FLOWSERVE

TECHNICAL BULLETIN

SIHI® LPH 85/95
Two-Stage Liquid Ring Vacuum Pumps

Models 85340, 85353, 95354, 95367

Experience In Motion

Proven liquid ring performance

Many pumps become unreliable when liquid or vapor are present in a gas element. The liquid ring technology used in SIHI LPH 85/95 vacuum pumps is a proven economical alternative. By creating a “ring” of service liquid around the rotating element, liquid ring vacuum pumps efficiently handle gases in a wide range of industrial processes. Liquids and condensed vapors effectively are separated out of the process and can be discharged, recirculated or recovered.

Benefits

- Near isothermal compression
- Oil-free; no internal lubrication required
- Handles almost all gases and vapors
- Tolerant to some liquid carryover
- Low maintenance and safe operation
- Low noise and almost vibration-free
- Available in a wide range of materials
- No metallic contact of the rotating parts

Applications

SIHI LPH 85/95 two-stage vacuum pumps are engineered to operate in applications where vacuums of 33 to 900 mbar (24.7 to 675 torr) must be created. A broad selection of alloys is available for corrosive applications.

Principle industries

- Chemical
- Pharmaceutical
- Food and beverage
- Medical
- Power generation
- Oil and gas
- General industry

Key vacuum applications

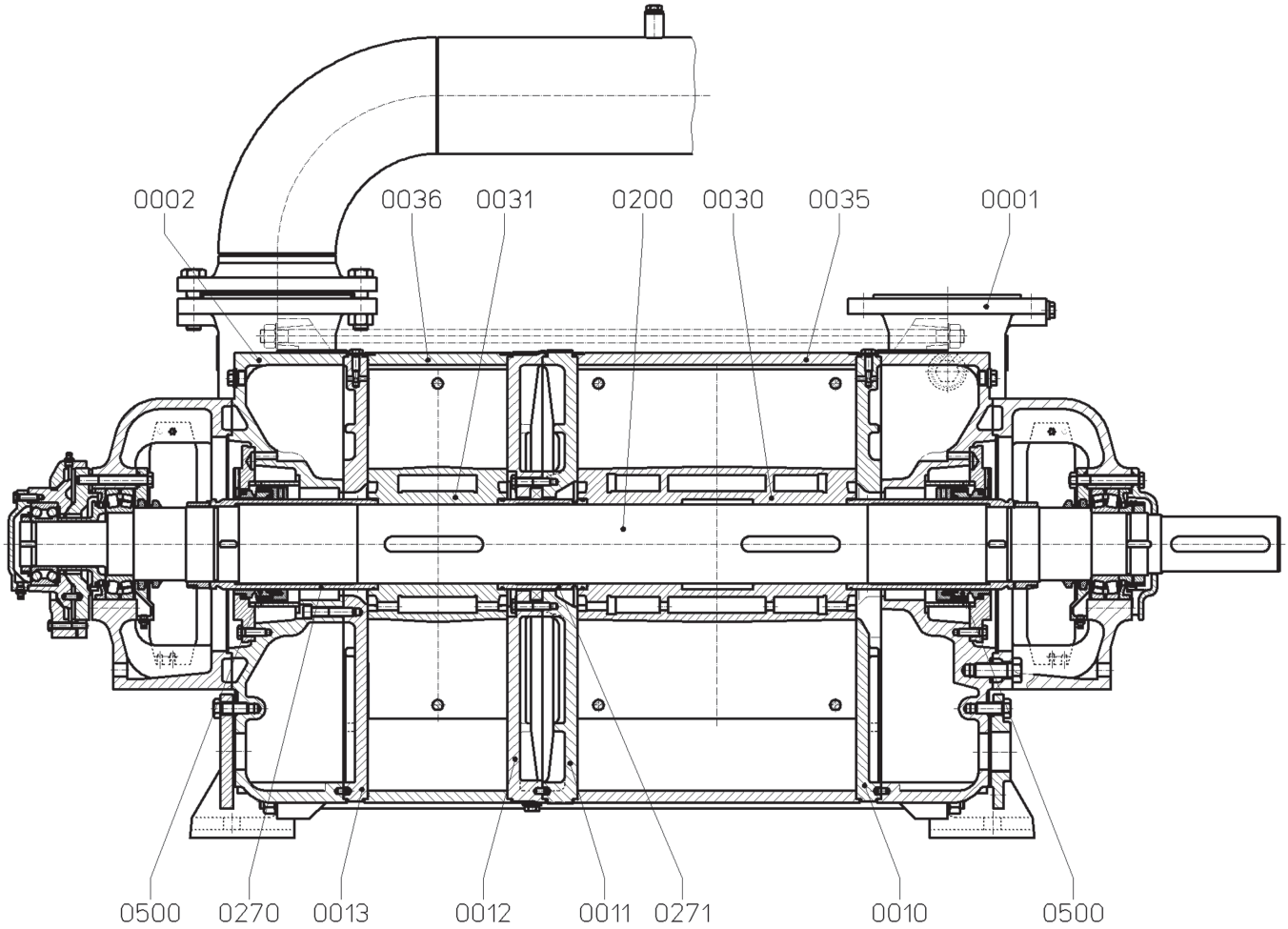
- Drying
- Distillation
- Filtration
- Sterilization
- Deaeration and gasification
- Forming and extrusion
- Vacuum chucking
- Scrubbing and vapor recovery
- Packaging and bottling
- Poultry processing
- Batch reactors

General technical data

Parameter		Unit(s)	Model					
			LPH 85340	LPH 85353		LPH 95354	LPH 95367	
Speeds		rpm	700	735[1]	880	465	585[1]	700
Max. compression over pressure		bar (psi)	1.5 (21.8)					
Max. admissible pressure difference (per speed)		bar (psi)	1.5 (21.8)	1.5 (21.8)	1.2 (17.4)[2]	1.5 (21.8)	1.5 (21.8)	1.2 (17.4)[2]
Hydraulic test (over pressure)		bar (psi)	3 (43.5)					
Moment of inertia of the rotating pump parts and the water filling		kg • m² (lb • ft²)	8.5 (202)		10 (237)	28 (664)		32 (759)
Sound pressure level at 80 mbar (60 torr) suction pressure (per speed)		dB(A)	80	80	82	87	88	90
Min. pulley diameter permissible in case of V-belt drive		mm (in)	315 (12.4)		450 (17.7)	710 (30.0)		800 (31.5)
Max. gas temperature	Dry	°C (°F)	160 (320)					
	Saturated	°C (°F)	80 (176)					
Service liquid	Max. temperature	°C (°F)	60 (140)					
	Max. viscosity	mm²/s (ft²/s)	90 (0.001)					
	Max. density	kg/m³ (lb/US gal)	1,200 (12)					
	Volume to shaft	L (gal)	75 (19.8)		91 (24.0)	228 (60.2)		250 (60.0)
Max. flow resistance of the heat exchanger		bar (psi)	0.2 (2.9)					

(1) Normal speed, (2) 1.5 bar (21.8 psi) in case of belt drive

Sectional drawing and material design — LPH 85340, LPH 85353



Item Number	Description	Materials of Construction	
		02 - Cast Iron/Carbon Steel	42 - Stainless Steel
0001, 0002	Casing	Cast iron - 0.6025	Stainless steel - 1.4408
0010, 0011	Guide disk	Cast iron - 0.6025	Stainless steel - 1.4408
0012, 0013			
0030, 0031	Vane wheel impeller	Steel - 1.0619	Stainless steel - 1.4408
0035, 0036	Central body	Carbon steel - Q235B	Stainless steel - AISI 316L
200	Shaft	Carbon steel - 55 steel	Carbon steel - 55 steel
0270, 0271	Shaft sleeve	Stainless steel - AISI 316L	Stainless steel - AISI 316L
0500	Mechanical seal	CrMo-steel, carbon and Viton® (Code: SBVGG)	CrMo-steel, carbon and Viton (Code: SBVGG)

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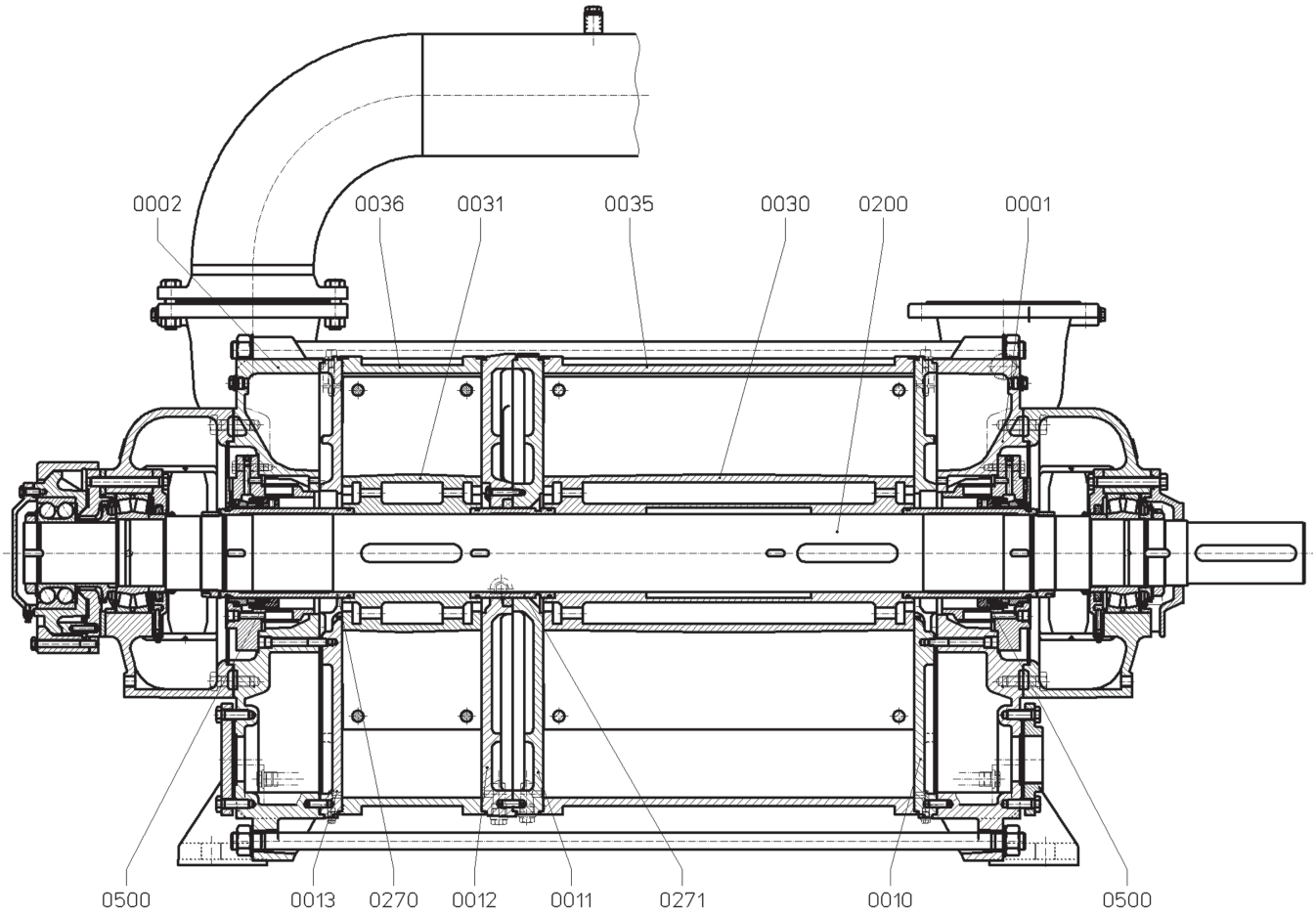
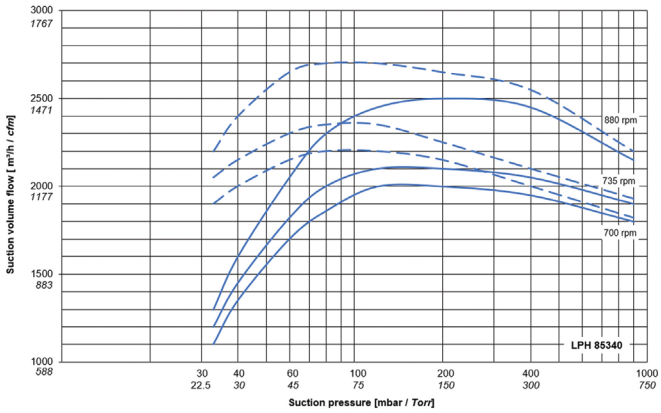
Sectional drawing and material design — LPH 95354, LPH 95367

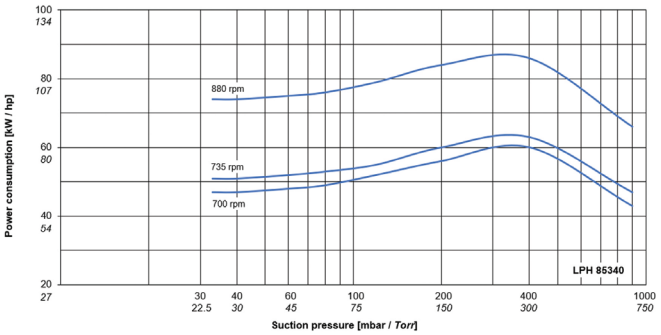


Item Number	Description	Materials of Construction	
		02 - Cast Iron/Carbon Steel	42 - Stainless Steel
0001, 0002	Casing	Cast iron - 0.6025	Stainless steel - 1.4408
0010, 0011	Guide disk	Cast iron - 0.6025	Stainless steel - 1.4408
0012, 0013			
0030, 0031	Vane wheel impeller	Steel - 1.0619	Stainless steel - 1.4408
0035, 0036	Central body	Carbon steel - Q235B	Stainless steel - AISI 316L
200	Shaft	Carbon steel - 55 steel	Carbon steel - 55 steel
0270, 0271	Shaft sleeve	Stainless steel - AISI 316L	Stainless steel - AISI 316L
0500	Mechanical seal	CrMo-steel, carbon and Viton (Code: SBVGG)	CrMo-steel, carbon and Viton (Code: SBVGG)

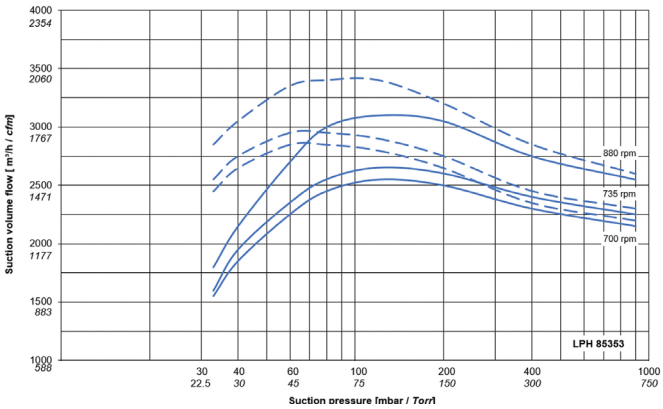
Suction volume flow and power absorption

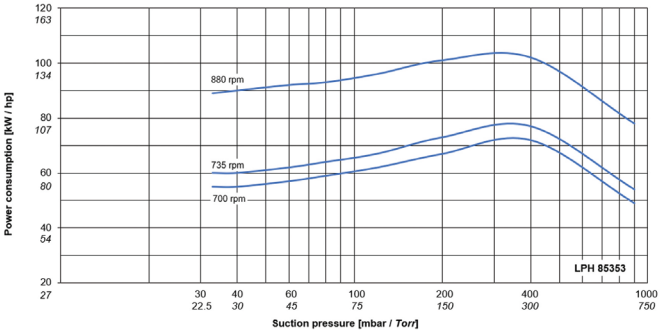
LPH 85340





LPH 85353



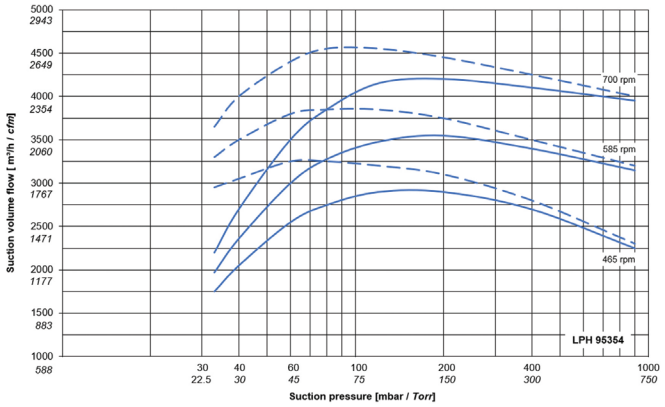


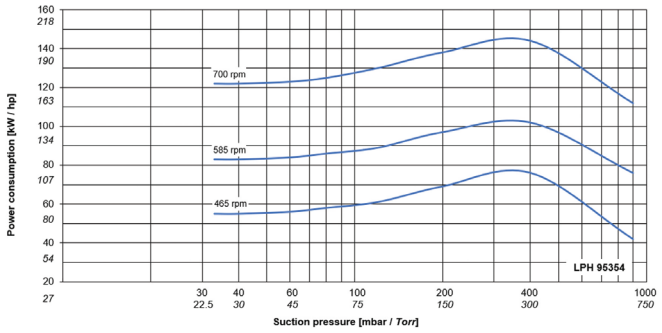
The operating data are applicable under the following conditions:

- Pumping medium:
  - dry air: 20°C (68°F) ——
  - water vapor saturated air: 20°C (68°F) - - - -
- Service liquid:
  - water: 15°C (59°F)
- Compression pressure: 1,013 mbar (760 torr)
- The suction volume flow is applied to the suction pressure.
- Tolerance of the operating data is 10%.
- Max. fresh water needed with lowest suction pressure

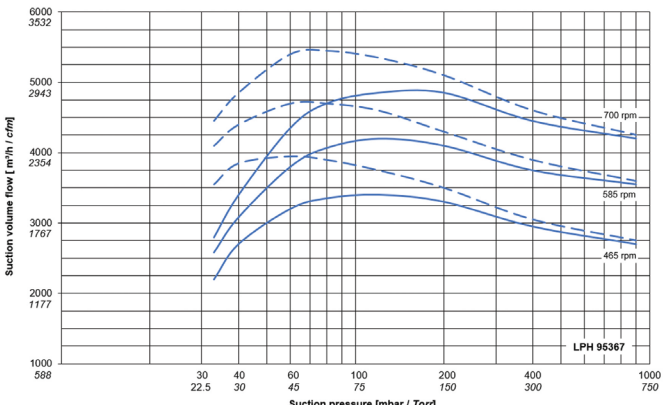
Suction volume flow and power absorption

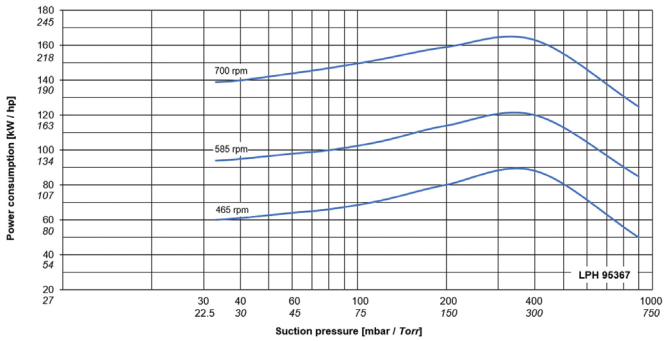
LPH 95354





LPH 95367

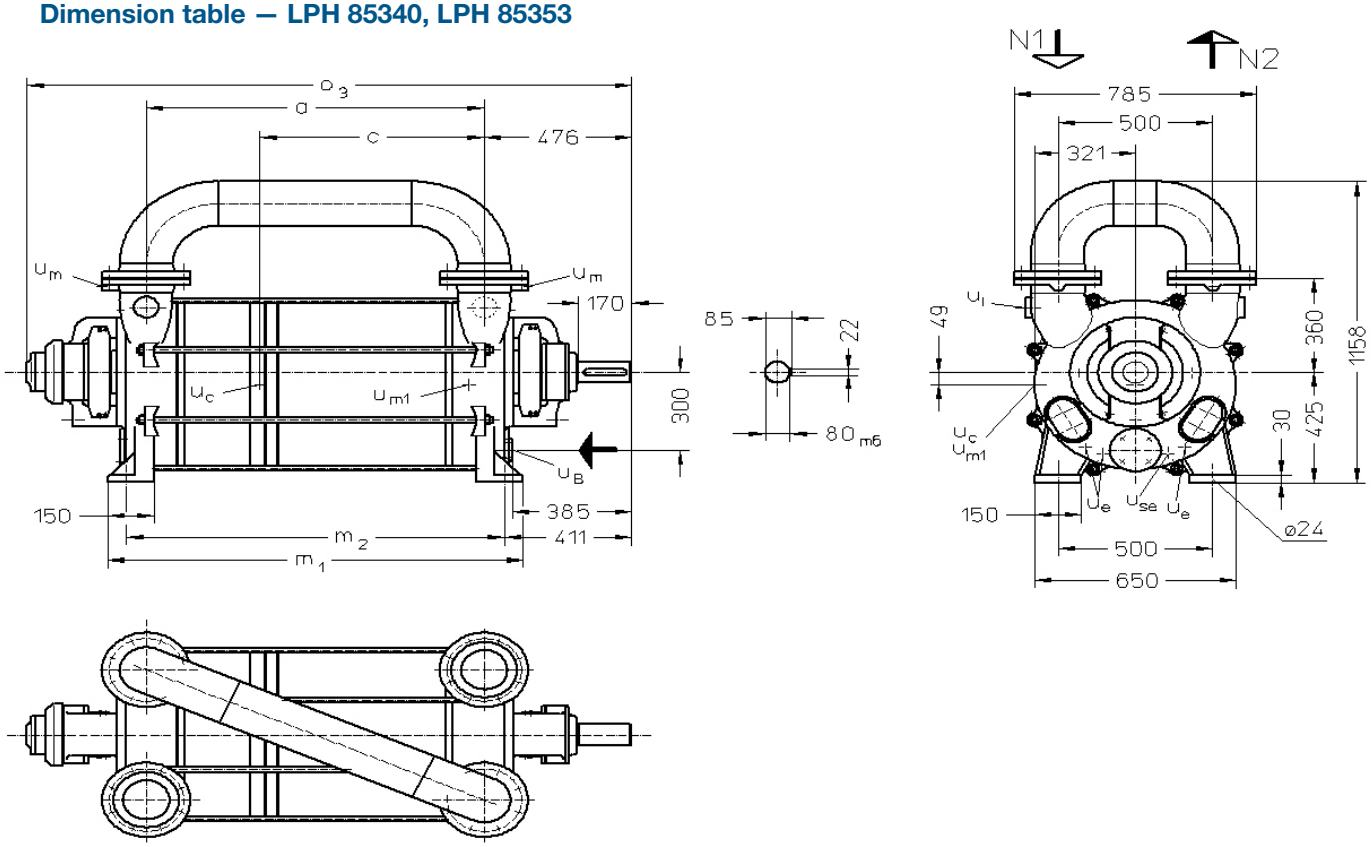




The operating data are applicable under the following conditions:

- Pumping medium:
  - – dry air: 20°C (68°F) ——
  - – water vapor saturated air: 20°C (68°F) - - - -
- Service liquid:
  - – water: 15°C (59°F)
- Compression pressure: 1,013 mbar (760 torr)
- The suction volume flow is applied to the suction pressure.
- Tolerance of the operating data is 10%.
- Max. fresh water needed with lowest suction pressure

Dimension table — LPH 85340, LPH 85353



N 1 = gas inlet DN 150

N 2 = gas outlet DN 150

u_B = connection for service liquid G 2

u_c = connection for protection against cavitation G ½

u_e = drain connection G ½

u_l = connection for vent cock G 1½

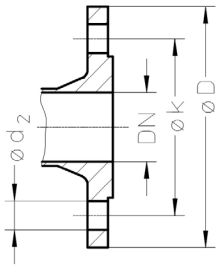
u_m = connection for pressure gauge G ½

u_{m1} = connection for drain valve G ½

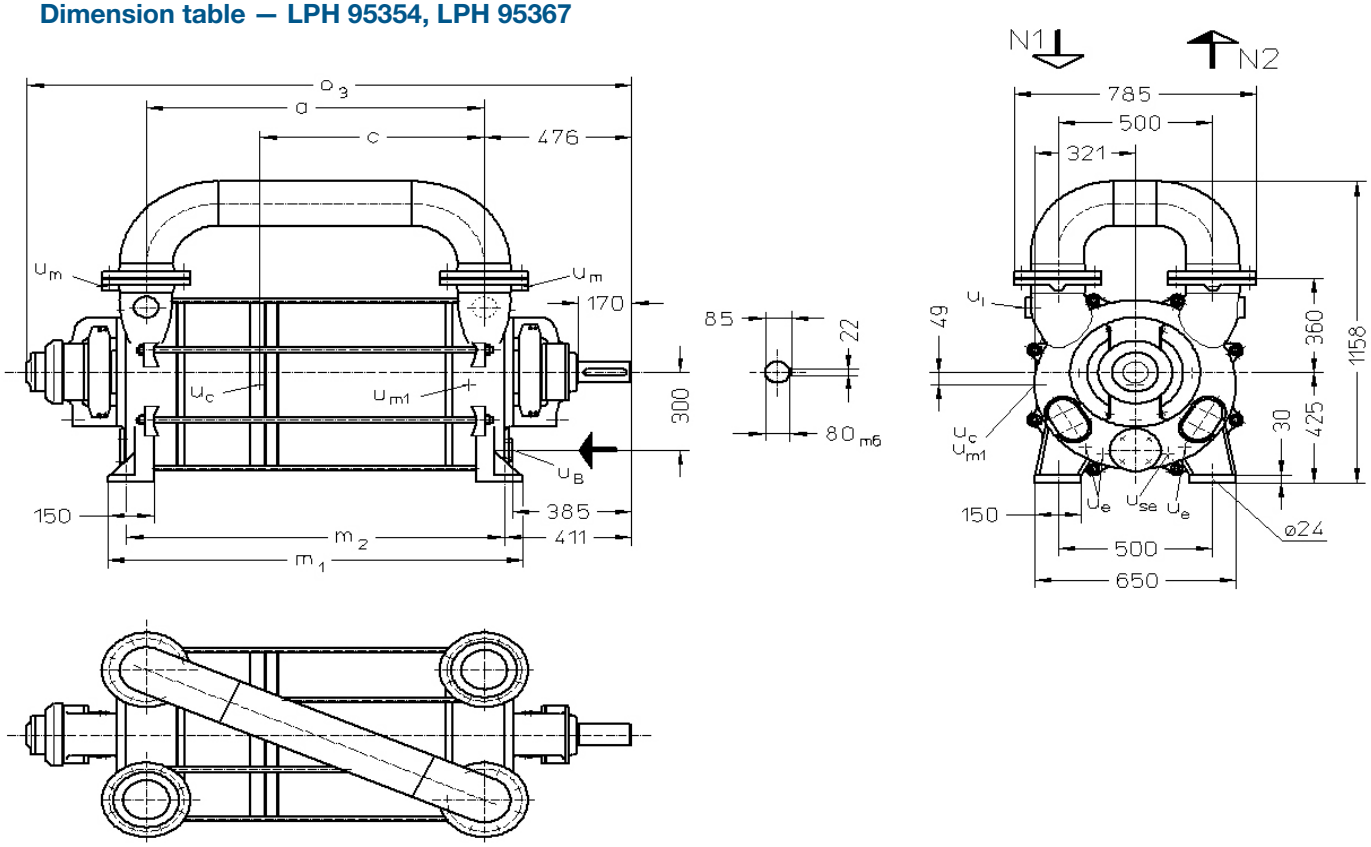
u_{se} = connection for dirt drain G ½

Model	Dimensions, mm (in)					Approx. Weight, kg (lb)	
	a	c	m_1	m_2	o_3	02 Cast Iron/Carbon Steel	42 Stainless Steel
LPH 85340 BN	961 (37.83)	596 (23.46)	1,211 (47.68)	1,091 (42.95)	1,823 (71.77)	1,180 (2,601)	1,260 (2,778)
LPH 85353 BN	1,091 (42.95)	726 (28.58)	1,341 (52.79)	1,221 (48.07)	1,953 (76.89)	1,285 (2,833)	1,375 (3,031)

Flange Connections to DIN 2501 PN 10	
DN in mm (in)	150 (5.90)
k in mm (in)	240 (9.45)
D in mm (in)	285 (11.22)
number x d_2	8 x 23 (0.91)



Dimension table — LPH 95354, LPH 95367



N 1 = gas inlet DN 200

N 2 = gas outlet DN 200

u_B = connection for service liquid G 3

u_c = connection for protection against cavitation G ½

u_e = drain connection G ¾

u_l = connection for vent cock G 1½

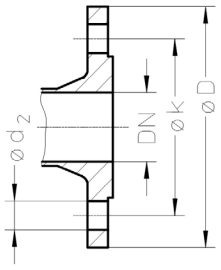
u_m = connection for pressure gauge G ½

u_{m1} = connection for drain valve G ¾

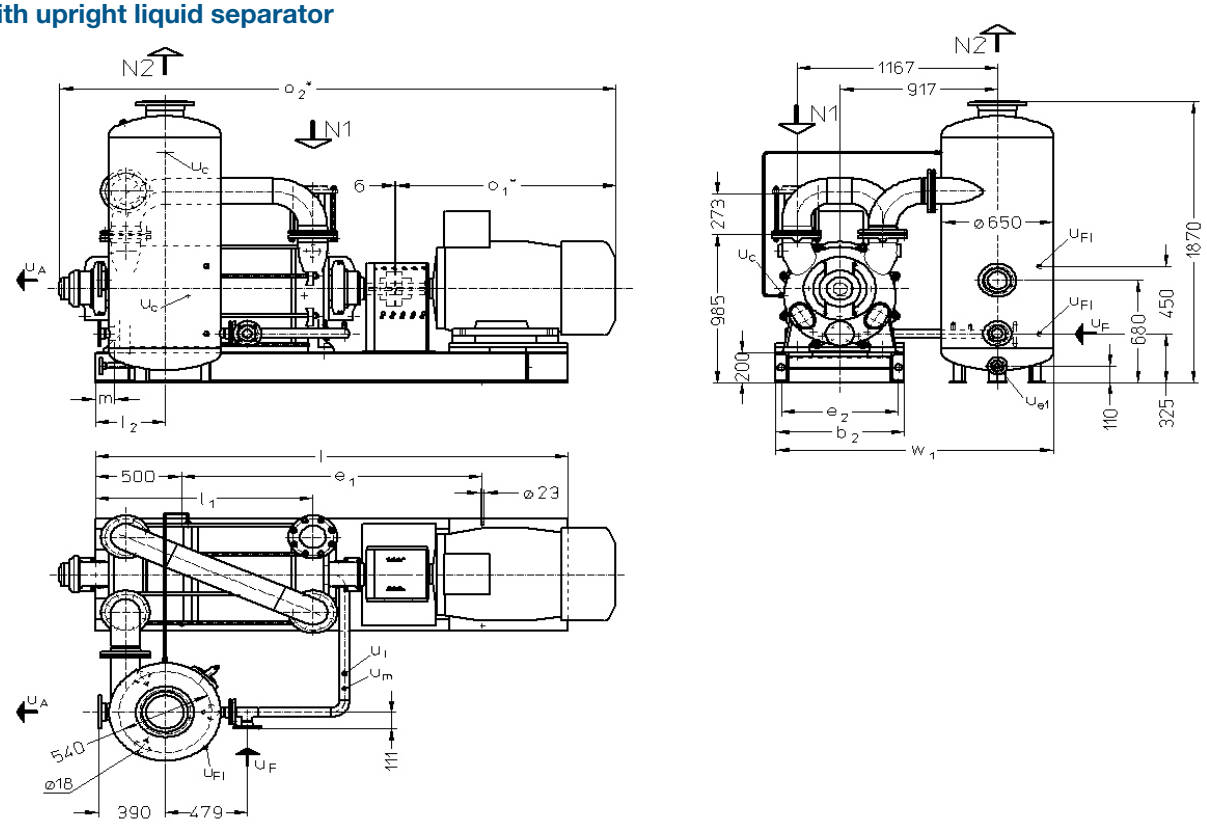
u_{se} = connection for dirt drain G ¾

Model	Dimensions, mm (in)					Approx. Weight, kg (lb)	
	a	c	m_1	m_2	o_3	02 Cast Iron/Carbon Steel	42 Stainless Steel
LPH 95354 BN	1,219 (50.83)	776 (30.55)	1,479 (58.23)	1,371 (53.98)	2,194 (86.38)	2,300 (5,071)	2,500 (5,512)
LPH 95367 BN	1,344 (52.91)	901 (35.47)	1,604 (63.15)	1,496 (58.90)	2,319 (91.30)	2,500 (5,512)	2,700 (5,953)

Flange Connections to DIN 2501 PN 10	
DN in mm (in)	200 (7.87)
k in mm (in)	295 (11.61)
D in mm (in)	340 (13.49)
number x d_2 in mm (in)	8 x 23 (0.91)



Arrangement drawing — LPH 85340, LPH 85353 with upright liquid separator



N 1 = gas inlet DN 150

N 2 = gas outlet DN 200

u_A = connection for liquid drain DN 100

u_c = connection for protection against cavitation G ⅜

u_{e1} = drain connection DN 25

u_F = connection for fresh liquid DN 50

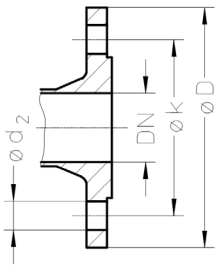
u_{FI} = connection for liquid level indicator G ½

u_m = connection for pressure gauge G ¼

u_t = connection for thermometer G ½

Model	E-Motor 50 Hz			Dimensions, mm (in)										Approx. Weight, kg (lb)
		kW (hp)												
	Size	IP 55	EEx e II T3	b_2	e_1	e_2	l	l_1	l_2	m	o_1*	o_2*	w_1	With IP 55 Motor
LPH 85340	315M	75 (100)	-	730 (28.74)	1,550 (61.02)	660 (25.98)	2,550 (88.58)	1,116 (43.94)	385 (15.16)	90 (3.54)	1,140 (44.88)	2,970 (116.93)	1,607 (63.27)	2,412 (5,318)
	315M	-	68 (91)								1,251 (49.25)	3,080 (121.26)		-
LPH 85353	315L	90 (120)	-	750 (29.53)	1,750 (68.90)	680 (26.77)	2,750 (108.23)	1,266 (49.84)	405 (15.94)	110 (4.33)	1,280 (50.39)	3,240 (127.56)	1,617 (63.66)	2,602 (5,736)
	315L	-	80 (107)								1,371 (53.98)	3,330 (131.10)		-
	355M	-	95 (127)								1,440 (56.69)	3,400 (133.86)		-

Flange Connections to DIN 2501 PN 10					
DN in mm (in)	25 (0.98)	50 (1.97)	100 (3.94)	150 (5.91)	200 (7.87)
k in mm (in)	85 (3.35)	125 (4.92)	180 (7.09)	240 (9.45)	295 (11.61)
D in mm (in)	115 (4.53)	165 (6.50)	220 (8.66)	285 (11.22)	340 (13.39)
number x d_2 in mm (in)	4 x 14 (0.55)	4 x 18 (0.71)	8 x 18 (0.71)	8 x 22 (0.87)	8 x 22 (0.87)



** Dimensions depend on the motor make.*

Fresh water requirements

Dependent on suction pressure, speed, mode of operation and difference in temperature

Suction Pressure [mbar]		Suction Pressure = 33 mbar (24.7 torr)				Suction Pressure = 120 mbar (90 torr)				
Model	speed [rpm]	KB - Combined Liquid Service, m³/h (gpm)			FB - Fresh Liquid Service Water, m³/h (gpm)	KB - Combined Liquid Service, m³/h (gpm)				FB - Fresh Liquid Service Water, m³/h (gpm)
		ΔT warmer than FB, °C (°F)				*ΔT warmer than FB, °C (°F)*				
		10 (18)	*5 (9)*	*2 (3.6)*		*20 (36)*	*10 (18)*	*5 (9)*	*2 (3.6)*	
LPH 85340	700	3.0 (13.2)	4.7 (20.7)	7.1 (31.3)	11 (48.4)	1.8 (7.9)	3.1 (13.6)	4.7 (20.7)	6.9 (30.4)	10 (44.0)
	735	3.1 (13.6)	4.9 (21.6)	7.3 (32.1)		1.9 (8.4)	3.2 (14.1)	4.9 (21.6)	7.0 (30.8)	
	880	4.0 (17.6)	5.9 (26.0)	8.2 (36.1)		2.5 (11.0)	4.0 (17.6)	5.8 (25.5)	7.7 (33.9)	
LPH 85353	700	3.5 (15.4)	5.6 (24.6)	8.8 (38.7)	14 (61.6)	2.2 (9.7)	3.8 (16.7)	5.9 (26.0)	8.7 (38.3)	13 (57.2)
	735	3.8 (16.7)	5.9 (26.0)	9.1 (40.1)		2.4 (10.6)	4.0 (17.6)	6.1 (26.9)	9.0 (39.6)	
	880	4.9 (21.6)	7.3 (32.1)	10.2 (44.9)		3.1 (13.6)	5.0 (22.0)	7.3 (32.1)	9.9 (43.6)	
LPH 95354	465	3.8 (16.7)	6.3 (27.7)	10.5 (46.2)	19 (83.6)	2.3 (10.1)	4.1 (18.1)	6.6 (29.1)	10.7 (47.1)	18 (79.3)
	585	5.2 (22.9)	8.1 (35.7)	12.4 (54.6)		3.2 (14.1)	5.4 (23.8)	8.3 (36.5)	12.2 (53.7)	
	700	6.8 (29.9)	10.0 (44.0)	13.9 (61.2)		4.3 (18.9)	6.9 (30.4)	10.0 (44.0)	13.6 (59.9)	
LPH 95367	465	4.1 (18.1)	6.9 (30.4)	11.6 (51.1)	21 (92.4)	2.6 (11.4)	4.6 (20.3)	7.4 (32.6)	11.7 (51.5)	19 (83.6)
	585	5.8 (25.5)	9.1 (40.0)	13.8 (60.8)		3.6 (15.9)	6.1 (26.9)	9.3 (40.9)	13.4 (59.0)	
	700	7.6 (33.5)	11.2 (49.3)	15.5 (68.2)		4.9 (21.6)	7.7 (33.9)	11.0 (48.4)	14.7 (64.7)	

Suction Pressure [mbar]		Suction Pressure = 200 mbar (150 torr)					Suction Pressure = 400 mbar (300 torr)				
Model	speed [rpm]	KB - Combined Liquid Service, m³/h (gpm)				FB - Fresh Liquid Service Water, m³/h (gpm)	KB - Combined Liquid Service, m³/h (gpm)				FB - Fresh Liquid Service Water, m³/h (gpm)
		ΔT warmer than FB, °C (°F)					*ΔT warmer than FB, °C (°F)*				
		20 (36)	*10 (18)*	*5 (9)*	*2 (3.6)*		*20 (36)*	*10 (18)*	*5 (9)*	*2 (3.6)*	
LPH 85340	700	1.9 (8.4)	3.1 (13.6)	4.5 (19.8)	6.3 (27.7)	8.5 (37.4)	1.7 (7.5)	2.5 (11.0)	3.4 (15.0)	4.2 (18.5)	5 (22.0)
	735	2.0 (8.8)	3.2 (14.1)	4.7 (20.7)	6.4 (28.2)		1.8 (7.9)	2.6 (11.4)	3.4 (15.0)	4.2 (18.5)	
	880	2.5 (11.0)	3.9 (17.2)	5.3 (23.3)	6.9 (30.4)		2.1 (9.2)	3.0 (13.2)	3.7 (16.3)	4.4 (19.4)	
LPH 85353	700	2.3 (10.1)	3.8 (16.7)	5.6 (24.6)	8.0 (35.2)	11 (48.4)	2.1 (9.2)	3.3 (14.5)	4.5 (19.8)	5.7 (25.1)	7 (30.8)
	735	2.4 (10.6)	4.0 (17.6)	5.9 (26.0)	8.1 (35.7)		2.2 (9.7)	3.4 (15.0)	4.6 (20.2)	5.8 (25.5)	
	880	3.1 (13.6)	4.9 (21.6)	6.7 (29.5)	8.8 (38.7)		2.7 (11.9)	3.9 (17.2)	5.0 (22.0)	6.0 (26.4)	
LPH 95354	465	2.5 (11.0)	4.3 (18.9)	6.8 (29.9)	10.4 (45.8)	16 (70.4)	2.5 (11.0)	4.1 (18.1)	6.0 (26.4)	8.2 (36.1)	11 (48.4)
	585	3.3 (14.5)	5.5 (24.2)	8.2 (36.1)	11.6 (51.1)		3.1 (13.6)	4.9 (21.6)	6.8 (29.9)	8.8 (38.7)	
	700	4.3 (18.9)	6.8 (29.9)	9.6 (42.3)	12.6 (55.5)		4.0 (17.6)	5.8 (25.5)	7.6 (33.5)	9.3 (41.0)	
LPH 95367	465	2.9 (12.8)	4.9 (21.6)	7.6 (33.5)	11.4 (50.2)	17 (74.8)	2.8 (12.3)	4.5 (19.8)	6.4 (28.2)	8.5 (37.4)	11 (48.4)
	585	3.8 (16.7)	6.2 (27.3)	9.1 (40.1)	12.6 (55.5)		3.5 (15.4)	5.3 (23.3)	7.2 (31.7)	9.1 (40.1)	
	700	4.9 (21.6)	7.6 (33.5)	10.5 (46.2)	13.6 (59.9)		4.3 (18.9)	6.2 (27.3)	7.9 (34.8)	9.5 (41.8)	

FB = fresh liquid service
KB = combined liquid service water 20°C (68°F), 10°C (50°F), 5°C (41°F), 2°C (36°F) warmer than the fresh water

Example for ordering:

Data regarding the pump size									
Series	Size	Bearing + Direction of Rotation		Shaft Sealing		Material Design		Casing Seal	
		B•	Two grease-lubricated, antifriction bearing	DAC	Mechanical seal with built-in flushing, Viton O-rings	02	Main parts cast iron without non-ferrous metal	0	Liquid seal
		•N	One shaft end, clockwise rotating			42	Main parts stainless steel		
LPH	**85340**	**BN**		**DAC**		**02**, 42		**0**	
	85353								
	95354			DAC					
	95367								

Example for ordering:

The pump size LPH 85340 BN 041 02 0

is the complete order number: **LPH• 85340 BN DAC 02 0**

On delivery, the point (•) in the fourth place of the type code is replaced by a letter in the factory.

Accessories

Accessories	Material Designation	Type		Weight, kg (lb)		Part Number	
		LPH 85340	LPH 85353	LPH 85340	LPH 85353	LPH 85340	LPH 85353
Upright liquid separator	Galvanized steel	XBp 5013		148 (326)		35000585	
	Stainless steel					35000586	
Service liquid line	Steel					35003189	35007072
	Stainless steel					35003190	35003191
Discharge line (bend)	Steel					35003237	
	Stainless steel					35003238	
Flowserve SIHI-ball type non-return valve	Cast iron	XCk 150	XCk 28	35 (77)		20072800	
	Stainless steel					20006987	
Base frame	Steel	-	-	417 (919)	423 (933)	35012206	35012207

Accessories	Material Designation	Type		Weight, kg (lb)		Part Number	
		LPH 95354	LPH 95367	LPH 95354	LPH 95367	LPH 95354	LPH 95367
Upright liquid separator	Galvanized steel	XBp 10112		205 (452)		35000593	
	Stainless steel					20000612	
Service liquid line	Steel					20027252	20027253
	Stainless steel					35003228	20027254
Discharge line (bend)	Steel					20027265	
	Stainless steel					35003238	

Any changes in the interest of technical development are reserved.

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