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Revision of 02.12.2024

DEFINITION OF BASIC TERMS

AIR DAMPER – an element of the ductwork designed to regulate the air flow in the open/closed modes (shut-off dampers) or smooth regulation (control dampers) with a normalized level of air leaks in the closed position at a given value of the maximum working pressure in the ductwork.

GENERAL DESIGN DAMPER – designed to solve the vast majority of civil engineering tasks, and not for use in special industrial equipment systems.

SPECIAL DESIGN DAMPER – designed to solve highly specialized industrial design and construction tasks, features much more advantages compared to other dampers of a similar type designed for general application conditions.

BACKDRAFT DAMPER – designed to prevent changes in the flow direction (reverse flow) of the gas-air medium in the ventilation system, while operating automatically under the action of gravity.

CONTROL DAMPER – designed to regulate the parameters of steam-gas-air flow in ventilation ductwork by changing its flow rate; controlled by external force from an electric or manual drive.

SHUT-OFF DAMPER – designed to block the working flow in ventilation ductwork and prevent it from entering the serviced area. Such a damper is controlled by an external force from an electric or manual drive.

PRESSURE-RELIEF DAMPER – designed for automatic discharge of excess steam-gas-air medium from the serviced area in order to restore the normalized pressure inside it; controlled automatically by the force of excess pressure.

CRITERIA FOR EFFECTIVE SELECTION

The main criterion for selecting a particular air damper is the leakage volume in the closed position at a given pressure drop. The classification of leakage volume proposed by CCK TM fully coincides with the classification of the EN 1751 standard "Ventilation for buildings - Air terminal devices - Aerodynamic testing of dampers and valves".

The use of the introduced quality parameter made it possible to significantly simplify the classification of dampers by their functionality, making it transparent to assess the capabilities of the manufacturer and the proposed equipment. After all, it is the volume of air leakage through a closed damper that allows us to clearly determine the following:

- feasibility and effectiveness of measures to eliminate pressure losses in the ventilation network;
- to what extent will the damper prevent uncontrolled heat loss from the room due to the natural pressure difference between air with different temperatures at the "outdoor/indoor" boundary;
- how efficient is the ventilation network and the equipment used in it;
- what is the benefit of using a damper in terms of saving heat and electricity spent on servicing the network;
- to what extent will a particular damper actually protect the network and the equipment used in it from freezing in the winter;
- how effective will it be to use a check damper (or so-called leaf damper) or a motorized shut-off damper to prevent backflow of air through the fan and protect its impeller from natural rotation in the opposite direction, which is quite critical when it can be started in automatic mode.

The unit of measurement for the leakage volume is assumed to be l/s*m^2. The torque acting on the damper drive, as well as the complete set of drives installed on the dampers, is calculated for the conditions when the damper operates directly (opens or closes, regulates the flow) at the specified maximum pressure. A certain indicator is the actual volume of air passing through a closed damper or flap.

Thus, any air damper whose characteristics do not indicate the standard leakage volume cannot be a full-fledged product for its intended purpose and carries a hidden hazard.

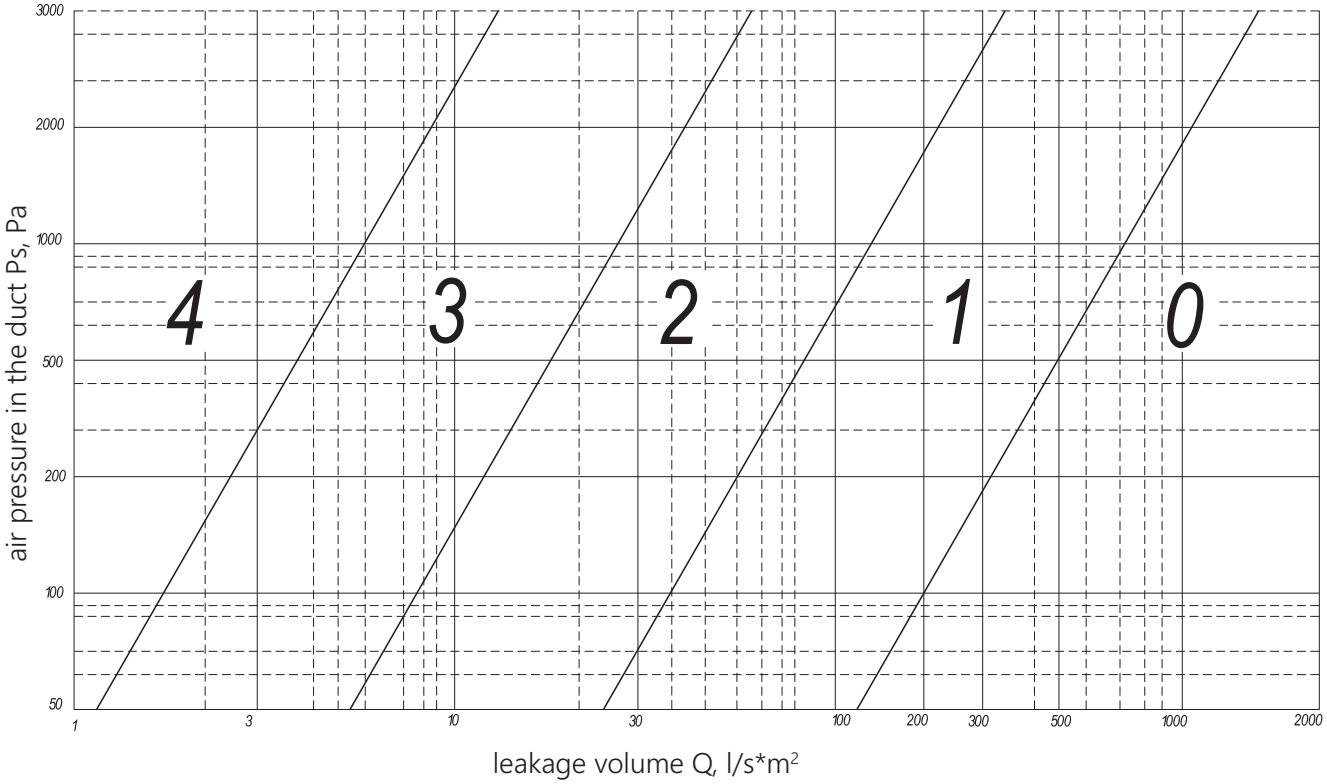
However, when considering quality indicators, no less important is the reliability of the information provided by the manufacturer about the volume of damper leakage in the closed position.

The only possible way to obtain verified data is to test the damper. To conduct tests, an appropriately equipped test stand with a verification and certification document is required.

CLASSIFICATION OF LEAKAGE VOLUME

DAMPER CLOSED

The leakage volume range is divided into classes 0, 1, 2, 3, and 4. Classes 0, 1, 2, 3 and 4 are determined by the maximum leakage limit in l/s*m^2 through closed damper blades, as a function of static pressure in the air duct in Pa. Dampers belonging to class "0" are not subject to leakage volume requirements.



CLASSIFICATION OF DAMPERS

INTENDED USE

Air dampers can be used as shut-off dampers for regulating the air flow in the "open/closed" mode and/or for smoothly regulating the amount of air in the network, the so-called control dampers. For dampers used as shut-off dampers, the defining characteristic is the class of leakage level in the closed position. The higher the leakage class (from 0 to 4), the higher the tightness of the damper when closed. Backdraft dampers can only be used as shut-off dampers to shut off the duct in the event of an air supply interruption when the fan is switched off..

DESIGN

Depending on the purpose, air dampers can be made in general industrial, explosion-proof, corrosion-resistant, etc. design versions or any combination of them. At the same time, it is important to understand the limitations of general industrial design and to be cautious about using it to solve tasks that are specific to your conditions. The use of a particular special design of dampers must have reasonable logical basis.

OPERATING PRESSURE

The operating pressure of the damper is the operating pressure of the air network in which this damper is installed.

It is important to understand that the limits of use of the vast majority of general industrial dampers available on the market today end beyond 1,500 Pa, despite all the assurances of manufacturers. At the same time, the operating pressure of 1,500 Pa is quite sufficient to solve most civil engineering tasks. The operating pressure of networks that can use special air dampers can reach 3,000 Pa or more in a special design version.

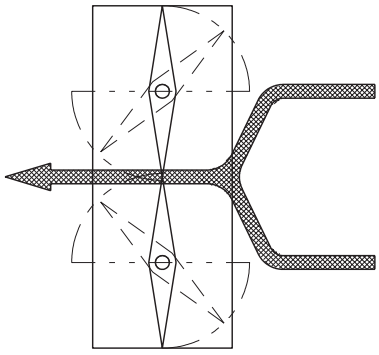
COMPLETE WITH ACTUATOR

Air dampers can be driven type (with a forced actuation mechanism: REG, GMK, NER, KED series, etc., with electric drive control, 220V or 24V power supply, or manually operated) and backdraft type (inertial or gravitational principles of operation, triggered by the action of air flow).

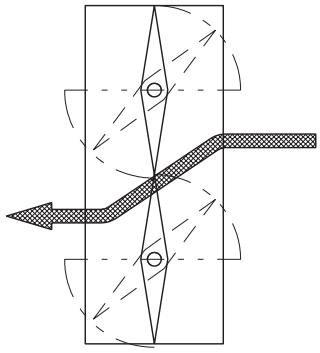
BLADE OPENING DESIGN OPTION

For the adjustment of air dampers (motorized dampers only), the classification according to the design option of opening the blades - symmetrical or parallel - is of fundamental importance. Symmetrical blade opening allows for smooth flow adjustment without pressure hammer and significant damage to its laminarity; parallel blade opening results in the formation of a “threshold” and turbulence, which reduces the air flow velocity at the damper outlet.

symmetrical opening
of the damper blades



parallel opening
of the damper blades



INSTALLATION POSITION

All motorized air dampers remain operational regardless of installation position and in any direction of air flow movement. For backdraft dampers, installation position is crucial to ensure its normal operation. There are separate types of backdraft dampers designed to operate on vertical or horizontal sections of ventilation networks with a pre-determined direction of air flow.

CLIMATIC VERSION

The type of climatic version and placement conditions are determined in strict accordance with GOST 15150.

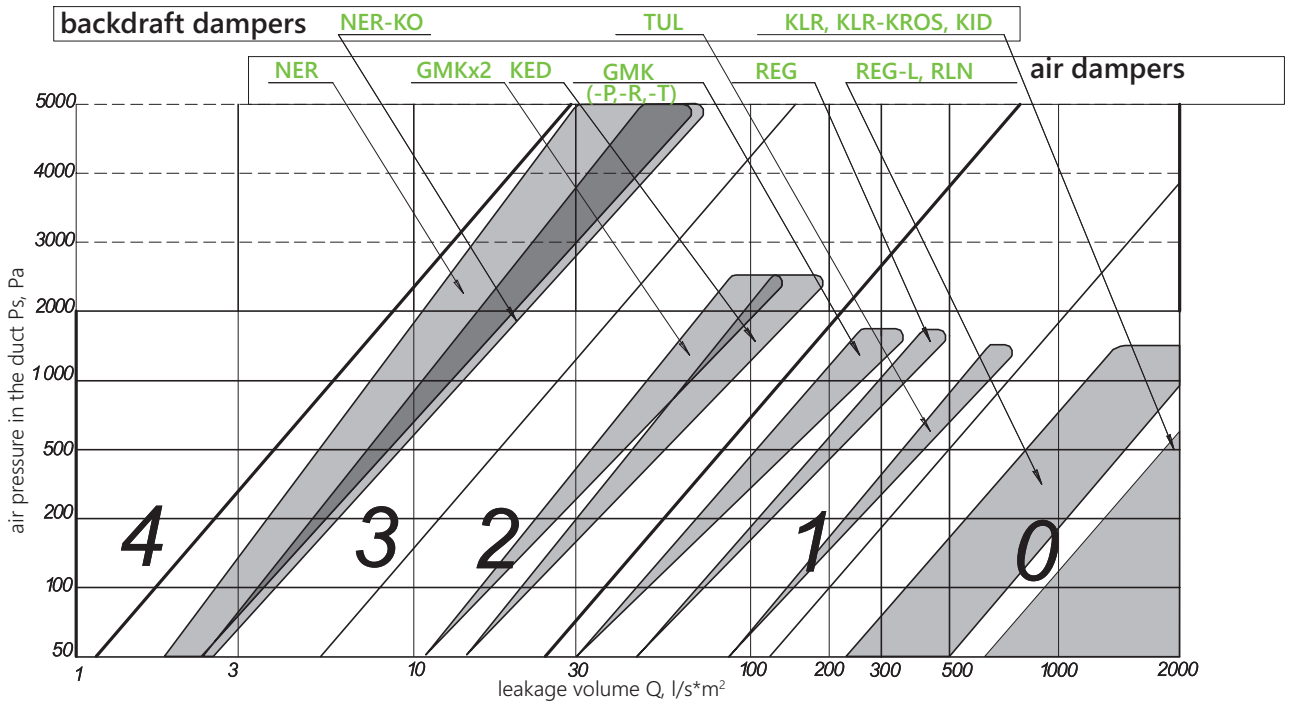
ADDITIONAL REQUIREMENTS

Additional requirements include special technical requirements for products of the appropriate purpose used in life safety systems, for example:

- earthquake resistance;
- safety class in accordance with the requirements of the "General Provisions for Ensuring the Safety of Nuclear Power Plants".

SUMMARY CHARACTERISTICS

VOLUME OF AIR DAMPER LEAKS



TECHNICAL SPECIFICATIONS

DAMPER TYPE	Design				Climatic version								Operating pressure, Pa								Leakage level class			
	N[1]	CR[2]	V[3]	CRV[4]	YHL2	YHL3	YHL4	Y2	Y3	T2(3)	TM3	TB3	20-150	up to 800	up to 1000	up to 1200	up to 1500	up to 1800	up to 2000	up to 2500	up to 10000	0	1	2	3
AIR DAMPERS																									
REG	■	■	■	■	■	■		■	■	■							■						■		
REG-L	■	■	■	■	■	■		■	■	■						■						■			
RLN	■				■	■	■									■						■			
GMK-P	■	■	■	■	■	■		■										■					■		
GMK-R	■	■	■	■	■	■		■										■					■		
GMK	■	■	■	■	■	■				■								■					■		
GMK-T	■	■	■	■	■													■					■		
GMKX2	■	■	■	■				■											■					■	
KED	■	■	■	■	■	■				■										■				■	
NER	■	■	■	■		■		■		■											■				■
KB-VAV	■	■				■									■							■			
BACKDRAFT DAMPERS																									
TUL	■	■	■	■	■										■								■		
KLR	■	■			■									■								■			
KLR-KROS	■	■			■									■								■			
NER-KO	■	■	■	■	■						■	■									■				■
KID	■	■			■	■							■									■			

[1] - general purpose industrial version
[2] - corrosion-resistant design
[3] - explosion-proof design
[4] - corrosion-resistant, explosion-proof design

GENERAL INDUSTRIAL DAMPERS

REG | UNIVERSAL AIR DAMPER

- this is a universal air damper designed for use in ventilation and air conditioning systems;
- dampers of rectangular cross-sections are produced only;
- single-section dampers can be manufactured in height (H) from 175 mm to 2,425 mm, in width (B) from 200 mm to 1,500 mm. Case length (L) 170 mm.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

INTENDED USE	shut-off
OPERATING PRESSURE	up to 1500 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	1
BLADE OPENING	parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• YHL • Y • T, placement category • 2 • 3
THERMAL CONDUCTIVITY	up to 64.2 W/m·K

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220 V or 24 V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The REG damper consists of a galvanized steel body, the damper blade is made of profiled galvanized sheet metal. The dumper leaves are spring-loaded at the ends by using special plate springs. The blades are joined in the form of a lock seal, with a seal located in the abutment area. The REG damper does not include any heating elements. "Parallel" opening of the damper blades. An open/closed electric drive with spring return (220V or 24V) or smooth adjustment can be used as an actuator, or a handle for manual control (manual control of the electric drive is always available by default). Electric drives are selected depending on the damper area and operating conditions in accordance with the electric drive configuration table. REG dampers feature a modern appearance that is compatible with existing design requirements for most types of premises.

Due to the fact that the damper blade is made of a steel profile formed on the profiling line, to optimize the flow cross-section of this damper, it is necessary to select the height from the standard range H = 175; 325; 475; 625; 775; 925; 1,075; 1,225; 1,375; 1,525; 1,675; 1,825; 1,975; 2,125; 2,275; 2,425 mm. Dampers with height dimensions other than these will be manufactured with a flow section close to the unified dimensions H, but with a higher stopper (with a smaller flow cross-section).

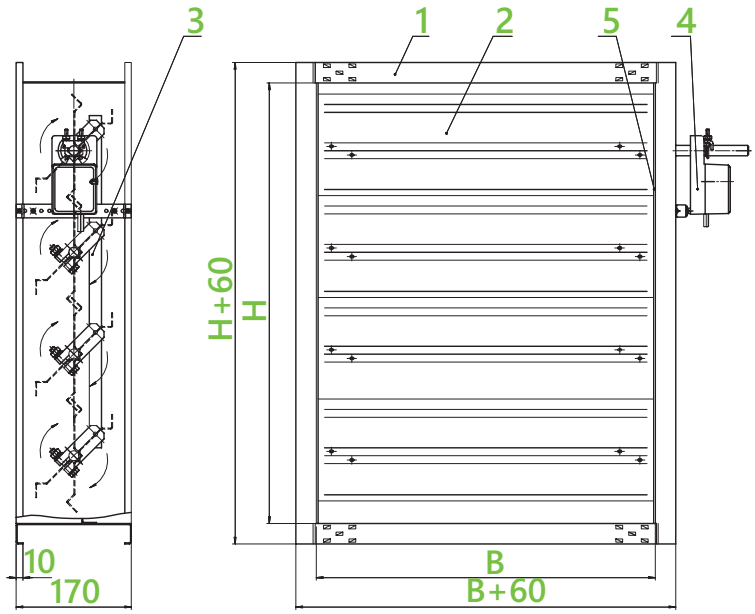
EXAMPLE:

REG damper; height 775 mm and width 620 mm, general industrial design, with one electric drive, spring return, supply voltage 220V, with a group of limit switch contacts, with parallel opening of the blades, climatic version Y2

REG–775x620–N–F220–S–PL–Y2

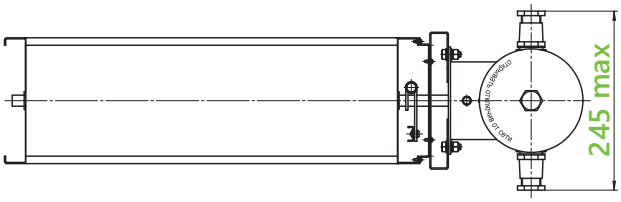
- universal air damper (•REG)
- useful cross-section of the damper: HxB (H - height, mm; B - width, mm)
- design (•N •CR •V •VCR)
- drive type (• electric drive - as to model designation see the section "Damper actuator encoding"; • manual drive - HD)
- blade opening design option (• PL - parallel)
- climatic version (• Y2 (3); • YHL2 (3); • T2 (3)

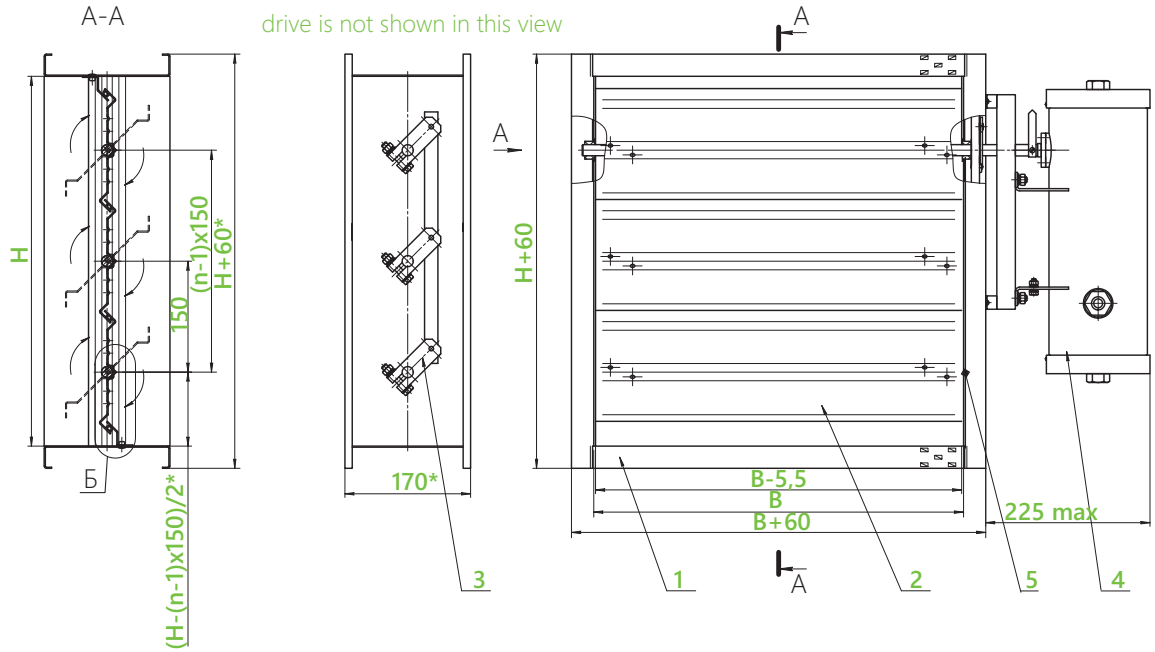
NOTE: special requirements for REG are specified additionally and agreed with the manufacturer.



1 - casing; 2 - blade; 3 - rod; 4 - executive mechanism; 5 - seal

EXPLOSION-PROOF DESIGN

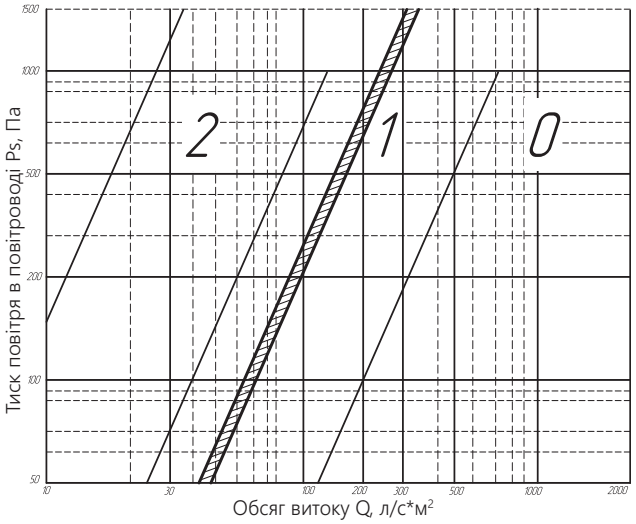




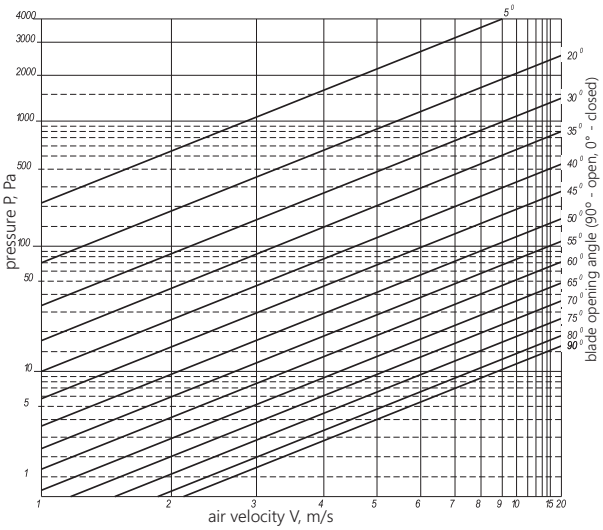
1 - casing; 2 - blade; 3 - rod; 4 - executive mechanism; 5 - seal

LEAKAGE VOLUME CHARACTERISTICS

LEAKAGE VOLUME IN THE CLOSED POSITION



PRESSURE DROP CHART



UNIVERSAL AIR DAMPER REG-L

- universal air damper is based on the REG damper and is designed to regulate the flow rate of supply, recirculating or exhaust air in ventilation and air conditioning systems in smooth adjustment and "open/closed" modes without any requirements for leakage in the closed position;
- REG-L damper can be used as a throttling device.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 1200 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	0 (not required)
BLADE OPENING	parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• YHL • Y • T, placement category • 2 • 3
THERMAL CONDUCTIVITY	not required

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220V or 24V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

REG-L dampers are manufactured in both rectangular and round cross-sections.

Single-section dampers can be manufactured in height (H) from 100 mm to 2,425 mm, width (B) from 100 mm to 1,500 mm, casing length (L) 170 mm. The range of connection and overall dimensions of round dampers is limited to the standard dimensions shown in the table (see below), but can be expanded depending on the actual order requirements. Round damper casing length (L) 200 mm (350 mm).

REG-L dampers consist of: rectangular - made of galvanized steel casing and blades made of profiled galvanized sheet profile; round - made of solid-rolled round casing and sheet metal blade also made of galvanized steel. REG-L dampers do not include any seals. "Parallel" opening of the damper blades.

An electric drive or a handle for manual control can be used as an actuator. Damper kinematics link consists of levers and rods. REG-L dampers are not equipped with terminal boxes as standard.

Due to the fact that the damper blade is made of a steel profile formed on the profiling line, to optimize the flow cross-section of this damper, it is necessary to select the height from the standard range H = 175; 325; 475; 625; 775; 925; 1075; 1225; 1375; 1525; 1675; 1825; 1975; 2125; 2275; 2425 mm. Dampers with height dimensions other than these will be manufactured with a flow section close to the unified dimensions H, but with a higher stopper (i.e., with a smaller flow cross-section).

EXAMPLE:

REG-L damper with a diameter of 560 mm, general industrial design, with one manual drive, climatic version Y2

REG-L–560–N–HD–Y2

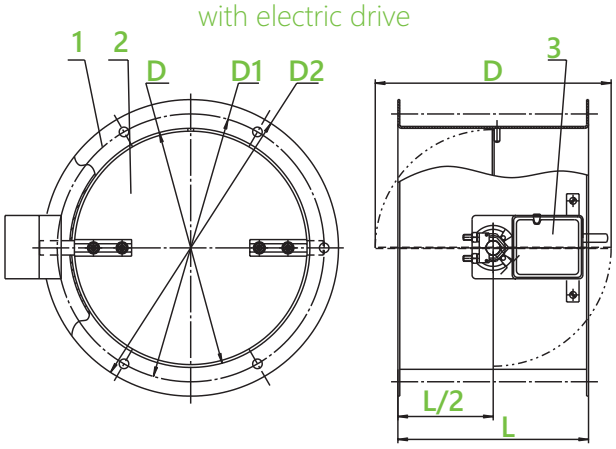
- universal air damper (•REG-L)
- useful cross-section of the damper (•HxB; •D)
  (H - height, mm; B - width, mm; D - diameter, mm)
- design (•N •CR •V •VCR)
- drive type (• electric drive - as to model designation
  see the section "Damper actuator encoding"; • manual drive - HD)
- climatic version (• Y2 (3); • YHL2 (3); • T2 (3))

NOTE: special requirements for REG-L are specified additionally and agreed with the manufacturer.

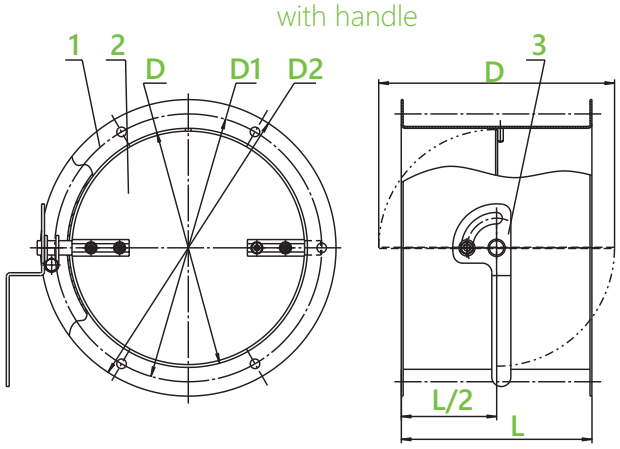
ROUND CROSS-SECTION

1 BLADE

with electric drive

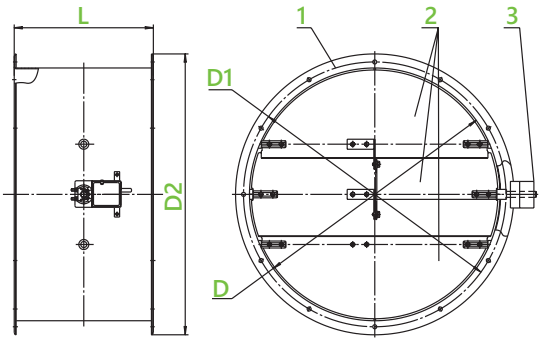


with handle

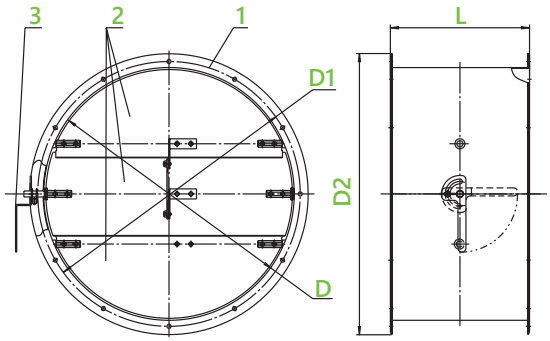


3 BLADES

with electric drive



with handle



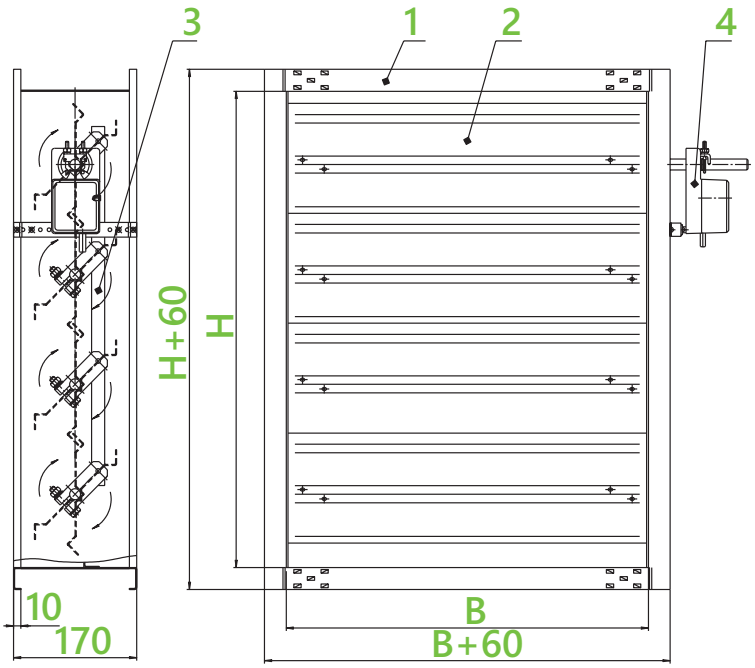
1 - casing; 2 - blade; 3 - executive mechanism; 4 - levers and rods

D, мм	D1, мм	D2, мм	L, мм	Number of blades
100*	130	260	200	1
125*	155	260	200	1
150*	180	260	200	1
160	190	220	200	1
180	201	240	200	1
200	230	260	200	1
250	280	310	200	1
280	310	340	350	1
315	345	375	350	1
355	385	415	350	1
400	430	460	350	1
450	480	510	350	1
500	530	560	350	1
560	590	620	350	3
630	660	690	350	3
710	740	770	350	3
800	830	860	350	3
900	930	960	350	3
1000	1030	1060	350	3
1120	1150	1180	350	3
1250	1280	1310	350	3

- torque 4 Nm - torque 10 Nm - torque 20 Nm

* - made with a diameter of 200 mm, with an adapter for the corresponding diameter..

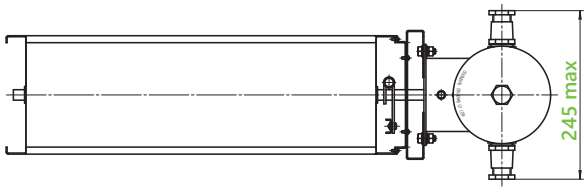
RECTANGULAR CROSS-SECTION

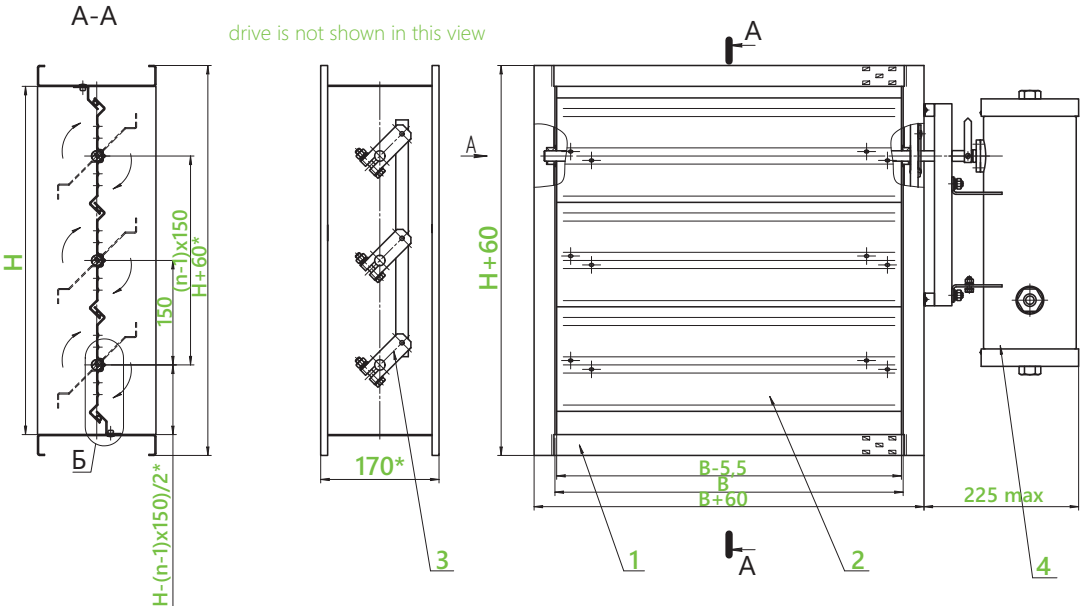


1 - casing; 2 - blade; 3 - rod; 4 - executive mechanism

EXPLOSION-PROOF DESIGN

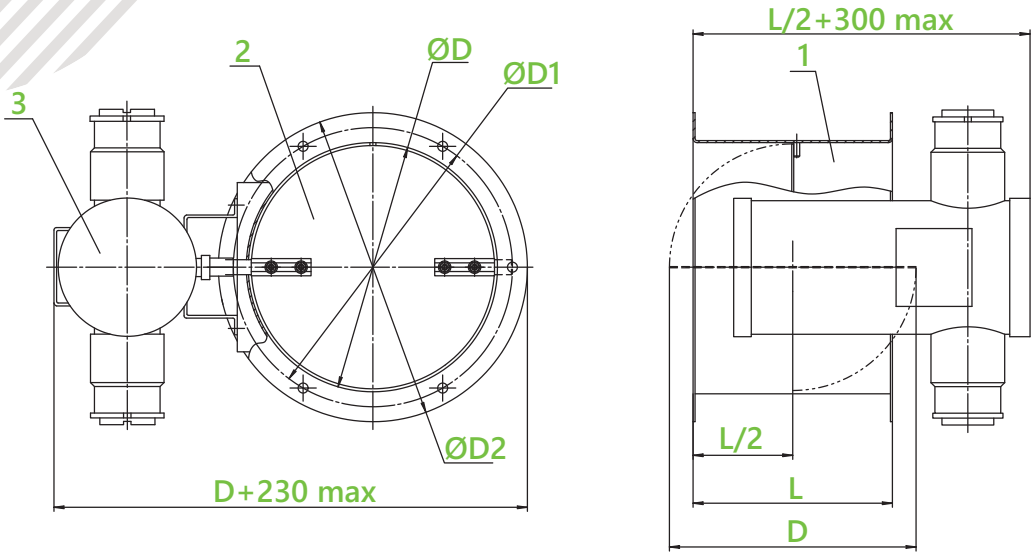
RECTANGULAR CROSS-SECTION





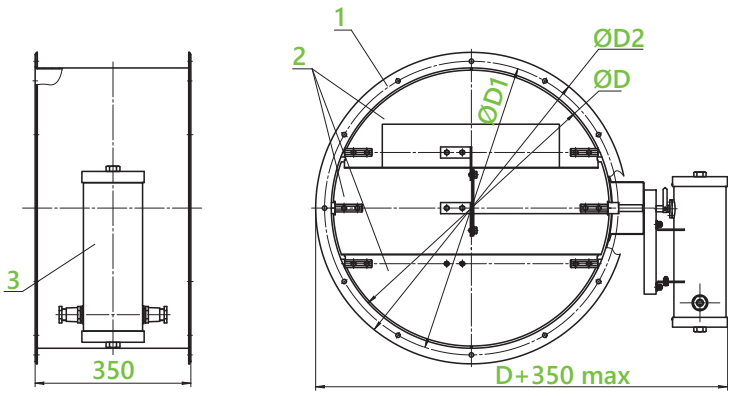
1 - casing; 2 - blade; 3 - rod; 4 - executive mechanism

ROUND CROSS-SECTION
1 BLADE



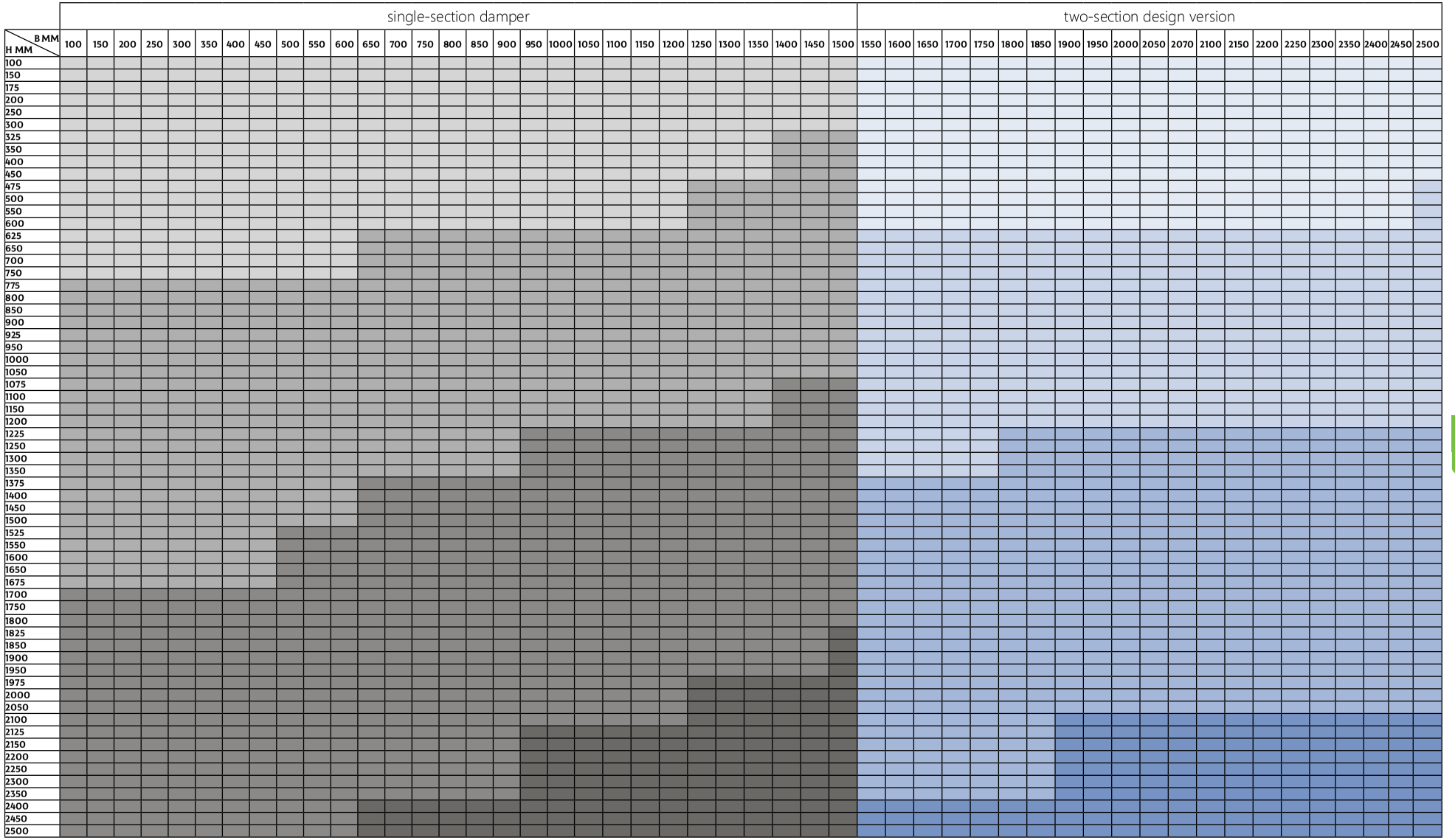
1 - casing; 2 - blade; 3 - executive mechanism

3 BLADES



1 - casing; 2 - blade; 3 - executive mechanism

STANDARD SIZE RANGE AND OPENING TORQUE FORCE OF A RECTANGULAR AIR DAMPER



AIR CONTROL EQUIPMENT

RLN | UNIVERSAL AIR DAMPER

- damper is designed mainly for regulating the flow rate of supply, re-circulating or exhaust air in ventilation and air conditioning systems, as well as for sealing the internal volume of ventilation networks, the working pressure of which does not exceed 1,200 Pa.
- dampers of rectangular cross-sections are produced only;
- height (H) of this single-section damper varies from 110 mm to 1,510 mm in 100 mm increments. The width (B) of this damper ranges from 150 mm to 1,200 mm. Case length (L) 125 mm.

DESIGN

- general purpose industrial (N).

INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 1200 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	0 (not required)
BLADE OPENING	symmetrical
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	YHL, placement category • 2 • 3 • 4 (with a limit not lower than minus 30° C)
THERMAL CONDUCTIVITY	not required

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220V or 24V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The RLN damper has a rectangular cross-section body made of aluminum profile, in the sliding bearings of which blades are fixed on the axes, which are also made of aluminum profile. The presence of bearings ensures easy opening of the damper. The bearing refers to plastic bushings and liners located in the internal cavities of the vertical walls of the damper. The transmission of motion between the blades is carried out using plastic gears. The opening of the blades for such a damper is always "symmetrical". There is a rubber seal in the abutment area of the blades.

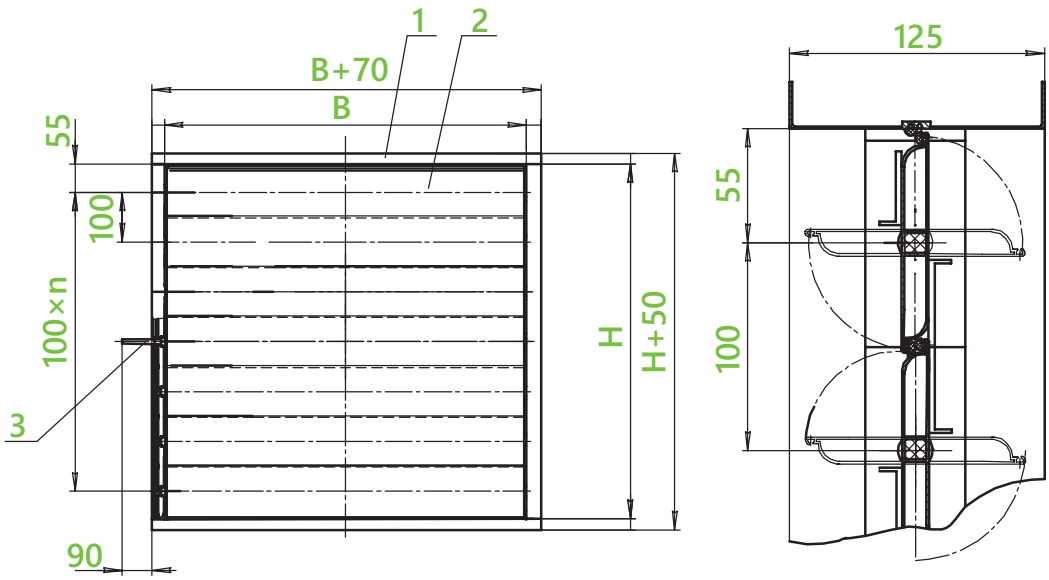
EXAMPLE:

RLN damper, 1,210 mm high and 1,000 mm wide, general industrial design, with one electric drive "open-closed", voltage 220V, without limit switches, climatic version YHL2

RLN–1210x1000–N–M220–YHL2

- universal air damper (•RLN)
- useful cross-section of the damper: HxB (H - height, mm; B - width, mm)
- design (•N)
- drive type (• electric drive - as to model designation see the section "Damper actuator encoding"; • manual drive - HD)
- climatic version (• YHL2 (3) (4))

NOTE: special requirements for RLN are specified additionally and agreed with the manufacturer.



1 - casing; 2 - blade; 3 - drive axle

STANDARD SIZE RANGE AND OPENING TORQUE FORCE OF AN AIR DAMPER

H, мм \ B, мм	200	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100
110																			
210																			
310																			
410																			
510																			
610																			
710																			
810																			
910																			
1010																			
1110																			
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1910																			
2010																			

– 1 drive 4 Nm
– 1 drive 10 Nm
– 1 drive 20 Nm
– 2 drives 4 Nm
– 2 drives 10 Nm
– 2 drives 20 Nm

GMK-P | AIR DAMPER

- air damper, which is designed specifically for use in low temperature conditions (down to minus 40°C), features design features that prevent heat loss through the damper blades;
- it is made only of rectangular cross-section;
- range of connection dimensions of this damper is presented in accordance with the size range of air conditioners, including the GMK-P damper can also be made in a sectional design version. If additionally specified in the order, the GMK-P damper can be manufactured in other combinations of width and height. The maximum height (H) of the single-section damper is 2,410 mm, and the width (B) is 2,000 mm. Case length (L) 170 mm.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

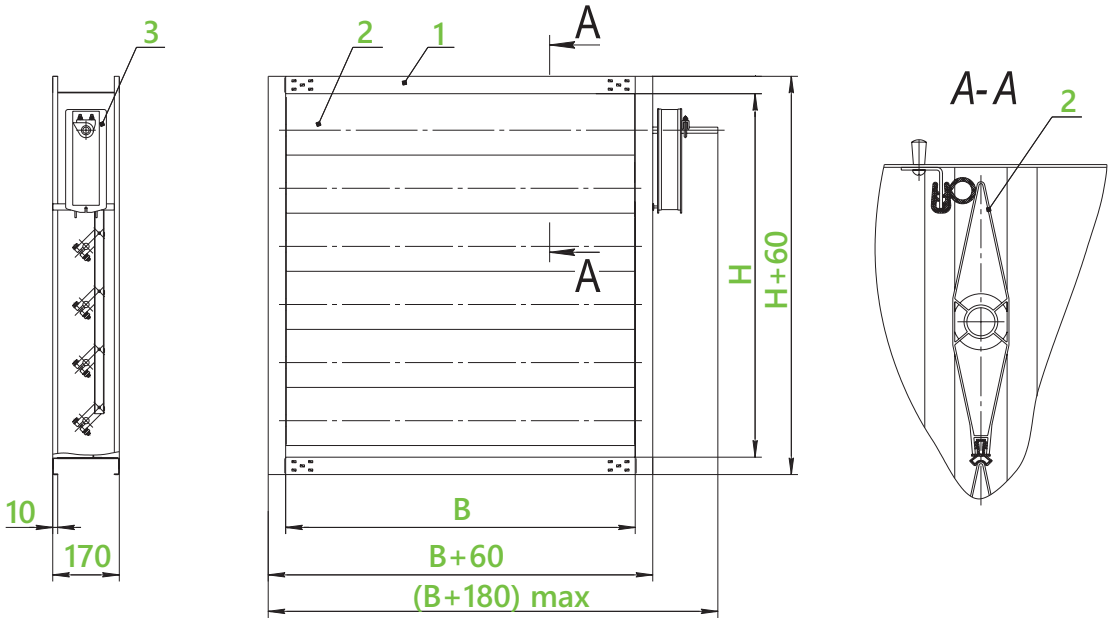
INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 1 800 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	1
BLADE OPENING	parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	Y, placement category 2
THERMAL CONDUCTIVITY	up to 52 W/m·K

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220V or 24V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The GMK-P damper consists of a four-wall box-shaped body made of galvanized steel, the damper blade is made of reinforced aluminum profile. The dumper leaves are spring-loaded at the ends by using special plate springs.

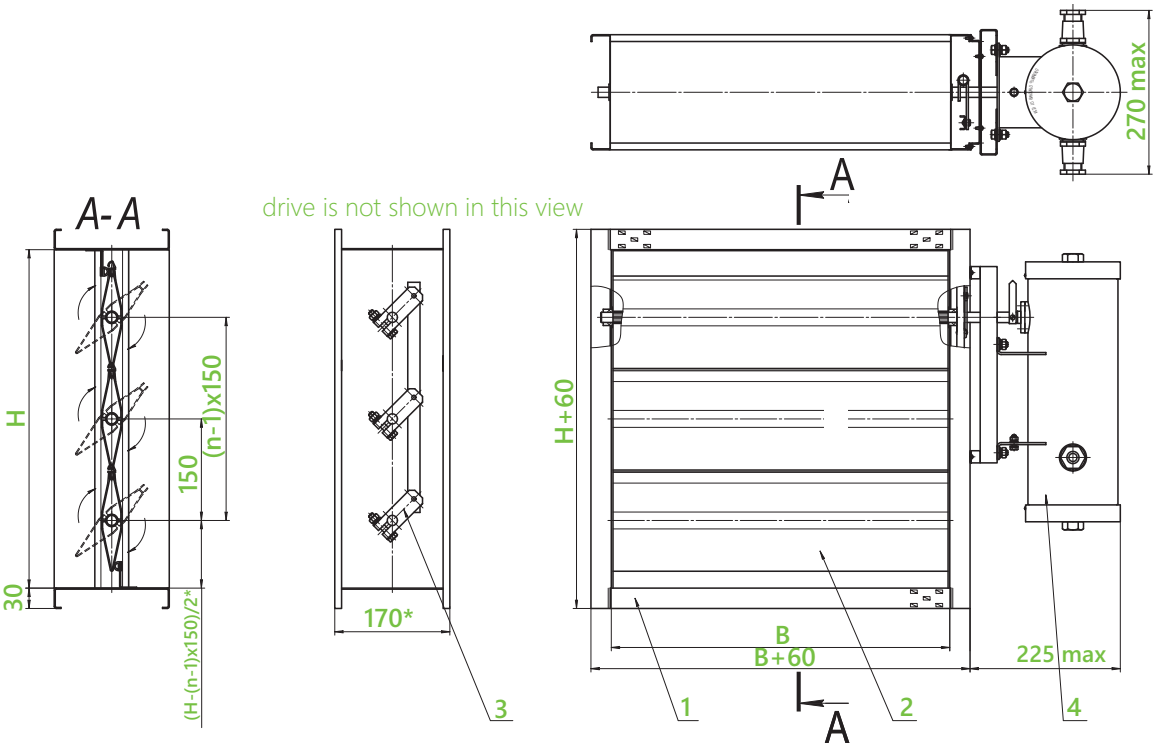
The plate springs are installed in the leaves adjoining area. The GMK-P damper does not include any heating elements. The kinematics of such a damper is levers and rods, the opening of the damper blades is "parallel". The GMK-P damper is not equipped with terminal boxes as standard. The appearance of such a damper is combined with the existing design requirements for most types of premises.

Due to the fact that the damper blade is made of a standard profile, to optimize the flow cross-section of this damper, it is necessary to select the height H = 160; 310; 460; 610; 760; 910; 1,060; 1,210; 1,360; 1,510; 1,660; 1,810; 1,960; 2,110; 2,260; 2,410. Dampers with height dimensions other than these will be manufactured with a flow section close to the unified dimensions H, but with a higher stopper (i.e., with a smaller flow cross-section).



1 - casing; 2 - blade; 3 - executive mechanism

EXPLOSION-PROOF DESIGN



1 - casing; 2 - blade; 4 - levers and rods; 4 - executive mechanism

GMK-R AIR DAMPER

- air damper is designed specifically for regulating air flow in general-purpose networks, including at low temperatures (down to minus 40°C), has design features that prevent flow breakdown, pressure hammers, jamming in intermediate positions and allow precise control of air flow resistance of the ventilation network;
- they are made only of rectangular cross-section;
- range of connection dimensions and useful cross-section dimensions fully corresponds to the size range of GMK-R series dampers without restrictions or additions.

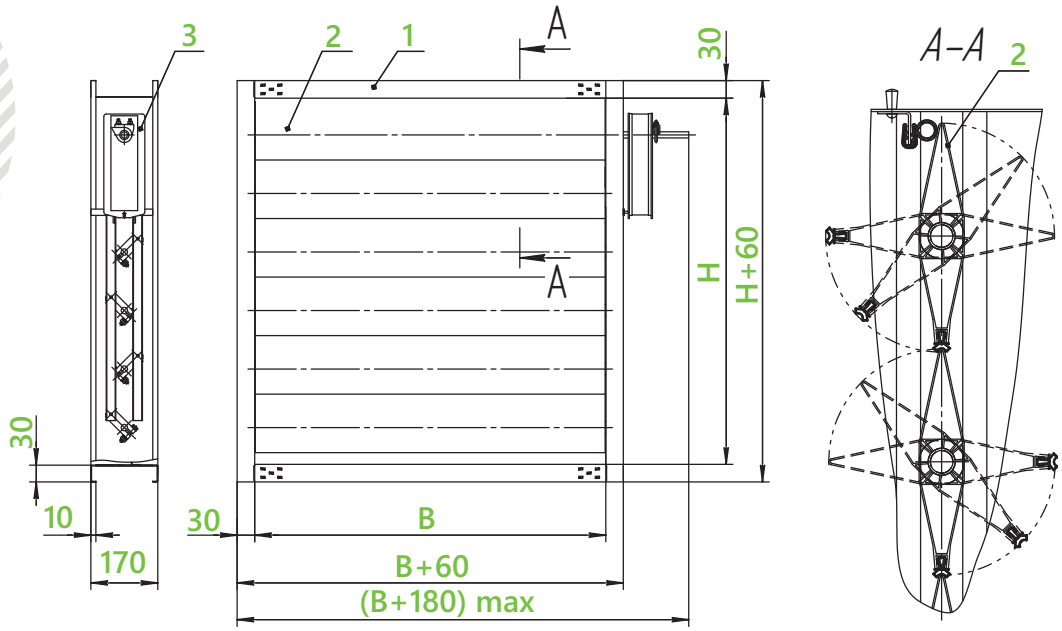
DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 1 800 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	1
BLADE OPENING	symmetricall
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	Y, placement category 2
THERMAL CONDUCTIVITY	up to 52 W/m·K

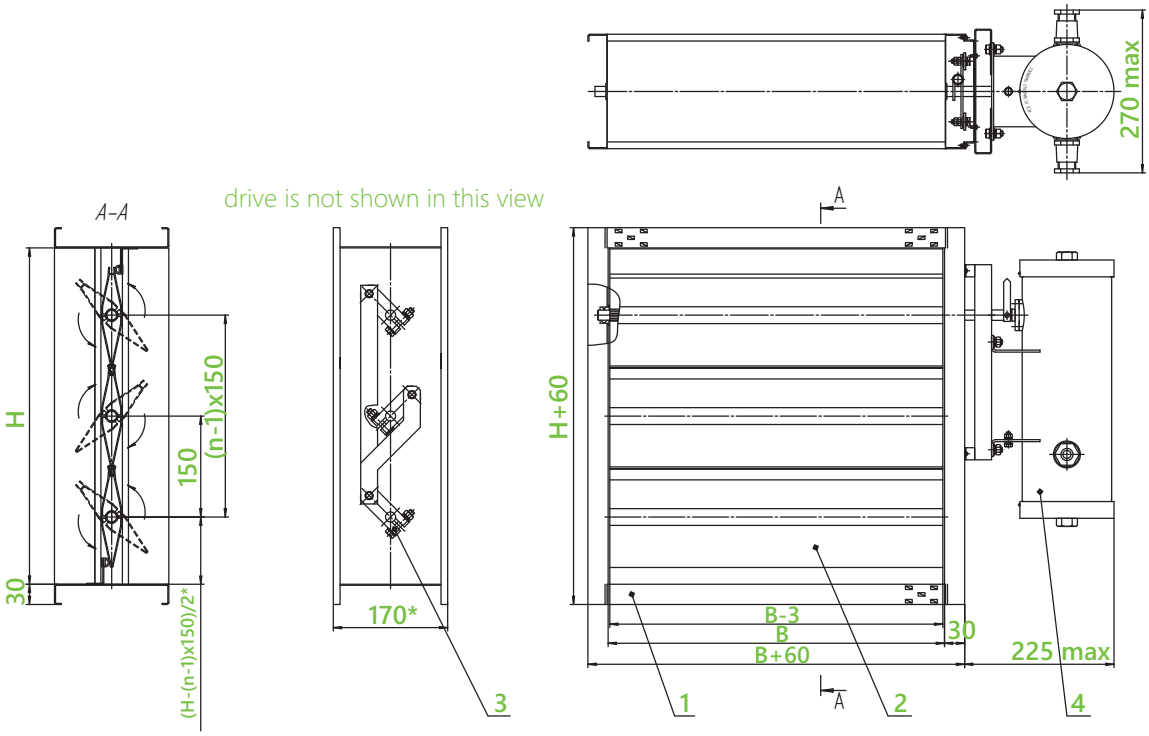
*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220V or 24V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The GMK-R damper consists of a four-wall box-shaped body made of steel using cold rolling technology. The damper leaf is made of an aluminum profile of diamond-shaped cross-section with internal stiffeners; the leaves adjoining line is airtight as these leaves spring-loaded by using special plate springs that are resistant to temperatures of category YHL 2 (GOST 15150). Just like the GMK-P series damper, the leaves of GMK-R damper are spring-loaded at the ends by using special plate springs. GMK-R does not contain any electric heating elements in its design. Unlike the GMK-P damper, the GMK-R damper has a specially organized kinematics: the levers and rods of the GMK-R damper are connected using fittings with increased friction properties and stability of fastening, compared to conventional dampers, which allows the GMK-R damper to have a symmetrical opening of the leaves with a high degree of mobility without loss of reliability, while maintaining full functionality throughout its entire service life. The design of the levers and rods is borrowed from high-pressure valves, which significantly increases their reliability, wear resistance, and withstandability to possible standard violations that may occur during installation (distortions, impacts, etc.). The GMK-R damper is not equipped with terminal boxes as standard.



1 - casing; 2 - blade; 3 - executive mechanism

EXPLOSION-PROOF DESIGN



1 - casing; 2 - blade; 4 - levers and rods; 4 - executive mechanism

GMK | INSULATED AIR DAMPER

- insulated damper designed for stable operation in conditions of low temperatures and high humidity (climatic version YHL (GOST 15150));
- features increased body rigidity, which is designed to protect the damper from distortions in conditions of high fluctuations in average daily temperature;
- a special feature of the GMK damper is the use of a perimeter heating in the form of a flexible self-regulating heating cable located along the outer perimeter of the damper, permanently connected to the 220V AC power network. This prevents ice formation on the damper kinematics;
- they are made only of rectangular cross-section;
- dimensions of the useful cross-section and overall connection dimensions are similar to the range of GMK-P damper sizes.

When specified in the order, it can be made in any other combination of height and width, including sectional design versions. The maximum height (H) of the single-section damper is 2,410 mm, and the width (B) is 2,000 mm.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

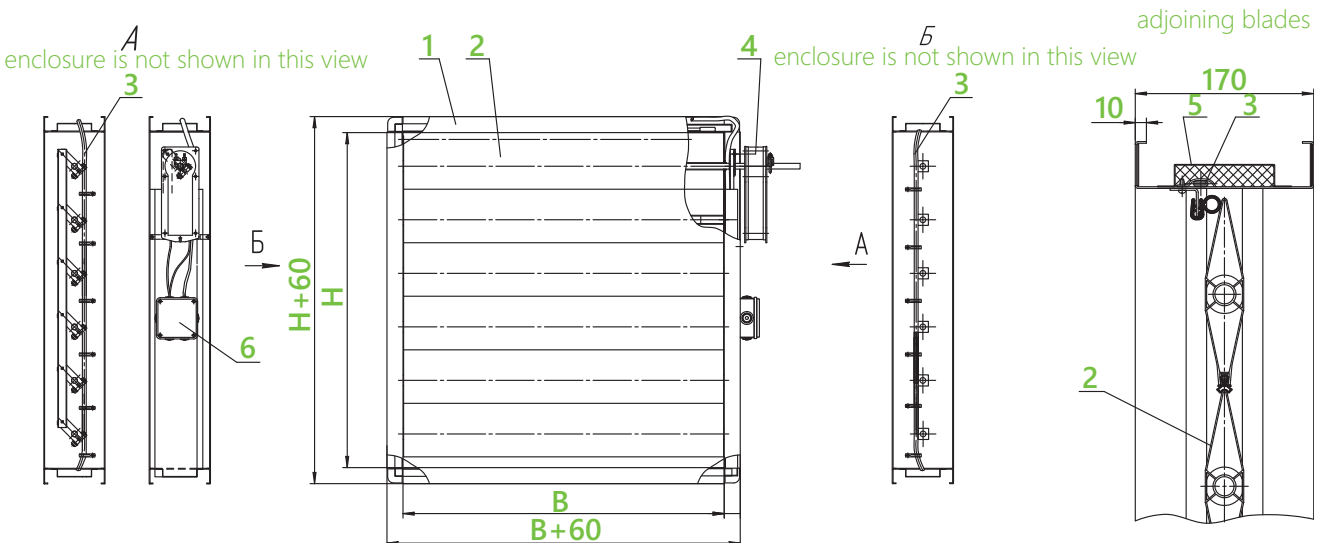
INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 1 800 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	1
BLADE OPENING	parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• YHL • T, placement category • 2 • 3
THERMAL CONDUCTIVITY	up to 52 W/m·K
Power consumption of the perimeter heating element:	
specific power	0.03 kW/m
total power	(2H/1,000 + 2B/1,000)x0.03 kW

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220V or 24V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The GMK damper consists of a four-wall box-shaped body made of galvanized steel, the damper blade is made of reinforced aluminum profile. The kinematics of such a damper is levers and rods, the opening of the damper blades is "parallel".

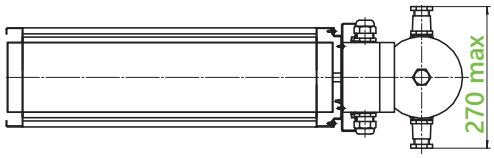
The heating cable located around the perimeter of the damper is self-regulating, that is, it has an across-the-line heating control, which does not require an additional automatic control circuit. On the outside the heating cable is covered with a special insulated casing. On the GMK damper body there is a terminal box for connecting automation and alarm systems (ingress protection rating IP54).

Due to the fact that the damper blade is made of a standard profile, to optimize the flow cross-section of this damper, it is necessary to select the height H = 160; 310; 460; 610; 760; 910; 1,060; 1,210; 1,360; 1,510; 1,660; 1,810; 1,960; 2,110; 2,260; 2,410 mm. Dampers with height dimensions other than these will be manufactured with a flow section close to the unified dimensions H, but with a higher stopper (i.e., with a smaller flow cross-section).

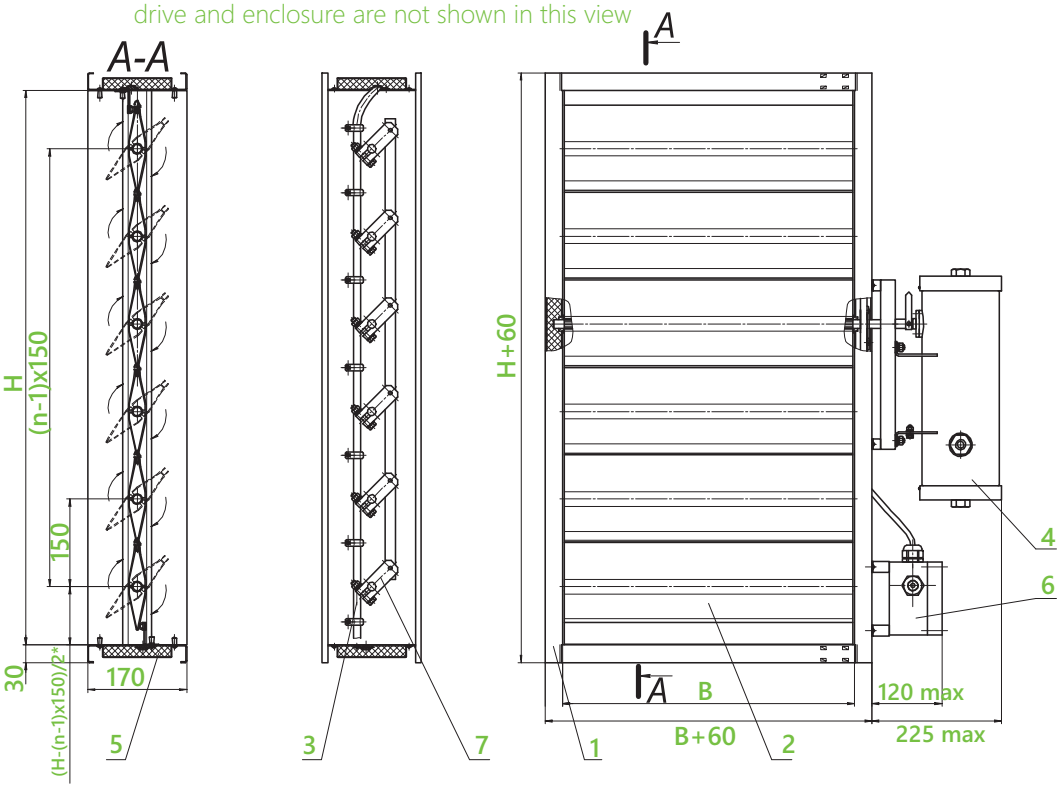


1 - casing; 2 - blade; 3 - self-regulating heating cable; 4 - executive mechanism; 5 - thermal insulation; 6 - terminal block

EXPLOSION-PROOF DESIGN



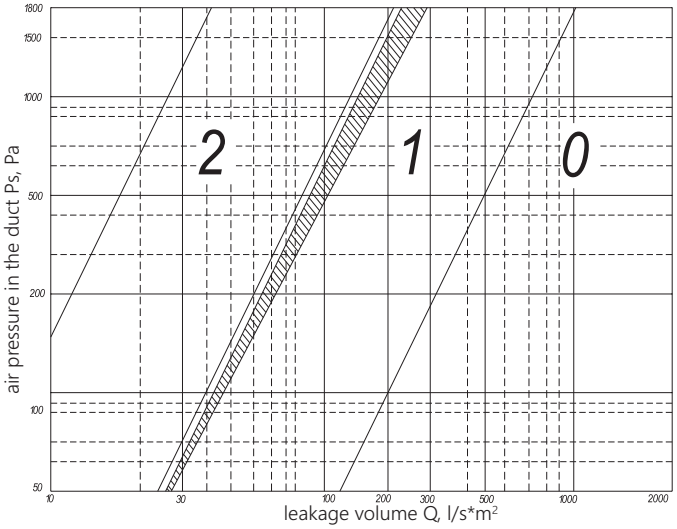
drive and enclosure are not shown in this view



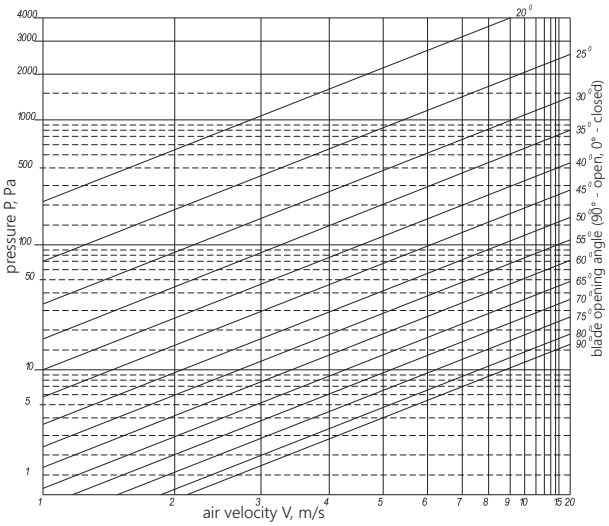
1 - casing; 2 - blade; 3 - self-regulating heating cable; 4 - executive mechanism; 5 - thermal insulation;
6 - terminal block; 7 - levers and rods

LEAKAGE VOLUME CHARACTERISTICS

LEAKAGE VOLUME IN THE CLOSED POSITION



PRESSURE DROP CHART



EXAMPLE:

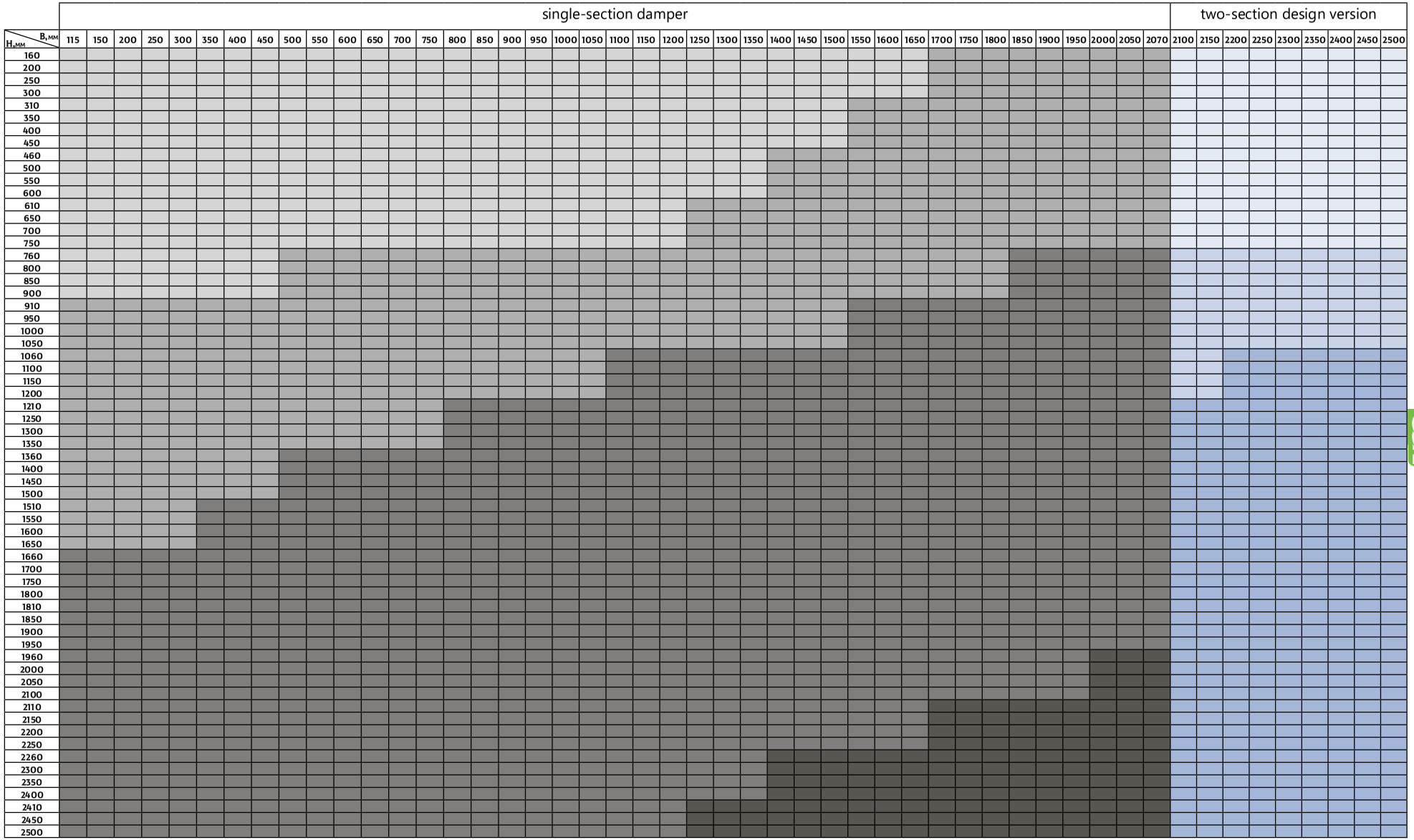
GMK damper, 760 mm high and 1,127 mm wide, general industrial design, with one electric drive "open-closed", supply voltage 220V, with a group of limit switches, indoor, climatic version YHL2

GMK–760x1127–N–M220-S–1–YHL2

- air damper (•GMK-P; •GMK-R; •GMK)
- useful cross-section of the damper: HxB
  (H - height, mm; B - width, mm)
- design (•N •CR •V •VCR)
- drive type (• electric drive - as to model designation
  see the section "Damper actuator encoding"; • manual drive - HD)
- damper location (•1 - indoors • 2 - outdoors (GMK only)
- climatic version (• Y2 (for GMK-P GMK-R); • YHL2 (3); • T2 (3) (for GMK)

NOTE: special requirements for GMK are specified additionally and agreed with the manufacturer.

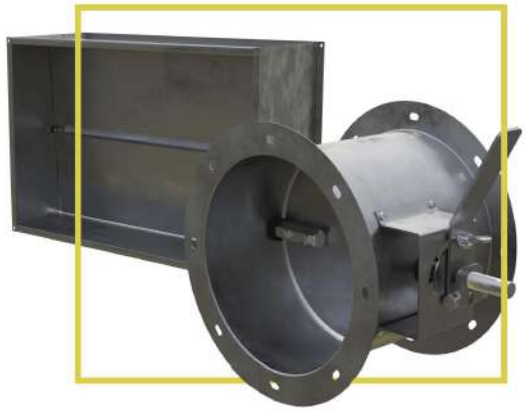
STANDARD SIZE RANGE AND OPENING TORQUE FORCE OF AN AIR DAMPER



– torque 4 Nm
– torque 10 Nm
– torque 20 Nm
– torque 40 Nm
– torque 2x4 Nm (2 drives of 4 Nm each)
– torque 2x10 Nm (2 drives of 10 Nm each)
– torque 2x20 Nm (2 drives of 20 Nm each)

AIR CONTROL EQUIPMENT

DK | SINGLE LEAF DAMPER



- designed to regulate the flow rate of supply, recirculating or exhaust air in ventilation and air conditioning systems;
- air flow in the closed position at maximum pressure difference – no more than 12%;
- manufactured with one blade of rectangular or round cross-section as standard.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V)

INTENDED USE	single leaf damper
OPERATING PRESSURE	up to 1 800 Pa
LEAKAGE LEVEL CLASS	0
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	Y, placement category • 2 • 3

DK–200x300–N–HD–CS

- single leaf damper
- useful cross-section of the damper •D; •HxB (H - height, mm; B - width, mm)
- design (•N •CR •V)
- drive type (• electric drive - as to model designation see the section "Damper actuator encoding"; • manual drive - HD)
- material (•CS - carbon steel with special coating •NS - stainless steel •ZS - low-alloy galvanized steel)

The DK series dampers consist of two main elements: a sheet metal body and a blade that provides flow control

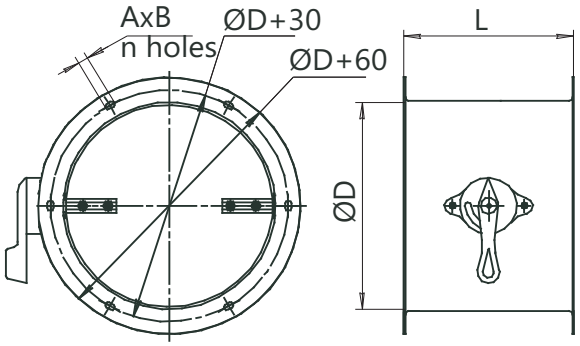
As an actuator, a handle (manual control) with a lock is used. The position of the single leaf damper blade can be smoothly adjusted within 90° of opening the manual drive.

The standard dimensions are shown in the table. Rectangular dampers can be manufactured in 25 mm increments. They range in size from 100x100 mm to 900x1,000 mm. By special order, it is possible to produce dampers of larger sizes and with a different number of blades.

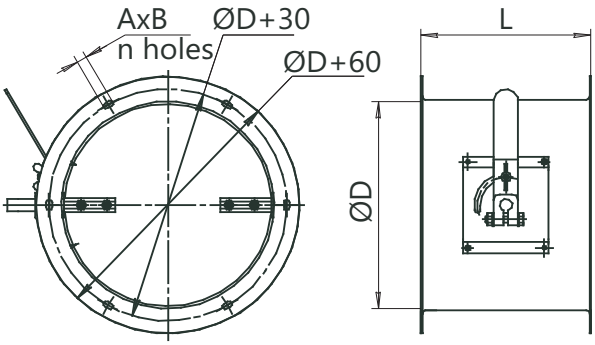
The single leaf damper remains operational despite its installation position.

ROUND CROSS-SECTION

from **DK-100** to **DK-250**



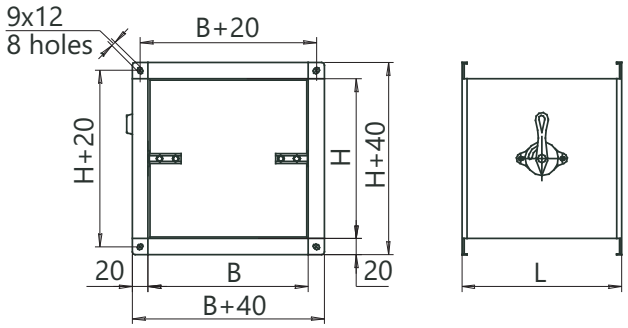
from **DK-315** to **DK-1250**



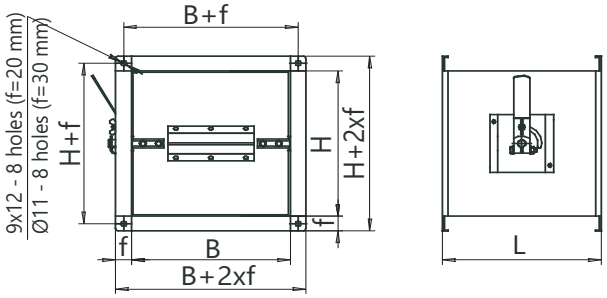
STANDARD SIZE	D, mm	L, mm	AxB, mm	n, pcs	Weight, kg, max
DK-100	100	185	7x12	4	1,2
DK-125	125	185	7x12	4	1,4
DK-140	140	185	7x12	6	1,5
DK-160	160	185	7x12	6	1,7
DK-180	180	185	7x12	6	1,9
DK-200	200	350	7x12	6	2,2
DK-225	225	350	7x12	6	3
DK-250	250	350	7x12	6	3,8
DK-280	280	350	7x12	8	4,1
DK-315	315	350	7x12	8	4,4
DK-355	355	500	7x12	8	4,8
DK-400	400	500	7x12	10	5,7
DK-450	450	500	7x12	10	6,2
DK-500	500	500	7x12	10	7,8
DK-560	560	500	7x12	10	11
DK-630	630	750	10x16	12	13,9
DK-710	710	750	10x16	12	16,4
DK-800	800	750	10x16	12	18,9
DK-900	900	750	10x16	16	20,2
DK-1000	1000	750	10x16	16	21,4
DK-1250	1250	750	10x16	16	25,2

RECTANGULAR CROSS-SECTION

from **DK-100x150** to **DK-300x300**



from **DK-325x325** to **DK-900x1000**



STANDARD SIZE	H, mm	B, mm	L, mm	Weight, kg, max
DK-100x150	100	150	170	1,5
DK-150x300	150	300	170	2,5
DK-150x400	150	400	170	3
DK-200x150	200	150	200	2,2
DK-200x300	200	300	200	3,1
DK-250x150	250	150	250	2,7
DK-250x250	250	250	250	3,5
DK-250x400	250	400	250	4,6
DK-400x500	400	500	400	8,9
DK-250x800	250	800	250	7,6
DK-300x300	300	300	300	4,7
DK-300x400	300	400	300	5,6
DK-300x1000	300	1000	300	10,8
DK-400x400	400	400	400	7,7
DK-400x600	400	600	400	10
DK-600x1000	600	1000	600	23,9

The size of the flange "f" for rectangular single leaf dampers varies depending on the overall dimensions: if H < 500 mm and B < 1,000 mm, the flange size is 20 mm, if H > 500 mm - the flange size is 30 mm

TUL | LEAF DAMPER

- gravity operated leaf-type backdraft damper – leaf damper. It differs from conventional (single-blade) backdraft dampers by its low response time and lower standard minimum flow rate required for its opening. The blades of such dampers open under the action of air flow and automatically return to their original closed position when the air supply is stopped. It is especially important to use such a damper together with axial fans, which, as a rule, have a lower flow rate at the outlet compared to radial fans;
- they are made only of rectangular cross-section in three main design versions:

TUL-1 – for operation on horizontal sections of the air duct (installed vertically);

TUL-2 – for operation on vertical sections of the air duct (installed horizontally) when the air flow moves from the bottom to top (air extract);

TUL-3 – for operation on vertical sections of the air duct (installed horizontally) when the air flow moves from top to bottom (air supply).

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

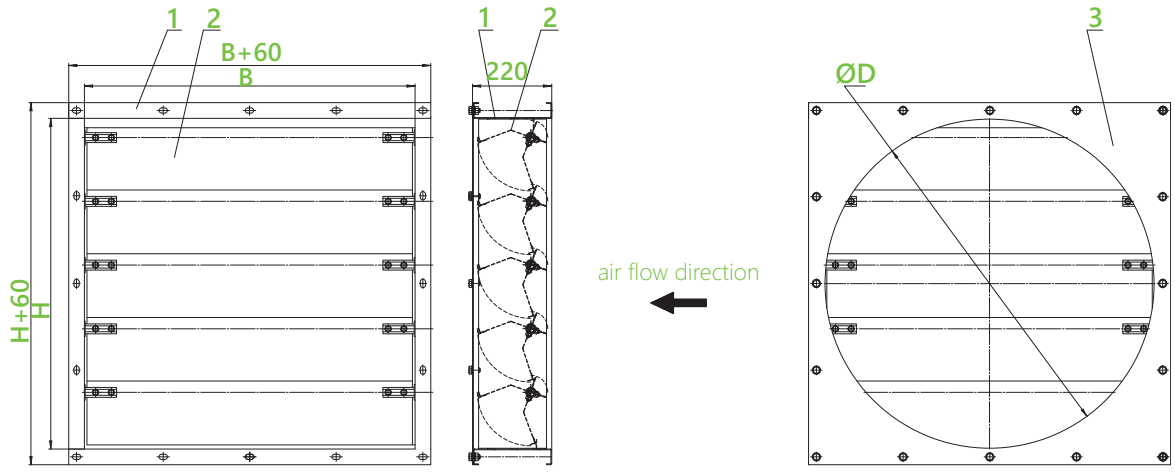
INTENDED USE	backdraft damper (leaf damper)
OPERATING PRESSURE	up to 1,000 Pa
AIR FLOW RATE:	
-**TUL-1** – on horizontal sections	4...15 m/s
-**TUL-2** – on vertical sections (air extract)	6...15 m/s
-**TUL-3** – on vertical sections (air supply)	6...15 m/s
LEAKAGE LEVEL CLASS	1
INSTALLATION POSITION:	
-**TUL-1**	only vertically
-**TUL-2**	only horizontally (air extract)
-**TUL-3**	only horizontally (air supply)
CLIMATIC VERSION	YHL, placement category • 2 • 3

The TUL damper consists of a four-wall box-shaped body and profiled leaves installed in the body on axles and made of galvanized steel. The abutment of the TUL damper blades is lockable.

TUL leaf dampers are manufactured only with a rectangular cross-section (for connection to round sections of air ducts, they can be equipped with an adapter for the corresponding diameter). Maximum possible size of a single-section rectangular damper: height (H) 1,250 mm, width (B) 1,250 mm. The range of connection and overall dimensions of round dampers is presented in the table (see below). If necessary, with additional approval, it is possible to manufacture TUL dampers of other sizes.

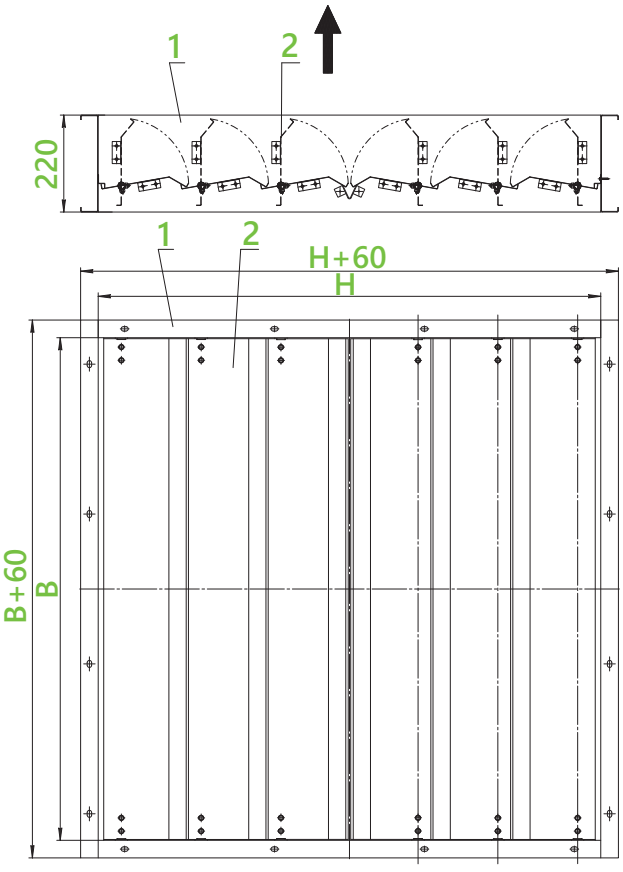
TUL 1

for operation on horizontal sections of the air duct (installed vertically)



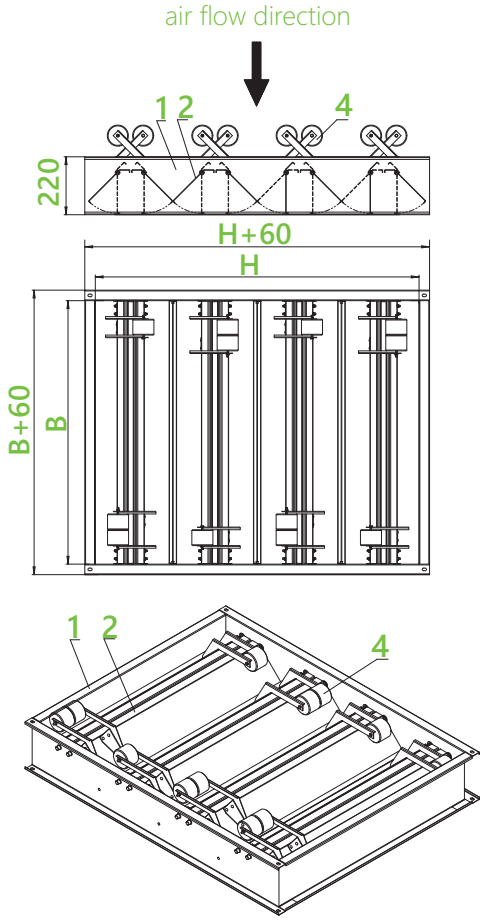
TUL 2

for operation on vertical sections of the air duct (installed horizontally) when the air flow moves from the bottom to top (air extract)



TUL 3

for operation on vertical sections of the air duct (installed horizontally) when the air flow moves from top to bottom (air supply)

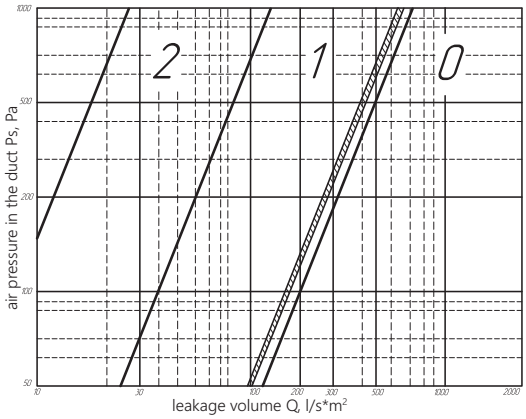


1 - casing; 2 - blade; 3 - adapter; 4 - counterweight

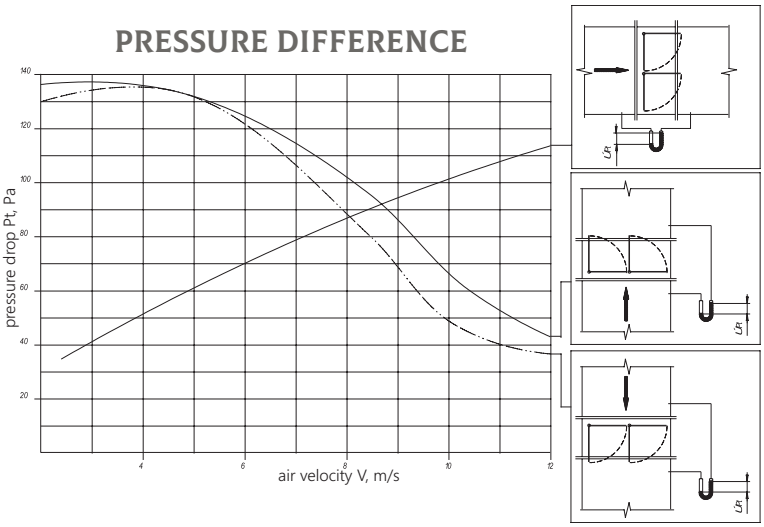
H, mm	B, mm	D, mm	Pressure loss ΔP, Pa		Weight, kg
			On a horizontal section (v=4 m/s)	On a vertical section (v=6 m/s)	
400	400	400	42	40	13,5
500	500	500	43	42	17,5
630	630	630	45	43	24
800	800	800	45	43	33,5
1000	1000	1000	48	46	43,5
1250	1250	1250	48	46	61,5

LEAKAGE VOLUME CHARACTERISTICS

LEAKAGE VOLUME IN THE CLOSED POSITION



PRESSURE DIFFERENCE



EXAMPLE:
TUL-1 damper, 800 mm high and 1,000 mm wide, general industrial design, without adapter

TUL-1–800x1000–N–0

- leaf damper (•TUL-1; •TUL-2; •TUL-3)
- useful cross-section of the damper: HxB (H - height, mm; B - width, mm)
- design (•N •CR •V •VCR)
- adapter for round cross-section (• nxD - number x diameter; • 0 - not included)

NOTE: the special requirements for TUL-1 (2) (3) are specified additionally and agreed with the manufacturer.

UNIVERSAL BACKDRAFT DAMPER KLR

- standard universal backdraft damper is designed to automatically close the air duct cross-section in order to prevent free air flow in ventilation systems when the fan is not operating; The KLR dampers are gravity dampers: the blades of such dampers open under the action of air flow (the air velocity in cross-section on horizontal sections should be at least 6 m/s, on vertical sections - at least 4 m/s) and automatically return to their original closed position when the air supply is stopped;
- they are made of both rectangular and round cross-sections;
- maximum possible size of a single-section rectangular damper: height (H) 1,250 mm, width (B) 1,250 mm. The range of connection and overall dimensions is limited to the standard dimensions shown in the tables below, but can be expanded if necessary as part of special requirements. KLR-KROS dampers are manufactured only in standard round cross-section.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR)

INTENDED USE	backdraft damper (leaf damper)
OPERATING PRESSURE	up to 800 Pa
AIR FLOW RATE:	
- on vertical sections	4...12 m/s
- on horizontal sections	6...12 m/s
LEAKAGE LEVEL CLASS	0 (not required)
INSTALLATION POSITION:	
- KLR	unspecified
- KLR-KROS	horizontally
CLIMATIC VERSION	YHL, placement category • 2 • 3
THERMAL CONDUCTIVITY	not required

KLR backdraft dampers consist of:

rectangular dampers - made of a four-wall box-shaped body and simple sheet leaves made of galvanized steel;

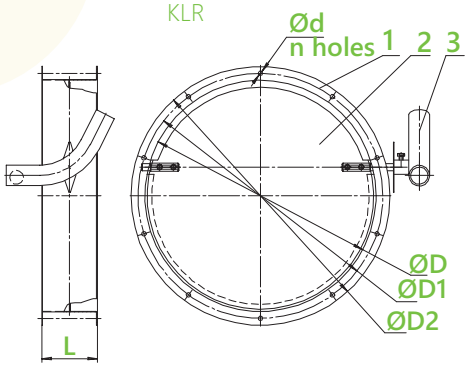
round dampers - made of a solid-rolled round body and a simple sheet leaf, also made of galvanized steel.

The main feature of the KLR dampers is a reinforced body that can withstand short-term mechanical stress and is additionally protected from possible distortions during installation. On the side surface there is a counterweight that can be adjusted to allow the damper to be adjusted during installation depending on the installation plane, which allows such dampers to remain operational regardless of installation position.

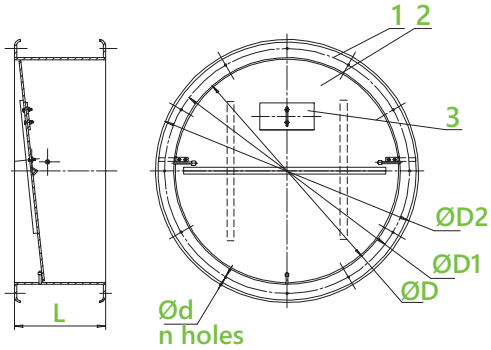
The KLR-KROS damper features design differences from the standard versions of the KLR damper. Thus, the design of the KLR-KROS backdraft damper provides for the absence of moving parts on the outside of the damper, which allows this damper to be installed in a ventilation shaft. That is, the external dimension of the KLR-KROS is significantly smaller than that of the KLR dampers and has a counterweight installed outside (for the KLR-KROS, the counterweight is installed directly on the leaf inside the damper). This circumstance imposes restrictions on the requirements for installation position: the KLR-KROS damper, unlike KLR dampers, can only be used on vertical sections of ventilation shafts and air ducts. When the blade is horizontally positioned in the closed state.

ROUND CROSS-SECTION

KLR



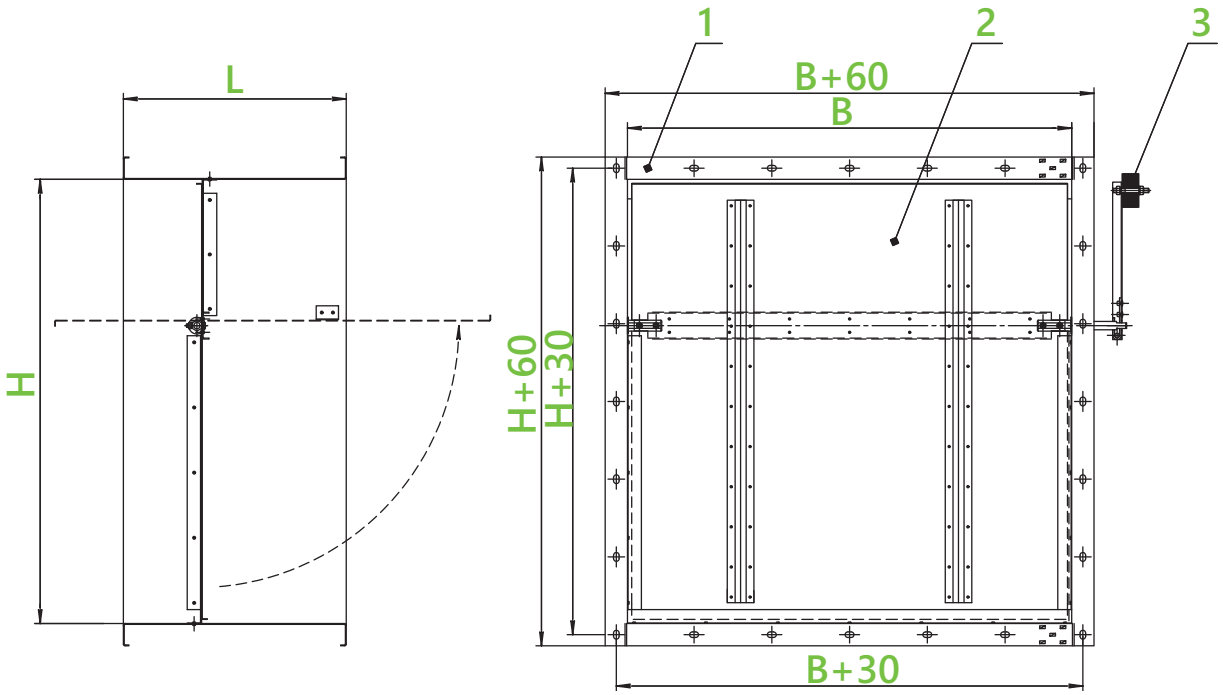
KLR-KROS



1 - casing; 2 - blade; 3 - counterweight

D, mm	D1, mm	D2, mm	L, mm	d, mm	n	Weight, kg	KLR	KLR-KROS
250	280	310	120	8	6	3,3	■	–
315	345	375	120	8	8	5,2	■	–
355	385	415	120	8	8	5,7	■	–
355	385	415	280	7	6	6	–	■
400	430	460	120	8	10	6,7	■	–
400	430	460	280	7	6	6,9	–	■
450	480	510	120	8	10	7,8	■	–
450	480	510	330	7	6	8	–	■
500	530	560	120	10	10	8,2	■	–
500	530	560	330	7	8	9	–	■
560	590	620	120	10	10	9,9	■	–
560	590	620	380	7	8	11	–	■
630	660	690	120	10	12	11,2	■	–
630	660	690	450	7	8	11,6	–	■
800	830	860	120	10	12	17,6	■	–
800	830	860	500	10	12	19,8	–	■
1000	1040	1080	120	12	16	29,6	■	–
1000	1040	1080	550	10	16	34	–	■
1250	1295	1335	120	12	18	47	■	–
1250	1295	1335	575	12	18	51	–	■

RECTANGULAR CROSS-SECTION



1 - casing; 2 - blade; 3 - counterweight

H, mm	B, mm	L, mm	Weight, kg
150	150	120	3,8
200	200	120	4,6
250	250	120	5,5
400	400	120	7,6
500	500	120	9,2
800	800	120	16
1000	1000	120	22

EXAMPLE:
KLR damper, 700 mm high and 500 mm wide, general industrial version

KLR–700x500–N

- universal backdraft damper (•KLR •KLR-KROS)
- useful cross-section of the : •HxB; •D
  (H - height, mm; B - width, mm; D - diameter, mm)
- design version (•N •CR)

NOTE: special requirements for KLR, KLR-KROS are specified additionally and agreed with the manufacturer.

KOL | UNIVERSAL BACKDRAFT DAMPER

- gravity operated leaf-type backdraft damper. The KOL damper is designed to prevent the flow of air and non-explosive air mixtures, the aggressiveness of which in relation to aluminum and aluminum alloys is not higher than the aggressiveness of air with a temperature of up to 60° C, not containing sticky substances and fibrous materials, with a content of dust and other solid impurities in an amount of not more than 100 mg/m3, through branches to switched off fans (from switched off fans) when the latter are connected to collectors;
- they are made only of rectangular cross-section;
- height of this damper varies from 100 mm to 1,940 mm in 80 mm increments. The width of this damper varies from 150 mm to 3,000 mm. The damper can be manufactured in any other combination of height and width, including sectional design versions. The maximum height of the damper in a single-section version is 1,940 mm, width - 3,000 mm.

DESIGN

- general purpose industrial (N)

INTENDED USE	backdraft damper (leaf damper)
OPERATING PRESSURE	up to 1500 Pa
AIR FLOW RATE:	
- on vertical sections	not less than 3 m/s
- on horizontal sections	not less than 4 m/s
LEAKAGE LEVEL CLASS	0 (not required)
BLADE OPENING DESIGN OPTION	only vertically or horizontally (air extract)
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	Y, placement category • 2 • 3
THERMAL CONDUCTIVITY	not required

The design of the KOL leaf-type backdraft damper provides for a rectangular body made of aluminum profile, in the sliding bearings of which blades are fixed on the axes, which are also made of aluminum profile. The presence of bearings ensures easy opening of the damper in conditions of negative outdoor temperatures during periodic operation of fans. Under the influence of the air flow when the fan is on, the blades are kept in the open position.

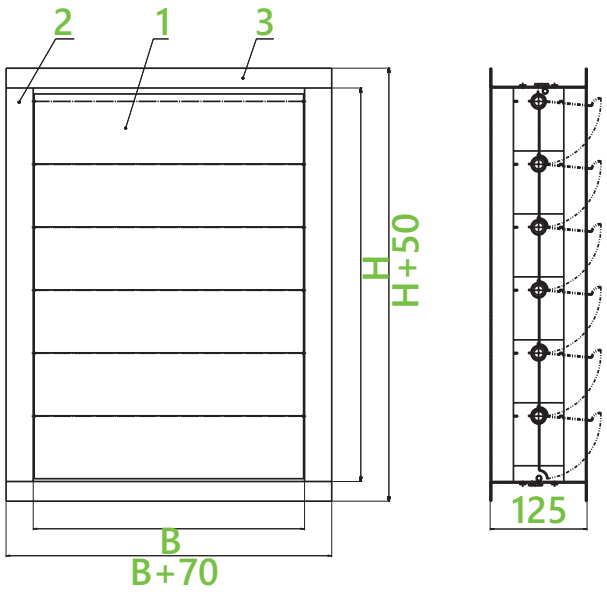
The KOL damper is also used to prevent outside air and precipitation from entering the room after the fans are turned off. The velocity of air flowing through the damper cross-section should not exceed 12 m/sec. After the fan is turned off, the blades automatically return to their original position and close the damper cross-section.

The KOL leaf-type backdraft damper can be used both as inertia-type louvered grilles and instead of KL or TUL type leaf dampers.

EXAMPLE:
KOL rectangular backdraft damper, 500 mm high and 600 mm wide, general industrial design.

KOL–500x600–N

- universal backdraft damper (•KOL)
- useful cross-section of the damper: •HxB (H - height, mm; B - width, mm)
- design (•N)



1 - blade; 2 - vertical wall; 3 - horizontal wall

KOL-K GRAVITY-OPERATED BACKDRAFT DAMPER (ROUND)

- призначений для автоматичного перекриття перерізу повітроводу з метою виключення вільного перетікання повітря у вентиляційних системах при непрацюючому вентиляторі. Лопатки таких клапанів відкриваються під дією потоку повітря та автоматично повертаються у вихідне закрите положення у разі припинення подачі повітря;
- виготовляються тільки круглого перерізу.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR)

INTENDED USE ..... backdraft damper (leaf damper)
DAMPER TYPE ..... duct-type
USEFUL CROSS-SECTION ..... round
OPERATING PRESSURE ..... up to 1,800 Pa
MINIMUM FLOW RATE
- on vertical sections ..... 8...15 m/s
- on horizontal sections ..... 4...15 m/s
LEAKAGE LEVEL CLASS ..... 0, not required
BLADE OPENING DESIGN OPTION ..... only vertically or horizontally (air extract)
INSTALLATION POSITION ..... vertical*, horizontal position only for air extract**
TYPE OF CLIMATIC VERSION ..... YHL, placement category • 2***
THERMAL CONDUCTIVITY ..... not required

* for installation on horizontal sections of air ducts;
** for installation on vertical sections of air ducts;
*** by special order, dampers of other climatic versions can be manufactured.

The KOL-K damper consists of a round body, inside which a rigid stand with two semicircular blades rotating around it is installed at an angle. When using the damper horizontally for air extract, the rigid stand must be installed vertically.

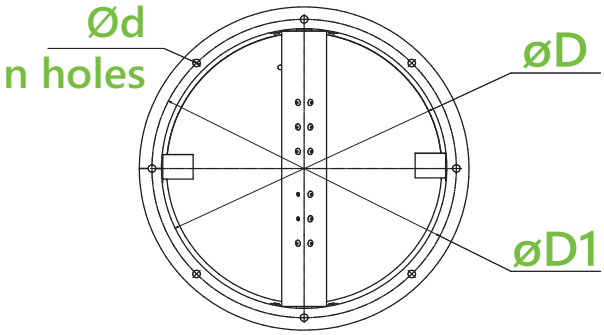
Such a damper does not contain parts and assemblies located outside the casing, including no blade reach beyond its size, which greatly simplifies and expands the conditions for installing the damper.

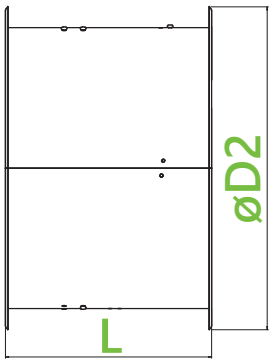
These are channel-type dampers and made of galvanized (version "N") or stainless (version "CR") steel.

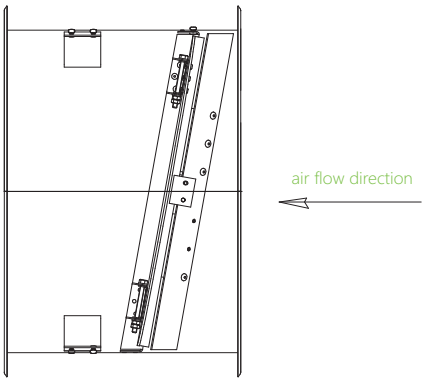
D, mm	400	450	500	560	630	710	800	900	1000
Flow cross-sectional area, m^2	0,082	0,108	0,137	0,177	0,229	0,296	0,382	0,49	0,612

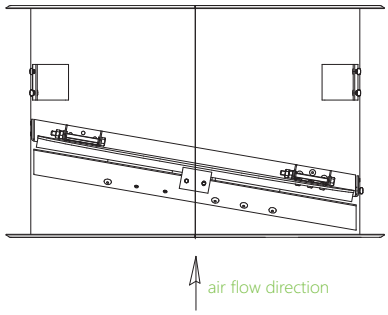
KOL-K–500–N

- universal backdraft damper
- round-type
- useful cross-section of the damper: •D
- design (•N; •CR)



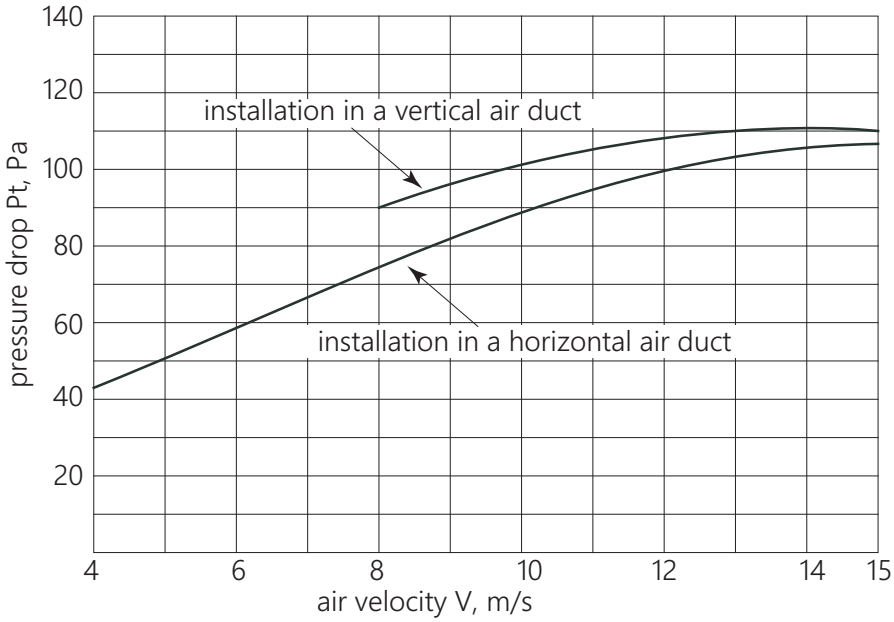






D, mm	400	450	500	560	630	710	800	900	1000
D1, мmm	430	480	530	620	690	770	860	960	1070
D2, mm	450	500	550	660	730	810	900	1010	1110
L, mm	300	325	350	380	415	455	500	550	600
d, pcs	12	12	12	12	12	12	12	14	14
n, pcs	8	8	12	12	12	16	16	16	16
Weight, kg	10,6	12,5	14,5	17,1	20,5	24,7	29,9	36,3	43,1

AERODYNAMIC CHARACTERISTICS



SPECIAL PURPOSE AIR CONTROL EQUIPMENT

GMK-T THERMALLY INSULATED DAMPER

- insulated damper is designed to operate at low temperatures (down to minus 70°C) for thermal insulation of serviced areas. This damper is designed to expand the application scope of a damper with perimeter heating at low temperatures;
- it is made only of rectangular cross-section;
- dimensions of the useful cross-section and overall connection dimensions are similar to a number of other dampers of the GMK series, with the difference that the depth of its body is 170 mm. When specified in the order, it can be made in any other combination of height and width, including sectional design versions. The maximum height (H) of the single-section damper is 2,440 mm, and the width (B) is 2,000 mm.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

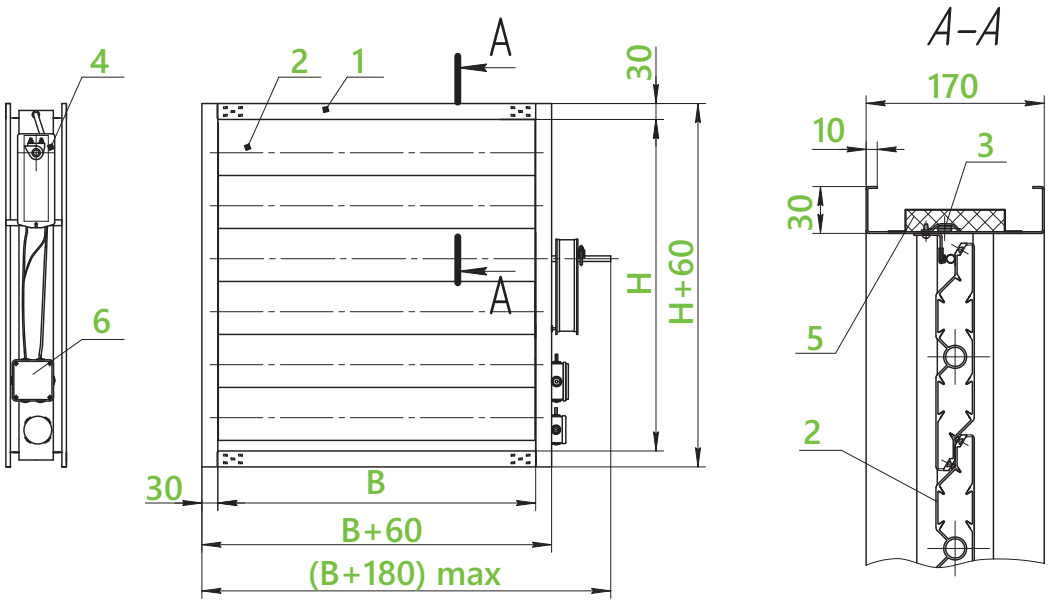
INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 1 800 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	1
BLADE OPENING	parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• YHL placement category • 2
THERMAL CONDUCTIVITY	up to 2.58 W/m·K
Power consumption of the perimeter heating element:	
specific power	0.03 kW/m
total power	(2H/1,000 + 2B/1,000)x0.03 kW

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220 V or 24 V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The GMK-T damper consists of a four-wall box-shaped body made of galvanized steel, the damper blade is made of reinforced aluminum profile with thermally disconnecting plastic inserts that make it impossible to transfer heat through the blade material. This is what makes it possible not only to maintain operability at low temperatures, like GMK, but also to use the GMK-T damper for thermal insulation of serviced areas. The kinematics of such a damper is levers and rods, the opening of the damper blades is "parallel". The heating cable is located around the perimeter of the damper on the outside of its body and is protected from convective contact with the environment by an insulated casing that does not extend beyond the outer dimensions of the damper flanges.

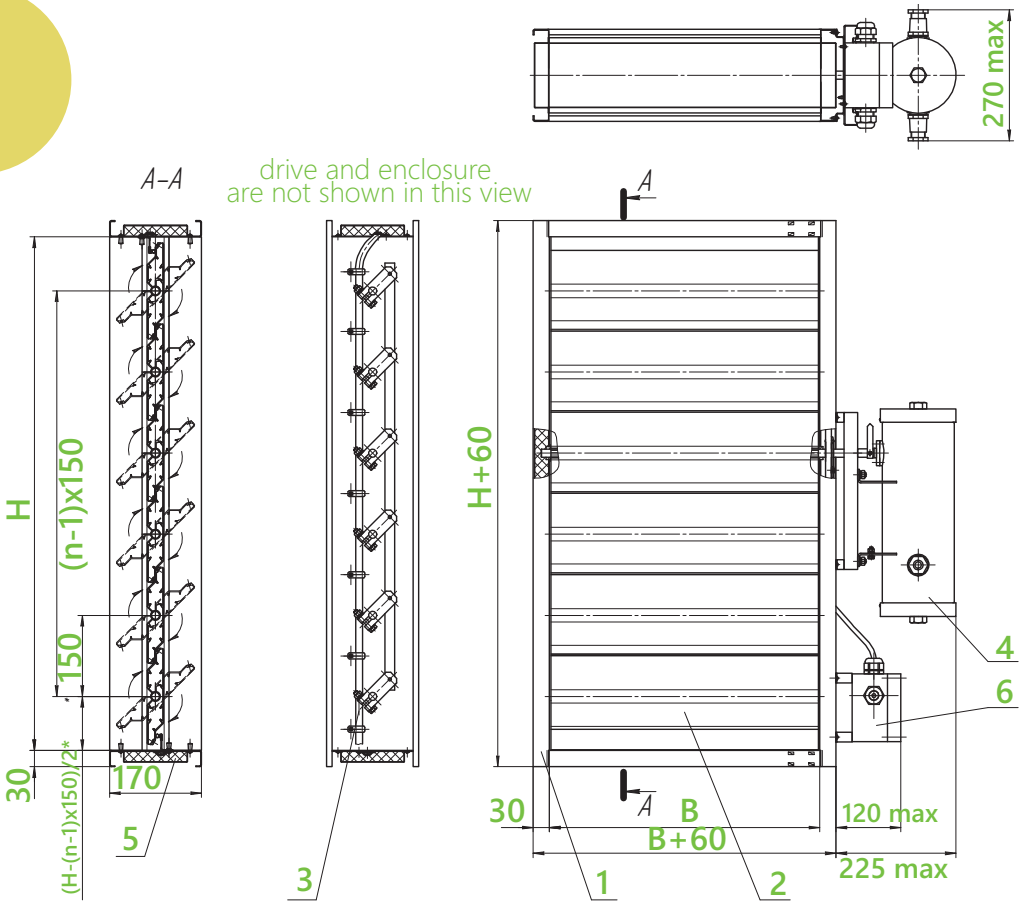
The heating cable used as part of the damper is self-regulating, i.e. it has an across-the-line heating control, which does not require an additional automatic control circuit. If it is necessary to place such a damper externally, the electric drive is placed in a special thermally insulated housing that protects the drive from precipitation and temperature influence. The need to supply the damper in this version is discussed individually when ordering. On the GMK-T damper body there is a terminal box for connecting automation and alarm systems (ingress protection rating IP54).

The complete set of actuators for this damper and the characteristics of pressure drop and leakage correspond to the GMK-P and GMK dampers.



1 - casing; 2 - blade; 3 - self-regulating heating cable; 4 - executive mechanism;
5 - thermal insulation; 6 - terminal block

EXPLOSION-PROOF DESIGN



1 - casing; 2 - blade; 3 - self-regulating heating cable; 4 - executive mechanism;
5 - thermal insulation; 6 - terminal block

GMK×2 THERMALLY INSULATED TANDEM LOUVRE DAMPER

- designed for passive thermal insulation of the serviced area under conditions of relatively high pressure differences;
- it is made only of rectangular cross-section;
- dimensions of the useful cross-section are not multiples and can have any value in the range: height from 460 mm to 2,000 mm, width from 460 mm to 2,000 mm. If it is necessary to use a damper with dimensions of more than 2,000 x 2,000 mm, it can be manufactured in a sectional design version. The cassette design involves combining two or more dampers into a common structure using two mounting frames made of a solid bent profile, each 60 mm deep.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

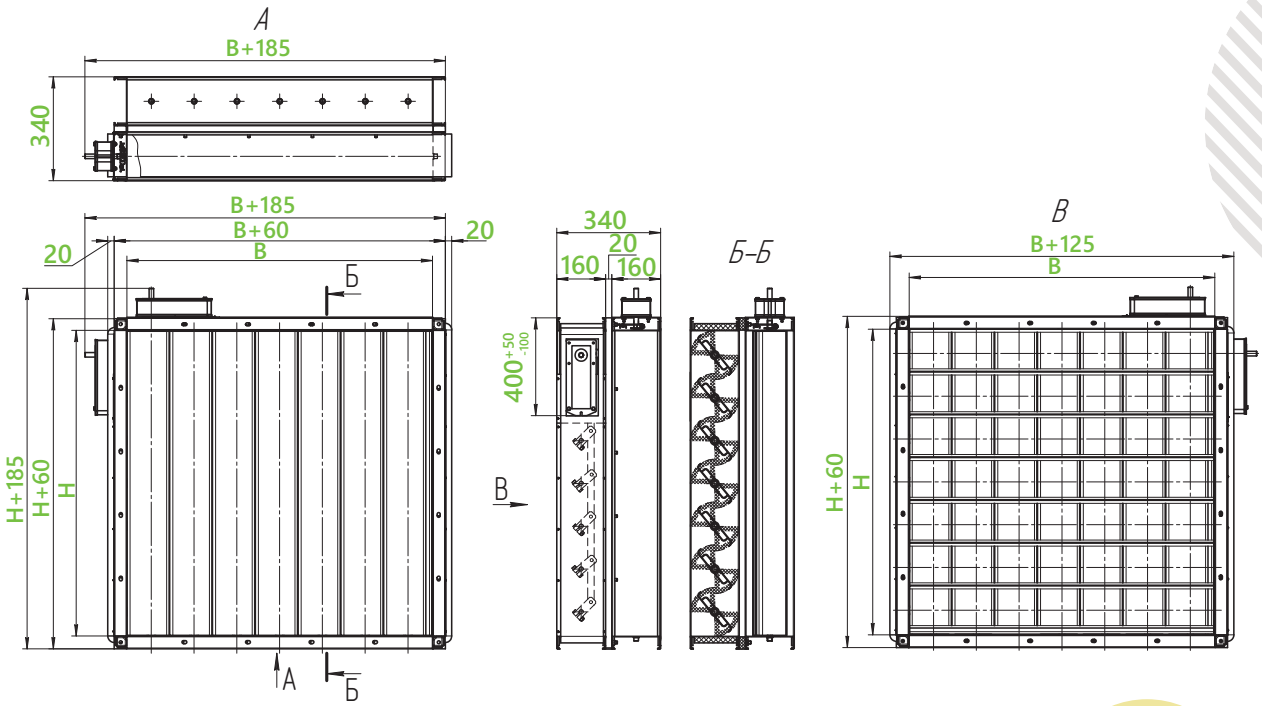
INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 2 000 Pa
EXECUTIVE MECHANISM*	• electric drive
LEAKAGE LEVEL CLASS	2
BLADE OPENING	parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• Y, placement category • 2
THERMAL CONDUCTIVITY	up to 1.43 W/m·K

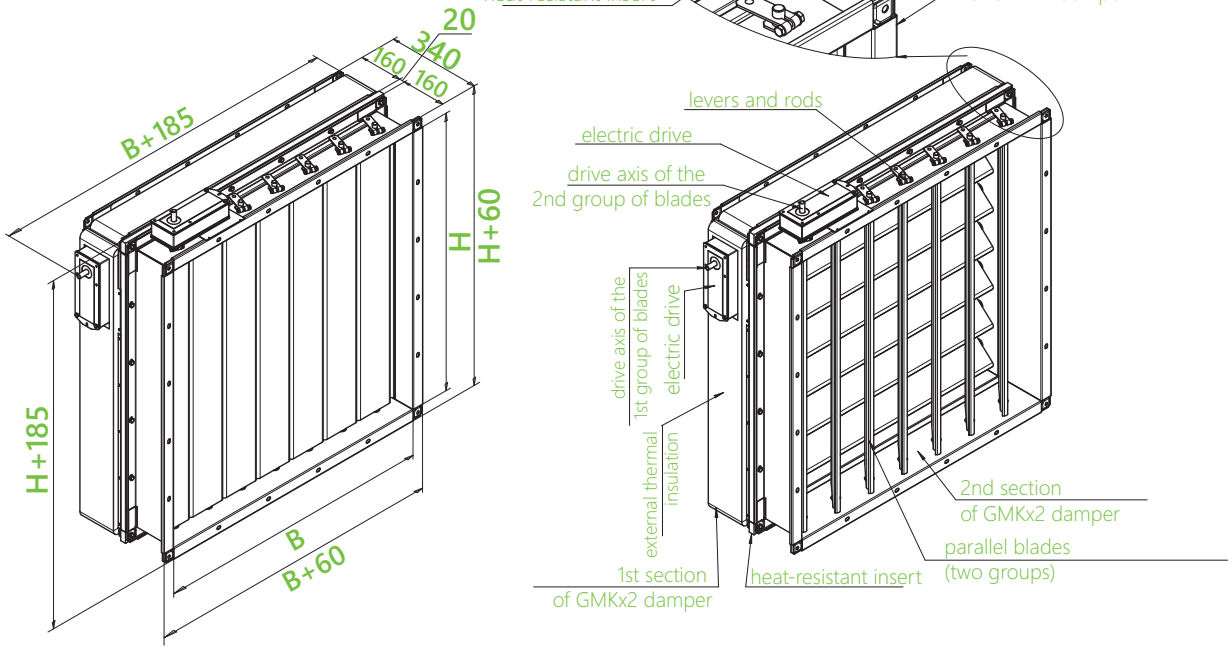
*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220 V or 24 V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

Thermally insulated tandem louvre damper with two perpendicular groups of blades, designed to operate at low temperatures (down to -60°C) of the YHL2 category (GOST 15150). Also, the GMKx2 damper features a tougher class of leakage in the closed position, which characterizes it as a damper of higher airtightness than conventional dampers of the GMK series. The GMKx2 damper has a double, highly rigid body designed to protect the damper from distortion during large fluctuations in average daily temperature.

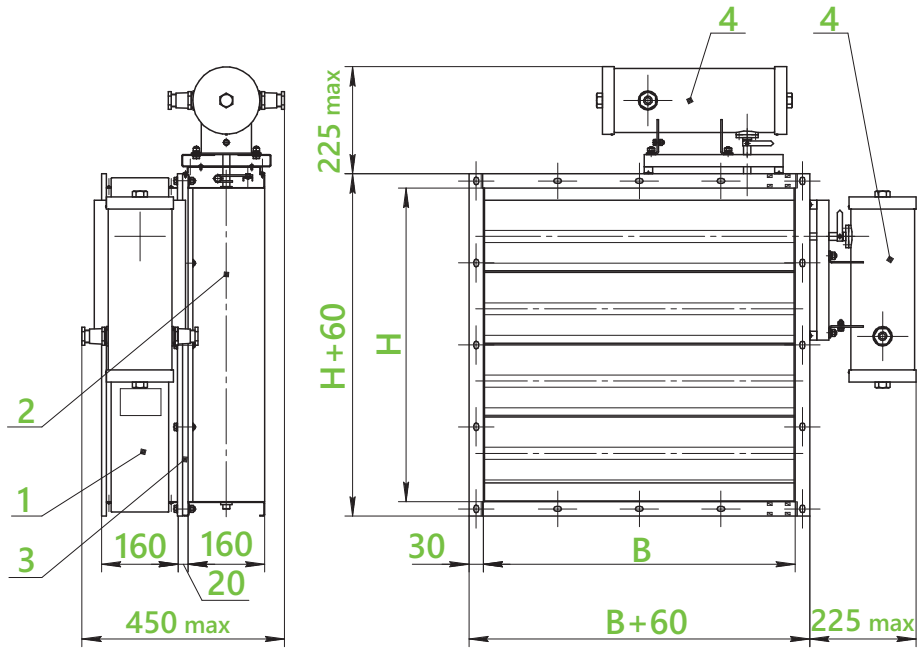
A special feature of the GMKx2 damper is the absence of any electric heating elements in the damper design. GMKx2 is a section of air insulation between two groups of damper blades. That is, the automatic control system of this damper should only provide for control of the damper drive; there should be no other elements for controlling electric heating or temperature control in the automation system. In addition, the presence of a double row of blades significantly increases the reliability of this damper at higher operating pressures, while significantly improving the tightness by reducing the level of leakage when closed.

The GMK/2 damper consists of two perpendicular-oriented blade sections of GMK-P dampers (without electric heating elements!) with the separation of their housings by a special thermally insulating insert with a bolted connection. Each of the two damper sections has a four-wall box-shaped body made of galvanized steel, the damper blade is made of aluminum profile. Due to the dual design of the body, its depth increases to 340 mm. The presence of a separating heat-resistant insert makes it impossible for cold to be transferred through the housing material. The outer perimeter of the first section of the damper (the first blade group) is covered with a protective layer of heat-insulating material, which eliminates convective transfer of cold by the damper to the serviced room. Each blade section is driven by its own electric drive - there is no direct mechanical connection between the sections. Kinematics of each blade section - levers and rods, opening of the damper blades - "parallel" for the most efficient operation in the mode of its main function - the shut-off damper.


A
B+185
340
B+185
B+60
B
20
20
Б
H+185
H+60
H
A
Б
340
20
160
160
Б-Б
400+50-100
B
B
B+125
B
H+60
H


30
external thermal insulation
(shown conditionally)
10
160
20
160
1st section
of GMKx2 damper
heat-resistant insert
2nd section
of GMKx2 damper
20
340
160
160
B+185
H+60
H
H+185
B
B+60
levers and rods
electric drive
drive axis of the
2nd group of blades
drive axis of the
1st group of blades
electric drive
external thermal
insulation
2nd section
of GMKx2 damper
parallel blades
(two groups)
1st section
of GMKx2 damper
heat-resistant insert

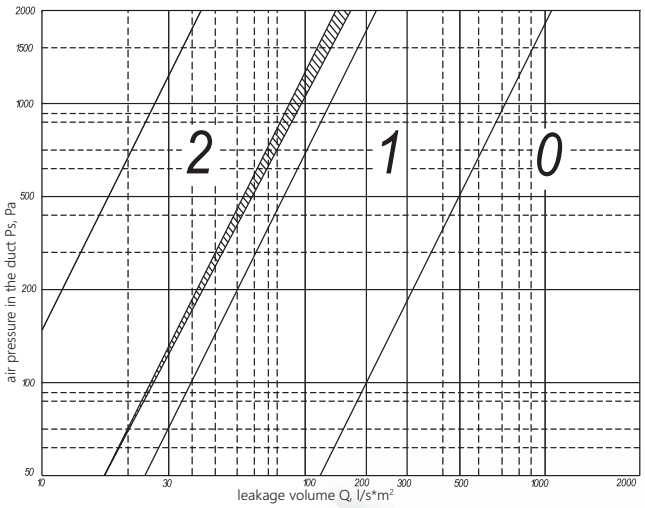
EXPLOSION-PROOF DESIGN



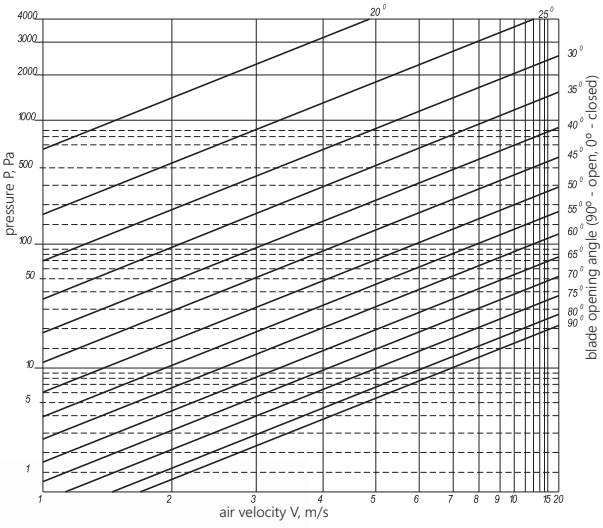
1 - insulated damper; 2 - non-insulated damper; 3 - heat-resistant insert; 4 - executive mechanism

LEAKAGE VOLUME CHARACTERISTICS

LEAKAGE VOLUME IN THE CLOSED POSITION

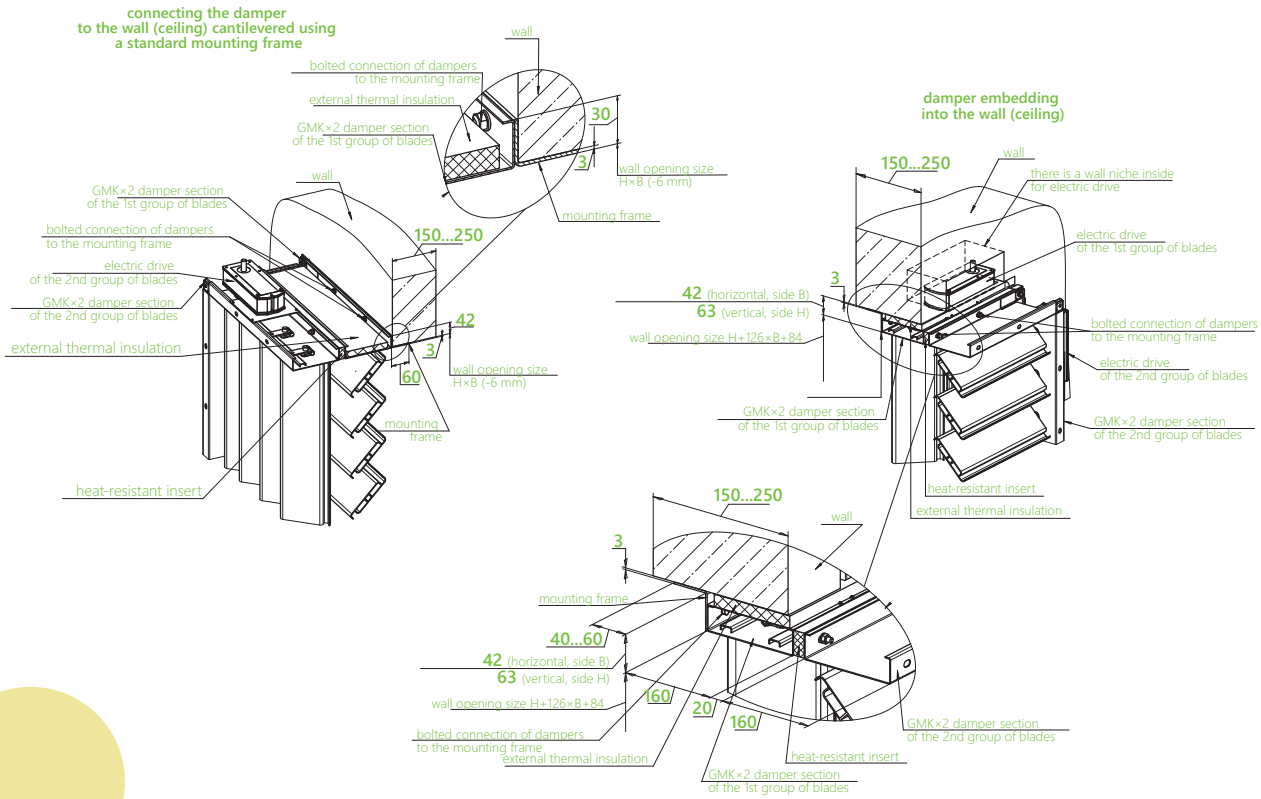


PRESSURE DROP CHART



INSTALLATION

The installation of the GMKx2 damper must be carried out taking into account its intended purpose, i.e. it is strictly not recommended to install such a damper on the outside of the serviced room. Accordingly, its installation should provide for the possibility of cantilever mounting to a wall or ceiling (using a standard mounting frame or directly to the flanges available on the damper body) or embedding directly into the wall or ceiling. The damper embedding into the wall should provide for the presence of a special niche for placing the electric drive, with the possibility of its further maintenance. During the installation of GMKx2 dampers, the tight fit of the outer flange of the damper to the surface of the mounting frame or directly to the floor slab panel is very important.



EXAMPLE:

GMK-T damper, 740 mm high and 1,127 mm wide, general industrial design, with one electric drive "open-closed", supply voltage 220V, with a group of limit switches, indoor, climatic version YHL2

GMK-T–740x1127–N–M220-S–1–YHL2

- air damper (•GMK-T; •GMKx2)
- useful cross-section of the damper: HxB (H - height, mm; B - width, mm)
- design (•N •CR1 •V •VCR)
- drive type (• electric drive - as to model designation see the section "Damper actuator encoding"; • manual drive - HD)
- damper location (•1 - indoors • 2 - outdoors (GMK-T only)
- climatic version (• Y2 (for GMKx2); • YHL2 (for GMK-T)

NOTE: special requirements for GMK are specified additionally and agreed with the manufacturer.

KED AIR-TIGHT DAMPER

- airtight damper designed to regulate supply, recirculating or exhaust air in high-pressure ventilation systems, as well as to seal the internal volume of ventilation networks, the operating pressure of which can reach 2,500 Pa;
- dampers of rectangular cross-sections are produced only;
- range of connection and overall dimensions is presented in the table below. The KED damper can also be made in a sectional design version, which becomes necessary if the useful cross-section area exceeds 1.8 m2 (the dimensions of the sectional design version must be agreed individually, depending on the order). If additionally specified in the order, the KED damper can be manufactured in other combinations of width and height. The maximum height (H) of the single-section damper is 2,490 mm, and the width (B) is 2,000 mm.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

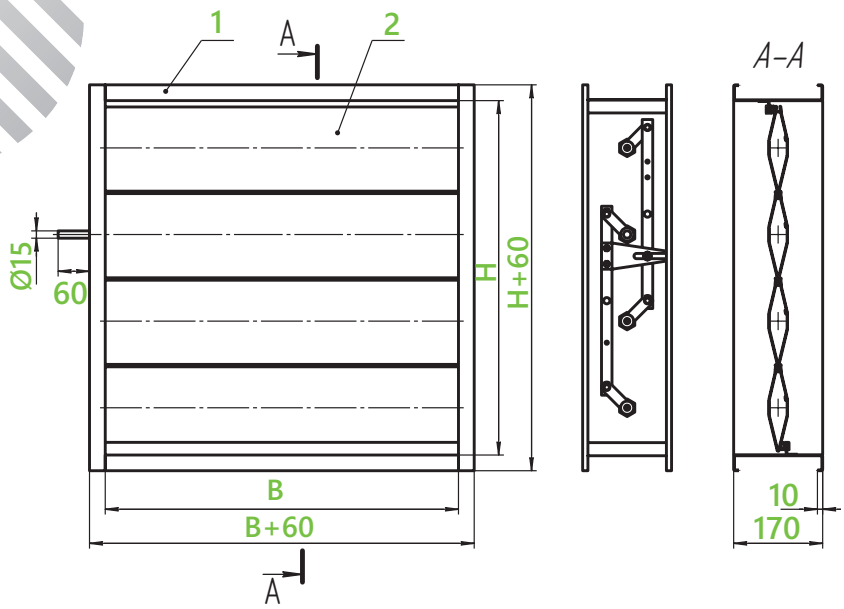
INTENDED USE	• shut-off • regulating
OPERATING PRESSURE	up to 2 500 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	2 (4 upon special request)
BLADE OPENING	• parallel • symmetrical
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• YHL • T, placement category • 2 • 3
THERMAL CONDUCTIVITY	not required

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220 V or 24 V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The KED damper consists of a four-wall box-shaped body reinforced with additional stiffening elements, made of stainless or low-alloy steel. The leaf of such a damper is made of a special steel profile. In all design versions of the damper, its leaves do not protrude beyond the body dimensions. An electric drive or a handle for manual control can be used as an actuator (manual control of the electric drive is always available by default). Kinematics of such a damper - levers and rods on a rigid hitch, opening of the damper blades - "parallel" or "symmetrical" - depending on the requirements of the order and purpose. Bearing units prevent the leaf axes from skewing under the influence of pressure, allowing for unimpeded flow adjustment under maximum pressure conditions. The KED damper is not equipped with terminal boxes as standard. With any configuration option, the KED damper remains operational regardless of its installation position.

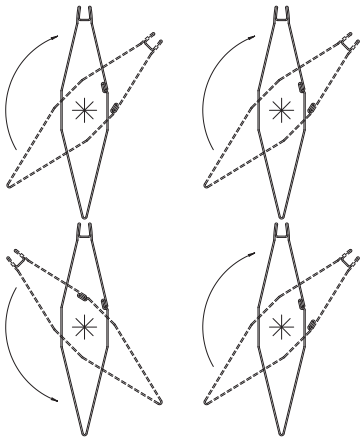
Due to the fact that the damper leaf is made of a steel profile obtained by rolling, to optimize the flow cross-section of this damper, it is necessary to select the height H = 180; 345; 510; 675; 840; 1,005; 1,170; 1,335; 1,500; 1,665; 1,830; 1,995; 2,160; 2,325; 2,490 mm. Dampers with height dimensions other than these will be manufactured with a flow section close to the unified dimensions H, but with a higher stopper (i.e., with a smaller flow cross-section). The damper design includes components that allow reducing the number of leaks and increasing the tightness class, according to EN 1751: 1998.

Among other things, one of the intended purposes of this type of damper is to use it as a shut-off damper in medium-pressure systems in which several fans operate out of sync. In this case, the KED damper is installed directly on the exhaust and (or) suction side of the fan and is used to prevent reverse spinning of the idle fan impeller, which is unacceptable if it can be started in automatic mode.



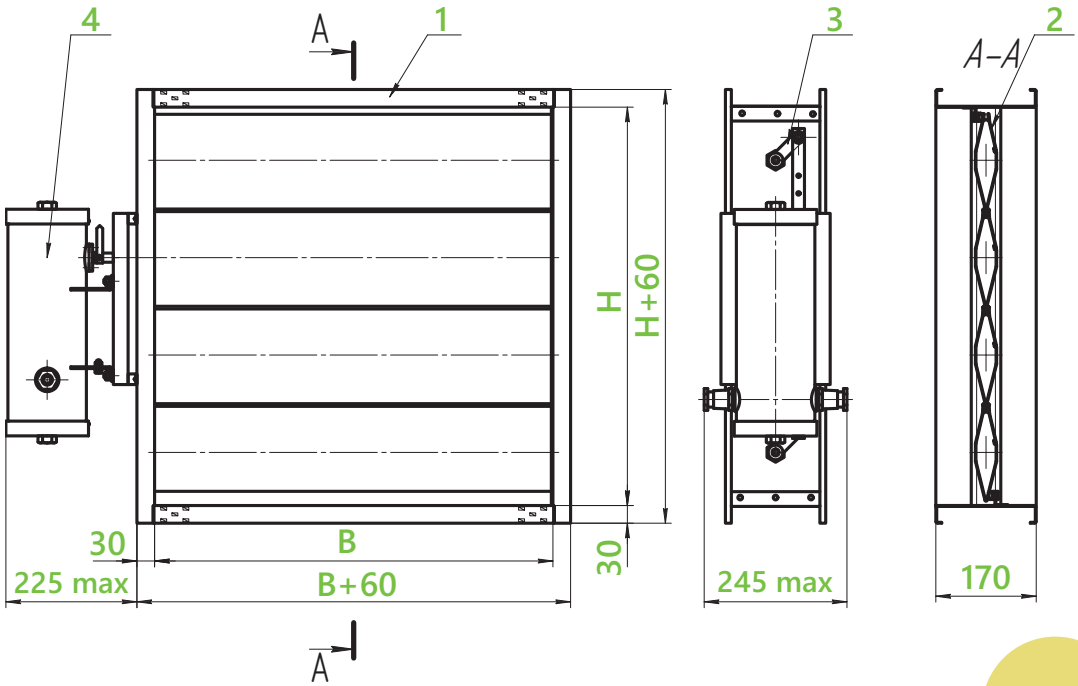
BLADE OPENING DESIGN OPTIONS

SYMMETRICAL PARALLEL



1 - casing; 2 - blade

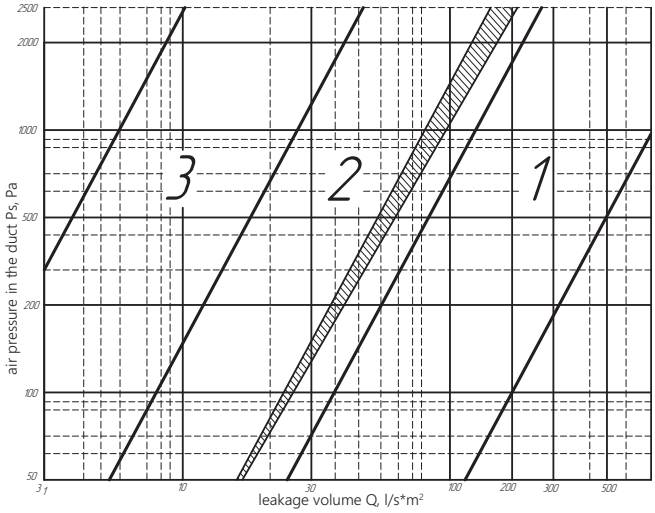
EXPLOSION-PROOF DESIGN



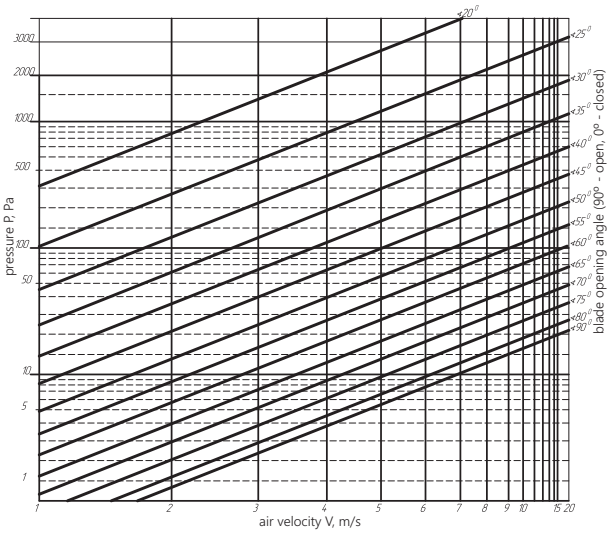
1 - casing; 2 - blade; 3 - levers; 4 - electric drive

LEAKAGE VOLUME CHARACTERISTICS

ОБСЯГ ВИТОКУ В ЗАКРИТОМУ СТАНІ



ДІАГРАМА ПАДІННЯ ТИСКУ



H, мм \ B, мм	200	350	500	650	800	950	1100	1250	1400	1550	1700	1850	2000
180													
345													
510													
675													
840													
1005													
1170													
1335													
1500													
1665													
1830													
1995													
2160													
2325													
2490													

- torque 4 Nm
- torque 10 Nm
- torque 20 Nm

EXAMPLE:

KED damper, 675 mm high and 950 mm wide, with one electric drive, spring return, supply voltage 220V, with a group of limit switch contacts, general industrial design, symmetrical opening of blades, climatic version YHL2

KED–675x950–N–F220–C–YHL2

- airtight damper (•KED)
- useful cross-section of the damper: HxB (H - height, mm; B - width, mm)
- design (•N •CR •V •VCR)
- drive type (• electric drive - as to model designation see the section "Damper actuator encoding"; • manual drive - HD)
- blade opening design option (• PL - parallel; • C - symmetrical)
- climatic version (• T2 (3); • YHL2 (3)

NOTE: special requirements for the KED damper are specified additionally and agreed with the manufacturer.

EARTHQUAKE-RESISTANT AIR DAMPER NER

- airtight dampers are designed to regulate supply, recirculating or exhaust air in high-pressure ventilation systems, in conditions of sudden surges in the operating pressure in the network, as well as to seal the internal volume of ventilation networks, the operating pressure of which can reach 10,000 Pa;
- NER dampers are unique for the domestic market, no comparables are observed;
- they are made of both rectangular and round cross-sections;
- maximum area of useful cross-section of rectangular NER dampers may not exceed 1.4 m^2, with the length of one of the sides not exceeding 1,600 mm. The range of connection and overall dimensions of round dampers is limited to the standard dimensions shown in the table (see below).

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

INTENDED USE	• shut-offf (sealing) • regulating
OPERATING PRESSURE	up to 10,000 Pa
EXECUTIVE MECHANISM*	• electric drive • handle
LEAKAGE LEVEL CLASS	3
BLADE OPENING	• parallel
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• Y2 • YHL3 • TM2 placement category • 2
THERMAL CONDUCTIVITY	not required

*For drive model designation, see the section "Drive encoding". As an actuator, the following can be used:
- electric drive (220 V or 24 V) with or without spring return: two-position (open/closed) or smooth adjustment;
- handle for fully manual operation (manual control of the electric drive is always available by default).

The NER dampers consist of a reinforced welded four-wall box-shaped body and hollow box-shaped leaves.

The leaves are joined in the form of a lock seal. A shock-absorbing seal is used at the ends of the casing and in the abutment areas of the leaves. An electric drive or a handle for manual control can be used as an actuator. The kinematics of such a damper is levers and rods on a rigid hitch, the opening of the damper blades is "parallel". Bearing units are made using self-aligning rolling bearings, which protect the axes of the damper leaves from skewing under the influence of pressure. This allows for easy adjustment of the flow under maximum pressure conditions without applying additional efforts on the drive.

Connecting flanges are performed with holes. The NER dampers in the corrosion-resistant version are made of stainless steel, in the general industrial version - of low-alloy thick-sheet steel (coated with powder enamel).

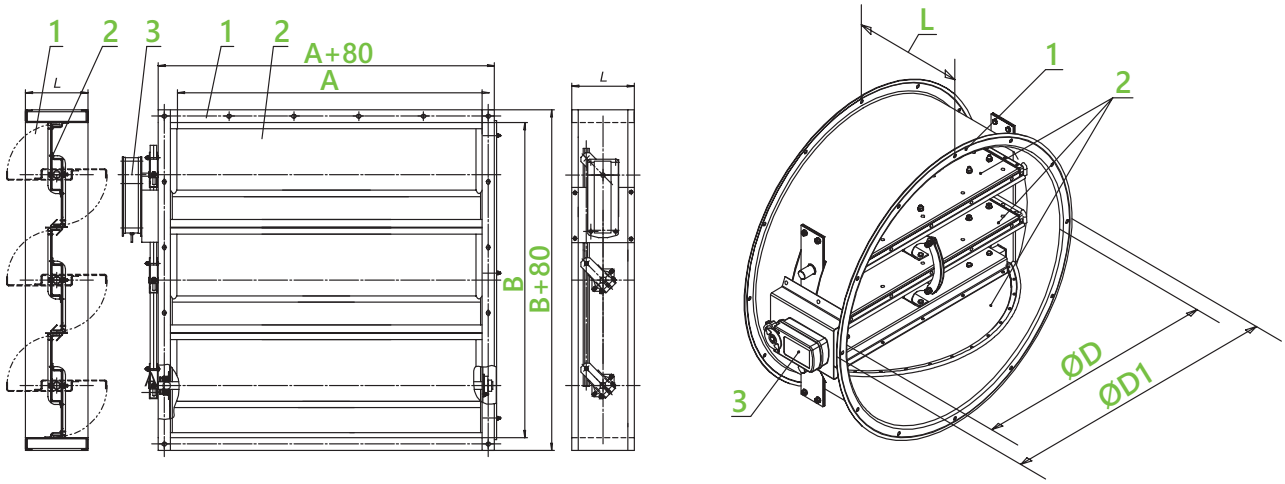
EXAMPLE:

NER damper, width 620 mm and height 1,100 mm, single electric drive, spring return, voltage 220V, with limit switch contact group, general industrial design, operating pressure 3,000 Pa, climatic version YHL3

NER–620x1100–N–F220-S–3000–YHL3

- earthquake-resistant air (•NER)
- useful cross-section of the damper (•AxB; •D)
  (A - width, B - height, mm; mm; D - diameter, mm)
- design (•N •CR •V •VCR)
- drive type (• electric drive - as to model designation
  see the section "Damper actuator encoding"; • manual drive - HD)
- operating pressure (1000 - 10000 Pa)
- climatic version (• Y2; • TM2 (3); • YHL3)

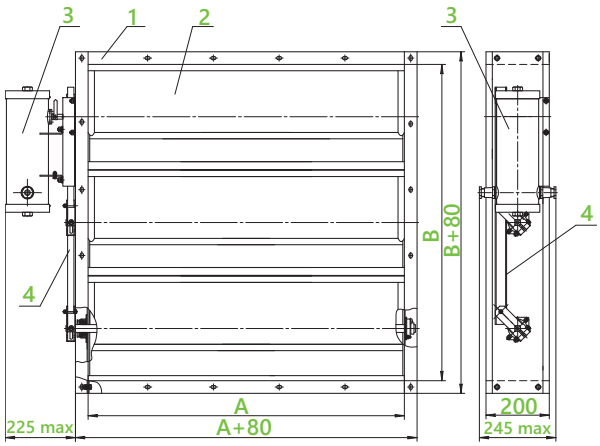
NOTE: special requirements for NER are specified additionally and agreed with the manufacturer.



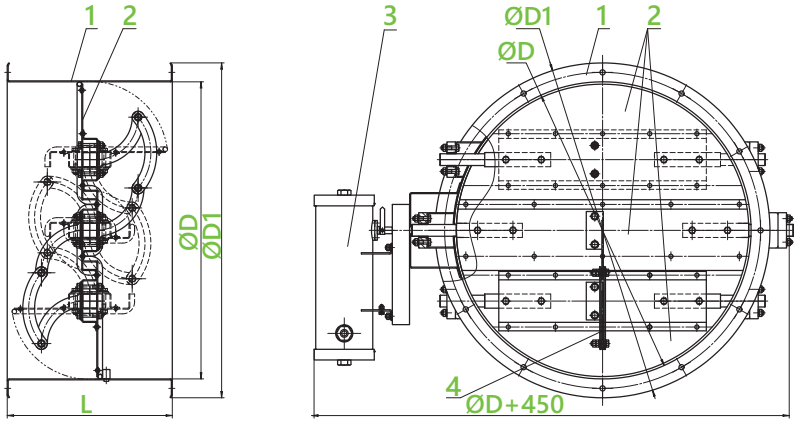
1 - casing; 2 - leaf; 3 - executive mechanism

D, мм	100	125	160	200	250	280	315	400	500	630	800	1000
D1, мм	160	185	220	260	310	340	375	460	560	690	860	1060
L, мм	200				350							
NUMBER OF BLADES	1									3		
WEIGHT, кг	12,1	14,2	18,6	22,8	27,1	29,9	32,7	38,4	43,5	54,2	61,3	70,2

EXPLOSION-PROOF DESIGN



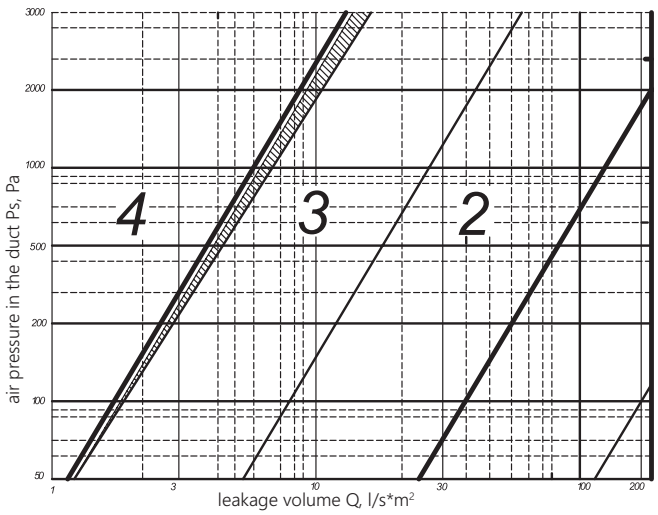
1 - casing; 2 - blade; 3 - drive; 4 - levers and rods



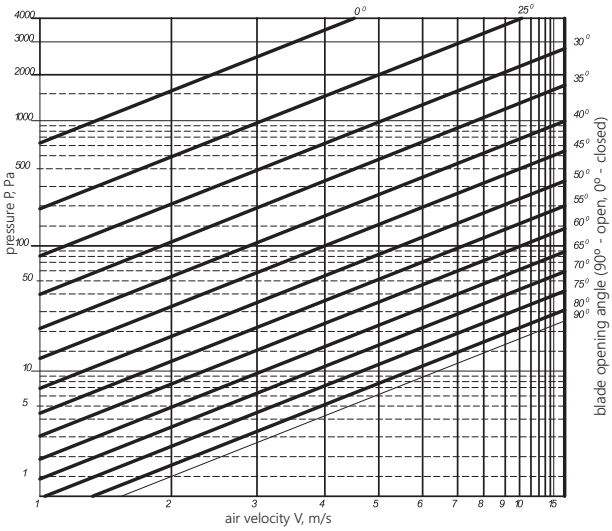
1 - casing; 2 - blade; 3 - drive; 4 - levers and rods

LEAKAGE VOLUME CHARACTERISTICS

LEAKAGE VOLUME IN THE CLOSED POSITION



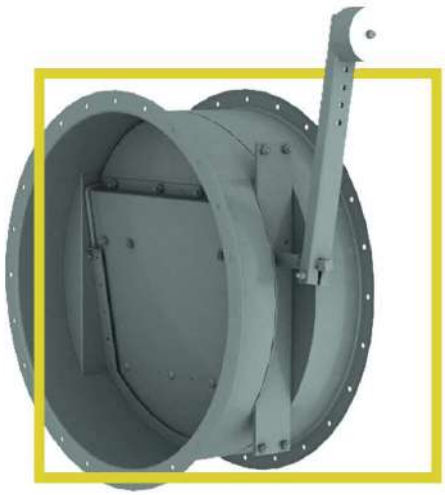
PRESSURE DROP CHART



A, мм / B, мм	200	400	500	600	800	1000	1100	1200	1400	1600
100										
200										
300										
400										
500										
600										
800										
1000										
1100										
1200										
1400										
1600										

- torque 10 Nm - torque 20 Nm - torque 40 Nm

NER-KO | EARTHQUAKE-RESISTANT BACKDRAFT DAMPER



- airtight backdraft dampers are designed to automatically shut off the air ducts when the fan is turned off. The NER-KO backdraft dampers are of gravity action type and designed for operation in high-pressure ventilation networks under conditions of sudden jumps of operating pressure in the network, as well as for sealing the internal volume of ventilation networks.
- NER-KO dampers are unique for the domestic market, no comparables are observed;
- they are made of both rectangular and round cross-sections;
- maximum useful cross-section size of rectangular dampers may not exceed 1.2 m^2 with a maximum damper height (H) not exceeding 1,500 mm and a maximum width (B) not exceeding 1,000 mm. The range of connection and overall dimensions of round dampers is limited to standard dimensions (see below).

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR);
- explosion-proof (V);
- explosion-proof corrosion-resistant (CRV).

INTENDED USE	backdraft damper (airtight damper)
OPERATING PRESSURE	up to 10,000 Pa
AIR FLOW RATE:	
- on vertical sections	not less than 5 m/s
- on horizontal sections	not less than 7 m/s
LEAKAGE LEVEL CLASS	3
HYDRAULIC RESISTANCE COEFFICIENT	no more than 1.5
INSTALLATION POSITION	unspecified
CLIMATIC VERSION	• YHL2 • TM3 • TB3, placement category • 2 • 3
THERMAL CONDUCTIVITY	not required

NER-KO backdraft dampers consist of: rectangular - from a reinforced welded four-wall box-shaped body made of stainless or low-alloy thick-sheet steel, round - from a solid-rolled round body (i.e., the flap flange is made "integrally" with the main body material and does not have any welded connection, which significantly increases the rigidity and improves geometry of the body), the leaf of all such dampers is also made of a hollow box shape made of stainless or low-alloy thick-sheet steel. The leaves are joined in the form of a lock seal. A shock-absorbing seal is used at the ends of the housing.

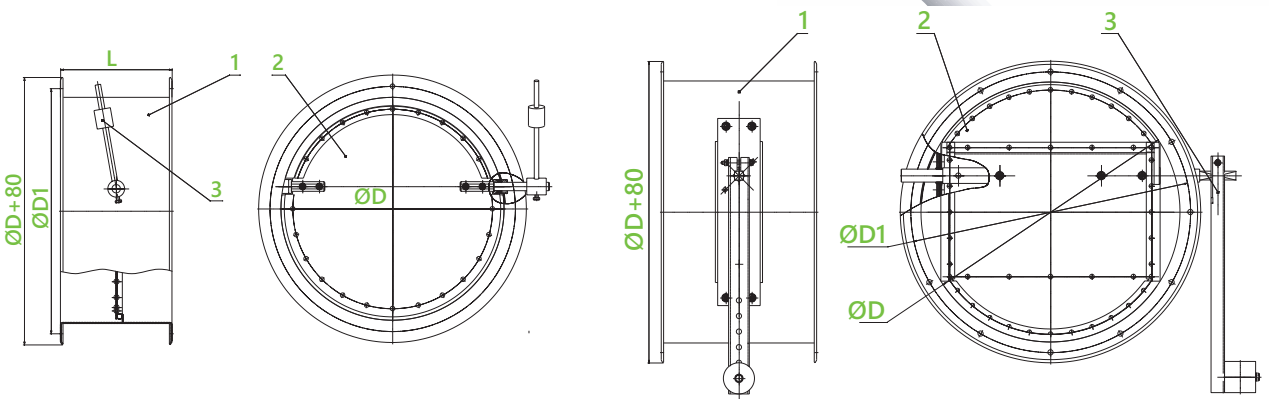
Bearing units are made using self-aligning rolling bearings that protect the axes of the damper leaves from skewing under the influence of pressure. On the side surface of the backdraft dampers there is a reinforced counterweight that can be adjusted during installation depending on the installation plane, which allows these dampers to remain operational regardless of installation position.

EXAMPLE:
NER-KO damper, 600 mm wide and 1000 mm high, climatic version YHL2, general industrial design, operating pressure 2,000 Pa

NER-KO–600x1000–N–2000

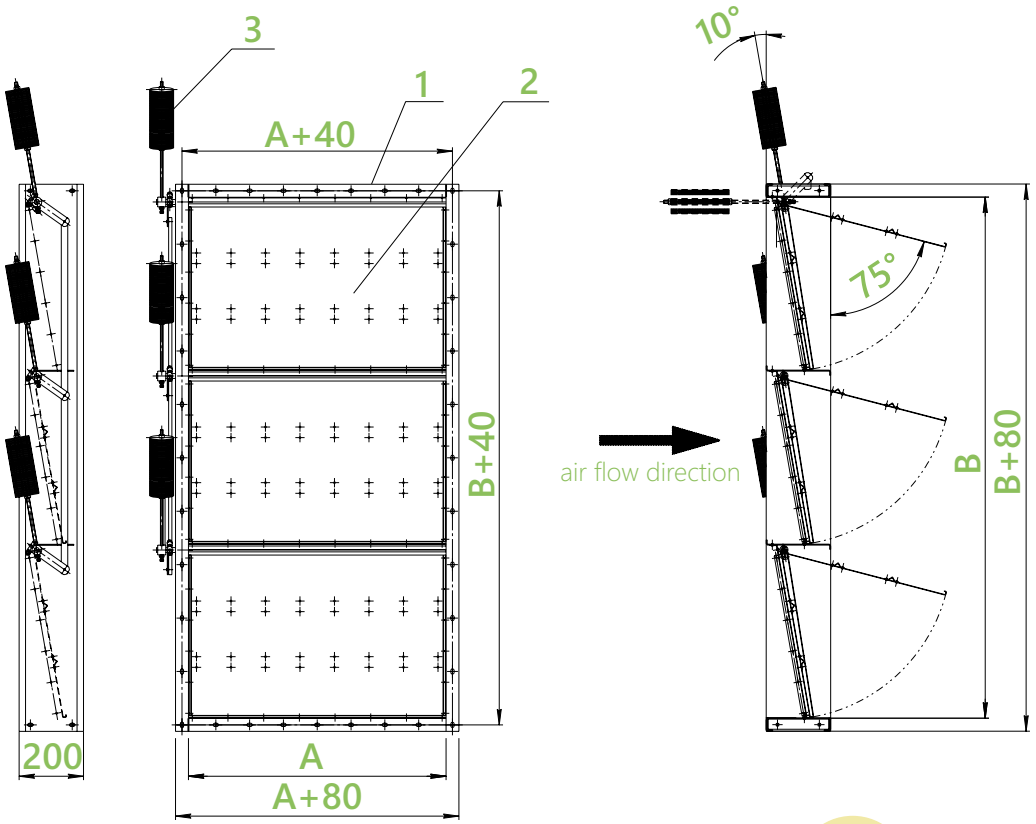
- earthquake-resistant backdraft damper (•NER-KO)
- useful cross-section of the damper (•AxB; •D)
  (A - width, mm; B - height, mm; D - diameter, mm)
- design (•N •CR •V •VCR)
- operating pressure (1,000 – 10,000 Pa)

NOTE: special requirements for NER-KO are specified additionally and agreed with the manufacturer.



1 - casing; 2 - blade; 3 - counterweight

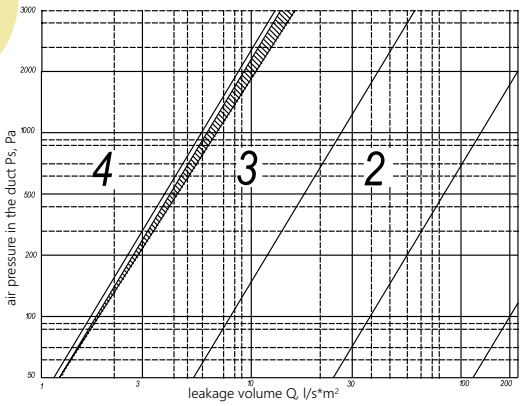
D, mm	250	315	400	500	630	800	1000	1250
D1, mm	310	375	460	560	710	880	1080	1330
L, mm	200			300			500	
Weight, kg	8,2	10,9	13,1	19,2	24,1	33,6	51,8	68,2



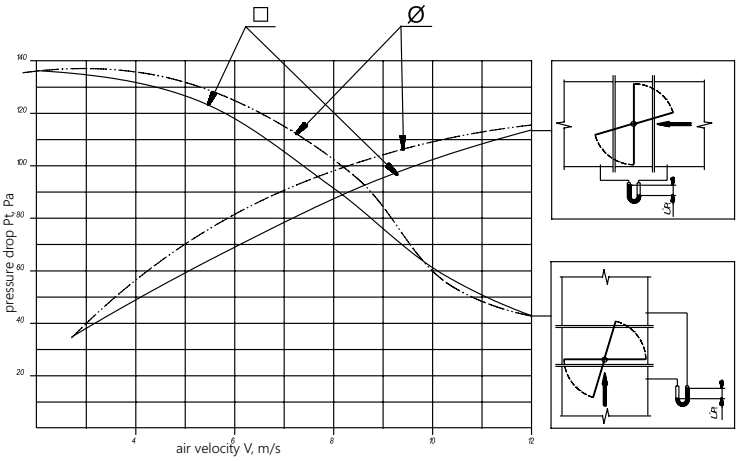
1 - casing; 2 - blade; 3 - counterweight

LEAKAGE VOLUME CHARACTERISTICS

LEAKAGE VOLUME IN THE CLOSED POSITION



PRESSURE DIFFERENCE



PRESSURE-RELIEF DAMPER KID

- leaf-type pressure-relief damper for controlled relief of the pressure considered excessive for the area served by this damper;
- it is made only of rectangular cross-section;
- range of connection and overall dimensions of these dampers is limited to the standard dimensions, which are presented in the table below. Other damper sizes can be manufactured upon request. The damper can be manufactured either with two connecting flanges (channel-type) or single-flange (wall-type) for embedding into the wall, with the possibility of installing a louvered grille or mesh.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR)

INTENDED USE	pressure-relief damper
OPERATING PRESSURE	20-150 Pa
AIR FLOW RATE	not less than 2 m/s
LEAKAGE LEVEL CLASS	0 (not required)
INSTALLATION POSITION	vertical only
CLIMATIC VERSION	YHL, placement category • 2 • 3
THERMAL CONDUCTIVITY	not required

The KID pressure-relief damper consists of a four-wall box-shaped body and box-shaped leaves mounted in the body on axles and made of galvanized steel. For synchronous operation, the damper blades are connected by a system of levers and rods. A spring-loaded adjustment mechanism is integrated into the KID damper body to adjust the damper opening pressure.

Design justification: one of the requirements of SP 7.13130, which determines the efficiency of SMOKE PROTECTION systems, is the excess pressure value in the protected areas (escape routes: stairwells, elevator shafts, elevator and stairwells, vestibules) and the flow rate of smoke being removed. The excess pressure value in the protected areas, in relation to the facade that isn't under influence of wind, must be at least 20 Pa.

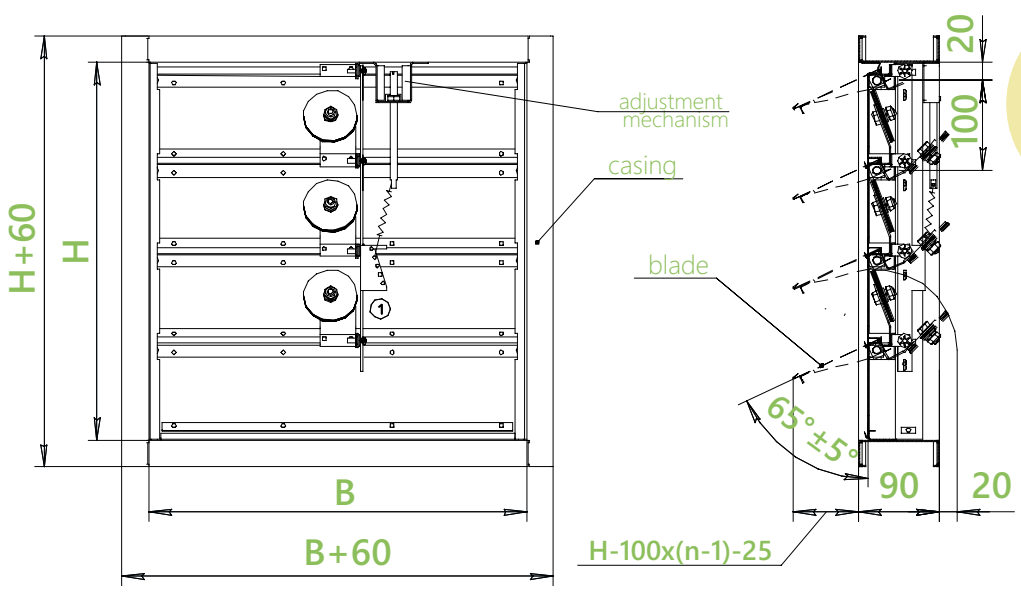
The norms also regulate the maximum pressure drop that occurs in the doors leading from the stairwell to the corridor, which should not exceed 150 Pa (SP 7.13130-2009, clause 7.4). For doors with dimensions of 2x1 m, the pressure drop of 150 Pa corresponds to the door opening force of 15 kgf.

Supply systems that supply outside air to the upper part of elevator shafts and stairwells during the cold season experience maximum back pressure caused by outside air, which decreases significantly during the warm season and can even reach negative values. Therefore, during the warm season, the fan performance may increase sharply, which will lead to an increase in energy consumption and an increase in pressure on the emergency exit doors and may complicate or completely block the possibility of opening the doors for evacuation. Therefore, supply air systems should be equipped with air pressure regulators on the upper floor of the stairwell or on the upper floors of its parts that are separated by a partition.

EXAMPLE:
KID pressure-relief damper with a cross-section of 550x550 mm, general industrial design

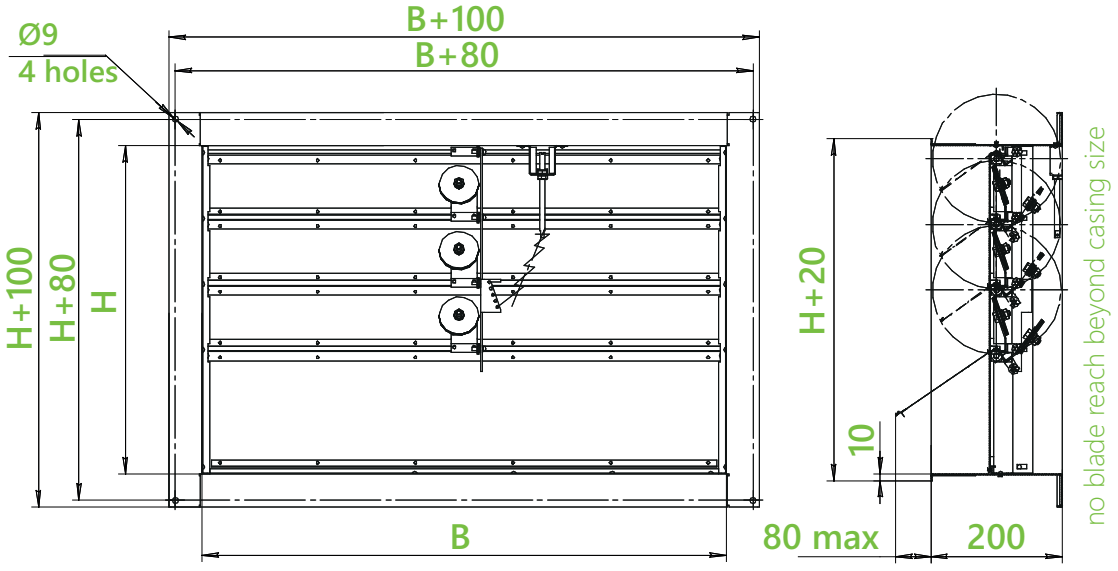
KID–550x550–N

- pressure-relief damper (•KID)
- useful cross-section of the damper (•HxB)
  (H - height, mm; B - width, mm)
- design version (•N •CR)

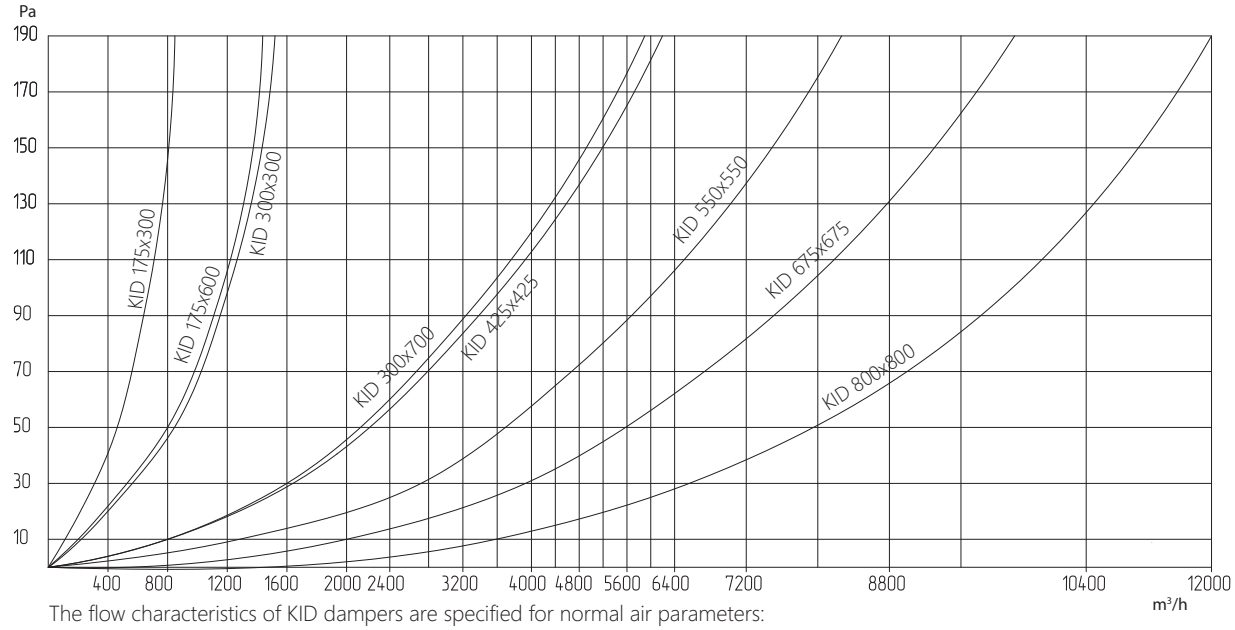


STANDARD SIZE* OF THE DUCT DAMPER	175x300	175x600	300x300	300x700	425x425	550x550	675x675	800x800
H, mm	175	175	300	300	425	550	675	800
B, mm	300	600	300	700	425	550	675	800
Weight, kg	6,5	9,7	7,3	11,2	9,1	11,2	15,2	25,8

*The standard size range can be expanded depending on the actual requirements of the order.



*The standard size range can be expanded depending on the actual requirements of the order.



The flow characteristics of KID dampers are specified for normal air parameters: density of 1.2 kg/m³ at a temperature of 20° C

VARIABLE AIR VOLUME DAMPERS FOR VAV SYSTEMS

KB-VAV

- designed to operate in ventilation systems with an air flow rate from 2 to 12 m/s and remain operational in any of their installation position. The task of the regulator is to maintain a given amount of supply or exhaust air, depending on the current demand;
- they are made only of round cross-section.

DESIGN

- general purpose industrial (N);
- corrosion-resistant (CR)

KB-VAV-125-N-LMV-D3-MP-914/5426-0

- universal air damper
- standard size (for round connection section)
- design (•N •CR)
- drive type (see table)
- air-flow rate (V_{min}/V_{max})
- control signal (•0 - 0-10 V; •2 - 2-10 V)

Drive type	Torque, Nm	Digital protocol	Configuration	Power supply, V
LMV-D3-MP	5	MP-BUS	electric drive; dynamic differential pressure sensor; controller	24 ~/=
LMV-D3-KNX	5	KNX (S-Mode)		
LMV-D3-MOD	5	MODBUS		

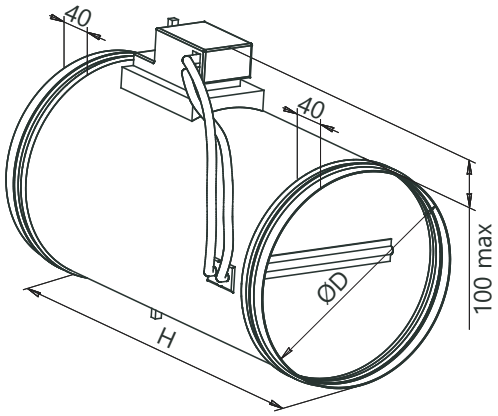
INTENDED USE ..... universal air damper
DAMPER TYPE ..... duct-type
USEFUL CROSS-SECTION ..... round
MAXIMUM STATIC PRESSURE ..... 1,000 Pa
SPEED OF THE MOVING PROCESSING MEDIUM ..... up to 12 m/s
INSTALLATION POSITION ..... unspecified
TYPE OF CLIMATIC VERSION ..... YHL3, placement category 3

Dampers of round cross-section (nipple type) are made of galvanized (version N) or stainless (version CR) Steel.

The required air flow rate is determined by the setpoint on the controller of the regulator or the value of the external control signal. This signal can be sent to the controller of the regulator from various sources installed in the premises of the building, such as: temperature controller, CO2 sensors, motion sensors or directly from the control panel of the Building Automation System (BAS) when the damper is integrated into this system using the MP-BUS, KNX (S-Mode) or MODBUS protocol.

BELIMO Compact controllers are installed on the dampers. By special order, it is possible to equip with BELIMO Universal series controllers.

The dampers are equipped with BELIMO electric drives.



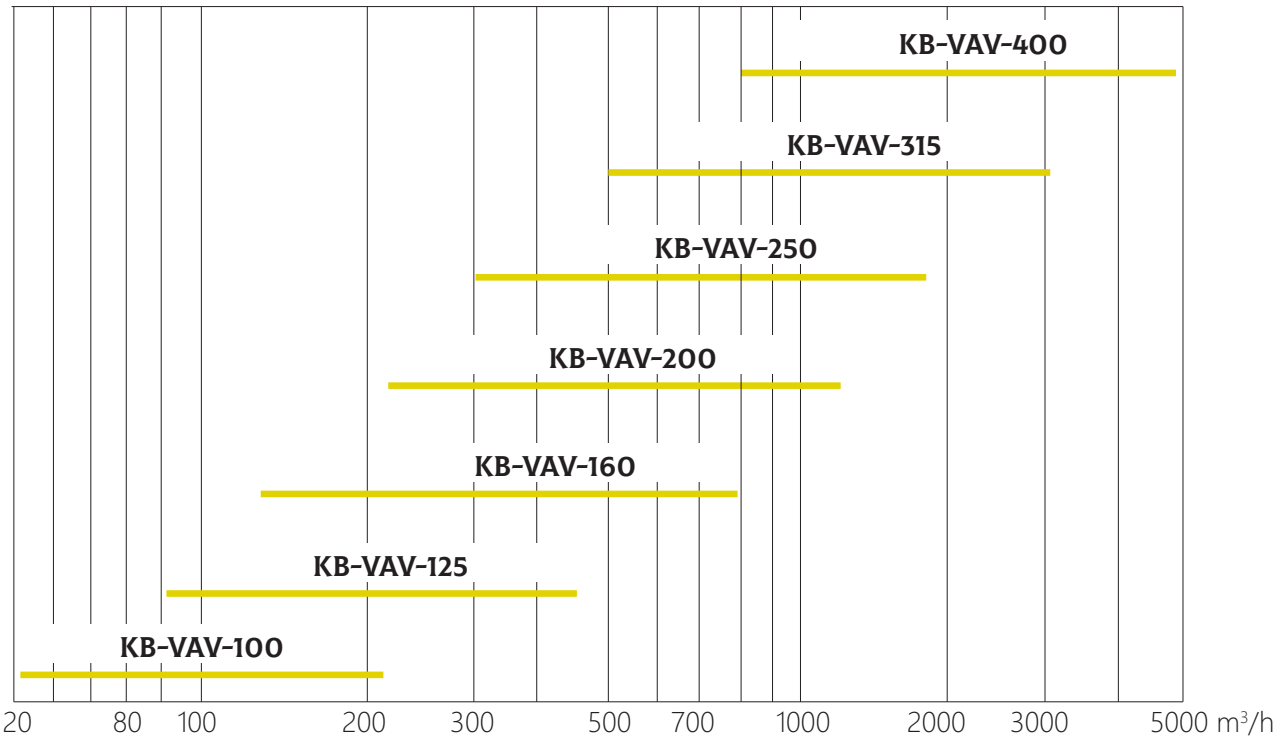
Dimensions, mm	STANDARD SIZE						
	100	**125**	**160**	**200**	**250**	**315**	**400**
D	100	125	160	200	250	315	400
H	400			500		600	
Weight, kg, max*	1,8	2	2,4	3	4,5	6	8,6

* weight specified without actuator

SELECTION OF STANDARD SIZES BASED ON AIR FLOW AND GENERATED NOISE LEVEL

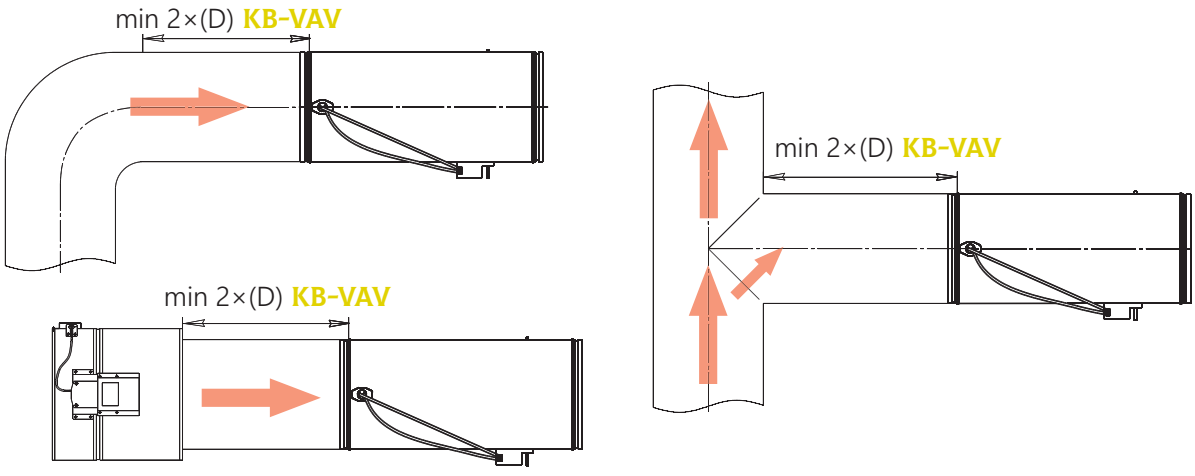
STANDARD SIZE	Air-flow rate, m^3/h		Noise level generated by the air flow, dB	Noise generated by the casing, dB
	V_{min}	V_{max}		
KB-VAV-100	57	339	53	36
KB-VAV-125	88	530	52	35
KB-VAV-160	145	868	54	36
KB-VAV-200	226	1 356	54	39
KB-VAV-250	353	2 120	53	39
KB-VAV-315	561	3 365	53	42
KB-VAV-400	904	5 426	51	38

NOMINAL AIR FLOW RATE



INSTALLATION EXAMPLE

To avoid errors in air flow measurement, these rules must be followed during installation.



DAMPER ACTUATOR ENCODING

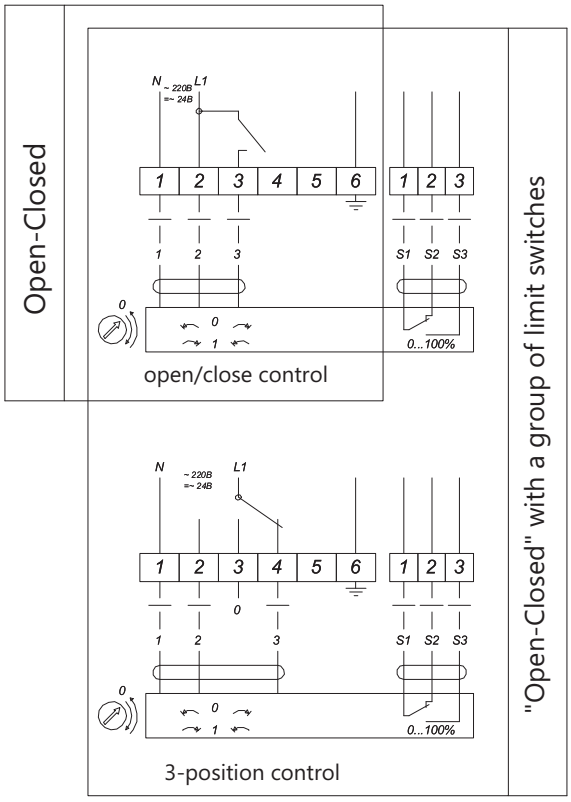
Due to the excessive number of possible electric drive control schemes and drive designation options accepted by numerous manufacturers, CCK TM offers its own drive designation option specified in the order line, which summarizes all reasonable options for the electric drives used. The above encoding can be used at the initial stages of matching. In invoices and accompanying documents, the drives are indicated explicitly.

Drive type	Handle	No spring return								With spring return					
Type of regulation	manual	open-closed				smooth adjustment				electric drive/spring				smooth adjustment	
Supply voltage, V	–	24	220	24	220	24	220	24	220	24	220	24	220	24	24
Availability of limit switches (endpoint sensors)	not available	not available		available		not available		available		not available		available		not available	available
Приклад позначення привода	HD	M24	M220	M24-S	M220-S	M24-SR	M230-SR	M24-SR+S1(2)	M220-SR+S1(2)	F24	F220	F24-S	F220-S	F24-SR	F24-SR+S1(2)

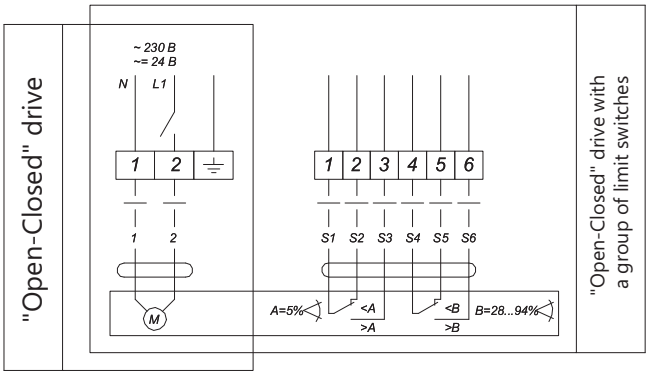
S1(2)A - auxiliary switches S1A or S2A.
M24 - "open-closed" drive, 24V, torque of 4 Nm, without limit switches.

ELECTRICAL DIAGRAMS FOR CONNECTING ELECTRIC DRIVES

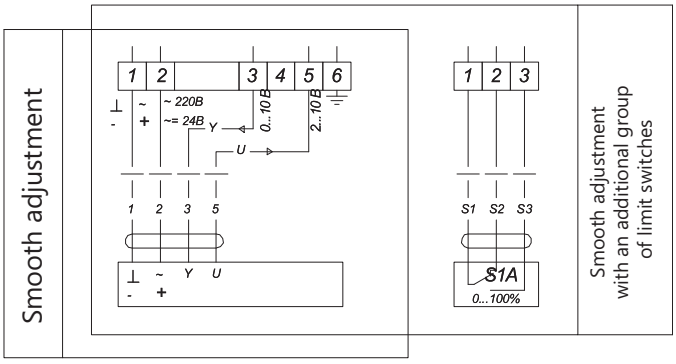
"Open-closed" drive



Drive with spring return



Stepless drive



RECOMMENDED INSTALLATION DIAGRAMS

When choosing the material of the product, the climatic features prevailing in the location of its placement should be taken into account.

When operating dampers at low temperatures, special precautions must also be taken in addition to the standard material requirements.

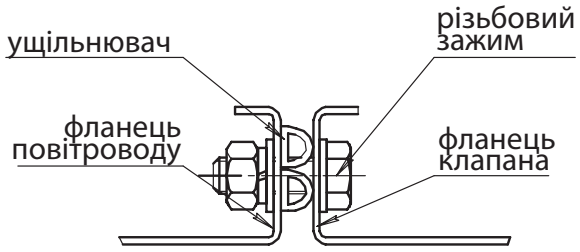
Carbon steel can be used at temperature down to -25°C. In the temperature range from -5°C to -45°C, it is necessary to use low-temperature steel.

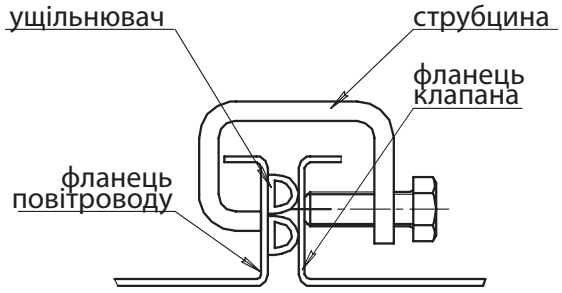
At temperatures below -45°C, it is necessary to use stainless steel.

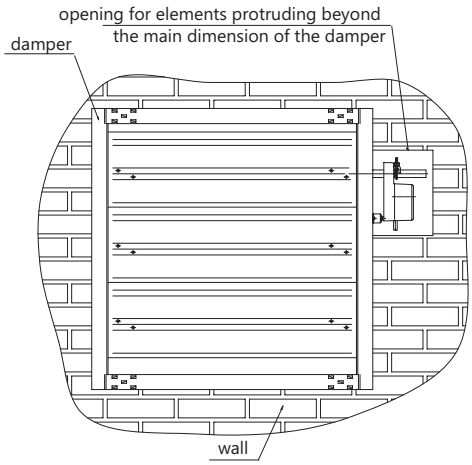
Our products use galvanized steel, which allows us to produce products in a wide temperature range (down to -45°C) and with resistance to aggressive environments, as well as stainless steel for products that work in more severe conditions (down to -70°C).

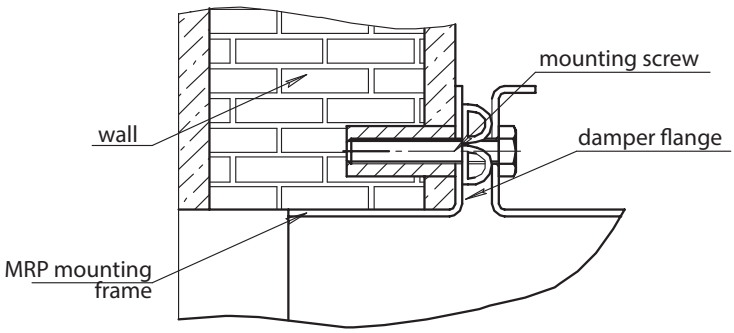
For dampers placed outdoors or under a canopy, when placed in areas with short-term temperatures down to -70°C, corrosion-resistant steel should be selected. These dampers must have an enclosure to protect the drive from moisture (if it is provided for by the design), as well as heating the damper casing.

Before installing the damper in the duct line, glue the ends of the adjacent flange with a self-adhesive sealing profile to prevent leakage through them or seal this area in any other way. Fixing the damper flanges to the duct flanges can be done using special clamps or the so-called "threaded clamp". In this case, if there are no holes in the adjacent flanges for the fastening option using a threaded clamp, the installer is asked to drill the holes himself, taking into account the individual conditions for ensuring the tightness of this connection after installation.









When embedding the damper in a wall, it is advisable to install spacers in its internal cavity in order to avoid distortions, twisting and other violations of the geometry of the damper body, which can lead to its jamming and loss of functionality. In case of possible deviations from the rectangular shape of the wall opening, it is advisable to attach the damper to the end of the wall using a mounting frame, which serves as the base for positioning and fixing the damper to the wall.

ADDITIONAL EQUIPMENT

R25, R50, R100 || DECORATIVE NON-ADJUSTABLE GRILLES

- R25 grilles are designed for interior decoration of premises: decorative protection of open cavities of air ducts, dampers, ventilation shafts;
- R50 and R100 grilles are designed for external protection of the exit points of ventilation shafts, air ducts, openings, if necessary, aesthetic design of the external (facade) side of the premises with additional protection from precipitation (flashing) and ingress of foreign objects into the protected internal space (mesh).

R25 grilles are manufactured from unified lightweight elements made of aluminum profile with the use of plastic elements. They are distinguished by their neat appearance. The grilles meet most existing architectural design standards. Due to the ease of installation, they practically do not interfere with the free flow of supply, recirculating or exhaust air in ventilation and air conditioning systems. They are made only in a rectangular cross-section, unpainted. R25 type grilles are manufactured using a special robotic line, which allows them to be produced automatically with high accuracy (the deviation of diagonal sizes on one separate grille of maximum cross-section is no more than 1.5 mm). Also, when choosing a grille, it is necessary to take into account that when using standard elements in its composition, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 25 mm.

The main disadvantage of such grilles is only the insufficient rigidity of the housing, which does not allow the production of R25 grilles with useful cross-section of more than 0.6 m2. If it is necessary to use a grille of large cross-sections, it is advisable to choose R50 or R100 grilles. The R25 grilles can be used as part of fire damper if it's indicated in the order line. The maximum air velocity through the R25 grille is limited to 7 m/s.

The R50 and R100 are made of reinforced unified aluminum profile elements.

They are distinguished by their neat appearance, easy installation. They are made only unpainted, in a rectangular cross-section, and do not provide for additional adjustment. R50 type grilles are recommended for use with useful cross-section of up to 5 m2, and R100 type grilles - up to 7.2 m2. The design of such grilles is distinguished by additional reinforcement of the elements that make up the grille. In addition, these grilles, if specified in the order, can be equipped with a perforated sheet mesh on the inside to prevent foreign objects from entering the area. The upper shelf of the R50 or R100 grille housing has a so-called "flashing" to protect against precipitation entering the inner cavity of the grille. Also, when choosing such grilles, it is necessary to take into account that when using standard unified elements in its composition, the width (B) of the grille should be chosen as a multiple of 10 mm, while its height (H) should be a multiple: for R50 - 50 mm + 20 mm to the obtained value; for R100 - 100 mm + 20 mm to the obtained value for installing the flashing. The maximum air velocity through the R50 and R100 grilles is limited to 15 m/s.

EXAMPLE:

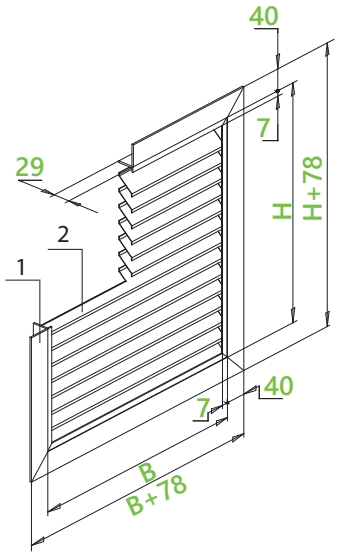
R50 type decorative aluminum non-adjustable grille with useful cross-section of 1020x1000 mm, with a protective aluminum perforated sheet mesh

R50–1020x1000–SET

- non-ajustable decorative grille (•R25; •R50; •R100)
- useful cross-section of the damper (•HxB)
  (H - height, mm; B - width, mm)
- mesh availability (•SET - with mesh (R50 and R100 only) •0 - without mesh)

NOTE: special requirements for R25, R50 and R100 are specified additionally and agreed with the manufacturer.

R25

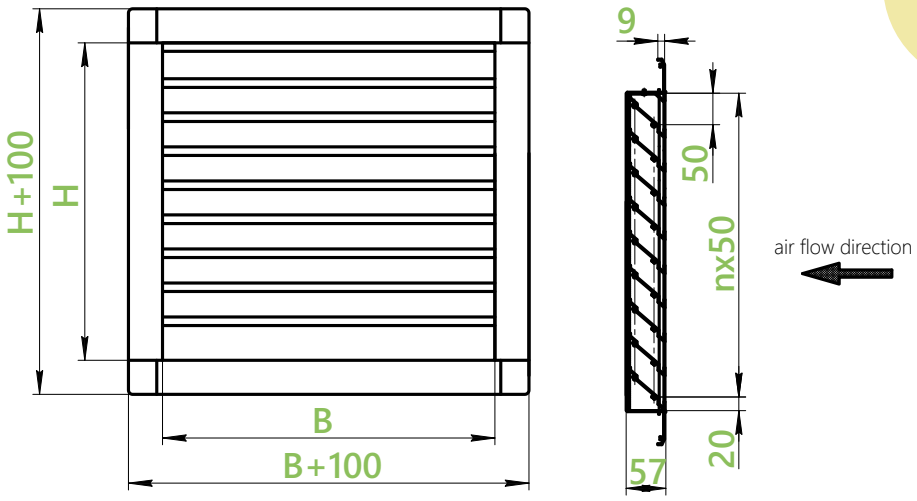


1 - casing; 2 - blade

B, мм / H, мм	100	150	200	250	300	350	400	450	500	550	600
100	0,0064	0,0096	0,0128	0,016	0,0192	0,0224	0,0256	0,0288	0,032	0,0352	0,0384
150	0,0096	0,0144	0,0192	0,024	0,0288	0,0336	0,0384	0,0432	0,048	0,0528	0,0576
200	0,0128	0,0192	0,0256	0,032	0,0384	0,0448	0,0512	0,0576	0,064	0,0704	0,0768
250	0,016	0,024	0,032	0,04	0,048	0,056	0,064	0,072	0,08	0,088	0,096
300	0,0192	0,0288	0,0384	0,048	0,0576	0,0672	0,0768	0,0864	0,096	0,1056	0,1152
350	0,0224	0,0336	0,0448	0,056	0,0672	0,0784	0,0896	0,1008	0,112	0,1232	0,1344
400	0,0256	0,0384	0,0512	0,064	0,0768	0,0896	0,1024	0,1152	0,128	0,1408	0,1536
450	0,0288	0,0432	0,0576	0,072	0,0864	0,1008	0,1152	0,1296	0,144	0,1584	0,1728
500	0,032	0,048	0,064	0,08	0,096	0,112	0,128	0,144	0,16	0,176	0,192
550	0,0352	0,0528	0,0704	0,088	0,1056	0,1232	0,1408	0,1584	0,176	0,1936	0,2112
600	0,0384	0,0576	0,0768	0,096	0,1152	0,1344	0,1536	0,1728	0,192	0,2112	0,2304
650	0,0416	0,0624	0,0832	0,104	0,1248	0,1456	0,1664	0,1872	0,208	0,2288	0,2496
700	0,0448	0,0672	0,0896	0,112	0,1344	0,1568	0,1792	0,2016	0,224	0,2464	0,2688
750	0,051	0,0765	0,102	0,1275	0,153	0,1785	0,204	0,2295	0,255	0,2805	0,306
800	0,0512	0,0768	0,1024	0,128	0,1536	0,1792	0,2048	0,2304	0,256	0,2816	0,3072
850	0,0544	0,0816	0,1088	0,136	0,1632	0,1904	0,2176	0,2448	0,272	0,2992	0,3264
900	0,0576	0,0864	0,1152	0,144	0,1728	0,2016	0,2304	0,2592	0,288	0,3168	0,3456
950	0,0608	0,0912	0,1216	0,152	0,1824	0,2128	0,2432	0,2736	0,304	0,3344	0,3648
1000	0,064	0,096	0,128	0,16	0,192	0,224	0,256	0,288	0,32	0,352	0,384

Also, when choosing R25 grilles, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 25 mm. When ordering the grille separately, the need for a 5 mm mounting gap should be taken into account: the cross-sectional dimensions of the grille must be at least 5 mm smaller than the dimensions of the opening where the grille is planned to be installed.

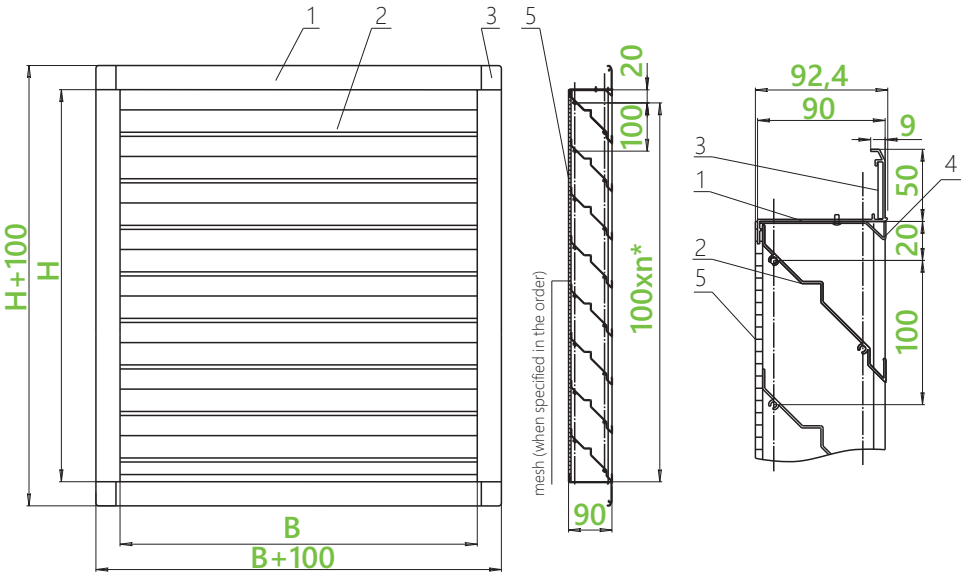
R50



H, мм \ B, мм	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
520	—	0,218	0,250	0,281	0,312	0,343	0,374	0,406	0,437	0,468	0,499	0,530	0,562	0,593	0,624
620	—	0,260	0,298	0,335	0,372	0,409	0,446	0,484	0,521	0,558	0,595	0,632	0,670	0,707	0,744
720	—	0,302	0,346	0,389	0,432	0,475	0,518	0,562	0,605	0,648	0,691	0,734	0,778	0,821	0,864
820	—	0,344	0,394	0,443	0,492	0,541	0,590	0,640	0,689	0,738	0,787	0,836	0,886	0,935	0,984
920	—	0,386	0,442	0,497	0,552	0,607	0,662	0,718	0,773	0,828	0,883	0,938	0,994	1,049	1,104
1020	0,367	0,428	0,490	0,551	0,612	0,673	0,734	0,796	0,857	0,918	0,979	1,040	1,102	1,163	1,224
1120	0,403	0,470	0,538	0,605	0,672	0,739	0,806	0,874	0,941	1,008	1,075	1,142	1,210	1,277	1,344
1220	0,439	0,512	0,586	0,659	0,732	0,805	0,878	0,952	1,025	1,098	1,171	1,244	1,318	1,391	1,464
1320	0,475	0,554	0,634	0,713	0,792	0,871	0,950	1,030	1,109	1,188	1,267	1,346	1,426	1,505	1,584
1420	0,511	0,596	0,682	0,767	0,852	0,937	1,022	1,108	1,193	1,278	1,363	1,448	1,534	1,619	1,704
1520	0,547	0,638	0,730	0,821	0,912	1,003	1,094	1,186	1,277	1,368	1,459	1,550	1,642	1,733	1,824
1620	0,583	0,680	0,778	0,875	0,972	1,069	1,166	1,264	1,361	1,458	1,555	1,652	1,750	1,847	1,944
1720	0,619	0,722	0,826	0,929	1,032	1,135	1,238	1,342	1,445	1,548	1,651	1,754	1,858	1,961	2,064
1820	0,655	0,764	0,874	0,983	1,092	1,201	1,310	1,420	1,529	1,638	1,747	1,856	1,966	2,075	2,184
1920	0,691	0,806	0,922	1,037	1,152	1,267	1,382	1,498	1,613	1,728	1,843	1,958	2,074	2,189	2,304
2020	0,727	0,848	0,970	1,091	1,212	1,333	1,454	1,576	1,697	1,818	1,939	2,060	2,182	2,303	2,424
2120	0,763	0,890	1,018	1,145	1,272	1,399	1,526	1,654	1,781	1,908	2,035	2,162	2,290	2,417	2,544
2220	0,799	0,932	1,066	1,199	1,332	1,465	1,598	1,732	1,865	1,998	2,131	2,264	2,398	2,531	2,664
2320	0,835	0,974	1,114	1,253	1,392	1,531	1,670	1,810	1,949	2,088	2,227	2,366	2,506	2,645	2,784
2420	0,871	1,016	1,162	1,307	1,452	1,597	1,742	1,888	2,033	2,178	2,323	2,468	2,614	2,759	2,904
2520	0,907	1,058	1,210	1,361	1,512	1,663	1,814	1,966	2,117	2,268	2,419	2,570	2,722	2,873	3,024

Also, when choosing R50 grilles, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 50 mm. When ordering the grille separately, the need for a 5 mm mounting gap should be taken into account: the cross-sectional dimensions of the grille must be at least 5 mm smaller than the dimensions of the opening where the grille is planned to be installed.

R100

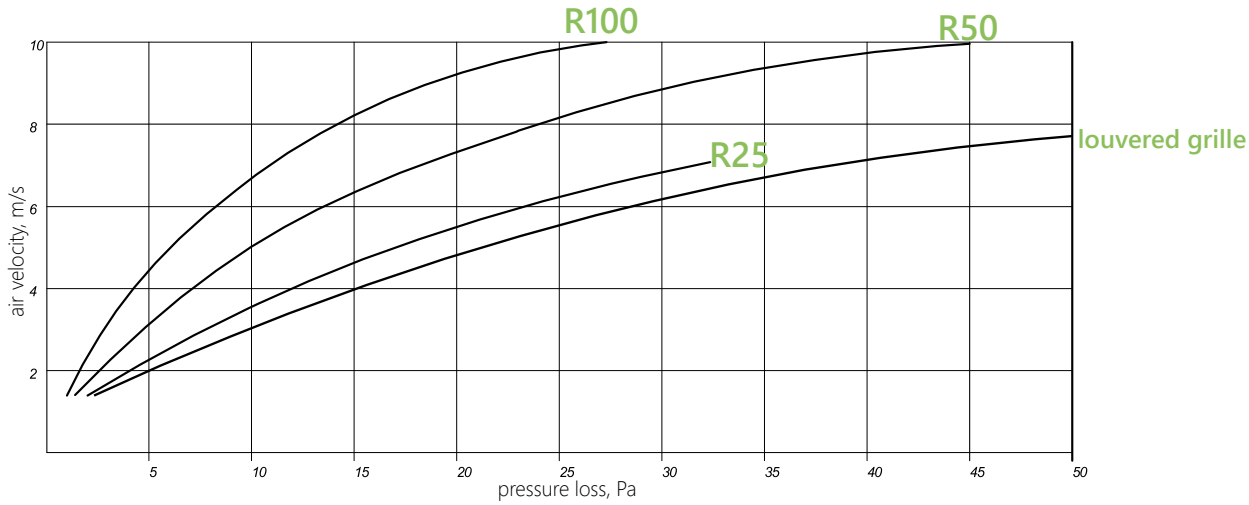


1 - casing; 2 - blade; 3 - mounting angle; 4 - flashing; 5 - mesh.

H, мм \ B, мм	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
1020	0,6936	0,76296	0,83232	0,90168	0,97104	1,0404	1,10976	1,17912	1,24848	1,31784	1,3872	1,45656	1,52592	1,59528	1,66464
1120	0,7616	0,83776	0,91392	0,99008	1,06624	1,1424	1,21856	1,29472	1,37088	1,44704	1,5232	1,59936	1,67552	1,75168	1,82784
1220	0,8296	0,91256	0,99552	1,07848	1,16144	1,2444	1,32736	1,41032	1,49328	1,57624	1,6592	1,74216	1,82512	1,90808	1,99104
1320	0,8976	0,98736	1,07712	1,16688	1,25664	1,3464	1,43616	1,52592	1,61568	1,70544	1,7952	1,88496	1,97472	2,06448	2,15424
1420	0,9656	1,06216	1,15872	1,25528	1,35184	1,4484	1,54496	1,64152	1,73808	1,83464	1,9312	2,02776	2,12432	2,22088	2,31744
1520	1,0336	1,13696	1,24032	1,34368	1,44704	1,5504	1,65376	1,75712	1,86048	1,96384	2,0672	2,17056	2,27392	2,37728	2,48064
1620	1,1016	1,21176	1,32192	1,43208	1,54224	1,6524	1,76256	1,87272	1,98288	2,09304	2,2032	2,31336	2,42352	2,53368	2,64384
1720	1,1696	1,28656	1,40352	1,52048	1,63744	1,7544	1,87136	1,98832	2,10528	2,22224	2,3392	2,45616	2,57312	2,69008	2,80704
1820	1,2376	1,36136	1,48512	1,60888	1,73264	1,8564	1,98016	2,10392	2,22768	2,35144	2,4752	2,59896	2,72272	2,84648	2,97024
1920	1,3056	1,43616	1,56672	1,69728	1,82784	1,9584	2,08896	2,21952	2,35008	2,48064	2,6112	2,74176	2,87232	3,00288	3,13344
2020	1,3736	1,51096	1,64832	1,78568	1,92304	2,0604	2,19776	2,33512	2,47248	2,60984	2,7472	2,88456	3,02192	3,15928	3,29664
2120	1,4416	1,58576	1,72992	1,87408	2,01824	2,1624	2,30656	2,45072	2,59488	2,73904	2,8832	3,02736	3,17152	3,31568	3,45984
2220	1,5096	1,66056	1,81152	1,96248	2,11344	2,2644	2,41536	2,56632	2,71728	2,86824	3,0192	3,17016	3,32112	3,47208	3,62304
2320	1,5776	1,73536	1,89312	2,05088	2,20864	2,3664	2,52416	2,68192	2,83968	2,99744	3,1552	3,31296	3,47072	3,62848	3,78624
2420	1,6456	1,81016	1,97472	2,13928	2,30384	2,4684	2,63296	2,79752	2,96208	3,12664	3,2912	3,45576	3,62032	3,78488	3,94944
2520	1,7136	1,88496	2,05632	2,22768	2,39904	2,5704	2,74176	2,91312	3,08448	3,25584	3,4272	3,59856	3,76992	3,94128	4,11264
2620	1,7816	1,95976	2,13792	2,31608	2,49424	2,6724	2,85056	3,02872	3,20688	3,38504	3,5632	3,74136	3,91952	4,09768	4,27584
2720	1,8496	2,03456	2,21952	2,40448	2,58944	2,7744	2,95936	3,14432	3,32928	3,51424	3,6992	3,88416	4,06912	4,25408	4,43904
2820	1,9176	2,10936	2,30112	2,49288	2,68464	2,8764	3,06816	3,25992	3,45168	3,64344	3,8352	4,02696	4,21872	4,41048	4,60224
2920	1,9856	2,18416	2,38272	2,58128	2,77984	2,9784	3,17696	3,37552	3,57408	3,77264	3,9712	4,16976	4,36832	4,56688	4,76544
3020	2,0536	2,25896	2,46432	2,66968	2,87504	3,0804	3,28576	3,49112	3,69648	3,90184	4,1072	4,31256	4,51792	4,72328	4,92864

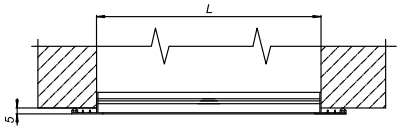
When choosing R100 grilles, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while the height (H) should be a multiple of 100 mm + 20 mm to the resulting value for flashing installation. When ordering the grille separately, the need for a 5 mm mounting gap should be taken into account: the cross-sectional dimensions of the grille must be at least 5 mm smaller than the dimensions of the opening where the grille is planned to be installed.

PRESSURE DROP CHART

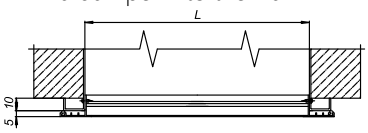


ALUMINUM GRILLE INSTALLATION OPTIONS

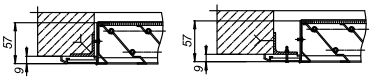
mounting a grille into the wall



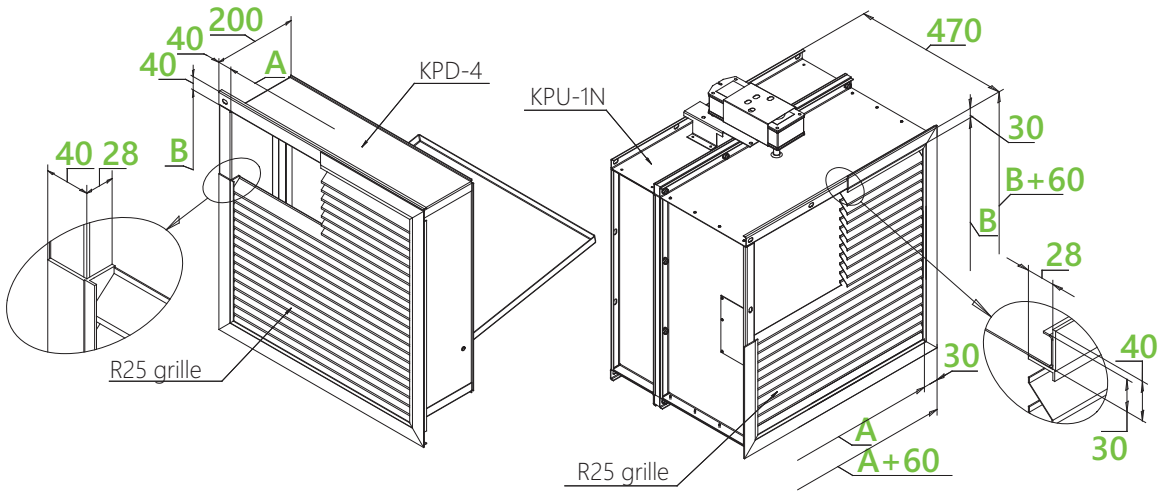
mounting a grille in an air duct or a damper into the wall



mounting a grille into the wall using a mounting frame



DAMPERS WITH R25 GRILLE



DECORATIVE NON-ADJUSTABLE GRILLES

RO25, RO50

- RO25 grilles are designed for interior decoration of premises: decorative protection of open cavities of air ducts, dampers, ventilation shafts when aesthetic decoration of premises is necessary;
- RO50 grilles are designed for external protection of the exit points of ventilation shafts, air ducts, openings, if necessary, aesthetic design of the external (facade) side of the premises with additional protection from precipitation (flashing) and ingress of foreign objects into the protected internal space (mesh).

RO25 grilles are manufactured of unified lightweight elements made of galvanized steel. They are distinguished by their neat appearance, compliance with the requirements of most existing architectural design standards, and ease of installation. They practically do not interfere with the free flow of supply, recirculating or exhaust air in ventilation and air conditioning systems. They are made unpainted. By special order, the grilles can be painted in the color agreed with the customer. Grilles of only rectangular cross-section are made. When choosing a grille, it should be taken into account that when using standard elements in its composition, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 25 mm.

The main disadvantage of such grilles is only the insufficient rigidity of the housing, which does not allow the production of RO25 grilles with a useful cross-section of more than 1 m2. If it is necessary to use a grille of large cross-sections, it is advisable to choose the RO50 grille. The RO25 grille can be used as part of the fire damper if it's indicated in the order line. The maximum air velocity through the RO25 grille is limited to 7 m/s.

RO50 is manufactured of reinforced unified elements made of galvanized steel. Grilles are distinguished by their neat appearance, easy installation. They are made unpainted, and by special order, the grilles can be painted in the color agreed with the customer. Grilles of only rectangular cross-section are made and do not provide for additional adjustment. RO50 grilles are recommended for use with useful cross-section of up to 4 m2. The design of such grilles is distinguished by additional reinforcement of the elements that make up the grille. The upper shelf of the RO50 grille housing has a so-called "flashing" to protect against precipitation entering the inner cavity of the grille. Also, when choosing such grilles, it is necessary to take into account that when using standard unified elements in its composition, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 50 mm. The maximum air velocity through the RO50 grilles is limited to 15 m/s.

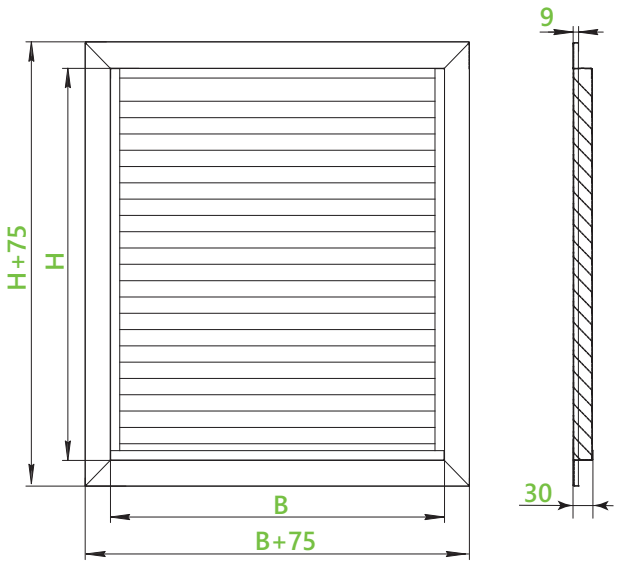
EXAMPLE:
decorative galvanized non-adjustable grille of RO50 type with useful cross-section of 700x1,000 mm, with protective mesh

RO50–700x1000–SET

- decorative non-adjustable grille (•RO25; •RO50)
- useful cross-section of the damper (•HxB)
  (H - height, mm; B - width, mm)
- mesh availability (•SET – with mesh; •0 – without mesh)

NOTE: special requirements for RO25 and RO50 are specified additionally and agreed with the manufacturer.

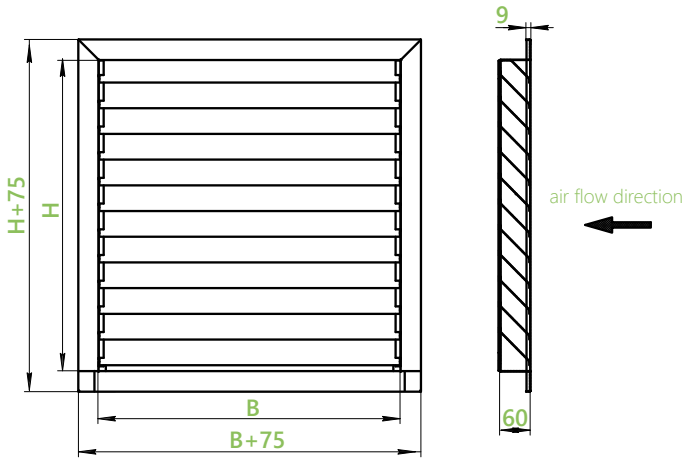
RO25



H, мм \ B, мм	650	700	750	800	850	900	950	1000
100	0,0416	0,0448	0,048	0,0512	0,0544	0,0576	0,0608	0,064
150	0,0624	0,0672	0,072	0,0768	0,0816	0,0864	0,0912	0,096
200	0,0832	0,0896	0,096	0,1024	0,1088	0,1152	0,1216	0,128
250	0,104	0,112	0,12	0,128	0,136	0,144	0,152	0,16
300	0,1248	0,1344	0,144	0,1536	0,1632	0,1728	0,1824	0,192
350	0,1456	0,1568	0,168	0,1792	0,1904	0,2016	0,2128	0,224
400	0,1664	0,1792	0,192	0,2048	0,2176	0,2304	0,2432	0,256
450	0,1872	0,2016	0,216	0,2304	0,2448	0,2592	0,2736	0,288
500	0,208	0,224	0,24	0,256	0,272	0,288	0,304	0,32
550	0,2288	0,2464	0,264	0,2816	0,2992	0,3168	0,3344	0,352
600	0,2496	0,2688	0,288	0,3072	0,3264	0,3456	0,3648	0,384
650	0,2704	0,2912	0,312	0,3328	0,3536	0,3744	0,3952	0,416
700	0,2912	0,3136	0,336	0,3584	0,3808	0,4032	0,4256	0,448
750	0,3315	0,357	0,3825	0,408	0,4335	0,459	0,4845	0,51
800	0,3328	0,3584	0,384	0,4096	0,4352	0,4608	0,4864	0,512
850	0,3536	0,3808	0,408	0,4352	0,4624	0,4896	0,5168	0,544
900	0,3744	0,4032	0,432	0,4608	0,4896	0,5184	0,5472	0,576
950	0,3952	0,4256	0,456	0,4864	0,5168	0,5472	0,5776	0,608
1000	0,416	0,448	0,48	0,512	0,544	0,576	0,608	0,64

Also, when choosing RO25 grilles, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 25 mm. When ordering the grille separately, the need for a 5 mm mounting gap should be taken into account: the cross-sectional dimensions of the grille must be at least 5 mm smaller than the dimensions of the opening where the grille is planned to be installed.

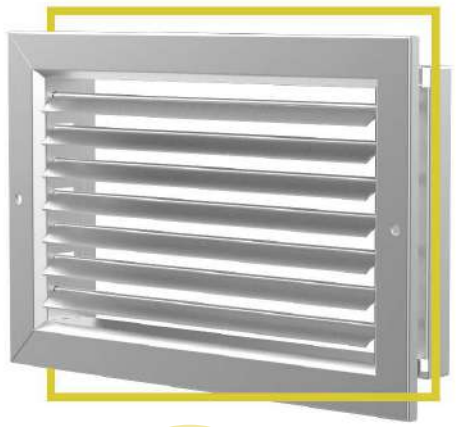
RO50



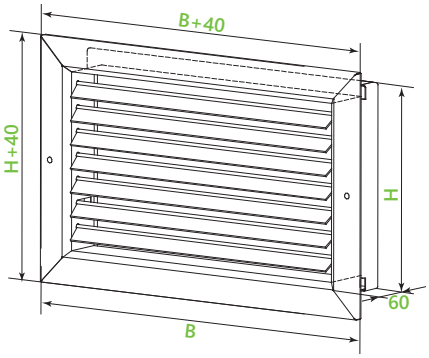
H, мм \ B, мм	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
500	—	0,218	0,250	0,281	0,312	0,343	0,374	0,406	0,437	0,468	0,499	0,530	0,562	0,593	0,624
600	—	0,260	0,298	0,335	0,372	0,409	0,446	0,484	0,521	0,558	0,595	0,632	0,670	0,707	0,744
700	—	0,302	0,346	0,389	0,432	0,475	0,518	0,562	0,605	0,648	0,691	0,734	0,778	0,821	0,864
800	—	0,344	0,394	0,443	0,492	0,541	0,590	0,640	0,689	0,738	0,787	0,836	0,886	0,935	0,984
900	—	0,386	0,442	0,497	0,552	0,607	0,662	0,718	0,773	0,828	0,883	0,938	0,994	1,049	1,104
1000	0,367	0,428	0,490	0,551	0,612	0,673	0,734	0,796	0,857	0,918	0,979	1,040	1,102	1,163	1,224
1100	0,403	0,470	0,538	0,605	0,672	0,739	0,806	0,874	0,941	1,008	1,075	1,142	1,210	1,277	1,344
1200	0,439	0,512	0,586	0,659	0,732	0,805	0,878	0,952	1,025	1,098	1,171	1,244	1,318	1,391	1,464
1300	0,475	0,554	0,634	0,713	0,792	0,871	0,950	1,030	1,109	1,188	1,267	1,346	1,426	1,505	1,584
1400	0,511	0,596	0,682	0,767	0,852	0,937	1,022	1,108	1,193	1,278	1,363	1,448	1,534	1,619	1,704
1500	0,547	0,638	0,730	0,821	0,912	1,003	1,094	1,186	1,277	1,368	1,459	1,550	1,642	1,733	1,824
1600	0,583	0,680	0,778	0,875	0,972	1,069	1,166	1,264	1,361	1,458	1,555	1,652	1,750	1,847	1,944
1700	0,619	0,722	0,826	0,929	1,032	1,135	1,238	1,342	1,445	1,548	1,651	1,754	1,858	1,961	2,064
1800	0,655	0,764	0,874	0,983	1,092	1,201	1,310	1,420	1,529	1,638	1,747	1,856	1,966	2,075	2,184
1900	0,691	0,806	0,922	1,037	1,152	1,267	1,382	1,498	1,613	1,728	1,843	1,958	2,074	2,189	2,304
2000	0,727	0,848	0,970	1,091	1,212	1,333	1,454	1,576	1,697	1,818	1,939	2,060	2,182	2,303	2,424

Also, when choosing RO50 grilles, it is advisable to choose the width (B) of the grille as a multiple of 10 mm, while its height (H) should be a multiple of 50 mm. When ordering the grille separately, the need for a 5 mm mounting gap should be taken into account: the cross-sectional dimensions of the grille must be at least 5 mm smaller than the dimensions of the opening where the grille is planned to be installed.

RRO-20 SINGLE-ROW ADJUSTABLE GRILLE



- single-row adjustable ventilation grilles are used for supply and exhaust ventilation, in air conditioning and air heating systems. A distinctive feature of these grilles is the ability to adjust the air flow by changing the angle of slats deflection;
- ventilation grilles consist of a galvanized casing and one row of high-quality aluminum slats;
- powder coating of the ventilation grille allows maintaining an aesthetic appearance, ensures resistance to adverse weather conditions and provides additional protection against corrosion;
- single-row adjustable ventilation grilles are painted with powder paints according to the RAL catalog. As standard, the grilles are painted white (RAL 9016);
- it is possible to manufacture non-standard grilles (upon agreement with the manufacturer).



H, мм \ B, мм	100	150	200	250	300	350	400	450	500	550	600
100	0,0048	0,0080	0,0112	0,0143	0,0175	0,0207	0,0239	0,0270	0,0302	0,0334	0,0366
150	0,0080	0,0133	0,0185	0,0238	0,0291	0,0344	0,0396	0,0449	0,0502	0,0555	0,0608
200	0,0109	0,0180	0,0252	0,0324	0,0396	0,0467	0,0539	0,0611	0,0683	0,0755	0,0826
250	0,0140	0,0233	0,0326	0,0419	0,0511	0,0604	0,0697	0,0790	0,0883	0,0975	0,1068
300	0,0172	0,0286	0,0400	0,0513	0,0627	0,0741	0,0855	0,0968	0,1082	0,1196	0,1310
350	0,0201	0,0334	0,0466	0,0599	0,0732	0,0865	0,0997	0,1130	0,1263	0,1396	0,1529
400	0,0233	0,0386	0,0540	0,0694	0,0848	0,1001	0,1155	0,1309	0,1463	0,1617	0,1770
450	0,0261	0,0434	0,0607	0,0780	0,0952	0,1125	0,1298	0,1471	0,1643	0,1816	0,1989
500	0,0293	0,0487	0,0681	0,0874	0,1068	0,1262	0,1456	0,1649	0,1843	0,2037	0,2231
550	0,0325	0,0540	0,0754	0,0969	0,1184	0,1399	0,1613	0,1828	0,2043	0,2258	0,2473
600	0,0356	0,0592	0,0828	0,1064	0,1300	0,1535	0,1771	0,2007	0,2243	0,2479	0,2714
650	0,0385	0,0640	0,0895	0,1150	0,1404	0,1659	0,1914	0,2169	0,2423	0,2678	0,2933
700	0,0417	0,0693	0,0969	0,1244	0,1520	0,1796	0,2072	0,2347	0,2623	0,2899	0,3175
750	0,0446	0,0740	0,1035	0,1330	0,1625	0,1920	0,2214	0,2509	0,2804	0,3099	0,3393
800	0,0477	0,0793	0,1109	0,1425	0,1741	0,2056	0,2372	0,2688	0,3004	0,3319	0,3635
850	0,0512	0,0851	0,1190	0,1529	0,1867	0,2206	0,2545	0,2884	0,3222	0,3561	0,3900
900	0,0535	0,0889	0,1242	0,1596	0,1950	0,2304	0,2658	0,3011	0,3365	0,3719	0,4073
950	0,0570	0,0946	0,1323	0,1700	0,2077	0,2454	0,2830	0,3207	0,3584	0,3961	0,4337
1000	0,0598	0,0994	0,1390	0,1786	0,2182	0,2577	0,2973	0,3369	0,3765	0,4160	0,4556

EXAMPLE:

Single-row adjustable ventilation grille of the RRO-20 type with useful cross-section of 150x200 mm, painted:

RRO-20–150(H)×200–9016

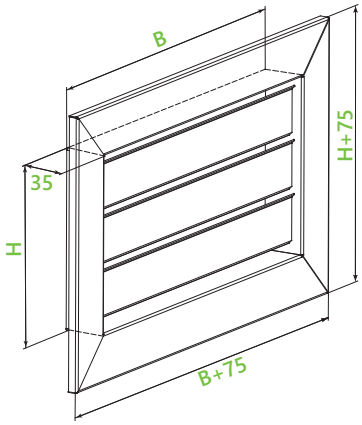
- single-row adjustable ventilation grille (•RRO-20)
- useful cross-section of the damper (•HxB)
  (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

NOTE: special requirements for RRO-20 are specified additionally and agreed with the manufacturer.

AIR CONTROL EQUIPMENT

SINGLE-ROW ADJUSTABLE GRILLE | RRO-25

- single-row adjustable ventilation grilles are used for supply and exhaust ventilation, in air conditioning and air heating systems. A distinctive feature of these grilles is the ability to adjust the air flow by changing the angle of slats deflection;
- ventilation grilles consist of a galvanized casing and one row of aluminum slats;
- powder coating of the ventilation grille allows maintaining an aesthetic appearance, ensures resistance to adverse weather conditions and provides additional protection against corrosion;
- single-row adjustable ventilation grilles are painted with powder paints according to the RAL catalog. As standard, the grilles are painted white;
- non-standard sized grilles can be manufactured upon request.



H, мм \ B, мм	100	150	200	250	300	350	400	450	500	550	600
100	0,0064	0,0096	0,0128	0,0160	0,0192	0,0224	0,0256	0,0288	0,0320	0,0352	0,0384
150	0,0096	0,0144	0,0192	0,0240	0,0288	0,0336	0,0384	0,0432	0,0480	0,0528	0,0576
200	0,0128	0,0192	0,0256	0,0320	0,0384	0,448	0,0512	0,0576	0,0640	0,0704	0,0768
250	0,0160	0,0240	0,0320	0,0400	0,0480	0,0560	0,0640	0,0720	0,0800	0,0880	0,0960
300	0,0192	0,0288	0,0384	0,0480	0,0576	0,0672	0,0768	0,0864	0,0960	0,1056	0,1152
350	0,0224	0,0336	0,0448	0,0560	0,0672	0,0784	0,0896	0,1008	0,1120	0,1232	0,1344
400	0,0256	0,0384	0,0512	0,0640	0,0768	0,0896	0,1024	0,1152	0,1280	0,1408	0,1536
450	0,0288	0,0432	0,0576	0,0720	0,0864	0,1008	0,1152	0,1296	0,1440	0,1584	0,1728
500	0,0320	0,048	0,0640	0,0800	0,0960	0,1120	0,1280	0,1440	0,1600	0,1760	0,1920
550	0,0352	0,0528	0,0704	0,0880	0,1056	0,1232	0,1408	0,1584	0,1760	0,1936	0,2112
600	0,0384	0,0576	0,0768	0,0960	0,1152	0,1344	0,1536	0,1728	0,1920	0,2112	0,2304
650	0,0416	0,0624	0,0832	0,1040	0,1248	0,1456	0,1664	0,1872	0,2080	0,2288	0,2496
700	0,0448	0,0672	0,0896	0,1120	0,1344	0,1568	0,1792	0,2016	0,2240	0,2464	0,2688
750	0,0510	0,0765	0,1020	0,1275	0,1530	0,1785	0,2040	0,2295	0,2550	0,2805	0,3060
800	0,0512	0,0768	0,1024	0,1280	0,1536	0,1792	0,2048	0,2304	0,2560	0,2816	0,3072
850	0,0544	0,0816	0,1088	0,1360	0,1632	0,1904	0,2176	0,2448	0,2720	0,2992	0,3264
900	0,0576	0,0864	0,1152	0,1440	0,1728	0,2016	0,2304	0,2592	0,2880	0,3168	0,3456
950	0,0608	0,0912	0,1216	0,1520	0,1824	0,2128	0,2432	0,2736	0,3040	0,3344	0,3648
1000	0,0640	0,0960	0,1280	0,1600	0,1920	0,2240	0,2560	0,2880	0,3200	0,3520	0,3840

EXAMPLE:

single-row adjustable ventilation grille of the RRO-25 type with useful cross-section of 150x200 mm, painted

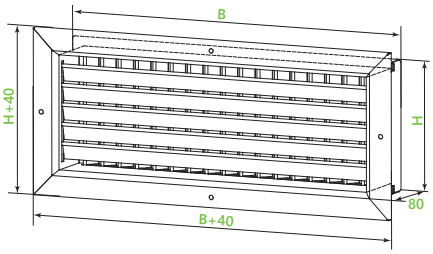
RRO-25–150(H)×200–9016

- single-row adjustable ventilation grille (•RRO-25)
- useful cross-section of the damper (•HxB) (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

NOTE: special requirements for RRO-25 are specified additionally and agreed with the manufacturer.

RRD-20 | DOUBLE-ROW ADJUSTABLE GRILLE

- double-row adjustable ventilation grilles are used for supply and exhaust ventilation, in air conditioning and air heating systems. These grilles are used to distribute air flows in different directions;
- by using the first and second row of movable slats and changing the angle of their deflection individually, it's possible to change the angle of air distribution in the premise;
- ventilation grilles consist of a galvanized body and two rows of movable high-quality aluminum slats that ensure smooth distribution of air flow in different directions;
- powder coating of the grille provides for its aesthetic appearance;
- grilles are painted with powder paints according to the RAL catalog. As standard, the grilles are painted white (RAL 9016);
- it is possible to manufacture non-standard grilles (upon agreement with the manufacturer).



H, мм \ B, мм	100	150	200	250	300	350	400	450	500	550	600
100	0,0040	0,0067	0,0091	0,0118	0,0145	0,0169	0,0196	0,0220	0,0246	0,0273	0,0300
150	0,0067	0,0111	0,0152	0,0196	0,0240	0,0280	0,0325	0,0365	0,0409	0,0453	0,0498
200	0,0091	0,0152	0,0206	0,0266	0,0327	0,0381	0,0442	0,0496	0,0556	0,0617	0,0677
250	0,0118	0,0196	0,0266	0,0344	0,0422	0,0493	0,0571	0,0641	0,0719	0,0797	0,0875
300	0,0145	0,0240	0,0327	0,0422	0,0518	0,0604	0,0700	0,0786	0,0882	0,0978	0,1073
350	0,0169	0,0280	0,0381	0,0493	0,0604	0,0705	0,0817	0,0918	0,1029	0,1141	0,1252
400	0,0196	0,0325	0,0442	0,0571	0,0700	0,0817	0,0946	0,1063	0,1192	0,1321	0,1450
450	0,0220	0,0365	0,0496	0,0641	0,0786	0,0918	0,1063	0,1194	0,1339	0,1485	0,1630
500	0,0246	0,0409	0,0557	0,0719	0,0882	0,1029	0,1192	0,1339	0,1502	0,1665	0,1828
550	0,0273	0,0454	0,0617	0,0797	0,0978	0,1141	0,1321	0,1485	0,1665	0,1845	0,2026
600	0,0300	0,0498	0,0677	0,0875	0,1073	0,1252	0,1451	0,1630	0,1828	0,2026	0,2224

EXAMPLE:

double-row adjustable ventilation grille of the RRD-20 type with useful cross-section of 150x200 mm, painted

RRD-20–150(H)×200–9016

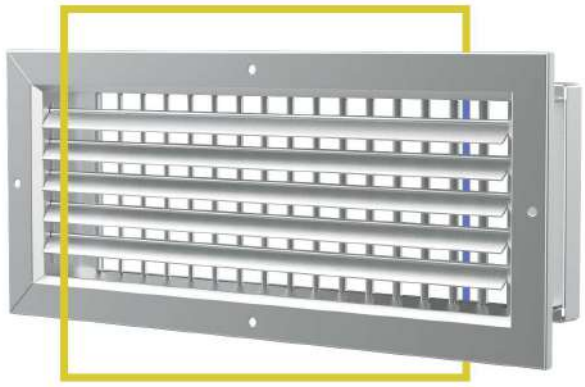
- double-row adjustable ventilation grille (•RRD-20)
- useful cross-section of the damper (•HxB)
  (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

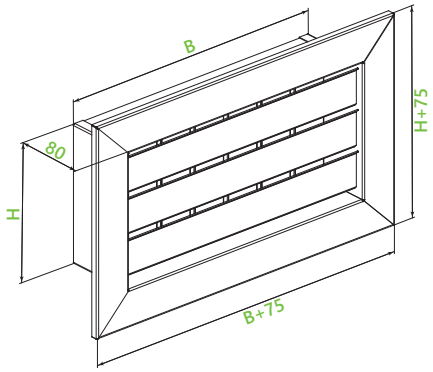
NOTE: special requirements for RRD-20 are specified additionally and agreed with the manufacturer.

AIR CONTROL EQUIPMENT

DOUBLE-ROW ADJUSTABLE GRILLE | RRD-25

- double-row adjustable ventilation grilles are used for supply and exhaust ventilation, in air conditioning and air heating systems. These grilles are used to distribute air flows in different directions;
- by using the first and second row of movable slats and changing the angle of their deflection individually, it's possible to change the angle of air distribution in the premise;
- ventilation grilles consist of a galvanized body and two rows of movable aluminum slats that ensure a smooth distribution of air flow in different directions;
- powder coating of the grille provides for its aesthetic appearance;
- grilles are painted with powder paints according to the RAL catalog. As standard, the grilles are painted white;
- non-standard sized grilles can be manufactured upon request.





H, мм \ B, мм	100	150	200	250	300	350	400	450	500	600	700	800
100	0,0063	0,0098	0,0134	0,0166	0,0201	0,0236	0,0272	0,0304	0,0399	0,0410	0,0477	0,0548
150	0,0097	0,0151	0,0206	0,0254	0,0309	0,0363	0,0418	0,0466	0,0521	0,0630	0,0733	0,0842
200	0,0131	0,0204	0,0277	0,0343	0,0417	0,0490	0,0563	0,0629	0,0703	0,0849	0,0989	0,1135
250	0,0164	0,0257	0,0349	0,0432	0,0524	0,0617	0,0709	0,0792	0,0884	0,1069	0,1244	0,1429
300	0,0198	0,0310	0,0421	0,0521	0,0632	0,0744	0,0855	0,0955	0,1066	0,1289	0,1500	0,1723
350	0,0232	0,0362	0,0493	0,0610	0,0740	0,0870	0,1001	0,1118	0,1248	0,1509	0,1756	0,2017
400	0,0266	0,0415	0,0565	0,0698	0,0848	0,0997	0,1147	0,1280	0,1430	0,1729	0,2012	0,2311
450	0,0300	0,0468	0,0636	0,0787	0,0956	0,1124	0,1292	0,1443	0,1612	0,1948	0,2268	0,2604
500	0,0333	0,0521	0,0708	0,0876	0,1063	0,1251	0,1438	0,1606	0,1793	0,2168	0,2523	0,2898
600	0,0401	0,0626	0,0852	0,1052	0,1279	0,1504	0,1730	0,1932	0,2157	0,2608	0,3035	0,3486
700	0,0469	0,0732	0,0995	0,1231	0,1495	0,1758	0,2021	0,2257	0,2521	0,3047	0,3547	0,4073
800	0,0536	0,0838	0,1139	0,1409	0,1710	0,2012	0,2313	0,2583	0,2884	0,3487	0,4058	0,4661

EXAMPLE:

double-row adjustable ventilation grille of the RRD-25 type with useful cross-section of 150x200 mm, painted

RRD-25–150(H)×200–9016

- double-row adjustable ventilation grille (•RRD-25)
- useful cross-section (•HxB)
  (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

NOTE: special requirements for RRD-25 are specified additionally and agreed with the manufacturer.

GDR | LEVER-DRIVEN DOUBLE-ROW GRILLE

- used for decorative design of supply and exhaust systems, public and industrial buildings;
- contribute to the correct distribution of air flow inside the room;
- wall and ceiling mounting is possible;
- grilles are not painted as standard. On request, it can be painted in any color according to the RAL catalog.

GDR ventilation grilles are used in supply and exhaust ventilation and can adjust the direction of air flow using adjustable blinds. The blinds in these grilles are double-row – external (horizontal) and internal (vertical).

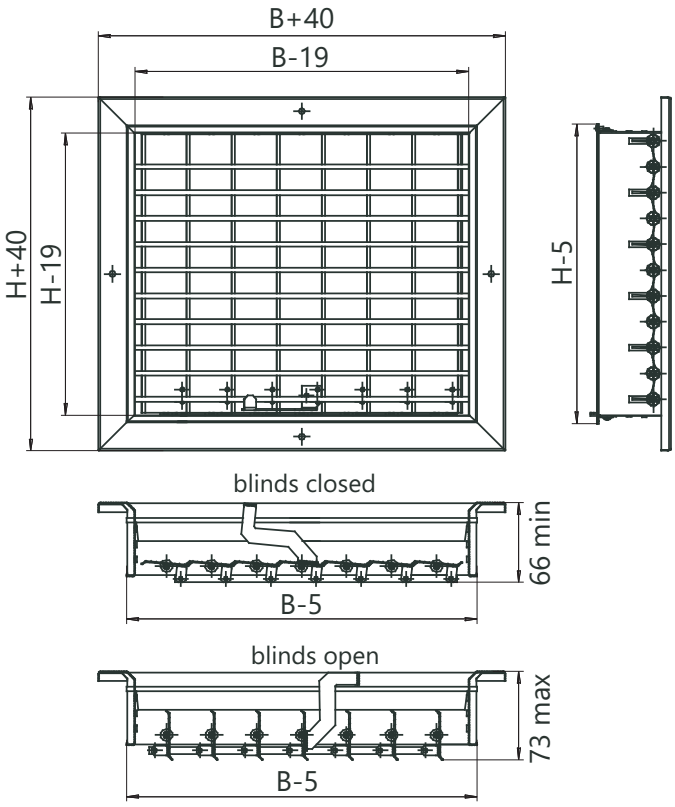
The angle of deflection of the individual horizontal blades is changed manually, and the angle of deflection of the vertical blinds is changed using a special adjustment lever.

The grilles consist of a galvanized body and two rows of aluminum slats of 20 and 25 mm, which ensure a smooth distribution of air flow in different directions.

Dimensions of ventilation grilles:

- height from 100 mm to 600 mm in 10 mm increments;
- width from 100 mm to 600 mm in 25 mm increments.

During installation, any installation position of the grilles is allowed.



GDR-20/25-150x200-9016

- lever-driven double-row grille
- blade profile size
- useful cross-section (•HxB) (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

RAD

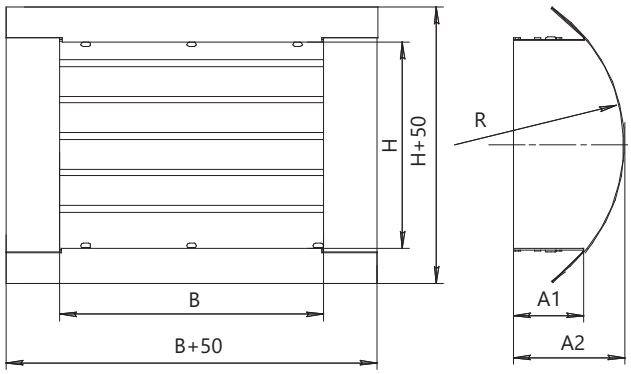
RADIAL ADJUSTABLE GRILLE

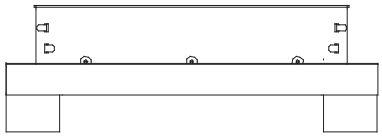
- designed for the supply and discharge of air flow in the air conditioning, ventilation and air heating system. The grilles provide smooth adjustment of the air flow in different

directions;

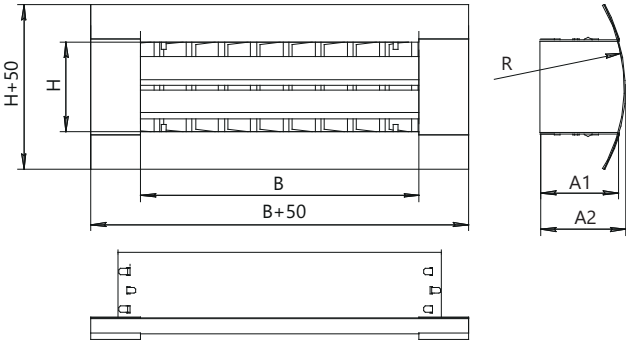
- grilles are made from galvanized sheet and fastened with bolts. The unit is assembled from a rectangular frame, in which one or two rows of rotary leaves (plates) are attached: 1- or 2-row grille;
- do not use in aggressive environments contaminated with mechanical, fibrous and sticky impurities;
- grilles are installed in the round air duct using self-tapping screws;
- grille frames are made of galvanized steel sheet, plates are made of aluminum;
- these grilles are painted with powder paints according to the RAL catalog. As standard, the grilles are painted white (RAL 9016).

RAD-1





RAD-2



H×B	grille size (height and width)
H1=H+25	height of the mounting hole
B1=B+25	width of the mounting hole
R	pipe bending radius
A1	depth of side bar of the frame
A2	total pipe depth

$$A2 = A1 + (R - \tfrac{1}{2}\sqrt{4R^2 - H^2})$$

RAD-1-300-100x600-9016

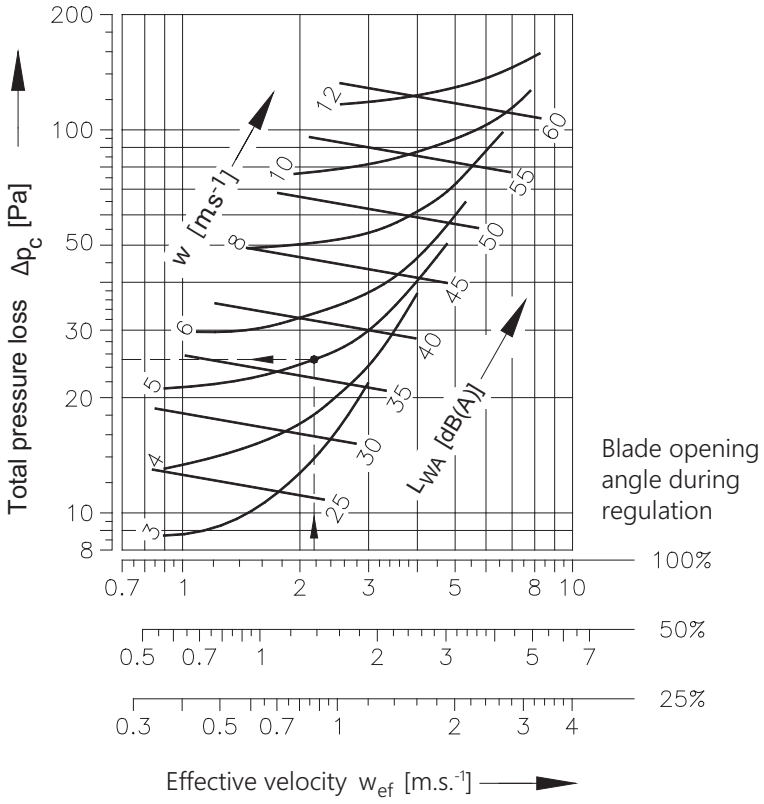
- radial adjustable grille
- row count (1 - single-row; 2 - double-row)
- duct diameter
- useful cross-section (•HxB) (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

Size H1xB1 (hole for the grille in the air duct)	Duct diameter D	DEPTH OF THE SIDE BAR OF THE A1 FRAME	
		1-row grille	2-row grille
75×225	150-400	30	50
75×325			
75×425			
75×525			
75×625			
85×225			
85×325			
85×425			
85×525			
85×625			
125×225	300-900		
125×325			
125×425			
125×525			
125×625			
225×225	630-1250		
225×325			
225×425			
225×525			
225×625			
325×225			
325×325			
325×425			
325×525			
325×625			

Height of the grille opening, H1	75	85	125	225	325
DUCT DIAMETER	Pipe bending radius, R				
150	90	90			
160	90	90			
180	90	90			
200	110	110			
225	110	110			
250	160	160	160		
300	160	160	160		
315	225	225	225		
355	225	225	225		
400	225	225	225		
450			225		
500			300		
560			300		
630			300	300	300
710			400	400	355
800			400	400	400
900				400	500
1000				600	500
1120				600	600
1250				600	600

Size H1xB1	Effective area Sef, m²		Size H1xB1	Effective area Sef, m²	
	1-row grille	2-row grille		1-row grille	2-row grille
75×225	0,0079	0,0061	125×525	0,0390	0,0298
75×325	0,0118	0,0090	125×625	0,0467	0,0356
75×425	0,0156	0,0119	225×225	0,03172	0,0234
75×525	0,0195	0,0149	225×325	0,0471	0,0347
75×625	0,0233	0,0178	225×425	0,0625	0,046
85×225	0,0095	0,0077	225×525	0,0779	0,0572
85×325	0,0141	0,0114	225×625	0,0933	0,0685
85×425	0,0188	0,0151	325×225	0,0476	0,0347
85×525	0,0234	0,0188	325×325	0,0707	0,0514
85×625	0,0280	0,0225	325×425	0,0938	0,068
125×225	0,0159	0,0122	325×525	0,1169	0,0847
125×325	0,0236	0,018	325×625	0,14	0,1013
125×425	0,0313	0,0239			

SOUND POWER AND PRESSURE LOSS



EFFECTIVE VELOCITY

$$W_{EF}=V/3600xS_{EF}$$

- **V,** m^3xh^{-1} air flow rate per 1 grille
- **ΔP$_C$,** Pa total pressure loss at ς=1.2 kgxm^{-3}
- **L$_{WA}$,** dB(A) sound power level
- **W$_{EF}$,** $m.s^{-1}$ effective flow rate through the grille
- **W,** $m.s^{-1}$ air flow rate in the duct
- **S$_{EF}$,** m^3 effective grille area

EXAMPLE

INPUT DATA: grille RAD-2-100x600
V=280 m^3xh^{-1}
w=5 $m.s^{-1}$

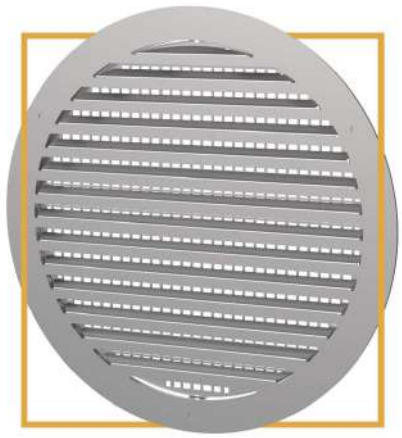
TABLE: S_{EF}=0,0356 m^2

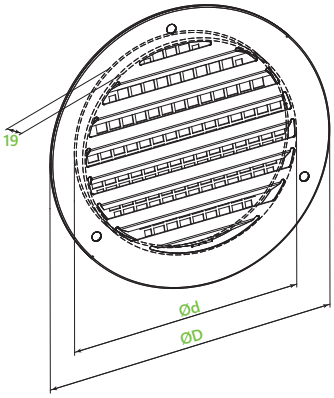
CALCULATIONK: $W_{EF}=V/3600xS_{EF}$=2,18 $M.S^{-1}$

CHART: ΔPc=25 Pa
Lwa=36 dB(A)

ROUND NON-ADJUSTABLE GRILLE | RKN

- round non-adjustable grilles are used for supply and exhaust ventilation, in air conditioning and air heating systems. For installation in air ducts or in round wall openings. Grilles are used for decorative design of inlet and outlet openings of domestic and industrial ventilation channels. These grilles protect air ducts from precipitation and foreign objects, and are also used to distribute air flows;
- no quality deterioration and changes in color are observed when the grilles used outdoors for a long time;
- grille is made of galvanized steel, and a galvanized steel mesh is installed on the back side;
- grille is characterized by high strength, easy installation and reliable operation. The use of powder coating provides for an aesthetic appearance, which allows the grille to have a harmonious look in any modern exterior and ensures resistance to adverse weather conditions;
- grilles are fixed with glue or solution, and it is also possible to attach them with self-tapping screws (using mounting holes on the front side);
- these grilles are painted with powder paints according to the RAL catalog. They are usually painted white.





DESIGNATED NAME	DIMENSIONS, MM		WEIGHT, KG, MAX
	D	d	
RKN-100	164	98	0,4
RKN-125	187	123	0,5
RKN-140	204	138	0,5
RKN-150	214	148	0,6
RKN-160	210	158	0,6
RKN-180	244	178	0,7
RKN-200	264	198	0,9
RKN-225	289	223	1,0
RKN-250	314	248	1,1
RKN-280	344	278	1,3
RKN-315	379	313	1,6

EXAMPLE:

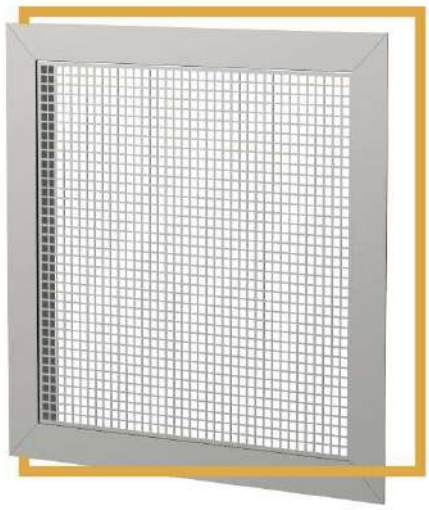
RKN non-adjustable round ventilation grille with a diameter of 160 mm, painted

RKN-160–9016

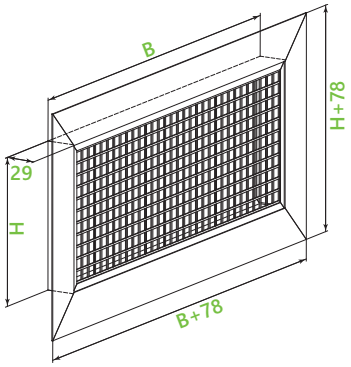
- non-adjustable round ventilation grille (•RKN)
- useful cross-section (•D - diameter, mm)
- color according to the RAL catalog (•0 - unpainted)

NOTE: special requirements for RKN are specified additionally and agreed with the manufacturer.

RKP | DECORATIVE GRILLE



- decorative grille is designed for air distribution between rooms, also used in supply and exhaust ventilation systems, air conditioning and air heating systems, decorative design of inlet and outlet openings of both domestic and industrial ventilation, by installation in air ducts or in wall openings;
- housing is made of high-quality aluminum profile and perforated galvanized sheet. Powder coating of the ventilation grille provides an aesthetic appearance and additionally protects against corrosion;
- painted with powder paints according to the RAL catalog. As standard, they are painted white;
- non-standard sized grilles can be manufactured upon request.



H, мм \ B, мм	100	150	200	250	300	350	400	450	500	600	700	800	900	1000
100	0,0084	0,0126	0,0168	0,0210	0,0252	0,0294	0,0336	0,0378	0,0420	0,0504	0,0588	0,0672	0,0756	0,0840
150	—	0,0189	0,0252	0,0315	0,0378	0,0441	0,0504	0,0567	0,0630	0,0756	0,0882	0,1008	0,1134	0,1260
200	—	—	0,0336	0,0420	0,0504	0,0588	0,0672	0,0756	0,0840	0,1008	0,1176	0,1344	0,1512	0,1680
250	—	—	—	0,0525	0,0630	0,0735	0,0840	0,0945	0,1050	0,1260	0,1470	0,1680	0,1890	0,2100
300	—	—	—	—	0,0756	0,0882	0,1008	0,1134	0,1260	0,1512	0,1764	0,2016	0,2268	0,2520
350	—	—	—	—	—	0,1029	0,1176	0,1323	0,1470	0,1764	0,2058	0,2352	0,2646	0,2940
400	—	—	—	—	—	—	0,1344	0,1512	0,1680	0,2016	0,2352	0,2688	0,3024	0,3360
450	—	—	—	—	—	—	—	0,1701	0,1890	0,2268	0,2646	0,3024	0,3402	0,3780
500	—	—	—	—	—	—	—	—	0,2100	0,2520	0,2940	0,3360	0,3780	0,4200
600	—	—	—	—	—	—	—	—	—	0,3024	0,3528	0,4032	0,4536	0,5040
700	—	—	—	—	—	—	—	—	—	—	0,4116	0,4704	0,5292	0,5880
800	—	—	—	—	—	—	—	—	—	—	—	0,5376	0,6048	0,6720
900	—	—	—	—	—	—	—	—	—	—	—	—	0,6804	0,7560
1000	—	—	—	—	—	—	—	—	—	—	—	—	—	0,8400

EXAMPLE:

RKP decorative surface mounted grille with useful cross-section of 150x200 mm, painted

RKP–150(H)×200–9016

- decorative surface mounted grille (•RKP)
- useful cross-section (•HxB)
  (H - height, mm; B - width, mm)
- color according to the RAL catalog (•0 - unpainted)

NOTE: special requirements for RKP are specified additionally and agreed with the manufacturer.

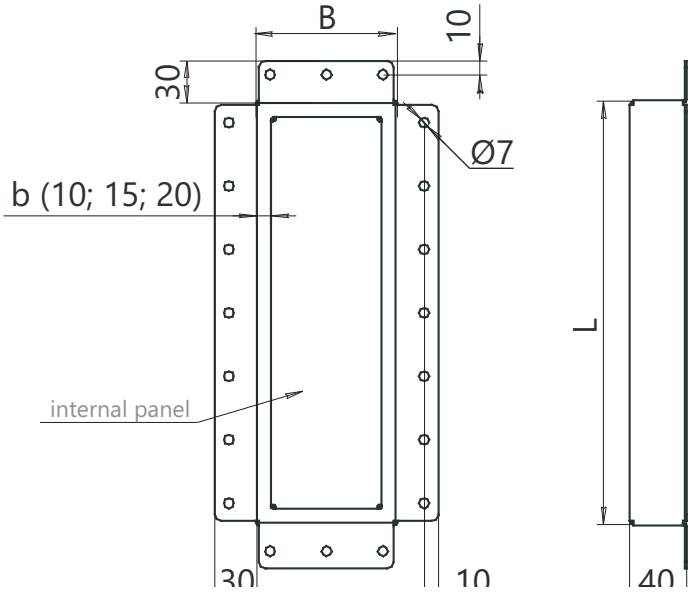
RSM FLUSH-MOUNTED GRILLE

- for natural and forced ventilation, as well as air conditioning systems;
- special design for use in rooms with high requirements for appearance and design;
- for walls and ceilings with painting, wallpaper and decorative plaster;
- length: from 300 mm to 2,200 mm (in 50 mm increments); height: 100 mm, 150 mm or 200 mm; depth: 40 mm. Perimeter slot width: 10 mm (15 mm or 20 mm on request). If the desired size is not among the standard ones, the possibility of manufacturing and the cost of the grille is discussed individually;
- painted with powder paints according to the RAL catalog. As standard, they are painted black;
- central panel, which remains visible, is very easy to install. It can also be easily removed for access to the adapter and duct. The central panel can be covered with wallpaper, paint, or even a thin layer of plaster, or the desired color of the grille must be specified when ordering the grille from the manufacturer.

CALCULATION OF THE REQUIRED SIZE AND NUMBER OF GRILLES:

The air flow rate through each grille depends on its dimensions L and B, the width of the slot b, and the air velocity allowed in the room (from 1 to 6 m/s).

To calculate the required number of grilles depending on the required air flow rate, you can contact the technical specialists of CCK TM.



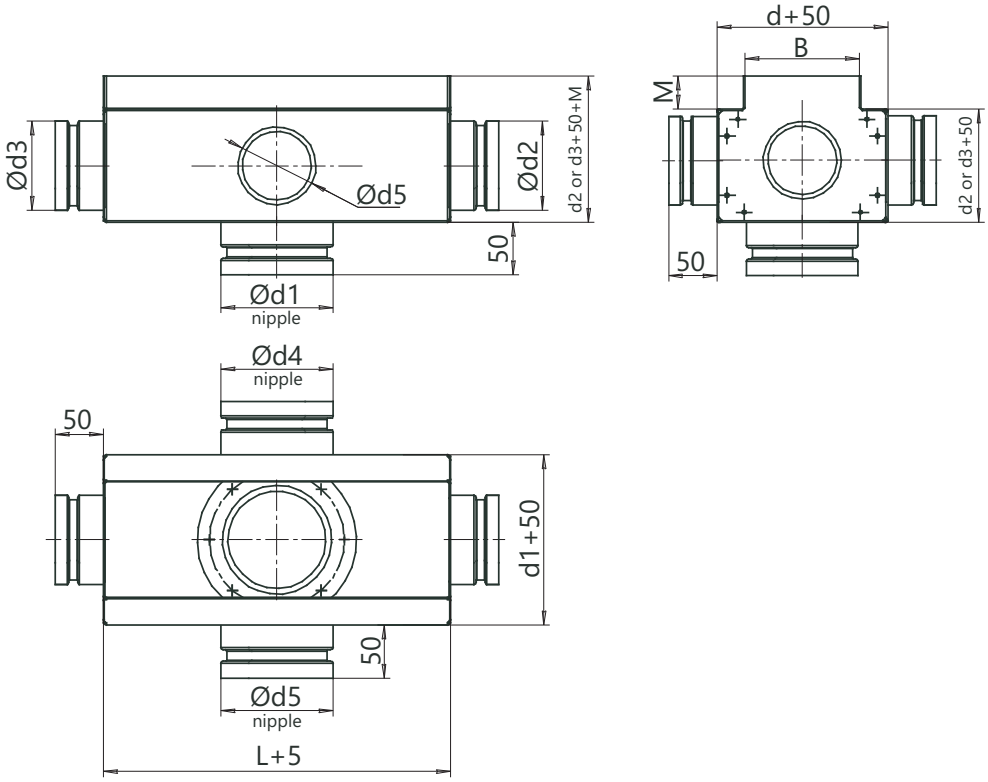
RSM-300x100-20-9005

- flush-mounted grille
- useful cross-section (LxB)
  (L - length, mm; B - width, mm)
- width of the slot for air passage around the perimeter, mm (• 10; • 15 or • 20)
- color according to the RAL catalog (•0 - unpainted)

AIR CONTROL EQUIPMENT

ADAPTER RSMA

- designed for connecting RSM flush-mounted ventilation grilles to the main lines of ventilation, air conditioning and heating systems. With the help of the adapter, the grilles are securely docked to any plastic or metal air duct of round, square or rectangular cross-section;
- ensures uniform distribution of air flow over the entire cross-section of the ventilation grille;
- manufactured with high precision using CNC equipment from galvanized sheet steel, which guarantees the strength and resistance of the adapters to corrosion;
- individual production of RSMA is possible with a non-standard arrangement of transitions to air ducts and other requirements according to the customer's sketch.



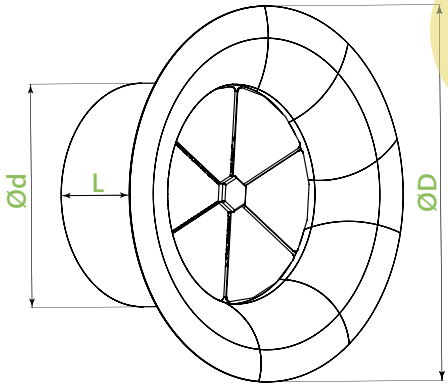
RSMA-300x100-30-1x100-0-0-0-0

- adapter for RSM
- useful cross-section (•LxB)
  (L - width, mm; B - height, mm)
- distance between the RSMA adapter and the RSM grille in the mounting position (M), mm
- one round transition to a pipe diameter d1 on the side opposite the grille
- transition to the air duct on the side to the right of the grille outlet, diameter d2 (•0 - not available)
- transition to the air duct on the side to the left of the grille outlet, diameter d3 (•0 - not available)
- transition to the air duct on the top side of the grille outlet, diameter d4 (•0 - not available)
- transition to the air duct on the side below the grille outlet, diameter d5 (•0 - not available)

NOTE: individual production of RSMA is possible with a non-standard arrangement of transitions to air ducts and other requirements according to the customer's sketch. In the model designation of such adapters, you need to add "according to the sketch". Providing a sketch agreed by the customer and the manufacturer for such adapters is mandatory.

ROTARY DIFFUSER DR

- DR rotary diffuser is designed for use in premises with a height of 3 m to 10 m, where a high-quality air conditioning system and powerful ventilation are required;
- diffusers are installed under the ceiling of the room on vertical branches of the air duct or it is possible to install a diffuser in the structure of a suspended ceiling (subject to compliance with building codes);
- these diffusers can be used in premises with a height of three meters or more. The DR rotary diffuser consists of a casing and blades. By manually adjusting the angle of the blade pitch, the direction of the air flow is changed. Each blade is adjustable separately. The round shape of the diffuser and adjustable blades ensure rotational movement of the air flow, resulting in intensive air mixing and reduced air stratification;
- diffusers are made of galvanized steel. Upon agreement with the customer, they can be painted with powder paint in the color according to the RAL catalog.



DESIGNATED NAME	DIMENSIONS, mm		
	D	d	L
DR-200	310	198	220
DR-250	390	248	240
DR-315	500	313	260
DR-350	580	348	250
DR-400	580	398	280
DR-450	632	448	296
DR-500	685	498	315
DR-630	865	628	380
DR-800	1090	798	555

EXAMPLE:

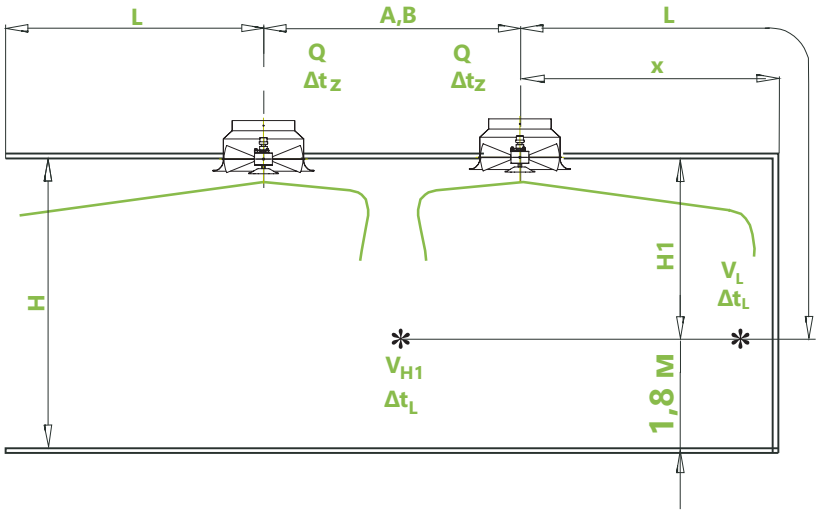
DR rotary diffuser, size 200, painted

DR–200–9016

- rotary diffuser (•DR)
- standard size
- color according to the RAL catalog (•0 - unpainted)

SELECTION AND CALCULATION OF ROTARY DIFFUSERS

Q, m^3/h - air flow rate
x, m - horizontal distance from the wall
H, m - room height
H1, m - distance from the ceiling to the work area
L, m - air discharge distance
VL, m/s - air flow velocity at distance L
Δt_z, K - is the difference between the indoor air temperature and the supply air temperature
Δt_l, K - is the difference between the room temperature and the air flow temperature
Δp_t, Pa - pressure drop
L_{wa}, dB(A) - sound power level
V_{H1}, m/s - air velocity at distance H1
A, B, m - distance between two diffusers in length and width



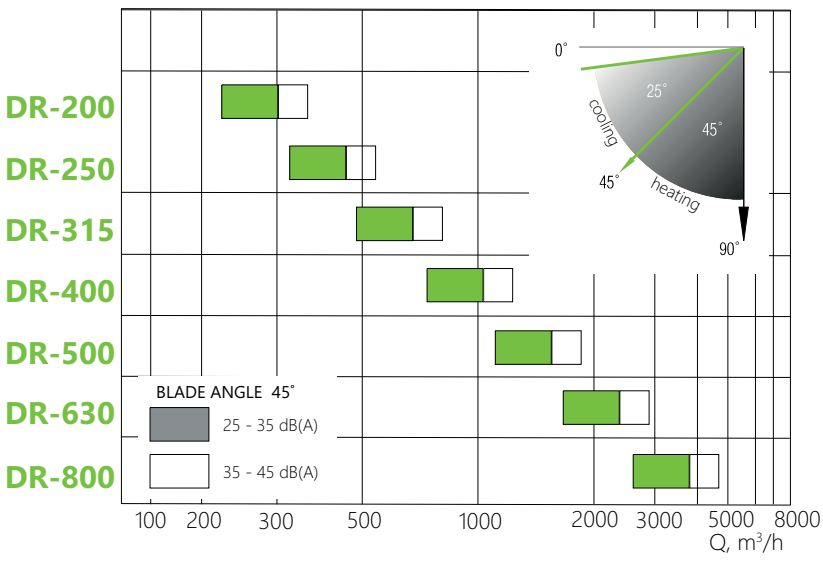
permissible air velocity in the working area VH1 ≤ 0.2 m/s

DIAGRAM FOR QUICK SELECTION OF THE DIFFUSER

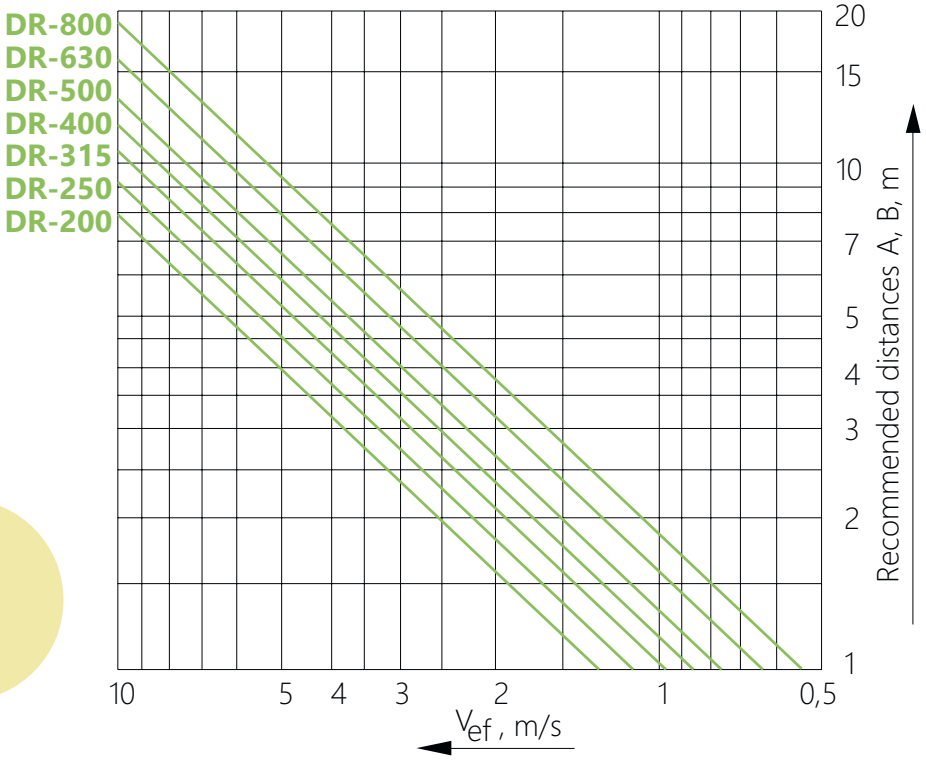
$V_{ef}=Q/(A_{ef}x3\ 600)$
where Q - air flow rate;
A_{ef} - diffuser cross-sectional area;
V_{ef} - effective velocity.

DIFFUSER CROSS-SECTIONAL AREA

DESIGNATED NAME	A_{ef}, m^2
DR-200	0,030
DR-250	0,048
DR-315	0,077
DR-400	0,125
DR-500	0,195
DR-630	0,310
DR-800	0,503



SIZE OF DIFFUSERS DEPENDING ON THE DISTANCE BETWEEN THEM AND THE EFFECTIVE VELOCITY



BLADE OPENING ANGLE FOR HEATING AND COOLING

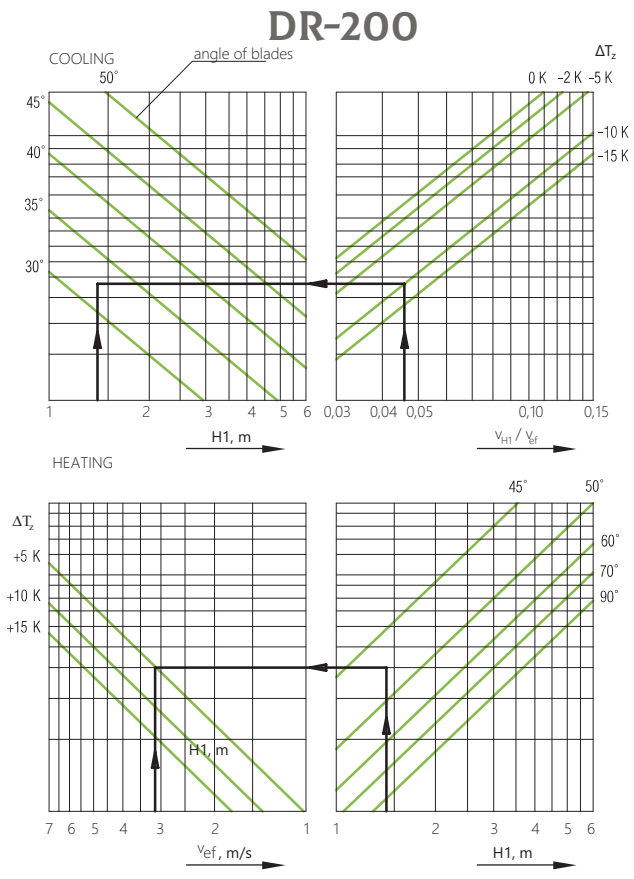
COOLING
CALCULATION

Q= 350 m³/h
H=3,2 m
H1=H-1,8=3,2-1,8=1,4 m
V_{H1}= 0,15 m/s
ΔT_z= -10 K
Recommended size: 200

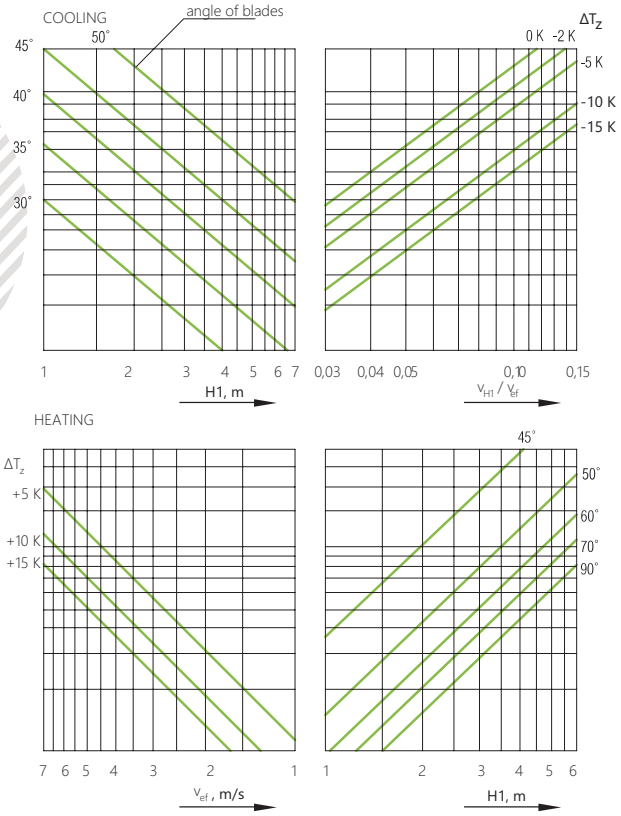
$V_{ef}=Q/(A_{ef}x3600)=350/(0,03x3600)$
V_{ef}=3,24 m/s
$V_{H1}/V_{ef}=0,15/3,24=0,046$
Blade angle: 32°

HEATING
CALCULATION
Q= 350 m³/h
H=3,2 m
H1=H-1,8=3,2-1,8=1,4 m
V_{H1}= 0,15 m/s
ΔT_z= 5 K
Recommended size: 200

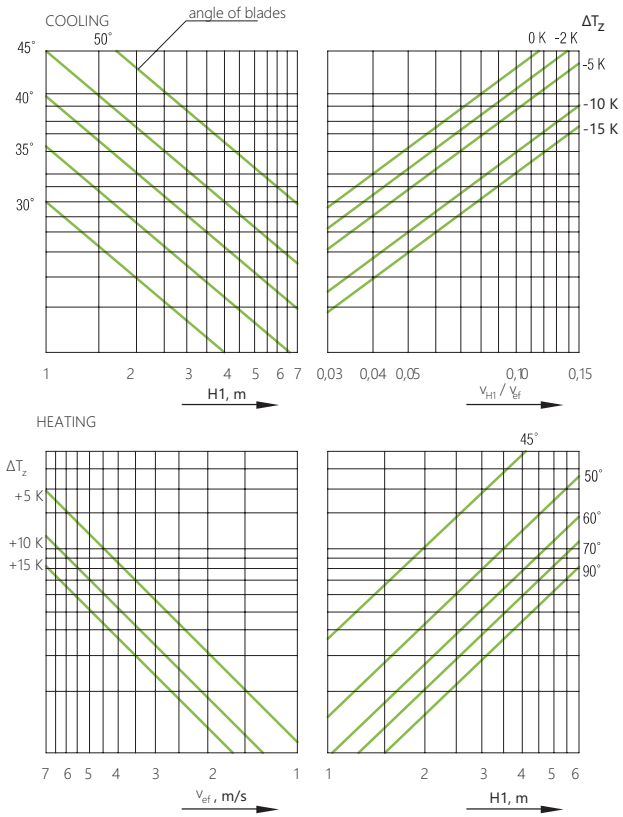
V_{ef}=3,24 m/s
Blade angle: 47°



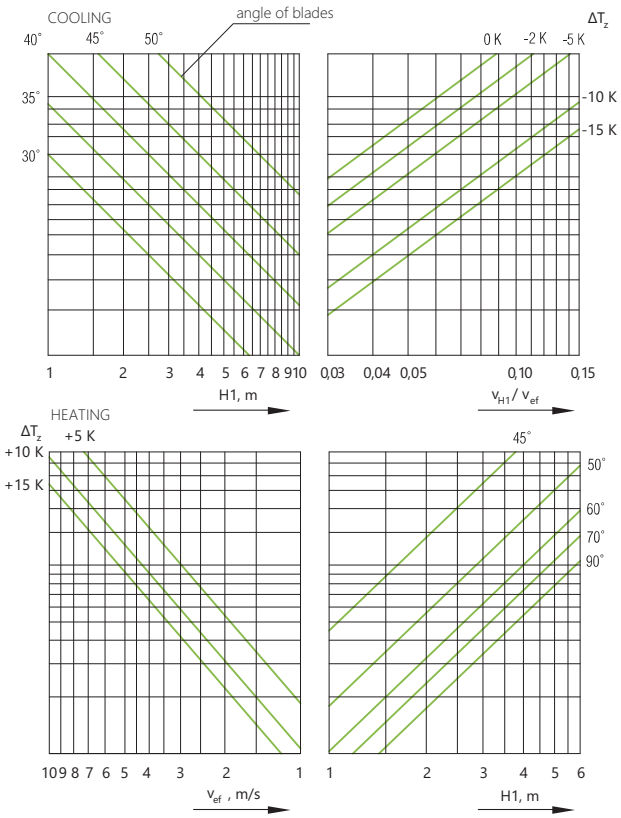
DR-250



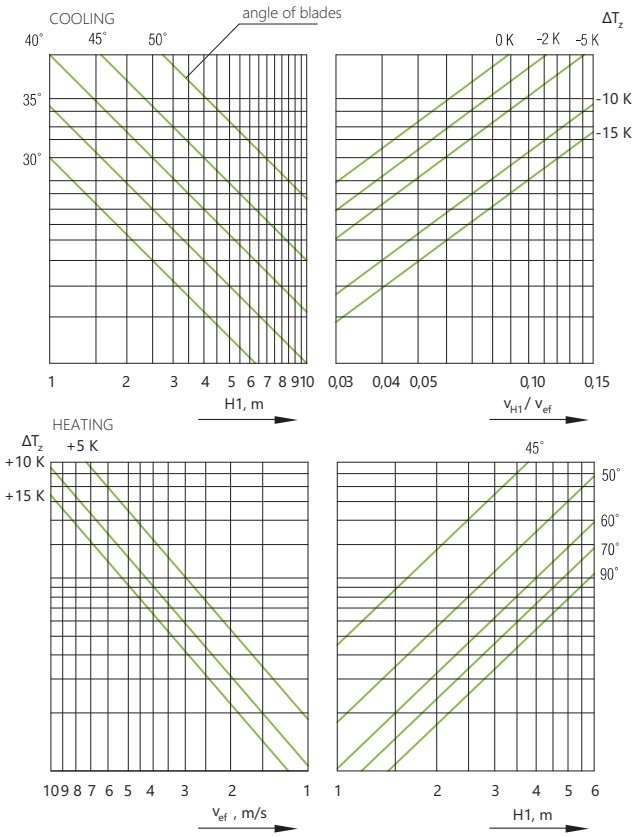
DR-315



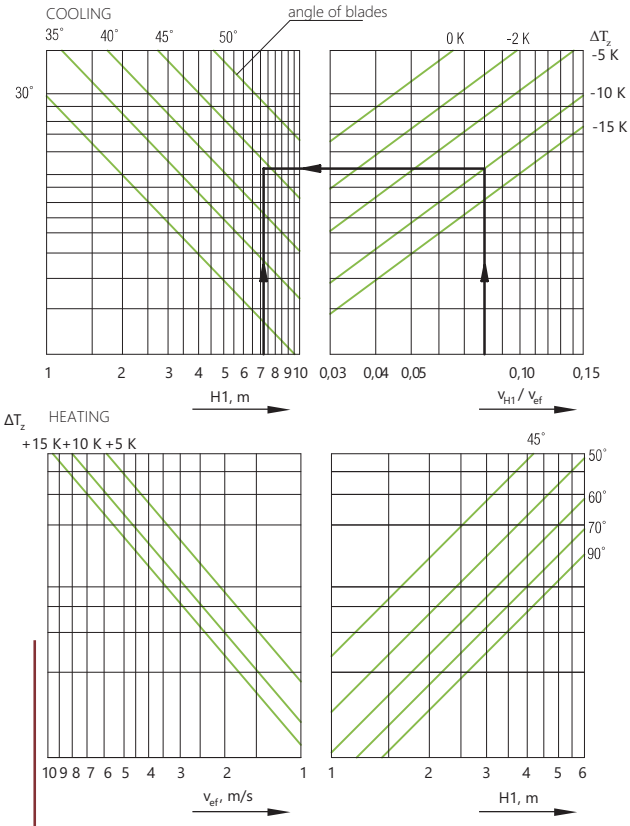
DR-400



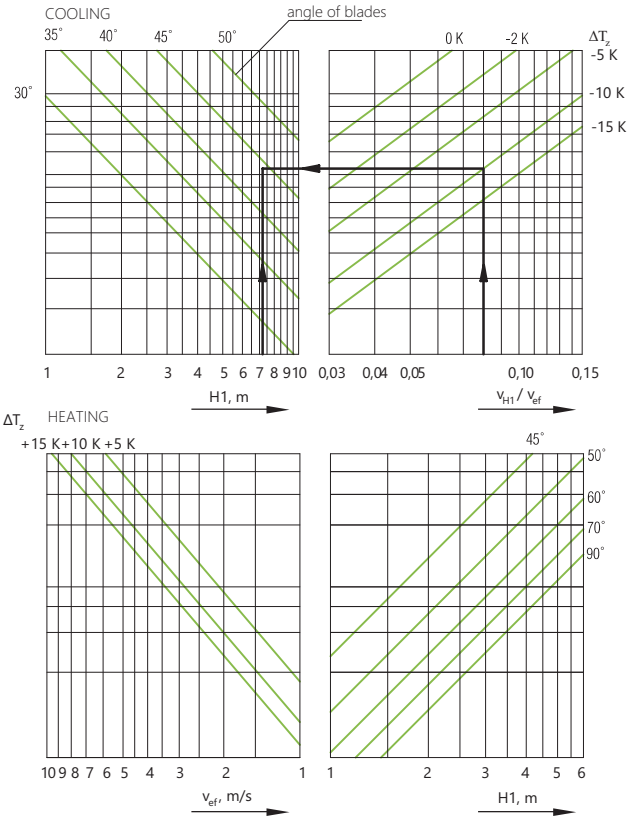
DR-500



DR-630


COOLING
angle of blades
35° 40° 45° 50°
30°
0 K -2 K
ΔTz
-5 K
-10 K
-15 K
1 2 3 4 5 6 7 8 9 10
H1, m
0,03 0,04 0,05 0,10 0,15
vH1 / vef
ΔTz HEATING
+15 K +10 K +5 K
45°
50°
60°
70°
90°
10 9 8 7 6 5 4 3 2 1
vef, m/s
1 2 3 4 5 6
H1, m

DR-800


COOLING
angle of blades
35° 40° 45° 50°
30°
0 K -2 K
ΔTz
-5 K
-10 K
-15 K
1 2 3 4 5 6 7 8 9 10
H1, m
0,03 0,04 0,05 0,10 0,15
vH1 / vef
ΔTz HEATING
+15 K +10 K +5 K
45°
50°
60°
70°
90°
10 9 8 7 6 5 4 3 2 1
vef, m/s
1 2 3 4 5 6
H1, m

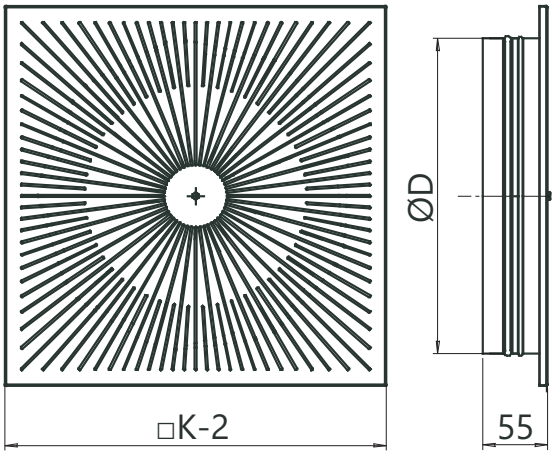
ROTARY DIFFUSER FOR SUSPENDED CEILINGS | DRX

- used in air conditioning, ventilation and heating systems, create a vortex air flow for good mixing with indoor air;
- used in rooms with high requirements for appearance and design;
- designed for both supplying and removing air from the room;
- installed in a suspended ceiling, or suspended from a building structure.

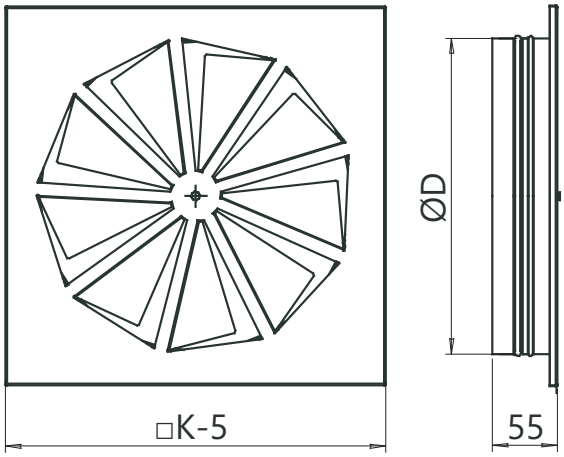
The DRX rotary diffuser for suspended ceilings structurally consists of a rotary diffuser and a square front panel (optional). The nominal diameter of the diffuser (standard size) should be selected from the standard range of diameters: 200 mm, 250 mm, 315 mm, 350 mm, 400 mm, 450 mm, 500 mm. Connection type to the air duct system: nipple with EPDM rubber seal. The diffuser blades are not adjustable. The blade bending angle is fixed and set at the factory. To select the bending angle, it's necessary to use the guidelines on page 75 of this catalog.
Page 75 shows the flow cross-sectional area of the diffuser without the front panel. The flow cross-sectional area of the diffuser with front panel is indicated on page 80 next to the corresponding front panel option. When calculating the bending angle of the diffuser blades with a front panel, select the lower flow cross-section value from those indicated on pages 75 and 80.
The front panel can be made in any size up to and including 625 mm. This allows the device to be used in both standard Armstrong-type suspended ceiling systems and any other systems. The front panel pattern is selected from the standard options listed below. It is also possible to manufacture the front panel according to the individual sketch of the customer. The front panel can be painted in any tone color according to the RAL catalog, which almost completely removes restrictions on the design and color scheme of products. It is possible to make a diffuser without a front panel. In this case, the diffuser blades will be painted in the color specified by the customer.
IMPORTANT: the diameter of the diffuser (standard size) must be smaller than the square tile of the suspended ceiling.

APPEARANCE OF THE ROTARY DIFFUSER FOR SUSPENDED CEILING

WITH FRONT PANEL



WITHOUT FRONT PANEL

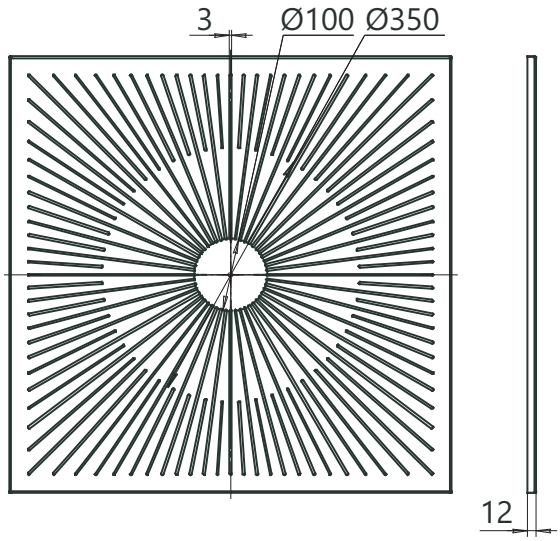


DRX-45-500–P1-600–9016

- rotary diffuser for suspended ceilings
- angle of fixed bending of the diffuser blades, degrees
- standard size
- front panel availability, type of drawing (•0 - without front panel, •PX - according to the customer's sketch)
- nominal square tile of the suspended ceiling that requires a diffuser K, mm
- color of the front part of the diffuser according to the RAL catalog (•0-unpainted)

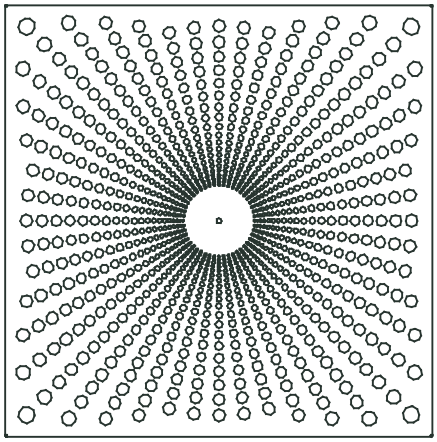
FRONT PANEL OPTIONS

P1



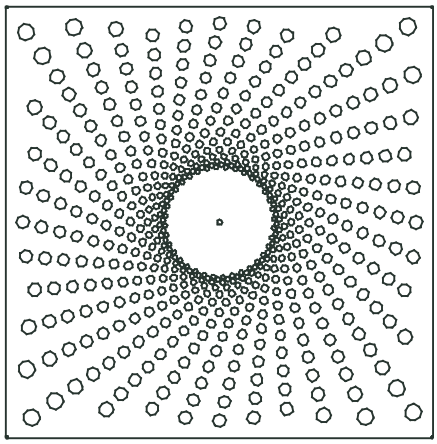
flow cross-sectional area for 600x600 mm panel = 0.059 m²

P2



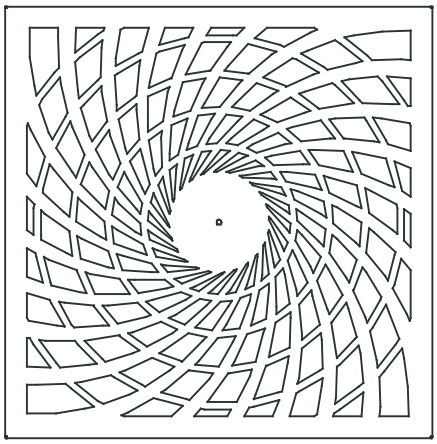
flow cross-sectional area for 600x600 mm panel = 0.088 m²

P3



flow cross-sectional area for 600x600 mm panel = 0.134 m²

P4

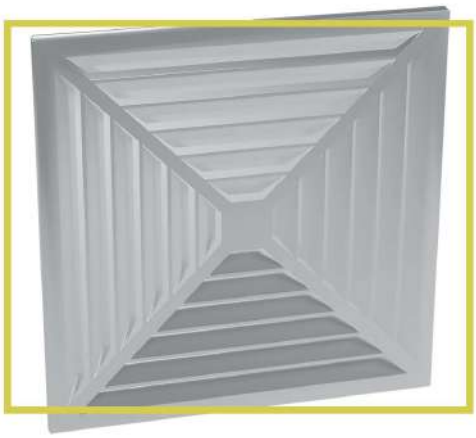


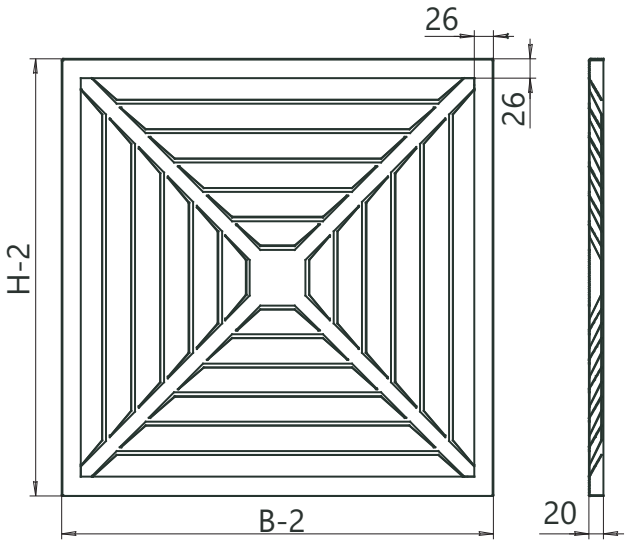
flow cross-sectional area for 600x600 mm panel = 0.069 m²

CEILING DIFFUSER MADE OF GALVANIZED STEEL | DPO

- designed for use in air conditioning, ventilation and heating systems;
- they are installed in residential and office buildings, in production, commercial and public facilities;
- designed for both supplying and removing air from the room;
- installed in a suspended ceiling, or suspended from a building structure.

Diffusers that distribute air in several directions are designed to evenly disperse air flows throughout the entire volume of the room. They are versatile in use and provide uniform air distribution.
Suitable for installation in open-type suspended ceiling "Armstrong" or similar as a replacement for standard tiles.
The diffusers are made of galvanized steel with a powder coating, which provides reliable protection from negative environmental influences and prevents premature wear of the product.
The minimum external size of the diffuser is 100x100 mm, and the maximum is 1,200x1,200 mm.
The standard paint color is white (RAL-9016), but at the customer's request, any other color from the RAL palette can be used.





DPO-600×600-9016

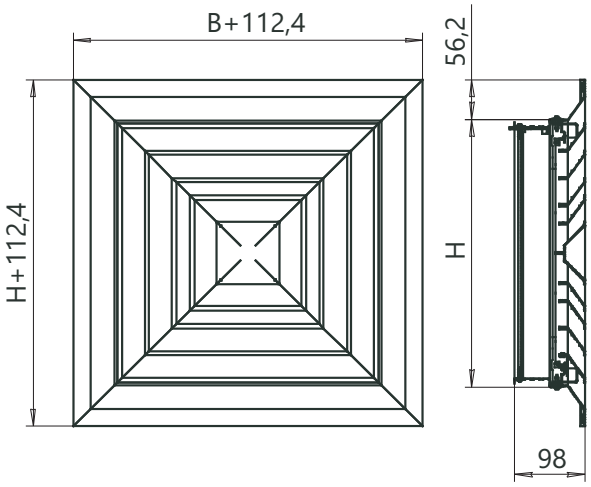
- ceiling diffuser made of galvanized steel
- external size (•BxH) (B - width, mm; H - height, mm)
- coating color according to the RAL catalog (•0 - unpainted, 9016 - standard white)

CEILING DIFFUSER MADE OF ALUMINUM PROFILE DPA

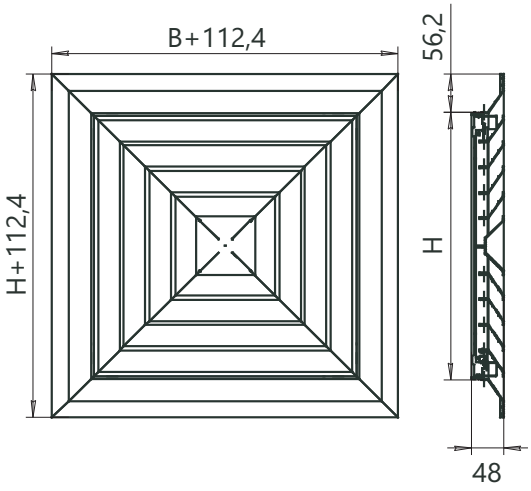
- designed for use in air conditioning, ventilation and heating systems;
- they are installed in residential and office buildings, in production, commercial and public facilities;
- designed for both supplying and removing air from the room;
- installed in a suspended ceiling, or suspended from a building structure;
- depending on the design version, it can be equipped with a flow control damper;
- non-standard size diffuser can be manufactured on customer request.

Diffusers that distribute air in several directions are designed to evenly disperse air flows throughout the entire volume of the room. They are versatile in use and provide uniform air distribution.
Suitable for installation in open-type suspended ceiling "Armstrong" or similar as a replacement for standard tiles.
In the version with a flow control damper, it is possible to change the volume of air that enters through the diffuser, which is important for comfort and efficiency of ventilation.
The diffusers are made of powder-coated aluminum profile, which provides reliable protection against negative environmental influences and prevents premature wear of the product.
The standard paint color is white (RAL-9016), but at the customer's request, any other color from the RAL palette can be used.

WITH DAMPER



WITHOUT DAMPER



DPA-600×600-0-9016

- ceiling diffuser made of aluminum profile
- external size (•BxH) (B - width, mm; H - height, mm)
- damper availability (0 - no damper, 1 - equipped with damper)
- coating color according to the RAL catalog (•0 - unpainted, •9016 - standard white)

The table shows the main parameters of the most popular diffuser sizes.

DESIGNATED NAME	AIR VOLUME, m^3/h	AIR DISCHARGE DISTANCE, M		pressure loss, Pa	noise level, dB(A)
		0,25 M/S	0,1 m/s		
150-150	120	1	1,5	9	<20
	160	1,1	2	15	<20
	200	1,5	2,5	23	<20
	250	1,7	3	33	<20
	280	2	3,5	43	19
225-225	280	1	2	9	<20
	370	1,5	2,5	15	<20
	460	2	3,5	23	<20
	55	2,1	4	33	23
	640	2,2	4,5	43	27
300-300	490	1,5	2,5	9	<20
	650	2	3,5	15	20
	810	2,2	4,5	23	25
	970	2,5	5	33	29
	1 130	3	6	43	32
375-375	760	2	3,5	9	<20
	1 010	2,2	4,5	15	24
	1 270	2,5	5,5	23	29
	1 520	3,5	6,5	33	33
	1 770	4	7,5	43	37
450-450	1 100	2	4	9	22
	1 460	2,5	5	15	28
	1 820	3,5	6,5	23	33
	2 190	4	8	33	36
	2 550	4,5	9	43	40
525-525	1 490	2,5	5	9	25
	1 980	3	6	15	30
	2 480	4	8	23	35
	2 980	4,5	9	33	40
	3 470	5	10,5	43	45
600-600	1 950	2,5	5,5	9	30
	2 590	3,5	7	15	35
	3 240	4,5	8,5	23	40
	3 890	5	10,5	33	45
	4 540	6	12	3	45

RON

THREE-DIMENSIONAL SURFACE MOUNTED GRILLE

- three-dimensional surface mounted grille is used to protect the internal space of dampers from unauthorized physical and visual access, to prevent the possibility of external mechanical impact on the actuator of wall dampers and to decorate their appearance;
- features a more attractive appearance and the necessary structural rigidity; can serve as an element of architectural decor of industrial design style. In addition, the RON grille blades feature an internal bend, which significantly reduces the possibility of their damage during installation and transportation. An additional feature of the RON grille is a lower air flow resistance and a slightly larger flow cross-section coefficient relative to its other grilles (louvered grille and R25 grille).

The RON grille is manufactured as a three-dimensional box structure with a "reverse-bent" flange, which significantly increases the rigidity of its structure and increases the flow cross-section of the grille. On the front side, the grille increases the external dimension - the damper depth by 30 mm. The outer part of the flanges is beveled with a significant bending radius, which gives the grille an aggressive design, external decorative appeal and increased aerodynamic properties. The grille is attached to the damper flanges from the outside through special mounting holes. The minimum size of the RON grille is 300x300 mm. The maximum size A can reach 1,400 mm if size B does not exceed or is equal to 1,100 mm. If the size B exceeds the value of 1,100 mm, the size A of such a grille cannot exceed 1,100 mm. In cases where the RON grille cannot be manufactured in a single-section version, it is manufactured in a cassette version and is assembled from two or four parts. The grille flange is selected when ordering and can have a width of 30 to 80 mm.

EXAMPLE:

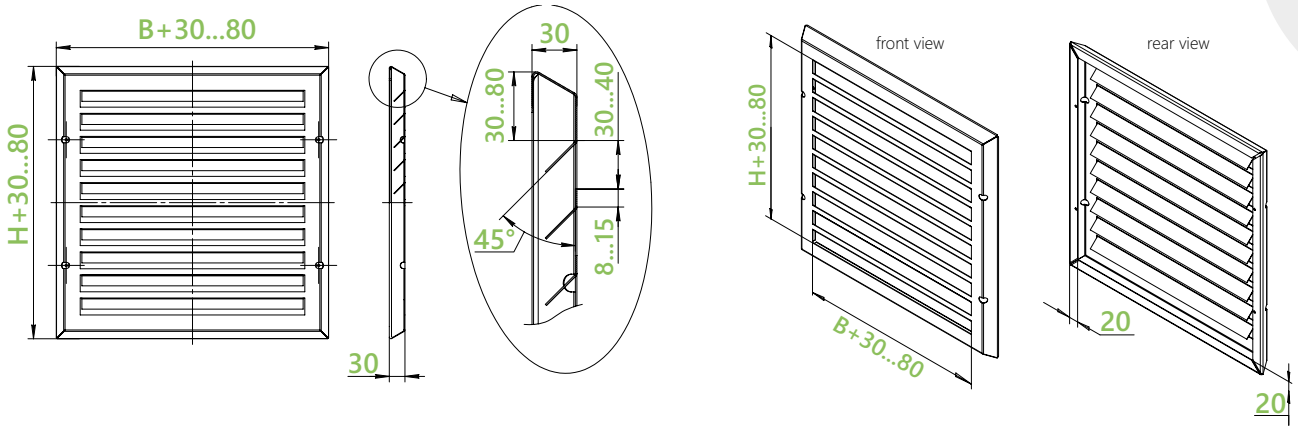
RON type three-dimensional surface mounted grille with a useful cross-section of 600x1000 mm, with a flange of 30 mm, made of galvanized steel:

RON–600×1000–30–ZS

- three-dimensional surface mounted grille (•RON)
- useful cross-section (•BxH)
  (B - width, mm; H - height, mm)
- mesh flange width (•30) (from 30 mm to 80 mm, in 5 mm increments)
- material (•CS - carbon steel with special coating •NS - stainless steel • ZS - low-alloy galvanized steel)

NOTE:

Special requirements for RON are specified additionally and agreed with the manufacturer.



B, мм \ A, мм	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000
300	0,082	0,096	0,109	0,123	0,137	0,150	0,164	0,177	0,191	0,205	0,218	0,232	0,246	0,259	0,273	0,287	0,300	0,314	0,328	0,341	0,355	0,369	0,382	0,383	0,396	0,409	0,422	0,436	0,449	0,462	0,475	0,488	0,502	0,515	0,528
350	0,096	0,111	0,127	0,143	0,159	0,175	0,191	0,207	0,223	0,239	0,255	0,271	0,287	0,303	0,319	0,334	0,350	0,366	0,382	0,398	0,414	0,430	0,446	0,447	0,462	0,477	0,493	0,508	0,524	0,539	0,554	0,570	0,585	0,601	0,616
400	0,109	0,127	0,146	0,164	0,182	0,200	0,218	0,237	0,255	0,273	0,291	0,309	0,328	0,346	0,364	0,382	0,400	0,419	0,437	0,455	0,473	0,491	0,510	0,510	0,528	0,546	0,563	0,581	0,598	0,616	0,634	0,651	0,669	0,686	0,704
450	0,123	0,143	0,164	0,184	0,205	0,225	0,246	0,266	0,287	0,307	0,328	0,348	0,369	0,389	0,410	0,430	0,450	0,471	0,491	0,512	0,532	0,553	0,573	0,574	0,594	0,614	0,634	0,653	0,673	0,693	0,713	0,733	0,752	0,772	0,792
500	0,137	0,159	0,182	0,205	0,228	0,250	0,273	0,296	0,319	0,341	0,364	0,387	0,410	0,432	0,455	0,478	0,501	0,523	0,546	0,569	0,592	0,614	0,637	0,638	0,660	0,682	0,704	0,726	0,748	0,770	0,792	0,814	0,836	0,858	0,880
550	0,150	0,175	0,200	0,225	0,250	0,275	0,300	0,325	0,350	0,375	0,400	0,425	0,450	0,475	0,501	0,526	0,551	0,576	0,601	0,626	0,651	0,676	0,701	0,702	0,726	0,750	0,774	0,799	0,823	0,847	0,871	0,895	0,920	0,944	0,968
600	0,164	0,191	0,218	0,246	0,273	0,300	0,328	0,355	0,382	0,410	0,437	0,464	0,491	0,519	0,546	0,573	0,601	0,628	0,655	0,683	0,710	0,737	0,764	0,766	0,792	0,818	0,845	0,871	0,898	0,924	0,950	0,977	1,003	1,030	1,056
650	0,177	0,207	0,237	0,266	0,296	0,325	0,355	0,384	0,414	0,444	0,473	0,503	0,532	0,562	0,592	0,621	0,651	0,680	0,710	0,739	0,769	0,799	0,828	0,829	0,858	0,887	0,915	0,944	0,972	1,001	1,030	1,058	1,087	1,115	1,144
700	0,191	0,223	0,255	0,287	0,319	0,350	0,382	0,414	0,446	0,478	0,510	0,541	0,573	0,605	0,637	0,669	0,701	0,733	0,764	0,796	0,828	0,860	0,892	0,893	0,924	0,955	0,986	1,016	1,047	1,078	1,109	1,140	1,170	1,201	1,232
750	0,205	0,239	0,273	0,307	0,341	0,375	0,410	0,444	0,478	0,512	0,546	0,580	0,614	0,648	0,683	0,717	0,751	0,785	0,819	0,853	0,887	0,921	0,956	0,957	0,990	1,023	1,056	1,089	1,122	1,155	1,188	1,221	1,254	1,287	1,320
800	0,218	0,255	0,291	0,328	0,364	0,400	0,437	0,473	0,510	0,546	0,582	0,619	0,655	0,692	0,728	0,764	0,801	0,837	0,874	0,910	0,946	0,983	1,019	1,021	1,056	1,091	1,126	1,162	1,197	1,232	1,267	1,302	1,338	1,373	1,408
850	0,232	0,271	0,309	0,348	0,387	0,425	0,464	0,503	0,541	0,580	0,619	0,657	0,696	0,735	0,774	0,812	0,851	0,890	0,928	0,967	1,006	1,044	1,083	1,085	1,122	1,159	1,197	1,234	1,272	1,309	1,346	1,384	1,421	1,459	1,496
900	0,246	0,287	0,328	0,369	0,410	0,450	0,491	0,532	0,573	0,614	0,655	0,696	0,737	0,778	0,819	0,860	0,901	0,942	0,983	1,024	1,065	1,106	1,147	1,148	1,188	1,228	1,267	1,307	1,346	1,386	1,426	1,465	1,505	1,544	1,584
950	0,259	0,303	0,346	0,389	0,432	0,475	0,519	0,562	0,605	0,648	0,692	0,735	0,778	0,821	0,865	0,908	0,951	0,994	1,037	1,081	1,124	1,167	1,210	1,212	1,254	1,296	1,338	1,379	1,421	1,463	1,505	1,547	1,588	1,630	1,672
1000	0,273	0,319	0,364	0,410	0,455	0,501	0,546	0,592	0,637	0,683	0,728	0,774	0,819	0,865	0,910	0,956	1,001	1,047	1,092	1,138	1,183	1,229	1,274	1,276	1,320	1,364	1,408	1,452	1,496	1,540	1,584	1,628	1,672	1,716	1,760
1050	0,287	0,334	0,382	0,430	0,478	0,526	0,573	0,621	0,669	0,717	0,764	0,812	0,860	0,908	0,956	1,003	1,051	1,099	1,147	1,194	1,242	1,290	1,338	1,340	1,386	1,432	1,478	1,525	1,571	1,617	1,663	1,709	1,756	1,802	1,848
1100	0,300	0,350	0,400	0,450	0,501	0,551	0,601	0,651	0,701	0,751	0,801	0,851	0,901	0,951	1,001	1,051	1,101	1,151	1,201	1,251	1,301	1,351	1,401	1,404	1,452	1,500	1,549	1,597	1,646	1,694	1,742	1,791	1,839	1,888	1,936
1150	0,314	0,366	0,419	0,471	0,523	0,576	0,628	0,680	0,733	0,785	0,837	0,890	0,942	0,994	1,047	1,099	1,151	1,164	1,214	1,265	1,316	1,366	1,417	1,467	1,518	1,569	1,619	1,670	1,720	1,771	1,822	1,872	1,923	1,973	2,024
1200	0,328	0,382	0,437	0,491	0,546	0,601	0,655	0,710	0,764	0,819	0,874	0,928	0,983	1,037	1,092	1,147	1,201	1,214	1,267	1,320	1,373	1,426	1,478	1,531	1,584	1,637	1,690	1,742	1,795	1,848	1,901	1,954	2,006	2,059	2,112
1250	0,341	0,398	0,455	0,512	0,569	0,626	0,683	0,739	0,796	0,853	0,910	0,967	1,024	1,081	1,138	1,194	1,251	1,265	1,320	1,375	1,430	1,485	1,540	1,595	1,650	1,705	1,760	1,815	1,870	1,925	1,980	2,035	2,090	2,145	2,200
1300	0,355	0,414	0,473	0,532	0,592	0,651	0,710	0,769	0,828	0,887	0,946	1,006	1,065	1,124	1,183	1,242	1,301	1,316	1,373	1,430	1,487	1,544	1,602	1,659	1,716	1,773	1,830	1,888	1,945	2,002	2,059	2,116	2,174	2,231	2,288
1350	0,369	0,430	0,491	0,553	0,614	0,676	0,737	0,799	0,860	0,921	0,983	1,044	1,106	1,167	1,229	1,290	1,351	1,366	1,426	1,485	1,544	1,604	1,663	1,723	1,782	1,841	1,901	1,960	2,020	2,079	2,138	2,198	2,257	2,317	2,376
1400	0,382	0,446	0,510	0,573	0,637	0,701	0,764	0,828	0,892	0,956	1,019	1,083	1,147	1,210	1,274	1,338	1,401	1,417	1,478	1,540	1,602	1,663	1,725	1,786	1,848	1,910	1,971	2,033	2,094	2,156	2,218	2,279	2,341	2,402	2,464
1450	0,396	0,462	0,528	0,594	0,660	0,726	0,792	0,858	0,924	0,990	1,056	1,122	1,188	1,254	1,320	1,385	1,451	1,467	1,531	1,595	1,659	1,723	1,786	1,850	1,914	1,978	2,042	2,105	2,169	2,233	2,297	2,361	2,424	2,488	2,552
1500	0,410	0,478	0,546	0,614	0,683	0,751	0,819	0,887	0,956	1,024	1,092	1,160	1,229	1,297	1,365	1,433	1,502	1,518	1,584	1,650	1,716	1,782	1,848	1,914	1,980	2,046	2,112	2,178	2,244	2,310	2,376	2,442	2,508	2,574	2,640
1550	0,423	0,494	0,564	0,635	0,705	0,776	0,846	0,917	0,987	1,058	1,128	1,199	1,269	1,340	1,411	1,481	1,552	1,569	1,637	1,705	1,773	1,841	1,910	1,978	2,046	2,114	2,182	2,251	2,319	2,387	2,455	2,523	2,592	2,660	2,728
1600	0,437	0,510	0,582	0,655	0,728	0,801	0,874	0,946	1,019	1,092	1,165	1,238	1,310	1,383	1,456	1,529	1,602	1,619	1,690	1,760	1,830	1,901	1,971	2,042	2,112	2,182	2,253	2,323	2,394	2,464	2,534	2,605	2,675	2,746	2,816
1650	0,450	0,526	0,601	0,676	0,751	0,826	0,901	0,976	1,051	1,126	1,201	1,276	1,351	1,426	1,502	1,577	1,652	1,670	1,742	1,815	1,888	1,960	2,033	2,105	2,178	2,251	2,323	2,396	2,468	2,541	2,614	2,686	2,759	2,831	2,904
1700	0,464	0,541	0,619	0,696	0,774	0,851	0,928	1,006	1,083	1,160	1,238	1,315	1,392	1,470	1,547	1,624	1,702	1,720	1,795	1,870	1,945	2,020	2,094	2,169	2,244	2,319	2,394	2,468	2,543	2,618	2,693	2,768	2,842	2,917	2,992
1750	0,478	0,557	0,637	0,717	0,796	0,876	0,956	1,035	1,115	1,194	1,274	1,354	1,433	1,513	1,593	1,672	1,752	1,771	1,848	1,925	2,002	2,079	2,156	2,233	2,310	2,387	2,464	2,541	2,618	2,695	2,772	2,849	2,926	3,003	3,080
1800	0,491	0,573	0,655	0,737	0,819	0,901	0,983	1,065	1,147	1,229	1,310	1,392	1,474	1,556	1,638	1,720	1,802	1,822	1,901	1,980	2,059	2,138	2,218	2,297	2,376	2,455	2,534	2,614	2,693	2,772	2,851	2,930	3,010	3,089	3,168
1850	0,488	0,570	0,651	0,733	0,814	0,895	0,977	1,058	1,140	1,221	1,302	1,384	1,465	1,547	1,628	1,709	1,791	1,872	1,954	2,035	2,116	2,198	2,279	2,361	2,442	2,523	2,605	2,686	2,768	2,849	2,930	3,012	3,093	3,175	3,256
1900	0,502	0,585	0,669	0,752	0,836	0,920	1,003	1,087	1,170	1,254	1,338	1,421	1,505	1,588	1,672	1,756	1,839	1,923	2,006	2,090	2,174	2,257	2,341	2,424	2,508	2,592	2,675	2,759	2,842	2,926	3,010	3,093	3,177	3,260	3,344
1950	0,515	0,601	0,686	0,772	0,858	0,944	1,030	1,115	1,201	1,287	1,373	1,459	1,544	1,630	1,716	1,802	1,888	1,973	2,059	2,145	2,231	2,317	2,402	2,488	2,574	2,660	2,746	2,831	2,917	3,003	3,089	3,175	3,260	3,346	3,432
2000	0,528	0,616	0,704	0,792	0,880	0,968	1,056	1,144	1,232	1,320	1,408	1,496	1,584	1,672	1,760	1,848	1,936	2,024	2,112	2,200	2,288	2,376	2,464	2,552	2,640	2,728	2,816	2,904	2,992	3,080	3,168	3,256	3,344	3,432	3,520

XXX – single-section version

XXX – two-section version (vertical connection)

XXX – two-section version (horizontal connection)

XXX – four-section version

RES | LOUVERED GRILLE

- complete set with a louvered grille is used when it is necessary to completely close the inner part of the damper and when there are no strict decorative requirements for external design;
- serves to protect against unauthorized access to the damper and its actuator, as well as to prevent external mechanical impact and ingress of foreign objects;
- can be used as part of any fire or smoke damper of rectangular cross-section, including sectional design version.

It is made in the form of a one-piece cut-out lattice barrier made of sheet steel, with the possibility of attachment to the front part of the damper through its connecting flange.

Due to the one-piece cutting out technology of its production, it is possible to adjust the flow cross-section (resistance) of louvered grilles by setting the required opening angle of the leaves - by bending them manually.

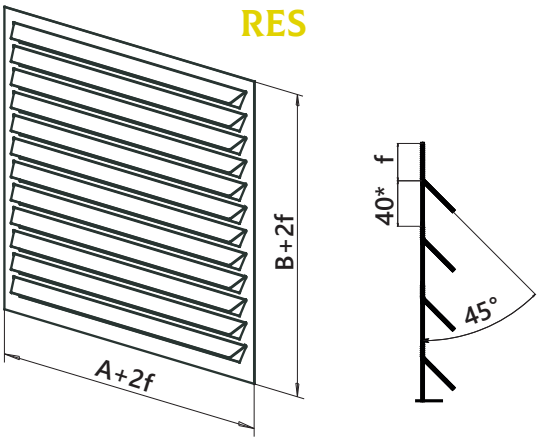
The size range of louvered grilles has no restrictions in the field of the maximum size of a standard sheet of galvanized steel, that is, it is possible to manufacture it with dimensions not exceeding 1.2x2.4 m. Dimensions: width "A" and height "B" in this case are the dimensions of the useful cross-section of the protected area.

Grilles are available in 2 versions:

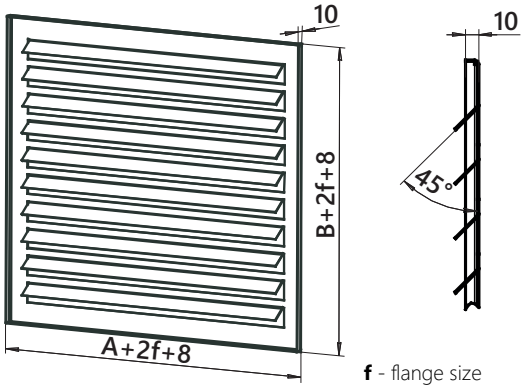
RES - with flat flanges (easier and cheaper);

RESb - with bends along the perimeter of the flanges, which not only give the grille greater rigidity, but also cover the flanges of the damper on which the grille is installed, on all sides

RES

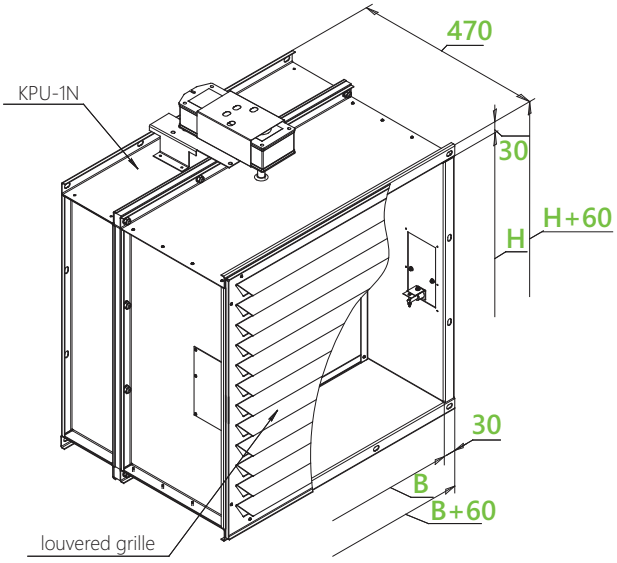


RESB



f - flange size

DAMPER WITH LOUVERED GRILLE



RES–1020×1000–30–ZS

- louvered grille (•RES; •RESb)
- useful cross-section (•AxB)
  (A - width, mm; B - height, mm)
- grille flange width (f)
- material (•CS - carbon steel with special coating •NS - stainless steel • ZS - low-alloy galvanized steel)

NOTE: special requirements for RES are specified additionally and agreed with the manufacturer.

A, мм / B, мм	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
100	0,004	0,008	0,011	0,015	0,019	0,022	0,026	0,030	0,033	0,037	0,041	0,044	0,048	0,052	0,055	0,059	0,062	0,066	0,070
150	0,006	0,012	0,017	0,023	0,028	0,034	0,039	0,044	0,050	0,055	0,061	0,066	0,072	0,077	0,083	0,088	0,094	0,099	0,105
200	0,008	0,016	0,023	0,030	0,037	0,045	0,052	0,059	0,067	0,074	0,081	0,088	0,096	0,103	0,110	0,118	0,125	0,132	0,139
250	0,010	0,019	0,029	0,038	0,047	0,056	0,065	0,074	0,083	0,092	0,101	0,111	0,120	0,129	0,138	0,147	0,156	0,165	0,174
300	0,012	0,023	0,034	0,045	0,056	0,067	0,078	0,089	0,100	0,111	0,122	0,133	0,144	0,155	0,165	0,176	0,187	0,198	0,209
350	0,014	0,027	0,040	0,053	0,065	0,078	0,091	0,104	0,117	0,129	0,142	0,155	0,168	0,180	0,193	0,206	0,219	0,231	0,244
400	0,016	0,031	0,046	0,060	0,075	0,089	0,104	0,119	0,133	0,148	0,162	0,177	0,191	0,206	0,221	0,235	0,250	0,264	0,279
450	0,019	0,035	0,051	0,068	0,084	0,101	0,117	0,133	0,150	0,166	0,183	0,199	0,215	0,232	0,248	0,265	0,281	0,297	0,314
500	0,021	0,039	0,057	0,075	0,094	0,112	0,130	0,148	0,166	0,185	0,203	0,221	0,239	0,258	0,276	0,294	0,312	0,330	0,349
550	0,023	0,043	0,063	0,083	0,103	0,123	0,143	0,163	0,183	0,203	0,223	0,243	0,263	0,283	0,303	0,323	0,343	0,364	0,384
600	0,025	0,047	0,068	0,090	0,112	0,134	0,156	0,178	0,200	0,222	0,243	0,265	0,287	0,309	0,331	0,353	0,375	0,397	0,418
650	0,027	0,050	0,074	0,098	0,122	0,145	0,169	0,193	0,216	0,240	0,264	0,287	0,311	0,335	0,359	0,382	0,406	0,430	0,453
700	0,029	0,054	0,080	0,105	0,131	0,156	0,182	0,207	0,233	0,259	0,284	0,310	0,335	0,361	0,386	0,412	0,437	0,463	0,488
750	0,031	0,058	0,086	0,113	0,140	0,168	0,195	0,222	0,250	0,277	0,304	0,332	0,359	0,386	0,414	0,441	0,468	0,496	0,523
800	0,033	0,062	0,091	0,120	0,150	0,179	0,208	0,237	0,266	0,295	0,325	0,354	0,383	0,412	0,441	0,470	0,500	0,529	0,558
850	0,035	0,066	0,097	0,128	0,159	0,190	0,221	0,252	0,283	0,314	0,345	0,376	0,407	0,438	0,469	0,500	0,531	0,562	0,593
900	0,037	0,070	0,103	0,136	0,168	0,201	0,234	0,267	0,300	0,332	0,365	0,398	0,431	0,464	0,496	0,529	0,562	0,595	0,628
950	0,039	0,074	0,108	0,143	0,178	0,212	0,247	0,282	0,316	0,351	0,385	0,420	0,455	0,489	0,524	0,559	0,593	0,628	0,663
1000	0,041	0,078	0,114	0,151	0,187	0,223	0,260	0,296	0,333	0,369	0,406	0,442	0,479	0,515	0,552	0,588	0,625	0,661	0,697
1050	0,043	0,082	0,120	0,158	0,196	0,235	0,273	0,311	0,350	0,388	0,426	0,464	0,503	0,541	0,579	0,617	0,656	0,694	0,732
1100	0,045	0,085	0,126	0,166	0,206	0,246	0,286	0,326	0,366	0,406	0,446	0,486	0,527	0,567	0,607	0,647	0,687	0,727	0,767
1150	0,047	0,089	0,131	0,173	0,215	0,257	0,299	0,341	0,383	0,425	0,467	0,509	0,551	0,592	0,634	0,676	0,718	0,760	0,802
1200	0,049	0,093	0,137	0,181	0,224	0,268	0,312	0,356	0,399	0,443	0,487	0,531	0,574	0,618	0,662	0,706	0,749	0,793	0,837
1250	0,051	0,097	0,143	0,188	0,234	0,279	0,325	0,370	0,416	0,462	0,507	0,553	0,598	0,644	0,690	0,735	0,781	0,826	0,872
1300	0,054	0,101	0,148	0,196	0,243	0,291	0,338	0,385	0,433	0,480	0,528	0,575	0,622	0,670	0,717	0,765	0,812	0,859	0,907
1350	0,056	0,105	0,154	0,203	0,252	0,302	0,351	0,400	0,449	0,499	0,548	0,597	0,646	0,695	0,745	0,794	0,843	0,892	0,942
1400	0,058	0,109	0,160	0,211	0,262	0,313	0,364	0,415	0,466	0,517	0,568	0,619	0,670	0,721	0,772	0,823	0,874	0,925	0,976
1450	0,060	0,113	0,165	0,218	0,271	0,324	0,377	0,430	0,483	0,536	0,588	0,641	0,694	0,747	0,800	0,853	0,906	0,958	1,011
1500	0,062	0,116	0,171	0,226	0,281	0,335	0,390	0,445	0,499	0,554	0,609	0,663	0,718	0,773	0,827	0,882	0,937	0,991	1,046
1550	0,064	0,120	0,177	0,233	0,290	0,346	0,403	0,459	0,516	0,572	0,629	0,685	0,742	0,798	0,855	0,912	0,968	1,025	1,081
1600	0,066	0,124	0,183	0,241	0,299	0,358	0,416	0,474	0,533	0,591	0,649	0,708	0,766	0,824	0,883	0,941	0,999	1,058	1,116
1650	0,068	0,128	0,188	0,248	0,309	0,369	0,429	0,489	0,549	0,609	0,670	0,730	0,790	0,850	0,910	0,970	1,030	1,091	1,151
1700	0,070	0,132	0,194	0,256	0,318	0,380	0,442	0,504	0,566	0,628	0,690	0,752	0,814	0,876	0,938	1,000	1,062	1,124	1,186
1750	0,072	0,136	0,200	0,263	0,327	0,391	0,455	0,519	0,583	0,646	0,710	0,774	0,838	0,902	0,965	1,029	1,093	1,157	1,221
1800	0,074	0,140	0,205	0,271	0,337	0,402	0,468	0,534	0,599	0,665	0,730	0,796	0,862	0,927	0,993	1,059	1,124	1,190	1,255
1850	0,076	0,144	0,211	0,279	0,346	0,413	0,481	0,548	0,616	0,683	0,751	0,818	0,886	0,953	1,020	1,088	1,155	1,223	1,290
1900	0,078	0,148	0,217	0,286	0,355	0,425	0,494	0,563	0,632	0,702	0,771	0,840	0,910	0,979	1,048	1,117	1,187	1,256	1,325
1950	0,080	0,151	0,222	0,294	0,365	0,436	0,507	0,578	0,649	0,720	0,791	0,862	0,933	1,005	1,076	1,147	1,218	1,289	1,360
2000	0,082	0,155	0,228	0,301	0,374	0,447	0,520	0,593	0,666	0,739	0,812	0,884	0,957	1,030	1,103	1,176	1,249	1,322	1,395

A, мм / B, мм	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000
100	0,073	0,077	0,081	0,084	0,088	0,092	0,095	0,099	0,103	0,106	0,110	0,113	0,117	0,121	0,124	0,128	0,132	0,135	0,139	0,143
150	0,110	0,116	0,121	0,126	0,132	0,137	0,143	0,148	0,154	0,159	0,165	0,170	0,176	0,181	0,187	0,192	0,198	0,203	0,209	0,214
200	0,147	0,154	0,161	0,169	0,176	0,183	0,191	0,198	0,205	0,212	0,220	0,227	0,234	0,242	0,249	0,256	0,263	0,271	0,278	0,285
250	0,183	0,193	0,202	0,211	0,220	0,229	0,238	0,247	0,256	0,266	0,275	0,284	0,293	0,302	0,311	0,320	0,329	0,338	0,348	0,357
300	0,220	0,231	0,242	0,253	0,264	0,275	0,286	0,297	0,308	0,319	0,330	0,340	0,351	0,362	0,373	0,384	0,395	0,406	0,417	0,428
350	0,257	0,270	0,282	0,295	0,308	0,321	0,333	0,346	0,359	0,372	0,384	0,397	0,410	0,423	0,436	0,448	0,461	0,474	0,487	0,499
400	0,294	0,308	0,323	0,337	0,352	0,366	0,381	0,396	0,410	0,425	0,439	0,454	0,469	0,483	0,498	0,512	0,527	0,541	0,556	0,571
450	0,330	0,347	0,363	0,379	0,396	0,412	0,429	0,445	0,462	0,478	0,494	0,511	0,527	0,544	0,560	0,576	0,593	0,609	0,626	0,642
500	0,367	0,385	0,403	0,422	0,440	0,458	0,476	0,495	0,513	0,531	0,549	0,567	0,586	0,604	0,622	0,640	0,659	0,677	0,695	0,713
550	0,404	0,424	0,444	0,464	0,484	0,504	0,524	0,544	0,564	0,584	0,604	0,624	0,644	0,664	0,684	0,704	0,725	0,745	0,765	0,785
600	0,440	0,462	0,484	0,506	0,528	0,550	0,572	0,593	0,615	0,637	0,659	0,681	0,703	0,725	0,747	0,768	0,790	0,812	0,834	0,856
650	0,477	0,501	0,524	0,548	0,572	0,596	0,619	0,643	0,667	0,690	0,714	0,738	0,761	0,785	0,809	0,833	0,856	0,880	0,904	0,927
700	0,514	0,539	0,565	0,590	0,616	0,641	0,667	0,692	0,718	0,743	0,769	0,794	0,820	0,846	0,871	0,897	0,922	0,948	0,973	0,999
750	0,550	0,578	0,605	0,632	0,660	0,687	0,715	0,742	0,769	0,797	0,824	0,851	0,879	0,906	0,933	0,961	0,988	1,015	1,043	1,070
800	0,587	0,616	0,645	0,675	0,704	0,733	0,762	0,791	0,820	0,850	0,879	0,908	0,937	0,966	0,995	1,025	1,054	1,083	1,112	1,141
850	0,624	0,655	0,686	0,717	0,748	0,779	0,810	0,841	0,872	0,903	0,934	0,965	0,996	1,027	1,058	1,089	1,120	1,151	1,182	1,213
900	0,661	0,693	0,726	0,759	0,792	0,825	0,857	0,890	0,923	0,956	0,989	1,021	1,054	1,087	1,120	1,153	1,186	1,218	1,251	1,284
950	0,697	0,732	0,766	0,801	0,836	0,870	0,905	0,940	0,974	1,009	1,044	1,078	1,113	1,148	1,182	1,217	1,251	1,286	1,321	1,355
1000	0,734	0,770	0,807	0,843	0,880	0,916	0,953	0,989	1,026	1,062	1,099	1,135	1,171	1,208	1,244	1,281	1,317	1,354	1,390	1,427

Intermediate size equipment can be manufactured optionally.

AIR CONTROL EQUIPMENT

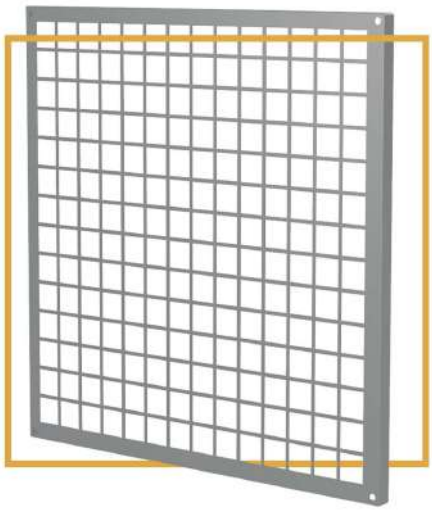
VANDAL-PROOF MESH SET

- complete set with a mesh is used in the absence of special requirements for the external design of the installed ventilation equipment to protect against unauthorized access to the damper and its actuator and prevent external mechanical impact and ingress of foreign objects;
- vandal-proof mesh can be used as part of any fire or smoke damper of both round and rectangular cross-section, including sectional-type damper;
- mesh is made of sheet steel by cutting holes (perforated steel sheet), the cell size is 30 mm. The mesh is made of low-alloy galvanized steel, on request it can be made of carbon steel with a paint coating or stainless steel;
- range of sizes of vandal-proof mesh has no limitations. Dimensions: height "B" and width "A" are the dimensions of the useful cross-section to be protected. The height of the mesh flange is fixed, the flange size is identical to the damper flange size. That is, when completing with a vandal-proof mesh (for example, for KPD series dampers), it is necessary to take into account that the external dimensions of such a mesh will completely cover the external front surface of the damper in its entire dimensions. The intended purpose of such a mesh is to protect the working space of the damper.

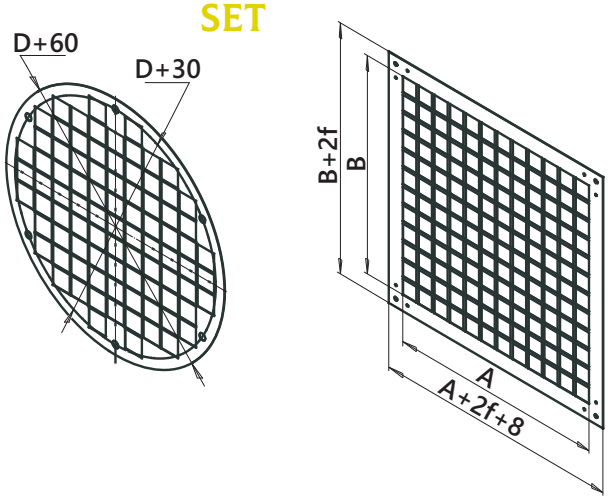
Mesh is available in 2 versions:

SET - rectangular and round, with flat flanges (these are simpler and cheaper);

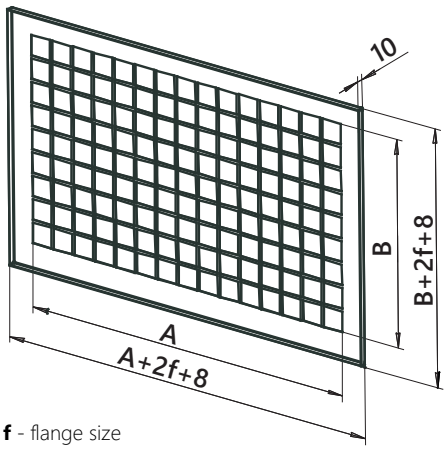
SETb - only for rectangular flanges with bends around the perimeter, which not only give the mesh more rigidity, but also cover the flanges of the damper on which the mesh is installed, from all sides.



SET



SETB



f - flange size

ROUND CROSS-SECTION

D, мм	100	125	140	150	160	180	200	225	250	280	315
flow cross-section	0,005	0,007	0,009	0,010	0,012	0,016	0,020	0,025	0,031	0,040	0,055

D, мм	355	400	450	500	560	630	710	800	900	1000
flow cross-section	0,075	0,082	0,115	0,135	0,157	0,233	0,280	0,354	0,492	0,566

SET–500×400–30–ZS

- vandal-proof mesh (•SET; •SETb (rectangular only)
- useful cross-section (•AxB •D)
  (•A - width, mm; B - height, mm; •D - diameter, mm)
- mesh flange width (f)
- material (•CS - carbon steel with special coating •NS - stainless steel • ZS - low-alloy galvanized steel)

NOTE: special requirements for SET are specified additionally and agreed with the manufacturer.

RECTANGULAR CROSS-SECTION

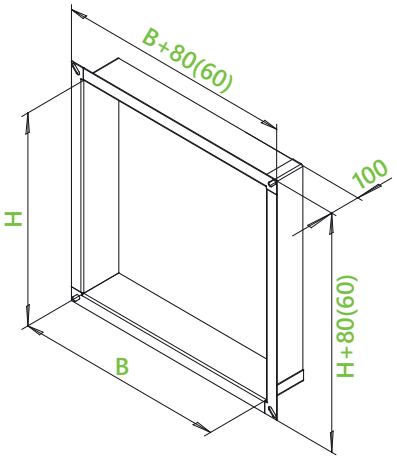
A, мм / B, мм	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050
100	0,008	0,010	0,015	0,020	0,023	0,028	0,030	0,035	0,040	0,043	0,048	0,050	0,056	0,061	0,063	0,068	0,073	0,076	0,081	0,083
150	0,010	0,013	0,020	0,027	0,030	0,037	0,040	0,047	0,054	0,057	0,064	0,067	0,074	0,081	0,084	0,091	0,098	0,101	0,108	0,111
200	0,015	0,020	0,030	0,040	0,045	0,056	0,061	0,071	0,081	0,086	0,096	0,101	0,111	0,121	0,126	0,136	0,146	0,151	0,161	0,167
250	0,020	0,027	0,040	0,054	0,061	0,074	0,081	0,094	0,108	0,114	0,128	0,135	0,148	0,161	0,168	0,182	0,195	0,202	0,215	0,222
300	0,023	0,030	0,045	0,061	0,068	0,083	0,091	0,106	0,121	0,129	0,144	0,151	0,167	0,182	0,189	0,204	0,220	0,227	0,242	0,250
350	0,028	0,037	0,056	0,074	0,083	0,102	0,111	0,130	0,148	0,157	0,176	0,185	0,204	0,222	0,231	0,250	0,268	0,278	0,296	0,305
400	0,030	0,040	0,061	0,081	0,091	0,111	0,121	0,141	0,161	0,172	0,192	0,202	0,222	0,242	0,252	0,272	0,293	0,303	0,323	0,333
450	0,035	0,047	0,071	0,094	0,106	0,130	0,141	0,165	0,188	0,200	0,224	0,235	0,259	0,283	0,294	0,318	0,341	0,353	0,377	0,389
500	0,040	0,054	0,081	0,108	0,121	0,148	0,161	0,188	0,215	0,229	0,256	0,269	0,296	0,323	0,336	0,363	0,390	0,404	0,431	0,444
550	0,043	0,057	0,086	0,114	0,129	0,157	0,172	0,200	0,229	0,243	0,272	0,286	0,315	0,343	0,357	0,386	0,415	0,429	0,458	0,472
600	0,048	0,064	0,096	0,128	0,144	0,176	0,192	0,224	0,256	0,272	0,304	0,320	0,352	0,383	0,399	0,431	0,463	0,479	0,511	0,527
650	0,050	0,067	0,101	0,135	0,151	0,185	0,202	0,235	0,269	0,286	0,320	0,336	0,370	0,404	0,421	0,454	0,488	0,505	0,538	0,555
700	0,056	0,074	0,111	0,148	0,167	0,204	0,222	0,259	0,296	0,315	0,352	0,370	0,407	0,444	0,463	0,500	0,537	0,555	0,592	0,611
750	0,061	0,081	0,121	0,161	0,182	0,222	0,242	0,283	0,323	0,343	0,383	0,404	0,444	0,484	0,505	0,545	0,585	0,606	0,646	0,666
800	0,063	0,084	0,126	0,168	0,189	0,231	0,252	0,294	0,336	0,357	0,399	0,421	0,463	0,505	0,526	0,568	0,610	0,631	0,673	0,694
850	0,068	0,091	0,136	0,182	0,204	0,250	0,272	0,318	0,363	0,386	0,431	0,454	0,500	0,545	0,568	0,613	0,659	0,681	0,727	0,749
900	0,073	0,098	0,146	0,195	0,220	0,268	0,293	0,341	0,390	0,415	0,463	0,488	0,537	0,585	0,610	0,659	0,707	0,732	0,780	0,805
950	0,076	0,101	0,151	0,202	0,227	0,278	0,303	0,353	0,404	0,429	0,479	0,505	0,555	0,606	0,631	0,681	0,732	0,757	0,807	0,833
1000	0,081	0,108	0,161	0,215	0,242	0,296	0,323	0,377	0,431	0,458	0,511	0,538	0,592	0,646	0,673	0,727	0,780	0,807	0,861	0,888

A, мм / B, мм	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000
100	0,088	0,093	0,096	0,101	0,103	0,108	0,114	0,116	0,121	0,126	0,129	0,134	0,136	0,141	0,146	0,149	0,154	0,156	0,161
150	0,118	0,124	0,128	0,135	0,138	0,145	0,151	0,155	0,161	0,168	0,172	0,178	0,182	0,188	0,195	0,198	0,205	0,209	0,215
200	0,177	0,187	0,192	0,202	0,207	0,217	0,227	0,232	0,242	0,252	0,257	0,267	0,272	0,283	0,293	0,298	0,308	0,313	0,323
250	0,235	0,249	0,256	0,269	0,276	0,289	0,303	0,309	0,323	0,336	0,343	0,357	0,363	0,377	0,390	0,397	0,410	0,417	0,431
300	0,265	0,280	0,288	0,303	0,310	0,325	0,341	0,348	0,363	0,378	0,386	0,401	0,409	0,424	0,439	0,447	0,462	0,469	0,484
350	0,324	0,342	0,352	0,370	0,379	0,398	0,416	0,426	0,444	0,463	0,472	0,490	0,500	0,518	0,537	0,546	0,564	0,574	0,592
400	0,353	0,373	0,383	0,404	0,414	0,434	0,454	0,464	0,484	0,505	0,515	0,535	0,545	0,565	0,585	0,595	0,616	0,626	0,646
450	0,412	0,436	0,447	0,471	0,483	0,506	0,530	0,542	0,565	0,589	0,600	0,624	0,636	0,659	0,683	0,695	0,718	0,730	0,754
500	0,471	0,498	0,511	0,538	0,552	0,579	0,606	0,619	0,646	0,673	0,686	0,713	0,727	0,754	0,780	0,794	0,821	0,834	0,861
550	0,500	0,529	0,543	0,572	0,586	0,615	0,643	0,658	0,686	0,715	0,729	0,758	0,772	0,801	0,829	0,844	0,872	0,886	0,915
600	0,559	0,591	0,607	0,639	0,655	0,687	0,719	0,735	0,767	0,799	0,815	0,847	0,863	0,895	0,927	0,943	0,975	0,991	1,023
650	0,589	0,622	0,639	0,673	0,690	0,723	0,757	0,774	0,807	0,841	0,858	0,891	0,908	0,942	0,976	0,992	1,026	1,043	1,076
700	0,648	0,685	0,703	0,740	0,759	0,796	0,833	0,851	0,888	0,925	0,944	0,981	0,999	1,036	1,073	1,092	1,129	1,147	1,184
750	0,706	0,747	0,767	0,807	0,828	0,868	0,908	0,928	0,969	1,009	1,029	1,070	1,090	1,130	1,171	1,191	1,231	1,251	1,292
800	0,736	0,778	0,799	0,841	0,862	0,904	0,946	0,967	1,009	1,051	1,072	1,114	1,135	1,177	1,219	1,240	1,283	1,304	1,346
850	0,795	0,840	0,863	0,908	0,931	0,976	1,022	1,045	1,090	1,135	1,158	1,203	1,226	1,272	1,317	1,340	1,385	1,408	1,453
900	0,854	0,902	0,927	0,976	1,000	1,049	1,098	1,122	1,171	1,219	1,244	1,293	1,317	1,366	1,415	1,439	1,488	1,512	1,561
950	0,883	0,934	0,959	1,009	1,034	1,085	1,135	1,161	1,211	1,262	1,287	1,337	1,362	1,413	1,463	1,489	1,539	1,564	1,615
1000	0,942	0,996	1,023	1,076	1,103	1,157	1,211	1,238	1,292	1,346	1,373	1,426	1,453	1,507	1,561	1,588	1,642	1,669	1,722

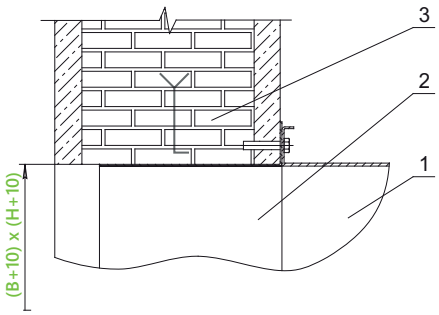
Intermediate size equipment can be manufactured optionally.

MRP MOUNTING FRAME

- mounting frame is not included in the obligatory delivery package, it is supplied if specified in the damper identification line. The mounting frame serves as a solid base when fixing the damper as an embedded element;
- dampers of rectangular cross-sections are produced only;
- mounting frame has a universal design for use when attaching the damper to a wall.



Embedding the damper with MRP mounting frame for attaching the damper to the wall



1 - damper; 2 - mounting frame; 3 - wall
where BxH, mm is the useful cross-section of the damper;
*for wall-type damper B=B+20; H=H+20

EXAMPLE:
mounting frame for attaching the GMK damper to the wall, useful cross-section of the damper 1000x800 mm, material - St3 steel

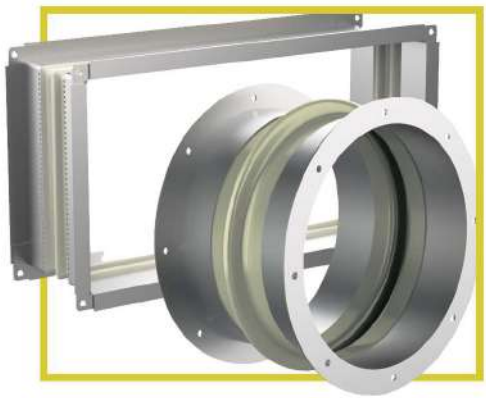
MRP–GMK-1000×800–C

- mounting frame
- application •REG •GMK •TUL •KLR •KED
- useful cross-section (•BxH) (B - width, mm; H - height, mm)
- material (•C - St3 steel; •NS - stainless steel •ZS - low-alloy galvanized steel)

FLEXIBLE CONNECTOR COM

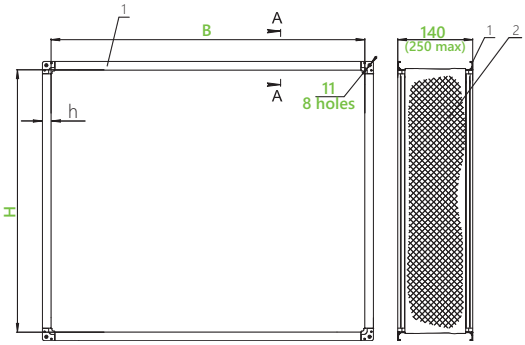
- COM standard flexible connectors are used as linear compensators in general ventilation networks to protect against the transmission of vibration loads from fans, ventilation units, air curtains or heating installations, etc. to air ducts, which, among other things, reduces the overall background noise of the ventilation system;
- main part of the flexible connector is a flexible sleeve made of special sealed fabric, which has rigid connecting flanges on both sides. Standard connectors of the COM series are fully operational in the temperature range from -40°C to + 60°C in installations that move air and air mixtures whose aggressiveness to the material is not higher than that of air;
- can be made of both round and rectangular useful cross-sections;
- dimensions of the useful cross-section can be standard: for round flexible connectors - from the standard range of diameters of round air ducts from 200 mm to 1250 mm, for rectangular flexible connectors - from 100x100 mm to 2,500(h)x1,500 mm (upon additional order, flexible connectors exceeding the specified cross-sections can be manufactured). The length of flexible connectors always corresponds to their length in the stretched state and can range from 140 mm to 250 mm, depending on the special requirements of the order (by default, the "default" length of connectors in the stretched state is 140 mm). In the folded position, the length of the connector is determined by the type of flat bar used in the manufacture of flanges: for rectangular connectors in the folded position, it can be 100 mm, for round connectors - 120 mm.

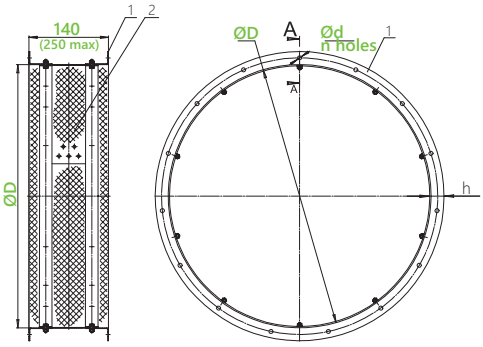
The number, size and location of holes on the round-section COM connector match to those of the KLR damper.



- COM 100 - general purpose industrial;
- COM 110 - general purpose industrial, heat-resistant (120°C - continuous);
- COM 120 - general purpose industrial, antistatic*;
- COM 200 - high strength design;
- COM 400 - heat-resistant up to 400 degrees;
- COM 600 - heat-resistant up to 600 degrees.

* COM antistatic connectors (120 series) can be installed in explosive areas where it is possible to form an explosive gas environment of all categories and groups.





COM series	Operating conditions		
	Moved medium	Operating pressure, Pa	Temperature, °C
100	• non-aggressive	1 500	from -40° to +70°
110	• non-aggressive	2 000	from -40° to +120° (continuous)
120	• non-aggressive explosive (antistatic surface)	1 500	from -40° to +70°
200	• non-aggressive	10 000	from -40° to +70°
400	• non-aggressive	2 000	from -45° to +200° (+400°/2 hours)
420	• non-aggressive explosive (antistatic surface)	2 000	from -45° to +200° (+400°/2 hours)
600	• non-aggressive	2 000	from -45° to +300° (+600°/2 hours)
620	• non-aggressive explosive (antistatic surface)	2 000	from -45° to +300° (+600°/2 hours)

EXAMPLE:
flexible connector with useful cross-section of 400x500 mm, general industrial design with a flange of 20 mm, made of St3 steel

COM-100-400×500-20-C

- flexible connector (•COM-100; •COM-110; •COM-120; •COM-200;•COM-400; •COM-420; •COM-600; •COM-620)
- useful cross-section (•HxB; •D) (H - height, mm; b - width, mm; D-diameter, mm)
- flange size (h) (20 mm or 30 mm, 40 mm or 50 mm possible by additional agreement)
- material (•C - St3 steel; •NS - stainless steel •ZS - low-alloy galvanized steel)

QUESTIONNAIRE
for general industrial type AIR DAMPERS

PLEASE FILL IN ALL THE NECESSARY DATA AND SEND IT TO THE NEAREST COMPANY OFFICE

damper designation (according to the catalog):

_____ (if known)

it is allowed to specify an analog from another manufacturer _____

Contact person:_____

Organization:_____

Tel.:_____ e-mail:_____

Region (city): _____ date:_____

please check ☑ specify the required value

when ordering equipment of different dimensions of the same configuration,
the dimensions of AxB or D and their quantity must be indicated in the table below

dimensions AxB (width x height) or D			**damper type according to the catalog**		☑
				(0, 1, 2, 3, 4 - specify the required one)	
			design	shut-off	
				regulating	
				with perimeter heating	
				backdraft	
			special conditions	air-tight	
				earthquake-resistant	
				pressure-relief damper	
				corrosion-resistant	
				explosion-proof	
				tandem louvre damper	
			type of actuator	without drive	
				handle	
				electric drive	
				220 V	
				24 V	
				with return spring	
				with smooth adjustment	
				with additional contacts	
			(if manufacturing is possible)		
			mounting frame	wall-mounted	
			adapter for round cross-section	diameter	
				quantity	

NOTE: for dimensions and equipment, see the catalog

Additional conditions:

Customer _____ _____
(signature) (full name)

QUESTIONNAIRE
FOR VENTILATION ELEMENTS

PLEASE FILL IN ALL THE NECESSARY DATA AND SEND IT TO THE NEAREST COMPANY OFFICE

damper designation (according to the catalog):

_____ (if known)

it is allowed to specify an analog from another manufacturer _____

Contact person:_____

Organization: _____

Tel.: _____ e-mail: _____

Region (city):_____ дата:_____

please check ☑ or specify the required value

when ordering equipment of different dimensions of the same configuration,
the dimensions of AxB or D and their quantity must be indicated in the table below

dimensions AxB (width x height) or D	Quantity		damper type by catalog		☑
			element type	**perforated grille**	
				louvered grille, perforated	
				slat size in 25 mm increments	
				slat size in 50 mm increments	
				slat size in 100 mm increments	
				grille (individually/additional equipment)	
			material	**galvanized steel**	
				carbon steel	
				stainless steel	
				aluminum	

dimensions AxB (width x height) or D	Quantity		(if manufacturing is possible)		
			mounting frame	wall-mounted	

NOTE: for dimensions and equipment, see the catalog

Additional conditions:

Customer _____ _____
(signature) (full name)