



Fire damper

Type FKR-EU

according to Declaration of Performance
DoP / FKR-EU / DE / 004



Short version

This is a content-reduced short version. The full version is available at www.trox-docs.com.

TROX[®] TECHNIK
The art of handling air

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General information

About this manual

This operating and installation manual enables operating or service personnel to correctly install the TROX product described below and to use it safely and efficiently.

This operating and installation manual is intended for use by fitting and installation companies, in-house technicians, technical staff, instructed persons, and qualified electricians or air conditioning technicians.

It is essential that these individuals read and fully understand this manual before starting any work. The basic prerequisite for safe working is to comply with the safety notes and all instructions in this manual.

The local regulations for health and safety at work and general safety regulations also apply.

This manual must be given to the system owner when handing over the system. The system owner must include the manual with the system documentation. The manual must be kept in a place that is accessible at all times.

Illustrations in this manual are mainly for information and may differ from the actual design.

Copyright

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Any use without our consent may be an infringement of copyright, and the violator will be held liable for any damage.

This applies in particular to:

- Publishing content
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TROX Technical Service

To ensure that your request is processed as quickly as possible, please keep the following information ready:

- Product name
- TROX order number
- Delivery date
- Brief description of the fault

Online	www.troxtechnik.com
Phone	+49 2845 202-400

Limitation of liability

The information in this manual has been compiled with reference to the applicable standards and guidelines, the state of the art, and our expertise and experience of many years.

The manufacturer does not accept any liability for damages resulting from:

- Non-compliance with this manual
- Incorrect use
- Operation or handling by untrained individuals
- Unauthorised modifications
- Technical changes
- Use of non-approved replacement parts

The actual scope of delivery may differ from the information in this manual for bespoke constructions, additional order options or as a result of recent technical changes.

The obligations agreed in the order, the general terms and conditions, the manufacturer's terms of delivery, and the legal regulations in effect at the time the contract is signed shall apply.

We reserve the right to make technical changes.

Warranty claims

The provisions of the respective general delivery terms apply to warranty claims. For purchase orders placed with TROX GmbH, these are the regulations in section "VI. Warranty claims" of the Delivery Terms of TROX GmbH, see www.trox.de/en/.

Safety notes

Symbols are used in this manual to alert readers to areas of potential hazard. Signal words express the degree of the hazard.

Comply with all safety instructions and proceed carefully to avoid accidents, injuries and damage to property.

DANGER!

Imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

Potentially hazardous situation which, if not avoided, may result in death or serious injury.

CAUTION!

Potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE!

Potentially hazardous situation which, if not avoided, may result in property damage.

ENVIRONMENT!

Environmental pollution hazard.

Tips and recommendations



Useful tips and recommendations as well as information for efficient and fault-free operation.

Safety notes as part of instructions

Safety notes may refer to individual instructions. In this case, safety notes will be included in the instructions and hence facilitate following the instructions. The above listed signal words will be used.

Example:

1. ▶ Loosen the screw.

2. ▶

CAUTION!

Danger of finger entrapment when closing the lid.

Be careful when closing the lid.

3. ▶ Tighten the screw.

Specific safety notes

The following symbols are used in safety notes to alert you to specific hazards:

Warning signs	Type of danger
	Warning – danger zone.

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1 Safety

1.1 General safety notes

Sharp edges, sharp corners and thin sheet metal parts

 **CAUTION!**

Danger of injury from sharp edges, sharp corners and thin sheet metal parts!

Sharp edges, sharp corners and thin sheet metal parts may cause cuts or grazes.

- Be careful when carrying out any work.
- Wear protective gloves, safety shoes and a hard hat.

Electrical voltage

 **DANGER!**

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Only skilled qualified electricians are allowed to work on the electrical system.
- Switch off the power supply before working on any electrical equipment.

1.2 Correct use

- The fire damper is used as an automatic shut-off device to prevent fire and smoke from spreading through ducting.
- The fire damper is suitable for supply and extract air in HVAC systems.
- The fire damper may be used in potentially explosive atmospheres if appropriate special accessories are used with it and if the product bears the CE conformity marking according to Directive 94/9/EC. Fire dampers for use in potentially explosive atmospheres are marked for the zones for which they have been approved.
- Operation of the fire dampers is allowed only in compliance with installation regulations and the technical data in this installation and operating manual.
- Modifying the fire damper or using replacement parts that have not been approved by TROX is not permitted.

If this fire damper is used in Germany:

- Do not use it in extract air systems in commercial kitchens.
- Not to be used as an air transfer damper.
- Do not use in combined penetration seal.
- Do not use in fire protection block bulkhead.
- Approvals under building regulations may be required for the use of upstream shutters for air transfer units. This must be checked and applied for by others.
- Flame-resistant, non-dripping building materials (elastomeric foams) must at least correspond to fire rating class C - s2, d0 according to the specifications of MVV TB (since 2019/1). The applicable local building regulations must be observed.

Incorrect use

 **WARNING!**

Danger due to incorrect use!

Incorrect use of the fire damper can lead to dangerous situations.

Never use the fire damper

- without specially approved attachments in areas with potentially explosive atmospheres
- as a smoke control damper
- outdoors without sufficient protection against the effects of weather
- in atmospheres where chemical reactions, whether planned or unplanned, may cause damage to the fire damper or lead to corrosion

1.3 Qualified staff

**WARNING!****Danger of injury due to insufficiently qualified individuals!**

Incorrect use may cause considerable injury or damage to property.

- Only specialist personnel must carry out work.

Personnel:

- Skilled qualified electrician
- Specialist personnel

Skilled qualified electrician

Skilled qualified electricians are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to work on electrical systems, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

Specialist personnel

Specialist personnel are individuals who have sufficient professional or technical training, knowledge and actual experience to enable them to carry out their assigned duties, understand any potential hazards related to the work under consideration, and recognise and avoid any risks involved.

2 Technical data

2.1 General data

Nominal sizes	315 – 800 mm
Casing lengths L	495 and 550 mm
Volume flow rate range	Up to 6000 l/s / up to 21600 m³/h (at 12 m/s)
Differential pressure range	Up to 2000 Pa
Temperature range ^{1, 3, 4}	-20 °C to 50 °C
Release temperature ⁴	72 °C or 95 °C (for warm air ventilation systems)
Upstream velocity ^{2, 4}	≤ 8 m/s with fusible link, ≤ 12 m/s with spring return actuator
Closed damper blade air leakage	EN 1751, Class 4
Casing leakage	EN 1751, Class C
EC conformity	<ul style="list-style-type: none"> ■ Construction Products Regulation (EU) Nr. 305/2011 ■ EN 15650 – Ventilation for buildings – Fire dampers ■ EN 13501-3 – Classification: Fire resistant ducts and fire dampers ■ EN 1366-2 – Fire resistance tests for installations: Fire dampers ⁵ ■ EN 1751 Ventilation for buildings – Air terminal devices ■ 2006/42/EC - Machinery Directive
Declaration of performance	DoP / FKR-EU / DE / 004

¹⁾ Temperatures may differ for units with attachments. Details for other applications are available on request.

²⁾ Data applies to uniform upstream and downstream conditions for the fire dampers.

³⁾ Condensation and the intake of humid fresh air have to be avoided as otherwise operation will be impaired or not possible.

⁴⁾ For FKR-EU in Ex construction, see the supplementary operating manual.

⁵⁾ Leakage rate of the fire damper system tested at 300 Pa negative pressure.

Product sticker

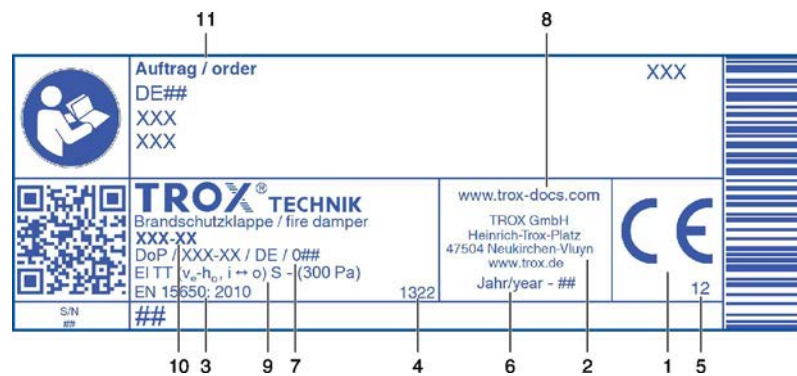


Fig. 1: Product sticker (example)

- | | | | |
|---|---|----|--|
| 1 | CE mark | 7 | No. of the declaration of performance |
| 2 | Manufacturer's address | 8 | Website from which the DoP can be downloaded |
| 3 | Number of the European standard and year of its publication | 9 | Regulated characteristics; the fire resistance class depends on the application and may vary
↳ Chapter 4.1 'Installation situations' on page 20 |
| 4 | Notified body | 10 | Type |
| 5 | The last two digits of the year in which the CE marking was affixed | 11 | Order number |
| 6 | Year of manufacture | | |

2.2 FKR-EU with fusible link

Dimensions and weight

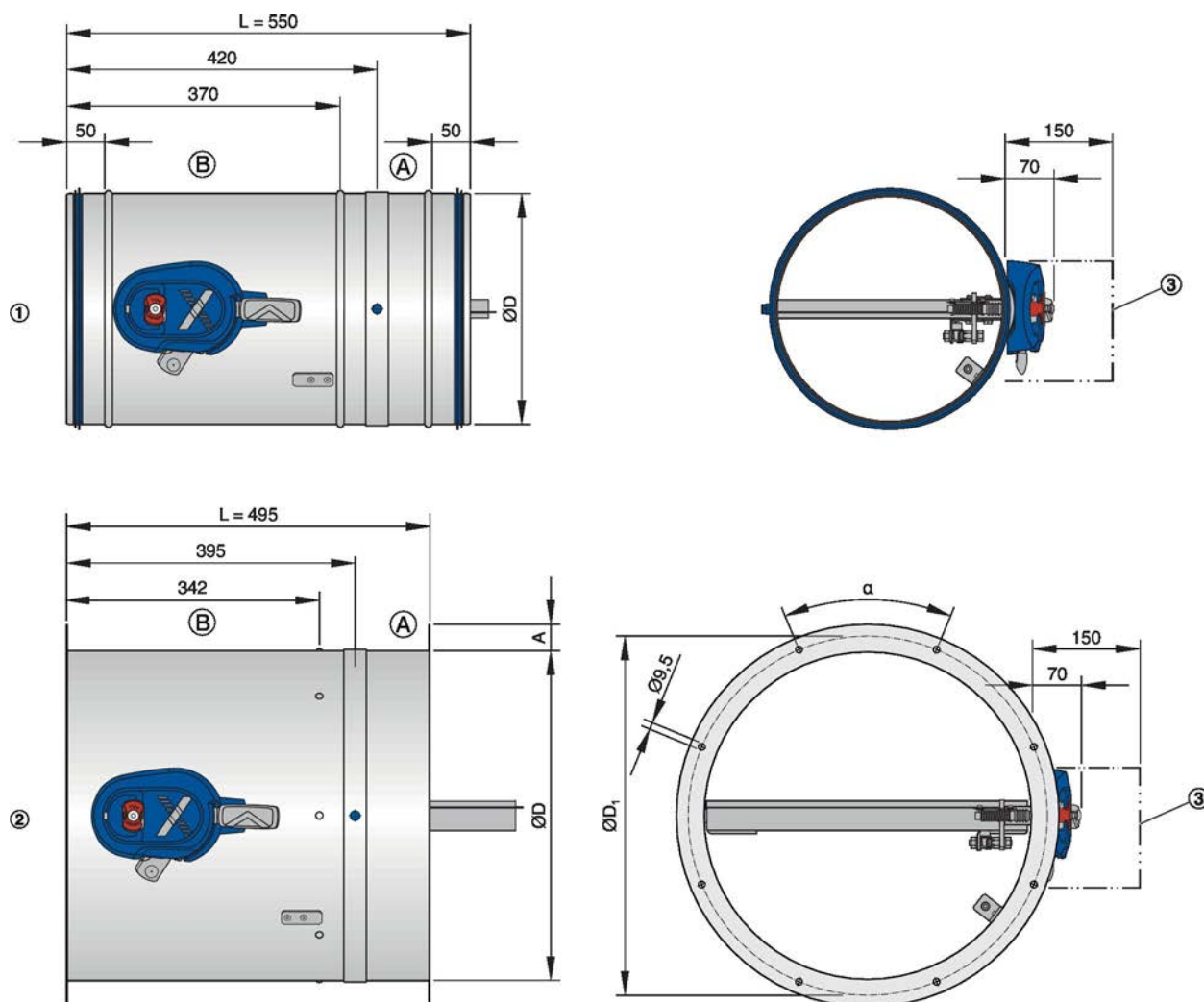


Fig. 2: FKR-EU with fusible link

- 1 Spigot construction
 - 2 Flange construction
 - 3 Keep clear to provide access for operation
- A Installation side
 - B Operating side

- Weight of FKR-EU with fusible link, see table 11.

Limit switch	
Connecting cable length / cross section	1 m / 3 × 0.34 mm ²
Protection level	IP 66
Type of contact	1 changeover contact, gold-plated
Maximum switching current	0.5 A
Maximum switching voltage	30 V DC, 250 V AC
Contact resistance	approx. 30 mΩ

Dimensions [mm] / Weight [kg]									
Nominal size DN	315	355	400	450	500	560	630	710	800
ØD	314	354	399	449	499	559	629	709	799
A	31				36				
ØD ₁	352	392	438	488	538	600	670	750	840
α	45 °					30 °			22.5 °
No. of holes	8					12			16
Weight of FKR-EU	6.8	7.3	8.5	14.1	16.4	18	21.3	25.7	28.6
Weight of FKR-EU with spigot and installation kit TQ	19.5	21.8	25	33.1	37.8	42.6	49.7	58.7	67.3

2.3 FKR-EU with spring return actuator

Dimensions and weight

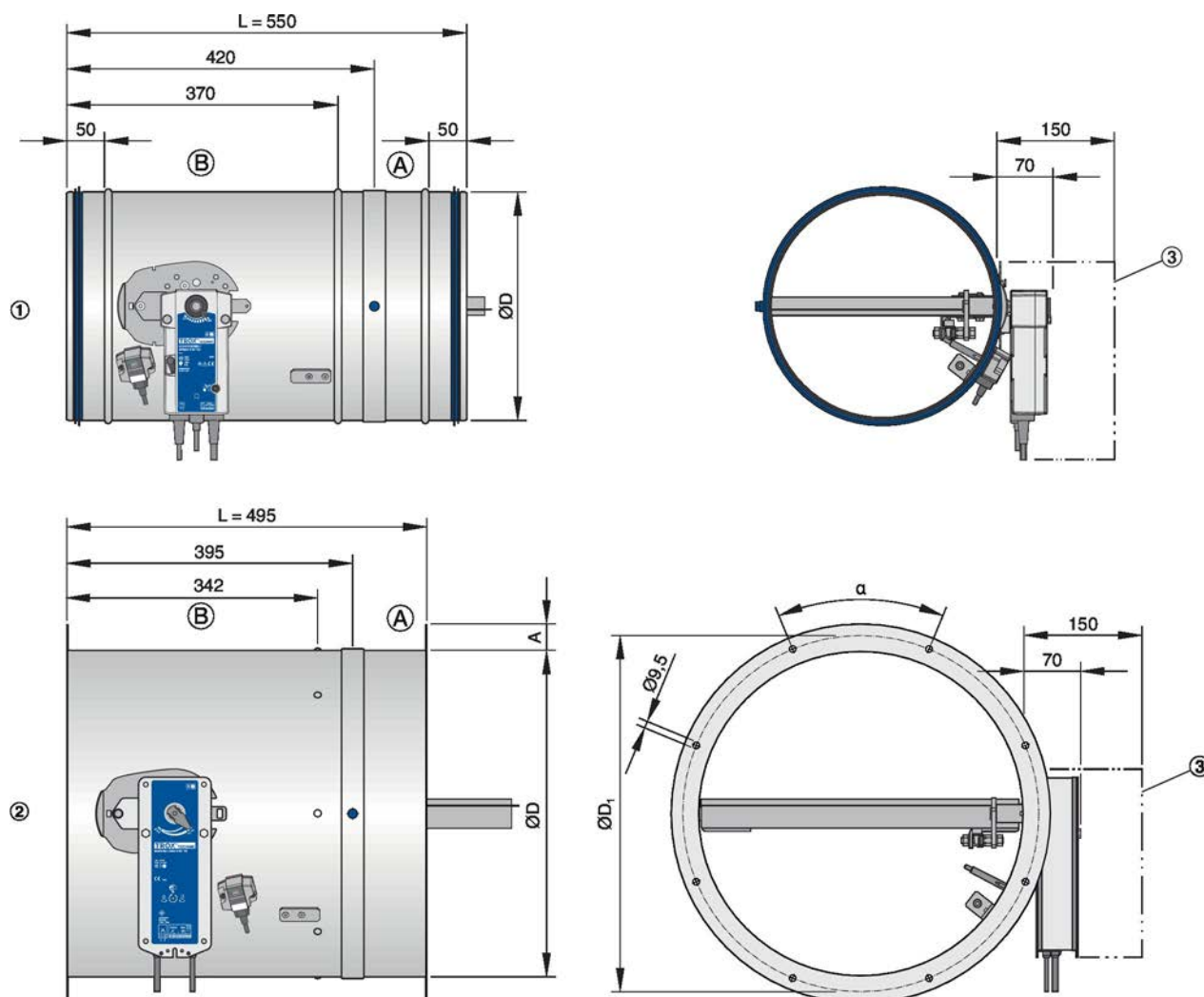


Fig. 3: FKR-EU with Belimo spring return actuator

- 1 Spigot construction
- 2 Flange construction
- 3 Keep clear to provide access for operation

- A Installation side
- B Operating side

- Weight of FKR-EU with fusible link + approx. 1 kg (BFN...) or 3 kg (BF...), see table 11.

Spring return actuator BFN...			
Construction		230-T TR	24-T-ST TR
Supply voltage		230 V AC, 50/60 Hz	24 V AC/DC, 50/60 Hz
Functional range		198 – 264 V AC	19.2 – 28.8 V AC 21.6 – 28.8 V DC
Power rating	Spring winding mechanism / hold position	5 W / 2.1 W	4 W / 1.4 W
	Rating	10 VA (I _{max} 4 A @ 5 ms)	6 VA (I _{max} 8.3 A @ 5 ms)
Run time	Actuator / spring return	< 60 s / < 20 s	
Limit switch	Type of contact	2 changeover contacts	
	Switching voltage	5 – 120 V DC / 5 – 250 V AC	
	Switching current	1 mA – 3 (0.5 inductive) A	
	Contact resistance	< 1 Ω (when new)	
IEC protection class / IP protection		II / IP 54	
Storage temperature / ambient temperature		-40 to 55 °C / -30 to 55 °C ¹	
Ambient humidity		≤ 95% rh, no condensation	
Connecting cable	Actuator / limit switch	1 m, 2 × 0.75 mm ² / 1 m, 6 × 0.75 mm ² (free of halogens)	

Spring return actuator type BFN... Nominal sizes: nominal width 315 – 400 mm.

¹ Up to 75 °C the safe position will definitely be reached.

Spring return actuator BF...			
Construction		BF230-TN-2 TR	BF24-TN-ST-2 TR
Supply voltage		230 V AC, 50/60 Hz	24 V AC/DC, 50/60 Hz
Functional range		198 – 264 V AC	19.2 – 28.8 V AC 21.6 – 28.8 V DC
Power rating	Spring winding mechanism / hold position	8.5 W / 3 W	7 W / 2 W
	Rating	11 VA	10 VA
Run time	Actuator / spring return	< 120 s / approx. 16 s	
Limit switch	Type of contact	2 changeover contacts	
	Switching voltage	5 – 120 V DC / 5 – 250 V AC	
	Switching current	1 mA ... 6 A	
	Contact resistance	< 100 mΩ	
IEC protection class / IP protection		II / IP 54	III / IP 54
Storage temperature / ambient temperature		-40 to 50 °C / -30 to 50 °C ¹	
Ambient humidity		≤ 95% rh, no condensation	
Connecting cable	Actuator / limit switch	1 m, 2 × 0.75 mm ² / 1 m, 6 × 0.75 mm ² (free of halogens)	

Spring return actuator type BF... for nominal sizes: nominal width 450 – 800 mm.

¹ Up to 75 °C the safe position will definitely be reached.

Dimensions and weight

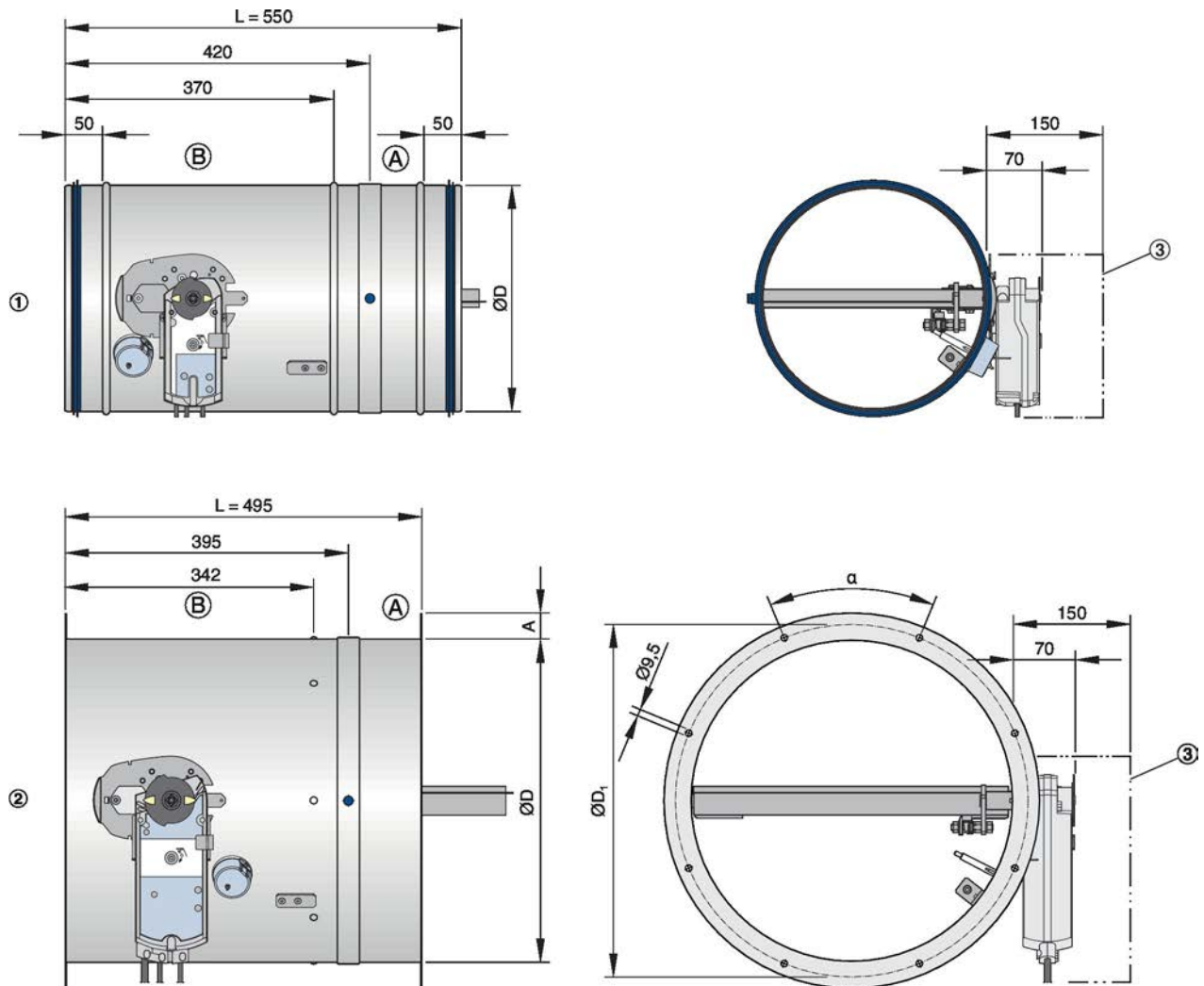


Fig. 4: FKR-EU with Siemens spring return actuator

1 Spigot construction

2 Flange construction

3 Keep clear to provide access for operation

A Installation side

B Operating side

- Weight of FKR-EU with fusible link + approx. 1.4 kg (GNA...) or 2.5 kg (GGA...), see table 11.

Spring return actuator GNA...			
Construction		326.1E	126.1E
Supply voltage		230 V AC, 50/60 Hz	24 V AC, 50/60 Hz / 24 – 48 V DC
Functional range		198 – 264 V AC	19.2 – 28.8 V AC 19.2 – 57.6 V DC
Power rating	Spring winding mechanism	7 VA / 4.5 W	5 VA / 3.5 W
	Hold position	3.5 W	2 W
Run time	Actuator / spring return	90 s / 15 s	
Limit switch	Type of contact	2 changeover contacts	
	Switching voltage	24 – 230 V AC / 12 – 30 V DC	
	Switching current	AC: 6 A (inductive 2 A) / DC: 2 A	
IEC protection class / IP protection		II / IP 42 or IP 54*	III / IP 42 or IP 54*
Storage temperature / ambient temperature		-20 to 50 °C / -20 to 50 °C	
Ambient humidity		< 95% rh, no condensation	
Connecting cable	Actuator / limit switch	0.9 m, 2 × 0.75 mm ² / 1 m, 6 × 0.75 mm ² (free of halogens)	

Spring return actuator type GNA... Nominal sizes: nominal width 315 – 400 mm.

*Connecting cable at the bottom

Spring return actuator GGA...			
Construction		326.1E	126.1E
Supply voltage		230 V AC, 50/60 Hz	24 V AC, 50/60 Hz / 24 – 48 V DC
Functional range		198 – 264 V AC	19.2 – 28.8 V AC 19.2 – 57.6 V DC
Power rating	Spring winding mechanism	8 VA / 6 W	7 VA / 5 W
	Hold position	4 W	3 W
Run time	Actuator / spring return	90 s / 15 s	
Limit switch	Type of contact	2 changeover contacts	
	Switching voltage	24 – 230 V AC / 12 – 30 V DC	
	Switching current	AC: 6 A (inductive 2 A) / DC: 2 A	
IEC protection class / IP protection		II / IP 42 or IP 54*	III / IP 42 or IP 54*
Storage temperature / ambient temperature		-20 to 50 °C / -20 to 50 °C	
Ambient humidity		< 95% rh, no condensation	
Connecting cable	Actuator / limit switch	0.9 m, 2 × 0.75 mm ² / 1 m, 6 × 0.75 mm ² (free of halogens)	

Spring return actuator type GGA... for nominal sizes: nominal width 450 – 800 mm.

*Connecting cable at the bottom

FKR-EU with Schischek explosion-proof spring return actuator

The FKR-EU can also be supplied with Schischek explosion-proof spring return actuator on request:

- ExMax-15-BF-TR
- RedMax-15-BF-TR

For further information, see "Supplementary operating manual for explosion-proof fire dampers Type FKR-EU".

FKR-EU with fusible link and cover grille on bot...

2.4 FKR-EU with fusible link and cover grille on both sides as an upstream shutter for the air transfer unit

Dimensions and weight

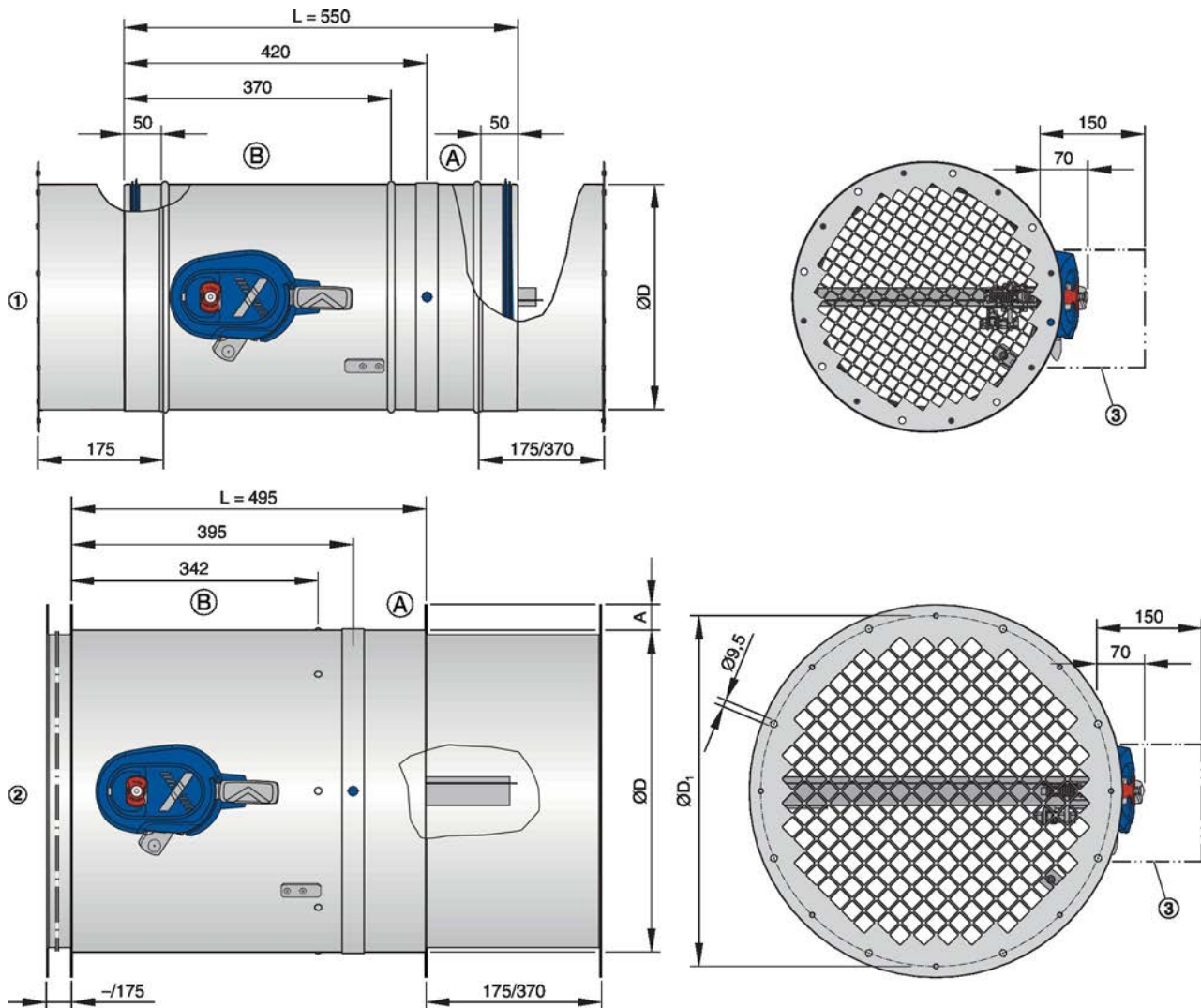


Fig. 5: FKR-EU with fusible link

- | | |
|--|---------------------|
| 1 Spigot construction | A Installation side |
| 2 Flange construction | B Operating side |
| 3 Keep clear to provide access for operation | |

- Weight of FKR-EU with fusible link, see table 11.

Note: Approvals under building regulations may be required for the use of air transfer units. This must be checked and applied for by others.

3 Supply package, transport and storage

Supply package

If attachments and accessories are supplied from the factory with the fire dampers, they are already taken into account in the order code.

Depending on the installation situation, supplementary materials for assembly and fixing may be needed to ensure proper installation, e.g. mortar, screws, mineral wool, etc.

Such materials are not included in the supply package, unless they are expressly described as included in the supply package.

The selection of additional attachments or accessories as well as the identification and provision of materials for assembly and fixing is the responsibility of those involved in the building project and must be done taking into account the required classification.

Delivery check

Check delivered items immediately after arrival for transport damage and completeness. In case of any damage or an incomplete shipment, contact the shipping company and your supplier immediately.

- Fire damper
 - Attachments/accessories, if any
- Operating manual (1 per shipment)



Colour hues on the damper blade

The blades of fire dampers are treated with a greenish impregnating agent. Resulting colour hues on the damper blade are due to technical reasons and do not constitute a defect of any kind.

Transport on site

If possible, take the product in its transport packaging up to the installation location.

Bearing

For temporary storage please note:

- Remove any plastic wrapping.
- Protect the product from dust and contamination.
- Store the product in a dry place and away from direct sunlight.
- Do not expose the unit to the effects of weather (not even in its packaging).
- Do not store the product below -40 °C or above 50 °C.

Packaging

Properly dispose of packaging material.

4 Installation

4.1 Installation situations

Note

The performance classes of the fire damper and the wall or ceiling slab may differ. The lower performance class determines the performance class of the overall system.

Installation situations					
Supporting construction	Installation location	Minimum thickness [mm]	Class of performance EI TT (v _e -h _o , i ↔ o) S up to	Installation type	Chapter
Solid walls	in	100	EI 120 S	N	☞ 35
		80 ¹⁾	EI 90 S	N	☞ 35
	in, combined assembly	100	EI 90 S	N	☞ 37
	in, multiple mounting	100	EI 90 S	N	*
	in, fire batt	100	EI 60 S	W	*
Metal stud walls	in	94	EI 90 S	N ²⁾	*
		80	EI 60 S	N ²⁾	*
		75	EI 30 S	N ²⁾	*
	in, combined assembly	94	EI 90 S	N ²⁾	*
	in, multiple mounting	94	EI 90 S	N	*
	in, installation kit TQ	94	EI 90 S	E	☞ 46
		80	EI 60 S	E	☞ 46
		75	EI 30 S	E	☞ 46
	in, fire batt	80	EI 60 S	W	☞ 49
		75	EI 30 S	W	☞ 49
in, without installation kit	94	EI 60 S	T	*	
Timber stud walls	in	130	EI 90 S	N	*
		110	EI 60 S	N	*
		105	EI 30 S	N	*
	in, combined assembly	130	EI 90 S	N	*
	in, multiple mounting	130	EI 90 S	N	*
	in, installation kit TQ	130	EI 90 S	E	*
		110	EI 60 S	E	*
		105	EI 30 S	E	*

¹⁾ Gypsum wall boards EN12859

²⁾ The class of performance depends on the installation details

³⁾ Thickness increased near the installation opening

⁴⁾ Cadolto system

⁵⁾ Depending on local conditions

* see complete operating and installation manual on www.trox-docs.com

N = Mortar-based installation

E = Installation kit

W = Fire batt

E = Dry mortarless installation

Installation situations					
Supporting construction	Installation location	Minimum thickness [mm]	Class of performance EI TT (v _e -h _o , i ↔ o) S up to	Installation type	Chapter
	in, fire batt	110	EI 60 S	W	*
		105	EI 30 S	W	*
Half-timbered constructions	in	140	EI 90 S	N	*
		110	EI 30 S	N	*
	in, combined assembly	140	EI 90 S	N	*
	in, multiple mounting	140	EI 90 S	N	*
	in, installation kit TQ	140	EI 90 S	E	*
		110	EI 30 S	E	*
	in, fire batt	140	EI 60 S	W	*
		110	EI 30 S	W	*
Solid wood / cross laminated timber walls	in	95	EI 90 S	N	*
	in, installation kit TQ	95	EI 90 S	E	*
	in, fire batt	95	EI 60 S	W	*
Shaft wall with metal support structure	in	90	EI 90 S	N	*
		90 ³	EI 30 S	N	*
		80	EI 90 S	N	*
		75	EI 30 S	N	*
	in, combined assembly	90	EI 90 S	N	*
Shaft wall without metal support structure	in	50	EI 90 S	N	*
Solid ceiling slabs	in	100 (150) ³	EI 120 S	N	*
		100 (150) ³	EI 90 S	N	*
	in, combined assembly	150	EI 90 S	N	*
	in, multiple mounting	150	EI 90 S	N	*
	in, with concrete base	100	EI 90 S	N	*
	in, with concrete base	100	EI 120 S	N	*
	in, with concrete base, combined assembly	100	EI 90 S	N	*
	in, with concrete base, multiple mounting	100	EI 90 S	N	*
	in, hollow stone ceilings	150	EI 90 S	N	*

¹⁾ Gypsum wall boards EN12859

²⁾ The class of performance depends on the installation details

³⁾ Thickness increased near the installation opening

⁴⁾ Cadolto system

⁵⁾ Depending on local conditions

* see complete operating and installation manual on www.trox-docs.com

N = Mortar-based installation

E = Installation kit

W = Fire batt

E = Dry mortarless installation

Installation situations					
Supporting construction	Installation location	Minimum thickness [mm]	Class of performance EI TT (v _e -h _o , i ↔ o) S up to	Installation type	Chapter
	in, hollow chamber ceilings	150	EI 90 S	N	*
	in, ribbed ceilings	150 ³	EI 90 S	N	*
	in, composite ceilings	150	EI 90 S	N	*
	in, combined with wooden beam ceilings	150	EI 90 S	N	*
	in, combined solid wood ceiling	150	EI 90 S	N	*
	in, combined lightweight ceiling ⁴	150	EI 120 S	N	*
Solid wood ceilings	in	140	EI 90 S	N	*
		112.5	EI 90 S	N	*
	in, installation kit TQ	140	EI 90 S	E	*
		112.5	EI 90 S	E	*
Wooden beam ceilings	in	167.5	EI 90 S	N	*
		155	EI 60 S	N	*
		142.5	EI 30 S	N	*
	in, installation kit TQ	167.5	EI 90 S	E	*
		155	EI 60 S	E	*
		142.5	EI 30 S	E	*
	in, historical wooden beam ceilings	– ⁵	EI 30 S	N	*

¹⁾ Gypsum wall boards EN12859

²⁾ The class of performance depends on the installation details

³⁾ Thickness increased near the installation opening

⁴⁾ Cadolto system

⁵⁾ Depending on local conditions

*see complete operating and installation manual on www.trox-docs.com

N = Mortar-based installation

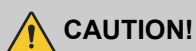
E = Installation kit

W = Fire batt

E = Dry mortarless installation

4.2 Safety notes regarding installation

Sharp edges, sharp corners and thin sheet metal parts



Danger of injury from sharp edges, sharp corners and thin sheet metal parts!

Sharp edges, sharp corners and thin sheet metal parts may cause cuts or grazes.

- Be careful when carrying out any work.
- Wear protective gloves, safety shoes and a hard hat.

4.3 General installation information

! NOTICE!

Risk of damage to the fire damper

- Protect the fire damper from contamination and damage.
- Cover openings and release mechanism (e.g. with plastic) to protect them from mortar and dripping water.
- Do not remove the transport and installation protection (if any) until installation is complete.

- Control elements, electric actuator and inspection access panel must remain accessible for maintenance.
- Loads imposed on the casing may impair the function of the fire damper. Install and connect the damper in such a way that no loads will be imposed on the installed damper. Ducts of combustible or non-combustible materials may be connected to fire dampers if the ducts have been installed straight and without any torsion.
- Before installation: Perform a functional test, then close the fire damper ↺ 56 .
- The adhesive tape in the installation area must NOT be removed.
- The product label must NOT be removed and must remain visible.
- Protect the fire damper from humidity and condensation as they will damage the fire damper.
- The construction variants with stainless steel or powder-coated casing and additionally with an impregnated damper blade meet more critical requirements for corrosion protection.
- When installing the FKR-EU, the structural properties of the supporting construction (wall / ceiling) must be ensured by others, even in the event of a fire.
- Unless stated otherwise in the respective installation details:
 - Each fire damper must be installed in a separate installation opening. The distance between two fire dampers is ≥ 200 mm.
 - The distance from load-bearing structural elements is ≥ 75 mm.
 - A maximum of two fire dampers must be installed in a single installation opening.
 - Fire dampers are allowed to be in mortar-based installation at a distance of ≥ 40 mm or ≥ 60 mm with installation kit TQ from steel beams, wooden beams or wooden ceilings with fire protection claddings. The fire-resistant cladding (panel material) must be manufactured in accordance with a national or European certificate and must lie against the supporting structure without cavities in the area of the fire damper.
- If several fire dampers are used on the same duct, the following has to be ensured: If one damper closes, the maximum permitted upstream velocity for the other fire dampers that remain open must not be exceeded. This must be ensured by other, e.g., by switching off the fan or by mutual interlocking in the case of the construction with a spring return actuator.
- As ducts may expand and walls may become deformed in the event of a fire, we recommend using flexible connectors for the following installation situations:
 - Lightweight partition walls
 - Lightweight shaft walls
 - Fire batt systems

The flexible connectors should be installed in such a way that they absorb both tension and compression. Flexible ducts can be used as an alternative.

Ducting must be installed in such a way that it does not impose any significant loads on the fire damper in the event of a fire. This can be achieved by a non-straight duct, i.e. by bends or elbows, for example. Be sure to comply with the relevant national guidelines and regulations.

- The interior of the fire damper must be accessible for maintenance work and cleaning. Depending on the installation configuration it may be necessary to provide inspection panels in the connecting ducts. As an alternative to the inspection access, we recommend connecting the duct using flexible connectors (fastened with hose clamp) or sliding connectors.
- Load-bearing components
Solid ceiling slabs and concrete beams, as well as load-bearing solid walls are called load-bearing components.

After installation

- Clean the fire damper.
- Remove transport and installation protection or the prop, if any. In case of mortar-based installation this protection must not be removed until the mortar has hardened.
- Test the function of the fire damper.
- Make electrical connections.

Connecting duct and extension piece

It is possible to insert screws near the spigot for fixing.

Equipotential bonding

Flange construction

- The flange of the fire damper can be used for equipotential bonding; no holes must be drilled into the damper casing.

Spigot construction

- The equipotential bonding is fixed, for example, with suitable clamps. Alternatively, it is allowable for drilled holes to be made near the spigot.

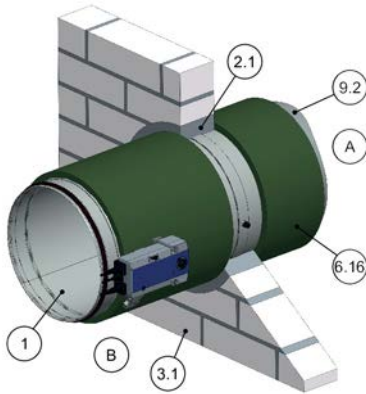
Thermal insulation

When using thermal insulation, especially for outside or exhaust air, fully bonded panel insulation materials made of elastomeric foams (synthetic rubber) can be used (e.g. Armaflex Ultima from Armacell). Be sure to comply with the relevant national guidelines and regulations for combustible building materials and smoke formation classes.

General installation information

Insulation is non-hazardous in terms of fire safety if the following requirements are met:

- the insulation does not impair the function of the fire damper,
- The fire damper remains accessible.
- The inspection accesses and product sticker remain accessible.
- The insulation does not penetrate walls or ceilings.



TR3726504, A

Fig. 6: Thermal insulation

- 1 FKR-EU
- 2.1 Mortar
- 3.1 Solid wall
- 6.16 Insulation (elastomeric foam, flame-resistant, non-dripping), around the perimeter, actuator and release mechanism, inspection accesses and product sticker must be accessible
- 9.2 Extension piece or duct
- 1 Up to EI 120 S

Note: The installation situation shown is representative of all supporting constructions.

The following applies to Germany:

In Germany, only insulation materials with a fire behaviour of at least C - s2, d0, may be used according to the specifications of the MVV TB (since 2019/1). This requirement is met by Armaflex Ultima insulation material from Armacell, for example. The applicable local building regulations must be observed.

For notes on the use of elastomeric foams, see § 6.

Extension pieces

To ensure that the fire damper can be connected to the ductwork after installation even if the wall or ceiling is fairly thick, you should extend the fire damper with a suitable extension piece (attachment or extension by others) on the installation side.

Installation positions

The fire damper may be installed so that the damper blade shaft is horizontal or vertical or in all intermediate positions (0 – 360°).

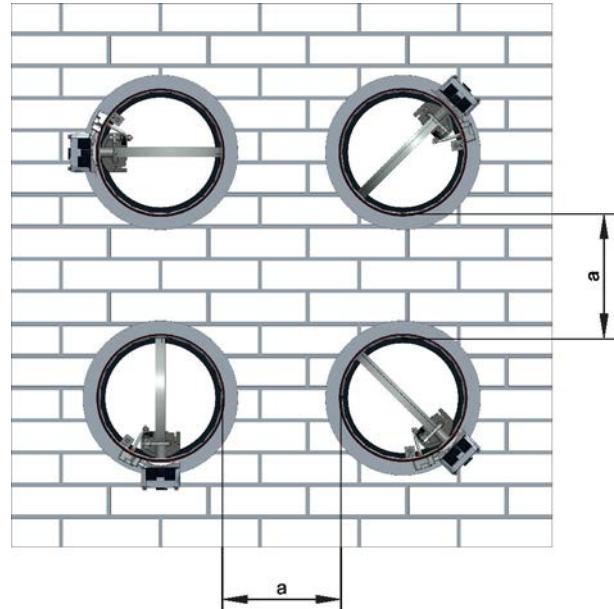


Fig. 7: Installation positions and distances

- a Distance between two fire dampers; see § 22 .
The distance also depends on the installation situation and is given in the installation details.

If a duct smoke detector is installed in the connected duct, it must be positioned at the top, regardless of the installation position.

Deviating arrangements are possible, provided that the specifications of the general building inspectorate licence of the duct smoke detector are observed.

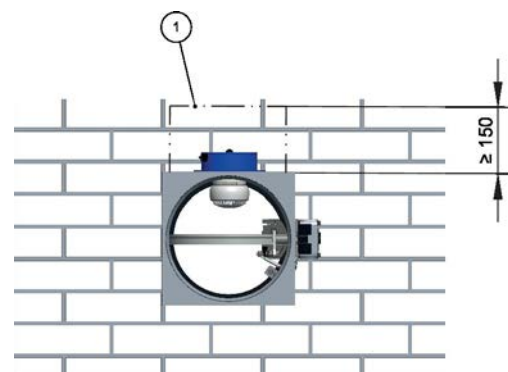
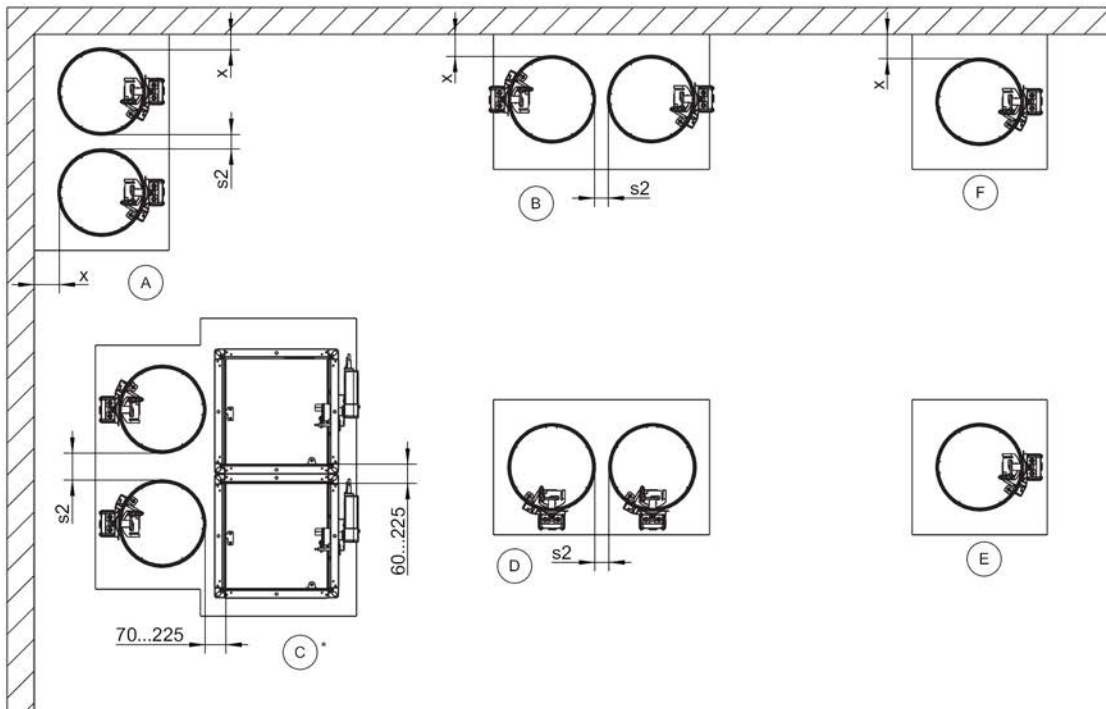


Fig. 8: Any installation position (0 – 360°), duct smoke detector always at top

- 1 Keep clear to provide access for operation

Distances



TR3749828, B

Fig. 9: Overview of distances

- x Distance to load-bearing components (solid walls and ceiling slabs, concrete beams as well as steel girders, wooden beams and solid wood ceilings with fire-rated cladding)
- s2 Distance between the fire dampers
- * Mixed installation with fire damper type FK2-EU

Distances (unless otherwise specified in the respective installation details)

Installation type	x [mm]	s2 [mm]
Mortar-based installation	40 – 225	40 – 225 ⁵
Dry mortarless installation with installation kit TQ ^{1,2}	100 / 60 ³	≥ 200 ⁴
Dry mortarless installation with fire batt	40 – 600	40 – 600 ⁵

¹ See "Installation openings" table under the respective installation details

² Installation into separate installation openings

³ With shortened cover plate

⁴ Separate installation opening

⁵ 80 – 225 mm and/or 80 – 600 mm with flange construction

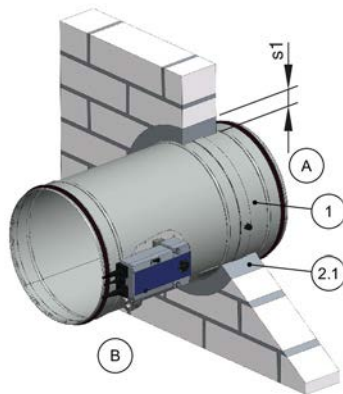
The perimeter gap is ≤ 225 mm with mortar-based installation and 40 – 600 mm with fire batt.

Installation orientations (see installation details for fire resistance properties)

Supporting construction	Installation type		
	Mortar-based installation	Dry mortarless installation	Fire batt installation
Solid wall	A – F		A, B, D – F
Gypsum wall boards	E, F		
Lightweight partition walls / compartment walls with metal support structure	A – F	E, F	A, B, D – F
Timber stud wall or half-timbered construction	A – F	E, F	A, B, D – F
Solid wood wall / cross-laminated timber wall	A, B, D – F	E, F	A, B, D – F
Shaft wall with metal support structure	C, E, F		
Shaft wall without metal support structure	E, F		
Solid ceiling slab	A – F		
Hollow chamber ceiling, hollow stone ceiling, composite ceiling, ribbed ceiling	E, F		
In combination with lightweight ceiling (Cadolto system)	A, B, D – F		
In / in combination with solid wood ceiling	E / A, B, D – F	E / –	
In / in combination with wooden beam ceiling	E / A, B, D – F	E / –	
Historical wooden beam ceilings	E		

Perimeter gap "s1"

- With mortar-based installation the perimeter gap "s1" must not exceed 225 mm (wall and ceiling). The perimeter gap »s« must be large enough so that mortar can be filled in even in case of thicker walls or ceilings. Be sure to close larger wall openings or holes beforehand and in a suitable way, i.e. depending on the type of wall. When there are larger openings in the solid ceiling slabs, the dampers must be encased in concrete when the ceiling section is created. The gap must be large enough so that mortar can be filled in. We recommend a gap of at least 20 mm (note the constructively required minimum installation opening size, e.g., for the flange construction). Reinforcement should meet structural requirements.



TR3724394, A

Fig. 10: Perimeter gap

- 1 FKR-EU
- 2.1 Mortar
- s1 Perimeter gap

Maximum gap widths are based on EN 15882-2. Larger gaps do not have an adverse effect with regard to fire protection and are in our opinion not critical.

Mortar-based installation

- Cover all openings and control elements of the fire damper (e.g. with plastic) to protect them from contamination.
- If the wall thickness is >115 mm, extend the fire damper on the installation side with an extension piece or a spiral duct.
- Push the fire dampers into the installation opening in a centred manner and secure them. The distance from the operating side to the wall/ceiling slab is 370 mm for the spigot construction and 342 mm for the flange construction. Connect extension piece or duct if required.
- In case of mortar-based installation, the open spaces between the fire damper casing and the wall or ceiling slab must be closed off with mortar. Entrapped air is to be avoided. The mortar bed depth should be equal to the thickness of the wall but must be at least 100 mm.
- If you install the fire damper as the solid wall or ceiling slab is being completed, perimeter gap »s1« is not required. The open spaces between the fire damper and the wall must be closed off with mortar; for installation into solid ceiling slabs, concrete can be used. Reinforcements should meet structural requirements.
- The mortar bed depth should be equal to the thickness of the wall. If trim panels with appropriate fire resistance are used, a mortar bed depth of 100 mm suffices.

Mortar

- DIN 1053: Groups II, IIa, III, IIIa; fire protection mortar of groups II, III
- EN 998-2: Classes M 2.5 to M 20 or fire protection mortar of classes M 2.5 to M 20
- Equivalent mortars that meet the requirements of the above standards, gypsum mortar or concrete

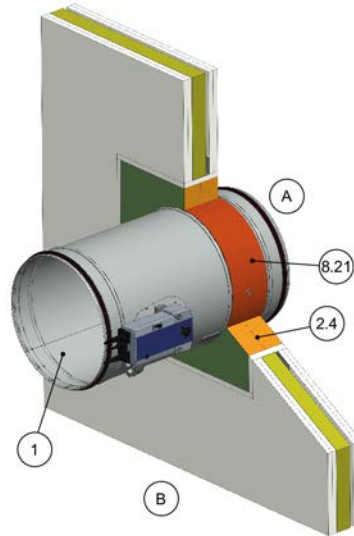
Mineral wool as filling material

Unless otherwise stated in the installation details, mineral wool with a gross density of $\geq 80 \text{ kg/m}^3$ and a melting point of $\geq 1000 \text{ }^\circ\text{C}$ must be used.

General installation information

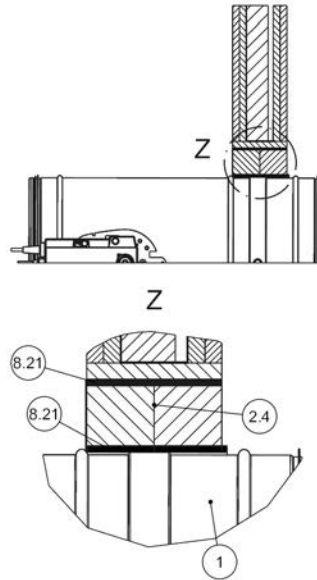
Installation with installation kit

- For installation without a mortar-mix, the installation kit TQ can be used (only FKR-EU in spigot construction).
The installation kit is assembled on the fire damper at the factory. Fixing to the wall / ceiling slab is carried out according to the respective installation details.
- The installation is carried out centred in the installation opening.
- For installation near the floor or ceiling, professionally shorten the cover plate of the installation kit on one side.
- Fixing to the wall / ceiling slab is carried out according to the respective installation details.



Installation with fire batt

- The distance from the operating side flange to the wall or ceiling has to be 370 mm for the spigot construction and Flange construction 342 mm.
- Fire batt systems consist of two layers of mineral wool slabs, gross density $\geq 140 \text{ kg/m}^3$.
- Apply fire-resistant sealant to the cut faces of the mineral wool slabs and fit them tightly into the installation opening. Seal any gaps between the mineral wool slabs and the installation opening, gaps between the cut faces of cut-to-size pieces, and gaps between slabs and the fire damper by applying fire-resistant sealant or coating. Use only sealant or coating that is suitable for the fire batt system.
- Apply ablative coating to the mineral wool slabs, joints, transitions and any imperfections on the coated mineral wool slabs; coating thickness $\geq 2.5 \text{ mm}$.
- Fix fire dampers on both sides of the wall, see ↗ 54 .
- If the wall/ceiling is fairly thick, you must use additional layers of mineral wool slabs on side A.
- Fire batt systems are not suitable for use below flexible ceiling joints.



TR3744235, B

Fig. 11: Fire-resistant sealant

- 1 FKR-EU
- 2.4 Coated board system
- 8.21 Firestop sealant

Fire batt systems

The following fire batt systems are acceptable (fire batt systems have to be provided by others). As for mineral wool slabs, all slabs that are part of the system and have been approved by the manufacturer may be used.

Promat[®]

- Ablative coating Promastop[®]-CC
- Ablative coating Promastop[®]-I
- Ablative coating Intumex-CSP
- Ablative coating Intumex-AC

Hilti

- Ablative coating CFS-CT
- Ablative coating CP 673
- Fire-resistant sealant CFS-S ACR

HENSEL

- Ablative coating HENSOMASTIK[®] 5 KS Farbe
- Fire-resistant sealant HENSOMASTIK[®] 5 KS Spachtel

SVT

- Ablative coating PYRO-SAFE FLAMMOTECT-A Farbe
- Fire-resistant sealant PYRO-SAFE FLAMMOTECT-A Spachtel

OBO Bettermann

- Ablative coating PYROCOAT[®] ASX Farbe
- Fire-resistant sealant PYROCOAT[®] ASX Spachtel

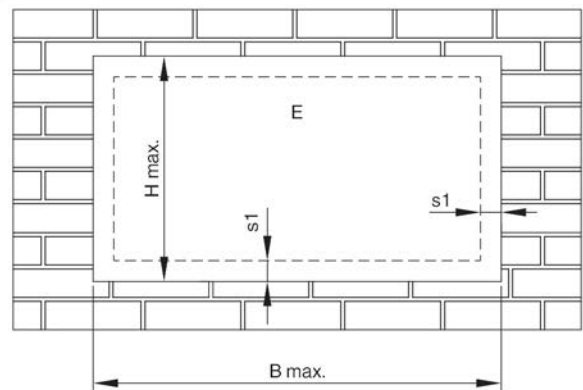
Würth

- Ablative coating Würth Ablationsbeschichtung I ('Ablation coating I')

AGI

- Ablative coating PYRO-SAFE Flammotect Combi S90
- Fire-resistant sealant AGI Flammotect COMBI S90

Dimensions and distances for fire batt systems for wall installation



GR3420162, D

Fig. 12: Fire batt – installation in solid walls and ceiling slabs, lightweight partition, timber stud wall, half-timbered construction and solid wood walls

E Installation area

Coated board system	B max. [mm]	H max. [mm]
Promat [®]	≤ 3750	≤ 1840
Hilti	≤ 3000	≤ 2115
Hensel	≤ 1900	≤ 1400
SVT		
OBO Bettermann		
Würth		
AGI		

Damper combination up to EI 90 S	s1 min. [mm]	s1 max. [mm]
FKR-EU	40	600

Requirements for wall and ceiling systems

FKR-EU fire dampers must be installed in wall and ceiling systems if these walls and ceiling slabs have been erected in compliance with the relevant regulations and according to the manufacturers' instructions, and if the information on the respective installation situation applies and the following requirements are met.

Provide any installation openings according to the installation details in this manual.

General installation information

Solid walls

- Solid walls or compartment walls made of, for example, concrete, aerated concrete, masonry, or solid gypsum wallboards according to EN 12859 (without open spaces), gross density $\geq 350 \text{ kg/m}^3$.
- Wall thickness $W \geq 100 \text{ mm}$, solid gypsum wallboards $W \geq 80 \text{ mm}$.
- Provide each installation opening and core drilled holes according to the local and structural conditions and with regard to the dimensions of the fire damper.

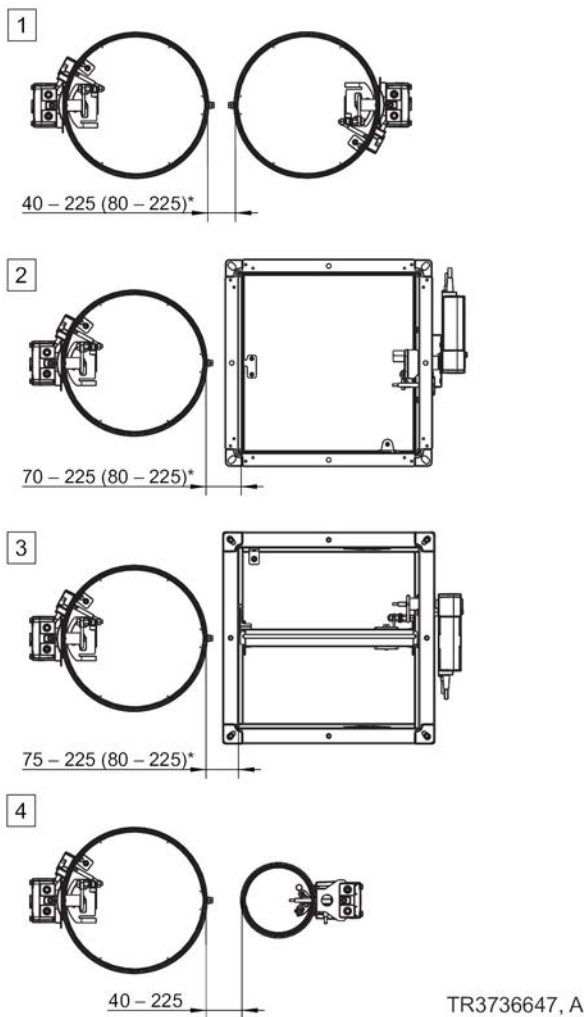


Fig. 13: Distance from the FKR-EU to other TROX fire dampers in mortar-based installation

* For flange construction

Distance between different TROX fire dampers in mortar-based installation in solid walls (one installation opening)

Item no.	Damper combination up to EI 90 S
1	FKR-EU / FKR-EU
2	FKR-EU – FK2-EU
3	FKR-EU – FK-EU
3	FKR-EU – FKRS-EU

Lightweight partition walls with metal support structure

- Lightweight partition walls, safety partition walls or walls to provide radiation protection, with metal support structure or steel support structure (box sections), with European classification to EN 13501-2 or equivalent national classification.
- Cladding on both sides made of gypsum bonded or cement bonded panel materials, fibre-reinforced gypsum or fire-rated calcium silicate boards.
- Wall thickness $W \geq 94 \text{ mm}$, for compartment walls or safety partition walls $W \geq 100 \text{ mm}$.
- Distance between metal support structures $\leq 625 \text{ mm}$; distance between metal support structures in compartment walls $\leq 312.5 \text{ mm}$.
- Compartment walls and safety partition walls may be provided with sheet steel inserts and may require less space between the metal studs.
- Create an installation opening with trimmers (studs and noggings).
- If necessary, provide trim panels and screw-fix them to the support structure
- Additional layers of cladding (if stated in the usability certificate for the wall) or double stud constructions are approved.
- Connect the metal sections near the installation opening according to the installation details in this manual.
- If reinforcing boards are required, they must be screwed to the metal support structure at intervals of approx. 100 mm.
- Installation only permitted in non-load-bearing walls (load-bearing wall constructions on request).
- The structural properties of the wall must be ensured by others and any necessary compensation measures, especially with large installation openings, must be checked and taken into account by others.

Lightweight partition walls with timber support structure / half-timbered construction

- Lightweight partition walls, either timber stud walls or half-timbered constructions, with European classification to EN 13501-2 or equivalent national classification.
- Cladding on both sides made of gypsum bonded or cement bonded panel materials, fibre-reinforced gypsum or fire-rated calcium silicate boards.
- Wall thickness $W \geq 130$ mm ($W \geq 110$ for F60, $W \geq 105$ for F30); wall thickness of half-timbered constructions $W \geq 140$ mm ($W \geq 110$ for F30).
- Erect the timber stud wall or half-timbered construction according to the manufacturer's instructions.
- Additional layers of cladding (if stated in the usability certificate for the wall) or double stud constructions are approved.
- Create an opening in the timber support structure with studs and trimmers.
- Trim panels and reinforcing boards have to be made of cladding material and have to be fixed to the frame at a distance of about 100 mm.
- The structural properties of the wall must be ensured by others and any necessary compensation measures, especially with large installation openings, must be checked and taken into account by others.

Solid wood walls

- Fire-resistant solid wood walls or cross laminated timber walls with European or national certificate.
- Wall thickness $W \geq 95$ mm (with reinforcing board $W \geq 100$ mm near the installation opening).
- If required, additional gypsum bonded or cement bonded panel materials or fibre-reinforced gypsum board are permitted.

Shaft walls with metal support structure

- Shaft walls or additional leaves with metal support structure or steel support structure (box sections), with European classification to EN 13501-2 or equivalent national classification.
- Cladding on one side made of gypsum bonded or cement bonded panel materials, fibre-reinforced gypsum or fire-rated calcium silicate boards.
- Wall thickness $W \geq 90$ mm ($W \geq 75$ for F30); cladding / reinforcing boards according to installation details.
- ≤ 625 mm distance between metal studs.
- Be sure to follow the manufacturers' instructions for the height, width and thickness of walls.
- Create an installation opening with trimmers (studs and noggings).
- If necessary, provide trim panels and screw-fix them to the support structure
- Installation is carried out with the actuator on the outside of the shaft.
- If reinforcing boards are required, they must be screwed to the metal support structure at intervals of approx. 100 mm.
- The structural properties of the wall must be ensured by others and any necessary compensation measures, especially with large installation openings, must be checked and taken into account by others.

Shaft walls without metal support structure

- Shaft walls without metal support structure, with European classification according to EN 13501-2 or equivalent national classification.
- Cladding on one side made of gypsum bonded or cement bonded panel materials, fibre-reinforced gypsum or fire-rated calcium silicate boards.
- Shaft wall between two solid walls, without corner formation
- Wall thickness $W \geq 50$ mm.
- If reinforcing boards are required, they must be screwed on at intervals of approx. 100 mm.

General installation information

Solid ceiling slabs

- Solid ceiling slabs without open spaces, made of concrete or aerated concrete, gross density $\geq 450 \text{ kg/m}^3$.
- Ceiling thickness $D \geq 100 \text{ mm}$, thickness increased to $D \geq 150 \text{ mm}$.
- Partial solid ceiling slab thickness $\geq 150 \text{ mm}$ as combination with fire-resistant wooden beam ceilings (gluelam also), solid wood ceilings and light-weight ceilings (Cadolto module ceiling system only).
- Provide each installation opening and core drilled holes according to the local and structural conditions and with regard to the dimensions of the fire damper.
- Other ceiling types:
 - Hollow stone ceilings, $D \geq 150 \text{ mm}$
 - Hollow chamber ceilings, $D \geq 150 \text{ mm}$
 - Ribbed ceilings, thickness increased to $D \geq 150 \text{ mm}$
 - Composite ceilings, $D \geq 150 \text{ mm}$
- The structural properties of the ceiling and the connection of the mortar/concrete grout to the ceiling or any necessary reinforcement must be checked and taken into account by others.

Solid wood ceilings

- Solid wood or cross-laminated timber ceilings.
- Ceiling thickness $D \geq 140 \text{ mm}$ or $D \geq 112.5 \text{ mm}$ with supplementary fire-resistant cladding.

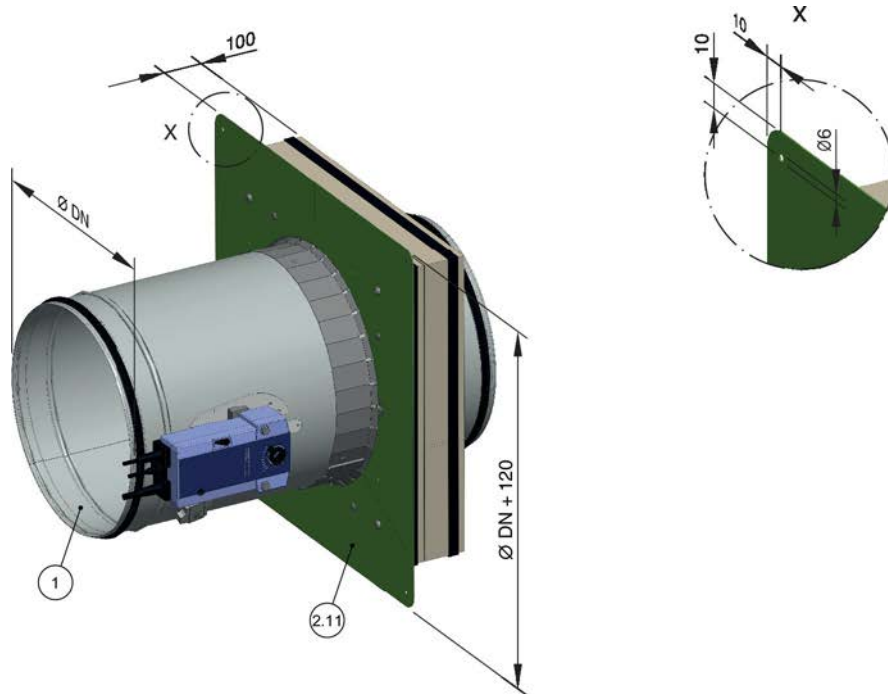
Wooden beam ceilings

- Wooden beam or gluelam construction.
- Ceiling thickness $D \geq 142.5 \text{ mm}$ (ceiling-dependent) with supplementary fire-resistant cladding.
- Historical wooden beam ceilings F30.

4.4 Installation kits

4.4.1 Installation kit TQ for dry mortarless installation

The installation kit TQ is an integral component of the fire damper and must be ordered together with the damper.



TR3758243, A

Fig. 14: Supply package and installation of installation kit TQ for dry mortarless installation

- 1 FKR-EU in spigot construction
- 2.11 Installation kit TQ with cover plate and intumescent seal

4.5 Solid walls

4.5.1 General

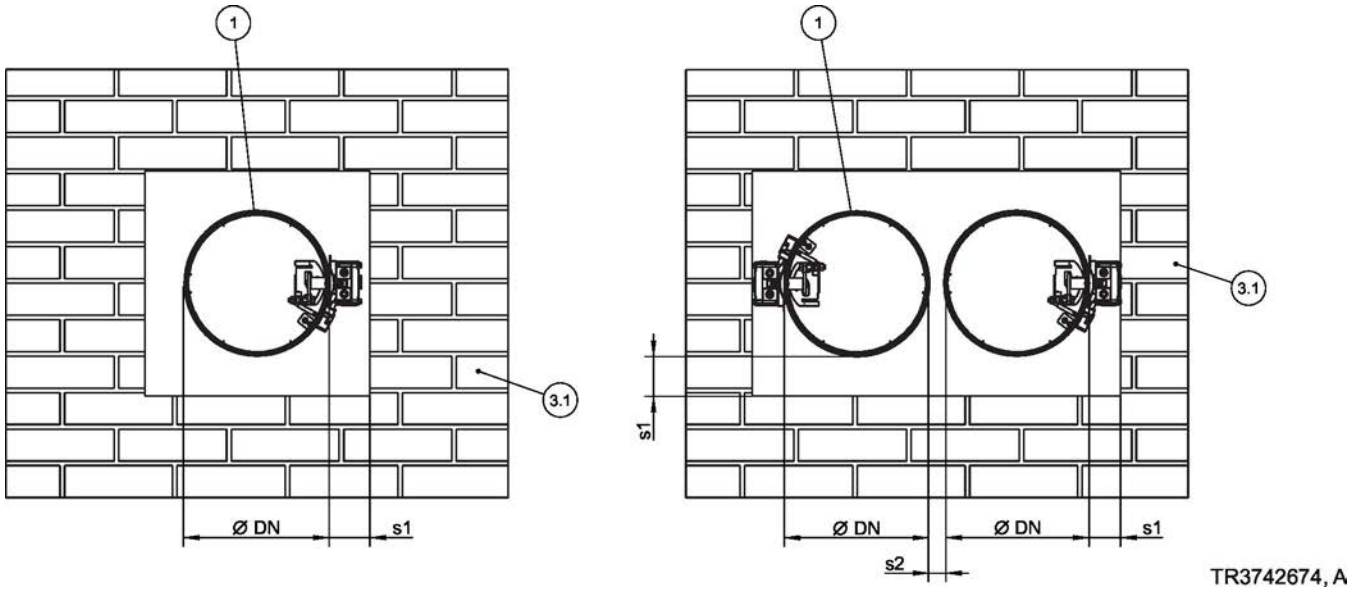


Fig. 15: Solid walls – arrangement / distances, side by side arrangement also applies to arrangement under one another

- 1 FKR-EU
- 3.1 Solid wall
- s1 Perimeter gap
- s2 Distance between the fire dampers
Spigot construction 40 – 225 mm
Flange construction 80 – 225 mm

Installation type	Installation opening [mm]	Distance [mm]	
		s1	s2
Mortar-based installation	Ønominal width + max. 450 mm	≤ 225	40 – 225 ²
Dry mortarless installation with fire batt ¹	Ønominal width + max. 1200 mm	40 – 600	40 – 600 ²

¹) Observe maximum permitted size of the fire batt!

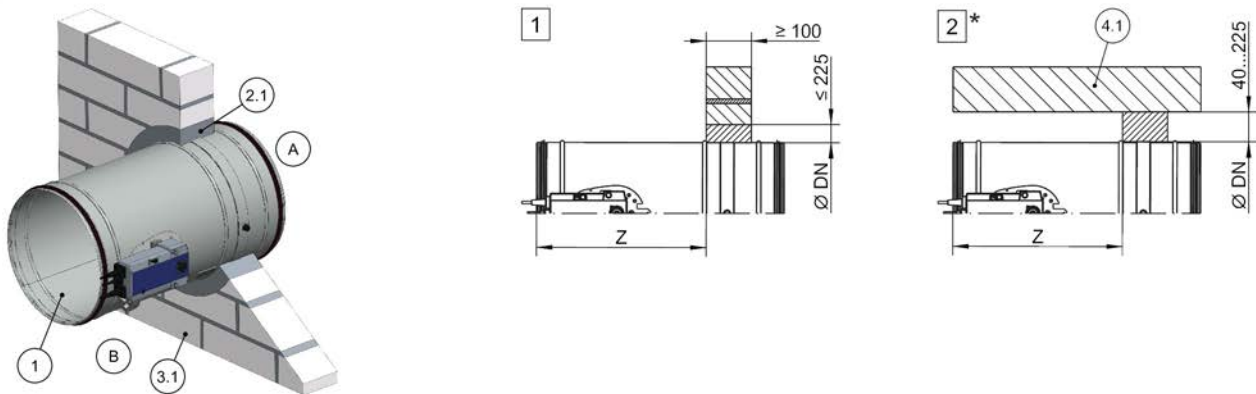
²) Flange construction 80 – 225 mm or 80 – 600 mm

Additional requirements: solid walls

- Solid wall ↗ on page 30
- Distances and installation orientations, ↗ 'Distances' on page 25

4.5.2 Mortar-based installation

Mortar-based installation into a solid wall

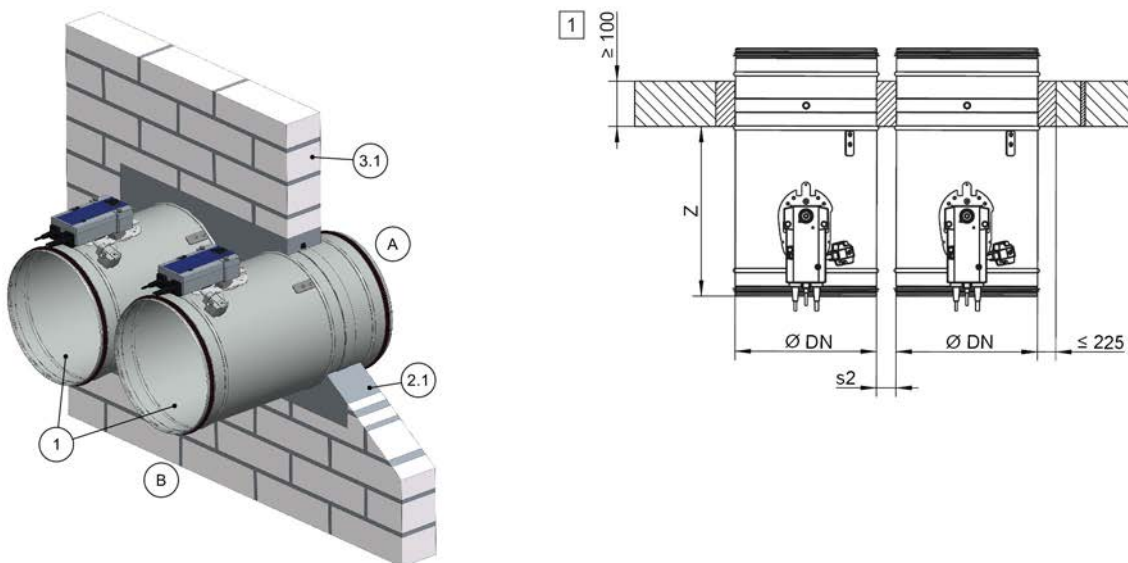


TR3724394, A

Fig. 16: Mortar-based installation into a solid wall

- | | | | |
|-----|----------------------------------|-------------------|--|
| 1 | FKR-EU | Z | Spigot construction 370 mm
Flange construction 342 mm |
| 2.1 | Mortar | * | Installation near the floor analogous to 2 |
| 3.1 | Solid wall | 1 2 | Up to EI 120 S |
| 4.1 | Solid ceiling slab / solid floor | | |

Mortar-based installation in solid wall, "flange to flange"

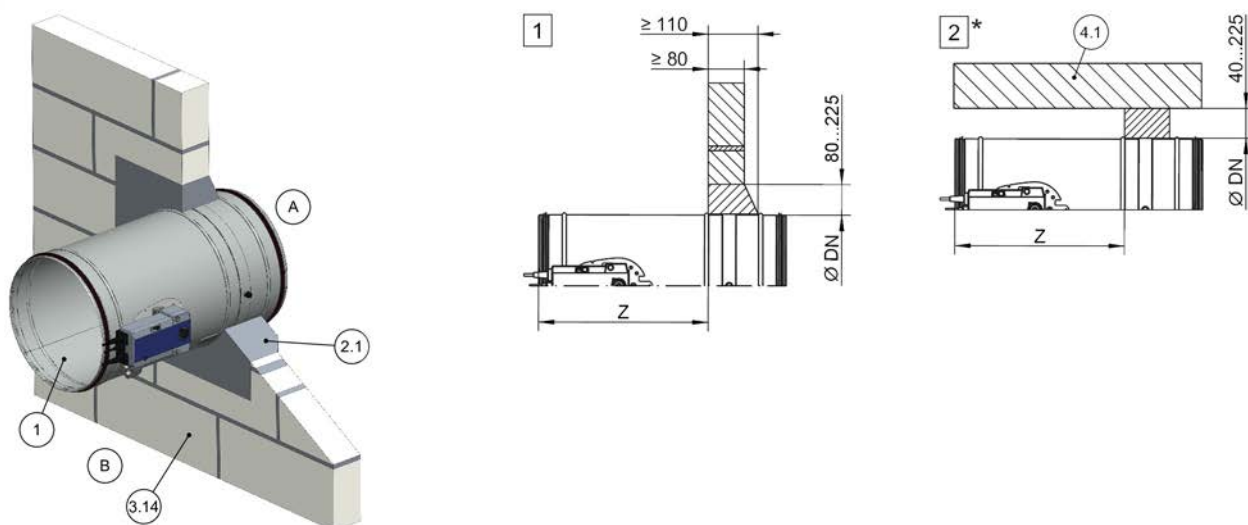


TR3647578, A

Fig. 17: Mortar-based installation into a solid wall, flange to flange, illustration shows side by side installation (applies also to installation of dampers on top of each other)

- | | | | |
|-----|----------------------------|----------|--|
| 1 | FKR-EU | s2 | Flange construction 342 mm
Spigot construction 40 – 225 mm
Flange construction 80 – 225 mm |
| 2.1 | Mortar | 1 | Up to EI 120 |
| 3.1 | Solid wall | | |
| Z | Spigot construction 370 mm | | |

Mortar-based installation into a solid wall made of gypsum wall boards

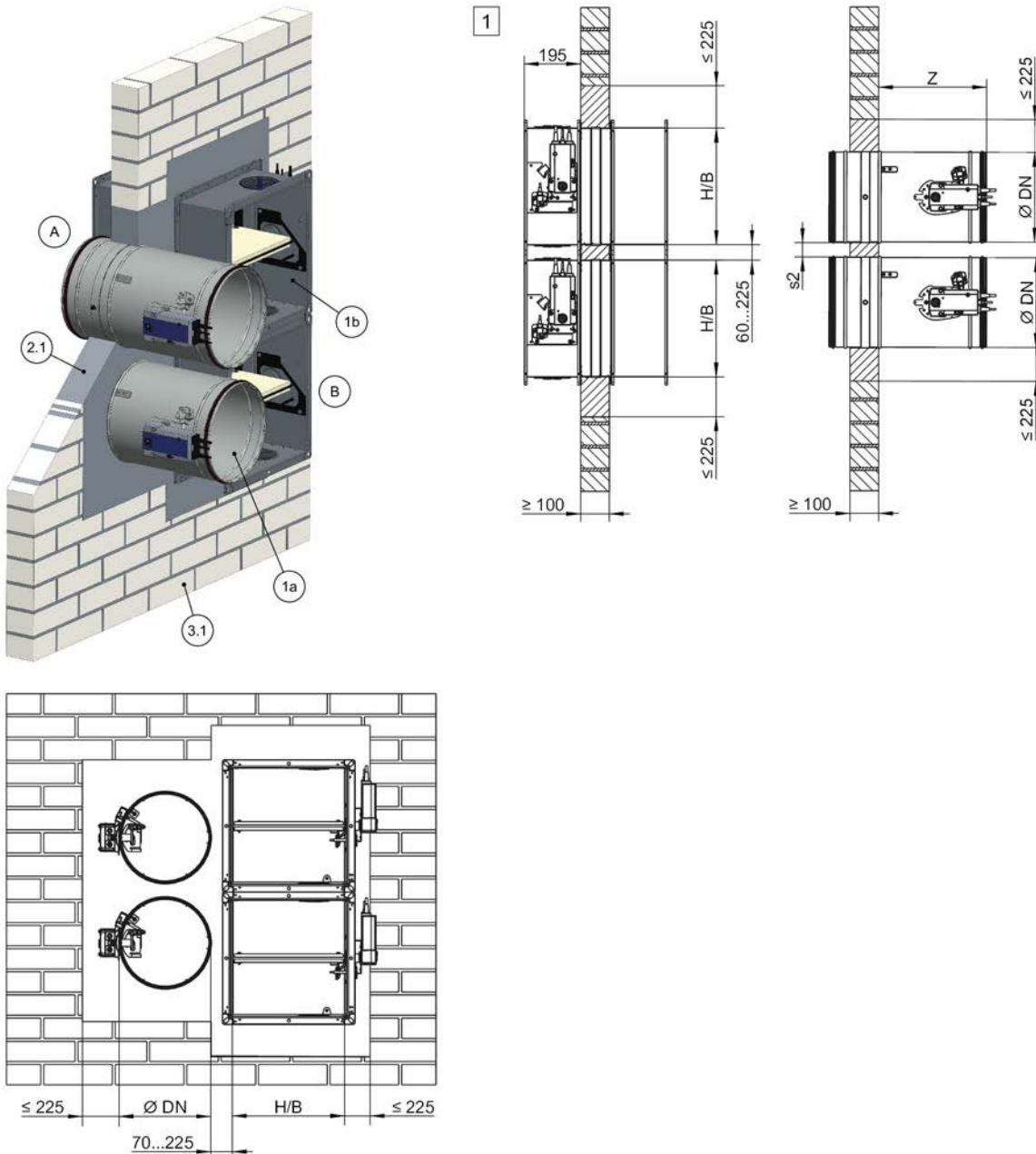


TR3727853, A

Fig. 18: Mortar-based installation into a solid wall made of gypsum wall boards

1	FKR-EU	Z	Spigot construction 370 mm Flange construction 342 mm
2.1	Mortar	*	Installation near the floor analogous to 2
3.14	Solid wall made of gypsum ball boards EN 12859 (formerly DIN 18163)	1 2	Up to EI 90 S
4.1	Solid ceiling slab		

Mortar-based installation into a solid wall, FKR-EU and FK2-EU combined



TR3732225, A

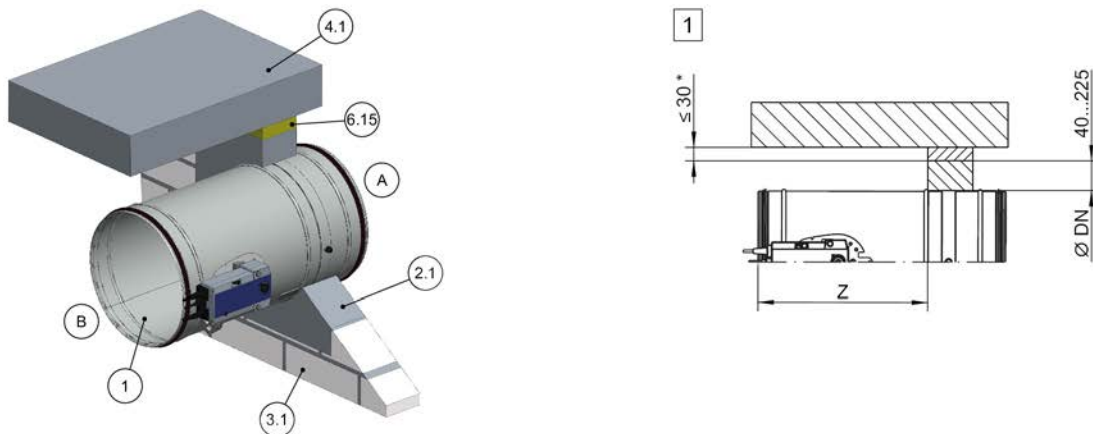
Fig. 19: Mortar-based installation into a solid wall, FKR-EU and FK2-EU combined

- | | | |
|-----|--|------------------------------------|
| 1a | FKR-EU | Flange construction 342 mm |
| 1b | FK2-EU up to $B \times H \leq 800 \times 400$ mm | s2 Spigot construction 40 – 225 mm |
| 2.1 | Mortar | Flange construction 80 – 225 mm |
| 3.1 | Solid wall | 1 Up to EI 90 S |
| Z | Spigot construction 370 mm | |

Note on combined installation:

- Total fire damper surface area ≤ 1.2 m².
- The number of fire dampers in an installation opening is limited by their size ($B \times H$ for FK2-EU and /or \varnothing nominal width for FKR-EU) and the overall area of the fire dampers (1.2 m²).
- Alternative installation orientations of side-by-side, under or on top of one another possible. Details are available upon request.
For installation details FK2-EU, see the installation and operating manual for this fire damper type.
- Distance to load-bearing structural elements ≥ 40 mm
- Distance of FKR-EU to a FK-EU 75 – 225 mm (flange construction 80 – 225 mm)

Mortar-based installation into a solid wall with flexible ceiling joint



TR3677319, A

Fig. 20: Mortar-based installation into a solid wall with flexible ceiling joint

1	FKR-EU	Z	Spigot construction 370 mm Flange construction 342 mm
2.1	Mortar	1	Up to EI 120 S
3.1	Solid wall	*	After subsidence of the ceiling slab
4.1	Solid ceiling slab		
6.15	Mineral wool, depending on the flexible ceiling joint		

Note on flexible ceiling joint: representative illustration. The distance to the ceiling depends on the design of the flexible ceiling joint, the expected ceiling subsidence and the specifications of the wall manufacturer.

Additional requirements: mortar-based installation into solid walls

- Solid wall ↗ on page 30

4.6 Lightweight partition walls

4.6.1 General

Lightweight partition wall with metal support structure and cladding on both sides

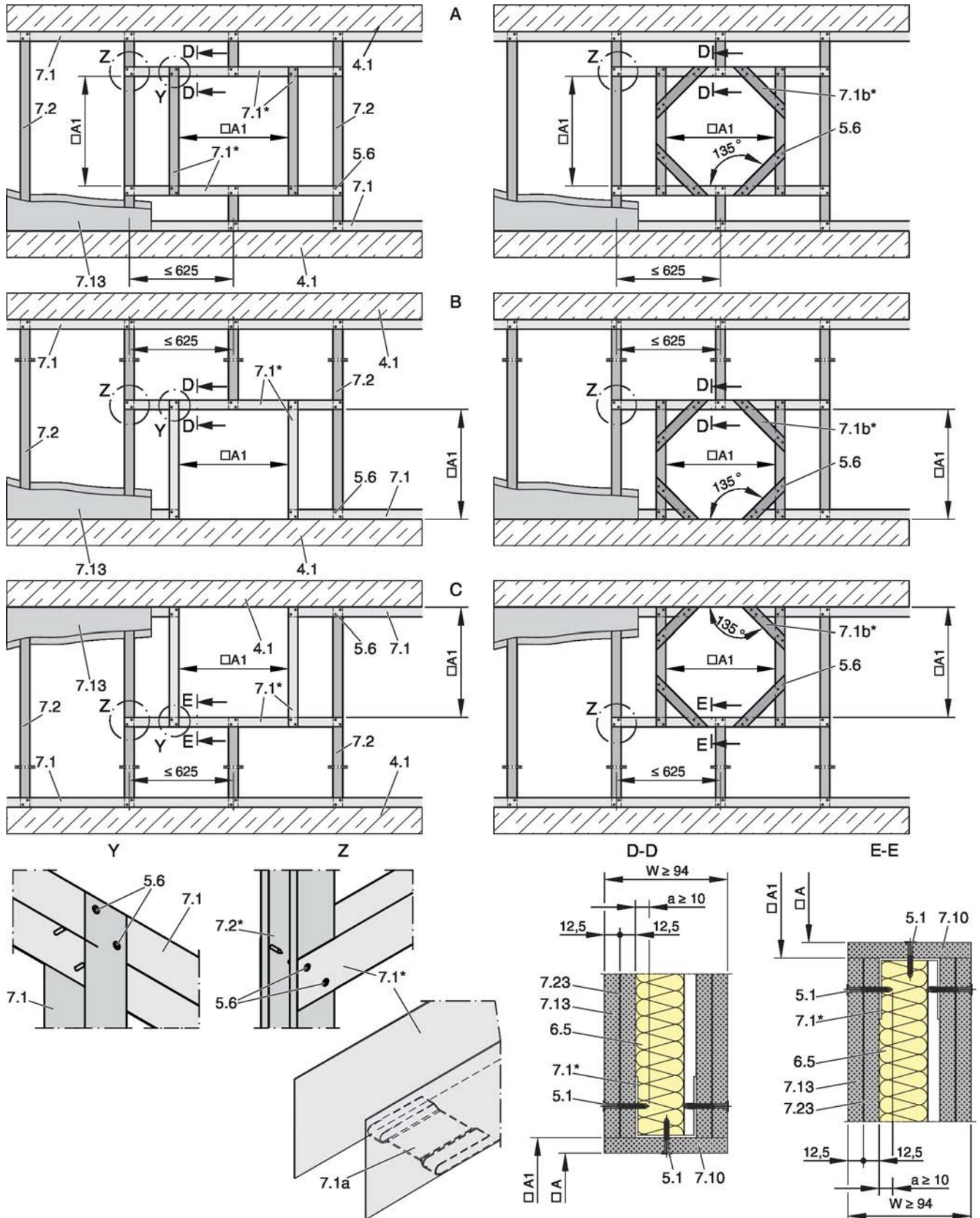


Fig. 21: Lightweight partition wall with metal support structure and cladding on both sides, caption & Fig. 24

Compartment wall

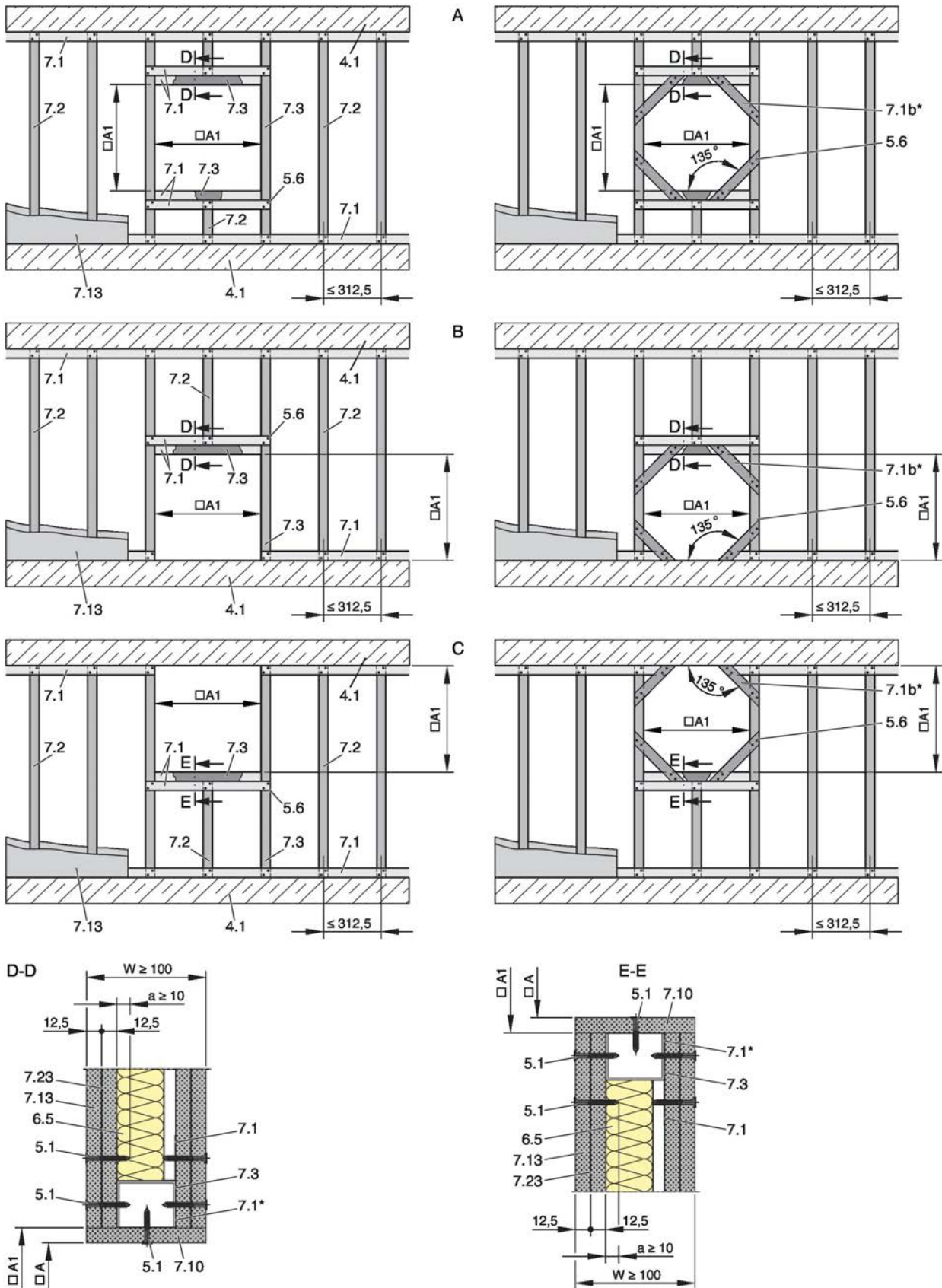


Fig. 24: Compartment wall with metal support structure and cladding on both sides

- | | |
|--|---|
| <p>A Lightweight partition wall with metal support structure or steel support structure / compartment wall / safety partition wall</p> <p>B Lightweight partition wall with metal support structure or steel support structure / compartment wall / safety partition wall, installation near the floor</p> <p>C Lightweight partition wall with metal support structure or steel support structure / compartment wall / safety partition wall, installation near the ceiling</p> <p>4.1 Solid ceiling slab / solid floor</p> <p>5.1 Dry wall screw</p> <p>5.6 Screw or steel rivet</p> <p>6.5 Mineral wool (depending on wall construction)</p> <p>7.1 UW section</p> <p>7.1a UW section, cut in and bent or cut off</p> | <p>7.1b UW section, only for mortar-based installation, nominal sizes \varnothing nominal width 450 - 800</p> <p>7.2 CW section</p> <p>7.3 UA section</p> <p>7.10 Trim panels according to installation details</p> <p>7.13 Cladding</p> <p>7.23 Sheet steel layer depending on wall manufacturer (if any)</p> <p><input type="checkbox"/>A Installation opening</p> <p><input type="checkbox"/>A1 Opening in the metal support structure (without trim panels: <input type="checkbox"/>A = <input type="checkbox"/>A1)</p> <p>* Closed side of metal section must face the installation opening</p> |
|--|---|

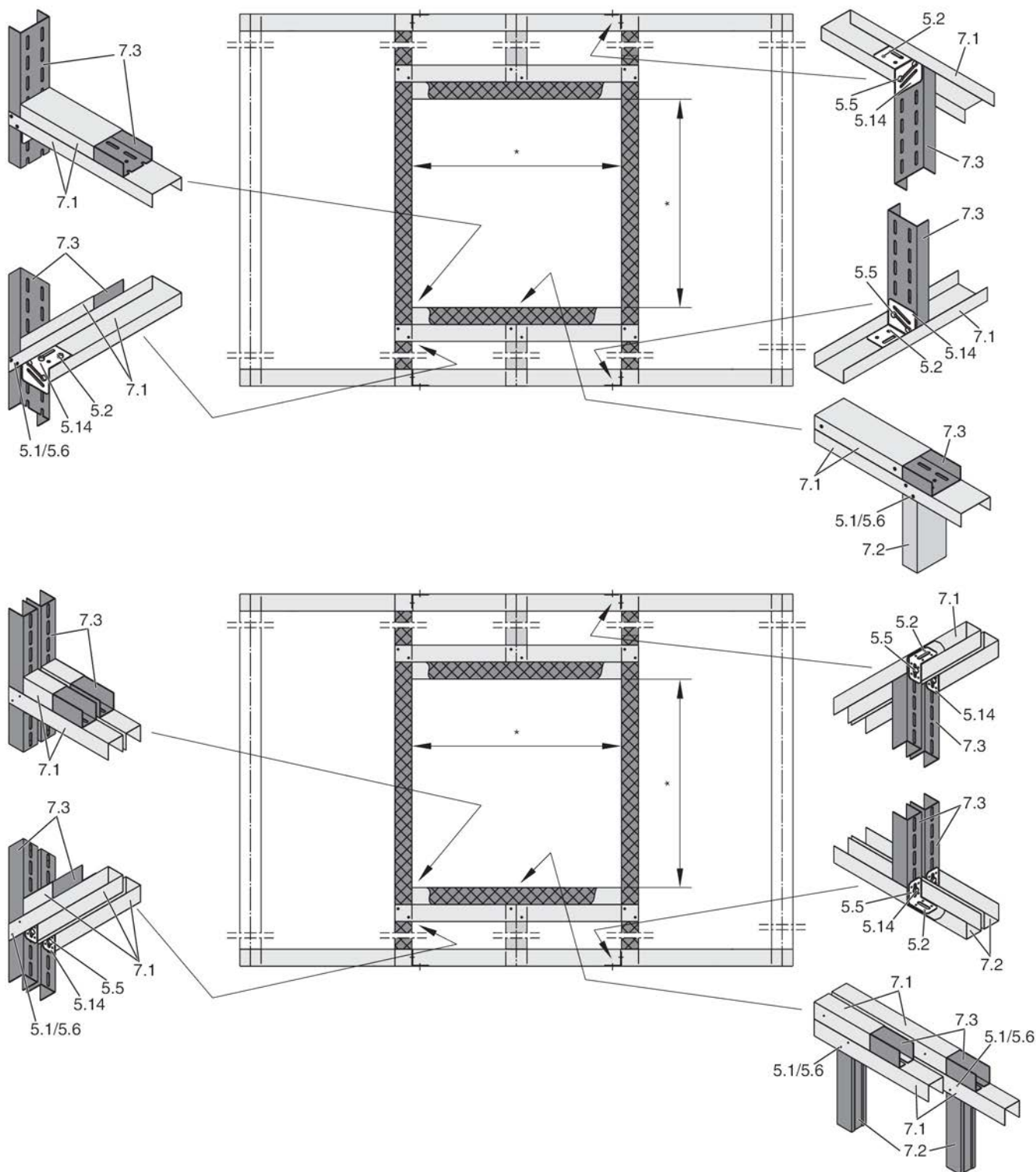


Fig. 25: Metal support structure of compartment wall, single and double stud system

5.1	Dry wall screw	7.1	UW section
5.2	Hexagon head screw M6	7.2	CW section
5.5	Carriage bolt, L ≤ 50 mm, with washer and nut	7.3	UA section
5.6	Steel rivet	*	Installation opening according to installation details
5.14	Angle bracket		

Installation opening □A [mm]									
Installation type	Nominal size Ønominal width								
	315	355	400	450	500	560	630	710	800
Mortar-based installation ¹	□A = Ønominal width + max. 450 mm □A1 = □A + (2 × trim panels)								
Dry mortarless installation with installation kit TQ ^{1, 2, 3}	435	475	520	570	620	680	750	830	920
Dry mortarless installation with fire batt ⁴	□A = Ønominal width + 80 – 1200 mm □A1 = □A + (2 × trim panels / 4 × trim panels)								


¹) Optional trim panels (max. 25 mm)

²) Installation opening tolerance ± 2 mm

³) Installation kit TQ is available only for FKR-EU with spigot

⁴) Trim panels according to installation details required

Additional requirements: lightweight partition walls and compartment walls with metal support structure

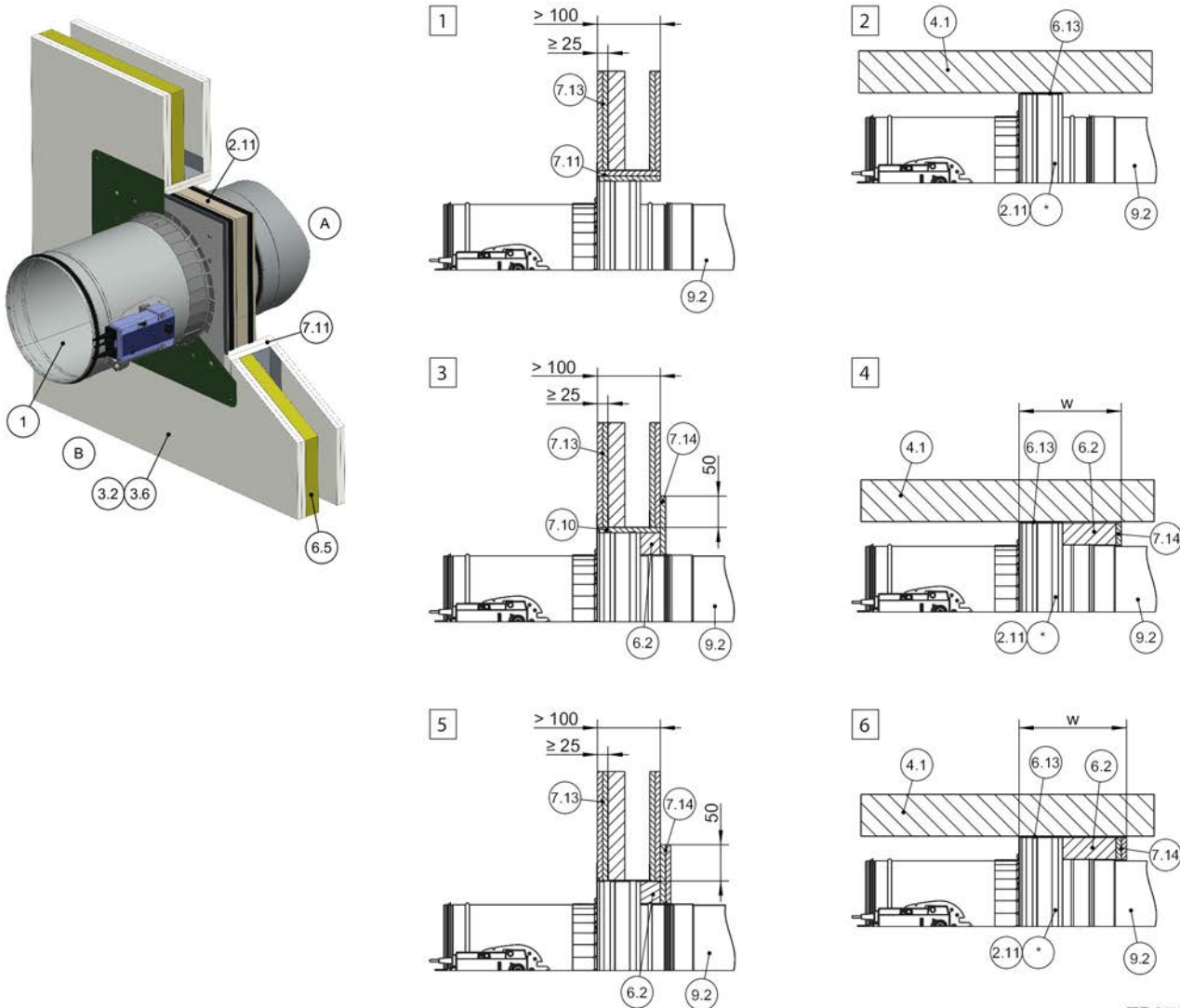
- Lightweight partition wall or compartment wall,
 on page 30

Erecting a wall and creating an installation opening

- Erect the lightweight partition wall according to the manufacturer's instructions and create an installation opening
 - Variant 1: Provide the installation opening in the metal support structure with suitable metal sections, then clad the wall.
 - Variant 2: After cladding the wall, create a square wall opening (clear installation opening ≤ 475 mm) between the regular studs and brace it with a perimeter metal section. Screw metal sections onto both sides over the cladding, spaced approx. 100 mm apart.
 - In case of mortar-based installation of fire dampers from nominal size Ø450, install four additional sections 7.1b at an angle of 45° in order to reinforce the metal support structure.

4.6.2 Dry mortarless installation with installation kit TQ

Dry mortarless installation into a lightweight partition wall, with installation kit TQ



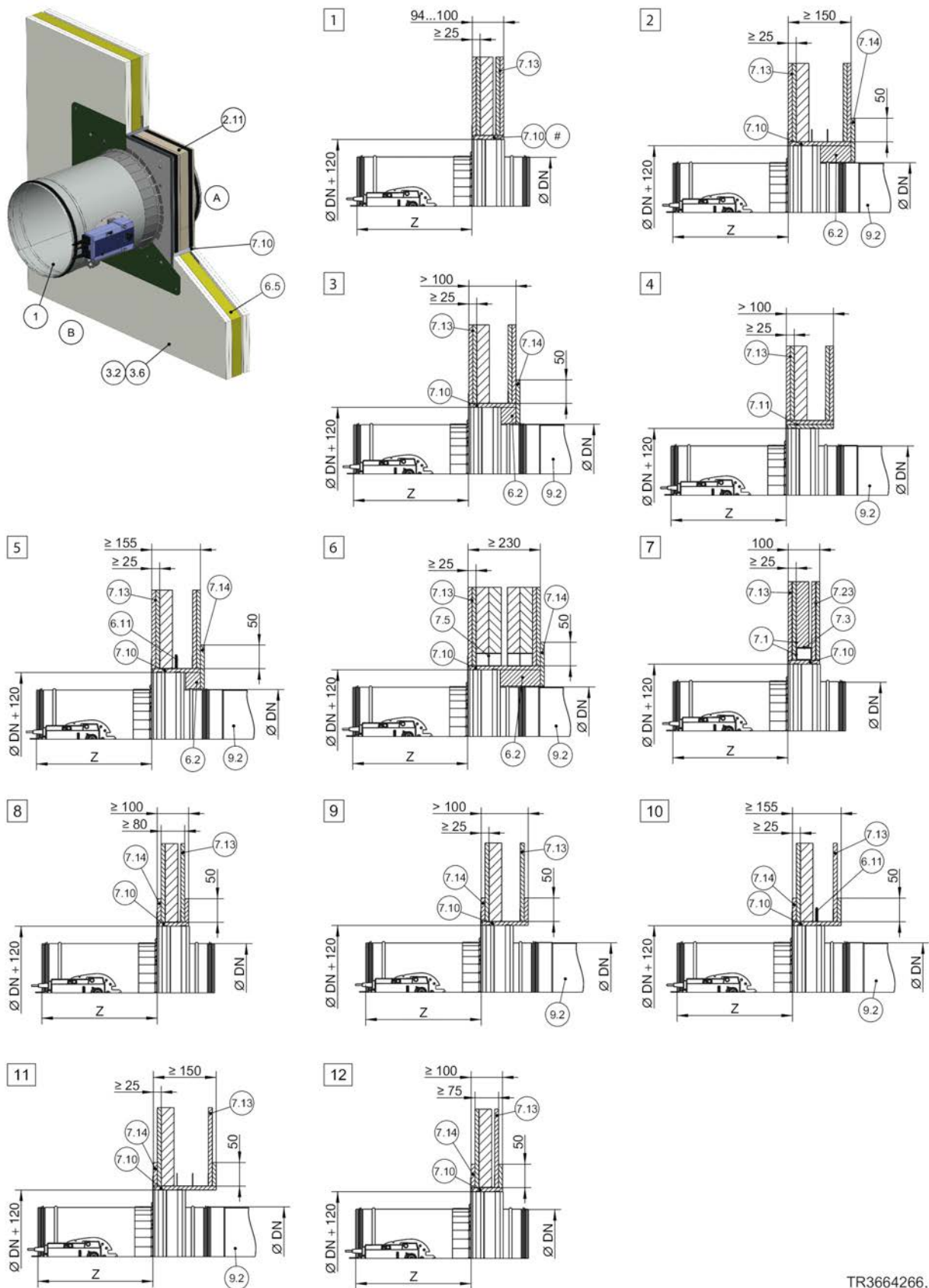
TR3742912, B

Fig. 26: Dry mortarless installation into a lightweight partition wall, with installation kit TQ

1	FKR-EU	7.10	Trim panels
2.11	Installation kit TQ (factory assembled)	7.11	Trim panels, fire-resistant, 2-ply, max. 25 mm (alternative to 6.2 and 7.14)
3.2	Lightweight partition wall with metal support structure, cladding on both sides	7.13	Cladding
3.6	Compartment wall or safety wall with metal support structure, cladding on both sides	7.14	Reinforcing board, made of wall panels (up to the fire damper casing)
4.1	Solid ceiling slab	9.2	Extension piece or duct
6.2	Mineral wool, $\geq 1000\text{ }^{\circ}\text{C}$, $\geq 80\text{ kg/m}^3$	*	Cover plate, shortened by others
6.5	Mineral wool (depending on wall construction)	1 – 6	Up to EI 90 S
6.13	Mineral wool strips A1, $\leq 5\text{ mm}$ thick, $\leq 1000\text{ }^{\circ}\text{C}$, filler as an alternative		

Note: **1** – **4** valid for all wall constructions and wall thicknesses.

5 and **6** valid for all wall thicknesses with a single stud frame.



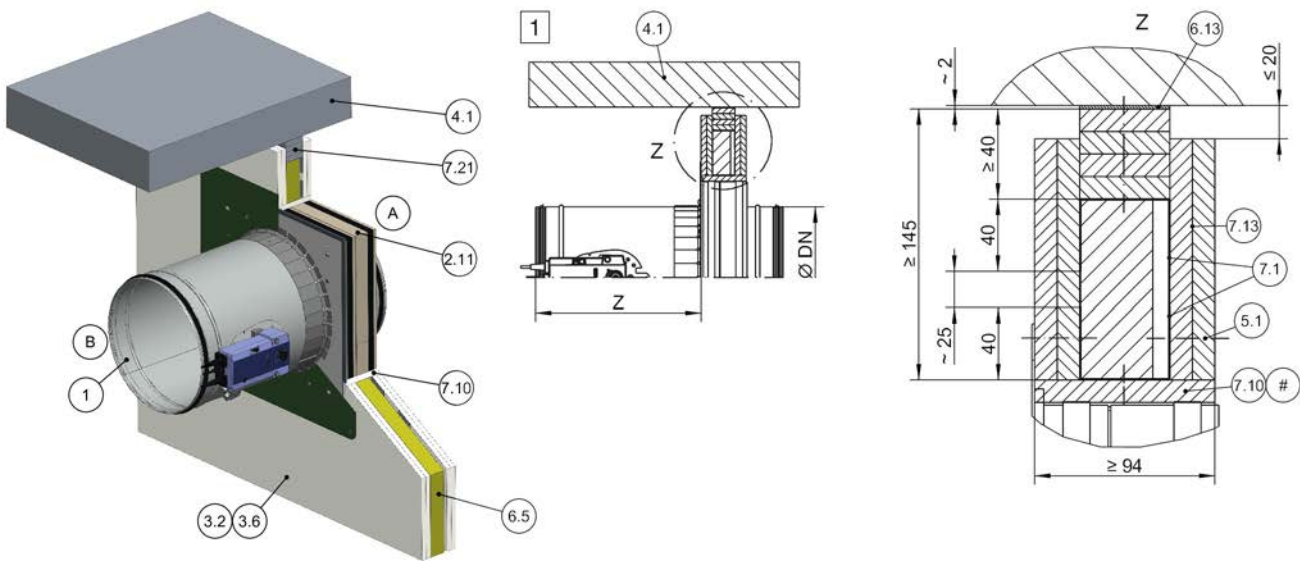
TR3664266, A

Fig. 27: Dry mortarless installation into a lightweight partition wall, with installation kit TQ

1	FKR-EU	7.13	Cladding
2.11	Installation kit TQ (factory assembled)	7.14	Reinforcing board made of wall panels (reinforcing board or alternatively wall cladding on the back, up to the fire damper casing)
3.2	Lightweight partition wall with metal support structure, cladding on both sides		

3.6	Compartment wall or safety wall with metal support structure, cladding on both sides	7.23	Sheet steel insert depending on wall manufacturer
6.2	Mineral wool, $\geq 1000\text{ °C}$, $\geq 80\text{ kg/m}^3$	9.2	Extension piece or duct
6.5	Mineral wool (depending on wall construction)	Z	Spigot construction 370 mm
6.11	Insulating strip (depending on wall construction)		Flange construction 342 mm
7.1	UW section	*	The total thickness of the trim panels must not exceed 25 mm
7.3	UA section	#	optional
7.5	Steel support structure	1 – 7	Up to EI 90 S
7.10	Trim panels *	8	Up to EI 60S
7.11	Trim panels, fire-resistant, 2-ply, max. 25 mm (alternative to 6.2 and 7.14)	9 – 12	EI 30 S

Dry mortarless installation into a lightweight partition wall, below a flexible ceiling joint with installation kit TQ



TR3669053, A

Fig. 28: Dry mortarless installation into a lightweight partition wall, below a flexible ceiling joint with installation kit TQ

1	FKR-EU	7.1	UW section
2.11	Installation kit TQ (factory assembled)	7.10	Trim panels
3.2	Lightweight partition wall with metal support structure, cladding on both sides	7.13	Cladding
3.6	Compartment wall or safety wall with metal support structure, cladding on both sides	7.21	Ceiling joint strips (e.g. $4 \times \geq 10\text{ mm}$)
4.1	Solid ceiling slab	Z	Spigot construction 370 mm
5.1	Dry wall screw		Flange construction 342 mm
6.5	Mineral wool (depending on wall construction)	#	Depending on the wall structure
6.13	Mineral wool strips A1, $\leq 5\text{ mm}$ thick, $\leq 1000\text{ °C}$, filler as an alternative	1	Up to EI 90 S

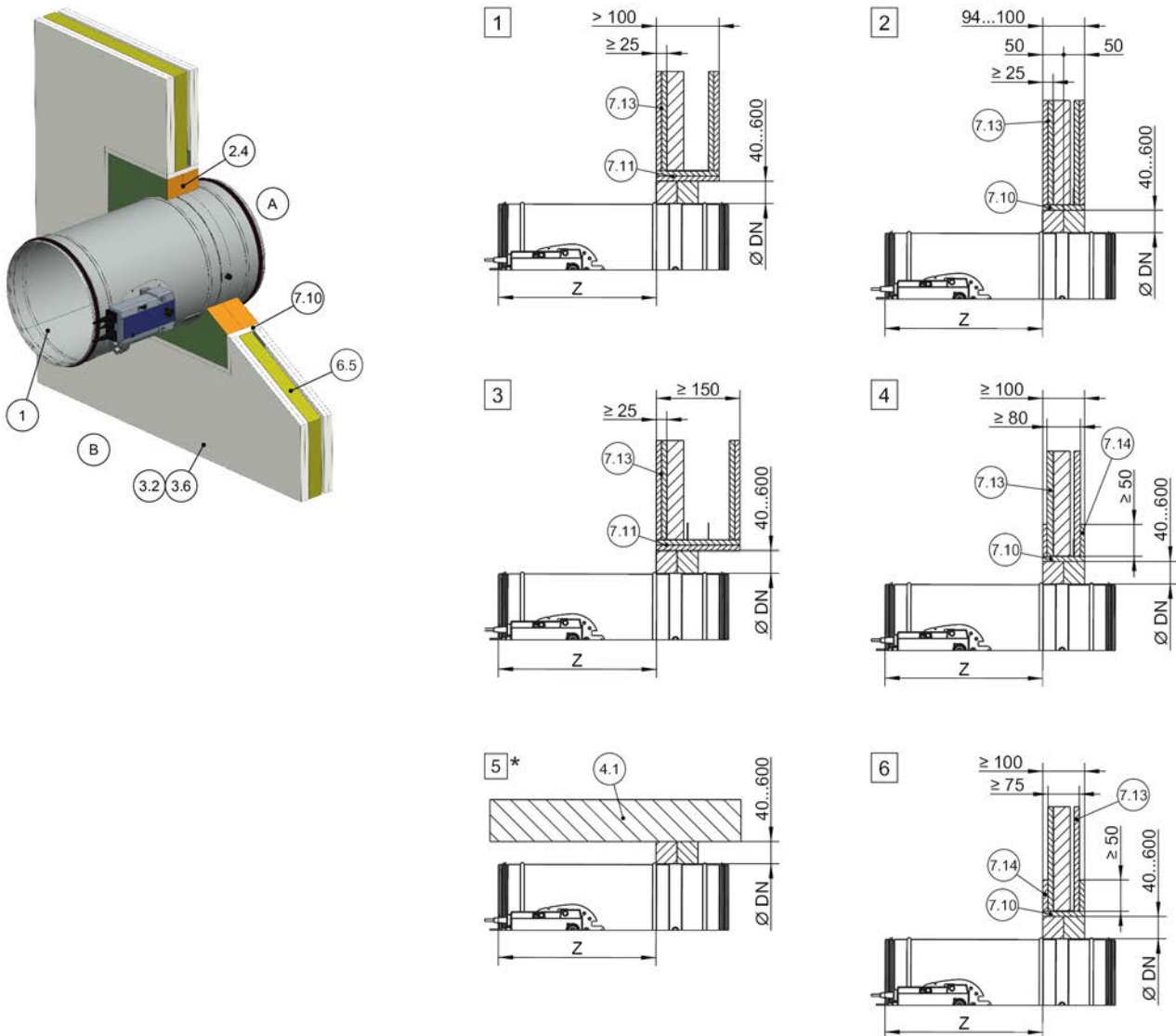
Note: representative illustration. The distance to the ceiling depends on the design of the flexible ceiling joint, the expected ceiling subsidence and the specifications of the wall manufacturer.

Additional requirements: dry mortarless installation with installation kit TQ in lightweight partition walls

- Lightweight partition wall or compartment wall, ↪ on page 30
- Installation kit TQ, ↪ on page 28
- $\geq 200\text{ mm}$ distance between two fire dampers in separate installation openings
- Fasten the cover plate with 4 (for nominal widths up to 400 mm) or 12 (for nominal widths from 450 mm) dry wall screws $\varnothing \geq 4.2\text{ mm}$ to the metal support structure

4.6.3 Dry mortarless installation with fire batt

Dry mortarless installation into a lightweight partition wall, with a fire batt

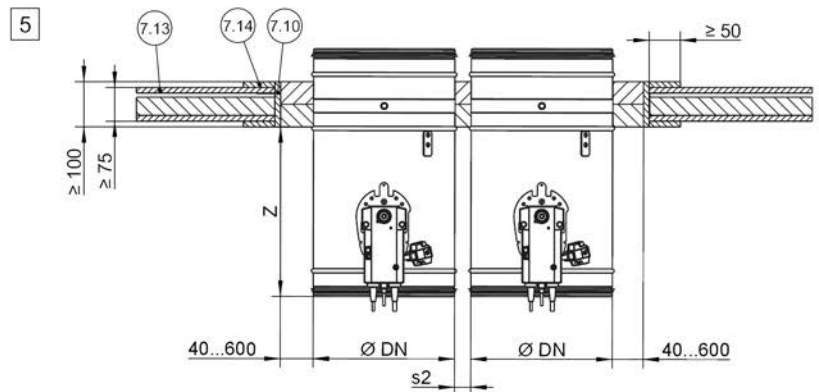
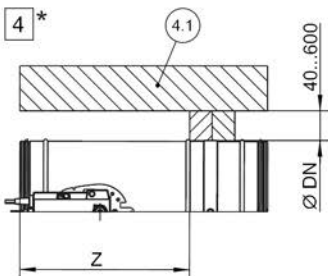
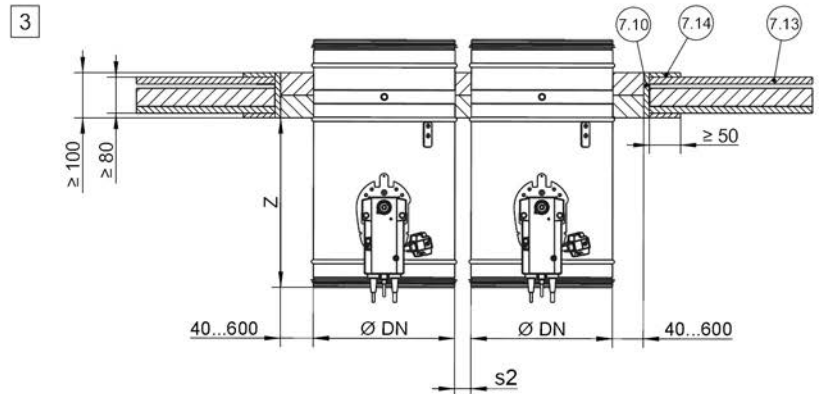
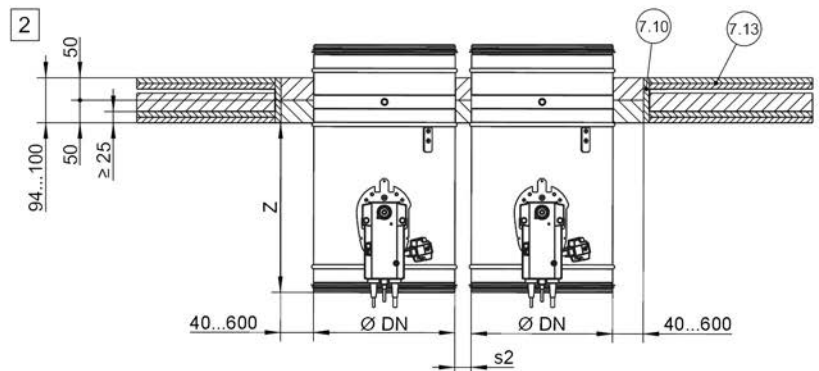
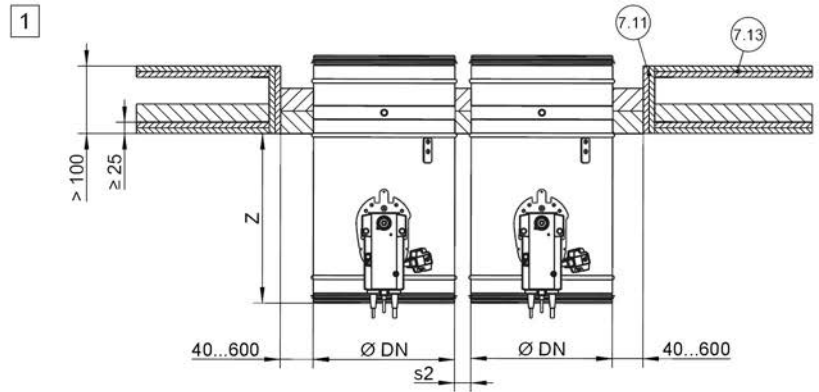
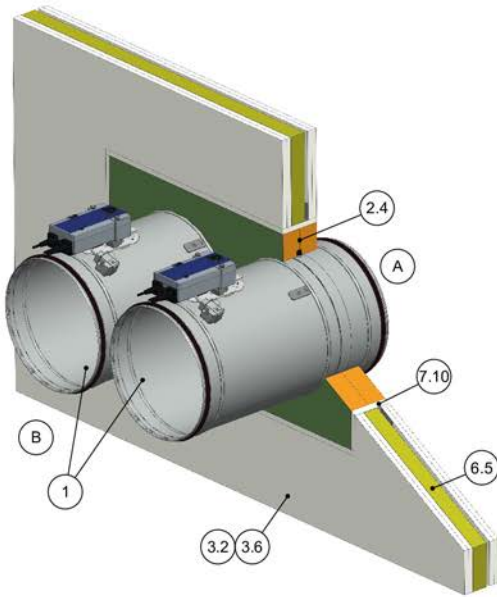


TR3676987, B

Fig. 29: Dry mortarless installation into a lightweight partition wall, with a fire batt

1	FKR-EU	7.13	Cladding
2.4	Coated board system	7.14	Reinforcing board of the same material as the wall
3.2	Lightweight partition wall with metal support structure, cladding on both sides	Z	Spigot construction 370 mm Flange construction 342 mm
3.6	Compartment wall or safety wall with metal support structure, cladding on both sides	*	Installation near the floor analogous to 5
4.1	Solid ceiling slab	1 - 5	Up to EI 60 S
6.5	Mineral wool (depending on wall construction)	6	EI 30 S
7.10	Trim panels		
7.11	Fire-resistant trim panels, double, in case of W > 100 mm		

Dry mortarless installation with fire batt, "flange to flange"

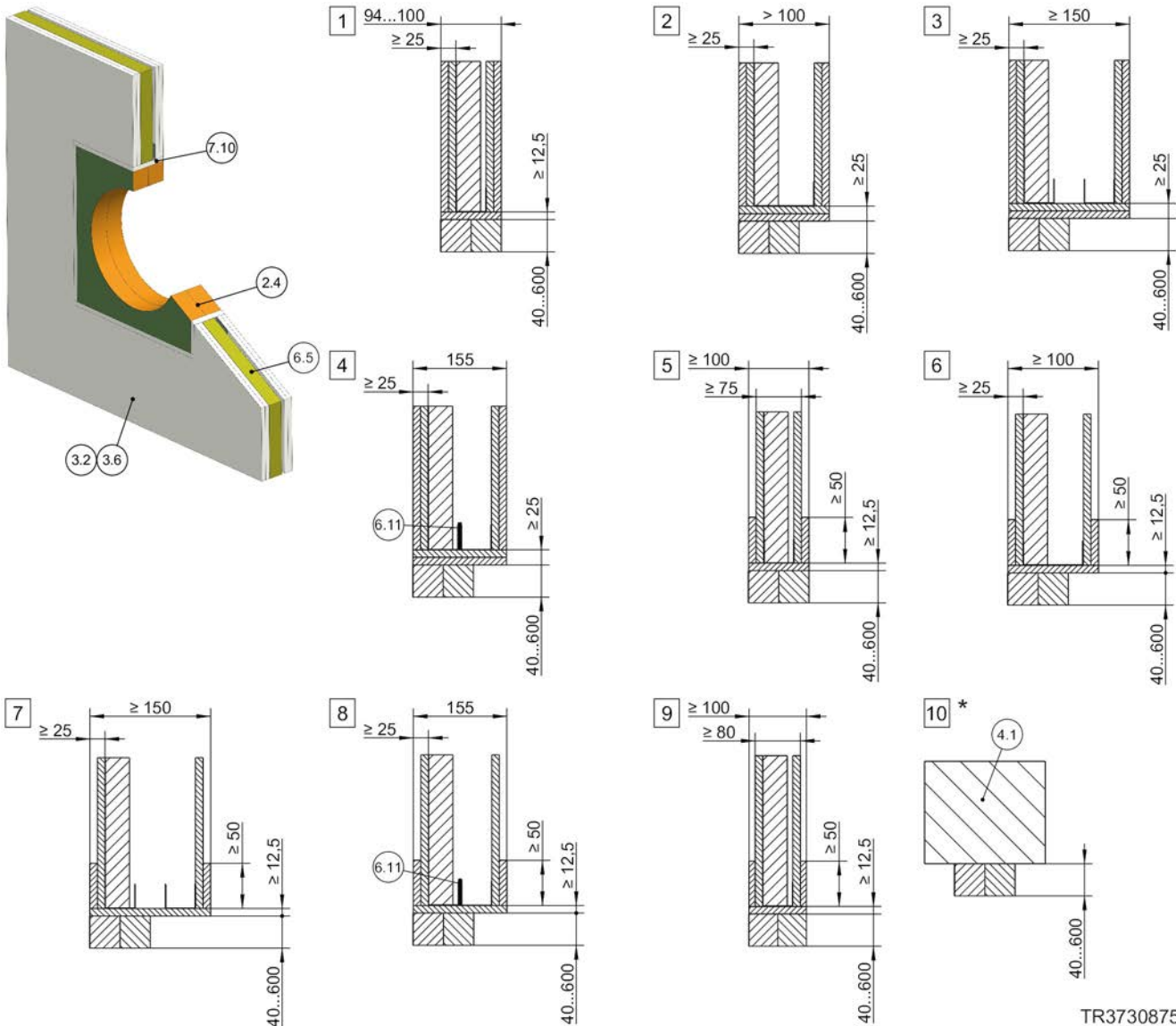


TR3677289, B

Fig. 30: Dry mortarless installation into a lightweight partition wall, with a fire batt, flange to flange, illustration shows side by side installation (applies also to installation of dampers on top of each other)

1	FKR-EU	7.14	Reinforcing board of the same material as the wall
2.4	Coated board system	Z	Spigot construction 370 mm Flange construction 342 mm
3.2	Lightweight partition wall with metal support structure, cladding on both sides	s2	Spigot construction 40 – 600 mm Flange construction 80 – 600 mm
3.6	Compartment wall or safety wall with metal support structure, cladding on both sides	*	Installation near the floor analogous to 4
4.1	Solid ceiling slab	1 – 4	Up to EI 60 S
6.5	Mineral wool (depending on wall construction)	5	EI 30 S
7.10	Trim panels		
7.11	Fire-resistant trim panels, double, in case of W > 100 mm		
7.13	Cladding		

Approved combinations for thicker walls



TR3730875, A

Fig. 31: Dry mortarless installation into a lightweight partition wall, with a fire batt, approved combinations for thicker walls

- 2.4 Coated board system
- 3.2 Lightweight partition wall or compartment wall with metal support structure or steel support structure, cladding on both sides
- 3.6 Compartment wall or safety wall with metal support structure, cladding on both sides
- 4.1 Solid ceiling slab / solid floor
- 6.5 Mineral wool (depending on wall construction)
- 6.11 Insulating strip (depending on wall construction)

- 7.10 Trim panels (for $W \leq 100$ mm, single-layer, from $W > 100$ mm and EI 60 S, double-layer)
- * Installation near the floor analogous to **10**
- 1** – **4** EI 60 S
- 5** – **8** EI 30 S
- 9** EI 60 S
- 10** EI 30 S to EI 60 S

Additional requirements: dry mortarless installation into lightweight partition walls, with fire batt

- Lightweight partition wall, on page 30
- Fire batt systems, installation details, distances / dimensions, on page 28
- Suspension and fixing, Chapter 4.7 'Fixing the fire damper' on page 53

4.7 Fixing the fire damper

4.7.1 General

For installation with fire batt, the fire dampers must be suspended with steel threaded rods (M10 – M12).

The rods have to be fixed to the ceiling slab; the required fire resistance must not be compromised. Use only fire-rated steel anchors with suitability certificate. Instead of anchors, you can use threaded rods and secure them using nuts and washers. Secure the threaded rods above the ceiling using steel nuts and washers. Threaded rods up to 1.50 m long do not require any insulation; longer rods do require insulation (according to Promat® work sheet 478, for example). Load the suspension system only with the weight of the fire damper, ducting must be suspended separately.

Weight [kg]: ↪ Chapter 2.2 'FKR-EU with fusible link' on page 10 ↪ Chapter 2.3 'FKR-EU with spring return actuator' on page 12 ↪ Chapter 2.4 'FKR-EU with fusible link and cover grille on both sides as an upstream shutter for the air transfer unit' on page 18 .

In addition to the fixing systems described in this manual, you may also use fixing systems that have been approved by accredited testing institutes. This applies in particular to the fire damper installation near a wall or in a corner (when angle sections or mounting plates are used).

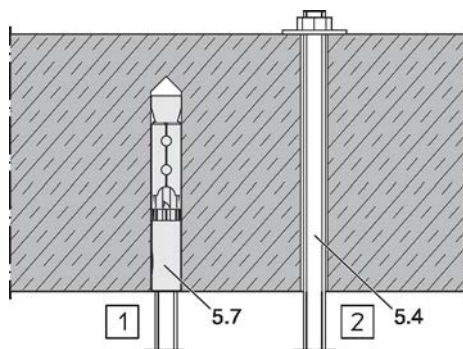


Fig. 32: Fixing to the ceiling slab

5.4 Threaded rod

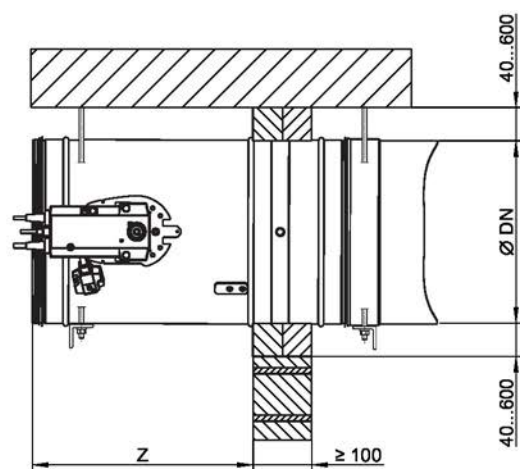
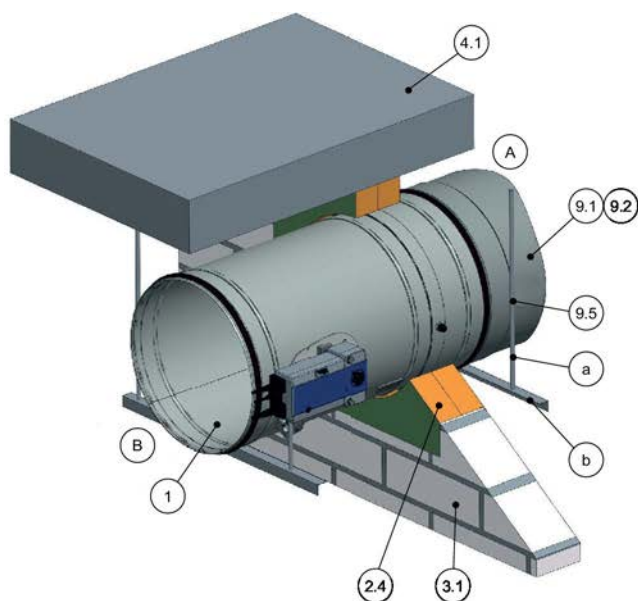
5.7 Fire-rated anchor (with suitability certificate)

- 1 Fixing with wallplugs with suitability certificate for fire safety engineering
- 2 Fixing with threaded rod and push through installation

Fixing the fire damper > Fixing the damper when a fire batt is used

4.7.2 Fixing the damper when a fire batt is used

4.7.2.1 Horizontal duct



TR3758501, A

Fig. 33: Suspension system, horizontal duct

- | | | | |
|-----|----------------------------------|-----|---|
| 1 | FKR-EU | 9.2 | Extension piece |
| 2.4 | Coated board system | 9.5 | Suspension system (by others) consisting of: |
| 3.1 | Solid wall | a | Threaded rod min. M10 with washer and nut |
| 4.1 | Solid ceiling slab | b | Steel angle section to EN 10056-1,
L ≥ 40 × 40 × 5 mm, galvanised or painted, or
equivalent |
| 9.1 | Flexible connector (recommended) | | |

Note: Each fire damper has to be suspended both on the operating side and on the installation side. As an alternative to suspension with cross bars, suspension on both sides with suitable pipe clamps is permissible.

5 Electrical connection

5.1 General safety notes

⚠ DANGER!

Danger of electric shock! Do not touch any live components! Electrical equipment carries a dangerous electrical voltage.

- Only skilled qualified electricians are allowed to work on the electrical system.
- Switch off the power supply before working on any electrical equipment.

The connecting cables are sized by others depending on the supply voltage (230 V or 24 V), the cable length and the power consumption and number of actuators.

5.2 Limit switches (fire dampers with fusible link)

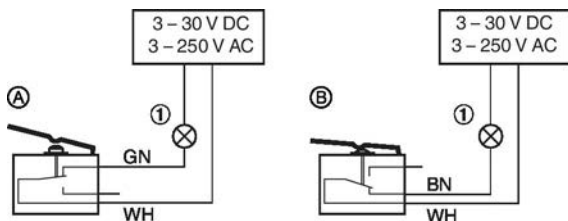


Fig. 34: Wiring of limit switches, example

- 1 Indicator light or relay, to be provided by others
 - A Type of connection normally closed
 - B Type of connection normally open
- The limit switches must be connected according to the wiring example Fig. 34
 - Indicator lights or relays may be connected as long as the performance specifications are taken into consideration.
 - Connection boxes must be fixed to the adjoining structure (wall or ceiling slab). They must not be fixed to the fire damper.

Type of connection	Limit switch	Damper blade	Electric circuit
A	Not actuated	CLOSED or OPEN position <u>not</u> reached	Closed
B	actuated	CLOSED or OPEN position reached	Closed

Note: For wiring explosion-proof limit switch, see "Supplementary operating manual for explosion-proof fire dampers Type FKR-EU".

5.3 Spring return actuator

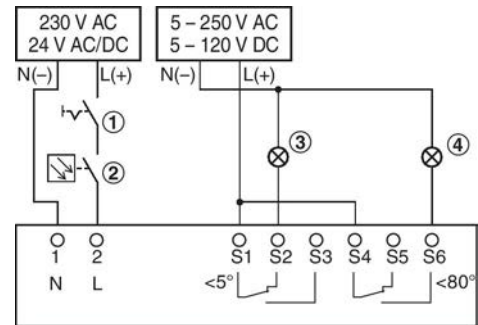


Fig. 35: Actuator connection, example

- 1 Switch for opening and closing, to be provided by others
 - 2 Optional release mechanism, e.g. TROX duct smoke detector Type RM-O-3-D or RM-O-VS-D
 - 3 Indicator light for CLOSED position, to be provided by others
 - 4 Indicator light for OPEN position, to be provided by others
- The fire damper may be equipped with a spring return actuator for a supply voltage of 230 V AC or 24 V AC/DC. See the performance data on the actuator rating plate.
 - The spring return actuator must be connected according to the wiring example shown. Several actuators can be connected in parallel as long as the performance specifications are taken into consideration.
 - Connection boxes must be fixed to the adjoining structure (wall or ceiling slab). They must not be fixed to the fire damper.

Note: For wiring explosion-proof spring return actuator see "Supplementary operating manual for explosion-proof fire dampers Type FKR-EU".

Actuators with 24 V AC/DC

Safety transformers must be used. The connecting cables are fitted with plugs. This ensures quick and easy connection to the TROX AS-i bus system. For connection to the terminals, shorten the connecting cable.

5.4 Spring return actuator and duct smoke detector RM-O-3-D

Note: For connection examples and further details see the RM-O-3-D operating and installation manual

6 Functional test

6.1 General

General

During operation at normal temperatures, the damper blade is open. A functional test involves closing the damper blade and opening it again.

 **CAUTION!**

Danger of injury when reaching into the fire damper while the damper blade is moving. Do not reach into the fire damper while actuating the release mechanism.

6.2 Functional test with automatic control unit

Functional test with automatic control unit

The function of fire dampers with a spring return actuator can also be tested with an automatic control unit. The control unit should have the following functions:

- Opening and closing fire dampers in regular intervals (intervals to be set by the system owner)
- Monitoring of the actuator running times
- Issuing an alarm when the running times are exceeded and when fire dampers close
- Recording the test results

TROXNETCOM systems such as TNC-EASYCONTROL or AS-interface meet all these requirements. For more information see www.troxtechnik.com.

TROXNETCOM systems allow for automatic functional tests; they do not replace maintenance and cleaning, which have to be carried out in regular intervals or depending on the condition of the product. The documentation of test results makes trends visible, e.g. the run time of actuators. They may also indicate the need for additional measures which help to maintain the system's function, e.g. removing heavy contamination (dust in extract air systems).

6.3 Fire damper with fusible link

damper blade position indicator

The position of the damper blade is indicated by the position of the handle (1.6).

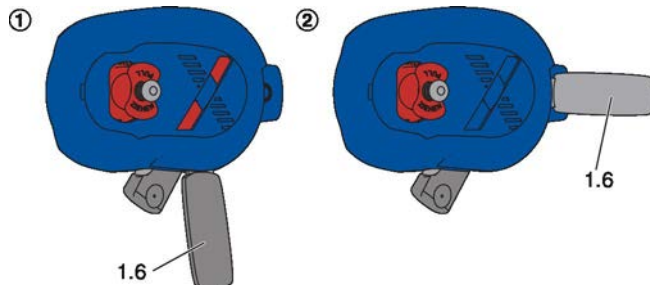


Fig. 36: damper blade position indicator

1. ▶ Damper blade is closed
2. ▶ Damper blade is open.

Close the damper blade

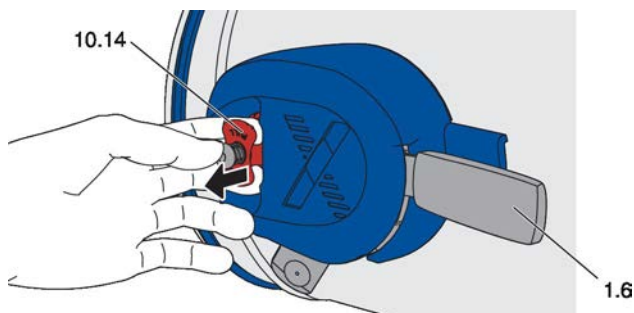


Fig. 37: Close the damper blade

Requirement

- Fire damper is open.
1. ▶ Grasp the thermal release mechanism (10.14) as shown with the thumb and middle fingers.
 2. ▶ Pull the thermal release mechanism (10.14) towards you with both fingers.
 - ⇒ The damper blade closes and the handle (1.6) locks into the CLOSED position, thereby locking the damper blade.

Opening the damper blade

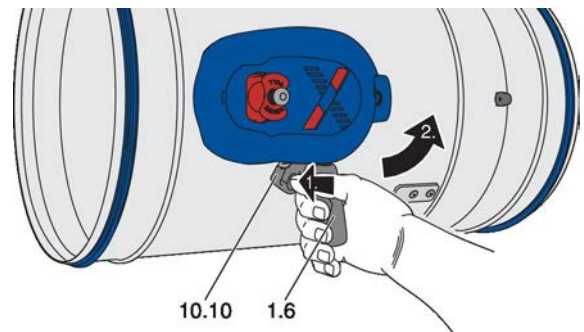


Fig. 38: Opening the damper blade

Requirement

- The fire damper is closed.
1. ▶ With your right hand, grasp the handle (1.6) as shown and press down the release tab (1.10) with your thumb, pull it forward and hold it in place.
 2. ▶ Then turn the handle (1.6) anti-clockwise to the travel stop.
 - ⇒ The handle (1.6) locks into the OPEN position and the damper blade is open.

6.4 Fire damper with spring return actuator

6.4.1 Spring return actuator BFN...

Status indicator



Fig. 39: Thermoelectric release mechanism BAT

- 1 Push button for functional test
- 2 Indicator light

The indicator light (2) for the thermoelectric release mechanism is illuminated when all of the following conditions apply:

- Power is being supplied.
- The thermal fuses are intact.
- The push button is not being pushed.

damper blade position indicator

The position of the damper blade is indicated by the pointer on the actuator.

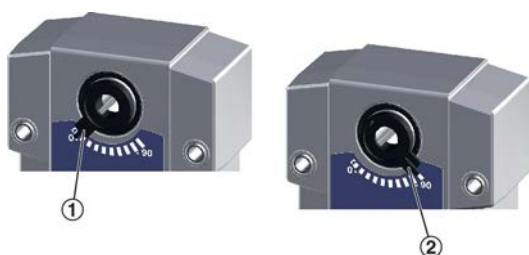


Fig. 40: damper blade position indicator

- 1 Damper blade is closed
- 2 Damper blade is open

Closing/opening the damper blade with spring return actuator



Fig. 41: Functional test (FKR-EU with BFN actuator shown in OPEN position)

CAUTION!

Danger of injury when reaching into the fire damper while the damper blade is moving. Do not reach into the fire damper while actuating the release mechanism.

Requirement

- Power is being supplied
1. ▶ Push the push button (1) and keep it pushed.
 - ⇒ This interrupts the power supply, and the damper blade closes.
 2. ▶ Check if the damper blade is CLOSED, check run time.
 3. ▶ Release the push button (1).
 - ⇒ Power is supplied again, and the damper blade opens.
 4. ▶ Check if the damper blade is OPEN, check run time.

Opening the damper blade using the crank handle



Fig. 42: Functional test (without power supply)


! DANGER!

Danger due to malfunction of the fire damper.

If the damper blade has been opened by means of the crank handle (without power supply), it will no longer be triggered by a temperature increase, i.e. in the event of a fire. In other words, the damper blade will not close.

To re-establish its function, connect the power supply.

Requirement

- The damper blade is CLOSED
- 1. ▶ Insert the crank handle (1) into the opening for the spring winding mechanism.
- 2. ▶ Turn the crank handle in the direction of the arrow (2) to just short of the travel stop and hold it.
- 3. ▶ Set the interlock (3) to "Lock  closed"
 - ⇒ The damper blade remains in the OPEN position.
- 4. ▶ Remove the crank handle.

Close the fire damper




Fig. 43: Functional test (without power supply)

! CAUTION!

Danger of injury when reaching into the fire damper while the damper blade is moving. Do not reach into the fire damper while actuating the release mechanism.

Requirement

- The damper blade is OPEN
 - ▶ Set the interlock (3) to "Lock  opened"
 - ⇒ The damper blade is released and closes.

6.4.2 Spring return actuator BF...

Status indicator



Fig. 44: Thermoelectric release mechanism BAT

- 1 Push button for functional test
- 2 Indicator light

The indicator light (2) for the thermoelectric release mechanism is illuminated when all of the following conditions apply:

- Power is being supplied.
- The thermal fuses are intact.
- The push button is not being pushed.

Damper blade position indicator

The position of the damper blade is indicated by the pointer on the actuator.



Fig. 45: Damper blade position indicator

- 1 Damper blade is closed
- 2 Damper blade is open

Closing/opening the damper blade with spring return actuator



Fig. 46: Functional test (FKR-EU with BF actuator shown in OPEN position)

⚠ CAUTION!

Danger of injury when reaching into the fire damper while the damper blade is moving. Do not reach into the fire damper while actuating the release mechanism.

Requirement

- Power is being supplied
1. ▶ Push the push button (1) and keep it pushed.
 - ⇒ This interrupts the power supply, and the damper blade closes.
 2. ▶ Check if the damper blade is CLOSED, check run time.
 3. ▶ Release the push button (1).
 - ⇒ Power is supplied again, and the damper blade opens.
 4. ▶ Check if the damper blade is OPEN, check run time.

Opening the damper blade using the crank handle



Fig. 47: Functional test (without power supply)


! DANGER!

Danger due to malfunction of the fire damper.

If the damper blade has been opened by means of the crank handle (without power supply), it will no longer be triggered by a temperature increase, i.e. in the event of a fire. In other words, the damper blade will not close.

To re-establish its function, connect the power supply.

Requirement

- The damper blade is CLOSED
- 1. ▶ Insert the crank handle (1) into the opening for the spring winding mechanism (the crank handle is clip-fixed to the connecting cable).
- 2. ▶ Turn the crank handle in the direction of the arrow (2) to just short of the travel stop.
- 3. ▶ Then quickly rotate the crank handle by approx. 90° towards the 'lock' position .
 - ⇒ The damper blade remains in the OPEN position.
- 4. ▶ Remove the crank handle.

Closing the damper blade using the crank handle




Fig. 48: Functional test (without power supply)

! CAUTION!

Danger of injury when reaching into the fire damper while the damper blade is moving. Do not reach into the fire damper while actuating the release mechanism.

Requirement

- The damper blade is OPEN
- 1. ▶ Insert the crank handle (1) into the opening for the spring winding mechanism (the crank handle is clip-fixed to the connecting cable).
- 2. ▶ Rotate the crank handle by approx. 90° towards the 'unlock' position  until a click can be heard.
 - ⇒ The damper blade is released and closes.
- 3. ▶ Remove the crank handle.

7 Commissioning

Before commissioning

Before commissioning, each fire damper must be inspected to determine and assess its actual condition.

The inspection work to be carried out is listed in the complete instructions, see installation and operating manual FKR-EU.

Operation

During normal operation the damper blade is open to enable air passage through the ventilation system.

If the temperature in the duct ($\geq 72\text{ °C}$ / $\geq 95\text{ °C}$ in warm air ventilation systems) or the ambient temperature ($\geq 72\text{ °C}$) rises in the event of a fire, the thermal release mechanism is triggered. This action closes the damper blade.



CLOSED fire dampers

Fire dampers which close while the ventilation system is running must be inspected before they are opened again in order to ensure their correct function.

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TROX[®] TECHNİK

The art of handling air

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