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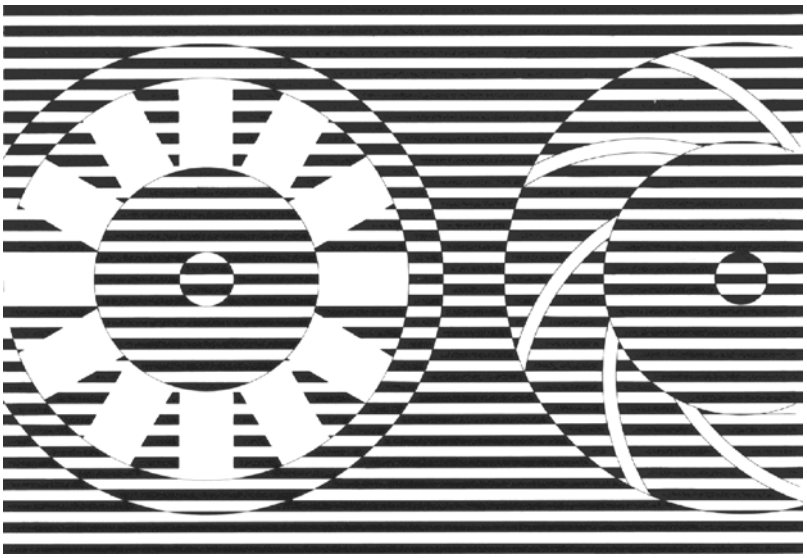


Technical Documentation

LTG High Performance Axial Fans
LTG High Performance Centrifugal Fans

LTG High Performance Axial Flow and Centrifugal Fans

Depending on application, a fan is required to satisfy a variety of requirements. Selection criteria may include the following:

- Required flow rate
- Overall external pressure
- Power requirement
- Degree of efficiency
- Space required
- Possible control techniques

Given that there is no such thing as an all-purpose fan which combines all these criteria to the optimum extent, LTG has developed a variety of types, with the result that a suitable fan is available to resolve any airflow problem.

The 10-point Programme for economical Fans

1 Optimum aerodynamic characteristics

Inflow losses minimized by flow-inducing intake design, minimal clearance losses between impeller and housing.

2 High degree of efficiency

Up to 89 % in the optimum range.

3 Characteristic curve with limit rating

No overloading of the motor under operating conditions at variance with design specification.

4 Smooth running

Impeller dynamically balanced, complete with hub and shaft.

5 Low noise

Within the range of the highest degree of efficiency, the specific sound power level is considerably lower than the guidelines laid down in VDI 2081.

6 Control options

Speed-controlled drive motors, impeller adjustment (VAR type).

7 Robust construction

Durable construction featuring high-strength, torsion resistant steel housing, welded, screwed and painted. Bearings designed to ensure long-term serviceability.

8 High-precision manufacture

Ensures that specified data are complied with.

9 Type availability

Within specified limits, a wide choice of models is available, meeting a variety of criteria.

10 Computer aided design

LTG fans are designed for every application with the aid of EDP programs which take account of selection criteria. This provides an assurance that the fan selected will be suitable for the intended purpose.

LTG High Performance Axial Flow Fan Series VAN

The low pressure axial flow fan type VAN is a high performance fan with aerodynamically optimized characteristics. Impellers are equipped with ten curved blades with laminar profiles complying with the NACA 16 series.

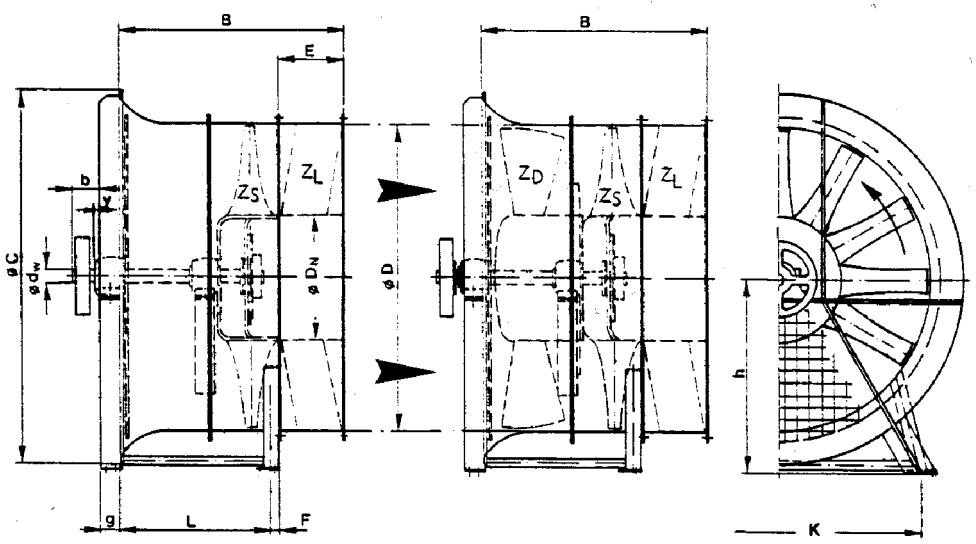
Eight sizes

Flow rates:	30,000 to 450,000 m^3/h
Maximum total pressure:	1,200 Pa
Impeller diameter:	1,000 to 2,500 mm

In standard configuration, VAN-type fans are equipped with an outlet guide vane system, to which the characteristic curves contained in this document also apply. The theoretical characteristic flow data at the maximum degree of efficiency are as follows:

Degree of efficiency	η_t	89.5 %
Volumetric factor	φ	0.22
Pressure factor	ψ_t	0.168

Dimensions and Weights



Without inlet guide vane *With inlet guide vane*

Size VAN		1000	1250	1400	1600	1800	2000	2240	2500
B	[mm]	770	940	1015	1100	1240	1397	1453	1579
ØC	[mm]	1240	1547	1701	1873	2178	2395	2639	2912
ØD	[mm]	1002	1261	1415	1587	1782	1999	2243	2516
$ØD_N$	[mm]	400	500	560	640	720	800	900	1000
E	[mm]	220	275	310	350	390	492	543	599
F	[mm]	36	38	38	38	40	45	45	45
K	[mm]	950	1180	1250	1400	1600	1800	2000	2240
L	[mm]	514	627	667	712	810	860	865	935
h	[mm]	630	800	900	1000	1120	1250	1400	1600
$Ød_W$	[mm]	50	60	60	75	75	90	100	100
b	[mm]	110	140	140	140	140	170	210	210
y	[mm]	7.5	15	10	12.5	12.5	20	17.5	17.5
g	[mm]	80	80	90	100	100	120	140	140
No. of blades Z_D		15	15	15	15	25	25	25	25
No. of blades Z_S		10	10	10	10	10	10	10	10
No. of blades Z_L		13	13	13	13	13	13	13	13
A_R	[m^2] 1)	0.663	1.053	1.326	1.666	2.098	2.636	3.315	4.186
A	[m^2] 2)	0.789	1.249	1.573	1.978	2.494	3.138	3.951	4.972
I	[kg · m^2]	1.38	3.15	5.27	9.50	18.1	30.9	54.3	94.1
Weight without inlet guide vane	[kg]	218	295	345	430	640	880	1050	1265
Weight with inlet guide vane	[kg]	260	307	395	510	700	1060	1250	1450
Weight of stator	[kg]	40	43	60	75	80	95	140	160

1) A_R = ring area $[(D^2 - D_N^2) \cdot \pi/4]$ 2) A = total area $[D^2 \cdot \pi/4]$

LTG High Performance Axial Flow Fan Series VAN

Special Characteristics

High flow rates, even with the smaller sizes, permitting use in centralized locations with limited space.

Impeller and shaft balanced in two planes (static and dynamic) to quality stage Q 2.5 of VDI 2060. Overall, the fan complies with quality stage Q 6.3 of VDI 2060, including bearing play etc.

Standard Configurations

With or without outlet guide vane.

With or without diffuser.

Horizontal or vertical installation.

Special Configurations

Direct drive, intake or discharge side.

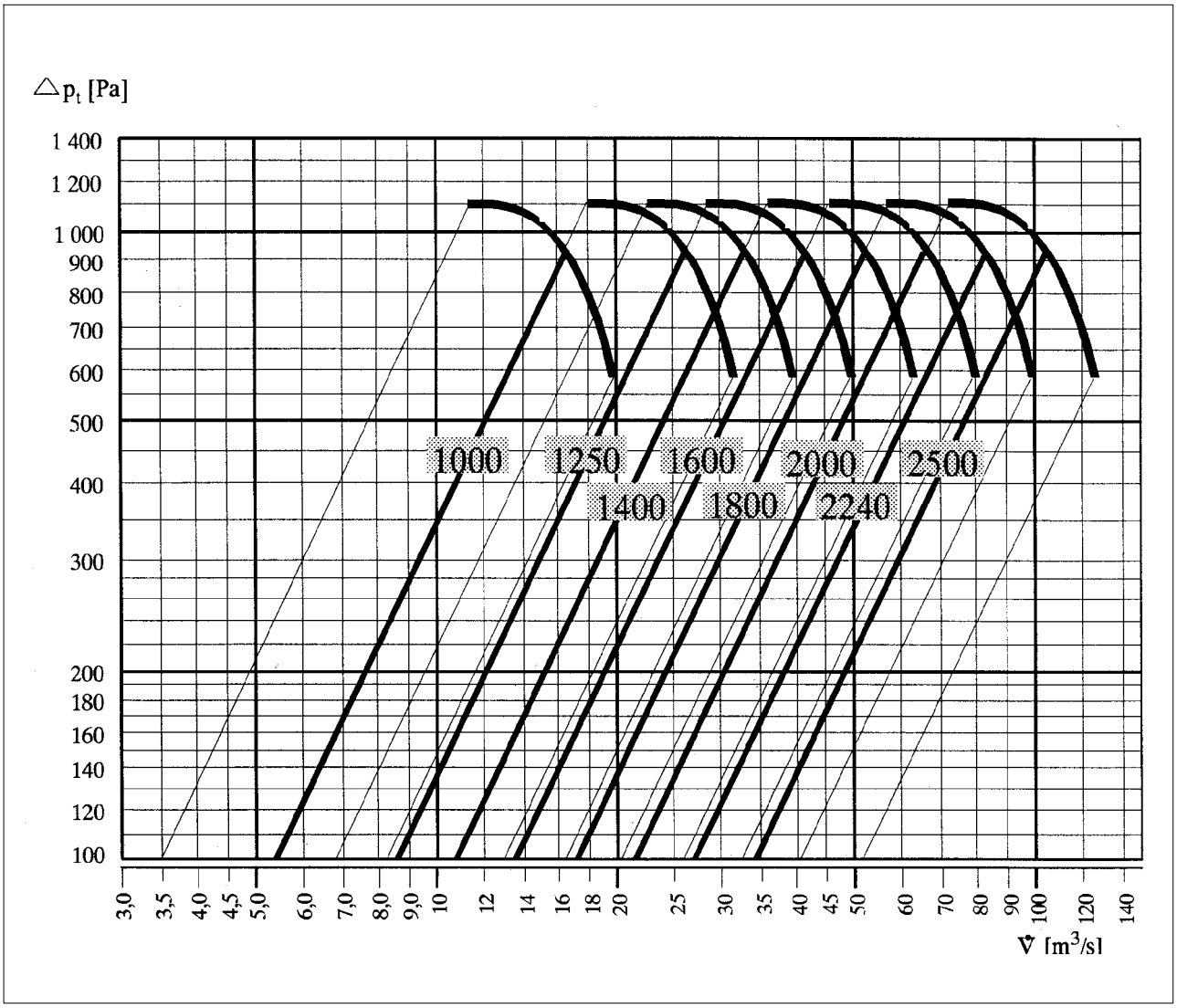
Sealed, separately ventilated impeller bearings for air temperatures above approx. 80°C.

Special corrosion proofing options: sand-blasting, hot galvanizing, rubberizing, stainless steel.

Other Accessories available

Diffuser · intake safety grating ·
narrow V-belt or flat belt drive · belt guard ·
baseframe or provision for setting in concrete ·
vibration insulation ·
resilient coupling on discharge side ·
flat or angled steel ring as counterflange on discharge side
wall-mounting ring on discharge side for embedding in concrete ·
motor slide rails · motor mounting.

Overview Diagram



LTG High Performance Axial Flow Fan Series VAH

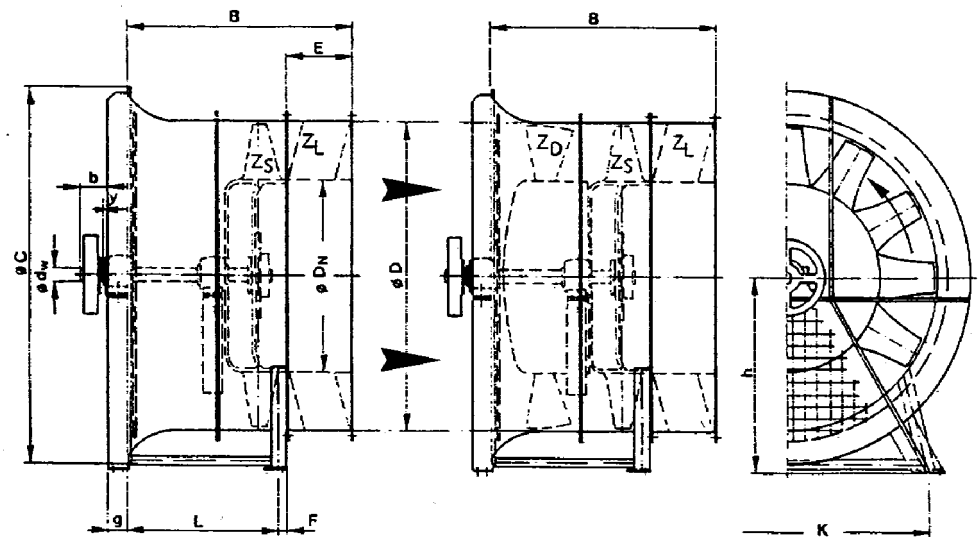
The high pressure axial-flow fan type VAH is a high performance fan with aerodynamically optimized characteristics. Impellers are equipped with twelve curved blades with laminar profiles complying with the NACA 16 series.

Seven sizes
Flow rates: 30,000 to 450,000 m^3/h
Maximum total pressure: 3,300 Pa
Impeller diameter: 1,250 to 2,500 mm

All VAH-type fans are equipped with an outlet guide vane, to which the characteristic curves contained in this document also apply. The theoretical characteristic flow data at the maximum degree of efficiency are as follows:

Degree of efficiency	η_t	89 %
Volumetric factor	φ	0.15
Pressure factor	ψ_t	0.240

Dimensions and Weights



Without inlet guide vane *With inlet guide vane*

Size VAH		1250	1400	1600	1800	2000	2240	2500
B	[mm]	936	1010	1085	1237	1327	1364	1500
ØC	[mm]	1547	1701	1873	2178	2395	2639	2912
ØD	[mm]	1261	1415	1587	1782	1999	2243	2516
$ØD_N$	[mm]	750	850	950	1100	1200	1300	1500
E	[mm]	271	305	335	387	422	454	520
F	[mm]	38	38	38	40	45	45	45
K	[mm]	1180	1250	1400	1600	1800	2000	2240
L	[mm]	627	667	712	810	860	865	935
h	[mm]	800	900	1000	1120	1250	1400	1600
$Ød_W$	[mm]	60	75	90	100	110	125	135
b	[mm]	140	140	140	140	170	210	235
y	[mm]	25.5	25	30	34,5	35	25	30
g	[mm]	100	120	120	140	140	180	180
No. of blades Z_D		15	15	15	25	25	25	25
No. of blades Z_S		12	12	12	12	12	12	12
No. of blades Z_L		13	13	13	13	13	13	13
A_R	$[m^2]$ 1)	0.897	1.005	1.269	1.544	2.007	2.624	3.205
A	$[m^2]$ 2)	1.249	1.573	1.978	2.494	3.138	3.951	4.972
I	$[kg \cdot m^2]$	9.50	15.1	25.0	42.8	63.1	107	179
Weight without inlet guide vane	[kg]	450	830	650	890	1150	1400	1750
Weight with inlet guide vane	[kg]	510	920	750	1050	1350	1600	2000

1) A_R = ring area $[(D^2 - D_N^2) \cdot \pi/4]$ 2) A = total area $[D^2 \cdot \pi/4]$

LTG High Performance Axial Flow Fan Series VAH

Special Characteristics

Use is recommended for high volume flow rates and pressures up to 3,300 Pa.

Impeller and shaft balanced in two planes (static and dynamic) to quality stage Q 2.5 of VDI 2060. Overall, the fan complies with quality stage Q 6.3 of VDI 2060, including bearing play etc.

Standard Configurations

With or without diffuser.

Horizontal or vertical installation.

Special Configurations

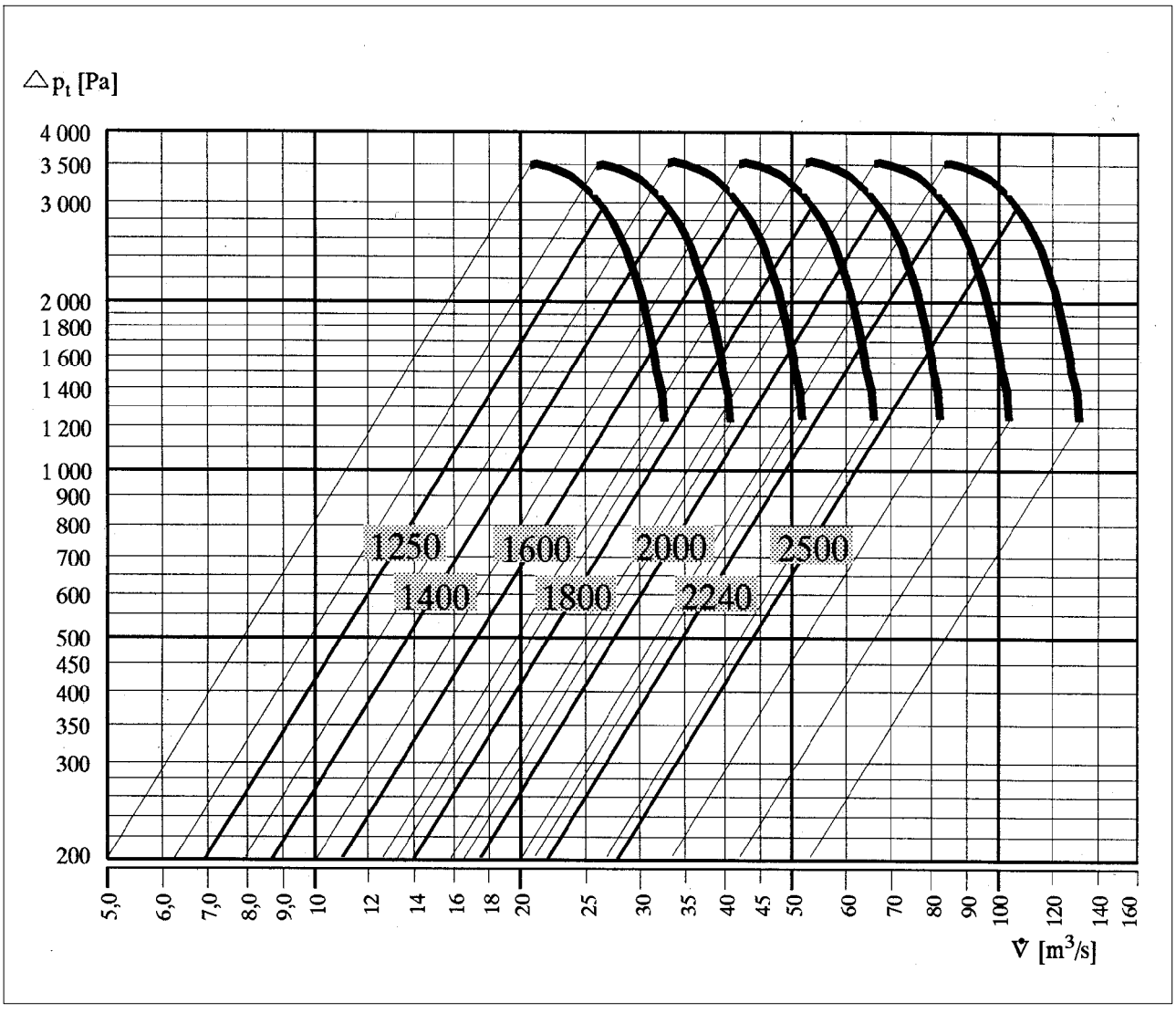
Sealed, separately ventilated impeller bearings for air temperatures above approx. 80°C.

Special corrosion proofing options: sand-blasting, hot galvanizing, rubberizing, stainless steel.

Other Accessories available

Diffuser · intake safety grating ·
narrow V-belt or flat belt drive · belt guard ·
baseframe, without provision for setting in concrete ·
vibration insulation ·
resilient coupling on discharge side ·
flat or angled steel ring as counterflange on discharge side
wall-mounting ring on discharge side for embedding in concrete
motor slide rails · motor mounting.

Overview Diagram



LTG High Performance Axial Flow Fan Series VAR

The VAR type fan with direct drive and adjustable impeller blades (when stationary) is a high performance axial flow fan with aerodynamically optimized characteristics.

Flow rates: up to 270,000 m^3/h

Maximum total pressure: 2 300 Pa

Fan Design, Construction Type

2 Versions:

Standard version with 10 impeller blades

Special VAR-5 version with 5 impeller blades
(half number of blades for less pressure, otherwise identical to VAR)

3 construction types:

Construction type	**opt. total efficiency**
without guide wheel, without diffuser	83,5 %
with guide wheel, without diffuser	80,0 %
with guide wheel, with diffuser	83,0 %

A diffuser has no significant pressure gain effect on the version without guide wheel

6 Sizes:
800, 900, 1000, 1120, 1250, 1400

Special Characteristics

Direct drive through unilateral wheel bearing on the squirrel-cage standard motor's shaft, positioned on the suction side on a bearing support welded to the casing.

This drive type allows operation of the fan at speeds determined by choice of the standard motor:

n_1 = 970 rpm (6-pole motor, 50 Hz)
n_1 = 1470 rpm (4-pole motor, 50 Hz)

By setting a suitable blade angle any working point of a $\dot{V}$ - Δp range may be achieved.

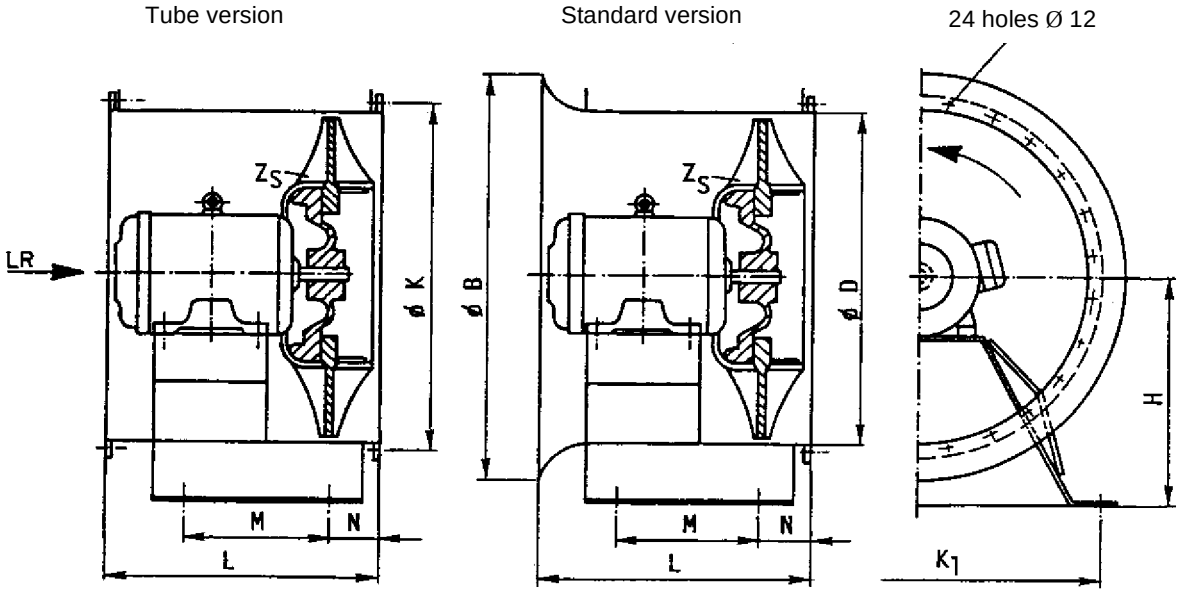
The casing is painted and consists of a welded sheet steel construction with pressure-side flange, with outside bracing, optional with continuously curved air inlet nozzle or tube connection flange on the suction side.
The foot console of metal sheet is welded to the casing.

The guide wheel (optional) is made of galvanized metal sheet.

The impeller consists of a cast hub with inserted adjustable, profiled, cast impeller blades.

Fan grade: G 6.3 based on DIN ISO 1940

Dimensions

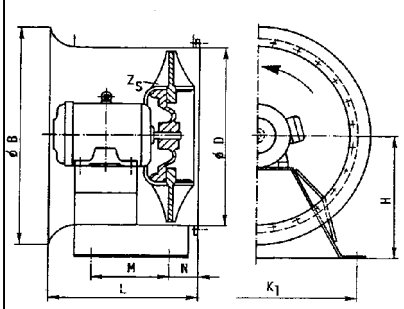


Number of blades: impeller 10
guide wheel 13

LTG High Performance Axial Flow Fan
Series VAR

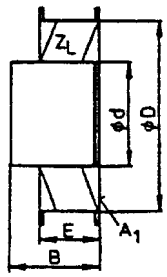
Dimensions

Fan VAR (shown with inlet nozzle)



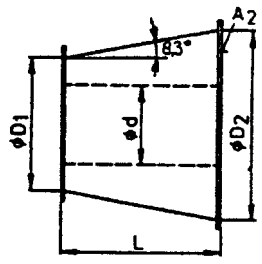
Size VAR	Ø B [mm]	Ø K [mm]	Ø D [mm]	H [mm]	K_1 [mm]	L [mm]	M [mm]	N [mm]	J [kg·m²]
800	1032	837	794	550	810	650	290	72	0,832
900	1131	934	893	600	910	650	420	72	0,925
1000	1240	1043	1002	630	950	800	480	82	2,479
1120	1362	1174	1124	710	1060	880	570	82	2,990
1250	1547	1311	1261	800	1180	1060	700	82	7,756
1400	1701	1465	1415	900	1250	1150	700	82	8,990

Guide Wheel VAR



Size VAR	B [mm]	Ø D [mm]	Ø d [mm]	E [mm]	Ring area A_1 [m²]
800	306	794	450	260	0,336
900	306	893	450	260	0,467
1000	379	1002	560	320	0,542
1120	379	1124	560	320	0,746
1250	471	1261	700	400	0,864
1400	471	1415	700	400	1,188

Diffuser VAR

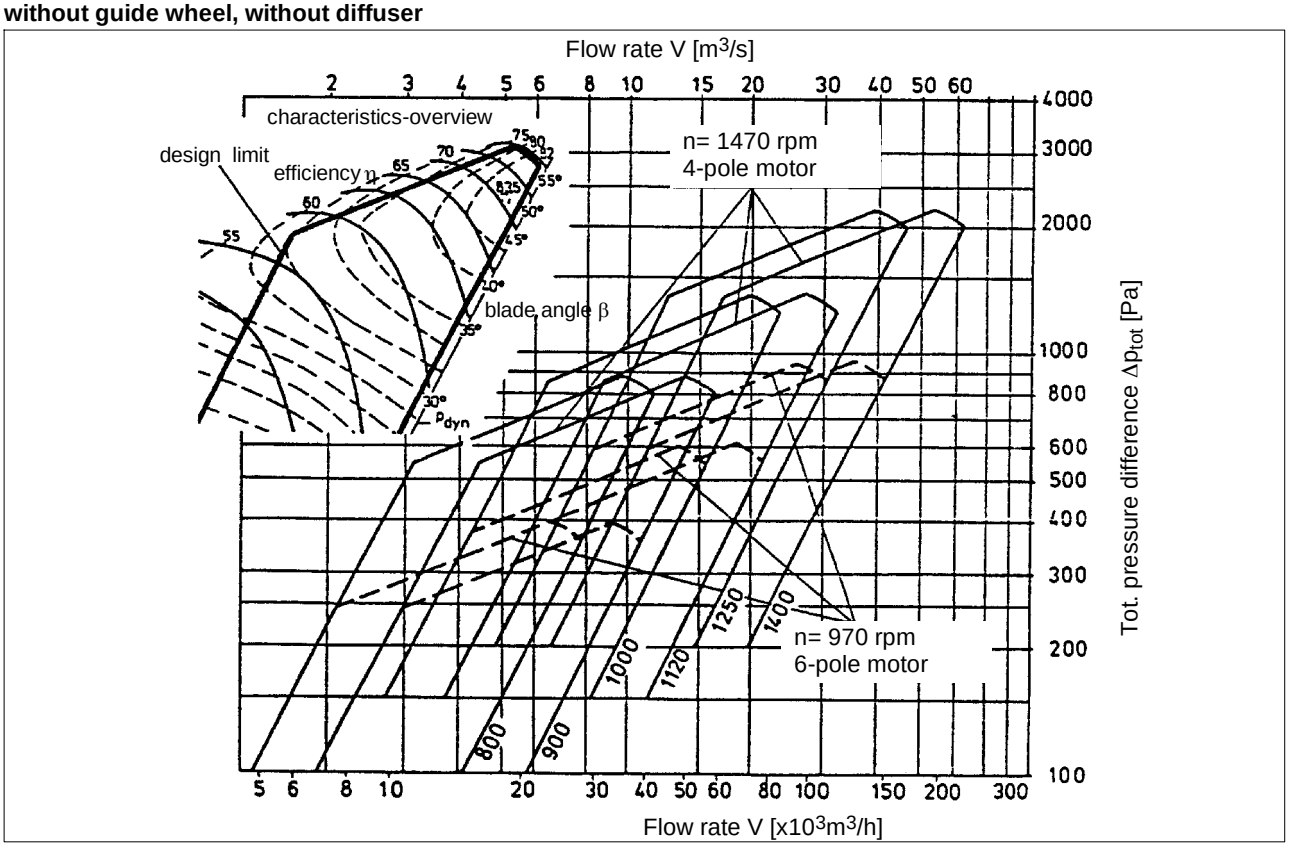


Size VAR	Ø D_1 [mm]	Ø D_2 [mm]	Ø d [mm]	L [mm]	Ring area A_2 [m²]
800	798	1006	450	710	0,64
900	897	1128	450	800	0,84
1000	1006	1265	560	900	1,01
1120	1128	1419	560	1000	1,34
1250	1265	1591	700	1100	1,60
1400	1419	1786	700	1250	2,12

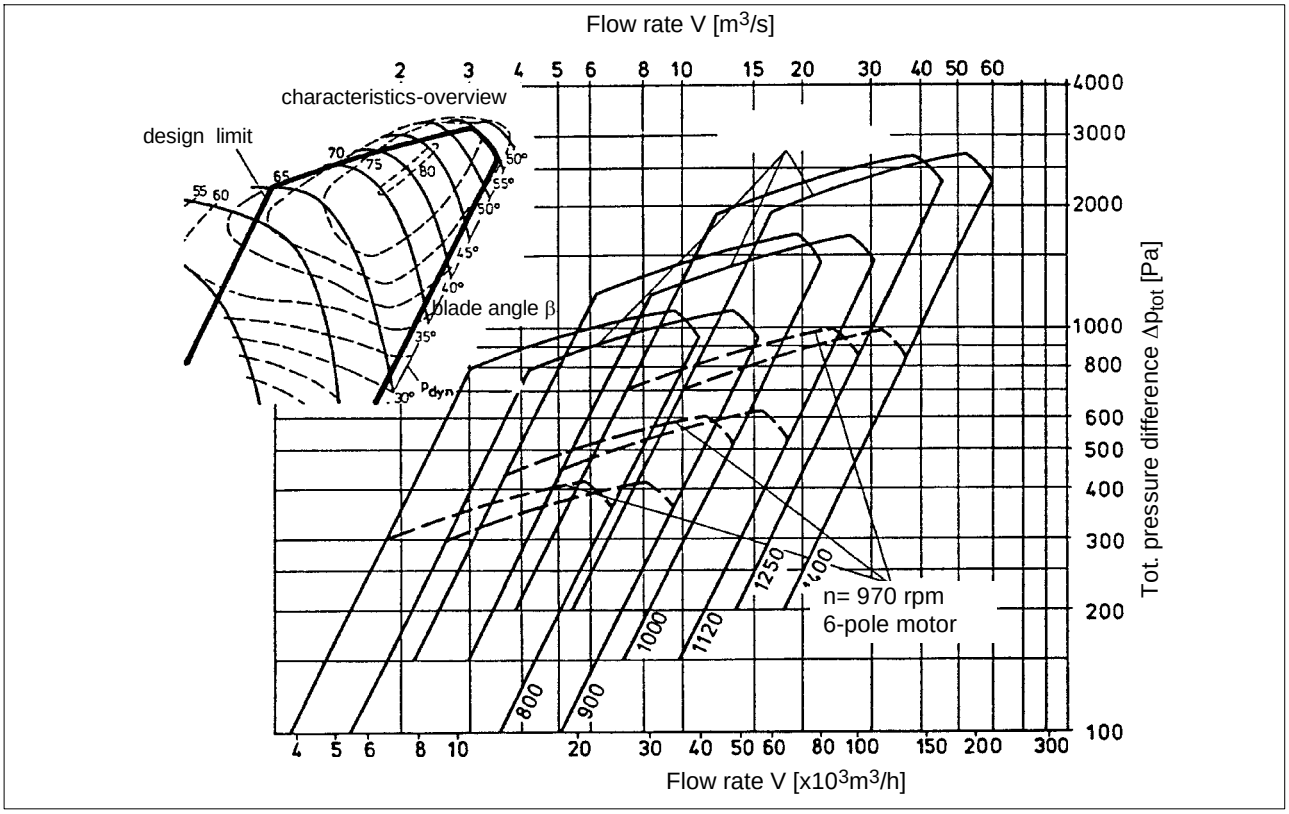
LTG High Performance Axial Flow Fan
Series VAR

Design Range

without guide wheel, without diffuser

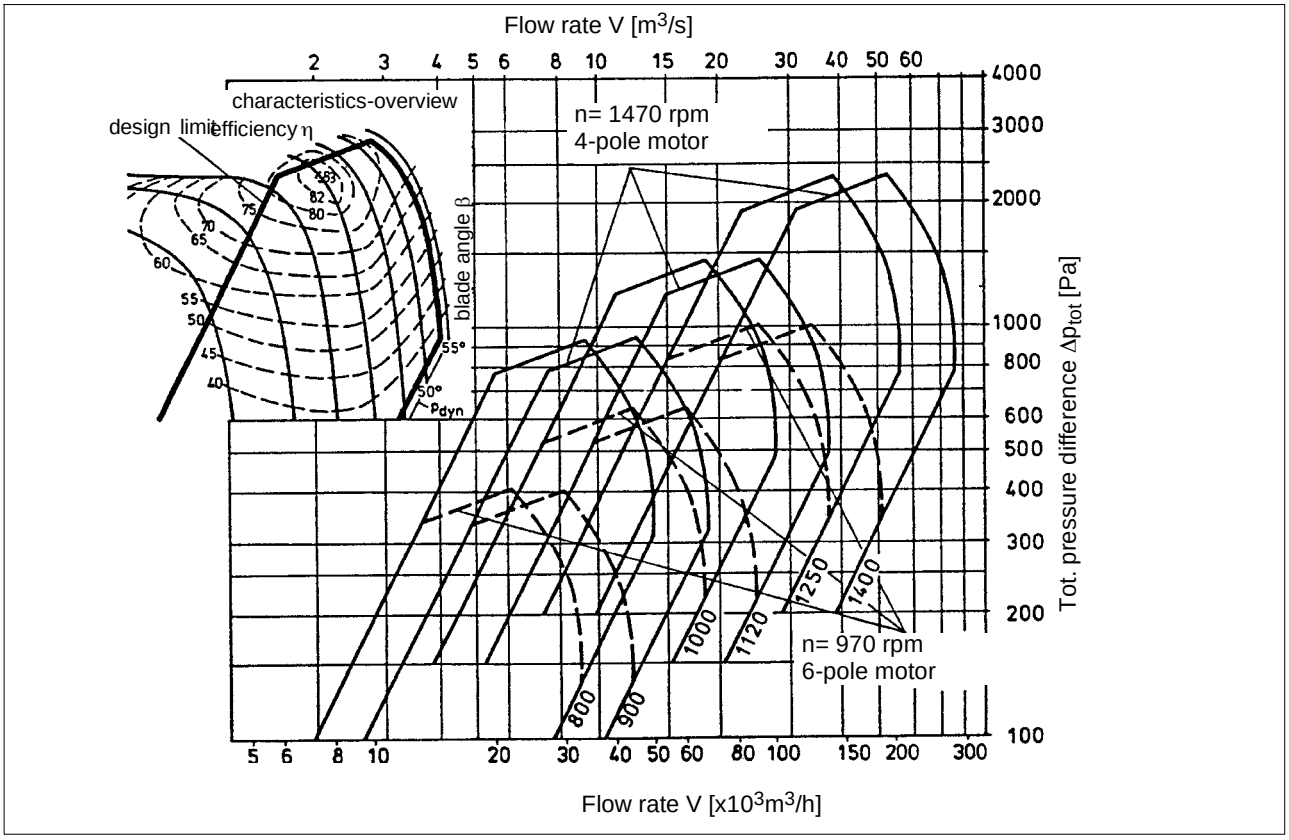


with guide wheel, without diffuser



LTG High Performance Axial Flow Fan
Series VAR

Design Range
with guide wheel, with diffuser



LTG High Performance Centrifugal Fan Quadrovent Series VRK

Centrifugal fans of small to medium size, housing and impeller of welded construction. Welded impeller with backward curved blades.

With single or double sided intakes, 12 sizes each.

Flow rates:	1,000 to 100,000 m^3/h
Maximum total pressure:	2,000 Pa
Nominal sizes:	280 to 1,000
Optimum degree of efficiency:	75%
Degree of efficiency with unrestricted discharge:	72 %

V-belt or flat-belt drive.

Special Characteristics

Low dynamic pressure loss, hence saving on motor output of approx. 25% by comparison with drum rotors;
approx. only 5% more motor power required by comparison with high performance fans producing 75% degree of efficiency.

Quality stage Q 6.3 to VDI 2060

Compact dimensions

Low noise

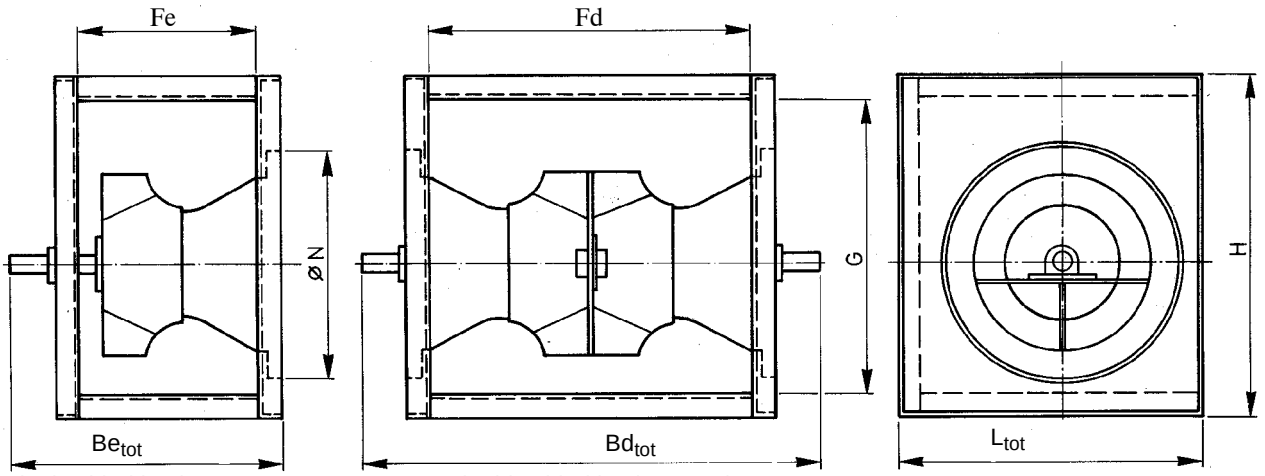
Stable characteristic pressure curve

No possibility of motor overload if installation resistance changes.

Standard Configurations

Single sided or double sided intake.
Available in four housing configurations (double sided intake: drive position optional, left or right side).

Dimensions and Weights



single sided intake VRKe — double sided intake VRKd

Size VRK*		280	315	355	400	450	500	560	630	710	800	900	1000
L_{tot}	[mm]	462	515	574	641	714	799	892	998	1115	1248	1402	1600
H	[mm]	533	591	656	728	810	901	1004	1119	1248	1393	1556	1778
Be_{tot}	[mm]	404	431	487	516	555	603	642	701	762	861	948	1085
Bd_{tot}	[mm]	710	759	821	934	1005	1090	1110	1205	1380	1510	1709	1864
G	[mm]	473	531	596	668	750	841	944	1059	1188	1333	1496	1678
Fe	[mm]	224	251	282	316	355	398	447	501	562	631	708	795
Fd	[mm]	398	447	501	562	631	708	794	891	1000	1122	1259	1412
N	[mm]	357	400	449	503	564	632	709	794	893	1002	1124	1220
Weight e (max.)	[kg]	28	32	39	56	60	86	110	155	180	220	290	520
Weight d (max.)	[kg]	37	48	52	72	85	116	143	200	248	340	480	835

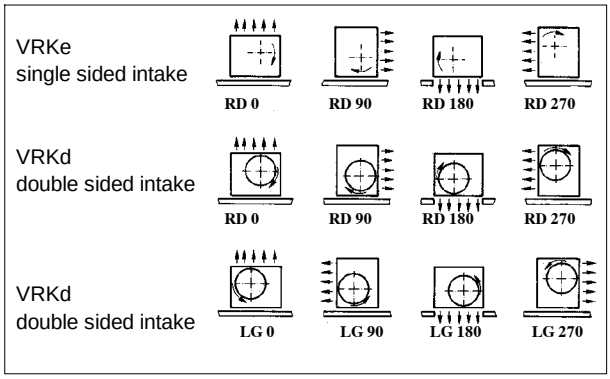
*)The diameter of the impeller in LTG centrifugal fans is approximately one type stage higher than the nominal size

LTG High Performance Centrifugal Fan Quadrovent Series VRK

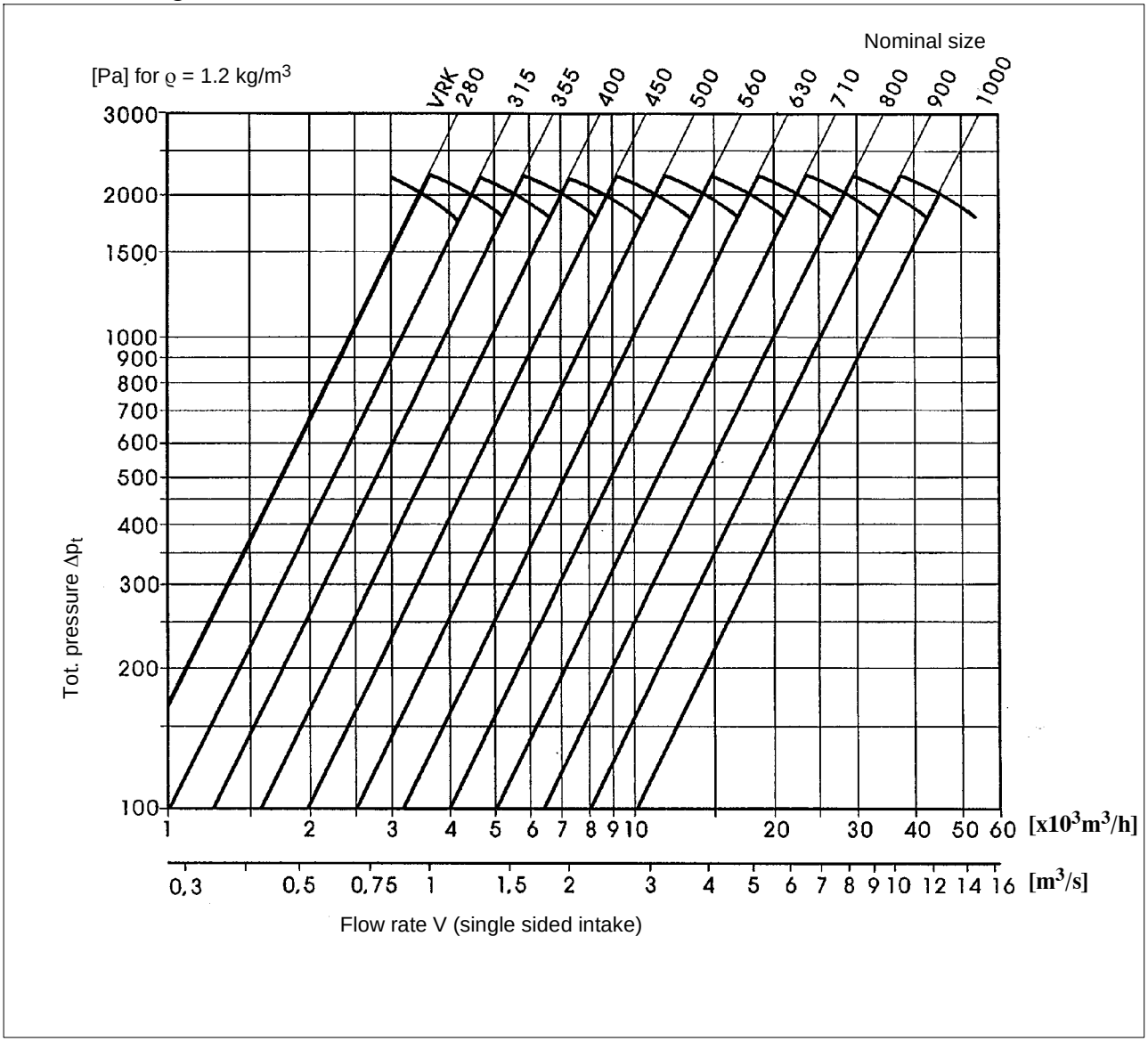
Design Range

The overview diagram shows the range of applications for type VRK fans. This will serve as a preliminary guide to selecting the size of fan required.

Housings



Overview Diagram



LTG High Performance Low-Pressure Centrifugal Fan Series VRS

High-performance centrifugal fans.
High-strength welded housing. Welded impeller with backward curved blades.
With single or double sided intakes, 10 sizes each.

Flow rates:	3,500 to 200,000 m^3/h
Maximum total pressure:	4,000 Pa
Nominal sizes:	450 to 1,250
Optimum degree of efficiency:	85%

V-belt or flat-belt drive.

Special Characteristics

High degree of efficiency and compact dimensions, even at high conveying pressures.

Quality stage Q 6.3 to VDI 2060

Stable characteristic pressure curves, hence possibility of unlimited flow control and parallel operation.

Specific sound power level at optimum degree of efficiency, 31 dB.

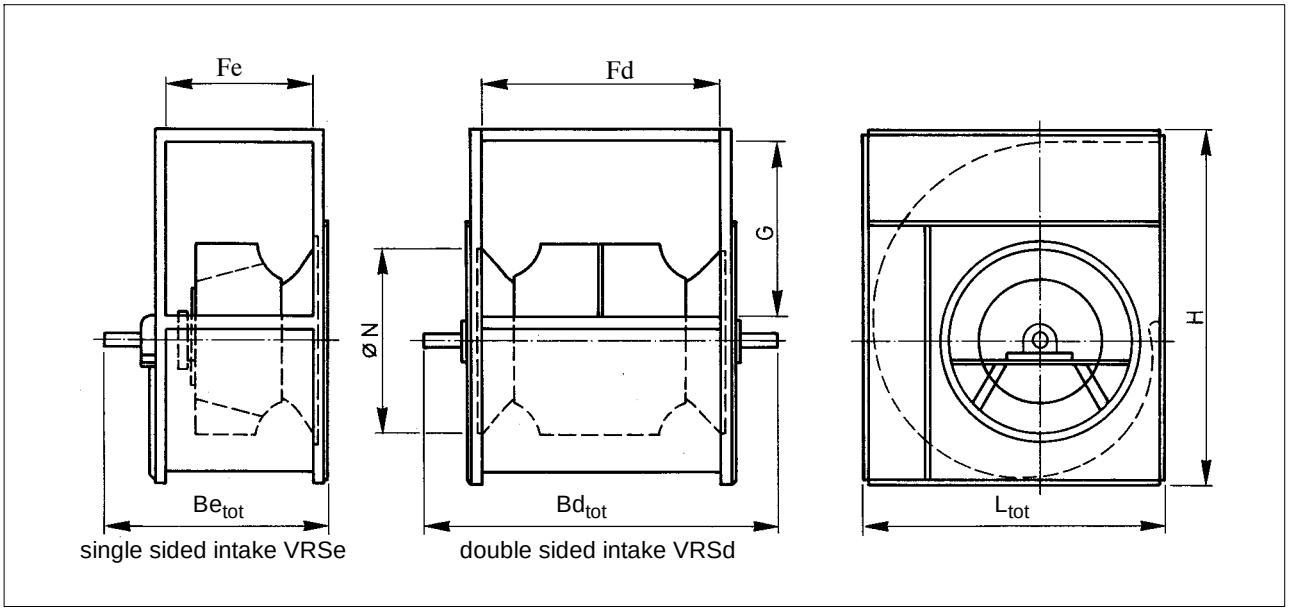
Standard Configurations

Single sided or double sided intake.
Available rotating clockwise or anti-clockwise in each group of four housing configurations. Double sided intake: drive position optional, left or right side.

Special Configurations

Special corrosion proofing options:
Sand blasting, hot galvanizing, rubberizing, stainless steel.

Dimensions and Weights



single sided intake VRSe — double sided intake VRSd

Size VRS*		450	500	560	630	710	800	900	1000	1120	1250
Ltot	[mm]	824	912	1014	1128	1266	1408	1568	1758	1961	2189
H	[mm]	954	1060	1184	1320	1494	1666	1858	2094	2355	2627
Be_{tot}	[mm]	605	655	690	760	823	943	1032	1128	1248	1400
Bd_{tot}	[mm]	991	1070	1150	1291	1460	1356	1530	1691	1914	2112
G	[mm]	473	531	596	668	750	841	944	1059	1188	1332
Fe	[mm]	355	398	447	501	562	631	708	795	895	1000
Fd	[mm]	631	708	794	891	1000	1122	1259	1412	1585	1778
N	[mm]	560	628	705	790	889	998	1119	1220	1261	1261
		one-piece						multi-part			
Weight e (max.)	[kg]	78	99	135	165	206	270	475	707	1040	1212
Weight d (max.)	[kg]	145	180	235	280	480	600	935	1205	1560	1880

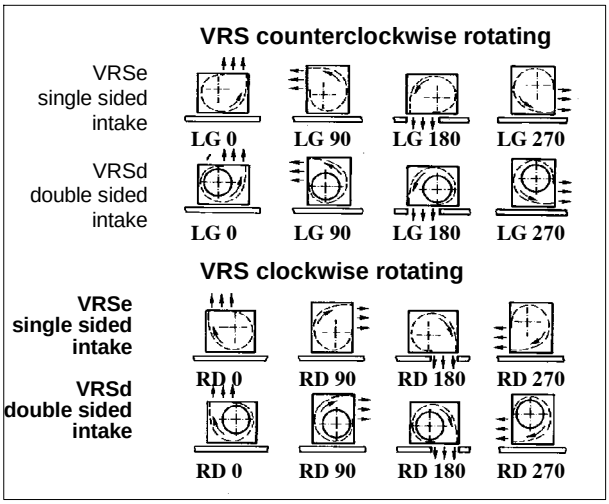
*)The diameter of the impeller in LTG centrifugal fans is approximately one type stage higher than the nominal size

LTG High Performance Low-Pressure Centrifugal Fan Series VRS

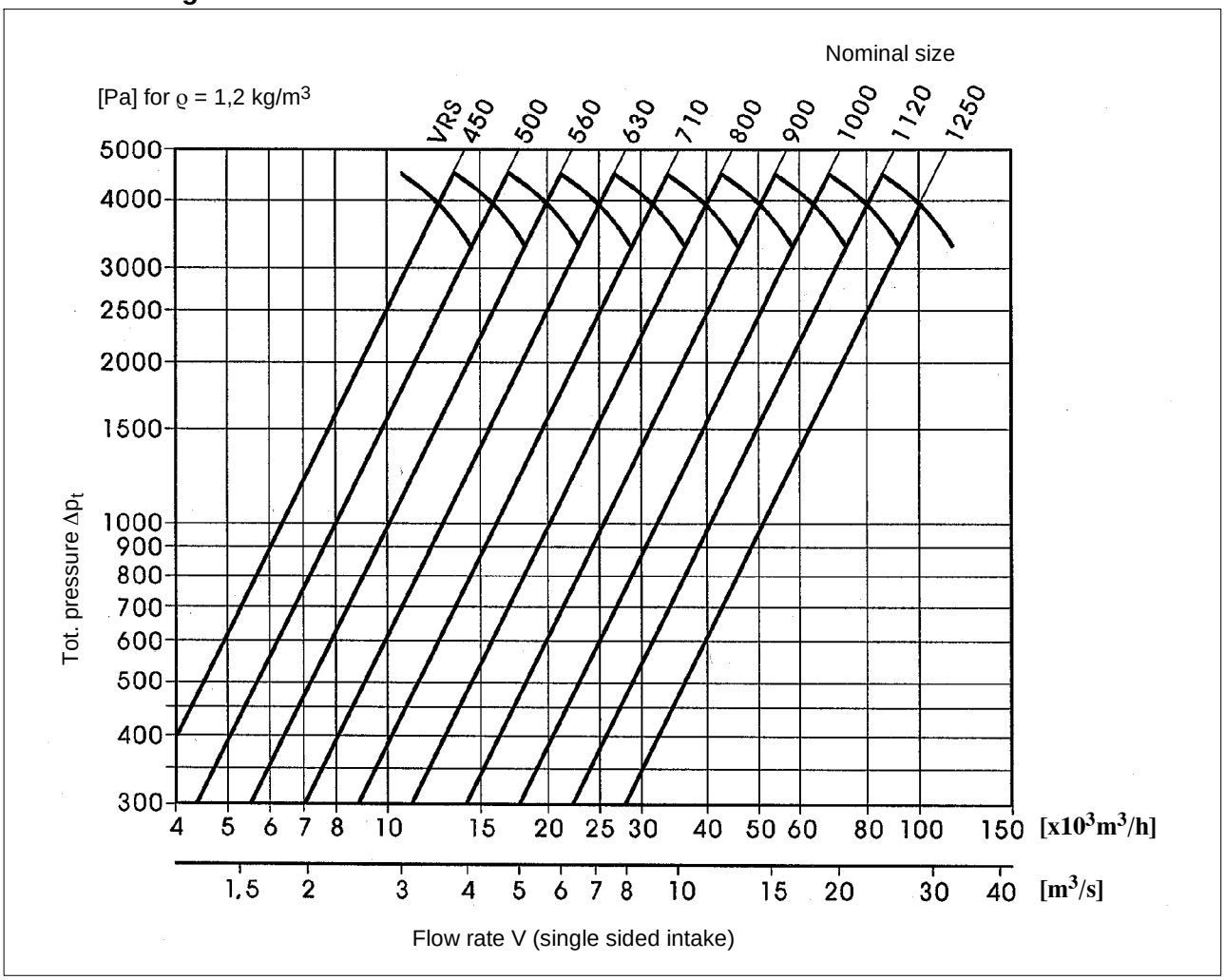
Design Range

The overview diagram shows the range of applications for type VRK fans. This will serve as a preliminary guide to selecting the size of fan required.

Housings



Overview Diagram



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Comfort Air Technology

Air Conditioning Systems

- Decentralized Facade Ventilation Units
- Fan Coil Units
- Induction Units, Active Chilled Beams

Air Diffusers

- Linear Air Diffusers
- Wall and Floor Mounted Air Diffusers
- Swirl Diffusers
- Industrial and Special Air Diffusers

Air Distribution

- Flow Rate and Pressure Controllers
- Shut-off and Balancing Dampers
- Silencers

Process Air Technology

Fans

- Tangential Fans
- Axial Fans
- Centrifugal Fans
- Fahrtwind-Simulators

Filtration Technology

- Suction Nozzles
- Dampers
- Filters, Dust Collectors
- Separators, Compactors

Humidification Technology

- Air Humidifiers
- Product Humidifiers

Engineering Services

Fluid Engineering

- Flow analysis
- Flow visualization
- CFD-simulations
- Flow optimization
- Air conditioning concepts

Thermodynamics

- Calorimetric performance measurement
- Thermal, dynamic, unsteady, system simulations

Acoustics

- Sound level measuring
- Vibration analysis
- Echo chamber measurement
- Acoustic optimization

Comfort

- Evaluation
- Optimization

Customer-specific Solutions

- Product development
- Process optimization
- Installation analysis

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