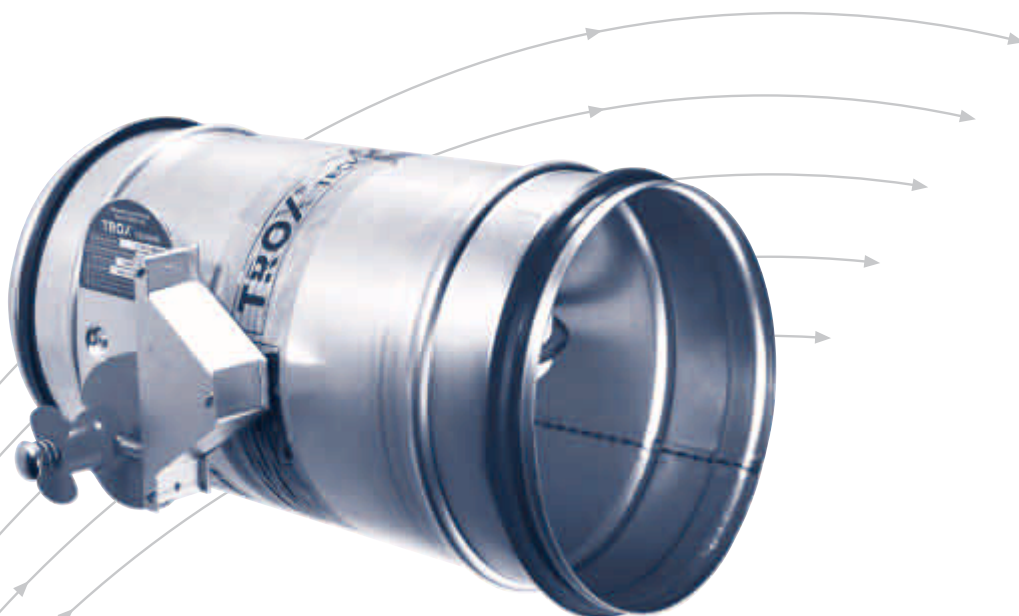


# Fire Dampers

- Type FKRS-02-K90
- with General building approval

Z-41.3-604



**TROX**<sup>®</sup> **TECHNIK**

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Fire dampers are designed for automatic isolation of fire compartments in ventilation and air conditioning systems (RLT-systems). Depending on their application they have different fire resistant classes (fire duration ratings) and are suitable for installation in walls and ceilings made of concrete or masonry and in lightweight walls. The damper installation is independent of the air flow direction.

Thermal release (automatic closure of the fire damper) is by means of a fusible link at temperatures > 72 °C. Alternatively, a release mechanism with an electrical spring actuator can also be used.

Supervision by an external organisation as required by the German law is performed by FMPA, Baden-Württemberg.

Material:

Casing made of galvanised sheet steel, damper blade made of special insulation material, bearing components made of stainless steel and maintenance-free plain bearings.

Alternatively:

- Casing with powder coating RAL 7001
- Casing made of stainless steel

FKRS-02-K90



FKRS-02-K90 with installation block



## Attention!

The correct and safe operation of the fire damper must be checked at commissioning and at regular inspections. If after two inspections at six monthly intervals there are no functional problems then inspections can be extended to a yearly basis. Maintenance work after commissioning is restricted to the removal of dirt which can impair functioning of the equipment, e.g. in the thermal release mechanism. *The maintenance intervals depend on the system engineering and operating conditions and must therefore be organised by the operator.*

Fire dampers are components that require authorisation. Therefore, the “General and Special Provisions” specified in the general building approvals and the instructions for installation, commissioning and maintenance which are enclosed with each delivery must be followed when using the fire dampers.

Furthermore the general maintenance guidelines in accordance with DIN 31051 in connection with DIN EN 13306 must be complied with.

The general building approval Z-41.3-604, the leaflet 4/10/EN/5 and the relevant assembly, commissioning and maintenance instructions MI-4/10/EN/5 can be found on the internet site [www.troxtechnik.com](http://www.troxtechnik.com).

## Type FKRS-02-K90

### FKRS-02-K90 with accessories Z42 or Z44

Application

– see table on page 4

Fire resistance class

– depending on the application

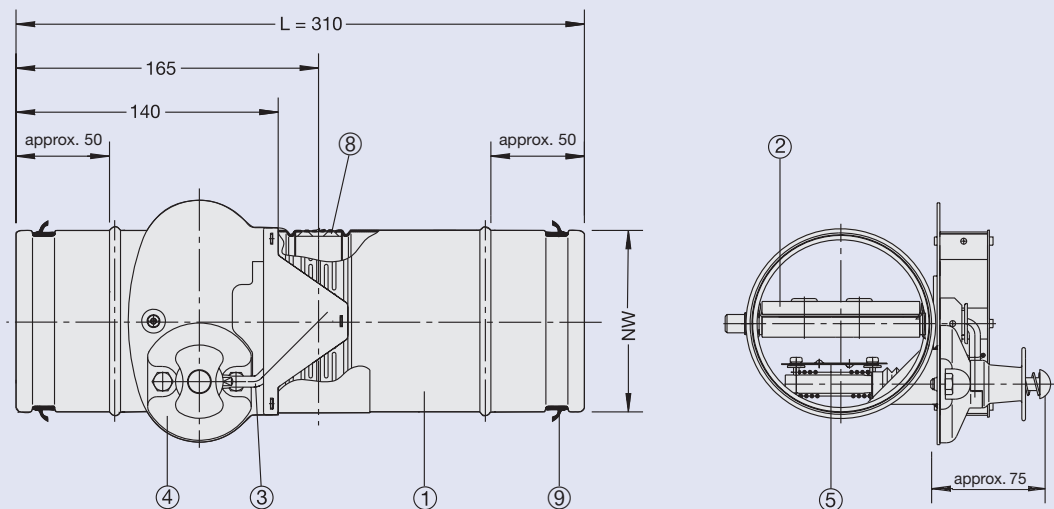
Release temperature 72°C, 95°C alternatively

Standard sizes

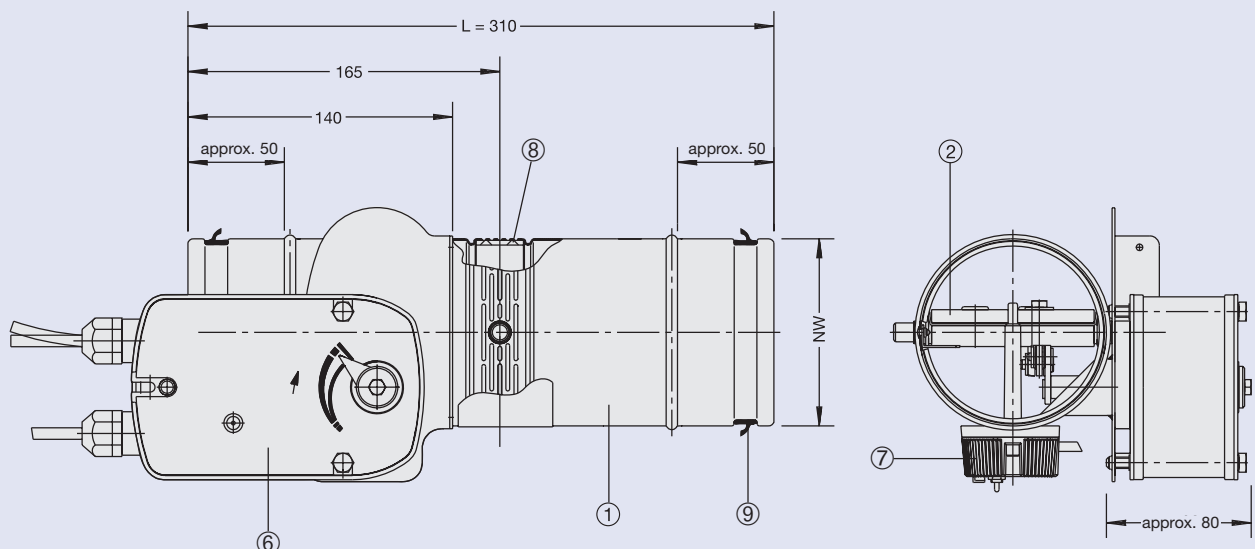
NW 100, NW 125, NW 160, NW 200

- ① Casing
- ② Damper blade with sealing ring
- ③ Manual lever
- ④ Release mechanism
- ⑤ Fusible link
- ⑥ Spring return actuator
- ⑦ Thermoelectric release mechanism
- ⑧ Continuous sealing strips (heat sensitive)
- ⑨ Lip seal (attachment 11 see page 9)

### Type FKRS-02-K90



### Type FKRS-02-K90 with accessories Z42 or Z44



# Applications · Standard Sizes · Weights

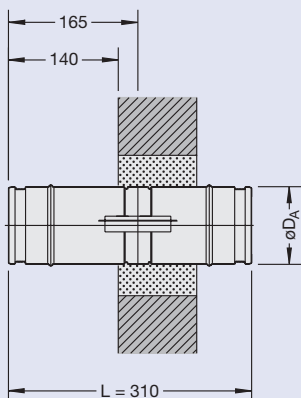
Application	Construction / material	Minimum thickness in mm	Fire resistance class at minimum thickness	Fire resistance class <sup>2)</sup>	Alternatively with installation block		Flexible connectors always required <sup>3)</sup>	Installation details see page / figure	
					circu- lar	square		wet instal- lation	dry instal- lation
– in solid walls <sup>1)</sup>	Concrete	100	F90	K90	X	–	–	6 / 1.1	6 / 1.2
	Aerated concrete/ lightweight concrete	75	F60	K60	X	–	X		
		100	F90	K90	X	–	–		
Masonry	115	F90	K90	X	–	–			
– in solid ceilings <sup>1)</sup>	Concrete / aerated concrete	100	F90	K90	X	–	–	6 / 1.3 and 7 / 1.5	6 / 1.4 and 7 / 1.6
– in wall boards	Gypsum	100	F180	K90	X	–	X	7 / 2.1	7 / 2.2
– in lightweight walls with metal supports	Lightweight partition walls with plasterboard cladding	75	F30	K30	–	X	X	8 / 3.1	8 / 3.2
		100	F90		–	X	X		
	Fire rated partition walls with calcium silicate board cladding	84	F90	K90	–	X	X		
	Shaft walls / framework clad with non-combustible plaster board	90	F30 or F90	K30 or K90	–	X	X		
– in lightweight walls without metal supports and walls with L90-ventilation-ducts	Fire rated partition walls made of calcium silicate boards	40	F90	K90	–	X	X	8 / 4.1	8 / 4.2

1) Fire dampers may only be connected to ventilation ducts designed or positioned in such a way that they do not exert any significant force on the fire damper or on the wall or ceiling, particularly when heating occurs in the event of a fire. If necessary, flexible connectors made from materials with low or normal flammability should be located between the fire damper and the ventilation duct.

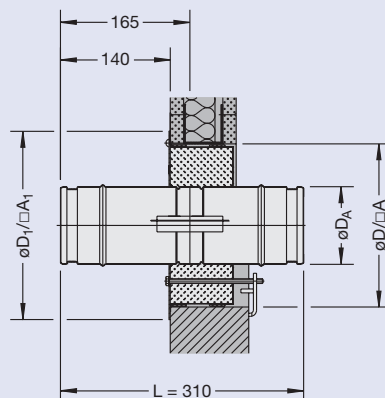
2) In conjunction with ventilation ducts connected on both ends made of non-combustible materials or in conjunction with cover grilles.

3) Flexible air ducts are allowed to be connected directly.

Type FKRS-02-K90



Type FKRS-02-K90 with installation block



Standard Sizes · Weights

NW	øDA in mm	øD/□A in mm	øD1/□A1 in mm	approx. weight in kg*
100	99	209	240	1 / 7
125	124	234	265	1.3 / 8
160	159	269	300	1.7 / 10
200	199	309	340	2.2 / 13

Standard size "NW" according to DIN

\* Weight without/ with installation block for release mechanisms Z42 and Z44, table values + 2 kg

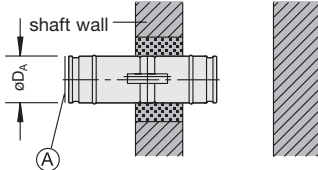
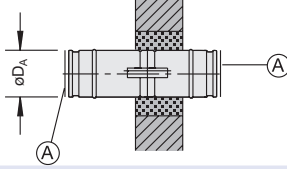
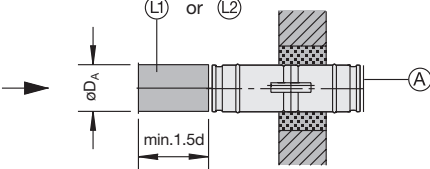
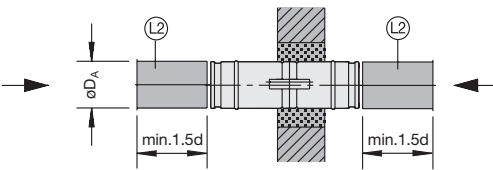
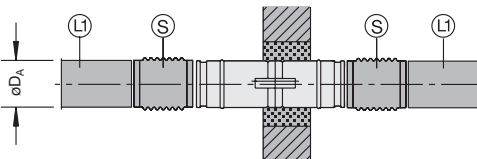
øD Installation opening for circular installation block (only for use in solid walls and ceiling slabs and also in gypsum wall boards)

□A Installation opening for square installation block

øD1 Cover plate for circular installation block

□A1 Cover plate for square installation block

# Connection of Ventilation Ducting

Ref. No.	Application	Fire resistance class*
1	- in shaft walls; cover grille on the drive side 	K90
2	- both ends with cover grilles 	K90
3	- with non-combustible ventilation ducting and cover grille on one end 	K90
4	- both ends with flexible, non-combustible ventilation ducting 	K90
5	- both ends with flexible connectors and non-combustible ventilation ducting 	K90

According to the general building approval, fire dampers may only be connected to ventilation ducts that are unable to exert any significant force on the fire damper or on the wall or ceiling, on account of duct construction layout, particularly when ducts heat up in event of fire. If this is not possible, flexible connectors must be located as shown in Ref. No. 5 for installation as shown in Fig. 1.1 and 1.2 ( $W < 100 \text{ mm}$ ) and 1.3 to 1.6.

For installation according to Figs. 2.1 to 4.2 ventilation ducts must be installed using only flexible connectors as shown in Ref. No. 5.


When using L2 ventilation ducting flexible connectors are not required.

- (A) Cover grille
  - (L1) Ventilation ducting made of non-combustible materials
  - (L2) Flexible, non-combustible ventilation ducting (ducts of steel or aluminium)
  - (S) Flexible connector of low-flammable or normal flammable building materials (Material class B1 or B2 acc. to DIN 4102 or flexible aluminium ducting acc. to DIN 24146-1), flexible length  $\geq 100 \text{ mm}$  when fitted
- “d” corresponds to the largest diameter
- \* Fire resistance class K90 in walls or ceilings with a min. fire resistance class of F90
- Connection of combustible ventilation ducting allowed (after min. 1.5d)

# Installation Details

## Installation in solid walls and ceilings

Installation – with vertical damper blade and casing in any orientation from 0° to 360° – in concrete or aerated walls with a minimum thickness of 100 mm and masonry walls with a minimum thickness of 115 mm, in aerated concrete walls according to Table 38 of DIN 4102, Part 4 (March 1994 issue), with resistance class F60-A, with a minimum thickness of 75 mm and also in lightweight concrete walls.

 = Mortar, concrete, approved fire protection mortar or plaster mortar

Gap “s” is to be filled with mortar from group II or III, DIN 1053, with concrete, with an approved fire protection mortar or with a plaster mortar.

Gap “s” can be omitted if the fire damper is installed in the wall or ceiling when it is built.

If  $W > 115$  mm or  $D > 115$  mm, an extension piece (V-part) should be provided by others, if necessary.

**If  $W < 100$  mm, ventilation duct connections are only permitted using flexible connectors or flexible ventilation ducts.**

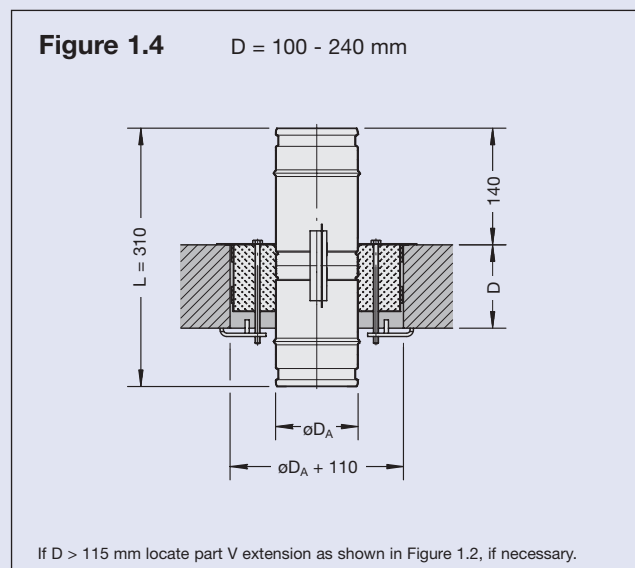
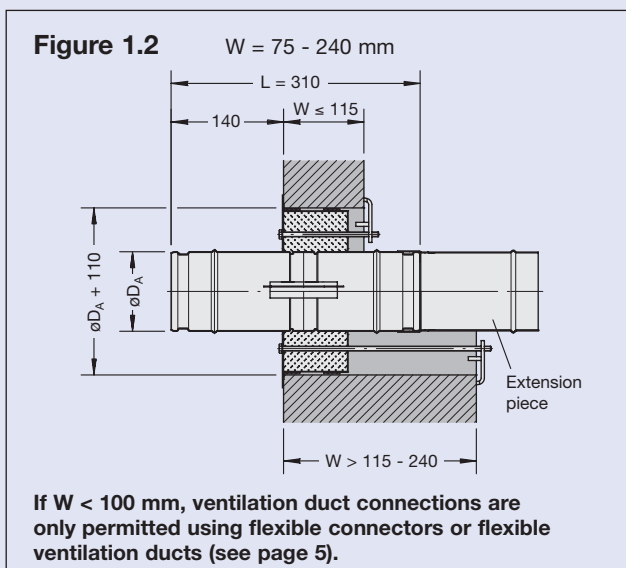
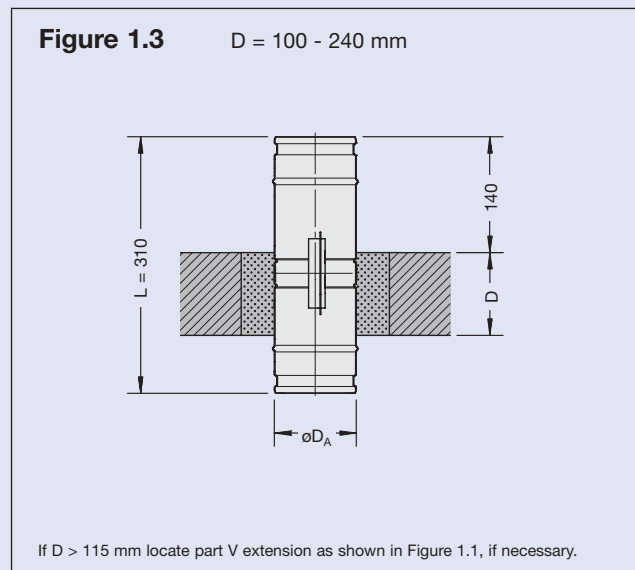
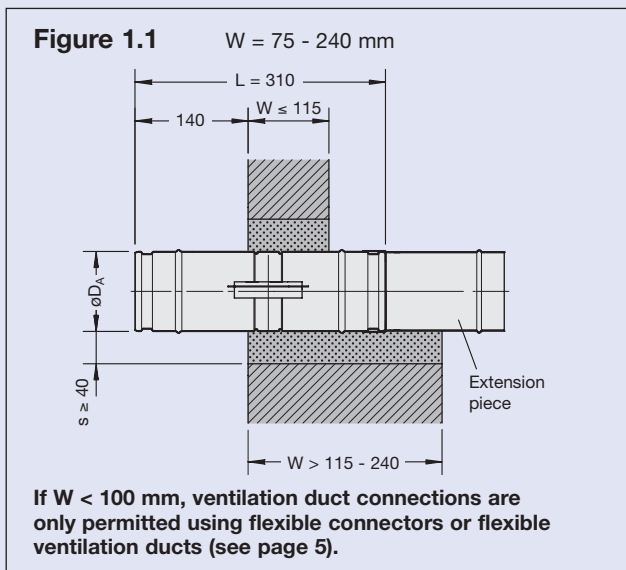
### Wall installation · Ceiling installation

Figure 1.1 Wall thickness  $W = 75 - 240$  mm wet installation

Figure 1.2 Wall thickness  $W = 75 - 240$  mm dry installation with circular installation block

Figure 1.3 Vertical in ceiling slabs, ceiling thickness  $D = 100 - 240$  mm, wet installation

Figure 1.4 Vertical in ceiling slabs, ceiling thickness  $D = 100 - 240$  mm, dry installation with circular installation block



## Wall installation · Ceiling installation

Figure 1.5 Suspended in ceilings, ceiling thickness  $D = 100 - 240$  mm wet installation

Figure 1.6 Suspended in ceilings, ceiling thickness  $D = 100 - 240$  mm dry installation with circular installation block

Figure 2.1 Installation in gypsum wall boards wet installation

Figure 2.2 Installation in gypsum wall boards dry installation with circular installation block

## Installation in gypsum wall boards

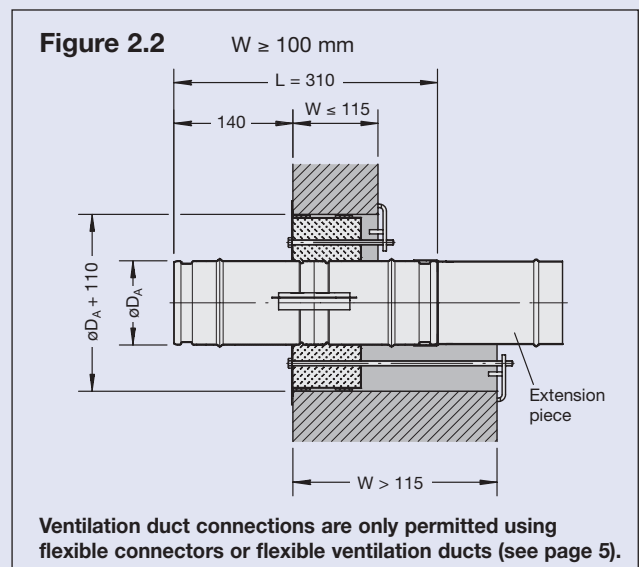
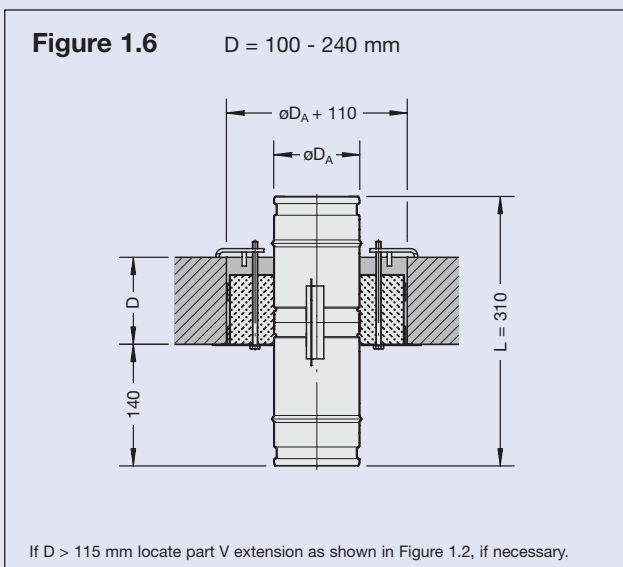
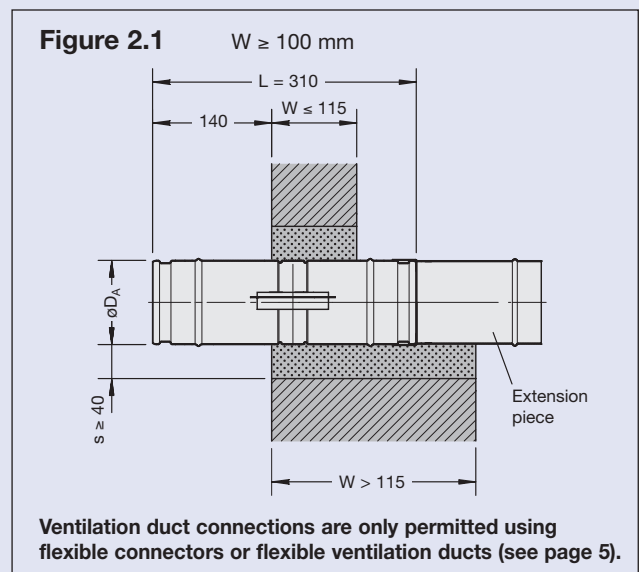
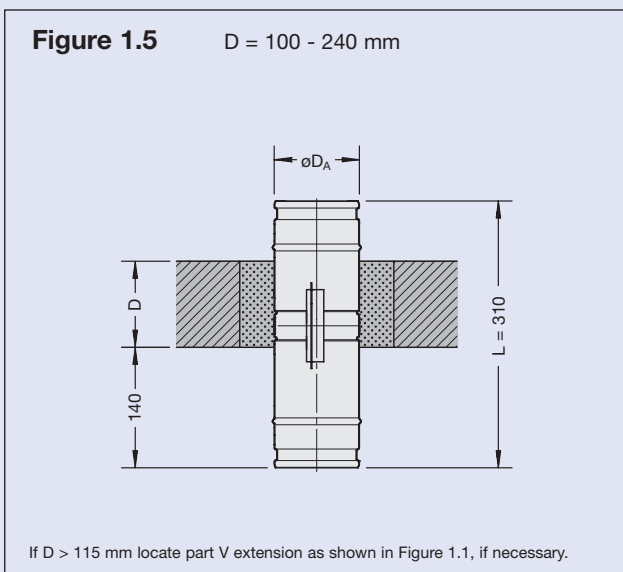
Installation – also with vertical damper blade and casing in any orientation from  $0^\circ$  to  $360^\circ$  – in gypsum wall boards according to DIN 18163, Part 1, gross density  $0.6 \text{ kg/dm}^3$  with a minimum thickness of 100 mm.

Gap “s” is to be filled with mortar from group II or III, DIN 1053, with concrete, with an approved fire protection mortar or with a plaster mortar.

Gap “s” can be omitted if the fire damper is installed in the wall or ceiling when it is built.

If  $W > 115$  mm, an extension piece (part V) should be provided by others, if necessary.

**Ventilation duct connections are only permitted using flexible connectors or flexible ventilation ducts.**



# Installation Details

## Installation in lightweight partition walls with metal supports

Installation – also with vertical damper blade and casing in any orientation from 0° to 360° – in lightweight partition walls, prefabricated- and shaft walls with metal supports according to the test certificate, the building inspectorate usage certificate or approval.

Gap “s” is to be filled with mortar from group II or III, DIN 1053, with concrete, with an approved fire protection mortar or with a plaster mortar.

If  $W > 115$  mm, an extension piece (part V) should be provided by others, if necessary.

### Ventilation duct connections are only permitted using flexible connectors or flexible ventilation ducts.

- ① Partition wall / shaft wall  
(Wall construction according to the particulars of the manufacturer)
- ② Reinforcing profile (according to the wall construction)

Figure 3.1 Wall thickness  $W \geq 75$  mm wet installation

Figure 3.2 Wall thickness  $W \geq 75$  mm dry installation with square installation block

## Installation in lightweight partition walls without metal supports and L90-walls

Installation – also with vertical damper blade and casing in any orientation from 0° to 360° – in at least 40 mm thick fire rated partition walls made of calcium silicate boards without metal supports and walls with L90-ventilation-ducts according to test certificate.

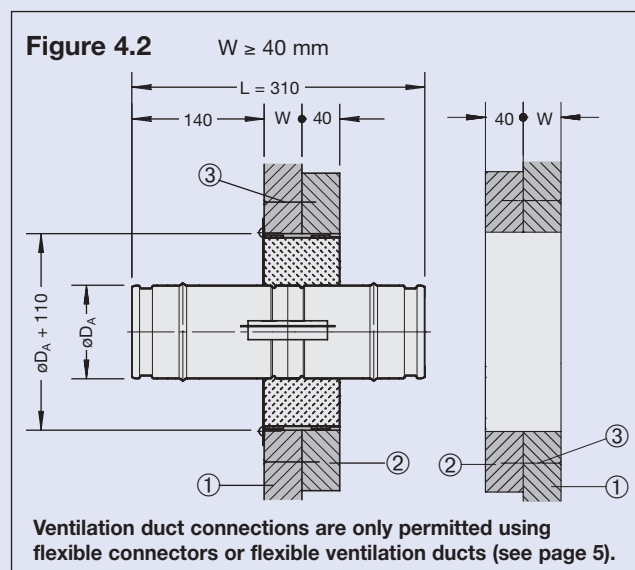
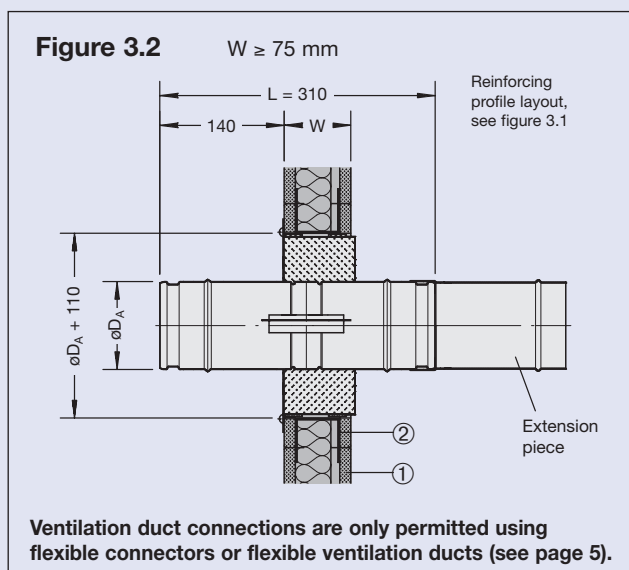
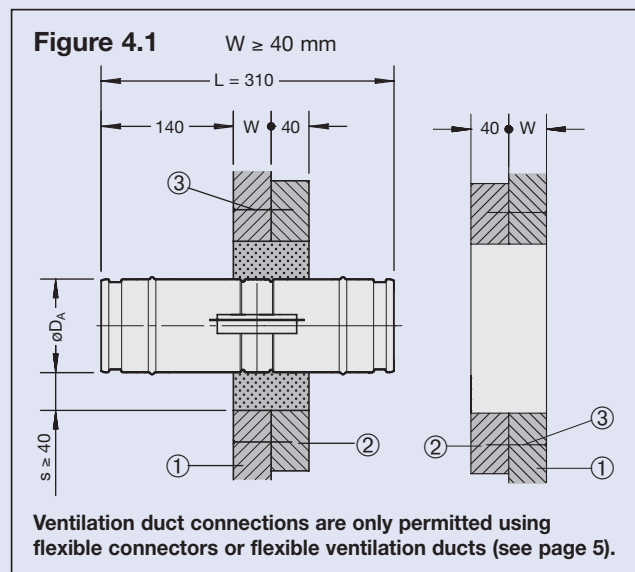
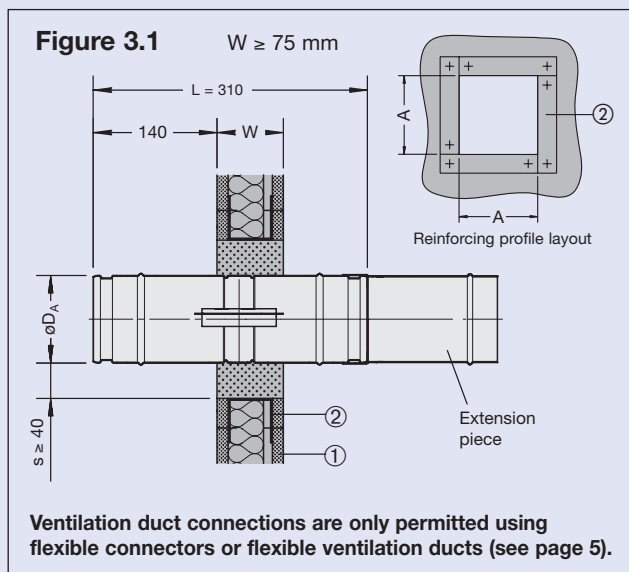
Gap “s” is to be filled with mortar from group II or III, DIN 1053, with concrete, with an approved fire protection mortar or with a plaster mortar.

### Ventilation duct connections are only permitted using flexible connectors or flexible ventilation ducts.

- ① Fire rated partition wall (Wall construction according to the particulars of the manufacturer) or L90-wall
- ② Perimeter strip (according to the wall construction)
- ③ Coarse thread wall screw, steel,  $L \geq 60$  mm

Figure 4.1 Wall thickness  $W \geq 40$  mm wet installation

Figure 4.2 Wall thickness  $W \geq 40$  mm dry installation with square installation block

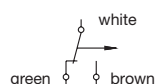


## Type designation FKRS-02-K90

### Code for construction variants

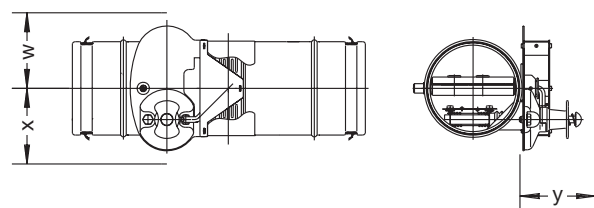
- K90-1 = Casing with powder coating RAL 7001
- K90-2 = Casing made of stainless steel

- 1) Limit switch with flying lead, 1.0 m long  
Protection category: IP 66  
Single pole changeover contact  
Contacts: gold flashed  
Max. switching current inductive, ohmic: 0.5 A  
Max. switching voltages: DC 30 V; AC 250 V  
Min. breaking capacity: 3 V / 5 mA
- 2) The ambient temperature for storage and operation must not exceed 50 °C or fall below - 30 °C.
- 3) Code for galvanised fire dampers
- 4) Code for powder-coated fire dampers (FKRS-02-K90-1)
- 5) Code for stainless steel fire dampers (FKRS-02-K90-2)
- 6) TROXNETCOM elements. You may find information on TROXNETCOM communication solutions for triggering fire dampers on the basis of the LON and AS-Interface on the internet under products/communication systems.

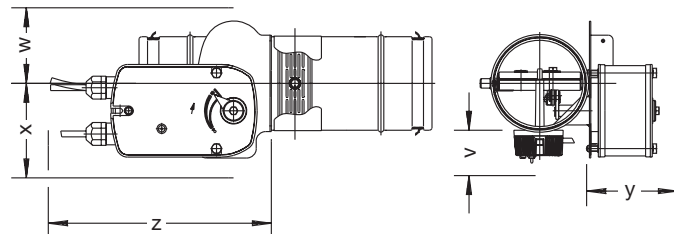


## Clearance dimensions for external release mechanisms (including space required for dismantling)

### Type FKRS-02-K90



### Type FKRS-02-K90 with accessory Z42 or Z44



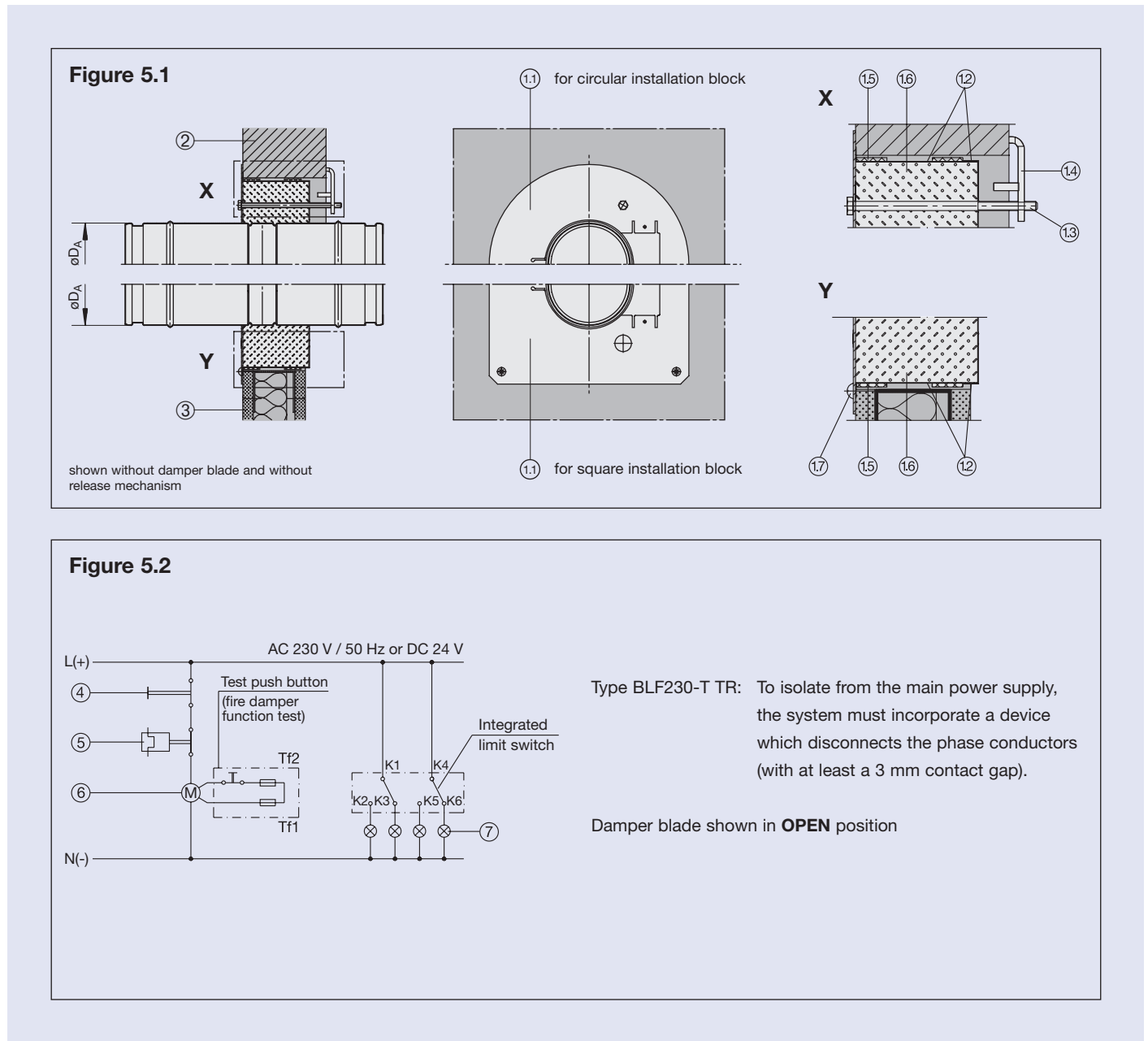
Accessories Construction or Construction variant	Combined with	Code	Clearance dimensions for installed release mechanisms				
			v	w	x	y	z
with fusible link (standard construction)	-	Z00	-	75	75	175	-
	Limit switch indicates blade "CLOSED" 1)	Z01	-	75	75	175	-
	Limit switch indicates blade "OPEN" 1)	Z02	-	75	75	175	-
	Limit switches indicate blade "CLOSED" and "OPEN" 1)	Z03	-	75	75	175	-
with spring return actuator, type BLF and thermo-electric release mechanism BAE72A-S (power off to close) 2)	-						
- spring return actuator with integrated limit switches and thermo-electric release mechanism							
Type BLF230-T TR U = AC 230 V, 50/60 Hz / opening P ≈ 5 W / in open setting P ≈ 3 W / rating 7 VA / protection category II / IP 54 / 100 % rated Open approx. 40 ... 75 secs / close approx. 20 secs Auxiliary switch: 2 x EPU 6 (1.5) A, AC 250 V ☐	-	Z42	120	75	100	150	250
Type BLF24-T-ST TR U = AC 24 V, 50/60 Hz or DC 24 V / opening P ≈ 5 W / in open setting P ≈ 2.5 W / rating 7 VA / protection category III / IP 54 / 100 % rated Open approx. 40 ... 75 secs / close approx. 20 secs Auxiliary switch: 2 x EPU 6 (1.5) A, AC 250 V ☐	-	Z44	120	75	100	150	250
	AS-EM/B-module TROXNETCOM AS-Interface 6)	ZA03	120	75	100	150	390
	LON-WA1/B TROXNETCOM LON 6)	ZL05	120	75	100	150	390

Attachments Construction or Construction variant	Combined with	Codes for		
		-K90 3)	-K90-1 4)	-K90-2 5)
with lip seal on both ends	-		11	
with circular installation block, see figure 5.1	-	12	32	52
	Lip seal on both ends	14	34	54
	one flexible connector suitable for the drive- or installation end	16	36	56
	two flexible connectors	18	38	58
	with square installation block, see figure 5.1	-	13	33
with lip seal on both ends	-	15	35	55
	one flexible connector suitable for the drive- or installation end	17	37	57
	two flexible connectors	19	39	59
with one cover grille located on the drive end	-	20		40
with one cover grille located on the installation end	-	21		41
with two cover grilles	-	22		42
with one flexible connector suitable for the drive- or installation end	-		23	
with two flexible connectors	-		24	

# Product Range · Circuit Diagram

- ① Installation block, consisting of:
  - ①.1 Panel
  - ①.2 Block cover sheet
  - ①.3 Clamping arm
  - ①.4 Clamping jaw
  - ①.5 Seal
  - ①.6 Precast block
  - ①.7 Particle board screw
- ② Solid wall or ceiling or gypsum wall boards
- ③ Lightweight partition wall
- ④ Electrical switch, supplied by others (close and open fire damper)
- ⑤ Sensor or detector, supplied by others (close fire damper); for release mechanism using power off to close principle, e.g. TROX smoke detector type RM-O/2 or RM-O-VS-D
- ⑥ Electric spring return actuator with integrated limit switches and thermo-electric release mechanism
- ⑦ Consumer electrics, supplied by others (e.g. pilot light for position indicator)

Figure 5.1 Circular or square installation block  
 Figure 5.2 Circuit diagram for construction Z42 and Z44



## Nomenclature

NW	:	Nominal size
$v_A$	in m/s :	Air velocity related to size NW
$\Delta p_t$	in Pa :	Total pressure drop (fully ducted) related to size = $\zeta \cdot 0.6 \cdot v_A^2$
		$\frac{\rho}{2} \xrightarrow{\uparrow}$
$\zeta$	:	Resistance coefficient (fully ducted)
$\rho$	in kg/m <sup>3</sup> :	Air density (approx. 1.2 at 20°C)
$L_{WA}$	in dB(A) :	A-weighted sound power level (re 10 <sup>-12</sup> W)
$L_W$	in dB/oct. :	Octave band sound power level
f	in Hz :	Octave band centre frequency
<	:	Value below 10 dB

- using  $v_A$  in the table:

$$\left. \begin{matrix} \Delta p_t \\ L_{WA} \\ L_W \end{matrix} \right\} \text{ can be determined}$$

- for intermediate values of  $v_A$ :

$$\Delta p_t = \zeta \cdot 0.6 \cdot v_A^2$$

$\left. \begin{matrix} L_{WA} \\ L_W \end{matrix} \right\}$  can be interpolated with sufficient accuracy between the values given in the table

## Example

Data given: Fire damper type FKRS-02-K90

NW = 125,  $v_A = 6$  m/s

Required:  $\Delta p_t$ ,  $L_{WA}$ ,  $L_W$

Result:  $\Delta p_t = 23.8$  Pa  
 $L_{WA} = 41$  dB(A)

## Attention!

Sound power levels corrected according to ISO 5135: 1998

$L_W$ in dB	f in Hz							
	63	125	250	500	1000	2000	4000	8000
	38	48	43	39	32	30	23	11

Size	$\zeta$	$v_A$ in m/s	$\Delta p_t$ in Pa	$L_{WA}$ in dB(A)	f in Hz							
					63	125	250	500	1000	2000	4000	8000
					$L_W$ in dB							
100	1.9	4	18.2	37	17	46	43	34	25	17	10	<
		6	41.0	44	33	52	47	43	36	30	26	16
		8	73.0	51	50	56	51	50	43	39	36	27
		10	114.0	56	53	60	55	55	50	46	44	36
		12	164.2	60	59	63	58	58	55	52	49	42
125	1.1	4	10.6	31	30	39	37	29	21	15	<	<
		6	23.8	41	38	48	43	39	32	30	23	11
		8	42.2	48	44	52	48	47	40	40	34	25
		10	66.0	54	48	55	52	52	46	47	41	30
		12	95.0	58	52	58	56	55	51	52	47	41
160	0.9	4	8.6	28	35	36	33	24	16	10	<	<
		6	19.4	37	43	45	40	35	29	26	19	<
		8	34.6	45	47	50	46	42	37	37	31	22
		10	54.0	50	50	54	50	47	43	43	39	31
		12	77.8	55	56	58	54	51	49	49	45	39
200	0.6	4	5.8	23	37	35	26	18	<	<	<	<
		6	13.0	33	46	41	35	30	25	23	15	12
		8	23.0	41	50	47	41	38	34	34	28	20
		10	36.0	48	55	52	46	43	41	42	37	29
		12	51.8	53	57	55	50	47	46	47	44	37
		15	81.0	58	65	59	55	52	51	53	50	46

## Leakage values (m<sup>3</sup>/h) with closed blade

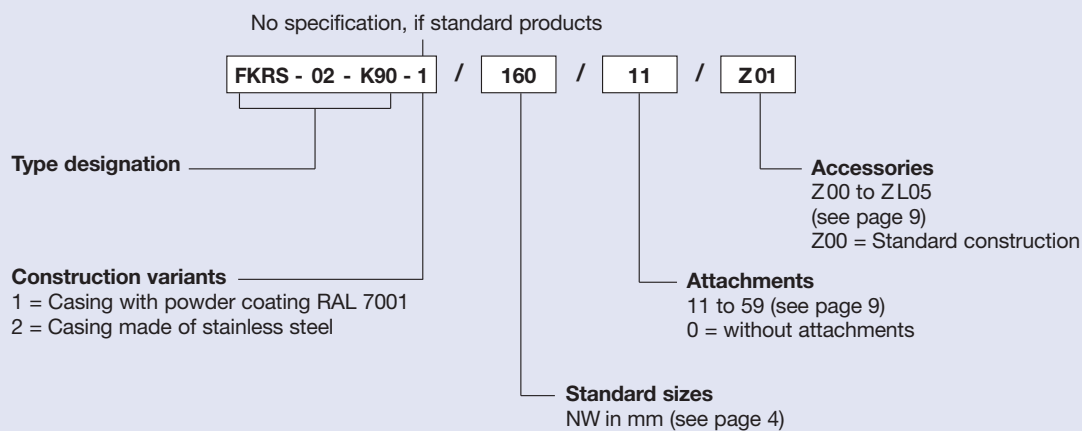
NW	Pressure differential in Pa					
	100	200	500	1000	2000	3000
100 – 200	< 0.4	< 0.6	< 1.0	< 1.5	< 2.4	< 3.0

Allowed leakage according to DIN 4102, part 6:

10 m<sup>3</sup>/h per m of perimeter at a pressure differential of 200 Pa

# Order Details

## Order code



## Specification Text

Circular fire dampers with general building approval for isolation of fire compartments in ventilation and air conditioning system (HVAC-systems). Thermal release (automatic closure of the fire damper) via a fusible link (release temperature > 72 °C). Functional tests possible without removing the ventilation duct components.

Texts for materials, construction variants, accessories, etc. can be taken from the leaflet.

Make: TROX

Type: FKRS-02-K90

## Order Example

Make: TROX

Type: FKRS - 02 - K90 - 1 / 160 / 11 / Z01

No.: 4