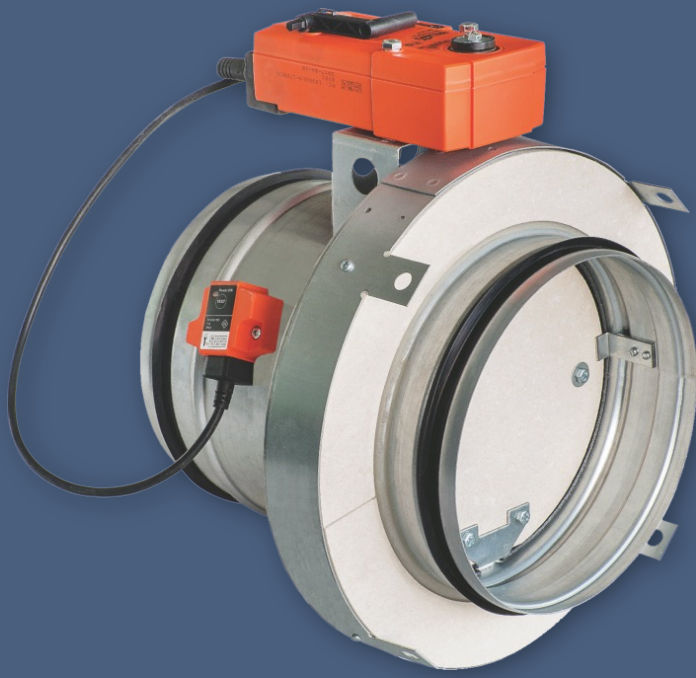
MANDÍK®

TPM 125/17
Version 2025-05-23

FDMS

Fire damper

Technical Documentation
Installation, Commissioning, Operation, Maintenance and Service Manual



CE
1391

MANDÍK®
www.mandik.com

MANDÍK, a. s. • Dobříšská 550 • 267 24 Hostomice • Czech Republic • Tel.: +420 311 706 742 • E-Mail: mandik@mandik.cz

These technical specifications state a row of manufactured sizes and models of fire dampers FDMS.
It is valid for production, designing, ordering, delivery, maintenance and operation.

CONTENT

In case of products with "P-mark" certification from RISE Institute in Sweden these technical specifications must be meet in addition to the standard design:

- In addition to activation by means of thermal fuses or links in the actuator, the damper must also be activated by smoke detectors and/or heat detectors that have been installed in suitable positions.
- The smoke and heat detectors used together with the fire damper must be designated and constructed in accordance with one of the following standards EN 54-5, EN 54-7, EN 54-12 or EN 54-20.
- The damper must be controlled by an actuator connected to a higher-level supervisory and control system.
- Correct operation of the damper must be verified by automatic testing of its function at least once per 48 hours.

After reaching of these requirements the product will be provided with this certificate:

- Certified body - RISE Certifiering.
- Number of the certificate - SC1433-17.

I. GENERAL

Description

Fire dampers are shutters in ducts of air-conditioning devices that prevent the spread of fire and combustion products from one fire segment to the other one by means of closing the duct in the points of fire separating constructions.

In the case of FDMS the fire damper blade closes automatically air duct using a closing spring or a spring return actuator. In the case of FDMS with VAV actuator the fire damper has an additional function of the variable air flow controller.

The return spring of the actuator is actuated when a thermoelectric activation device BAT (TAE - GRUNER) is activated, when a test button on BAT (TAE - GRUNER) is pressed or when power supply of the actuator is interrupted. In case of manual control with thermal fuse, the closing spring is actuated after the moment, when the thermal fuse is melted.

After closing the blade, the damper is sealed with silicon against smoke penetration. On request by customer, the damper can be supplied silicon-free. In the closed position, the damper is also sealed with material which increases its volume due to increasing temperature and air proofs the air duct.

The damper is equipped with an additional collar, in the position of the blade. On the collar, there are several metallic plates (fixtures for easy installation on the wall or ceiling construction).

FDMS with spring return actuator

FDMS with manual control

FDMS with VAV actuator

Damper characteristics

- CE certified acc. to EN 15650
- Tested in accordance with EN 1366-2
- Classified acc. to EN 13501-3+A1
- External Casing leakage class min. C acc. to EN 1751, Internal leakage min. class 2 acc. to EN 1751
- Cycling test acc. to EN 15650: FDMS - class C_{10000}, FDMS with VAV actuator - class C_{20000} - C_{MOD} classification
- Corrosion resistant acc. to EN 15650
- Certificate of constancy of performance No. 1391-CPR-XXXX/XXXX
- P-mark certification from RISE Institute in Sweden No. SC1433-17
- Declaration of Perfomance No. PM/FDMS/01/XX/X
- Hygienic assessment of fire dampers - Report No. 1.6/pos/19/19b

Working conditions

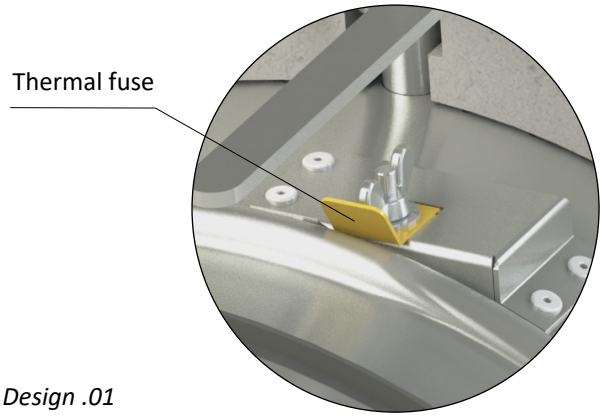
- Exact damper function is provided under the following conditions:
  - maximum air velocity 12 m/s
  - maximum pressure difference 2500 Pa
  - the air circulation in the whole damper section must be secured steady over the entire surface.
- Operation of the dampers does not depend on the direction of air-flow (circulation). In case of FDMS with VAV actuator the direction of air-flow is strictly defined.
- Dampers can be installed in arbitrary position.
- Dampers are suitable for systems without abrasive, chemical and adhesive particles.
- Dampers are designed for macroclimatic areas with mild climate according to EN IEC 60 721-3-3 ed.2., class 3K22. (Environment 3K22 is typically protected place with regulated temperature)
- Temperature in the place of installation is permitted to range from -30°C to +50°C.

II. DESIGN

Damper design FDMS with manual control

Design .01

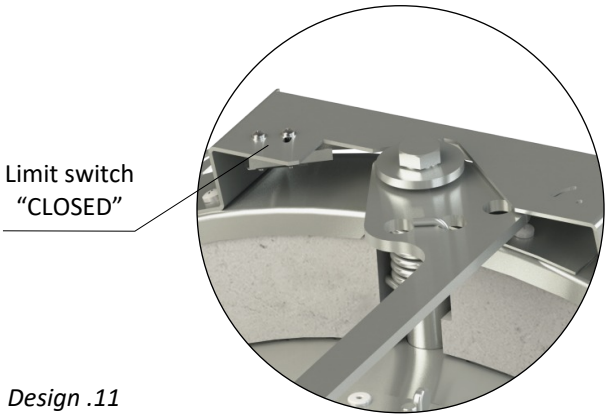
- Design with manual control with a thermal fuse which actuates the shutting device, after the nominal activation temperature 72°C has been reached.
- Automatic initiation of the manual control is not activated if the temperature does not exceed 70°C.



Design .01

Design .11

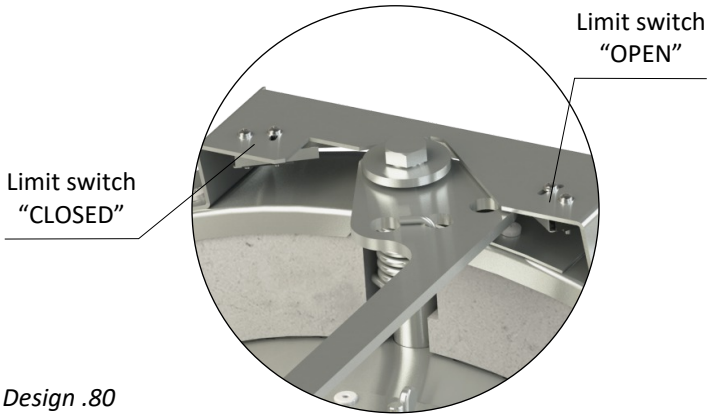
- Design .01 with manual control can be complemented with a limit switch signaling of the damper blade position "CLOSED".
- Cable is connected directly to limit switch.
- Limit switch detail → see page 5



Design .11

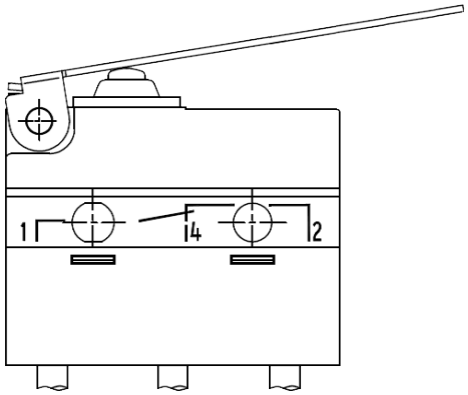
Design .80

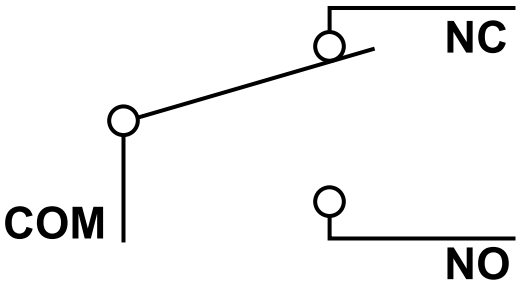
- Design .01 with manual control can be complemented with two limit switches signaling of the damper blade position "CLOSED" and "OPEN".
- Cables are connected directly to limit switches.
- Limit switch detail → see page 5



Design .80

Limit switch G905-300E03W1





1(COM) - black wire
2(NC) - gray wire
4(NO) - blue wire

Nominal voltage and maximal current	AC 230V / 5A
Class of protection	IP 67
Working temperature	-25°C … +120°C

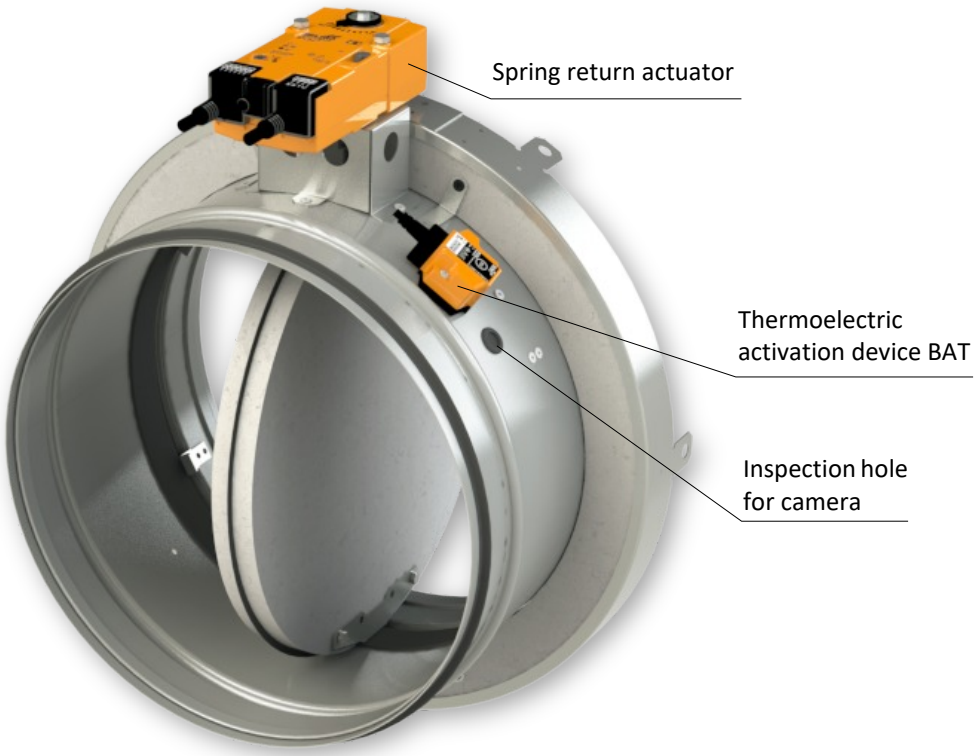
This limit switch is possible to connect in two following ways

- CUT-OFF if the arm is moving … connect wire 1+2
- SWITCH-ON if the arm is moving … connect wire 1+4

Damper design FDMS with spring return actuator

Design .40 and .50

- The fire dampers are equipped with Belimo spring return actuators with thermoelectric activation device BAT. The spring return actuator types are BFL, BFN depending on the damper size. (Further mentioned as „actuator“).
- After being connected to power supply 230V or AC/DC 24V, the actuator rotates the damper blade to the operating position "OPEN" and at the same time pre-stretches its return spring.
- When the actuator is power supplied, the damper blade is in the position "OPEN" and the return spring is pre-stretched.
- Time needed for full opening of the damper blade from the position "CLOSED" to the position "OPEN" is maximum 120 sec. If the actuator power supply is interrupted (due to loss of supply voltage, or pressing a test button on the thermoelectric activation device BAT), the actuator rotates the damper blade to the breakdown position "CLOSED".
- The time of closing the damper blade from the position "OPEN" to the position "CLOSED" takes maximum 20 sec.
- In case that the power supply is restored again (the blade can be in any position), the actuator starts to rotate the damper blade back to the position "OPEN".
- A thermoelectric activation device BAT, which contains two thermal fuses Tf1 and Tf2, is an integral part of the actuator.
- These fuses are activated when temperature +72°C has been reached (the fuse Tf1 due to temperature outside the duct and the fuse Tf2 due to temperature inside the duct). The thermoelectric activation device can also be equipped with a Tf2 thermal fuse type ZBAT 95/120/140 (must be specified in the order). In this case, the activation temperature inside the duct is +95°C, +120°C or +140°C (depending on the type).
- After the thermal fuse Tf1 or Tf2 has been activated, the power supply is permanently and irreversibly interrupted and the actuator, by means of the pre-stretched spring, rotates the damper blade into the breakdown position "CLOSED".
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.

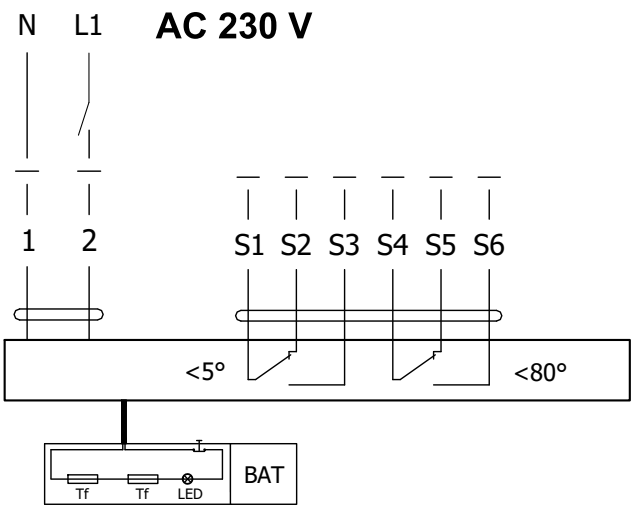


Design .40 and .50

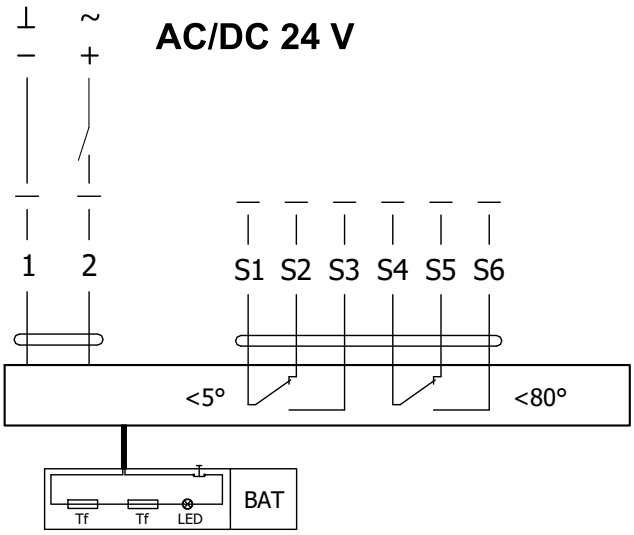
Design .4V and .5V

- This design is the same .40 and .50 designs except the BAT thermoelectric activation device is not mounted on the damper casing.
- The option of installing a BAT thermoelectric activation device in the connected air duct.
- The BAT thermoelectric activation device is permanently connected to the actuator with a connecting cable.

Actuator BELIMO BFL 230-T

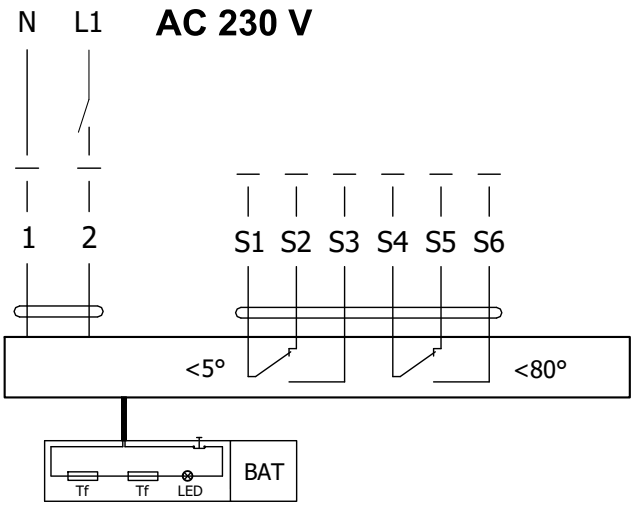


Actuator BELIMO BFL 24-T(-ST)

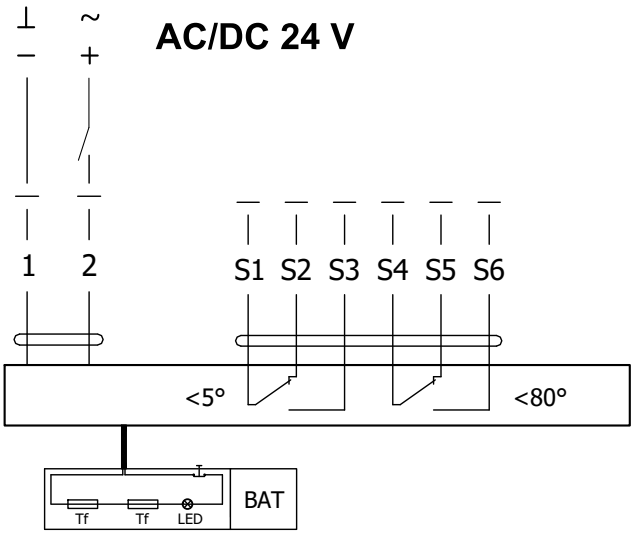


Actuator BELIMO BFL 230-T(-ST), BFL 24-T(-ST)		
Actuator BELIMO - 4 Nm/ 3 Nm Spring	**BFL 230-T(-ST)**	**BFL 24-T(-ST)**
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	3,5 W 1,1 W	2,5 W 0,8 W
Dimensioning	6,5 VA (Imax 4 A @ 5 ms)	4 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	< 60 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	 -30°C … +55°C The safe position will be attained up to max. +75°C -40°C … +55°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm² (BFL 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm² (BFL 2xx-T-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

Actuator BELIMO BFN 230-T



Actuator BELIMO BFN 24-T(-ST)

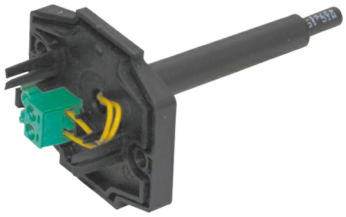


Actuator BELIMO BFN 230-T(-ST), BFN 24-T(-ST)		
Actuator BELIMO - 9 Nm/ 7 Nm Spring	**BFN 230-T(-ST)**	**BFN 24-T(-ST)**
Power voltage	AC 230 V 50/60Hz	AC/DC 24 V 50/60Hz
Power consumption - in operation - in rest position	5 W 2,1 W	4 W 1,4 W
Dimensioning	10 VA (Imax 4 A @ 5 ms)	6 VA (Imax 8,3 A @ 5 ms)
Protection class	II	III
Degree of protection	IP 54	
Running time - motor - spring return	< 60 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature	 -30°C … +55°C The safe position will be attained up to max. +75°C -40°C … +55°C	
Connection - supply/control - auxiliary switch	cable 1 m, 2 x 0,75 mm² (BFN 2xx-T-ST) with 3-pin plug-in connectors cable 1 m, 6 x 0,75 mm² (BFN 2xx-T-ST) with 6-pin plug-in connectors	
Response temperature thermal fuse	duct outside temperature +72°C duct inside temperature +72°C	

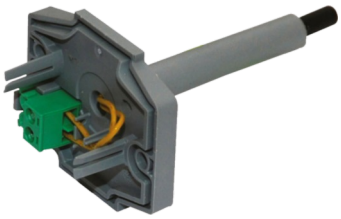
Thermoelectric activation device BAT

- If the thermal fuse Tf1 is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. Thermoelectric activation device BAT is integral part of the actuator.
- If the thermal fuse Tf2 is interrupted (due to temperature inside the duct), only the spare part ZBAT 72 (95/120/140) needs to be replaced (acc.to the activation temperature).
- When one of the thermal fuses responds, the supply voltage is interrupted permanently and irreversibly.
- The function (interruption of the supply voltage) can be checked by pressing the test button.
- Installation is carried out with the pre-assembled, self-tapping screws.

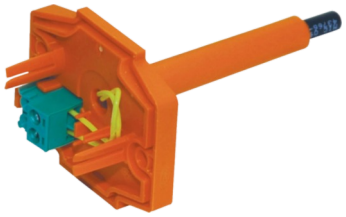
BELIMO ZBAT 72
Black (BK) = 72°C (standard)



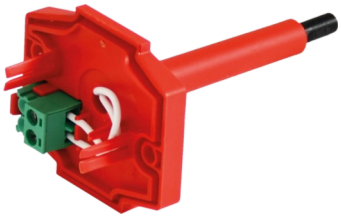
BELIMO ZBAT 95
Grey (GY) = 95°C

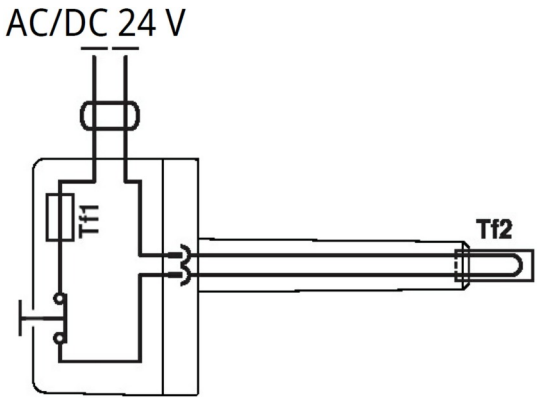


BELIMO ZBAT 120
Orange (OG) = 120°C



BELIMO ZBAT 140
Red (RD) = 140°C



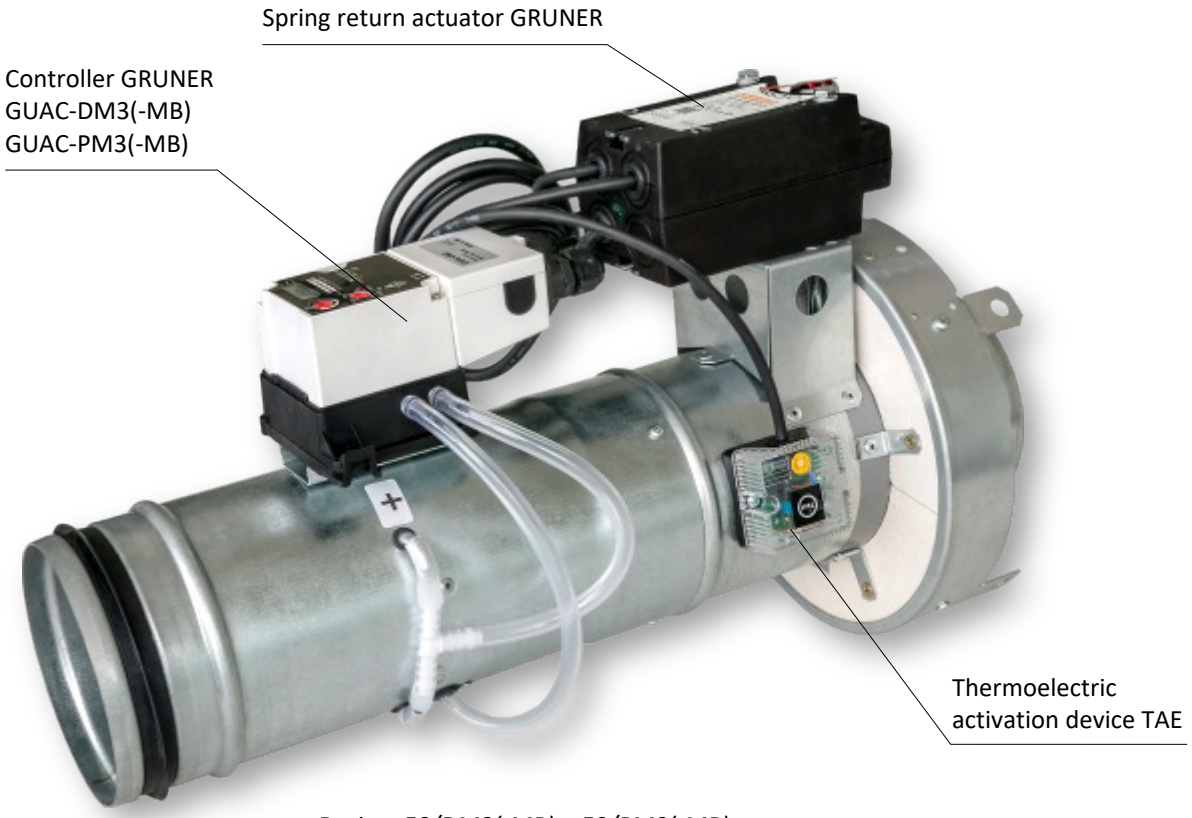


Thermoelectric activation device BAT 72 (95/120/140)	
Power voltage	AC/DC 24 V 50/60Hz
Rated current	1 A
AC/DC throughput resistance	<1 Ω
Protection class	III
Degree of protection	IP 54
Probe length	65 mm
Ambient temperature Storage temperature Ambient humidity	-30°C … +50°C -40°C … +50°C Max. 95% RH, non-condensing
Connection supply	Cable 1 m, 2 x 0.5 mm², Betaflam cable heatresistant up to 145°C
Response temperature thermal fuse	Duct inside temperature +72 (95/120/140)°C Duct outside temperature +72 (95/120/140)°C

Damper design with VAV actuator

Design .50/DM3(-MB), .50/PM3(-MB)

- The damper design, which allows the delivery of the required amount of air to the room or occupied zone, is variable over time and can be changed according to requirements. The fire damper is equipped with an additional measuring section (measuring cross) for the purpose of measuring the air flow.
- Fire dampers are equipped with GRUNER spring return actuators with thermoelectric activation device, type 340CTA or 360CTA depending on the damper size.
- To ensure the VAV function there is an universal actuator controller GUAC-DM3 (.50/DM3) for air flow control and GUAC-PM3 (.50/PM3) for pressure control.
- To ensure the VAV function there is an universal actuator controller for air flow control with communication Modbus GUAC-DM3-MB (.50/DM3-MB) for pressure control with communication Modbus GUAC-PM3-MB (.50/PM3-MB).
- After connection to the power supply AC/DC 24V, the actuator rotates the damper blade to the operating position given by the required air volume flow.
- At the same time return spring of the actuator is pre-stretched. When the actuator is power supplied, the damper blade is in the position given by the required air volume flow.
- If the actuator power supply is interrupted (due to loss of supply voltage, or pressing a test button on the thermoelectric activation device TAE, spring return rotates the damper blade into the safety position "CLOSED". The time needed for rotation of the blade from the position "OPEN" to the position "CLOSE" takes maximum 20s.
- In case that the power supply is restored again (the blade can be in any position), the actuator starts to rotate the damper blade position given by the required air volume flow.
- A thermoelectric activation device TAE, which contains two thermal fuses Tf1 and Tf2, is an integral part of the actuator.
- These fuses are activated when temperature +72°C has been reached (the fuse Tf1 due to temperature outside the duct and the fuse Tf2 due to temperature inside the duct). Both fuses, they are in serial connection. It means in fact, that when one of them is activated, the power supply of the actuator is disconnected and the actuator rotate blade in safety position "CLOSED".
- Signalisation of damper blade position "OPEN" and "CLOSE" is provided by two microswitches.



Design .50/DM3(-MB), .50/PM3(-MB)

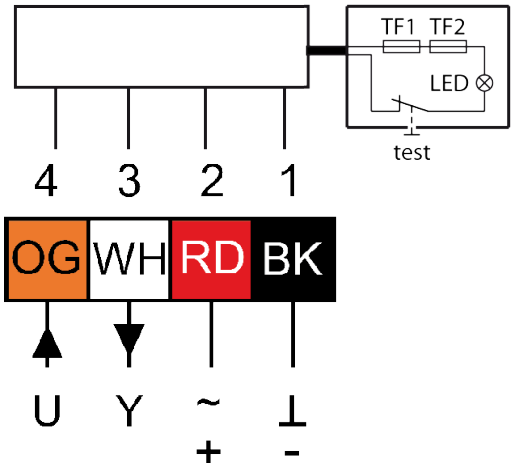
Actuator GRUNER 340CTA-024D-03, 340CTA-024-05

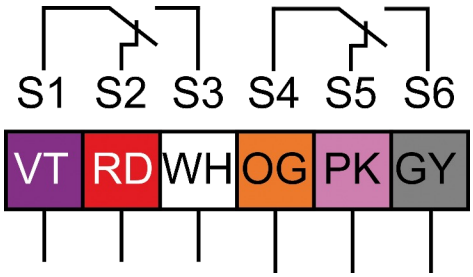
GRUNER - 3 N.m, 5 N.m

Actuator GRUNER 360CTA-024-12

GRUNER - 12 N.m

TAE - 72

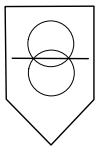




Cable colors:
OG = orange
WH = white
RD = red
BK = black
VT = purple
PK = pink
GY = grey

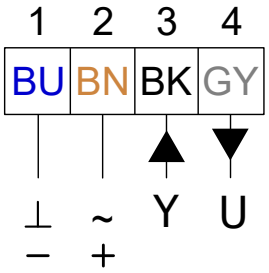
Actuator GRUNER 340CTA-024D-03, 340CTA-024-05, 360CTA-024-12			
Actuator GRUNER	**340CTA-024D-03 (3 N.m)**	**340CTA-024-05 (5 N.m)**	**360CTA-024-12 (12 N.m)**
Power voltage		AC/DC 24 V 50/60Hz	
Power consumption - in operation - in rest position	6,5 W 1 W	6,5 W 2 W	5 W 2 W
Dimensioning	7,5 VA	7,5 VA	7 VA
Protection class		III	
Degree of protection		IP 54	
Running time - motor - spring return		< 75 s ~ 20 s	
Ambient temperature - normal duty - safety duty - non-operating temperature		 -30°C ... +50°C max. +75°C -30°C ... +50°C	
Connection - actuator - auxiliary switch		cable 1 m, 4 x 0,75 mm^2 cable 1 m, 6 x 0,75 mm^2	
Response temperature thermal fuse		duct outside temperature +71°C duct inside temperature +72°C	

Controller GRUNER GUAC-DM3(-MB), GUAC-PM3(-MB)

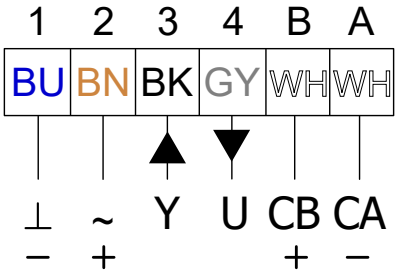


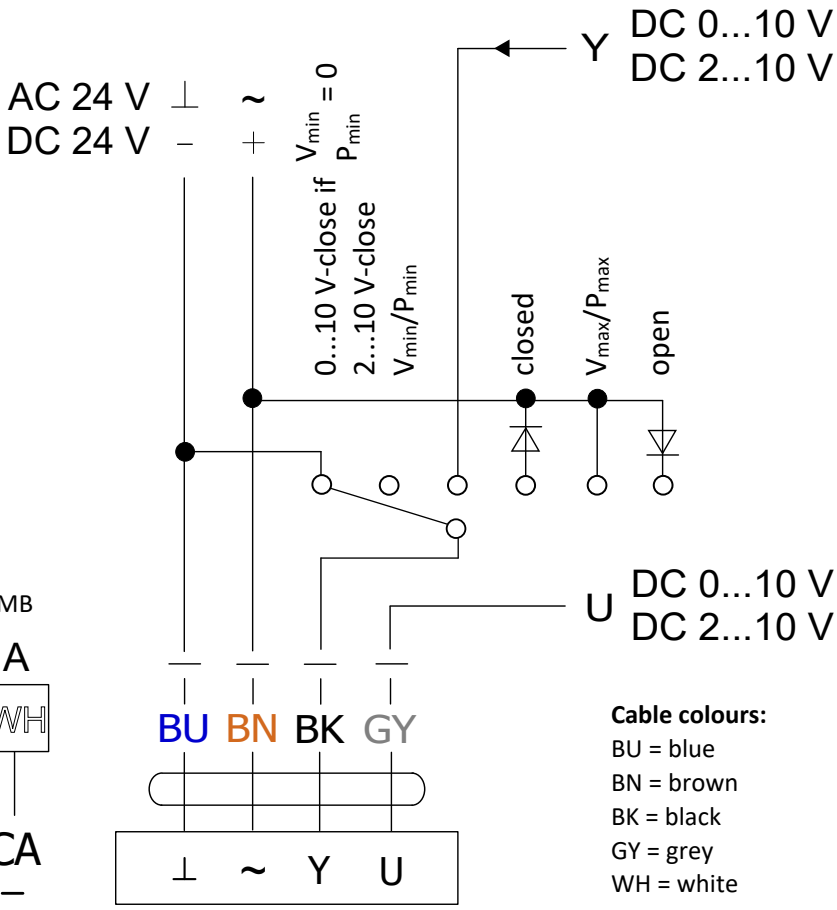
safety transformer

GUAC-DM3 / GUAC-PM3



GUAC-DM3-MB / GUAC-PM3-MB

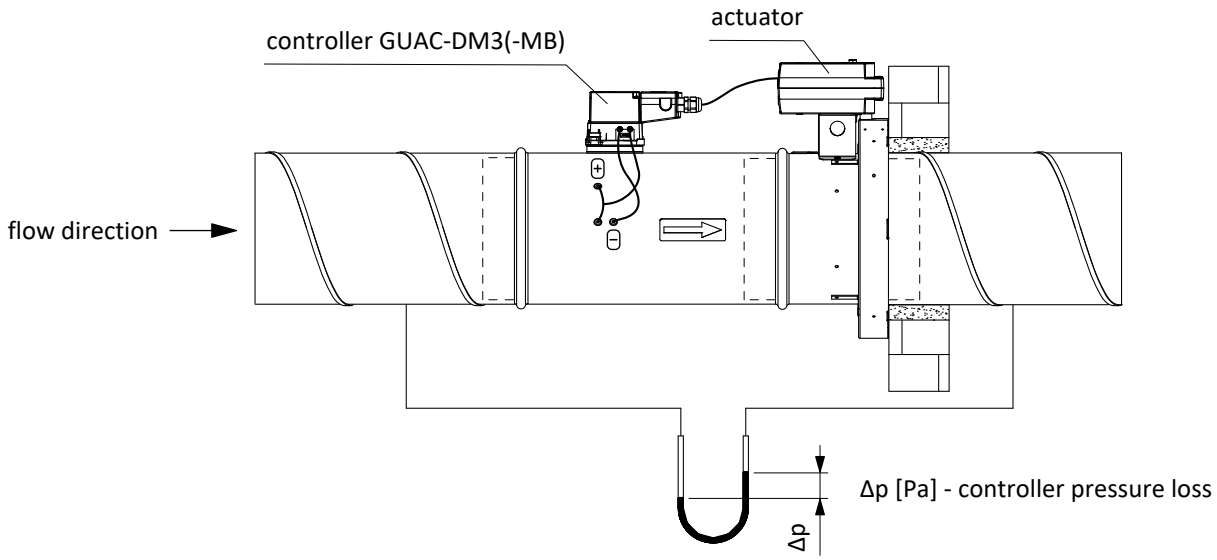




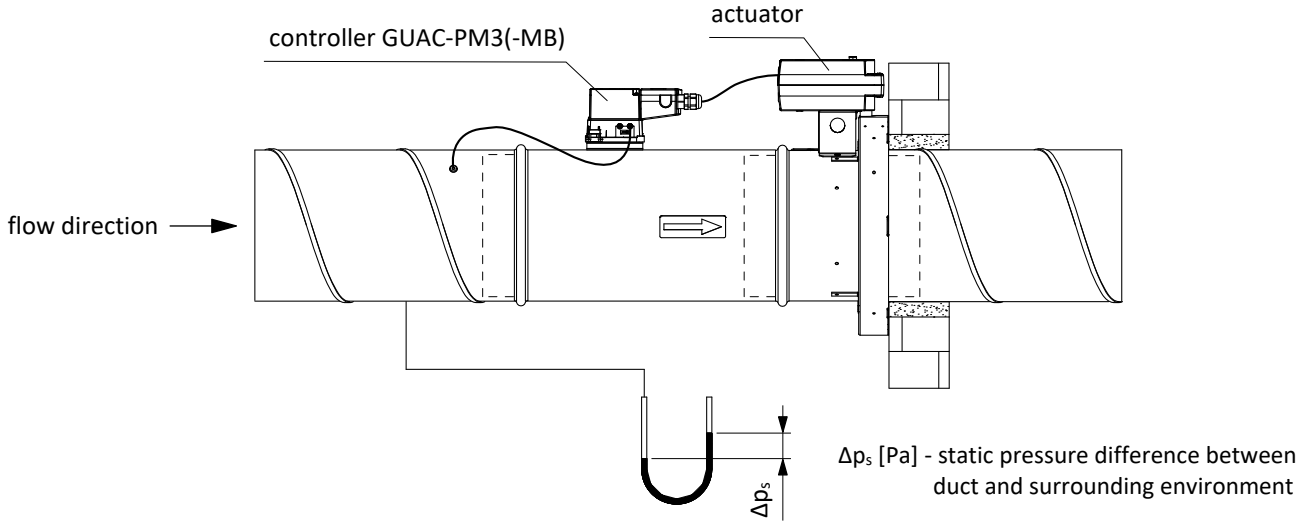
Cable colours:
BU = blue
BN = brown
BK = black
GY = grey
WH = white

Controller GRUNER GUAC-DM3(-MB), GUAC-PM3(-MB)				
Controller GRUNER	**GUAC-DM3**	**GUAC-PM3**	**GUAC-DM3-MB**	**GUAC-PM3-MB**
Power voltage	AC/DC 24 V 50/60Hz			
Power consumption	0,6 W			
Dimensioning	1,3 VA			
Protection class	III			
Degree of protection	IP 54 (cable downwards)			
Control	(0)2...10 VDC / Ri > (100 kΩ) 50 kΩ (0)4...20 mA / Rext. = 500 Ω		Modbus RTU / analog (0)2...10 VDC / Ri > (100 kΩ) 50 kΩ (0)4...20 mA / Rext. = 500 Ω	
Feedback signal	(0)2...10 VDC, max. 0,5 mA		Modbus RTU / analog (0)2...10 VDC, max. 0,5 mA	
Priority control	close / V_{min} / V_{max} / open	close / P_{min} / P_{max} / open	close / V_{min} / V_{max} / open	close / P_{min} / P_{max} / open
Ambient Temperature - normal duty - storage temperature	-0°C ... +50°C -20°C ... +80°C			
Connecting - controller - actuators	screw terminals, 4-pin, 0,5...2,5 mm² cabel 1 m with Lumberg connector		screw terminals, 6-pin, 0,5...2,5 mm² cabel 1 m with Lumberg connector	
Connection GUIV	via diagnostic connector and feedback signal U/PP		Modbus RTU protocol	
Sensor	300 Pa (dynamic)	300 Pa (static)	300 Pa (dynamic)	300 Pa (static)
Communication	PP-Bus (1200 Bd, max. 15 VDC)		Modbus RTU	

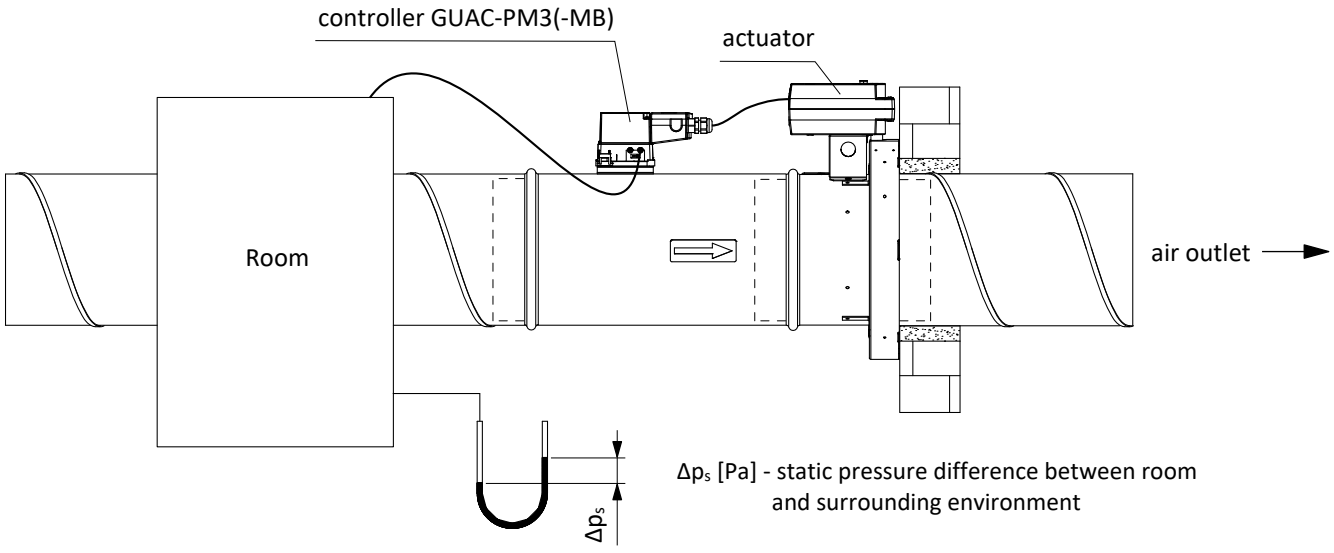
Air flow control



Duct pressure control



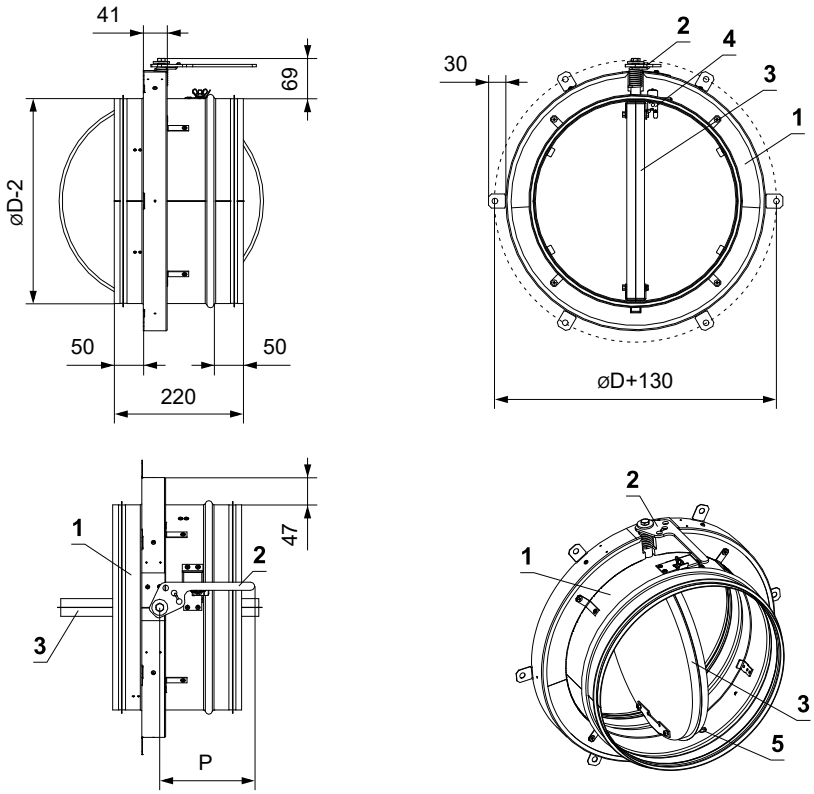
Room pressure control



III. DIMENSIONS

Dimensions of FDMS

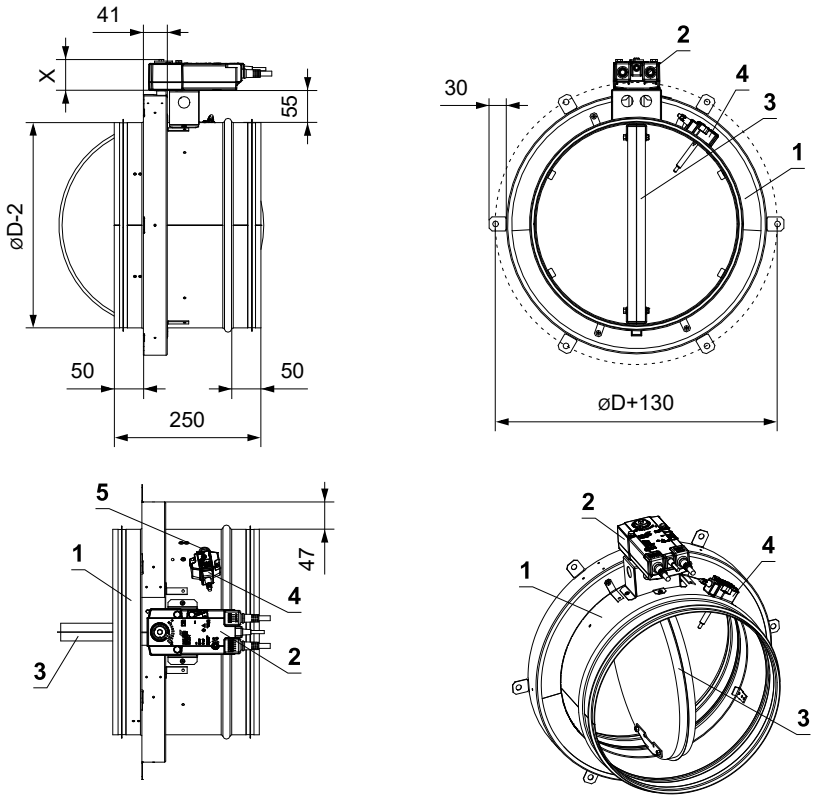
Design with manual control



P=113 mm for DN 100 - DN 200
P=163 mm for DN 225 - DN 630

1 Damper casing
2 Manual control
3 Damper blade
4 Thermal fuse
5 Hole for camera

Design with spring return actuator

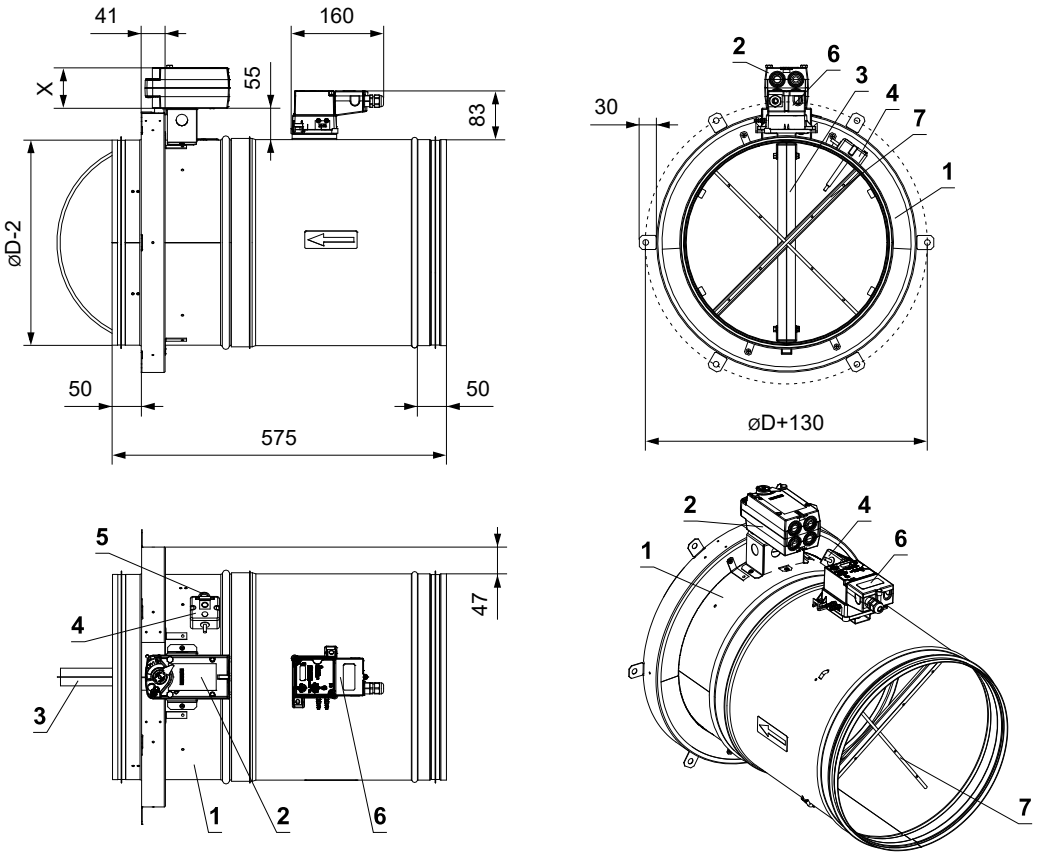


X=55 mm (BFL) *
X=59 mm (BFN) *

1 Damper casing
2 Spring return actuator BELIMO
3 Damper blade
4 Thermoelectric activation device BAT
5 Hole for camera

* Assignment of actuators to individual sizes → see page 17

Dimensions of FDMS with VAV actuator



X=74 mm (340CTA-024D-03, 340CTA-024-05) *
X=64 mm (360CTA-024-12) *

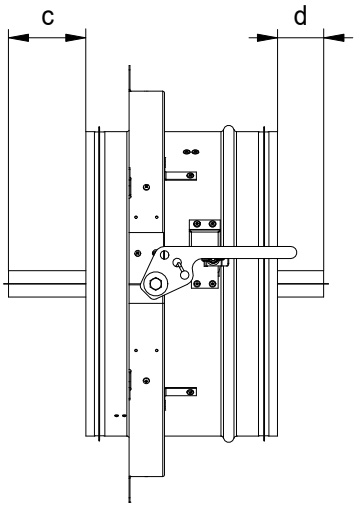
1 Damper casing
2 Spring return actuator GRUNER
3 Damper blade
4 Thermoelectric activation device TAE
5 Hole for camera
6 Controller GRUNER GUAC-DM3(-MB) / GUAC-PM3(-MB)
7 Measuring cross

* Assignment of actuators to individual sizes → see page 17

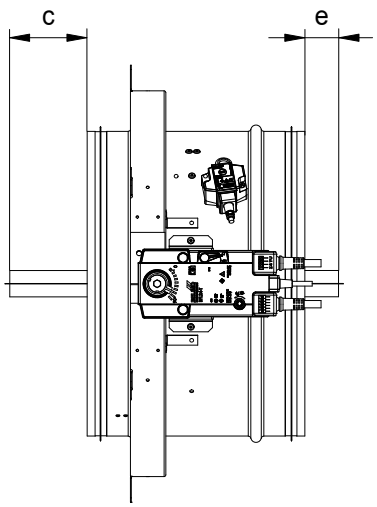
Damper blade overlaps of FDMS

- Open damper blade overlaps the damper casing by the value „c“ / „d“ / „e“. These values are specified in chapter Technical parameters → see page 17. Values „c“ / „d“ / „e“ has to be respected when projecting following air-conditioning duct.

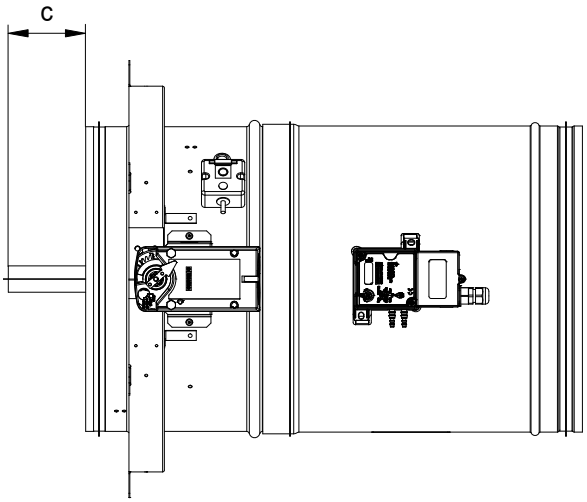
Blade overlaps of FDMS with manual control



Blade overlaps of FDMS with actuating mechanism

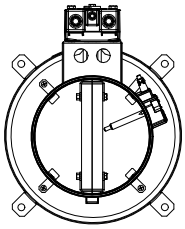


Blade overlaps of FDMS with VAV actuator

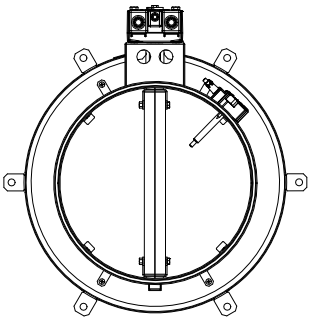


Overview of dampers acc. the number of anchors

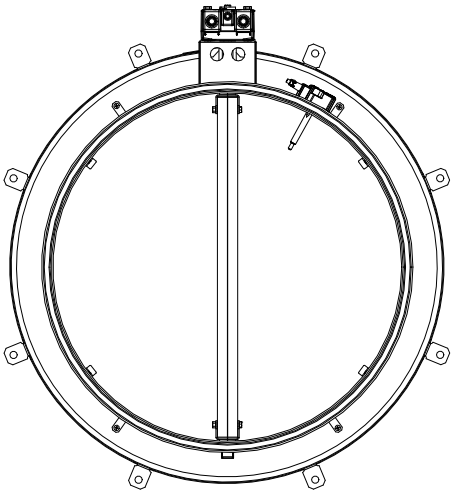
DN 100 - DN 250 (4x)



DN 280 - DN 450 (6x)



DN 500 - DN 630 (8x)



Technical parameters

Fire damper FDMS							
Nominal size ØD [mm]	Damper blade overlaps			Weight		Effective area Sef [m²]	Actuator BELIMO
	c [mm]	d [mm]	e [mm]	Man. control [kg]	Actuator [kg] *		
100	-	-	-	2,2	3,3	0,0032	BFL
125	-	-	-	2,6	3,7	0,0063	BFL
160	-	-	-	3,2	4,3	0,0086	BFL
180	2,5	-	-	3,6	4,7	0,0102	BFL
200	12,5	-	-	4	5,1	0,0122	BFL
225	25	-	-	4,5	5,6	0,0164	BFL
250	37,5	-	-	5,1	6,2	0,0213	BFL
280	52,5	-	-	5,8	6,9	0,0280	BFL
315	70	12	-	6,7	7,8	0,0400	BFL
355	90	35	2	7,7	8,8	0,0530	BFL
400	112,5	54,5	24,5	9	10,1	0,0710	BFL
450	137,5	79,5	49,5	10,4	11,5	0,0940	BFL
500	162,5	104,5	74,5	12	13,4	0,1260	BFN
560	192,5	134,5	104,5	14,1	15,5	0,1700	BFN
630	227,5	169,5	139,5	16,7	18,1	0,2500	BFN

** For designs with BKN a weight of 0.5 kg must be added.*

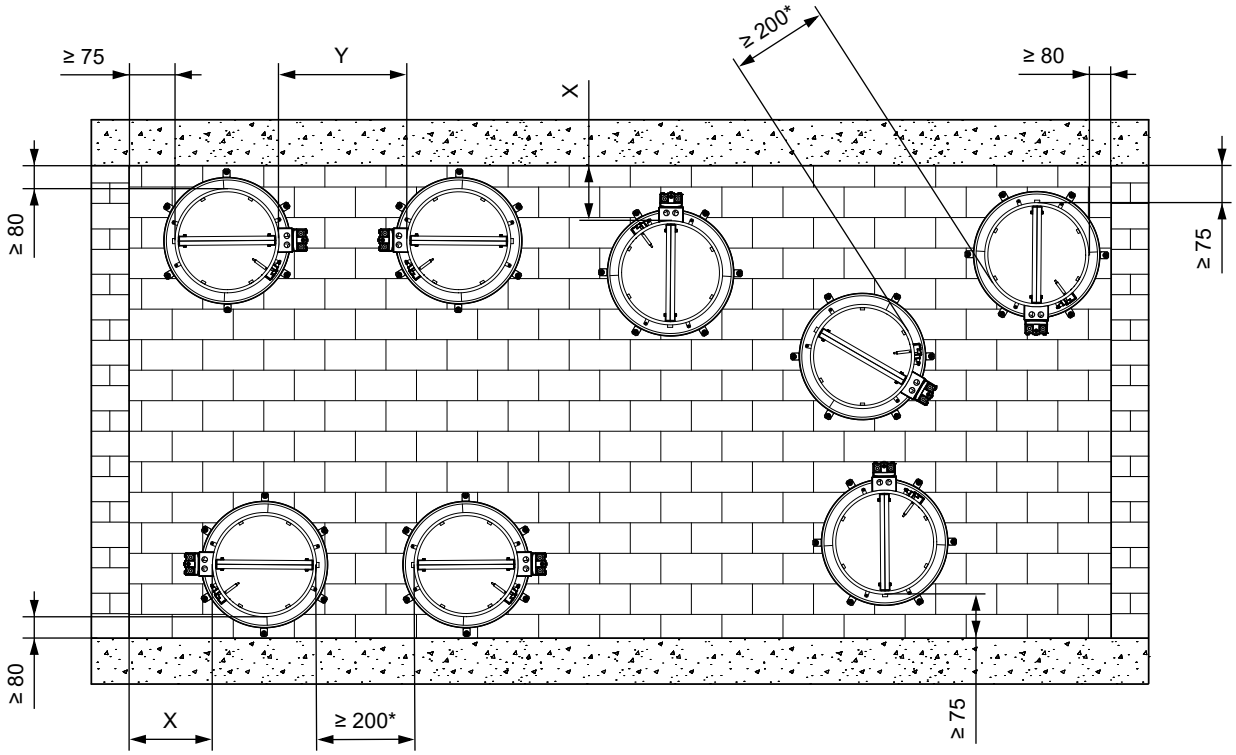
Fire damper FDMS with VAV actuator				
Nominal size ØD [mm]	Damper blade overlap	Weight	Effective area Sef [m²]	Actuator GRUNER
	c [mm]			
100	-	4,3	0,0032	340CTA-024D-03
125	-	4,8	0,0063	340CTA-024D-03
160	-	5,6	0,0086	340CTA-024D-03
180	2,5	6,1	0,0102	340CTA-024D-03
200	12,5	6,6	0,0122	340CTA-024D-03
225	25	7,3	0,0164	340CTA-024D-03
250	37,5	8,1	0,0213	340CTA-024D-03
280	52,5	9,1	0,0280	340CTA-024D-03
315	70	10,9	0,0400	340CTA-024D-03
355	90	11,5	0,0530	340CTA-024-05
400	112,5	14,1	0,0710	340CTA-024-05
450	137,5	17,3	0,0940	340CTA-024-05
500	162,5	20,1	0,1260	360CTA-024-12
560	192,5	23,5	0,1700	360CTA-024-12
630	227,5	28,9	0,2500	360CTA-024-12

IV. INSTALLATION

Placement and installation

- The fire dampers are suitable for installation in arbitrary position in vertical and horizontal passages of fire separating constructions, each other connected to the circular duct. The damper installation procedures must be done so that all load transfer from the fire separating constructions to the damper and duct is absolutely excluded. Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. The gap between the installed damper (connected to the duct) and the fire separating construction must be perfectly filled with approved material.
- Damper doesn't have an inspection door. To ensure that the internal surfaces of the fire damper can be inspected, the damper is equipped with an inspection hole for a camera as standard. For other service works, the external access door (inspection door) must be installed on the air duct, next to the fire damper.
- During the installation and plastering process, the actuating mechanism must be protected (covered) against damage and pollution. The damper casing should not be deformed during bricking in. Once the damper is built in, the damper blade should not grind against the damper casing during opening or closing.
- The distance between the fire damper and the construction (wall, ceiling) must be 75 mm at the minimum, according to EN 1366-2. If two or more dampers are to be installed in one fire separating construction, the distance between adjacent dampers must be 200 mm at the minimum, according to EN 1366-2.

Minimum distance between the fire dampers FDMS and the construction



X = recommended min. distance ≥ 220 mm required to access the actuator or manual control

Y = recommended min. distance ≥ 320 mm required to access the actuator or manual control

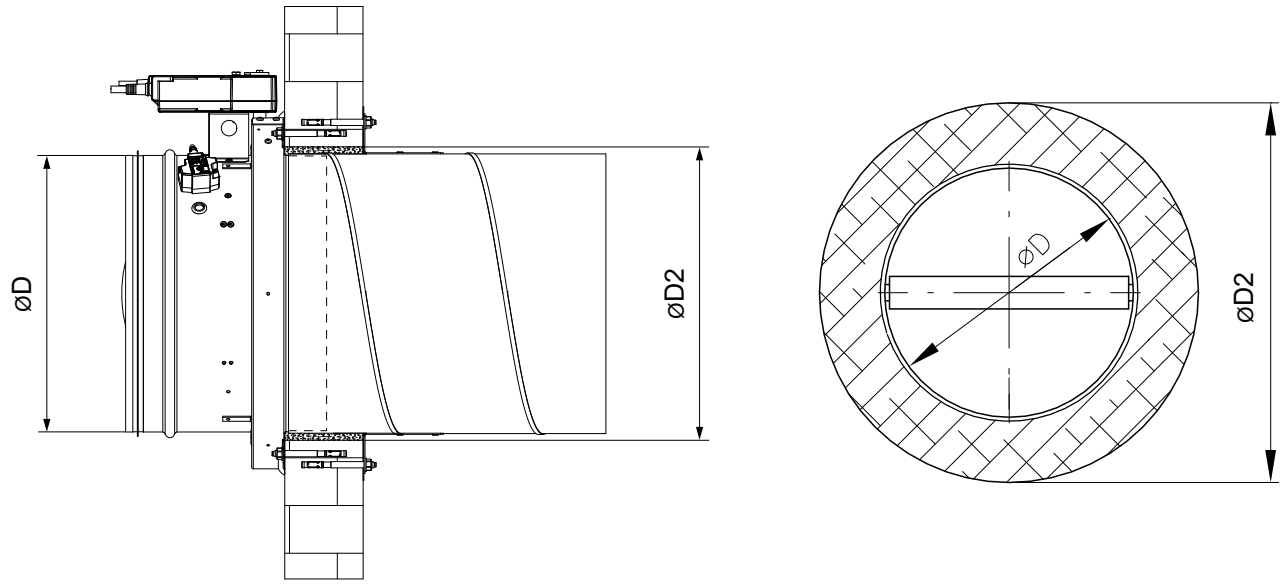
* Reduced distances between dampers are allowed, with specifications defined for each individual installation option.

Statement of installations dampers FDMS

Installation	wall/ceiling min. thickness [mm]	Fire resistance	Page
In solid wall construction	100	EI 90 (v_e) S [V/H]	20
Outside solid wall construction	100	EI 60 (v_e) S [V/H]	21
In gypsum wall construction	100	EI 90 (v_e) S [V/H]	22
Outside gypsum wall construction	100	EI 60 (v_e) S [V/H]	23
In sandwich wall construction	100	EI 45 (v_e) S [V/H]	24
Outside sandwich wall construction	100	EI 60 (v_e) S [V/H]	25
In CLT wall construction	90	EI 60 (v_e) S [V/H]	26
In solid ceiling construction	150	EI 60 (h_o) S [H]	27
Outside solid ceiling construction	150	EI 60 (h_o) S [H]	28

Dimensions of an installation opening (øD2) for connected air duct to fire damer, depends on the type of fire resistant fill

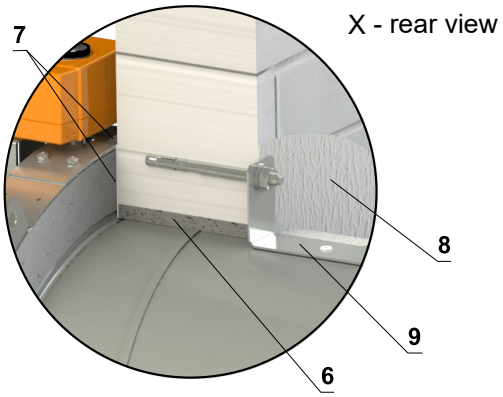
Type of fire resistant fill	Recommended material	øD2 [mm]
Fire-resistant mastic	**HILTI** CFS-S ACR...	øD+10
Stone wool	**KNAUF** MPS (density ≥ 50kg/m^3, reaction to fire A1)	øD+40

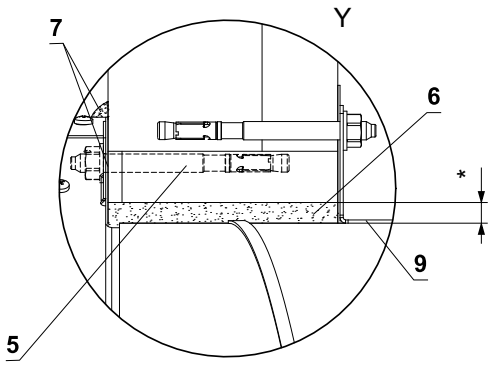


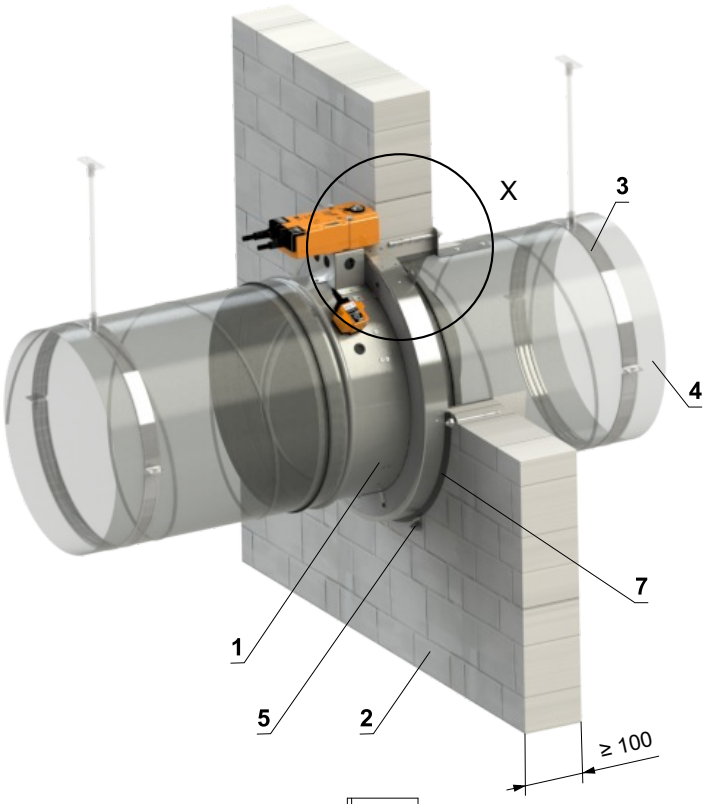
In solid wall construction

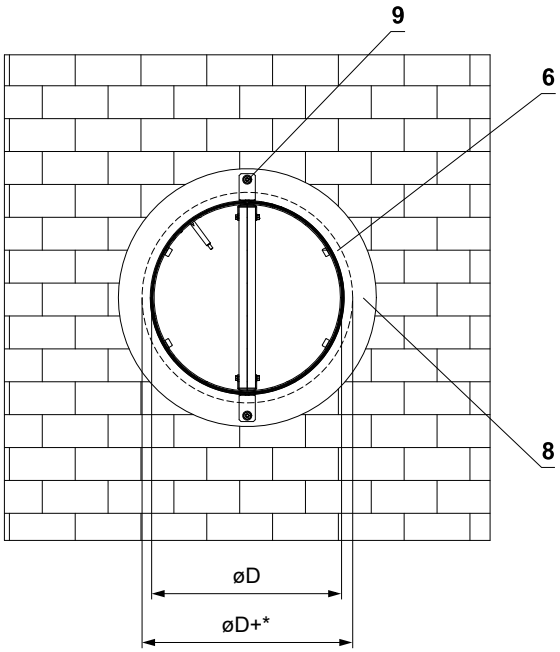
EI 90 (v_e) S [V/H] - 500 Pa

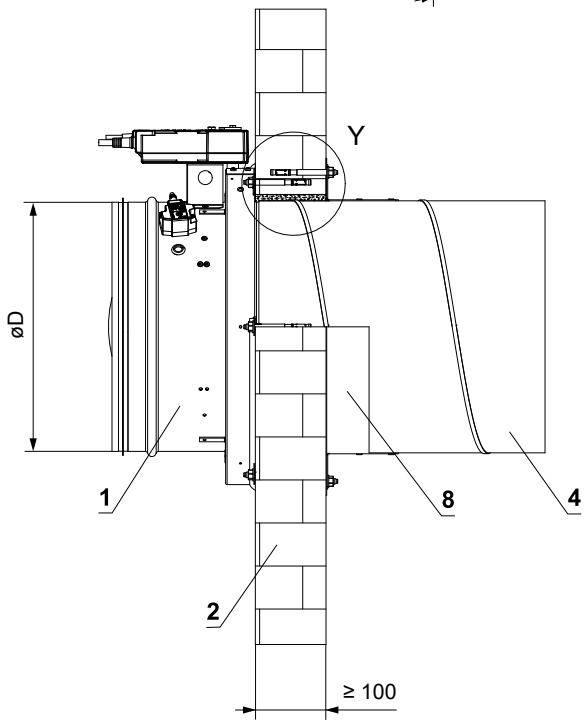
- For connection of following duct → see page 30
- The minimum permitted distance between FDMS dampers is ≥ 96 mm.











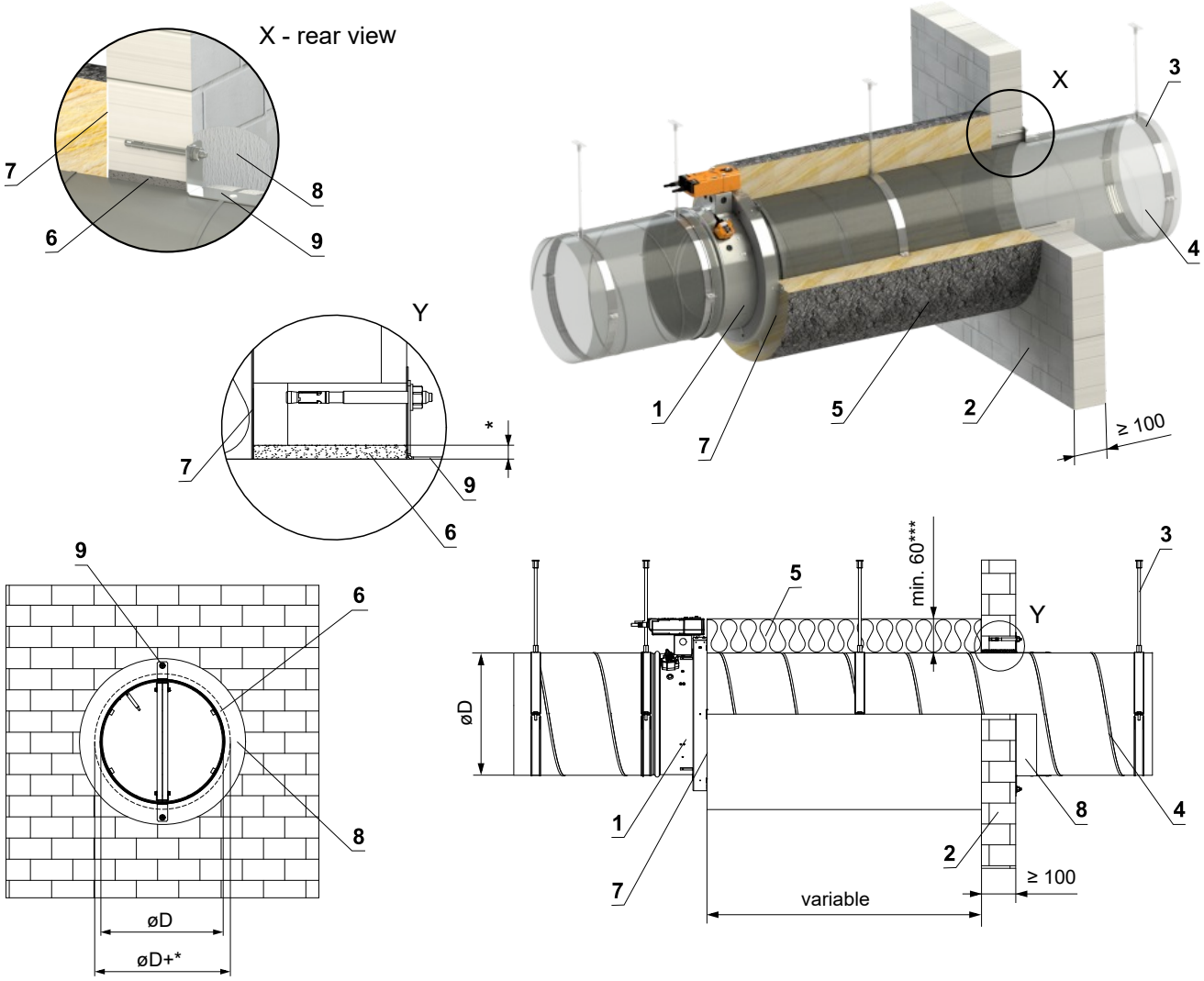
1 FDMS
2 Solid wall construction
3 Clamp with threaded rod → see page 30
4 Duct
5 Anchor (e.g. FISCHER - type ZYKON FZA M8x30) - fixation of damper to the construction
6 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
7 Fire-resistant mastic - (Hilti CFS-S ACR...) - seal the damper to the construction by applying the mastic between the construction and the damper collar before installation. Alternatively, or additionally, apply a corner sealant around the perimeter of the damper collar after installation.
8 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct - (when using mastic as a fire resistant fill, it is not necessary to use coating)
9 Fixing element of the duct - riveted to the duct and fixed to the construction with an anchor - (recommended to use) - isn't included in the delivery

* Dimensions of installation holes → see table on page 19

Installation outside solid wall construction

EI 60 (v_e) S [V/H] - 500 Pa
EI 60 (v_e) S [V/H] - 300 Pa**

- For connection of following duct → see page 30
- Minimum and maximum distance between the wall and fire damper is unlimited.
- When installing the insulation, follow the insulation manufacturer's instructions.
- The damper and the duct must be suspended separately.
- The duct must be suspended on both sides of damper acc. to national rules.
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards.
- Load of the suspension system depends on weight of the fire damper and duct system → see page 29
- Max. distance between two suspension systems is 1500 mm.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.



* Dimensions of installation holes → see table on page 19

** If **PAROC** insulation is used

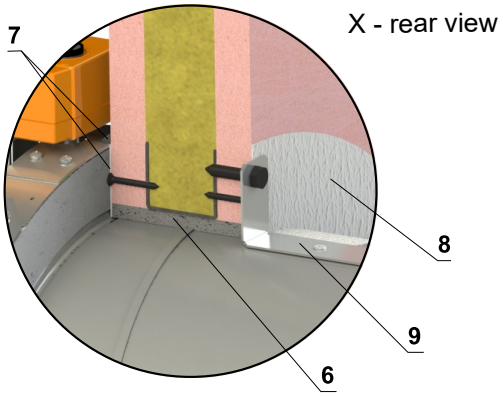
*** **ISOVER** min. density 66 kg/m³, min. th. 100 mm
PAROC min. density 80 kg/m³, min. th. 60 mm

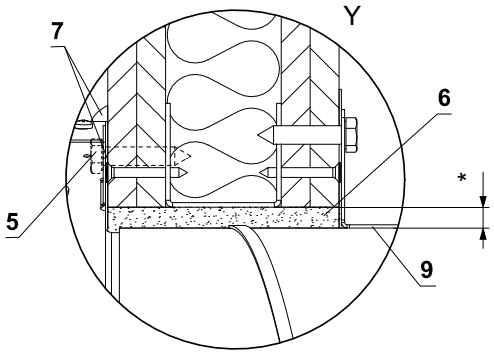
1 FDMS
2 Solid wall construction
3 Clamp with threaded rod → see page 30
4 Duct
5 Duct insulation (ISOVER - Ultimate Protect Wired Mat 4.0 Alu1, PAROC Hvac Fire Mat BlackCoat)***
6 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
7 Fire protection sealant - coat the area between the insulation and the construction and between the insulation and the damper collar with sealant before installing the insulation - (type of sealant according to the insulation manufacturer)
8 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct - (when using mastic as a fire resistant fill, it is not necessary to use coating
9 Fixing element of the duct - riveted to the duct and fixed to the construction with an anchor - (recommended to use) - isn't included in the delivery

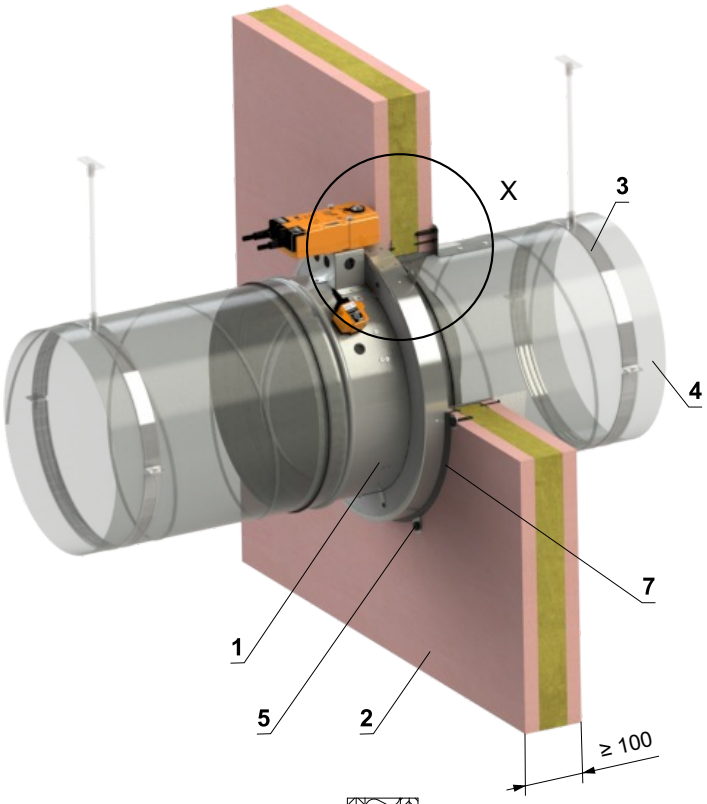
In gypsum wall construction

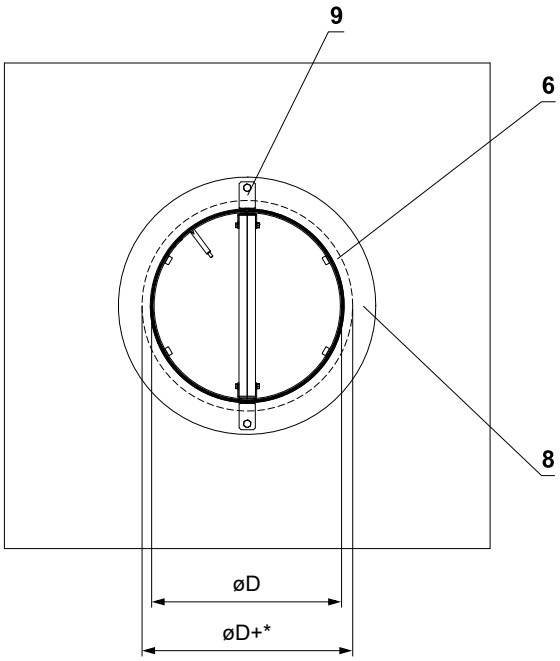
EI 90 (v_e) S [V/H] - 500 Pa

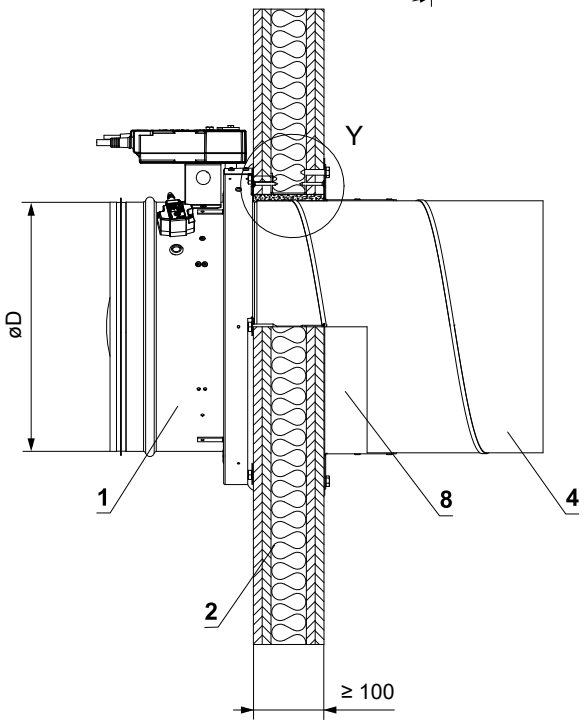
- For connection of following duct → see page 30
- The minimum permitted distance between FDMS dampers is ≥ 96 mm.











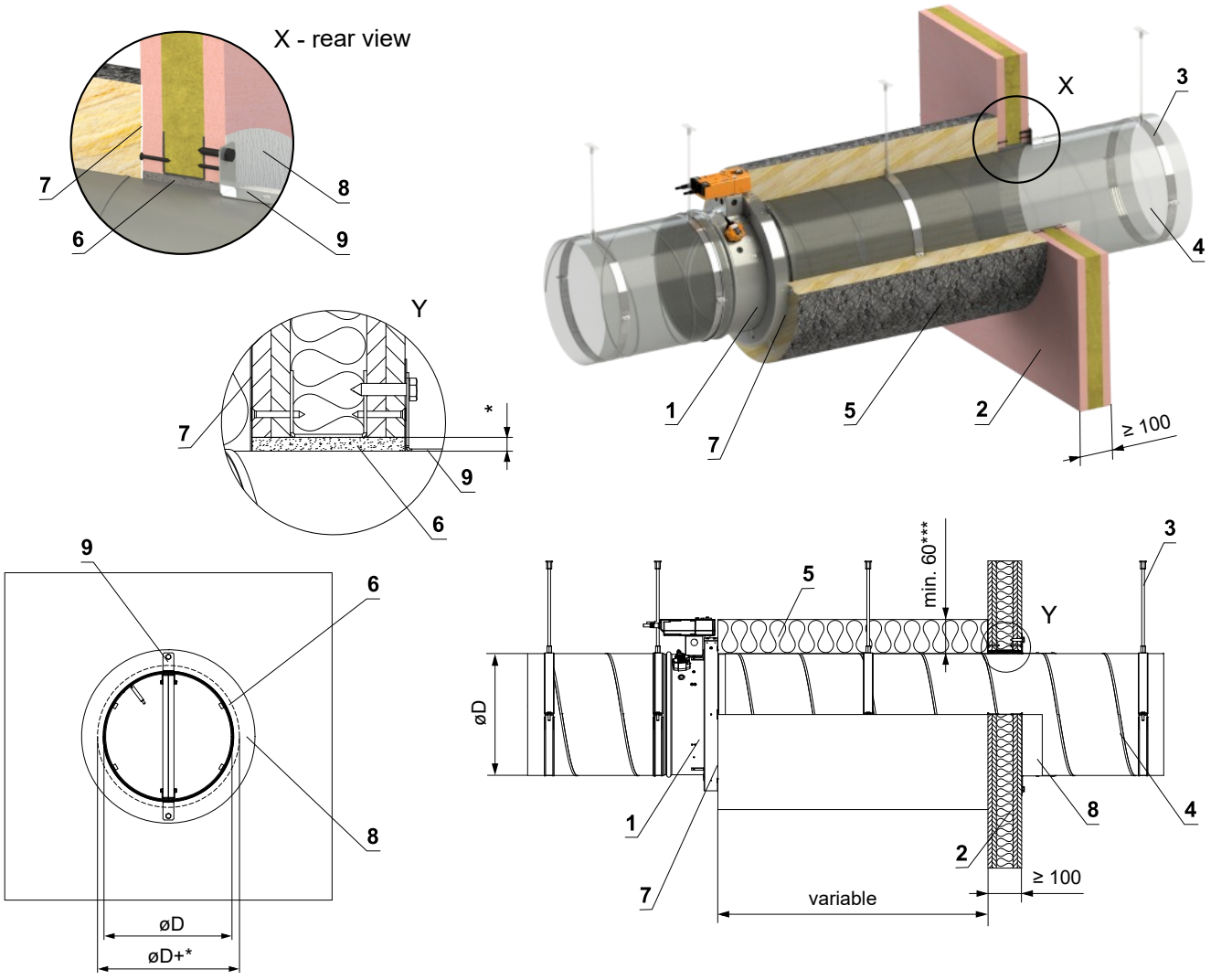
1 FDMS
2 Gypsum wall construction
3 Clamp with threaded rod → see page 30
4 Duct
5 M8 screw or M8 threaded rod + M8 nut - fixation of damper to the construction
6 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
7 Fire-resistant mastic - (Hilti CFS-S ACR...) - seal the damper to the construction by applying the mastic between the construction and the damper collar before installation. Alternatively, or additionally, apply a corner sealant around the perimeter of the damper collar after installation.
8 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct - (when using mastic as a fire resistant fill, it is not necessary to use coating)
9 Fixing element of the duct - riveted to the duct and fixed to the construction with an anchor - (recommended to use) - isn't included in the delivery

* Dimensions of installation holes → see table on page 19

Installation outside gypsum wall construction

EI 60 (v_e) S [V/H] - 500 Pa
EI 60 (v_e) S [V/H] - 300 Pa**

- For connection of following duct → see page 30
- Minimum and maximum distance between the wall and fire damper is unlimited.
- When installing the insulation, follow the insulation manufacturer's instructions.
- The damper and the duct must be suspended separately.
- The duct must be suspended on both sides of damper acc. to national rules.
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards.
- Load of the suspension system depends on weight of the fire damper and duct system → see page 29
- Max. distance between two suspension systems is 1500 mm.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.



* Dimensions of installation holes → see table on page 19

** If **PAROC** insulation is used

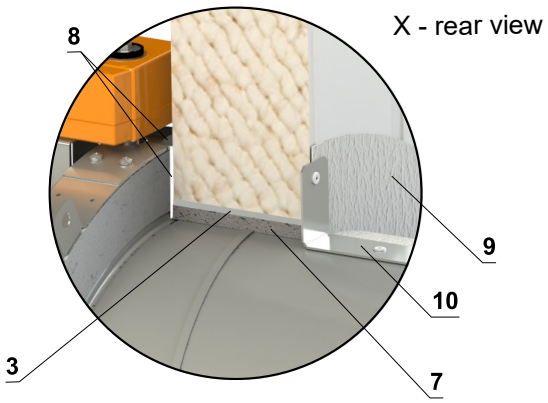
*** **ISOVER** min. density 66 kg/m³, min. th. 100 mm
PAROC min. density 80 kg/m³, min. th. 60 mm

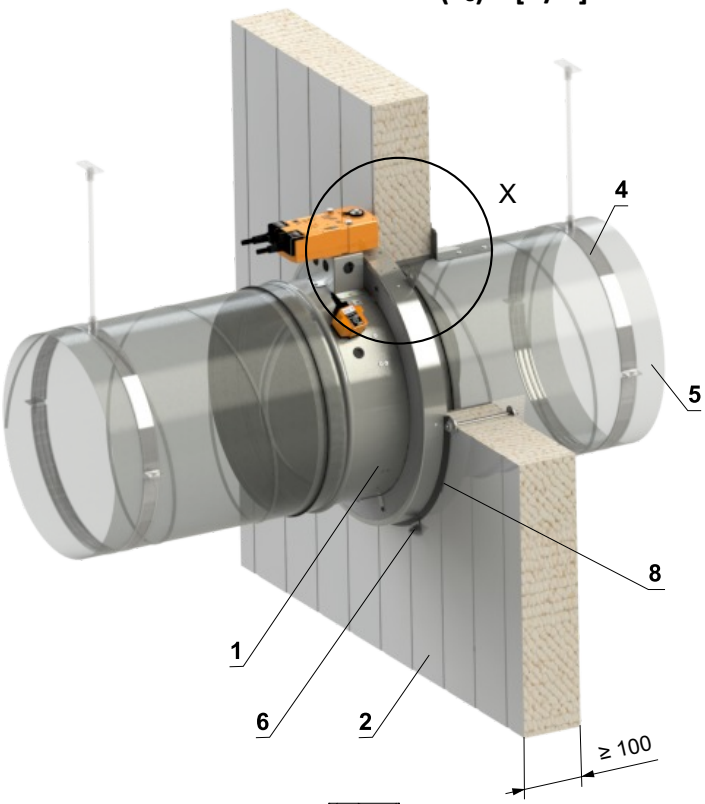
1 FDMS
2 Gypsum wall construction
3 Clamp with threaded rod → see page 30
4 Duct
5 Duct insulation (ISOVER Ultimate protect Wired MAT 4.0 ALU1, PAROC Hvac Fire Mat BlackCoat)***
6 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
7 Fire protection mastic - coat the area between the insulation and the construction and between the insulation and the damper collar with sealant before installing the insulation - (type of sealant according to the insulation manufacturer)
8 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct - (when using mastic as a fire resistant fill, it is not necessary to use coating
9 Fixing element of the duct - riveted to the duct and fixed to the construction with an anchor - (recommended to use) - isn't included in the delivery

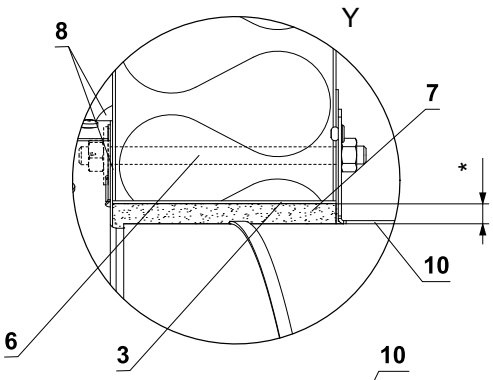
In sandwich wall construction

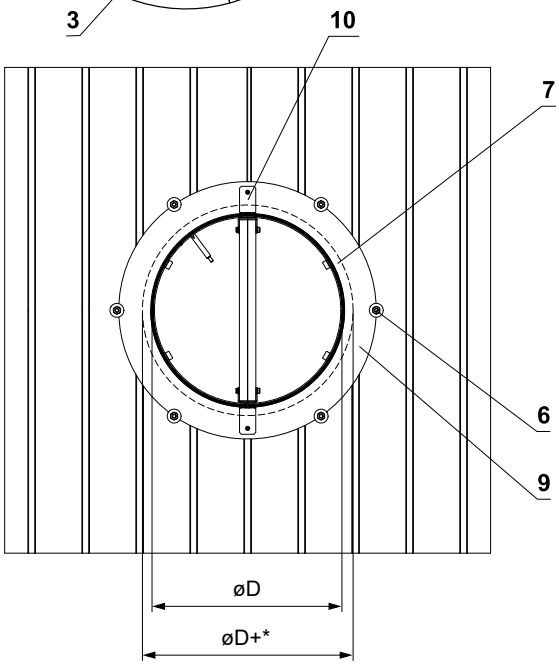
EI 45 (v_e) S [V/H] - 500 Pa

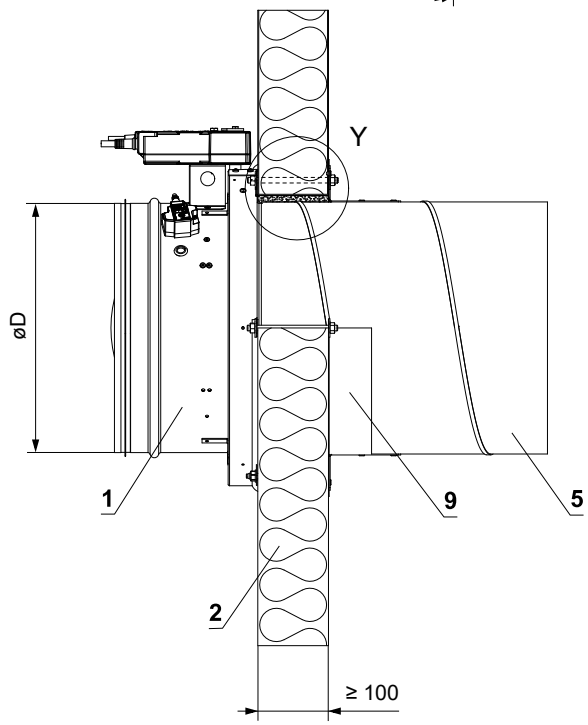
- For connection of following duct → see page 30











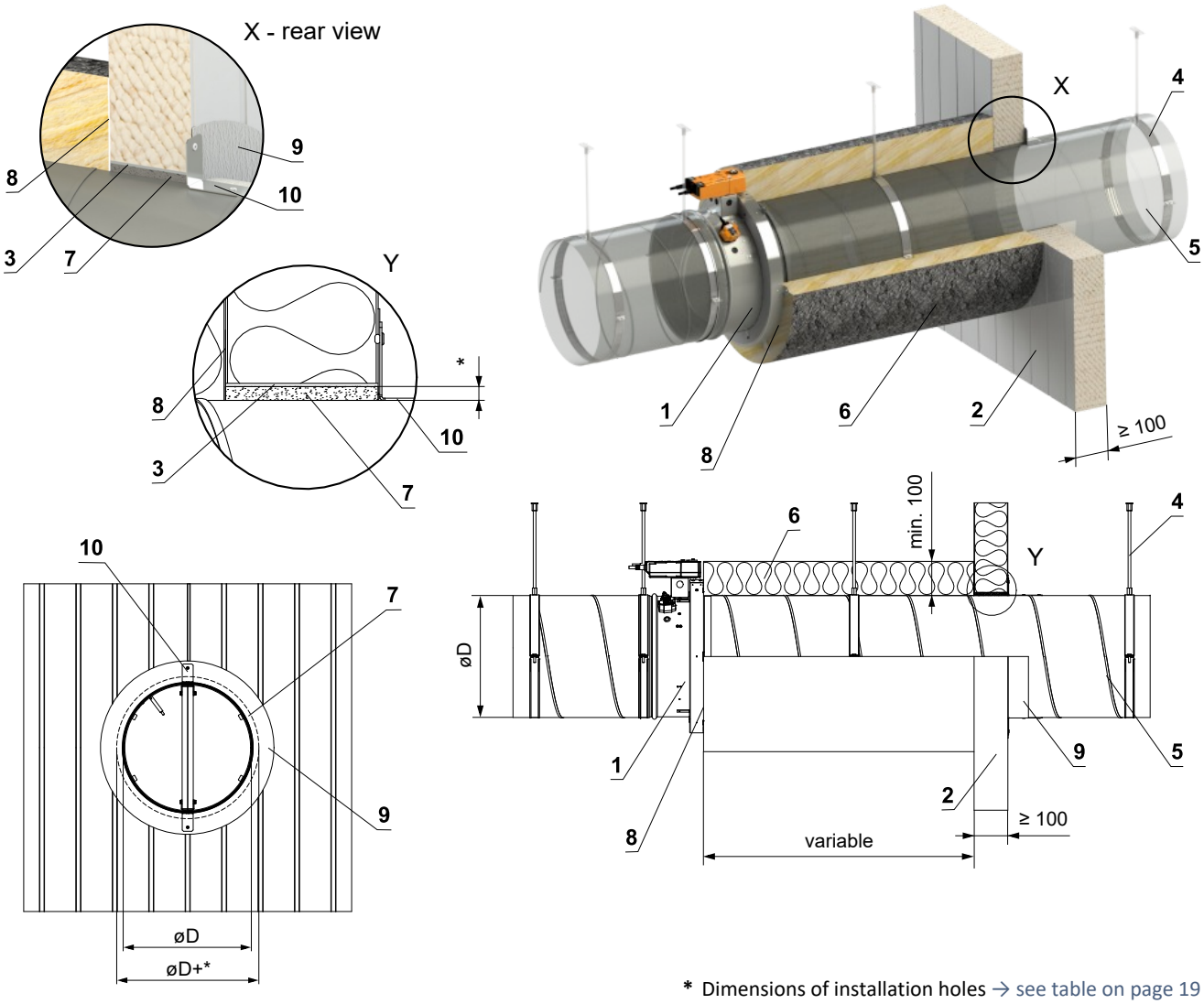
* Dimensions of installation holes → see table on page 19

1 FDMS
2 Sandwich wall construction - min. th. 100 mm (e.g. KINGSPAN - type KS1150FR)
3 Sheathing of the penetration - before the fire seal is installed, it is necessary to cover the opening with sheet metal element/cover.
4 Clamp with threaded rod → see page 30
5 Duct
6 M8 threaded rod + M8 nut - fixation of damper to the construction
7 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
8 Fire resistant mastic - (Hilti CFS-S ACR...) - seal the damper to the construction by applying the mastic between the construction and the damper collar before installation. Alternatively, or additionally, apply a corner sealant around the perimeter of the damper collar after installation.
9 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct
10 Fixing element of the duct - riveted to the duct and to the construction - (recommended to use) - isn't included in the delivery

Installation outside sandwich wall construction

EI 60 (v_e) S [V/H] - 500 Pa

- For connection of following duct → see page 30
- Minimum and maximum distance between the wall and fire damper is unlimited.
- When installing the insulation, follow the insulation manufacturer's instructions.
- The damper and the duct must be suspended separately.
- The duct must be suspended on both sides of damper acc. to national rules.
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards.
- Load of the suspension system depends on weight of the fire damper and duct system → see page 29
- Max. distance between two suspension systems is 1500 mm.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.



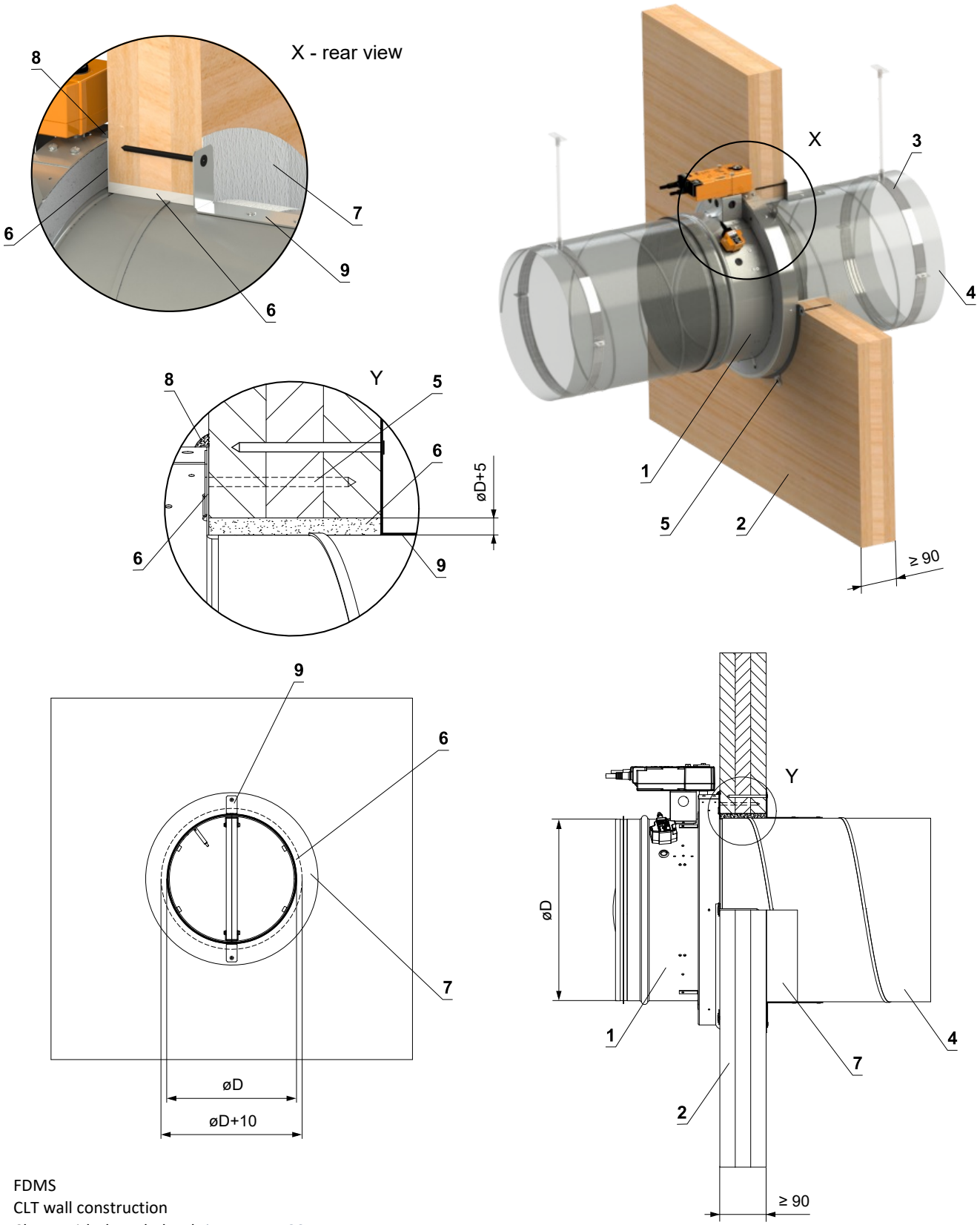
* Dimensions of installation holes → see table on page 19

1 FDMS
2 Sandwich wall construction - min. th. 100 mm (e.g. KINGSPAN - type KS1150FR)
3 Sheathing of the penetration - before the fire seal is installed, it is necessary to cover the opening with sheet metal element/cover.
4 Clamp with threaded rod → see page 30
5 Duct
6 Duct insulation (ISOVER Ultimate protect Wired MAT 4.0 ALU1)
7 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
8 Fire protection mastic - coat the area between the insulation and the construction and between the insulation and the damper collar with sealant before installing the insulation - (type of sealant according to the insulation manufacturer)
9 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct
10 Fixing element of the duct - riveted to the duct and to the construction - (recommended to use) - isn't included in the delivery

In CLT wall construction

EI 60 (v_e) S [V/H]

- For connection of following duct → see page 30

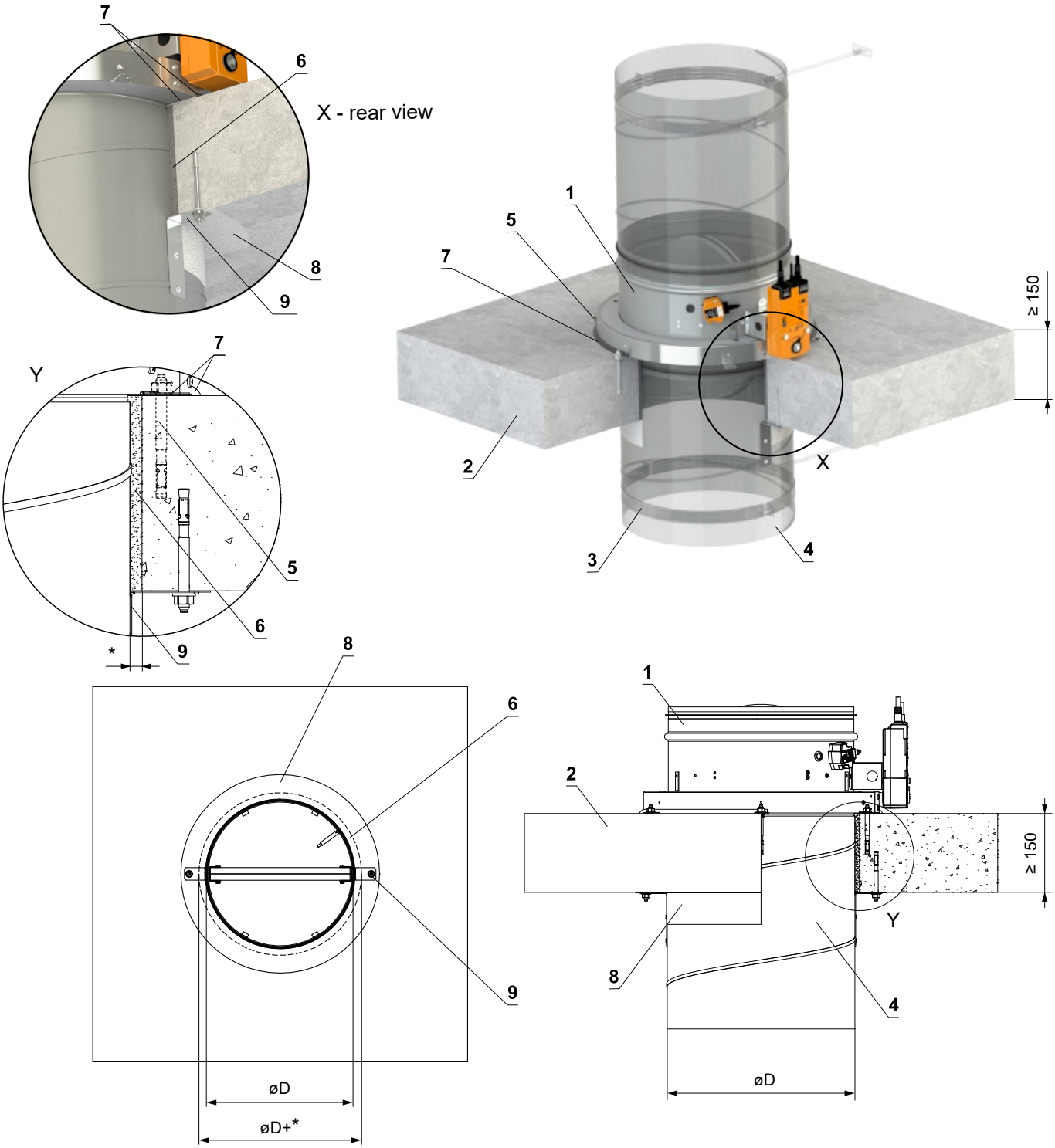


1 FDMS
2 CLT wall construction
3 Clamp with threaded rod → see page 30
4 Duct
5 Screw 5x80 mm + large washer - fixing damper to the construction
6 Fire-resistant mastic - (Hilti CFS-S ACR...) - fill the gap between construction and damper/duct
7 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is applied to the construction and to the duct
8 Fire stop intumescent sealant - (Hilti CFS-IS...) - after installing the damper, seal by applying sealant around collar
9 Fixing element of the duct - riveted to the duct and screwed to the construction - (recommended to use) - isn't included in the delivery

In solid ceiling construction

EI 60 (h_o) S [H] - 500 Pa

- For connection of following duct → see page 30
- The minimum permitted distance between FDMS dampers is ≥ 96 mm.



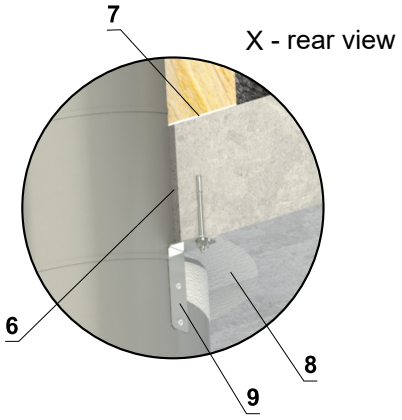
* Dimensions of installation holes → see table on page 19

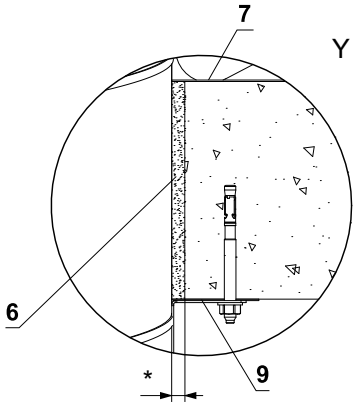
1 FDMS
2 Solid ceiling construction
3 Clamp with threaded rod → see page 30
4 Duct
5 Anchor (e.g. FISCHER - type ZYKON FZA M8x30) - fixation of damper to the construction
6 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
7 Fire-resistant mastic - (Hilti CFS-S ACR...) - seal the damper to the construction by applying the mastic between the construction and the damper collar before installation. Alternatively, or additionally, apply a corner sealant around the perimeter of the damper collar after installation.
8 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct - (when using mastic as a fire resistant fill, it is not necessary to use coating
9 Fixing element of the duct - riveted to the duct and fixed to the construction with an anchor - (recommended to use) - isn't included in the delivery

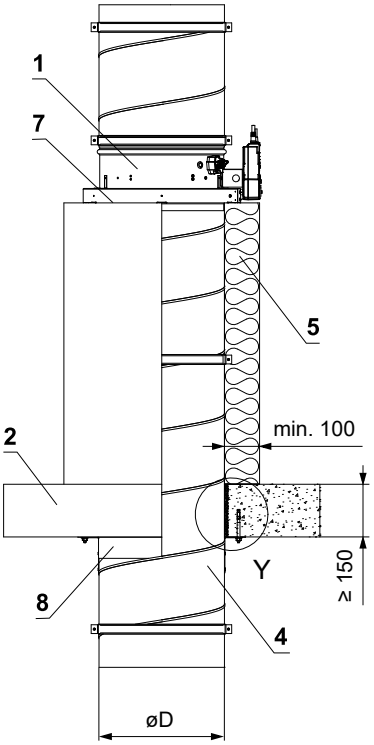
Installation outside solid ceiling construction

EI 60 (h_o) S [H] - 500 Pa

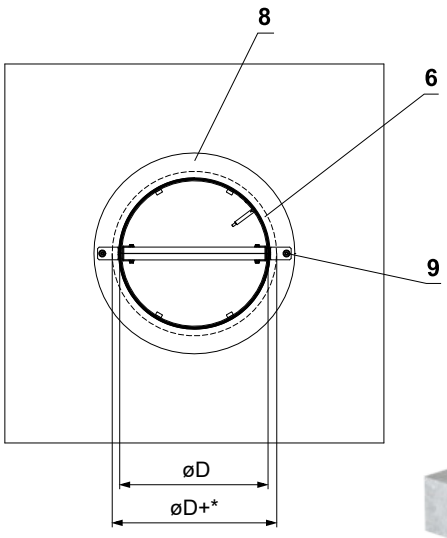
- For connection of following duct → see page 30
- Minimum and maximum distance between the ceiling and fire damper is unlimited.
- When installing the insulation, follow the insulation manufacturer's instructions.
- The damper and the duct must be suspended separately.
- The duct must be suspended on both sides of damper acc. to national rules.
- Duct between fire damper and fire separating construction must be suspended by using threaded rods and mounting profiles, or another mounting system acc. to national standards.
- Load of the suspension system depends on weight of the fire damper and duct system → see page 29
- Max. distance between two suspension systems is 1500 mm.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the fire damper is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.

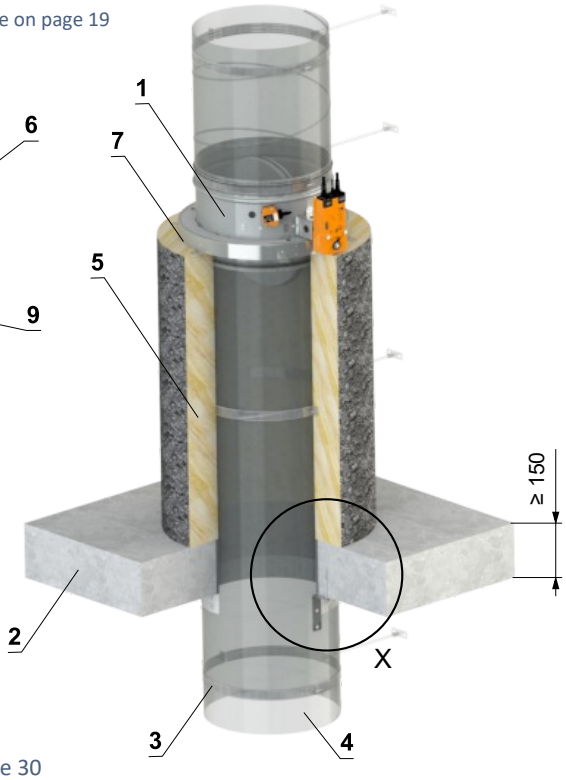






* Dimensions of installation holes → see table on page 19





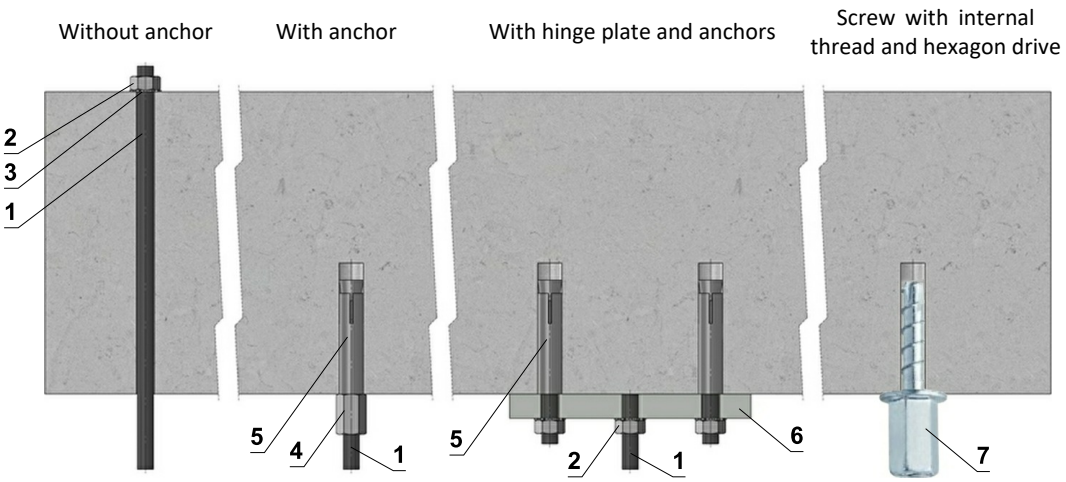
1 FDMS
2 Solid ceiling construction
3 Clamp with threaded rod → see page 30
4 Duct
5 Duct insulation (ISOVER Ultimate protect Wired MAT 4.0 ALU1)
6 Fire resistant fill (recommended materials → see table on page 19) - fill the gap between construction and duct
7 Fire protection mastic - coat the area between the insulation and the construction and between the insulation and the damper collar with sealant before installing the insulation - (type of sealant according to the insulation manufacturer)
8 Fire stop coating - th. 1 mm (Hilti CFS-CT...) - coating is overcoated on the support construction and on the duct - (when using mastic as a fire resistant fill, it is not necessary to use coating
9 Fixing element of the duct - riveted to the duct and fixed to the construction with an anchor - (recommended to use) - isn't included in the delivery

V. SUSPENSION SYSTEMS

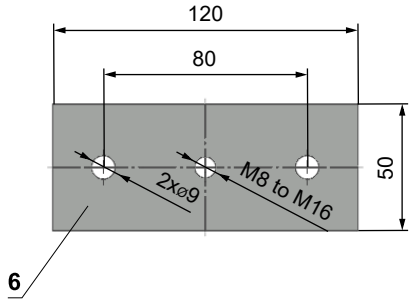
Mounting to the ceiling wall

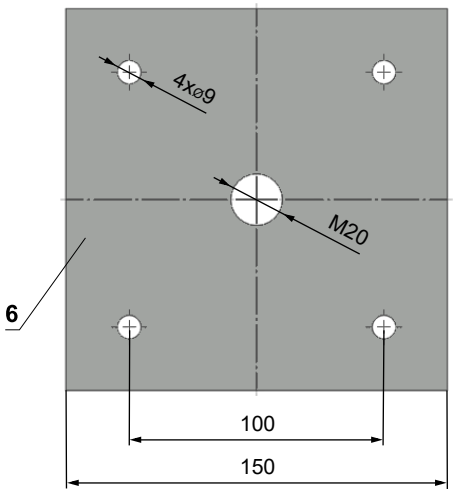
- The dampers must be suspended using threaded rods and mounting profiles. Their dimensioning depend on the weight of the damper.
- The dampers and the duct must be suspended separately.
- Following air-conditioning duct must be suspended or supported so that all load transfer from the following duct to the damper flanges is absolutely excluded. Adjacent duct must be suspended or supported, as required by the duct suppliers.
- Threaded rods longer than 1,5 m must be protected by fire insulation.

Examples of anchoring to the ceiling construction
Follow the instructions of fixing specialist or installation company



Hinge plates





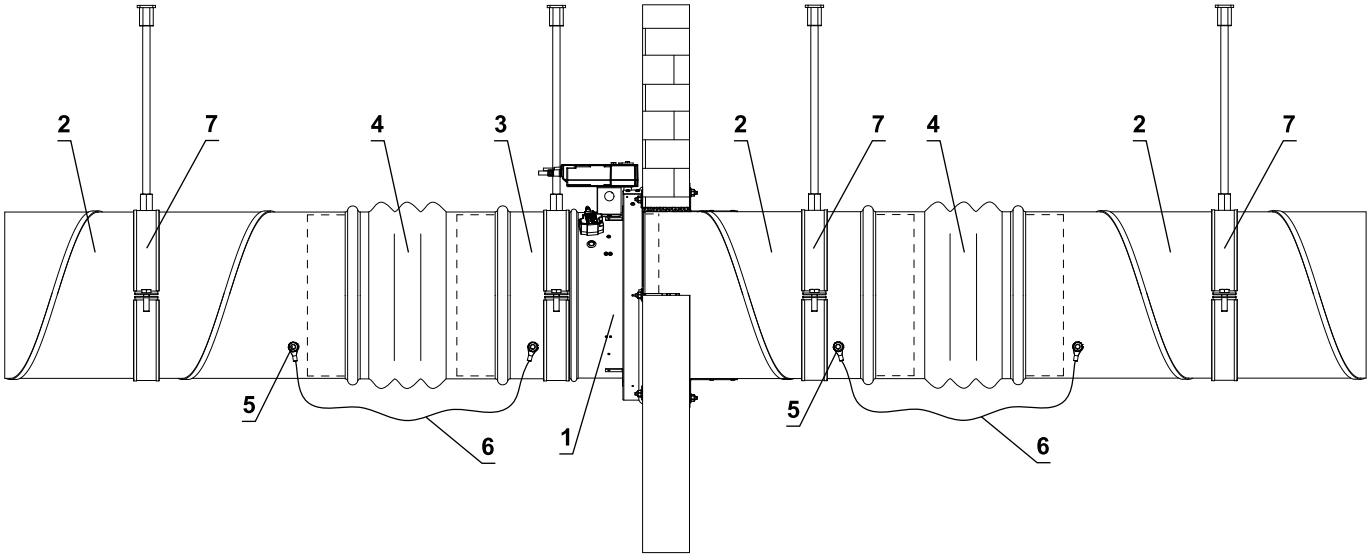
- If in doubt, always consult an anchor specialist engineer such as Halfen or Hilti.

1 Threaded rod M8 - M20
2 Nut M8 - M20
3 Washer for M8 - M20
4 Coupling Nut M8 - M20
5 Anchor
6 Hinge plate - min. thickness 10 mm
7 Concrete screw tested for fire resistance R30-R90, max. Tension up to 0.75 KN (length 35 mm)

Load capacities of threaded rods at the required fire resistance 60 min. < t ≤ 120 min.

Size	As [mm²]	Weight [kg]	
		for 1 rod	for 2 rods
M8	36,6	22	44
M10	58	35	70
M12	84,3	52	104
M16	157	96	192
M18	192	117	234
M20	245	150	300

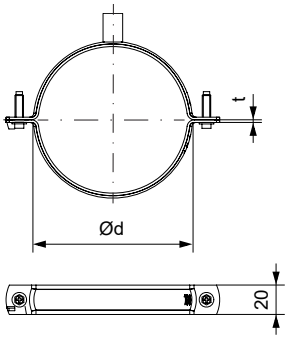
Example of duct connection and anchoring to the wall and ceiling



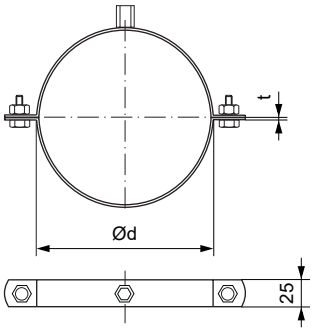
1 FDMS
2 Duct
3 Extension piece (if required)
4 Damping pad
5 Bolt assembly M8 (bolt M8x20 mm, 2 pcs large washer M8, nut M8)
6 Protective bonding conductor
7 Clamp with threaded rod

Recommended types of clamps, according to the nominal size of the FDMS

Ø100–400
t(mm): 1,5



Ø450–630
t(mm): 2,5

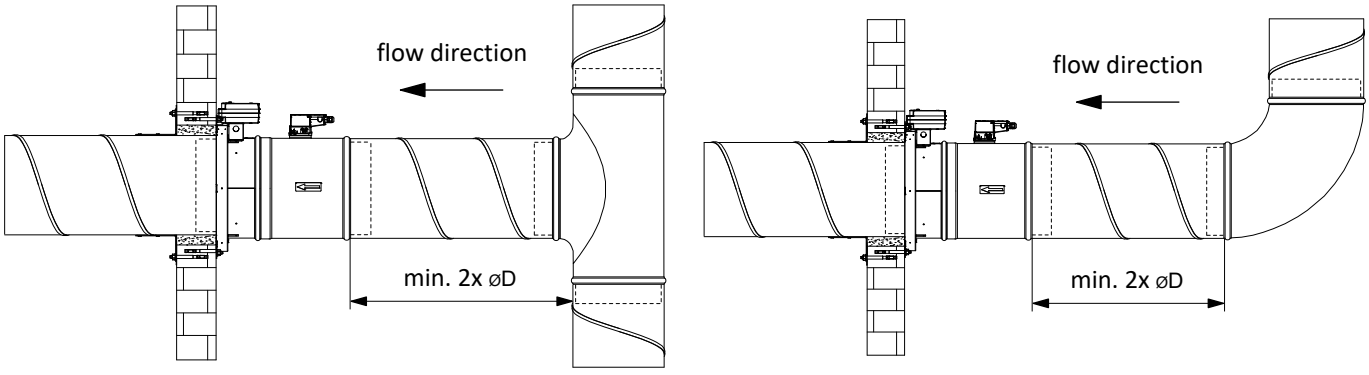


Ø100–400
Quick closing system.
2x screw M6×20.
Fixing nut for threaded rod M8.

Ø450–630
2x screw connection M10x30 or threaded rods M10
Combined fixing nut for threaded rod M8+M10.

- The method of attachment must follow the minimum requirements for attachment and connection of ductwork in accordance with national regulations. Also, the elements can be suspended from the top, or supported from bottom, or fastened from the side.

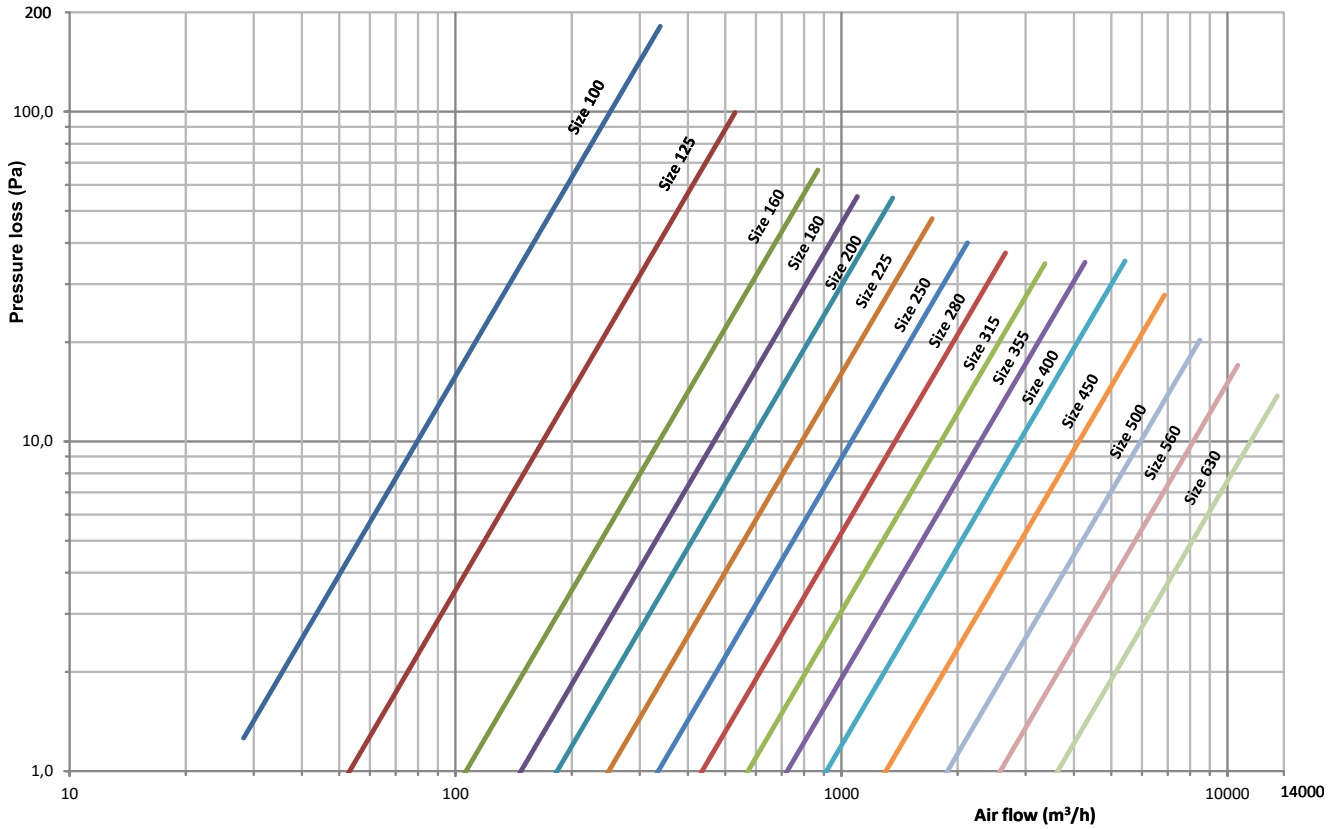
Recommended distances of the .50/DM3(-MB) damper from branches, T-pieces, elbows, fittings in the ductline to ensure optimal flow measurement accuracy.



VI. TECHNICAL DATA

Pressure loss

- All data is valid for dampers in full "OPEN" position !



FDMS with VAV actuator - operating mode and settings

Design 50/DM3(-MB) - GUAC-DM3(-MB)

Operating mode

Through connecting the power supply to BU+BN (1+2) and a reference signal Y to BK (3) in the range of (0)2…10 VDC, the connected actuator regulates to the set point.

The current flow in % of Vnom is provided as a feedback signal U on GY (4) for other actuators and can be communicated via PP-Bus.

CAV modes / override controls:
AC*/DC signal to terminal BK (3)
Modbus RTU terminal 5/6 (for GUAC-DM3-MB)

The controller is overload-proof.

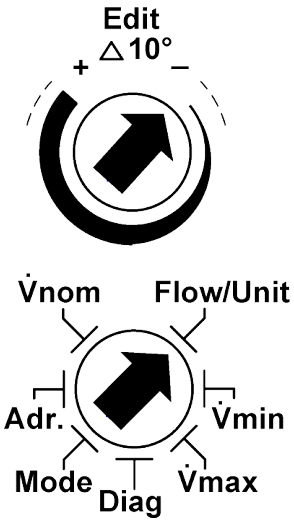
Settings

The selector allows the changing of values. The position of the arrow shows the value set. The changes are displayed as soon as the selector is moved ±10° from the position.

Flow / Unit
Setting the desired actual volume flow unit in m³/h and l/s.

Vmin
Adjust the desired flow Vmin
(setpoint Y = 0/2 VDC).

Vmax
Adjust the desired flow Vmax
(setpoint Y = 10 VDC).



Diag
Diagnostic menu:
off - diagnostic mode is off
on - diagnostic mode is on
oP - opens the damper
cL - closes the damper
Lo - activated Vmin
Hi - activated Vmax
123 - software version

Mode
Setting the direction of rotation:
0-n...0-10 VDC normal
2-n...2-10 VDC normal
0-i ...0-10 VDC invers
2-i ...2-10 VDC invers

Vnom
Setting the nominal volumetric flow depending on the VAV-box.

Adr (for GUAC-DM3-MB)
Setting the address of the Modbus
(1...247) and Modbus parameter.

Nominal size ØD [mm]	Air volume flow [m³/h]		V_{nom} [m³/h]
	minimum (w ≈ 1 m/s)	maximum (w ≈ 7 m/s)	
100	30	200	200
125	45	310	310
140	55	400	400
160	70	500	500
180	90	650	650
200	115	800	800
225	145	1000	1000
250	180	1250	1250
280	220	1550	1550
315	280	2000	2000
355	355	2500	2500
400	455	3200	3200
500	710	5000	5000
630	1120	7900	7900

Design .50/PM3(-MB) - GUAC-PM3(-MB)

Operating mode	Settings

Through connecting the power supply to BU+BN (1+2) and a reference signal Y to BK (3) in the range of (0)2…10 VDC, the connected actuator regulates to the specified set point.

The current pressure in % of Pnom is provided as a feedback signal U on GY (4) for other actuators and can be communicated via PP-Bus.

CAP modes / override controls:
AC*/DC signal to terminal BK (3)
Modbus RTU terminal 5/6 (for GUAC-DM3-MB)

The controller is overload-proof.

The selector allows the changing of values. The position of the arrow shows the value set. The changes are displayed as soon as the selector is moved ±10° from the position.

Pres / Unit
Setting the desired actual pressure unit to Pa and H^2O.

Pmin
Adjust the desired pressure Pmin (setpoint Y = 0/2 VDC).

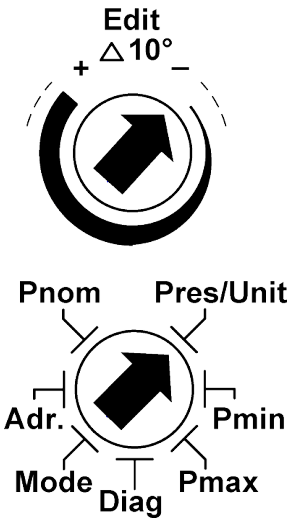
Pmax
Adjust the desired pressure Pmax (setpoint Y = 10 VDC).

Diag
Diagnostic menu:
off - diagnostic mode is off
on - diagnostic mode is on
oP - opens the damper
cL - closes the damper
Lo - activated Pmin
Hi - activated Pmax
123 - software version

Mode
Setting the direction of rotation:
0-n...0-10 VDC normal
2-n...2-10 VDC normal
0-i ...0-10 VDC invers
2-i ...2-10 VDC invers

Pnom
Shows the nominal pressure setting.

Adr (for GUAC-DM3-MB)
Setting the address of the Modbus (1...247) and Modbus parameter.



Noise data

- All data is valid for dampers in full "OPEN" position !

Level of acoustic output corrected with filter A

L_{WA}	[dB(A)]	level of acoustic output corrected with filter A
f	[Hz]	frequency in octave range
w	[m/s]	air flow velocity

L_{wA} values for size 100 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	2	8	13	16	19	22	25	27	29
125	< 2	4	12	18	23	27	31	34	36	39	41
250	< 2	8	17	24	29	34	37	41	44	46	49
500	< 2	9	18	26	31	36	40	44	47	50	53
1000	< 2	5	16	24	30	35	40	43	47	50	53
2000	< 2	< 2	10	18	25	30	35	39	43	46	49
4000	< 2	< 2	< 2	9	16	22	27	32	36	39	43
8000	< 2	< 2	< 2	< 2	5	11	16	21	25	29	32
Total	**< 15**	**< 15**	**23**	**30**	**36**	**41**	**45**	**49**	**52**	**55**	**57**

L_{wA} values for size 125 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	< 2	5	9	13	16	19	21	23	25
125	< 2	< 2	8	15	20	24	27	30	33	35	37
250	< 2	4	13	20	26	30	34	37	40	43	45
500	< 2	5	15	22	28	33	37	41	44	47	49
1000	< 2	< 2	12	20	26	32	36	40	43	46	49
2000	< 2	< 2	6	14	21	27	32	36	39	43	46
4000	< 2	< 2	< 2	6	13	19	24	28	32	36	39
8000	< 2	< 2	< 2	< 2	< 2	7	13	18	22	25	29
Total	**< 15**	**< 15**	**19**	**26**	**32**	**37**	**41**	**45**	**48**	**51**	**54**

L_{wA} values for size 160 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	< 2	5	10	13	16	19	22	24	26
125	< 2	< 2	9	15	20	24	27	31	33	36	38
250	< 2	5	14	21	26	31	34	38	41	43	46
500	< 2	6	15	23	28	33	37	41	44	47	50
1000	< 2	2	13	21	27	32	37	40	44	47	50
2000	< 2	< 2	7	15	22	27	32	36	40	43	46
4000	< 2	< 2	< 2	6	13	19	24	29	33	36	40
8000	< 2	< 2	< 2	< 2	< 2	8	13	18	22	26	29
Total	**< 15**	**< 15**	**20**	**27**	**33**	**38**	**42**	**45**	**49**	**52**	**54**

L_{wA} values for size 180 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	4	9	13	16	18	21	23	25
125	< 2	< 2	8	14	19	23	27	30	32	35	37
250	< 2	4	13	20	25	30	34	37	40	42	45
500	< 2	5	15	22	28	33	37	40	43	46	49
1000	< 2	< 2	12	20	26	31	36	40	43	46	49
2000	< 2	< 2	6	14	21	27	31	35	39	42	45
4000	< 2	< 2	< 2	6	13	19	24	28	32	36	39
8000	< 2	< 2	< 2	< 2	< 2	7	12	17	21	25	29
Total	**< 15**	**< 15**	**19**	**26**	**32**	**37**	**41**	**45**	**48**	**51**	**54**

L_{wA} values for size 200 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	5	10	13	17	19	22	24	26
125	< 2	< 2	9	15	20	24	28	31	33	36	38
250	< 2	5	14	21	26	31	35	38	41	43	46
500	< 2	6	15	23	29	33	38	41	44	47	50
1000	< 2	3	13	21	27	32	37	41	44	47	50
2000	< 2	< 2	7	15	22	27	32	36	40	43	46
4000	< 2	< 2	< 2	6	14	19	25	29	33	37	40
8000	< 2	< 2	< 2	< 2	< 2	8	13	18	22	26	30
Total	**< 15**	**< 15**	**20**	**27**	**33**	**38**	**42**	**46**	**49**	**52**	**55**

L_{wA} values for size 225 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	4	9	12	15	18	21	23	25
125	< 2	< 2	8	14	19	23	27	30	32	35	37
250	< 2	4	13	20	25	30	33	37	40	42	45
500	< 2	5	14	22	27	32	36	40	43	46	49
1000	< 2	< 2	12	20	26	31	36	39	43	46	49
2000	< 2	< 2	6	14	21	26	31	35	39	42	45
4000	< 2	< 2	< 2	5	12	18	23	28	32	35	39
8000	< 2	< 2	< 2	< 2	< 2	7	12	17	21	25	28
Total	**< 15**	**< 15**	**19**	**26**	**32**	**37**	**41**	**45**	**48**	**51**	**53**

L_{wA} values for size 250 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	4	9	12	15	18	21	23	25
125	< 2	< 2	8	14	19	23	27	30	32	35	37
250	< 2	4	13	20	25	30	33	37	40	42	45
500	< 2	5	14	22	27	32	36	40	43	46	49
1000	< 2	< 2	12	20	26	31	36	39	43	46	49
2000	< 2	< 2	6	14	21	26	31	35	39	42	45
4000	< 2	< 2	< 2	5	12	18	23	28	32	35	39
8000	< 2	< 2	< 2	< 2	< 2	7	12	17	21	25	28
Total	**< 15**	**< 15**	**19**	**26**	**32**	**37**	**41**	**44**	**48**	**51**	**53**

L_{wA} values for size 280 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	< 2	5	10	13	16	19	22	24	26
125	< 2	< 2	9	15	20	24	27	30	33	36	38
250	< 2	5	14	21	26	30	34	38	41	43	45
500	< 2	6	15	23	28	33	37	41	44	47	49
1000	< 2	2	13	21	27	32	37	40	44	47	50
2000	< 2	< 2	6	15	22	27	32	36	40	43	46
4000	< 2	< 2	< 2	6	13	19	24	29	33	36	39
8000	< 2	< 2	< 2	< 2	< 2	8	13	18	22	26	29
Total	**< 15**	**< 15**	**20**	**27**	**33**	**38**	**42**	**45**	**49**	**52**	**54**

L_{wA} values for size 315 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	< 2	6	10	14	17	20	22	24	26
125	< 2	< 2	9	16	21	25	28	31	34	36	38
250	< 2	5	14	21	27	31	35	38	41	44	46
500	< 2	6	16	23	29	34	38	41	45	48	50
1000	< 2	3	13	21	27	33	37	41	44	47	50
2000	< 2	< 2	7	15	22	28	33	37	40	44	47
4000	< 2	< 2	< 2	7	14	20	25	29	33	37	40
8000	< 2	< 2	< 2	< 2	2	8	14	18	23	26	30
Total	**< 15**	**< 15**	**20**	**27**	**33**	**38**	**42**	**46**	**49**	**52**	**55**

L_{wA} values for size 355 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	< 2	7	11	15	18	21	23	25	27
125	< 2	2	10	17	22	26	29	32	35	37	39
250	< 2	6	15	22	28	32	36	39	42	45	47
500	< 2	7	17	24	30	35	39	42	46	49	51
1000	< 2	4	14	22	28	34	38	42	45	48	51
2000	< 2	< 2	8	16	23	29	34	38	41	45	48
4000	< 2	< 2	< 2	8	15	21	26	30	34	38	41
8000	< 2	< 2	< 2	< 2	3	9	15	19	24	27	31
Total	**< 15**	**< 15**	**21**	**28**	**34**	**39**	**43**	**47**	**50**	**53**	**56**

L_{wA} values for size 400 [dB(A)]

f [Hz]	w [m/s]										
	2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
63	< 2	< 2	< 2	8	12	16	19	22	24	26	28
125	< 2	3	11	18	23	27	30	33	36	38	40
250	< 2	7	16	23	29	33	37	40	43	46	48
500	< 2	8	18	25	31	36	40	43	47	50	52
1000	< 2	5	15	23	29	35	39	43	46	49	52
2000	< 2	< 2	9	17	24	30	35	39	42	46	49
4000	< 2	< 2	< 2	9	16	22	27	31	35	39	42
8000	< 2	< 2	< 2	< 2	4	10	16	20	25	28	32
Total	**< 15**	**< 15**	**22**	**29**	**35**	**40**	**44**	**48**	**51**	**54**	**57**

L_{wA} values for size 450 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	6	11	15	18	21	23	25	27
125	< 2	< 2	10	16	21	25	29	32	35	37	39
250	< 2	6	15	22	27	32	36	39	42	45	47
500	< 2	7	17	24	30	35	39	42	46	48	51
1000	< 2	4	14	22	28	33	38	42	45	48	51
2000	< 2	< 2	8	16	23	29	33	38	41	45	48
4000	< 2	< 2	< 2	8	15	21	26	30	34	38	41
8000	< 2	< 2	< 2	< 2	3	9	15	19	24	27	31
Total	**< 15**	**< 15**	**21**	**28**	**34**	**39**	**43**	**47**	**50**	**53**	**56**

L_{wA} values for size 500 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	4	9	12	16	18	21	23	25
125	< 2	< 2	8	14	19	23	27	30	32	35	37
250	< 2	4	13	20	25	30	34	37	40	42	45
500	< 2	5	14	22	28	32	37	40	43	46	49
1000	< 2	< 2	12	20	26	31	36	40	43	46	49
2000	< 2	< 2	6	14	21	26	31	35	39	42	45
4000	< 2	< 2	< 2	5	13	18	24	28	32	36	39
8000	< 2	< 2	< 2	< 2	< 2	7	12	17	21	25	28
Total	**< 15**	**< 15**	**19**	**26**	**32**	**37**	**41**	**45**	**48**	**51**	**53**

L_{wA} values for size 560 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	5	10	13	17	19	22	24	26
125	< 2	< 2	9	15	20	24	28	31	33	36	38
250	< 2	5	14	21	26	31	35	38	41	43	46
500	< 2	6	15	23	29	33	38	41	44	47	50
1000	< 2	3	13	21	27	32	37	41	44	47	50
2000	< 2	< 2	7	15	22	27	32	36	40	43	46
4000	< 2	< 2	< 2	6	14	19	25	29	33	37	40
8000	< 2	< 2	< 2	< 2	< 2	8	13	18	22	26	29
Total	**< 15**	**< 15**	**20**	**27**	**33**	**38**	**42**	**46**	**49**	**52**	**54**

L_{wA} values for size 630 [dB(A)]											
f [Hz]	w [m/s]										
	2	3	4	5	6	7	8	9	10	11	12
63	< 2	< 2	< 2	3	8	12	15	18	20	22	24
125	< 2	< 2	7	13	18	22	26	29	32	34	36
250	< 2	3	12	19	25	29	33	36	39	41	44
500	< 2	4	14	21	27	32	36	39	43	45	48
1000	< 2	< 2	11	19	25	31	35	39	43	45	48
2000	< 2	< 2	5	13	20	26	30	35	39	41	45
4000	< 2	< 2	< 2	5	12	18	23	27	31	35	38
8000	< 2	< 2	< 2	< 2	< 2	6	12	16	21	24	28
Total	**< 15**	**< 15**	**18**	**25**	**31**	**36**	**40**	**44**	**47**	**50**	**53**

VII. MATERIAL, FINISHING

- Damper casings are made from galvanized sheet metal without further surface treatment.
- Damper collar is made from galvanized sheet metal and calcium silicate plates.
- Damper blades are made from fire resistant asbestos free boards made of mineral fibres.
- Damper control mechanism and springs are made of steel and galvanized without additional surface treatment.
- Thermal fuses are made of sheet brass, thickness 0,5 mm.
- Fasteners are galvanized.
- According to the customer's requirements, dampers can be made of stainless steel material.

  Specifications for stainless-steel design:

  - Class A2 – Food-grade stainless steel (AISI 304 – EN 1.4301)
  - Class A4 – Chemistry-grade stainless steel (AISI 316, 316L – EN 1.4401, EN 1.4404)

  The respective stainless steel is the material for all components that are located or entering the damper inner space; components outside the damper casing are typically from galvanised sheet metal (fasteners for mounting the actuator or manual control, mechanical components).

  The following components, including the fasteners, are made from stainless steel at all times:

  1) Damper casing and all components permanently attached
  2) Blade holders including pins, metal parts of blades

  The damper blade is made from a two board of homogeneous material Promatect-H, thickness 15 mm, connected with galvanised nailed “U” connectors.

  Thermal fuse is identical for all material variants of the dampers. Upon specification by customer, the thermal fuse can be made from A4 from stainless steel sheet metal.

  Thermoelectric activation device BAT (TAE - GRUNER) is modified for stainless-steel variant of the dampers; standard galvanised screws are replaced with stainless-steel M4 screws of corresponding class. Damper casing has stainless-steel riveting M4 nuts.

  Plastic, rubber and silicon components, sealants, foaming tapes, glass-ceramic seals, housings, brass bearings of the blade, actuators, and end switches are identical for all material variants of the dampers.

  Some fasteners and components are only available in one class of stainless steel; the type will be used in all stainless-steel variants.

  The damper blade in the variant for chemical environments (Class A4) is always treated with a coating of chemically resistant Promat SR.

  Any other requirements for the design will be considered atypical and will be addressed on an individual basis.

VIII. TRANSPORTATION, STORAGE AND WARRANTY

Logistic terms

- Dampers are delivered on pallets. As standard, the dampers are wrapped in plastic foil for protection during transport and must not be used for long-term storage. Temperature changes during transport can cause condensation of water inside the packaging and thereby cause corrosion of materials used in the dampers (e.g. white corrosion on zinc-coated items or mould on calcium silicate). Therefore, it is necessary to remove the transport packaging immediately after unloading to allow air to circulate around the product.
- The dampers must be stored in clean, dry, well ventilated and dust-free environment out of direct sunlight. Ensure protection against moisture and extreme temperatures (minumum temperature +5°C). The dampers must be protected against mechanical and accidental damage prior to installation.
- Another required packaging system should be approved and agreed by manufacturer. Packaging material is not returnable in case that another packaging system (material) is required and used and it is not included into final price of damper.
- Dampers are transported by box freight vehicles without direct weather impact, there must not occur any shocks and ambient temperature must not exceed +50°C. Dampers must be protected against impact when transported and manipulated. During transportation, the damper blade must be in the "CLOSED" position.
- Dampers must be stored indoor in environment without any aggressive vapours, gases or dust. Indoor temperature must be in the range from -30°C to +50°C and maximum relative humidity 95%.

Warranty

- The manufacturer provides a warranty of 24 months from the date of dispatch for the dampers.
- The warranty for fire dampers FDMS, provided by the manufacturer, is completely void if actuating, closing and control devices are unprofessionally handled by untrained workers or if electric components, i.e. limit switches, actuators, communication and supply devices and thermoelectric activation devices are dismounted.
- The warranty is void if dampers are used for other purposes, devices and working conditions than those allowed by these technical conditions or if the dampers are mechanically damaged during handling.
- If the dampers are damaged by transport, a record must be written down with the forwarder at reception for later complaint.

IX. ASSEMBLY, ATTENDANCE AND MAINTENANCE

- Assembly, maintenance and damper function check can be done only by qualified and trained person, i.e. “AUTHORIZED PERSON” according to the manufacturer documentation. All works done on the fire dampers must be done according international and local norms and laws.
- All effective safety standards and directives must be observed during damper assembly.
- To ensure reliable damper function it is necessary to avoid blocking the actuating mechanism and contact surfaces with collected dust, fibre and sticky materials and solvents.

Manual operation - actuator control without electric voltage

- A special wrench (part of the actuator) can be used to manually turn the damper blade to any position. When the wrench is turned in the direction of the arrow, the damper blade rotates to its open position. As the blade rotation is stopped, in every position, the actuator will be locked. Unlocking is possible even manually as per instructions on the actuator, or by the activation of the supply voltage.
- If the actuator is manually locked, the damper blade will not close in the event of a fire after the activation of the thermoelectric activation device BAT. To restore correct damper operation, the actuator must be unlocked (manually or by applying power supply).

Limit switches

- If the damper is equipped with limit switches and these switches are not used during operation (e.g. because of a project change), they can be left on the damper and not connected (they need not be dismounted).
- On the other hand, if the limit switch is to be added to the damper design, the change can be implemented by change kit.
- These facts must be recorded in the respective operation documentation of the damper (record books of the damper, fire logs, etc.) and subsequently, adequate function checks must be carried out.

Commissioning and revisions

- Before putting the damper into operation, serviceability checks and functional tests must be carried out including testing of functionality of all electrical elements. After putting into operation these serviceability checks must be carried at least twice a year. If no defect is found during two subsequent serviceability checks, these checks can be carried out once a year.
- In case that dampers are found unable to serve for their function for any cause, it must be clearly marked. The operator is obliged to ensure that the damper is put into condition in which it is ready for function and meanwhile he is obliged to provide the fire protection by another appropriate way.
- Results of regular checks, imperfections found and all-important facts connected with the damper function must be recorded in the "FIRE BOOK" and immediately reported to the operator.
- Before entering the dampers with actuator into operation after their assembly and by sequential checks. Check of blade rotation into the breakdown position "CLOSED" can be done after disconnecting the actuator supply (e.g. by pressing the test button at the thermoelectric activation device BAT or disconnecting the supply from ELECTRICAL FIRE SIGNALISATION). Check of blade rotation back into the "OPEN" position can be done after restoration of power supply (e.g. by releasing the test button or restoration of supply from ELECTRICAL FIRE SIGNALISATION). Without power supply, the damper can be operated manually and fixed in any required position. Release of the locking mechanism can be achieved manually or automatically by applying the supply voltage. It is recommended to provide periodical checks, maintenance and service actions on fire equipment by authorized persons. The authorized persons can be trained by producer, or by authorized distributor. All effective safety standards and directives must be observed during fire damper assembly.
- Visual inspection of proper damper installation, inner area of a damper, damper blade, contact surfaces and silicon seal.
- For regular or exceptional inspection of interior of fire damper, micro-camera device can be used. On each fire damper is an inspection opening for micro-camera. In the case of inspection by camera, take out the black rubber cap, insert the camera inside the damper, check interior and at the end of inspection, put the rubber cap back tightly to cover the empty hole.
- Ensure each damper is fully checked for operational capability, control should be initiated from the control system or by manual control. Damper blades should open and close correctly and operation should be visually inspected and documented prior to handover.

For dampers with manual control, the following checks must be carried out

- Check of thermal fuse and closing mechanism.
- Remove the thermal fuse and check the adjustment of the damper blade to the "CLOSED" position. Closing must be vigorously.
- Turning of damper blade to the "OPEN" position is performed by control lever rotation by 90°. The position of blade in open position must be locked by refitting the thermal fuse.

For the designs with actuators, following checks must be carried out

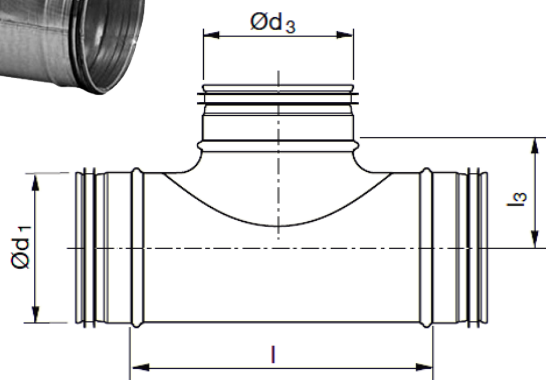
- Check the rotation of the blade to "CLOSED" failure position after disconnection the power supply of the actuator (e.g. by pressing the test button on the thermoelectric activation device BAT (TAE - GRUNER) or by disconnection the power supply from electrical fire signalization). Check the rotation of the blade back to "OPEN" position by restoring the power supply to the actuator (e.g. by releasing the test button or by restoring the power supply from electrical fire signalization).

How to proceed after Tf1 or Tf2 fuses have been activated

- If the thermal fuse **Tf1** is interrupted (due to temperature outside the duct), it is necessary to replace the spring return actuator. → see page 9.
- If the thermal fuse **Tf2** is interrupted (due to temperature inside the duct), only the spare part needs to be replaced: for actuator BELIMO - ZBAT 72 (95/120/140) acc.to the activation temperature → see page 9, for actuator GRUNER - TA-72.

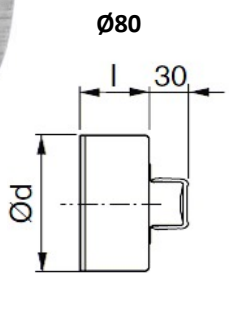
X. ACCESSORIES

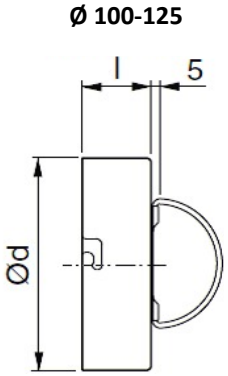
T-piece for inspection



Size FDMS [mm]	Ød1 [mm]	Ød3 [mm]	l [mm]	l3 [mm]
100	98	80	97	60
125	123	80	97	72
160	158	100	130	95
180	178	100	175	105
200	198	100	175	115
225	223	100	175	127
250	248	100	175	140
280	278	100	175	155
315	313	100	175	173
355	353	100	175	193
400	398	125	225	220
450	448	125	225	245
500	498	125	225	270
560	558	125	225	300
630	628	125	225	335

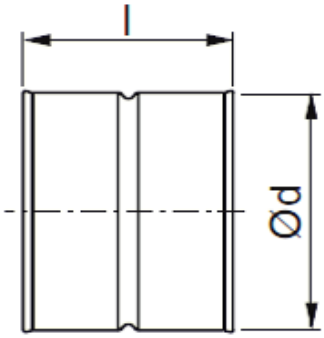
Access door for T-piece





Size FDMS [mm]	Ød [mm]	l [mm]
100	80	48
125	80	48
160	100	40
180	100	40
200	100	40
225	100	40
250	100	40
280	100	40
315	100	40
355	100	40
400	125	40
450	125	40
500	125	40
560	125	40
630	125	40

Female coupling

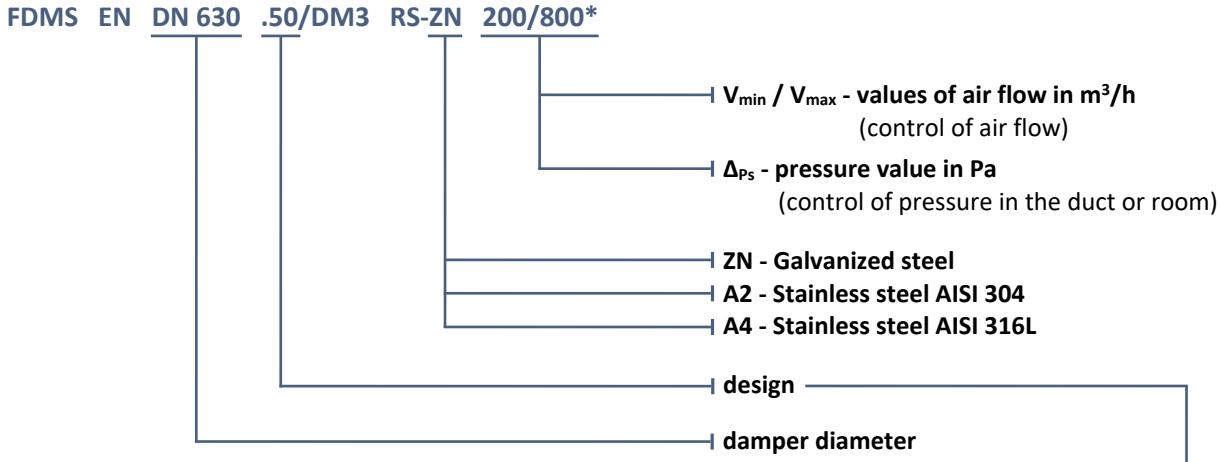


Size FDMS [mm]	Ød [mm]	l [mm]
100	100	97
125	125	97
160	160	97
180	180	97
200	200	97
225	225	97
250	250	139
280	280	139
315	315	139
355	355	139
400	400	184
450	450	184
500	500	184
560	560	184
630	630	184

XI. ORDERING INFORMATIONS

Ordering key

Fire damper FDMS



* These data are entered only in case of .50/DM3(-MB) and .50/PM3(-MB) designs

EXAMPLES:
FDMS EN DN 630 .50 ZN - DN 630-damper diameter, .50-damper design, ZN-galvanized steel,

FDMS EN DN 630 .50/DM3 ZN 200/800 - DN 630-damper diameter, .50/DM3-damper design, ZN-galvanized steel, 200/800-pressure value in Pa

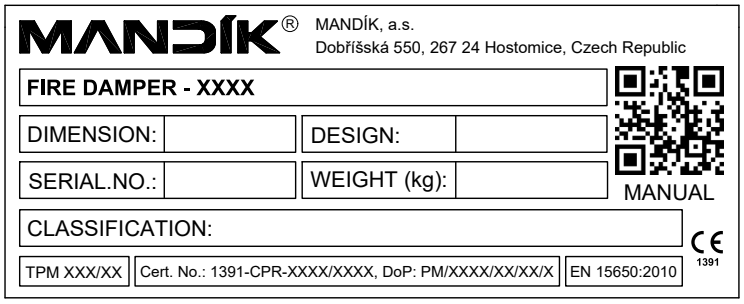
Damper design	Additional digit
Manual control and thermal	.01
Manual control and thermal with a terminal switch („CLOSED“)	.11
Manual control and thermal with two terminal switches („OPEN“, „CLOSED“)	.80
With actuator BFL (BFN) 230-T - voltage AC 230 V	.40
With actuator BFL (BFN) 24-T - voltage AC/DC 24 V	.50
With actuator BFL (BFN) 230-T - voltage AC 230 V - sensor BAT is not mounted on the damper casing	.4V
With actuator BFL (BFN) 24-T - voltage AC/DC 24 V - sensor BAT is not mounted on the damper casing	.5V
With VAV actuator for flow control GRUNER 340CTA-024D-03, 340CTA-024-05, 360CTA-024-12 - voltage AC/DC 24 V with GRUNER GUAC-DM3 controller - voltage AC/DC 24 V	.50/DM3
With VAV actuator for pressure control GRUNER 340CTA-024D-03, 340CTA-024-05, 360CTA-024-12 - voltage AC/DC 24 V with GRUNER GUAC-PM3 controller - voltage AC/DC 24 V	.50/PM3
With VAV actuator for flow control GRUNER 340CTA-024D-03, 340CTA-024-05, 360CTA-024-12 - voltage AC/DC 24 V with controller and Modbus communication GRUNER GUAC-DM3-MB - voltage AC/DC 24 V	.50/DM3-MB
With VAV actuator for pressure control GRUNER 340CTA-024D-03, 340CTA-024-05, 360CTA-024-12 - voltage AC/DC 24 V with controller and Modbus communication GRUNER GUAC-PM3-MB - voltage AC/DC 24 V	.50/PM3-MB

Additional information for fire dampers with VAV actuator

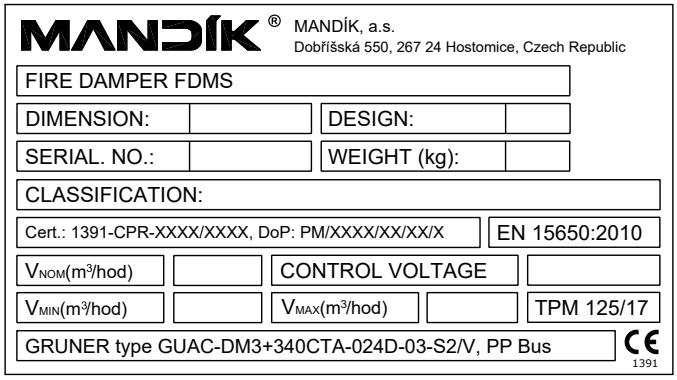
- *The standard operating mode is set for DC 2...10 V. If is it requested by customer, it can be set for DC 0...10 V.*
- *The values of air volume Vmin and Vmax will be set by the manufacturer according to the customer's order. The pressure values Pmin and Pmax will be set according to the customer's order.If the customer does not determine the required values, the values will be set according to TPM resp. at pressure Pmin to 0 Pa and Pmax to the maximum value of the pressure sensor.*
- *For Gruner actuators, it is possible to additionally reset the values of Vmin, Vmax and the operating mode using a display on the GUAC.*

Data label

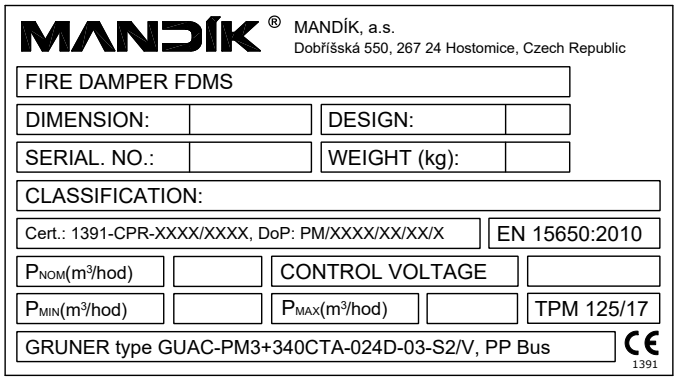
Data label FDMS - is placed on the damper casing (example)



Data label FDMS with air flow control GUAC-DM3(-MB) - is placed on the damper casing (example)



Data label FDMS with pressure control GUAC-PM3(-MB) - is placed on the damper casing (example)



The producer reserves the right for innovations of the product.
For actual product information see www.mandik.com

MANDÍK®

www.mandik.com

MANDÍK, a. s. • Dobříšská 550 • 267 24 Hostomice • Czech Republic • Tel.: +420 311 706 742 • E-Mail: mandik@mandik.cz