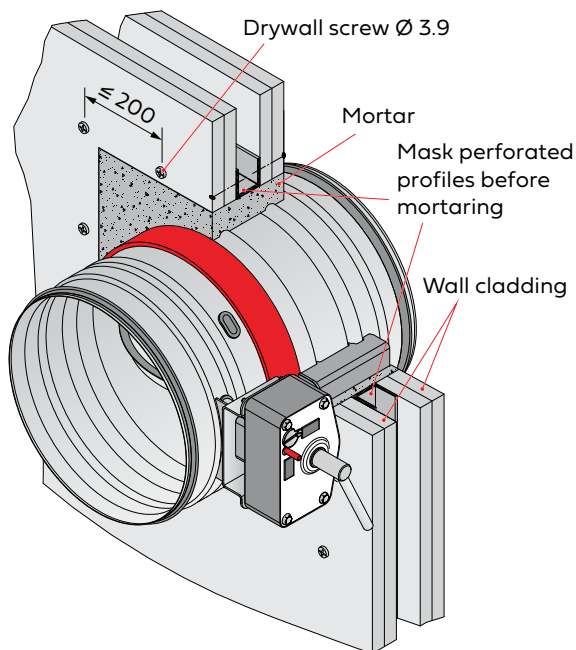


Trimmers, as shown for retroactive installation, require additional metal studs on the left and right. These should be set in the floor and ceiling profiles.

For this purpose, the wall can be cut open 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. Claddings must be screwed to them with spacing of ≤ 200 mm.

5.4.1 Wet installation with mortar



Minimum thicknesses Wall [mm]	
Description of the wall	Fire resistance period
	30 min
	60 min
	90 min
	120 min
Metal stud wall with ≥ 2 -layer cladding on both sides	94

i Further information on walls and wall mounting ► [page 31 ff.](#)

- **Mortar anchors** made from, for example, riveted perforated tape must be attached to the metal profiles of the wall, at least 1 pc. per side, with approx. 200 mm spacing.
- Openings in perforated metal profiles must be masked with adhesive film before mortaring.
- Mortar fillings need to be bonded with the wall profiles in order to prevent sliding out, e.g. using the beading in CW profiles or with a mortar anchor, e.g. made from perforated tape. In reveals, drywall screws protruding by around 5 mm, with spacing of 200 mm, are sufficient.

- **Installation opening:**
 $a = DN + 30 \dots 450 \text{ mm}$
 $b = DN + 75 \dots 450 \text{ mm}$
 $\varnothing d = DN + 65 \dots 450 \text{ mm}$
- **Gap dimension:**
 $s = 15 \text{ mm} \dots 225 \text{ mm}$

Weight limit

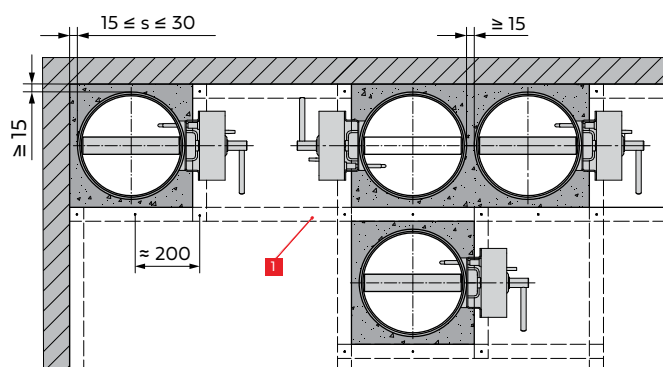
FR90 fire dampers with a total weight of $\leq 90 \text{ kg}$ including mortar (approx. 2200 kg/m^3) may be installed between two metal studs.

Total weight of fire damper incl. mortar with wall = 100 mm									
DN	100	125	140	160	180	200	224	250	280
[kg]	6	7	8	9	10	11	13	14	16
DN	315	355	400	450	500	560	630	710	800
[kg]	19	24	28	33	37	44	52	62	75


- For wall = 150 mm, the weights must be multiplied by 1.35.
- The table applies for installation openings of the size $DN + 60 \text{ mm}$.

Installation

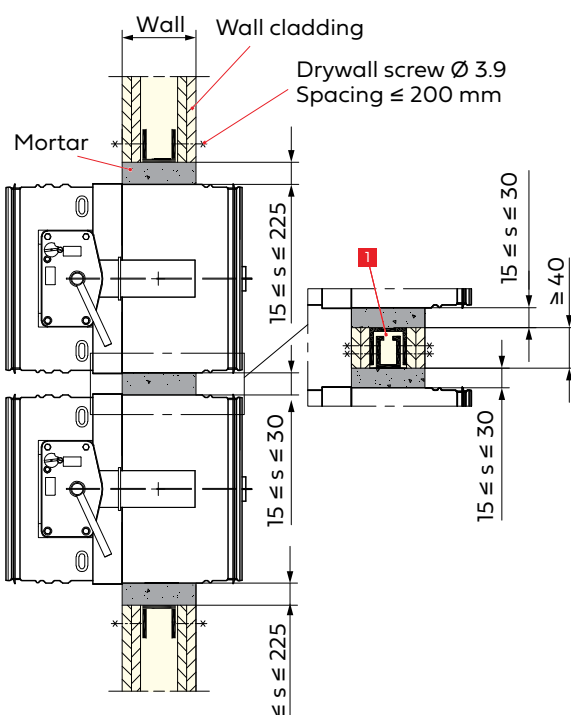
FR90 fire damper



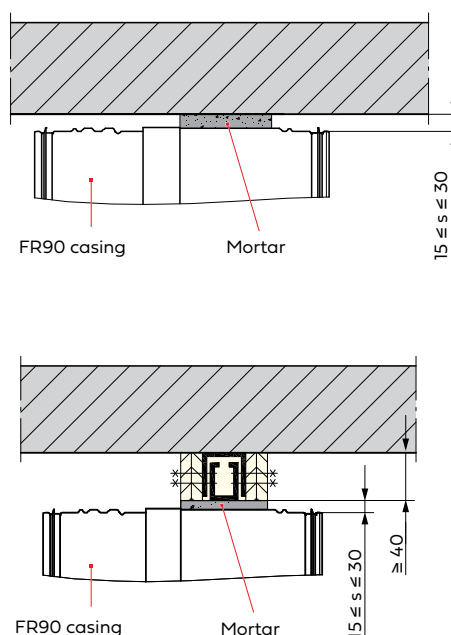
Spacings between the FR90 fire dampers and from adjacent walls and ceilings

A bay rail  is installed horizontally between the fire dampers if the spacing between the fire dampers is greater than 30 mm.

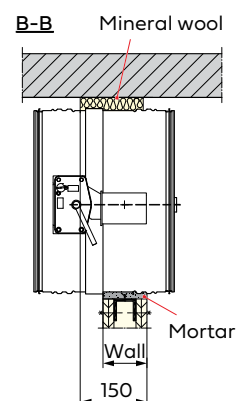
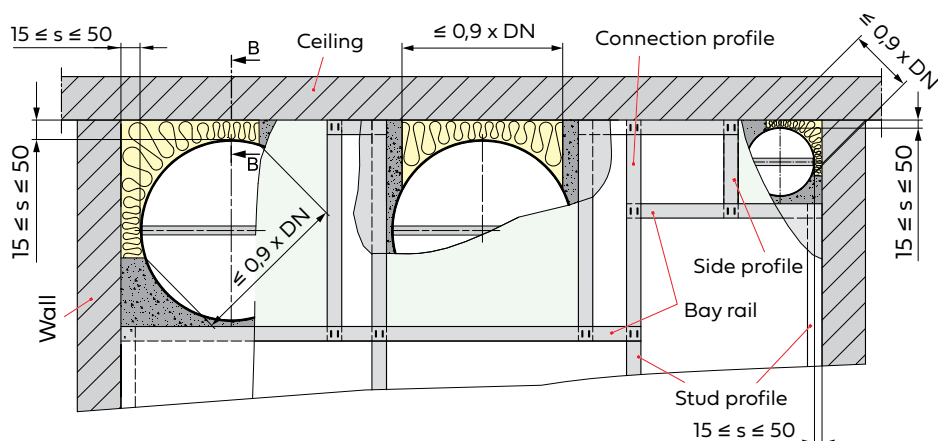
Connections within the wall




Connections to rigid walls, ceilings, floors



Partial mortaring (up to fire resistance period of 90 min)



Gap $s = 15 \dots 50$ mm must be filled 150 mm deep with mineral wool in two-layer cuts of boards, and secured with non-combustible adhesive to prevent it from falling out. A sheet metal cover is recommended when using insulation wool.

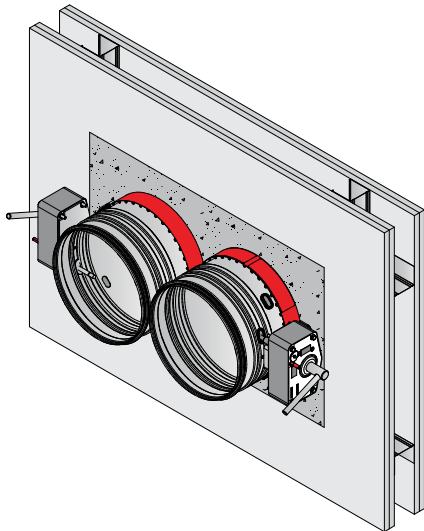
 Further information on mineral wool and mortar ► [page 31](#), adhesive [page 12](#).

All dimensions in mm

Installation

FR90 fire damper

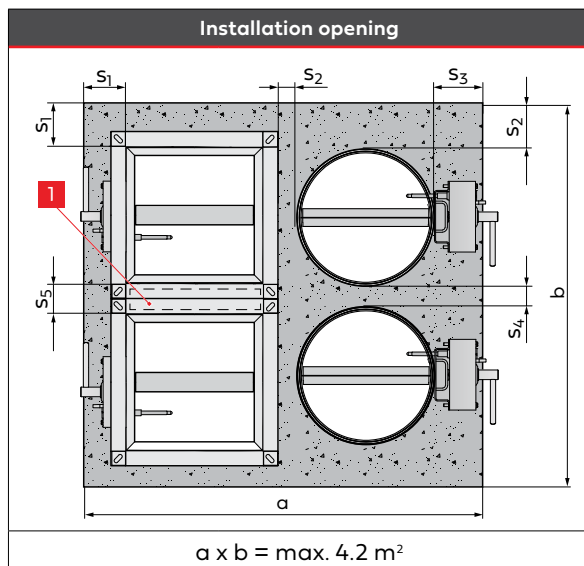
5.4.1.1 Multiple installation with mortar



Minimum thicknesses Wall [mm]	
Description of the wall	Fire resistance period
	30 min
	60 min
	90 min
	120 min
Metal stud wall with ≥ 2 -layer cladding on both sides	94

i Further information on walls and wall mounting ► [page 31 ff.](#)

- Multiple installation of up to 4 pcs. FR90 fire dampers of the same size side-by-side, above each other or combined with FK90 fire dampers is possible.
- Observe the weight indications on [page 33](#).

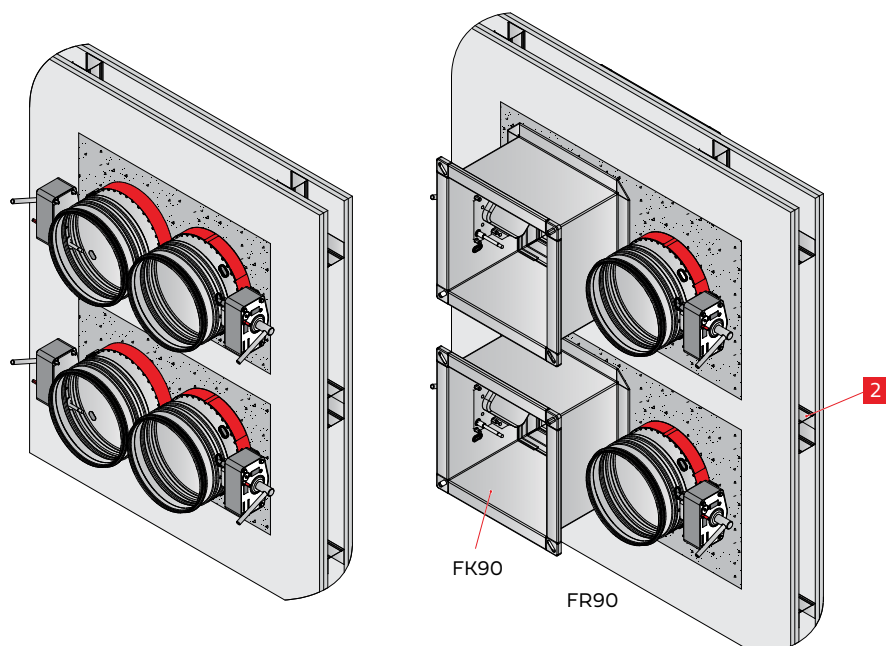


- **Gap dimensions:**
All-round gap in relation to all installed fire dampers = max. 225 mm

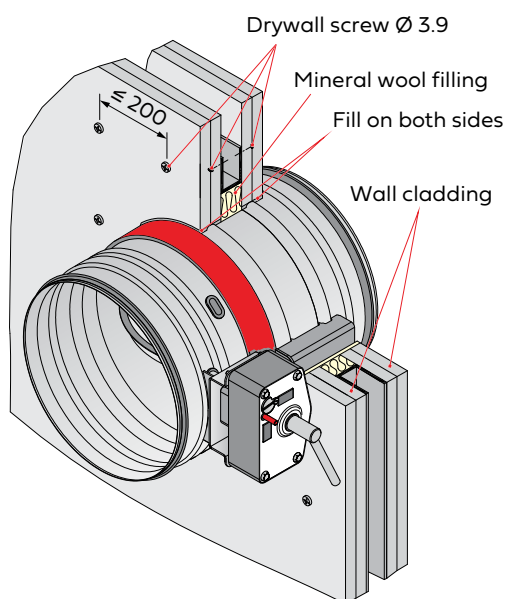
	Description	Gap dimension
s ₁	Minimum gap FK90 - installation opening	≥ 40 mm
s ₂	Minimum gap around FR90	≥ 15 mm
s ₃	Minimum gap, operation side FR90 - installation opening	≥ 50 mm

- An interleaved profile **1** is inserted (► [page 31](#)) between FK90 fire dampers which are installed one above the other.
- A cross rail **2** must be used between the upper and lower fire dampers in a common installation opening if the following gap dimensions are exceeded:
 - vertical gap between FR90 and FR90 s₄ > 30 mm or
 - vertical gap between FK90 and FK90 s₅ > 120 mm

Installation example



5.4.2 Dry installation with mineral wool



Minimum thicknesses Wall [mm]	
Description of the wall	Fire resistance period
	30 min
	60 min
	90 min
	120 min
Metal stud wall with ≥ 2 -layer cladding on both sides	94

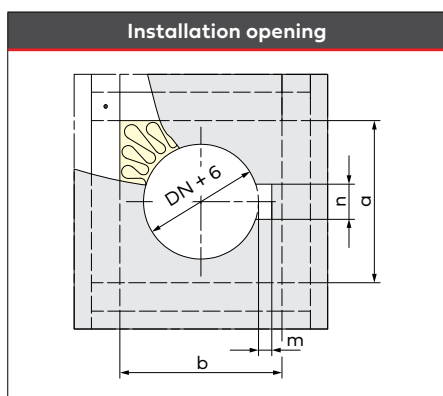
i Further information on walls and wall mounting ► [page 31 ff.](#)

Mineral wool filling

The bulk density of the mineral wool filling around the casing of the FR90 fire damper for a fire resistance period of 90 minutes or more must be $\geq 150 \text{ kg/m}^3$. For 60 minutes, $\geq 100 \text{ kg/m}^3$ is sufficient, for 30 minutes $\geq 50 \text{ kg/m}^3$ is sufficient.

Installation recommendation

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



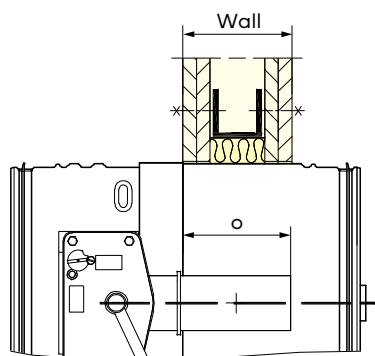
Installation opening in metal studs:

$a \times b \geq \text{DN} + \text{approx. } 60 \text{ mm}$

In the cladding:

Casing of the FR90 fire damper = $\text{DN} + 6 \text{ mm}$.

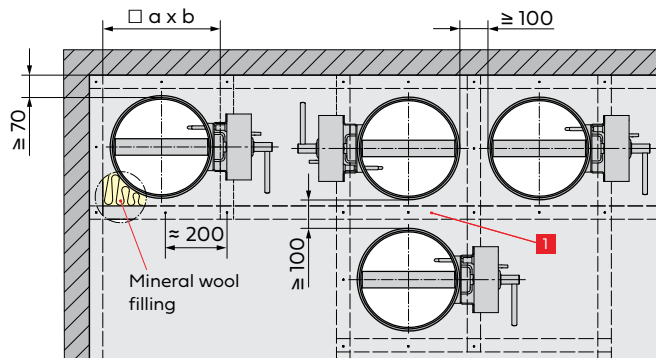
The notch $m \times n$ is required on the operation side in addition. On the non-operation side it is only needed if the dimension "o" (depth of the actuator box from the installation edge) on the non-operation side is greater than the wall thickness, minus the thickness of the cladding.



Nominal size	m	n	o
$\text{DN} \leq 315$	26	56	101
$\text{DN} \geq 355$	31	77	101

Installation

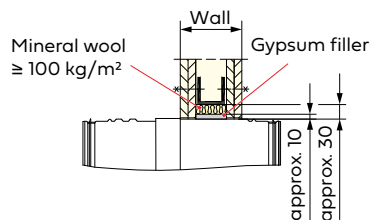
FR90 fire damper



Spacings between the FR90 fire dampers and from adjacent walls and ceilings

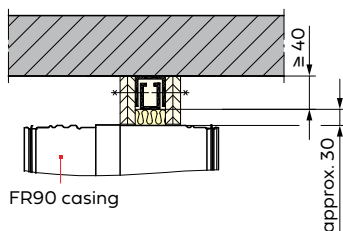
- A bay rail **1** is installed horizontally between the fire dampers.

Installation in EI 120 walls

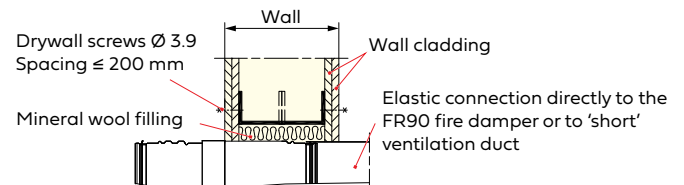


- The installation in EI 120 walls is in principle unchanged. Approx. 10 mm of gypsum filler must be applied all-round.

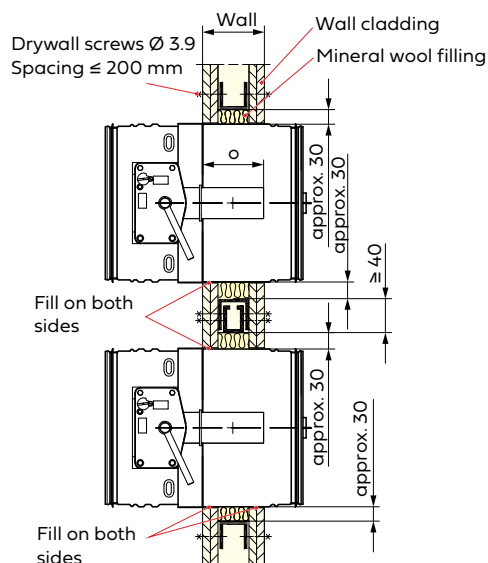
Connections to rigid walls, ceilings, floors



Example for thicker wall



Connections within the wall



All dimensions in mm

5.4.3 Dry installation with installation subframe

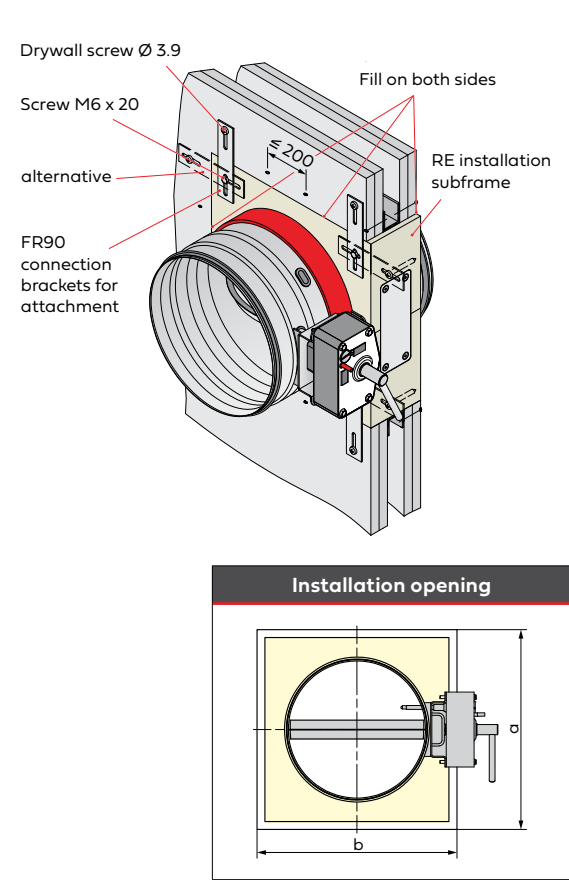


Table with 4 columns: Description of the wall, Minimum thicknesses Wall [mm], and Fire resistance period (30 min, 60 min, 90 min). It details requirements for metal stud walls with 1-layer or 2-layer cladding.

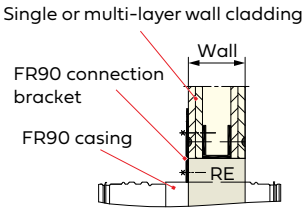
Further information on walls and wall mounting ► page 31 ff.

- FR90 connection brackets are sufficient on one side of the wall if they are screwed to the all-round profile around the frame (DN ≤ 315: 4 pcs., DN ≥ 355: 8 pcs.). Otherwise, the RE installation subframe must be fastened to the rear of the wall with the same number of brackets.
- For fire walls and safety partition walls, the studs, bay rails and reinforcements adjacent to the FR90 fire dampers must be produced from UA profiles.

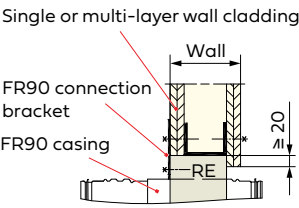
- Installation opening::
DN ≤ 315: a x b = DN + 91+3 mm
DN ≥ 355: a x b = DN + 101+3 mm

Connections within the wall

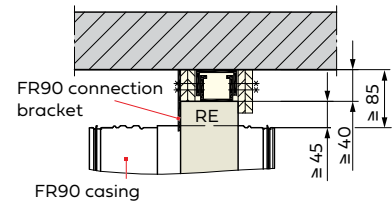
RE100: wall ≤ 110 / RE150: wall ≤ 150



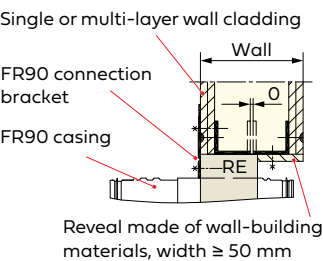
RE100: wall = 125 / RE150: wall = 175



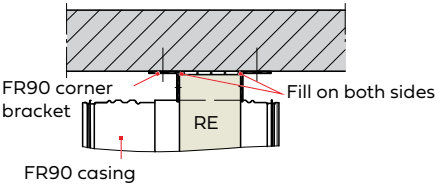
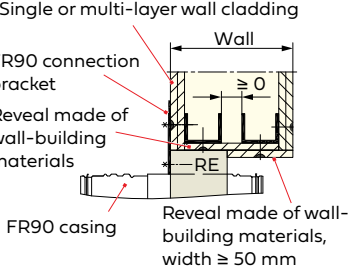
Connections to rigid walls, ceilings, floors



RE100: wall ≥ 150 / RE150: wall ≥ 200



RE100: wall ≥ 150 / RE150: wall ≥ 200

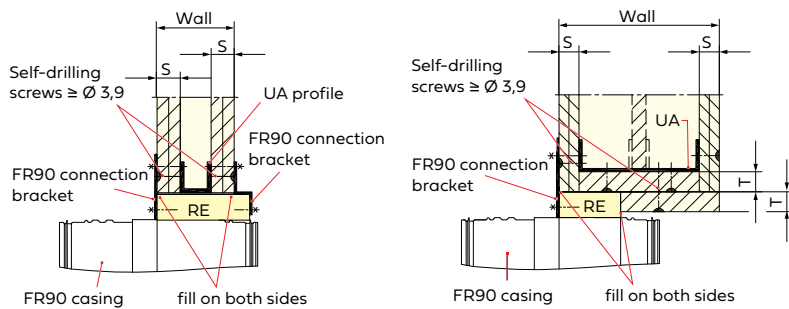


All dimensions in mm

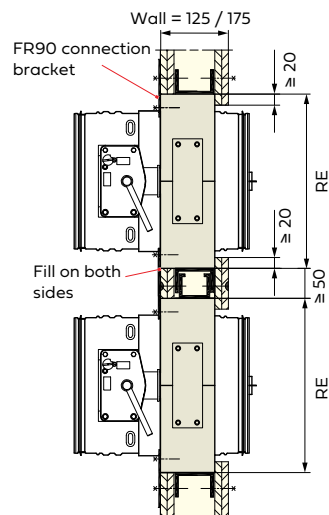
Installation

FR90 fire damper

Wall connections in fire walls and safety partition walls

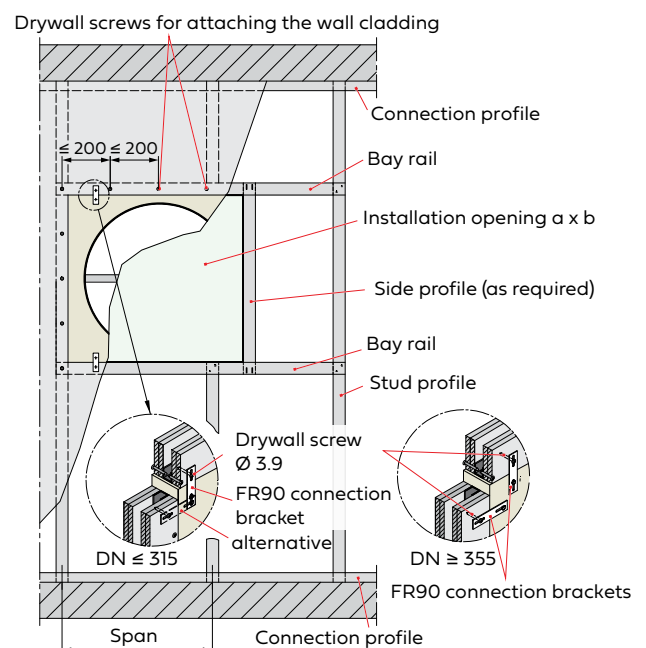
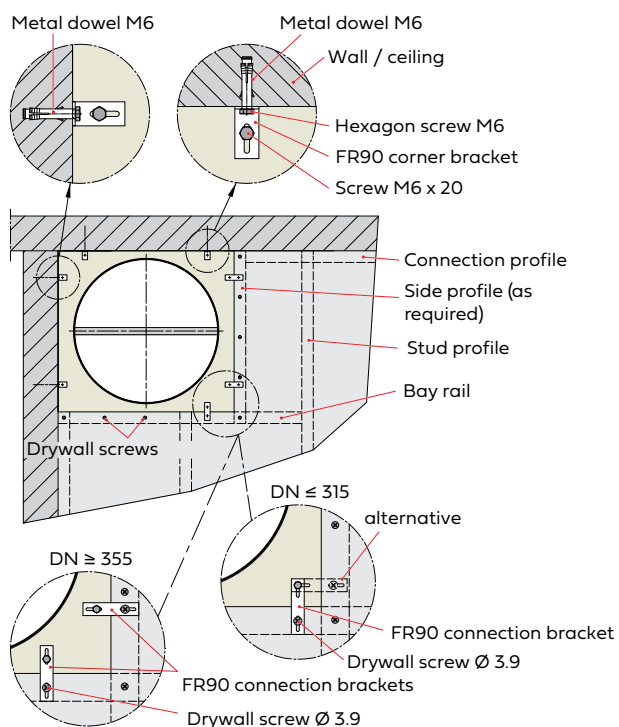


- Reveals must be cladged with $T \geq 20$ mm thick calcium silicate boards or with $T \geq S$ thick boards made from wall cladding materials.



- Between the frames of FR90 fire dampers which are not installed as a package (► [page 40](#)), but rather individually, a spacing of ≥ 50 mm is required.

Installation with all-round metal profiles



All dimensions in mm

5.4.3.1 Multiple installation with installation subframes

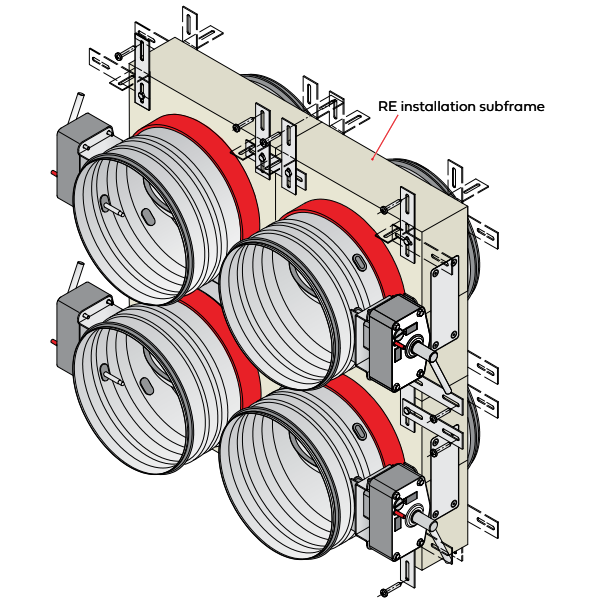


Table with 2 columns: Description of the wall, Fire resistance period. Row 1: Metal stud wall with ≥ 2-layer cladding on both sides, 94.

- Further information on walls and wall mounting ▶ page 31 ff.
- Up to 4 of the same nominal sizes may be installed side-by-side, above each other or in a combined manner.
- Assembly is performed using FR90 connection brackets and screws M6 x 20. They should be screwed on both sides of the installation subframe into the factory-produced threaded sockets provided.
- Reveals of the installation subframe must be filled with gypsum filler or non-combustible adhesive; mineral wool is possible ▶ page 31.
- Accordingly, there are spacings of ≤ 2 mm or ≤ 20 mm between the installation subframes.

Installation with all-round metal profiles, see also ▶ page 39

- Weight limit ≤ 90 kg
- The following combinations are possible:

Table with 4 columns: Pcs., 2, 3, 4. Row 1: RE100, ≤ DN 800, ≤ DN 560, ≤ DN 450. Row 2: RE150, ≤ DN 630, ≤ DN 500, ≤ DN 400.

Installation without all-round metal profiles, see also ▶ page 41

- Weight limit ≤ 50 kg
- The following combinations are possible:

Table with 4 columns: Pcs., 2, 3, 4. Row 1: RE100, ≤ DN 500, ≤ DN 355, ≤ DN 315. Row 2: RE150, ≤ DN 400, ≤ DN 315, ≤ DN 280.

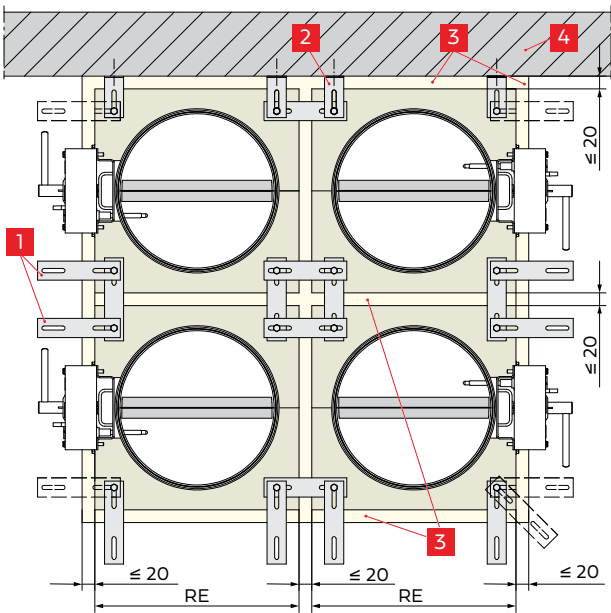
Fastening in metal stud walls is performed with FR90 connection brackets. Fastening to adjacent rigid walls and ceilings with FR90 angle brackets; when installing without all-round metal profile on both sides of the wall. Factory-produced threaded sockets in the installation subframes are provided for the M6x20 screws. Per side of wall:

- DN ≤ 315: 2 connection brackets each between adjacent frames + 12 connection brackets/angle brackets for connection to the wall/ceiling
- DN ≥ 355: 4 connection brackets each between adjacent frames + 24 connection brackets/angle brackets for connection to the wall/ceiling

Assembled multiple fire dampers must be installed as a single fire damper. Installation and further fastening are described for the wall types, including sealing the reveal ▶ page 39.

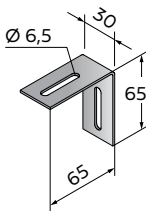
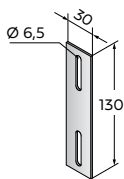
RE installation subframes can be installed immediately next to each other. Other installation spacings depend on the thickness of the filling used.

Adhesive ▶ page 12



FR90 connection bracket

FR90 corner bracket



Nomenclature

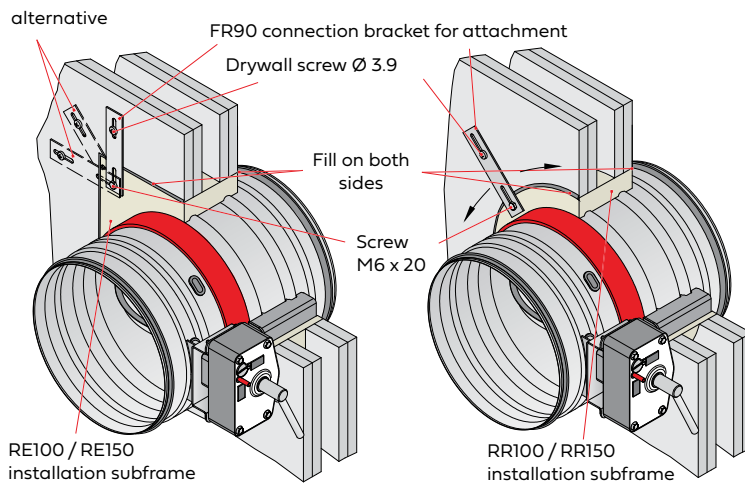
Table with 2 columns: No., Description. Row 1: 1, FR90 connection bracket. Row 2: 2, FR90 corner bracket. Row 3: 3, Filling. Row 4: 4, Adjacent wall/ceiling.

All dimensions in mm

Installation

FR90 fire damper

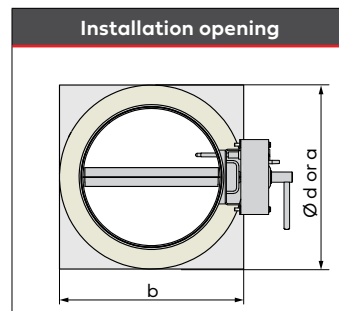
5.4.3.2 Dry installation with installation subframe without all-round profiles



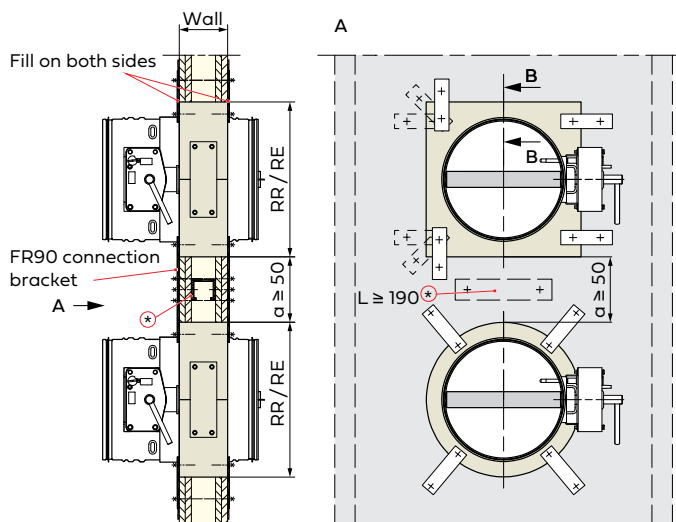
Minimum thicknesses Wall [mm]	Fire resistance period
Description of the wall	30 min 60 min 90 min
Metal stud wall with ≥ 2 -layer cladding on both sides	94

i Further information on walls and wall mounting ► [page 31 ff.](#)

- For installation with round RR installation subframes (DN ≤ 315 mm) and with rectangular RE installation subframes, no profiles are required in the wall all-round.
- The installation subframes must be fastened on both sides of the wall with FR90 connection brackets (DN ≤ 315 : 2 x 4 pcs., DN ≥ 355 : 2 x 8 pcs.).



- Installation opening:
 DN ≤ 315 : $a \times b = DN + 91^{+3}$ mm
 $\varnothing d = DN + 101^{+3}$ mm
 DN ≥ 355 : $a \times b = DN + 101^{+3}$ mm



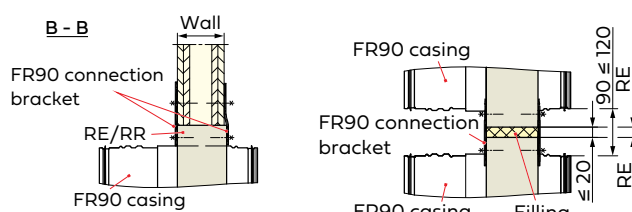
Installation

- Always select the thickness of the installation subframes RR or RE (100 or 150 mm) equal to or greater than the wall thickness.
- An installation opening should be cut through the clad wall.
- The damper should be inserted and fastened with FR90 connection brackets on both sides.

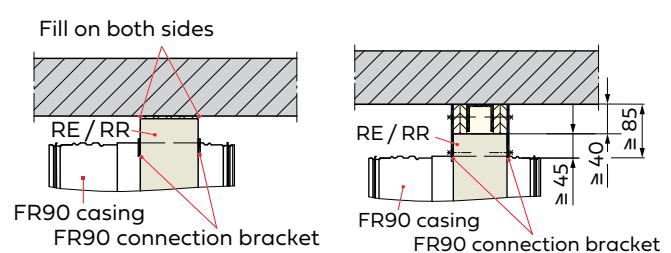
Seal the remaining joints on both sides with gypsum filler as usual for this type of wall.

- ⊕ Spacings $a = 50$ mm to 100 mm between installation subframes RR or RE require $a \geq 190$ mm long stud profile in the wall for reinforcement. It is inserted via the installation openings into the wall cavity and fastened to the claddings with two drywall screws.

Connections within the wall

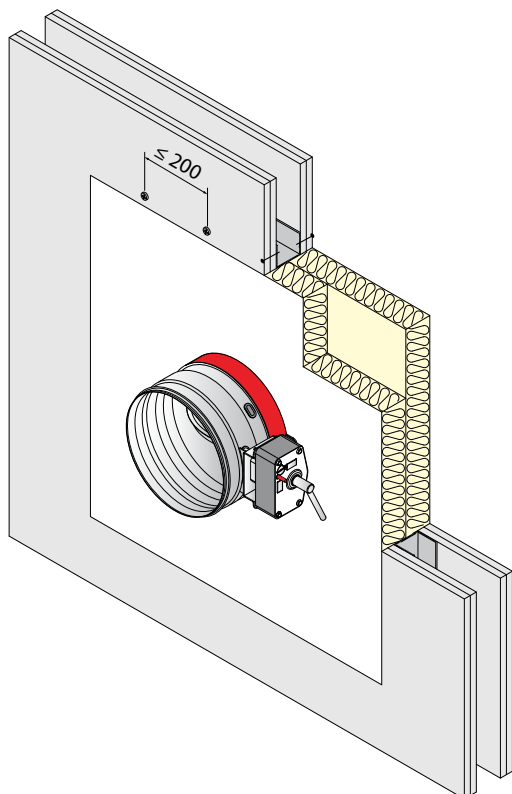


Connections to rigid walls, ceilings, floors



All dimensions in mm

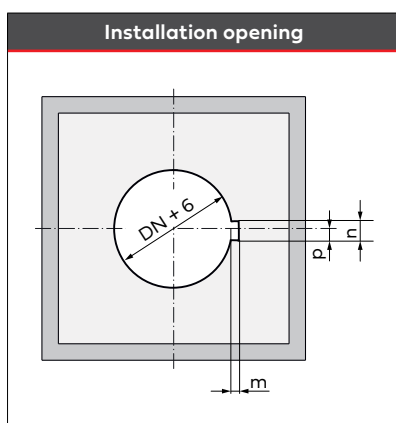
5.4.4 Dry installation with fire batt system



Minimum thicknesses Wall [mm]	
Description of the wall	Fire resistance period
	30 min
	60 min
	90 min
Metal stud wall with ≥ 2 -layer cladding on both sides	100

i Further information on walls and wall mounting ► [page 31 ff.](#)

- The fire damper is suspended on both sides using the suspension of the connected ventilation duct. Special fire protection fastenings or suspensions for the fire damper are not required.
- The weight of the fire damper (size-dependent weight table ► [page 76](#)) must also be borne by the connected ventilation duct.
- When using flexible connectors or without a ventilation duct connection, suspension can also be performed directly on the fire damper, e.g. using ventilation pipe clips.
- In the opening area, the drywall screws for the cladding must be affixed with spacing of ≤ 200 mm.



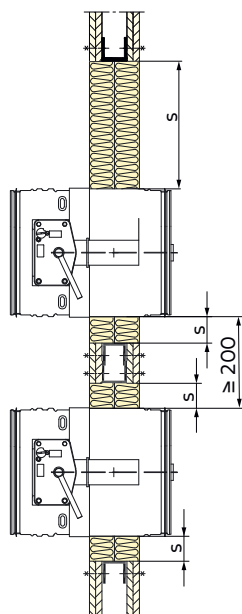
Nominal size	m	n	p
DN ≤ 315	26 mm	56 mm	28 mm
DN ≥ 355	31 mm	77 mm	47 mm

Installation

The board material must be cut to size to suit the installation opening and contour of the fire damper so that it rests firmly in placed after installation. Coated edges must be chamfered. The cut surfaces of the board material and the reveal in the installation opening must be brushed with the coating putty or the filler of the specific system. Insert the first layer of board material, make sure that the surface coated in the factory faces outwards. Insert the second layer of board material. In this case, too, have the coated surface face outwards, and arrange the butt joints offset from one another. Seal all butt joints, including those on supporting structures and the fire damper, completely on both sides of the wall with the coating putty or filler and brush them with the fire safety coating.

Installation

FR90 fire damper

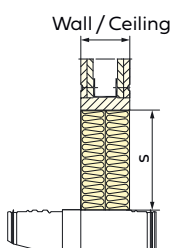


- Only one fire damper may be installed per fire batt system.
- Clearance between FR90 fire dampers ≥ 200 mm (Austria: ≥ 100 mm according to ÖNORM H 6025).

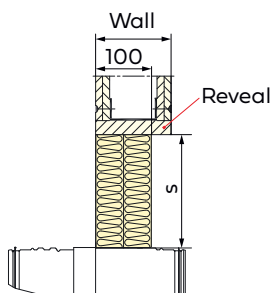
s	s1	s1 (Austria)
50 ... 600 mm	75 ... 600 mm	20 ... 600 mm

Installation examples

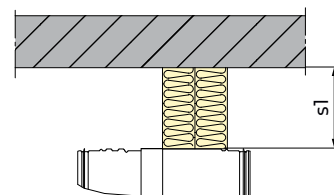
**Wall = 100 mm,
fire batt system = 100 mm**



**Wall ≥ 100 mm
(shown = 150 mm, fire batt system = 100 mm)**



**Installation directly on walls
or ceilings**



Overview of fire batt systems

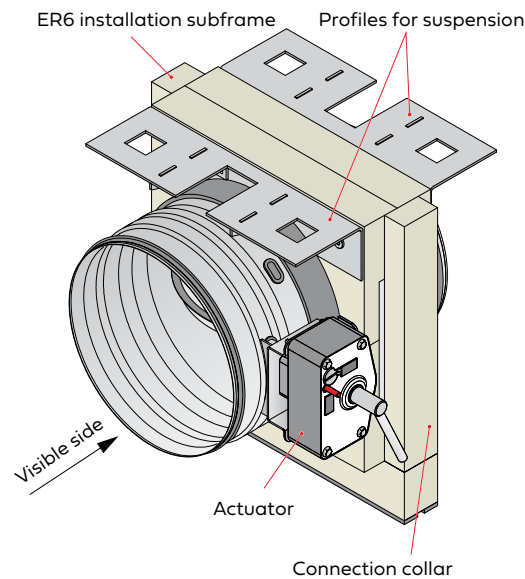
Manufacturer	Fire safety coating	Fire safety sealing compound	Board material
FLAMRO®	Flammotect®-A paint	Flammotect®-A filler	Flammotect®-A precoated mineral fibre board
	Flamro® BML / BMA	Flamro® BMS	Coated mineral fibre board (BMA)
Hensel®	Hensomastik® 5 KS viscose	Hensomastik® 5 KS viscose	Hensomastik® 5 KS precoated mineral fibre board
Hilti®	Hilti® CFS-CT	Hilti® CFS-S ACR	Hilti® CFS-CT B
	Hilti® CP 673	Hilti® CP 673	Hilti® CP 673
OBO Bettermann®	Pyrocoat® ASX paint	Pyrocoat® ASX filler	According to manufacturer's instructions
Promat®	Promastop® -CC	Promastop® -CC	Promat® mineral wool board, precoated, type CC
	Promastop® -CA	Promastop® -CA	Promat® mineral wool board, precoated, type CC
SVT®	Pyro-Safe® Flammotect®-A paint	Pyro-Safe® Flammotect®-A filler	Pyro-Safe® Flammotect®-A mineral fibre board
	BML/BMA	BMS	BMA coated mineral fibre board
Würth®	Würth® ablation coating 1	Würth® ablation coating 1	Würth® mineral fibre board AB, precoated

The material stipulated by the respective manufacturer must be used.

In addition, all fire batt systems can be used with ablative coatings if they meet the following requirements:

- Board material non-combustible, melting point ≥ 1000 °C, minimum thickness 50 mm
- Density of the board material at least 140 kg/m³
- Ablative coating, reaction to fire at least class E, in accordance with EN 13501-1
- Test certificate according to EN 1366-3 (submission of a valid ETA is sufficient as proof of suitability as long as the required specifications are observed). The user is responsible for verifying the suitability of the fire batt systems in relation to fire resistance.

5.4.5 Installation with sliding ceiling connection

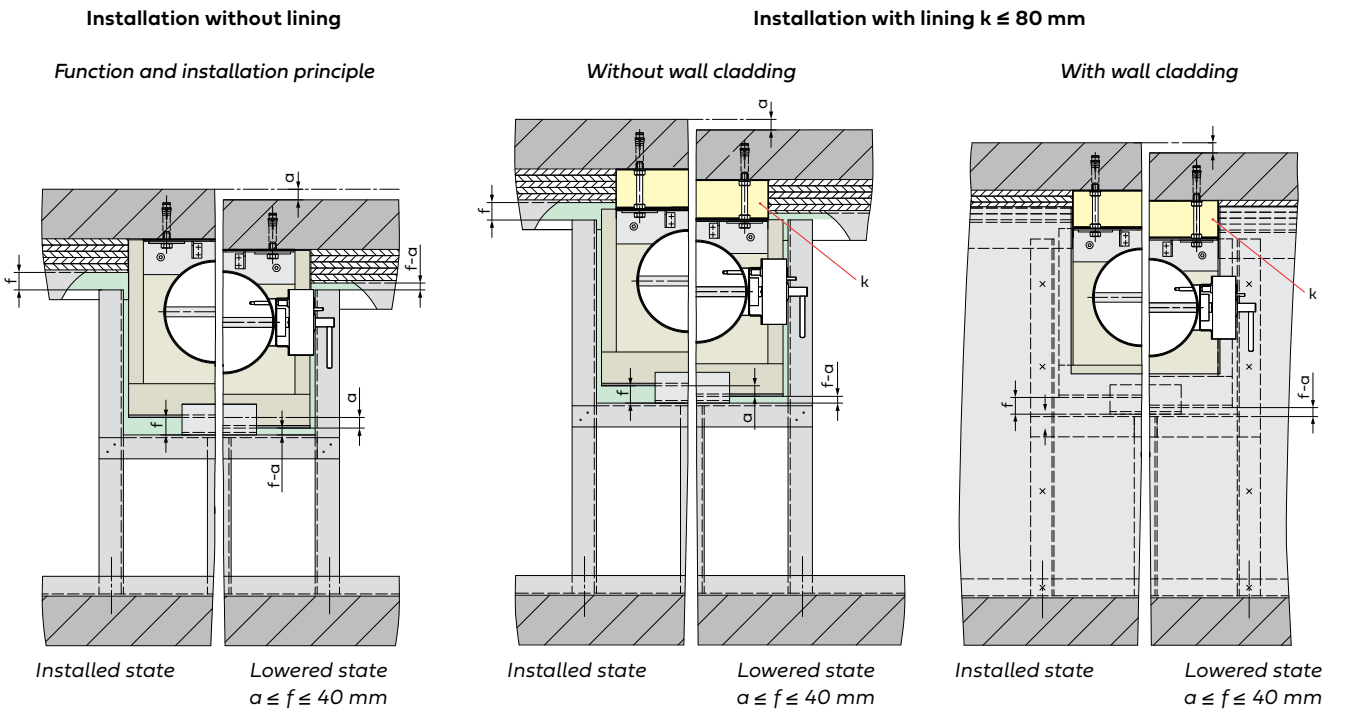


Minimum thicknesses Wall [mm]	
Description of the wall	Fire resistance period
	30 min
	60 min
	90 min
Metal stud wall with ≥ 2-layer cladding on both sides	95

i Further information on the walls and filling material ▶ [page 31 ff.](#)

- With the expected ceiling drops of $f \geq 10$ mm, it is necessary to produce a sliding ceiling connection for the metal stud wall.
- The designs of expansion joints for ceiling drops $f \leq 20$ mm are described in DIN 4102-4. Designs for $f \leq 40$ mm, for example, are included in the general building authority test certificates (abP). Conventional installation of fire dampers is only possible in a wall area that is far below the ceiling connections of up to 200 mm in height.
- In metal stud walls with cladding on both sides, FR90 fire dampers can be installed with an ER6 installation subframe directly or with 30 ... 80 mm spacing below rigid ceilings. The ER6 installation subframes guide the sliding ceiling connection around the FR90 fire damper. This is fastened in such a way that it lowers together with the ceiling and the ventilation ducts.
- When ordering, the following information must be provided:
 - Actuator position: left, right (shown), bottom
 - Stud profile depths $S = 50, 60, 75, 85, 100, 125$ mm

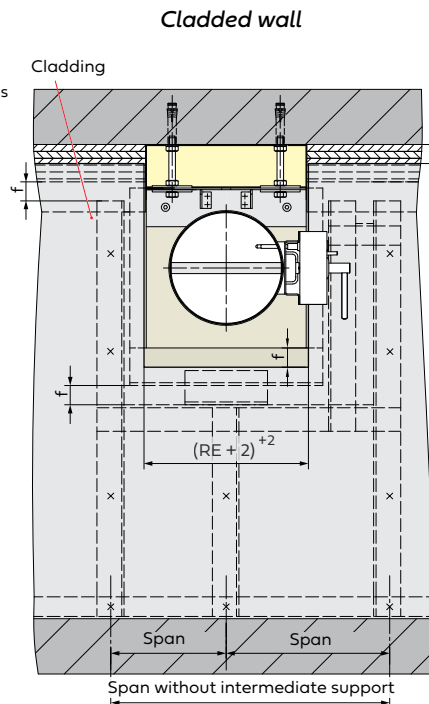
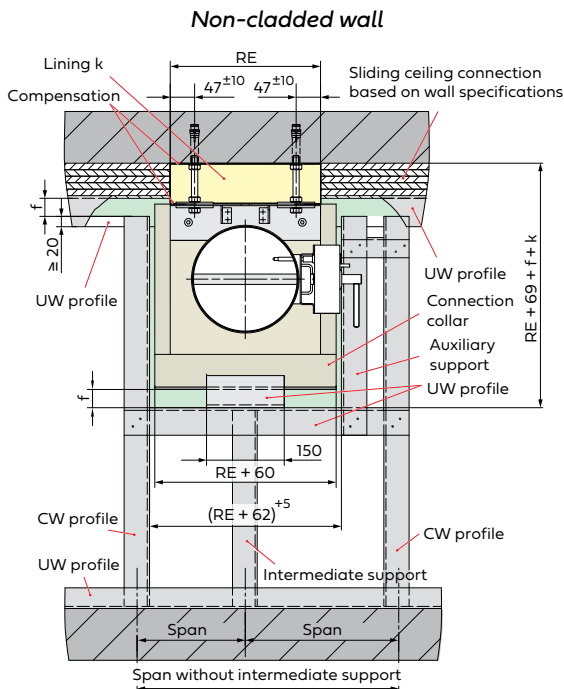
Function of the sliding ceiling connection



Installation

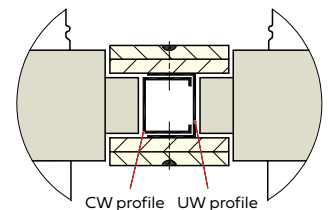
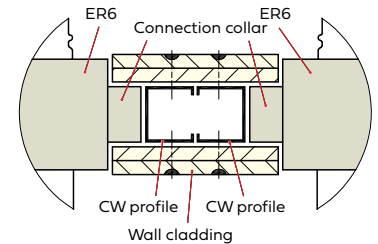
FR90 fire damper

Installation and arrangement of the metal studs

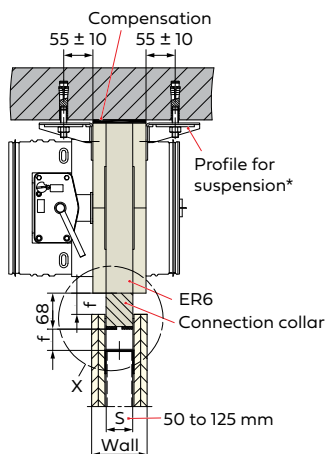


Examples of installation of two fire dampers next to each other

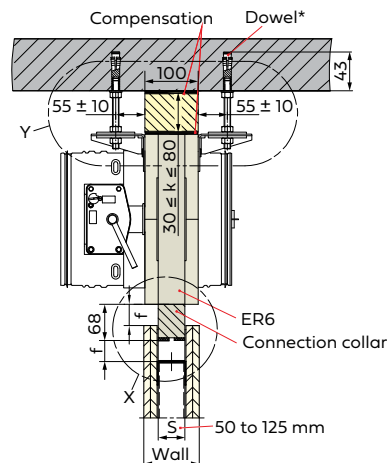
- An installation opening is required for each fire damper.
- The respective profiles can be inserted in each other.



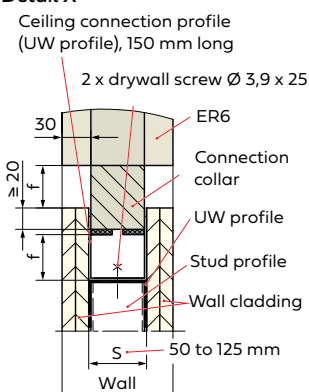
Installation without lining



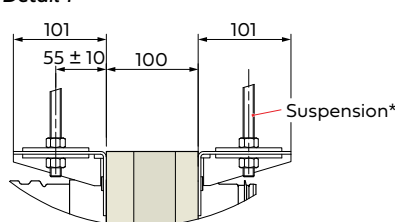
Installation with lining $k = 30 \dots 80 \text{ mm}$ (including compensation)



Detail X



Detail Y



*) Is included in the scope of delivery of the ER6 installation subframes. Adhere to the installation instructions for the plugs. The Zykon drills with drive-in mandrels needed for installation can be supplied as optional items.

- ER6 installation subframes must match the stud profile depth S of the metal studs.
- ER6 installation subframes can be installed directly below rigid ceilings or with $30 \dots 80 \text{ mm}$ spacing. It must be sealed with a lining k attached to the ceiling and made from 100 mm wide strips of calcium silicate board with a bulk density of 500 kg/m^3 .
- The surfaces of the ceilings must be smooth and even. If necessary, evening measures must be taken (rendering, smoothing etc.). Gaps and joints between the ER6 installation subframe, the lining k and the ceiling must be levelled off and sealed in a manner appropriate to the wall in question. Any openings remaining in the reveal between connection collars and ceiling connection profiles should be sealed, either with strips of wallboard and/or gypsum filler or with mineral wool strips (melting point $\geq 1000 \text{ }^\circ\text{C}$ and $\geq 80 \text{ kg/m}^3$ bulk density) and non-combustible adhesive.
- Fire dampers with ER6 installation subframes should be screwed onto the rigid ceiling using the M12 suspension components provided, and should then be aligned.
- The metal studs can then be positioned, whereby intermediate supports and lateral auxiliary supports must be fitted underneath the FR90 fire dampers if required due to the spans.
- There must also be clearances for incorporating the planned ceiling drop below the attached FR90 fire dampers in the area of the CW profiles, any CW intermediate supports, U profiles and claddings.
- Wall claddings must be attached according to general building authority test certificates and technical standards.

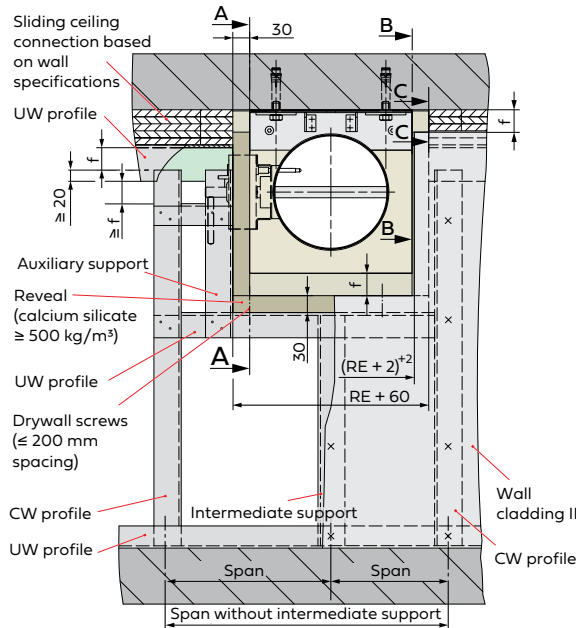
All dimensions in mm

Installation

FR90 fire damper

5.4.5.1 Sliding ceiling connection in double-studded walls

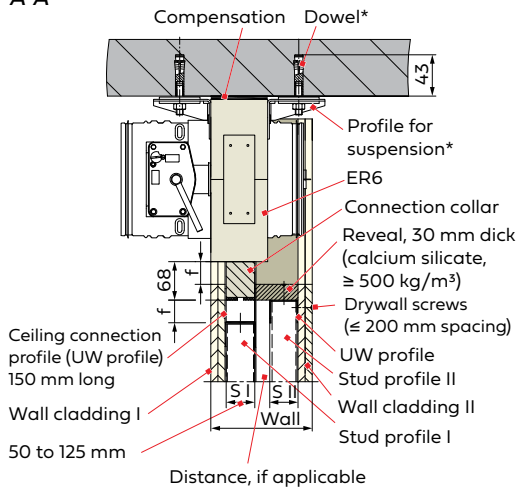
Installation directly under ceilings



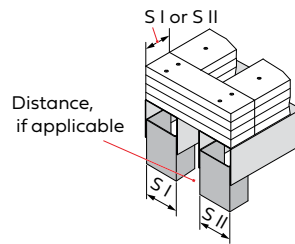
- Installation the same in principle as ► [page 45](#).
- ER6 installation subframes must fit the stud profile depth S I of the metal studs I, which should have profiles with the corresponding stud profile depths.
- The metal studs II contain a recess that is framed by the wall profiles. Accordingly, the strips of wall cladding material (e.g. plasterboard) attached to the ceiling are interrupted and sealed at the front (sections C - C).
- The profiles surrounding the recess on the metal studs II have reveals made from 30 mm thick calcium silicate boards. They are advanced onto the ceiling up to the spacing f of the drop (sections B - B) and fastened to the metal stud profiles with spacing of ≤ 200 mm using drywall screws.
- If the metal studs have claddings on both sides, the sliding joint for the connection collar of the ER6 installation subframe rests between cladding I and the reveal adjacent to the cladding II (sections B - B).
- Joints should be filled according to standard practice in wall construction.

The views on the left and below show the rear of the wall, i.e. the non-operation side of the FR90 fire damper.

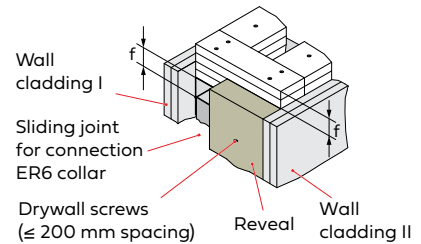
A-A



B-B (without connection collar)

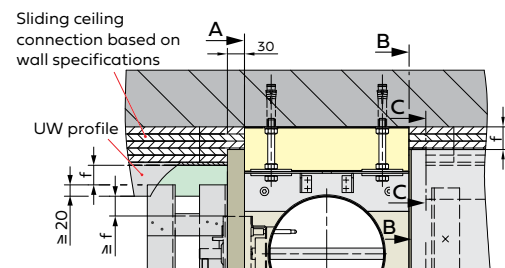


C-C

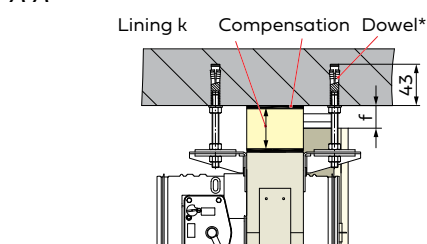


*) Is included in the scope of delivery of the ER6 installation subframes

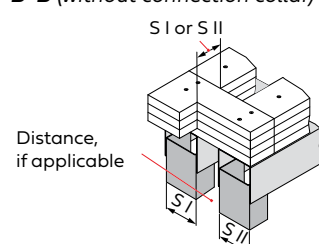
Installation with lining for spacing of ≤ 80 mm from ceilings



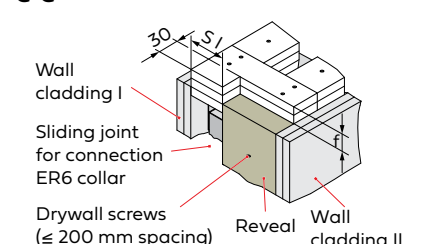
A-A



B-B (without connection collar)



C-C

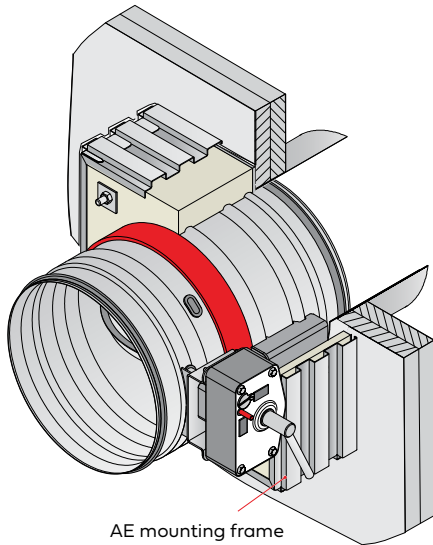


All dimensions in mm

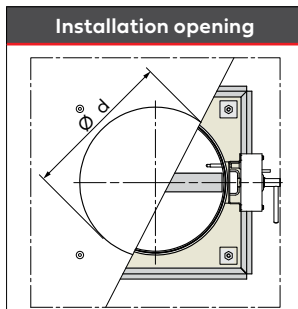
Installation

FR90 fire damper

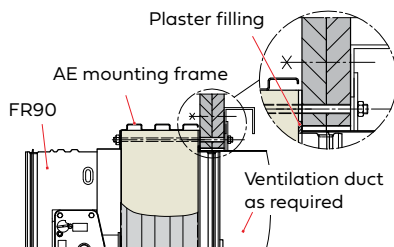
5.4.6 Mounting on shaft walls with and without metal studs



AE mounting frame



Installation opening



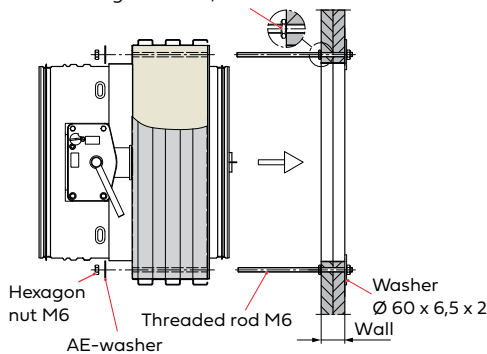
Plaster filling

AE mounting frame

FR90

Ventilation duct as required

Hexagon nut M6, flat



Minimum thicknesses Wall [mm]		
Description of the wall		Fire resistance period
		30 min
		60 min
		90 min
Shaft wall made of wall boards, at least 2-layer	with metal studs	90
	without metal studs	40

i Further information on walls and wall mounting ► [page 31 ff.](#)

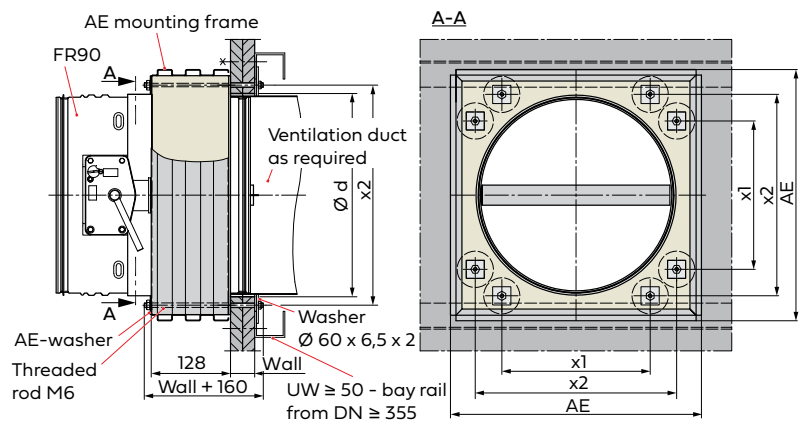
- AE mounting frames must be secured with threaded rods which pass through the wall, and washers and nuts on both sides.
- The spacing between the casings of two FR90 fire dampers must be ≥ 200 mm. No spacing is required with respect to adjacent walls or ceilings.
- Further details on the designs of the walls ► [page 31.](#)

Mounting on a shaft wall without metal studs is shown.

- Installation opening:
 $\varnothing d = DN + 6 \dots 8$ mm

The number of fastenings is predetermined by the drilled holes in the AE mounting frames made in the factory:

Nominal size	Quantity per corner	Total quantity
DN ≤ 315	1	4
DN ≥ 355	2	8



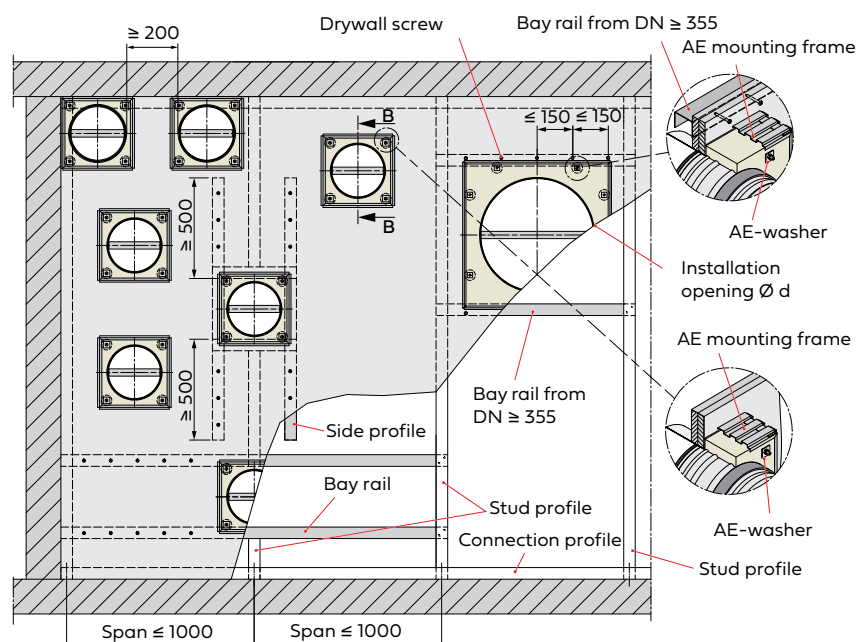
DN	100	125	140	160	180	200	224	250	280	315	355	400	450	500	560	630	710	800
AE	210	235	250	270	290	310	334	360	390	425	475	520	570	620	680	750	830	920
x1	-	-	-	-	-	-	-	-	-	-	228	250	275	300	330	365	405	450
x2	120	145	160	180	200	220	244	270	300	335	385	430	480	530	590	660	740	830

All dimensions in mm

Installation

FR90 fire damper

Mounting on shaft walls with metal studs (example)

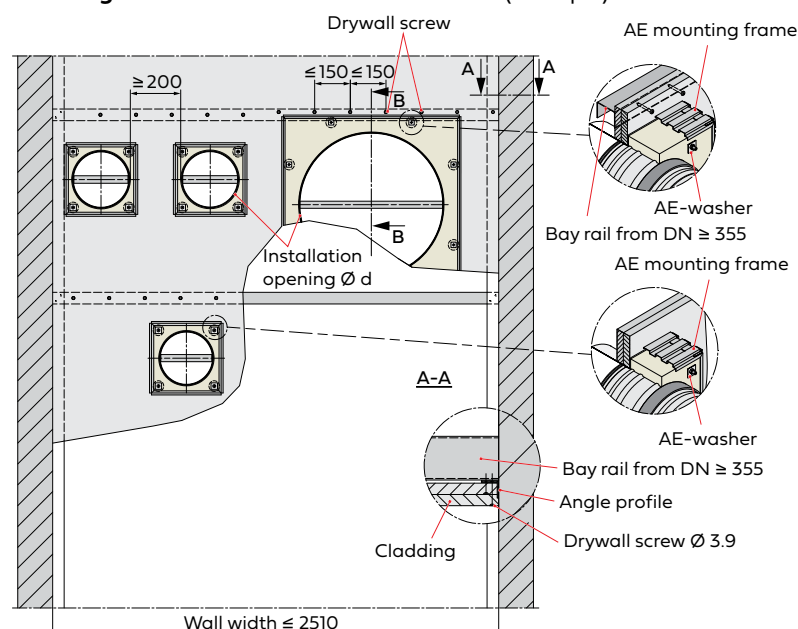


Spans of framework smaller than the installation opening require bay rails and side profiles with an excess length of 500 mm. If smaller dimensions are available, the side profiles must be guided onto the connection profiles and fastened there in a manner which is usual for the wall in question. Stud profiles (supports) can replace side profiles.

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

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

Mounting on shaft walls without metal studs (example)



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

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

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

All dimensions in mm

5.5 Walls and ceilings in solid timber and timber frame construction

Walls and ceilings in timber frame construction

- **Solid timber construction** is a construction type with generally large-format, rigid wall and ceiling elements made of wood, mostly cross-laminated timber. The board layers can be bonded with adhesive and joined with wooden plugs or wire nails. Claddings with gypsum boards are possible.
- **Timber frame construction** is a construction type with wooden frames and crossbeams in walls or with wooden beams in ceilings. Claddings are generally implemented with gypsum boards, reinforcements with wooden material boards. Gaps can be filled with insulating materials.

The walls and ceilings are produced in accordance with European technical approvals and European Technical Assessments (ETA) or in accordance with building inspectorate approvals (abZ) and test certificates (abP).

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

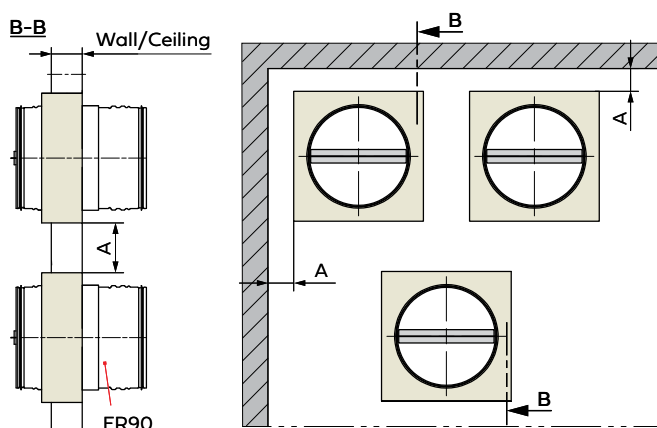
The installation of fire dampers for ventilation ducts requires fire resistance tests together with walls and ceilings in timber frame construction. The appropriate test certificates, declarations of performance and CE markings are available for FR90 fire dampers of the FR92 series.

Dry installation with installation subframes in wall or ceiling, dry installation with frames and fireproof foam for high installation tolerances, and wet installation with mortar are possible. That way, the reveals of the installation openings are protected from increased mass burning. Additional reveal protection in walls and ceilings is possible, but it is only required for specific requirements (e.g. double-studded walls).

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

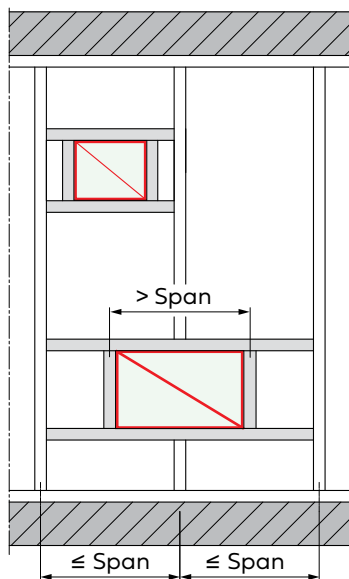
Wall or ceiling	Building material of the wall/ceiling	Cladding of the wall/ceiling	Type of installation	Minimum thickness of the (cladded) wall/ceiling	Minimum dimension of wooden frames – width x depth	Fire resistance period of the wall/ceiling/fire damper in minutes
Wall	Rigid boards made of cross-laminated timber $\geq 350 \text{ kg/m}^3$	Without	Installation subframe/mortar	90 mm	-	30 / 60
		Without	Mortar	95 mm	-	30 / 60 / 90
		Without	Installation subframes	110 mm	-	30 / 60 / 90
		On both sides with 1 x 15 mm gypsum boards	Installation subframe/mortar	124 mm	-	30 / 60 / 90
Ceiling		Without	Installation subframe/mortar	100 mm	-	30 / 60
		Without	Installation subframe/mortar	130 mm	-	30 / 60 / 90 ¹⁾
Wall	Wooden framework/ wooden beams with insulating material fillings	On both sides with 1 x 12.5 mm gypsum boards	Installation subframe/mortar	85 mm	40 mm x 60 mm	30 / 60
		On both sides with 2 x 12.5 mm gypsum boards	Installation subframe/mortar	110 mm	60 mm x 60 mm	30 / 60 / 90 / 120
Ceiling		On the bottom with 2 x 12.5 mm gypsum boards	Installation subframe/mortar	100 mm	60 mm x 60 mm	30 / 60 / 90

¹⁾ This installation (fire resistance period 90 minutes) must be performed with RH150 installation subframe or mortar.



- Spacings "A" between FR90 fire dampers and to adjacent walls and ceilings are only required for specific requirements, for example, for installing the fastenings.
- The user must make sure that the walls and ceilings meet the structural and fire safety requirements. Installation openings must be arranged accordingly.

Details on timber frame construction for walls and ceilings



- Stud spacing in walls or beam spacing in ceilings ≤ 625 mm (span), see example for installation openings on the left.
- Minimum dimensions for studs and beams ▶ [table on page 49](#).
- Installation of the FR90 fire dampers with RH installation subframe ▶ [page 52 ff.](#)
- Installation openings are required with all-round frames made of wooden building materials.
- Installation openings can additionally be fitted 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 established to prevent the reveal from sliding out.
- Walls can be constructed single- and double-studded.
- Further information ▶ [page 49](#).

Connection brackets and angle brackets for installation of the RH installation subframes

FR90 connection bracket	RH connection bracket	RH angle bracket

Fastening the FR90 connection brackets in walls and ceilings made of wood

DN ≤ 315	DN ≥ 355
<p>Hexagon screw M6 x 20 (DIN 933)</p> <p>alternative</p> <p>FR90 connection bracket for the operation and non-operation side</p> <p>Drywall screw Ø 3.9 x 55 (DIN 18182-2)</p>	<p>Hexagon screw M6 x 20 (DIN 933)</p> <p>FR90 connection bracket for the operation and non-operation side</p> <p>Drywall screw Ø 3.9 x 55 (DIN 18182-2)</p>

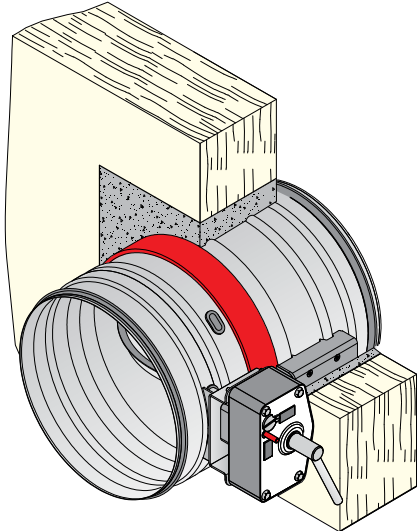
RH installation subframes are fastened on one side of the wall with FR90 connection brackets and with RH angle brackets on the other side (DN ≤ 315 : 2 x 4 pcs., DN ≥ 355 : 2 x 8 pcs.).

Installation

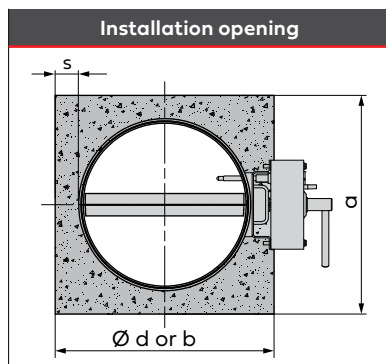
FR90 fire damper

5.5.1 Walls and ceilings in solid timber construction

5.5.1.1 Wet installation with mortar



- Fillings or gaps must be filled with mortar of group II or III according to DIN 1053 or with the classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar.
- When installing the ceiling, mortar fillings require a bond with the cross-laminated timber, e.g. using 1 mortar anchor per side of the cutout, to prevent sliding out.

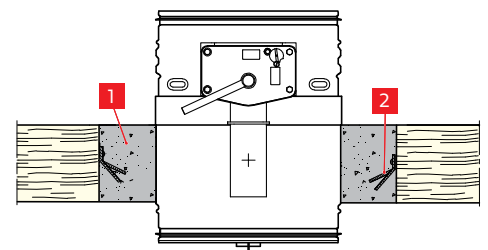
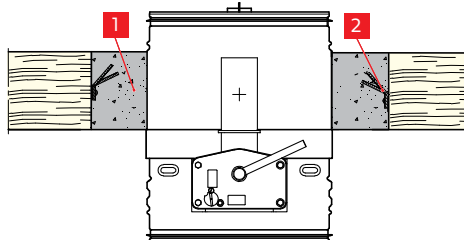
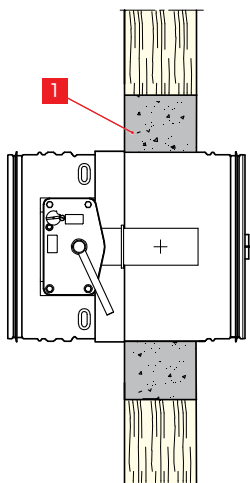


- Installation opening:
 $a = DN + 30 \dots 150 \text{ mm}$
 $b = DN + 75 \dots 150 \text{ mm}$
 $\varnothing d = DN + 65 \dots 150 \text{ mm}$
- Gap dimension:
 $s = 15 \dots 75 \text{ mm}$

Installation example, wall 90 mm,
mortar depth 90 mm, gap width 65 mm

Installation example, ceiling 100 mm,
mortar depth 100 mm, gap width 65 mm

Installation example, ceiling 100 mm,
actuator above,
mortar depth 100 mm, gap width 65 mm



Nomenclature

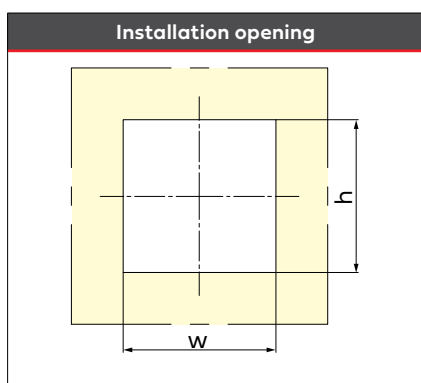
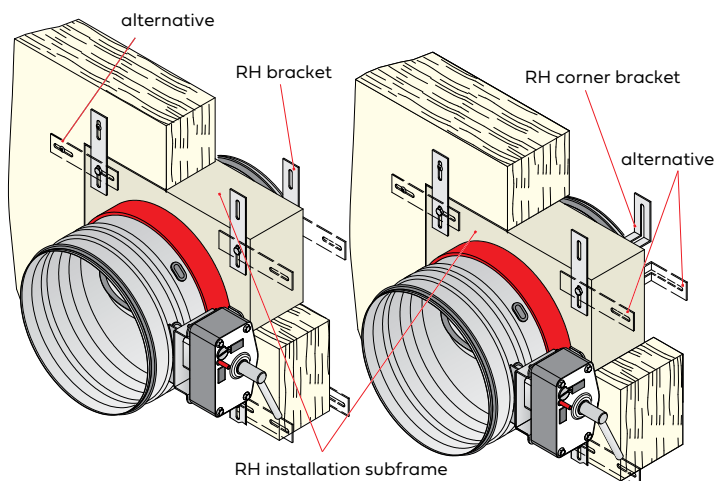
No.	Description	No.	Description
1	Mortar	2	Mortar anchor

Installation

FR90 fire damper

5.5.1.2 Dry installation with installation subframe

In non-cladded walls and ceilings in solid timber construction

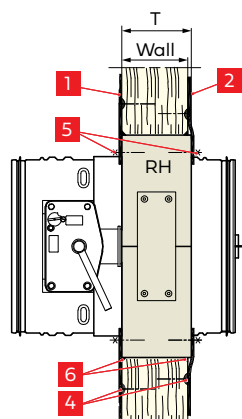


FR90 fire dampers of the FR92 series are suitable for dry installation with RH installation subframes in rigid wooden walls and wooden ceilings.

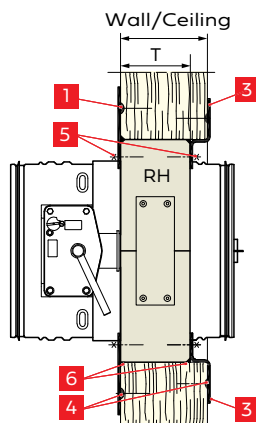
The fastening is performed on both sides of the wall or ceiling with special connection brackets and hexagon screws **5** in threaded sockets M6 which are inserted in the factory.

- On the operation side, use FR90 connection brackets **1**. On the non-operation side, if the thickness of the wall or ceiling matches the frame depth 100 mm or 150 mm.
- In case of excess lengths of walls or frames of up to approximately 5 mm on the non-operation side, use RH connection brackets **2**; for example, for frames with a depth of 100 mm and a wall thickness of 95 mm.
- With frames with a depth of 100 mm in walls or ceilings with a thickness of ≥ 105 mm or frames with a depth of 150 mm in walls or ceilings with a thickness of ≥ 155 mm on the non-operation side, use pre-formed RH angle brackets **3**. RH angle brackets **3** can be adapted to the thicknesses of the walls or ceilings in the reveal by the user. To do so, the necessary bending of the angle brackets and connection brackets requires some specialist knowledge.
- The remaining joints between the frame and the wall or ceiling must be sealed with fireproof sealant **6** approximately 10 mm in depth.
- Installation opening:
 $DN \leq 315$: $w \times h = DN + 91^{+4}_{-4}$ mm
 $DN \geq 355$: $w \times h = DN + 101^{+4}_{-4}$ mm

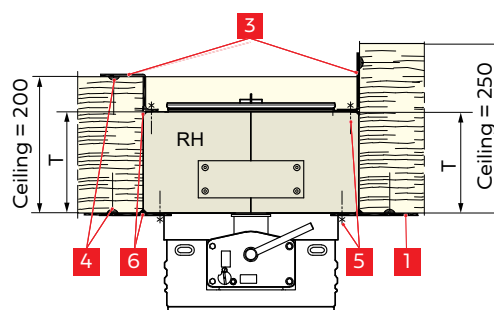
Installation example, wall ≥ 90 mm
 shown wall = 95 mm,
 frame depth T = 100 mm



Installation example, wall/ceiling ≥ 100 mm
 shown wall = 145 mm,
 frame depth T = 100 mm



Installation example in wooden ceilings
 shown ceiling = 200 mm/250 mm,
 frame depth T = 150 mm
 and actuator beneath the ceiling



Nomenclature

No.	Description	No.	Description
1	FR90 connection bracket for the operation side and non-operation side ¹⁾	4	Drywall screw 3.9 x 55 DIN 18182-2 ¹⁾
2	RH connection bracket for the non-operation side ¹⁾	5	Hexagon screw M6 x 20 DIN 933 ¹⁾
3	RH angle bracket for the non-operation side ¹⁾	6	Promaseal® Mastic fireproof sealant ²⁾

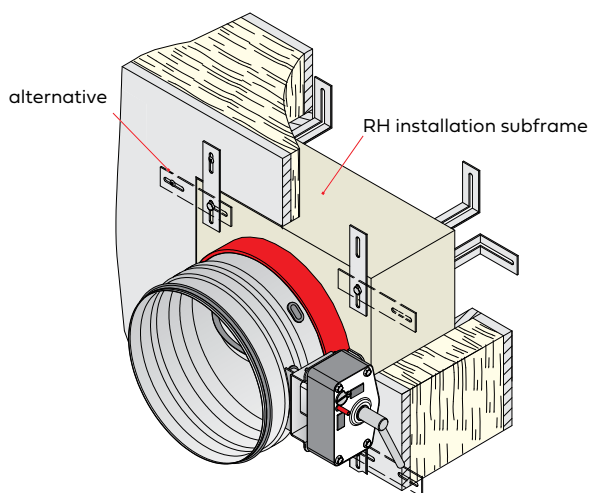
¹⁾ Included in the scope of delivery of the fire damper with RH installation subframe. Therefore, it could be superfluous depending on the installation scenario.

²⁾ Not included in the scope of delivery. Order separately as required. Up to a maximum gap of 4 mm, use fireproof foam for larger gap ► [page 54](#).

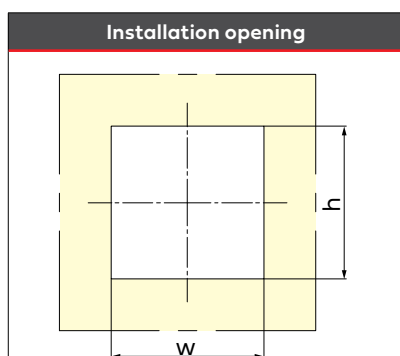
Installation

FR90 fire damper

In cladded walls in solid wood construction (with rectangular RH installation subframe)

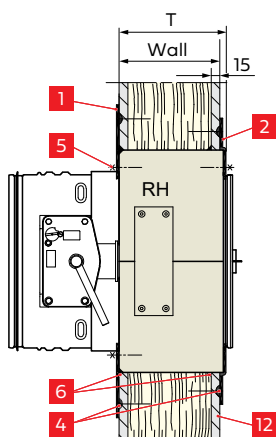


- The fastening is performed in principle as with installation in non-cladded walls ► [page 52](#).
- Further information on connection brackets and angle brackets ► [page 50](#).
- The cladding of the wooden walls and wooden ceilings must be fastened properly. To do so, drywall screws with spacing of ≤ 250 mm, a length of ≥ 35 mm and $\varnothing \geq 3.5$ mm are used.

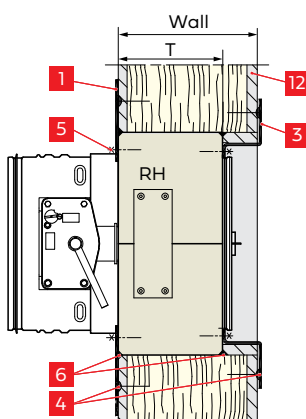


- Installation opening:
 $DN \leq 315$: $w \times h = DN + 91^{+4}$ mm
 $DN \geq 355$: $w \times h = DN + 101^{+4}$ mm

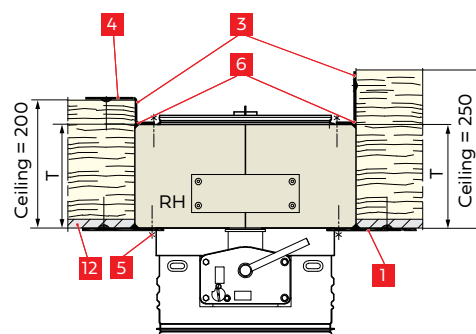
Installation example, wall = 145 mm,
frame depth T = 150 mm



Installation example, wall = 200 mm,
frame depth T = 150 mm



Installation example, ceiling = 200 mm/250 mm,
frame depth T = 150 mm



Nomenclature

No.	Description	No.	Description
1	FR90 connection bracket for the operation side and non-operation side ¹⁾	5	Hexagon screw M6 x 20 DIN 933 ¹⁾
2	RH connection bracket for the non-operation side ¹⁾	6	Promaseal® Mastic fireproof sealant ²⁾
3	RH angle bracket for the non-operation side ¹⁾	12	Wall/ceiling cladding
4	Drywall screw 3.9 x 55 DIN 18182-2 ¹⁾		

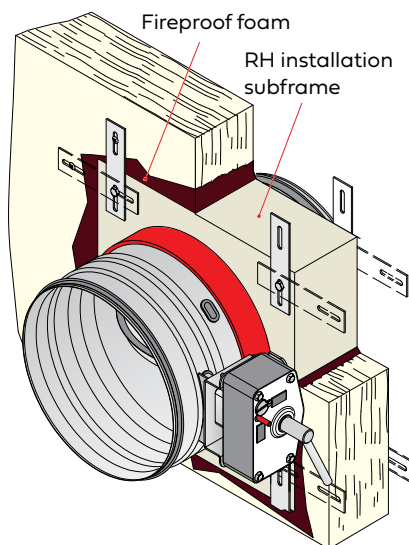
¹⁾ Included in the scope of delivery of the fire damper with RH installation subframe. Therefore, it could be superfluous depending on the installation scenario.

²⁾ Not included in the scope of delivery. Order separately as required.

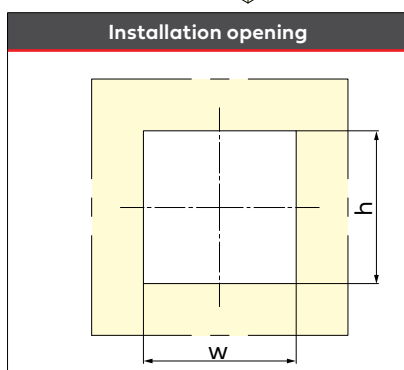
Installation

FR90 fire damper

5.5.1.3 Dry installation with installation subframe and fireproof foam



- Fireproof foam can also be used to completely seal uneven and non-straight gaps around the RH installation subframe.
- The gaps must be at least wide enough so that the entire depth of the installation subframe is filled, and they must be filled with fireproof foam in accordance with the manufacturer's instructions.

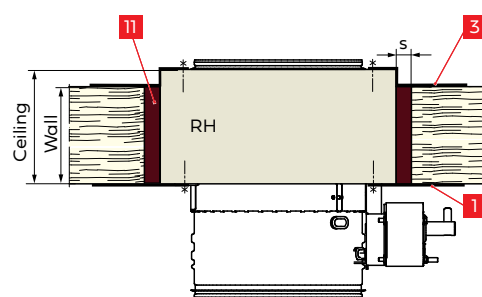
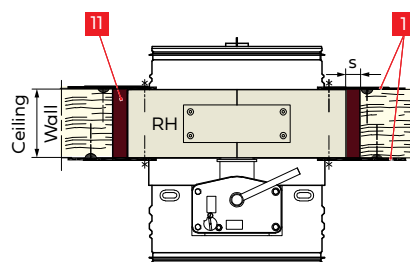
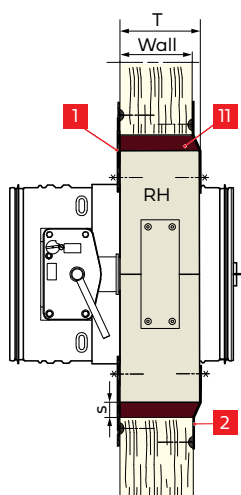


- Installation opening when filling gaps with fireproof foam:
 $DN \leq 315$: $w \times h = DN + 99 \dots 179 \text{ mm}$
 $DN \geq 355$: $w \times h = DN + 109 \dots 189 \text{ mm}$
- Recommended gap width between wall/ceiling and frame:
at least 5 mm

Installation example, wall = 90 mm,
frame depth $T = 100 \text{ mm}$,
gap width, foam $s = 20 \text{ mm}$

Installation example, ceiling = 100 mm,
frame depth $T = 100 \text{ mm}$,
gap width, foam $s = 20 \text{ mm}$

Installation example, ceiling = 130 mm,
frame depth $T = 150 \text{ mm}$,
gap width, foam $s = 20 \text{ mm}$



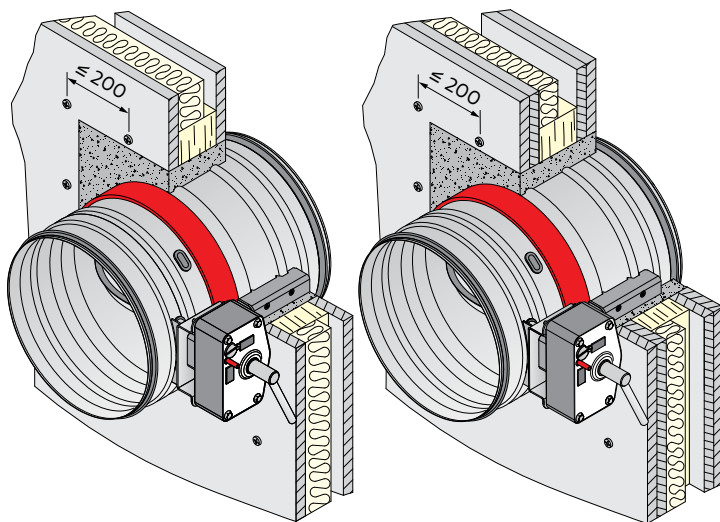
Nomenclature

No.	Description	No.	Description
1	FR connection bracket for the operation side and non-operation side ¹⁾	11	Fireproof foam (Hilti® CFS-F FX fireproof foam, Würth® Kombi fireproof foam or Zapp Zimmermann ZZ® 330 fireproof foam)
2	RH connection bracket for the non-operation side ¹⁾		
3	RH angle bracket ¹⁾		

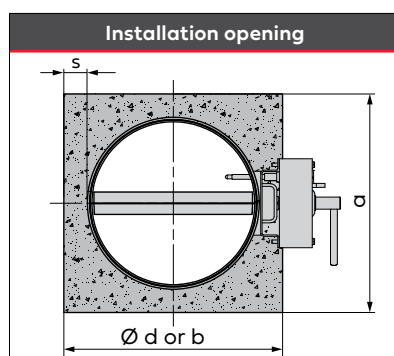
¹⁾ Included in the scope of delivery of the fire damper with RH installation subframe. Therefore, it could be superfluous depending on the installation scenario.

5.5.2 Walls and ceilings in timber frame construction

5.5.2.1 Wet installation with mortar

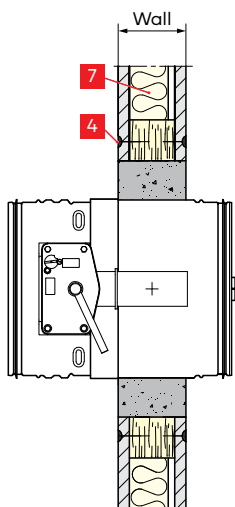


- Fillings or gaps must be filled with mortar of group II or III according to DIN 1053 or with the classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar.
- When installing the ceiling, mortar fillings require a bond with the cross-laminated timber, e.g. using 1 mortar anchor per side of the cutout, to prevent sliding out.
- Walls with double-studding installed with spacing require reveals made of wall-building materials. Greater wall thicknesses reduce the required depth of mortaring to 100 mm to 120 mm, thereby also bringing about reductions in weight.

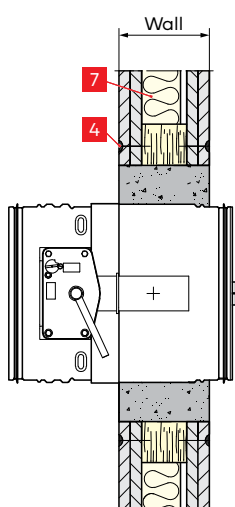


- Installation opening:
 $a = DN + 30 \dots 150 \text{ mm}$
 $b = DN + 75 \dots 150 \text{ mm}$
 $\varnothing d = DN + 65 \dots 150 \text{ mm}$
- Gap dimension:
 $s = 15 \dots 75 \text{ mm}$

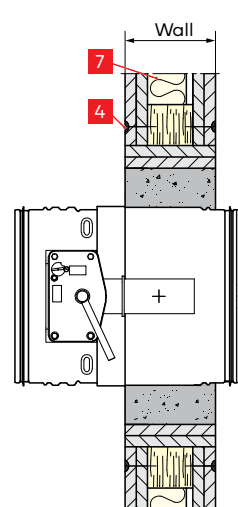
Installation example,
wall $\geq 85 \text{ mm}$



Installation example,
wall $\geq 110 \text{ mm}$



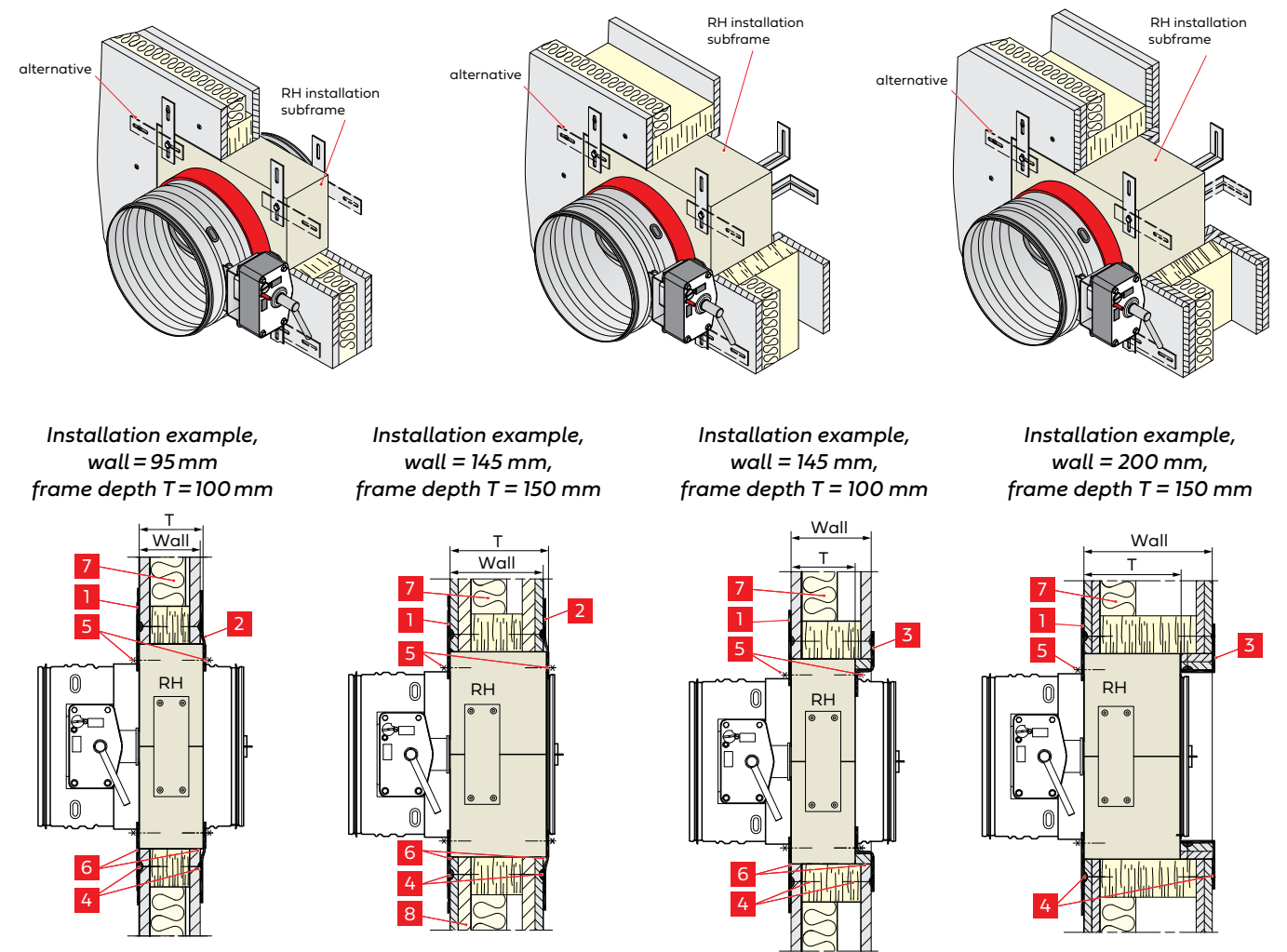
Installation example, wall $\geq 110 \text{ mm}$ with
additional reveal made of wall-building materials



Nomenclature

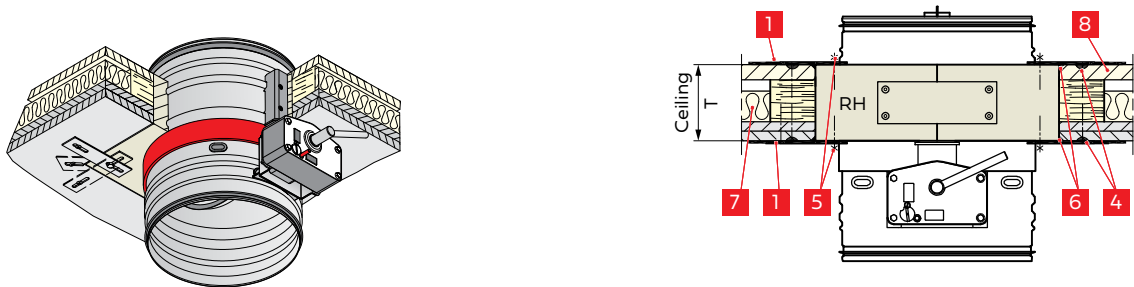
No.	Description	No.	Description
4	Drywall screw 3.9 x 55 DIN 18182-2	7	Insulating material (specific to the wall/ceiling)

5.5.2.2 Dry installation with installation subframe



- The reveals can optionally be cladded with wall-building materials.

Installation example in wooden ceilings with ceiling ≥ 100 mm
Shown: ceiling = 100 mm, frame depth T = 100 mm and actuator beneath the ceiling



Nomenclature

No.	Description	No.	Description
1	FR90 connection bracket for the operation side and non-operation side ¹⁾	5	Hexagon screw M6 x 20 DIN 933 ¹⁾
2	RH connection bracket for the non-operation side ¹⁾	6	Promaseal® Mastic fireproof sealant ²⁾
3	RH angle bracket for the non-operation side ¹⁾	7	Insulating material (specific to the wall/ceiling)
4	Drywall screw 3.9 x 55 DIN 18182-2 ¹⁾	8	Wooden material board density ≥ 600 kg/m³ or equivalent specific to the wall or ceiling

¹⁾ Included in the scope of delivery of the fire damper with RH installation subframe. Therefore, it could be superfluous depending on the installation scenario.
²⁾ Not included in the scope of delivery. Order separately as required.

5.6 Walls with timber frame construction with clay panel cladding and wood fibre insulation

Walls in timber frame construction with clay panel cladding must be produced in accordance with the specifications of the manufacturer. Specifications on the design, fire resistance period and fire safety classification, wall heights and wall thicknesses must be observed.

If the installation position of the fire damper is in the area of supports within the wall, trimmers have to be installed in these areas of the wall. Trimmers are required for installation openings which are wider than the span of the wall. The structural stability of the wall must be verified by the user.

The substructures of the walls are made up of squared timbers with a format of 60 x 60 mm or 80 x 60 mm which act as supports. They are set up with a span ≤ 625 mm. Installation openings for FR90 fire dampers must be produced as all-round closed frames made of squared timbers. The fillings of wood fibre boards with a raw density ≥ 50 kg/m³ are adjacent to them. The clay boards with a thickness of 22 mm attached for cladding must be fastened in accordance with the manufacturer's instructions.

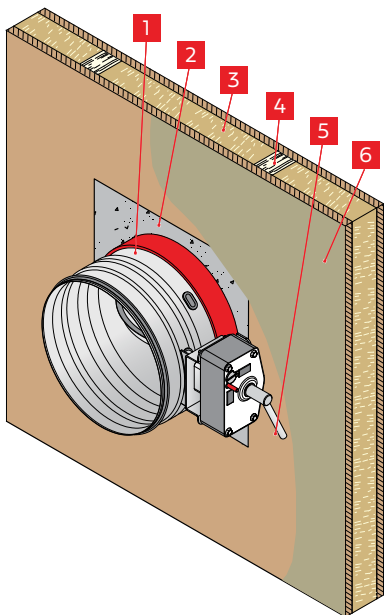
Wall surfaces and transitions to the mortar sealings can be covered with reinforcement fabric and then rendered with fine clay plaster according to DIN 18947.

The fire resistance period of the fire dampers is up to 90 minutes. It is reduced to the fire resistance period of the wall if it is lower. The following table specifies the minimum dimensions:

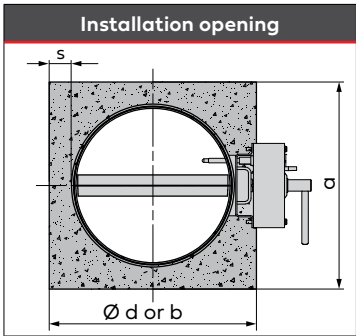
Building material of the wall	Cladding of the wall	Infill of the wall	Type of installation	Minimum thickness of the cladded wall	Minimum dimension of wooden frames – width x depth	Fire resistance period of the wall/ fire damper in minutes
Wooden framework with insulation material filling made of wood fibre boards	on both sides with 1x22 mm clay boards	Wood fibre insulation board, raw density ≥ 50 kg/m ³	Mortar	104 mm	60 mm x 60 mm	30 / 60
				124 mm	80 mm x 60 mm	30 / 60 / 90
			Clay plaster mortar with fibre content	104 mm	60 mm x 60 mm	30 / 60
				124 mm	80 mm x 60 mm	30 / 60 / 90
			Installation subframe	104 mm	60 mm x 60 mm	30 / 60
				124 mm	80 mm x 60 mm	30 / 60 / 90

► For information on installation, see following pages.

5.6.1 Wet installation with mortar

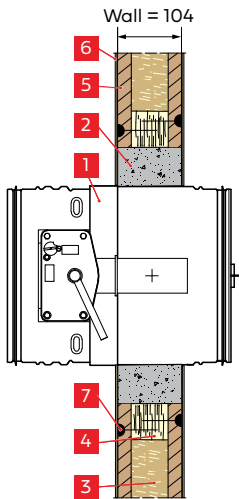


- Further information on wall mounting and wall surfaces ▶ page 57.
- Mortar fillings require a bond with the wooden reveal. If necessary, support measures, for example mortar anchors, must be provided by the operating company.
- Fillings or gaps must be filled with mortar of group II or III according to DIN 1053 or with the classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar.

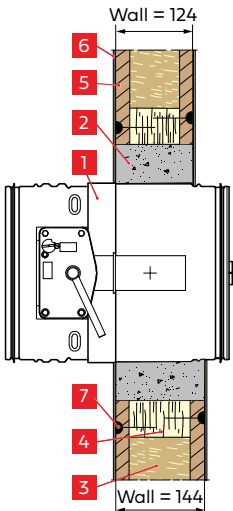


- Installation opening:
a = DN + 30... 450 mm
b = DN + 75 ... 450 mm
Ø d = DN + 65 ... 450 mm
- Gap dimension:
s = 15 ... 225 mm

Installation example wall = 104



Installation example wall = 124 / 144

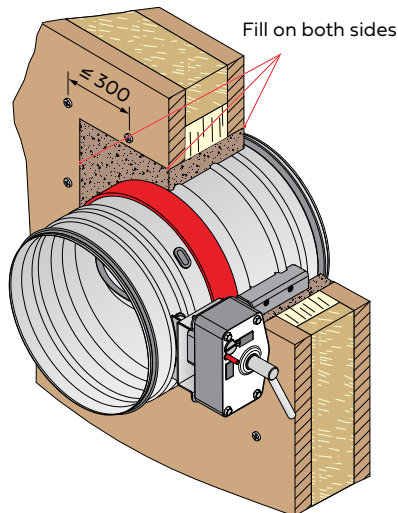


Nomenclature

No.	Description	No.	Description
1	FR90 fire damper	5	Clay board according to DIN 18948
2	Mortar	6	Fine clay plaster according to DIN 18947 (as required with reinforcement fabric)
3	Wood fibre insulation board, raw density ≥ 50 kg/m³	7	Clay board screws, 5 x 60 mm
4	Wooden frame construction		

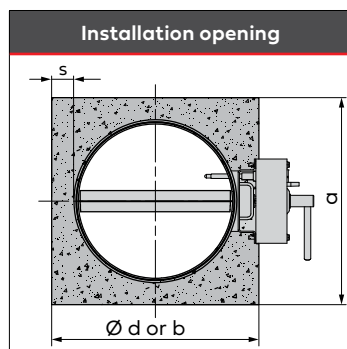
All dimensions in mm

5.6.2 Wet installation with clay plaster mortar



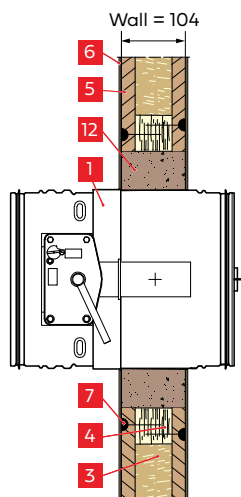
i Further information on wall mounting and wall surfaces ► [page 57](#).

- Mortar fillings require a bond with the wooden reveal. If necessary, support measures, for example mortar anchors, must be provided by the operating company.
- Fillings for gaps must be made with clay plaster mortar with fibre content in accordance with DIN 18947 - LPM 0/4 f - S II - 1.8. It consists of construction clay, sand and fibre content, for example, straw.
- The transitions between the clay plaster mortar and the clay board are filled with fine clay plaster in accordance with DIN 18947 - LPM 0/1 f - S II-1.8. It consists of construction clay, sand and plant fibres.

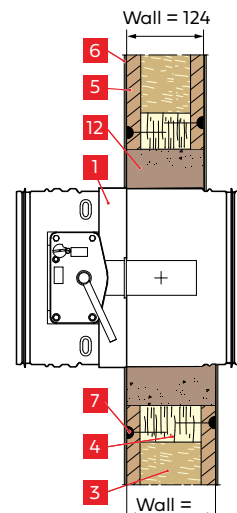


- **Installation opening:**
 $a = DN + 30 \dots 200 \text{ mm}$
 $b = DN + 75 \dots 200 \text{ mm}$
 $\varnothing d = DN + 65 \dots 200 \text{ mm}$
- **Gap dimension:**
 $s = 15 \dots 100 \text{ mm}$

Installation example wall = 104



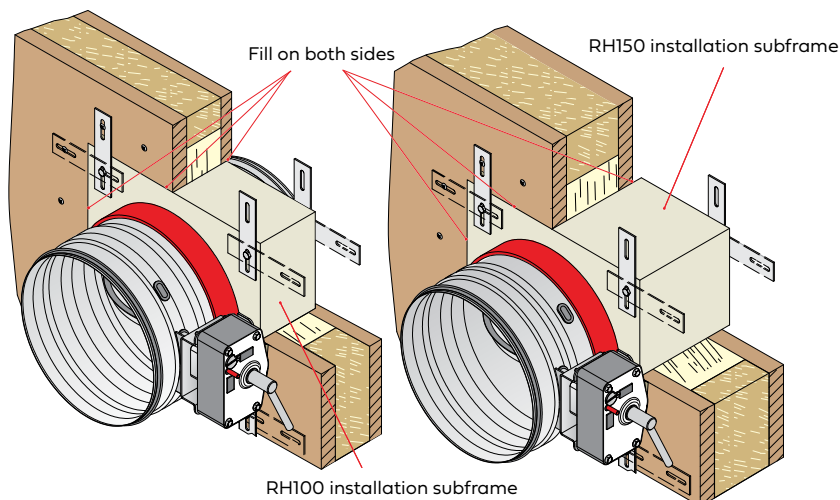
Installation example wall = 124 / 144



Nomenclature

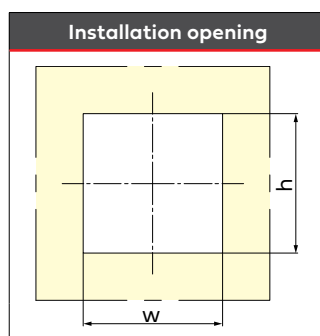
No.	Description	No.	Description
1	FR90 fire damper	6	Fine clay plaster according to DIN 18947 (as required with reinforcement fabric)
3	Wood fibre insulation board, raw density $\geq 50 \text{ kg/m}^3$	7	Clay board screws, 5 x 60 mm
4	Wooden frame construction	12	Clay plaster mortar with fibre content according to DIN 18947
5	Clay board according to DIN 18948	All dimensions in mm	

5.6.3 Dry installation with installation subframe



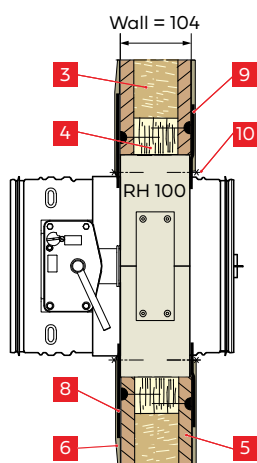
i Further information on wall mounting and wall surfaces ► [page 57](#).

- Gaps between RH100/RH150 installation subframes and the supporting structure must be a maximum of 10 mm, and are filled with fine clay plaster in accordance with DIN 18947 - LPM 0/1 f - S II-1.8.
- The RH100/RH150 installation subframe is installed as with installation in cladded walls in wooden frame construction ► [page 56](#).
- For protection of the timber frame when it comes to wall thicknesses > 150 mm, the reveal must be cladded with clay boards or a filling made of fire protection boards must be provided (► [page 56](#)).

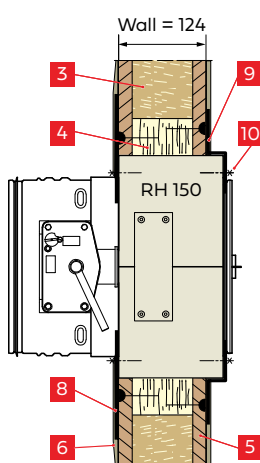


- Installation opening:
 $DN \leq 315: w \times h = DN + 91 \dots 101 \text{ mm}$
 $DN \geq 355: w \times h = DN + 101 \dots 111 \text{ mm}$

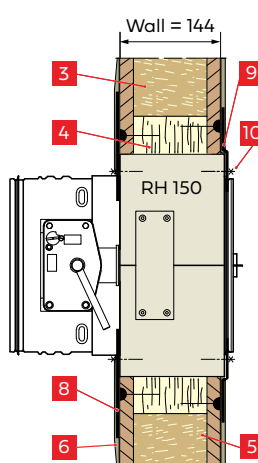
Installation example
wall = 104, frame = 100



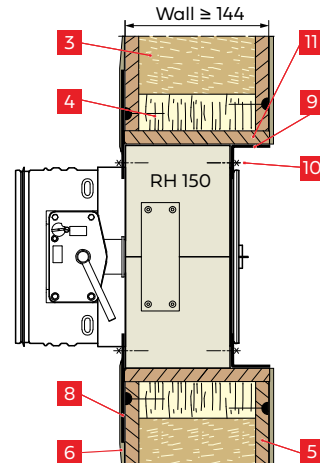
Installation example
wall = 124, frame = 150



Installation example
wall = 144, frame = 150



Installation example
wall = 204, frame = 150,
with reveal protection



Nomenclature

No.	Description	No.	Description
3	Wood fibre insulation board, raw density $\geq 50 \text{ kg/m}^3$	8	RH connection bracket for the operation side ¹⁾
4	Wooden frame construction	9	RH angle bracket for the non-operation side ¹⁾
5	Clay board according to DIN 18948	10	Drywall screw 3.9 x 45 DIN 18182-2 ¹⁾
6	Fine clay plaster according to DIN 18947	11	Reveal protection consisting of clay board 3 according to DIN 18948

¹⁾ Included in the scope of delivery of the fire damper with RH installation subframe. Therefore, it could be superfluous depending on the installation scenario.

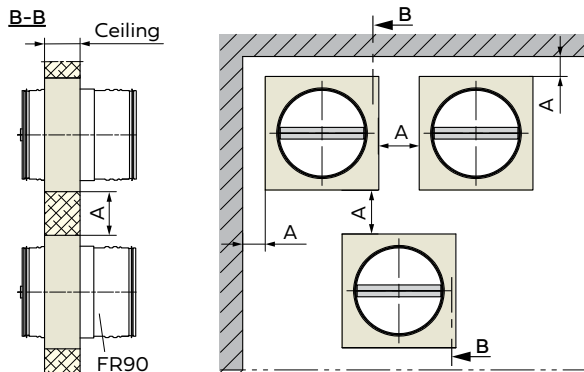
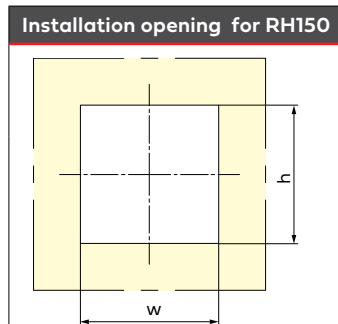
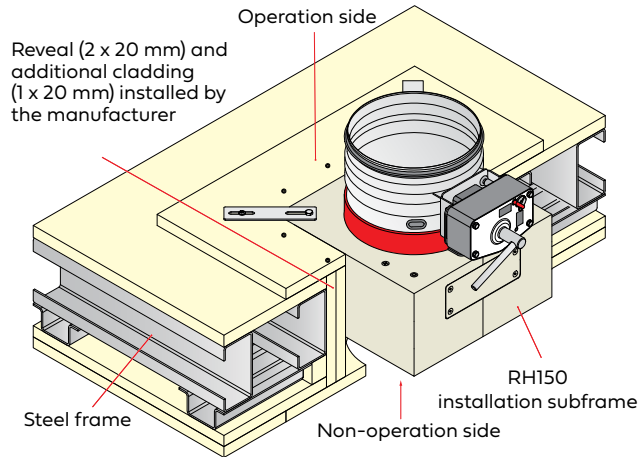
All dimensions in mm

Installation

FR90 fire damper

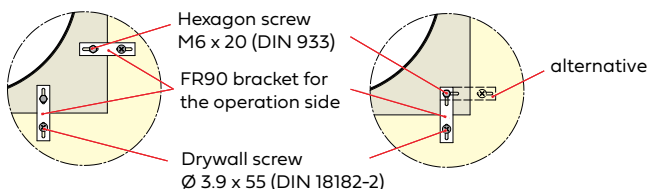
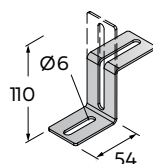
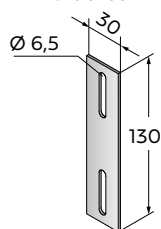
5.7 Ceilings with steel frames

5.7.1 Dry installation in ceiling and roof constructions



FR90 connection bracket

RH angle bracket



Minimum thicknesses Ceiling [mm]

Description of the ceiling	Fire resistance period		
	30 min	60 min	90 min
Ceiling construction made of cladded steel frames	222		

The modular construction system by KLEUSBERG comprises cladded steel frames and is installed as a building. FR90 fire dampers with RH150 installation subframes can be installed. They are inserted into installation openings which are cladded all-round with reveals made of fire protection boards, and fastened with FR90 connection brackets and RH angle brackets. The operation side of the fire dampers can be positioned above or below the ceilings.

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

- **Installation opening:**
DN ≤ 315: w x h = (DN + 91⁺⁴ mm)
DN ≥ 355: w x h = (DN + 101⁺⁴ mm)

Spacings

- Installation spacings "A" between FR90 fire dampers and to adjacent walls are only required for specific requirements, for example, for installing the reveals and fastenings.
- The user must make sure that the ceilings meet the structural and fire safety requirements. Installation openings must be arranged accordingly.

Fastening

The installation subframe is fastened to the ceiling with FR90 connection brackets on the operation side of the fire damper, and with RH angle brackets on the non-operation side.

FR90 connection brackets and RH angle brackets are screwed to the RH150 installation subframes with the specified quantity of hexagon screws:

- DN ≤ 315: 4 pcs.
- DN > 315: 8 pcs.

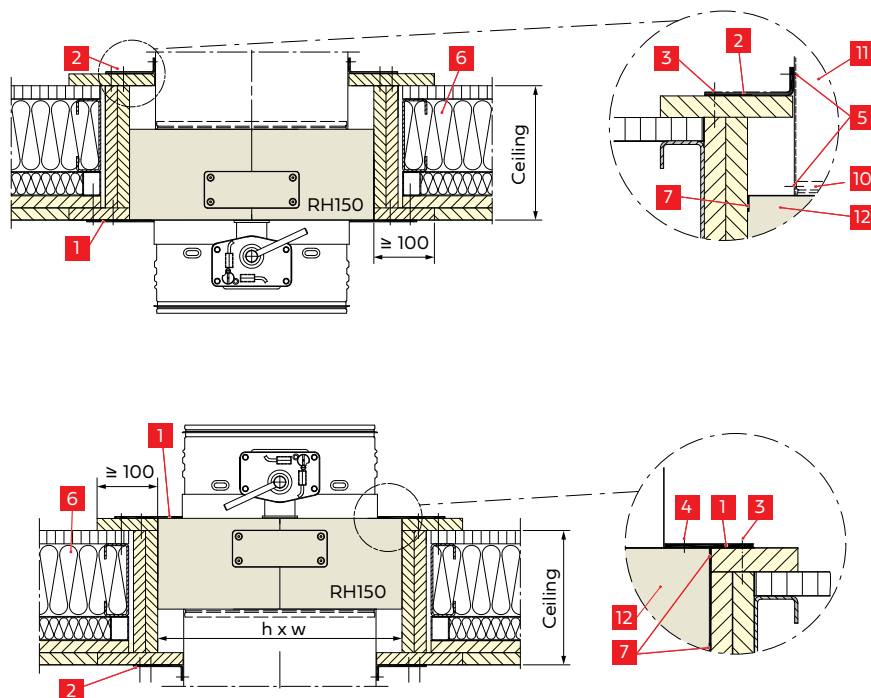
The figures on the left show a section of the installation subframe in a top view.

All dimensions in mm

Installation

FR90 fire damper

Installation in roof constructions



Installation instructions

- Fastenings must be implemented on both sides of the ceiling and roof constructions.
- Joints between the RH150 installation subframes and reveals of ceiling and roof constructions must be sealed on both sides approximately 10 mm deep with fireproof sealant.
- Alternatively, fireproof sealant can be applied to the RH150 installation subframe of the fire damper all-round before insertion into the installation opening.
- Attention must be paid to excess lengths or mechanical and electrical components.
- Fire dampers installed in or on roof constructions require weather protection which also guarantees accessibility.
- The fastening to ceiling claddings is performed with drywall screws **3**. In the connection area of the fire damper casing or on ventilation ducts, it is performed using tapping screws **5**.

Installation in ceiling constructions

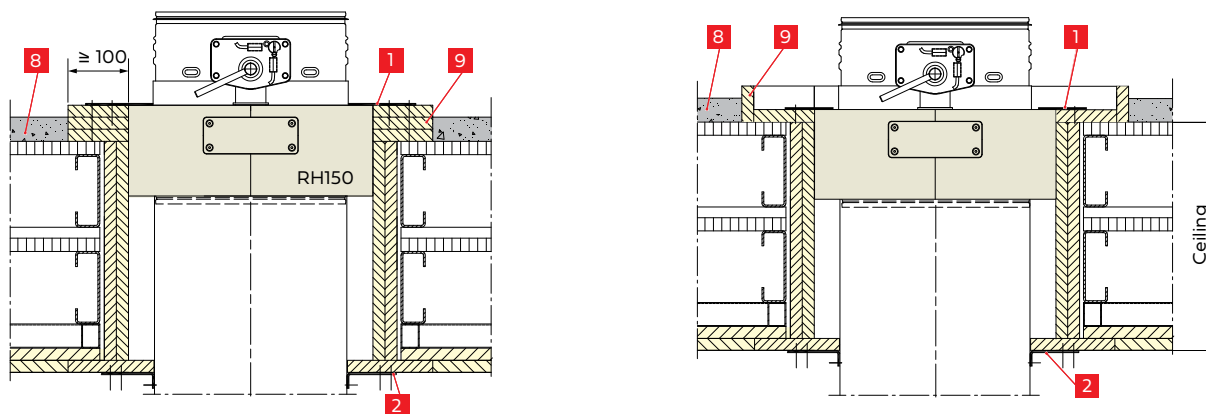


Illustration: FR90 fire damper on a ceiling on the top of which a floor and a formwork (in two different designs) made of fire protection boards for installation of screed have been attached.

Nomenclature

No.	Description	No.	Description
1	FR90 connection bracket for the operation side ¹⁾	7	Promaseal® Mastic fireproof sealant ²⁾
2	RH angle bracket for the non-operation side ¹⁾	8	Screed
3	Drywall screw Ø 3.9 x 55, DIN 18182-2 ¹⁾	9	Formwork made of fire protection boards
4	Hexagon screw M6 x 20, DIN 933 ¹⁾	10	FR90 fire damper
5	Tapping screw Ø 3.9 x 25 with washers or equivalent made of steel	11	Ventilation duct
6	Insulating material for roof constructions	12	RH150 installation subframe

¹⁾ Included in the scope of delivery of the FR90 fire damper with RH150 installation subframes. Depending on the installation scenario, fastening material can be superfluous.

²⁾ Order separately as required.

All dimensions in mm

5.8 Historical wooden beam ceilings

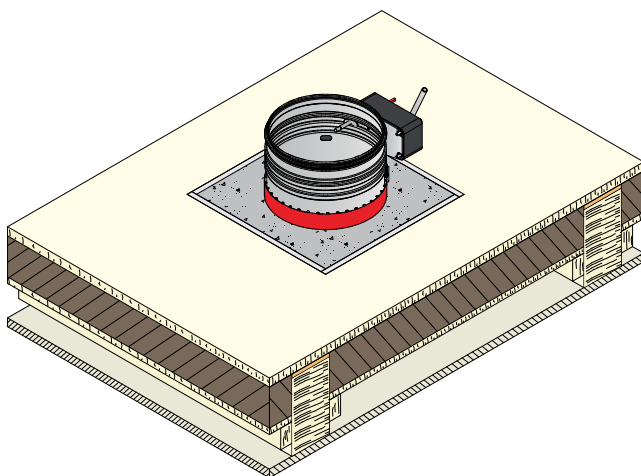
The construction of historical wooden beam ceilings is generally made up of the wooden beams with a floor made of edged boards inserted between them. On the inserted floors, there is an infill made of daub, clay or cob filling, sand filling or similar. Finally, timber floor boards are laid on the wooden beams.

The respective building supervisory authority or fire safety officer must be consulted before installing fire dampers. The technical expert must include aspects, for example the ceiling construction, connections, trimmers, insulation and the integration of the trimmers into the historical ceiling in his/her assessment. For new constructions of the wooden beams inserted at a later date, the minimum requirements for wooden ceiling installation in accordance with "5.5 Walls and ceilings in solid timber and timber frame construction" on [page 49](#) apply.

In order to prevent a high weight load on the historical ceiling construction, the mortar gap between the fire damper and the reveal in the ceiling must only be made as large as genuinely necessary. Alternatively, the fire damper can also be installed with an RH installation subframe. To do so, installation in wooden beam ceilings must be implemented in accordance with "5.5 Walls and ceilings in solid timber and timber frame construction".

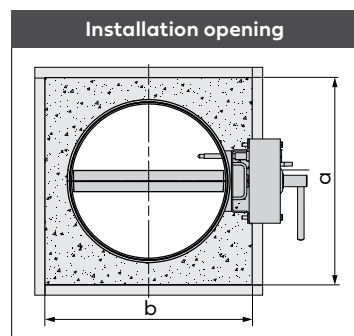
5.8.1 Wet installation with mortar

Installation example, fire resistance period 30 minutes



Minimum thicknesses Ceiling [mm]	
Description of the ceiling	Fire resistance period
	30 min 60 min
Wooden beam ceiling with inserted floors	100

- The installation opening is clad all-round with suitable fire-resistant construction boards.
- Mortar fillings require a bond with the ceiling construction, e.g. using mortar anchors.
- Fillings must be filled with mortar of group II or III according to DIN 1053 or with the classes M2.5, M5, M10 or M20 according to EN 998-2, or with the corresponding fire protection mortar or gypsum mortar.
- The user must make sure that the ceilings meet the structural and fire safety requirements.



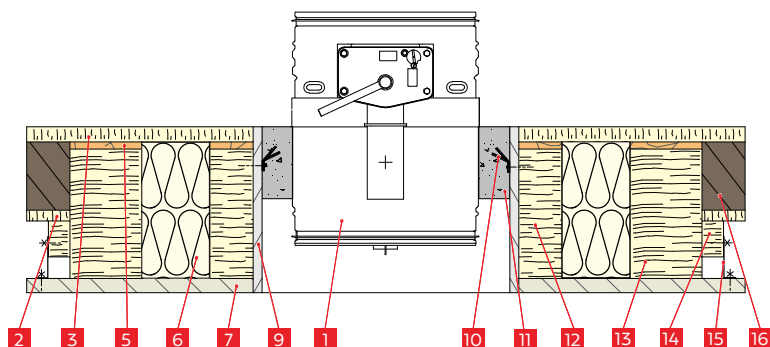
- Installation opening:
 $a \times b = DN + 60 \dots 150 \text{ mm}$

Installation

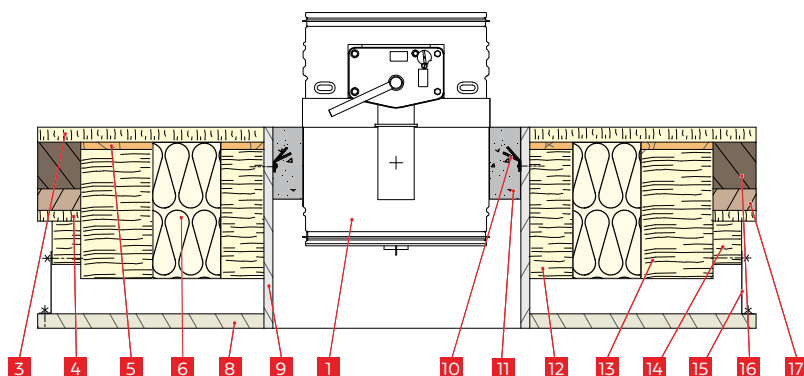
FR90 fire damper

The illustrations on this page represent an example ceiling configuration. The conditions on site can differ from this configuration.

Installation example, fire resistance period 30 min.



Installation example, fire resistance period 60 min.



Nomenclature

No.	Description	No.	Description
1	FR90 fire damper	10	Mortar anchor ²⁾
2	Intermediate floor ¹⁾	11	Mortar ²⁾
3	Planed boards ¹⁾	12	Wooden beam ²⁾
4	Inserted floor ¹⁾	13	Wooden beam ¹⁾
5	Silane strip ¹⁾	14	Flooring sleeper ¹⁾
6	Mineral wool ²⁾	15	Suspension ¹⁾
7	Pipe matting with lime-gypsum-sand rendering ¹⁾	16	Fill of burnt sand ¹⁾
8	Ribbed drawn metal with lime-gypsum-sand rendering ¹⁾	17	Daub ¹⁾
9	Cladding made of gypsum board fire safety panels ²⁾		

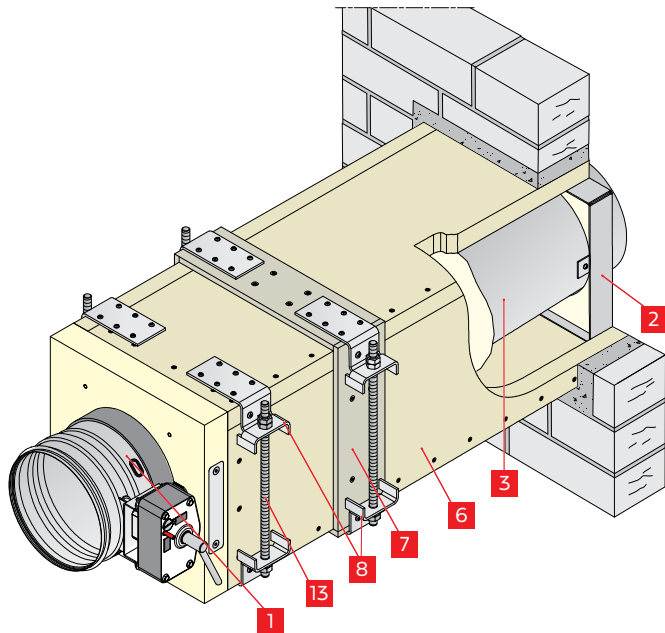
¹⁾ Existing component of the historical ceiling.

²⁾ To be installed by the user.

5.9 Installation remote from walls and ceilings

5.9.1 Installation remote from rigid walls and ceilings

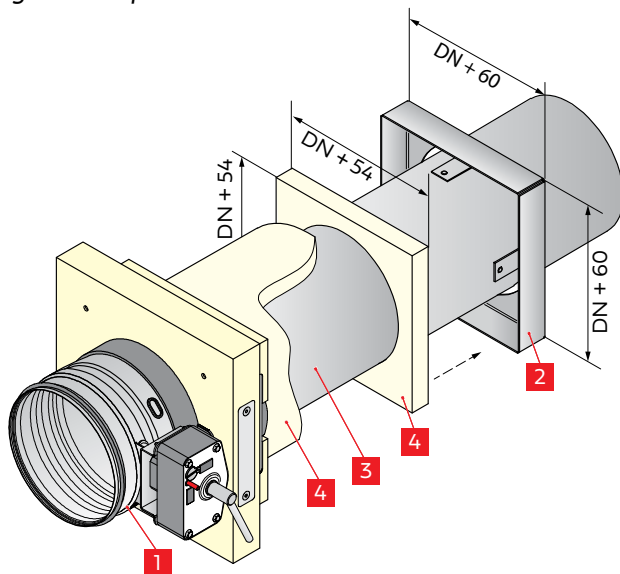
Example: Cladded ventilation duct routed through rigid wall



Minimum thicknesses Wall/Ceiling [mm]	
Description of the wall and ceiling	Fire resistance period
	30 min
	60 min
	90 min
Rigid wall and ceiling	100

- An RV mounting frame is used for installation of the FR90 fire damper remote from walls in a cladded ventilation duct. The installed FR90 fire damper is generally suspended using threaded rods (► [page 66](#)).
- Optionally, the butt joints of the cladding can be produced using FR90 angle brackets which are available as accessories (see illustration on the left). To do so, glue the additional cladding to the cladding 7 with Promat® K84 adhesive, and screw in place with drywall screws. Otherwise, the butt joints must be produced in accordance with the manufacturer's instructions (e.g. according to Promat® construction 478).
- Screws, mortar anchors and rivets should generally be installed with spacings of ≤ 200 mm.
- Details on configuration of walls and ceilings ► [page 20](#).

System setup



Nomenclature

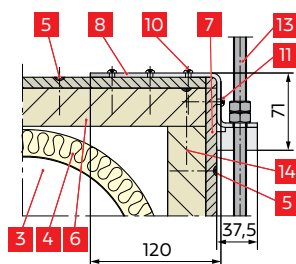
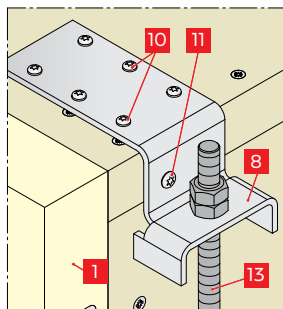
No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478
2	Connecting frame ¹⁾	7	Option: 100 mm wide additional cladding made of 10 mm Promatect® H boards
3	Sheet steel ventilation duct	8	FR90 angle bracket ¹⁾
4	Mineral wool, 30 mm, ≥ 40 kg/m ³ , > 1000 °C melting point, clad in aluminium foil	13	Threaded rods for suspending with secured nuts

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

All dimensions in mm

Installation

FR90 fire damper



Suspension with threaded rods

The fire damper is suspended with steel threaded rods arranged in pairs.

They must be fastened to ceilings in accordance with the fire resistance period. Tighten the nuts used for this purpose (4 pcs. M8 for DN ≤ 315, otherwise 4 pcs. M12) or use all-steel lock nuts. Threaded rods that end above the ceilings can be secured there with nuts and washers made of steel. If plugs are used for fastening to ceilings, follow the manufacturer's specifications. End plates can be used to distribute the load acting on the threaded rod across multiple fastenings.

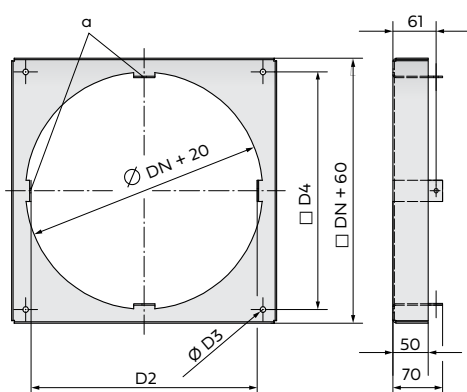
Threaded rods of up to 1.50 m in length can be left unclad. Cladding is required for longer threaded rods (e.g. according to Promat® construction 476).

The section on the left shows the suspension in the middle part of the cladding ventilation duct with additional cladding on the butt joint.

With FR90 fire dampers installed remote from ceilings, the weight forces are transferred into the ceiling via the sheet steel ventilation duct. Information on the weight of the FR90 fire damper ► [page 76](#).

Permissible weights for suspensions with steel threaded rods (with a fire resistance period of 90 minutes):

Size	A _s [mm ²] Stress cross-section according to DIN 13	Weight [kg]	
		1 pc.	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



Dimensions and quantity of connection brackets for the connecting frames

DN sizes	100 ... 140	160 ... 315	355 ... 800
D2	DN + 6	DN + 4	DN + 6
Ø D3	9	9	13
□ D4	DN + 20	DN + 20	DN - 20
Number of connection brackets a	4	4	8

Nomenclature

No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	7	100 mm wide additional cladding made of 10 mm Promatect® H boards. On 6 with Promat® K84 adhesive
3	Sheet steel ventilation duct	8	FR90 angle bracket ¹⁾
4	Mineral wool, 30 mm, ≥ 40 kg/m ³ , > 1000 °C melting point, clad in aluminium foil	10	Round head chipboard screw 4 x 45 mm ^{1) 2)}
5	Drywall screw 3.9 x 35 mm	11	Round head chipboard screw 5 x 70 mm ¹⁾
6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478	13	Threaded rods for suspending with secured nuts
		14	Chipboard screws 4 x 60 mm

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

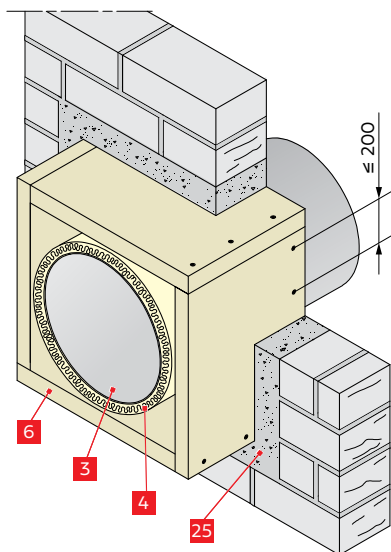
²⁾ Available as accessory.

All dimensions in mm

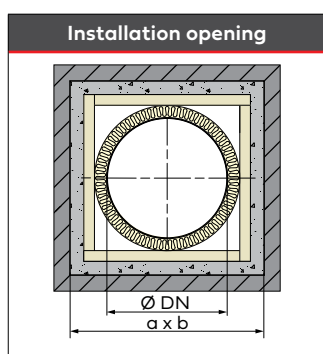
Installation

FR90 fire damper

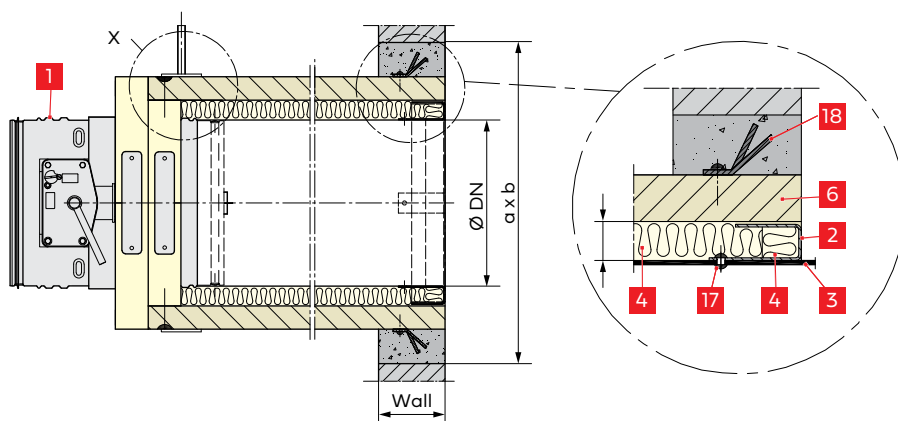
Routing cladding of the ventilation duct through rigid wall



- Insert mortar anchors or suitable concrete screws with spacing of ≤ 200 mm.



- Installation opening:
a x b \approx DN + 135 mm
+ mortar gap as required



Nomenclature

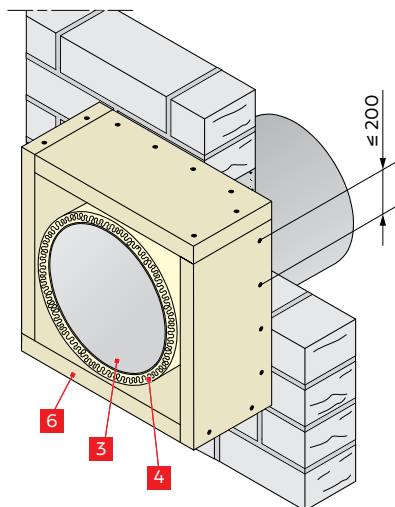
No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478
2	Connecting frame ¹⁾	17	Steel pop rivets 4.8 mm or tapping screws arranged all-round; 4 pcs. for DN \leq 315, otherwise 4 pcs. M12
3	Sheet steel ventilation duct	18	Mortar anchor or concrete screws
4	Mineral wool, 30 mm, ≥ 40 kg/m ³ , > 1000 °C melting point, clad in aluminium foil	25	Mortar gap

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

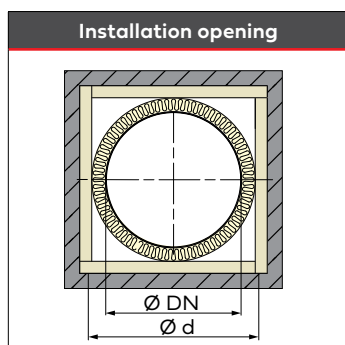
Installation

FR90 fire damper

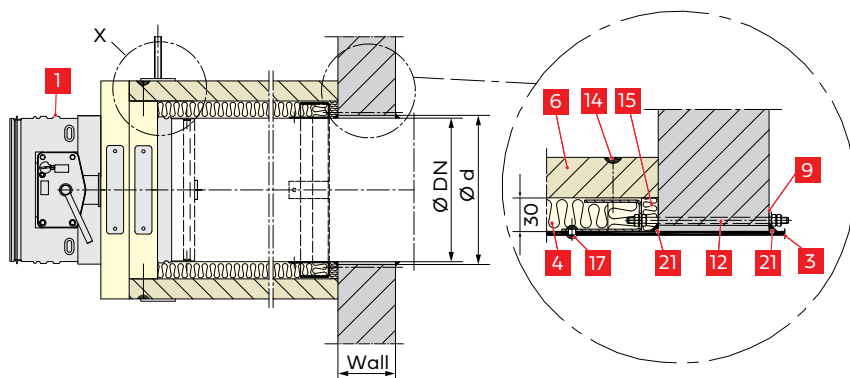
Connecting cladding of the ventilation duct to rigid wall



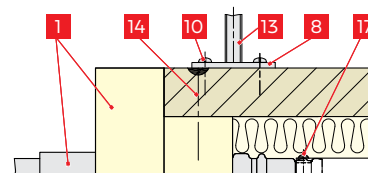
- Fasten the connecting frame to the wall in a suitable manner.
- Seal the remaining joints with Promaseal® Mastic fireproof sealant ► [page 13](#).
- If the upper installation side is not accessible, the screwing of the FR90 angle brackets, connecting frames and RV frames to the cladding can be omitted in this position.



- Installation opening:
 $\varnothing d \approx DN + 5 \text{ mm}$



Detail X



Nomenclature

No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	12	Threaded rods for fastening with secured nuts, 4 pcs. M8 for DN ≤ 315, 4 pcs. M12 for DN > 315
3	Sheet steel ventilation duct	13	Threaded rods for suspending with secured nuts
4	Mineral wool, 30 mm, ≥ 40 kg/m ³ , > 1000 °C melting point, clad in aluminium foil	14	Chipboard screws 4 x 60 mm. DPre-drill in 2 with Ø3 mm
6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478	15	Sealing with mineral wool 4. This should be compressed to around 12 mm
8	FR90 angle bracket ^{1) 2)}	17	Steel pop rivets 4.8 mm or tapping screws arranged all-round; 4 pcs. for DN ≤ 315, otherwise 4 pcs. M12
9	Washer for RV ^{1) 2)}	21	Sealings with Promaseal® Mastic fireproof sealant
10	Round head chipboard screw 4 x 45 mm ^{1) 2)}		

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

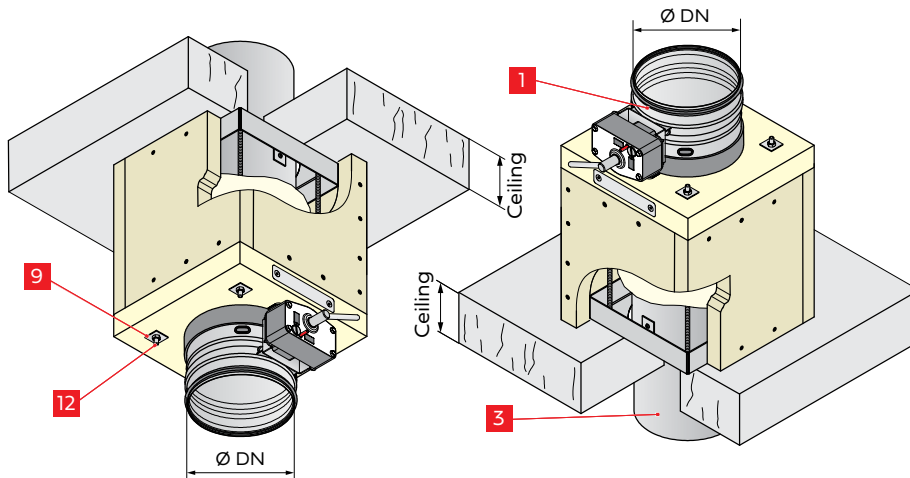
²⁾ Available as accessory.

All dimensions in mm

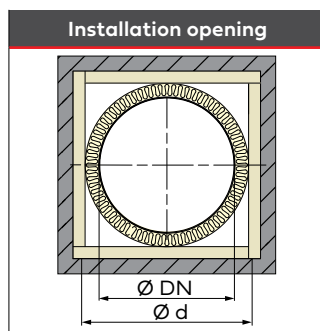
Installation

FR90 fire damper

Connecting cladding to rigid ceiling



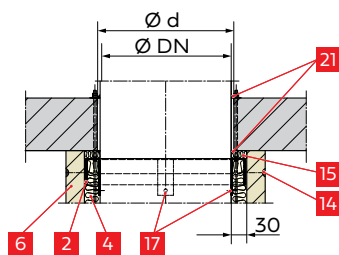
The illustration shows examples for installation suspended underneath rigid ceilings (left) and in an upright position on rigid ceilings (right).



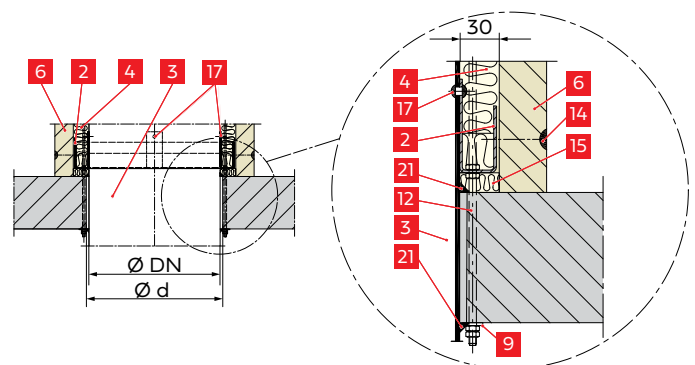
- Tighten the nuts on the threaded rods for fastening and suspension, or use all-steel lock nuts.
- Screws, mortar anchors and rivets should generally be installed with spacings of ≤ 200 mm.

- Installation opening:
 $\varnothing d \approx DN + 5$ mm

Fastening suspended from rigid ceilings



Fastening in an upright position on rigid ceilings



Nomenclature

No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	12	Threaded rods for fastening with secured nuts ²⁾ . 4 pcs. M8 for DN ≤ 315 , otherwise 4 pcs. M12
2	Connecting frame ¹⁾	14	Chipboard screws 4 x 60 mm. Pre-drill in 2 with $\varnothing 3$ mm
3	Sheet steel ventilation duct	15	Sealing with mineral wool 4. This should be compressed to around 12 mm
4	Mineral wool, 30 mm, ≥ 40 kg/m ³ , > 1000 °C melting point, clad in aluminium foil	17	Steel pop rivets 4.8 mm or tapping screws arranged all-round; 4 pcs. for DN ≤ 315 , otherwise 8 pcs.
6	Cladding made of 35 mm Promat [®] LS fire protection boards. Production according to Promat [®] construction 478	21	Sealings with Promaseal [®] Mastic fireproof sealant
9	Washer for RV ¹⁾ 2)		

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

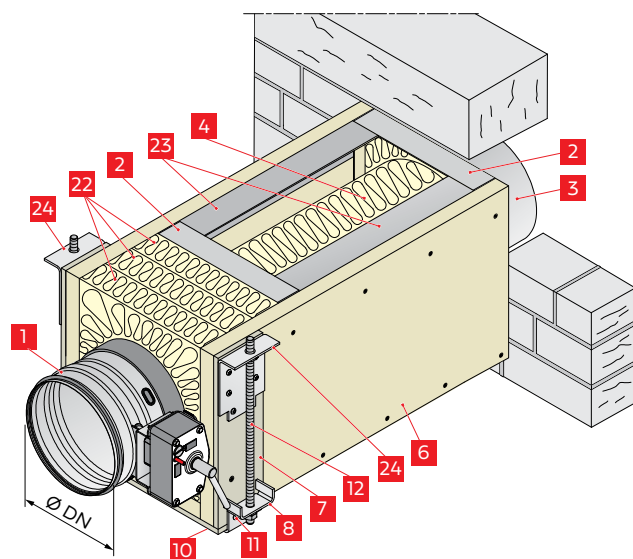
²⁾ Available as accessory.

All dimensions in mm

Installation

FR90 fire damper

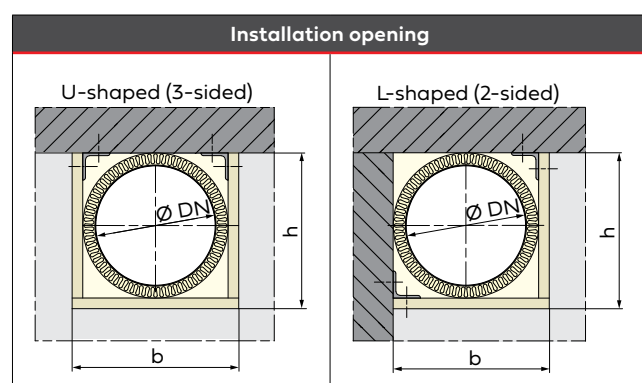
Installation remote from walls adjacent to rigid wall/ceiling



- The fire damper can also be installed remote from rigid walls. In the process, adjacent rigid walls or ceilings partially replace the fire-resistant claddings for the ventilation ducts:
The remaining fire-resistant claddings then surround the ventilation ducts in a U shape (on 3 sides) or in an L shape (on 2 sides), see illustrations of installation opening.
- Tighten the nuts on the threaded rods for fastening and suspension, or use all-steel lock nuts.

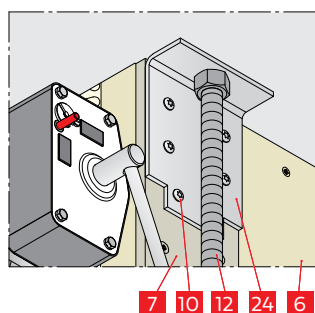
Details on fastening the connecting frame ► [page 68](#).

The illustration on the left shows a ventilation duct adjacent to the rigid wall which requires protection, which has U-shaped cladding and is adjacent to a rigid ceiling on the non-cladded side. For details on routing the ventilation duct through a wall see also ► [page 73](#).

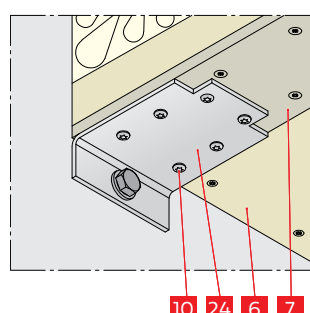


- Installation opening for claddings right up to the wall being protected:
 - $\varnothing d \approx DN + 5 \text{ mm}$
- Installation opening for claddings right through the wall being protected:
 - U-shaped : $w \times h \approx (DN + 134) \times (DN + 99 \text{ mm})$
 - L-shaped: $w \times h \approx (DN + 99) \times (DN + 99 \text{ mm})$
 - + mortar gap as required

Suspension from rigid ceilings



Fastening to rigid walls



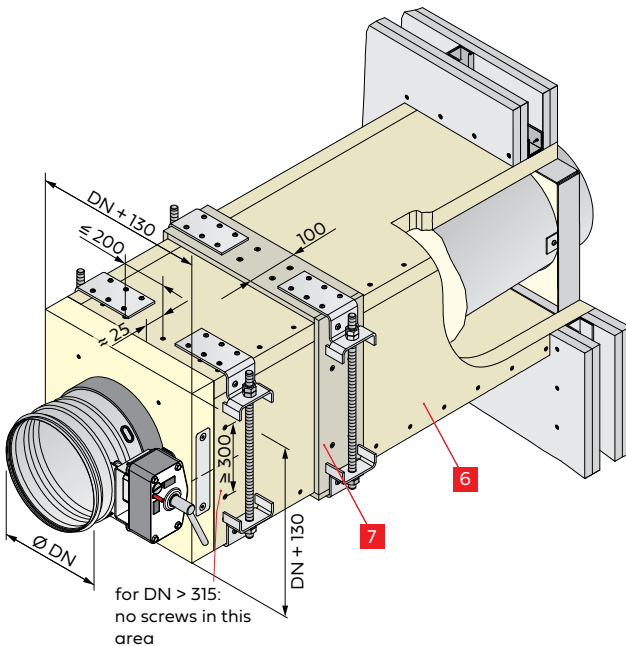
Nomenclature

No.	Description	No.	Description
1	FR90 fire damper	8	FR90 angle bracket ¹⁾
2	Connecting frame	10	Round head chipboard screw 4 x 45 mm ¹⁾
3	Sheet steel ventilation duct	11	Round head chipboard screw 5 x 70 mm ¹⁾
4	Mineral wool, 30 mm, $\geq 40 \text{ kg/m}^3$, $> 1000 \text{ }^\circ\text{C}$ melting point, clad in aluminium foil	12	Threaded rods for fastening with secured nuts ²⁾ . 4 pcs. M8 for $DN \leq 315$, otherwise 4 pcs. M12
6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478	22	Mineral wool, 50 mm, $\geq 140 \text{ kg/m}^3$
7	100 mm wide additional cladding made of 10 mm Promatect® H boards. Bond to 6 with Promat® K84 adhesive and screw in place with drywall screws 3.9 x 35 mm	23	Angle steel $\geq 40 \times 40 \text{ mm} \times 3 \text{ mm}$ DIN EN 10056 or equivalent. Fastening according to Promat® construction 478
		24	Suspension bracket ¹⁾

¹⁾ Included in the scope of delivery of the FR90 fire damper with connecting frame, and also available as accessory.

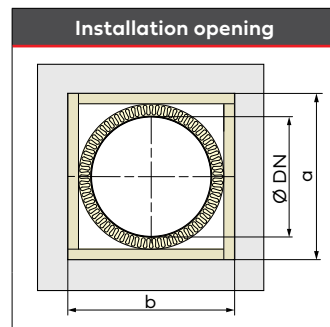
5.9.2 Installation remote from metal stud walls

Routing cladding of the ventilation duct through metal stud wall

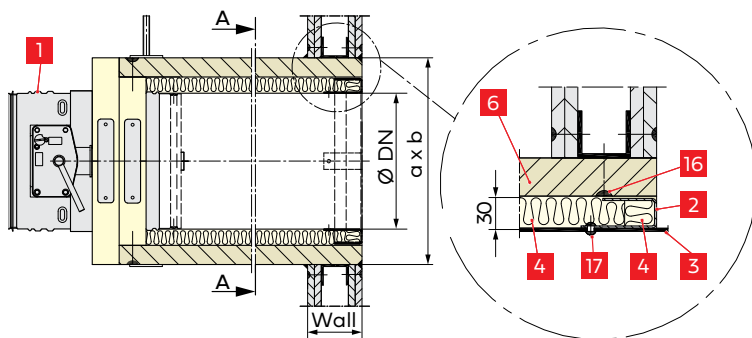


Minimum thicknesses Wall [mm]	
Description of the wall	Fire resistance period
	30 min
	60 min
	90 min
Metal stud wall with cladding on both sides	95

- FR90 fire dampers installed remote from walls are generally suspended using steel threaded rods arranged in pairs. Details on suspension, threaded rods and permitted weights ▶ [page 65 ff.](#)
- Dimensions of the connecting frames required for installation and the number of connection brackets on the frames ▶ [page 66.](#)
- Optionally, the butt joints of the cladding can be produced using FR90 angle brackets which are available as accessories (see illustration on the left). Otherwise, it is performed in accordance with Promat® construction 478.
- Screws and rivets generally have to be installed with spacings of ≤ 200 mm.
- Details on configuration of walls and ceilings ▶ [page 31 ff.](#)

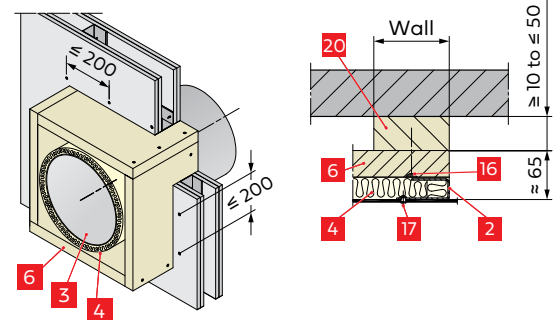


- Installation opening:
 $a \times b \approx DN + 135$ mm



A - A

Option: Installation underneath rigid ceilings



Nomenclature

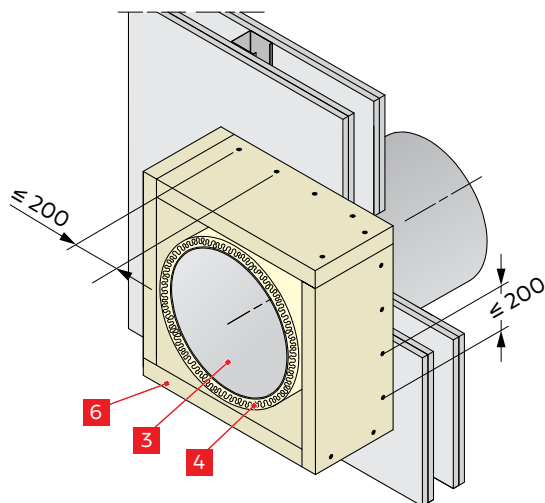
No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	7	100 mm wide additional cladding made of 10 mm Promatect® H boards. Bond to 6 with Promat® K84 adhesive and screw in place with drywall screws 3.9 x 35 mm
2	Connecting frame ¹⁾	16	Drywall screw 3.9 x 55 mm
3	Sheet steel ventilation duct	17	Steel pop rivets 4.8 mm or tapping screws arranged all-round; 4 pcs. for DN ≤ 315 , otherwise 4 pcs. M12
4	Mineral wool, 30 mm, ≥ 40 kg/m ³ , > 1000 °C melting point, clad in aluminium foil	20	Calcium silicate boards fastened to the ceiling ≥ 500 kg/m ³
6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478		

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

Installation

FR90 fire damper

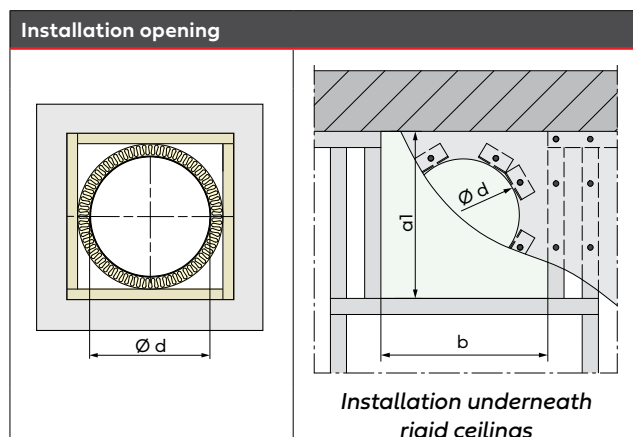
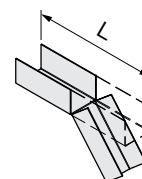
Connecting cladding of the ventilation duct to metal stud wall



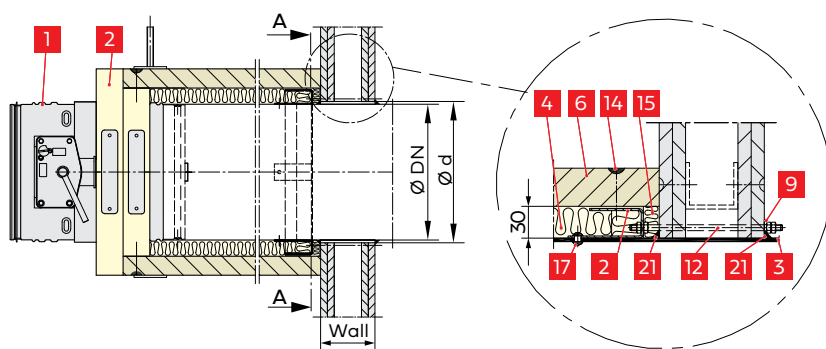
- If the cladded ventilation duct is connected to a metal stud wall, the user must attach a reinforcement around the ventilation duct within the metal stud wall in order to prevent the wall construction boards from becoming damaged when fastening the threaded rods. This can be performed, for example, using segments made of UW profiles.
- UW profiles from DN > 200 are fastened to the ventilation duct which passes through the wall with tapping screws ≥ 4.2 mm.

Cut lengths of the UW profiles:

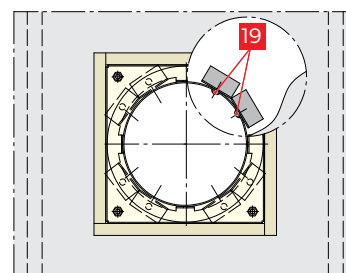
DN sizes	100 ... 200	224 ... 315	355 ... 800
L	110	175	210



- Installation opening:
 $\varnothing d \approx DN + 5 \text{ mm}$
- Option of installation underneath rigid ceilings:
a1 $\approx DN + 135 \text{ mm} + \text{ceiling spacing}$
b $\approx DN + 135 \text{ mm}$
 $\varnothing d \approx DN + 5 \text{ mm} + \text{ceiling spacing}$



A - A



Nomenclature

No.	Description	No.	Description
1	FR90 fire damper with RV mounting frame	12	Threaded rods for fastening with secured nuts
2	Connecting frame ¹⁾	14	Chipboard screws 4 x 60 mm. Pre-drill in 2 with $\varnothing 3 \text{ mm}$
3	Sheet steel ventilation duct	15	Sealing with mineral wool 4. This should be compressed to around 12 mm
4	Mineral wool, 30 mm, $\geq 40 \text{ kg/m}^3$, $> 1000 \text{ }^\circ\text{C}$ melting point, clad in aluminium foil	17	Steel pop rivets 4.8 mm or tapping screws arranged all-round; 4 pcs. for DN ≤ 315 , otherwise 4 pcs. M12
6	Cladding made of 35 mm Promat [®] LS fire protection boards. Production according to Promat [®] construction 478	19	From DN > 200: Tapping screw $\geq 4.2 \text{ mm}$
9	Washer for RV ^{1), 2)}	21	Sealings with Promaseal [®] Mastic fireproof sealant

¹⁾ Included in the scope of delivery of the FR90 fire damper with RV mounting frame.

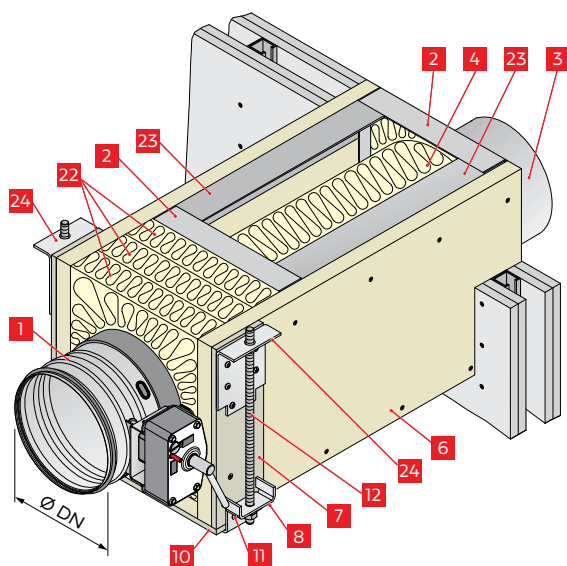
²⁾ Available as accessory.

All dimensions in mm

Installation

FR90 fire damper

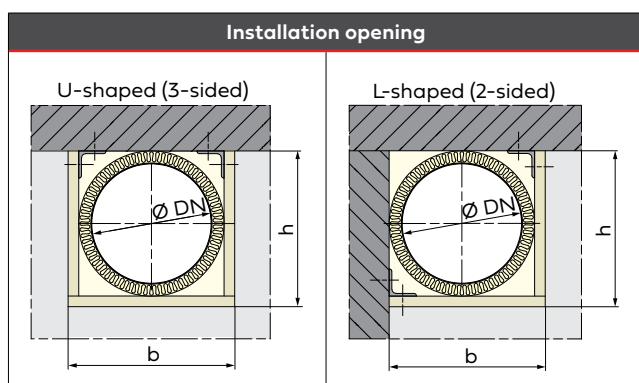
Installation remote from walls adjacent to rigid wall/ceiling



- The fire damper can also be installed remote from metal stud walls. In the process, adjacent rigid walls or ceilings partially replace the fire-resistant claddings for the ventilation ducts.
- The remaining fire-resistant claddings then surround the ventilation ducts in a U shape (on 3 sides) or in an L shape (on 2 sides), see illustrations of installation opening.
- Tighten the nuts on the threaded rods for fastening and suspension, or use all-steel lock nuts.

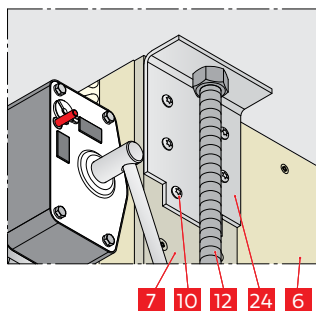
Details on fastening the connecting frame ► [page 71](#).

The illustration on the left shows a ventilation duct routed through the metal stud wall which requires protection, which has U-shaped cladding and is adjacent to a rigid ceiling on the non-cladded side. Details on connection of the ventilation duct to a wall ► [page 70](#).

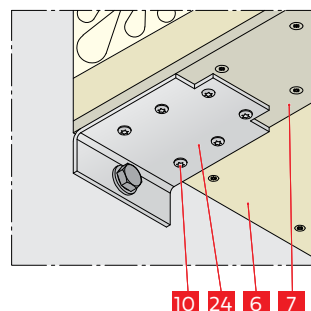


- Installation opening for claddings right up to the wall being protected:
 - $\varnothing d \approx DN + 5 \text{ mm}$
- Installation opening for claddings right through the wall being protected:
 - U-shaped : $w \times h \approx (DN + 134) \times (DN + 99 \text{ mm})$
 - L-shaped: $w \times h \approx (DN + 99) \times (DN + 99 \text{ mm})$

Suspension from rigid ceilings



Fastening to rigid walls



Nomenclature

No.	Description	No.	Description
1	FR90 fire damper	8	FR90 angle bracket ¹⁾
2	Connecting frame	10	Round head chipboard screw 4 x 45 mm ¹⁾
3	Sheet steel ventilation duct	11	Round head chipboard screw 5 x 70 mm ¹⁾
4	Mineral wool, 30 mm, $\geq 40 \text{ kg/m}^3$, $> 1000 \text{ }^\circ\text{C}$ melting point, clad in aluminium foil	12	Threaded rods for fastening with secured nuts ²⁾ . 4 pcs. M8 for $DN \leq 315$, otherwise 4 pcs. M12
6	Cladding made of 35 mm Promatect® LS fire protection boards. Production according to Promat® construction 478	22	Mineral wool, 50 mm, $\geq 140 \text{ kg/m}^3$
7	100 mm wide additional cladding made of 10 mm Promatect® H boards. Bond to 6 with Promat® K84 adhesive and screw in place with drywall screws 3.9 x 35 mm	23	Angle steel $\geq 40 \times 40 \text{ mm} \times 3 \text{ mm}$ DIN EN 10056 or equivalent. Fastening according to Promat® construction 478
		24	Suspension bracket ¹⁾

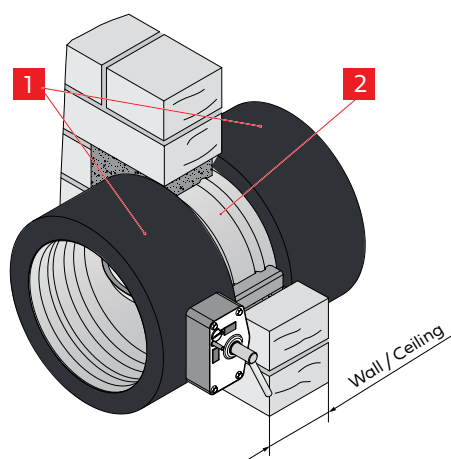
¹⁾ Included in the scope of delivery of the FR90 fire damper with connecting frame, and also available as accessory.

6 Installation

- Information on installation ► [page 17](#).
- Electrical wiring must be installed by the user.
- Equipotential bonding cables for bridging flexible connectors on fire dampers can be fastened with metal screws if they are made of copper with a cross section of up to 6 mm² or are made of aluminium.
- Fire dampers must be properly earthed when used in an explosive atmosphere.

i Further information on the electrical connection ► [page 79 ff.](#)

- Connection areas **1** of the FR90 fire dampers can be insulated thermally, for example, to prevent condensation in outdoor air suction systems. For insulation, flame-retardant, closed-cell foam can be used, for example from Armaflex. Otherwise, clad mineral wool must be used.



1 Connection areas (insulated)

2 Installation area in wall/ceiling thickness must remain non-insulated

7 Servicing

Functional test

- Fire dampers must be serviced by the operating company or owner. The function should be tested periodically, see VDMA standard sheet 24000. The intervals largely depend on the system operation. Relevant regulations should be followed.
- Functional checks are limited to the release and re-opening of the FR90 fire dampers. This can be performed remotely with an electric actuator.
- Repair or service work is required in the event of malfunctions. Original spare parts must be used for this purpose.
- Cleaning work required in ventilation systems for hygiene reasons must be performed in an operation-dependent manner, and also includes the fire dampers.

Information on maintenance-free items

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

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

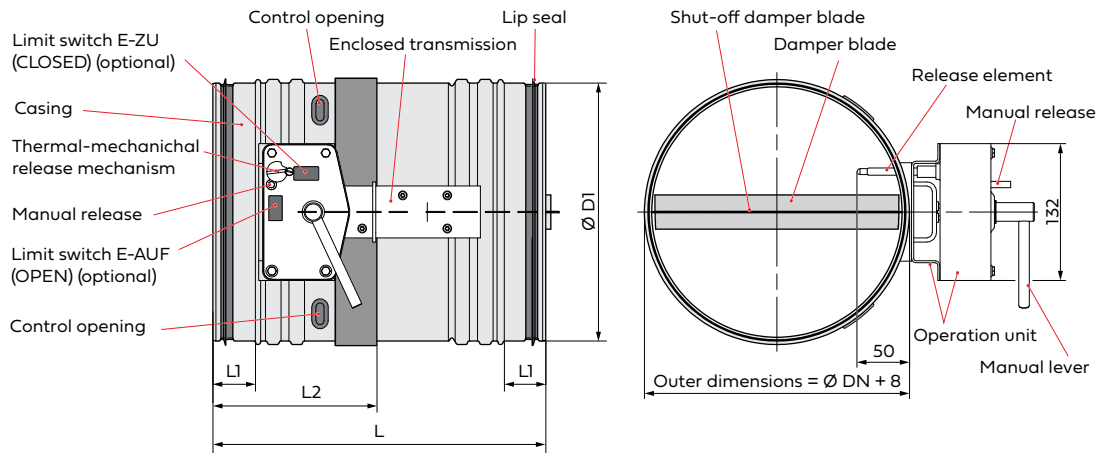
There is no requirement for continuous recurring cleaning and lubrication which is otherwise required.

Damper blades are break-proof. Sealants and all other materials are designed durably and for a long service life.

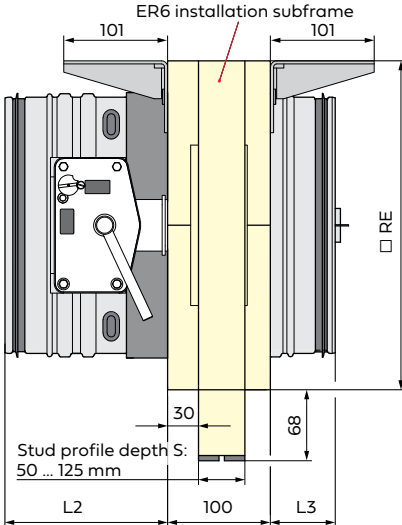
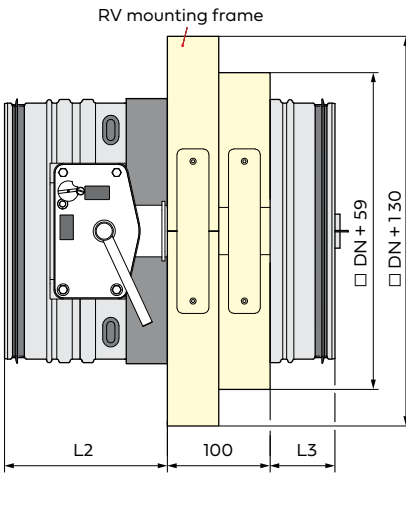
- The reliability of the FR90 fire dampers is due to the special drive mechanism with dead-centre positions in the opened and closed positions. This facilitates reliable closing, locking and signalling of the limit positions. This is the only way to ensure the reliability of remote-controlled functional checks and their automation.
- Manual functional checks are limited to the closing and opening of the FR90 fire dampers.
- Two control openings are provided for inspecting the interior of the fire dampers, one above and one below the damper blade. The position and size of these openings are specially adapted to the FR90 fire dampers and are fully adequate. FR90 fire dampers are largely insensitive to dust and dirt.

8 Technical Data

8.1 Dimensions



RR/RE/RH (100 mm in length)	RR/RE/RH (150 mm in length)	AE
<p>RR100 / RE100 / RH100 installation subframe</p>	<p>RR150 / RE150 / RH150 installation subframe</p>	<p>AE mounting frame</p>
<p>With RR100, RR150 (circular) or RE100, RE150, RH100, RH150 (rectangular) installation subframe ► page 6, page 24 ff., page 38 ff. and page 52 ff. Construction lengths 100 mm and 150 mm.</p>		
<p>With AE mounting frame ► page 7, page 26 and page 47.</p>		

ER6 (only available for delivery assembled)		RV	Overview of dimensions																																					
			<table><thead><tr><th></th><th>DN100 ... DN 315</th><th>DN 355 ... DN 800</th></tr></thead><tbody><tr><td>Ø D1</td><td>DN - 1</td><td>DN - 1</td></tr><tr><td>Ø RR</td><td>DN + 99</td><td>-</td></tr><tr><td>□ RE/RH</td><td>DN + 89</td><td>DN + 99</td></tr><tr><td>□ AE</td><td>DN + 110</td><td>DN + 120</td></tr><tr><td>L</td><td>320</td><td>340</td></tr><tr><td>L1</td><td>40</td><td>50</td></tr><tr><td>L2</td><td>155</td><td>160</td></tr><tr><td>L3</td><td>65</td><td>80</td></tr><tr><td>L4</td><td>37</td><td>52</td></tr><tr><td>L5</td><td>283</td><td>288</td></tr><tr><td>L6</td><td>15</td><td>30</td></tr></tbody></table>			DN100 ... DN 315	DN 355 ... DN 800	Ø D1	DN - 1	DN - 1	Ø RR	DN + 99	-	□ RE/RH	DN + 89	DN + 99	□ AE	DN + 110	DN + 120	L	320	340	L1	40	50	L2	155	160	L3	65	80	L4	37	52	L5	283	288	L6	15	30
	DN100 ... DN 315	DN 355 ... DN 800																																						
Ø D1	DN - 1	DN - 1																																						
Ø RR	DN + 99	-																																						
□ RE/RH	DN + 89	DN + 99																																						
□ AE	DN + 110	DN + 120																																						
L	320	340																																						
L1	40	50																																						
L2	155	160																																						
L3	65	80																																						
L4	37	52																																						
L5	283	288																																						
L6	15	30																																						
With ER6 installation subframe ▶ page 7 and page 45 .		With RV mounting frame ▶ page 6 and page 65 .																																						
All dimensions in mm																																								

8.2 Free cross-sections and weights

Fire damper with thermal-mechanical release mechanism

Size	Free cross-section [m ²]	Weight [kg]							
DN	A _{free}	Fire damper ¹⁾	Installation subframe				Mounting frame	Installation subframe	Mounting frame
	FR90	FR90	RE100/ RH100	RE150/ RH150	RR100	RR150	AE	ER6	RV
100	0.0047	2.4	2.0	3.0	1.4	2.2	3.5	4.9	2.1
125	0.0082	2.6	2.4	3.6	1.7	2.5	4.1	5.7	2.5
140	0.0108	2.7	2.6	3.9	1.8	2.7	4.5	6.1	2.7
160	0.0149	2.9	3.0	4.5	2.0	3.0	5.0	6.8	3.1
180	0.0195	3.1	3.3	5.0	2.2	3.3	5.5	7.4	3.4
200	0.0248	3.3	3.7	5.5	2.4	3.6	6.1	8.1	3.8
224	0.0298	3.7	4.1	6.2	2.7	4.0	6.8	8.2	4.2
250	0.0383	4.0	4.7	7.0	2.9	4.4	7.6	9.0	4.8
280	0.0494	4.5	5.3	7.9	3.2	4.8	8.5	9.9	5.4
315	0.0642	4.9	6.0	9.0	3.6	5.3	9.6	11.0	6.1
355	0.0806	7.5	7.6	11.4	-	-	11.8	14.3	7.0
400	0.1051	8.5	8.7	13.1	-	-	13.4	16.2	8.1
450	0.1356	10.0	10.0	15.1	-	-	15.3	18.5	9.4
500	0.1702	11.4	11.5	17.2	-	-	17.3	20.9	10.7
560	0.2169	12.9	13.3	19.9	-	-	19.9	23.9	12.4
630	0.2786	17.9	15.5	23.2	-	-	23.0	27.7	14.6
710	0.3584	21.2	18.2	27.3	-	-	26.8	32.3	17.2
800	0.4603	25.8	21.5	32.3	-	-	31.3	37.9	20.3

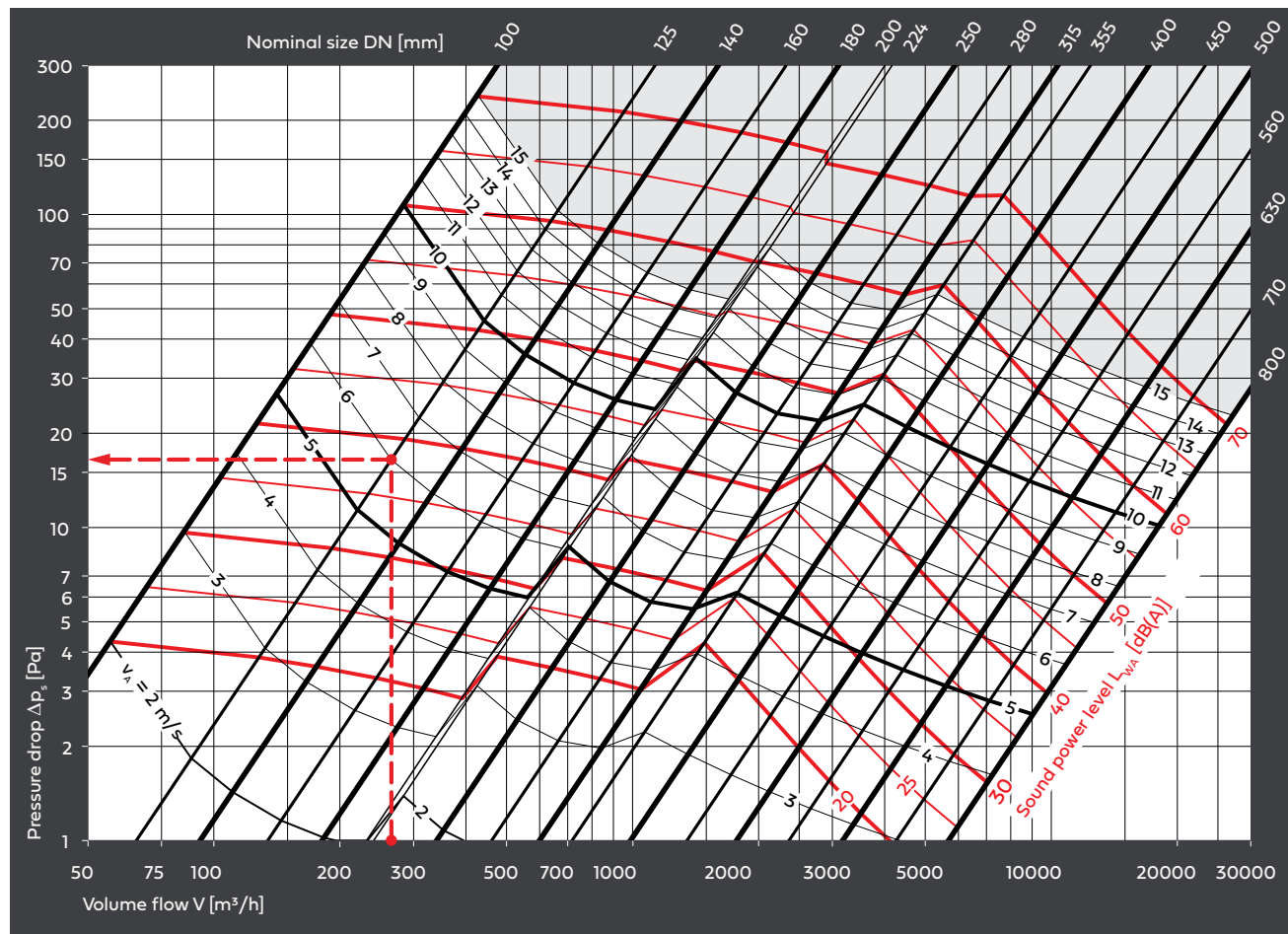
¹⁾ Design with thermal-mechanical release mechanism

- The weight of the respective used RE, RH, RR or ER6 installation subframe model, the AE mounting frame or the RV mounting frame must be added to the weight of the fire damper.
- In the case of a design with actuator, the weight supplements stated in the following table must be added.

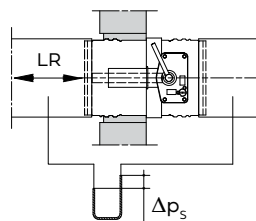
Actuators	
M220-9/H, M24-9/H	1.3 kg
M220-10/F, M24-10/F	0.3 kg
M220-11/H, M24-11/H	0.8 kg
EM-1, EM-2, RM-1	4.1 kg

8.3 Pressure drop and sound power level

Pressure drop with ventilation duct connection on both sides



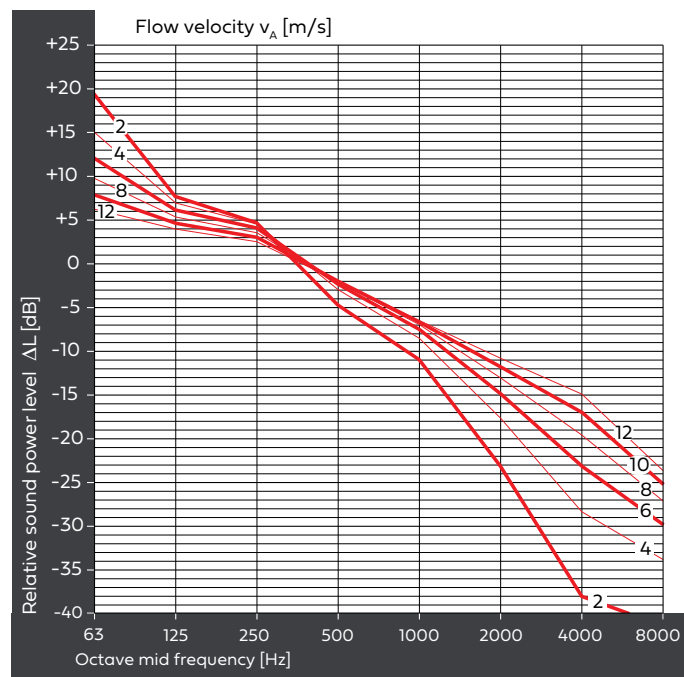
FR90 fire dampers can be used up to a speed of 15 m/s in the inflow cross-section A_A and up to an operating pressure of 2500 Pa.



Technical Data

FR90 fire damper

Relative sound power level



Example: Both sides with ventilation duct connection

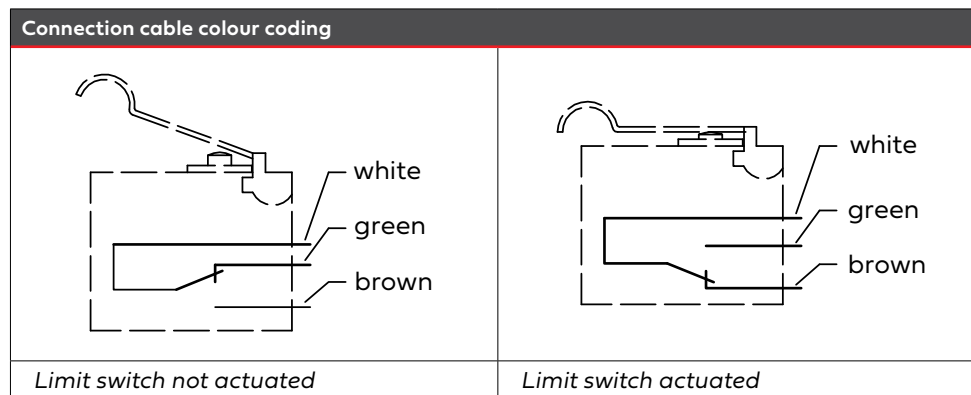
$V = 265 \text{ m}^3/\text{h}$
 $DN = 125 \text{ mm}$
 $v_A = 6 \text{ m/s}$
 $\Delta p_s = 16 \text{ Pa}$
 $L_{WA} = 38 \text{ dB(A)}$

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)]	38	38	38	38	38	38	38	38
$\Delta L_{6 \text{ m/s}}$	[dB]	+12	+6	+4	-2	-7	-15	-23	-30
L_{W-Oct}	[dB]	50	44	42	36	31	23	-	-

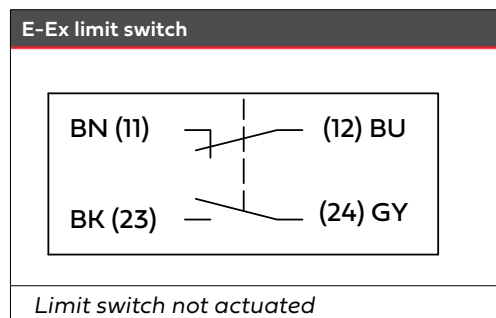
Nomenclature page 76 to 78				
DN	[mm]	Nominal size	L_{W-Oct}	[dB] Octave sound power level $L_{W-Oct} = L_{WA} + \Delta L$
A_A	[m ²]	Inflow cross-section	ΔL	[dB] Relative sound power level to L_{WA}
A_{free}	[m ²]	Free cross-section	f	[Hz] Octave mid frequency
V	[m ³ /h]	Flow rate	L_{WA}	[dB(A)] A-weighted, area-corrected sound power level
v_A	[m/s]	Flow velocity in inflow cross-section	LR	Direction of air flow
Δp_s	[Pa]	Static pressure drop		

8.4 Electrical connections

Limit switches on thermal-mechanical release mechanisms



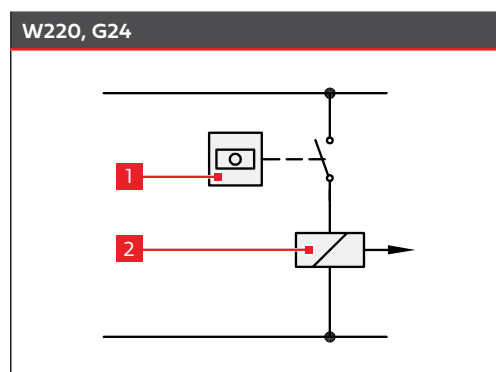
E-Ex limit switch



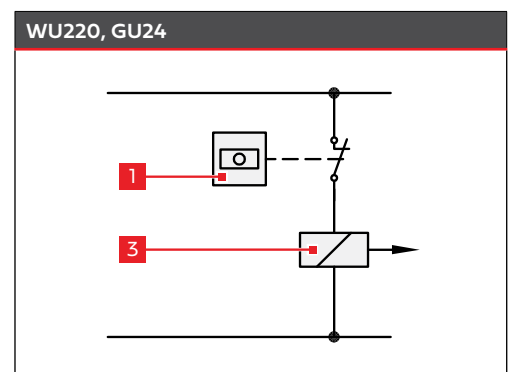
Remote release

Control voltages 230 V AC or 24 V DC

Open circuit principle



Closed circuit principle

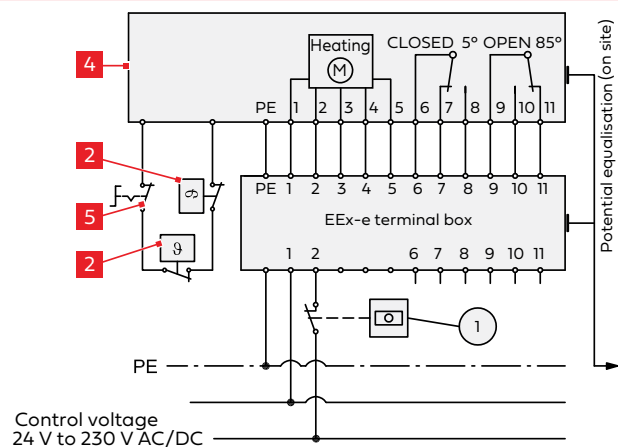
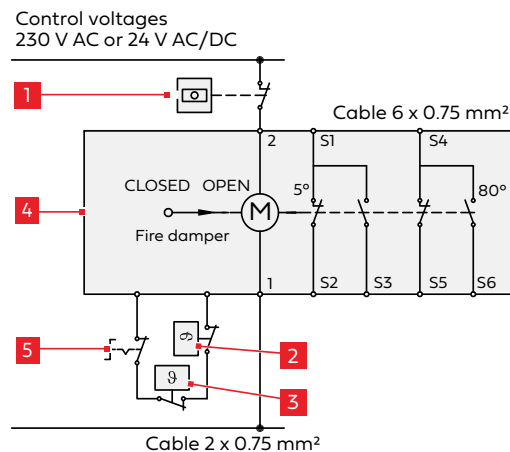
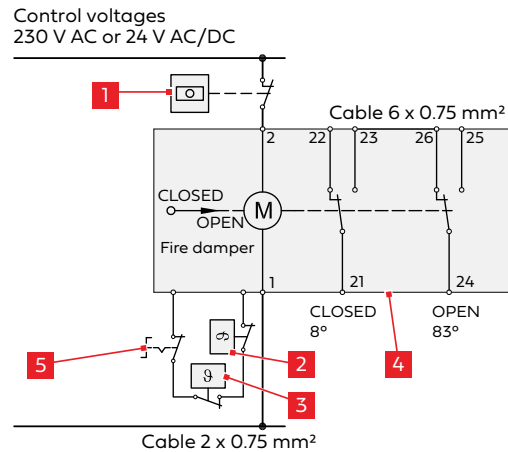


Nomenclature

No.	Description	No.	Description
1	Thermostats, smoke detectors and switches must only be installed if required. On site delivery.	2	Lifting solenoid
		3	Magnetic clamp

FR90 fire damper

For the actuators M24-9/H and M24-10/H and M24-11/H, the operating voltage of 24 V AC or 24 V DC has to be provided and connected by the operating company.



No.	Description	No.	Description
1	Thermostats, smoke detectors and switches must only be installed if required. Must be provided on site	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
2	Thermal-electrical release element 70 °C or 95 °C within the casing of the fire damper; EM-1, EM-2 and RM-1 only 70 °C	5	Button for functional check
3	Thermal cut-off approx. 70 °C outside the casing of the fire damper		

9 Specification text

Maintenance-free fire damper according to EN 15650 with declaration of performance and CE marking up to 120 minutes fire resistance period and fire resistance classes EI 30/60/90/120 (ve - ho, i ↔ o) S C 10000. Maintenance-free: The operation unit, release mechanism and release element are fully enclosed, meaning that no cleaning, regular lubrication or adjustment is needed to maintain function. Straightforward functional check (opening and closing) using external operation and position indicator. Air-tight casing, leak tightness class ATC 3 according to DIN EN 1751, made of galvanized sheet steel with moulded plug connections for spiral lockseam duct, flexible pipe and for similar circular ventilation ducts or air conditioning systems. Casing with lip seals and epoxy resin powder coating on both sides. Replaceable damper blade made of abrasion-proof calcium silicate, with wear-resistant elastomer lip seals/with metal cover made of galvanized steel or 1.4301 stainless steel. Fully enclosed, maintenance-free slider crank transmission in the area of the casing wall, as a self-locking drive mechanism for break-proof torque transmission. Sealed drive axles made of stainless steel, with gunmetal bearings. Suitable for installation with minimum spacing and with any damper blade axial position, even installed as part of a package with up to 4 fire dampers of the same size next to each other, one above the other or a combination. Installation is also possible in, on and remote from rigid walls and ceilings, in hard-to-access installation openings, also with mineral wool, in and remote from metal stud walls, on shaft walls with and without metal studs, in solid timber and timber frame construction walls, in this case using installation subframes also with fireproof foam, and in walls and ceilings in wooden frame construction, in timber frame construction with clay board cladding and in ceilings with steel frames and historical wooden beam ceilings. Fire batt system installation in rigid walls and ceilings and in metal stud walls. Direct connection to ventilation ducts made of non-combustible or combustible materials, or with protective grilles.

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

- For manual single-handed operation
 - Corrosion-resistant release element 70 °C
 - With (two) electrical limit switch(es) for signalling the damper blade positions CLOSED, OPEN, CLOSED AND OPEN
 - With remote release via magnetic clamp 230 V AC or 24 V DC / lifting solenoid 230 V AC or 24 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) explosion-protected electrical limit switch(es) for signalling the damper blade positions CLOSED/OPEN
 - With explosion-protected electric drive for 24 V to 240 V AC/DC.
- With
 - RE100/RE150 installation subframe for installation in rigid walls, ceilings and in metal stud walls.
 - RH100/RH150 installation subframe for installation in wooden walls and ceilings
 - RH150 installation subframe for installation in ceilings with steel frames.
 - RR100/RR150 installation subframe for installation in rigid walls and ceilings and in metal stud walls.
 - AE mounting frame for mounting on rigid walls and ceilings and on walls with cladding on one side (shaft walls) and with and without metal studs.
 - ER6 installation subframe for sliding ceiling connections in metal stud walls.
 - RV mounting frame and connecting frame (1 pc.) for installation remote from rigid walls and ceilings and remote from metal stud walls with 4-sided connection.
 - Connecting frames (2 pcs.) for installation remote from rigid walls and remote from metal stud walls with 2- and 3-sided connection.

Tested according to EN 15650, annex B, with 20 % saline solution, for verification of permanent functioning under highly corrosive conditions.

In compliance with the hygiene requirements in accordance with VDI 6022-1, VDI 3803-1, DIN 1946-4, 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.

Specification text

FR90 fire damper

..... pcs.	Diameter DN:	..... mm		
	Volume flow:	..... m ³ /h		
	Pressure drop:	..... Pa		
	Sound power level:	..... dB(A)		
	Manufacturer:	WILDEBOER		
	Type/series:	FR90 / FR92	deliver:	.....
			install:	.....

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

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

Flexible connectors for fire dampers, made from polyester with a cadmium-free coating, with clips. Stretched length around 210 mm, at least 100 mm axial expansion absorption, building material class B1 according to DIN 4102. With certificate for hygiene conformity test as proof of compliance in accordance with VDI 6022-1, VDI 3803-1, DIN 1946-4, ÖNorm H 6021, ÖNorm H 6020, SWKI VA 104-01, SWKI VA 105-01.

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

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

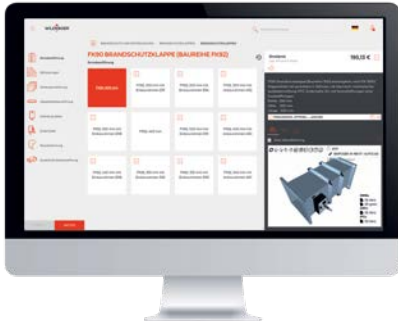
..... pcs.	AB-01 for 24 V AC/DC			
	Manufacturer:	WILDEBOER	deliver:	.....
			install:	.....

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

Delete text not printed in bold as required!

10 Wildeboer makes it easy

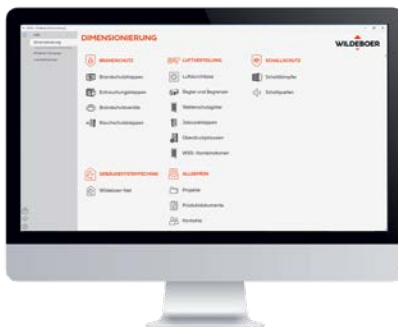
10.1 Wildeboer Connect



- High-performance configurator with customer-specific net prices
 - Quick, intuitive product configuration of Wildeboer products
 - Access to prices and unique version keys for ordering products
 - Easy calculation of operating point data for configured products
 - Interface to Autodesk Revit and AutoCAD for transferring CAD geometries
 - Download of CAD data, data sheets, specification texts and further product documents in common data formats
- Transparent real-time order tracking
 - Detailed order information
 - Access to order documents
 - Access to shipment tracking



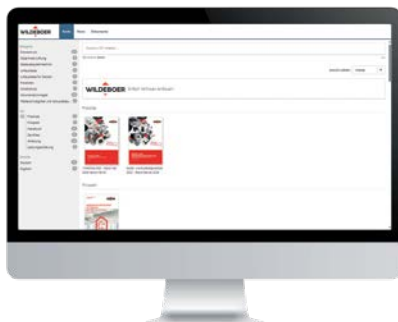
10.2 WiDim dimensioning software



- Functional, modern and intuitive dimensioning of Wildeboer products
- Conveniently collect operating point data, 3D product views, suitable accessories and current revision documents in a single project
- Project can be output in various formats
- A GAEB interface and an interface based on VDI 3805 facilitate a continuous planning process



10.3 Documents online



- Paperless and environmentally friendly online access to Wildeboer documents
- All documents in one central location and always up to date
- Supporting interactive formats and content



10.4 Documents for acceptance

The following list contains the documents which are required for acceptance of an FR90 fire damper.



FR90 in ventilation systems

- | | |
|---|---|
| <input type="checkbox"/> FR90 fire damper user manual | |
| <input type="checkbox"/> Declaration of performance | DoP No. CPR/FR90/003 |
| <input type="checkbox"/> Reaction to fire certificate | MPA-BS 6000/593/18 |
| <input type="checkbox"/> CE marking with necessary manufacturer information | Applied to fire damper in the factory.
Please remove before mortaring. |
| <input type="checkbox"/> Approval Z-78.6-250 OR4 smoke detector
(if installed in ventilation system) | |
| <input type="checkbox"/> ATEX EU declaration (if applicable) | |

FR90 as air transfer application closure (Ü-FR)

- | | |
|---|---|
| <input type="checkbox"/> FR90 fire damper user manual | |
| <input type="checkbox"/> Declaration of performance | DoP No. CPR/FR90/003 |
| <input type="checkbox"/> Reaction to fire certificate | MPA-BS 6000/593/18 |
| <input type="checkbox"/> CE marking with necessary manufacturer information | Applied to fire damper in the factory.
Please remove before mortaring. |
| <input type="checkbox"/> User manual for Ü-FK Ü-FR (OR4 series) or
user manual for Ü-FK Ü-FR (OR32 series) | |
| <input type="checkbox"/> Type approval, Ü-FR (OR32 & OR4 series) | Z-6.50-2133 |
| <input type="checkbox"/> Compliance declaration, Ü-FR | |



Supplementary documents for completion of the documentation

- Installation and operating instructions
- Hygiene certificate
- Environment product declaration

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, light gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid lines are evenly spaced both horizontally and vertically.

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin gray lines. There are no margins, text, or other markings on the page.

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, light gray lines. There are no margins, text, or other markings on the page.

Always there for you

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