Technical Catalogue 2016

Dear Sir/Madam,

Please accept our Technical Catalogue for fire ventilation systems, which contains detailed information on the use, design, versions, manufacture and equipment, methods of installation and technical parameters of our fire dampers and valves.

Every appliance dispatched from Air Pressure Solutions factories to a Customer is thoroughly verified in accordance with the highest quality management standards and subjectto a range of approval tests. We are proud to provide safety through our operations.

The electronic version of our Technical Catalogue is available at www.airpressuresolutions.co.uk

SOLUTIONS

FIRE VENTILATION SYSTEMS

Fire ventilation systems

Technical Catalogue 2016

Edited by: APS - Fire Ventilation Systems Department

FIRE VENTILATION SYSTEMS

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AP SOLUTIONS

mcr FID S/S c/P

low-resistance single-blade cut-off fire dampers for residential ventilation systems

CE
1488-CPD-0203

PRODUKT Z ATESTEM PZH
ATEST HIGIENICZNY

ITB
CERTYFIKACJA PRODUKTU

- **EIS120**
- **Certificate of constancy of performance 1488-CPD-0203/W.**
- **Dampers certified for compliance with EN 15650.**
- **Dampers qualified under EN 13501-4 and tested under EN 1366-2.**
- **Cut-off dampers with the fire resistance independent of airflow direction and installation side.**
- **Lower acoustic noise and hydraulic resistance in the system with reduced partition thickness.**

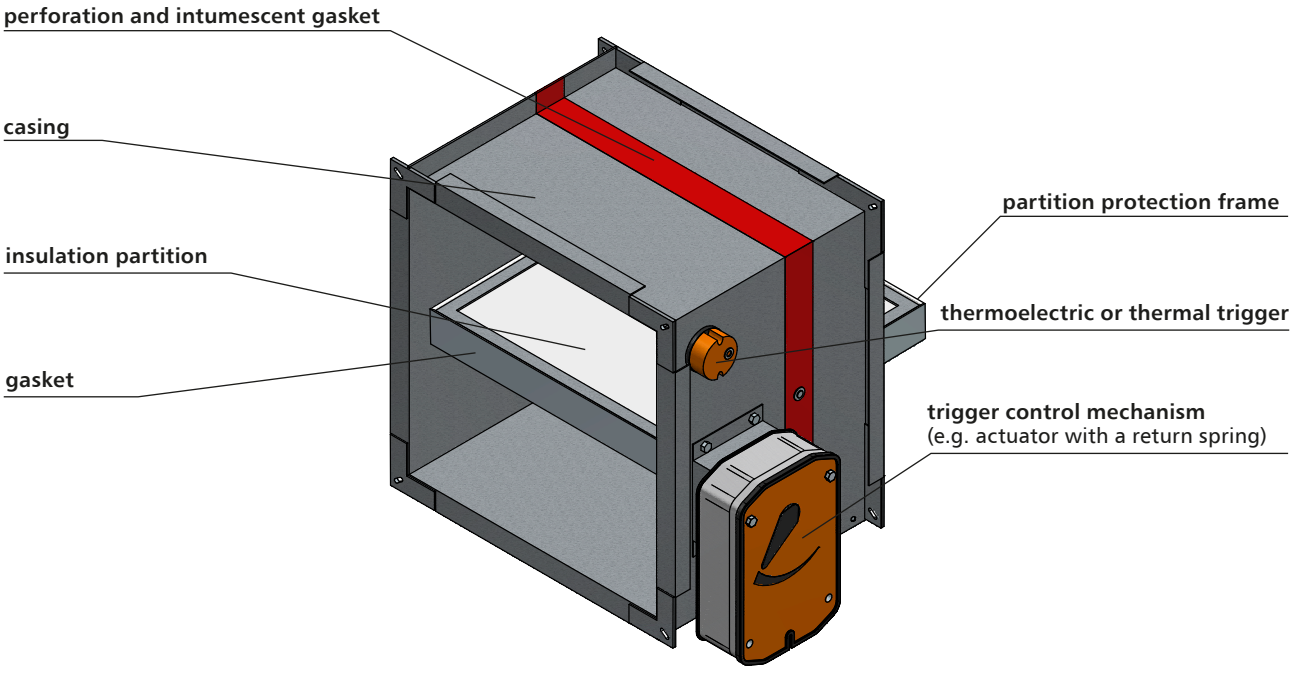
1.1. application

The mcr FID S/S c/P low-resistance cut-off dampers are designed for integration in general ventilation systems, where those systems pass through vertical and horizontal construction partitions. The dampers are intended for example for systems with increased acoustic requirements.

During a fire, they enable the maintenance of the fire resistance of the construction partition that ventilation and air conditioning ducts are routed through. Furthermore, they prevent the spreading of fire, smoke and burning fumes to the remaining part of the building not on fire. During normal system operation, the partition of the damper is open. In case of fire, the partition of the damper closes.

The dampers cannot be operated in systems exposed to dust, except for when they are included in a special, individually developed programme of service and technical inspections.

1.2. design



mcr FID S/S c/P

low-resistance single-blade cut-off fire dampers for residential ventilation systems

The mcr FID S/S/ c/P cut-off fire dampers consist of a casing with a rectangular cross section, a moving insulation partition and a trigger control mechanism, which is activated remotely or automatically when the thermal or thermoelectric trigger is tripped. Standard damper casing is made of galvanised steel sheet. In chemically aggressive environments, special manufacture casing is used, in which steel elements are made of 1.4404 acid-proof steel, while other elements are impregnated.

The casing total length is at least 296 mm. In the middle part, in which the insulation partition is seated, the casing is perforated at the width of 30 mm. On the inner side of the casing, around the closed cut-off valve, there is an intumescent gasket. The insulation partition is made of a fire-proof panel with the total thickness of 30 mm.

The insulation partition is seated in a sheet reinforcement profile. The inner surface of the casing has an adhering „P" ventilation gasket, which ensures the tightness of dampers at the ambient temperature. Both ends of the fire damper casing feature flange connections.

1.3. manufacture versions

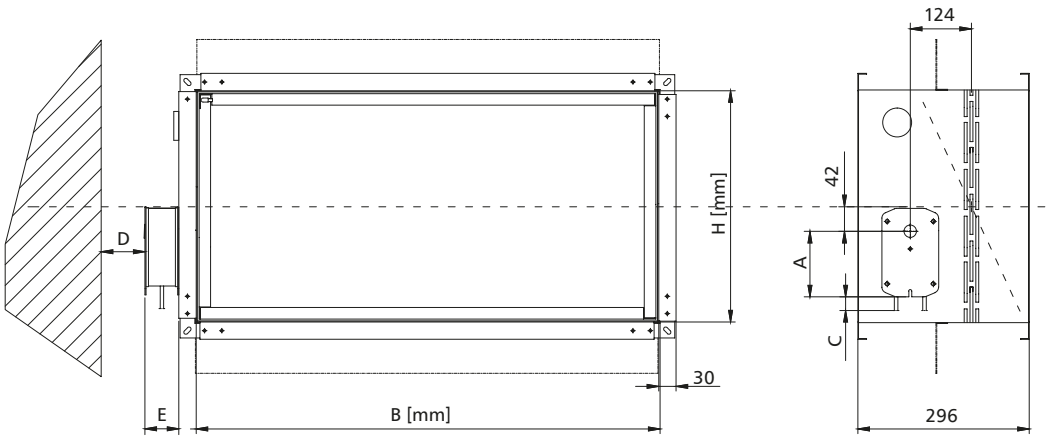
1.3.1. mcr FID S/S c/P – the cut-off fire damper for ventilation ducts with an actuator with a return spring – damper closing and opening with an actuator

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically or remotely by cutting off the power supply.

The mcr FID S/S c/P dampers feature a trigger control mechanism in the form of a Belimo **BLF, BFL, BFN** axial actuator with a return spring, powered with 24 V AC/DC or 230 V AC, with thermoelectric trigger rated at 72°C (optionally it is possible to use triggers with the nominal tripping temperature of 95°C). BLF, BFL, BFN series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

The thermoelectric trigger features a test switch and a power supply indicator (LED).

Dampers with Belimo actuators: analogue BLF, BFL, BFN, digital BF-TL, EXBF explosion proof actuators close as a result of thermoelectric trigger tripping or power supply cut-off by the action of the return spring placed in the actuator. The dampers open when the power supply voltage is applied to the actuator terminals. Furthermore, dampers with those actuators may be opened manually using a key.

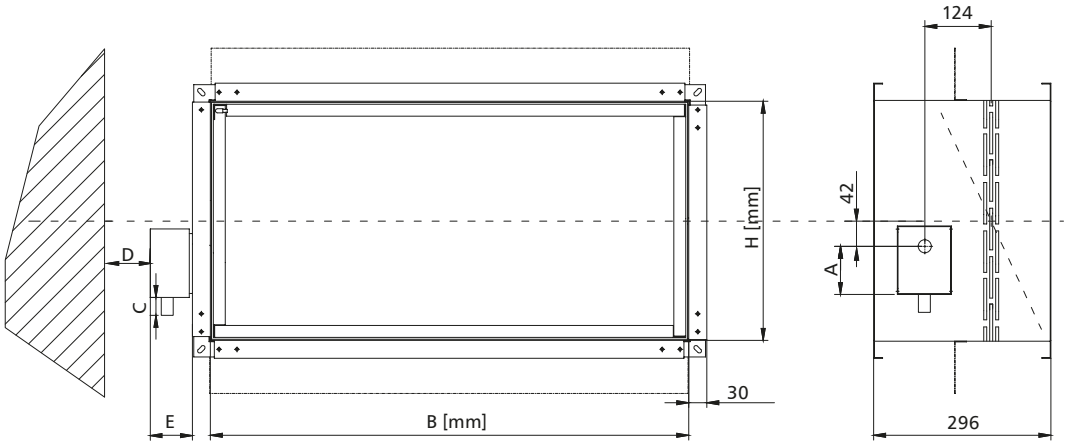


mechanism	A	C	D	E
BLF	130	30	75	65
BFN	157	30	75	57
BFL	138	30	75	53
BF24TL-ST	198	10	75	65
EXBF	225	55	75	175

1.3.2. **mcr FID S/S c/P** – the cut-off fire damper for ventilation ducts with a spring drive and thermal trigger

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically.

The mcr FID S/S c/P dampers are equipped with a **RST** trigger control mechanism with a drive spring (without an integrated thermal trigger). In this case, a thermal trigger rated at 74°C (optionally 95°C) is installed outside the damper mechanism, on the appliance partition itself. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. On the RST mechanism, there is a mechanical indicator of partition position. It is possible to equip the damper with WK1 or WK2 limit switches used to signal the partition position state.

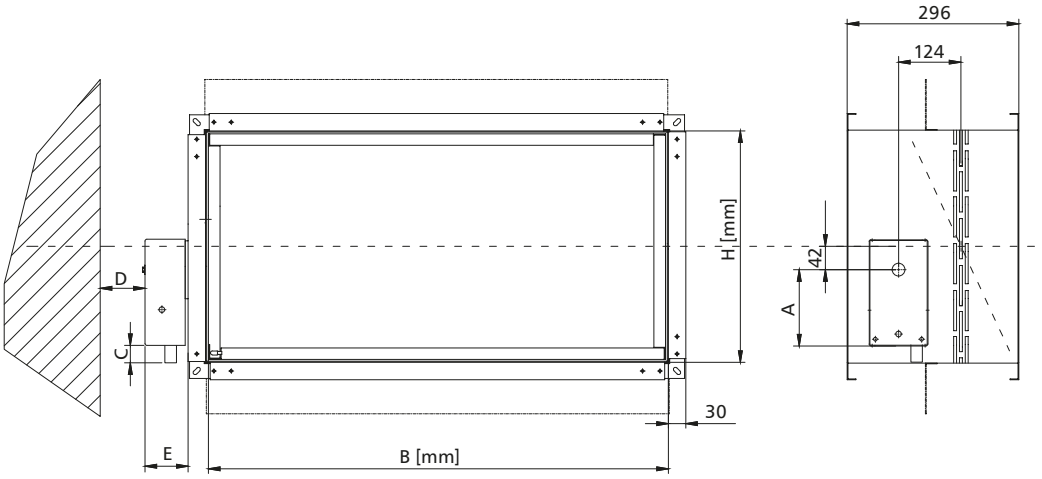


mechanism	A	C	D	E
RST	50	30	75	70

1.3.3. **mcr FID S/S c/P** – the cut-off fire damper for ventilation ducts with a spring drive and an integrated thermal trigger, optionally equipped with an electromagnetic trigger and limit switches

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically or, in case of a damper with an electromagnetic trigger, additionally using the fire automation.

The mcr FID S/S c/P dampers are equipped with a **RST-KW1** trigger control mechanism with a drive spring and a cam lever assembly. A thermal trigger rated at 74°C (optionally at 95°C) is integrated into the damper mechanism. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. On the RST-KW1 mechanism, there is a mechanical partition position indicator. It is possible to equip a trigger control mechanism with an electromagnetic trigger activated by the application („pulse") or removal („break") of the power supply voltage and with limit switches used to signal the partition position state. The mechanism features test and partition button-release functions. Partition re-opening is activated manually.



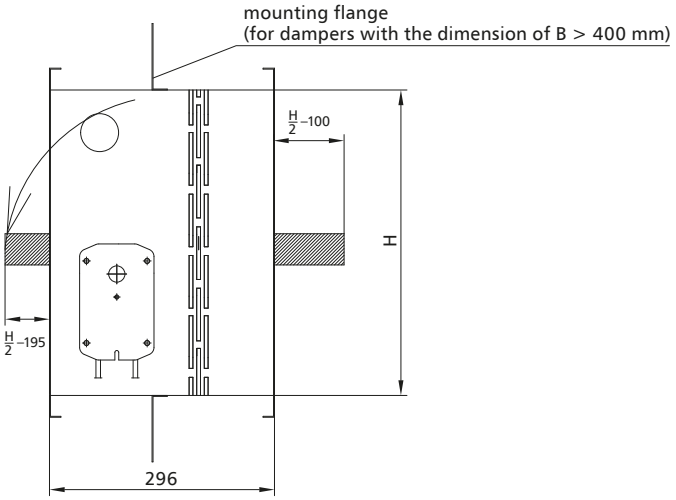
mechanism	A	C	D	E
RST-KW1	130	30	75	80

1.4. dimensions

Rectangular dampers:

- nominal width B: from 200 mm to 800 mm
- nominal height H: from 200 mm to 400 mm
- the maximum cross-section surface of one damper up to 0.32 m^2

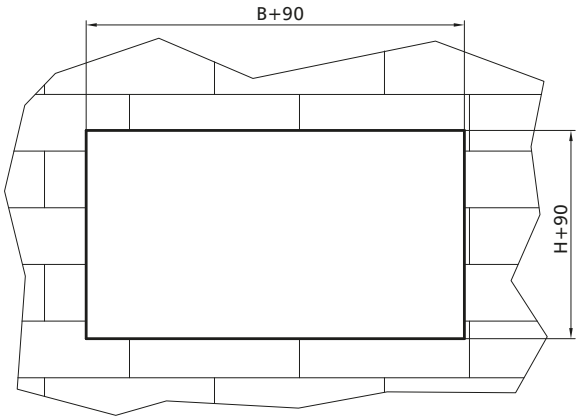
Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).



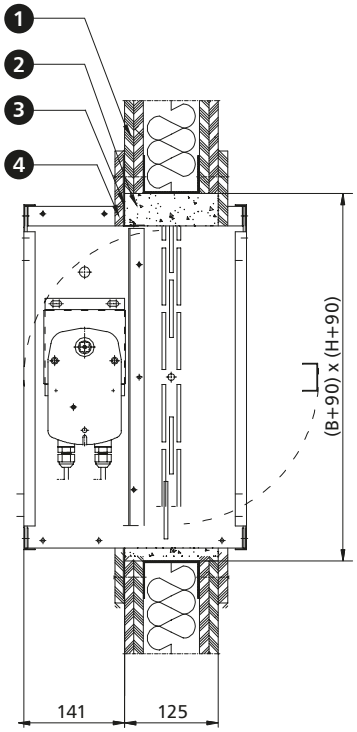
1.5. installation

The mcr FID S/S c/P rectangular dampers are EI120(ve ho i↔o)S-rated if installed in concrete partitions with the thickness of at least 110 mm, made of full bricks or cellular concrete blocks with the thickness of at least 115 mm, lightweight walls of cardboard-plaster panels on a steel framework with the thickness of at least 125 mm and the resistance class of not less than EI120 and concrete ceilings with the thickness of at least 150 mm.

1.5.1. preparation of installation openings



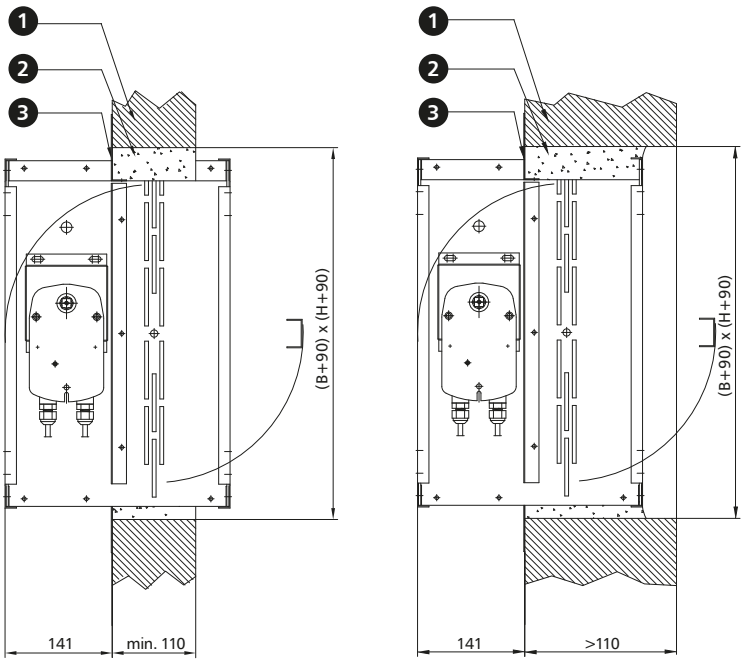
1.5.2. sample installation in lightweight walls of plaster-cardboard panels



1. lightweight wall
2. sealing - plaster mortar*
3. mounting flange - embedding border
4. circumferential belt of 100 x 12.5 plaster-cardboard panels

*it is possible to use a different sealing that ensures the required fire resistance

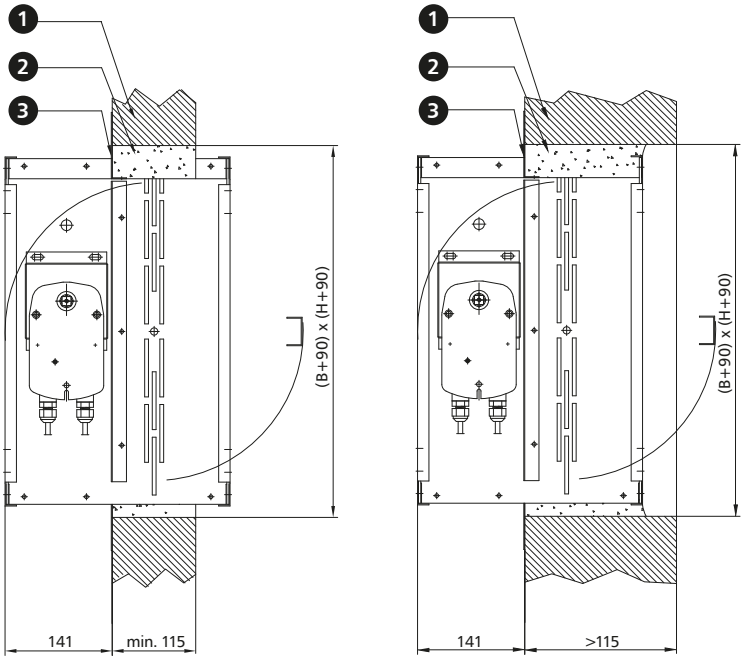
1.5.3. sample installation in concrete walls



1. rigid wall
2. sealing - cement or cement-lime masonry mortar*
3. mounting flange - embedding border

*it is possible to use a different sealing that ensures the required fire resistance

1.5.4. sample installation in masonry walls

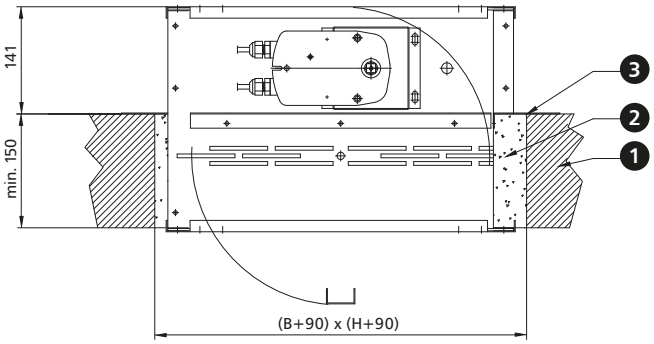


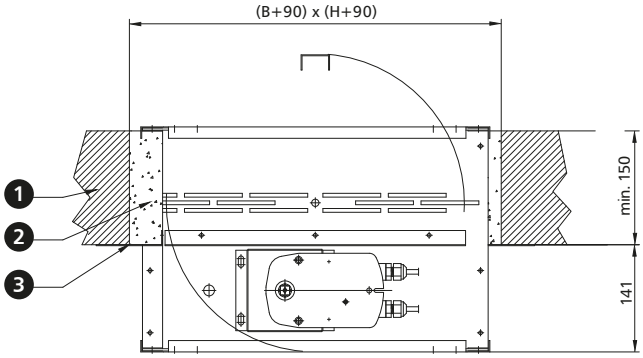
1. rigid wall
2. sealing - cement or cement-lime masonry mortar*
3. mounting flange - embedding border

*it is possible to use a different sealing that ensures the required fire resistance

If the damper is installed in a wall with the thickness of less than 115 mm, one should increase the wall thickness along the damper circumference by installing a belt of panels or other construction elements to the required thickness.

1.5.5. sample installation in ceilings

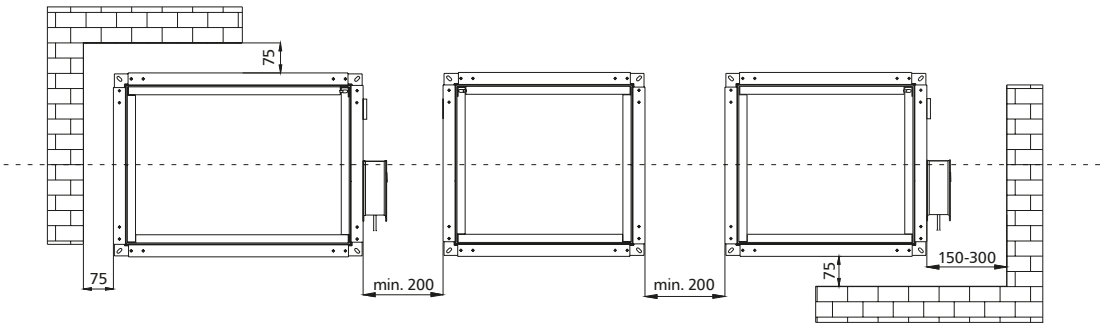




1. ceiling
2. sealing - cement or cement-lime masonry mortar*
3. mounting flange - embedding border

*it is possible to use a different sealing that ensures the required fire resistance

Distance between systems and partitions



1.6. technical parameters of mcr FID S/S c/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			200					250					300				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.04	0.033	468	7	27	0.05	0.043	612	6	26	0.06	0.053	756	6	28
		6			702	15	37			918	13	37			1 134	13	38
		8			936	26	45			1 224	24	45			1 512	22	44
		10			1 170	41	51			1 530	37	50			1 890	34	50
	250	4	0.05	0.041	585	6	27	0.0625	0.053	765	6	27	0.075	0.066	945	5	26
		6			878	14	37			1 148	13	38			1 418	11	37
		8			1 170	24	45			1 530	23	45			1 890	20	44
		10			1 463	38	50			1 913	36	51			2 363	31	50
	300	4	0.06	0.049	702	6	27	0.075	0.064	918	6	28	0.09	0.079	1 134	4	26
		6			1 053	13	38			1 377	13	38			1 701	10	36
		8			1 404	24	45			1 836	22	46			2 268	18	44
		10			1 755	37	51			2 295	35	51			2 835	28	49
	350	4	0.07	0.057	819	6	27	0.0875	0.074	1 071	5	27	0.105	0.092	1 323	4	25
		6			1 229	13	38			1 607	11	37			1 985	9	35
		8			1 638	22	45			2 142	20	45			2 646	16	43
		10			2 048	35	51			2 678	31	50			3 308	25	49
	400	4	0.08	0.065	936	5	27	0.1	0.085	1 224	4	25	0.12	0.105	1 512	4	24
		6			1 404	12	38			1 836	9	35			2 268	8	34
		8			1 872	22	45			2 448	17	43			3 024	14	42
		10			2 340	34	51			3 060	26	49			3 780	22	47
	450	4	0.09	0.073	1 053	5	27	0.1125	0.096	1 377	3	22	0.135	0.118	1 701	3	23
		6			1 580	11	37			2 066	7	33			2 552	7	33
		8			2 106	20	45			2 754	13	40			3 402	13	41
		10			2 633	31	50			3 443	20	46			4 253	20	47
	500	4	0.1	0.081	1 170	4	26	0.125	0.106	1 530	3	23	0.15	0.131	1 890	3	23
		6			1 755	10	36			2 295	8	34			2 835	7	34
		8			2 340	18	44			3 060	13	41			3 780	13	41
		10			2 925	28	50			3 825	21	47			4 725	20	47
	550	4	0.11	0.089	1 287	4	25	0.1375	0.117	1 683	3	23	0.165	0.144	2 079	3	22
		6			1 931	9	36			2 525	7	33			3 119	6	33
		8			2 574	17	43			3 366	13	41			4 158	12	40
		10			3 218	26	49			4 208	20	47			5 198	18	46
	600	4	0.12	0.098	1 404	3	21	0.15	0.128	1 836	3	20	0.18	0.158	2 268	2	20
		6			2 106	7	32			2 754	6	31			3 402	5	31
		8			2 808	12	39			3 672	10	38			4 536	10	38
		10			3 510	19	45			4 590	16	44			5 670	15	44
	650	4	0.13	0.106	1 521	3	22	0.1625	0.138	1 989	3	21	0.195	0.171	2 457	2	20
		6			2 282	7	32			2 984	6	31			3 686	5	30
		8			3 042	12	40			3 978	10	39			4 914	9	38
		10			3 803	19	46			4 973	16	45			6 143	14	44
	700	4	0.14	0.114	1 638	3	21	0.175	0.149	2 142	2	20	0.21	0.184	2 646	2	19
		6			2 457	6	32			3 213	5	31			3 969	5	30
		8			3 276	12	39			4 284	10	38			5 292	8	37
		10			4 095	18	45			5 355	15	44			6 615	13	43
	750	4	0.15	0.122	1 755	3	21	0.1875	0.159	2 295	2	20	0.225	0.197	2 835	2	20
		6			2 633	6	31			3 443	5	31			4 253	5	30
		8			3 510	11	39			4 590	10	38			5 670	8	38
		10			4 388	17	45			5 738	15	44			7 088	13	43
	800	4	0.16	0.130	1 872	2	20	0.2	0.170	2 448	2	20	0.24	0.210	3 024	2	19
		6			2 808	5	30			3 672	5	30			4 536	4	29
		8			3 744	10	38			4 896	9	38			6 048	8	37
		10			4 680	15	43			6 120	14	44			7 560	12	43

1.6. technical parameters of mcr FID S/S c/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

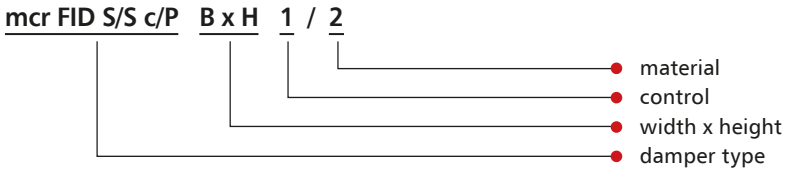
			height H [mm]										
			350					400					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.07	0.063	900	5	26	0.08	0.073	1 044	5	26
		6			1 350	12	37			1 566	11	37
		8			1 800	21	44			2 088	19	44
		10			2 250	32	50			2 610	30	50
	250	4	0.0875	0.078	1 125	4	25	0.1	0.091	1 305	4	25
		6			1 688	10	36			1 958	9	35
		8			2 250	17	43			2 610	16	43
		10			2 813	27	49			3 263	25	49
	300	4	0.105	0.094	1 350	4	26	0.12	0.109	1 566	4	24
		6			2 025	10	36			2 349	8	35
		8			2 700	17	44			3 132	15	42
		10			3 375	27	50			3 915	23	48
	350	4	0.1225	0.109	1 575	4	25	0.14	0.127	1 827	4	25
		6			2 363	9	36			2 741	8	36
		8			3 150	15	43			3 654	15	43
		10			3 938	24	49			4 568	23	49
	400	4	0.14	0.125	1 800	3	24	0.16	0.145	2 088	3	23
		6			2 700	8	34			3 132	7	34
		8			3 600	13	42			4 176	12	41
		10			4 500	21	48			5 220	19	47
	450	4	0.1575	0.141	2 025	3	24	0.18	0.163	2 349	3	21
		6			3 038	7	34			3 524	6	32
		8			4 050	13	42			4 698	10	39
		10			5 063	20	48			5 873	16	45
	500	4	0.175	0.156	2 250	2	20	0.2	0.181	2 610	2	20
		6			3 375	5	31			3 915	5	31
		8			4 500	10	38			5 220	9	38
		10			5 625	15	44			6 525	14	44
	550	4	0.1925	0.172	2 475	2	19	0.22	0.199	2 871	2	20
		6			3 713	5	29			4 307	5	30
		8			4 950	8	37			5 742	8	38
		10			6 188	13	43			7 178	13	43
	600	4	0.21	0.188	2 700	2	18	0.24	0.218	3 132	2	19
		6			4 050	4	29			4 698	4	28
		8			5 400	8	36			6 264	7	36
		10			6 750	12	42			7 830	11	42
	650	4	0.2275	0.203	2 925	2	19	0.26	0.236	3 393	2	18
		6			4 388	4	29			5 090	4	29
		8			5 850	8	37			6 786	7	36
		10			7 313	12	42			8 483	11	42
	700	4	0.245	0.219	3 150	2	18	0.28	0.254	3 654	2	18
		6			4 725	4	28			5 481	4	29
		8			6 300	7	36			7 308	7	36
		10			7 875	11	42			9 135	11	42
	750	4	0.2625	0.234	3 375	2	18	0.3	0.272	3 915	2	17
		6			5 063	4	29			5 873	4	28
		8			6 750	7	36			7 830	6	35
		10			8 438	11	42			9 788	10	41
	800	4	0.28	0.250	3 600	2	18	0.32	0.290	4 176	2	18
		6			5 400	4	29			6 264	4	28
		8			7 200	7	36			8 352	6	36
		10			9 000	11	42			10 440	10	41

1.7. estimated weights of mcr FID S/S c/P dampers for rectangular ventilation ducts [kg]

height H [mm] \ width B [mm]	200	250	300	400	500	600	700	800
200	7,5	8	9	10	11	14	16	18
250	8	9.5	10	11	14	15	17	19
300	9	10.5	11	12	15	16	18	20
350	10	11.5	12	13	16	17	19	21
400	11	12.5	13.5	14	18	19	21	22

For dampers with no actuator, subtract ~1 kg.

1.8. designation



1 – control:

– RST trigger control mechanism
RST – thermal trigger
RST/WK1 – thermal trigger + limit switch (closed partition signal)
RST/WK2 – thermal trigger + limit switch (open/closed partition signal)

– RST-KW1 trigger control mechanism
RST-KW1/S – thermal trigger
RST-KW1/S/WK2 – thermal trigger + limit switch (open/closed partition signal)
RST-KW1/24I – thermal trigger + „pulse" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/24P – thermal trigger + „break" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/230I – thermal trigger + „pulse" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)
RST-KW1/230P – thermal trigger + „break" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)

– Belimo trigger control mechanism
BLF24-T – actuator with a return spring, U = 24 V AC/DC
BLF230-T – actuator with a return spring, U = 230 V AC
BF24TL-T-ST (with the BKN230-24MP option) – actuator with a return spring, U = 24 V, MP Bus digital control
EXBF24-T – explosion proof actuator with a return spring in the Ex version, U = 24 V AC/DC
EXBF230-T – explosion proof actuator with a return spring in the Ex version, U = 230 V AC
BLF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFL24-T – actuator with a return spring, U = 24 V AC/DC
BFL230-T – actuator with a return spring, U = 230 V AC
BFL24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFN24-T – actuator with a return spring, U = 24 V AC/DC
BFN230-T – actuator with a return spring, U = 230 V AC
BFN24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system

2 – material

[no symbol] – galvanised steel, Zn 275 g/m^2 coating
KN – 1.4404 acid-proof stainless steel

example designation:

mcr FID S/S c/P 400 x 400 BLF24-T

EIS120 low-resistance cut-off damper with a 24 V compact Belimo actuator with limit switches.

Chapter 9 - power supply and control (p. 95) contains:
- technical specifications and connection diagrams for the trigger control mechanisms supporting the damper,
- location of trigger control mechanisms in relation to the damper - manufacture standards.

mcr FID S/S p/P
mcr FID S/S p/O

single-blade cut-off fire dampers for residential ventilation systems

PRODUCT CONFIGURATOR AT WWW.MERCOR.COM.PL

1396-CPR-0103

1488-CPR-0422

ATEST HIGIENICZNY

CERTYFIKACJA PRODUKTU

- **EIS120**
- **Certificate of constancy of performance 1488-CPR-0422/W and 1396-CPR-0103.**
- **Dampers certified for compliance with EN 15650.**
- **Dampers qualified under EN 13501-4 and tested under EN 1366-2.**
- **Cut-off dampers with the fire resistance independent of airflow direction and installation side.**
- **Dampers for rectangular and circular ventilation ducts.**

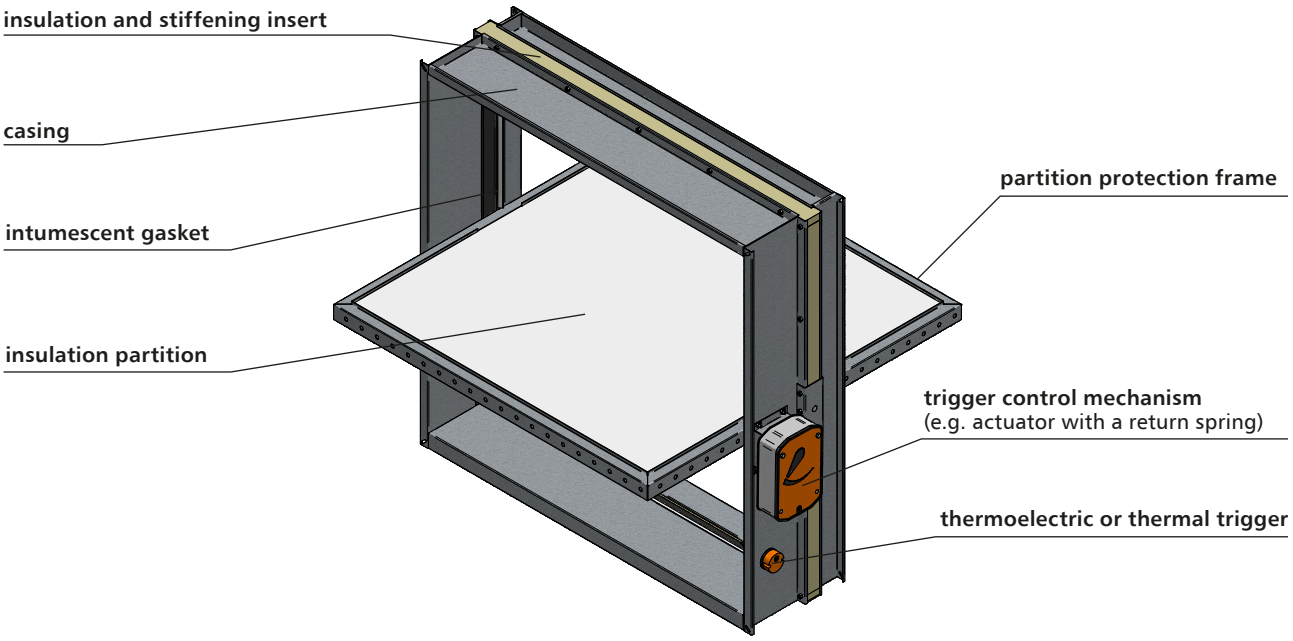
2.1. application

The mcr FID S/S p/P and mcr FID S/S p/O cut-off dampers are designed for integration in general ventilation systems, where those systems pass through construction partitions.

During a fire, they enable the maintenance of the fire resistance of the construction partition that ventilation and air conditioning ducts are routed through. Furthermore, they prevent the spreading of fire, smoke and burning fumes to the remaining part of the building not on fire. During normal system operation, the partition of the damper is open. In case of fire, the partition of the damper closes.

Additionally mcr FID S/S dampers may be used as relief dampers in gas extinguishing systems, in which case they are equipped with drives without thermoelectric or thermal triggers.

2.2. design



The mcr FID S/S shut-off dampers consist of a casing with a rectangular (mcr FID S/S p/P) or circular (mcr FID S/S p/O) cross-section, made of two segments separated with a fire-proof panel with the cross-section of 20 x 40 mm, a moving insulation partition and a trigger control mechanism, which is activated remotely or automatically by tripping a thermal or thermoelectric trigger. Standard damper casing is made of galvanised steel sheet. In chemically aggressive environments, special manufacture casing is used, in which steel elements are made of 1.4404 acid-proof steel, while other elements are impregnated. The casing total length is at least 296 mm. Dampers may be made with an extension part, in which case the casing length is 400 mm.

The insulation partition is made of a fire-proof panel with the total thickness of 40 mm, which is seated in a reinforcement metal sheet. The inner side of the fire damper casing features an intumescent gasket. There are stop shapes fastened to the inner casing surface, which limit the rotating motion of the insulation partition. The stop shapes are lined with a polyethylene ventilation-grade seal. In dampers with a rectangular cross-section, both ends feature flange connections, and in circular dampers, with nipple and flange connections.

2.3. manufacture versions

2.3.1. **mcr FID S/S** – the cut-off fire damper for ventilation ducts with an actuator with a return spring – damper closing and opening with an actuator

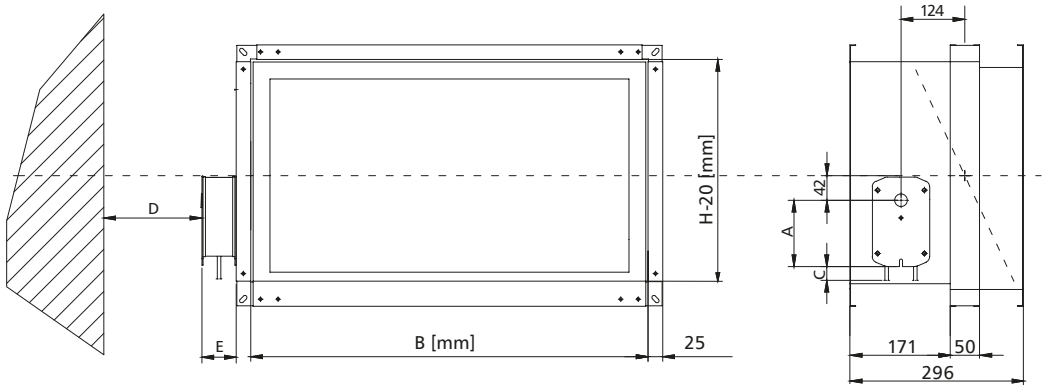
During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically or remotely by cutting off the power supply.

The mcr FID S/S c/P dampers feature a trigger control mechanism in the form of a Belimo **BF, BLF, BFL, BFN** axial actuator with a return spring, powered with 24 V AC/DC or 230 V AC, with thermoelectric trigger rated at 72°C (optionally it is possible to use triggers with the nominal tripping temperature of 95°C). BLF and BFL-series actuators are used in dampers with the height of not more than 600 mm and the diameter of not more than 550 mm. BFN-series actuators are used in dampers with the height of not more than 1000 mm and the diameter of not more than 630 mm.

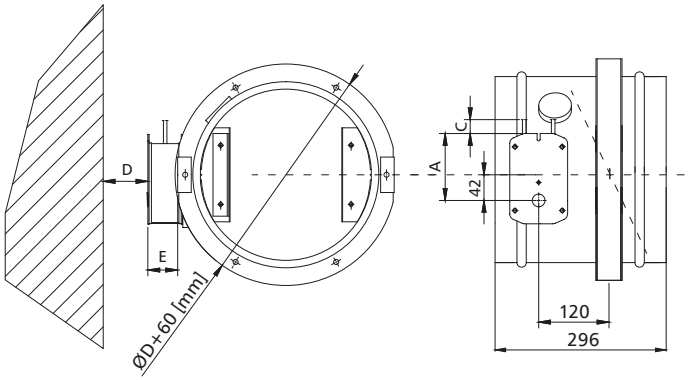
BF, BLF, BFL, BFN series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

The thermoelectric trigger features a test switch and a power supply indicator (LED).

Dampers with Belimo actuators: analogue B(L)F, BFL, BFN, digital BF-TL, EXBF explosion proof actuators close as a result of thermoelectric trigger tripping or power supply cut-off by the action of the return spring placed in the actuator. The dampers open when the power supply voltage is applied to the actuator terminals. Furthermore, dampers with those actuators may be opened manually using a key.



mechanism	A	C	D	E
BLF	130	30	180	70
BFN	157	30	188	62
BFL	138	30	192	58
BF24TL-ST	198	10	180	70
EXBF	225	55	75	175
BF	198	10	180	70

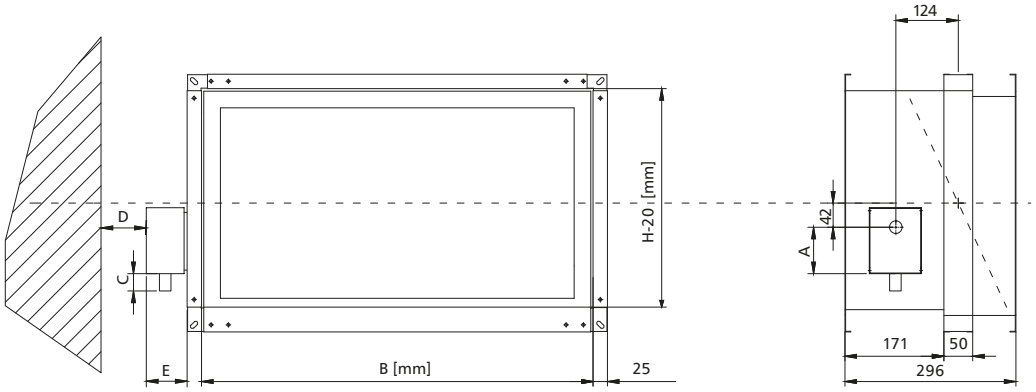


mechanism	A	C	D	E
BLF	130	30	75	50
BFN	157	30	75	42
BFL	138	30	75	38
BF24TL-ST	198	10	75	50
EXBF	225	55	75	160
BF	198	10	75	50

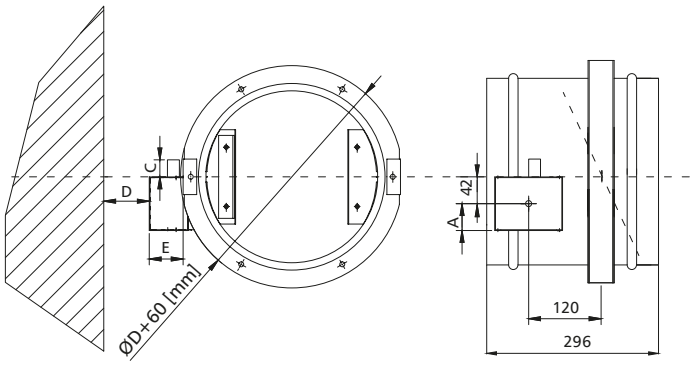
2.3.2. **mcr FID S/S** – the cut-off fire damper for ventilation ducts with a spring drive and thermal trigger

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically.

The mcr FID S/S dampers are equipped with a RST trigger control mechanism with a drive spring (without an integrated thermal trigger). In this case, a thermal trigger rated at 74°C (optionally 95°C) is installed outside the damper mechanism, on the appliance partition itself. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. On the RST mechanism, there is a mechanical partition position indicator. It is possible to equip the damper with WK1 or WK2 limit switches used to signal the partition position state.



mechanism	A	C	D	E
RST	50	30	75	75

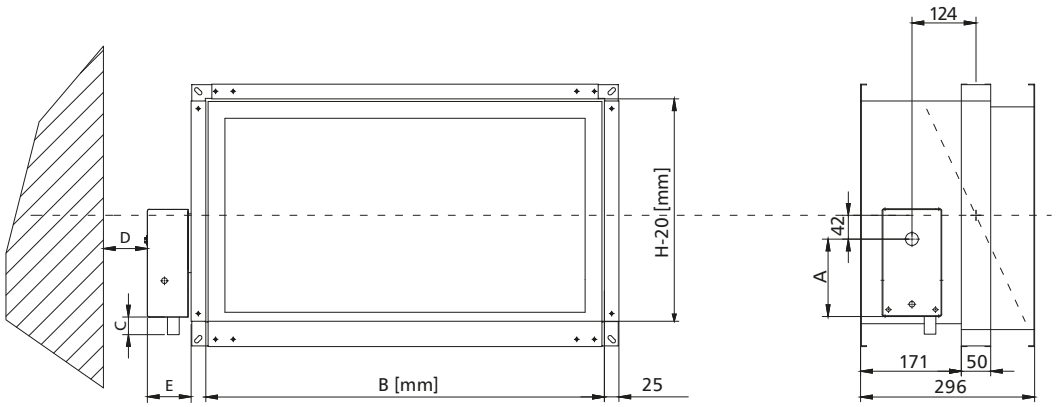


mechanism	A	C	D	E
RST	40	30	75	55

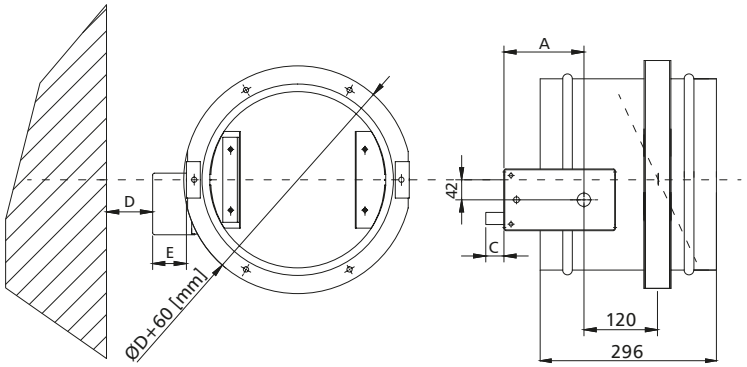
2.3.3. **mcr FID S/S** – the cut-off fire damper for ventilation ducts with a spring drive and an integrated thermal trigger, optionally equipped with an electromagnetic trigger and limit switches

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically or, in case of a damper with an electromagnetic trigger, additionally using the fire automation.

The mcr FID S/S dampers are equipped with a **RST-KW1** trigger control mechanism with a drive spring and a cam lever assembly. A thermal trigger rated at 74°C (optionally at 95°C) is integrated into the damper mechanism. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. On the RST-KW1 mechanism, there is a mechanical partition position indicator. It is possible to equip a trigger control mechanism with an electromagnetic trigger activated by the application („pulse") or removal („break") of the power supply voltage and with limit switches used to signal the partition position state. The mechanism features test and partition button-release functions. Partition re-opening is activated manually. It is not required to dismantle the system to replace the thermal trigger. The RST-KW1 mechanism may be replaced with an electric actuator.



mechanism	A	C	D	E
RST-KW1	130	30	75	85



mechanism	A	C	D	E
RST-KW1	130	30	75	65

2.4. dimensions

Rectangular dampers:

- nominal width B: from 200 mm to 1500 mm
- nominal height H: from 200 mm to 1500 mm
- the maximum cross-section surface of one damper up to 1.8 m^2

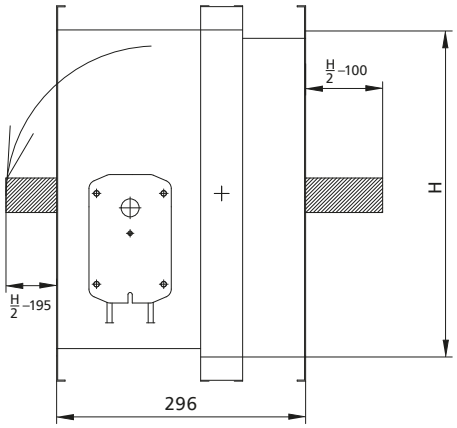
Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).

Circular dampers:

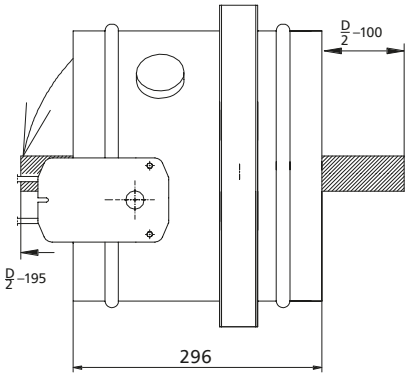
- nominal diameter D from 125 mm to 630 mm

Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).

mcr FID S/S p/P damper



mcr FID S/S p/O damper



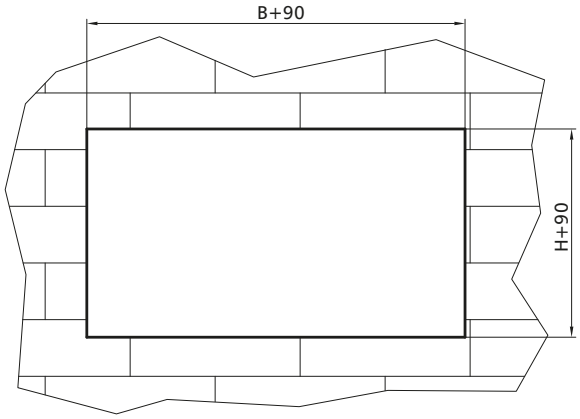
2.5. installation

The mcr FID S/S p/P rectangular dampers are EI120(ve ho i↔o)S-rated if installed in concrete partitions made of full bricks or cellular concrete blocks with the thickness of at least 110 mm, lightweight walls of cardboard-plaster panels on a steel framework with the thickness of at least 125 mm and the resistance class of not less than EI120 and concrete ceilings with the thickness of at least 150 mm.

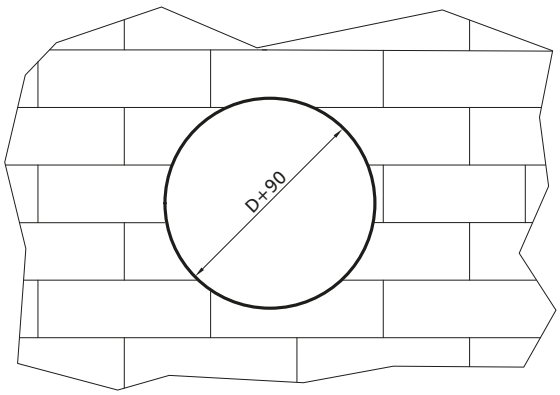
The mcr FID S/S p/O circular dampers are EI120 (ve ho i↔o)-rated if installed in concrete partitions made of full bricks or cellular concrete blocks with the thickness of at least 110 mm, lightweight walls of cardboard-plaster panels on a steel framework with the thickness of at least 125 mm and the resistance class of not less than EI120 and concrete ceilings with the thickness of at least 150 mm.

2.5.1. preparation of installation openings

mcr FID S/S p/P damper

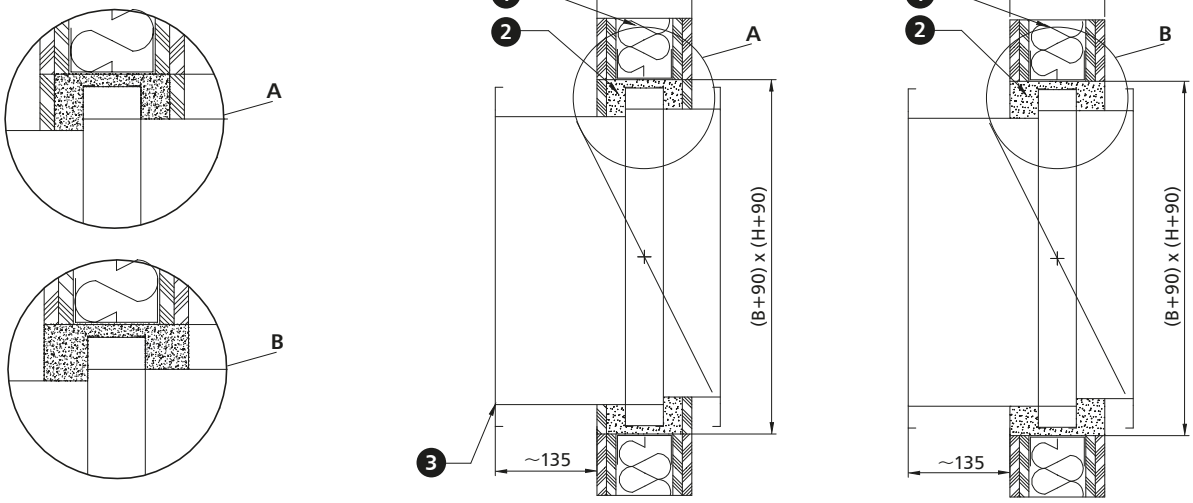


mcr FID S/S p/O damper



2.5.2. sample installation in lightweight walls of plaster-cardboard panels

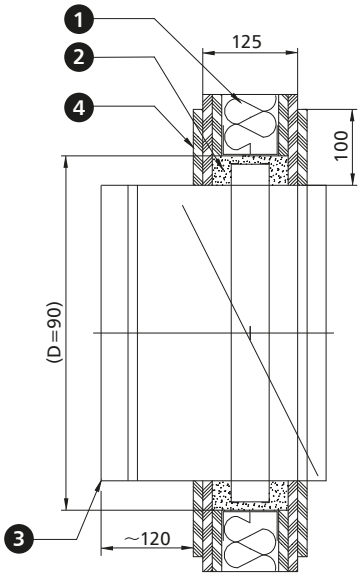
mcr FID S/S p/P damper



1. lightweight wall
2. sealing - plaster mortar*
3. fire damper

*it is possible to use a different sealing that ensures the required fire resistance

mcr FID S/S p/O damper

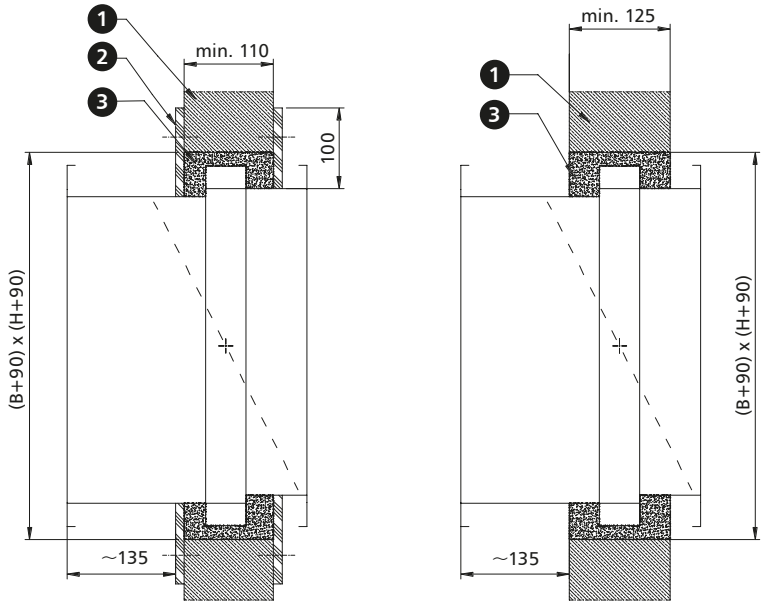


1. lightweight wall
2. sealing - plaster mortar*
3. fire damper
4. circumferential band of plaster-cardboard panels

*it is possible to use a different sealing that ensures the required fire resistance

2.5.3. sample installation in concrete and masonry walls

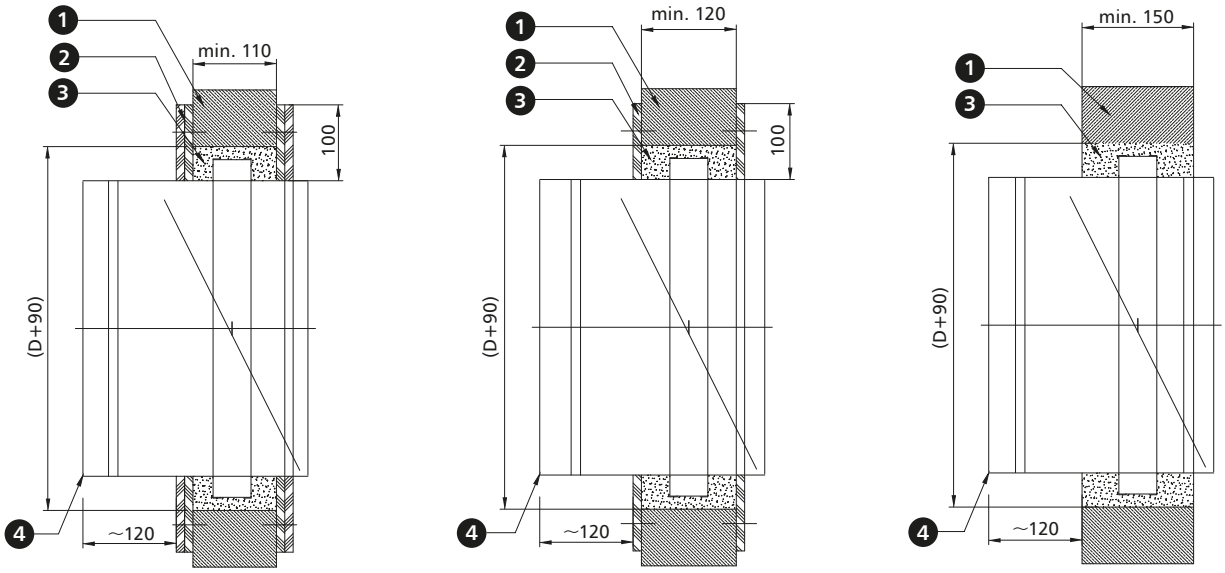
mcr FID S/S p/P damper



1. rigid wall - concrete, cellular concrete or bricks
2. circumferential band of plaster-cardboard panels
3. sealing - concrete, cement or cement-lime masonry mortar*

*it is possible to use a different sealing that ensures the required fire resistance

mcr FID S/S p/O damper

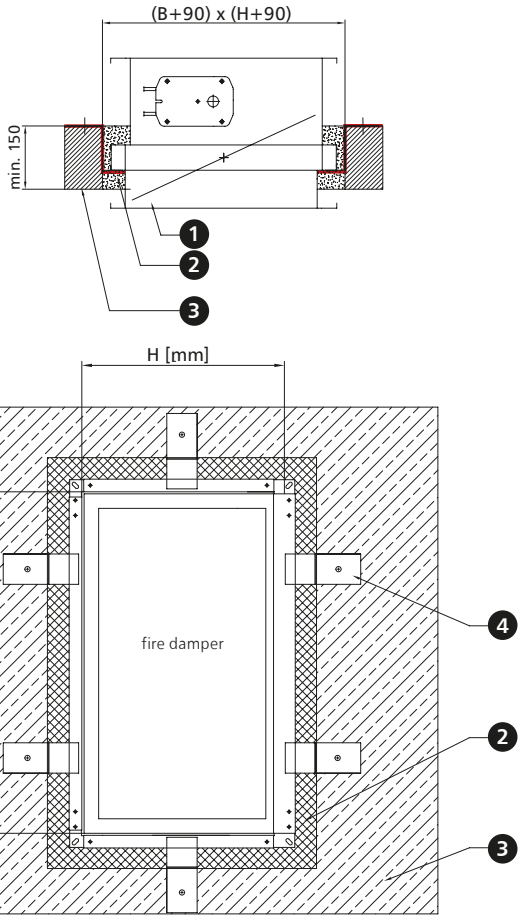


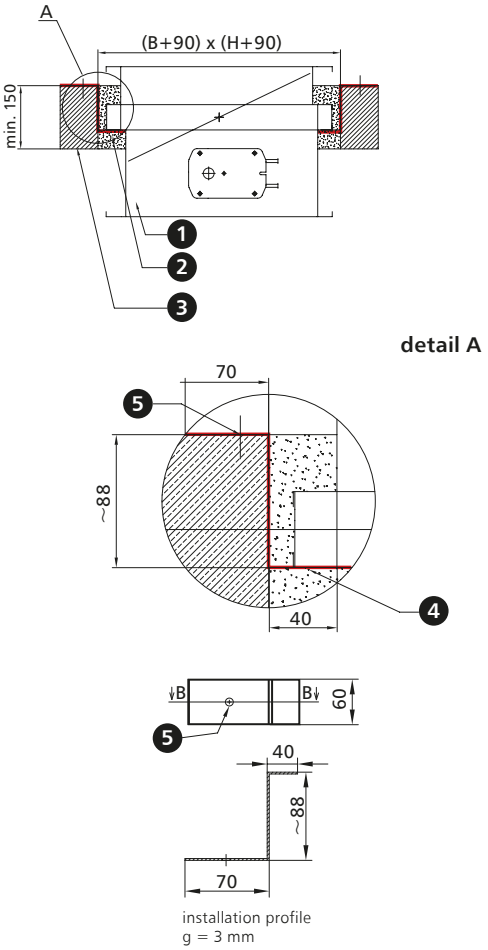
1. rigid wall - concrete, cellular concrete or bricks
2. circumferential band of plaster-cardboard panels
3. sealing - concrete, cement or cement-lime masonry mortar*
4. fire damper

*it is possible to use a different sealing that ensures the required fire resistance

2.5.4. sample installation in ceilings

mcr FID S/S p/P damper



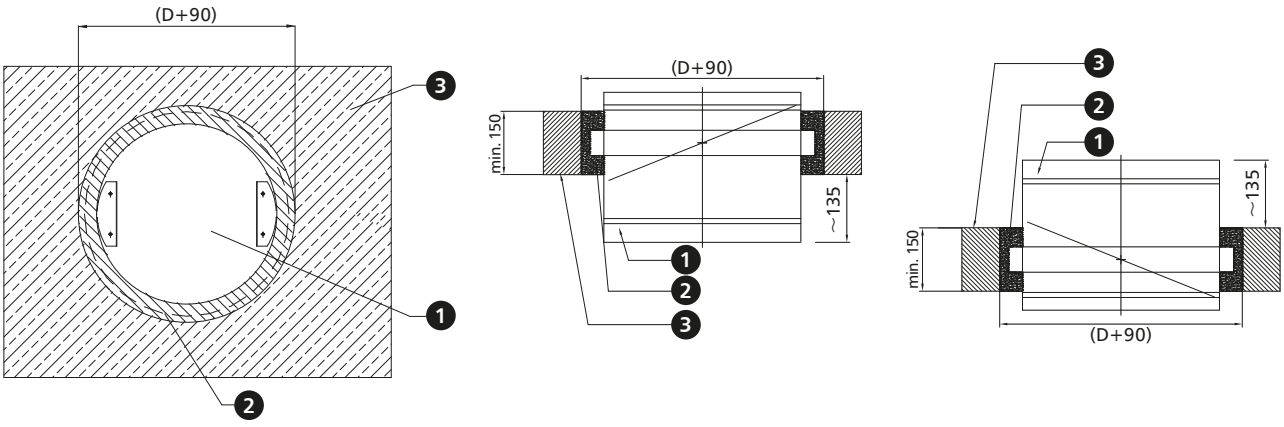


1. fire damper
2. sealing - concrete, cement or cement-lime masonry mortar*
3. ceiling

4. installation profile g = 3 mm
5. steel expansion plug

*it is possible to use a different sealing that ensures the required fire resistance

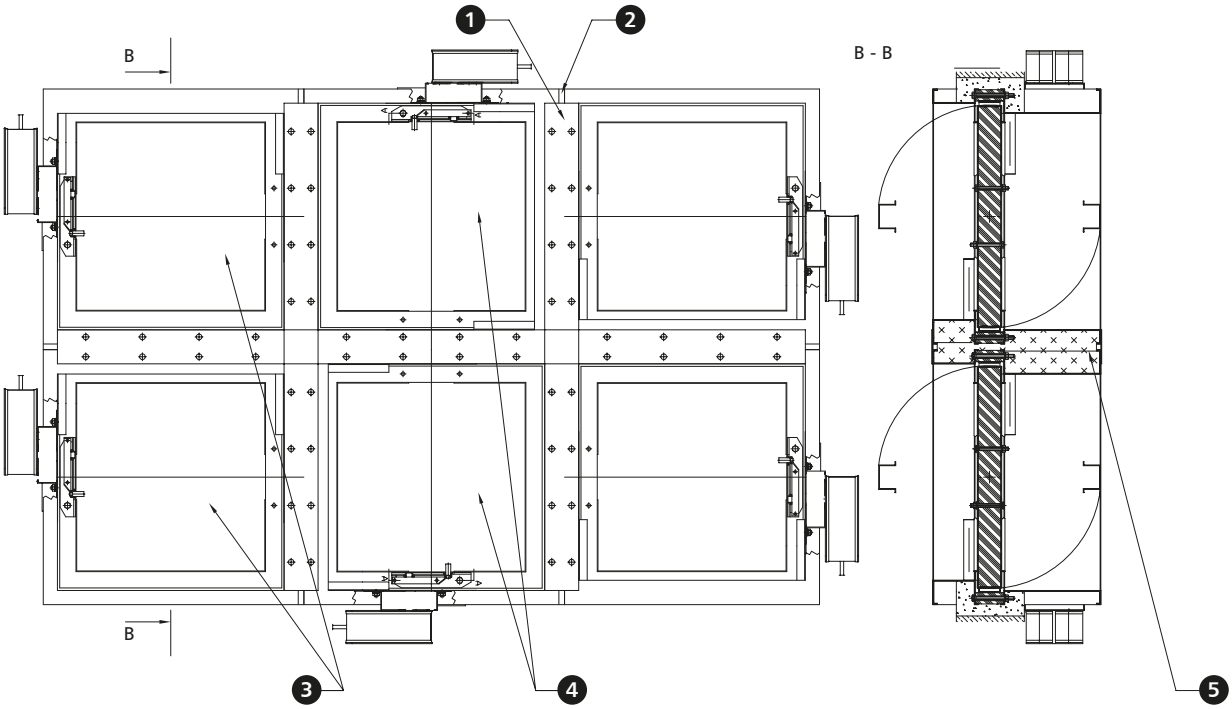
mcr FID S/S p/O damper



1. fire damper
2. sealing - concrete, cement or cement-lime masonry mortar*
3. ceiling

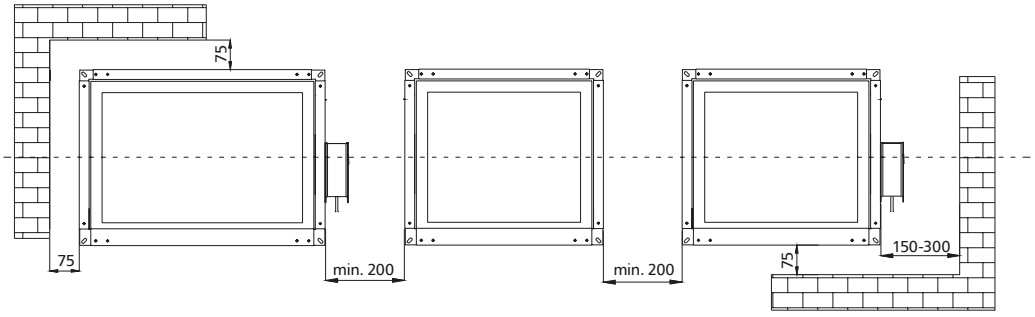
*it is possible to use a different sealing that ensures the required fire resistance

2.5.5. sample installation in sets



1. installation flat bar, width 60 mm
2. 10 mm gaps between damper flanges
3. dampers turned by 180°
4. dampers turned by 90° and 270°
5. fire resistant material, e.g. mineral wool with the density of at least 60 kg/m^3

Distance between systems and partitions



2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]	height H [mm]	v [m/s]	200 Sk [m^2]	200 Se [m^2]	200 Q [m^3/h]	200 dp [Pa]	200 L_{WA} [dB]	250 Sk [m^2]	250 Se [m^2]	250 Q [m^3/h]	250 dp [Pa]	250 L_{WA} [dB]	300 Sk [m^2]	300 Se [m^2]	300 Q [m^3/h]	300 dp [Pa]	300 L_{WA} [dB]
	200	4	0.040	0.029	420	9	31	0.050	0.039	564	9	31	0.06	0.049	708	8	32
		6			631	21	41			847	19	42			1 063	19	42
		8			841	37	49			1 129	35	49			1 417	33	50
		10			1 051	58	55			1 411	54	55			1 771	52	55
	250	4	0.050	0.037	526	9	31	0.063	0.049	706	9	32	0.075	0.062	886	8	32
		6			788	21	42			1 058	19	43			1 328	18	42
		8			1 051	37	50			1 411	35	50			1 771	31	50
		10			1 314	57	55			1 764	54	56			2 214	49	56
	300	4	0.060	0.044	631	9	32	0.075	0.059	847	8	33	0.09	0.074	1 063	8	32
		6			946	20	43			1 270	19	43			1 594	17	43
		8			1 261	36	50			1 693	34	51			2 125	30	50
		10			1 577	56	56			2 117	53	56			2 657	47	56
	350	4	0.070	0.051	736	9	33	0.088	0.069	988	8	33	0.105	0.086	1 240	7	32
		6			1 104	20	43			1 482	19	44			1 860	16	43
		8			1 472	36	51			1 976	33	51			2 480	29	50
		10			1 840	56	57			2 470	52	57			3 100	45	56
	400	4	0.080	0.058	841	9	33	0.100	0.078	1 129	8	34	0.12	0.098	1 417	7	32
		6			1 261	19	43			1 693	19	44			2 125	15	42
		8			1 682	35	51			2 258	33	52			2 834	27	50
		10			2 102	54	57			2 822	52	57			3 542	42	56
	450	4	0.090	0.066	946	9	33	0.113	0.088	1 270	7	32	0.135	0.111	1 594	7	32
		6			1 419	19	44			1 905	17	43			2 391	15	43
		8			1 892	35	51			2 540	29	51			3 188	27	50
		10			2 365	54	57			3 175	46	56			3 985	42	56
	500	4	0.100	0.073	1 051	9	34	0.125	0.098	1 411	7	32	0.15	0.123	1 771	7	32
		6			1 577	19	44			2 117	16	43			2 657	15	43
		8			2 102	35	52			2 822	28	50			3 542	26	50
		10			2 628	54	58			3 528	44	56			4 428	41	56
	550	4	0.110	0.080	1 156	8	34	0.138	0.108	1 552	7	33	0.165	0.135	1 948	6	33
		6			1 734	19	44			2 328	16	43			2 922	14	43
		8			2 313	34	52			3 105	28	51			3 897	26	51
		10			2 891	53	58			3 881	44	57			4 871	40	56
	600	4	0.120	0.088	1 261	8	34	0.150	0.118	1 693	7	33	0.18	0.148	2 125	6	33
		6			1 892	19	45			2 540	15	43			3 188	14	43
		8			2 523	34	52			3 387	27	51			4 251	26	51
		10			3 154	53	58			4 234	42	56			5 314	40	57
	650	4	0.130	0.095	1 367	8	35	0.163	0.127	1 835	6	32	0.195	0.160	2 303	6	33
		6			2 050	19	45			2 752	14	43			3 454	14	44
		8			2 733	34	53			3 669	26	50			4 605	26	51
		10			3 416	53	59			4 586	40	56			5 756	40	57
	700	4	0.140	0.102	1 472	8	35	0.175	0.137	1 976	6	33	0.21	0.172	2 480	6	34
		6			2 208	19	45			2 964	14	43			3 720	14	44
		8			2 943	33	53			3 951	26	51			4 959	26	52
		10			3 679	52	59			4 939	40	56			6 199	40	57
	800	4	0.160	0.117	1 682	8	35	0.200	0.157	2 258	6	32	0.24	0.197	2 834	6	33
		6			2 523	18	45			3 387	14	43			4 251	14	44
		8			3 364	32	53			4 516	24	51			5 668	24	52
		10			4 205	50	59			5 645	38	56			7 085	38	57
	900	4	0.180	0.131	1 892	7	34	0.225	0.176	2 540	6	32	0.27	0.221	3 188	5	32
		6			2 838	16	44			3 810	13	43			4 782	12	42
		8			3 784	29	52			5 080	23	50			6 376	21	50
		10			4 730	45	58			6 350	36	56			7 970	32	56
	1000	4	0.200	0.146	2 102	7	34	0.250	0.196	2 822	6	32	0.3	0.246	3 542	5	32
		6			3 154	16	45			4 234	13	43			5 314	12	43
		8			4 205	29	52			5 645	22	50			7 085	21	50
		10			5 256	45	58			7 056	35	56			8 856	32	56
	1100	4	0.220	0.161	2 313	7	35	0.275	0.216	3 105	5	32	0.33	0.271	3 897	5	33
		6			3 469	16	45			4 657	12	43			5 845	12	43
		8			4 625	29	53			6 209	22	50			7 793	21	51
		10			5 782	45	59			7 762	34	56			9 742	32	56
	1200	4	0.240	0.175	2 523	8	37	0.300	0.235	3 387	5	33	0.36	0.295	4 251	9	40
		6			3 784	18	47			5 080	12	43			6 376	20	51
		8			5 046	29	53			6 774	22	51			8 502	36	58
		10			6 307	45	59			8 467	34	57			10 627	42	60
	1300	4	0.260	0.190	2 733	8	37	0.325	0.255	3 669	5	33	0.39	0.320	4 605	5	33
		6			4 100	18	47			5 504	12	43			6 908	12	44
		8			5 466	29	54			7 338	21	51			9 210	21	51
		10			6 833	45	59			9 173	33	57			11 513	32	57
	1400	4	0.280	0.204	2 943	7	36	0.350	0.274	3 951	5	33	0.42	0.344	4 959	5	34
		6			4 415	16	46			5 927	12	44			7 439	12	44
		8			5 887	29	54			7 903	21	51			9 919	21	52
		10			7 358	45	60			9 878	32	57			12 398	32	58
	1500	4	0.300	0.219	3 154	7	35	0.375	0.294	4 234	5	33	0.45	0.369	5 314	5	34
		6			4 730	15	46			6 350	12	44			7 970	12	45
		8			6 307	27	53			8 467	21	51			10 627	21	52
		10			7 884	42	59			10 584	32	57			13 284	32	58

2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]	height H [mm]	v [m/s]	350 Sk [m^2]	350 Se [m^2]	350 Q [m^3/h]	350 dp [Pa]	350 L_{WA} [dB]	400 Sk [m^2]	400 Se [m^2]	400 Q [m^3/h]	400 dp [Pa]	400 L_{WA} [dB]	450 Sk [m^2]	450 Se [m^2]	450 Q [m^3/h]	450 dp [Pa]	450 L_{WA} [dB]
	200	4	0.070	0.059	852	8	32	0.080	0.069	996	7	31	0.090	0.079	1 140	7	31
		6			1 279	18	42			1 495	17	42			1 711	15	41
		8			1 705	32	50			1 993	29	49			2 281	26	49
		10			2 131	50	56			2 491	46	55			2 851	41	54
	250	4	0.088	0.074	1 066	7	31	0.100	0.087	1 246	6	29	0.113	0.099	1 426	6	29
		6			1 598	16	42			1 868	13	40			2 138	13	40
		8			2 131	29	50			2 491	23	47			2 851	22	47
		10			2 664	45	55			3 114	36	53			3 564	35	53
	300	4	0.105	0.089	1 279	7	32	0.120	0.104	1 495	6	30	0.135	0.119	1 711	5	30
		6			1 918	16	43			2 242	13	41			2 566	12	40
		8			2 557	28	50			2 989	24	48			3 421	22	48
		10			3 197	44	56			3 737	37	54			4 277	34	54
	350	4	0.123	0.104	1 492	7	32	0.140	0.121	1 744	6	30	0.158	0.139	1 996	5	30
		6			2 238	15	42			2 616	13	41			2 994	12	41
		8			2 984	26	50			3 488	22	48			3 992	21	48
		10			3 730	41	56			4 360	35	54			4 990	33	54
	400	4	0.140	0.118	1 705	6	31	0.160	0.138	1 993	6	31	0.180	0.158	2 281	5	30
		6			2 557	13	41			2 989	13	41			3 421	12	41
		8			3 410	24	49			3 986	22	49			4 562	21	48
		10			4 262	37	55			4 982	35	55			5 702	32	54
	450	4	0.158	0.133	1 918	5	30	0.180	0.156	2 242	5	30	0.203	0.178	2 566	4	29
		6			2 877	12	41			3 363	12	41			3 849	10	40
		8			3 836	22	48			4 484	21	48			5 132	18	47
		10			4 795	34	54			5 605	32	54			6 415	28	53
	500	4	0.175	0.148	2 131	5	31	0.200	0.173	2 491	5	30	0.225	0.198	2 851	4	29
		6			3 197	12	41			3 737	11	40			4 277	9	39
		8			4 262	22	49			4 982	19	48			5 702	17	47
		10			5 328	34	55			6 228	30	54			7 128	26	52
	550	4	0.193	0.163	2 557	5	30	0.220	0.190	2 740	5	30	0.248	0.218	3 136	4	29
		6			3 836	12	41			4 110	11	41			4 704	9	40
		8			5 115	21	48			5 481	19	48			6 273	17	47
		10			6 394	32	54			6 851	30	54			7 841	26	53
	600	4	0.210	0.178	2 557	5	30	0.240	0.208	2 989	4	28	0.270	0.238	3 421	4	29
		6			3 836	10	40			4 484	8	37			5 132	9	40
		8			5 115	19	48			5 979	14	45			6 843	17	47
		10			6 394	29	53			7 474	27	53			8 554	26	53
	650	4	0.228	0.192	2 771	5	30	0.260	0.225	3 239	4	30	0.293	0.257	3 707	4	30
		6			4 156	10	40			4 858	10	40			5 560	9	40
		8			5 541	19	48			6 477	17	48			7 413	17	48
		10			6 926	29	54			8 096	27	53			9 266	26	54
	700	4	0.245	0.207	2 984	5	30	0.28	0.242	3 488	4	30	0.315	0.277	3 992	4	30
		6			4 476	10	41			5 232	10	40			5 988	9	40
		8			5 967	19	48			6 975	17	48			7 983	16	48
		10			7 459	29	54			8 719	27	54			9 979	25	53
	800	4	0.280	0.237	3 410	4	30	0.32	0.277	3 986	4	30	0.360	0.317	4 562	4	29
		6			5 115	10	41			5 979	9	41			6 843	9	40
		8			6 820	18	48			7 972	17	48			9 124	16	47
		10			8 525	28	54			9 965	26	54			11 405	25	53
	900	4	0.315	0.266	3 836	4	31	0.360	0.311	4 484	6	35	0.405	0.356	5 132	4	29
		6			5 754	10	41			6 726	12	44			7 698	9	40
		8			7 672	18	49			8 968	26	54			10 264	16	47
		10			9 590	28	55			11 210	33.4	58			12 830	25	53
	1000	4	0.350	0.296	4 262	4	30	0.400	0.346	4 982	4	31	0.450	0.396	5 702	4	29
		6			6 394	9	41			7 474	9	42			8 554	9	40
		8			8 525	17	48			9 965	17	49			11 405	16	47
		10			10 656	26	54			12 456	26	55			14 256	25	53
	1100	4	0.385	0.326	4 689	4	32	0.440	0.381	5 481	4	31	0.495	0.436	6 273	4	29
		6			7 033	10	42			8 221	9	42			9 409	9	39
		8			9 377	18	50			10 961	17	49			12 545	15	47
		10			11 722	28	56			13 702	26	55			15 682	24	53
	1200	4	0.420	0.355	5 115	4	31	0.480	0.415	5 979	4	31	0.540	0.475	6 843	4	29
		6			7 672	9	41			8 968	9	42			10 264	9	39
		8			10 230	16	49			11 958	16	49			13 686	15	47
		10			12 787	25	54			14 947	25	55			17 107	24	53
	1300	4	0.455	0.385	5 541	4	32	0.520	0.450	6 477	4	32	0.585	0.515	7 413	4	28
		6			8 312	10	43			9 716	9	42			11 120	8	39
		8			11 082	17	50			12 954	16	50			14 826	15	46
		10			13 853	27	56			16 193	25	55			18 533	23	52
	1400	4	0.490	0.414	5 967	4	32	0.560	0.484	6 975	4	32	0.630	0.554	7 983	4	28
		6			8 951	10	43			10 463	9	43			11 975	8	39
		8			11 935	17	50			13 951	16	50			15 967	15	46
		10			14 918	27	56			17 438	25	56			19 958	23	52
	1500	4	0.525	0.444	6 394	4	32	0.600	0.519	7 474	4	32	0.675	0.594	8 554	4	28
		6			9 590	9	43			11 210	9	43			12 830	8	38
		8			12 787	17	50			14 947	16	50			17 107	14	46
		10			15 984	26	56			18 684	25	56			21 384	22	51

2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			500					550					600				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.1	0.089	1 284	6	29	0.110	0.099	1 428	5	29	0.120	0.109	1 572	5	29
		6			1 927	13	40			2 143	12	39			2 359	12	39
		8			2 569	22	47			2 857	21	47			3 145	21	47
		10			3 211	35	53			3 571	33	53			3 931	32	53
	250	4	0.125	0.112	1 606	6	30	0.138	0.124	1 786	5	30	0.150	0.137	1 966	5	30
		6			2 408	13	41			2 678	12	40			2 948	12	40
		8			3 211	22	48			3 571	21	48			3 931	21	48
		10			4 014	35	54			4 464	33	53			4 914	32	54
	300	4	0.15	0.134	1 927	5	30	0.165	0.149	2 143	5	30	0.180	0.164	2 359	5	30
		6			2 890	12	41			3 214	12	41			3 538	11	40
		8			3 853	21	48			4 285	21	48			4 717	19	48
		10			4 817	33	54			5 357	32	54			5 897	30	53
	350	4	0.175	0.156	2 248	5	30	0.193	0.174	2 500	5	31	0.210	0.191	2 752	5	30
		6			3 372	12	41			3 750	12	41			4 128	10	40
		8			4 496	21	48			5 000	21	49			5 504	19	48
		10			5 620	32	54			6 250	32	55			6 880	29	54
	400	4	0.2	0.178	2 569	5	30	0.220	0.198	2 857	5	30	0.240	0.218	3 145	4	30
		6			3 853	11	41			4 285	10	41			4 717	10	41
		8			5 138	19	48			5 714	19	48			6 290	18	48
		10			6 422	30	54			7 142	29	54			7 862	28	54
	450	4	0.225	0.201	2 890	4	29	0.248	0.223	3 214	4	29	0.270	0.246	3 538	4	30
		6			4 335	9	39			4 821	9	40			5 307	9	40
		8			5 780	17	47			6 428	17	47			7 076	17	48
		10			7 225	26	52			8 035	26	53			8 845	26	53
	500	4	0.250	0.223	3 211	4	27	0.275	0.248	3 571	4	29	0.300	0.273	3 931	4	29
		6			4 817	8	38			5 357	9	39			5 897	9	39
		8			6 422	14	45			7 142	15	47			7 862	15	47
		10			8 028	20	50			8 928	24	52			9 828	24	53
	550	4	0.275	0.245	3 853	3	27	0.303	0.273	4 285	4	28	0.330	0.300	4 717	4	28
		6			5 780	8	37			6 428	8	38			7 076	8	39
		8			7 707	13	45			8 571	14	46			9 435	14	46
		10			9 634	21	51			10 714	22	52			11 794	22	52
	600	4	0.3	0.268	3 853	3	27	0.330	0.298	4 285	3	28	0.360	0.328	4 717	3	28
		6			5 780	8	38			6 428	8	38			7 076	8	39
		8			7 707	13	45			8 571	13	46			9 435	13	46
		10			9 634	21	51			10 714	21	51			11 794	21	52
	650	4	0.325	0.290	4 175	4	31	0.358	0.322	4 643	3	28	0.390	0.355	5 111	3	28
		6			6 262	10	41			6 964	8	38			7 666	8	39
		8			8 349	17	49			9 285	13	46			10 221	13	46
		10			10 436	21	51			11 606	21	52			12 776	21	52
	700	4	0.350	0.312	4 496	3	28	0.385	0.347	5 000	3	28	0.420	0.382	5 504	3	29
		6			6 744	8	38			7 500	8	39			8 256	8	39
		8			8 991	13	46			9 999	13	46			11 007	13	47
		10			11 239	21	52			12 499	21	52			13 759	21	52
	800	4	0.4	0.357	5 138	3	28	0.440	0.397	5 714	3	29	0.480	0.437	6 290	3	29
		6			7 707	8	39			8 571	8	39			9 435	8	40
		8			10 276	13	46			11 428	13	47			12 580	13	47
		10			12 845	21	52			14 285	21	53			15 725	21	53
	900	4	0.45	0.401	5 780	3	28	0.495	0.446	6 428	3	29	0.540	0.491	7 076	3	30
		6			8 670	8	39			9 642	8	40			10 614	8	38
		8			11 560	13	46			12 856	13	47			14 152	13	45
		10			14 450	21	52			16 070	21	53			17 690	21	51
	1000	4	0.5	0.446	6 422	3	28	0.550	0.496	6 428	3	30	0.600	0.546	7 862	3	30
		6			9 634	8	39			9 642	8	40			11 794	8	41
		8			12 845	13	46			12 856	13	48			15 725	13	48
		10			16 056	21	52			16 070	21	54			19 656	21	54
	1100	4	0.55	0.491	7 065	4	29	0.605	0.546	7 857	4	31	0.660	0.601	8 649	3	31
		6			10 597	8	39			11 785	8	41			12 973	8	41
		8			14 129	14	47			15 713	14	49			17 297	13	49
		10			17 662	22	53			19 642	22	55			21 622	21	54
	1200	4	0.6	0.535	7 707	3	27	0.660	0.595	8 571	3	30	0.720	0.655	9 435	3	30
		6			11 560	7	38			12 856	7	40			14 152	7	40
		8			15 414	13	45			17 142	13	48			18 870	12	48
		10			19 267	20	51			21 427	20	54			23 587	19	54
	1300	4	0.65	0.580	8 349	3	27	0.715	0.645	9 285	3	30	0.780	0.710	10 221	3	30
		6			12 524	7	38			13 928	7	41			15 332	7	41
		8			16 698	13	45			18 570	13	48			20 442	12	48
		10			20 873	20	51			23 213	20	54			25 553	19	54
	1400	4	0.7	0.624	8 991	3	27	0.770	0.694	9 999	3	31	0.840	0.764	11 007	3	30
		6			13 487	7	38			14 999	7	41			16 511	7	41
		8			17 983	13	45			19 999	13	49			22 015	12	48
		10			22 478	20	51			24 998	20	54			27 518	19	54
	1500	4	0.75	0.669	9 634	3	27	0.825	0.744	10 714	3	31	0.900	0.819	11 794	3	31
		6			14 450	7	38			16 070	7	41			17 690	7	41
		8			19 267	13	45			21 427	13	49			23 587	12	49
		10			24 084	20	51			26 784	20	55			29 484	19	54

2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			650					700					750				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.130	0.119	1 716	5	29	0.140	0.129	1 860	5	29	0.150	0.139	2 004	5	29
		6			2 575	11	39			2 791	11	40			3 007	11	40
		8			3 433	20	47			3 721	20	47			4 009	20	47
		10			4 291	31	53			4 651	31	53			5 011	31	53
	250	4	0.163	0.149	2 146	5	30	0.175	0.162	2 326	5	30	0.188	0.174	2 506	5	30
		6			3 218	11	40			3 488	11	41			3 758	11	41
		8			4 291	20	48			4 651	20	48			5 011	20	48
		10			5 364	31	53			5 814	31	54			6 264	31	54
	300	4	0.195	0.179	2 575	5	30	0.210	0.194	2 791	4	29	0.225	0.209	3 007	4	30
		6			3 862	10	40			4 186	10	40			4 510	10	40
		8			5 149	19	48			5 581	18	47			6 013	18	48
		10			6 437	29	53			6 977	28	53			7 517	28	54
	350	4	0.228	0.209	3 004	4	30	0.245	0.226	3 256	4	30	0.263	0.244	3 508	4	30
		6			4 506	10	40			4 884	10	40			5 262	10	41
		8			6 008	18	48			6 512	17	48			7 016	17	48
		10			7 510	28	54			8 140	27	53			8 770	27	54
	400	4	0.260	0.238	3 433	4	30	0.280	0.258	3 721	4	30	0.300	0.278	4 009	4	31
		6			5 149	10	41			5 581	10	41			6 013	10	41
		8			6 866	18	48			7 442	17	48			8 018	17	49
		10			8 582	28	54			9 302	27	54			10 022	27	54
	450	4	0.293	0.268	3 862	4	30	0.315	0.291	4 186	4	29	0.338	0.313	4 510	4	30
		6			5 793	9	40			6 279	9	40			6 765	9	40
		8			7 724	17	48			8 372	15	47			9 020	15	48
		10			9 655	26	54			10 465	24	53			11 275	24	53
	500	4	0.325	0.298	4 291	4	29	0.350	0.323	4 651	4	29	0.375	0.348	5 011	4	29
		6			6 437	9	40			6 977	8	40			7 517	8	40
		8			8 582	15	47			9 302	15	47			10 022	15	47
		10			10 728	24	53			11 628	23	53			12 528	23	53
	550	4	0.358	0.328	5 149	4	29	0.385	0.355	5 116	4	29	0.413	0.383	5 512	4	29
		6			7 724	8	39			7 674	8	39			8 268	8	40
		8			10 299	14	47			10 233	14	47			11 025	14	47
		10			12 874	22	52			12 791	22	53			13 781	22	53
	600	4	0.390	0.358	5 149	3	28	0.420	0.388	5 581	3	29	0.450	0.418	6 013	3	29
		6			7 724	8	39			8 372	8	39			9 020	8	40
		8			10 299	13	46			11 163	13	47			12 027	13	47
		10			12 874	21	52			13 954	21	53			15 034	21	53
	650	4	0.423	0.387	5 579	3	28	0.455	0.420	6 047	3	28	0.488	0.452	6 515	3	28
		6			8 368	7	39			9 070	7	39			9 772	7	39
		8			11 157	13	46			12 093	13	46			13 029	12	46
		10			13 946	20	52			15 116	20	52			16 286	19	52
	700	4	0.455	0.417	6 008	3	28	0.490	0.452	6 512	3	29	0.525	0.487	7 016	3	28
		6			9 012	7	39			9 768	7	39			10 524	7	39
		8			12 015	13	46			13 023	13	47			14 031	12	46
		10			15 019	20	52			16 279	20	53			17 539	19	52
	800	4	0.520	0.477	6 866	3	27	0.560	0.517	7 442	4	29	0.600	0.557	8 018	3	28
		6			10 299	6	38			11 163	7	37			12 027	6	39
		8			13 732	12	45			14 884	11	43			16 036	12	46
		10			17 165	18	51			18 605	16	47			20 045	18	52
	900	4	0.585	0.536	7 724	3	26	0.630	0.581	8 372	3	27	0.675	0.626	9 020	3	27
		6			11 586	6	36			12 558	6	37			13 530	6	38
		8			15 448	10	44			16 744	10	45			18 040	10	45
		10			19 310	16	50			20 930	16	51			22 550	16	51
	1000	4	0.650	0.596	8 582	3	26	0.700	0.646	9 302	3	27	0.750	0.696	10 022	3	28
		6			12 874	6	36			13 954	6	38			15 034	6	38
		8			17 165	10	44			18 605	10	45			20 045	10	46
		10			21 456	16	50			23 256	16	51			25 056	16	52
	1100	4	0.715	0.656	9 441	3	29	0.770	0.711	10 233	3	31	0.825	0.766	11 025	3	28
		6			14 161	8	40			15 349	8	42			16 537	6	39
		8			18 881	13	47			20 465	13	49			22 049	10	46
		10			23 602	21	53			25 582	21	55			27 562	16	52
	1200	4	0.780	0.715	10 299	3	28	0.840	0.775	11 163	3	30	0.900	0.835	12 027	2	28
		6			15 448	7	39			16 744	7	41			18 040	5	38
		8			20 598	12	46			22 326	12	48			24 054	10	46
		10			25 747	19	52			27 907	19	54			30 067	15	52
	1300	4	0.845	0.775	11 157	3	28	0.910	0.840	12 093	3	31	0.975	0.905	13 029	2	28
		6			16 736	7	39			18 140	7	41			19 544	5	39
		8			22 314	12	46			24 186	12	49			26 058	10	46
		10			27 893	19	52			30 233	19	55			32 573	15	52
	1400	4	0.910	0.834	12 015	3	28	0.980	0.904	13 023	3	31	1.050	0.974	14 031	2	28
		6			18 023	7	39			19 535	7	42			21 047	5	39
		8			24 031	12	46			26 047	12	49			28 063	10	46
		10			30 038	19	52			32 558	19	55			35 078	15	52
	1500	4	0.975	0.894	12 874	3	28	1.050	0.969	13 954	3	31	1.125	1.044	15 034	3	30
		6			19 310	7	39			20 930	7	42			22 550	6	41
		8			25 747	12	46			27 907	12	49			30 067	11	48
		10			32 184	19	52			34 884	19	55			37 584	17	54

2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]	height H [mm]	v [m/s]	800 Sk [m^2]	800 Se [m^2]	800 Q [m^3/h]	800 dp [Pa]	800 L_{WA} [dB]	850 Sk [m^2]	850 Se [m^2]	850 Q [m^3/h]	850 dp [Pa]	850 L_{WA} [dB]	900 Sk [m^2]	900 Se [m^2]	900 Q [m^3/h]	900 dp [Pa]	900 L_{WA} [dB]
200		4	0.160	0.149	2 148	5	29	0.170	0.159	2 292	5	29	0.180	0.169	2 436	5	30
		6			3 223	11	40			3 439	11	40			3 655	11	40
		8			4 297	19	47			4 585	19	48			4 873	19	48
		10			5 371	30	53			5 731	30	53			6 091	30	54
250		4	0.200	0.187	2 686	5	30	0.213	0.199	2 866	5	30	0.225	0.212	3 046	5	31
		6			4 028	11	41			4 298	11	41			4 568	11	41
		8			5 371	19	48			5 731	19	49			6 091	19	49
		10			6 714	30	54			7 164	30	54			7 614	30	55
300		4	0.240	0.224	3 223	4	30	0.255	0.239	3 439	4	30	0.270	0.254	3 655	4	30
		6			4 834	10	41			5 158	10	41			5 482	10	41
		8			6 445	18	48			6 877	18	48			7 309	17	48
		10			8 057	28	54			8 597	28	54			9 137	27	54
350		4	0.280	0.261	3 760	4	30	0.298	0.279	4 012	4	31	0.315	0.296	4 264	4	30
		6			5 640	10	41			6 018	10	41			6 396	9	41
		8			7 520	17	48			8 024	17	49			8 528	17	48
		10			9 400	27	54			10 030	27	54			10 660	26	54
400		4	0.320	0.298	4 297	4	31	0.340	0.318	4 585	4	31	0.360	0.338	4 873	4	30
		6			6 445	10	41			6 877	10	42			7 309	9	41
		8			8 594	17	49			9 170	17	49			9 746	16	48
		10			10 742	27	55			11 462	27	55			12 182	25	54
450		4	0.360	0.336	4 834	4	29	0.383	0.358	5 158	4	29	0.405	0.381	5 482	3	29
		6			7 251	8	39			7 737	8	40			8 223	8	39
		8			9 668	14	47			10 316	14	47			10 964	13	47
		10			12 085	22	53			12 895	22	53			13 705	21	52
500		4	0.400	0.373	5 371	4	29	0.425	0.398	5 731	4	29	0.450	0.423	6 091	3	29
		6			8 057	8	40			8 597	8	40			9 137	8	40
		8			10 742	14	47			11 462	14	47			12 182	13	47
		10			13 428	22	53			14 328	22	53			15 228	21	53
550		4	0.440	0.410	5 908	3	29	0.468	0.438	6 304	3	29	0.495	0.465	6 700	3	29
		6			8 862	8	40			9 456	8	40			10 050	7	39
		8			11 817	13	47			12 609	13	47			13 401	13	47
		10			14 771	21	53			15 761	21	53			16 751	20	53
600		4	0.480	0.448	6 445	3	29	0.510	0.478	6 877	3	29	0.540	0.508	7 309	3	29
		6			9 668	7	39			10 316	7	40			10 964	7	39
		8			12 891	13	47			13 755	13	47			14 619	12	47
		10			16 114	20	53			17 194	20	53			18 274	19	52
650		4	0.520	0.485	6 983	3	28	0.553	0.517	7 451	3	29	0.585	0.550	7 919	3	29
		6			10 474	7	39			11 176	7	39			11 878	7	39
		8			13 965	12	46			14 901	12	47			15 837	12	47
		10			17 456	19	52			18 626	19	53			19 796	19	53
700		4	0.560	0.522	7 520	3	28	0.595	0.557	8 024	3	28	0.630	0.592	8 528	3	27
		6			11 280	6	39			12 036	6	39			12 792	6	38
		8			15 039	12	46			16 047	12	46			17 055	10	45
		10			18 799	18	52			20 059	18	52			21 319	16	51
800		4	0.640	0.597	8 594	3	27	0.680	0.637	9 170	3	27	0.720	0.677	9 746	3	28
		6			12 891	6	38			13 755	6	38			14 619	6	38
		8			17 188	10	45			18 340	10	45			19 492	10	46
		10			21 485	16	51			22 925	16	51			24 365	16	51
900		4	0.720	0.671	9 668	3	28	0.765	0.716	10 316	3	28	0.810	0.761	10 964	3	28
		6			14 502	6	38			15 474	6	38			16 446	6	39
		8			19 336	10	46			20 632	10	46			21 928	10	46
		10			24 170	16	51			25 790	16	52			27 410	16	52
1000		4	0.800	0.746	10 742	3	28	0.850	0.796	11 462	3	28	0.900	0.846	12 182	3	29
		6			16 114	6	39			17 194	6	39			18 274	6	39
		8			21 485	10	46			22 925	10	46			24 365	10	47
		10			26 856	16	52			28 656	16	52			30 456	16	52
1100		4	0.880	0.821	11 817	3	28	0.935	0.876	12 609	3	29	0.990	0.931	13 401	3	29
		6			17 725	6	39			18 913	6	39			20 101	6	40
		8			23 633	10	46			25 217	10	47			26 801	10	47
		10			29 542	16	52			31 522	16	53			33 502	16	53
1200		4	0.960	0.895	12 891	2	28	1.020	0.955	13 755	2	28	1.080	1.015	14 619	2	28
		6			19 336	5	39			20 632	5	39			21 928	5	38
		8			25 782	10	46			27 510	10	46			29 238	9	46
		10			32 227	15	52			34 387	15	52			36 547	14	51
1300		4	1.040	0.970	13 965	2	28	1.105	1.035	14 901	2	29	1.170	1.100	15 837	2	29
		6			20 948	5	39			22 352	5	39			23 756	5	39
		8			27 930	10	46			29 802	10	47			31 674	10	47
		10			34 913	15	52			37 253	15	52			39 593	15	53
1400		4	1.120	1.044	15 039	2	29	1.190	1.114	16 047	3	30	1.260	1.184	17 055	2	28
		6			22 559	5	39			24 071	6	40			25 583	5	39
		8			30 079	10	47			32 095	10	48			34 111	9	46
		10			37 598	15	52			40 118	16	54			42 638	14	52
1500		4	1.200	1.119	16 114	3	31	1.275	1.194	17 194	3	30	1.350	1.269	18 274	2	29
		6			24 170	6	41			25 790	6	41			27 410	5	40
		8			32 227	11	49			34 387	10	48			36 547	10	48
		10			40 284	17	54			42 984	16	54			45 684	15	53

2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]	height H [mm]	v [m/s]	1000 Sk [m^2]	1000 Se [m^2]	1000 Q [m^3/h]	1000 dp [Pa]	1000 L_{WA} [dB]	1100 Sk [m^2]	1100 Se [m^2]	1100 Q [m^3/h]	1100 dp [Pa]	1100 L_{WA} [dB]	1200 Sk [m^2]	1200 Se [m^2]	1200 Q [m^3/h]	1200 dp [Pa]	1200 L_{WA} [dB]
200		4	0.200	0.189	2 724	5	30	0.220	0.209	3 012	5	30	0.240	0.229	3 300	4	30
		6			4 087	10	40			4 519	10	41			4 951	10	41
		8			5 449	19	48			6 025	19	48			6 601	18	48
		10			6 811	29	54			7 531	29	54			8 251	28	54
250		4	0.250	0.237	3 406	5	31	0.275	0.262	3 766	4	31	0.300	0.287	4 126	4	31
		6			5 108	10	41			5 648	10	41			6 188	10	41
		8			6 811	19	49			7 531	18	49			8 251	17	49
		10			8 514	29	55			9 414	28	55			10 314	27	55
300		4	0.300	0.284	4 087	4	31	0.330	0.314	4 519	4	31	0.360	0.344	4 951	4	31
		6			6 130	10	41			6 778	10	42			7 426	9	42
		8			8 173	17	49			9 037	17	49			9 901	17	49
		10			10 217	27	54			11 297	27	55			12 377	26	55
350		4	0.350	0.331	4 768	4	31	0.385	0.366	5 272	4	31	0.420	0.401	5 776	4	31
		6			7 152	9	41			7 908	9	42			8 664	9	41
		8			9 536	17	49			10 544	17	49			11 552	15	49
		10			11 920	26	55			13 180	26	55			14 440	24	54
400		4	0.400	0.378	5 449	3	28	0.440	0.418	6 025	3	28	0.480	0.458	6 601	3	29
		6			8 173	7	39			9 037	7	39			9 901	7	39
		8			10 898	13	46			12 050	13	46			13 202	13	47
		10			13 622	20	52			15 062	20	52			16 502	20	53
450		4	0.450	0.426	6 130	3	28	0.495	0.471	6 778	3	29	0.540	0.516	7 426	3	29
		6			9 195	7	39			10 167	7	39			11 139	7	40
		8			12 260	13	47			13 556	13	47			14 852	13	47
		10			15 325	20	52			16 945	20	53			18 565	20	53
500		4	0.500	0.473	6 811	3	29	0.550	0.523	7 531	3	29	0.600	0.573	8 251	3	30
		6			10 217	7	39			11 297	7	40			12 377	7	40
		8			13 622	13	47			15 062	13	47			16 502	13	48
		10			17 028	20	53			18 828	20	53			20 628	20	54
550		4	0.550	0.520	7 492	3	29	0.605	0.575	8 284	3	30	0.660	0.630	9 076	3	30
		6			11 238	7	40			12 426	7	40			13 614	7	41
		8			14 985	13	47			16 569	13	48			18 153	13	48
		10			18 731	20	53			20 711	20	54			22 691	20	54
600		4	0.600	0.568	8 173	3	29	0.660	0.628	9 037	3	29	0.720	0.688	9 901	3	29
		6			12 260	7	40			13 556	6	39			14 852	6	40
		8			16 347	12	47			18 075	12	47			19 803	12	47
		10			20 434	19	53			22 594	18	53			24 754	18	53
650		4	0.650	0.615	8 855	3	29	0.715	0.680	9 791	3	29	0.780	0.745	10 727	3	30
		6			13 282	7	40			14 686	6	40			16 090	6	40
		8			17 709	12	47			19 581	12	47			21 453	12	48
		10			22 136	19	53			24 476	18	53			26 816	18	53
700		4	0.700	0.662	9 536	3	27	0.770	0.732	10 544	2	27	0.840	0.802	11 552	2	27
		6			14 304	6	38			15 816	5	38			17 328	5	38
		8			19 071	10	46			21 087	10	45			23 103	10	46
		10			23 839	16	51			26 359	15	51			28 879	15	51
800		4	0.800	0.757	10 898	3	28	0.880	0.837	12 050	2	28	0.960	0.917	13 202	2	28
		6			16 347	6	39			18 075	5	38			19 803	5	39
		8			21 796	10	46			24 100	10	46			26 404	10	46
		10			27 245	16	52			30 125	15	52			33 005	15	52
900		4	0.900	0.851	12 260	3	29	0.990	0.941	13 556	3	29	1.080	1.031	14 852	2	29
		6			18 390	6	39			20 334	6	40			22 278	5	39
		8			24 520	10	47			27 112	10	47			29 704	10	47
		10			30 650	16	52			33 890	16	53			37 130	15	52
1000		4	1.000	0.946	13 622	3	29	1.100	1.046	15 062	2	29	1.200	1.146	16 502	2	28
		6			20 434	6	40			22 594	5	39			24 754	5	39
		8			27 245	10	47			30 125	10	47			33 005	9	46
		10			34 056	16	53			37 656	15	52			41 256	14	52
1100		4	1.100	1.041	14 985	3	29	1.210	1.151	16 569	2	29	1.320	1.261	18 153	2	29
		6			22 477	6	40			24 853	5	40			27 229	5	39
		8			29 969	10	48			33 137	10	47			36 305	9	47
		10			37 462	16	53			41 422	15	53			45 382	14	52
1200		4	1.200	1.135	16 347	2	28	1.320	1.255	18 075	10	47	1.440	1.375	19 803	2	28
		6			24 520	5	39			27 112	22	58			29 704	5	39
		8			32 694	9	46			36 150	38	66			39 606	8	46
		10			40 867	14	52			45 187	14	52			49 507	13	52
1300		4	1.300	1.230	17 709	2	28	1.430	1.360	19 581	2	28	1.560	1.490	21 453	2	28
		6			26 564	5	39			29 372	5	38			32 180	5	39
		8			35 418	9	46			39 162	8	46			42 906	8	46
		10			44 273	14	52			48 953	13	52			53 633	13	52
1400		4	1.400	1.324	19 071	2	29	1.540	1.464	21 087	2	28	1.680	1.604	23 103	2	28
		6			28 607	5	39			31 631	5	39			34 655	4	38
		8			38 143	9	47			42 175	8	46			46 207	8	46
		10			47 678	14	53			52 718	13	52			57 758	12	51
1500		4	1.500	1.419	20 434	2	28	1.650	1.569	22 594	2	29	1.800	1.719	24 754	2	28
		6			30 650	5	39			33 890	5	39			37 130	4	38
		8			40 867	8	46			45 187	8	47			49 507	8	46
		10			51 084	13	52			56 484	13	52			61 884	12	52

2.6.1. technical parameters of mcr FID S/S p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

		height H [mm]																
		1300						1400					1500					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.260	0.249	3 588	4	30	0.280	0.269	3 876	4	29	0.300	0.289	4 164	4	29
		6			5 383	9	40			5 815	9	40			6 247	9	40
		8			7 177	17	48			7 753	16	47			8 329	15	47
		10			8 971	26	53			9 691	25	53			10 411	24	53
	250	4	0.325	0.312	4 486	4	31	0.350	0.337	4 846	4	30	0.375	0.362	4 164	4	30
		6			6 728	9	41			7 268	9	40			6 247	8	40
		8			8 971	17	49			9 691	15	48			8 329	15	48
		10			11 214	26	54			12 114	24	54			10 411	23	53
	300	4	0.390	0.374	5 383	4	31	0.420	0.404	5 815	4	31	0.450	0.434	6 247	4	30
		6			8 074	9	41			8 722	9	41			9 370	8	40
		8			10 765	16	49			11 629	15	49			12 493	14	48
		10			13 457	25	55			14 537	24	54			15 617	22	54
	350	4	0.455	0.436	6 280	4	30	0.490	0.471	6 784	3	30	0.525	0.506	7 288	3	30
		6			9 420	8	41			10 176	8	40			10 932	8	40
		8			12 560	15	48			13 568	13	48			14 576	13	48
		10			15 700	23	54			16 960	21	53			18 220	21	54
	400	4	0.520	0.498	7 177	3	29	0.560	0.538	7 753	3	29	0.600	0.578	8 329	3	30
		6			10 765	7	40			11 629	7	40			12 493	7	40
		8			14 354	13	47			15 506	13	48			16 658	13	48
		10			17 942	20	53			19 382	20	53			20 822	20	54
	450	4	0.585	0.561	8 074	3	29	0.630	0.606	8 722	3	29	0.675	0.651	9 370	3	30
		6			12 111	7	40			13 083	7	40			14 055	7	40
		8			16 148	12	47			17 444	12	47			18 740	12	48
		10			20 185	19	53			21 805	19	53			23 425	19	53
	500	4	0.650	0.623	8 971	3	29	0.700	0.673	9 691	3	30	0.750	0.723	10 411	3	30
		6			13 457	7	40			14 537	7	40			15 617	7	41
		8			17 942	12	48			19 382	12	48			20 822	12	48
		10			22 428	19	53			24 228	19	54			26 028	19	54
	550	4	0.715	0.685	9 868	3	30	0.770	0.740	10 660	3	30	0.825	0.795	11 452	3	31
		6			14 802	7	40			15 990	7	41			17 178	7	41
		8			19 737	12	48			21 321	12	48			22 905	12	49
		10			24 671	19	54			26 651	19	54			28 631	19	54
	600	4	0.780	0.748	10 765	3	29	0.840	0.808	11 629	3	29	0.900	0.868	12 493	3	29
		6			16 148	6	39			17 444	6	40			18 740	6	40
		8			21 531	11	47			23 259	11	47			24 987	11	48
		10			26 914	17	53			29 074	17	53			31 234	17	53
	650	4	0.845	0.810	11 663	3	29	0.910	0.875	12 599	3	29	0.975	0.940	13 535	3	30
		6			17 494	6	40			18 898	6	40			20 302	6	40
		8			23 325	11	47			25 197	11	48			27 069	11	48
		10			29 156	17	53			31 496	17	53			33 836	17	54
	700	4	0.910	0.872	12 560	2	28	0.980	0.942	13 568	2	28	1.050	1.012	14 576	2	28
		6			18 840	5	38			20 352	5	39			21 864	5	39
		8			25 119	10	46			27 135	10	46			29 151	10	47
		10			31 399	15	52			33 919	15	52			36 439	15	52
	800	4	1.040	0.997	14 354	2	28	1.120	1.077	15 506	2	29	1.200	1.157	16 658	2	29
		6			21 531	5	39			23 259	5	39			24 987	5	40
		8			28 708	10	46			31 012	10	47			33 316	10	47
		10			35 885	15	52			38 765	15	53			41 645	15	53
	900	4	1.170	1.121	16 148	2	29	1.260	1.211	17 444	2	29	1.350	1.301	18 740	2	30
		6			24 222	5	39			26 166	5	40			28 110	5	40
		8			32 296	10	47			34 888	10	47			37 480	10	48
		10			40 370	15	53			43 610	15	53			46 850	15	53
	1000	4	1.300	1.246	17 942	2	28	1.400	1.346	19 382	2	28	1.500	1.446	20 822	2	28
		6			26 914	5	39			29 074	5	38			31 234	5	39
		8			35 885	9	47			38 765	8	46			41 645	8	46
		10			44 856	14	52			48 456	13	52			52 056	13	52
	1100	4	1.430	1.371	19 737	2	29	1.540	1.481	21 321	2	27	1.650	1.591	22 905	2	26
		6			29 605	5	39			31 981	4	38			34 357	4	37
		8			39 473	9	47			42 641	8	45			45 809	7	44
		10			49 342	14	53			53 302	12	51			57 262	11	50
	1200	4	1.560	1.495	21 531	2	28	1.680	1.615	23 259	2	28	1.800	1.735	24 987	2	26
		6			32 296	5	39			34 888	4	38			37 480	4	36
		8			43 062	8	46			46 518	8	46			49 974	6	44
		10			53 827	13	52			58 147	12	51			62 467	10	49
	1300	4	1.690	1.620	23 325	2	28	1.820	1.750	25 197	2	27					
		6			34 988	4	38			37 796	4	37					
		8			46 650	8	46			50 394	7	45					
		10			58 313	12	51			62 993	11	51					
	1400	4	1.820	1.744	25 119	2	28										
		6			37 679	4	39										
		8			50 239	8	46										
		10			62 798	12	52										

2.6.2. technical parameters of mcr FID S/S p/O circular dampers

D – nominal diameter [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

D [mm]	v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
250	2	0.0491	0.0392	281	1	15
	4			560	4	24
	6			890	8	28
	8			1130	11	33
315	2	0.0779	0.0653	478	1	18
	4			949	4	24
	6			1400	8	30
	8			1880	16	35
355	2	0.0989	0.0847	610	1	17
	4			1 220	5	24
	6			1 830	11	34
	8			2 440	20	40
400	2	0.1256	0.1096	789	1	17
	4			1 578	5	25
	6			2 367	11	34
	8			3 156	10	41

D [mm]	v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
450	2	0.1590	0.1410	1 015	1	16
	4			2 030	4	25
	6			3 045	10	35
	8			4 060	18	41
500	2	0.1963	0.1763	1 269	1	18
	4			2 538	4	24
	6			3 807	8	33
	8			5 076	15	40
560	2	0.2462	0.2238	1 611	1	16
	4			3 222	3	24
	6			4 834	7	33
	8			6 445	13	39
630	2	0.3116	0.2864	2 062	1	20
	4			4 124	2	22
	6			6 186	5	33
	8			8 247	9	40

The mcr FID S fire damper selection program is available at **www.mercor.com.pl**, in the Architect and Designer Zone.

2.7.1. estimated weights of mcr FID S/S p/P dampers for rectangular ventilation ducts [kg]

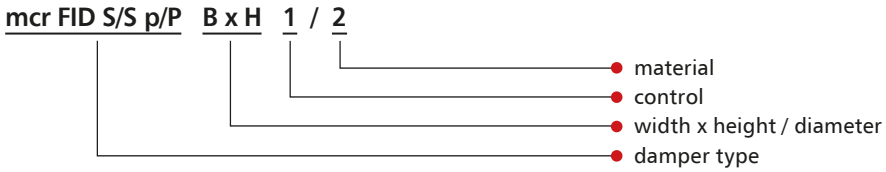
height H [mm] \ width B [mm]	200	250	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
200	9.5	9.7	10	10	15	17	17.5	19	22	25	28	30	33	39	45
250	9.5	10	11	11	16	17.5	18	21	24	27	29	32	34	45	48
300	10	11	11	12	17	20	21	23	26	28	31	34	38	50	51
350	11	11	11	16	18	20.5	23	26	28	29	33	35	36	52	53
400	10	11	12	18	19	21	25	29	30	33	35	36	39	54	55
500	15	16	17	19	20	23	27	32	33	35	38	40	44	55	56
600	17	17.5	20	21	30	26	30	35	37	39	43	48	52	56	58
700	17.5	18	21	23	30	35	35	40	42	44	47	52	54	57	65
800	20	21	22	24	29	35	37	41	43	49	52	57	60	62	78
900	22	25	25	28	33	35	39	43	47	53	56	60	62	64	82
1000	23	29	28	33	36	42	43	49	53	56	59	65	67	69	98
1100	26	30	31	35	38	42	47	56	59	62	63	69	71	73	101
1200	32	33	35	36	40	49	53	56	61	71	72	73	85	86	105
1300	39	40	38	39	44	52	57	59	78	79	80	81	92		
1400	–	–	48	39	48	56	63	65	80	82	85	87			
1500	–	–	50	50	52	58	68	71	82	98	115	120			

For dampers with no actuator, subtract ~1 kg.

2.7.2. estimated weights of mcr FID S/S c/O dampers for circular ventilation ducts [kg]

diameter D [mm]	RST, RST-KW1	actuator
125	4	5
160	5	6
200	6	7
250	7	8
315	9	10
355	12	13
400	14	15
500	16	17
630	20	21

2.8. designation



1 – control:

– RST trigger control mechanism
RST – thermal trigger
RST/WK1 – thermal trigger + limit switch (closed partition signal)
RST/WK2 – thermal trigger + limit switch (open/closed partition signal)

– RST-KW1 trigger control mechanism
RST-KW1/S – thermal trigger
RST-KW1/S/WK2 – thermal trigger + limit switch (open/closed partition signal)
RST-KW1/24I – thermal trigger + „pulse" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/24P – thermal trigger + „break" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/230I – thermal trigger + „pulse" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)
RST-KW1/230P – thermal trigger + „break" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)

– Belimo trigger control mechanism
BF24-T – actuator with a return spring, U = 24 V AC/DC
BF230-T – actuator with a return spring, U = 230 V AC
BF24TL-T-ST (with the BKN230-24MP option) – actuator with a return spring, U = 24 V, MP Bus digital control
BLF24-T – actuator with a return spring, U = 24 V AC/DC
BLF230-T – actuator with a return spring, U = 230 V AC
EXBF24-T – explosion proof actuator with a return spring in the Ex version, U = 24 V AC/DC
EXBF230-T – explosion proof actuator with a return spring in the Ex version, U = 230 V AC
BF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BLF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFL24-T – actuator with a return spring, U = 24 V AC/DC
BFL230-T – actuator with a return spring, U = 230 V AC
BFL24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFN24-T – actuator with a return spring, U = 24 V AC/DC
BFN230-T – actuator with a return spring, U = 230 V AC
BFN24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system

2 – material

[no symbol] – galvanised steel, Zn 275 g/m^2 coating

KN – 1.4404 acid-proof stainless steel

example designation:

mcr FID S/S p/P 400 x 400 BLF24-T

EIS120 cut-off fire damper with a 24 V compact Belimo actuator with limit switches.

mcr FID S/S p/O Ø400 RST / WK2

EIS120 cut-off fire damper with a trigger rated at 72°C and a partition opening and closing limit switch.

Chapter 9 - power supply and control (p. 95) contains:
- technical specifications and connection diagrams for the trigger control mechanisms supporting the damper,
- location of trigger control mechanisms in relation to the damper - manufacture standards.

mcr FID S/V p/P

single-blade smoke exhaust fire dampers for multi-zone fire ventilation systems

PRODUCT CONFIGURATOR AT WWW.MERCOR.COM.PL

1488-CPR-0448

ATEST HIGIENICZNY

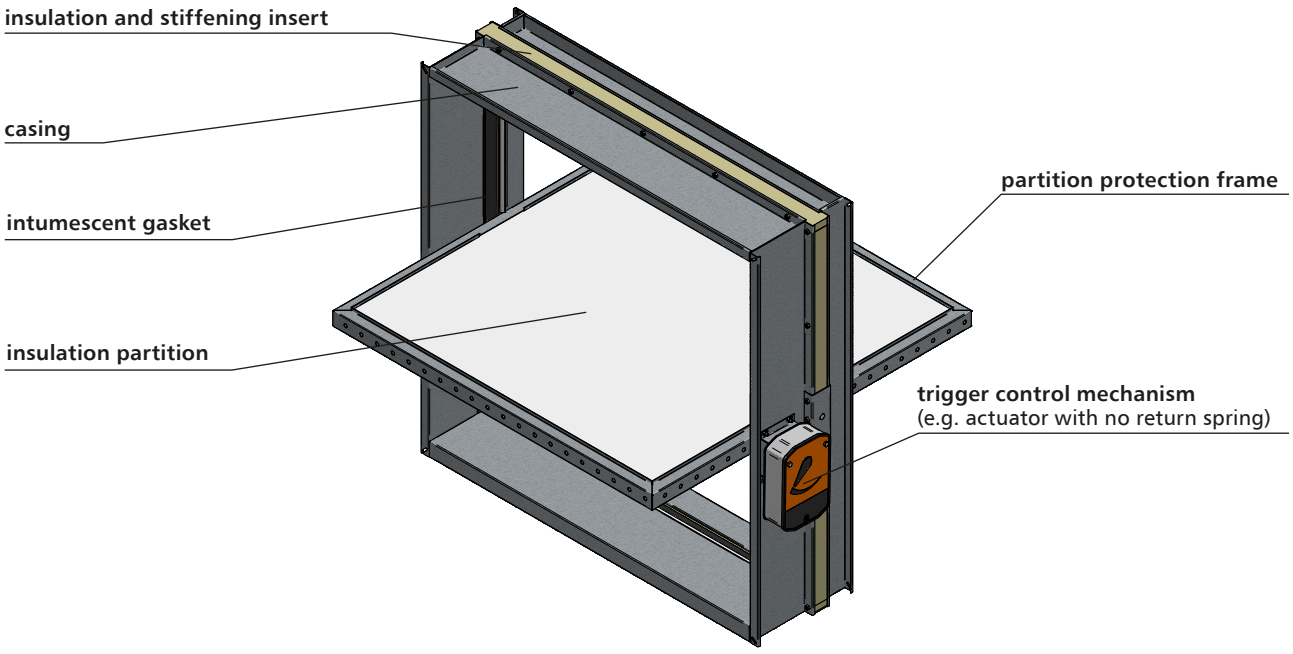
CERTYFIKACJA PRODUKTU

- **EIS120**
- **Certificate of constancy of performance 1488-CPR-0448/W.**
- **Dampers certified for compliance with EN 12101-8.**
- **Dampers qualified under EN 13501-4 and tested under EN 1366-2.**
- **Smoke exhaust dampers with the fire resistance independent of airflow direction and installation side.**

3.1. application

The mcr FID S/V p/P smoke exhaust dampers are intended for installation in automatically operated fire ventilation systems. They support both single and multiple fire zones in a building. They prevent the spreading of fire, smoke and burning fumes into the adjacent zones. During normal system operation, the partition of the damper is open or closed. The damper partition opens in the zone on fire and dampers close in other zones.

3.2. design



The mcr FID S/V p/P smoke exhaust dampers consist of a casing with a rectangular cross-section, made of two segments separated with a fire-proof panel with the cross-section of 20 x 40 mm, a moving insulation partition and a remotely activated actuator. Standard damper casing is made of galvanised steel sheet. In chemically aggressive environments, special manufacture casing is used, in which steel elements are made of 1.4404 acid-proof steel, while other elements are impregnated. The casing total length is at least 296 mm. Dampers may be made with an extension part, in which case the casing length is 400 mm.

The insulation partition is made of a fire-proof panel with the total thickness of 40 mm, which is seated in a reinforcement metal sheet. The inner side of the fire damper casing features an intumescent gasket. There are stop shapes fastened to the inner casing surface, which limit the rotating motion of the insulation partition. The stop shaped are lined with a polyethylene ventilation-grade seal.

3.3. manufacture versions

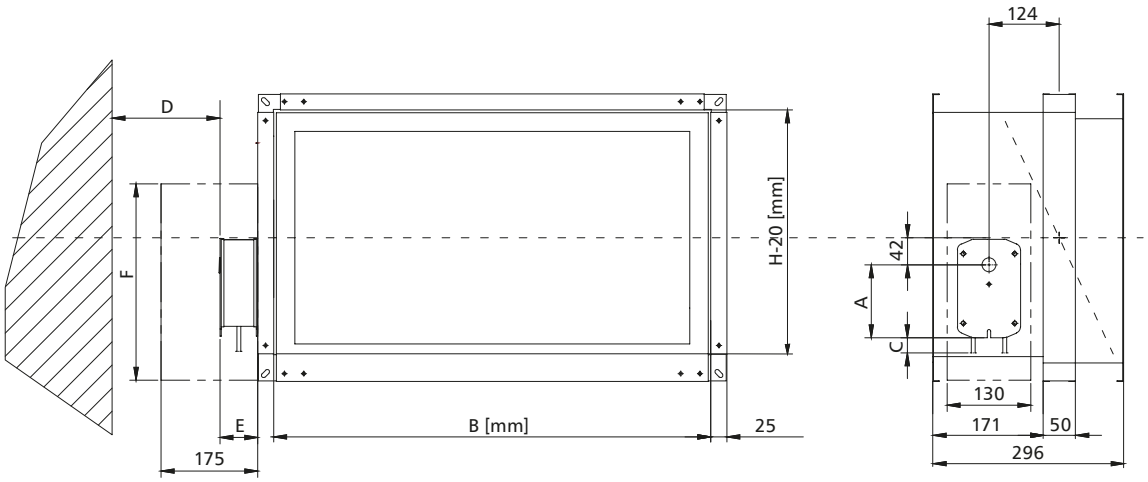
3.3.1. **mcr FID S/V p/P** – smoke exhaust fire damper for multi-zone fire ventilation systems with an actuator – damper closing and opening with an actuator

During normal operation, the insulation partition of the fire damper remains open or closed. In case of fire, the partition of the damper in the zone on fire opens, while in other zones the damper partitions are closed - the dampers are remotely activated by applying the power supply.

The mcr FID S/V p/P dampers are equipped with a trigger control mechanism in the form of a Belimo **BE** or **BLE** series axial actuator, powered with 24 V AC/DC or 230 V AC. BLE-series actuators are used in dampers with the surface of not more than 0.75 m^2.

BE and BLE series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

Dampers with Belimo BE or BLE series actuators close and open when the voltage is applied to the actuator terminals.



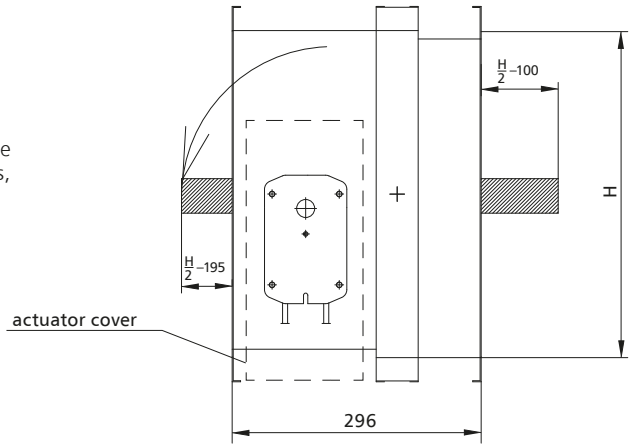
mechanism	A	C	D	E	F
BE	198	10	169	81	345
BLE	130	30	183	70	305

3.4. dimensions

Rectangular dampers:

- nominal width B: from 200 mm to 1500 mm
- nominal height H: from 200 mm to 1500 mm
- the maximum cross-section surface of one damper up to 1.5 m^2

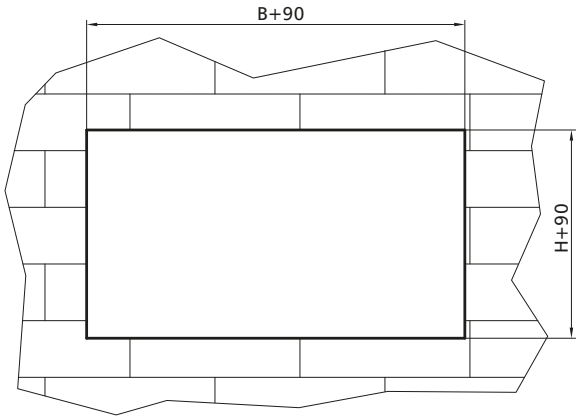
Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).



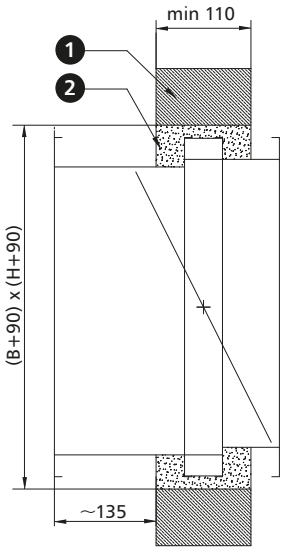
3.5. installation

The mcr FID S/V p/P rectangular dampers are EI120(V_{ew} i↔o)S1000C_{10000}AAmulti rated if installed in concrete partitions made of full bricks or cellular bloks with the thickness of at least 110 mm.

3.5.1. preparation of installation openings



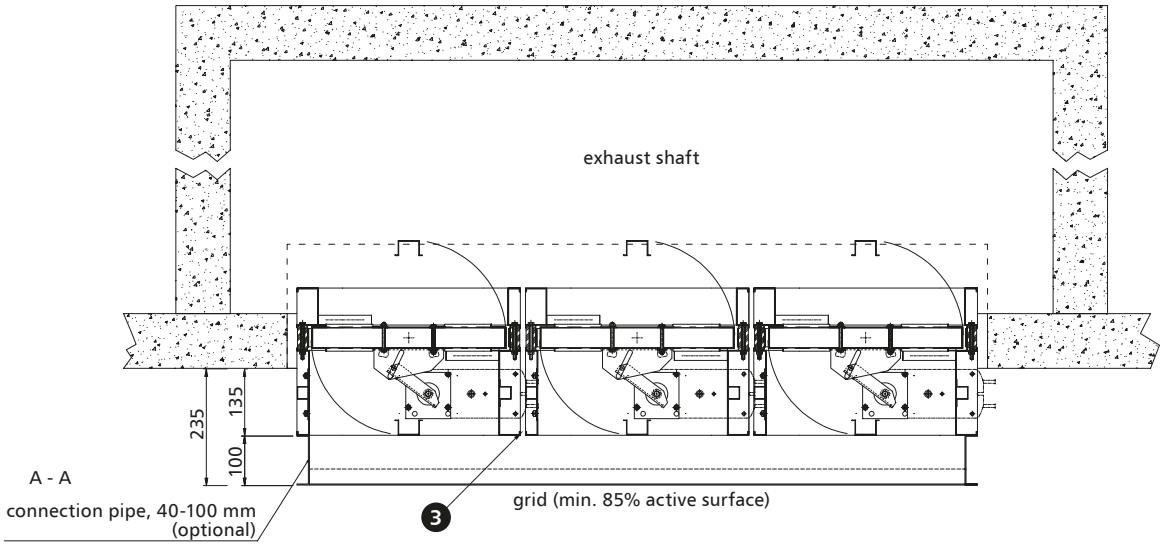
3.5.2. sample installation in concrete and masonry walls



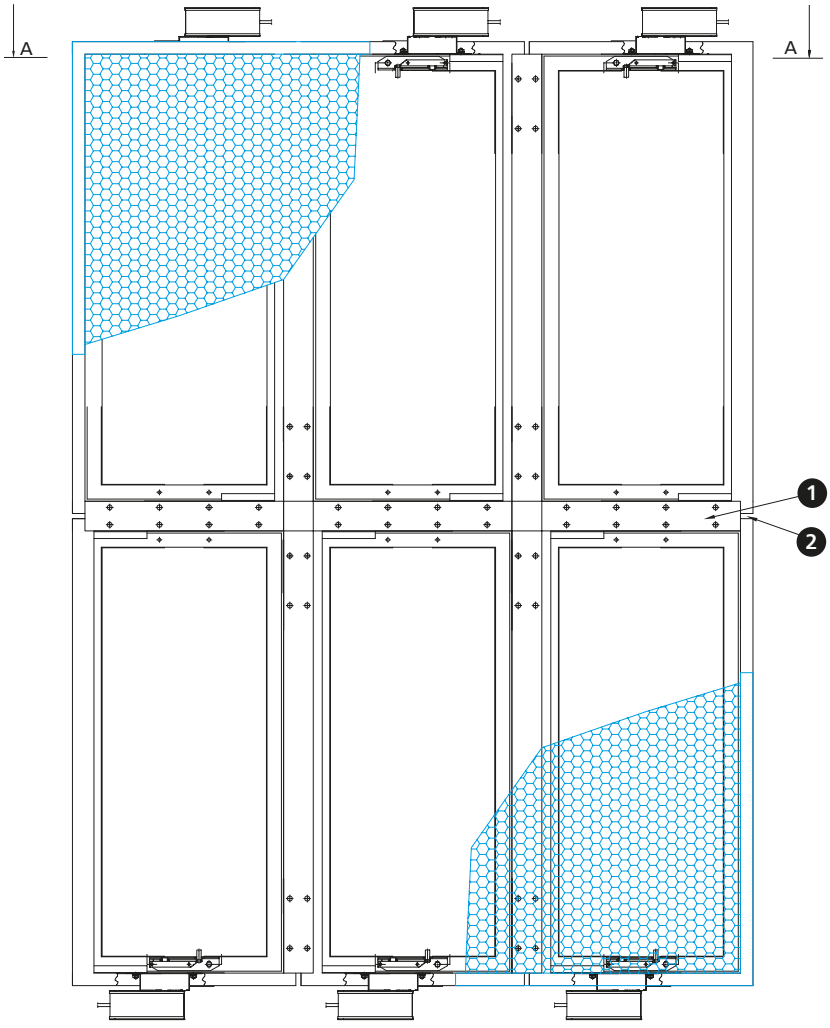
1. rigid wall - concrete, cellular concrete or bricks
2. sealing - concrete, cement or cement-lime masonry mortar*

*it is possible to use a different sealing that ensures the required fire resistance

3.5.3. sample installation in sets



The height of H=400 mm ensures that the partition does not protrude outside the damper casing on the actuator side.
To attach a guard grid (grill), a connection pipe of 40-100 mm is required.



1. installation flat bar, width 60 mm
2. 10 mm gaps between damper flanges
3. fire resistant material, e.g. mineral wool with the density of at least 60 kg/m^3

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			200					250					300				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.040	0.029	420	9	31	0.050	0.039	564	9	31	0.06	0.049	708	8	32
		6			631	21	41			847	19	42			1 063	19	42
		8			841	37	49			1 129	35	49			1 417	33	50
		10			1 051	58	55			1 411	54	55			1 771	52	55
	250	4	0.050	0.037	526	9	31	0.063	0.049	706	9	32	0.075	0.062	886	8	32
		6			788	21	42			1 058	19	43			1 328	18	42
		8			1 051	37	50			1 411	35	50			1 771	31	50
		10			1 314	57	55			1 764	54	56			2 214	49	56
	300	4	0.060	0.044	631	9	32	0.075	0.059	847	8	33	0.09	0.074	1 063	8	32
		6			946	20	43			1 270	19	43			1 594	17	43
		8			1 261	36	50			1 693	34	51			2 125	30	50
		10			1 577	56	56			2 117	53	56			2 657	47	56
	350	4	0.070	0.051	736	9	33	0.088	0.069	988	8	33	0.105	0.086	1 240	7	32
		6			1 104	20	43			1 482	19	44			1 860	16	43
		8			1 472	36	51			1 976	33	51			2 480	29	50
		10			1 840	56	57			2 470	52	57			3 100	45	56
	400	4	0.080	0.058	841	9	33	0.100	0.078	1 129	8	34	0.12	0.098	1 417	7	32
		6			1 261	19	43			1 693	19	44			2 125	15	42
		8			1 682	35	51			2 258	33	52			2 834	27	50
		10			2 102	54	57			2 822	52	57			3 542	42	56
	450	4	0.090	0.066	946	9	33	0.113	0.088	1 270	7	32	0.135	0.111	1 594	7	32
		6			1 419	19	44			1 905	17	43			2 391	15	43
		8			1 892	35	51			2 540	29	51			3 188	27	50
		10			2 365	54	57			3 175	46	56			3 985	42	56
	500	4	0.100	0.073	1 051	9	34	0.125	0.098	1 411	7	32	0.15	0.123	1 771	7	32
		6			1 577	19	44			2 117	16	43			2 657	15	43
		8			2 102	35	52			2 822	28	50			3 542	26	50
		10			2 628	54	58			3 528	44	56			4 428	41	56
	550	4	0.110	0.080	1 156	8	34	0.138	0.108	1 552	7	33	0.165	0.135	1 948	6	33
		6			1 734	19	44			2 328	16	43			2 922	14	43
		8			2 313	34	52			3 105	28	51			3 897	26	51
		10			2 891	53	58			3 881	44	57			4 871	40	56
	600	4	0.120	0.088	1 261	8	34	0.150	0.118	1 693	7	33	0.18	0.148	2 125	6	33
		6			1 892	19	45			2 540	15	43			3 188	14	43
		8			2 523	34	52			3 387	27	51			4 251	26	51
		10			3 154	53	58			4 234	42	56			5 314	40	57
	650	4	0.130	0.095	1 367	8	35	0.163	0.127	1 835	6	32	0.195	0.160	2 303	6	33
		6			2 050	19	45			2 752	14	43			3 454	14	44
		8			2 733	34	53			3 669	26	50			4 605	26	51
		10			3 416	53	59			4 586	40	56			5 756	40	57
	700	4	0.140	0.102	1 472	8	35	0.175	0.137	1 976	6	33	0.21	0.172	2 480	6	34
		6			2 208	19	45			2 964	14	43			3 720	14	44
		8			2 943	33	53			3 951	26	51			4 959	26	52
		10			3 679	52	59			4 939	40	56			6 199	40	57
	800	4	0.160	0.117	1 682	8	35	0.200	0.157	2 258	6	32	0.24	0.197	2 834	6	33
		6			2 523	18	45			3 387	14	43			4 251	14	44
		8			3 364	32	53			4 516	24	51			5 668	24	52
		10			4 205	50	59			5 645	38	56			7 085	38	57
	900	4	0.180	0.131	1 892	7	34	0.225	0.176	2 540	6	32	0.27	0.221	3 188	5	32
		6			2 838	16	44			3 810	13	43			4 782	12	42
		8			3 784	29	52			5 080	23	50			6 376	21	50
		10			4 730	45	58			6 350	36	56			7 970	32	56
	1000	4	0.200	0.146	2 102	7	34	0.250	0.196	2 822	6	32	0.3	0.246	3 542	5	32
		6			3 154	16	45			4 234	13	43			5 314	12	43
		8			4 205	29	52			5 645	22	50			7 085	21	50
		10			5 256	45	58			7 056	35	56			8 856	32	56
	1100	4	0.220	0.161	2 313	7	35	0.275	0.216	3 105	5	32	0.33	0.271	3 897	5	33
		6			3 469	16	45			4 657	12	43			5 845	12	43
		8			4 625	29	53			6 209	22	50			7 793	21	51
		10			5 782	45	59			7 762	34	56			9 742	32	56
	1200	4	0.240	0.175	2 523	8	37	0.300	0.235	3 387	5	33	0.36	0.295	4 251	9	40
		6			3 784	18	47			5 080	12	43			6 376	20	51
		8			5 046	29	53			6 774	22	51			8 502	36	58
		10			6 307	45	59			8 467	34	57			10 627	42	60
	1300	4	0.260	0.190	2 733	8	37	0.325	0.255	3 669	5	33	0.39	0.320	4 605	5	33
		6			4 100	18	47			5 504	12	43			6 908	12	44
		8			5 466	29	54			7 338	21	51			9 210	21	51
		10			6 833	45	59			9 173	33	57			11 513	32	57
	1400	4	0.280	0.204	2 943	7	36	0.350	0.274	3 951	5	33	0.42	0.344	4 959	5	34
		6			4 415	16	46			5 927	12	44			7 439	12	44
		8			5 887	29	54			7 903	21	51			9 919	21	52
		10			7 358	45	60			9 878	32	57			12 398	32	58
	1500	4	0.300	0.219	3 154	7	35	0.375	0.294	4 234	5	33	0.45	0.369	5 314	5	34
		6			4 730	15	46			6 350	12	44			7 970	12	45
		8			6 307	27	53			8 467	21	51			10 627	21	52
		10			7 884	42	59			10 584	32	57			13 284	32	58

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]															
			350					400					450					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.070	0.059	852	8	32	0.080	0.069	996	7	31	0.090	0.079	1 140	7	31
		6			1 279	18	42			1 495	17	42			1 711	15	41
		8			1 705	32	50			1 993	29	49			2 281	26	49
		10			2 131	50	56			2 491	46	55			2 851	41	54
	250	4	0.088	0.074	1 066	7	31	0.100	0.087	1 246	6	29	0.113	0.099	1 426	6	29
		6			1 598	16	42			1 868	13	40			2 138	13	40
		8			2 131	29	50			2 491	23	47			2 851	22	47
		10			2 664	45	55			3 114	36	53			3 564	35	53
	300	4	0.105	0.089	1 279	7	32	0.120	0.104	1 495	6	30	0.135	0.119	1 711	5	30
		6			1 918	16	43			2 242	13	41			2 566	12	40
		8			2 557	28	50			2 989	24	48			3 421	22	48
		10			3 197	44	56			3 737	37	54			4 277	34	54
	350	4	0.123	0.104	1 492	7	32	0.140	0.121	1 744	6	30	0.158	0.139	1 996	5	30
		6			2 238	15	42			2 616	13	41			2 994	12	41
		8			2 984	26	50			3 488	22	48			3 992	21	48
		10			3 730	41	56			4 360	35	54			4 990	33	54
	400	4	0.140	0.118	1 705	6	31	0.160	0.138	1 993	6	31	0.180	0.158	2 281	5	30
		6			2 557	13	41			2 989	13	41			3 421	12	41
		8			3 410	24	49			3 986	22	49			4 562	21	48
		10			4 262	37	55			4 982	35	55			5 702	32	54
	450	4	0.158	0.133	1 918	5	30	0.180	0.156	2 242	5	30	0.203	0.178	2 566	4	29
		6			2 877	12	41			3 363	12	41			3 849	10	40
		8			3 836	22	48			4 484	21	48			5 132	18	47
		10			4 795	34	54			5 605	32	54			6 415	28	53
	500	4	0.175	0.148	2 131	5	31	0.200	0.173	2 491	5	30	0.225	0.198	2 851	4	29
		6			3 197	12	41			3 737	11	40			4 277	9	39
		8			4 262	22	49			4 982	19	48			5 702	17	47
		10			5 328	34	55			6 228	30	54			7 128	26	52
	550	4	0.193	0.163	2 557	5	30	0.220	0.190	2 740	5	30	0.248	0.218	3 136	4	29
		6			3 836	12	41			4 110	11	41			4 704	9	40
		8			5 115	21	48			5 481	19	48			6 273	17	47
		10			6 394	32	54			6 851	30	54			7 841	26	53
	600	4	0.210	0.178	2 557	5	30	0.240	0.208	2 989	4	28	0.270	0.238	3 421	4	29
		6			3 836	10	40			4 484	8	37			5 132	9	40
		8			5 115	19	48			5 979	14	45			6 843	17	47
		10			6 394	29	53			7 474	27	53			8 554	26	53
	650	4	0.228	0.192	2 771	5	30	0.260	0.225	3 239	4	30	0.293	0.257	3 707	4	30
		6			4 156	10	40			4 858	10	40			5 560	9	40
		8			5 541	19	48			6 477	17	48			7 413	17	48
		10			6 926	29	54			8 096	27	53			9 266	26	54
	700	4	0.245	0.207	2 984	5	30	0.28	0.242	3 488	4	30	0.315	0.277	3 992	4	30
		6			4 476	10	41			5 232	10	40			5 988	9	40
		8			5 967	19	48			6 975	17	48			7 983	16	48
		10			7 459	29	54			8 719	27	54			9 979	25	53
	800	4	0.280	0.237	3 410	4	30	0.32	0.277	3 986	4	30	0.360	0.317	4 562	4	29
		6			5 115	10	41			5 979	9	41			6 843	9	40
		8			6 820	18	48			7 972	17	48			9 124	16	47
		10			8 525	28	54			9 965	26	54			11 405	25	53
	900	4	0.315	0.266	3 836	4	31	0.360	0.311	4 484	6	35	0.405	0.356	5 132	4	29
		6			5 754	10	41			6 726	12	44			7 698	9	40
		8			7 672	18	49			8 968	26	54			10 264	16	47
		10			9 590	28	55			11 210	33.4	58			12 830	25	53
	1000	4	0.350	0.296	4 262	4	30	0.400	0.346	4 982	4	31	0.450	0.396	5 702	4	29
		6			6 394	9	41			7 474	9	42			8 554	9	40
		8			8 525	17	48			9 965	17	49			11 405	16	47
		10			10 656	26	54			12 456	26	55			14 256	25	53
	1100	4	0.385	0.326	4 689	4	32	0.440	0.381	5 481	4	31	0.495	0.436	6 273	4	29
		6			7 033	10	42			8 221	9	42			9 409	9	39
		8			9 377	18	50			10 961	17	49			12 545	15	47
		10			11 722	28	56			13 702	26	55			15 682	24	53
	1200	4	0.420	0.355	5 115	4	31	0.480	0.415	5 979	4	31	0.540	0.475	6 843	4	29
		6			7 672	9	41			8 968	9	42			10 264	9	39
		8			10 230	16	49			11 958	16	49			13 686	15	47
		10			12 787	25	54			14 947	25	55			17 107	24	53
	1300	4	0.455	0.385	5 541	4	32	0.520	0.450	6 477	4	32	0.585	0.515	7 413	4	28
		6			8 312	10	43			9 716	9	42			11 120	8	39
		8			11 082	17	50			12 954	16	50			14 826	15	46
		10			13 853	27	56			16 193	25	55			18 533	23	52
	1400	4	0.490	0.414	5 967	4	32	0.560	0.484	6 975	4	32	0.630	0.554	7 983	4	28
		6			8 951	10	43			10 463	9	43			11 975	8	39
		8			11 935	17	50			13 951	16	50			15 967	15	46
		10			14 918	27	56			17 438	25	56			19 958	23	52
	1500	4	0.525	0.444	6 394	4	32	0.600	0.519	7 474	4	32	0.675	0.594	8 554	4	28
		6			9 590	9	43			11 210	9	43			12 830	8	38
		8			12 787	17	50			14 947	16	50			17 107	14	46
		10			15 984	26	56			18 684	25	56			21 384	22	51

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			500					550					600				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.1	0.089	1 284	6	29	0.110	0.099	1 428	5	29	0.120	0.109	1 572	5	29
		6			1 927	13	40			2 143	12	39			2 359	12	39
		8			2 569	22	47			2 857	21	47			3 145	21	47
		10			3 211	35	53			3 571	33	53			3 931	32	53
	250	4	0.125	0.112	1 606	6	30	0.138	0.124	1 786	5	30	0.150	0.137	1 966	5	30
		6			2 408	13	41			2 678	12	40			2 948	12	40
		8			3 211	22	48			3 571	21	48			3 931	21	48
		10			4 014	35	54			4 464	33	53			4 914	32	54
	300	4	0.15	0.134	1 927	5	30	0.165	0.149	2 143	5	30	0.180	0.164	2 359	5	30
		6			2 890	12	41			3 214	12	41			3 538	11	40
		8			3 853	21	48			4 285	21	48			4 717	19	48
		10			4 817	33	54			5 357	32	54			5 897	30	53
	350	4	0.175	0.156	2 248	5	30	0.193	0.174	2 500	5	31	0.210	0.191	2 752	5	30
		6			3 372	12	41			3 750	12	41			4 128	10	40
		8			4 496	21	48			5 000	21	49			5 504	19	48
		10			5 620	32	54			6 250	32	55			6 880	29	54
	400	4	0.2	0.178	2 569	5	30	0.220	0.198	2 857	5	30	0.240	0.218	3 145	4	30
		6			3 853	11	41			4 285	10	41			4 717	10	41
		8			5 138	19	48			5 714	19	48			6 290	18	48
		10			6 422	30	54			7 142	29	54			7 862	28	54
	450	4	0.225	0.201	2 890	4	29	0.248	0.223	3 214	4	29	0.270	0.246	3 538	4	30
		6			4 335	9	39			4 821	9	40			5 307	9	40
		8			5 780	17	47			6 428	17	47			7 076	17	48
		10			7 225	26	52			8 035	26	53			8 845	26	53
	500	4	0.250	0.223	3 211	4	27	0.275	0.248	3 571	4	29	0.300	0.273	3 931	4	29
		6			4 817	8	38			5 357	9	39			5 897	9	39
		8			6 422	14	45			7 142	15	47			7 862	15	47
		10			8 028	20	50			8 928	24	52			9 828	24	53
	550	4	0.275	0.245	3 853	3	27	0.303	0.273	4 285	4	28	0.330	0.300	4 717	4	28
		6			5 780	8	37			6 428	8	38			7 076	8	39
		8			7 707	13	45			8 571	14	46			9 435	14	46
		10			9 634	21	51			10 714	22	52			11 794	22	52
	600	4	0.3	0.268	3 853	3	27	0.330	0.298	4 285	3	28	0.360	0.328	4 717	3	28
		6			5 780	8	38			6 428	8	38			7 076	8	39
		8			7 707	13	45			8 571	13	46			9 435	13	46
		10			9 634	21	51			10 714	21	51			11 794	21	52
	650	4	0.325	0.290	4 175	4	31	0.358	0.322	4 643	3	28	0.390	0.355	5 111	3	28
		6			6 262	10	41			6 964	8	38			7 666	8	39
		8			8 349	17	49			9 285	13	46			10 221	13	46
		10			10 436	21	51			11 606	21	52			12 776	21	52
	700	4	0.350	0.312	4 496	3	28	0.385	0.347	5 000	3	28	0.420	0.382	5 504	3	29
		6			6 744	8	38			7 500	8	39			8 256	8	39
		8			8 991	13	46			9 999	13	46			11 007	13	47
		10			11 239	21	52			12 499	21	52			13 759	21	52
	800	4	0.4	0.357	5 138	3	28	0.440	0.397	5 714	3	29	0.480	0.437	6 290	3	29
		6			7 707	8	39			8 571	8	39			9 435	8	40
		8			10 276	13	46			11 428	13	47			12 580	13	47
		10			12 845	21	52			14 285	21	53			15 725	21	53
	900	4	0.45	0.401	5 780	3	28	0.495	0.446	6 428	3	29	0.540	0.491	7 076	3	30
		6			8 670	8	39			9 642	8	40			10 614	8	38
		8			11 560	13	46			12 856	13	47			14 152	13	45
		10			14 450	21	52			16 070	21	53			17 690	21	51
	1000	4	0.5	0.446	6 422	3	28	0.550	0.496	6 428	3	30	0.600	0.546	7 862	3	30
		6			9 634	8	39			9 642	8	40			11 794	8	41
		8			12 845	13	46			12 856	13	48			15 725	13	48
		10			16 056	21	52			16 070	21	54			19 656	21	54
	1100	4	0.55	0.491	7 065	4	29	0.605	0.546	7 857	4	31	0.660	0.601	8 649	3	31
		6			10 597	8	39			11 785	8	41			12 973	8	41
		8			14 129	14	47			15 713	14	49			17 297	13	49
		10			17 662	22	53			19 642	22	55			21 622	21	54
	1200	4	0.6	0.535	7 707	3	27	0.660	0.595	8 571	3	30	0.720	0.655	9 435	3	30
		6			11 560	7	38			12 856	7	40			14 152	7	40
		8			15 414	13	45			17 142	13	48			18 870	12	48
		10			19 267	20	51			21 427	20	54			23 587	19	54
	1300	4	0.65	0.580	8 349	3	27	0.715	0.645	9 285	3	30	0.780	0.710	10 221	3	30
		6			12 524	7	38			13 928	7	41			15 332	7	41
		8			16 698	13	45			18 570	13	48			20 442	12	48
		10			20 873	20	51			23 213	20	54			25 553	19	54
	1400	4	0.7	0.624	8 991	3	27	0.770	0.694	9 999	3	31	0.840	0.764	11 007	3	30
		6			13 487	7	38			14 999	7	41			16 511	7	41
		8			17 983	13	45			19 999	13	49			22 015	12	48
		10			22 478	20	51			24 998	20	54			27 518	19	54
	1500	4	0.75	0.669	9 634	3	27	0.825	0.744	10 714	3	31	0.900	0.819	11 794	3	31
		6			14 450	7	38			16 070	7	41			17 690	7	41
		8			19 267	13	45			21 427	13	49			23 587	12	49
		10			24 084	20	51			26 784	20	55			29 484	19	54

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			650					700					750				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.130	0.119	1 716	5	29	0.140	0.129	1 860	5	29	0.150	0.139	2 004	5	29
		6			2 575	11	39			2 791	11	40			3 007	11	40
		8			3 433	20	47			3 721	20	47			4 009	20	47
		10			4 291	31	53			4 651	31	53			5 011	31	53
	250	4	0.163	0.149	2 146	5	30	0.175	0.162	2 326	5	30	0.188	0.174	2 506	5	30
		6			3 218	11	40			3 488	11	41			3 758	11	41
		8			4 291	20	48			4 651	20	48			5 011	20	48
		10			5 364	31	53			5 814	31	54			6 264	31	54
	300	4	0.195	0.179	2 575	5	30	0.210	0.194	2 791	4	29	0.225	0.209	3 007	4	30
		6			3 862	10	40			4 186	10	40			4 510	10	40
		8			5 149	19	48			5 581	18	47			6 013	18	48
		10			6 437	29	53			6 977	28	53			7 517	28	54
	350	4	0.228	0.209	3 004	4	30	0.245	0.226	3 256	4	30	0.263	0.244	3 508	4	30
		6			4 506	10	40			4 884	10	40			5 262	10	41
		8			6 008	18	48			6 512	17	48			7 016	17	48
		10			7 510	28	54			8 140	27	53			8 770	27	54
	400	4	0.260	0.238	3 433	4	30	0.280	0.258	3 721	4	30	0.300	0.278	4 009	4	31
		6			5 149	10	41			5 581	10	41			6 013	10	41
		8			6 866	18	48			7 442	17	48			8 018	17	49
		10			8 582	28	54			9 302	27	54			10 022	27	54
	450	4	0.293	0.268	3 862	4	30	0.315	0.291	4 186	4	29	0.338	0.313	4 510	4	30
		6			5 793	9	40			6 279	9	40			6 765	9	40
		8			7 724	17	48			8 372	15	47			9 020	15	48
		10			9 655	26	54			10 465	24	53			11 275	24	53
	500	4	0.325	0.298	4 291	4	29	0.350	0.323	4 651	4	29	0.375	0.348	5 011	4	29
		6			6 437	9	40			6 977	8	40			7 517	8	40
		8			8 582	15	47			9 302	15	47			10 022	15	47
		10			10 728	24	53			11 628	23	53			12 528	23	53
	550	4	0.358	0.328	5 149	4	29	0.385	0.355	5 116	4	29	0.413	0.383	5 512	4	29
		6			7 724	8	39			7 674	8	39			8 268	8	40
		8			10 299	14	47			10 233	14	47			11 025	14	47
		10			12 874	22	52			12 791	22	53			13 781	22	53
	600	4	0.390	0.358	5 149	3	28	0.420	0.388	5 581	3	29	0.450	0.418	6 013	3	29
		6			7 724	8	39			8 372	8	39			9 020	8	40
		8			10 299	13	46			11 163	13	47			12 027	13	47
		10			12 874	21	52			13 954	21	53			15 034	21	53
	650	4	0.423	0.387	5 579	3	28	0.455	0.420	6 047	3	28	0.488	0.452	6 515	3	28
		6			8 368	7	39			9 070	7	39			9 772	7	39
		8			11 157	13	46			12 093	13	46			13 029	12	46
		10			13 946	20	52			15 116	20	52			16 286	19	52
	700	4	0.455	0.417	6 008	3	28	0.490	0.452	6 512	3	29	0.525	0.487	7 016	3	28
		6			9 012	7	39			9 768	7	39			10 524	7	39
		8			12 015	13	46			13 023	13	47			14 031	12	46
		10			15 019	20	52			16 279	20	53			17 539	19	52
	800	4	0.520	0.477	6 866	3	27	0.560	0.517	7 442	4	29	0.600	0.557	8 018	3	28
		6			10 299	6	38			11 163	7	37			12 027	6	39
		8			13 732	12	45			14 884	11	43			16 036	12	46
		10			17 165	18	51			18 605	16	47			20 045	18	52
	900	4	0.585	0.536	7 724	3	26	0.630	0.581	8 372	3	27	0.675	0.626	9 020	3	27
		6			11 586	6	36			12 558	6	37			13 530	6	38
		8			15 448	10	44			16 744	10	45			18 040	10	45
		10			19 310	16	50			20 930	16	51			22 550	16	51
	1000	4	0.650	0.596	8 582	3	26	0.700	0.646	9 302	3	27	0.750	0.696	10 022	3	28
		6			12 874	6	36			13 954	6	38			15 034	6	38
		8			17 165	10	44			18 605	10	45			20 045	10	46
		10			21 456	16	50			23 256	16	51			25 056	16	52
	1100	4	0.715	0.656	9 441	3	29	0.770	0.711	10 233	3	31	0.825	0.766	11 025	3	28
		6			14 161	8	40			15 349	8	42			16 537	6	39
		8			18 881	13	47			20 465	13	49			22 049	10	46
		10			23 602	21	53			25 582	21	55			27 562	16	52
	1200	4	0.780	0.715	10 299	3	28	0.840	0.775	11 163	3	30	0.900	0.835	12 027	2	28
		6			15 448	7	39			16 744	7	41			18 040	5	38
		8			20 598	12	46			22 326	12	48			24 054	10	46
		10			25 747	19	52			27 907	19	54			30 067	15	52
	1300	4	0.845	0.775	11 157	3	28	0.910	0.840	12 093	3	31	0.975	0.905	13 029	2	28
		6			16 736	7	39			18 140	7	41			19 544	5	39
		8			22 314	12	46			24 186	12	49			26 058	10	46
		10			27 893	19	52			30 233	19	55			32 573	15	52
	1400	4	0.910	0.834	12 015	3	28	0.980	0.904	13 023	3	31	1.050	0.974	14 031	2	28
		6			18 023	7	39			19 535	7	42			21 047	5	39
		8			24 031	12	46			26 047	12	49			28 063	10	46
		10			30 038	19	52			32 558	19	55			35 078	15	52
	1500	4	0.975	0.894	12 874	3	28	1.050	0.969	13 954	3	31	1.125	1.044	15 034	3	30
		6			19 310	7	39			20 930	7	42			22 550	6	41
		8			25 747	12	46			27 907	12	49			30 067	11	48
		10			32 184	19	52			34 884	19	55			37 584	17	54

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			800					850					900				
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.160	0.149	2 148	5	29	0.170	0.159	2 292	5	29	0.180	0.169	2 436	5	30
		6			3 223	11	40			3 439	11	40			3 655	11	40
		8			4 297	19	47			4 585	19	48			4 873	19	48
		10			5 371	30	53			5 731	30	53			6 091	30	54
	250	4	0.200	0.187	2 686	5	30	0.213	0.199	2 866	5	30	0.225	0.212	3 046	5	31
		6			4 028	11	41			4 298	11	41			4 568	11	41
		8			5 371	19	48			5 731	19	49			6 091	19	49
		10			6 714	30	54			7 164	30	54			7 614	30	55
	300	4	0.240	0.224	3 223	4	30	0.255	0.239	3 439	4	30	0.270	0.254	3 655	4	30
		6			4 834	10	41			5 158	10	41			5 482	10	41
		8			6 445	18	48			6 877	18	48			7 309	17	48
		10			8 057	28	54			8 597	28	54			9 137	27	54
	350	4	0.280	0.261	3 760	4	30	0.298	0.279	4 012	4	31	0.315	0.296	4 264	4	30
		6			5 640	10	41			6 018	10	41			6 396	9	41
		8			7 520	17	48			8 024	17	49			8 528	17	48
		10			9 400	27	54			10 030	27	54			10 660	26	54
	400	4	0.320	0.298	4 297	4	31	0.340	0.318	4 585	4	31	0.360	0.338	4 873	4	30
		6			6 445	10	41			6 877	10	42			7 309	9	41
		8			8 594	17	49			9 170	17	49			9 746	16	48
		10			10 742	27	55			11 462	27	55			12 182	25	54
	450	4	0.360	0.336	4 834	4	29	0.383	0.358	5 158	4	29	0.405	0.381	5 482	3	29
		6			7 251	8	39			7 737	8	40			8 223	8	39
		8			9 668	14	47			10 316	14	47			10 964	13	47
		10			12 085	22	53			12 895	22	53			13 705	21	52
	500	4	0.400	0.373	5 371	4	29	0.425	0.398	5 731	4	29	0.450	0.423	6 091	3	29
		6			8 057	8	40			8 597	8	40			9 137	8	40
		8			10 742	14	47			11 462	14	47			12 182	13	47
		10			13 428	22	53			14 328	22	53			15 228	21	53
	550	4	0.440	0.410	5 908	3	29	0.468	0.438	6 304	3	29	0.495	0.465	6 700	3	29
		6			8 862	8	40			9 456	8	40			10 050	7	39
		8			11 817	13	47			12 609	13	47			13 401	13	47
		10			14 771	21	53			15 761	21	53			16 751	20	53
	600	4	0.480	0.448	6 445	3	29	0.510	0.478	6 877	3	29	0.540	0.508	7 309	3	29
		6			9 668	7	39			10 316	7	40			10 964	7	39
		8			12 891	13	47			13 755	13	47			14 619	12	47
		10			16 114	20	53			17 194	20	53			18 274	19	52
	650	4	0.520	0.485	6 983	3	28	0.553	0.517	7 451	3	29	0.585	0.550	7 919	3	29
		6			10 474	7	39			11 176	7	39			11 878	7	39
		8			13 965	12	46			14 901	12	47			15 837	12	47
		10			17 456	19	52			18 626	19	53			19 796	19	53
	700	4	0.560	0.522	7 520	3	28	0.595	0.557	8 024	3	28	0.630	0.592	8 528	3	27
		6			11 280	6	39			12 036	6	39			12 792	6	38
		8			15 039	12	46			16 047	12	46			17 055	10	45
		10			18 799	18	52			20 059	18	52			21 319	16	51
	800	4	0.640	0.597	8 594	3	27	0.680	0.637	9 170	3	27	0.720	0.677	9 746	3	28
		6			12 891	6	38			13 755	6	38			14 619	6	38
		8			17 188	10	45			18 340	10	45			19 492	10	46
		10			21 485	16	51			22 925	16	51			24 365	16	51
	900	4	0.720	0.671	9 668	3	28	0.765	0.716	10 316	3	28	0.810	0.761	10 964	3	28
		6			14 502	6	38			15 474	6	38			16 446	6	39
		8			19 336	10	46			20 632	10	46			21 928	10	46
		10			24 170	16	51			25 790	16	52			27 410	16	52
	1000	4	0.800	0.746	10 742	3	28	0.850	0.796	11 462	3	28	0.900	0.846	12 182	3	29
		6			16 114	6	39			17 194	6	39			18 274	6	39
		8			21 485	10	46			22 925	10	46			24 365	10	47
		10			26 856	16	52			28 656	16	52			30 456	16	52
	1100	4	0.880	0.821	11 817	3	28	0.935	0.876	12 609	3	29	0.990	0.931	13 401	3	29
		6			17 725	6	39			18 913	6	39			20 101	6	40
		8			23 633	10	46			25 217	10	47			26 801	10	47
		10			29 542	16	52			31 522	16	53			33 502	16	53
	1200	4	0.960	0.895	12 891	2	28	1.020	0.955	13 755	2	28	1.080	1.015	14 619	2	28
		6			19 336	5	39			20 632	5	39			21 928	5	38
		8			25 782	10	46			27 510	10	46			29 238	9	46
		10			32 227	15	52			34 387	15	52			36 547	14	51
	1300	4	1.040	0.970	13 965	2	28	1.105	1.035	14 901	2	29	1.170	1.100	15 837	2	29
		6			20 948	5	39			22 352	5	39			23 756	5	39
		8			27 930	10	46			29 802	10	47			31 674	10	47
		10			34 913	15	52			37 253	15	52			39 593	15	53
	1400	4	1.120	1.044	15 039	2	29	1.190	1.114	16 047	3	30	1.260	1.184	17 055	2	28
		6			22 559	5	39			24 071	6	40			25 583	5	39
		8			30 079	10	47			32 095	10	48			34 111	9	46
		10			37 598	15	52			40 118	16	54			42 638	14	52
	1500	4	1.200	1.119	16 114	3	31	1.275	1.194	17 194	3	30	1.350	1.269	18 274	2	29
		6			24 170	6	41			25 790	6	41			27 410	5	40
		8			32 227	11	49			34 387	10	48			36 547	10	48
		10			40 284	17	54			42 984	16	54			45 684	15	53

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

		height H [mm]																
		1000						1100					1200					
width B [mm]		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
	200	4	0.200	0.189	2 724	5	30	0.220	0.209	3 012	5	30	0.240	0.229	3 300	4	30
		6			4 087	10	40			4 519	10	41			4 951	10	41
		8			5 449	19	48			6 025	19	48			6 601	18	48
		10			6 811	29	54			7 531	29	54			8 251	28	54
	250	4	0.250	0.237	3 406	5	31	0.275	0.262	3 766	4	31	0.300	0.287	4 126	4	31
		6			5 108	10	41			5 648	10	41			6 188	10	41
		8			6 811	19	49			7 531	18	49			8 251	17	49
		10			8 514	29	55			9 414	28	55			10 314	27	55
	300	4	0.300	0.284	4 087	4	31	0.330	0.314	4 519	4	31	0.360	0.344	4 951	4	31
		6			6 130	10	41			6 778	10	42			7 426	9	42
		8			8 173	17	49			9 037	17	49			9 901	17	49
		10			10 217	27	54			11 297	27	55			12 377	26	55
	350	4	0.350	0.331	4 768	4	31	0.385	0.366	5 272	4	31	0.420	0.401	5 776	4	31
		6			7 152	9	41			7 908	9	42			8 664	9	41
		8			9 536	17	49			10 544	17	49			11 552	15	49
		10			11 920	26	55			13 180	26	55			14 440	24	54
	400	4	0.400	0.378	5 449	3	28	0.440	0.418	6 025	3	28	0.480	0.458	6 601	3	29
		6			8 173	7	39			9 037	7	39			9 901	7	39
		8			10 898	13	46			12 050	13	46			13 202	13	47
		10			13 622	20	52			15 062	20	52			16 502	20	53
	450	4	0.450	0.426	6 130	3	28	0.495	0.471	6 778	3	29	0.540	0.516	7 426	3	29
		6			9 195	7	39			10 167	7	39			11 139	7	40
		8			12 260	13	47			13 556	13	47			14 852	13	47
		10			15 325	20	52			16 945	20	53			18 565	20	53
	500	4	0.500	0.473	6 811	3	29	0.550	0.523	7 531	3	29	0.600	0.573	8 251	3	30
		6			10 217	7	39			11 297	7	40			12 377	7	40
		8			13 622	13	47			15 062	13	47			16 502	13	48
		10			17 028	20	53			18 828	20	53			20 628	20	54
	550	4	0.550	0.520	7 492	3	29	0.605	0.575	8 284	3	30	0.660	0.630	9 076	3	30
		6			11 238	7	40			12 426	7	40			13 614	7	41
		8			14 985	13	47			16 569	13	48			18 153	13	48
		10			18 731	20	53			20 711	20	54			22 691	20	54
	600	4	0.600	0.568	8 173	3	29	0.660	0.628	9 037	3	29	0.720	0.688	9 901	3	29
		6			12 260	7	40			13 556	6	39			14 852	6	40
		8			16 347	12	47			18 075	12	47			19 803	12	47
		10			20 434	19	53			22 594	18	53			24 754	18	53
	650	4	0.650	0.615	8 855	3	29	0.715	0.680	9 791	3	29	0.780	0.745	10 727	3	30
		6			13 282	7	40			14 686	6	40			16 090	6	40
		8			17 709	12	47			19 581	12	47			21 453	12	48
		10			22 136	19	53			24 476	18	53			26 816	18	53
	700	4	0.700	0.662	9 536	3	27	0.770	0.732	10 544	2	27	0.840	0.802	11 552	2	27
		6			14 304	6	38			15 816	5	38			17 328	5	38
		8			19 071	10	46			21 087	10	45			23 103	10	46
		10			23 839	16	51			26 359	15	51			28 879	15	51
	800	4	0.800	0.757	10 898	3	28	0.880	0.837	12 050	2	28	0.960	0.917	13 202	2	28
		6			16 347	6	39			18 075	5	38			19 803	5	39
		8			21 796	10	46			24 100	10	46			26 404	10	46
		10			27 245	16	52			30 125	15	52			33 005	15	52
	900	4	0.900	0.851	12 260	3	29	0.990	0.941	13 556	3	29	1.080	1.031	14 852	2	29
		6			18 390	6	39			20 334	6	40			22 278	5	39
		8			24 520	10	47			27 112	10	47			29 704	10	47
		10			30 650	16	52			33 890	16	53			37 130	15	52
	1000	4	1.000	0.946	13 622	3	29	1.100	1.046	15 062	2	29	1.200	1.146	16 502	2	28
		6			20 434	6	40			22 594	5	39			24 754	5	39
		8			27 245	10	47			30 125	10	47			33 005	9	46
		10			34 056	16	53			37 656	15	52			41 256	14	52
	1100	4	1.100	1.041	14 985	3	29	1.210	1.151	16 569	2	29	1.320	1.261	18 153	2	29
		6			22 477	6	40			24 853	5	40			27 229	5	39
		8			29 969	10	48			33 137	10	47			36 305	9	47
		10			37 462	16	53			41 422	15	53			45 382	14	52
	1200	4	1.200	1.135	16 347	2	28	1.320	1.255	18 075	10	47	1.440	1.375	19 803	2	28
		6			24 520	5	39			27 112	22	58			29 704	5	39
		8			32 694	9	46			36 150	38	66			39 606	8	46
		10			40 867	14	52			45 187	14	52			49 507	13	52
	1300	4	1.300	1.230	17 709	2	28	1.430	1.360	19 581	2	28					
		6			26 564	5	39			29 372	5	38					
		8			35 418	9	46			39 162	8	46					
		10			44 273	14	52			48 953	13	52					
	1400	4	1.400	1.324	19 071	2	29										
		6			28 607	5	39										
		8			38 143	9	47										
		10			47 678	14	53										
	1500	4	1.500	1.419	20 434	2	28										
		6			30 650	5	39										
		8			40 867	8	46										
		10			51 084	13	52										

3.6. technical parameters of mcr FID S/V p/P rectangular dampers

B – nominal width [mm]
H – nominal height [mm]
v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

		height H [mm]																
		1300						1400					1500					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.260	0.249	3 588	4	30	0.280	0.269	3 876	4	29	0.300	0.289	4 164	4	29
		6			5 383	9	40			5 815	9	40			6 247	9	40
		8			7 177	17	48			7 753	16	47			8 329	15	47
		10			8 971	26	53			9 691	25	53			10 411	24	53
	250	4	0.325	0.312	4 486	4	31	0.350	0.337	4 846	4	30	0.375	0.362	4 164	4	30
		6			6 728	9	41			7 268	9	40			6 247	8	40
		8			8 971	17	49			9 691	15	48			8 329	15	48
		10			11 214	26	54			12 114	24	54			10 411	23	53
	300	4	0.390	0.374	5 383	4	31	0.420	0.404	5 815	4	31	0.450	0.434	6 247	4	30
		6			8 074	9	41			8 722	9	41			9 370	8	40
		8			10 765	16	49			11 629	15	49			12 493	14	48
		10			13 457	25	55			14 537	24	54			15 617	22	54
	350	4	0.455	0.436	6 280	4	30	0.490	0.471	6 784	3	30	0.525	0.506	7 288	3	30
		6			9 420	8	41			10 176	8	40			10 932	8	40
		8			12 560	15	48			13 568	13	48			14 576	13	48
		10			15 700	23	54			16 960	21	53			18 220	21	54
	400	4	0.520	0.498	7 177	3	29	0.560	0.538	7 753	3	29	0.600	0.578	8 329	3	30
		6			10 765	7	40			11 629	7	40			12 493	7	40
		8			14 354	13	47			15 506	13	48			16 658	13	48
		10			17 942	20	53			19 382	20	53			20 822	20	54
	450	4	0.585	0.561	8 074	3	29	0.630	0.606	8 722	3	29	0.675	0.651	9 370	3	30
		6			12 111	7	40			13 083	7	40			14 055	7	40
		8			16 148	12	47			17 444	12	47			18 740	12	48
		10			20 185	19	53			21 805	19	53			23 425	19	53
	500	4	0.650	0.623	8 971	3	29	0.700	0.673	9 691	3	30	0.750	0.723	10 411	3	30
		6			13 457	7	40			14 537	7	40			15 617	7	41
		8			17 942	12	48			19 382	12	48			20 822	12	48
		10			22 428	19	53			24 228	19	54			26 028	19	54
	550	4	0.715	0.685	9 868	3	30	0.770	0.740	10 660	3	30	0.825	0.795	11 452	3	31
		6			14 802	7	40			15 990	7	41			17 178	7	41
		8			19 737	12	48			21 321	12	48			22 905	12	49
		10			24 671	19	54			26 651	19	54			28 631	19	54
	600	4	0.780	0.748	10 765	3	29	0.840	0.808	11 629	3	29	0.900	0.868	12 493	3	29
		6			16 148	6	39			17 444	6	40			18 740	6	40
		8			21 531	11	47			23 259	11	47			24 987	11	48
		10			26 914	17	53			29 074	17	53			31 234	17	53
	650	4	0.845	0.810	11 663	3	29	0.910	0.875	12 599	3	29	0.975	0.940	13 535	3	30
		6			17 494	6	40			18 898	6	40			20 302	6	40
		8			23 325	11	47			25 197	11	48			27 069	11	48
		10			29 156	17	53			31 496	17	53			33 836	17	54
	700	4	0.910	0.872	12 560	2	28	0.980	0.942	13 568	2	28	1.050	1.012	14 576	2	28
		6			18 840	5	38			20 352	5	39			21 864	5	39
		8			25 119	10	46			27 135	10	46			29 151	10	47
		10			31 399	15	52			33 919	15	52			36 439	15	52
	800	4	1.040	0.997	14 354	2	28	1.120	1.077	15 506	2	29	1.200	1.157	16 658	2	29
		6			21 531	5	39			23 259	5	39			24 987	5	40
		8			28 708	10	46			31 012	10	47			33 316	10	47
		10			35 885	15	52			38 765	15	53			41 645	15	53
	900	4	1.170	1.121	16 148	2	29	1.260	1.211	17 444	2	29	1.350	1.301	18 740	2	30
		6			24 222	5	39			26 166	5	40			28 110	5	40
		8			32 296	10	47			34 888	10	47			37 480	10	48
		10			40 370	15	53			43 610	15	53			46 850	15	53
	1000	4	1.300	1.246	17 942	2	28	1.400	1.346	19 382	2	28	1.500	1.446	20 822	2	28
		6			26 914	5	39			29 074	5	38			31 234	5	39
		8			35 885	9	47			38 765	8	46			41 645	8	46
		10			44 856	14	52			48 456	13	52			52 056	13	52
	1100	4	1.430	1.371	19 737	2	29										
		6			29 605	5	39										
		8			39 473	9	47										
		10			49 342	14	53										

3.7. estimated weights of mcr FID S/V p/P rectangular dampers for rectangular ventilation ducts [kg]

height [H] \ width [B]	200	250	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
200	9.5	9.7	10	10	15	17	17.5	19	22	25	28	30	33	39	45
250	9.5	10	11	11	16	17.5	18	21	24	27	29	32	34	45	48
300	10	11	11	12	17	20	21	23	26	28	31	34	38	50	51
350	11	11	11	16	18	20.5	23	26	28	29	33	35	36	52	53
400	10	11	12	18	19	21	25	29	30	33	35	36	39	54	55
500	15	16	17	19	20	23	27	32	33	35	38	40	44	55	56
600	17	17.5	20	21	30	26	30	35	37	39	43	48	52	56	58
700	17.5	18	21	23	30	35	35	40	42	44	47	52	54	57	65
800	20	21	22	24	29	35	37	41	43	49	52	57	60	62	78
900	22	25	25	28	33	35	39	43	47	53	56	60	62	64	82
1000	23	29	28	33	36	42	43	49	53	56	59	65	67	69	98
1100	26	30	31	35	38	42	47	56	59	62					
1200	32	33	35	36	40	49	53	56	61	71					
1300	39	40	38	39	44	52	57	59	78	79					
1400	–	–	48	39	48	56	63	65	80	82					
1500	–	–	50	50	52	58	68	71	82	98					

For dampers with no actuator, subtract ~1 kg.

3.8. designation

mcr FID S/V p/P B x H 1 / 2

- material
- control
- width x height
- damper type

1 – control:

– Belimo trigger control mechanism
BE24 – actuator with no return spring, U = 24 V AC/DC
BLE24 – actuator with no return spring, U = 24 V AC/DC
BE24-ST (with the BKNE230-24 option) – actuator with no return spring, U = 24 V AC/DC, with a plug for the SBS Control system
BLE24-ST (with the BKNE230-24 option) – actuator with no return spring, U = 24 V AC/DC, with a plug for the SBS Control system
BE230 – actuator with no return spring, U = 230 V AC
BLE230 – actuator with no return spring, U = 230 V AC

2 – material

[no symbol] – galvanised steel, Zn 275 g/m^2 coating
KN – 1.4404 acid-proof stainless steel

example designation:

mcr FID S/V p/P 400 x 400 BLE24

Smoke exhaust damper for fire ventilation systems with a 24 V compact Belimo actuator with limit switches.

Chapter 9 - power supply and control (p. 95) contains:
- technical specifications and connection diagrams for the trigger control mechanisms supporting the damper,
- location of trigger control mechanisms in relation to the damper - manufacture standards.

mcr FID PRO

low-resistance circular single-blade cut-off fire dampers for residential ventilation systems

PRODUCT CONFIGURATOR AT WWW.MERCOR.COM.PL

1488-CPR-0467/W

1396-CPR-0098

ATEST HIGIENICZNY

CERTYFIKACJA PRODUKTU

- EIS120
- **Certificate of constancy of performance 1488-CPR-0467/W and 1396-CPR-0098.**
- **Dampers certified for compliance with EN 15650.**
- **Dampers qualified under EN 13501-4 and tested under EN 1366-2.**
- **Cut-off dampers with the fire resistance independent of airflow direction and installation side.**
- **Lower acoustic noise and hydraulic resistance in the system with reduced partition thickness.**

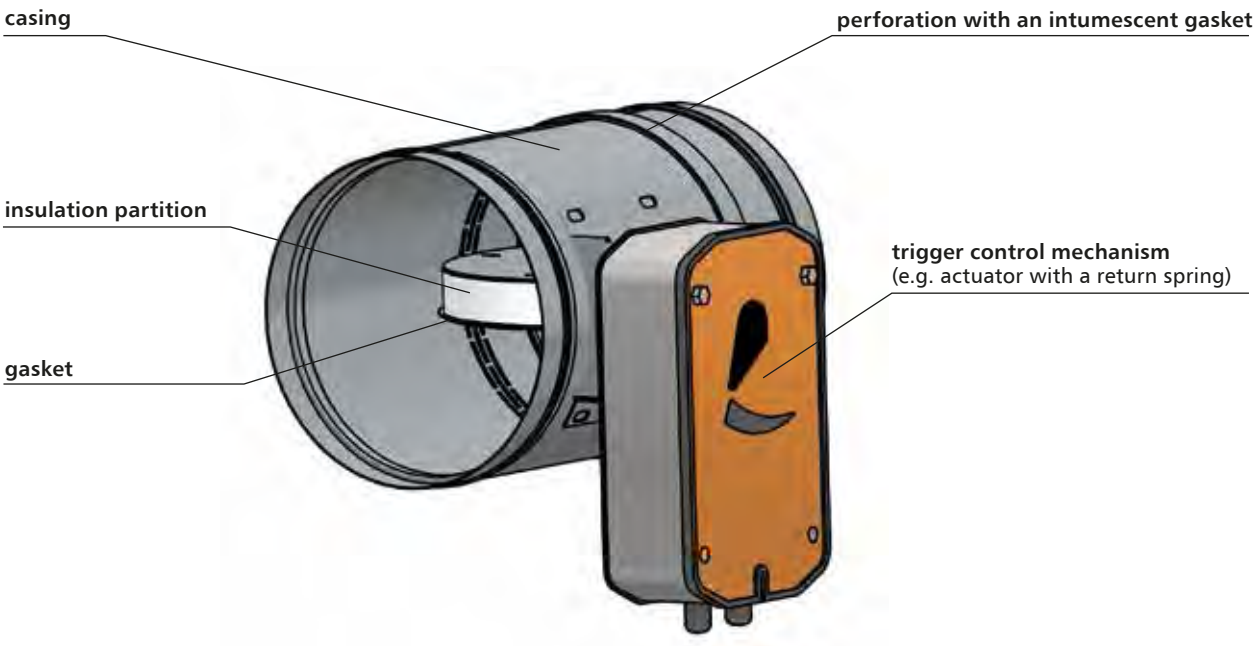
4.1. application

The mcr FID PRO low-resistance cut-off dampers are designed for integration in residential ventilation systems, where those systems pass through vertical and horizontal construction partitions. They are installed e.g. in systems with increased acoustic requirements.

During a fire, they enable the maintenance of the fire resistance of the construction partition that ventilation and air conditioning ducts are routed through. Furthermore, they prevent the spreading of fire, smoke and burning fumes to the remaining part of the building not on fire. During normal system operation, the partition of the damper is open. In case of fire, the damper partition closes.

The dampers cannot be operated in systems exposed to dust, except for when they are included in a special, individually developed programme of service and technical inspections.

4.2. design



The mcr FID PRO cut-off fire dampers consist of a casing with a circular cross section, a moving insulation partition and a trigger control mechanism, which is activated remotely or automatically when the thermal or thermoelectric trigger is tripped. Standard damper casing is made of galvanised steel sheet. In chemically aggressive environments, special manufacture casing is used, in which steel elements are made of 1.4404 acid-proof steel, while other elements are impregnated.

In the middle part, in which the insulation partition is seated, the casing is perforated at the width of 20 mm. On the damper circumference, around the closed cut-off valve, there is an intumescent gasket. The insulation partition is made of a fire-proof panel with the total thickness of 20 mm.

The partition is coated with sheet on both sides for mechanical reinforcement and reduced friction resistance. The damper circumference has a ventilation gasket installed, which ensures the tightness of dampers at the ambient temperature. Both ends of the casing feature a nipple (standard) or muff connection.

4.3. manufacture versions

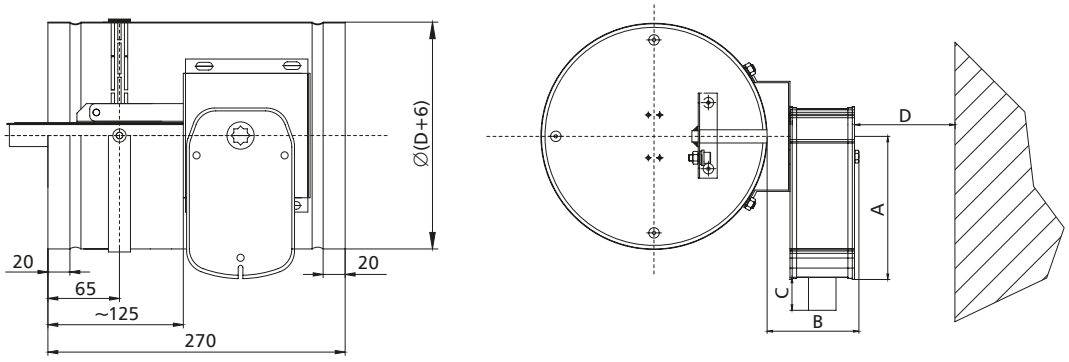
4.3.1. **mcr FID PRO** – the cut-off fire damper for ventilation ducts with an actuator with a return spring – damper closing and opening with an actuator

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically or remotely by cutting off the power supply.

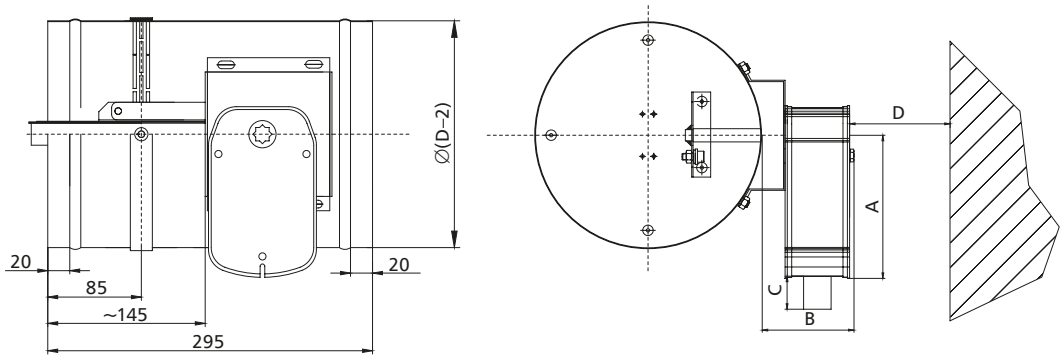
The mcr FID PRO dampers feature a trigger control mechanism in the form of a Belimo **BLF**, **BFL**, **BFN** axial actuator with a return valve, powered with 24 V AC/DC or 230 V AC, with thermoelectric trigger rated at 72°C (optionally it is possible to use triggers with the nominal tripping temperature of 95°C). BLF, BFL or BFN series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

The thermoelectric trigger features a test switch and a power supply indicator (LED).

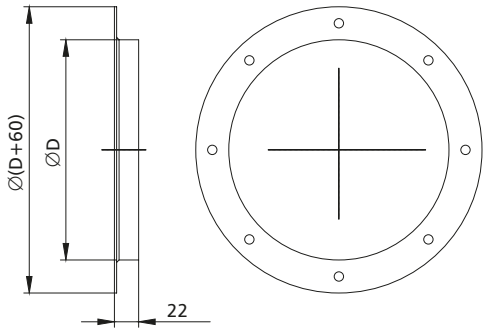
Dampers with Belimo actuators: analogue BLF, BFL, BFN, digital BF-TL, EXBF explosion proof actuators close as a result of thermoelectric trigger tripping or power supply cut-off by the action of the return spring placed in the actuator. The dampers open when the power supply voltage is applied to the actuator terminals. Furthermore, dampers with those actuators may be opened manually using a key.



female connection type (muff)



male connection type (nipple)



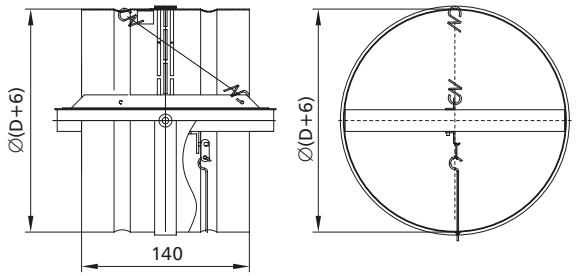
flange

mechanism	A	B	C	D
BLF	130	85	30	75
BFN	157	78	30	75
BFL	138	74	30	75
BF24TL-ST	198	85	10	75
EXBF	225	190	55	100

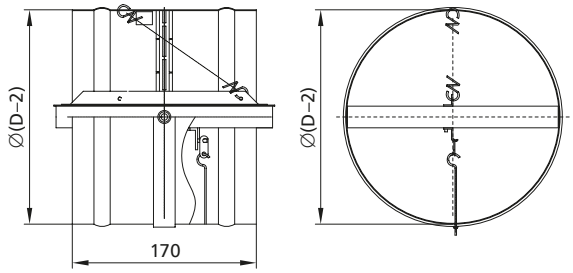
4.3.2. **mcr FID PRO** – the cut-off fire damper for ventilation ducts with a spring drive and thermal trigger

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically.

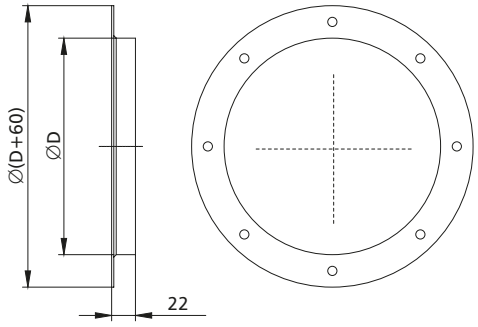
The mcr FID PRO dampers are equipped with a **RST** trigger control mechanism with a drive spring (without an integrated thermal trigger). In this case, a thermal trigger rated at 74°C (optionally 95°C) is installed outside the damper mechanism, on the appliance partition itself. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. It is possible to equip the damper with a WK1 or WK2 limit switch used to signal the partition position state.



female connection type (muff)



male connection type (nipple)

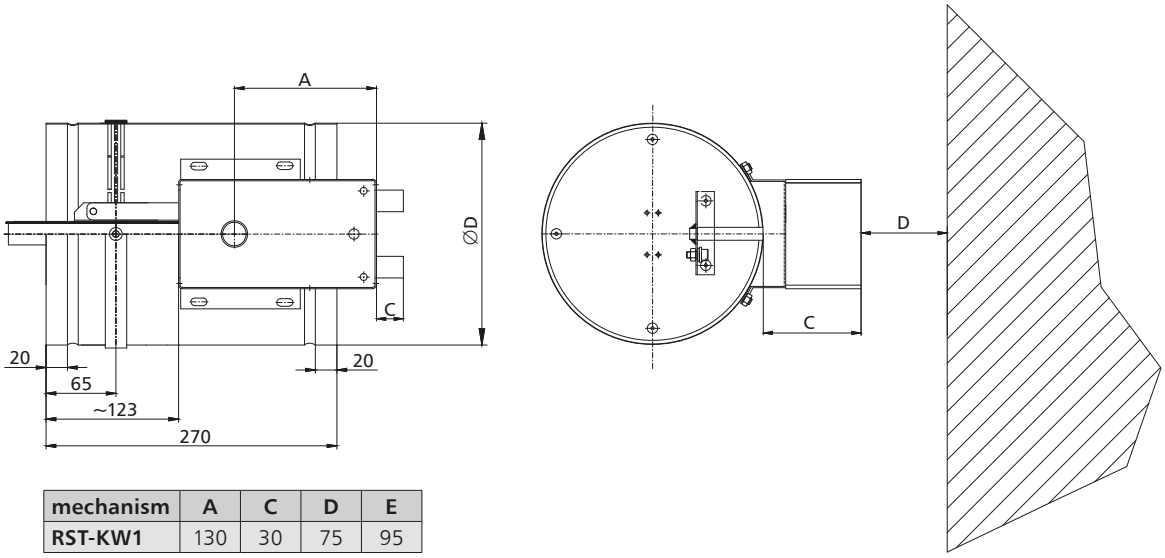


flange

4.3.3. mcr FID PRO – the cut-off fire damper for ventilation ducts with a spring drive and an integrated thermal trigger, optionally equipped with an electromagnetic trigger and limit switches

During normal operation, the insulation partition of the fire damper remains open. In case of fire, the partition closes automatically or, in case of a damper with an electromagnetic trigger, additionally using the fire automation.

The mcr FID PRO dampers are equipped with a **RST-KW1** trigger control mechanism with a drive spring and a cam lever assembly. A thermal trigger rated at 74°C (optionally at 95°C) is integrated into the damper mechanism. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. On the RST-KW1 mechanism, there is a mechanical indicator of partition position. It is possible to equip a trigger control mechanism with an electromagnetic trigger activated by the application („pulse") or removal („break") of the power supply voltage and with limit switches used to signal the partition position state. The mechanism features test and partition button-release functions. Partition re-opening is activated manually. It is not required to dismantle the system to replace the thermal trigger. The RST-KW1 mechanism may be replaced with an electric actuator.



mechanism	A	C	D	E
RST-KW1	130	30	75	95

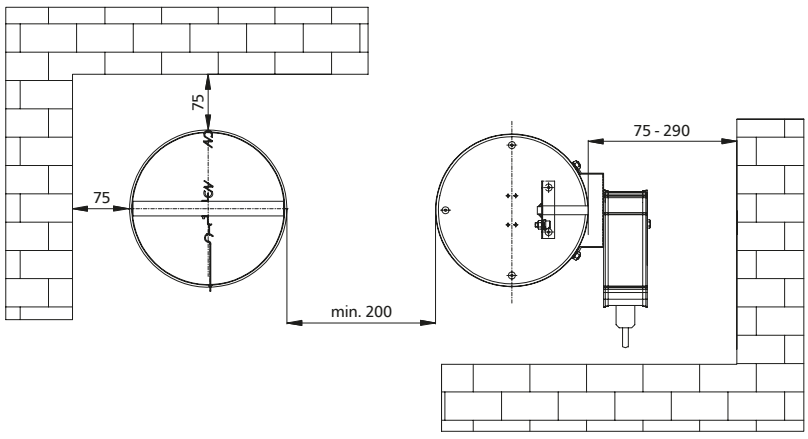
4.4. dimensions

Circular dampers:

- nominal diameter D from 100 mm to 200 mm

Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).

Distance between systems and partitions

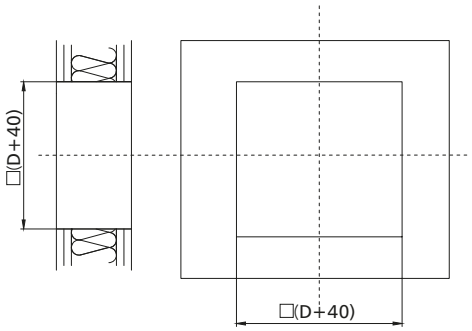


4.5. installation

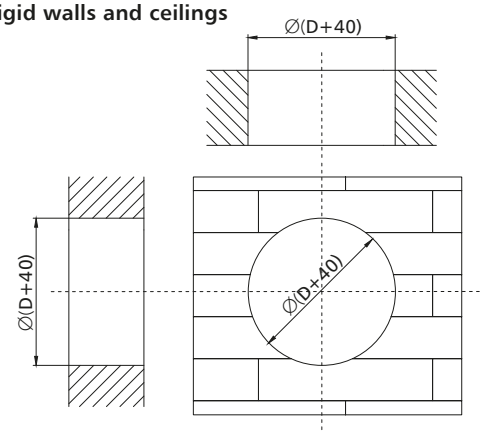
The mcr FID PRO circular dampers are EI120(ve ho i↔o)S-rated if installed in concrete partitions made of full bricks or cellular concrete blocks with the thickness of at least 125 mm, lightweight walls of cardboard-plaster panels on a steel framework with the thickness of at least 125 mm and the resistance class of not less than EI120 and concrete ceilings with the thickness of at least 150 mm.

4.5.1. preparation of installation openings

in light plaster-cardboard walls

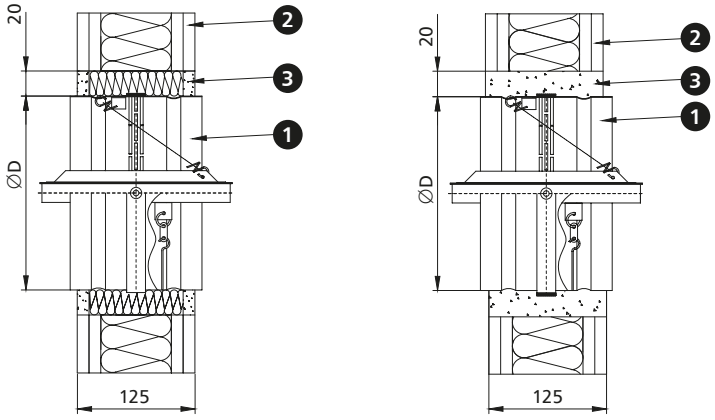


in rigid walls and ceilings

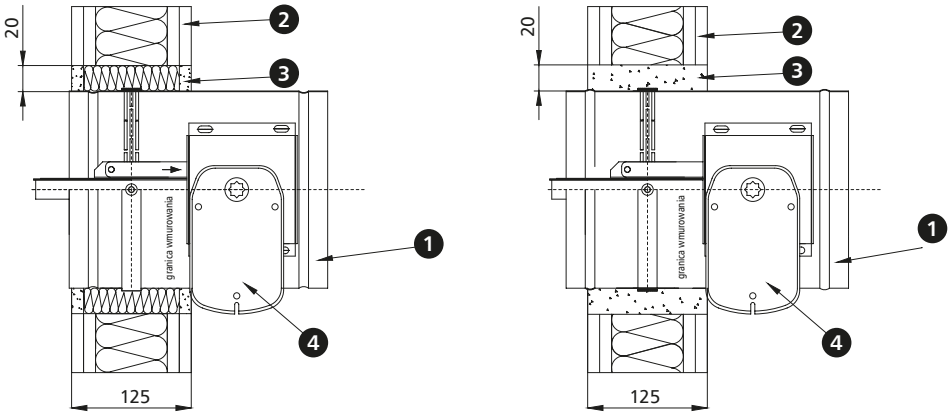


4.5.2. installation in lightweight walls of plaster-cardboard panels

sample installation of mcr FID PRO with a RST mechanism



sample installation of mcr FID PRO with a BLF, BFL, BFN or RST-KW1 mechanism

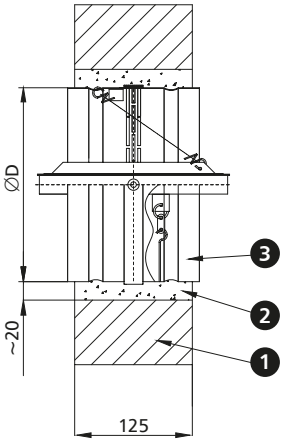


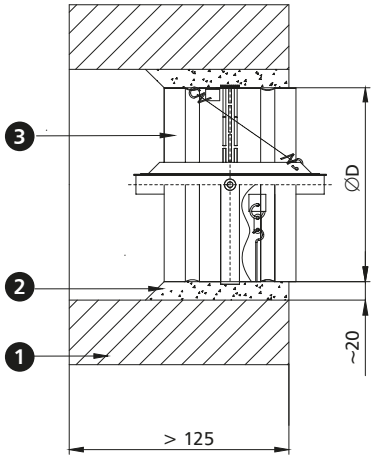
1. fire damper
2. lightweight wall
3. sealing - mineral wool and/or plaster mortar*
4. trigger control mechanism

*it is possible to use a different sealing that ensures the required fire resistance

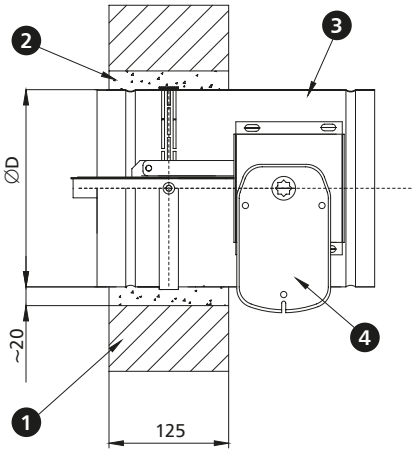
4.5.3. installation in concrete and masonry walls

sample installation of mcr FID PRO with a RST mechanism





sample installation of mcr FID PRO with a BLF, BFL, BFN or RST-KW1 mechanism

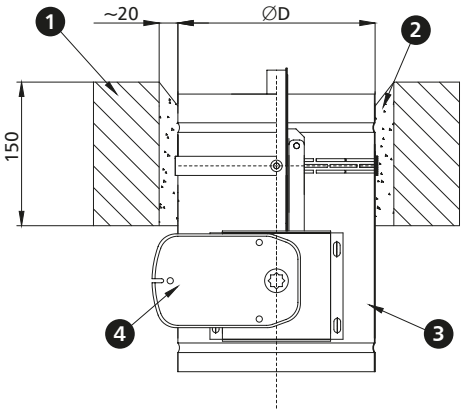


1. rigid wall - concrete, cellular concrete or bricks
2. sealing - concrete, cement or cement-lime masonry mortar*
3. fire damper
4. trigger control mechanism

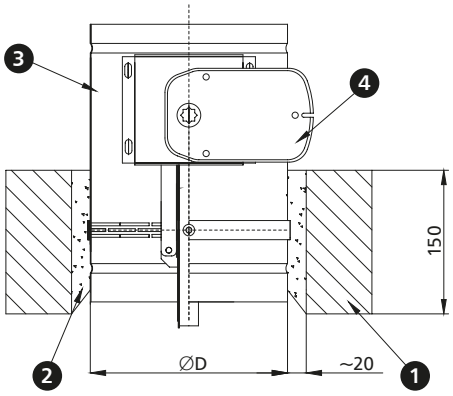
*it is possible to use a different sealing that ensures the required fire resistance

4.5.4. installation in ceilings

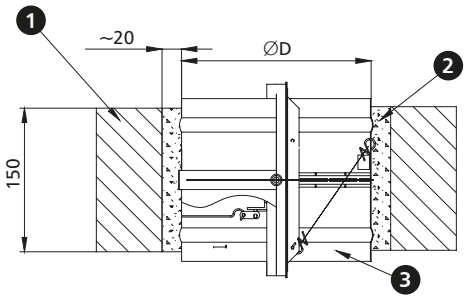
sample installation of a mcr FID PRO damper with a BLF, BFL, BFN or RST-KW1 mechanism



sample installation of a mcr FID PRO damper with a BLF, BFL, BFN or RST-KW1 mechanism



sample installation of a mcr FID PRO damper with a RST mechanism



1. ceiling
2. sealing - concrete, cement or cement-lime masonry mortar*
3. fire damper
4. trigger control mechanism

*it is possible to use a different sealing that ensures the required fire resistance

4.6. technical parameters of mcr FID PRO circular dampers

D – nominal diameter [mm]
v – velocity [m/s]

Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]
Q – flow [m^3/h]

weff – velocity measured on the damper active surface [m/s]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

mcr FID PRO 100

d [mm]	Sk [m^2]	Se [m^2]	v [m/s]	Q [m^3/h]	weff [m/s]	dp [Pa]	L_{WA} [dB]
100	0.0079	0.0057	2.0	41	2.8	4.5	21
			4.0	81	5.5	14	29
			6.0	122	8.3	26	37
			8.0	163	11.1	42	43

mcr FID PRO 125

d [mm]	Sk [m^2]	Se [m^2]	v [m/s]	Q [m^3/h]	weff [m/s]	dp [Pa]	L_{WA} [dB]
125	0.0123	0.0095	2.0	69	2.6	3	19
			4.0	137	5.2	10	27
			6.0	206	7.8	20	36
			8.0	274	10.4	33	42

mcr FID PRO 160

d [mm]	Sk [m^2]	Se [m^2]	v [m/s]	Q [m^3/h]	weff [m/s]	dp [Pa]	L_{WA} [dB]
160	0.0201	0.0166	2.0	119	2.4	2	17
			4.0	239	4.8	6	23
			6.0	358	7.3	15	34
			8.0	477	9.7	24	41

mcr FID PRO 200

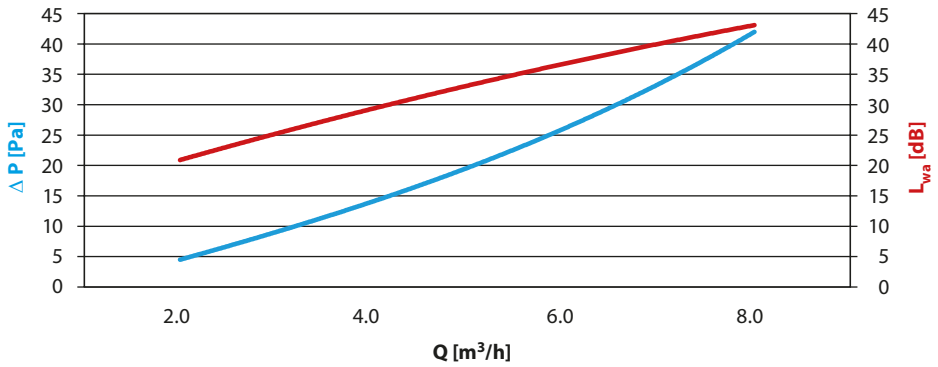
d [mm]	Sk [m^2]	Se [m^2]	v [m/s]	Q [m^3/h]	weff [m/s]	dp [Pa]	L_{WA} [dB]
200	0.0314	0.027	2.0	194	2.3	1	16
			4.0	389	4.7	5	21
			6.0	583	7.0	11	33
			8.0	778	9.3	20	40

4.6.1 flow characteristics in circular mcr FID PRO dampers

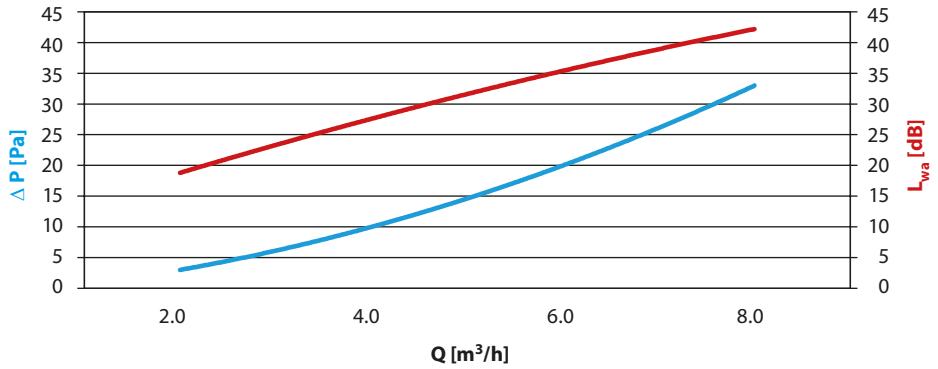
pressure drop on a damper

damper noise level

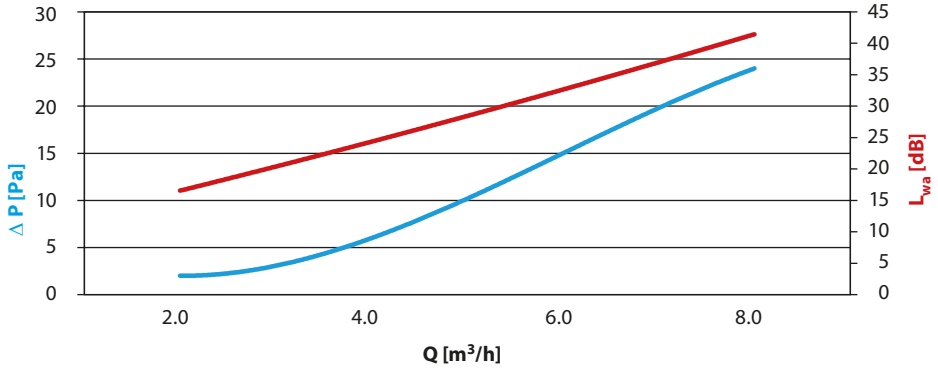
mcr FID PRO 100



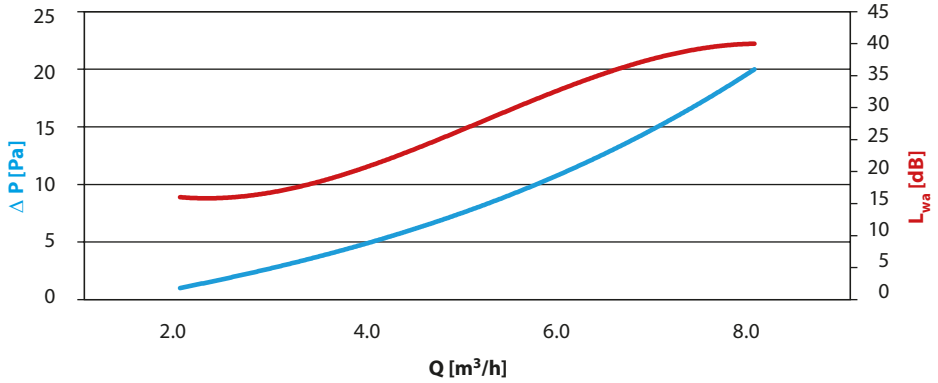
mcr FID PRO 125



mcr FID PRO 160



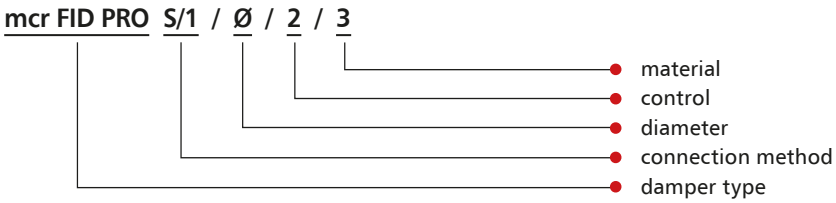
mcr FID PRO 200



4.7. estimated weights of mcr FID PRO dampers for circular ventilation ducts [kg]

diameter D [mm]	RST	actuator/RST-KW1
100	0.7	2.5
125	0.9	3
160	1.25	3.5
200	1.5	4.5

4.8. designation



1 – connection method:

N or **[no symbol]** – male connection (nipple**)**
M – female connection (muff)
K – flange

2 – control:

– RST trigger control mechanism
RST – thermal trigger
RST/WK1 – thermal trigger + limit switch (closed partition signal)
RST/WK2 – thermal trigger + limit switch (open/closed partition signal)

– RST-KW1 trigger control mechanism
RST-KW1/S – thermal trigger
RST-KW1/S/WK2 – thermal trigger + limit switch (open/closed partition signal)
RST-KW1/24I – thermal trigger + „pulse" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/24P – thermal trigger + „break" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/230I – thermal trigger + „pulse" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)
RST-KW1/230P – thermal trigger + „break" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)

– Belimo trigger control mechanism
BLF24-T – actuator with a return spring, U = 24 V AC/DC
BLF230-T – actuator with a return spring, U = 230 V AC
BF24TL-T-ST (with the BKN230-24MP option) – actuator with a return spring, U = 24 V, MP Bus digital control
EXBF24-T – explosion proof actuator with a return spring in the Ex version, U = 24 V AC/DC
EXBF230-T – explosion proof actuator with a return spring in the Ex version, U = 230 V AC
BLF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFL24-T – actuator with a return spring, U = 24 V AC/DC
BFL230-T – actuator with a return spring, U = 230 V AC
BFL24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFN24-T – actuator with a return spring, U = 24 V AC/DC
BFN230-T – actuator with a return spring, U = 230 V AC
BFN24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system

3 – material:

[no symbol] – galvanised steel, Zn 275 g/m^2 coating
KN – 1.4404 acid-proof stainless steel

example designation:

mcr FID PRO Ø125 BLF24-T

EIS120 low-resistance cut-off damper with a 24 V compact Belimo actuator with a thermoelectric trigger and limit switches.

mcr FID PRO Ø125 RST/WK1

EIS120 low-resistance cut-off fire damper with a trigger rated at 74°C and a partition closing limit switch.

Chapter 9 - power supply and control (p. 95) contains:
- technical specifications and connection diagrams for the trigger control mechanisms supporting the damper,
- location of trigger control mechanisms in relation to the damper - manufacture standards.

1396-CPR-0092

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- **EIS120**
- **Certificate of constancy of performance 1396-CPR-0092.**
- **Valves certified for compliance with EN 15650.**
- **Valves qualified under EN 13501-4 and tested under EN 1366-2.**

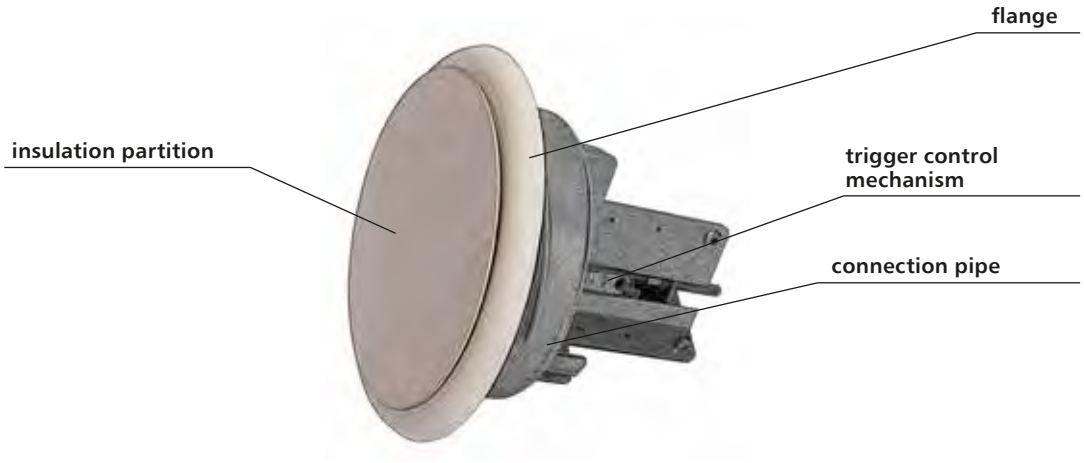
5.1. application

The mcr ZIPP cut-off fire valves are designed for installation on the ends of the general ventilation system, where those systems pass through construction partitions. They are used to separate the fire hazard zone from other parts of the building and to transfer air through construction partitions. During normal system operation, the valves are open. In case of fire, the valves close.

Furthermore, the mcr ZIPP cut-off fire valves may be used to close transfer openings, in which case they are installed without connection ducts.

Valves may also be used in the systems protecting escape routes from smoke, in which case they remain open during the fire and ensure the supply of fresh air to escape routes. As the fire develops further, the valves are automatically closed as a result of thermal trigger tripping, which prevents the spreading of fire and smoke to other rooms.

5.2. design



The mcr ZIPP cut-off valves consist of a casing with a circular cross-section, a moving cut-off partition (cover), a connection stub pipe and a trigger control mechanism activated when the thermal or electromagnetic trigger trips, with the automatic trip of the thermal trigger overrides the remote power supply application or disconnection.

The connection stub pipe is made of galvanised steel sheet. The valve flange is made of powder-painted steel sheet. The insulation partition of the valve is made of fire protection material, coated on the outside with powder-painted steel sheet. The partition is seated on a treaded, moving guiding pin, which enables the adjustment of performance (active surface) of the valve by tightening the cover.

During normal operation, cut-off valves remain open. The valve switches to safe mode (closes):

- automatically, by the thermal trigger tripping (RST trigger control mechanism),
- remotely, by the electromagnetic and thermal trigger tripping (RST+EK trigger control mechanism).

As a standard the valves are painted in RAL 9010.

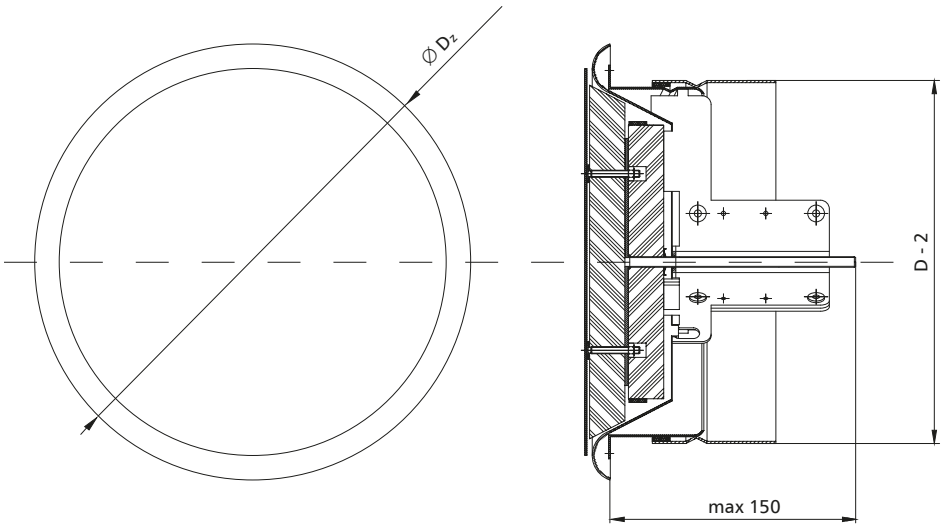
5.3. manufacture versions

5.3.1. **mcr ZIPP RST** – the cut-off fire valve for ventilation ducts with a thermal trigger

During normal operation, the insulation partition of the fire valve remains open. In case of fire, the partition closes automatically.

The mcr ZIPP RST valves are equipped with a RST trigger control mechanism with a thermal trigger rated at 74°C (optionally, it is possible to use triggers with the nominal tripping temperature of 95°C) and a drive spring. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. It is possible to equip the valves with a WK1 limit switch used to signal the partition position state.

closed valve partition

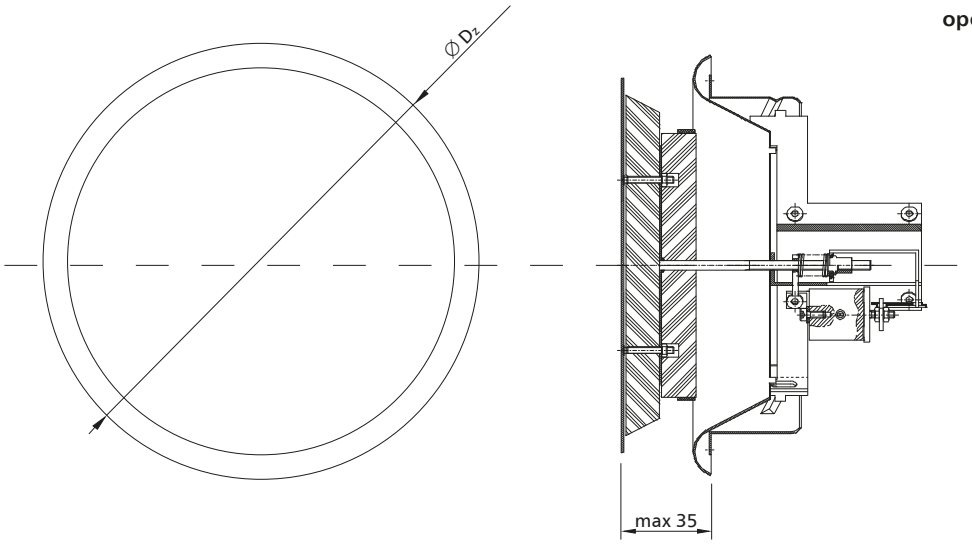


5.3.2. **mcr ZIPP RST+EK** – the cut-off fire valve for ventilation ducts with an electromagnetic and thermal trigger

During normal operation, the insulation partition of the fire valve remains open. In case of fire, the partition closes automatically or remotely by applying or cutting off the power supply.

The mcr ZIPP RST+EK valves are equipped with a trigger control mechanism with a thermal trigger rated at 74°C (optionally 95°C), a drive spring and an electromagnetic trigger tripped by the power supply application („pulse") or removal („break"). The use of a MP230/24 conversion element enables tripping the partition with 230 V AC voltage. The valve is equipped with a WK1 limit switch used to signal the partition position state.

open valve partition



5.4. dimensions

Circular valves:

- nominal diameter D: 100 mm, 125 mm, 160 mm, 200 mm.

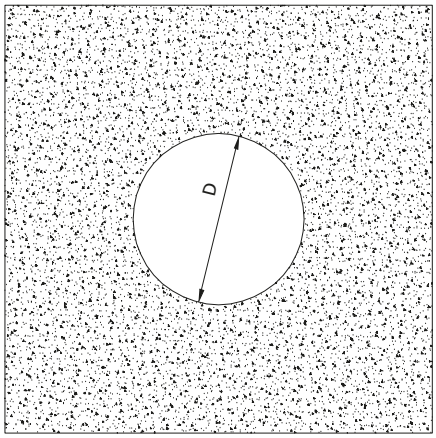
5.5. installation

The mcr ZIPP valves are EI120(ve ho o→i)S-rated if installed in concrete partitions made of full bricks or cellular concrete blocks with the thickness of at least 110 mm, light walls of cardboard-plaster panels on a steel framework with the thickness of at least 125 mm and the resistance class of not less than EI120 and concrete ceilings with the thickness of at least 150 mm.

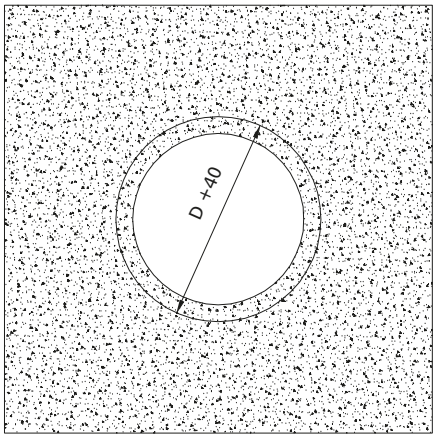
In the case of ductless installation, the valves have the resistance of EI120(ho i→o).

5.5.1. preparation of installation openings

in lightweight plaster-cardboard walls

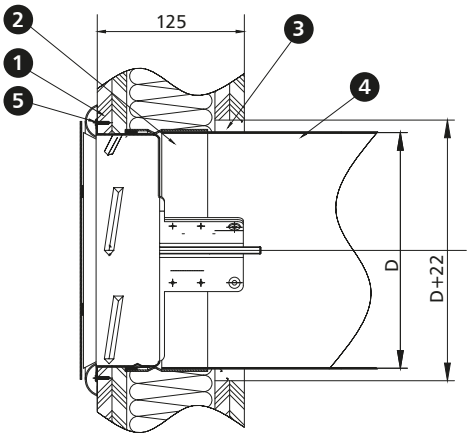


in rigid walls and ceilings



5.5.2. installation in lightweight walls of plaster-cardboard panels on a steel framework

duct installation

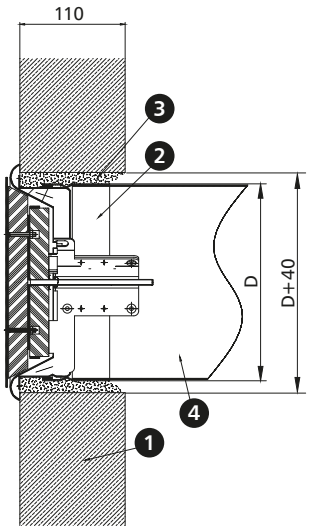


1. plaster-cardboard panel
2. extension connection pipe
3. sealing - plaster mortar*
4. ventilation duct
5. screw for plaster-cardboard

*it is possible to use a different sealing that ensures the required fire resistance

5.5.3. installation in rigid walls

duct installation

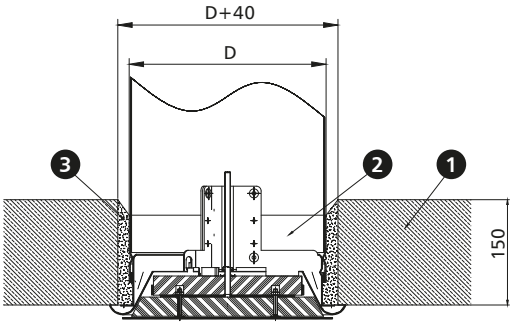


1. rigid concrete or masonry wall
2. extension connection pipe
3. sealing - plaster or cement mortar*
4. duct

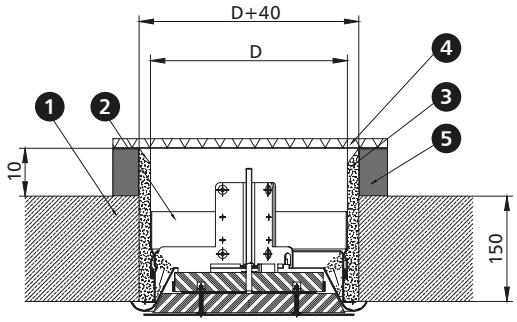
*it is possible to use a different sealing that ensures the required fire resistance

5.5.4. installation in ceilings

duct installation



ductless installation



1. ceiling
2. extension connection pipe
3. sealing - plaster or cement mortar*
4. guard grid (not included)
5. circumferential band or duct cover of the given height

*it is possible to use a different sealing that ensures the required fire resistance

5.6. technical parameters of mcr ZIPP valves

Se – damper active cross-section [m^2]
Sk – duct cross-section [m^2]
D – nominal diameter [mm]

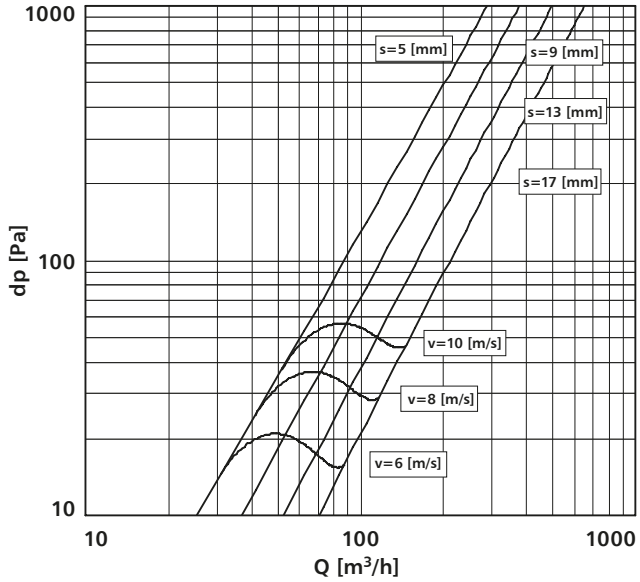
diameter D [mm]	100	125	160	200
Se	0.0027	0.0055	0.0111	0.0191
Sk	0.0079	0.0123	0.0201	0.0314

Flow characteristics

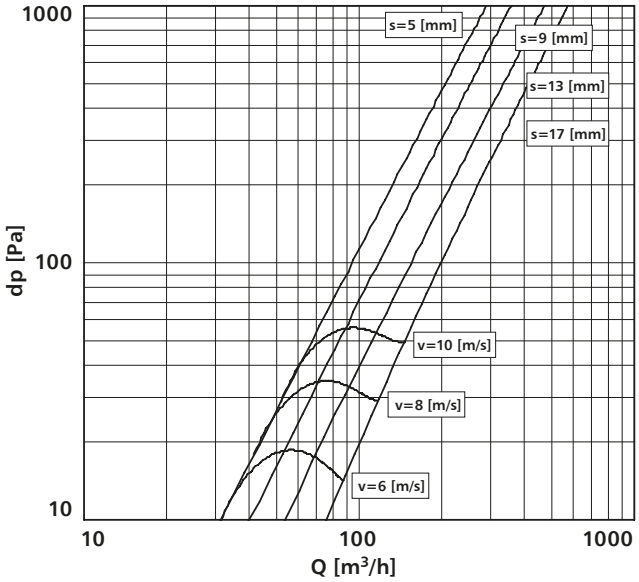
dp – pressure drop [Pa] **s** – valve opening [mm] **v** – velocity [m/s] **Q** – flow [m³/h]

mcr ZIPP 100 flow characteristics

air supply

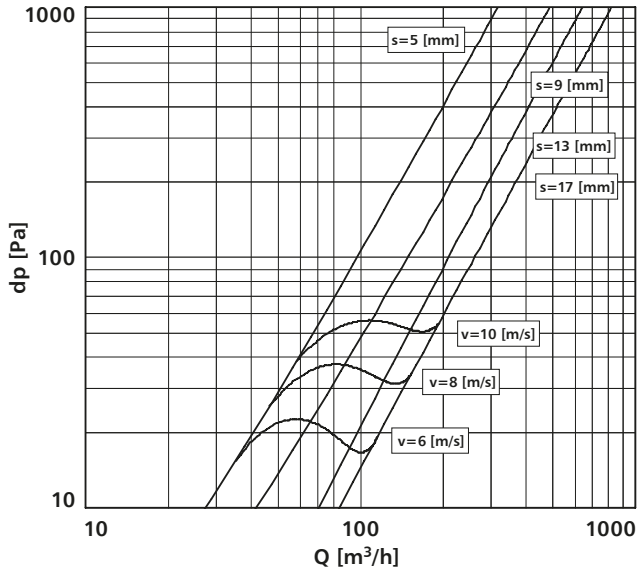


exhaust

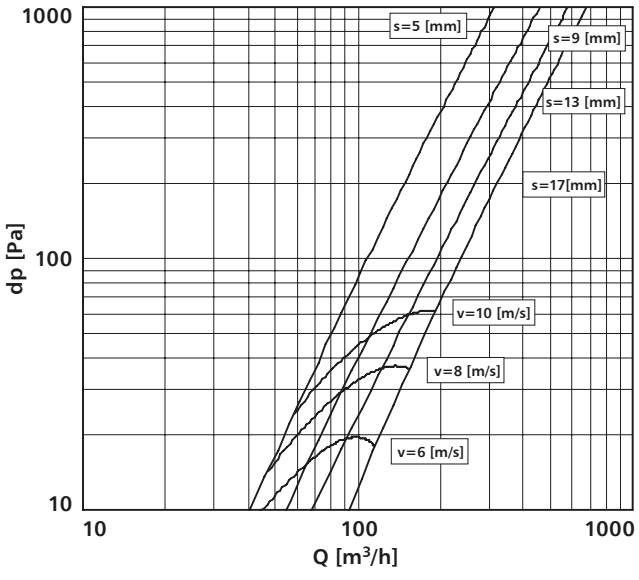


mcr ZIPP 125 flow characteristics

air supply



exhaust

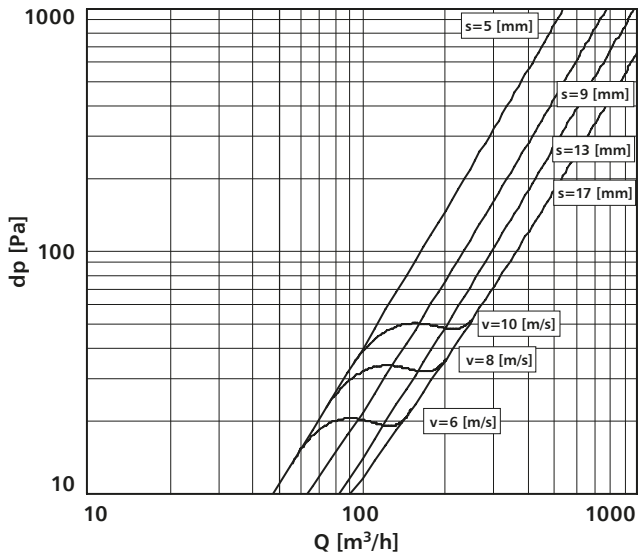


Flow characteristics

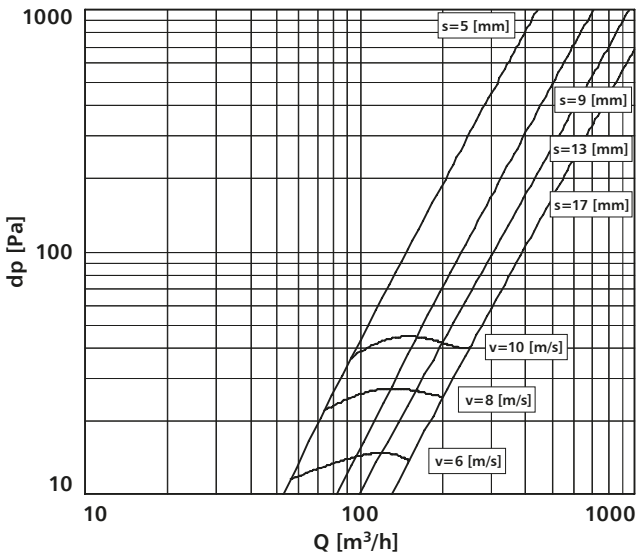
dp – pressure drop [Pa] **s** – valve opening [mm] **v** – velocity [m/s] **Q** – flow [m³/h]

mcr ZIPP 160 flow characteristics

air supply

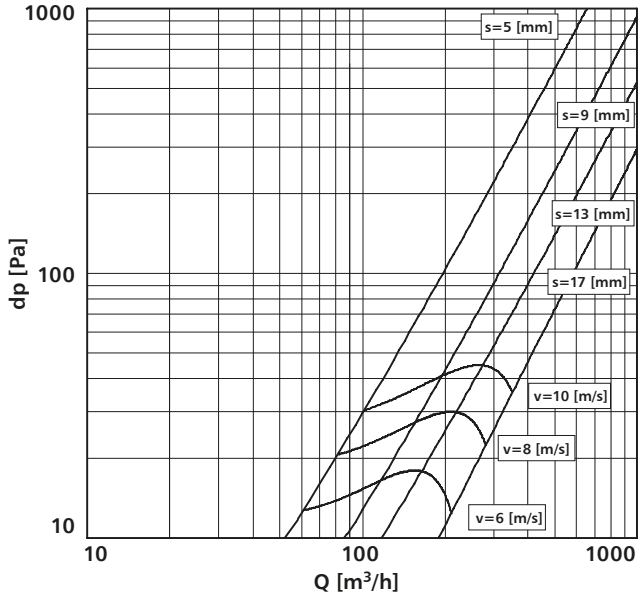


exhaust

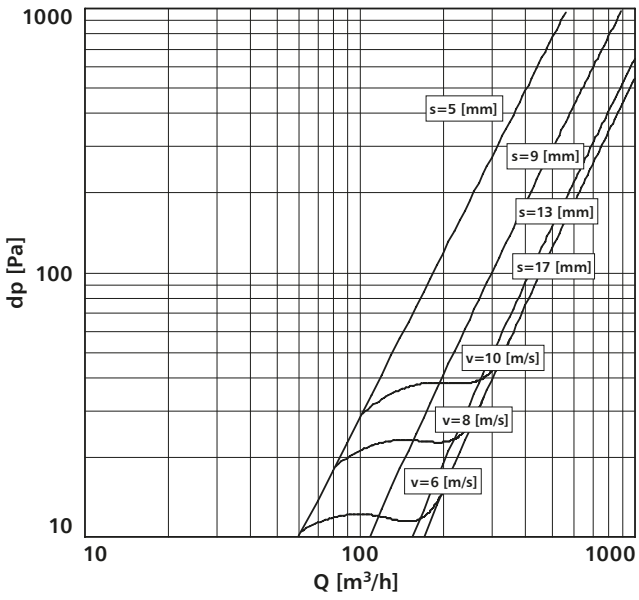


mcr ZIPP 200 flow characteristics

air supply



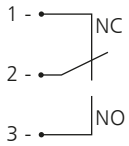
exhaust



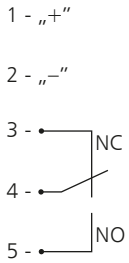
5.7. trigger control mechanisms – specifications and connection diagram

manufacture type	RST	RST+WK1	RST+EKI	RST+EKP	MP230/24
thermal trigger	+	+	+	+	-
limit switch	-	250 V AC / 5A	250V AC / 5A	250 V AC / 5A	-
rated voltage	-	-	24 V DC	24 V DC	230 V AC / output 24 V DC
power consumption	-	-	3.5 W	1.8 W	2 W

electric connection diagram for the ZIPP RST+WK1 valve

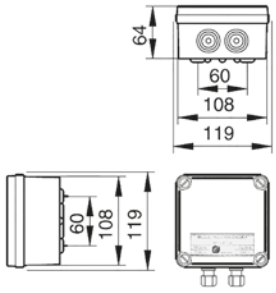


electric connection diagram for the ZIPP RST+EK valve



note: the position of limit switch in standby

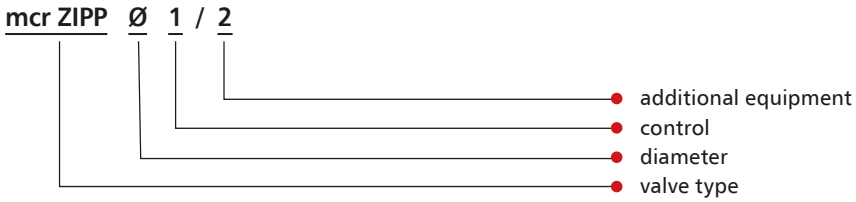
diagram and dimensions of the MP230/24 conversion unit



5.8. weights of the mcr ZIPP values for circular ventilation ducts [kg]

D [mm]	RST	RST+EK
100	0.9	1
125	1.5	1.6
160	1.7	1.8
200	2.7	2.8

5.9. designation



1 – control:

– RST trigger control mechanism
RST – thermal trigger

– RST+EK trigger control mechanism
RST+EKI24 – thermal trigger + „pulse" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST+EKP24 – thermal trigger + „break" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)

2 – additional equipment:

WK1 – limit switch (closed partition signal)
MP230/24 – conversion unit – possible to power with the voltage of 230 V AC
RMK – extension stub pipe

example designation:

mcr ZIPP Ø125 RST

EIS120 cut-off fire valve with a thermal trigger rated at 74°C.

mcr ZIPP Ø125 RST + WK1

EIS120 cut-off fire valve with a thermal trigger rated at 74°C and a limit switch.

mcr ZIPP Ø125 RST + EKP24

EIS120 cut-off fire valve with a thermal trigger rated at 74°C and a „break" electromagnetic trigger, U = 24 V DC and a limit switch.

mcr ZIPP Ø125 RST+EKI24+MP230/24

EIS120 cut-off fire valve with a thermal trigger rated at 74°C and a „pulse" electromagnetic trigger, U = 24 V DC, a limit switch and a 230 V AC to 24 V DC voltage conversion unit.

mcr WIP

multi-blade cut-off fire dampers for residential ventilation systems

1396-CPR-P0097

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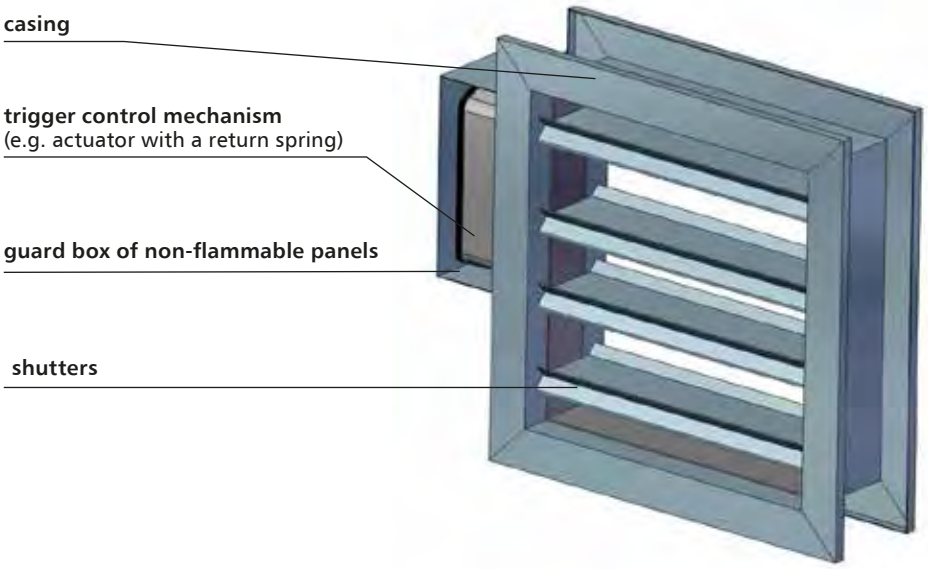
- **EIS60, ES120**
- **Certificate of constancy of performance 1396-CPR-P0097.**
- **Dampers certified for compliance with EN 15650.**
- **Dampers qualified under EN 13501-3 and tested under EN 1366-2.**
- **Narrow shutter cut-off dampers.**

6.1. application

The mcr WIP multi-plane cut-off dampers are designed for integration in general ventilation systems, where those systems pass through construction partitions. The mcr WIP dampers are particularly useful for systems with a silencer elbow or supply and extract grill.

During a fire, they enable the maintenance of the fire resistance of the construction partition that ventilation and air conditioning ducts are routed through. Furthermore, they prevent the spreading of fire, smoke and burning fumes to the remaining part of the building not on fire. During normal system operation, the shutters are open. In case of fire, the shutters close.

6.2. design



The mcr WIP cut-off dampers consist of a casing with a rectangular cross section, a moving insulation partition in the form of multiple blades - shutters revolving on their axes and a trigger control mechanism which is tripped remotely or automatically by tripping a thermal trigger. Damper casing is made of a steel, galvanised or stainless steel sheet. Its integral part is a flange of silicate-cement panels. The inner side of the fire damper casing features an intumescent gasket. The casing total length is 140 mm.

The shutter surface is covered with galvanised or stainless steel sheet. Each shutter with the thickness of 15 mm is filled with a plaster panel. The partition shutters revolve on their axes, which consist of two steel pins.

Square and rectangular dampers are made with 50 mm flanges that enable the correct installation of dampers in ventilation ducts. In a circular duct, the damper is made as square with a circular connection.

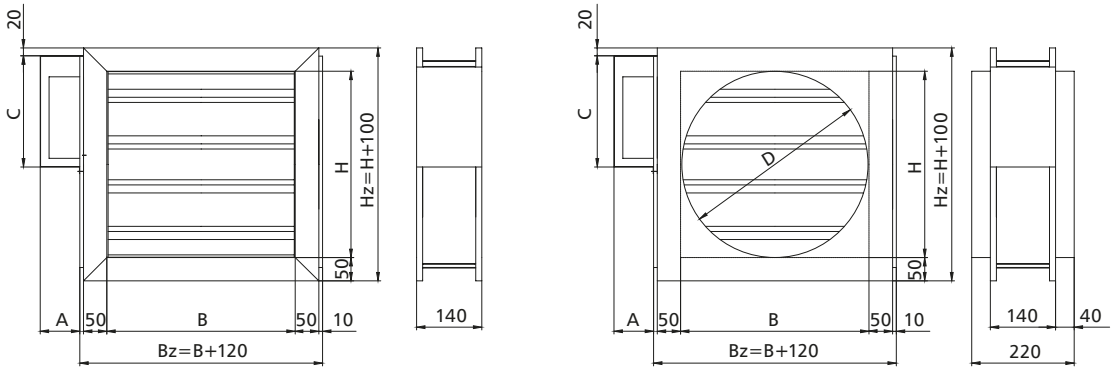
6.3. manufacture versions

6.3.1. **mcr WIP/S** – the cut-off fire damper for ventilation ducts with an actuator with a return spring – damper closing and opening with an actuator

During normal operation, the cut-off shutters of the fire damper remain open. In case of fire, the shutters close automatically or remotely by cutting off the power supply.

The mcr WIP/S dampers feature a trigger control mechanism in the form of a Belimo **BLF, BFL, BFN, BF** axial actuator with a return spring, powered with 24 V AC/DC or 230 V AC, with thermoelectric trigger rated at 72°C (optionally it is possible to use triggers with the nominal tripping temperature of 95°C). BLF, BFL, BFN, BF series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

Dampers with Belimo actuators: analogue BLF, BFL, BFN, BF, digital BF-TL, EXBF explosion proof actuators close as a result of thermoelectric trigger tripping or power supply cut-off by the action of the return spring placed in the actuator. The dampers open when the power supply voltage is applied to the actuator terminals. Furthermore, dampers with those actuators may be opened manually using a key.

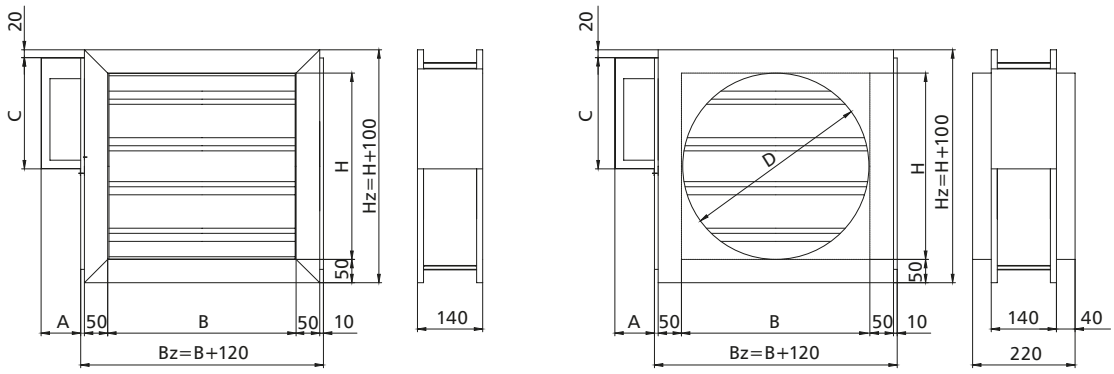


mechanism	A	C
BLF	125	275
BFN	125	325
BFL	125	275
BF	125	325
BF24TL-ST	125	325
EXBF	175	400

6.3.2. mcr WIP/S – the cut-off fire damper for ventilation ducts with a spring drive and an integrated thermal trigger, optionally equipped with an electromagnetic trigger and limit switches

During normal operation, the cut-off shutters of the fire damper remain open. In case of fire, the shutters close automatically or, in case of a damper with an electromagnetic trigger, additionally using the fire automation.

The mcr WIP/S dampers are equipped with a **RST-KW1** trigger control mechanism with a drive spring and a cam lever assembly. A thermal trigger rated at 74°C (optionally at 95°C) is integrated into the damper mechanism. After the set temperature is exceeded, the thermal trigger is tripped and the partition closes. On the RST-KW1 mechanism, there is a mechanical partition position indicator. It is possible to equip a trigger control mechanism with an electromagnetic trigger activated by the application („pulse") or removal („break") of the power supply voltage and with limit switches used to signal the partition position state. The mechanism features test and partition button-release functions. Partition reopening is activated manually.



mechanism	A	C
RST-KW1	165	275

6.4. dimensions

Rectangular dampers:

- nominal width B: from 120 mm to 1000 mm
- nominal height H: from 160 mm to 1000 mm
- the maximum cross-section surface of one damper up to 1 m^2

Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).

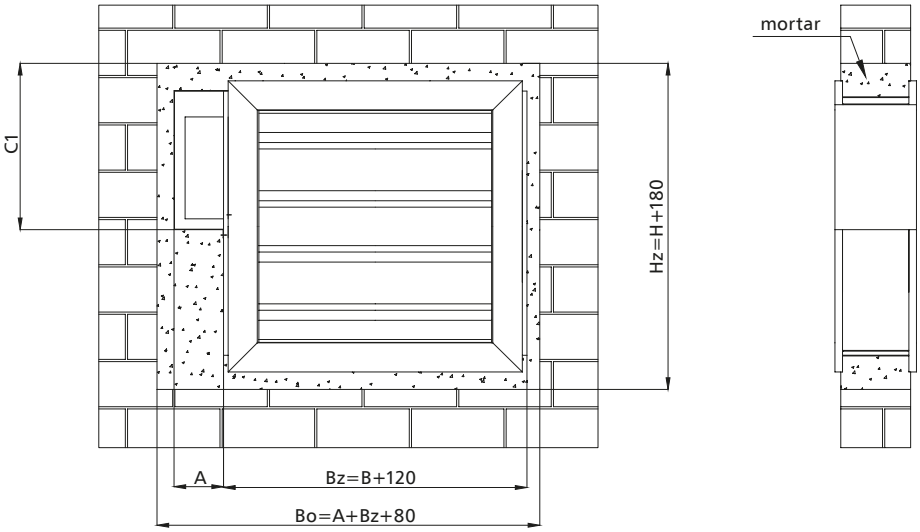
6.5. installation

The mcr WIP/S rectangular dampers are EI60(ve i↔o)S-rated and E120(ve i↔o)S-rated if installed in concrete partitions with the thickness of at least 110 mm, made of full bricks or cellular concrete blocks with the thickness of at least 115 mm, lightweight walls with the resistance rating of not less than EI60.

6.5.1. preparation of installation openings

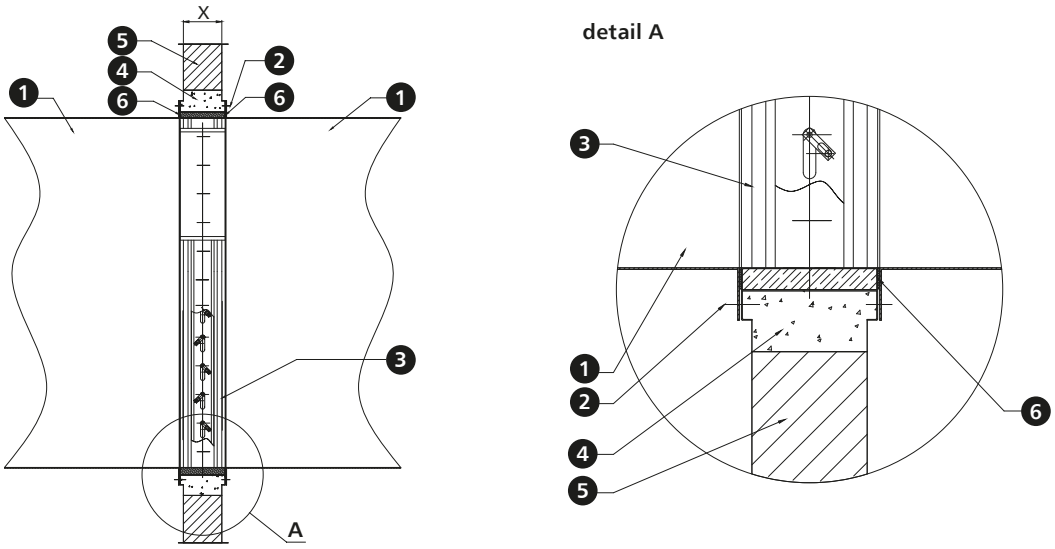
The minimum dimensions of the installation opening that permits correct installation of the mcr WIP damper is:

Bo = (A+Bz+80) mm
Ho = (H+180) mm



	BF	BLF	BFL	BFN	RST-KW1	EXBF
C1 [mm]	385	335	335	385	335	460
A [mm]	125	125	125	125	165	175

6.5.2. sample installation in concrete or masonry walls

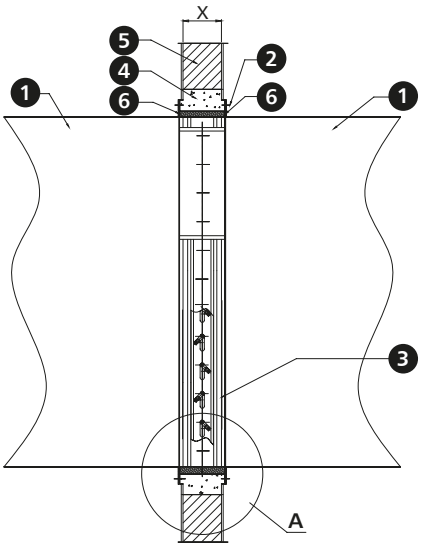


1. ventilation duct
2. screw ST4.2x16
3. mcr WIP damper
4. sealing - e.g. cement masonry mortar*
5. masonry wall
6. heat resistant gasket

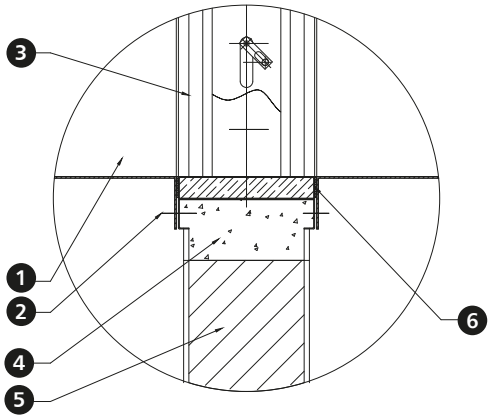
X. wall thickness

*it is possible to use a different sealing that ensures the required fire resistance

6.5.3. sample installation in concrete block or full brick walls



detail A

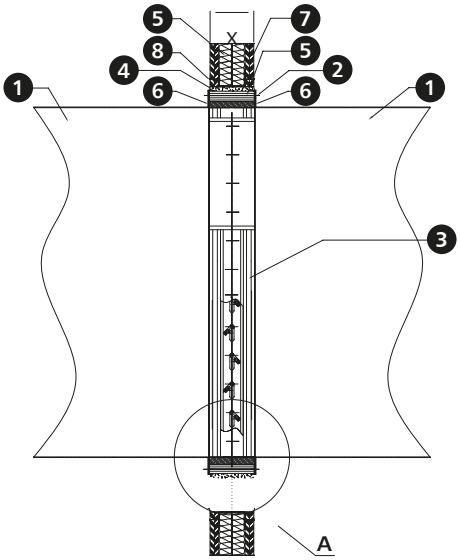


1. ventilation duct
2. screw ST4.2x16
3. mcr WIP damper
4. sealing - e.g. cement masonry mortar*
5. wall of concrete blocks or full bricks
6. heat resistant gasket

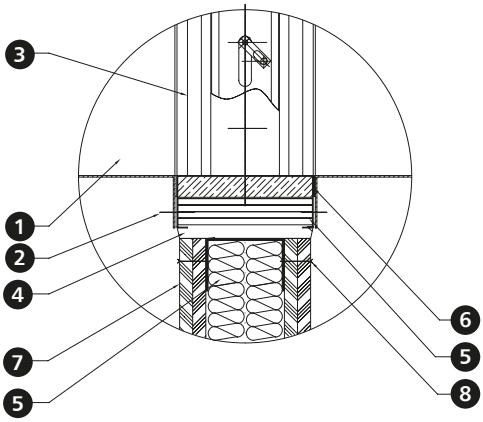
X. wall thickness

*it is possible to use a different sealing that ensures the required fire resistance

6.5.4. sample installation in lightweight walls



detail A

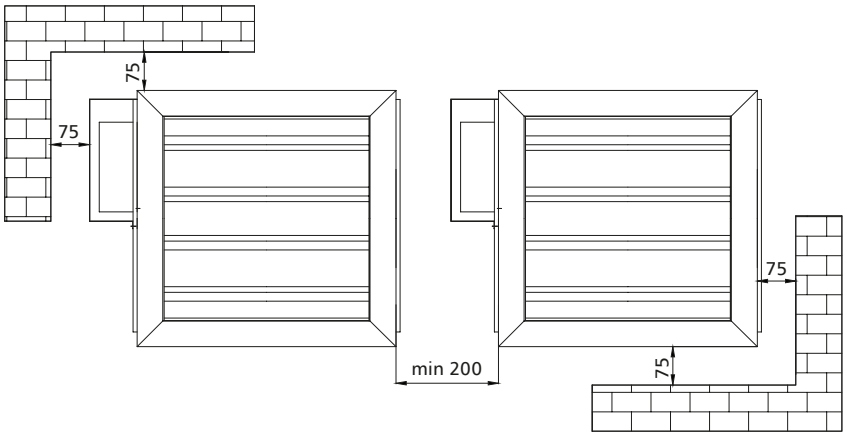


1. ventilation duct
2. screw ST4.2x16
3. mcr WIP damper
4. sealing - e.g. cement masonry mortar*
5. mineral wool with the density of at least 80 kg/m^3
6. heat resistant gasket
7. lightweight wall
8. screw ST5.5x38

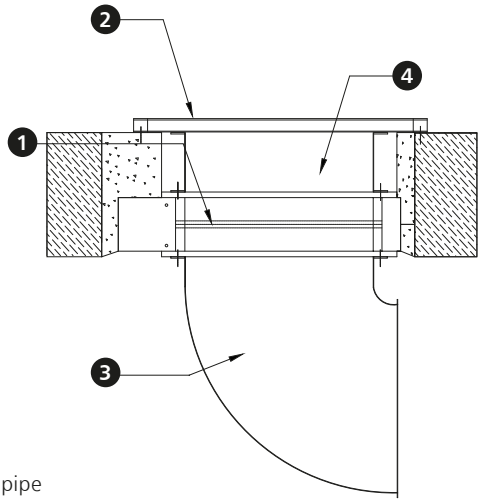
X. wall thickness

*it is possible to use a different sealing that ensures the required fire resistance

distance between systems and partitions



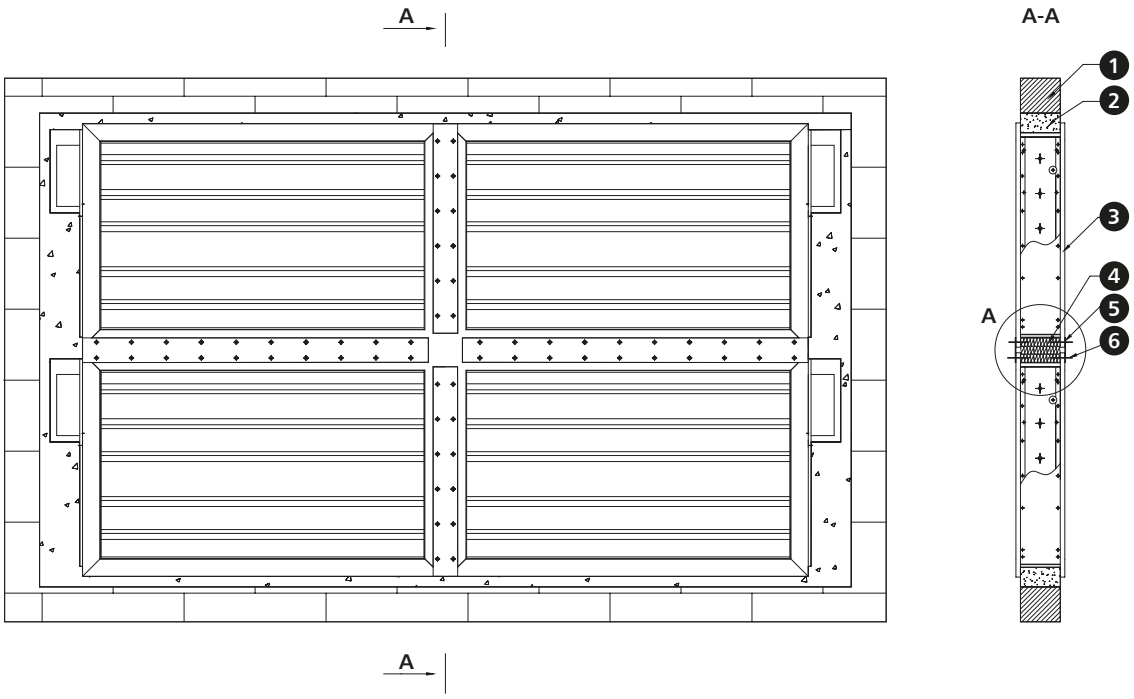
sample application

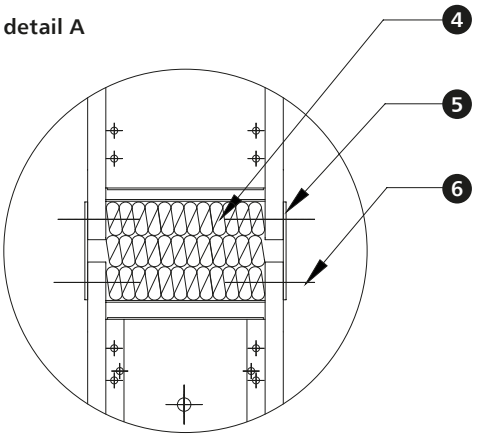


1. mcr WIP damper
2. duct cover
3. ventilation duct
4. duct - ventilation straight connection pipe

If a mcr WIP damper is used, with the shutters (no single-plane partition) it is possible to use the space in front of and behind the damper for such system elements as a grill or a rectangular silencer or to route a duct along the wall using a duct bend or reduction.

6.5.4. sample installation in a multiple set (a battery of four dampers)





1. e.g. masonry wall
2. e.g. cement mortar*
3. mcr WIP damper
4. mineral wool with the density of at least 80 kg/m^3
5. installation flat bar with the width of 70 mm
6. screw ST8x16

*it is possible to use a different sealing that ensures the required fire resistance

6.6. technical parameters of mcr WIP/S rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]															
			200					250					300					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.040	0.034	490	6	26	0.050	0.043	612	6	26	0.06	0.051	734	6	27
		6			734	13	36			918	13	37			1 102	13	37
		8			979	24	44			1 224	23	44			1 469	22	45
		10			1 224	37	49			1 530	36	50			1 836	35	50
	250	4	0.050	0.043	612	6	26	0.063	0.053	765	6	27	0.075	0.064	918	6	28
		6			918	13	37			1 148	13	38			1 377	13	38
		8			1 224	23	44			1 530	23	45			1 836	22	46
		10			1 530	36	50			1 913	36	51			2 295	35	51
	300	4	0.060	0.051	734	6	27	0.075	0.064	918	6	28	0.09	0.077	1 102	6	28
		6			1 102	13	37			1 377	13	38			1 652	13	39
		8			1 469	23	45			1 836	23	46			2 203	22	46
		10			1 836	36	51			2 295	36	52			2 754	35	52
	350	4	0.070	0.060	857	6	27	0.088	0.074	1 071	36	52	0.105	0.089	1 285	5	29
		6			1 285	13	38			1 607	13	39			1 928	12	39
		8			1 714	22	45			2 142	22	46			2 570	22	47
		10			2 142	35	51			2 678	35	52			3 213	34	52
	400	4	0.080	0.068	979	6	28	0.100	0.085	1 224	6	29	0.12	0.102	1 469	5	29
		6			1 469	13	38			1 836	13	39			2 203	12	40
		8			1 958	22	46			2 448	22	47			2 938	22	47
		10			2 448	35	52			3 060	35	53			3 672	34	53
	450	4	0.090	0.077	1 102	6	28	0.113	0.096	1 377	6	29	0.135	0.115	1 652	5	30
		6			1 652	13	39			2 066	13	40			2 479	12	40
		8			2 203	22	46			2 754	22	47			3 305	22	48
		10			2 754	35	52			3 443	35	53			4 131	34	54
	500	4	0.100	0.085	1 224	5	28	0.125	0.106	1 530	5	29	0.15	0.128	1 836	5	30
		6			1 836	12	39			2 295	12	40			2 754	12	40
		8			2 448	22	46			3 060	22	47			3 672	21	48
		10			3 060	34	52			3 825	34	53			4 590	33	54
	550	4	0.110	0.094	1 346	5	29	0.138	0.117	1 683	5	30	0.165	0.140	2 020	5	31
		6			2 020	12	39			2 525	12	40			3 029	12	41
		8			2 693	22	47			3 366	22	48			4 039	22	49
		10			3 366	34	53			4 208	34	54			5 049	34	54
	600	4	0.120	0.102	1 469	5	29	0.150	0.128	1 836	5	30	0.18	0.153	2 203	5	31
		6			2 203	12	40			2 754	12	41			3 305	12	41
		8			2 938	22	47			3 672	22	48			4 406	21	49
		10			3 672	34	53			4 590	34	54			5 508	33	54
	650	4	0.130	0.111	1 591	5	30	0.163	0.138	1 989	5	30	0.195	0.166	2 387	5	31
		6			2 387	12	40			2 984	12	41			3 580	12	41
		8			3 182	22	48			3 978	22	49			4 774	21	49
		10			3 978	34	53			4 973	34	54			5 967	33	55
	700	4	0.140	0.119	1 714	5	30	0.175	0.149	2 142	5	31	0.21	0.179	2 570	5	31
		6			2 570	12	40			3 213	12	41			3 856	12	42
		8			3 427	22	48			4 284	22	49			5 141	21	49
		10			4 284	34	54			5 355	34	55			6 426	33	55
	750	4	0.150	0.128	1 836	5	30	0.188	0.159	2 295	5	31	0.225	0.191	2 754	5	31
		6			2 754	12	40			3 443	12	41			4 131	12	42
		8			3 672	21	48			4 590	21	49			5 508	21	49
		10			4 590	33	54			5 738	33	55			6 885	32	55
	800	4	0.160	0.136	1 958	5	30	0.200	0.170	2 448	5	31	0.24	0.204	2 938	5	31
		6			2 938	12	41			3 672	12	42			4 406	12	42
		8			3 917	21	48			4 896	21	49			5 875	21	49
		10			4 896	33	54			6 120	33	55			7 344	32	55
	850	4	0.170	0.145	2 081	5	30	0.213	0.181	2 601	5	31	0.255	0.217	3 121	5	31
		6			3 121	12	40			3 902	12	41			4 682	11	42
		8			4 162	21	48			5 202	21	49			6 242	20	49
		10			5 202	32	54			6 503	32	55			7 803	31	55
	900	4	0.180	0.153	2 203	5	30	0.225	0.191	2 754	5	31	0.27	0.230	3 305	5	31
		6			3 305	12	41			4 131	12	42			4 957	11	42
		8			4 406	21	48			5 508	21	49			6 610	20	50
		10			5 508	32	54			6 885	32	55			8 262	31	55
	1000	4	0.200	0.170	2 448	5	31	0.250	0.213	3 060	5	32	0.3	0.255	3 672	5	32
		6			3 672	12	41			4 590	12	42			5 508	11	43
		8			4 896	21	49			6 120	21	50			7 344	20	50
		10			6 120	32	54			7 650	32	55			9 180	31	56

6.6. technical parameters of mcr WIP/S rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]	height H [mm]	v [m/s]	350 Sk [m^2]	350 Se [m^2]	350 Q [m^3/h]	350 dp [Pa]	350 L_{WA} [dB]	400 Sk [m^2]	400 Se [m^2]	400 Q [m^3/h]	400 dp [Pa]	400 L_{WA} [dB]	450 Sk [m^2]	450 Se [m^2]	450 Q [m^3/h]	450 dp [Pa]	450 L_{WA} [dB]
200		4	0.070	0.060	857	6	27	0.080	0.068	979	5	27	0.090	0.077	1 102	5	28
		6			1 285	13	38			1 469	12	38			1 652	12	38
		8			1 714	22	45			1 958	22	45			2 203	22	46
		10			2 142	35	51			2 448	34	51			2 754	34	52
250		4	0.088	0.074	1 071	6	28	0.100	0.085	1 224	5	28	0.113	0.096	1 377	5	29
		6			1 607	13	39			1 836	12	39			2 066	12	39
		8			2 142	22	46			2 448	22	46			2 754	22	47
		10			2 678	35	52			3 060	34	52			3 443	34	53
300		4	0.105	0.089	1 285	6	29	0.120	0.102	1 469	5	29	0.135	0.115	1 652	5	30
		6			1 928	13	40			2 203	12	40			2 479	12	40
		8			2 570	22	47			2 938	22	47			3 305	22	48
		10			3 213	35	53			3 672	34	53			4 131	34	54
350		4	0.123	0.104	1 499	5	29	0.140	0.119	1 714	5	29	0.158	0.134	1 928	5	30
		6			2 249	12	40			2 570	12	40			2 892	12	41
		8			2 999	22	47			3 427	21	48			3 856	21	48
		10			3 749	34	53			4 284	33	53			4 820	33	54
400		4	0.140	0.119	1 714	5	30	0.160	0.136	1 958	5	30	0.180	0.153	2 203	5	31
		6			2 570	12	40			2 938	12	41			3 305	12	41
		8			3 427	22	48			3 917	21	48			4 406	21	49
		10			4 284	34	54			4 896	33	54			5 508	33	54
450		4	0.158	0.134	1 928	5	30	0.180	0.153	2 203	5	31	0.203	0.172	2 479	5	31
		6			2 892	12	41			3 305	12	41			3 718	12	42
		8			3 856	22	48			4 406	21	49			4 957	21	49
		10			4 820	34	54			5 508	33	54			6 197	33	55
500		4	0.175	0.149	2 142	5	30	0.200	0.170	2 448	5	31	0.225	0.191	2 754	5	32
		6			3 213	12	41			3 672	12	42			4 131	12	42
		8			4 284	21	48			4 896	21	49			5 508	21	50
		10			5 355	33	54			6 120	33	55			6 885	33	55
550		4	0.193	0.164	2 570	5	31	0.220	0.187	2 693	5	31	0.248	0.210	3 029	5	32
		6			3 856	12	42			4 039	12	42			4 544	12	43
		8			5 141	22	49			5 386	21	49			6 059	21	50
		10			6 426	34	55			6 732	33	55			7 574	33	56
600		4	0.210	0.179	2 570	5	31	0.240	0.204	2 938	4	28	0.270	0.230	3 305	5	32
		6			3 856	12	42			4 406	8	37			4 957	12	42
		8			5 141	21	49			5 875	14	44			6 610	21	50
		10			6 426	33	55			7 344	32	55			8 262	32	56
650		4	0.228	0.193	2 785	5	32	0.260	0.221	3 182	5	32	0.293	0.249	3 580	5	32
		6			4 177	12	42			4 774	12	42			5 370	12	43
		8			5 569	21	50			6 365	21	50			7 160	21	50
		10			6 962	33	55			7 956	32	56			8 951	32	56
700		4	0.245	0.208	2 999	5	32	0.28	0.238	3 427	5	32	0.315	0.268	3 856	5	33
		6			4 498	12	42			5 141	12	43			5 783	12	43
		8			5 998	21	50			6 854	21	50			7 711	21	51
		10			7 497	33	56			8 568	32	56			9 639	32	56
750		4	0.263	0.223	3 213	5	32	0.3	0.255	3 672	5	32	0.338	0.287	4 131	5	33
		6			4 820	12	42			5 508	12	43			6 197	12	43
		8			6 426	21	50			7 344	21	50			8 262	21	51
		10			8 033	32	56			9 180	32	56			10 328	32	57
800		4	0.280	0.238	3 427	5	32	0.32	0.272	3 917	5	33	0.360	0.306	4 406	5	32
		6			5 141	12	43			5 875	11	43			6 610	11	42
		8			6 854	21	50			7 834	20	50			8 813	20	50
		10			8 568	32	56			9 792	31	56			11 016	31	56
850		4	0.298	0.253	3 641	5	32	0.34	0.289	4 162	5	32	0.383	0.325	4 682	5	31
		6			5 462	11	42			6 242	11	43			7 023	11	42
		8			7 283	20	50			8 323	19	50			9 364	19	49
		10			9 104	31	56			10 404	30	56			11 705	30	55
900		4	0.315	0.268	3 856	5	32	0.360	0.306	4 406	6	35	0.405	0.344	4 957	5	31
		6			5 783	11	43			6 610	12	44			7 436	11	42
		8			7 711	20	50			8 813	26	54			9 914	19	49
		10			9 639	31	56			11 016	30	56			12 393	30	55
1000		4	0.350	0.298	4 284	5	33	0.400	0.340	4 896	5	33	0.450	0.383	5 508	5	31
		6			6 426	11	43			7 344	11	43			8 262	11	42
		8			8 568	20	51			9 792	19	51			11 016	19	49
		10			10 710	31	56			12 240	30	57			13 770	30	55

6.6. technical parameters of mcr WIP/S rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]	height H [mm]	v [m/s]	650 Sk [m^2]	650 Se [m^2]	650 Q [m^3/h]	650 dp [Pa]	650 L_{WA} [dB]	700 Sk [m^2]	700 Se [m^2]	700 Q [m^3/h]	700 dp [Pa]	700 L_{WA} [dB]	750 Sk [m^2]	750 Se [m^2]	750 Q [m^3/h]	750 dp [Pa]	750 L_{WA} [dB]
200		4	0.130	0.111	1 591	5	29	0.140	0.119	1 714	5	29	0.150	0.128	1 836	5	29
		6			2 387	12	39			2 570	11	39			2 754	11	40
		8			3 182	21	47			3 427	20	47			3 672	20	47
		10			3 978	32	53			4 284	31	52			4 590	31	53
250		4	0.163	0.138	1 989	5	30	0.175	0.149	2 142	5	30	0.188	0.159	2 295	5	30
		6			2 984	12	40			3 213	11	40			3 443	11	40
		8			3 978	21	48			4 284	20	48			4 590	20	48
		10			4 973	32	54			5 355	31	53			5 738	31	54
300		4	0.195	0.166	2 387	5	30	0.210	0.179	2 570	5	30	0.225	0.191	2 754	5	31
		6			3 580	12	41			3 856	11	41			4 131	11	41
		8			4 774	21	49			5 141	20	48			5 508	20	49
		10			5 967	32	54			6 426	31	54			6 885	31	55
350		4	0.228	0.193	2 785	5	31	0.245	0.208	2 999	5	31	0.263	0.223	3 213	5	31
		6			4 177	11	41			4 498	11	41			4 820	11	42
		8			5 569	20	49			5 998	19	49			6 426	19	49
		10			6 962	31	55			7 497	30	54			8 033	30	55
400		4	0.260	0.221	3 182	5	31	0.280	0.238	3 427	5	31	0.300	0.255	3 672	5	32
		6			4 774	11	42			5 141	11	42			5 508	11	42
		8			6 365	20	49			6 854	19	49			7 344	19	50
		10			7 956	31	55			8 568	30	55			9 180	30	55
450		4	0.293	0.249	3 580	5	32	0.315	0.268	3 856	5	32	0.338	0.287	4 131	5	32
		6			5 370	11	42			5 783	11	42			6 197	11	43
		8			7 160	20	50			7 711	19	50			8 262	19	50
		10			8 951	31	56			9 639	30	56			10 328	30	56
500		4	0.325	0.276	3 978	5	32	0.350	0.298	4 284	5	32	0.375	0.319	4 590	5	32
		6			5 967	11	43			6 426	11	43			6 885	11	43
		8			7 956	20	50			8 568	19	50			9 180	19	51
		10			9 945	31	56			10 710	30	56			11 475	30	56
550		4	0.358	0.304	4 774	5	33	0.385	0.327	4 712	5	33	0.413	0.351	5 049	5	33
		6			7 160	11	43			7 069	11	43			7 574	11	43
		8			9 547	20	51			9 425	19	51			10 098	19	51
		10			11 934	31	57			11 781	30	56			12 623	30	57
600		4	0.390	0.332	4 774	5	33	0.420	0.357	5 141	5	33	0.450	0.383	5 508	5	33
		6			7 160	11	44			7 711	11	44			8 262	11	44
		8			9 547	20	51			10 282	19	51			11 016	19	51
		10			11 934	31	57			12 852	30	57			13 770	30	57
650		4	0.423	0.359	5 171	5	33	0.455	0.387	5 569	5	33	0.488	0.414	5 967	5	33
		6			7 757	11	44			8 354	10	43			8 951	10	44
		8			10 343	19	51			11 138	19	51			11 934	19	51
		10			12 929	30	57			13 923	29	57			14 918	29	57
700		4	0.455	0.387	5 569	5	33	0.490	0.417	5 998	5	33	0.525	0.446	6 426	5	34
		6			8 354	11	44			8 996	10	44			9 639	10	44
		8			11 138	19	51			11 995	19	51			12 852	19	52
		10			13 923	30	57			14 994	29	57			16 065	29	57
750		4	0.488	0.414	5 967	5	34	0.525	0.446	6 426	5	34	0.563	0.478	6 885	5	34
		6			8 951	11	44			9 639	10	44			10 328	10	44
		8			11 934	19	52			12 852	19	52			13 770	19	52
		10			14 918	30	57			16 065	29	57			17 213	29	58
800		4	0.520	0.442	6 365	5	33	0.560	0.476	6 854	4	29	0.600	0.510	7 344	4	34
		6			9 547	10	44			10 282	7	37			11 016	10	44
		8			12 730	19	51			13 709	11	43			14 688	18	52
		10			15 912	29	57			17 136	28	54			18 360	28	57
850		4	0.553	0.470	6 763	4	33	0.595	0.506	7 283	4	34	0.638	0.542	7 803	4	34
		6			10 144	10	43			10 924	10	44			11 705	10	44
		8			13 525	18	51			14 566	18	52			15 606	18	52
		10			16 907	28	57			18 207	28	57			19 508	28	58
900		4	0.585	0.497	7 160	4	33	0.630	0.536	7 711	4	33	0.675	0.574	8 262	4	34
		6			10 741	10	43			11 567	10	44			12 393	10	44
		8			14 321	18	51			15 422	17	51			16 524	17	52
		10			17 901	28	57			19 278	27	57			20 655	27	58
1000		4	0.650	0.553	7 956	4	33	0.700	0.595	8 568	4	34	0.750	0.638	9 180	4	34
		6			11 934	10	43			12 852	10	44			13 770	10	45
		8			15 912	18	51			17 136	17	52			18 360	17	52
		10			19 890	28	57			21 420	27	58			22 950	27	58

6.6. technical parameters of mcr WIP/S rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

width B [mm]		v [m/s]	height H [mm] 800 Sk [m^2]	800 Se [m^2]	800 Q [m^3/h]	800 dp [Pa]	800 L_{WA} [dB]	850 Sk [m^2]	850 Se [m^2]	850 Q [m^3/h]	850 dp [Pa]	850 L_{WA} [dB]	900 Sk [m^2]	900 Se [m2]	900 Q [m^3/h]	900 dp [Pa]	900 L_{WA} [dB]	1000 Sk [m^2]	1000 Se [m^2]	1000 Q [m^3/h]	1000 dp [Pa]	1000 L_{WA} [dB]
	200	4	0.160	0.136	1 958	5	29	0.170	0.145	2 081	5	29	0.180	0.153	2 203	5	29	0.200	0.170	2 448	5	29
		6			2 938	11	39			3 121	11	40			3 305	10	39			3 672	10	40
		8			3 917	19	47			4 162	19	47			4 406	19	47			4 896	19	47
		10			4 896	30	53			5 202	30	53			5 508	29	53			6 120	29	53
	250	4	0.200	0.170	2 448	5	30	0.213	0.181	2 601	5	30	0.225	0.191	2 754	5	30	0.250	0.213	3 060	5	30
		6			3 672	11	40			3 902	11	41			4 131	10	40			4 590	10	41
		8			4 896	19	48			5 202	19	48			5 508	19	48			6 120	19	48
		10			6 120	30	54			6 503	30	54			6 885	29	54			7 650	29	54
	300	4	0.240	0.204	2 938	5	31	0.255	0.217	3 121	5	31	0.270	0.230	3 305	5	31	0.300	0.255	3 672	5	31
		6			4 406	11	41			4 682	11	41			4 957	10	41			5 508	10	42
		8			5 875	19	49			6 242	19	49			6 610	19	49			7 344	19	49
		10			7 344	30	54			7 803	30	55			8 262	29	54			9 180	29	55
	350	4	0.280	0.238	3 427	5	31	0.298	0.253	3 641	5	31	0.315	0.268	3 856	4	31	0.350	0.298	4 284	4	31
		6			5 141	10	41			5 462	10	42			5 783	10	41			6 426	10	42
		8			6 854	19	49			7 283	19	49			7 711	18	49			8 568	18	49
		10			8 568	29	55			9 104	29	55			9 639	28	55			10 710	28	55
	400	4	0.320	0.272	3 917	5	31	0.340	0.289	4 162	5	32	0.360	0.306	4 406	4	31	0.400	0.340	4 896	4	32
		6			5 875	10	42			6 242	10	42			6 610	10	42			7 344	10	42
		8			7 834	19	49			8 323	19	50			8 813	18	49			9 792	18	50
		10			9 792	29	55			10 404	29	55			11 016	28	55			12 240	28	56
	450	4	0.360	0.306	4 406	5	32	0.383	0.325	4 682	4	32	0.405	0.344	4 957	4	31	0.450	0.383	5 508	4	32
		6			6 610	10	42			7 023	10	42			7 436	10	42			8 262	10	42
		8			8 813	19	50			9 364	18	50			9 914	17	50			11 016	17	50
		10			11 016	29	56			11 705	28	56			12 393	27	55			13 770	27	56
	500	4	0.400	0.340	4 896	5	32	0.425	0.361	5 202	4	32	0.450	0.383	5 508	4	32	0.500	0.425	6 120	4	32
		6			7 344	10	43			7 803	10	43			8 262	10	42			9 180	10	43
		8			9 792	19	50			10 404	18	50			11 016	17	50			12 240	17	50
		10			12 240	29	56			13 005	28	56			13 770	27	56			15 300	27	56
	550	4	0.440	0.374	5 386	5	33	0.468	0.397	5 722	4	33	0.495	0.421	6 059	4	32	0.550	0.468	6 732	4	33
		6			8 078	10	43			8 583	10	43			9 088	10	43			10 098	10	43
		8			10 771	19	51			11 444	18	51			12 118	17	50			13 464	17	51
		10			13 464	29	57			14 306	28	56			15 147	27	56			16 830	27	57
	600	4	0.480	0.408	5 875	5	33	0.510	0.434	6 242	4	33	0.540	0.459	6 610	4	33	0.600	0.510	7 344	4	33
		6			8 813	10	44			9 364	10	43			9 914	10	43			11 016	10	44
		8			11 750	19	51			12 485	18	51			13 219	17	51			14 688	17	51
		10			14 688	29	57			15 606	28	57			16 524	27	57			18 360	27	57
	650	4	0.520	0.442	6 365	5	33	0.553	0.470	6 763	4	33	0.585	0.497	7 160	4	33	0.650	0.553	7 956	4	34
		6			9 547	10	44			10 144	10	44			10 741	10	44			11 934	10	44
		8			12 730	19	52			13 525	18	51			14 321	17	51			15 912	17	52
		10			15 912	29	57			16 907	28	57			17 901	27	57			19 890	27	57
	700	4	0.560	0.476	6 854	4	33	0.595	0.506	7 283	4	33	0.630	0.536	7 711	4	33	0.700	0.595	8 568	4	33
		6			10 282	10	44			10 924	10	44			11 567	9	43			12 852	9	44
		8			13 709	18	51			14 566	17	51			15 422	17	51			17 136	17	51
		10			17 136	28	57			18 207	27	57			19 278	26	57			21 420	26	57
	750	4	0.600	0.510	7 344	4	34	0.638	0.542	7 803	4	33	0.675	0.574	8 262	4	33	0.750	0.638	9 180	4	34
		6			11 016	10	44			11 705	10	44			12 393	9	44			13 770	9	44
		8			14 688	18	52			15 606	17	51			16 524	17	51			18 360	17	52
		10			18 360	28	57			19 508	27	57			20 655	26	57			22 950	26	57
	800	4	0.640	0.544	7 834	4	34	0.680	0.578	8 323	4	34	0.720	0.612	8 813	4	33	0.800	0.680	9 792	4	34
		6			11 750	10	44			12 485	10	44			13 219	9	44			14 688	9	44
		8			15 667	18	52			16 646	17	52			17 626	17	52			19 584	17	52
		10			19 584	28	58			20 808	27	58			22 032	26	57			24 480	26	58
	850	4	0.680	0.578	8 323	4	34	0.723	0.614	8 843	4	33	0.765	0.650	9 364	4	34	0.850	0.723	10 404	4	34
		6			12 485	10	44			13 265	9	44			14 045	9	44			15 606	9	45
		8			16 646	17	52			17 687	17	52			18 727	17	52			20 808	17	52
		10			20 808	27	58			22 109	26	57			23 409	26	58			26 010	26	58
	900	4	0.720	0.612	8 813	4	34	0.765	0.650	9 364	4	34	0.810	0.689	9 914	4	34	0.900	0.765	11 016	4	34
		6			13 219	10	45			14 045	9	44			14 872	9	45			16 524	9	44
		8			17 626	17	52			18 727	17	52			19 829	17	52			22 032	16	52
		10			22 032	27	58			23 409	26	58			24 786	26	58			27 540	25	58
	1000	4	0.800	0.680	9 792	4	34	0.850	0.723	10 404	4	34	0.900	0.765	11 016	4	33	1.000	0.850	12 240	4	34
		6			14 688	9	44			15 606	9	44			16 524	9	44			18 360	9	44
		8			19 584	17	52			20 808	16	52			22 032	15	51			24 480	15	52
		10			24 480	26	58			26 010	25	58			27 540	24	57			30 600	24	58

6.7. estimated weights of mcr WIP/S dampers for rectangular ducts [kg]

height H [mm] \ width B [mm]	200	250	300	400	500	600	700	800	900	1000
200	10	10	10	10	15	17	18	19	22	25
250	10	10	11	11	16	18	18	21	24	27
300	10	11	11	12	17	20	21	23	26	28
350	11	11	11	16	18	21	23	26	28	30
400	12	12	14	18	19	21	25	29	30	33
500	15	16	17	19	20	23	27	32	33	35
600	17	18	20	21	23	26	30	35	37	39
700	18	18	21	23	25	28	32	35	38	40
800	20	21	22	24	29	35	37	41	43	49
900	22	25	25	28	33	35	39	43	49	52
1000	23	29	32	33	36	42	43	47	53	60

The table shows the weights of dampers with RST-KW1 trigger control mechanisms or actuators.

6.8. designation

mcr WIP/S / B x H / 1 / 2

- 2 – material
- 1 – control
- B x H – width x height
- mcr WIP/S – damper type

1 – control:

– RST-KW1 trigger control mechanism
RST-KW1/S – thermal trigger
RST-KW1/S/WK2 – thermal trigger + limit switch (open/closed partition signal)
RST-KW1/24I – thermal trigger + „pulse" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/24P – thermal trigger + „break" electromagnetic trigger, U = 24 V DC + limit switch (open/closed partition signal)
RST-KW1/230I – thermal trigger + „pulse" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)
RST-KW1/230P – thermal trigger + „break" electromagnetic trigger, U = 230 V AC + limit switch (open/closed partition signal)

– Belimo trigger control mechanism
BF24-T – actuator with a return spring, U = 24 V AC/DC
BF230-T – actuator with a return spring, U = 230 V AC
BF24TL-T-ST (with the BKN230-24MP option) – actuator with a return spring, U = 24 V, MP Bus digital control
BLF24-T – actuator with a return spring, U = 24 V AC/DC
BLF230-T – actuator with a return spring, U = 230 V AC
EXBF24-T – explosion proof actuator with a return spring in the Ex version, U = 24 V AC/DC
EXBF230-T – explosion proof actuator with a return spring in the Ex version, U = 230 V AC
BF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BLF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFL24-T – actuator with a return spring, U = 24 V AC/DC
BFL230-T – actuator with a return spring, U = 230 V AC
BFL24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFN24-T – actuator with a return spring, U = 24 V AC/DC
BFN230-T – actuator with a return spring, U = 230 V AC
BFN24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system

2 – material:

[no symbol] – galvanised steel, Zn 275 g/m^2 coating
KN – 1.4404 acid-proof stainless steel

example designation:

mcr WIP/S 400 x 400 BLF24-T
EIS60 multi-blade cut-off damper with a 24 V compact Belimo actuator with limit switches.

Chapter 9 - power supply and control (p. 95) contains:
- technical specifications and connection diagrams for the trigger control mechanisms supporting the damper,
- location of trigger control mechanisms in relation to the damper - manufacture standards.

ATEST HIGIENICZNY

CERTYFIKACJA PRODUKTU

- **$EI_2$120**
- **Technical Approval AT-15-9582/2015.**
- **Dampers qualified under EN 13501-2 and tested under EN 1366-2.**
- **Transfer shutter dampers.**

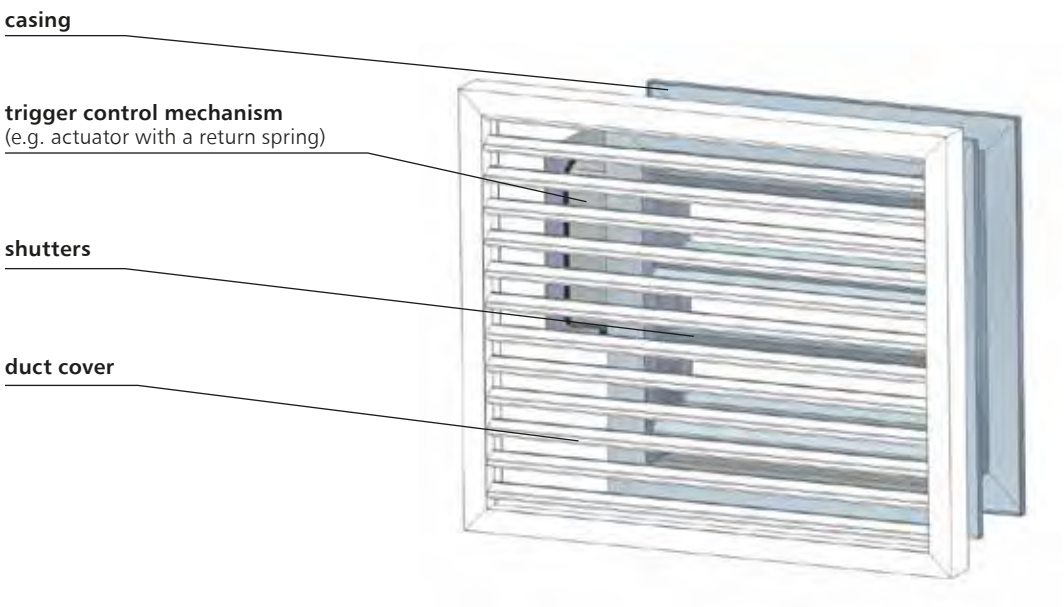
7.1. application

The mcr WIP transfer dampers are intended for installation in automatically operated fire ventilation systems. They are installed in fire walls without connecting ventilation ducts and retain their fire resistance during the fire. During normal operation, damper blades are open, what enables the supply of fresh air to escape routes, protecting them from smoke, or to the space, in which air exchange or supply through vertical construction partitions is required.

It is possible to use a closed transfer damper, in which the shutters open to transfer compensation air upon the receipt of an alarm signal from the fire signalling centre. In both cases, when the temperature around the mcr WIP/T damper exceeds 72°C, the damper closes regardless of the alarm signal.

The mcr WIP/T-G dampers are used as relief dampers, e.g. in gas extinguishing systems. In that case, they are equipped with drives without thermoelectric triggers. Shutter closing and opening is achieved through dedicated control units.

7.2. design



The mcr WIP transfer and relief dampers consist of a casing with a rectangular cross section, a moving insulation partition in the form of multiple blades - shutters revolving on their axes and a trigger control mechanism which is tripped remotely or automatically by tripping a thermal trigger (only mcr WIP/T). Damper casings are made of a galvanised steel or stainless steel sheet. Its integral part is a flange of silicate-cement panels. The inner side of the fire damper casing features an intumescent gasket. The casing total length is 140 mm.

The shutter surface is covered with galvanised or stainless steel sheet. Each shutter with the thickness of 15 mm is filled with a plaster panel. The partition shutters revolve on their axes, which consist of two steel pins. Transfer dampers must be protected with duct covers.

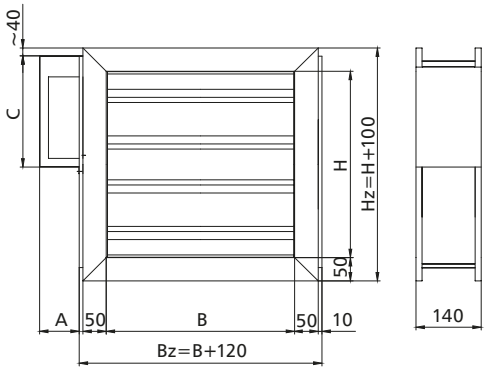
7.3. manufacture versions

7.3.1. **mcr WIP/T** – the transfer fire damper with an actuator with a return spring – damper closing and opening with an actuator

During normal operation, the shutters of the fire damper remain open or closed. In case of fire, the shutters shift or remain in standby.

The mcr WIP/T dampers feature a trigger control mechanism in the form of a Belimo **BLF-T, BFL-T, BFN-T, BF-T** axial actuator with a return valve, powered with 24 V AC/DC or 230 V AC, with thermoelectric trigger rated at 72°C (optionally it is possible to use triggers with the nominal tripping temperature of 95°C). BLF, BFL, BFN, BF series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

Dampers with Belimo actuators: analogue BLF, BFL, BFN, BF, digital BF-TL, EXBF explosion proof actuators close as a result of thermoelectric trigger tripping or power supply cut-off by the action of the return spring placed in the actuator. The dampers open when the power supply voltage is applied to the actuator terminals. Furthermore, dampers with those actuators may be opened manually using a key.



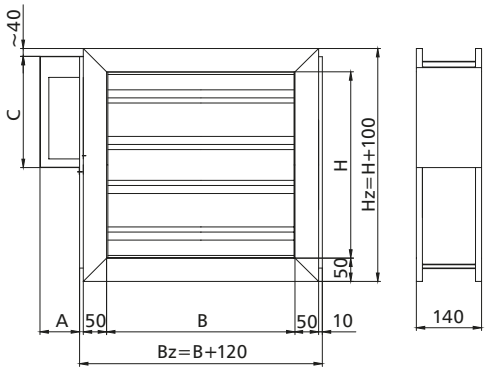
mechanism	A	C
BLF	125	275
BFN	125	325
BFL	125	275
BF	125	325
BF24TL-ST	125	325
EXBF	175	400

7.3.2. **WIP/T-G** – the relief fire damper with an actuator with a return spring – damper closing and opening with an actuator

During normal operation, the shutters of the relief damper remain open or closed. In case of fire, the shutters are shifted remotely by dedicated control units.

The mcr WIP/T-G dampers are equipped with a trigger control mechanism in the form of a Belimo **BLF, BFL, BFN, BF** series axial actuator with a return spring, powered with 24 V AC/DC or 230 V AC without a thermoelectric trigger. BLF, BFL, BFN, BF series actuators are equipped with limit switches used to monitor the partition position. Furthermore, the mechanical position indicator is placed on the actuator.

The mcr WIP/T-G relief dampers are designed e.g. to release the extinguishing medium from the space, in which the gas extinguishing system was tripped. Dampers have no thermal triggers installed. Damper closing and opening is triggered by a suitable control device, according to the fire protection design prepared for the given building.



mechanism	A	C
BLF	125	275
BFN	125	325
BFL	125	275
BF	125	325

7.4. dimensions

Rectangular dampers:

- nominal width B: from 120 mm to 1000 mm
- nominal height H: from 160 mm to 1000 mm
- the maximum cross-section surface of one damper up to 1 m^2

Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).

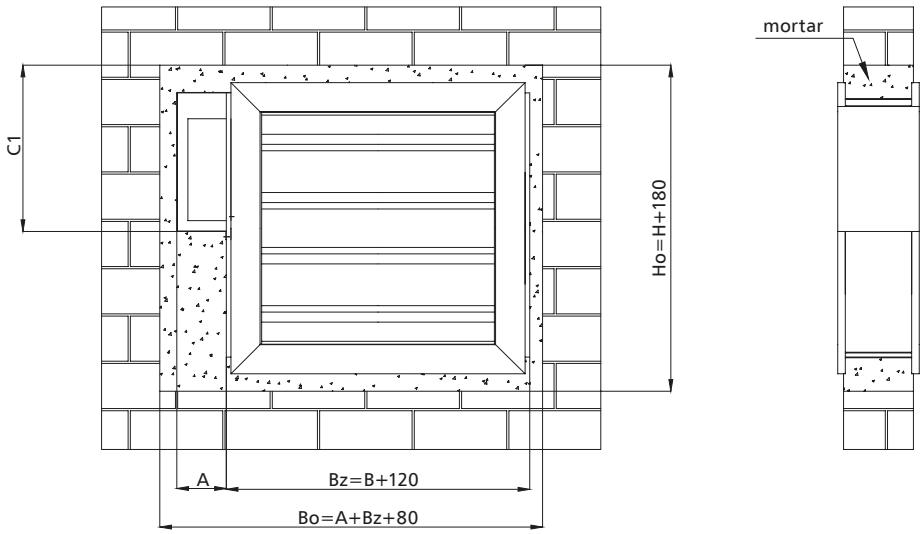
7.5. installation

The mcr WIP/T rectangular dampers are $EI_1$60-rated and $EI_2$120-rated in the case of installation in concrete or reinforced concrete partitions with the thickness of at least 110 mm, made of full bricks or concrete blocks with the thickness of at least 110 mm, made of hollow bricks or cellular concrete blocks with the thickness of at least 110 mm.

7.5.1. preparation of installation openings

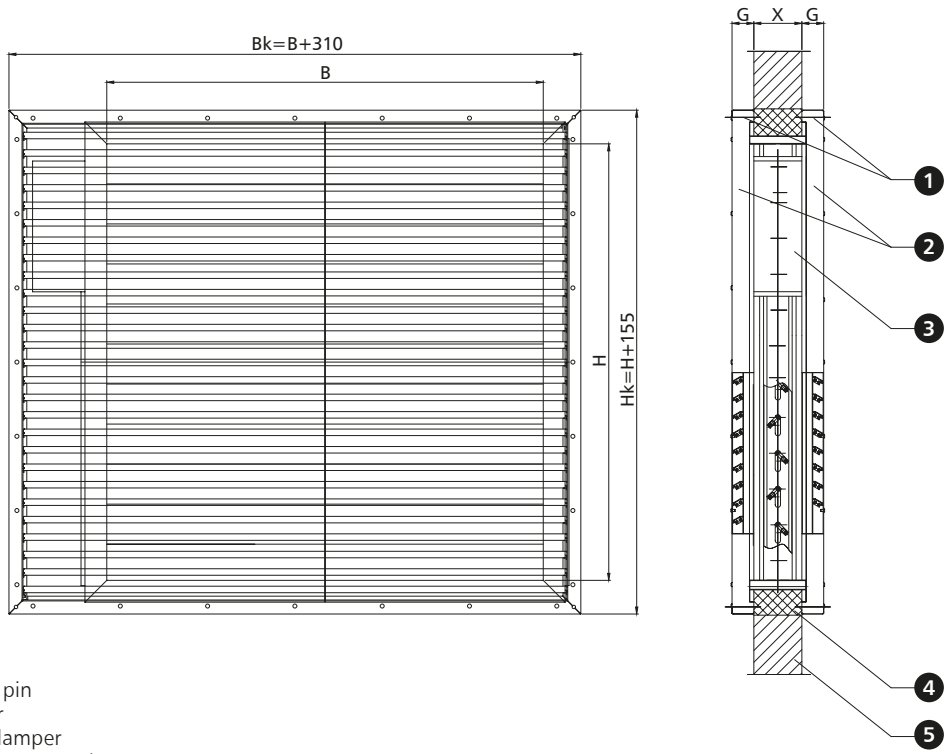
The minimum dimensions of the installation opening that allows correct installation of the mcr WIP/T damper is:

Bo = (A+Bz+80) mm
Ho = (H+180) mm



	BF	BLF	BFL	BFN	EXBF
C1 [mm]	385	335	335	385	460
A [mm]	125	125	125	125	175

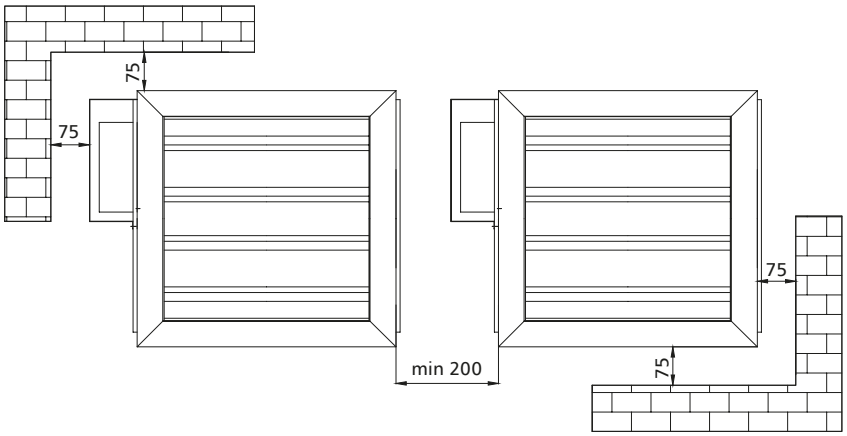
7.5.2. sample installation in concrete block or full brick walls



1. mounting pin
2. duct cover
3. mcr WIP damper
4. e.g. cement mortar*
5. e.g. masonry wall

*it is possible to use a different sealing that ensures the required fire resistance

distance between systems and partitions



7.6. technical parameters of mcr WIP/T rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]															
			200					250					300					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.040	0.034	490	6	26	0.050	0.043	612	6	26	0.06	0.051	734	6	27
		6			734	13	36			918	13	37			1 102	13	37
		8			979	24	44			1 224	23	44			1 469	22	45
		10			1 224	37	49			1 530	36	50			1 836	35	50
	250	4	0.050	0.043	612	6	26	0.063	0.053	765	6	27	0.075	0.064	918	6	28
		6			918	13	37			1 148	13	38			1 377	13	38
		8			1 224	23	44			1 530	23	45			1 836	22	46
		10			1 530	36	50			1 913	36	51			2 295	35	51
	300	4	0.060	0.051	734	6	27	0.075	0.064	918	6	28	0.09	0.077	1 102	6	28
		6			1 102	13	37			1 377	13	38			1 652	13	39
		8			1 469	23	45			1 836	23	46			2 203	22	46
		10			1 836	36	51			2 295	36	52			2 754	35	52
	350	4	0.070	0.060	857	6	27	0.088	0.074	1 071	36	52	0.105	0.089	1 285	5	29
		6			1 285	13	38			1 607	13	39			1 928	12	39
		8			1 714	22	45			2 142	22	46			2 570	22	47
		10			2 142	35	51			2 678	35	52			3 213	34	52
	400	4	0.080	0.068	979	6	28	0.100	0.085	1 224	6	29	0.12	0.102	1 469	5	29
		6			1 469	13	38			1 836	13	39			2 203	12	40
		8			1 958	22	46			2 448	22	47			2 938	22	47
		10			2 448	35	52			3 060	35	53			3 672	34	53
	450	4	0.090	0.077	1 102	6	28	0.113	0.096	1 377	6	29	0.135	0.115	1 652	5	30
		6			1 652	13	39			2 066	13	40			2 479	12	40
		8			2 203	22	46			2 754	22	47			3 305	22	48
		10			2 754	35	52			3 443	35	53			4 131	34	54
	500	4	0.100	0.085	1 224	5	28	0.125	0.106	1 530	5	29	0.15	0.128	1 836	5	30
		6			1 836	12	39			2 295	12	40			2 754	12	40
		8			2 448	22	46			3 060	22	47			3 672	21	48
		10			3 060	34	52			3 825	34	53			4 590	33	54
	550	4	0.110	0.094	1 346	5	29	0.138	0.117	1 683	5	30	0.165	0.140	2 020	5	31
		6			2 020	12	39			2 525	12	40			3 029	12	41
		8			2 693	22	47			3 366	22	48			4 039	22	49
		10			3 366	34	53			4 208	34	54			5 049	34	54
	600	4	0.120	0.102	1 469	5	29	0.150	0.128	1 836	5	30	0.18	0.153	2 203	5	31
		6			2 203	12	40			2 754	12	41			3 305	12	41
		8			2 938	22	47			3 672	22	48			4 406	21	49
		10			3 672	34	53			4 590	34	54			5 508	33	54
	650	4	0.130	0.111	1 591	5	30	0.163	0.138	1 989	5	30	0.195	0.166	2 387	5	31
		6			2 387	12	40			2 984	12	41			3 580	12	41
		8			3 182	22	48			3 978	22	49			4 774	21	49
		10			3 978	34	53			4 973	34	54			5 967	33	55
	700	4	0.140	0.119	1 714	5	30	0.175	0.149	2 142	5	31	0.21	0.179	2 570	5	31
		6			2 570	12	40			3 213	12	41			3 856	12	42
		8			3 427	22	48			4 284	22	49			5 141	21	49
		10			4 284	34	54			5 355	34	55			6 426	33	55
	750	4	0.150	0.128	1 836	5	30	0.188	0.159	2 295	5	31	0.225	0.191	2 754	5	31
		6			2 754	12	40			3 443	12	41			4 131	12	42
		8			3 672	21	48			4 590	21	49			5 508	21	49
		10			4 590	33	54			5 738	33	55			6 885	32	55
	800	4	0.160	0.136	1 958	5	30	0.200	0.170	2 448	5	31	0.24	0.204	2 938	5	31
		6			2 938	12	41			3 672	12	42			4 406	12	42
		8			3 917	21	48			4 896	21	49			5 875	21	49
		10			4 896	33	54			6 120	33	55			7 344	32	55
	850	4	0.170	0.145	2 081	5	30	0.213	0.181	2 601	5	31	0.255	0.217	3 121	5	31
		6			3 121	12	40			3 902	12	41			4 682	11	42
		8			4 162	21	48			5 202	21	49			6 242	20	49
		10			5 202	32	54			6 503	32	55			7 803	31	55
	900	4	0.180	0.153	2 203	5	30	0.225	0.191	2 754	5	31	0.27	0.230	3 305	5	31
		6			3 305	12	41			4 131	12	42			4 957	11	42
		8			4 406	21	48			5 508	21	49			6 610	20	50
		10			5 508	32	54			6 885	32	55			8 262	31	55
	1000	4	0.200	0.170	2 448	5	31	0.250	0.213	3 060	5	32	0.3	0.255	3 672	5	32
		6			3 672	12	41			4 590	12	42			5 508	11	43
		8			4 896	21	49			6 120	21	50			7 344	20	50
		10			6 120	32	54			7 650	32	55			9 180	31	56

7.6. technical parameters of mcr WIP/T rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]														
			350					400					450				
width B [mm]		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
	200	4	0.070	0.060	857	6	27	0.080	0.068	979	5	27	0.090	0.077	1 102	5	28
		6			1 285	13	38			1 469	12	38			1 652	12	38
		8			1 714	22	45			1 958	22	45			2 203	22	46
		10			2 142	35	51			2 448	34	51			2 754	34	52
	250	4	0.088	0.074	1 071	6	28	0.100	0.085	1 224	5	28	0.113	0.096	1 377	5	29
		6			1 607	13	39			1 836	12	39			2 066	12	39
		8			2 142	22	46			2 448	22	46			2 754	22	47
		10			2 678	35	52			3 060	34	52			3 443	34	53
	300	4	0.105	0.089	1 285	6	29	0.120	0.102	1 469	5	29	0.135	0.115	1 652	5	30
		6			1 928	13	40			2 203	12	40			2 479	12	40
		8			2 570	22	47			2 938	22	47			3 305	22	48
		10			3 213	35	53			3 672	34	53			4 131	34	54
	350	4	0.123	0.104	1 499	5	29	0.140	0.119	1 714	5	29	0.158	0.134	1 928	5	30
		6			2 249	12	40			2 570	12	40			2 892	12	41
		8			2 999	22	47			3 427	21	48			3 856	21	48
		10			3 749	34	53			4 284	33	53			4 820	33	54
	400	4	0.140	0.119	1 714	5	30	0.160	0.136	1 958	5	30	0.180	0.153	2 203	5	31
		6			2 570	12	40			2 938	12	41			3 305	12	41
		8			3 427	22	48			3 917	21	48			4 406	21	49
		10			4 284	34	54			4 896	33	54			5 508	33	54
	450	4	0.158	0.134	1 928	5	30	0.180	0.153	2 203	5	31	0.203	0.172	2 479	5	31
		6			2 892	12	41			3 305	12	41			3 718	12	42
		8			3 856	22	48			4 406	21	49			4 957	21	49
		10			4 820	34	54			5 508	33	54			6 197	33	55
	500	4	0.175	0.149	2 142	5	30	0.200	0.170	2 448	5	31	0.225	0.191	2 754	5	32
		6			3 213	12	41			3 672	12	42			4 131	12	42
		8			4 284	21	48			4 896	21	49			5 508	21	50
		10			5 355	33	54			6 120	33	55			6 885	33	55
	550	4	0.193	0.164	2 570	5	31	0.220	0.187	2 693	5	31	0.248	0.210	3 029	5	32
		6			3 856	12	42			4 039	12	42			4 544	12	43
		8			5 141	22	49			5 386	21	49			6 059	21	50
		10			6 426	34	55			6 732	33	55			7 574	33	56
	600	4	0.210	0.179	2 570	5	31	0.240	0.204	2 938	4	28	0.270	0.230	3 305	5	32
		6			3 856	12	42			4 406	8	37			4 957	12	42
		8			5 141	21	49			5 875	14	44			6 610	21	50
		10			6 426	33	55			7 344	32	55			8 262	32	56
	650	4	0.228	0.193	2 785	5	32	0.260	0.221	3 182	5	32	0.293	0.249	3 580	5	32
		6			4 177	12	42			4 774	12	42			5 370	12	43
		8			5 569	21	50			6 365	21	50			7 160	21	50
		10			6 962	33	55			7 956	32	56			8 951	32	56
	700	4	0.245	0.208	2 999	5	32	0.28	0.238	3 427	5	32	0.315	0.268	3 856	5	33
		6			4 498	12	42			5 141	12	43			5 783	12	43
		8			5 998	21	50			6 854	21	50			7 711	21	51
		10			7 497	33	56			8 568	32	56			9 639	32	56
	750	4	0.263	0.223	3 213	5	32	0.3	0.255	3 672	5	32	0.338	0.287	4 131	5	33
		6			4 820	12	42			5 508	12	43			6 197	12	43
		8			6 426	21	50			7 344	21	50			8 262	21	51
		10			8 033	32	56			9 180	32	56			10 328	32	57
	800	4	0.280	0.238	3 427	5	32	0.32	0.272	3 917	5	33	0.360	0.306	4 406	5	32
		6			5 141	12	43			5 875	11	43			6 610	11	42
		8			6 854	21	50			7 834	20	50			8 813	20	50
		10			8 568	32	56			9 792	31	56			11 016	31	56
	850	4	0.298	0.253	3 641	5	32	0.34	0.289	4 162	5	32	0.383	0.325	4 682	5	31
		6			5 462	11	42			6 242	11	43			7 023	11	42
		8			7 283	20	50			8 323	19	50			9 364	19	49
		10			9 104	31	56			10 404	30	56			11 705	30	55
	900	4	0.315	0.268	3 856	5	32	0.360	0.306	4 406	6	35	0.405	0.344	4 957	5	31
		6			5 783	11	43			6 610	12	44			7 436	11	42
		8			7 711	20	50			8 813	26	54			9 914	19	49
		10			9 639	31	56			11 016	30	56			12 393	30	55
	1000	4	0.350	0.298	4 284	5	33	0.400	0.340	4 896	5	33	0.450	0.383	5 508	5	31
		6			6 426	11	43			7 344	11	43			8 262	11	42
		8			8 568	20	51			9 792	19	51			11 016	19	49
		10			10 710	31	56			12 240	30	57			13 770	30	55

7.6. technical parameters of mcr WIP/T rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

		height H [mm]															
		650					700					750					
	v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]																	
200	4	0.130	0.111	1 591	5	29	0.140	0.119	1 714	5	29	0.150	0.128	1 836	5	29
	6			2 387	12	39			2 570	11	39			2 754	11	40
	8			3 182	21	47			3 427	20	47			3 672	20	47
	10			3 978	32	53			4 284	31	52			4 590	31	53
250	4	0.163	0.138	1 989	5	30	0.175	0.149	2 142	5	30	0.188	0.159	2 295	5	30
	6			2 984	12	40			3 213	11	40			3 443	11	40
	8			3 978	21	48			4 284	20	48			4 590	20	48
	10			4 973	32	54			5 355	31	53			5 738	31	54
300	4	0.195	0.166	2 387	5	30	0.210	0.179	2 570	5	30	0.225	0.191	2 754	5	31
	6			3 580	12	41			3 856	11	41			4 131	11	41
	8			4 774	21	49			5 141	20	48			5 508	20	49
	10			5 967	32	54			6 426	31	54			6 885	31	55
350	4	0.228	0.193	2 785	5	31	0.245	0.208	2 999	5	31	0.263	0.223	3 213	5	31
	6			4 177	11	41			4 498	11	41			4 820	11	42
	8			5 569	20	49			5 998	19	49			6 426	19	49
	10			6 962	31	55			7 497	30	54			8 033	30	55
400	4	0.260	0.221	3 182	5	31	0.280	0.238	3 427	5	31	0.300	0.255	3 672	5	32
	6			4 774	11	42			5 141	11	42			5 508	11	42
	8			6 365	20	49			6 854	19	49			7 344	19	50
	10			7 956	31	55			8 568	30	55			9 180	30	55
450	4	0.293	0.249	3 580	5	32	0.315	0.268	3 856	5	32	0.338	0.287	4 131	5	32
	6			5 370	11	42			5 783	11	42			6 197	11	43
	8			7 160	20	50			7 711	19	50			8 262	19	50
	10			8 951	31	56			9 639	30	56			10 328	30	56
500	4	0.325	0.276	3 978	5	32	0.350	0.298	4 284	5	32	0.375	0.319	4 590	5	32
	6			5 967	11	43			6 426	11	43			6 885	11	43
	8			7 956	20	50			8 568	19	50			9 180	19	51
	10			9 945	31	56			10 710	30	56			11 475	30	56
550	4	0.358	0.304	4 774	5	33	0.385	0.327	4 712	5	33	0.413	0.351	5 049	5	33
	6			7 160	11	43			7 069	11	43			7 574	11	43
	8			9 547	20	51			9 425	19	51			10 098	19	51
	10			11 934	31	57			11 781	30	56			12 623	30	57
600	4	0.390	0.332	4 774	5	33	0.420	0.357	5 141	5	33	0.450	0.383	5 508	5	33
	6			7 160	11	44			7 711	11	44			8 262	11	44
	8			9 547	20	51			10 282	19	51			11 016	19	51
	10			11 934	31	57			12 852	30	57			13 770	30	57
650	4	0.423	0.359	5 171	5	33	0.455	0.387	5 569	5	33	0.488	0.414	5 967	5	33
	6			7 757	11	44			8 354	10	43			8 951	10	44
	8			10 343	19	51			11 138	19	51			11 934	19	51
	10			12 929	30	57			13 923	29	57			14 918	29	57
700	4	0.455	0.387	5 569	5	33	0.490	0.417	5 998	5	33	0.525	0.446	6 426	5	34
	6			8 354	11	44			8 996	10	44			9 639	10	44
	8			11 138	19	51			11 995	19	51			12 852	19	52
	10			13 923	30	57			14 994	29	57			16 065	29	57
750	4	0.488	0.414	5 967	5	34	0.525	0.446	6 426	5	34	0.563	0.478	6 885	5	34
	6			8 951	11	44			9 639	10	44			10 328	10	44
	8			11 934	19	52			12 852	19	52			13 770	19	52
	10			14 918	30	57			16 065	29	57			17 213	29	58
800	4	0.520	0.442	6 365	5	33	0.560	0.476	6 854	4	29	0.600	0.510	7 344	4	34
	6			9 547	10	44			10 282	7	37			11 016	10	44
	8			12 730	19	51			13 709	11	43			14 688	18	52
	10			15 912	29	57			17 136	28	54			18 360	28	57
850	4	0.553	0.470	6 763	4	33	0.595	0.506	7 283	4	34	0.638	0.542	7 803	4	34
	6			10 144	10	43			10 924	10	44			11 705	10	44
	8			13 525	18	51			14 566	18	52			15 606	18	52
	10			16 907	28	57			18 207	28	57			19 508	28	58
900	4	0.585	0.497	7 160	4	33	0.630	0.536	7 711	4	33	0.675	0.574	8 262	4	34
	6			10 741	10	43			11 567	10	44			12 393	10	44
	8			14 321	18	51			15 422	17	51			16 524	17	52
	10			17 901	28	57			19 278	27	57			20 655	27	58
1000	4	0.650	0.553	7 956	4	33	0.700	0.595	8 568	4	34	0.750	0.638	9 180	4	34
	6			11 934	10	43			12 852	10	44			13 770	10	45
	8			15 912	18	51			17 136	17	52			18 360	17	52
	10			19 890	28	57			21 420	27	58			22 950	27	58

7.6. technical parameters of mcr WIP/T rectangular dampers

B – nominal width [mm]
H – nominal height [mm]

v – velocity [m/s]
Sk – duct cross-section [m^2]
Se – damper active cross-section [m^2]

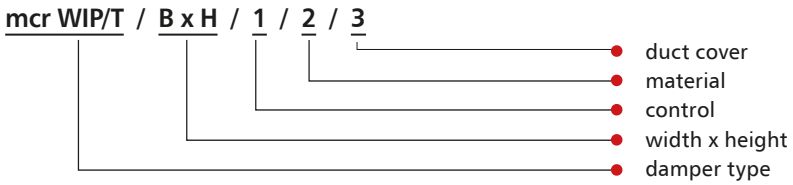
Q – flow [m^3/h]
dp – pressure drop [Pa]
L_{WA} – damper noise level [dB]

			height H [mm]																			
			800					850					900					1000					
		v [m/s]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]	Sk [m^2]	Se [m^2]	Q [m^3/h]	dp [Pa]	L_{WA} [dB]
width B [mm]	200	4	0.160	0.136	1 958	5	29	0.170	0.145	2 081	5	29	0.180	0.153	2 203	5	29	0.200	0.170	2 448	5	29
		6			2 938	11	39			3 121	11	40			3 305	10	39			3 672	10	40
		8			3 917	19	47			4 162	19	47			4 406	19	47			4 896	19	47
		10			4 896	30	53			5 202	30	53			5 508	29	53			6 120	29	53
	250	4	0.200	0.170	2 448	5	30	0.213	0.181	2 601	5	30	0.225	0.191	2 754	5	30	0.250	0.213	3 060	5	30
		6			3 672	11	40			3 902	11	41			4 131	10	40			4 590	10	41
		8			4 896	19	48			5 202	19	48			5 508	19	48			6 120	19	48
		10			6 120	30	54			6 503	30	54			6 885	29	54			7 650	29	54
	300	4	0.240	0.204	2 938	5	31	0.255	0.217	3 121	5	31	0.270	0.230	3 305	5	31	0.300	0.255	3 672	5	31
		6			4 406	11	41			4 682	11	41			4 957	10	41			5 508	10	42
		8			5 875	19	49			6 242	19	49			6 610	19	49			7 344	19	49
		10			7 344	30	54			7 803	30	55			8 262	29	54			9 180	29	55
	350	4	0.280	0.238	3 427	5	31	0.298	0.253	3 641	5	31	0.315	0.268	3 856	4	31	0.350	0.298	4 284	4	31
		6			5 141	10	41			5 462	10	42			5 783	10	41			6 426	10	42
		8			6 854	19	49			7 283	19	49			7 711	18	49			8 568	18	49
		10			8 568	29	55			9 104	29	55			9 639	28	55			10 710	28	55
	400	4	0.320	0.272	3 917	5	31	0.340	0.289	4 162	5	32	0.360	0.306	4 406	4	31	0.400	0.340	4 896	4	32
		6			5 875	10	42			6 242	10	42			6 610	10	42			7 344	10	42
		8			7 834	19	49			8 323	19	50			8 813	18	49			9 792	18	50
		10			9 792	29	55			10 404	29	55			11 016	28	55			12 240	28	56
	450	4	0.360	0.306	4 406	5	32	0.383	0.325	4 682	4	32	0.405	0.344	4 957	4	31	0.450	0.383	5 508	4	32
		6			6 610	10	42			7 023	10	42			7 436	10	42			8 262	10	42
		8			8 813	19	50			9 364	18	50			9 914	17	50			11 016	17	50
		10			11 016	29	56			11 705	28	56			12 393	27	55			13 770	27	56
	500	4	0.400	0.340	4 896	5	32	0.425	0.361	5 202	4	32	0.450	0.383	5 508	4	32	0.500	0.425	6 120	4	32
		6			7 344	10	43			7 803	10	43			8 262	10	42			9 180	10	43
		8			9 792	19	50			10 404	18	50			11 016	17	50			12 240	17	50
		10			12 240	29	56			13 005	28	56			13 770	27	56			15 300	27	56
	550	4	0.440	0.374	5 386	5	33	0.468	0.397	5 722	4	33	0.495	0.421	6 059	4	32	0.550	0.468	6 732	4	33
		6			8 078	10	43			8 583	10	43			9 088	10	43			10 098	10	43
		8			10 771	19	51			11 444	18	51			12 118	17	50			13 464	17	51
		10			13 464	29	57			14 306	28	56			15 147	27	56			16 830	27	57
	600	4	0.480	0.408	5 875	5	33	0.510	0.434	6 242	4	33	0.540	0.459	6 610	4	33	0.600	0.510	7 344	4	33
		6			8 813	10	44			9 364	10	43			9 914	10	43			11 016	10	44
		8			11 750	19	51			12 485	18	51			13 219	17	51			14 688	17	51
		10			14 688	29	57			15 606	28	57			16 524	27	57			18 360	27	57
	650	4	0.520	0.442	6 365	5	33	0.553	0.470	6 763	4	33	0.585	0.497	7 160	4	33	0.650	0.553	7 956	4	34
		6			9 547	10	44			10 144	10	44			10 741	10	44			11 934	10	44
		8			12 730	19	52			13 525	18	51			14 321	17	51			15 912	17	52
		10			15 912	29	57			16 907	28	57			17 901	27	57			19 890	27	57
	700	4	0.560	0.476	6 854	4	33	0.595	0.506	7 283	4	33	0.630	0.536	7 711	4	33	0.700	0.595	8 568	4	33
		6			10 282	10	44			10 924	10	44			11 567	9	43			12 852	9	44
		8			13 709	18	51			14 566	17	51			15 422	17	51			17 136	17	51
		10			17 136	28	57			18 207	27	57			19 278	26	57			21 420	26	57
	750	4	0.600	0.510	7 344	4	34	0.638	0.542	7 803	4	33	0.675	0.574	8 262	4	33	0.750	0.638	9 180	4	34
		6			11 016	10	44			11 705	10	44			12 393	9	44			13 770	9	44
		8			14 688	18	52			15 606	17	51			16 524	17	51			18 360	17	52
		10			18 360	28	57			19 508	27	57			20 655	26	57			22 950	26	57
	800	4	0.640	0.544	7 834	4	34	0.680	0.578	8 323	4	34	0.720	0.612	8 813	4	33	0.800	0.680	9 792	4	34
		6			11 750	10	44			12 485	10	44			13 219	9	44			14 688	9	44
		8			15 667	18	52			16 646	17	52			17 626	17	52			19 584	17	52
		10			19 584	28	58			20 808	27	58			22 032	26	57			24 480	26	58
	850	4	0.680	0.578	8 323	4	34	0.723	0.614	8 843	4	33	0.765	0.650	9 364	4	34	0.850	0.723	10 404	4	34
		6			12 485	10	44			13 265	9	44			14 045	9	44			15 606	9	45
		8			16 646	17	52			17 687	17	52			18 727	17	52			20 808	17	52
		10			20 808	27	58			22 109	26	57			23 409	26	58			26 010	26	58
	900	4	0.720	0.612	8 813	4	34	0.765	0.650	9 364	4	34	0.810	0.689	9 914	4	34	0.900	0.765	11 016	4	34
		6			13 219	10	45			14 045	9	44			14 872	9	45			16 524	9	44
		8			17 626	17	52			18 727	17	52			19 829	17	52			22 032	16	52
		10			22 032	27	58			23 409	26	58			24 786	26	58			27 540	25	58
	1000	4	0.800	0.680	9 792	4	34	0.850	0.723	10 404	4	34	0.900	0.765	11 016	4	33	1.000	0.850	12 240	4	34
		6			14 688	9	44			15 606	9	44			16 524	9	44			18 360	9	44
		8			19 584	17	52			20 808	16	52			22 032	15	51			24 480	15	52
		10			24 480	26	58			26 010	25	58			27 540	24	57			30 600	24	58

7.7. estimated weights of mcr WIP/T dampers for rectangular ventilation ducts [kg]

height H [mm] \ width B [mm]	200	250	300	400	500	600	700	800	900	1000
200	10	10	10	10	15	17	18	19	22	25
250	10	10	11	11	16	18	18	21	24	27
300	10	11	11	12	17	20	21	23	26	28
350	11	11	11	16	18	21	23	26	28	30
400	12	12	14	18	19	21	25	29	30	33
500	15	16	17	19	20	23	27	32	33	35
600	17	18	20	21	23	26	30	35	37	39
700	18	18	21	23	25	28	32	35	38	40
800	20	21	22	24	29	35	37	41	43	49
900	22	25	25	28	33	35	39	43	49	52
1000	23	29	32	33	36	42	43	47	53	60

7.8. designation



1 – control:

– Belimo trigger control mechanism
BF24-T – actuator with a return spring, U = 24 V AC/DC
BF230-T – actuator with a return spring, U = 230 V AC
BF24TL-T-ST (with the BKN230-24MP option) – actuator with a return spring, U = 24 V, MP Bus digital control
BLF24-T – actuator with a return spring, U = 24 V AC/DC
BLF230-T – actuator with a return spring, U = 230 V AC
EXBF24-T – explosion proof actuator with a return spring in the Ex version, U = 24 V AC/DC
EXBF230-T – explosion proof actuator with a return spring in the Ex version, U = 230 V AC
BF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BLF24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFL24-T – actuator with a return spring, U = 24 V AC/DC
BFL230-T – actuator with a return spring, U = 230 V AC
BFL24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system
BFN24-T – actuator with a return spring, U = 24 V AC/DC
BFN230-T – actuator with a return spring, U = 230 V AC
BFN24-T-ST (with the BKN230-24 option) – actuator with a return spring, for the SBS Control system

2 – material:

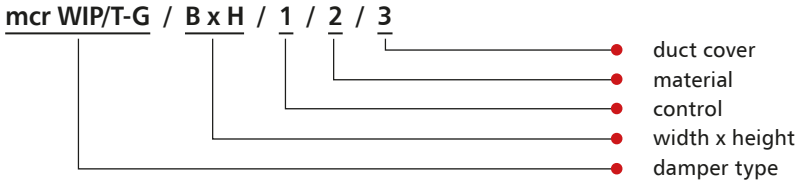
[no symbol] – galvanised steel, Zn 275 g/m^2 coating
KN – 1.4404 acid-proof stainless steel

3 – duct cover:

MSTx1 – single duct cover
MSTx2 – double duct cover

example designation:

mcr WIP/T 400 x 400 BLF24-T
EI120 multi-blade transfer damper with a 24 V compact Belimo actuator with limit switches.



1 – control:

– Belimo trigger control mechanism
BF24 – actuator with a return spring, U = 24 V AC/DC
BF230 – actuator with a return spring, U = 230 V AC
BLF24 – actuator with a return spring, U = 24 V AC/DC
BLF230 – actuator with a return spring, U = 230 V AC
BFL24 – actuator with a return spring, U = 24 V AC/DC
BFL230 – actuator with a return spring, U = 230 V AC
BFN24 – actuator with a return spring, U = 24 V AC/DC
BFN230 – actuator with a return spring, U = 230 V AC

2 – material:

[no symbol] – galvanised steel, Zn 275 g/m^2 coating
KN – 1.4404 acid-proof stainless steel

3 – duct cover:

MSTx1 – single duct cover
MSTx2 – double duct cover

example designation:

mcr WIP/T-G 400 x 400 BLF24

EI120 multi-blade relief damper with a 24 V compact Belimo actuator with limit switches.

Chapter 9 - power supply and control (p. 95) contains:
- technical specifications and connection diagrams for the trigger control mechanisms supporting the damper,
- location of trigger control mechanisms in relation to the damper - manufacture standards.

0832-CPR-P0001

- **E120**
- **Certificate of constancy of performance 0832-CPR-P0001.**
- **Dampers certified for compliance with EN 15650.**
- **Dampers qualified under EN 13501-3 and tested under EN 1366-2.**
- **Narrow cut-off dampers with a stainless steel curtain with a large active surface.**

8.1. application

The mcr FS fire dampers with a thermal trigger are used in vertical construction partitions to allow the air to flow through. The purpose of the dampers is to maintain the fire resistance of the partition, in which they are installed.

During normal operation, the dampers remain open. The dampers switch to safe mode (close):

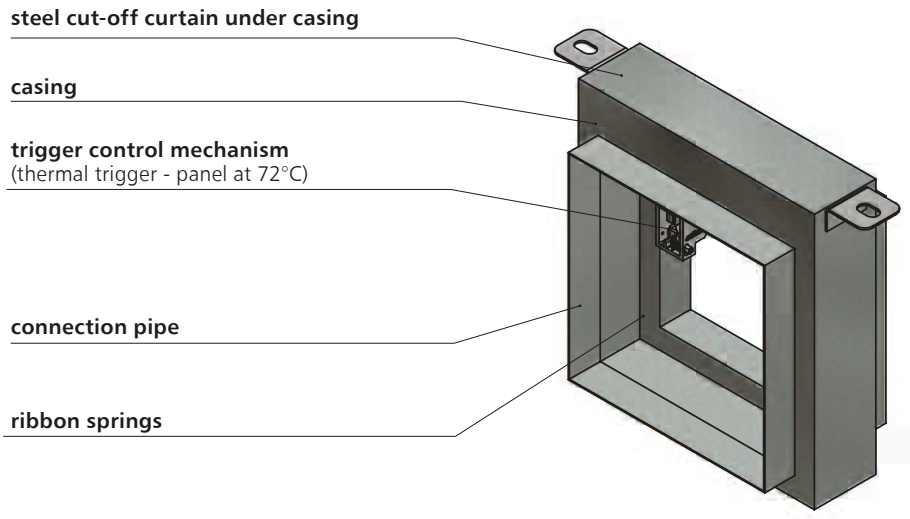
- automatically, by the thermal trigger tripping at 72°C,
- manually (in test mode), by pressing the manual release button (trigger control mechanism),
- remotely, by the EM electromagnetic trigger tripping (optional).

Dampers with EM electromagnetic triggers (optional) close as a result of power supply cut-off due to the action of return springs in the damper. The dampers open upon the application of the power supply to trigger terminals and upon manual lifting of the steel partition.

Dampers with a thermal trigger control mechanism close as a result of the action of the drive spring in the damper, activated by the trigerring of the thermal trigger or manually, by pressing the dedicated button on the panel. The dampers are opened manually, by lifting the steel partition and locking it in the trigger control mechanism clamps.

The mcr FS dampers used in the systems protecting escape routes from smoke remain open during the fire, which ensure the supply of fresh air to escape routes. If the fire develops further, the dampers are automatically closed as a result of thermal trigger tripping to prevent the spreading of fire.

8.2. design



The mcr FS dampers consist of a double casing with a rectangular cross section, a moving insulation partition in the form of a falling foldable curtain and a trigger control mechanism (panel), which is activated remotely or automatically when the thermal trigger is tripped. The damper casing is made of galvanised steel sheet. The casing total length is 90 mm for rectangular dampers and 92 mm for circular dampers. On two sides, each damper features a connection stub pipe with the length of 38 mm for rectangular dampers and 60 mm for circular dampers. The insulation partition is made of stainless steel sheet. The exterior of the casing features a steel flat bar of resilient sheet, resulting in the additional tightening of appliances upon activation.

The drive of the mcr FS dampers, which moves the partition, consists of two ribbon springs, placed on the inside of the damper sides, along its height. If the allowed temperature is exceeded in the panel, the trigger control mechanism is triggered and the spring-powered partition is lowered. It is possible to equip the damper with an EM mechanism for remote control.

8.3. manufacture versions

8.3.1. mcr FS I/F – cut-off fire damper for E120(ve ho i→o) rigid walls and ceilings

The mcr FS I/F damper is suitable for installation in rigid walls.

The cut-off curtain of stainless steel falls when the temperature of 72°C is exceeded or if the voltage is removed from the EM trigger control mechanism (optional).

The damper may be equipped with a MSSP curtain closing limit switch or a MSDP curtain closing and opening limit switch.

8.3.2. mcr FS DWFX-C – cut-off damper for E120(ve i→o) lightweight walls

The mcr FS DWFX-C damper is suitable for installation in newly constructed lightweight walls.

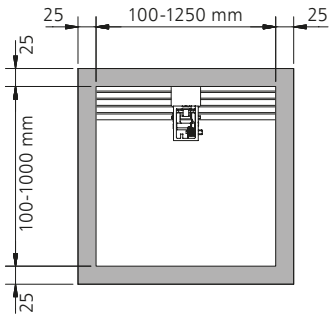
The cut-off curtain of stainless steel falls when the temperature of 72°C is exceeded or if the voltage is removed from the EM trigger control mechanism (optional).

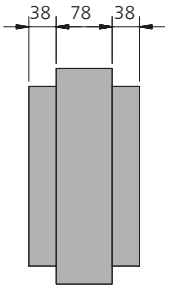
The damper may be equipped with a MSSP curtain closing limit switch or a MSDP curtain closing and opening limit switch.

8.4. dimensions

The mcr FS transfer dampers are manufactured in three series:

101 series (rectangular dampers) with a curtain partly in the air stream – from 100x100 mm to 1250x1000 mm.





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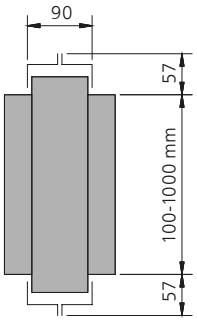
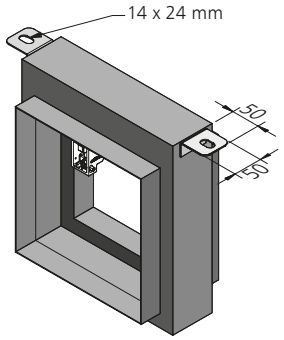
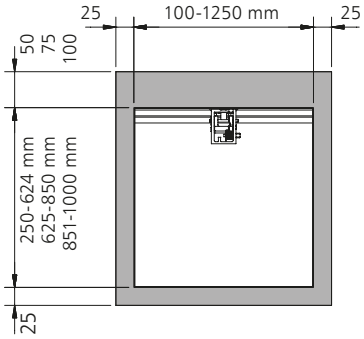
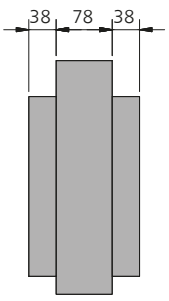


DWFX-C



201 series (rectangular dampers) with a curtain outside the air stream – from 100x250 mm to 1250x1000 mm.





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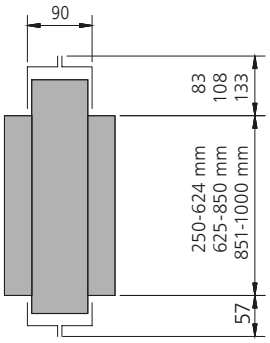
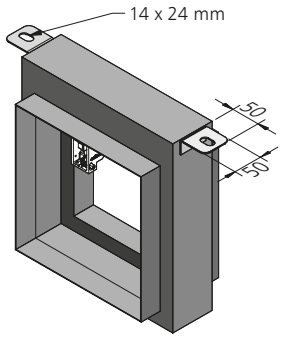
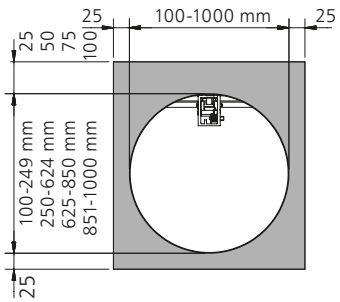
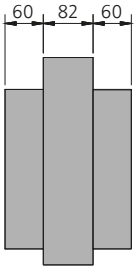


DWFX-C



301 series (circular dampers) with a curtain outside the air flow – from D100 to D1000 mm.





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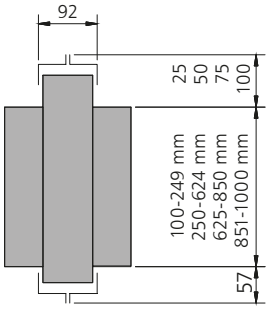
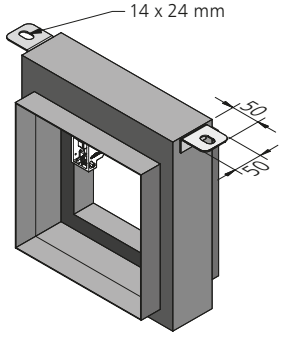


DWFX-C



Apart from the standard dimensions, fire dampers may be manufactured with intermediate dimensions (in 1 mm increments, in the given range).

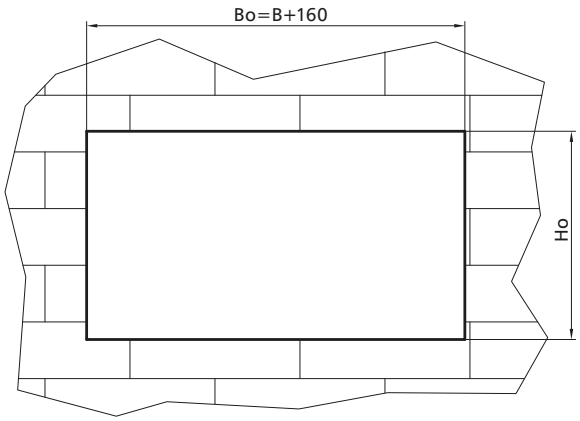
8.5. installation

The mcr FS I/F dampers are E120(ve he i→o)-rated if installed in concrete partitions, made of full bricks or cellular concrete blocks with the thickness of at least 110 mm and concrete ceilings with the thickness of at least 150 mm.

The mcr FS DWFX-C dampers are E120(ve i→o)-rated if installed in lightweight walls of cardboard-plaster panels, on a steel framework with the thickness of at least 125 mm.

8.5.1. preparation of installation openings

version mcr FS I/F

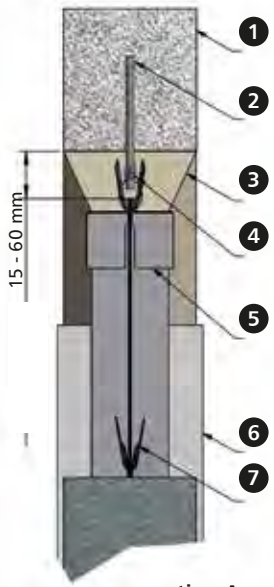


Ho = H + 160* for mcr FS 101 I/F
Ho = H + 180* for mcr FS 201 I/F 250-624 mm
Ho = H + 205* for mcr FS 201 I/F 625-850 mm
Ho = H + 230* for mcr FS 201 I/F 851-1000 mm
* applies also to mcr FS 301 I/F

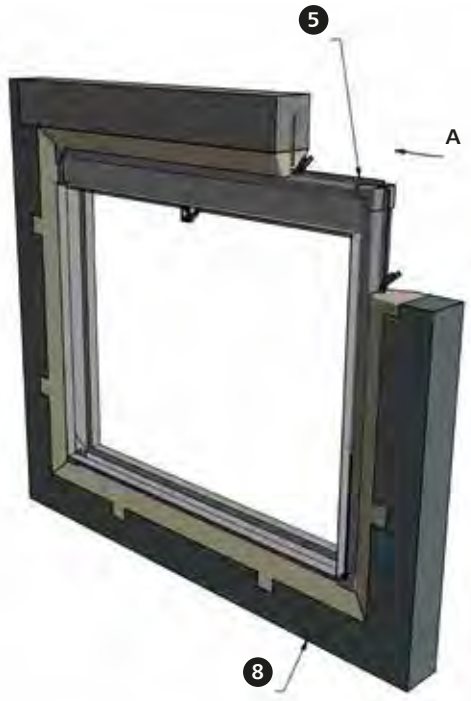
version mcr FS DWFX-C

The dampers are installed during the construction of the plaster-cardboard panel wall (the damper is embedded in the wall of panels).

8.5.2. sample installation of mcr FS I/F dampers

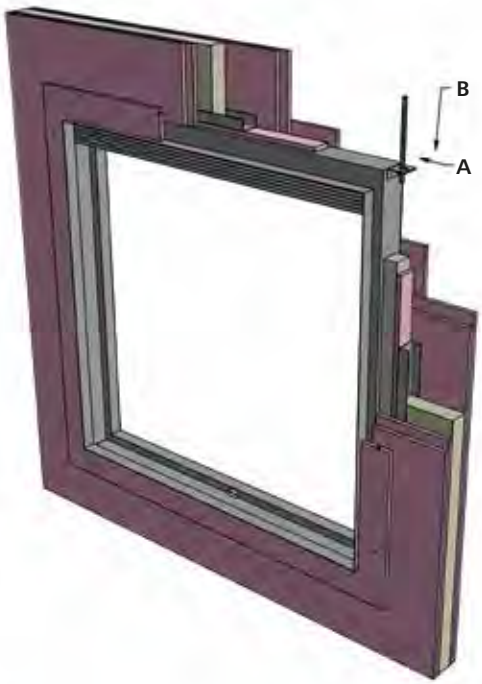


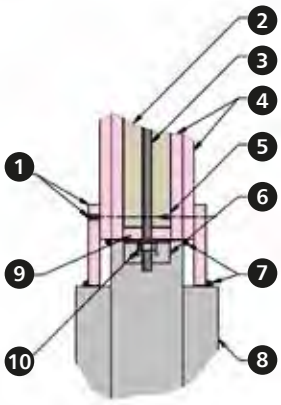
cross-section A



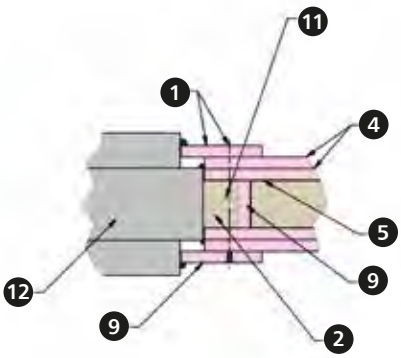
1. lintel
2. steel anchors Ø min. 6.5 mm
3. 4:1 sand-cement mortar
4. steel wire Ø 1,5 mm binding the anchors with frame runners
5. installation frame
6. fire damper
7. frame runners - for bending sideways and downwards
8. rigid partition

8.5.3. sample installation of mcr FS DWFX-C dampers





cross-section A



cross-section B

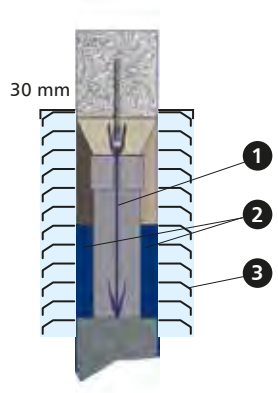
1. circumferential band of 12.5 x 100 mm plaster-cardboard panels around the damper bolted to the plaster-cardboard wall (@300 mm), to the UD50 profile
2. mineral wool 33 kg/m^3
3. rod M10 (pin)
4. 2 x 12.5 mm two-sided plaster-cardboard panels
5. UD50 profile
6. angle bar welded to both ends of the casing
7. low expansion intumescent compound around the damper, on both sides
8. damper casing
9. 12.5 mm band
10. nut M10
11. angle bar with an opening
12. fire damper

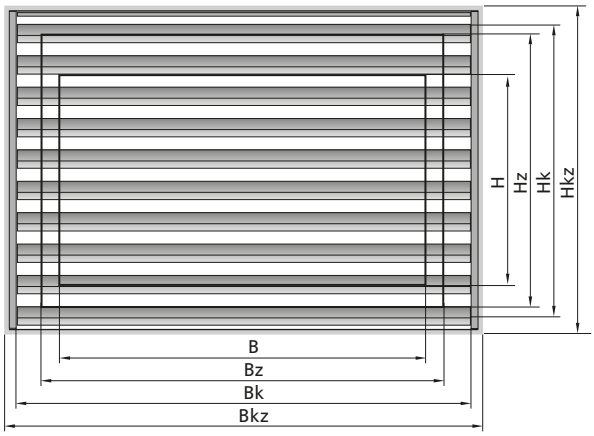
8.5.4. sample installation of mcr FS dampers with duct covers

NOTE: **Minimum wall thickness: 155 mm**.
B x H damper dimensions
Bz x Hz damper external dimensions
Bk x Hk duct cover dimensions
Bkz x Hkz duct cover external dimensions

type\size	H	Hz	Hk	Hkz
mcr FS 101 I/F	100-1000	H+114	H+160	H+210
mcr FS 201 I/F	250-624	H+140	H+180	H+230
mcr FS 201 I/F	625-850	H+165	H+205	H+255
mcr FS 201 I/F	851-1000	H+190	H+230	H+280

type\size	B	Bz	Bk	Bkz
mcr FS 101 I/F	100-1000	B+114	B+160	B+210
mcr FS 201 I/F	100-1000	B+114	B+160	B+210

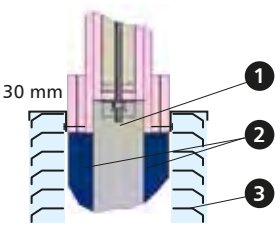


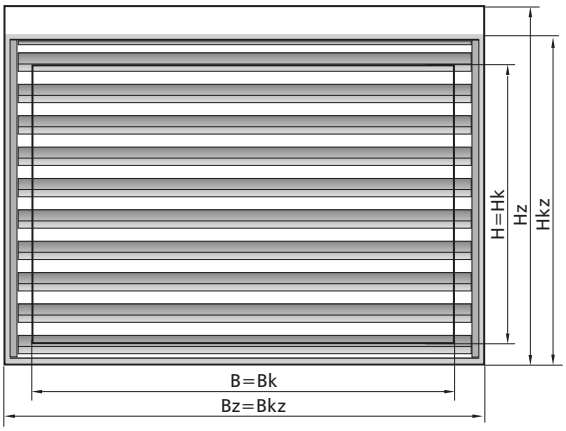


1. mcr FS damper
2. duct - ventilation straight connection pipe
3. duct cover

type\size	H	Hz	Hk	Hkz
mcr FS 101 / DWFX-C	100-1000	H+50	H	H+50
mcr FS 201 / DWFX-C	250-624	H+75	H	H+50
mcr FS 201 / DWFX-C	625-850	H+100	H	H+50
mcr FS 201 / DWFX-C	851-1000	H+125	H	H+50

type\size	B	Bz	Bk	Bkz
mcr FS 101 / DWFX-C	100-1000	B+50	B	B+50
mcr FS 201 / DWFX-C	100-1000	B+50	B	B+50





1. mcr FS damper
2. duct - ventilation straight connection pipe
3. duct cover

8.6. technical parameters

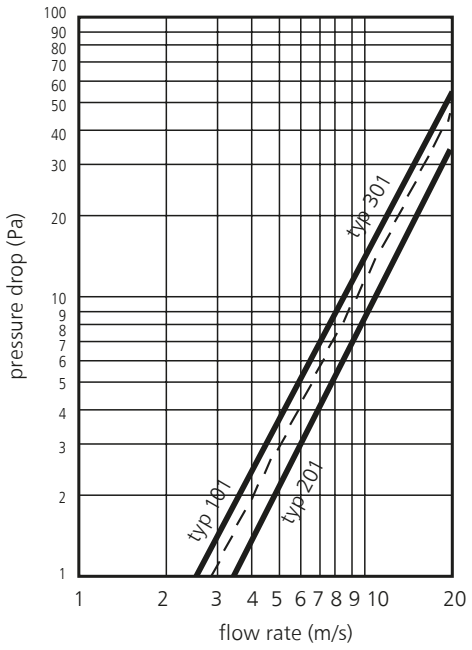
damper active surface in relation to the B and H nominal and Bz and Hz total dimensions

101 series														
H \ B	100	200	300	400	500	600	700	800	900	1000	1100	1200	1250	
100	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	150
200	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.22	0.24	0.25	250
300	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.37	350
400	0.03	0.07	0.11	0.15	0.19	0.23	0.27	0.31	0.35	0.39	0.43	0.47	0.49	450
500	0.04	0.09	0.14	0.19	0.24	0.29	0.34	0.39	0.44	0.49	0.54	0.59	0.62	550
600	0.05	0.11	0.17	0.23	0.29	0.35	0.41	0.47	0.53	0.59	0.65	0.71	0.74	650
700	0.05	0.12	0.19	0.26	0.33	0.40	0.47	0.54	0.61	0.68	0.75	0.82	0.85	750
800	0.04	0.12	0.20	0.28	0.36	0.44	0.52	0.60	0.68	0.76	0.84	0.92	0.96	850
900	0.04	0.13	0.22	0.31	0.40	0.49	0.58	0.67	0.76	0.85	0.94	1.03	1.07	950
1000	0.03	0.13	0.23	0.33	0.43	0.53	0.63	0.73	0.83	0.93	1.03	1.13	1.18	1050
	150	**250**	**350**	**450**	**550**	**650**	**750**	**850**	**950**	**1050**	**1150**	**1250**	**1300**	Bz \ Hz

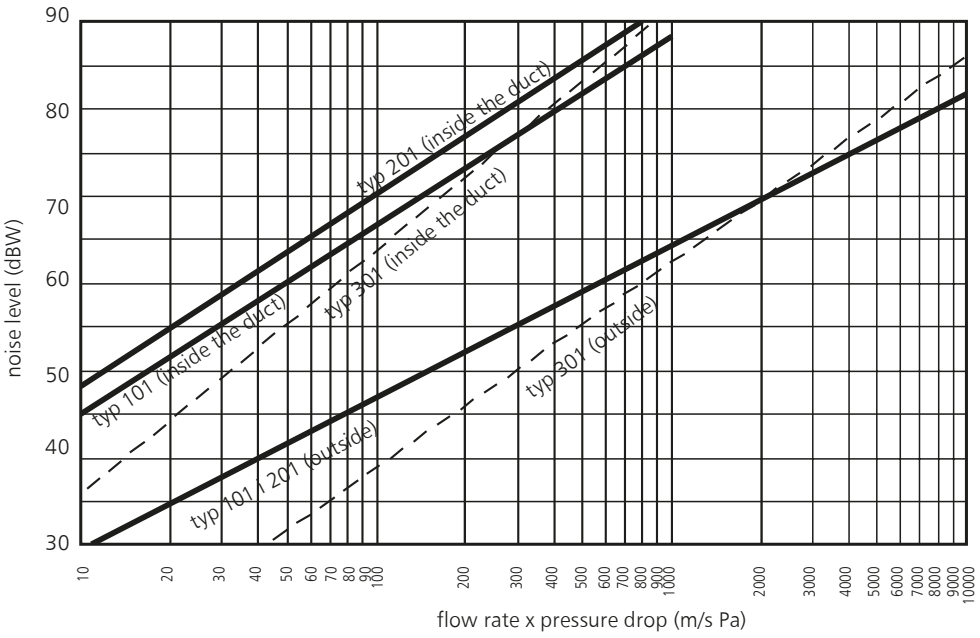
201 series														
H \ B	100	200	300	400	500	600	700	800	900	1000	1100	1200	1250	
250	0.03	0.05	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.28	0.30	0.31	325
300	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.38	375
400	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.50	475
500	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.63	575
600	0.06	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.54	0.60	0.66	0.72	0.75	675
700	0.07	0.14	0.21	0.28	0.35	0.42	0.49	0.56	0.63	0.70	0.77	0.84	0.88	800
800	0.08	0.16	0.24	0.32	0.40	0.48	0.56	0.64	0.72	0.80	0.88	0.96	1.00	900
900	0.09	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81	0.90	0.99	1.08	1.13	1025
1000	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.25	1125
	150	**250**	**350**	**450**	**550**	**650**	**750**	**850**	**950**	**1050**	**1150**	**1250**	**1300**	Bz \ Hz

301 series										
D	100	200	300	400	500	600	700	800	900	1000
active surface	0.01	0.03	0.07	0.13	0.20	0.28	0.38	0.50	0.64	0.79
Hz	150	250	375	475	575	675	800	900	1025	1125
Bz	150	250	350	450	550	650	750	850	950	1050

8.6.1. flow characteristics



pressure drop (Pa) and flow rate (m/s)



flow rate (m/s) x pressure drop (Pa) and noise level (dBW)

acoustic power spectrum for mcr FS dampers (outside)

frequency	Hz	63	125	250	500	1k	2k	3k	4k
typ 101	dB	10	7	3	9	13	20	30	33
typ 201	dB	10	7	3	9	13	20	30	33
typ 301	dB	13	10	3	7	11	12	26	42

acoustic power spectrum for mcr FS dampers (inside the duct)

frequency	Hz	63	125	250	500	1k	2k	3k	4k
typ 101	dB	4	12	16	18	22	20	32	38
typ 201	dB	4	11	17	19	22	30	33	40
typ 301	dB	4	10	16	18	21	24	30	38

8.7. weights of mcr FS curtain dampers

approximate weights of dampers [kg]																			
active opening dimensions □Ø(mm)	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
101 series/DWFX-C	1.6	2.1	2.8	3.5	4.2	5.0	5.7	6.9	7.5	8.6	9.5	10.9	12.0	13.1	13.8	15.2	16.7	18.1	19.0
101 series/ I/F	3.8	4.6	5.7	6.8	8.0	9.2	10.7	11.8	12.9	14.1	15.8	17.9	19.1	20.2	21.4	23.3	25.2	27.4	29.2
201 series/DWFX-C	-	-	-	4.1	4.6	5.4	6.0	7.1	8.0	9.3	10.5	12.1	12.7	14.4	16.0	17.5	19.0	20.5	22.0
201 series/ I/F	-	-	-	7.4	8.5	9.6	10.4	12.6	13.8	15.3	16.8	18.0	20.3	21.7	23.6	25.5	27.6	29.8	31.0
301 series/DWFX-C	2.3	3.0	4.0	5.4	6.5	7.6	8.8	10.2	11.7	13.2	14.9	16.9	18.7	20.5	22.4	24.5	26.7	28.8	31.0
301 series/ I/F	4.4	5.5	6.9	9.0	10.4	11.7	13.6	15.5	16.5	18.5	20.3	22.2	42.5	27.8	30.4	32.8	35.2	38.9	42.0

8.8. options

8.8.1. EM trigger control mechanism

mechanism operation description:

The EM mechanism is designed to operate mcr FS transfer dampers. After the removal of the power supply voltage the mechanism lock is released, which causes in the steel cord movement and damper operation. The mechanism does not feature a drive (return) spring. The spring is installed directly on the damper.

versions:

EM24 – mechanism supplied with the voltage of 24 V AC/DC –
– released by the removal of the power supply voltage

EM240 – mechanism supplied with the voltage of 230 V AC –
– released by the removal of the power supply voltage

specifications

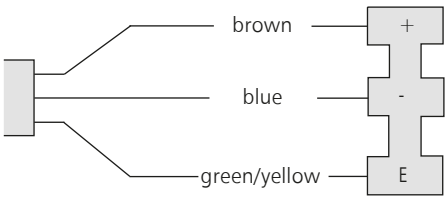
	EM24	EM240
power supply voltage	24 V AC / DC	230 V AC 50 Hz
rated current	120 m A	10 m A
electrical connection	wire 3 x 0.75 mm^2	
weight	1.6 kg	1.6 kg

electrical diagram of the mechanism

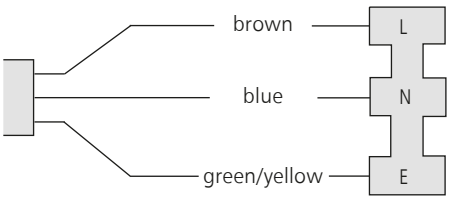
mechanism power supply

brown lead – „+" supply or „L"
blue lead – mass „-" or „N"
green-yellow lead - ground „E"

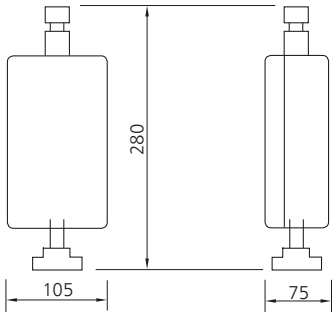
24 V AC/DC



230 V AC



mechanism dimensions



8.8.2. MSSP and MSDP independent limit switches

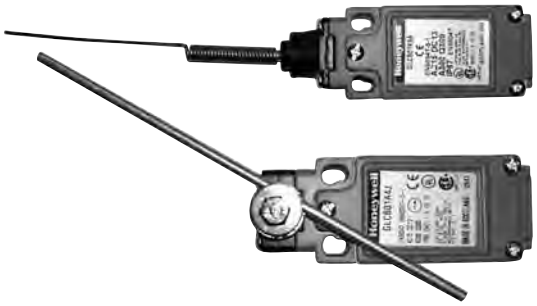
operation description:

The limit switch is used to signal the position of the fire damper partition.

versions:

MSSP – single switch – closed partition damper signaling.

MSDP – assembly of two switches – closed and open partition damper signaling.



specifications

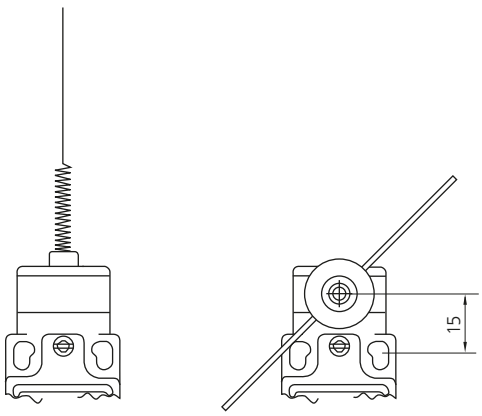
MSSP and MSDP limit switch	1NO/1NC SPDT (switching contact)
limit switch operating temperature	-25°C do +85°C
service durability	5 000 000 cycles
voltage	300 V AC i 250 V DC
current	10 A
head manufacture	„cat whiskers" or „steel rod"
ingress protection rating	IP 66

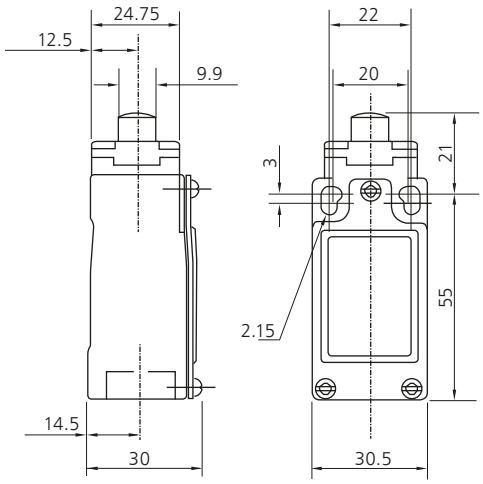
electrical diagram of the mechanism

MSSP – single limit switch, closed damper signaling:

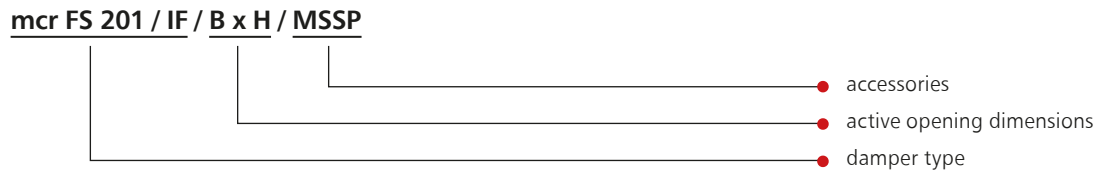
MSDP – two limit switches:

- contacts 13 and 14 NO (normally open)
- contacts 21 and 22 NC (normally closed)





8.9. designation



type:

mcr FS 101 - square or rectangular damper with a curtain partly in the air stream
mcr FS 201 - square or rectangular damper with a curtain outside the air stream
mcr FS 301 - circular damper with a curtain outside the air stream
+ IF - installation frame for rigid partitions
+ DWFX-C - frame for installation before the assembly of dry partition walls

accessories:

MSSP - single limit switch (closed damper signaling)
MSDP - two single limit switches (closed and open damper signalling)
EM24 - electromagnetic trigger (power supply voltage of 24 V AC/DC)
EM240 - electromagnetic trigger (power supply voltage of 230 V AC)
MKPZ - duct cover x 1 front, x 2 front and rear

9.1. cooperation with smoke exhaust/cut-off dampers - drive quick selection table

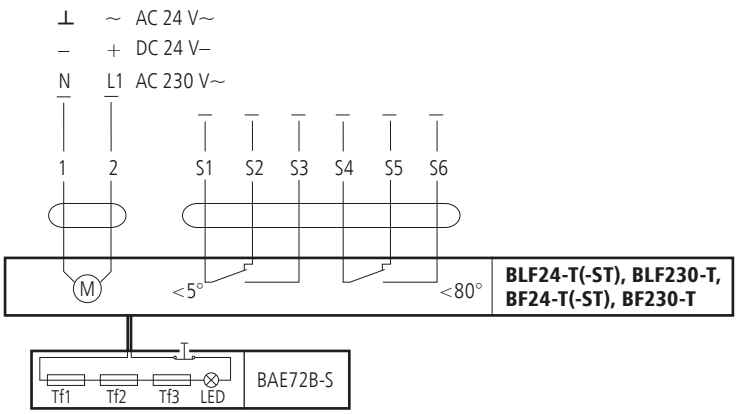
	mcr FID S/S c/P	mcr FID S/S p/P mcr FID S/S p/O	mcr FID S/V p/P	mcr FID PRO	mcr WIP
BF24-T (-ST)		X			X
BLF24-T (-ST)	X	X		X	X
BF230-T		X			X
BLF230-T	X	X		X	X
BFL24-T (-ST)	X			X	X
BFL230-T	X			X	X
BFN24-T (-ST)	X			X	X
BFN230-T	X			X	X
BE24			X		
BE230			X		
BLE24			X		
BLE230			X		
EXBF24-T	X	X		X	X
EXBF230-T	X	X		X	X
BF24TL-T (-ST)	X	X		X	X
RST	X	X		X	
RST/WK1	X	X		X	
RST/WK2	X	X		X	
RST-KW1/S	X	X		X	X
RST-KW1/S/WK2	X	X		X	X
RST-KW1/24I	X	X		X	
RST-KW1/24P	X	X		X	
RST-KW1/230I	X	X		X	
RST-KW1/230P	X	X		X	

9.2. actuators

9.2.1. BLF, BF electric actuators

Specifications	BLF24 (BLF24-T)	BLF230 (BLF230-T)	BF24 (BF24-T)	BF230 (BF230-T)
power supply	AC 24 V 50/60 Hz DC 24 V	AC 220-240 V 50/60 Hz	AC 24 V 50/60 Hz DC 24 V	AC 220-240 V 50/60 Hz
power demand: - for spring tensioning - for holding	 5 W 2.5 W	 5 W 3 W	 7 W 2 W	 8.5 W 3 W
sizing (apparent power)	7 VA	7 VA	10 VA	11 VA
protection class	III	II	III	II
ingress protection rating	IP 54	IP 54	IP 54	IP 54
auxiliary circuit breaker:	2 x SPDT 3 (0.5) A AC 250 V	2 x SPDT 3 (0.5) A AC 250 V	2 x EPU 3 (0.5) A 250 V	2 x EPU 3 (0.5) A 250 V~
- activation position	5°, 80°	5°, 80°	5°, 80°	5°, 80°
torque: - motor - return spring	 6 Nm 4 Nm	 6 Nm 4 Nm	 18 Nm 12 Nm	 18 Nm 12 Nm
cable connection: - motor (length: 0.9 m) - auxiliary circuit breaker	 2 x 0.75 mm^2 6 x 0.75 mm^2	 2 x 0.75 mm^2 6 x 0.75 mm^2	 2 x 0.75 mm^2 6 x 0.75 mm^2	 2 x 0.75 mm^2 6 x 0.75 mm^2
movement time (0-90°): - motor - return spring	 40-75 s ~20 s	 40-75 s ~20 s	 120 s ~16 s	 120 s ~16 s
operating temperature range	-30 ... +50°C	-30 ... +50°C	-30 ... +50°C	-30 ... +50°C
sound intensity level: - motor - return spring	 max 45 dB (A) ~62 dB (A)	 max 45 dB (A) ~62 dB (A)	 max 45 dB (A) ~63 dB (A)	 max 45 dB (A) ~63 dB (A)

electrical diagram of the BLF, BF series actuator:



note: 24 V connection through a safety transformer.

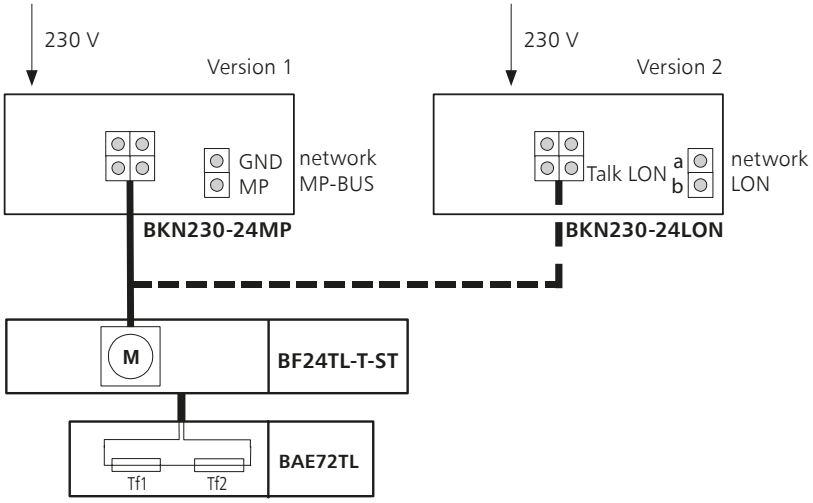
To disconnect the 230 V actuator from the mains, the gap of at least 3 mm between the contacts (when off) is required in the switch.

It is possible to connect further drives in parallel. Check the power consumption.

note:

The location of the actuator limit switches is shown for the no voltage position.

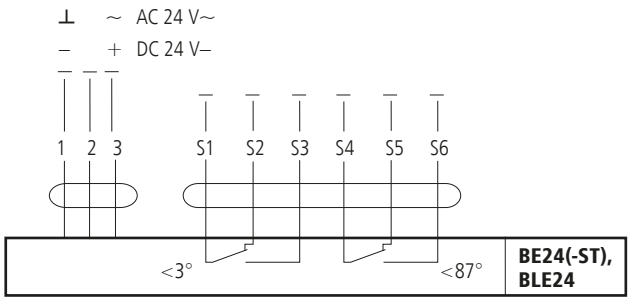
electrical diagram of the BF24TL-T(-ST) actuator:



9.2.2. BE, BLE electric actuators

Specifications	BE24, BE24-ST	BE230	BLE24	BLE230
power supply	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz	AC 24 V 50/60 Hz DC 24 V	AC 230 V 50/60 Hz
power demand: - in movement - for holding	 12 W 0.5 W	 8 W 0.5 W	 7.5 W 0.5 W	 5 W 0.5 W
sizing (apparent power)	18 VA	15 VA	9 VA	12 VA
protection class	III	II	III	II
ingress protection rating	IP 54	IP 54	IP 54	IP 54
auxiliary circuit breaker:	2 x SPDT 6 (1.5) A AC 250 V	2 x SPDT 6 (1.5) A AC 250 V	2 x EPU 3 (0.5) A 250 V	2 x EPU 3 (0.5) A 250 V~
- activation position	5°, 80°	5°, 80°	5°, 80°	5°, 80°
torque - motor	40 Nm	40 Nm	15 Nm	15 Nm
movement time (0-90°) - motor	< 60 s dla 90°	< 60 s dla 90°	< 30 s dla 90°	< 30 s dla 90°
operating temperature range	-30 ... +50°C	-30 ... +50°C	-30 ... +50°C	-30 ... +50°C
sound intensity level	~62 dB (A)	~62 dB (A)	~62 dB (A)	~62 dB (A)

electrical diagram of the BE, BLE series actuator:



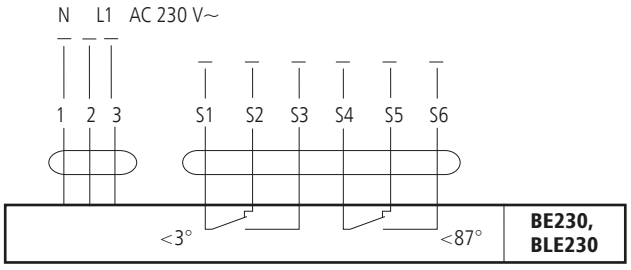
note:

The actuator operation control requires routing three-wire system to it. The actuator rotation sense is changed by the application of the power supply voltage to the terminal 2 or 3, depending on the desired sense.

note: 24 V connection through a safety transformer.

To disconnect the 230 V actuator from the mains, the gap of at least 3 mm between the contacts (when off) is required in the switch.

It is possible to connect further drives in parallel. Check the power consumption.



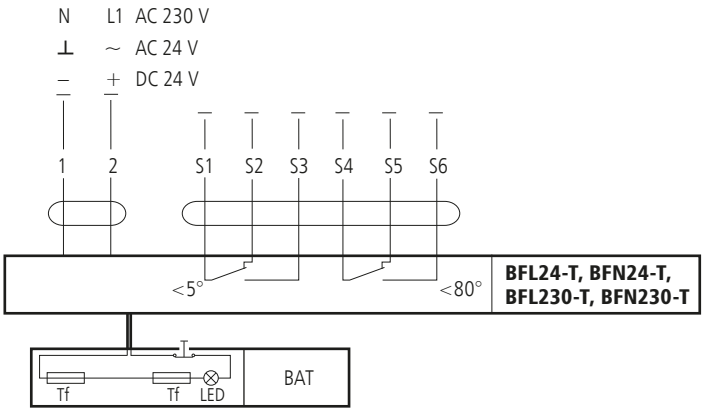
note:

The location of the actuator limit switches is shown for the no voltage position.

9.2.3. BFL, BFN electric actuators

Specifications	BFL24 (BFL24-T)	BFL230 (BFL230-T)	BFN24 (BFN24-T)	BFN230 (BFN230-T)
power supply	AC 24 V 50/60 Hz DC 24 V	AC 220-240 V 50/60 Hz	AC 24 V 50/60 Hz DC 24 V	AC 220-240 V 50/60 Hz
power demand: - for spring tensioning - for holding	 2.5 W 0.7 W	 3.5 W 1.1 W	 4 W 1.4 W	 5 W 2.1 W
sizing (apparent power)	4 VA	6.5 VA	6 VA	10 VA
protection class	III	II	III	II
ingress protection rating	IP 54	IP 54	IP 54	IP 54
auxiliary circuit breaker:	2 x SPDT 3 (0.5) A AC 250 V	2 x SPDT 3 (0.5) A AC 250 V	2 x EPU 3 (0.5) A 250 V	2 x EPU 3 (0.5) A 250 V~
- activation position	5°, 80°	5°, 80°	5°, 80°	5°, 80°
torque: - motor - return spring	 4 Nm 3 Nm	 4 Nm 3 Nm	 9 Nm 7 Nm	 9 Nm 7 Nm
cable connection: - motor (length: 0.9 m) - auxiliary circuit breaker	 2 x 0.75 mm^2 6 x 0.75 mm^2	 2 x 0.75 mm^2 6 x 0.75 mm^2	 2 x 0.75 mm^2 6 x 0.75 mm^2	 2 x 0.75 mm^2 6 x 0.75 mm^2
movement time (0-90°): - motor - return spring	 < 60 s ~20 s	 < 60 s ~20 s	 < 60 s ~20 s	 < 60 s ~20 s
operating temperature range	-30 ... +55°C	-30 ... +55°C	-30 ... +55°C	-30 ... +55°C
sound intensity level: - motor - return spring	 max 43 dB (A) ~62 dB (A)	 max 43 dB (A) ~62 dB (A)	 max 55 dB (A) ~67 dB (A)	 max 55 dB (A) ~67 dB (A)

electrical diagram of the BFL, BFN series actuator:



note: 24 V connection through a safety transformer.

To disconnect the 230 V actuator from the mains, the gap of at least 3 mm between the contacts (when off) is required in the switch.

It is possible to connect further drives in parallel. Check the power consumption.

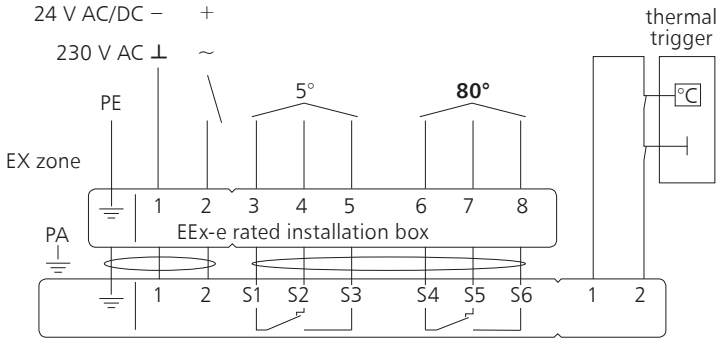
note:

The location of the actuator limit switches is shown for the no voltage position.

9.2.4. EXBF actuators

Specifications	EXBF B 001 2 ...0 N 000	EXBF A 001 2 ...0 N 000
zone	1, 2, 21, 22	
ATEX-rating	II 2 GD EEx d IIC T6	
power supply	24 V AC ±20% 50/60 Hz / 24 V DC -10/+20%	230 V AC ±14% 50/60 Hz
power demand: - for spring tensioning - for holding	 7 W 2 W	 8 W 3 W
sizing (apparent power)	10 VA	12.5 VA
ingress protection rating	IP 66	IP 66
auxiliary circuit breaker: - activation position	2 x SPDT 6 A (3) max 250 V AC 5°, 80°	2 x SPDT 6 A (3) max 250 V AC 5°, 80°
torque: - motor - return spring	 18 Nm 12 Nm	 18 Nm 12 Nm
movement time (90°C): - motor - return spring	 150 s ~20 s	 150 s ~20 s
ambient temperature	-30 ... +50°C	-30 ... +50°C

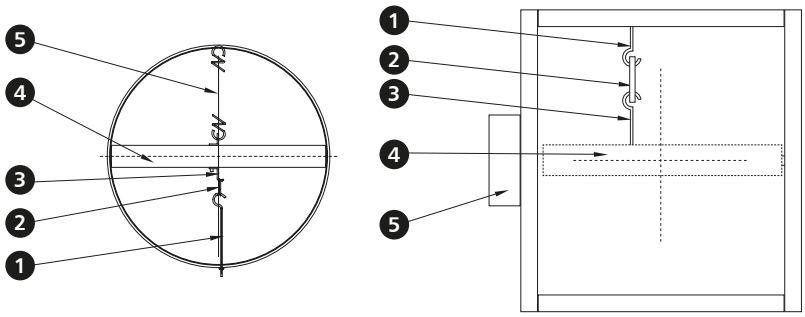
connection diagram for EXBF actuators



9.3. RST trigger control mechanisms

In the RST version the WK1 limit switches are independent units installed inside the fire damper casing. The thermal trigger is on the damper partition. The driving spring is installed on the damper partition or in a guard box on its casing.

1. moving hook with nut
2. thermal cell
3. fixed hook on the damper partition
4. damper partition
5. drive spring



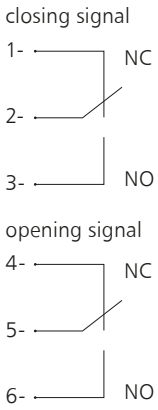
Independent limit switches – RST version

WK1 – limit switch (closed partition signal)
WK2 – limit switch (closed/open partition signal)

Switch specifications

WK1 and WK2 limit switch	1xNO/1xNC SPDT 5 A, 230 V AC
limit switch operating temperature	-25 ... +85°C
casing	plastic

electric connection diagram of WK1 and WK2 limit switches



note:
When the isolation partition closes, the closed indication limit switch is switched over (contacts 2-3 are closed).

9.4. RST-KW1 mechanisms

	RST-KW1/S	RST-KW1/S/WK2	RST-KW1/24I	RST-KW1/24P	RST-KW1/230I	RST-KW1/230P
rated voltage	–	–	24 V - 48 V DC	24 V - 48 V DC	230 AC	230 AC
power consumption	–	–	3.5 W	1.6 W	2 W	2 W
thermal trigger	74°C (optionally 95°C)					
connections - trigger	–	–	wire 0.6 m, 2 x 0.5 mm^2			
connections - limit switches	–	wire 0.6 m, 6 x 0.5 mm^2				
limit switch	–	2 x NO/NC 5A, 230 V AC				
movement time	maks. 2 s					
mechanism operation control (closing)	–	–	voltage application „pulse"	voltage removal „break"	voltage application „pulse"	voltage removal „break"
mechanism operation control (opening)	manual	manual	manual	manual	manual	manual

description of electrical connections:

RST-KW1 mechanism power supply	closing limit switch	opening limit switch
wire number: 1-2	wire number: 3-4 – NO (normally open)	wire number: 6-7 – NO (normally open)
	wire number: 4-5 – NC (normally closed)	wire number: 7-8 – NC (normally closed)

9.5. manufacture standards

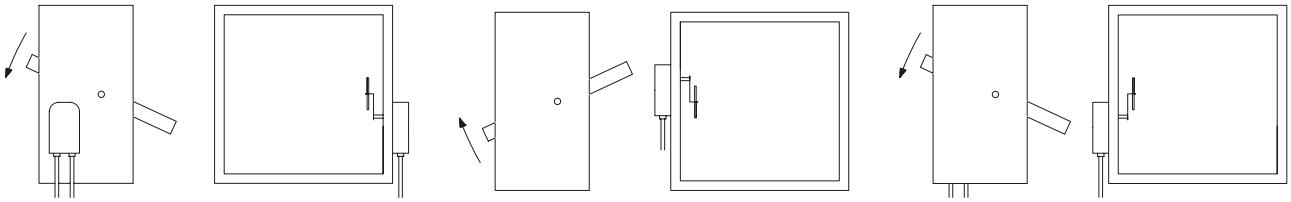
damper type	description	standard	option
mcr FID S/S c/P	right damper	X	
	inverse damper		X
	left damper		X
	actuator normal to the axis flow	X	
	actuator along the axis flow		
mcr FID S/S p/P mcr FID S/V p/P	right damper	X	
	inverse damper		X
	left damper		X
	actuator normal to the axis flow	X	
	actuator along the axis flow		X
mcr FID S/S p/O	right damper	X	
	inverse damper		
	left damper		
	actuator normal to the axis flow	X	
	BF actuator along the v (exception)	X	
	actuator along the axis flow		X
mcr FID PRO	right damper	X	
	inverse damper		
	left damper		
	actuator normal to the axis flow	X	
	actuator along the axis flow		X
mcr WIP	right damper		
	inverse damper		X
	left damper	X	
	actuator normal to the axis flow	X	
	actuator along the axis flow		

mcr FID S/S c/P damper

standard right damper

inverse damper
(wires downward)

left damper

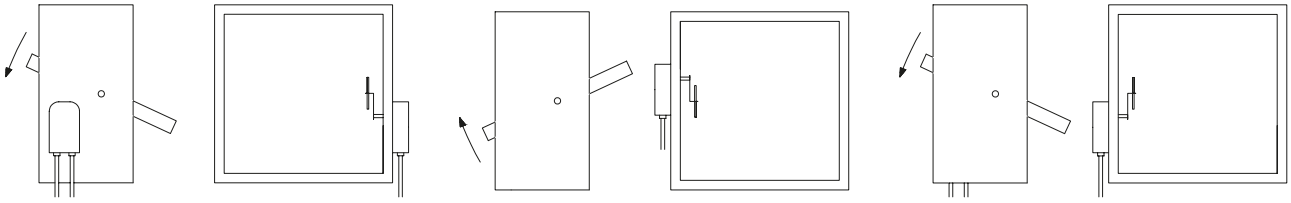


mcr FID S/S p/P, mcr FID S/S p/O, mcr FID S/V p/P damper

standard right damper

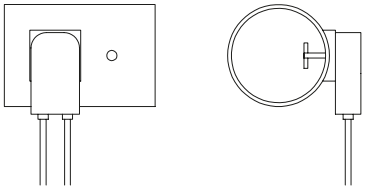
inverse damper
(wires downward)

left damper

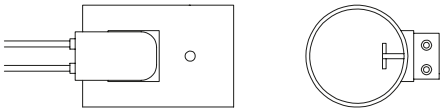


mcr FID PRO damper

standard right damper

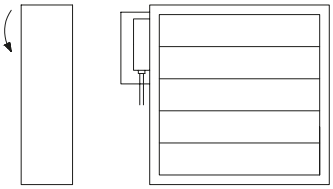


actuator along the axis flow



mcr WIP damper

standard left damper



inverse damper (wires downward)