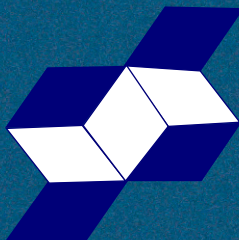


# Technical Specification

Low Pressure Centrifugal Fan (CNB)  
Medium Pressure Centrifugal Fan (CBS)  
High Pressure Blower (CPC)  
Finned Heating Coils (LFD)



**PT. CENTRINDO PALMAX**

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**FAN AND HEATER  
IN  
PALM OIL MILL**

# Centrifugal Fans CNA and CNB

Centrifugal fans type CNA and CNB are light-weight, compact low pressure fans with high efficiency designed for universal installation. They are therefore well suited for commercial ventilation and air conditioning, besides which they are often used in other ventilation plants (industrial and marine) where economic operation and a low sound level are important factors.

Type CNA is available in nine standard sizes with impeller diameters from 250 mm to 1000 mm, and type CNB in seven sizes with impeller diameters from 400 mm to 1000 mm. As appears from the performance curves type CNB is designed for higher speeds than type CNA.

Centrifugal fans types CNA and CNB comprise the following main components:

**Fan casing** made up of two rectangular side plates and a scroll plate.  
Material: galvanized sheet steel.

**Shaped inlet** fitted in the front side plate, providing a spigot for connection to ducting. The inlet is specially designed to guide the air to the impeller without loss in pressure.  
Material: Aluminium.

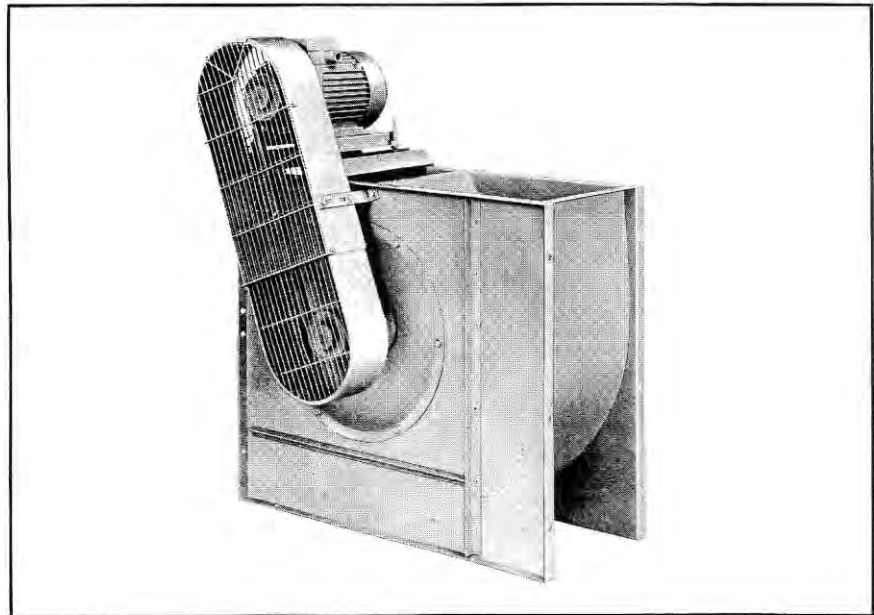
**Impeller** with broad, backward curved blades.  
Material: CNA-250 to -630: galvanized sheet steel; other impellers black sheet steel.

**Bearing assembly** with deep groove ball bearings, shaft and bearing tube fitted in the casing back plate. The bearings are fitted in dust and watertight housings.

**Installation:** universal.

**Capacities:** air flow rates up to approx. 20 m<sup>3</sup>/s (72,000 m<sup>3</sup>/h), total pressures up to approx. 1600 N/m<sup>2</sup> (160 mm w.g.). Selection curves page C3-2.1 and -2.2 in general catalogue. Performance curves for individual sizes on pages C3-3.0 to -6.0 in special catalogue: Centrifugal Fans.

**Positions:** see sketches to the right. Direction of rotation RD or LG. Motor positions 1, 2, 3 and 4 refer to the location of the motor in relation to the outlet opening. Previous designations in brackets.



## FINISH

All parts of the fan are protected against ordinary atmospheric corrosion.

## ACCESSORIES

**Motor** to specification.

**Motor mounting plate** for mounting of motors not exceeding the sizes stated on page C3-2.0 on the flanges of the fan casing. The mounting plate is adjustable for tensioning of the belts.

**Base frame** for mounting of motors larger than the sizes stated on page C3-2.0 beside the fan. Sizes 250, 315 and 400 are also available with direct connected flanged motors mounted on the casing back plate.

**Belt drive** consisting of pulleys, v-belts, and belt guard.

**Flexible connections** for inlet spigot and outlet flange.

**Counter flange** for outlet flange.

**Protective screen** for inlet opening.

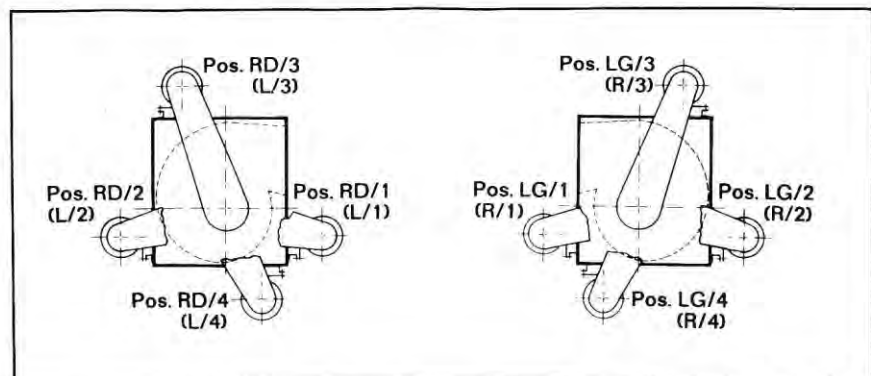
**Anti-vibration mountings.**

**Inlet vane control gear** for regulation of fan output. An inlet flange is required for the mounting of the gear on sizes 710 to 1000.

**Inlet flange** for mounting on fan inlet spigot. Also used for attachment of flexible connection to the inlet vane control.

**Inspection door** in fan casing scroll plate, see page C3-2.0.

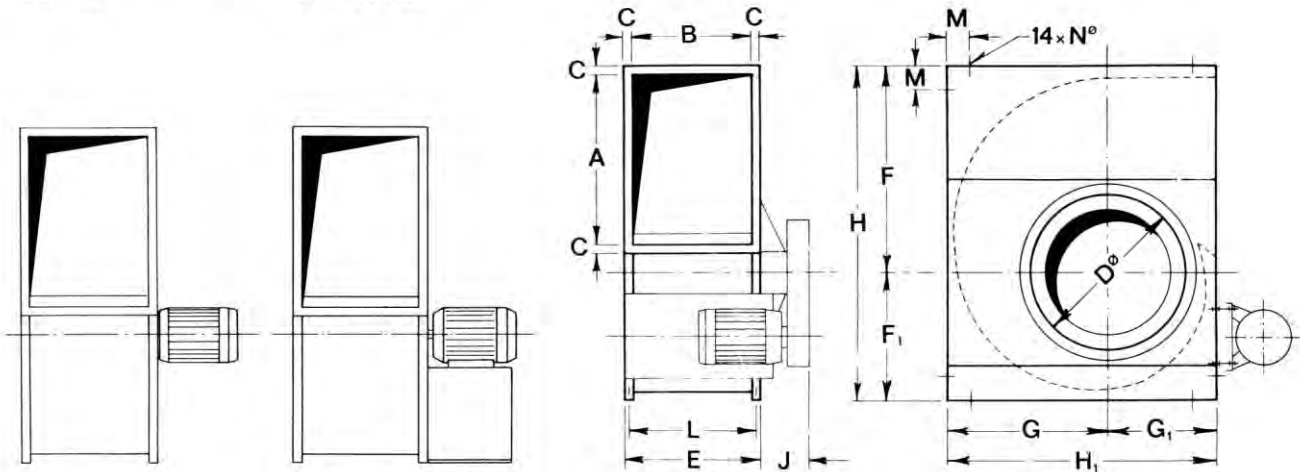
**Drain connection**, see page C3-2.0.



**Direct connected:**  
CNA-250, -315, -400  
CNB-400

CNA-500, -630  
CNB-500 -630

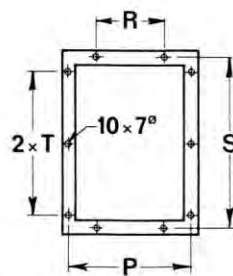
**Belt drive:**  
all sizes



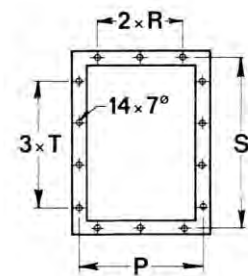
CNA- CNB-	A	B	C	D	E	F	F <sub>1</sub>	G	G <sub>1</sub>	H	H <sub>1</sub>	J	L	M	N	Weight* kg	
																CNA	CNB
250	250	175	30	250	235	310	250	245	200	560	445	150	207	60	12	22	-
315	315	220	30	315	280	410	280	345	250	690	595	160	252	100	12	35	-
400	400	280	30	400	340	485	315	400	300	800	700	145	312	100	12	53	55
500	500	350	35	500	420	600	400	500	350	1000	850	170	392	125	15	89	98
630	630	440	35	630	510	758	488	623	440	1246	1063	250	482	125	15	146	161
710	710	497	40	710	577	870	535	670	465	1405	1135	260	537	62,5	15	238	262
800	800	560	40	800	640	976	604	754	516	1580	1270	280	600	85	15	304	334
900	900	630	45	900	720	1098	680	847	573	1778	1420	300	680	110	15	350	385
1000	1000	700	45	1000	790	1215	750	940	640	1965	1580	360	750	90	15	487	535

\* Weight excl. of motor and belt drive.

CNA- CNB-	P	R	S	T
250	207	85	282	110
315	252	110	347	142,5
400	312	140	432	185
500	386	125	536	155
630	476	170	666	200
710	537	150	750	170
800	600	170	840	175
900	680	195	950	200
1000	750	160	1050	180



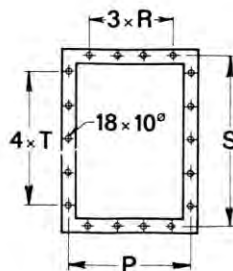
Outlet flanges Sizes 250, 315, 400



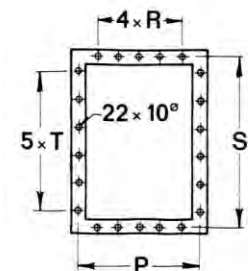
Sizes 500, 630

**Counter flanges** (4 strips) with bolt holes as in the outlet flanges are available as optional extras.

**Ducts** are made with the same inside dimensions as the fan outlet (AxB).

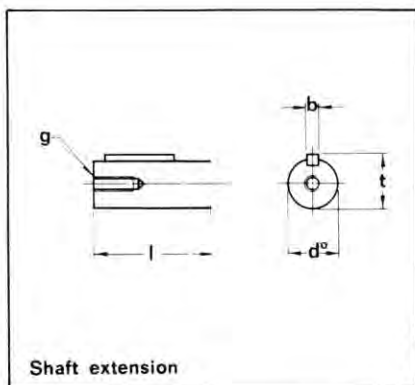


Sizes 710, 800, 900



Size 1000

# Centrifugal Fans CNA and CNB



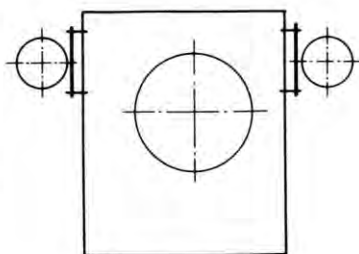
Shaft extension

CNA	d	l	b	t	g
250	24 j6	50	8	27	M8
315	24 j6	50	8	27	M8
400	24 j6	50	8	27	M8
500	28 j6	50	8	31	M10
630	32k6	60	10	35	M10
710	35h8	100	10	38	M10
800	40h8	100	12	43	M10
900	40h8	100	12	43	M10
1000	55h8	100	16	59	M12

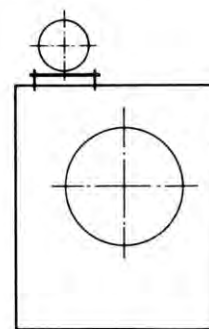
CNB-	d	l	b	t	g
400	28 j6	50	8	31	M10
500	38k6	90	10	41	M12
630	48k6	90	14	51,5	M12
710	55m6	100	16	59	M12
800	55m6	100	16	59	M12
900	60m6	115	18	64	M12
1000	60m6	115	18	64	M12

## Motor mounting arrangements

The tables show the maximum sizes of motors that may be mounted direct on the fans. Motors of larger sizes should be mounted on slide rails beside the fans. A base frame supporting both fan and motors as illustrated in the sketches to the right can be supplied. Please specify motor position (pos. W, X, Y or Z, see page C1-3.0).



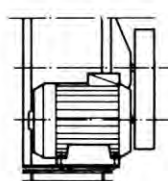
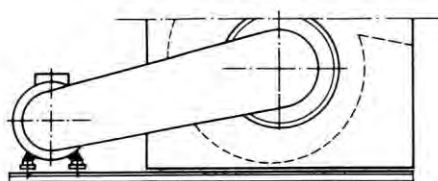
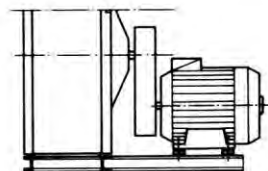
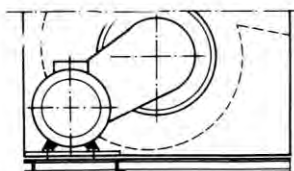
Motor on side  
- vertical mounting plate



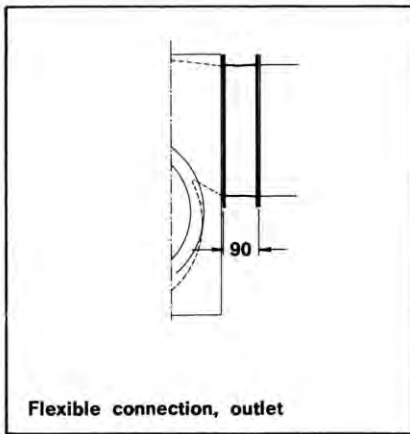
Motor on top  
- horizontal mounting plate

CNA-CNB-	Max. motor Type	Weight
250	90	20
315	112	40
400	112	40
500	132	70
630	132	70
710	132	70
800	132	70
900	132	70
1000	132	70

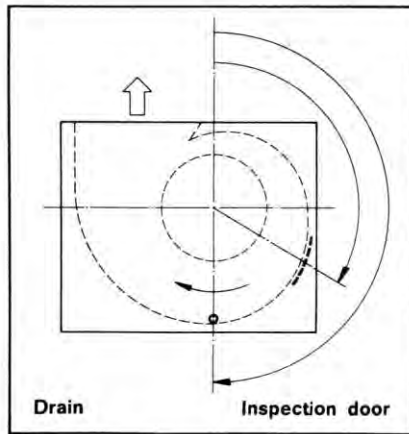
CNA-CNB-	Max. motor Type	Weight
250	90	20
315	112	40
400	112	40
500	132	70
630	132	70
710	160	140
800	160	140
900	180	190
1000	180	190



Base frames for fan and motor



Flexible connection, outlet



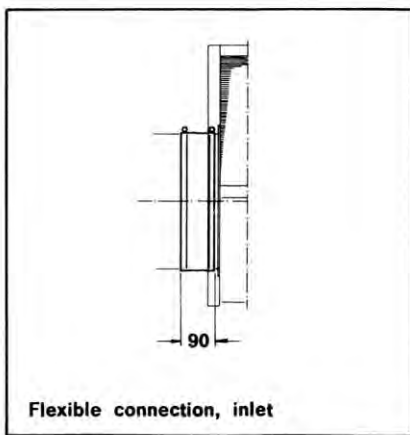
Drain Inspection door

Types CNA and CNB can be supplied with drain and inspection door in the scroll plate.

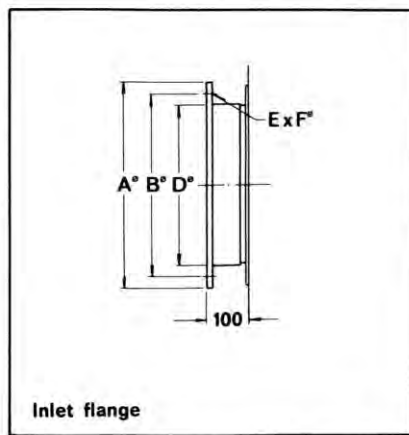
When ordering please state location of inspection door and drain in relation to the outlet direction,

e.g. inspection door pos. RD 120, drain pos. RD 180,

in conformity with the rules given on page C1-3.0.

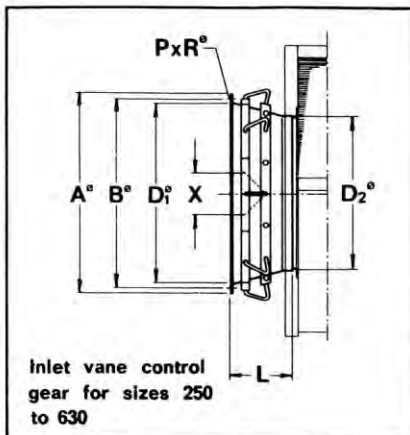


Flexible connection, inlet



Inlet flange

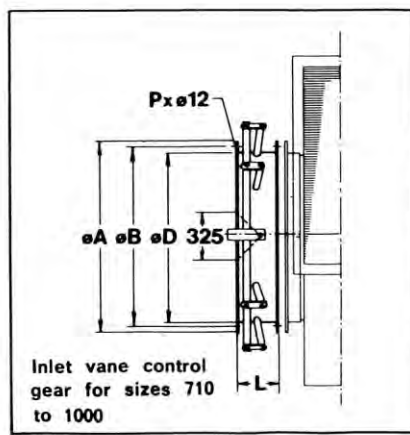
CNA-CNB-	A	B	D	E	F
250	306	286	250	6	10
315	381	356	315	8	10
400	468	438	400	12	10
500	568	541	500	12	10
630	708	674	630	16	12
710	790	751	710	16	12
800	880	837	800	24	12
900	980	934	900	24	12
1000	1080	1043	1000	24	12



Inlet vane control gear for sizes 250 to 630

CNA-CNB-	A	B	D <sub>1</sub>	D <sub>2</sub>	L	P	R	X	Weight kg
250	377	356	315	250	150	8	10	70	10
315	462	438	400	315	195	12	10	87	12
400	562	541	500	400	215	12	10	111	16
500	702	674	630	500	284	16	12	138	25
630	872	837	800	630	365	24	12	174	45

The control gear is mounted direct on the inlet spigot. Use an inlet flange for attachment of flexible connection. The curves apply to the fan without inlet vane control.



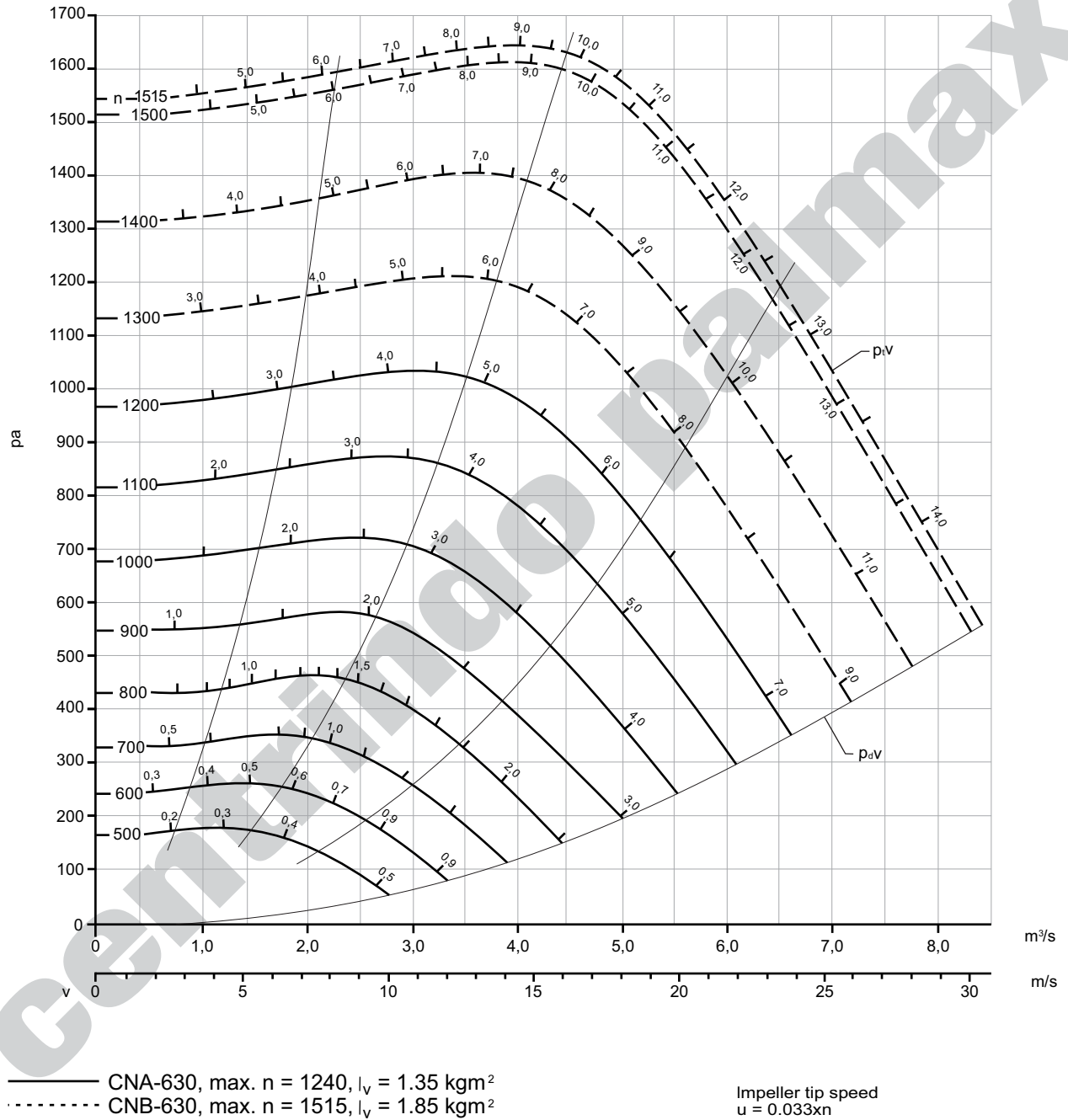
Inlet vane control gear for sizes 710 to 1000

CNA-CNB-	A	B	D	L	P	Weight kg
710	790	751	710	250	16	40
800	880	837	800	270	24	46
900	980	934	900	290	24	53
1000	1080	1043	1000	320	24	62

The inlet vane control gear is mounted on the fan by means of an inlet flange. Use an inlet flange for attachment of flexible connection. The curves apply to the fan without inlet vane control.

CNA-630, CNB-630

$\rho = 1.225 \text{ kg/m}^3$

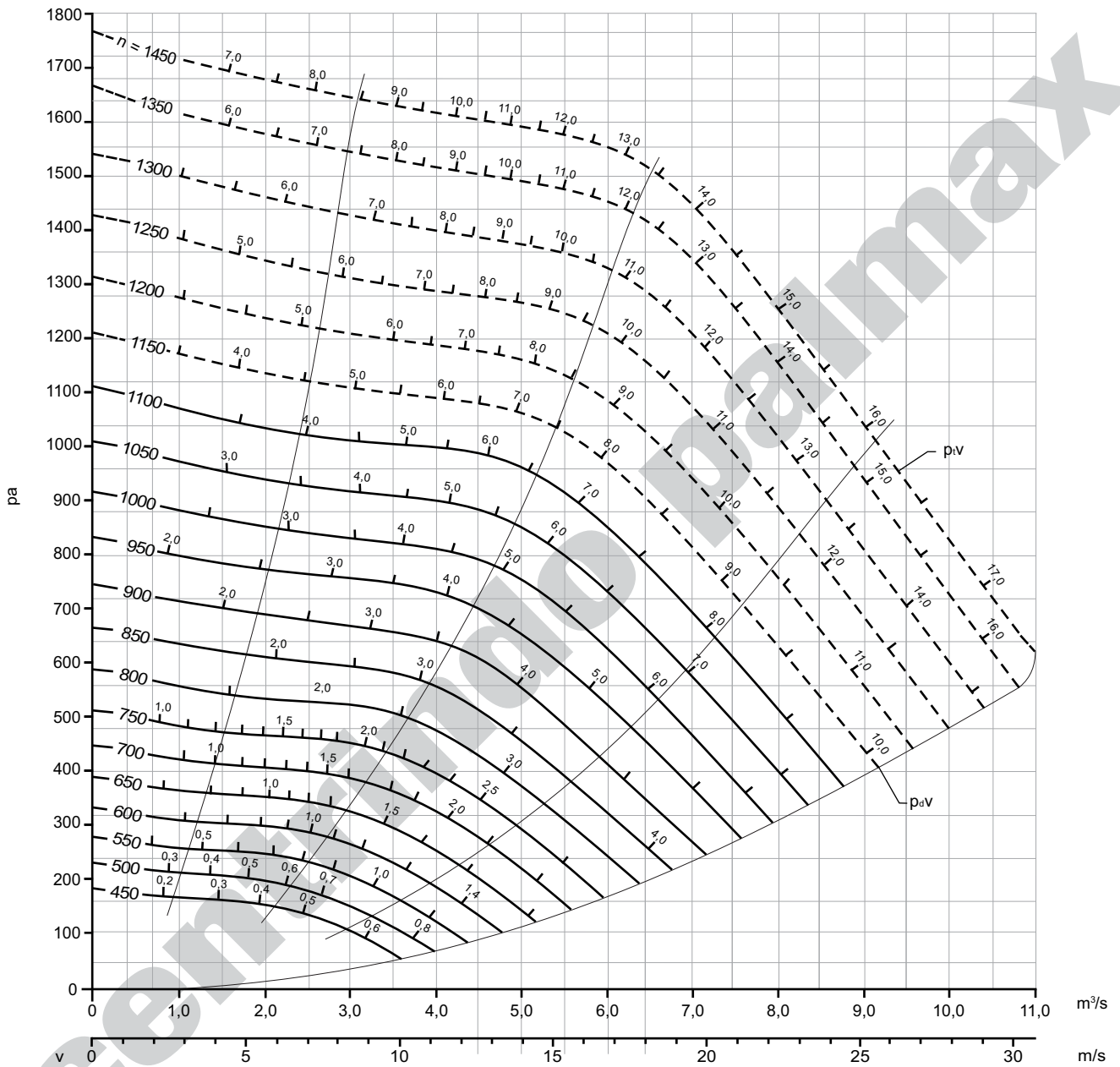


$n$ : Fan speed, r.p.m  
 The numbers on the curves indicate the fan power consumption in kW  
 $p$ : Pressure, Pa  
 $P_v$ : Fan total pressure

$P_{dw}$ : Fan velocity pressure  
 $u$ : Impeller tip speed, m/s  
 $v$ : Air velocity in outlet opening, m/s

### CNA-710, CNB-710

$\rho = 1.225 \text{ kg/m}^3$



— CNA-710, max.  $n = 1105$ ,  $I_v = 3 \text{ kgm}^2$

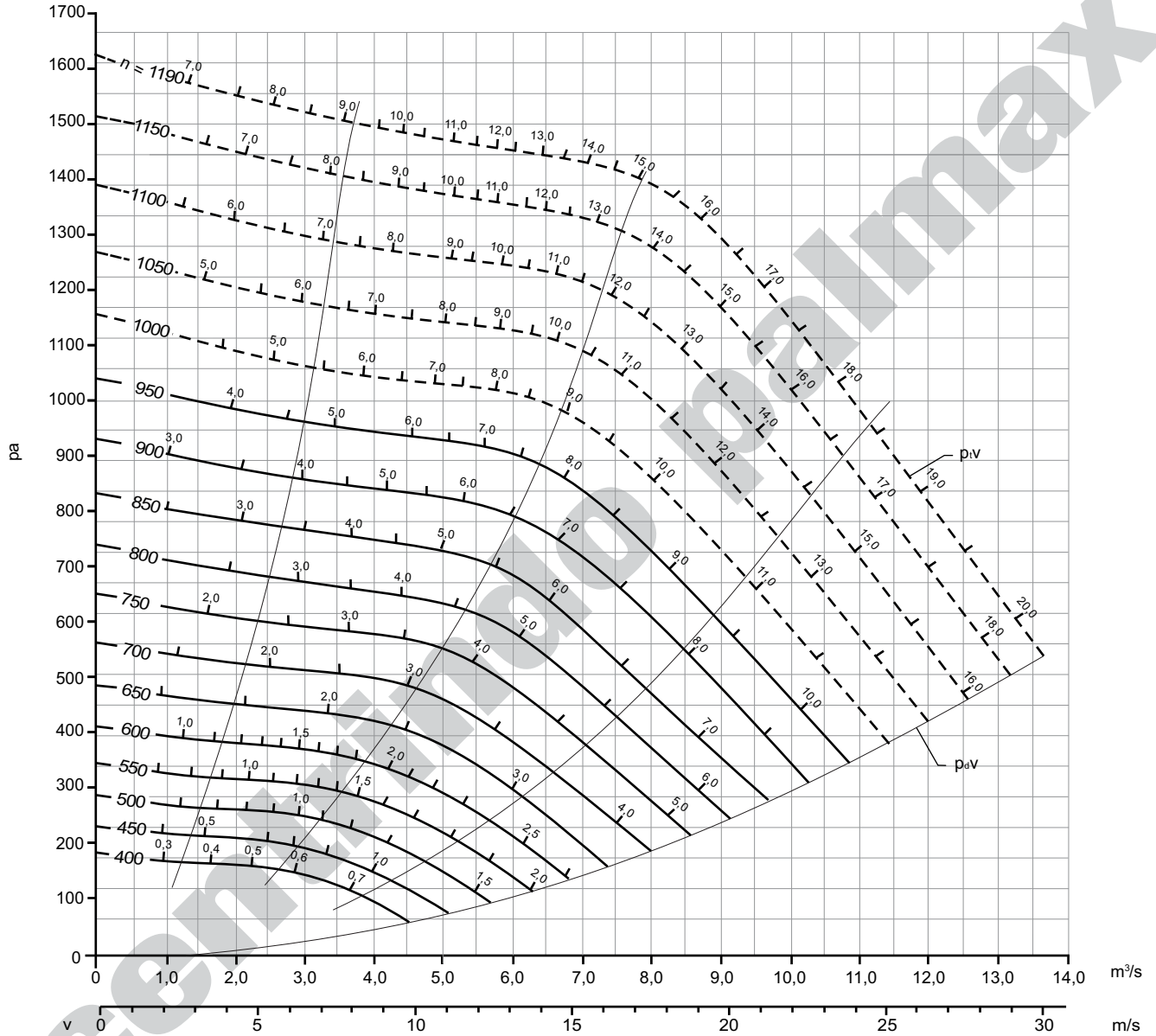
Impeller tip speed  
 $u = 0.037xn$

$n$ : Fan speed, r.p.m  
The numbers on the curves indicate the fan power consumption in kW  
 $p$ : Pressure, Pa  
 $P_v$ : Fan total pressure

$P_{dv}$ : Fan velocity pressure  
 $u$ : Impeller tip speed, m/s  
 $v$ : Air velocity in outlet opening, m/s

CNA-800, CNB-800

$\rho = 1.225 \text{ kg/m}^3$



— CNA-800, max.  $n = 975$ ,  $l_v = 5 \text{ kgm}^2$   
 - - - - - CNB-800, max.  $n = 1190$ ,  $l_v = 5 \text{ kgm}^2$

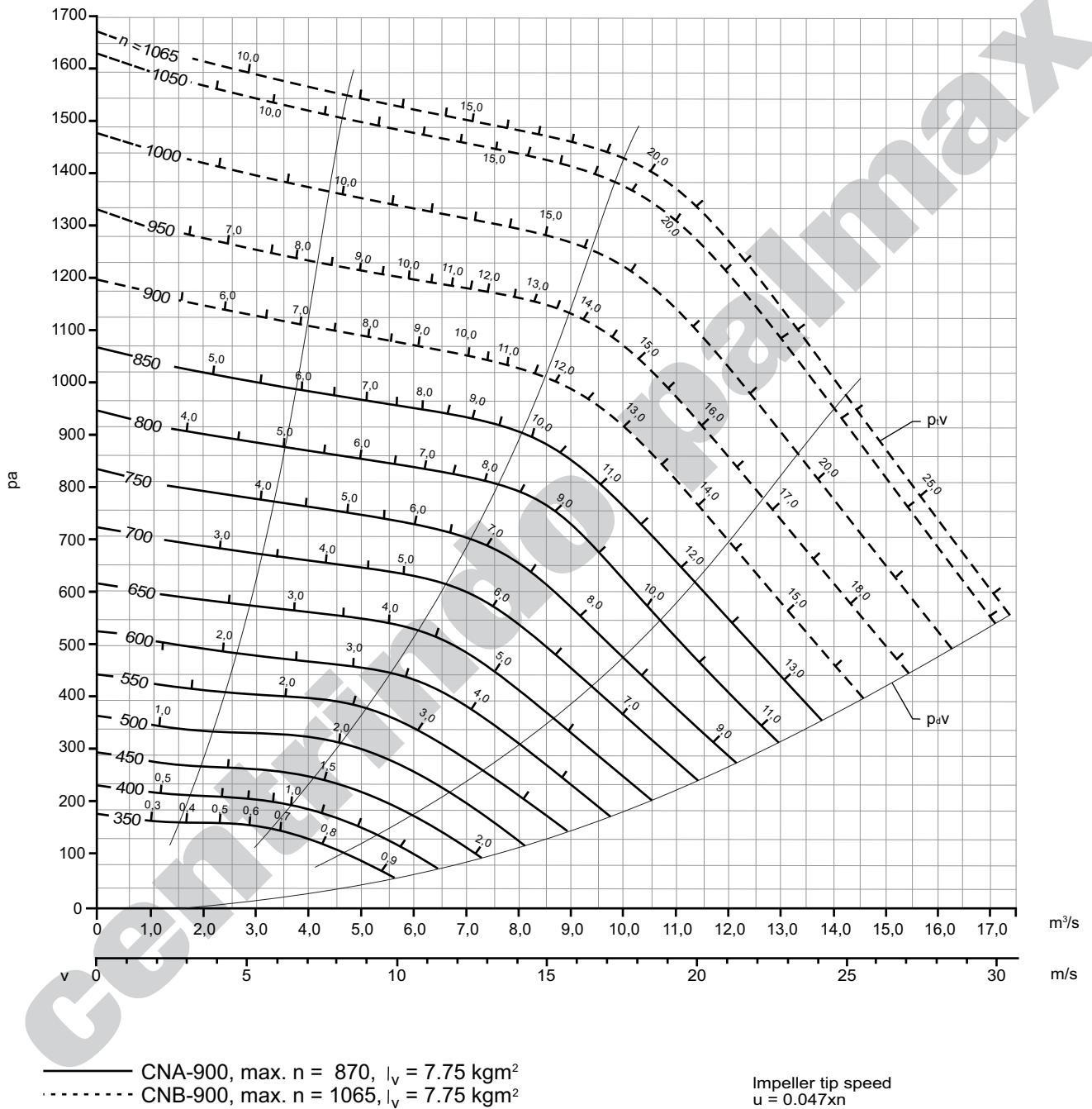
Impeller tip speed  
 $u = 0.042 \times n$

$n$ : Fan speed, r.p.m.  
 The numbers on the curves indicate the fan power consumption in kW  
 $p$ : Pressure, Pa  
 $P_{dv}$ : Fan total pressure

$P_{dv}$ : Fan velocity pressure  
 $u$ : Impeller tip speed, m/s  
 $v$ : Air velocity in outlet opening, m/s

CNA-900, CNB-900

$\rho = 1.225 \text{ kg/m}^3$

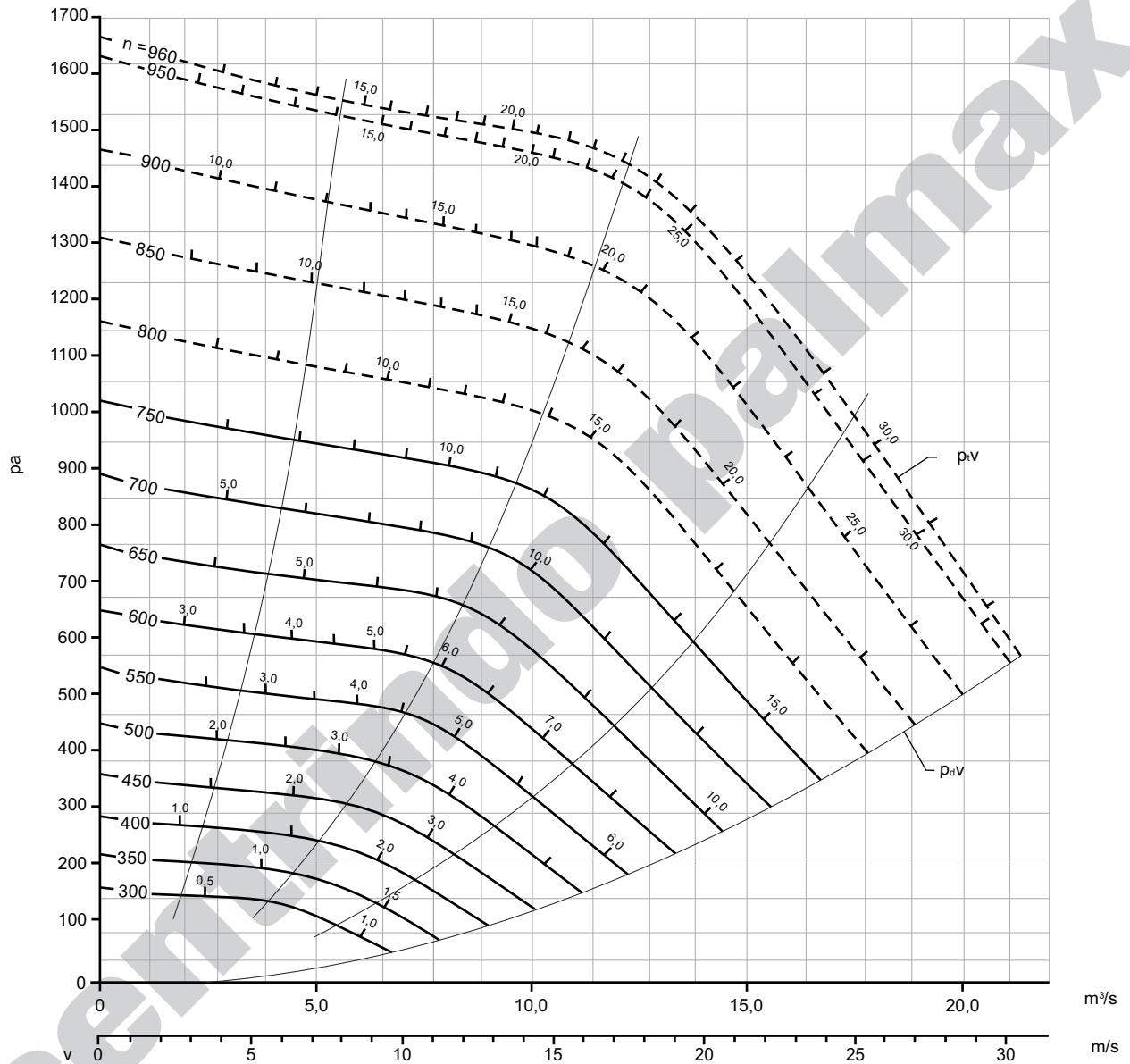


$n$ : Fan speed, r.p.m.  
 The numbers on the curves indicate the fan power consumption in kW  
 $p$ : Pressure, Pa  
 $P_v$ : Fan total pressure

$P_{dv}$ : Fan velocity pressure  
 $u$ : Impeller tip speed, m/s  
 $v$ : Air velocity in outlet opening, m/s

CNA-1000, CNB-1000

$\rho = 1.225 \text{ kg/m}^3$



— CNA-1000, max.  $n = 785$ ,  $l_v = 14 \text{ kgm}^2$   
 - - - - - CNB-1000, max.  $n = 960$ ,  $l_v = 14 \text{ kgm}^2$

Impeller tip speed  
 $u = 0.052\pi n$

$n$ : Fan speed, r.p.m  
 The numbers on the curves indicate the fan power consumption in kW  
 $p$ : Pressure, Pa  
 $P_{dv}$  Fan total pressure

$P_{dv}$ : Fan velocity pressure  
 $u$ : Impeller tip speed, m/s  
 $v$ : Air velocity in outlet opening, m/s

# Centrifugal Fans type CBS

Centrifugal fan type CBS is a compact and robust medium pressure fan with self-cleaning blades, which can be used where the air has a relatively high dust concentration. It is designed for universal installation and is well suited for all types of ventilation plants where economic operation and a low sound level are important factors.

Type CBS can be supplied in special designs capable of handling air at temperatures up to 360°C.

Type CBS is available in 7 standard sizes with impeller diameters from 400 mm to 1000 mm; it is normally supplied with an impeller having the width designation 70 (e.g. fan designation CBS-710/70). All sizes can be furnished on order with impellers having the width designation 50; the capacities of these will be stated on request.

Type CBS consists of the following main components:

**Fan casing** consisting of two rectangular side plates and a scroll plate.

The side plates have flanges with bolt holes along all four sides for mounting of the fan.

Material: black sheet steel.

**Shaped inlet** fitted in the inlet side plate with spigot for connection to ducting and so designed that the air is guided to the impeller without loss in pressure.

Material: aluminium, cast.

**Impeller** with backward curved, self-cleaning blades in robust, welded construction, designed for relatively high speeds.

Material: black sheet steel.

**Installation:** universal.

**Capacities:** air flow rates up to approx. 25 m<sup>3</sup>/s (90 000 m<sup>3</sup>/h), total pressures up to approx. 8 000 N/m<sup>2</sup> (800 mm w.g.).

Performance curves for the individual sizes on page C6-3.0 to -6.0 in special catalogue: Centrifugal Fans.

**Positions:** see sketches to the right.

Direction of rotation: RD or LG.

Motor positions, 1, 2, 3 and 4 refer to the location of the motor in relation to the outlet opening. Previous designations in brackets.



**Bearing assembly** consisting of a shaft and two anti-friction bearings in a bearing tube fitted in the back plate of the fan casing.

## FINISH

All parts of the fan are protected against ordinary atmospheric corrosion.

## ACCESSORIES

**Motor** to specification.

**Motor mounting plate** for mounting of motors not exceeding the sizes stated on C6-2.0 on the flanges of the fan casing. The mounting plate is adjustable for tensioning of the belts.

**Base frame** for mounting of motors larger than the sizes stated on page C6-2.0 beside the fan.

**Belt drive** consisting of pulleys, v-belts and belt guard.

**Flexible connections** for inlet spigot and outlet flange.

**Counter flange** for fan outlet flange.

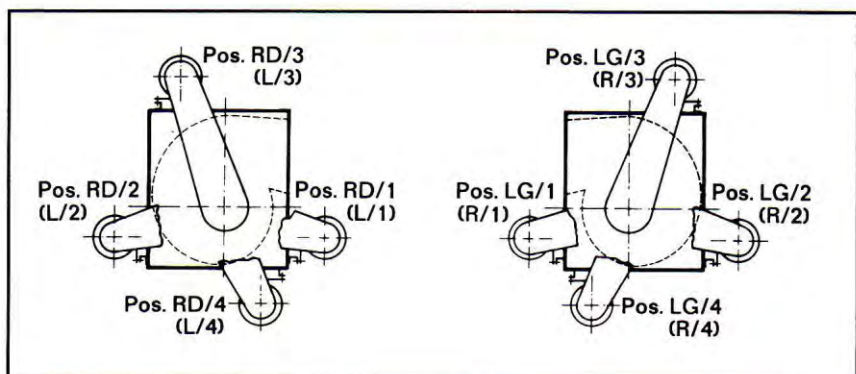
**Protective screen** for inlet opening.

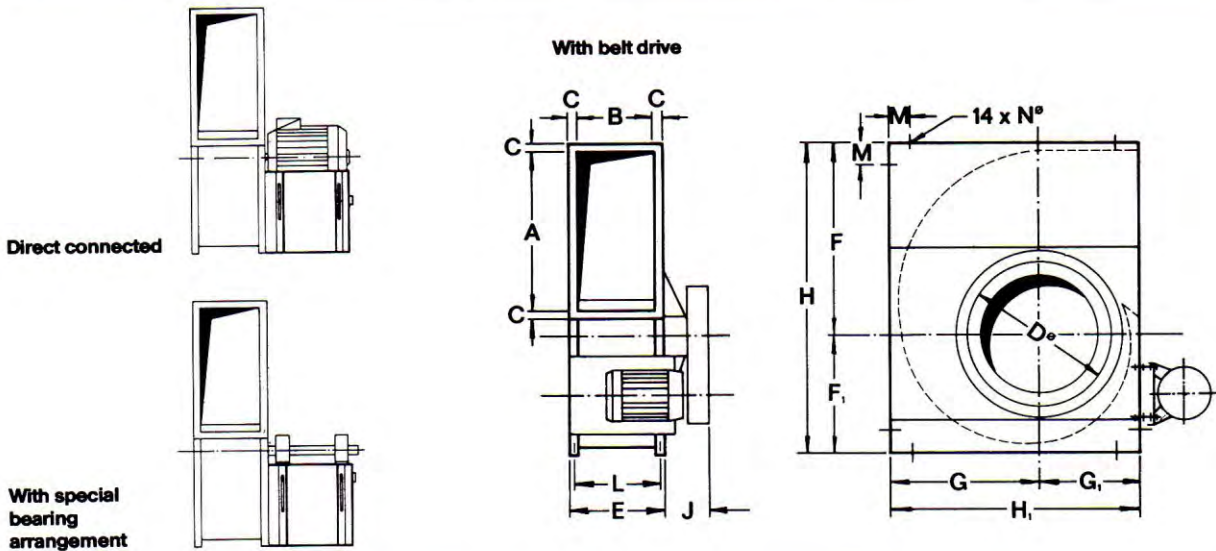
**Anti-vibration mountings.**

**Inlet vane control gear** for regulation of fan output.

**Inlet flange** for mounting on fan inlet spigot.

**Duct spigot** for connection of flexible connection to inlet vane control gear.





CBS-	A	B	C	D	E	F	F <sub>1</sub>	G	G <sub>1</sub>	H	H <sub>1</sub>	J	L	M	N	Weight kg*
400	400	196	30	315	256	485	315	400	300	800	700	134	228	100	12	82
500	500	245	35	400	315	600	400	500	350	1000	850	170	287	125	15	153
630	630	308	35	450	378	758	488	623	440	1246	1063	180	350	125	15	250
710	710	348	40	500	428	870	535	670	465	1405	1135	210	388	62,5	15	353
800	800	392	40	560	472	976	604	754	516	1580	1270	222	432	85	15	463
900	900	440	45	630	530	1098	680	847	573	1778	1420	250	490	110	15	582
1000	1000	490	45	710	580	1215	750	940	640	1965	1580	284	540	90	15	692

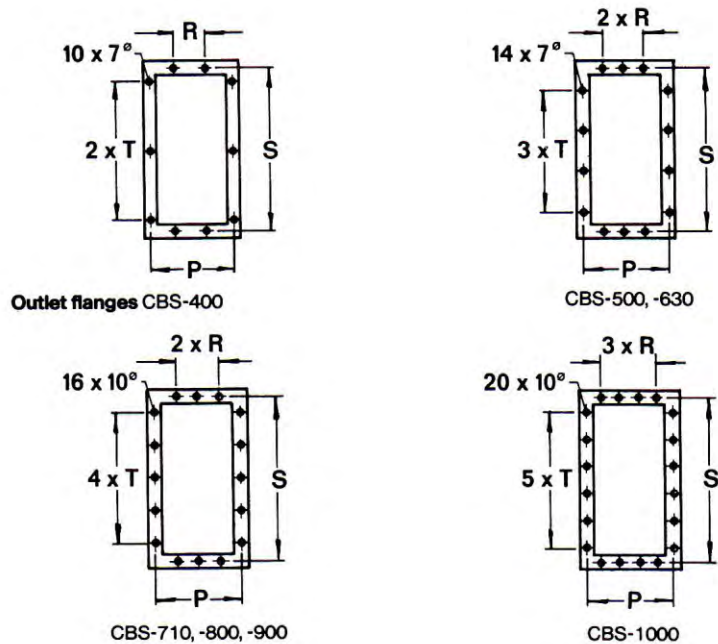
\*Weight exclusive of motor and belt drive.

CBS-	P	R	S	T
400	228	140	432	185
500	281	100	536	155
630	344	125	666	200
710	388	150	750	170
800	432	170	840	175
900	490	195	950	200
1000	540	150	1050	180

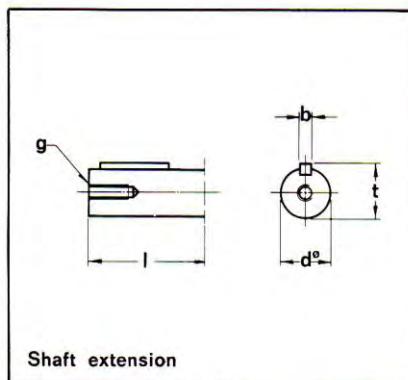
**Counter flanges** (4 strips) with bolt holes as in the outlet flanges are available as optional extras.

**Counter flanges** for welding on duct (flat iron frame) with bolt holes as in the outlet flanges are available as optional extras.

**Ducts** to be made with same inside dimensions as the fan outlet flange (A x B).



# Centrifugal Fans type CBS

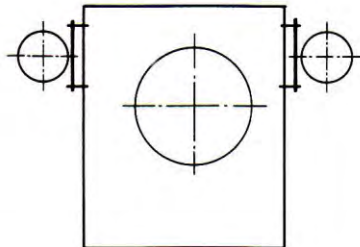


CBS-	d	l	b	t	g
400	-	-	-	-	-
500	38 k6	90	10	41	M12
630	48 k6	90	14	51,5	M12
710	55m6	105	16	59	M12
800	55m6	105	16	59	M12
900	60m6	120	18	64	M12
1000	60m6	120	18	64	M12

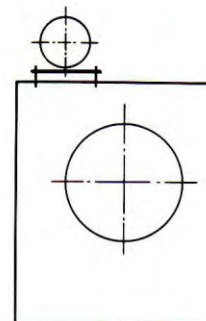
Shaft extension

## Motor mounting arrangement

The tables show the maximum sizes of motors that may be mounted direct on the fan. Motors of larger sizes should be mounted on slide rails beside the fan. A base frame supporting both fan and motor as illustrated in the sketches to the right can be supplied. Please specify motor position (pos. W, X, Y or Z, see page C1-3.0).



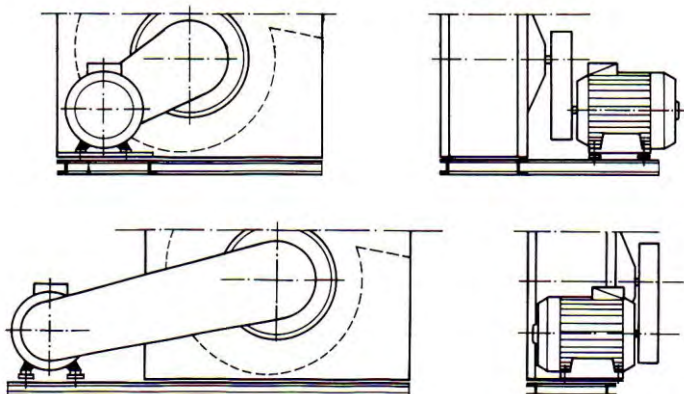
Motor on side  
vertical mounting plate



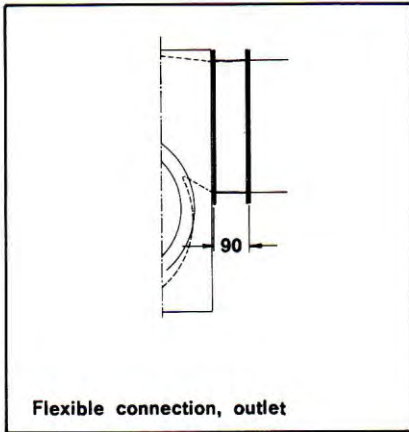
Motor on top  
horizontal  
mounting plate

CBS-	Type	Max. motor Weight, kg
400	132	70
500	132	70
630	132	70
710	132	70
800	132	70
900	132	70
1000	132	70

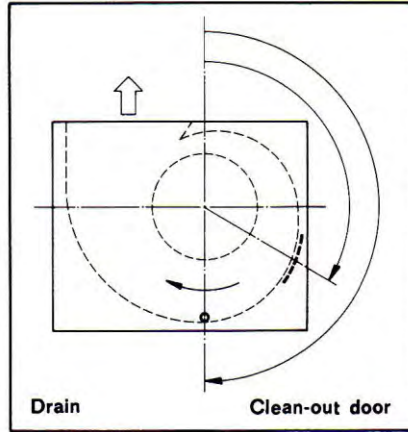
CBS-	Type	Max. motor Weight kg
400	132	70
500	132	70
630	132	70
710	132	70
800	160	140
900	160	140
1000	180	190



Base frames for fan and motor

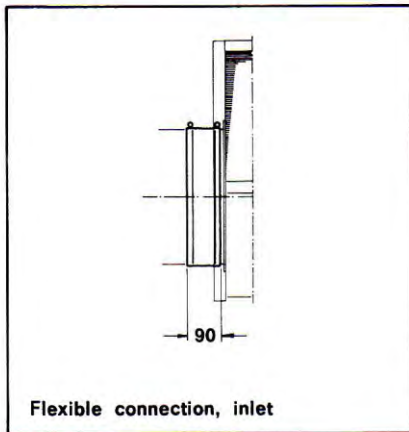


Flexible connection, outlet

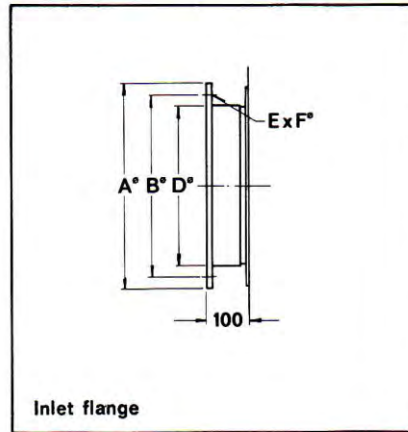


Drain Clean-out door

Type CBS is supplied with inspection door in the casing side plates; a clean-out door in the scroll plate and a drain can be supplied on order. When ordering please state location of clean-out door and drain in relation to the outlet direction e.g. clean-out door pos. RD 120 drain pos. RD 180 in conformity with the rules given on page C1-3.0.

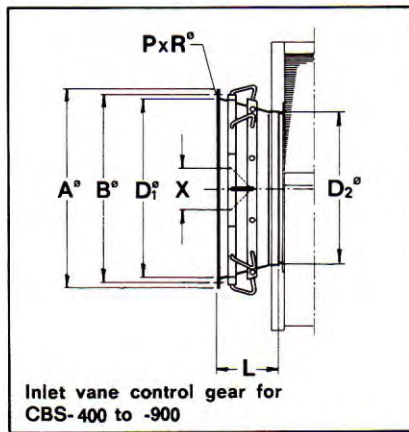


Flexible connection, inlet



Inlet flange

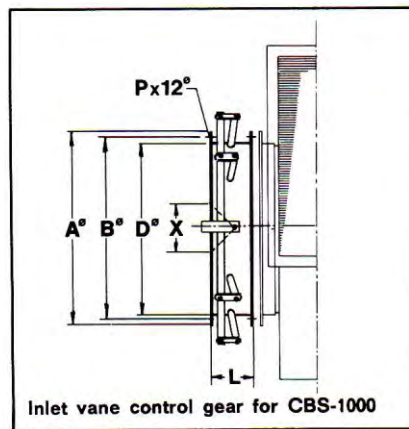
CBS-	A	B	D	E	F
400	400	366	315	8	12
500	486	448	400	12	12
630	536	497	450	12	12
710	588	551	500	12	12
800	668	629	560	16	15
900	738	698	630	16	15
1000	818	775	710	16	15



Inlet vane control gear for CBS-400 to -900

CBS-	A	B	D <sub>1</sub>	D <sub>2</sub>	L	P	R	X	Weight kg.
400	462	438	400	315	195	12	10	87	12
500	562	541	500	400	215	12	10	111	16
630	638	605	560	450	245	12	12	110	20
710	702	674	630	500	284	16	12	138	25
800	790	751	710	560	298	16	12	160	35
900	872	837	800	630	365	24	12	174	45

The control gear is mounted direct on the inlet spigot. Use duct spigot for attachment of flexible connection to vane control gear. The curves apply to the fan without vane control gear.



Inlet vane control gear for CBS-1000

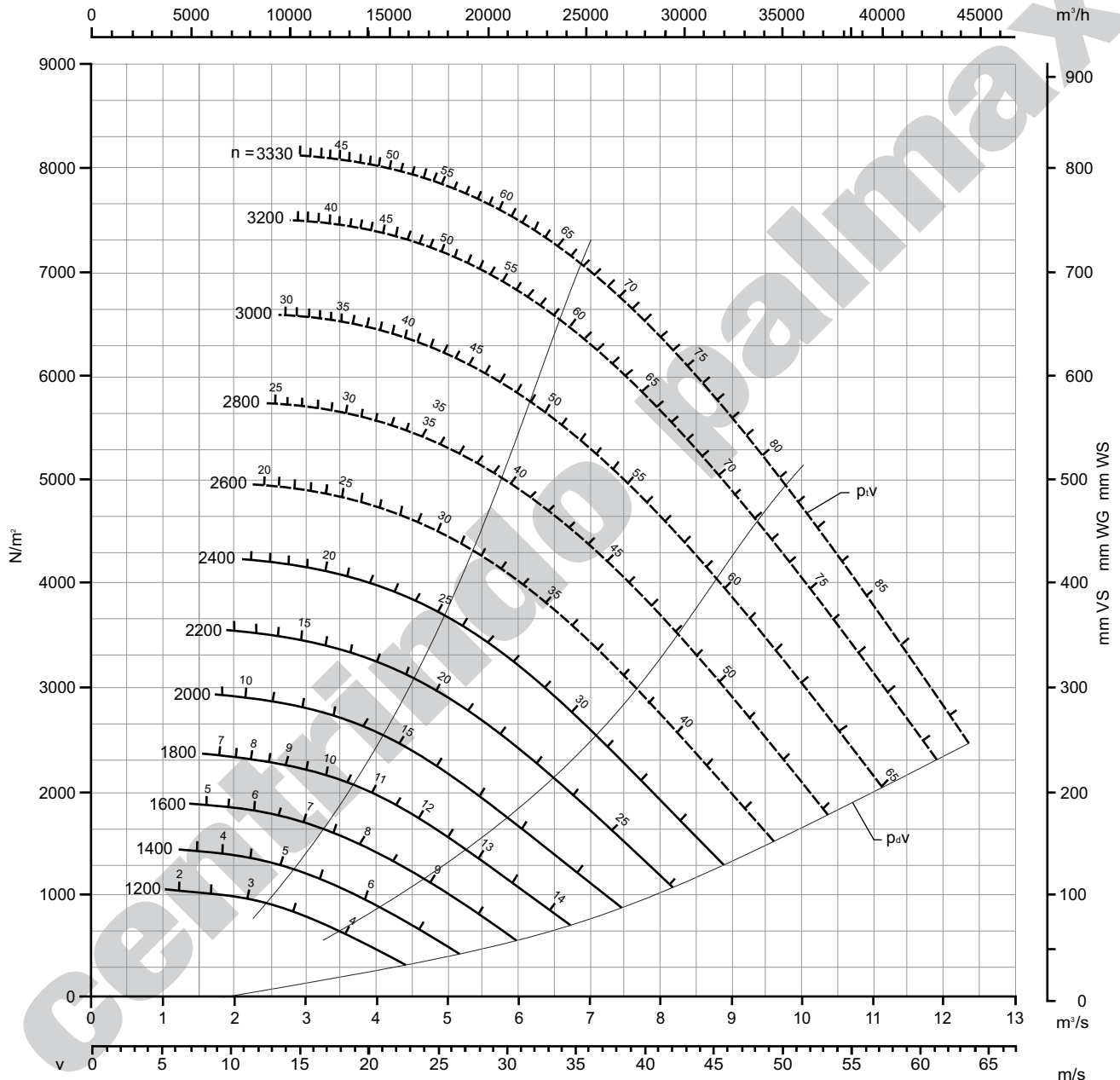
CBS-	A	B	D	L	P	X	Weight kg
1000	790	751	710	250	16	80	40

The inlet vane control gear is mounted on the fan by means of an inlet flange. Use duct spigot for attachment of flexible connection to vane control gear. The curves apply to the fan without vane control gear.

**Centrifugalventilator type CBS**  
**Centrifugal Fan type CBS**  
**Zentrifugalventilator type CBS**

**DIMENSIONERINGSKURVER**  
**PERFORMANCE CURVES**  
**AUSLEGUNGSKURVEN**

CBS-630/70  
 $\rho = 1.225 \text{ kg/m}^3$



max. n = 2420  
**Standardudførelse**  
**Standard design**  
**Standard Ausführung**

max. n = 3330  
**Med specielt lejearrangement**  
**With special bearing arrangement**  
**Mit Spezial-Lageranordnung**

**GD² = 6,4 kg m²**  
**Periferhastighed**  
**Impeller tip speed**  
**Umfangsgeschwindigkeit**  
**u=0,033Xn**

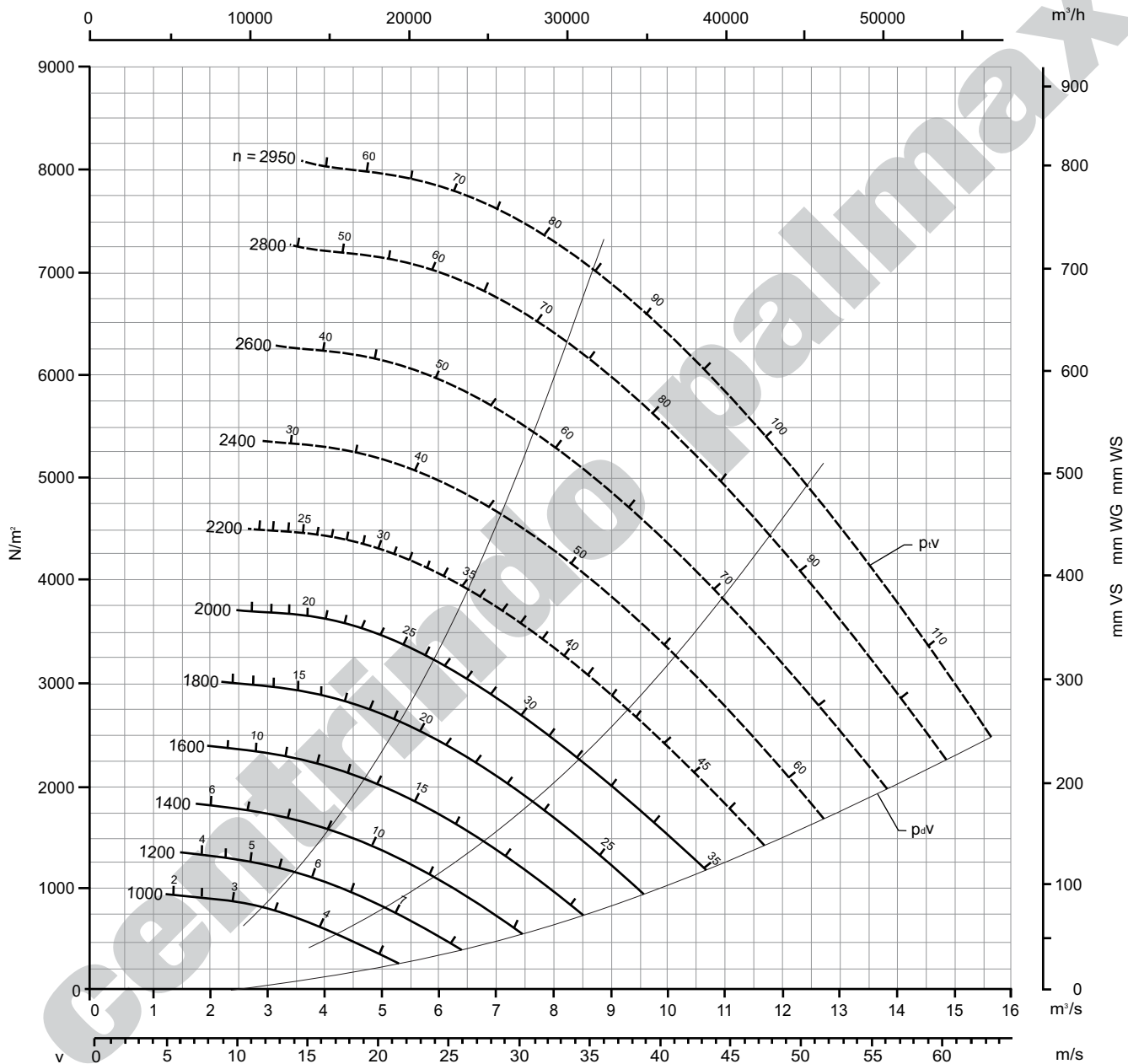
n: Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens  
 kraftforbrug i kW  
 P: Tryk, N/m (mm²VS)  
 P<sub>V</sub>: Ventilatorens totaltryk  
 P<sub>dV</sub>: Ventilatorens dynamiske tryk  
 u: Periferhastighed, m/s  
 v: Lufthastighed i udlobsoåbningen, m/s

n: Fan speed, r.p.m.  
 The numbers on the curves indicate the  
 fan power consumption in kW  
 P: Pressure, N/m² (mm w.g.)  
 P<sub>V</sub>: Fan total pressure  
 P<sub>dV</sub>: Fan velocity pressure  
 u: Impeller tip speed, m/s  
 v: Air velocity in outlet opening, m/s

n: Lufter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den  
 Kraftbedarf des Lufters in kW an  
 P: Druck, N/m² (mm WS)  
 P<sub>V</sub>: Lufter Gesamtdruck  
 P<sub>dV</sub>: Lufter dynamischer Druck  
 u: Umfangsgeschwindigkeit, m/s  
 v: Luftgeschwindigkeit in der  
 Austrittsoffnung, m/s

# CBS-710/70

$\rho = 1.225 \text{ kg/m}^3$



max.  $n = 2160$   
**Standardudførelse**  
 Standard design  
 Standard Ausführung

max.  $n = 2970$   
**Med specielt lejearrangement**  
 With special bearing arrangement  
 Mit Spezial-Lageranordnung

$GD^2 = 14,0 \text{ kg m}^2$   
**Periferhastighed**  
**Impeller tip speed**  
**Umfangsgeschwindigkeit**  
 $u=0,037Xn$

$n$ : Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens kraftforbrug i kW  
 $P$ : Tryk,  $\text{N/m}^2$  (mm $^2$ VS)  
 $P_v$ : Ventilatorens totaltryk  
 $P_{dv}$ : Ventilatorens dynamiske tryk  
 $u$ : Periferhastighed, m/s  
 $v$ : Lufthastighed i udlobsoåbningen, m/s

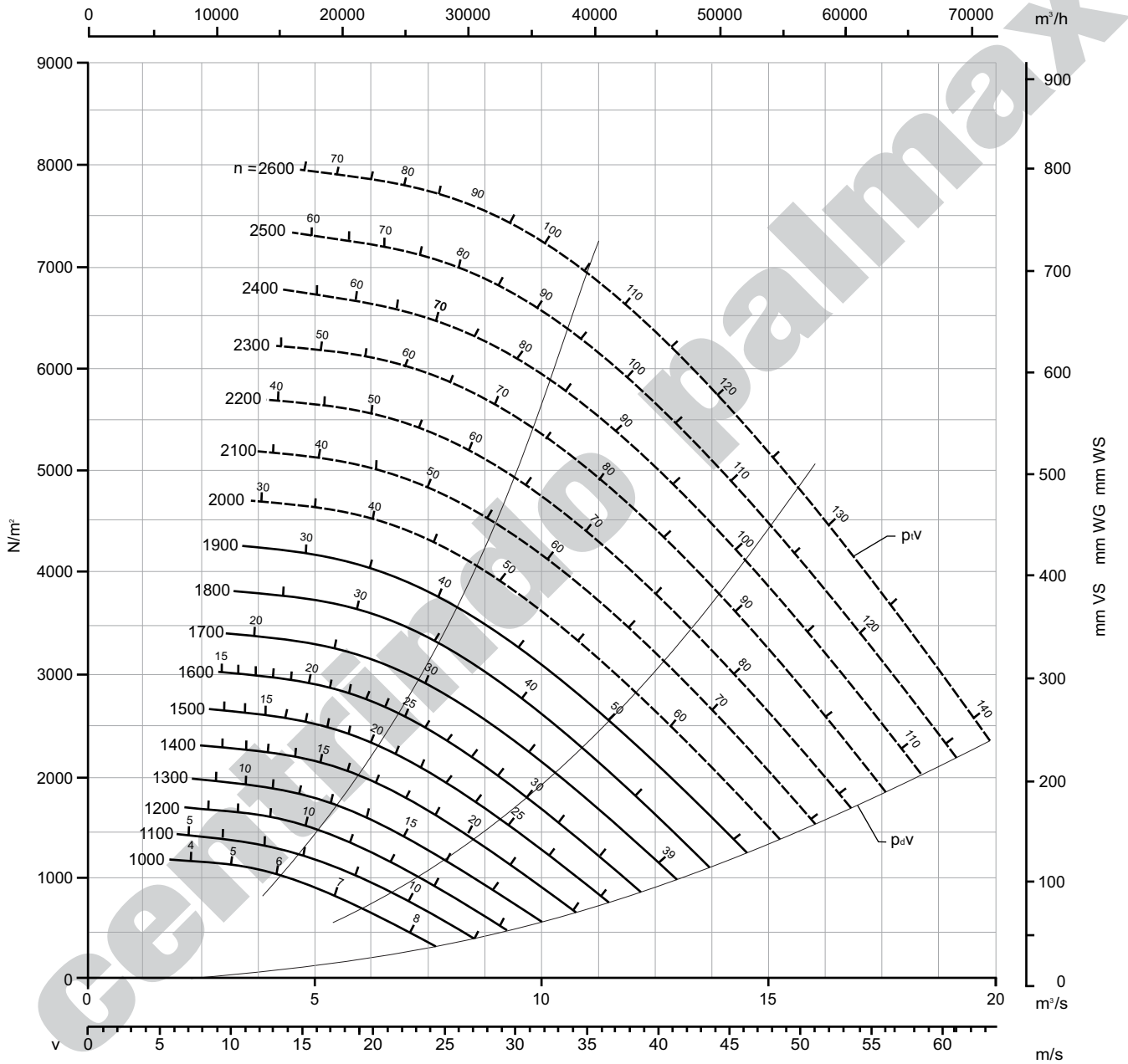
$n$ : Fan speed, r.p.m.  
 The numbers on the curves indicate the fan power consumption in kW  
 $P$ : Pressure,  $\text{N/m}^2$  (mm w.g.)  
 $P_v$ : Fan total pressure  
 $P_{dv}$ : Fan velocity pressure  
 $u$ : Impeller tip speed, m/s  
 $v$ : Air velocity in outlet opening, m/s

$n$ : Lufter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den Kraftbedarf des Lufers in kW an  
 $P$ : Druck,  $\text{N/m}^2$  (mm WS)  
 $P_v$ : Lufter Gesamtdruck  
 $P_{dv}$ : Lufter dynamischer Druck  
 $u$ : Umfangsgeschwindigkeit, m/s  
 $v$ : Luftgeschwindigkeit in der Austrittsoffnung, m/s

**Centrifugalventilator type CBS**  
**Centrifugal Fan type CBS**  
**Zentrifugalventilator type CBS**

**DIMENSIONERINGSKURVER**  
**PERFORMANCE CURVES**  
**AUSLEGUNGSKURVEN**

CBS-800/70  
 $\rho = 1.225 \text{ kg/m}^3$



————— max. n = 1900  
**Standardudførelse**  
**Standard design**  
**Standard Ausführung**

----- max. n = 2620  
**Med specielt lejearrangement**  
**With special bearing arrangement**  
**Mit Spezial-Lageranordnung**

**GD<sup>2</sup> = 22,4 kg m<sup>2</sup>**  
**Periferhastighed**  
**Impeller tip speed**  
**Umfangsgeschwindigkeit**  
**u=0,033Xn**

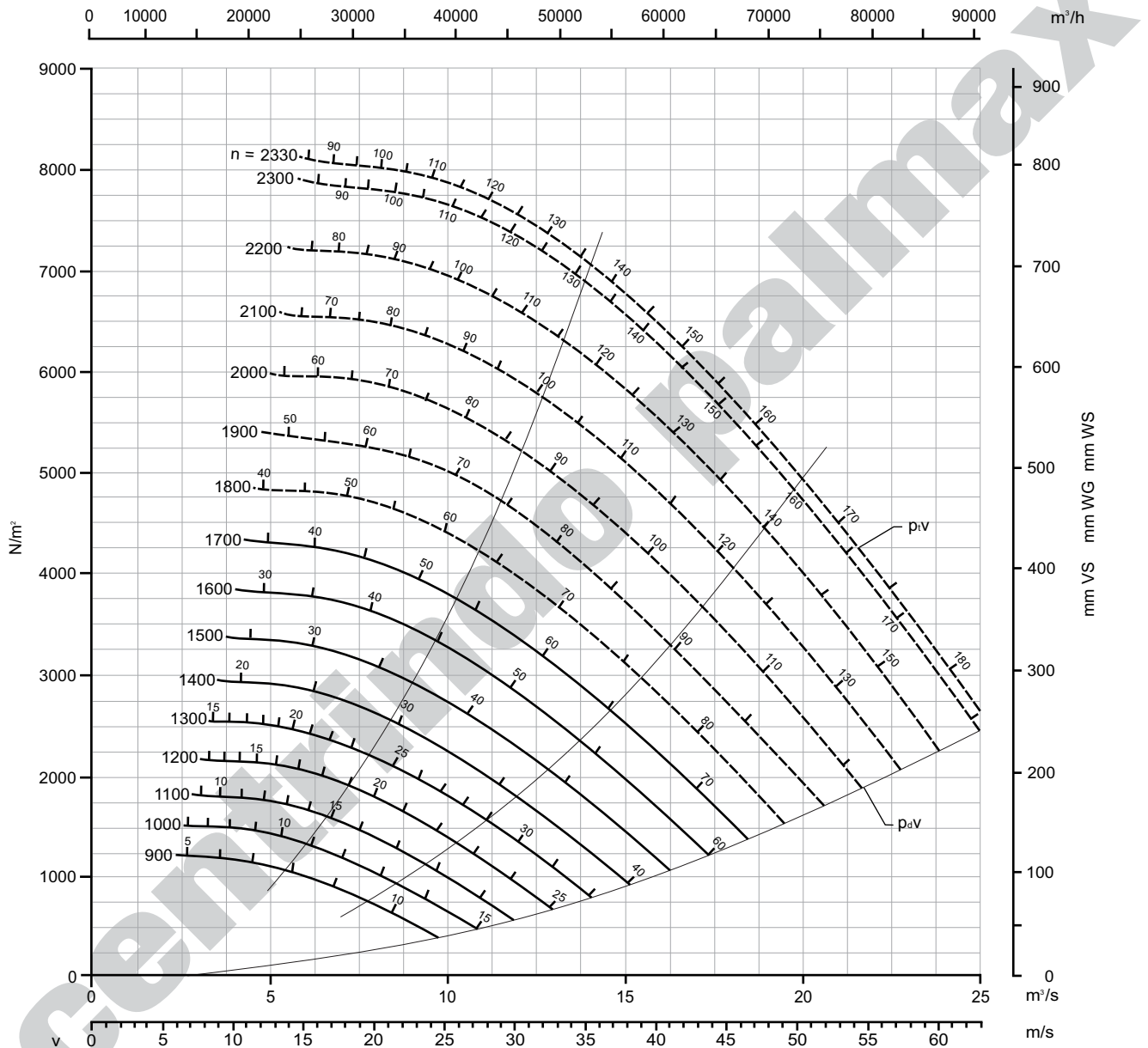
n: Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens  
 kraftforbrug i kW  
 P: Tryk, N/m<sup>2</sup> (mm VS)  
 P<sub>tV</sub>: Ventilatorens totaltryk  
 P<sub>dV</sub>: Ventilatorens dynamiske tryk  
 u: Periferhastighed, m/s  
 v: Lufthastighed i udlobsoåbningen, m/s

n: Fan speed, r.p.m.  
 The numbers on the curves indicate the  
 fan power consumption in kW  
 P: Pressure, N/m<sup>2</sup> (mm w.g.)  
 P<sub>tV</sub>: Fan total pressure  
 P<sub>dV</sub>: Fan velocity pressure  
 u: Impeller tip speed, m/s  
 v: Air velocity in outlet opening, m/s

n: Lufter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den  
 Kraftbedarf des Lufters in kW an  
 P: Druck, N/m<sup>2</sup> (mm WS)  
 P<sub>tV</sub>: Lufter Gesamtdruck  
 P<sub>dV</sub>: Lufter dynamischer Druck  
 u: Umfangsgeschwindigkeit, m/s  
 v: Luftgeschwindigkeit in der  
 Austrittsoffnung, m/s

# CBS-900/70

$\rho = 1.225 \text{ kg/m}^3$



————— max. n = 1700  
**Standardudførelse**  
 Standard design  
 Standard Ausführung

----- max. n = 2340  
**Med specielt lejearrangement**  
 With special bearing arrangement  
 Mit Spezial-Lageranordnung

**GD² = 36 kg m²**  
**Periferhastighed**  
**Impeller tip speed**  
**Umfangsgeschwindigkeit**  
**u=0,037Xn**

n: Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens  
 kraftforbrug i kW  
 P: Tryk, N/m (mm²VS)  
 PiV: Ventilatorens totaltryk  
 PaV: Ventilatorens dynamiske tryk  
 u: Periferhastighed, m/s  
 v: Lufthastighed i udlobsoåbningen, m/s

n: Fan speed, r.p.m.  
 The numbers on the curves indicate the  
 fan power consumption in kW  
 P: Pressure, N/m² (mm w.g.)  
 PiV: Fan total pressure  
 PaV: Fan velocity pressure  
 u: Impeller tip speed, m/s  
 v: Air velocity in outlet opening, m/s

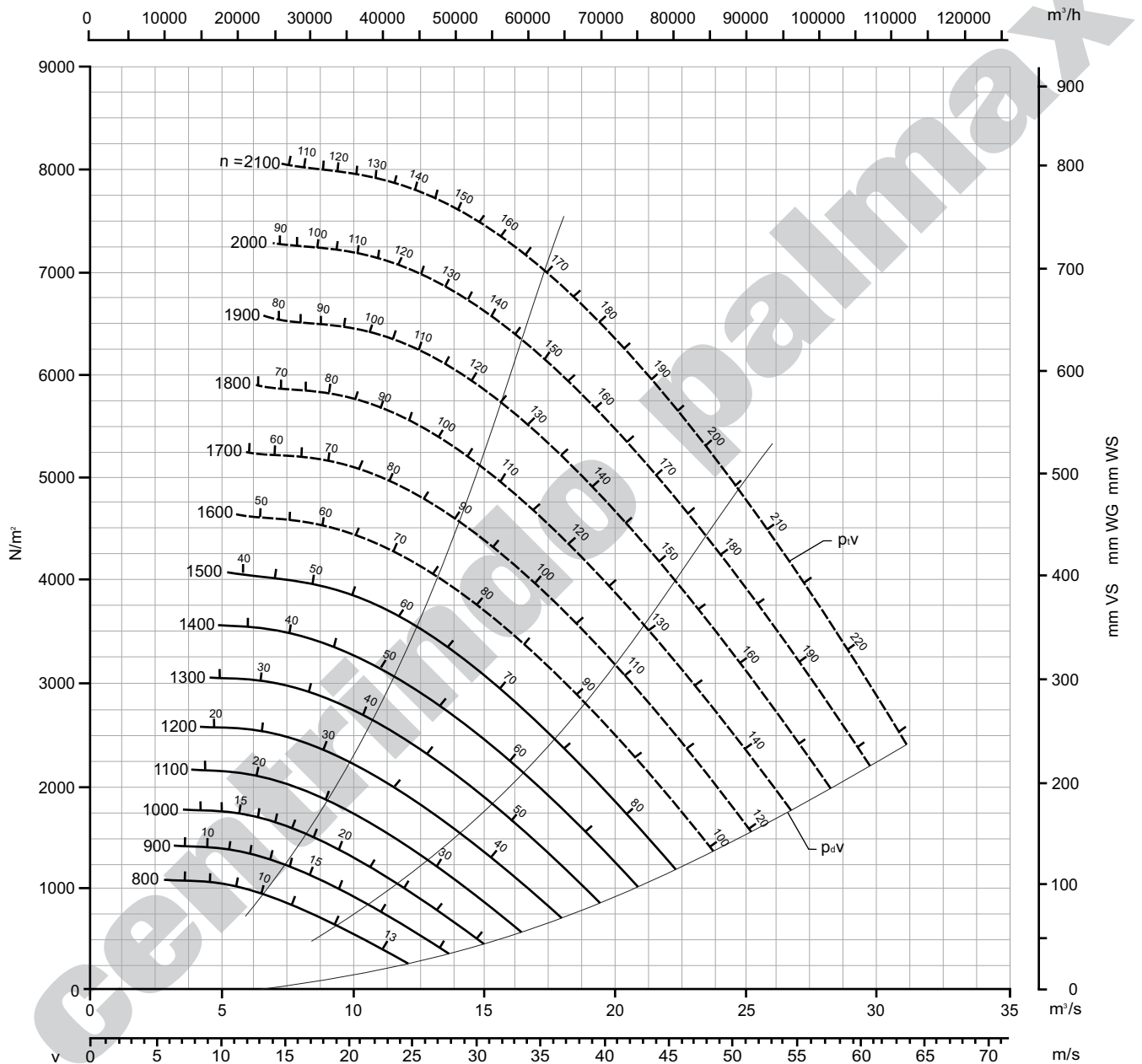
n: Lufter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den  
 Kraftbedarf des Lufters in kW an  
 P: Druck, N/m² (mm WS)  
 PiV: Lufter Gesamtdruck  
 PaV: Lufter dynamischer Druck  
 u: Umfangsgeschwindigkeit, m/s  
 v: Luftgeschwindigkeit in der  
 Austrittsoffnung, m/s

**Centrifugalventilator type CBS**  
**Centrifugal Fan type CBS**  
**Zentrifugalventilator type CBS**

**DIMENSIONERINGSKURVER**  
**PERFORMANCE CURVES**  
**AUSLEGUNGSKURVEN**

CBS-1000/70

$\rho = 1.225 \text{ kg/m}^3$



————— max. n = 1540  
**Standardudførelse**  
**Standard design**  
**Standard Ausföhrung**

----- max. n = 2110  
**Med specielt lejearrangement**  
**With special bearing arrangement**  
**Mit Spezial-Lageranordnung**

**GD<sup>2</sup> = 68 kg m<sup>2</sup>**  
**Periferhastighed**  
**Impeller tip speed**  
**Umfangsgeschwindigkeit**  
**u=0,037Xn**

n: Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens  
 kraftforbrug i kW  
 P: Tryk, N/m (mm<sup>2</sup>VS)  
 P<sub>tV</sub>: Ventilatorens totaltryk  
 P<sub>dV</sub>: Ventilatorens dynamiske tryk  
 u: Periferhastighed, m/s  
 v: Lufthastighed i udlobsoåbningen, m/s

n: Fan speed, r.p.m.  
 The numbers on the curves indicate the  
 fan power consumption in kW  
 P: Pressure, N/m<sup>2</sup> (mm w.g.)  
 P<sub>tV</sub>: Fan total pressure  
 P<sub>dV</sub>: Fan velocity pressure  
 u: Impeller tip speed, m/s  
 v: Air velocity in outlet opening, m/s

n: Lufter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den  
 Kraftbedarf des Lufters in kW an  
 P: Druck, N/m<sup>2</sup> (mm WS)  
 P<sub>tV</sub>: Lufter Gesamtdruck  
 P<sub>dV</sub>: Lufter dynamischer Druck  
 u: Umfangsgeschwindigkeit, m/s  
 v: Luftgeschwindigkeit in der  
 Austrittsoåbning, m/s

# Centrifugal Fans type CPC

Centrifugal fan type CPC has a narrow radial type impeller with long backward curved blades and is designed for relatively small air volumes and high pressures. It is mainly used in industrial installations.

Type CPC is available in nine standard sizes, having impeller diameters from 250 mm to 1 000 mm and delivering air volumes up to approx. 4.5 m<sup>3</sup>/s (16200 m<sup>3</sup>/h) against pressures up to approx. 10 000 N/m<sup>2</sup> (1 000 mm wg.). All sizes can be furnished on order in varying widths, so that the capacity can be adapted to specific requirements. Dimensions and capacities for such fans will be stated on request. Special constructions (e.g. with gastight stuffing box, cooling discs, etc.) are made to specification.

Type CPC is made up of the following main components:

**Fan casing** consisting of two side plates and a scroll plate. For pressures up to 2 000 N/m<sup>2</sup> (200 mm w.g.) a lock-formed casing can be supplied. For higher pressure the casing will be welded.

Material: black sheet steel.

**Shaped inlet** fitted in the inlet side plate with spigot for connection to ducting, and so designed that the air is guided to the impeller without loss in pressure.

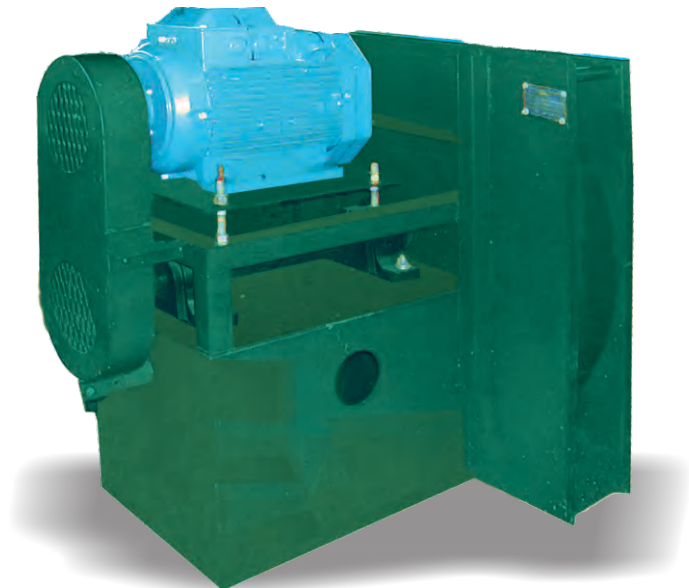
Material: cast iron.

**Impeller** with long backward curved blades for high pressures at relatively small air volumes.

Material: black sheet steel, riveted.

**Bearing/motor pedestal** with feet to support the fan assembly. The fan bearings and/or the motor are mounted on the pedestal as shown in the dimensioned sketch overleaf. When the motor is mounted above the pedestal, it is placed on an adjustable plate to facilitate belt tensioning.

**Shaft and bearings.** In the case of belt driven fans the impeller is mounted on a shaft supported on two spherical ball bearings in plummer blocks.



## FINISH

All parts of the fan are protected against ordinary atmospheric corrosion.

## ACCESSORIES

**Belt drive** comprising two pulleys, v-belts and a belt guard. The drive is dimensioned to suit operating conditions in each individual case.

**Motor** to specification. For direct connected fans the impeller is normally mounted direct on the extended motor shaft.

**Flexible connections** for inlet spigot and outlet flange.

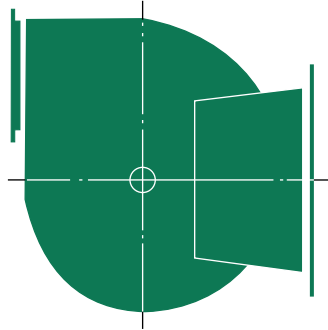
**Counter flange** for outlet.

**Flange** for inlet spigot

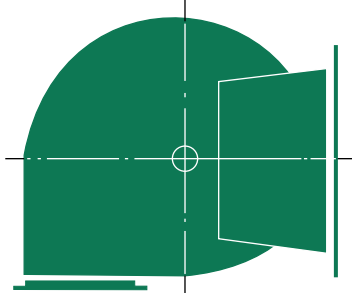
**Anti-vibration mountings.**

## STANDARD POSITIONS

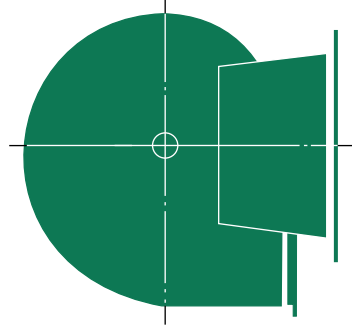
Position designations apply to the fan viewed from the side opposite to the inlet opening. The designations used are in conformity with EUROVENT's rules for designating directions of rotation and discharge of centrifugal fans. The designations previously used are shown in brackets.



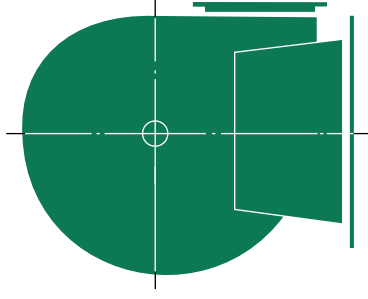
**LG 0 (RN)**



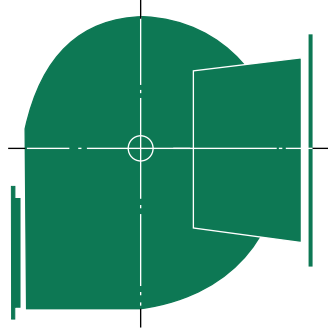
**LG 90 (RO)**



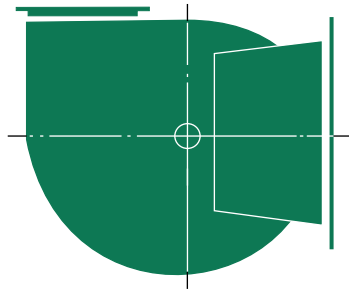
**LG 180 (RS)**



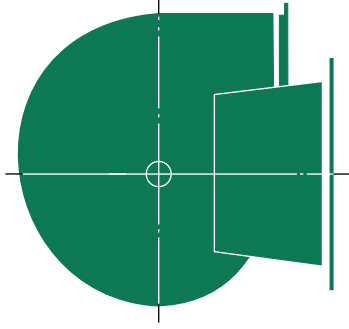
**LG 270 (RV)**



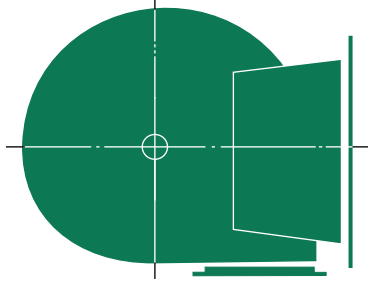
**RD 0 (LN)**



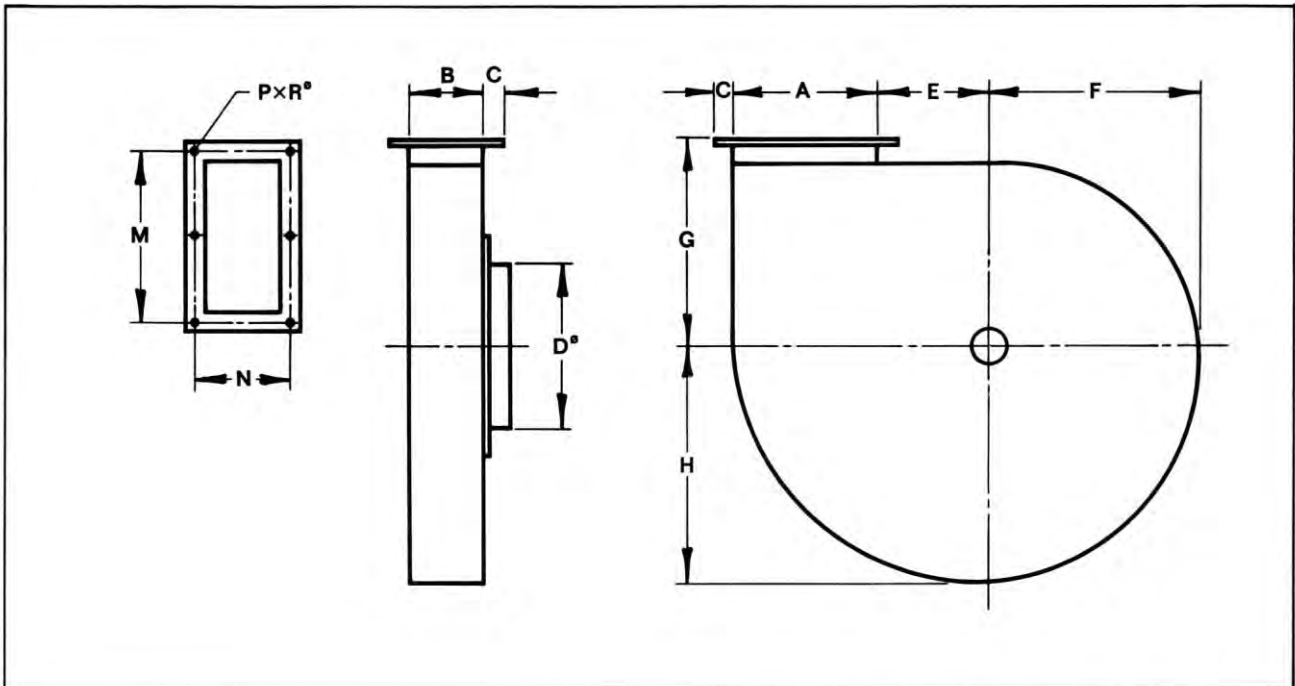
**RD 90 (LV)**



**RD 180 (LS)**

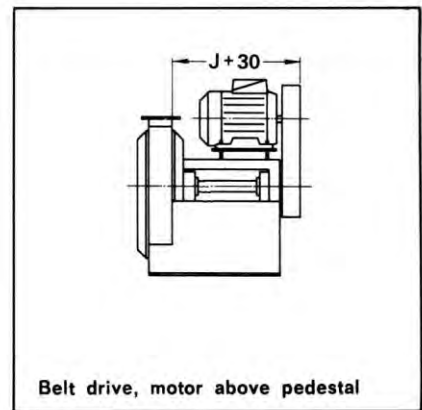
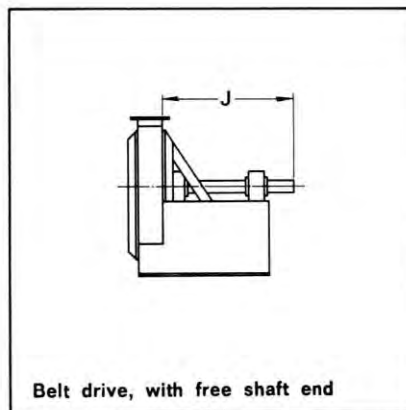
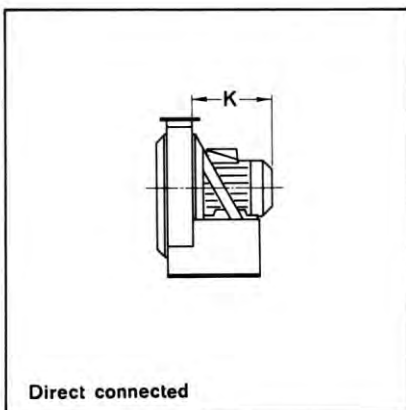


**RD 270 (LO)**



	A	B	C	D	E	F	G	H	M	N	P	R	Weight kg*
<b>CPC-250</b>	105	56	25	125	84	159	165	176	2×66,5	84	6	10	23
<b>CPC-315</b>	132	70	25	160	106	200	202	221	2×80	98	6	10	36
<b>CPC-400</b>	168	88	30	200	135	253	256	280	2×101	122	6	10	52
<b>CPC-500</b>	210	109	30	250	169	315	312	348	2×122	143	6	10	82
<b>CPC-630</b>	265	138	30	315	213	397	388	439	2×149,5	172	6	10	138
<b>CPC-710</b>	298	156	40	356	240	445	442	493	3×114	2×100	10	10	233
<b>CPC-800</b>	336	176	40	400	270	498	484	552	3×127	2×111	10	12	293
<b>CPC-900</b>	380	198	45	450	302	559	550	620	4×107,5	2×124	12	12	400
<b>CPC-1000</b>	420	218	50	500	337	621	615	689	4×119	2×137	12	12	520

\*) Max. weight excl. of motor.

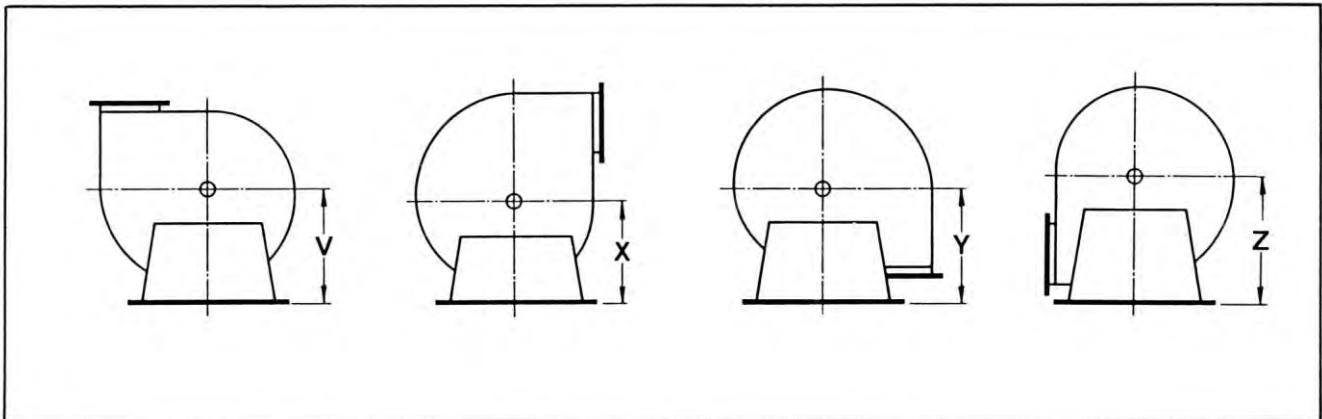


J- and K-dimensions depend on motor size. The J-dimensions shown apply primarily to small and medium sized motors. For large motors the shaft may be up to 200 mm longer.

CPC	-250	-315	-400	-500	-630	-710	-800	-900	1000
J	315	315	315	400	500	630	630	800	800

# Centrifugal Fans type CPC

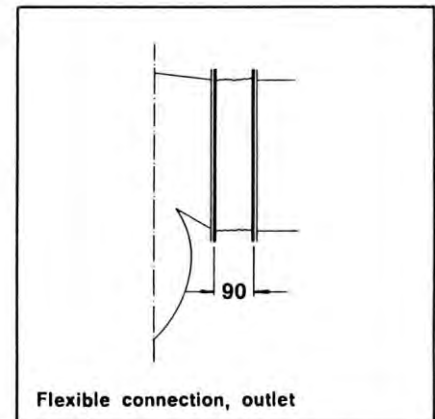
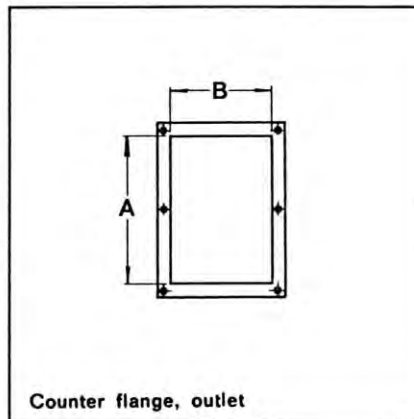
## DIMENSIONS



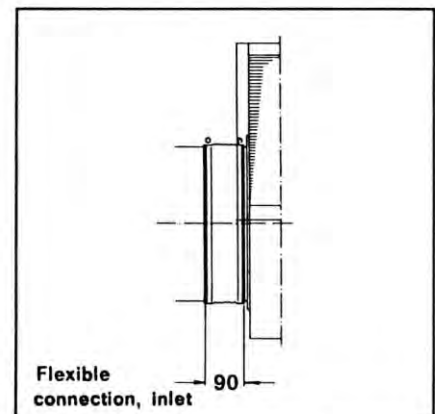
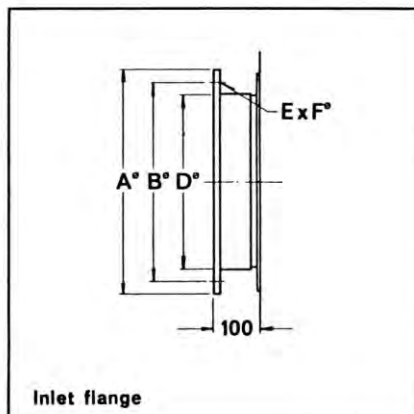
	V	X	Y	Z
CPC-250	200	180	200	250
CPC-315	250	225	280	300
CPC-400	325	300	310	375
CPC-500	400	360	400	450
CPC-630	500	420	480	550
CPC-710	550	500	500	630
CPC-800	600	550	550	700
CPC-900	635	635	635	800
CPC-1000	750	700	700	875

	A	B
CPC-250	105	56
CPC-315	132	70
CPC-400	168	88
CPC-500	210	109
CPC-630	265	138
CPC-710	298	156
CPC-800	336	176
CPC-900	380	198
CPC-1000	420	218

Bolt holes as in fan outlet flange.



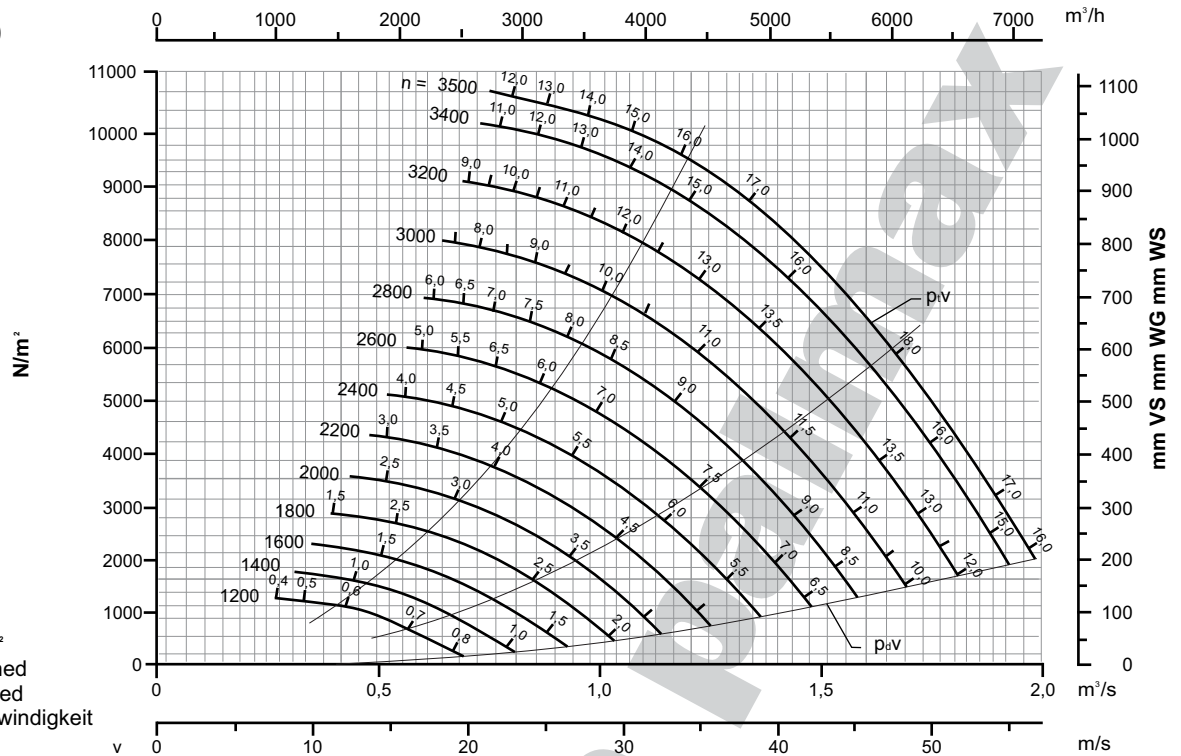
	A	B	D	E	F
CPC-250	190	165	125	4	12
CPC-315	235	200	160	8	12
CPC-400	275	241	200	8	12
CPC-500	325	292	250	8	12
CPC-630	400	366	315	8	12
CPC-710	440	405	356	8	12
CPC-800	486	448	400	12	12
CPC-900	536	497	450	12	12
CPC-1000	588	551	500	12	12



### CPC-630/100

$\rho = 1.225 \text{ kg/m}^3$

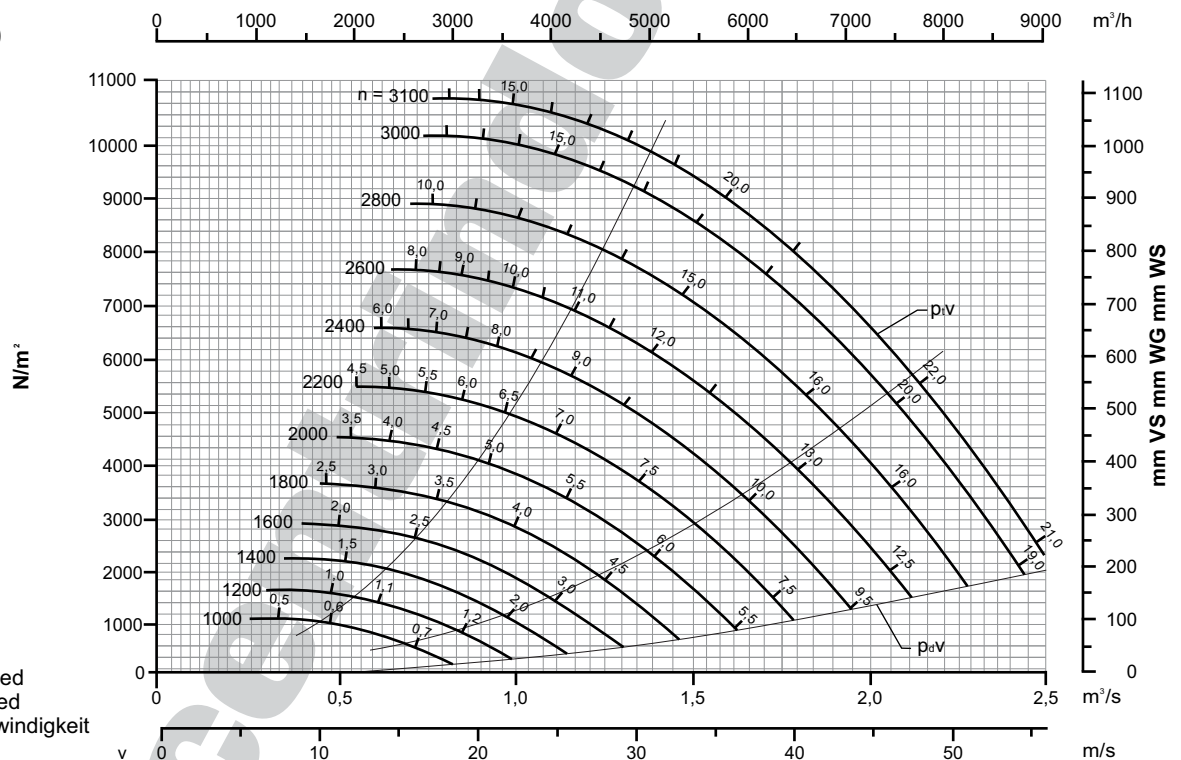
$GD^2 = 3,2 \text{ kg m}^2$   
 Periferhastighed  
 Impeller tip speed  
 Umfangsgeschwindigkeit  
 $u = 0,033Xn$



### CPC-710/100

$\rho = 1.225 \text{ kg/m}^3$

$GD^2 = 7,0 \text{ kg m}^2$   
 Periferhastighed  
 Impeller tip speed  
 Umfangsgeschwindigkeit  
 $u = 0,037Xn$



n: Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens  
 kraftforbrug i kW  
 P: Tryk, N/m (mm<sup>2</sup>VS)  
 P<sub>tV</sub>: Ventilatorens totaltryk  
 P<sub>dV</sub>: Ventilatorens dynamiske tryk  
 u: Periferhastighed, m/s  
 v: Lufthastighed i udlobssåbningen, m/s

n: Fan speed, r.p.m  
 The numbers on the curves indicate the  
 fan power consumption in kW  
 P: Pressure, N/m<sup>2</sup> (mm w.g.)  
 P<sub>tV</sub>: Fan total pressure  
 P<sub>dV</sub>: Fan velocity pressure  
 u: Impeller tip speed, m/s  
 v: Air velocity in outlet opening, m/s

n: Lüfter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den  
 Kraftbedarf des Lüfters in kW an  
 P: Druck, N/m<sup>2</sup> (mm WS)  
 P<sub>tV</sub>: Lüfter Gesamtdruck  
 P<sub>dV</sub>: Lüfter dynamischer Druck  
 u: Umfangsgeschwindigkeit, m/s  
 v: Luftgeschwindigkeit in der  
 Austrittsöffnung, m/s

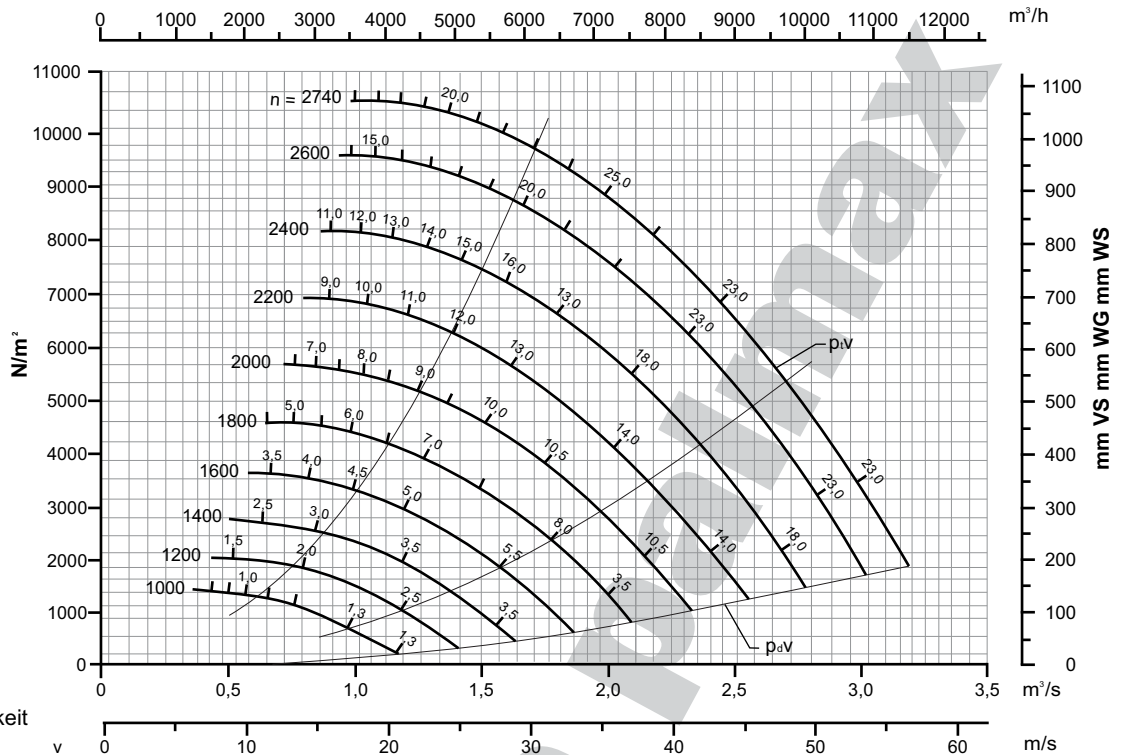
**Centrifugalventilator type CPC**  
**Centrifugal Fan type CPC**  
**Zentrifugalventilator type CPC**

**DIMENSIONERINGSKURVER**  
**PERFORMANCE CURVES**  
**AUSLEGUNGSKURVEN**

**CPC-800/100**

$\rho = 1.225 \text{ kg/m}^3$

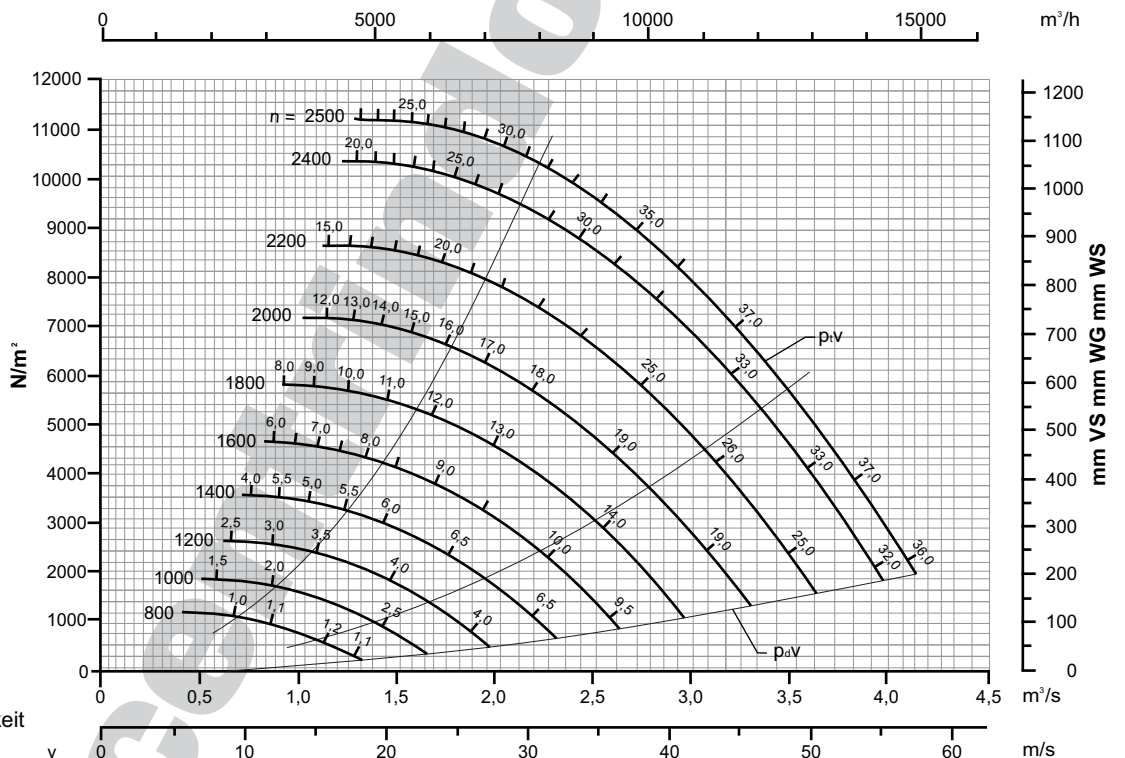
$GD^2 = 11,8 \text{ kg m}^2$   
 Periferhastighed  
 Impeller tip speed  
 Umfangsgeschwindigkeit  
 $u = 0,042Xn$



**CPC-910/100**

$\rho = 1.225 \text{ kg/m}^3$

$GD^2 = 20,6 \text{ kg m}^2$   
 Periferhastighed  
 Impeller tip speed  
 Umfangsgeschwindigkeit  
 $u = 0,047Xn$

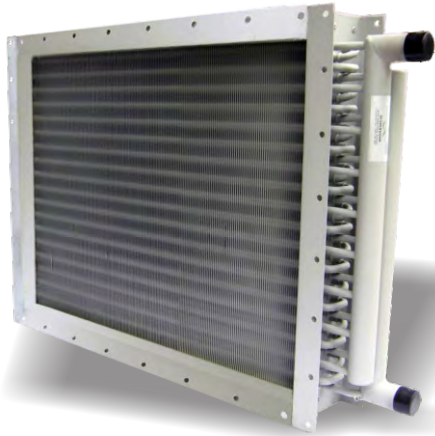


n: Ventilatorens omdrejningstal, o/min  
 Tallene på kurverne angiver ventilatorens  
 kraftforbrug i kW  
 P: Tryk, N/m (mm<sup>2</sup> VS)  
 P<sub>tV</sub>: Ventilatorens totaltryk  
 P<sub>dV</sub>: Ventilatorens dynamiske tryk  
 u: Periferhastighed, m/s  
 v: Lufthastighed i udlobsabningen, m/s

n: Fan speed, r.p.m  
 The numbers on the curves indicate the  
 fan power consumption in kW  
 P: Pressure, N/m<sup>2</sup> (mm w.g.)  
 P<sub>tV</sub>: Fan total pressure  
 P<sub>dV</sub>: Fan velocity pressure  
 u: Impeller tip speed, m/s  
 v: Air velocity in outlet opening, m/s

n: Lufter Drehzahl, U/min  
 Die Zahlen auf den Kurven geben den  
 Kraftbedarf des Lufters in kW an  
 P: Druck, N/m<sup>2</sup> (mm WS)  
 P<sub>tV</sub>: Lufter Gesamtdruck  
 P<sub>dV</sub>: Lufter dynamischer Druck  
 u: Umfangsgeschwindigkeit, m/s  
 v: Luftgeschwindigkeit in der  
 Austrittsöffnung, m/s

# Finned Heating Coils



**Type LFD**



**Type LFD**

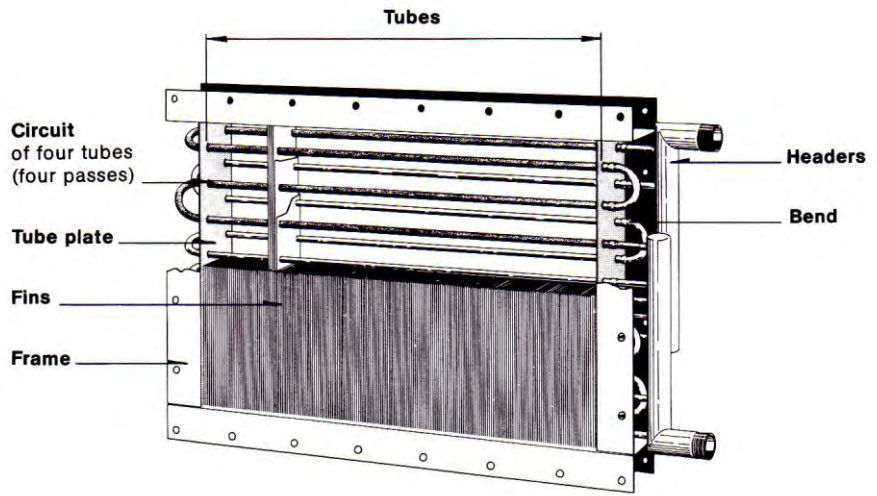
NORDISK VENTILATOR produces a range of finned heating coils designed for heating of atmospheric air by means of hot water or steam. The coils may also be used for cooling air by means of cold water, for cooling down cooling water by means of air, as well as for exchange of heat between other liquids and gases provided that these do not attack the metals used in the coil construction.

Type	Heating medium	Materials		Section
		Tubes	Fins	
LFA LFB	Water Water	Copper Copper	Aluminium Aluminium	L2 L2
LFD LFE	Steam Steam	Copper Copper	Aluminium Aluminium	L2 L2
LF LG	Steam* Steam*	Steel Steel	Steel -	L3 L3

\* May also be used for water

**Design.** The finned heating coils are composed of a number of tubes with mechanically bonded fins, built into a sheet steel frame. Coupled together by means of bends to form circuits of 2, 4, 6 or 8 passes, the tubes are provided with headers for the entering and leaving heating medium. Type LF, however, differs slightly from this pattern, as described in section L3.

For operation where the air has a large content of lint or other particles which would settle on the front edge of the fins, we can supply plain tube coils (without fins), type LG.



**Arrangement.** Finned heating coils are available in a large number of standard sizes, having face areas up to 1000 x 2000 mm and up to four rows of tubes, as shown in the dimensioned sketches and selection charts of the different types.

In installations of large capacity the standard sizes may be combined into banks as shown in the sketches at the bottom of this page,

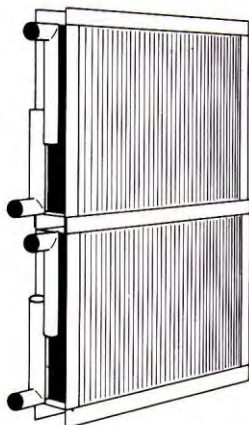
- if the air volume requires a larger face area than that of the largest standard coil, two or more heating coils can be installed beside each other, or one on top of the other,
- if the heating load is greater than one standard coil can cope with, several coils can be combined, one after the other.

In such banks of heating coils the coils may be built into the pipe system in parallel or in series, as shown on page L1-2.0. For series connected heating coils using water as the heating medium the question of whether the air is to pass through the bank of coils in a parallel flow or counter flow arrangement is of great importance; this subject will be dealt with under "Selection".

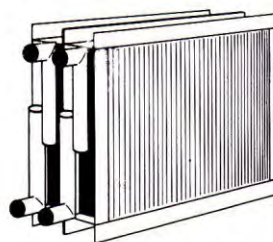
**Mounting.** The sheet steel frame of the heating coils has flanges and bolt holes for mounting of the coil and connection to ducting. The coils are designed for vertical or horizontal installation, as stated in the description of the individual types, and they may only be mounted in the position for which they are designed.

Owing to the longitudinal expansion of the tubes the sheet steel frame of the heating coil cannot be made absolutely tight where the tubes are extended through the tube plates. It may therefore be necessary, in installations operating at high pressures or where complete tightness is required, to build the heating coil into an airtight enclosure or to tighten with a non-hardening sealing-compound around the tubes.

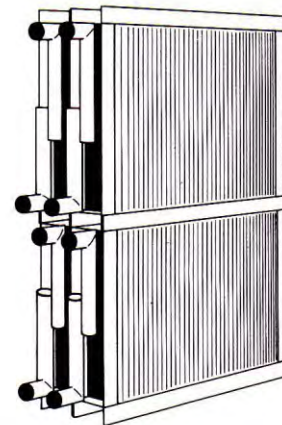
**Selection.** The dimensions and design of the heating coils are selected on the basis of the selection charts of the individual types with a view to obtaining a heat transfer surface and a coefficient of transmission that will give the heating coil the required capacity. The selection charts are based on



Large air volume

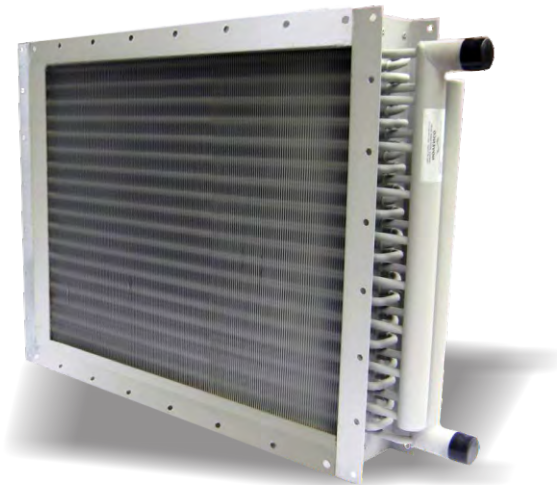


Large heating load



Large air volume - large heating load

# Finned Heating Coils types LFA, LFB, LFD and LFE



Finned heating coils type LFA, LFB, and LFE consist of a number of copper tubes with aluminium fins built into a frame of galvanized sheet steel.

The frame has flanges for mounting of the coil and connection to ducting.

The heating medium enters and leaves through steel headers which have screwed pipe connections.

The fields of application of the four types are listed in the table below.

The tubes of the heating coil are coupled together by means of bends to form circuits of 2, 4, 6 or 8 passes, as shown on page L1-1.0. The number of passes that will make the coil best suited for the operating conditions concerned, is found by means of the selection charts.

Each of the four types is made in 140 standard sizes with face areas up to H (height)xB (width) = 1000x2000 mm and with 1, 2, 3 or 4 rows of tubes in the direction of the air flow. The standard sizes can be combined into banks on top of, beside or after each other, as shown on page L2-1.1.

The designation of heating coil or a bank of coils is composed of the type designation plus a number of digits representing the dimensions of the face area, the number of rows of tubes, and the number of passes in each circuit, as illustrated by the examples overleaf. When ordering please state position designations as given on page L2-1.1.

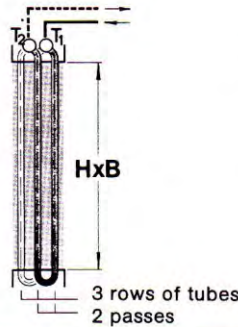
Type	Heating medium	Fin spacing mm	Max. operating temp. °C	Normal test pressure ato	Capacities page
LFA	Water	3	120*	20	L2.2.0
LFD	Water	2	120*	20	L2.2.0
LFD	Steam	3	220	20	L2-3.0
LFE	Steam	2	220	20	L2-3.0

- \* For high pressure hot water (above 120 °C) use:
- type LFD sized according to the LFA selection chart, or
- type LFE sized according to the LFB selection chart.

Single heating coil in standard size.

H = height of face area  
B = width of face area

Horizontal section of coil

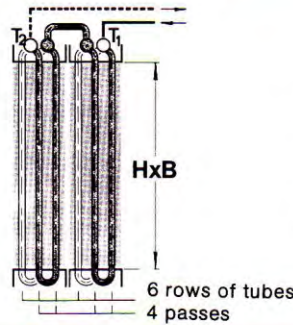


Dimensions	Symbols
H = 600 mm	6
B = 800 mm	8
3 rows of tubes	3
2 passes	-2

**Designation: LFA-683-2**

Two heating coils type LFA-683-2 arranged tandem, connected in series.

Horizontal section of coil

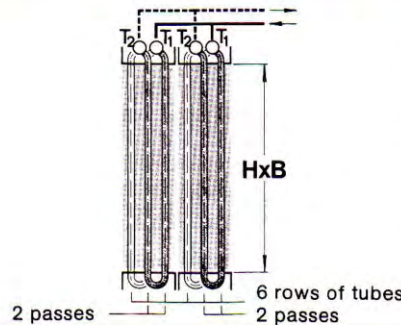


Dimensions	Symbols
H = 600 mm	6
B = 800 mm	8
6 rows of tubes	6
4 passes	-4
Connected in series	S

**Designation: LFA-686-4S**

Two heating coils type LFA-683-2 arranged in tandem, connected in parallel.

Horizontal section of coil

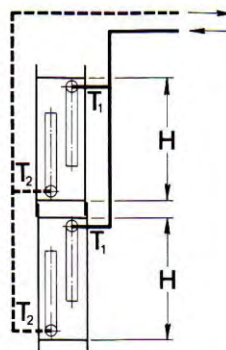


Dimensions	Symbols
H = 600 mm	6
B = 800 mm	8
6 rows of tubes	6
2 passes	-2
Connected in parallel	P

**Designation: LFA-686-2P**

Two heating coils type LFA-683-2 arranged one on top of the other and connected in parallel.

Side view of coil

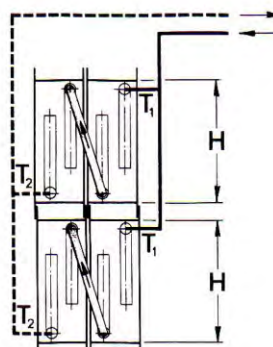


Dimensions	Symbols
H + H = 1200 mm	12
B = 800 mm	8
3 rows of tubes	3
2 passes	-2
Connected in parallel	P

**Designation: LFA-1283-2P**

Two banks of heating coils type LFA-686-4S arranged one on top of the other and connected in parallel.

Side view of coil



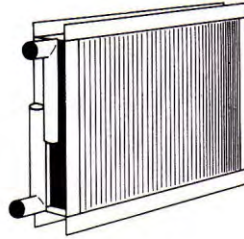
Dimensions	Symbols
H + H = 1200 mm	12
B = 800 mm	8
6 rows of tubes	6
4 passes	-4
Connected in series	S
Connected in parallel	P

**Designation: LFA-1286-4SP**

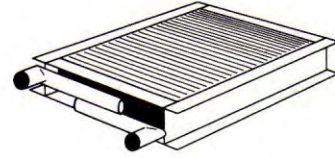
# Finned Heating Coils types LFA, LFB, LFD and LFE

## POSITION DESIGNATIONS

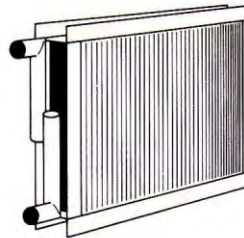
All sizes of heating coils types LFA, LFB, LFD and LFE can be supplied in pos. L and pos. V for vertical or horizontal installation, respectively. The coils should only be installed in the position for which they have been designed, and the tubes of the coil must always be horizontal. The position designation is indicated on the nameplate of the coil. Numbers 1 and 2 in the position designations refer to the location of the pipe connections.



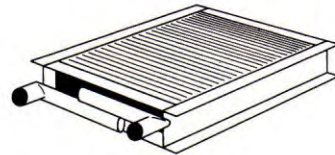
Pos. L1



Pos. V1



Pos. L2



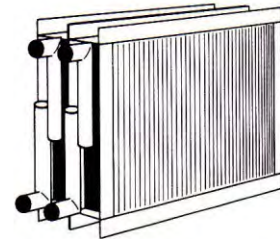
Pos. V2

## BANKS OF COILS

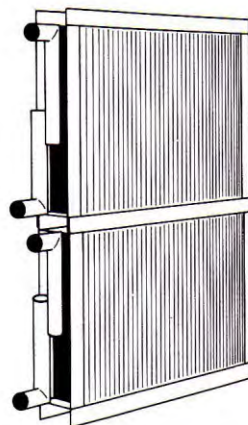
For air volumes requiring a larger face area than can be obtained with a standard heating coil, several coils can be combined into banks, being placed on top of or beside each other.

In case of greater heating loads than a standard coil can cope with, a number of coils can be arranged one after the other.

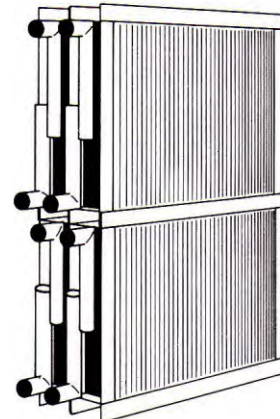
In such banks the coils may be connected either in parallel or in series as illustrated on pages L2-1.0 and L1-2.0.



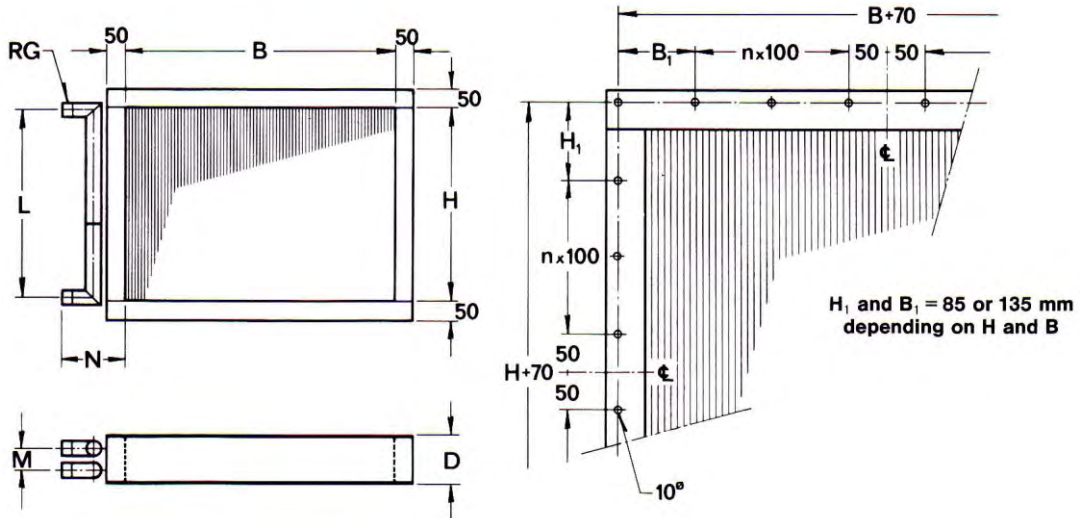
Large heating capacity



Large air volume



Large air volume – large heating capacity



### 3 Tube rows

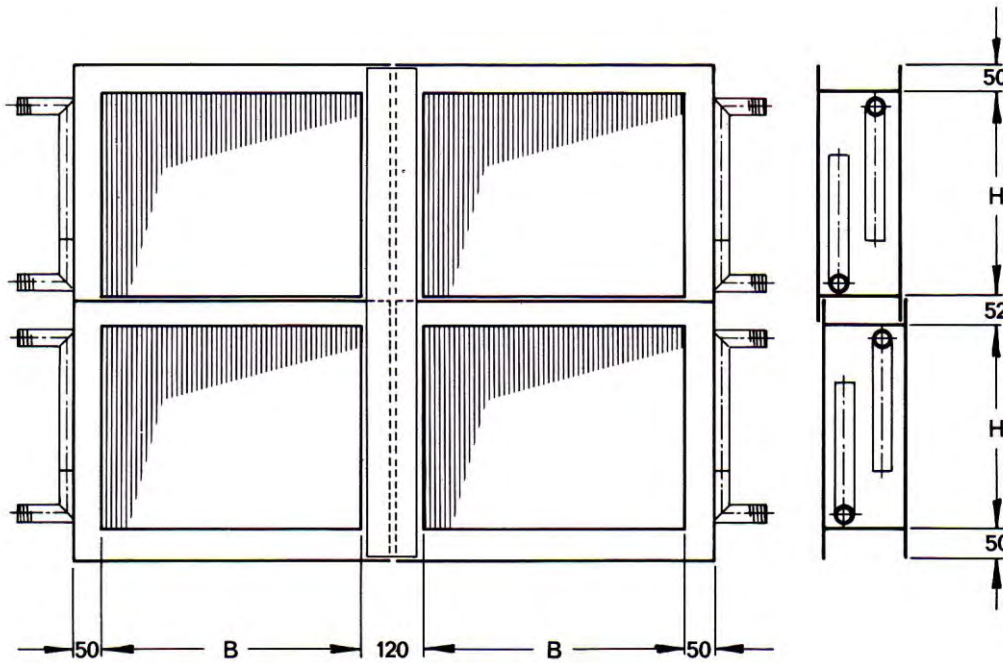
B = 300 to 2000 mm at increments of 100 mm

	Number of passes	D	L	M	N	RG (BSP)
H = 300	-2	160	275	69	205	2"
	-6	160	292	50	180	1 1/4"
H = 400	-2	160	375	69	205	2"
	-4	160	392	50	180	1 1/4"
	-6	160	392	50	180	1 1/4"
	-8	160	392	50	180	1 1/4"
H = 600	-2	160	575	69	205	2"
	-4	160	575	69	205	2"
	-6	160	592	50	180	1 1/4"
H = 800	-2	160	759	78	225	2 1/2"
	-4	160	775	69	205	2"
	-6	160	792	50	180	1 1/4"
	-8	160	792	50	180	1 1/4"
H = 1000	-2	160	959	78	225	2 1/2"
	-4	160	975	69	205	2"
	-6	160	975	69	205	2"

### 4 Tube rows

B = 300 to 2000 mm at increments of 100 mm

	Number of passes	D	L	M	N	RG (BSP)
H = 300	-2	160	275	94	205	2"
	-4	160	292	107	180	1 1/4"
	-6	160	292	75	180	1 1/4"
	-8	160	292	107	180	1 1/4"
H = 400	-2	160	375	94	205	2"
	-4	160	392	107	180	1 1/4"
	-6	160	392	107	180	1 1/4"
	-8	160	392	107	180	1 1/4"
H = 600	-2	160	559	80	225	2 1/2"
	-4	160	575	94	205	2"
	-6	160	592	75	180	1 1/4"
	-8	160	592	107	180	1 1/4"
H = 800	-2	160	759	80	225	2 1/2"
	-4	160	775	94	205	2"
	-8	160	792	107	180	1 1/4"
H = 1000	-2	200	946	108	240	3"
	-4	160	959	80	225	2 1/2"
	-8	160	975	94	205	2"



- for other dimensions see preceding dimension sketches

The tables below give the weight of heating coils type LFA. For other types multiply by the following correction factors:

### WEIGHT

Type	LFB	LFD	LFE
Factor	1.15	1.20	1.35

#### 1 tube row

Heating coil Type	kg	Water kg
331	3	0.24
341	4	0.32
351	5	0.40
361	6	0.48
441	5	0.42
451	6	0.53
461	7	0.64
481	8	0.85
661	13	0.96
681	14	1.3
6101	15	1.6
6121	16	1.9
881	18	1.7
8101	20	2.1
8121	22	2.5
8161	27	3.4
10101	25	2.7
10121	27	3.2
10161	34	4.2
10201	38	5.3

#### 2 tube rows

Heating coil Type	kg	Water kg
332	5	0.48
342	6	0.64
352	7	0.80
362	8	0.96
442	9	0.85
452	10	1.1
462	11	1.3
482	13	1.7
662	20	1.9
682	22	2.5
6102	25	3.2
6122	28	3.8
882	30	3.4
8102	34	4.2
8122	38	5.1
8162	45	6.8
10102	43	5.3
10122	48	6.4
10162	58	8.5
10202	68	11

#### 3 tube rows

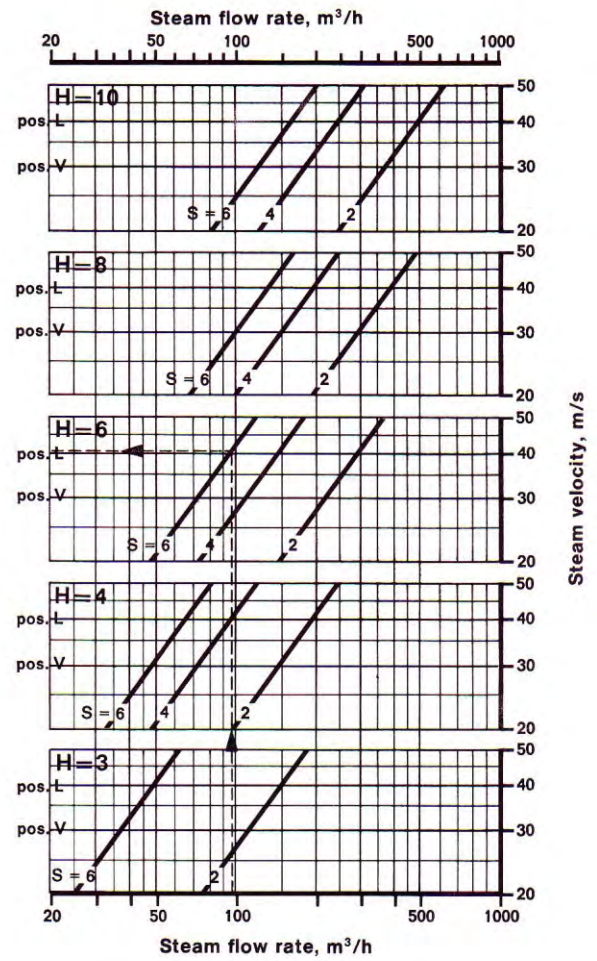
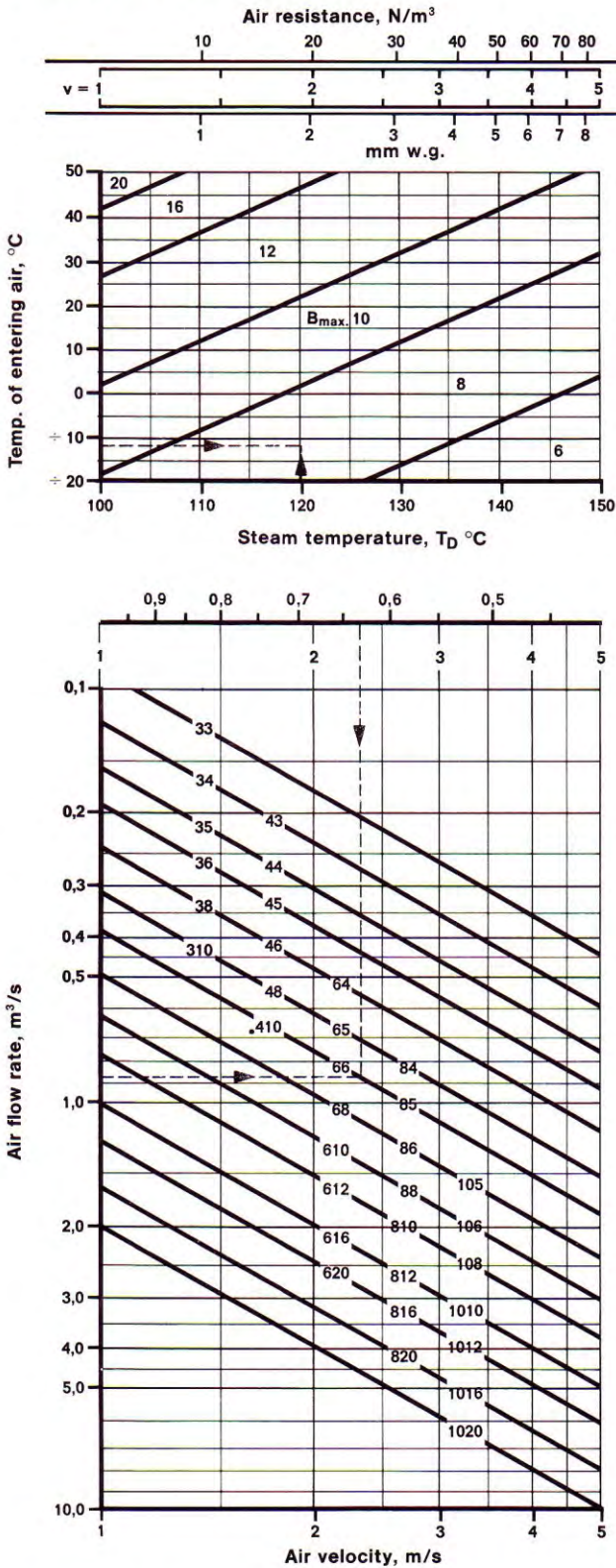
Heating coil Type	kg	Water kg
333	7	0.72
343	8	0.96
353	9	1.2
363	10	1.4
443	12	1.3
453	13	1.6
463	15	1.9
483	17	2.5
663	26	2.9
683	30	3.8
6103	34	4.8
6123	38	5.7
883	42	5.1
8103	47	6.4
8123	53	7.6
8163	64	10
10103	60	8.0
10123	66	9.6
10163	80	13
10203	94	16

#### 4 tube rows

Heating coil Type	kg	Water kg
334	9	0.96
344	10	1.3
354	11	1.6
364	13	1.9
444	15	1.7
454	17	2.1
464	19	2.5
484	22	3.4
664	31	3.8
684	37	5.1
6104	42	6.4
6124	48	7.6
884	54	6.8
8104	61	8.5
8124	68	10
8164	82	14
10104	76	11
10124	86	13
10164	102	17
10204	124	21

3 rows of tubes,  $\kappa = 0.45$  to  $0.95$

## STEAM



H = height of face area, dm  
 S = number of passes  
 B<sub>max</sub> = largest allowable width of heating coil face area

**Example:**

Air flow rate:  $q = 0.88 \text{ m}^3/\text{s}$   
 Air temperature:  $t_1 = -12^\circ\text{C}$ ,  $t_2 = 50^\circ\text{C}$   
 Steam temperature:  $T_D = 120^\circ\text{C}$  (2 ata)  
 Heat output:  $\Phi = q \times \rho \times c \times (t_2 - t_1) = 0.88 \times 1.20 \times 1.0 \times 62 = 65.5 \text{ kW}$

Steam flow rate:  $\frac{\Phi}{w} = \frac{65.5}{2441} = 2.7 \times 10^{-2} \text{ m}^3/\text{s} = 96.6 \text{ m}^3/\text{h}$

Heat transfer ratio:  
 $\Delta t_1 = 132^\circ\text{C}$ ,  $\Delta t_2 = 70^\circ\text{C}$ ,  $\Delta t_m = 98^\circ\text{C}$   
 $\kappa = \frac{t_2 - t_1}{\Delta t_m} = \frac{62}{98} = 0.63$

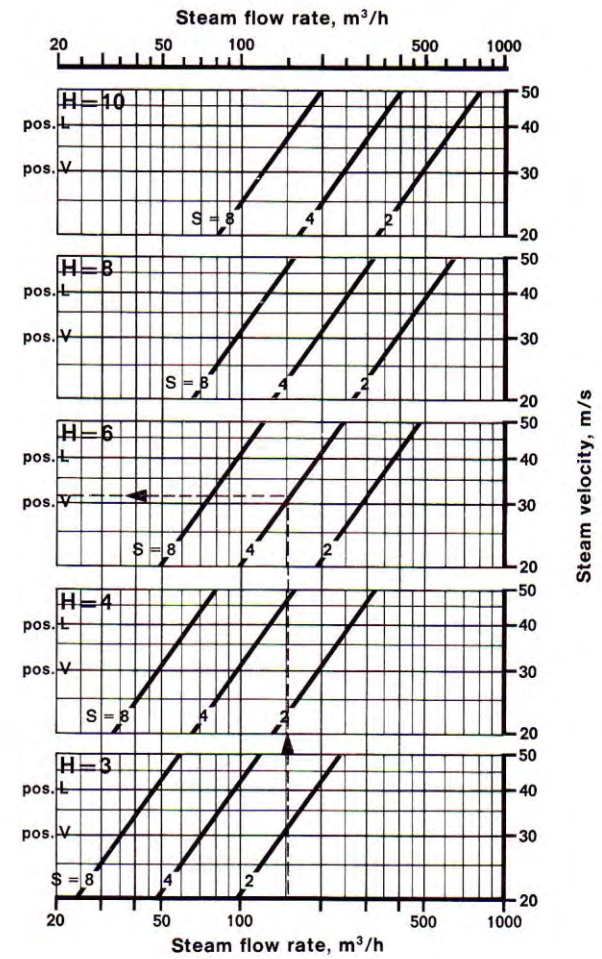
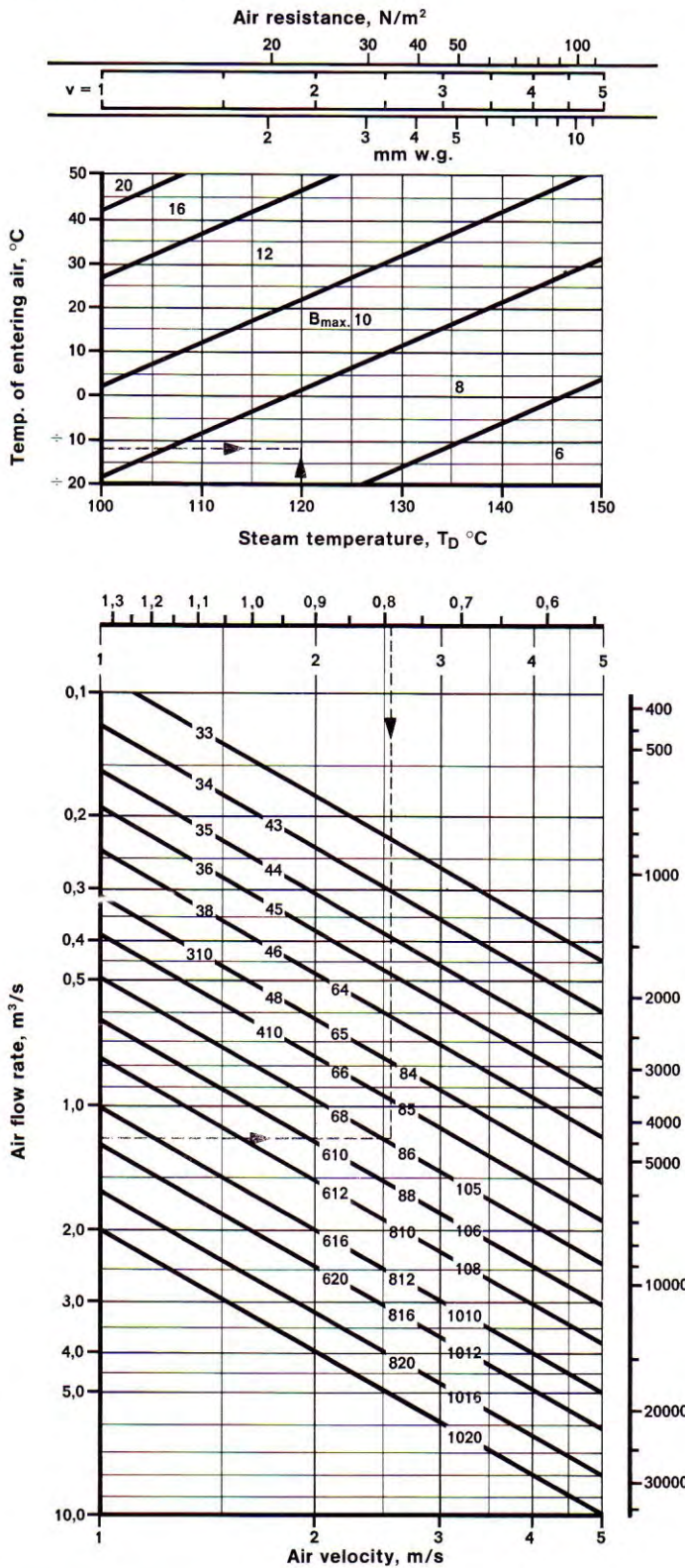
Max. width:  $B_{\text{max}} = 8$   
 Heating coil: LFD-663-6 pos. L.

The figures on the curves represent the face area of the heating coil, e.g.:  
 68: H = 600 mm, B = 800 mm  
 810: H = 800 mm, B = 1000 mm  
 108: H = 1000 mm, B = 800 mm  
 For coils of other dimensions than those indicated, find air velocity by interpolation or calculation.

**Type LFD fin spacing 3 mm**

4 rows of tubes,  $\kappa = 0.55$  to 1.30

## STEAM



H = height of face area, dm  
 S = number of passes  
 B<sub>max</sub> = largest allowable width of heating coil face area

**Example:**

Air flow rate:  $q = 1.2 \text{ m}^3/\text{s}$   
 Air temperature:  $t_1 = -12^\circ\text{C}$ ,  $t_2 = 60^\circ\text{C}$   
 Steam temperature:  $T_D = 120^\circ\text{C}$  (2 ata)  
 Heat output:  $\Phi = q \times \rho \times c \times (t_2 - t_1) = 1.2 \times 1.20 \times 1.0 \times 72 = 104 \text{ kW}$

Steam flow rate:  $\frac{\Phi}{w} = \frac{104}{2441} = 4.2 \times 10^{-2} \text{ m}^3/\text{s} = 153 \text{ m}^3/\text{h}$

Heat transfer ratio:  
 $\Delta t_1 = 132^\circ\text{C}$ ,  $\Delta t_2 = 60^\circ\text{C}$ ,  $\Delta t_m = 91^\circ\text{C}$   
 $\kappa = \frac{t_2 - t_1}{\Delta t_m} = \frac{72}{91} = 0.79$

Max. width:  $B_{\text{max}} = 8$   
 Heating coil: LFD-684-4 pos. L.

The figures on the curves represent the face area of the heating coil, e.g.:  
 68: H = 600 mm, B = 800 mm  
 810: H = 800 mm, B = 1000 mm  
 108: H = 1000 mm, B = 800 mm  
 For coils of other dimensions than those indicated, find air velocity by interpolation or calculation.

**Type LFD fin spacing 3 mm**