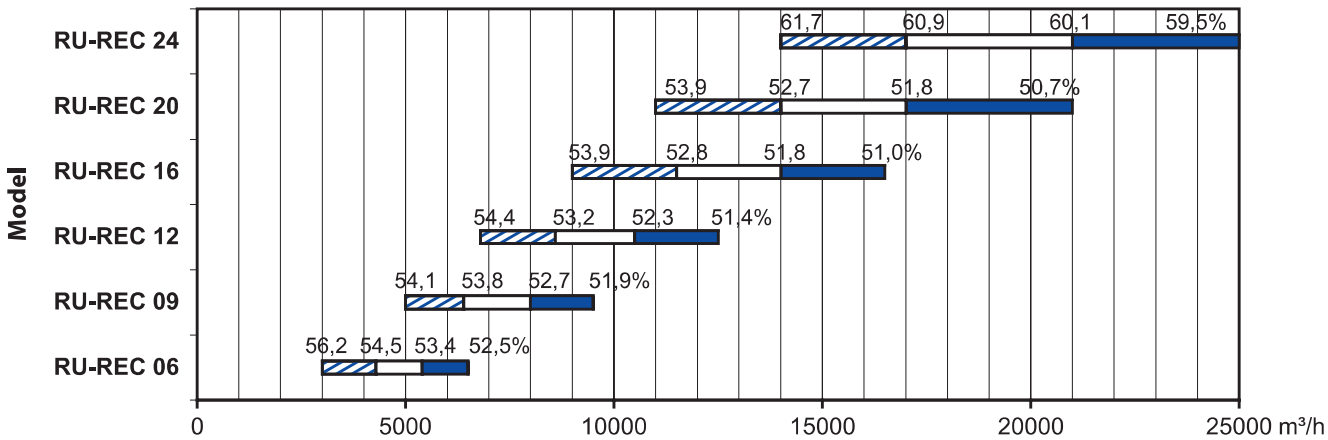
Efficiency of RU-REC / RU-ROT

• Initial conditions (parameters):

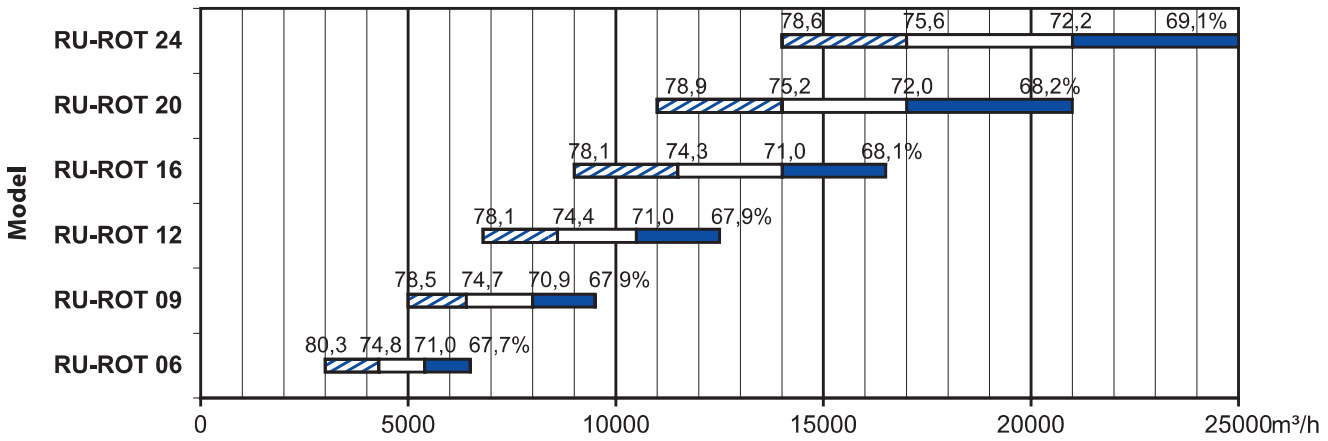
Amounts of fresh and exhausted air are equal – $V_S=V_E$ [m³/h]
Atmospheric pressure - 710 mmHg ≈ 940 hPa

- T_{S1} ($T_{вн.}$) = -12°C - fresh air temperature
- φ_S = 80% - fresh air humidity
- T_{E1} ($T_{пом.}$) = +22°C - fresh air temperature
- φ_S = 30% - exhausted air humidity

RU-REC



RU-ROT

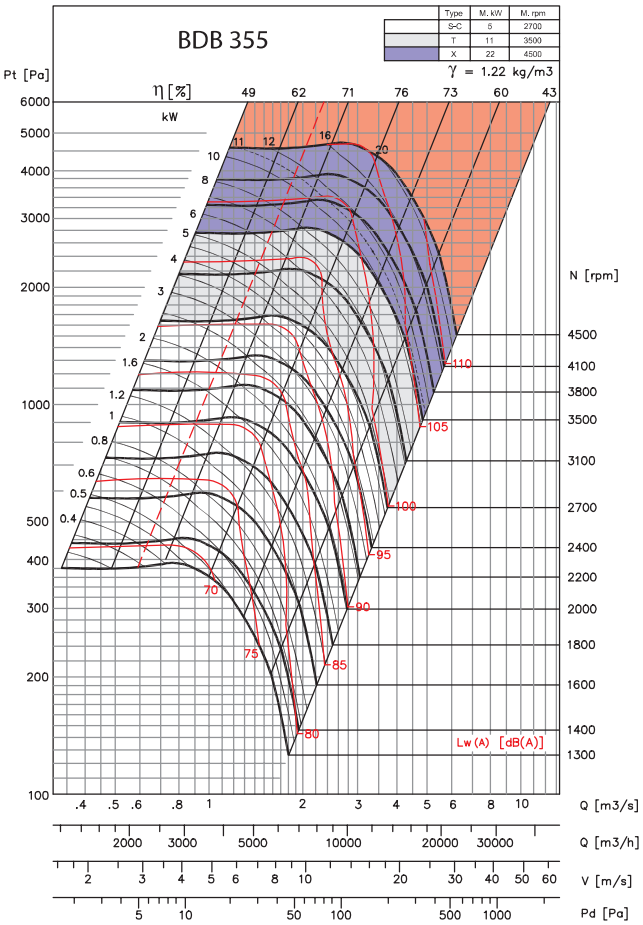


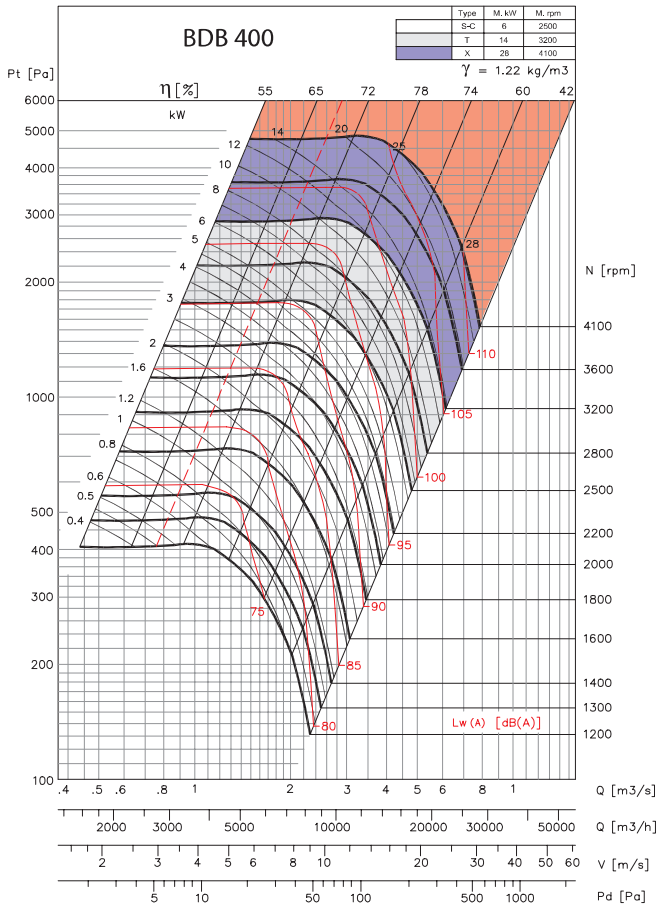
increased noise requirment
regular mode
industrial systems

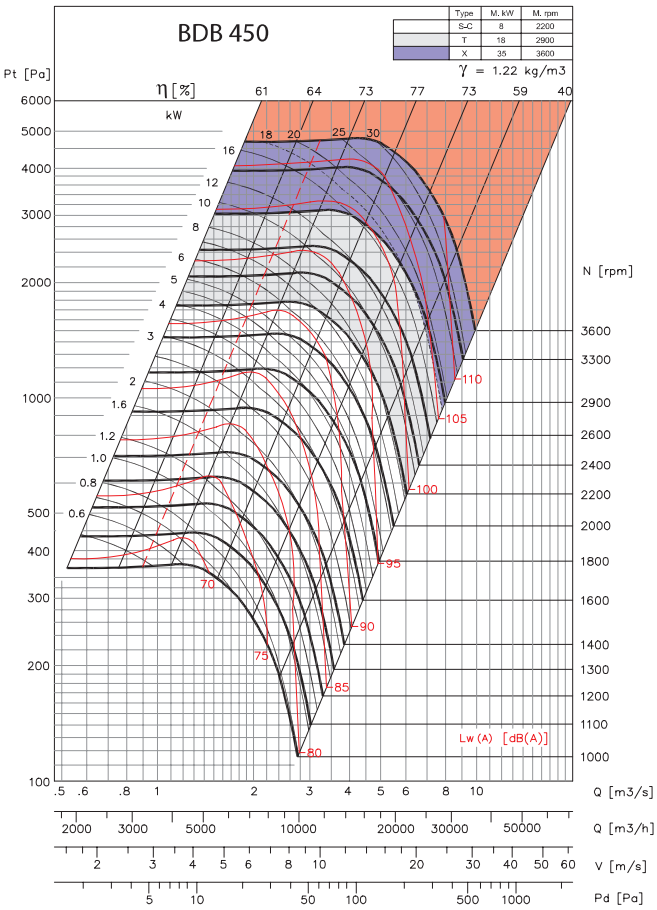
Note :

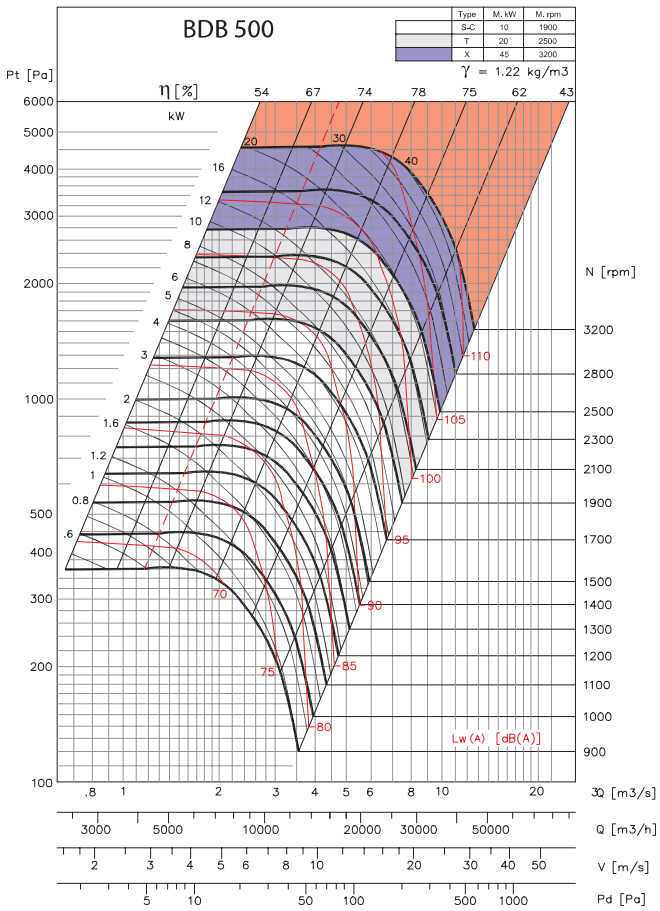
- E [%] - efficiency of fresh air
- For more specific cases and accurate determination of all parameters, please, contact us or use online software REC 01 on our website.

Aerodynamic characteristics of fan BDB *** C BU **



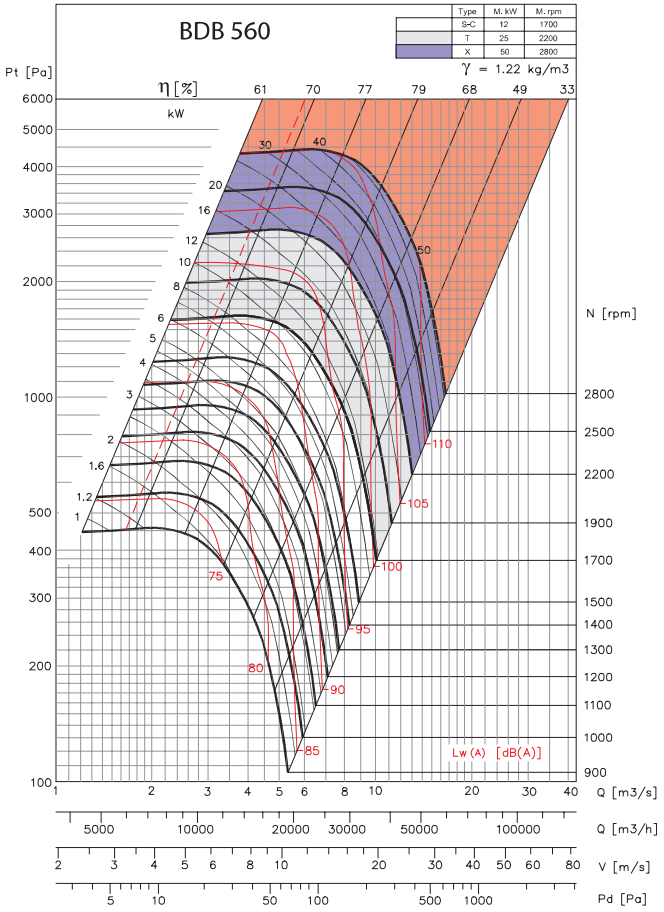


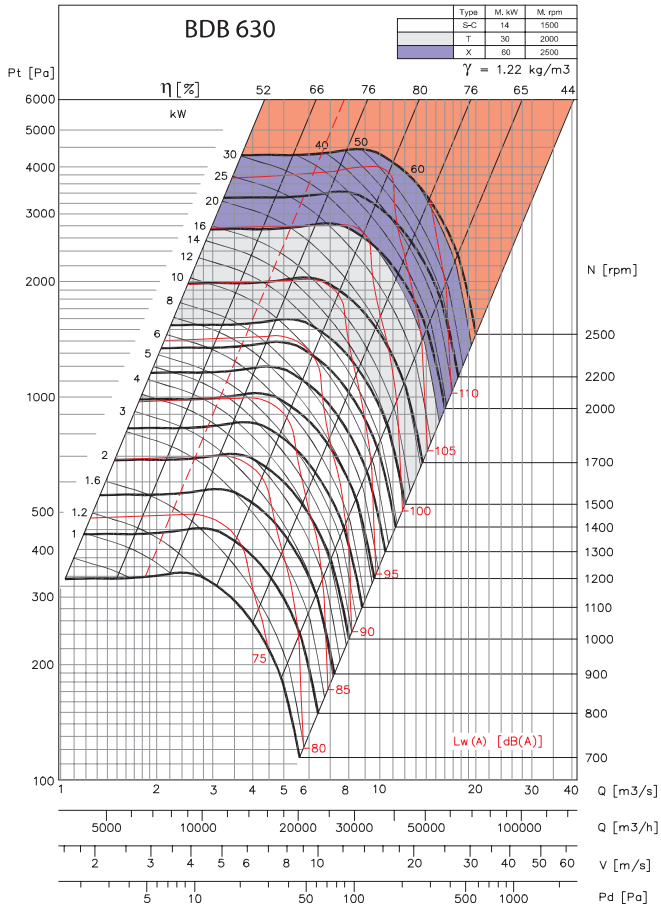


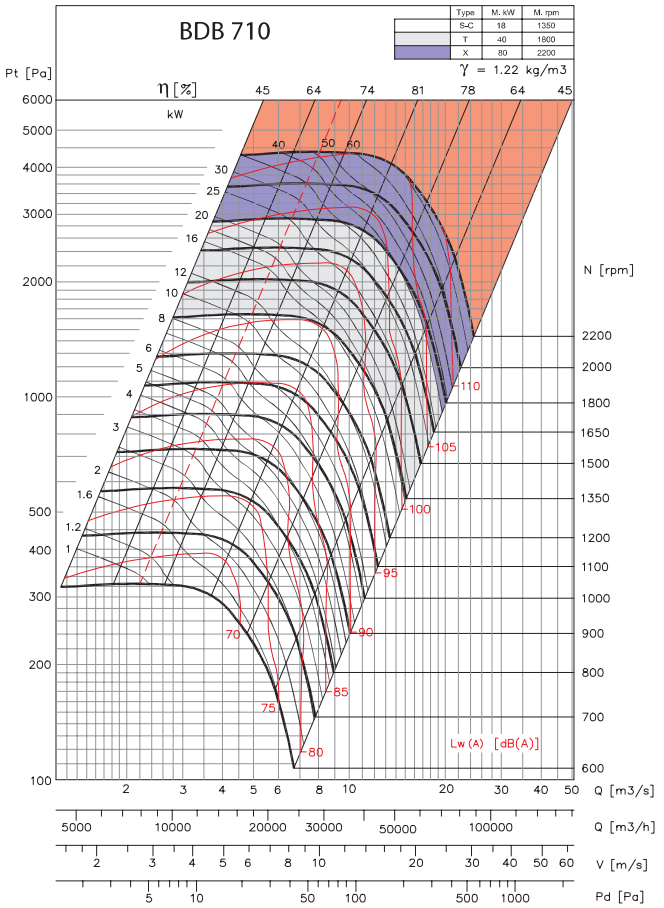


Aerodynamic characteristics of fan BDB *** C

BU **



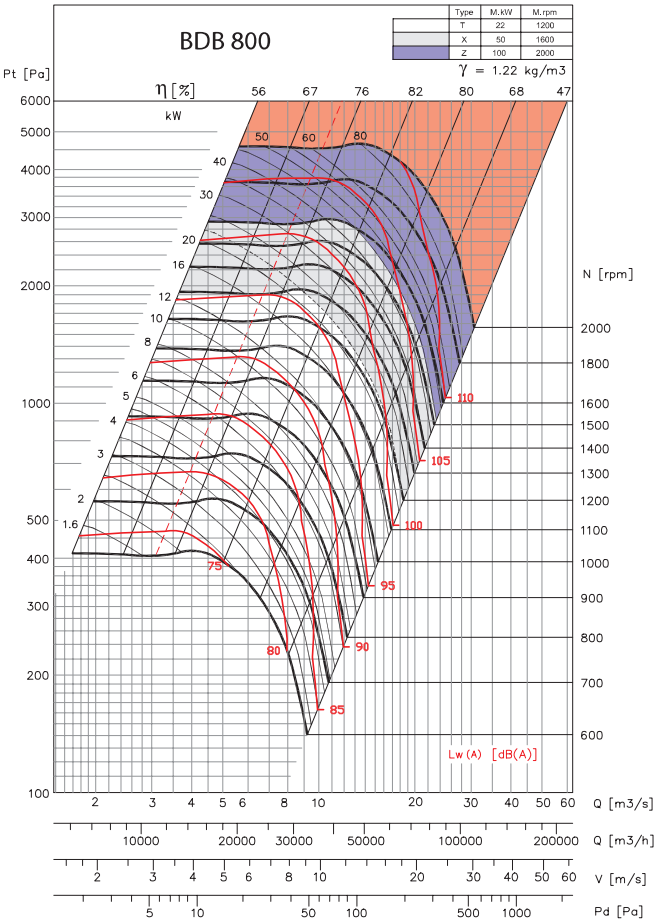


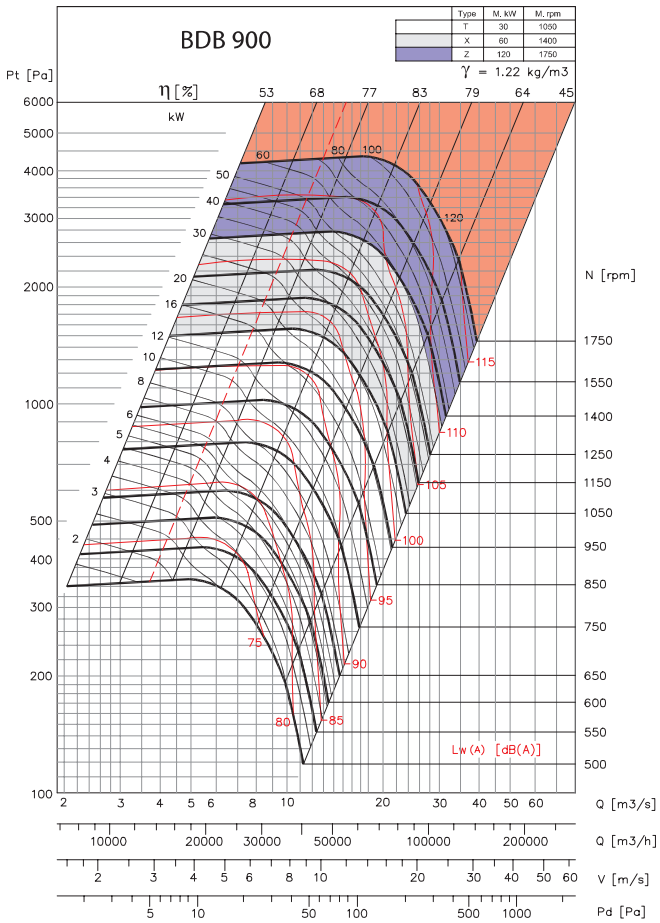


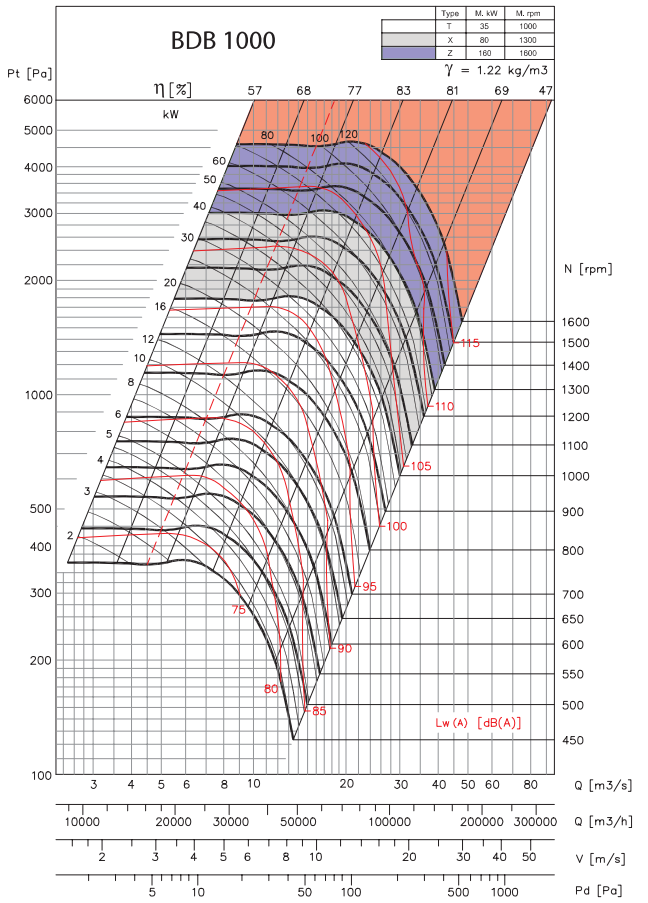
Note :

- For determination of sound level pressure on frequency bands - page 06.01-24
- For determination of the necessary motor power $N_{EL.}$ - page 06.01-25

Aerodynamic characteristics of fan BDB *** T BU **







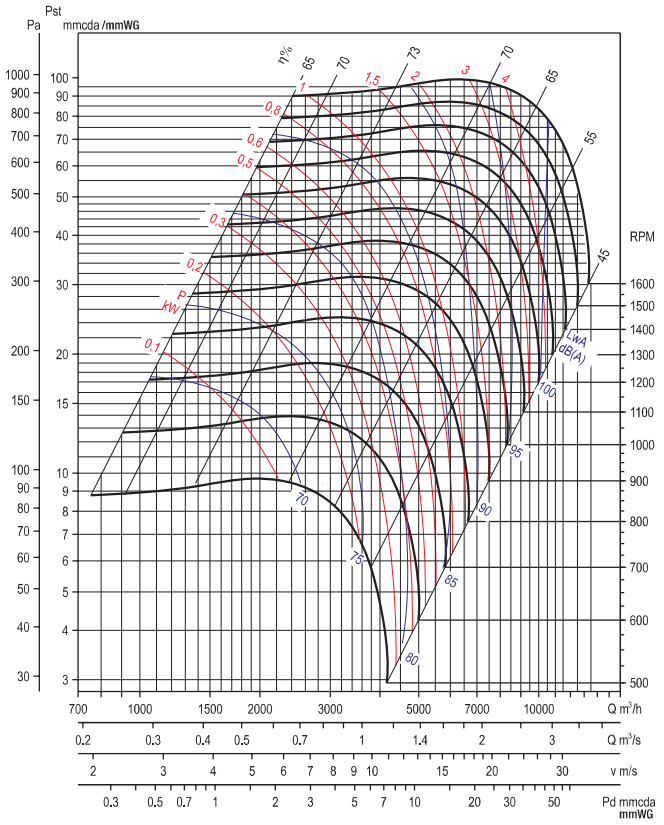
Note :

- For determination of sound level pressure on frequency bands - page 06.01-24
- For determination of the necessary motor power $N_{EL.}$ - page 06.01-25

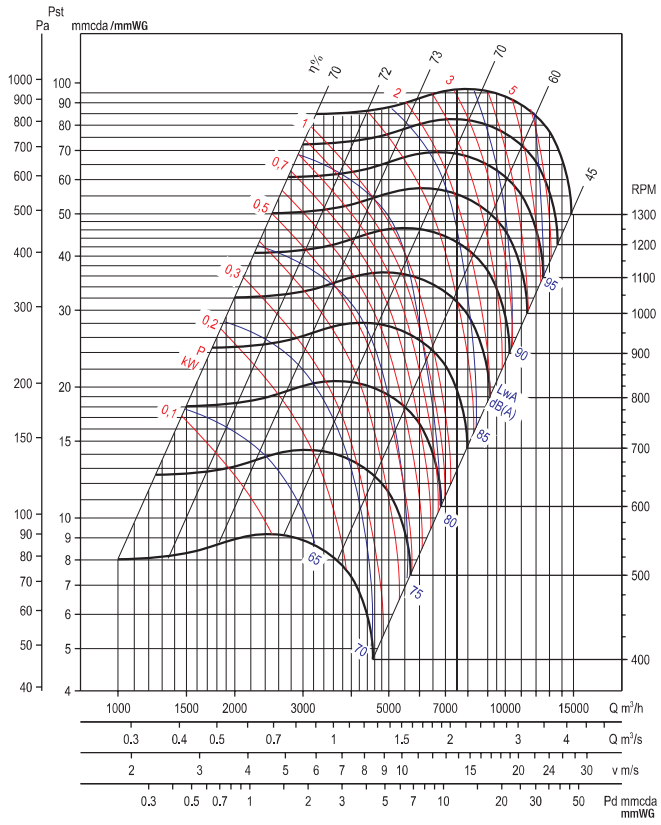
Aerodynamic characteristics of fan CBP

BU ** A

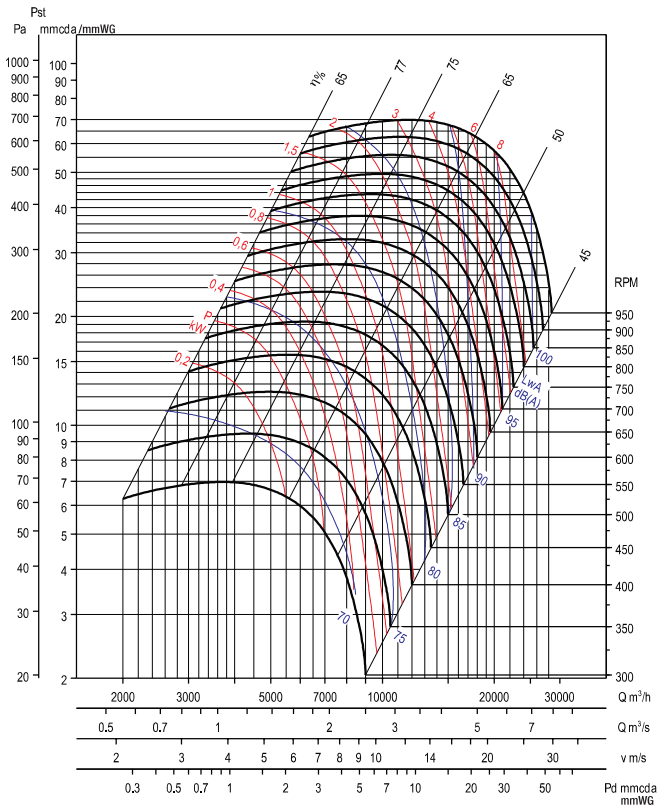
CBP - 12/9



CBP - 15/11



CBP - 18/18



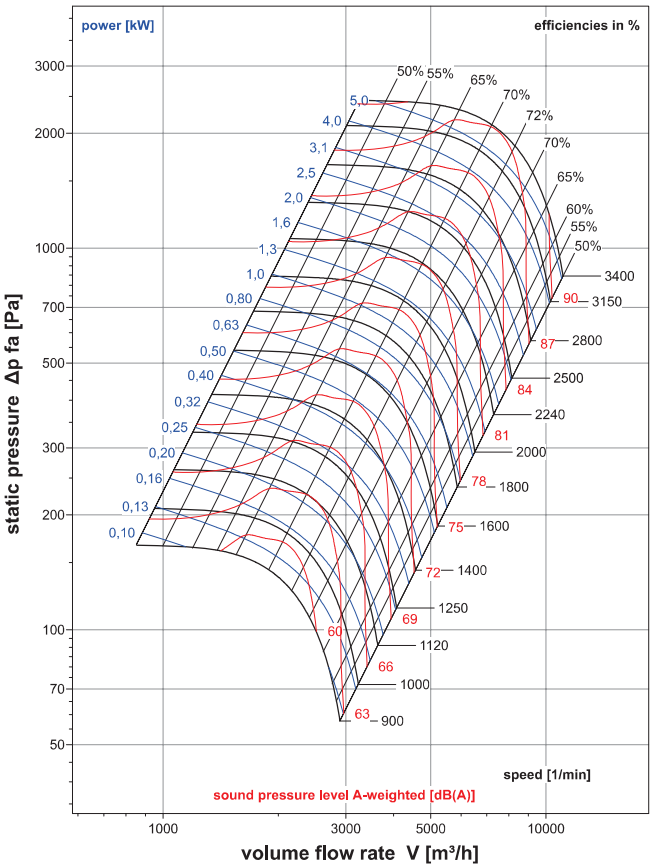
Note :

- For determination of sound level pressure on frequency bands - page 06.01-24
- For determination of the necessary motor power $N_{EL.}$ - page 06.01-25

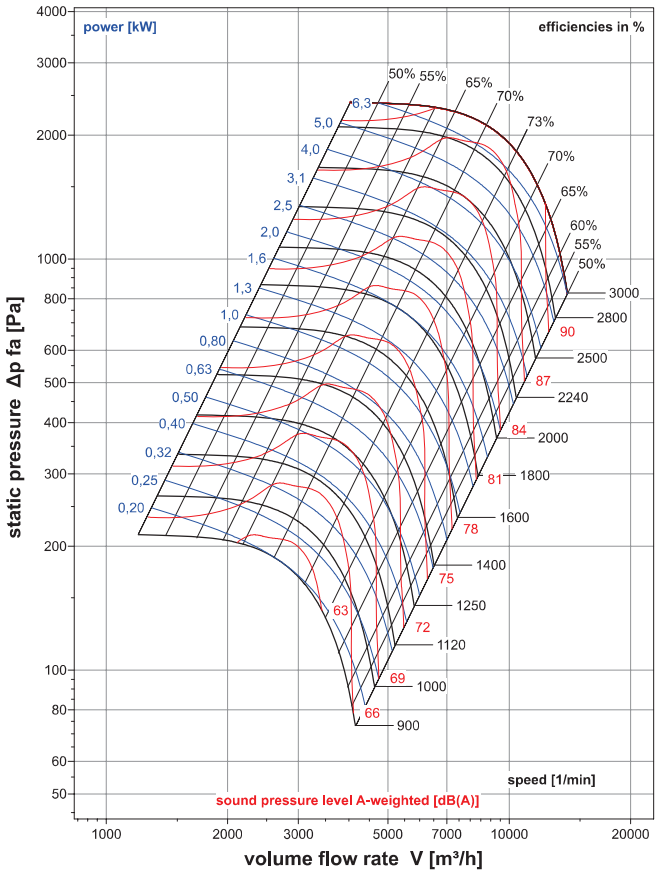
Aerodynamic characteristics of fan BPF

BU ** BD

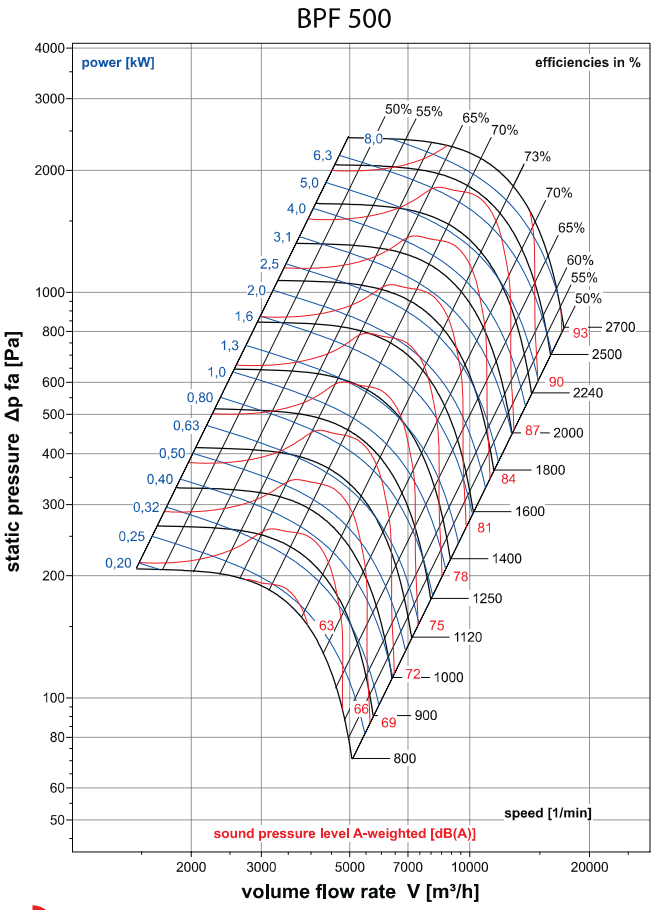
BPF 400



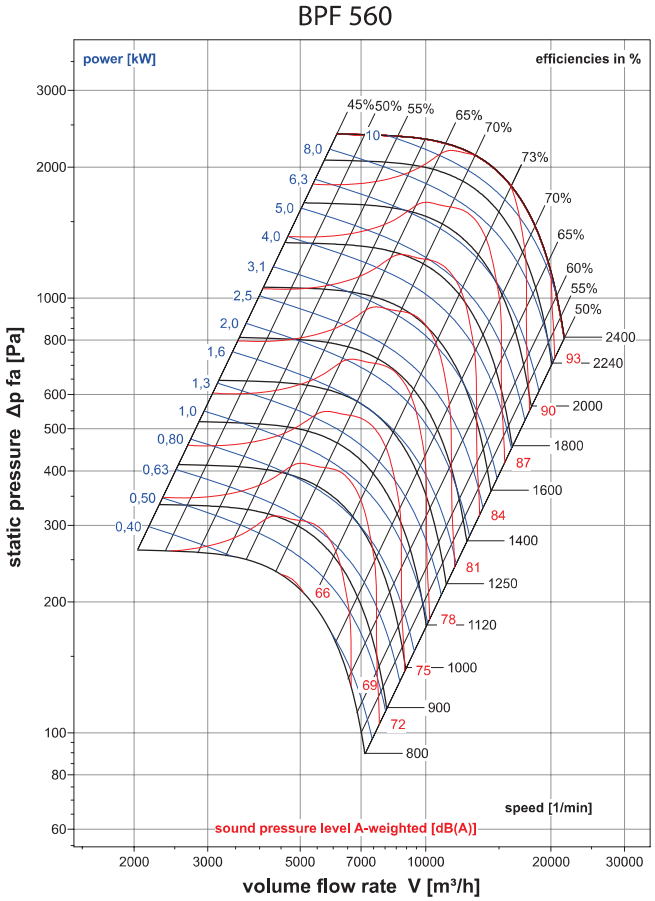
BPF 450



BPF 500



BPF 560

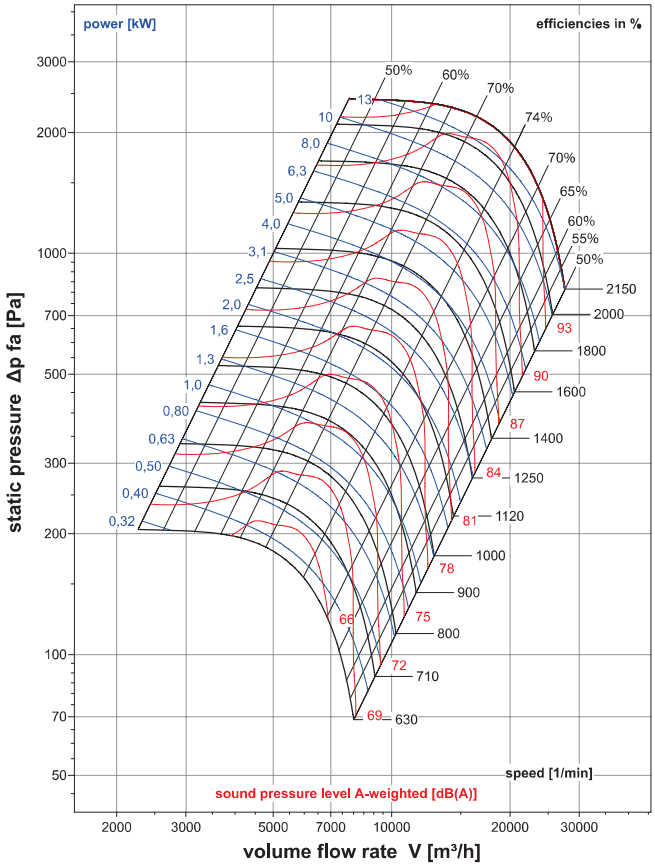


We reserve the right to introduce alternations both in design and technical data without prior notice, due to continued product development.

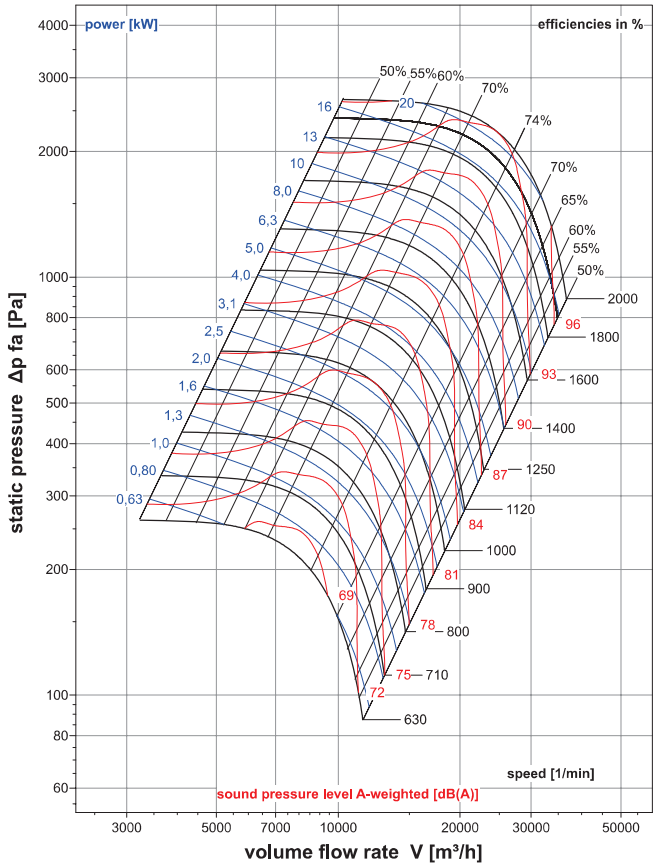
Aerodynamic characteristics of fan BPF

BU ** BD

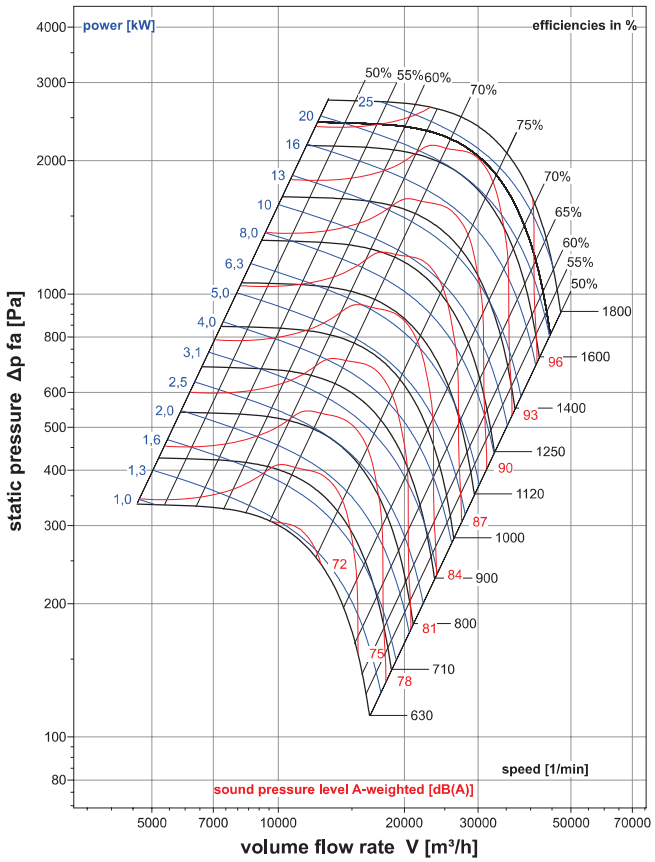
BPF 630



BPF 710



BPF 800



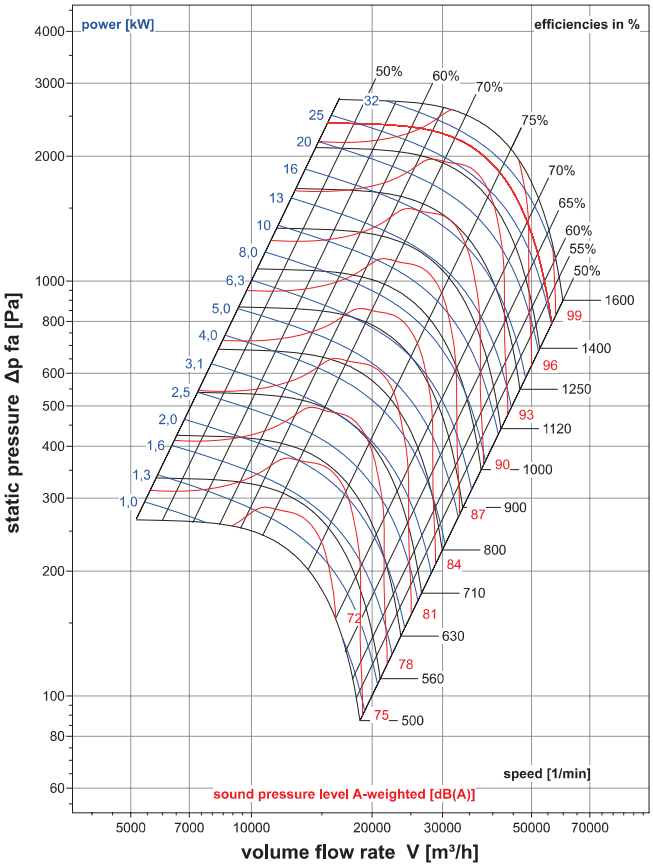
Note :

- For determination of sound level pressure on frequency bands - page 06.01-24
- For determination of the necessary motor power $N_{EL.}$ - page 06.01-25

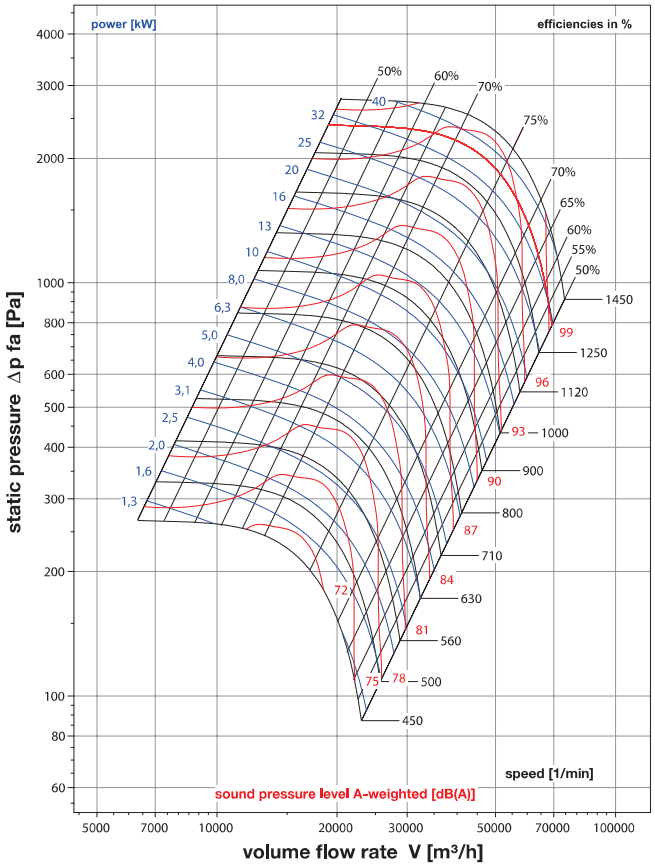
Aerodynamic characteristics of fan BPF

BU ** BD

BPF 900



BPF 1000



Acoustic characteristics

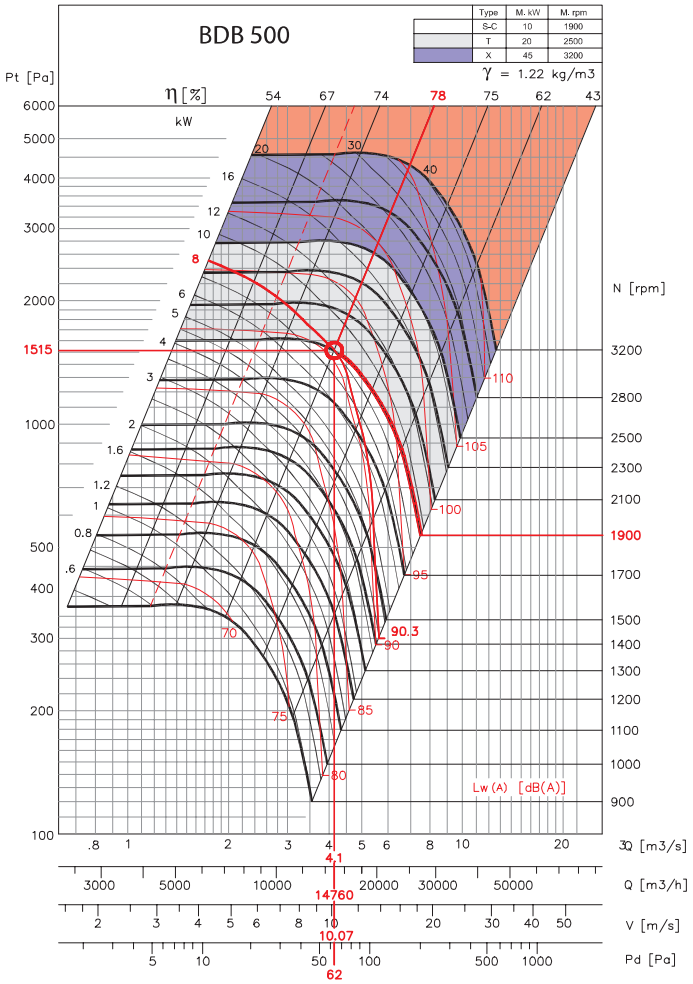
For all types of fans sound pressure level could be defined by the formula:

Lw = Lw (A) + K , where:

- Lw (A) read from the graphics of each fan for specific air flow and pressure (page. 06.01–18 ÷ 06.01-24)
- K [dB] factor of correction for sound pressure level on frequency bands

Size of section	Fan		K [dB] – factor of correction for sound pressure level							
			Frequency bands [Hz]							
			63	125	250	500	1000	2000	4000	8000
BU **	BDB ****	-	3.9	5.8	0.7	-2.9	-5.8	-8.8	-14.5	-20.8
BU 06A	CBP 12/9	-	-30	-22	-15	-9	-3.5	-5.5	-10	-18
BU 09A	CBP 15/11	-	-26	-18	-15	-8	-4.7	-5.7	-8	-16
BU 12A	CBP 18/18	-	-24	-17	-13	-5	-4.9	-7	-10	-20
BU 06B **BU 09B** **BU 12B**	BPF 400 BPF 450 BPF 500	inlet	-6	-5	-3	-4	-8	-11	-15	-20
		outlet	-3	-2	-1	-2	-4	-8	-11	-16
BU 16B **BU 20B** **BU 24B**	BPF 560 BPF 630 BPF 710	inlet	-5	-2	-1	-6	-8	-10	-16	-20
		outlet	-2	0	-4	-4	-4	-7	-12	-17
BU 30B **BU 36B** **BU 45B**	BPF 800 BPF 900 BPF 1000	inlet	-3	-1	-2	-7	-7	-10	-18	-23
		outlet	1	2	-4	-4	-5	-7	-14	-19

Example:



Air flow	Q=14760 m³/h
Dynamic pressure	Pd=62 Pa
Fan speed	N=1900 min-1
Efficiency	η=78%
Air velocity	V=10.07 m/s
Total pressure	Pt=1515 Pa
Absorbed power	Wвен=8.0 kW
Sound pressure level	Lw(A)=90.3 dB(A)

The necessary motor power is determined by the formula:

$$N_{el} = K_1 \frac{W_{вен}}{K_2}$$

, where:

- K_1 – safety factor to overcome the starting torque
- K_2 – efficiency (for V-belt transmissions K2=0.9)

Absorbed power W [kW]	< 0.5	0.5 ÷ 2.0	2.0 ÷ 5.0	5.0 ÷ 10.0	> 10.0
Safety factor K_1	1.5	1.3	1.2	1.15	1.1

$$N_{el} = 1.15 \frac{8.0}{0.9} = 10.22 \text{ kW} \rightarrow 11.0 \text{ kW}$$

Sound pressure level [dB] on frequency bands [Hz]

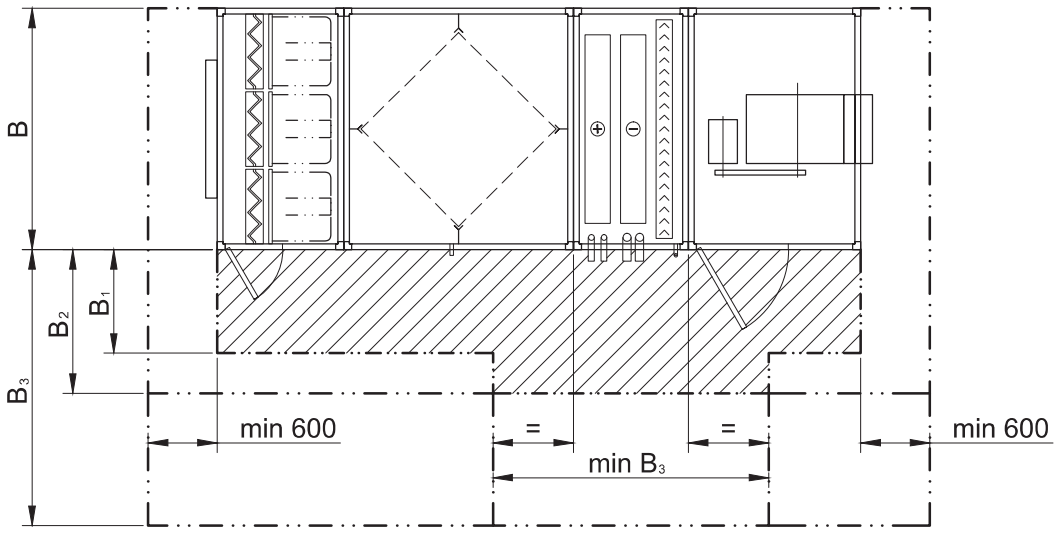
Model	Fan	Lw(A)	63	125	250	500	1000	2000	4000	8000
BU **	BDB 500T	90.3 dB	3.9	5.8	0.7	-2.9	-5.8	-8.8	-14.5	-20.8
			94.2	96.1	91.0	87.4	84.5	81.5	75.8	69.5

Order designation - BU 16 / 33 – R / (14760 / -) (11,0kW)

- BU 16 - fan section type with fan BDB 500C, Nел=11.0kW / 380V
- 33 – performance scheme (see page 06.01-10); ending section; fan position 0°
- R – air stream direction the inspection side – from left to right
- 14760 m³/h - air flow 15500³/h and total pressure 1515 Pa
- (11.0kW) - absorbed power different from the nominal

Recommendation for installation

- Air handling unit is mounted over a leveled building site (foundation or construction). The site should be sized for the specific camera.
- Sections are mounted one to another with sealing rubber between them. Connection between them is made with bolt connection.
- When connect the air handling unit to duct system, flexible connections should be used to prevent transmissions of noise and vibration.
- The supplying pipes for heating and cooling units should not prevent the unit maintenance. It is advisable to connect them through flexible pipe-connections.
- The indicated directions of inlet and outlet of water sections and counter-flow between water and air must be observed.
- To prevention of freezing of water coil unit is recommended at the inlet section (fresh air) to mount multiple leaf damper equipped with spring return actuator.
- Must be ensured siphon, placed before condensation line is connected to the building installation.
- To make a repair or maintenance of the unit, enough space in front of it must be ensured.
- The size of doors and entry of the technical room should be considered with the overall dimensions of the installed sections when mounted, repaired or maintained.



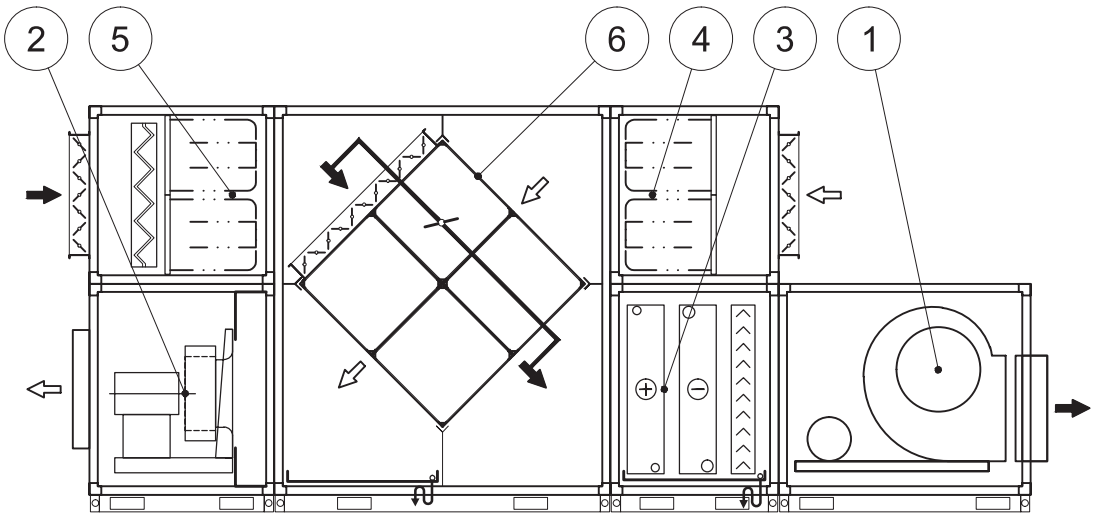
Model	B [mm]	B_1 [mm]	B_2 [mm]	B_3 [mm]	Minimum free area to access to the technical room		
					B_4 [mm]	H_2 [mm]	H_3 [mm]
AHU 06	1350	800	1100	1650	900	1900	1400
AHU 09	1600	800	1100	1900	900	1900	1650
AHU 12	1850	900	1150	2150	900	1900	1900
AHU 16	2100	900	1250	2400	1000	1900	2150
AHU 20	2360	900	1350	2700	1100	1900	2400
AHU 24	2360	900	1500	2700	1200	1950	2650
AHU 30H	2360	900	1650	2700	1300	1950	-
AHU 36H	2360	900	1850	2700	1500	1950	-
AHU 45H	2360	900	2200	2700	1800	2250	-

- B_1 – maintenance and cleaning of air filters
- B_2 – repair and replacement of fan
- B_3 – repair and replacement of heat exchangers: COT; COX; REC or ROT
- B_4 – minimum width of the door of technical room
- H_2 – height when fan, water section COT/COX or recuperator REC is repaired
- H_3 – minimum height when rotary heat exchanger ROT is repaired

Order designation

AHU-DD 16 - Air handling unit, type 16

1. BU 16 / 32 – R / (15500/700)	Fan section with BDB 500C,air flow 15500 m^3/h and external pressure 700Pa, position 270°, direction – **R** – from left to right; $N_{el.}$ = 7.5kW/380V; ending section according scheme 32;
2. BU 16B / 62 – L / (15500/550)	Fan section with BPF 560, air flow 15500 m^3/h and external pressure 550Pa, direction – **L** – from right to left; $N_{el.}$ = 7.5kW/380V; ending section according scheme 62 with outlet flange 1200/700
3. TU 16 / 2R / 4R / K – R	Thermal section with 2-rows heating and 4-rows cooling heat exchanger, drop eliminator and drain tray. Direction from the supply side **R** – from left to tight
4. InU 16 / 1 / F / 1050x1000 - L	Inlet section with air filter and damper, height – 1050mm and length 1000mm; direction **L** – from right to left; multiple leaf damper with manual control PJR 1200/700+M; bag filters AFC-B (F7) (specify when ordering)
5. InU 16 / 1 / F+F / 1050x1150 - R	Inlet section with two-stage cleaning and damper; height 1050mm and length 1115mmm, direction **R** – from left to right, damper PJR 1200/700+A with spring return actuator; air filter AFC-V (G4), bag filter – AFC-B (F7). Type of filters and actuator are specified when ordering
6. RU-REC 16 - R / L1	Recuperative section with plate heat exchanger type REC-Al, drain tray and by-pass damper PJR-BP, direction of fresh air **R** – from left to right and direction of exhausted air $\mathbf{L_1}$ - from right to left

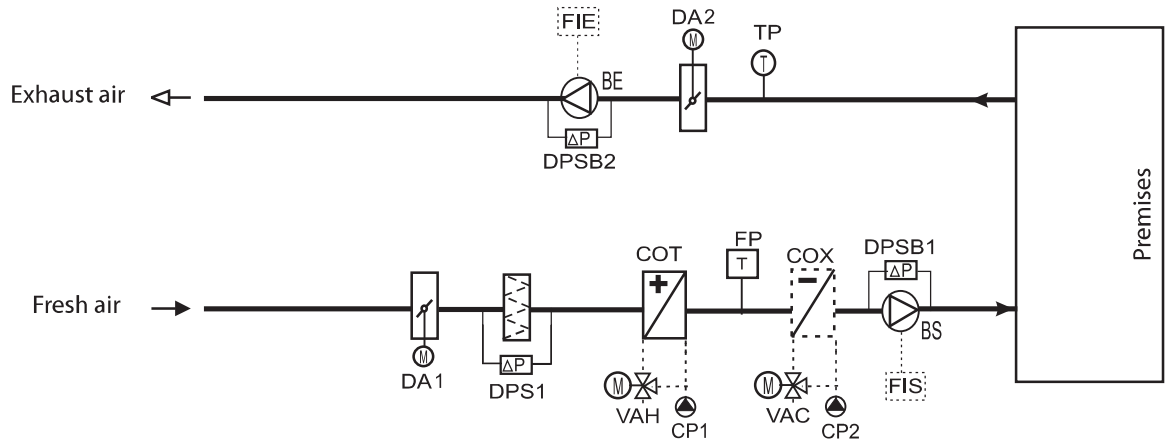


Note :

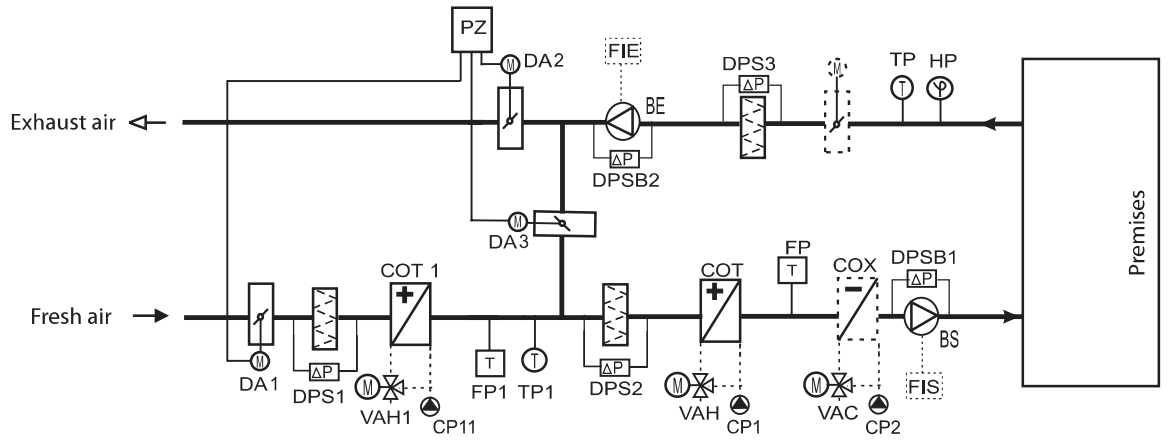
- Fans total pressure, speed, absorbed power and belt drive are selected automatically.
- Actuator type is specified when ordering.
- Air filters types are specified when ordering.
- When ordering should be additionally specified control elements and automation, as well as other options and possibilities (see p . 06.01-5)
- The scheme is viewed from the inspection side
- Implementation of the order is proceed after co-ordination of scheme and technical parameters of the unit.

Functional schemes for management, control equipment and automation AHU- H

Air handling unit with self-dependent exhaust fan



Air handling unit with mixing section and pre-heating exchanger "water-air"



Units

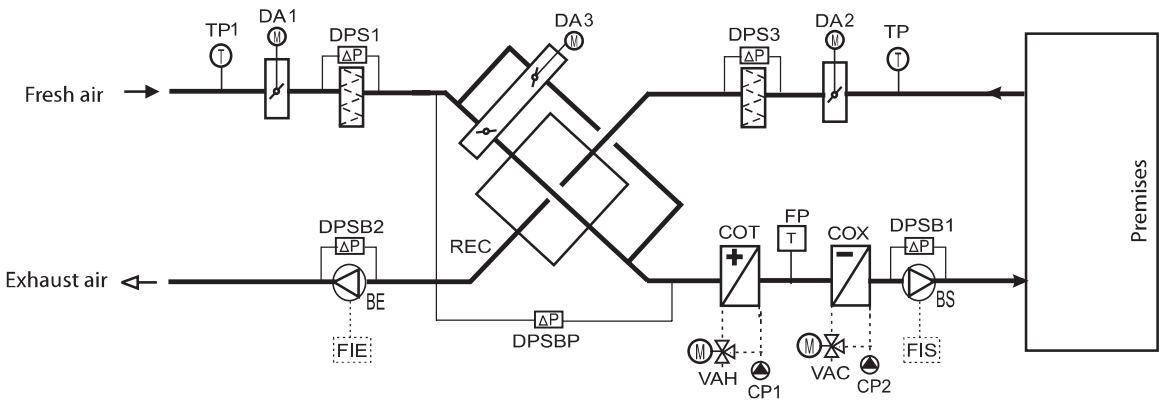
- BS - supply fan
- BE - exhaust fan
- COT1– pre-heating water exchanger
- COT – water heating section
- COX – water cooling section

Control equipment and automation elements:

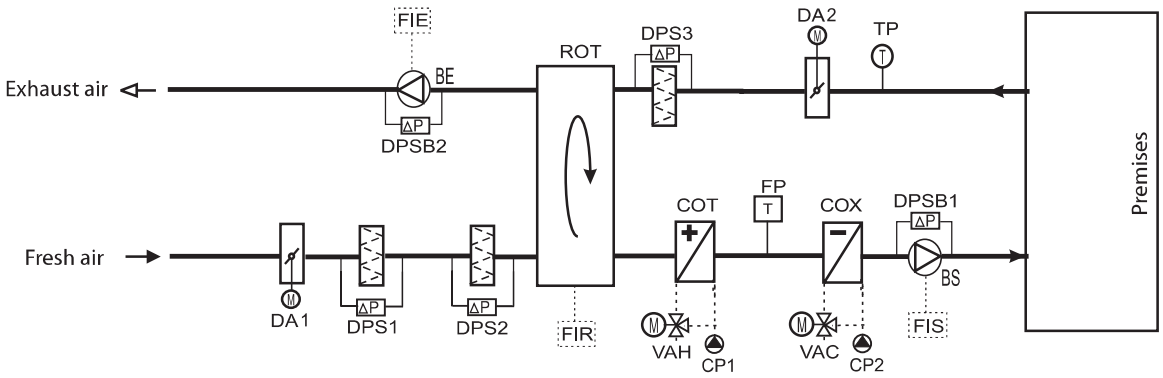
- DA1 - fresh air damper actuator
- DA2 - exhausted air damper actuator
- DA3 - air damper actuator - mixing section
- DPS1 - differential pressure switch - rough filter for fresh air
- DPS2 - differential pressure switch - fine filter for fresh air
- DPS3 - differential pressure switch - filter for exhaust air
- DPSB1 - differential pressure switch - torn belt of the supply fan
- DPSB2 - differential pressure switch - torn belt of the exhaust fan
- FP/FP1 - frost protection of water heating sections COT or COT1
- TP1 - temperature probe managing VAH1
- TP - temperature probe managing VAH or VAC
- HP - humidity probe
- VAH1 - 3-way valve actuator for pre-heating exchanger
- VAH - 3-way valve actuator - heating
- VAC - 3-way valve actuator - cooling
- FIS - frequency inverter control of the supply fan
- FIE - frequency inverter control of the exhaust air
- PZ - positioner - unified control signal
- CP11 – circulation pump - heating (pre-heating exchanger COT1)
- CP1 – circulation pump - heating
- CP2 – circulation pump - cooling

Functional schemes for management, control equipment and automation AHU-DD

Air handling unit with plate heat exchanger "air-air"



Air handling unit with rotary regenerative heat exchanger "air-air"



Units

- BS - supply fan
- BE - exhaust fan
- REC - plate heat exchanger
- ROT - rotary regenerative heat exchanger
- COT – water heating section
- COX – water cooling section

Control equipment and automation elements:

- DA1 - fresh air damper actuator
- DA2 - exhausted air damper actuator
- DA3 - by-pass damper actuator
- DPS1 - differential pressure switch - rough filter for fresh air
- DPS2 - differential pressure switch - fine filter for fresh air
- DPS3 - differential pressure switch - air filter for exhausted air
- DPSB1 - differential pressure switch - torn belt of the supply fan
- DPSB2 - differential pressure switch - torn belt of the exhaust fan
- DPSBP - pressure switch managing DA3 (defrosting REC-AL - winter mode
- FP - frost protection of water section COT
- TP - temperature probe managing VAH/VAC
- TP1 - temperature probe managing DA3 (by-pass damper REC-AL - "free cooling")
- VAH - 3-way valve actuator - heating
- VAC - 3-way valve actuator - cooling
- FIS - frequency inverter control of the supply fan
- FIE - frequency inverter control of the exhaust fan
- FIR - frequency inverter control of rotary regenerative heat exchanger
- CP1 – circulation pump - heating
- CP2 – circulation pump - cooling