Liquid ring vacuum pumps
in compact design

LEM 25, LEM 50

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **4 to 50 m³/h**

CONSTRUCTION

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and relable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- shaft not contact with the medium
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

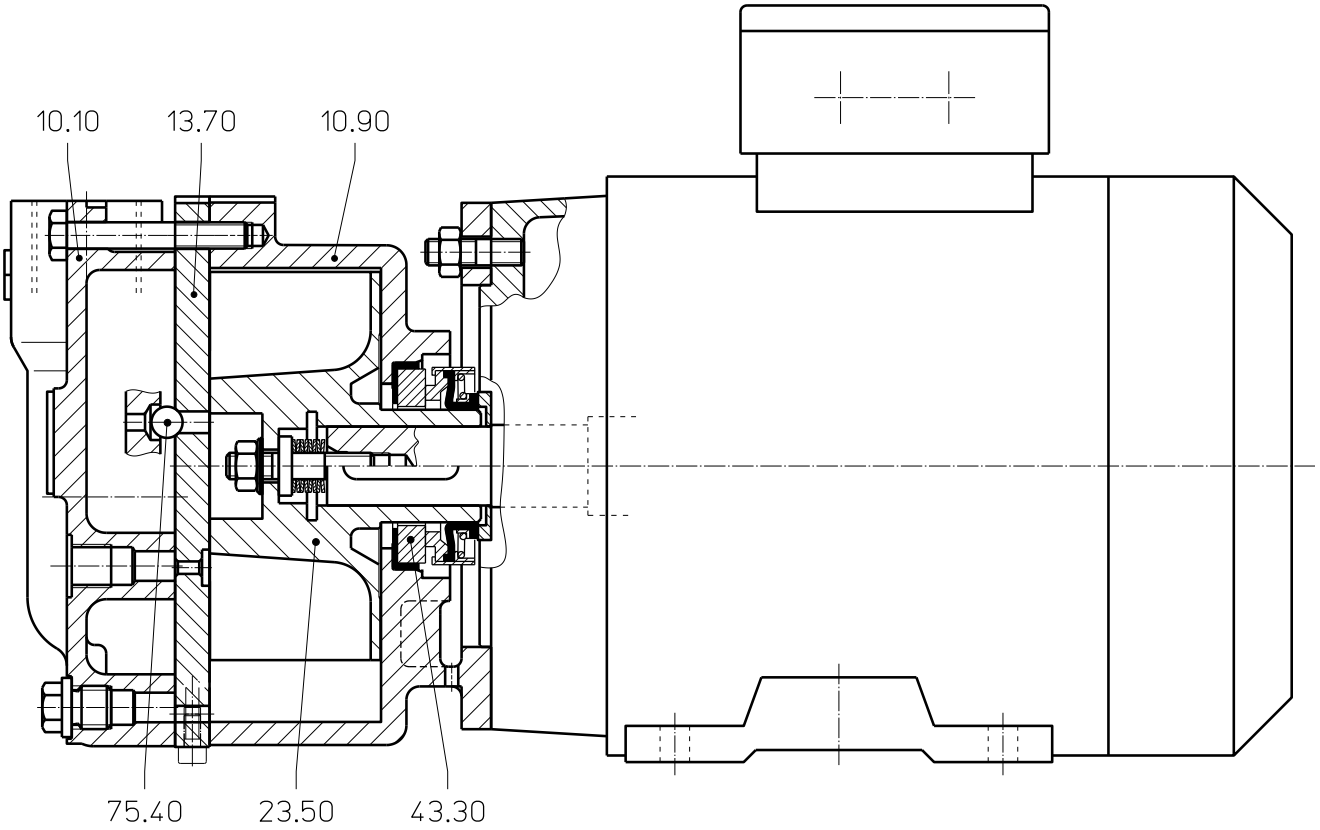
Pump Type		Units	LEM 25	LEM 50
Speed	50 Hz 60 Hz	rpm	2900 3500	
Maximum overpressure on compression		bar	0.3	
Permissible pressure difference between suction and discharge side	max. min.	bar	1.1 0.2	
Hydraulic test pressure (overpressure)		bar	3	
Moment of inertia of rotating parts of pump and water content		kg · m²	0.003	0.0095
Noise level at 80 mbar suction pressure		dB (A)	68	69
Maximum gas temperature	dry saturated	°C °C	200 100	
Service liquid Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C mm²/s kg/m³ litre	 80 10 4 1200 0.3	 0.4
Maximum flow resistance of the heat exchanger		bar	0.2	

In selecting a pump, avoid choosing one which is likely to be operating at a combination of its maximum permissible limits e.g. maximum viscosity and maximum permissible pressure difference.

Materials

Item	COMPONENTS	MATERIALS 0K
10.10	Vacuum casing	0.6025
10.90	Central body	
13.70	Guide disc	
23.50	Vane wheel impeller	1.4308
-	Steel parts in contact with the medium	1.4401
43.30	Standard mechanical seal	Steatite / Carbon / Butadiene rubber
75.40	Valve balls	polyamide A

Cut-away diagram LEM 25, LEM 50



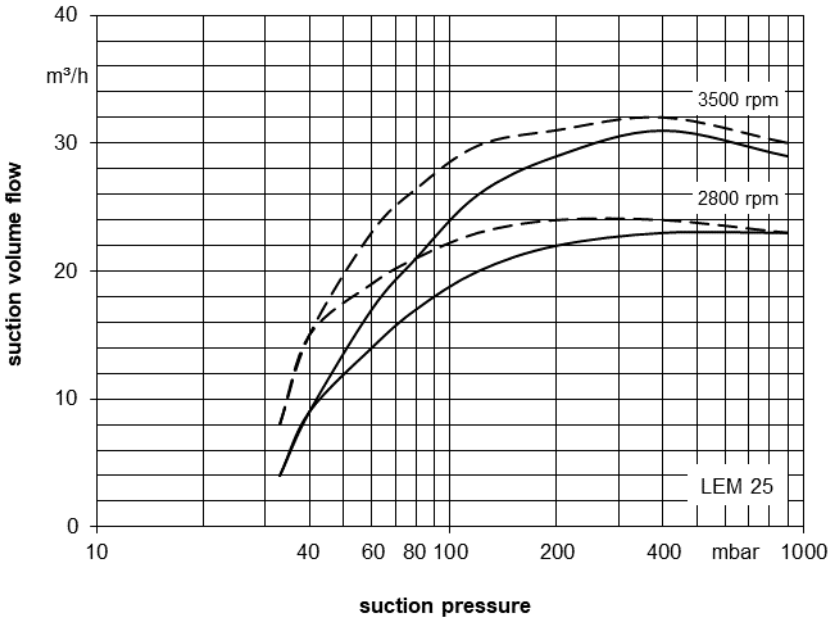
Make-up Liquid Consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference

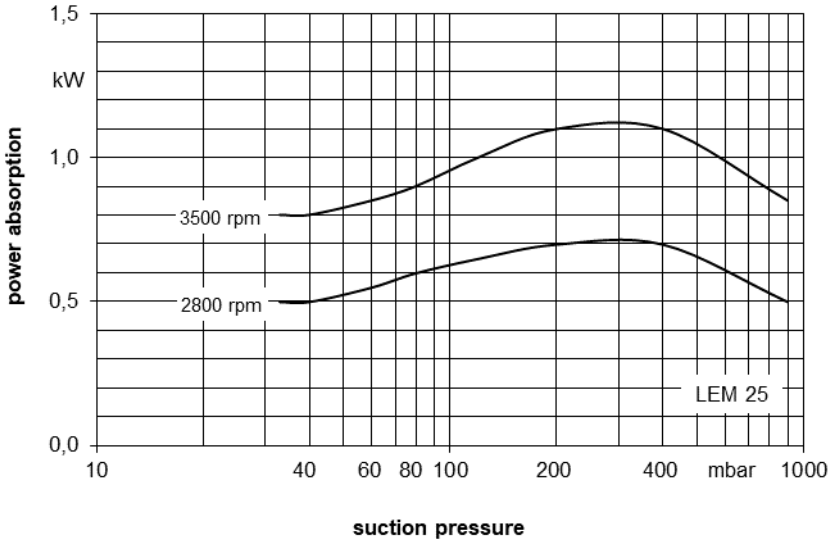
suction pressure in [mbar]		33				120				200				400			
pump type	speed [rpm]	KB temperature difference [°C] 10	5	2	FB	KB temperature difference [°C] 10	5	2	FB	KB temperature difference [°C] 10	5	2	FB	KB temperature difference [°C] 10	5	2	FB
LEM 25	2800	0.04	0.06	0.12	0.26	0.05	0.08	0.13	0.26	0.05	0.08	0.14	0.26	0.05	0.08	0.12	0.2
	3500	0.05	0.09	0.15		0.06	0.10	0.16		0.07	0.11	0.16		0.06	0.10	0.14	
LEM 50	2800	0.07	0.13	0.23	0.5	0.09	0.15	0.25	0.48	0.09	0.15	0.25	0.45	0.09	0.14	0.22	0.35
	3500	0.11	0.18	0.29		0.12	0.20	0.31		0.13	0.20	0.30		0.12	0.18	0.25	

FB = total service liquid flow rate on once-through system

KB = flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C warmer than make-up water

Performance Characteristics LEM 25



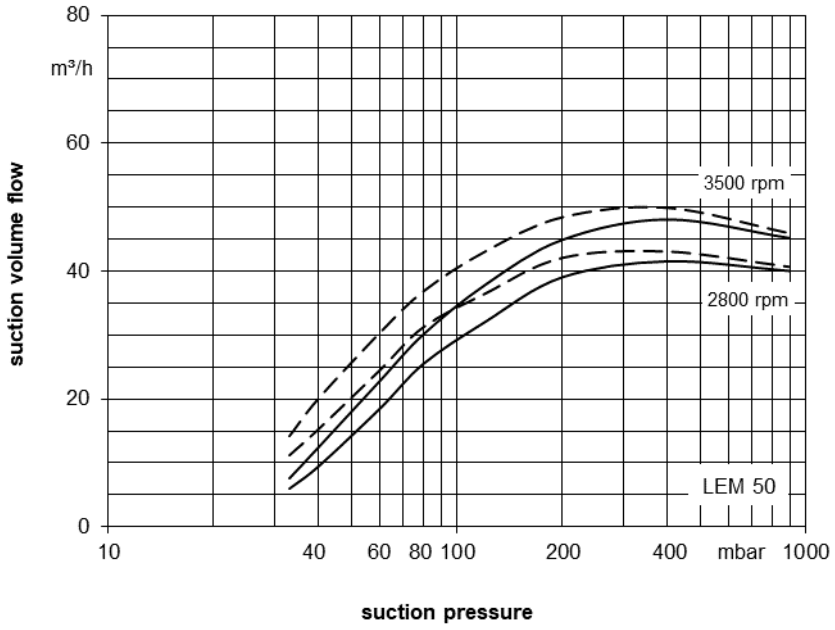


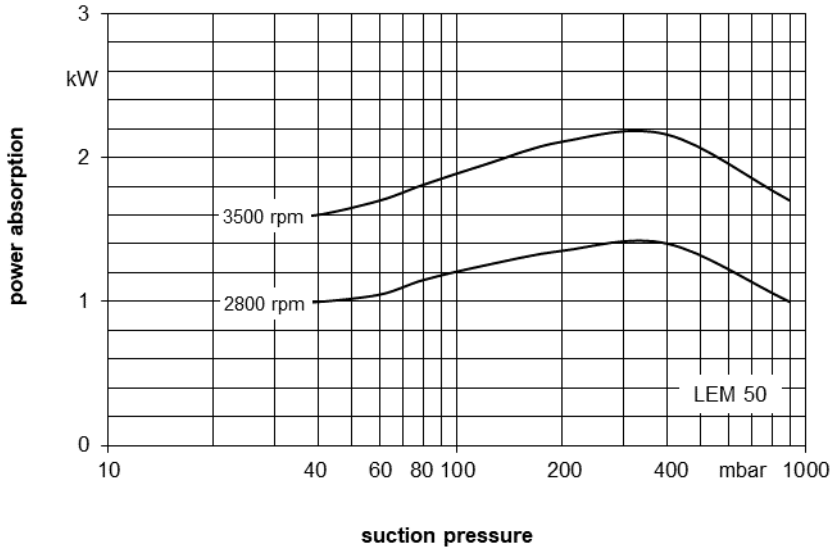
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 50



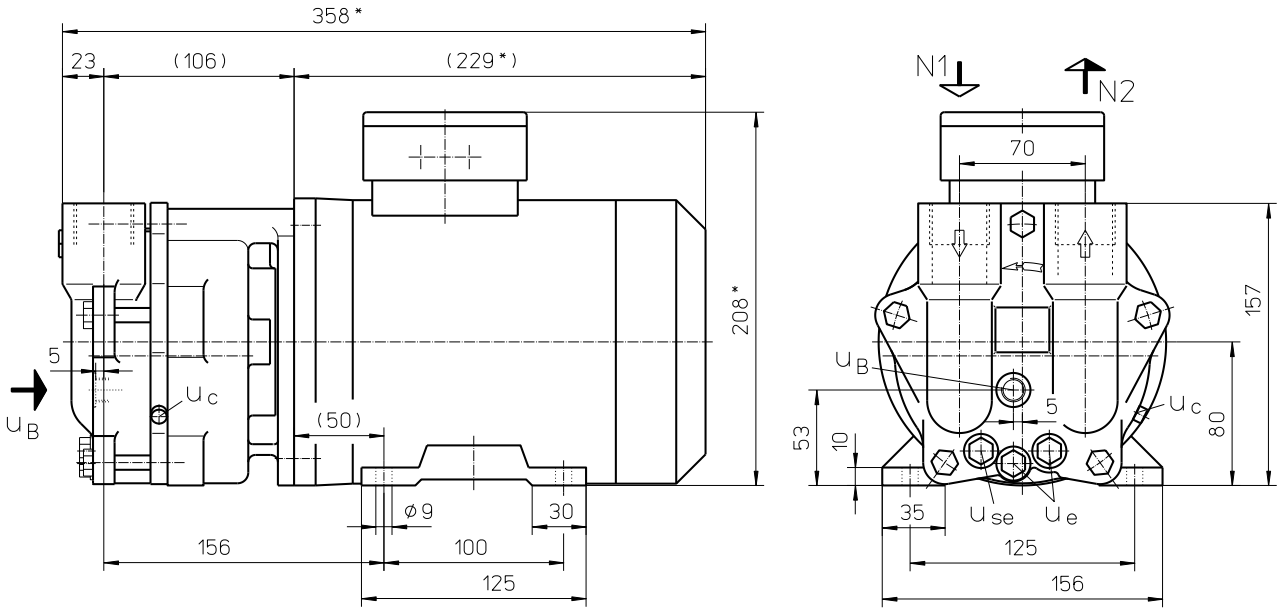


The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 25

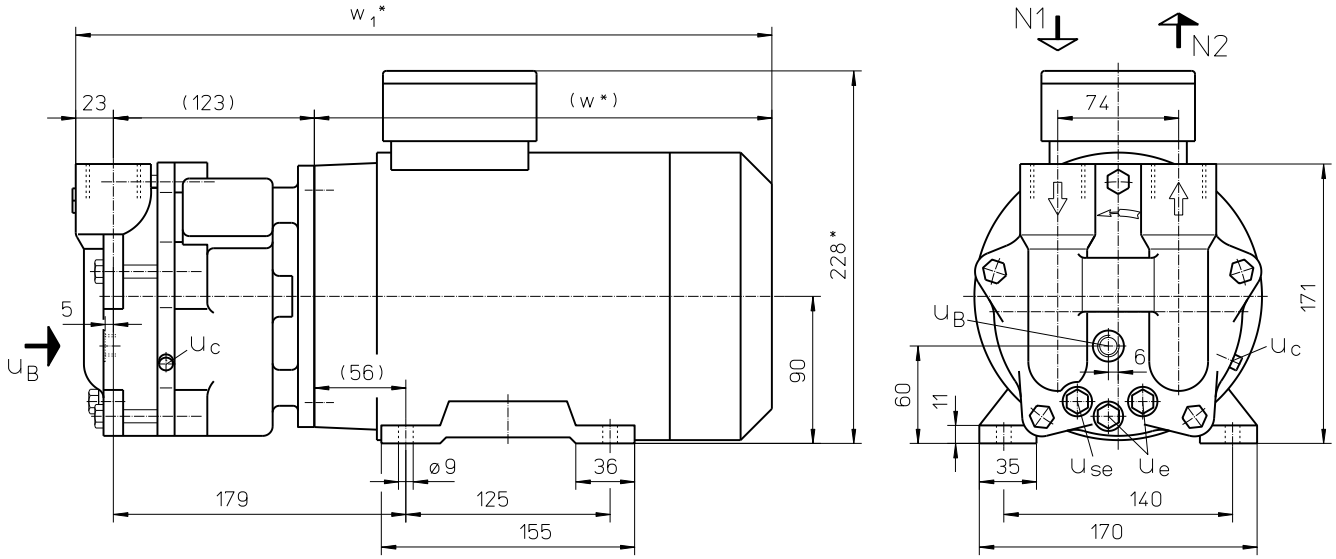


	electric motor IP 55			
	size	kW		approx. weight
		50 Hz	60 Hz	[kg]
LEM 25	80	0.75	1.1	19

other motors on request
* dimensions dependent upon motor supplier

N 1 = gas inlet G 1
N 2 = gas outlet G 1
u B = connection for service liquid G ¼
u c = connection for protection against cavitation M5
u e = connection for drain G ¼
u se = connection for dirt drain G ¼

Dimensions LEM 50

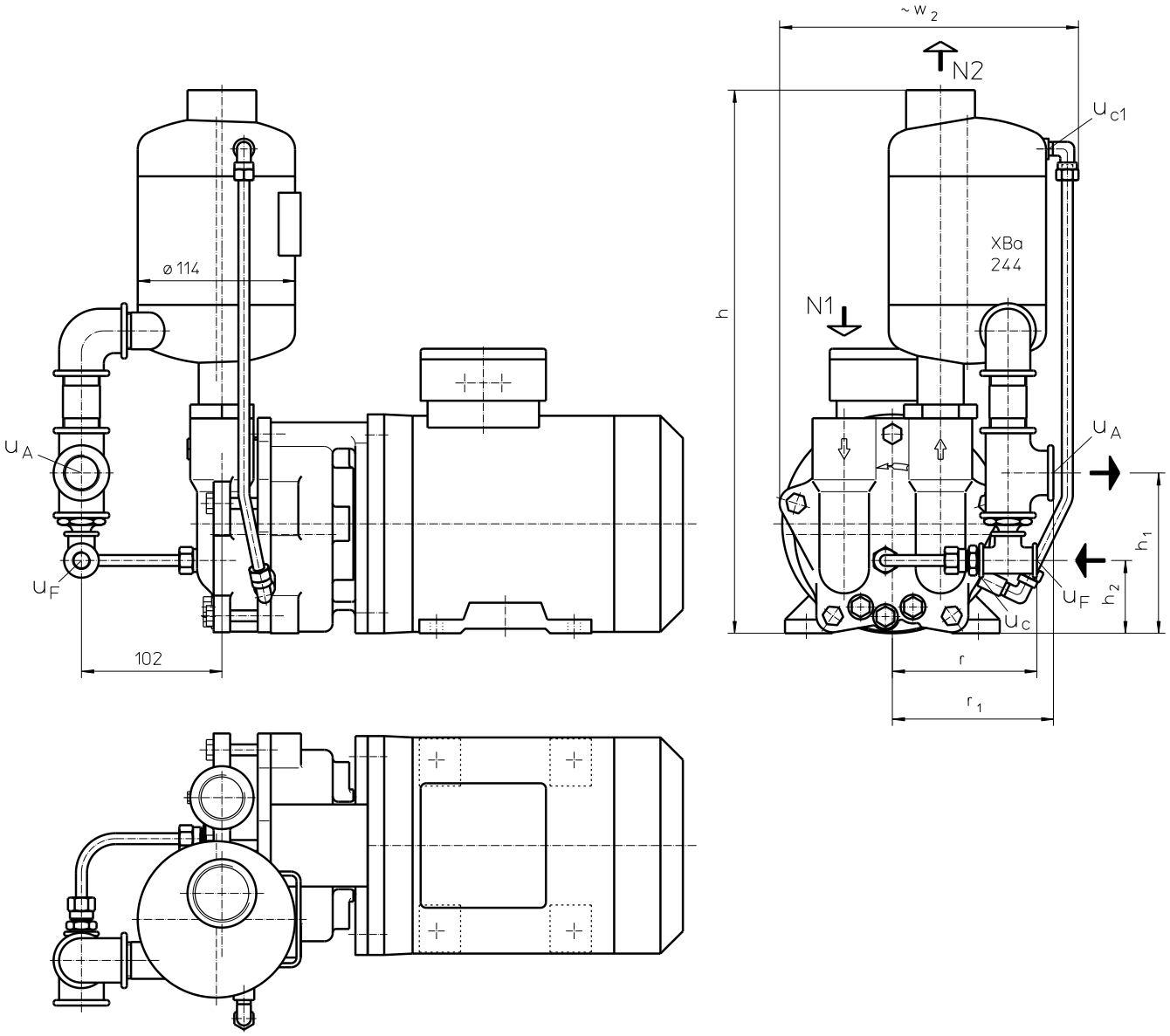


N 1 = gas inlet G 1
N 2 = gas outlet G 1
u B = connection for service liquid G ¼
u c = connection for protection against cavitation M5
u e = connection for drain G ¼
u se = connection for dirt drain G ¼

	electric motor IP 55					
	size	kW		w *	w 1*	approx. weight
		50 Hz	60 Hz	[mm]	[mm]	[kg]
LEM 50	90 L	1.5	-	270	416	31
		-	2.2	280	426	37

other motors on request * dimensions dependent upon motor supplier

Arrangement drawing LEM 25, LEM 50



N 1 = gas inlet G 1

N 2 = gas outlet G 1 ¼

u_A = liquid overflow G ¾

u_c = connection for protection against cavitation M5

u_{c1} = connection for protection against cavitation G $^1/_8$

u_F = connection for make-up liquid G ¼

	h [mm]	h_1 [mm]	h_2 [mm]	r [mm]	r_1 [mm]	w_2 [mm]	approx. weight [kg]
LEM 25	398	117	54	105	117	217	22
LEM 50	411	123	60	107	119	225	29

Data regarding the pump size - order notes

range + size	hydraulic + bearings	shaft seal	materials	casing sealing
	A• hydraulic A •Z two grease lubricated antifriction bearings arranged in the motor	X1L mechanical seal carbon / butadiene rubber	0K main parts out of cast iron, impeller in low alloyed steel	0 liquid seal
LEM 25/50	AZ	X1L	0K	0

Motor Selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example of an Order:

LEMA 25 AZ X1L 0K 0 with 0.75 kW AC motor, 50 Hz, 230V Δ, IP55

Accessories LEM 25, LEM 50

Recommended Accessory	Material execution		LEM 25	LEM 50
Top Mounted Liquid Separator		Type / weight	XBa 244 / 2.8 kg	
Top mounted separator	1.4571	SIHI-Part No.	43 133 503	
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 072 997 20 072 998	
Service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	on request 20 072 556	
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 050 496 20 050 589	
SIHI – Gas Ejector see Technical Catalogue – Gas Ejector				
at service liquid temperature 15 °C		Type / weight	GEV 25 A / 1.1 kg	GEV 50 A / 1.1 kg
at service liquid temperature 30 °C		Type / weight	GEV 25 A / 1.1 kg	GEV 50 A / 1.1 kg
SIHI – Non Return Ball Valve		Size / weight	G1 / 0.7 kg	
	Brass + Butadiene rubber Brass + Teflon 1.4571 + Teflon	SIHI-Part No.	20 044 637 20 044 639 20 072 807	

Any changes in the interest of the technical development are reserved.

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Liquid ring vacuum pumps
in compact design

LEM 26, LEM 51

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **3 to 51 m³/h**

CONSTRUCTION TYPE

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

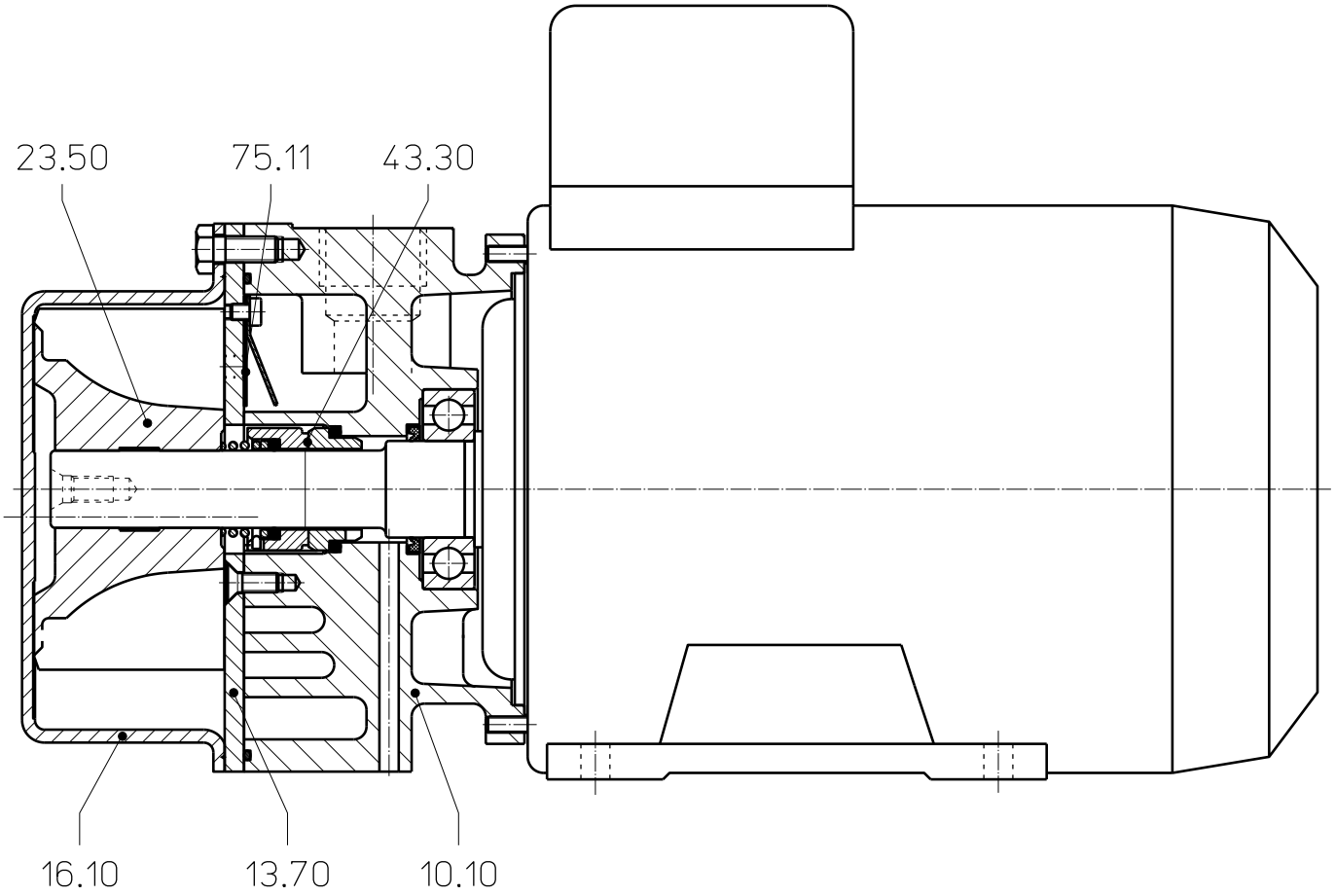
Pump type	units	LEM 26	LEM 51
Speed 50 Hz 60 Hz	rpm	2900 3500	
Maximum overpressure on compression	bar	0.3	
Permissible pressure difference between suction and discharge side	bar	1.1 0.2	
Hydraulic test pressure (overpressure)	bar	3	
Moment of inertia of rotating parts of pump and water content	kg · m²	0.003	0.005
Noise level at 80 mbar suction pressure	dB (A)	68	
Maximum gas temperature dry saturated	°C °C	200 100	
Service liquid: Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft	 °C °C mm²/s kg/m³ litre	 80 10 4 1200 0.4	 0.6
Maximum flow resistance of the heat exchanger	bar	0.2	

In selecting a pump, avoid choosing one which is likely to be operating at a combination of its maximum permissible limits e.g. maximum viscosity and maximum permissible pressure difference.

Materials

Position number	COMPONENT	MATERIALS 0A	0K	4B
10.10	Vacuum casing	0.6025		1.4408
13.70	Guide disc	1.4301		1.4404
16.10	Cover			
23.50	Vane wheel impeller	2.1096.01	1.4308	1.4408 (LEM 26) 1.4517 (LEM 51)
43.30	Standard mechanical seal	Cr-steel / carbon / butadiene rubber		Cr Ni Mo-steel / carbon / Viton
75.11	Valve plate	PTFE		

Cut-away diagram LEM 26, LEM 51



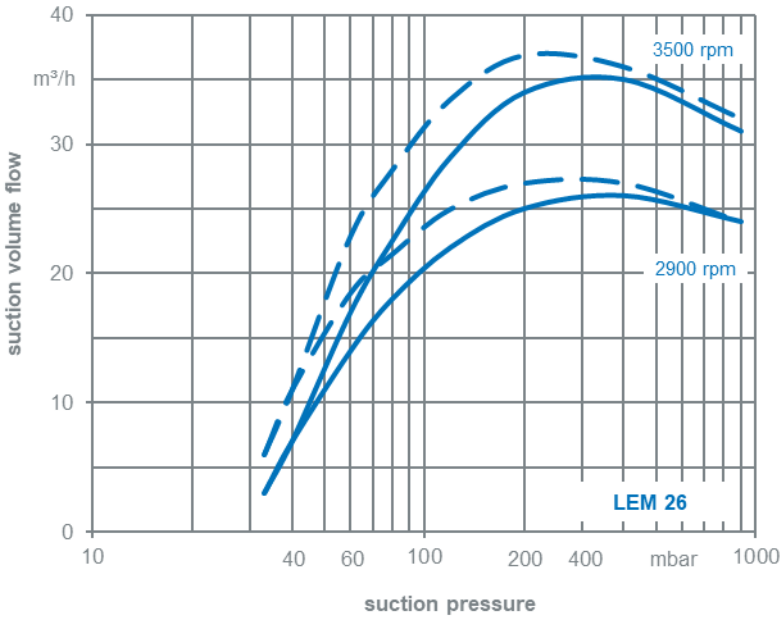
Make-up liquid consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference

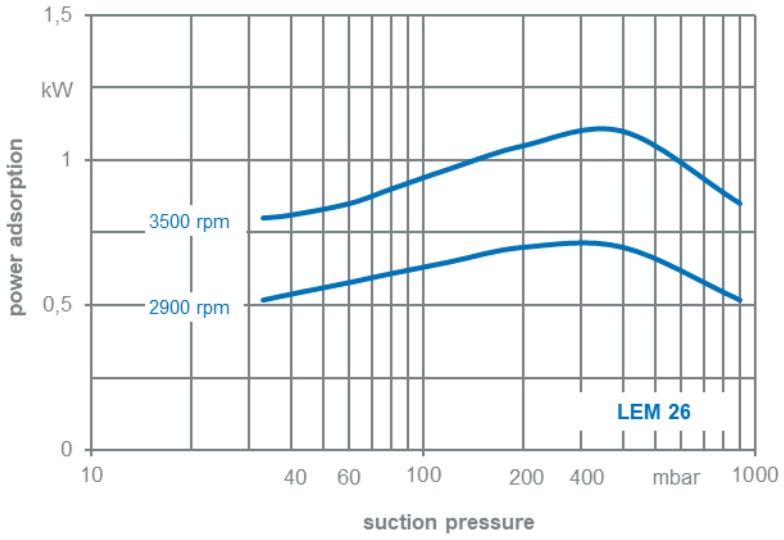
Suction Pressure [mbar]		33				120				200				400			
Pump Type	Speed	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB
	[rpm]	10	5	2		10	5	2		10	5	2		10	5	2	
LEM 26	2900	0.04	0.07	0.14	0.39	0.05	0.09	0.16	0.36	0.05	0.09	0.15	0.3	0.05	0.08	0.14	0.28
	3500	0.06	0.10	0.18		0.07	0.11	0.19		0.07	0.11	0.18		0.07	0.11	0.18	
LEM 51	2900	0.07	0.13	0.23	0.48	0.09	0.15	0.25	0.42	0.09	0.14	0.23	0.36	0.09	0.14	0.22	0.34
	3500	0.11	0.17	0.28		0.13	0.19	0.29		0.12	0.18	0.26		0.12	0.18	0.25	

FB = Total service liquid flow rate on once-through system

KB = Flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C, warmer than make-up water

Performance Characteristics LEM 26



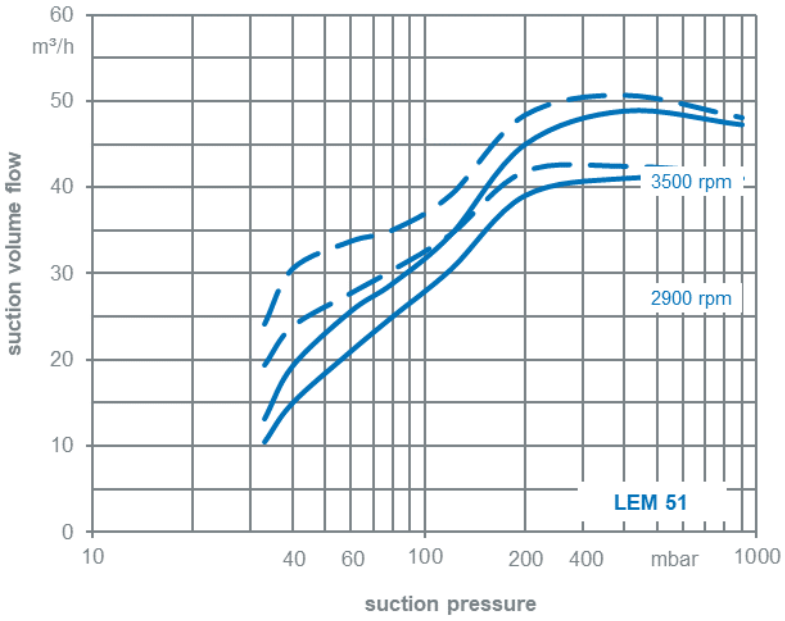


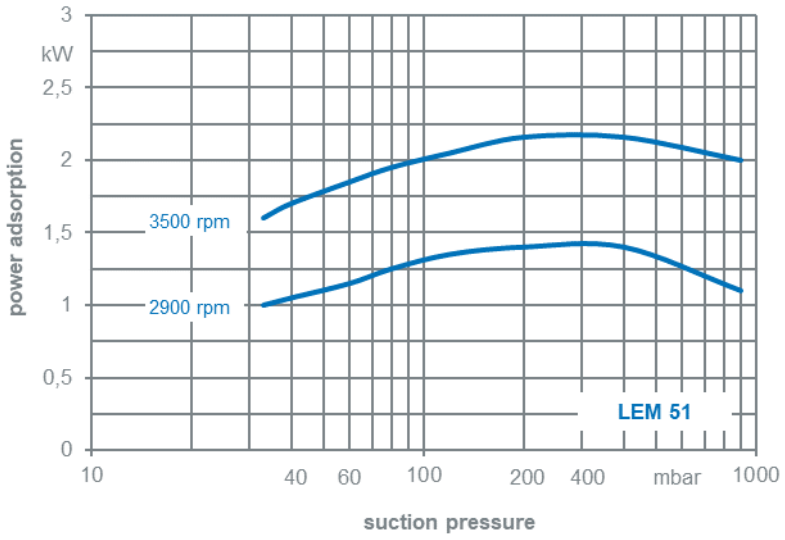
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 51



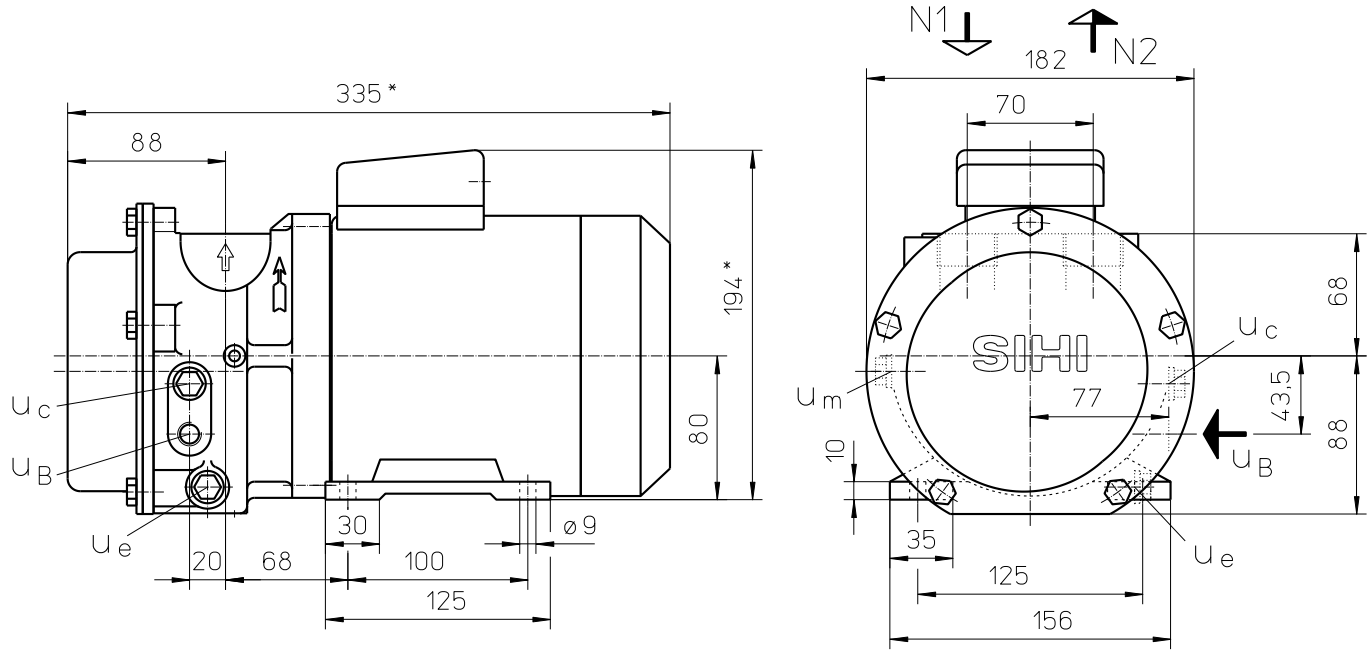


The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 26

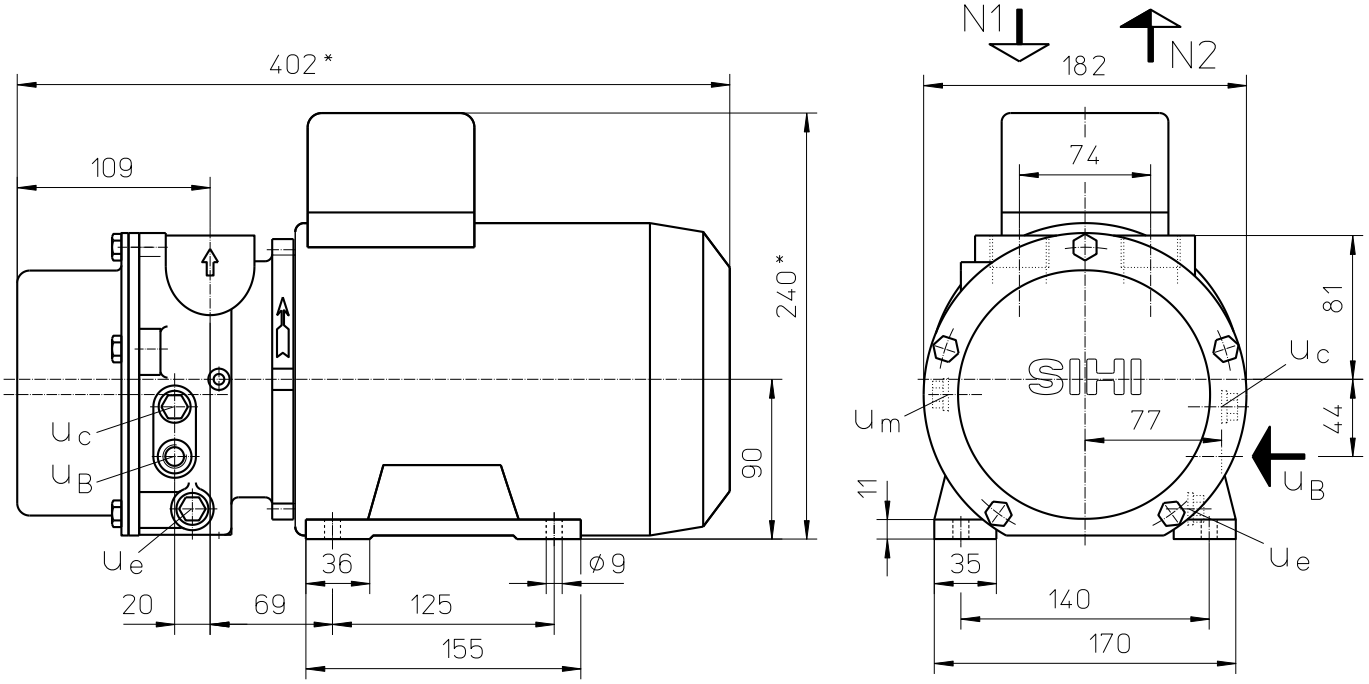


	electric motor IP 55			approx.
	size	kW		weight
		50 Hz	60 Hz	[kg]
LEM 26	80	1.1	1.1	22

other motors on request
* dimension dependent upon motor supplier

N 1 = gas inlet G 1
N 2 = gas outlet G 1
u_B = connection for service liquid G ¼
u_c = connection for protection against cavitation G ¼
u_e = connection for drain G ¼
u_m = connection for pressure gauge G ¼

Dimensions LEM 51

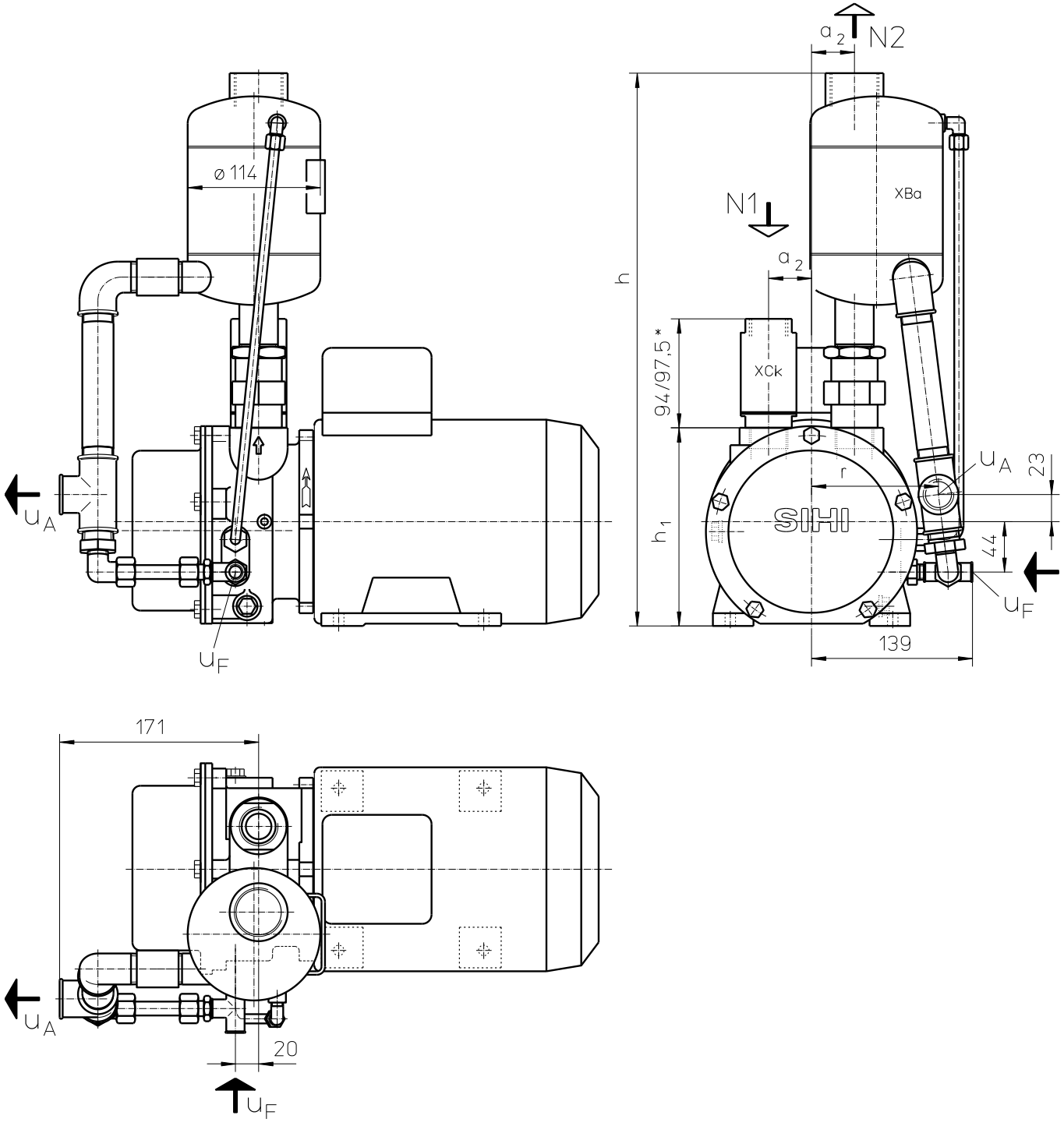


	electric motor IP 55			approx.
	size	kW		weight
		50 Hz	60 Hz	[kg]
LEM 51	90 L	1.8	2.2	30 … 32

other motors on request
* dimension dependent upon motor supplier

N 1 = gas inlet G 1
N 2 = gas outlet G 1
u_B = connection for service liquid G ¼
u_c = connection for protection against cavitation G ¼
u_e = connection for drain G ¼
u_m = connection for pressure gauge G ¼

Arrangement drawing LEM 26, LEM 51



* stainless steel / brass

N 1 = gas inlet G 1
N 2 = gas outlet G 1¼
u_A = liquid overflow G ¾
u_F = connection for make-up liquid G ¼

	electric motor IP 55 size	kW 50 Hz	kW 60 Hz	a_2 [mm]	h [mm]	h_1 [mm]	r [mm]	approx. weight [kg]
LEM 26	80	1.1	1.1	35	394	148	105	28
LEM 51	90 L	1.8	2.2	37	477	171	109	36 … 38

Data regarding the pump size - order hints

range + size	hydraulic + bearings	shaft seal	materials	casing sealing
	A• hydraulic A •Z two grease lubricated antifriction bearings arranged in the motor	AAE mechanical seal, o-rings butadiene rubber AA1 similar to AAE, but o-rings Viton	0A main parts out of cast iron 0K main parts out of cast iron, impeller in low alloyed steel 4B main parts out of stainless steel	7 O-rings, teflon cord
LEM 26	AZ	AAE, AA1	0K, 4B	7
LEM 51			0A, 4B	

Motor Selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example of an Order:

LEMA 51 AZ AAE 0A 7 with 1.8 kW AC motor, 50 Hz, 230V Δ, IP55

Accessories LEM 26, LEM 51

Recommended accessories	Material execution		LEM 26	LEM 51
Top mounted liquid separator		Type / weight	XBa 244 / 2.8 kg	
Top mounted separator	1.4571	SIHI-Part No.	35 000 375	
service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 055 639 20 055 640	20 087 968 20 088 080
service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	20 086 989 20 050 596	
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 042 674 20 042 672	
SIHI – Gas ejector				
at service liquid temperature 15 °C		Type / weight	GEV 25 A / 1.1 kg	GEV 50 A / 1.1 kg
at service liquid temperature 30 °C		Type / weight	GEV 25 A / 1.1 kg	GEV 50 A / 1.1 kg
SIHI – Non return ball valve		Size / weight	G 1 / 0.7 kg	
	Brass + Butadiene rubber Brass + Teflon 1.4571 + Teflon	SIHI-Part Nr.	20 044 637 20 044 639 20 072 807	

Any changes in the interest of the technical development are reserved.

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Liquid ring vacuum pumps

with magnetic coupling

LEM 90, LEM 125, LEM 150, LEM 250

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **20 to 200 m³/h**

CONSTRUCTION TYPE

SIHI liquid ring vacuum pumps with magnetic coupling are displacement pumps of simple and robust design meeting high demands on tightness. Two liquid surrounded sleeve bearings of tungsten and silicon carbide (WC / SiC) bear the shaft axially and radial. The application of high-grade magnetic materials with high density of energy guarantees the transmission of the nominal torque and safety during the start-up phase and in case of overload.
The modular magnetic system makes possible the optimal adaptation to different operating conditions. The main components of the pumps mostly are equal to those of the standard pumps, the connecting dimensions are identical.

The material design can be adapted to the operating conditions.

APPLICATION

The vacuum pumps with magnetic coupling are suitable for handling and exhausting of nearly all dry and humid gases.
They are applied wherever extremely high demands on tightness exist which cannot be met by pumps with shaft seals.

NOTE

The main fields of application are in the chemical and pharmaceutical industry where polluting , unhealthy or dangerous media are to be handled. Many different process vapours can be exhausted and the generated condensate possibly can be used as service liquid for the pump.
For that purpose the service liquid, separated from the gas in a liquid separator, is run in a circuit. For the cooling of the system a heat exchanger is arranged in the circulating liquid line.

GENERAL TECHNICAL DATA

Pump type		unit	LEM 90	LEM 125	LEM 150	LEM 250
Nominal speed		rpm	1450			
Power of the electric motor	IP 55 [1)]	kW	3	4	5,5	7,5
	EEx e II T3 [1)]	kW	3,6	3,6	5	6,8
Max. compression over pressure		bar	0,3			
Max admissible pressure difference		bar	1,1			
Hydraulic test (over pressure)		bar	3			
Moment of the inertial of the rotating pump parts and of the water filling (without outer magnet)		kg · m²	0,24	0,26	0,27	0,3
Sound pressure level at a suction pressure of 80 mbar		dB (A)	65			
Max. gas temperature	dry	°C	100			
	saturated	°C	50			
Service liquid						
max. admissible temperature		°C	50			
max. viscosity		mm²/s	4			
max. density		kg/m³	1200			
volume up to shaft level		liter	3	3,5	4	5
Max. flow resistance of the heat exchanger		bar	0,2			
Leakage		$\frac{\text{mbar} \cdot \text{l}}{\text{s}}$	$< 1 \cdot 10^{-3}$			

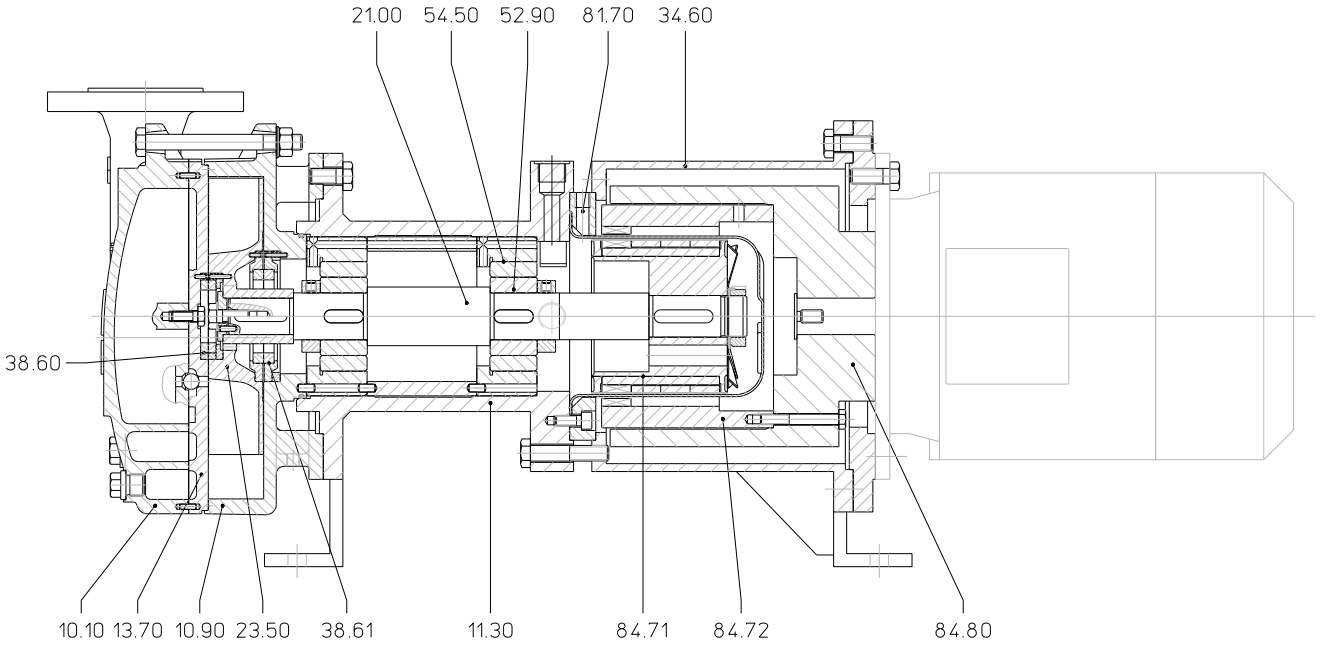
The combination of several limiting values is not admissible.

[1)] normally
The dimensioning of the magnetic coupling and of the electric motor depends on the physical data of the service liquid and of the suction and discharge pressure of the pump

Material designs LEM 90, LEM 125, LEM 150 with magnetic coupling

Item	COMPONENTS	MATERIAL DESIGN	
		0B	4B
10.10	Casing	0.6025	1.4408
10.90	Central body		
13.70	Guide disk		
11.30	Bearing bracket casing	1.0038	1.4571
21.00	Shaft	1.4021	
23.50	Vane wheel impeller	1.4027.05	1.4517
34.60	Stool	1.0038	1.0038 stove enamelling
38.60, 38.61	Thrust bearing	1.4462 / silicon carbide	
54.50	Bush	1.4571 / silicon carbide	
52.90	Bushing	tungsten carbide	
81.70	Isolation shroud	1.4571 / 2.4610	
84.71	Inner magnet	1.4571 / magnet	
84.72	Outer magnet	1.0553 / magnet	
84.80	Magnetic bell	1.0553	

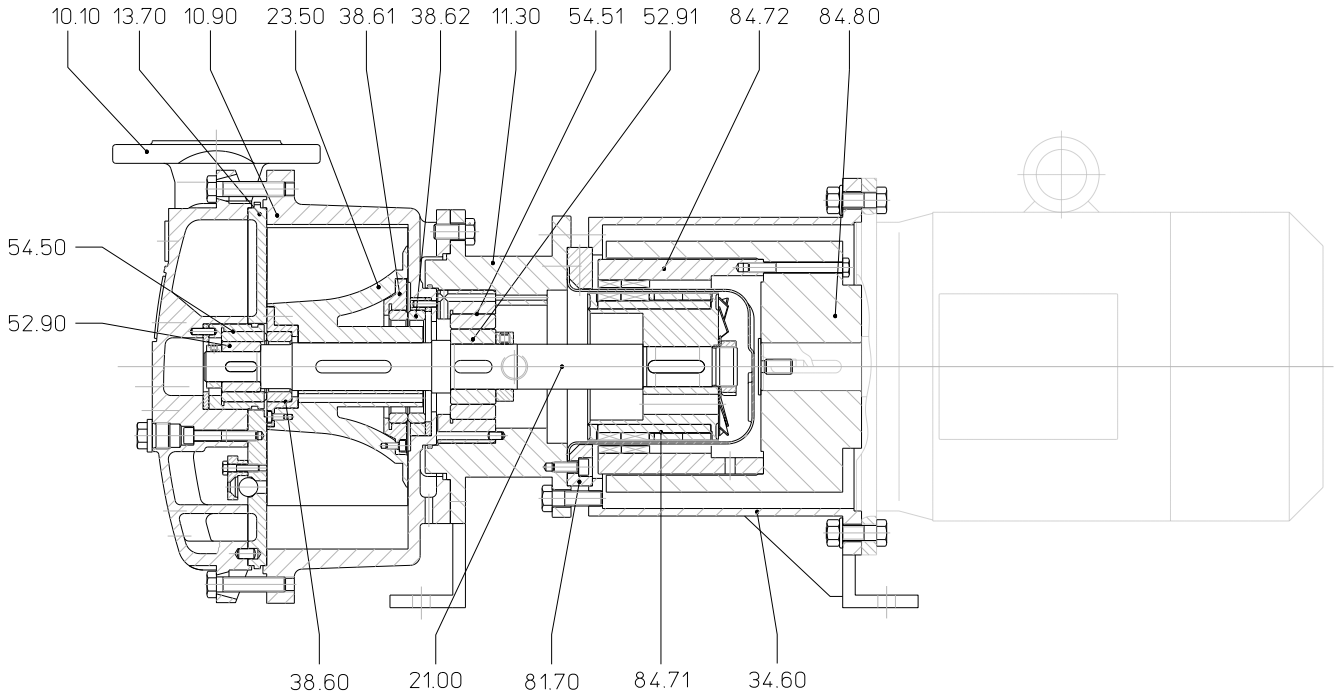
Sectional drawing LEM 90, LEM 125, LEM 150 with magnetic coupling



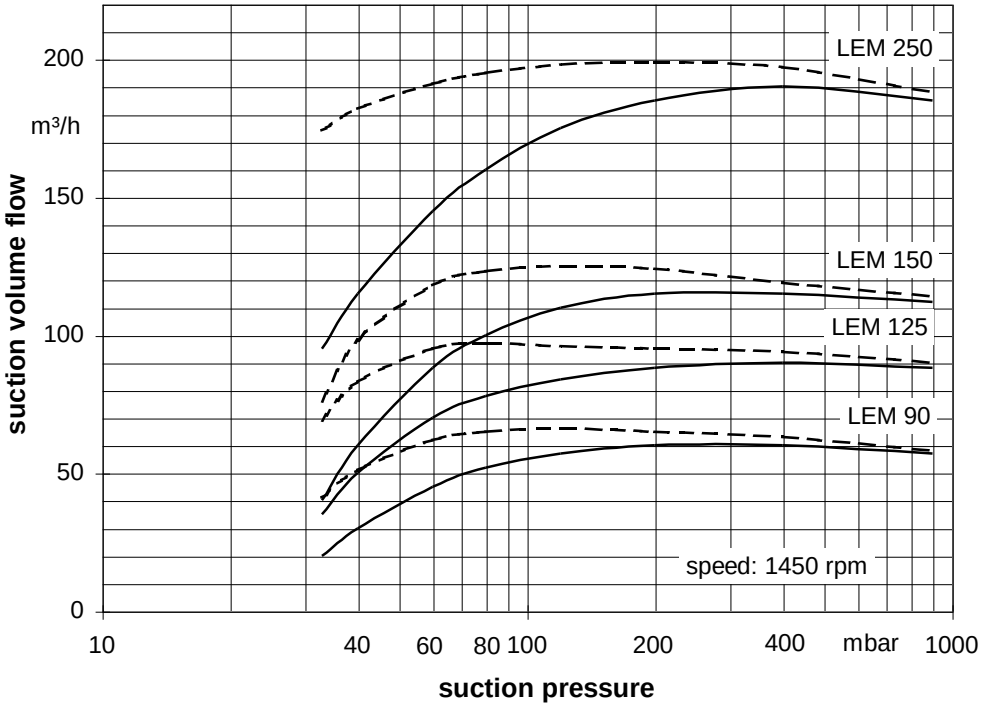
Material design LEM 250 with magnetic coupling

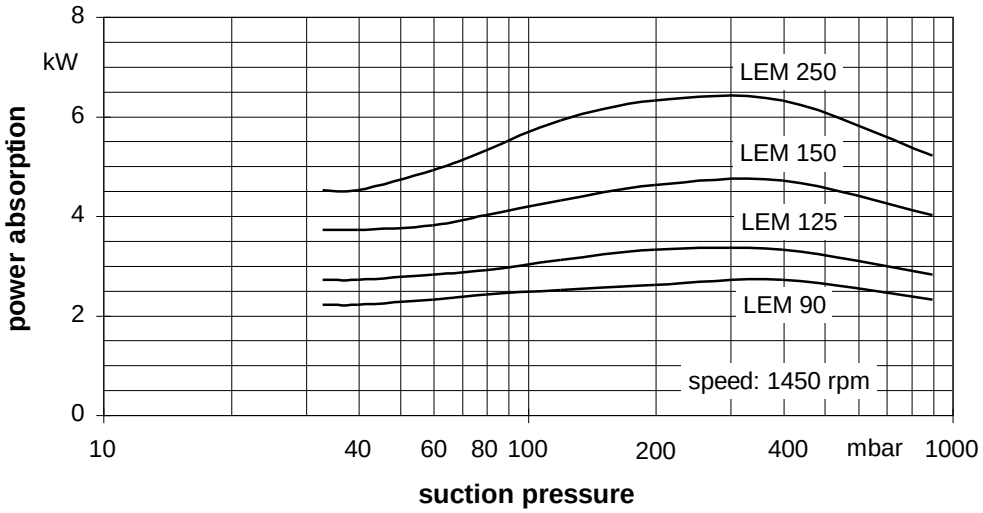
Item	COMPONENTS	MATERIAL DESIGN 0B	4B
10.10	Casing	0.6025	1.4408
10.90	Central body		
13.70	Guide disk		
11.30	Bearing bracket casing	1.0553	1.4571
21.00	Shaft	1.4021	
23.50	Vane wheel impeller	1.4027.05	1.4517
34.60	Stool	1.0038	1.0038 stove enamelling
38.60, 38.61, 38.62	Thrust bearing	1.4462 / silicon carbide	
54.50, 54.51	Bush	1.4571 / silicon carbide	
52.90, 52.91	Bushing	tungsten carbide	
81.70	Isolation shroud	1.4571 / 2.4610	
84.71	Inner magnet	1.4571 / magnet	
84.72	Outer magnet	1.0553 / magnet	
84.80	Magnetic bell	1.0553	

Sectional drawing LEM 250 with magnetic coupling



Suction volume flow and power absorption LEM 90, 125, 150, 250 with magnetic coupling



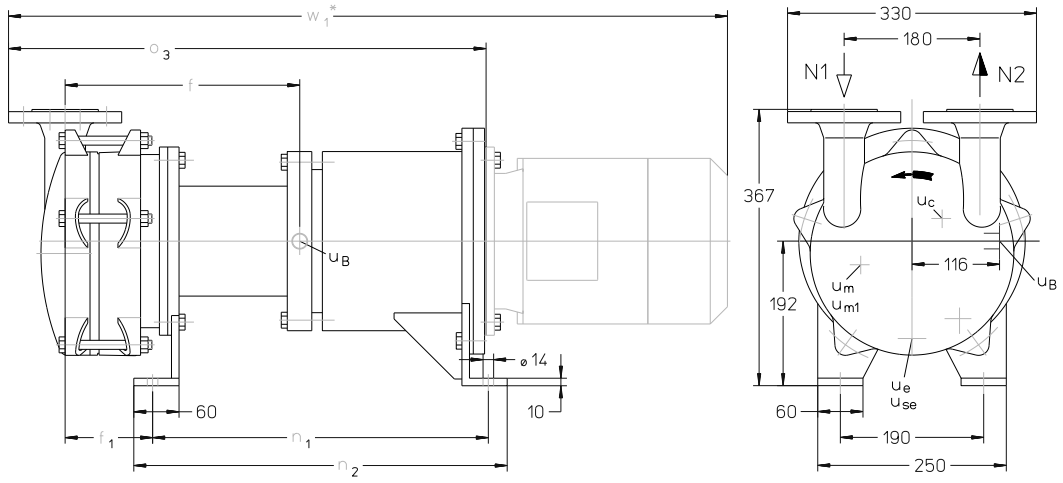


The operating data are applicable under the following conditions:

- pumping medium: - dry air: 20°C
  - water vapour saturated air : 20°C
- service liquid: - water: 15°C

Compression pressure 1013 mbar (atmospheric pressure)
The suction volume flow is applied to the suction pressure
Tolerance of the operating data 10%
Max. fresh water need with lowest suction pressure

Dimension table LEM 90, LEM 125, LEM 150 with magnetic coupling

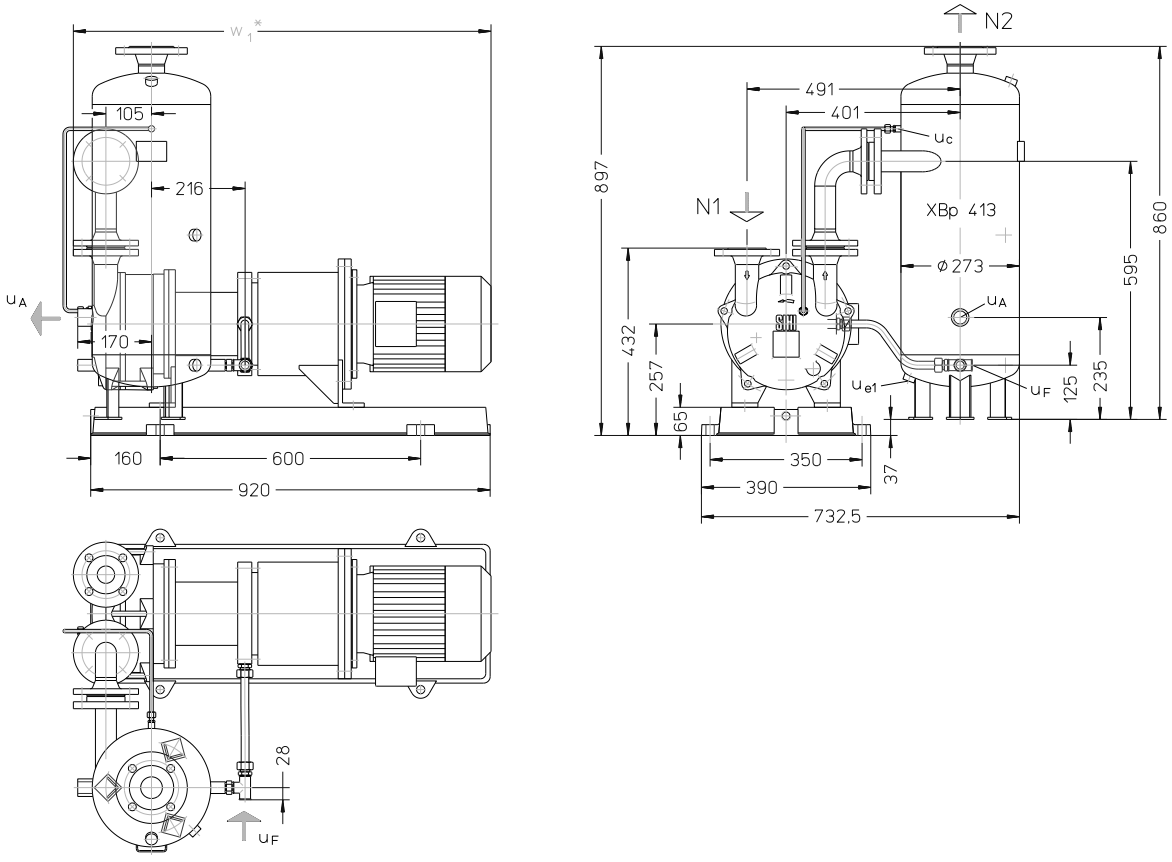


	f	f_1	n_1	n_2	o_3	w_1*	weight out motor app. kg
LEM 90	311	116	445	495	633	950	80
LEM 125	320	125			642	980	89
LEM 150	337	142	462	512	659	1080	96

* dimensions dependent on the motor make
flange connections see page 6

N 1 = gas inlet DN 40
N 2 = gas outlet DN 40
u_B = connection for service liquid G ½
u_c = connection for protection against cavitation G $^3/_8$
u_e = drain connection G $^3/_8$
u_{se} = connection for dirt drain G $^3/_8$
u_m = connection for pressure gauge G $^3/_8$
u_{m1} = connection for drain valve G $^3/_8$

Arrangement drawing LEM 90, LEM 125, LEM 150 with magnetic coupling

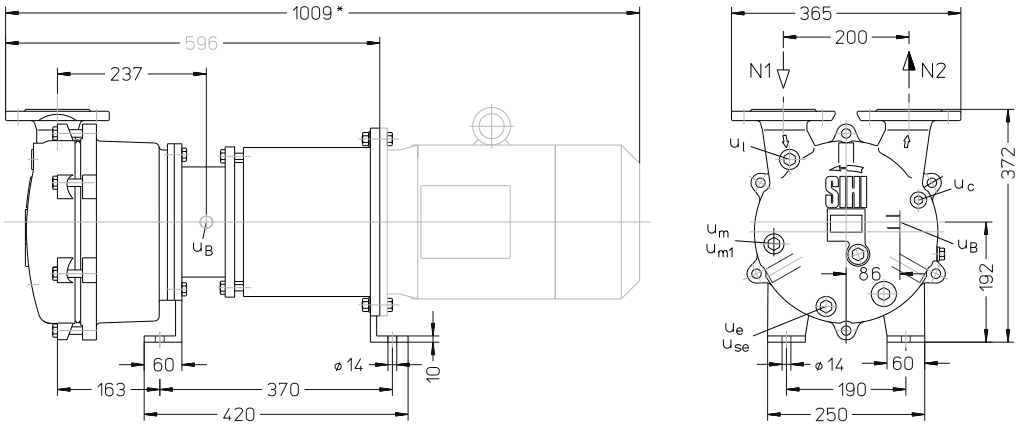


	w_1*	weight app. kg
LEM 90	950	168
LEM 125	980	185
LEM 150	1080	210

* dimension dependent on the motor make
flange connections see page 6

N 1 = gas inlet DN 40
N 2 = gas outlet DN 50
u_A = connection for liquid drain G 1
u_F = connection for fresh liquid G ½
u_c = connection for protection against cavitation G $^1/_8$
u_{e1} = drain connection G ½

Dimension table LEM 250 with magnetic coupling



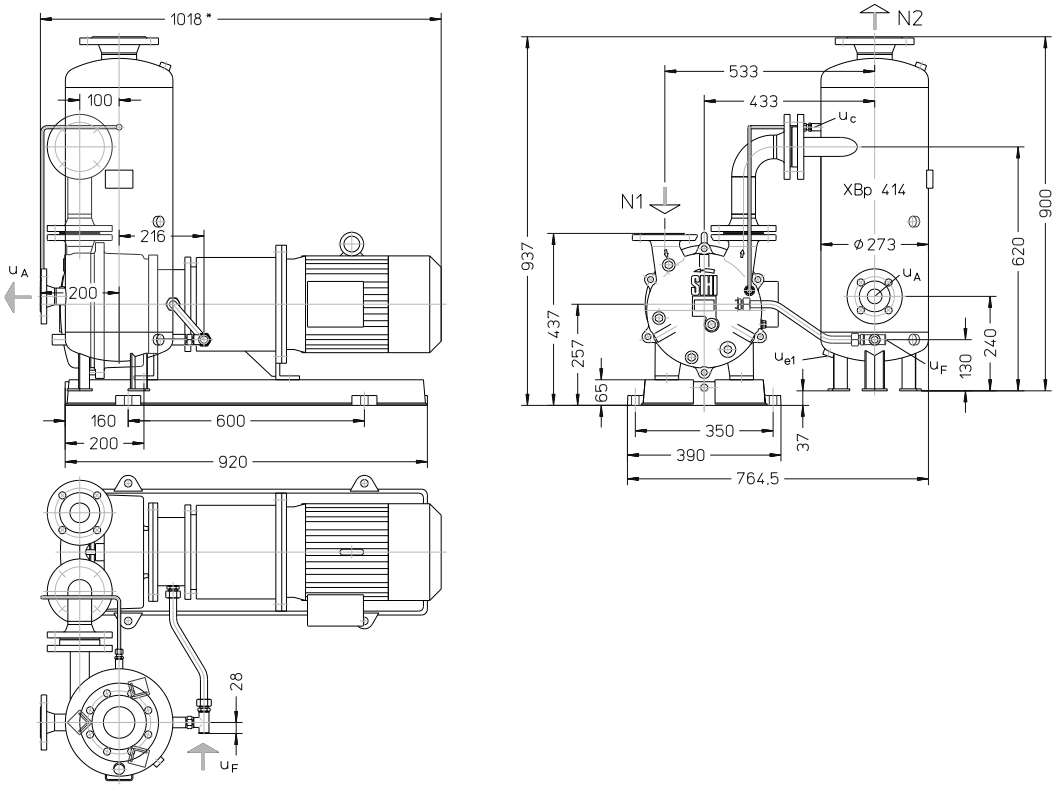
N 1 = gas inlet DN 50
N 2 = gas outlet DN 50

weight without motor app. 124 kg

* dimension dependent on the motor make

u_B = connection for service liquid G ½
u_c = connection for protection against cavitation G ¼
u_e = drain connection G ½
u_{se} = connection for dirt drain G ½
u_l = connection for vent cock G ½
u_m = connection for pressure gauge G ½
u_{m1} = connection for drain valve G ½

Arrangement drawing LEM 250 with magnetic coupling



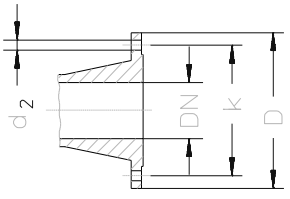
N 1 = gas inlet DN 50
N 2 = gas outlet DN 80

weight app. 245 kg

* dimension dependent on the motor make

u_A = connection for liquid drain DN 32
u_F = connection for fresh liquid G ½
u_c = connection for protection against cavitation G ¼
u_{e1} = drain connection G ½

flange connections to DIN 2501 PN 10				
DN	32	40	50	80
k	100	110	125	160
D	140	150	165	200
number x d_2	4 x 18	4 x 18	4 x 18	8 x 18



Fresh water requirements in [m³/h] dependent on suction pressure, speed, mode of operation and difference in temperature

suction pressure [mbar]			33				120				200				400			
pump		speed [rpm]	KB difference in temperature [°C] 10	5	2	FB	KB difference in temperature [°C] 10	5	2	FB	KB difference in temperature [°C] 10	5	2	FB	KB difference in temperature [°C] 10	5	2	FB
LEM	90	1450	0,16	0,29	0,53		0,18	0,31	0,56		0,19	0,32	0,55		0,18	0,31	0,51	
LEM	125	1450	0,19	0,33	0,59	1,2	0,22	0,36	0,62	1,15	0,23	0,37	0,62	1,1	0,22	0,35	0,55	0,9
LEM	150	1450	0,25	0,42	0,68		0,28	0,45	0,71		0,29	0,46	0,71		0,28	0,43	0,62	
LEM	250	1450	0,31	0,51	0,84	1,5	0,37	0,59	0,90	1,4	0,38	0,58	0,86	1,25	0,35	0,52	0,73	1,0

FB = fresh liquid service
KB = combined liquid service with service water 10 °C, 5 °C, 2 °C warmer than the fresh water.

Data regarding the pump size - order notes

series + size	hydraulics + bearings	shaft sealing + magnetic coupling	material design	casing seal	code of motor connection**
	A • hydraulic A • F two grease lubricated antifriction bearings	2 • • 20-pole magnet • A • glandless with isolation shroud • • W torque of the magnetic coupling • • Z * • • A	0B main parts of GG without non-ferrous metal 4B main parts of Cr Ni Mo cast steel	4 soft Teflon	LS for IMB3 motor 100L resp. 112M flange Ø 250 MS for IMB3 motor 132S resp. 132M flange Ø 300
LEM 90	AF	2AW	alternative 0B, 4B	4	LS
LEM 125	AF	2AW	alternative 0B, 4B	4	LS
LEM 150	AF	2AZ	alternative 0B, 4B	4	MS
LEM 250	AF	2AA	alternative 0B, 4B	4	MS

* The magnet size depends on the load range of the pump. In case of deviation from standard, please request further information and give details of your problems.
**Only applicable when ordering pumps without motor

Motor selection table

		motor enclosure IP 55 n = 1450 rpm power kW	size	motor-designation	motor enclosure EEx e II T3 n = 1450 rpm power kW	size	motor-designation
LEM	90	3,0	100 L	LB	3,6	112 M	MK
LEM	125	4,0	112 M	MB	3,6	112 M	MK
LEM	150	5,5	132 S	NB	5,0	132 S	NK
LEM	250	7,5	132 M	PB	6,8	132 M	PK

Example for ordering:

The construction size LEM 150 AF 2AZ 4B 4 with 5,5 kW three-phase ac motor (50 Hz, 400 VΔ) 1450 rpm has the complete order number: **LEM• 150 AF 2AZ 4B 4 NB**

If motors with the other voltage or frequency are required a special information should be given.

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

Accessories LEM 90, LEM 125, LEM 150, LEM 250 with magnetic coupling

Recommended accessories			LEM 90	LEM 125	LEM 150	LEM 250
Upright liquid separator		type / weight	XBp 413 / 28 kg			XBp 414/31 kg
material design	130 / galvanized	SIHI part No.	35 000 502			35 000 504
	172 / 1.4571		35 000 503			35 000 505
service liquid line						
material design	072 / St 37-0	SIHI part No.	35 007 898			35 008 029
	172 / 1.4571		35 007 899			35 008 030
cavitation protection line						
material design	072 / St 37-0	SIHI part No.	20 041 543			20 041 563
	172 / 1.4571		20 041 544			20 041 564
discharge line						
material design	072 / St 37-0	SIHI part No.	35 003 172			35 003 214
	172 / 1.4571		35 005 535			35 003 215
SIHI-gas ejector						
at service liquid temperature		15 °C	GEVB 90 A	GEVB 125 A	GEVB 150 A	GEVB 250 A
at service liquid temperature		30 °C	GEVB 90 B	GEVB 125 B	GEVB 150 B	GEVB 250 B
SIHI-ball type non-return valve		type	XCk 40			XCk 50
		weight	2,8 resp. 5,2 kg			3,6 resp. 10,8 kg
material design	767 / GG-25	SIHI part No.	43 016 890			43 016 892
	784 / 1.4408		43 030 996			20 029 498
Motor						
IP 55		size	100 L	112 M	132 S	132 M
		power	3 kW	4 kW	5,5 kW	7,5 kW
		weight	20 kg	28 kg	45 kg	50 kg
EEx e II T3		size	112 M		132 S	132 M
		power	3,6 kW		5 kW	6,8 kW
		weight	30 kg		65 kg	80 kg
base plate		type / weight	P 303 / 36 kg			
material design	003 / GG-25	SIHI part No.	43 016 850			

Any changes in the interest of the technical development are reserved.

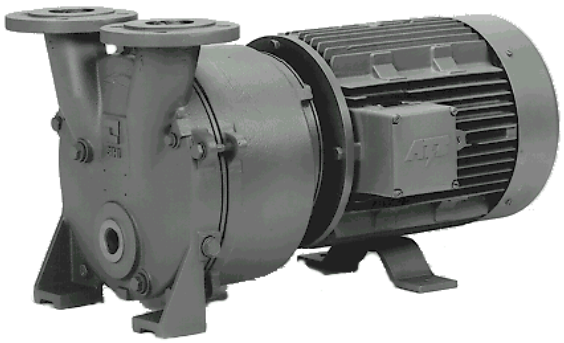
Sterling SIHI GmbH
Lindenstraße 170 , D-25524 Itzehoe, Germany
Telephone +49 (0) 48 21 / 7 71-01 , Fax +49 (0) 48 21 / 7 71-274
www.sihi.com

Liquid ring vacuum pumps
in compact design

LEM 325, LEM 425

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **100 to 475 m³/h**



CONSTRUCTION TYPE

SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- shaft not contact with the medium
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The SIHI liquid ring vacuum pumps LEM are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

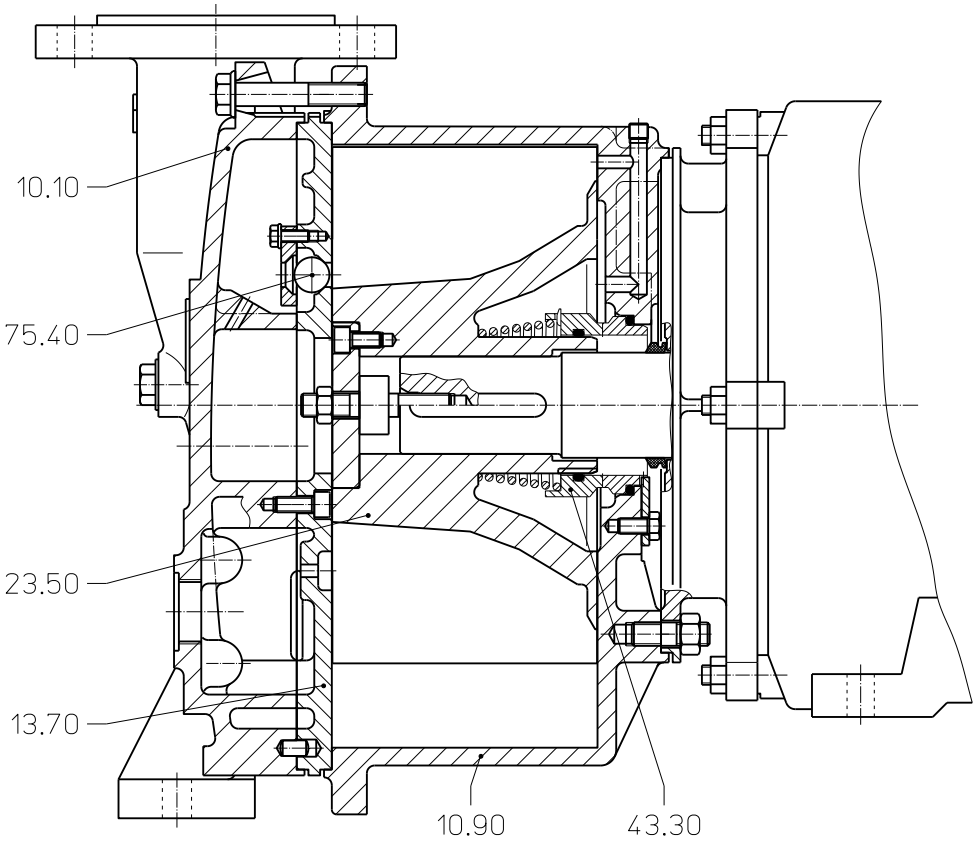
Pump Type		Units	LEM 325	LEM 425
Speed	50 Hz 60 Hz	rpm	1450 1750	
Maximum overpressure on compression		bar	0.3	
Permissible pressure difference between suction and discharge side	max. min.	bar	1.1 0.2	
Hydraulic test pressure (overpressure)		bar	3	
Moment of inertia of rotating parts of pump and water content		kg · m²	0.14	0.21
Noise level at 80 mbar suction pressure		dB (A)	70	72
Maximum gas temperature	dry saturated	°C °C	200 100	
Service liquid: Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C °C mm²/s kg/m³ liter	 80 10 4 1200 4.3	 4.7
Maximum flow resistance of the heat exchanger		bar	0.2	

The combination of several limiting values is not admissible.

Materials

Position number	COMPONENT	MATERIALS 0B	MATERIALS 4B
10.10	Vacuum casing	0.6025	1.4408
10.90	Central body		
13.70	Guide disc		
23.50	Vane wheel impeller	0.7043	1.4517
43.30	Standard mechanical seal	Cr-Steel / Carbon / Butadiene rubber	Cr Ni Mo-Steel / Carbon / Viton
75.40	Valve balls	Polyamide A	PTFE

Cut-away diagram LEM 325, LEM 425



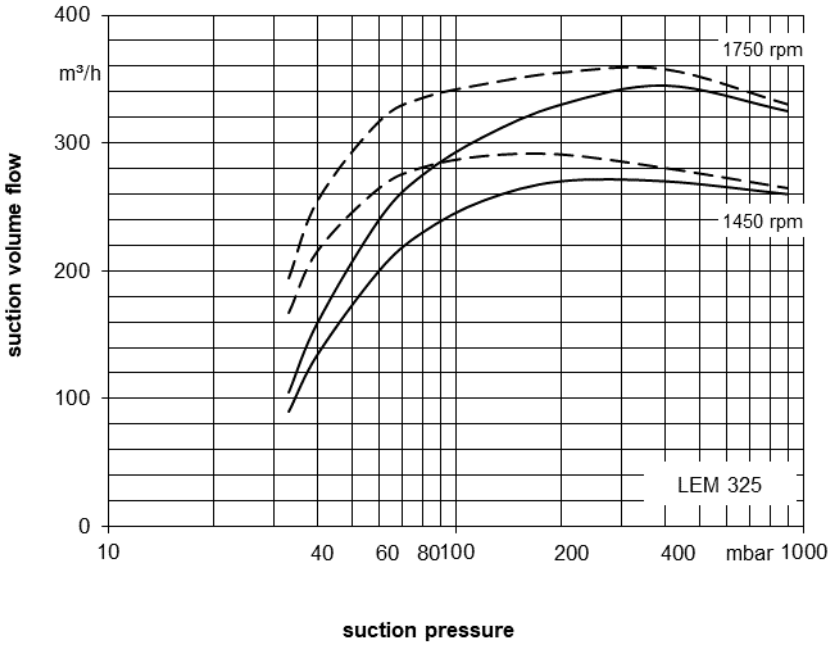
Make-up Liquid Consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference

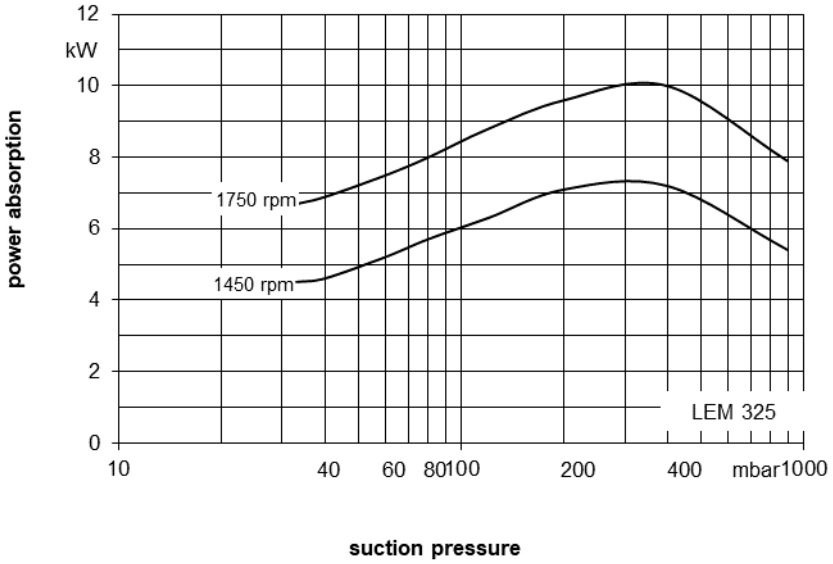
Suction Pressure [mbar]		33				120				200				400			
Pump Type	Speed [rpm]	KB Temperature Difference [°C] 10	5	2	FB	KB Temperature Difference [°C] 10	5	2	FB	KB Temperature Difference [°C] 10	5	2	FB	KB Temperature Difference [°C] 10	5	2	FB
LEM 325	1460	0.31	0.52	0.88	1.6	0.40	0.63	0.97	1.5	0.42	0.65	0.96	1.4	0.41	0.61	0.86	1.2
	1750	0.42	0.67	1.03		0.50	0.75	1.07		0.52	0.76	1.05		0.50	0.71	0.94	
LEM 425	1460	0.46	0.75	1.20	2.0	0.54	0.81	1.15	1.6	0.55	0.80	1.09	1.45	0.54	0.76	1.01	1.3
	1750	0.64	0.97	1.40		0.67	0.94	1.25		0.67	0.91	1.17		0.65	0.86	1.08	

FB = Total service liquid flow rate on once-through system

KB = Flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C warmer than make-up water

Performance Characteristics LEM 325



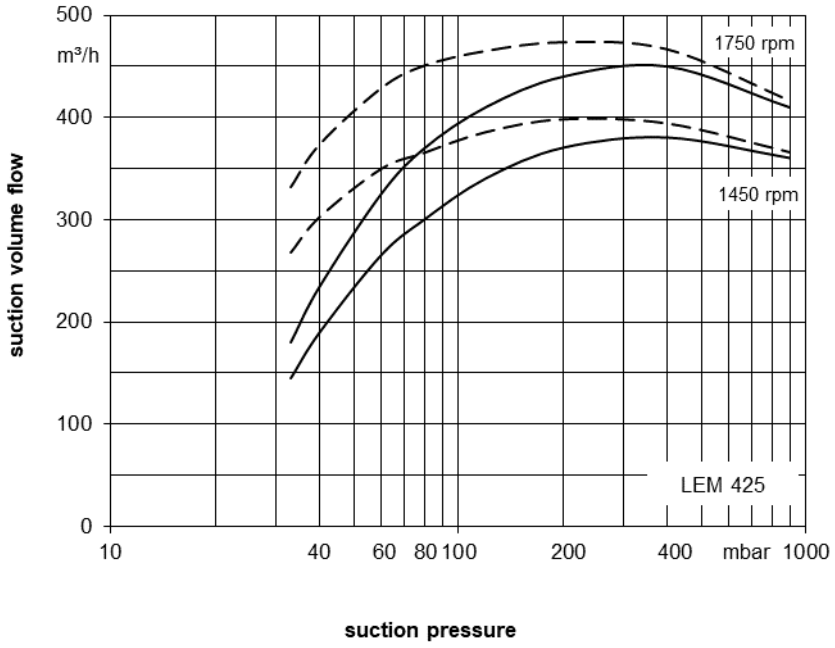


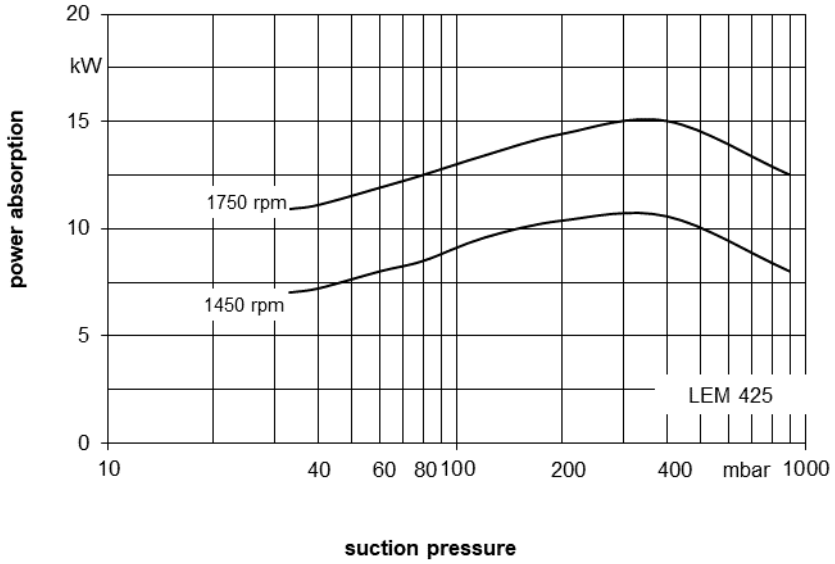
The operating data is valid under the following conditions:

- Process media: - dry air: 20°C
  - steam saturated air: 20°C
- Service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 425



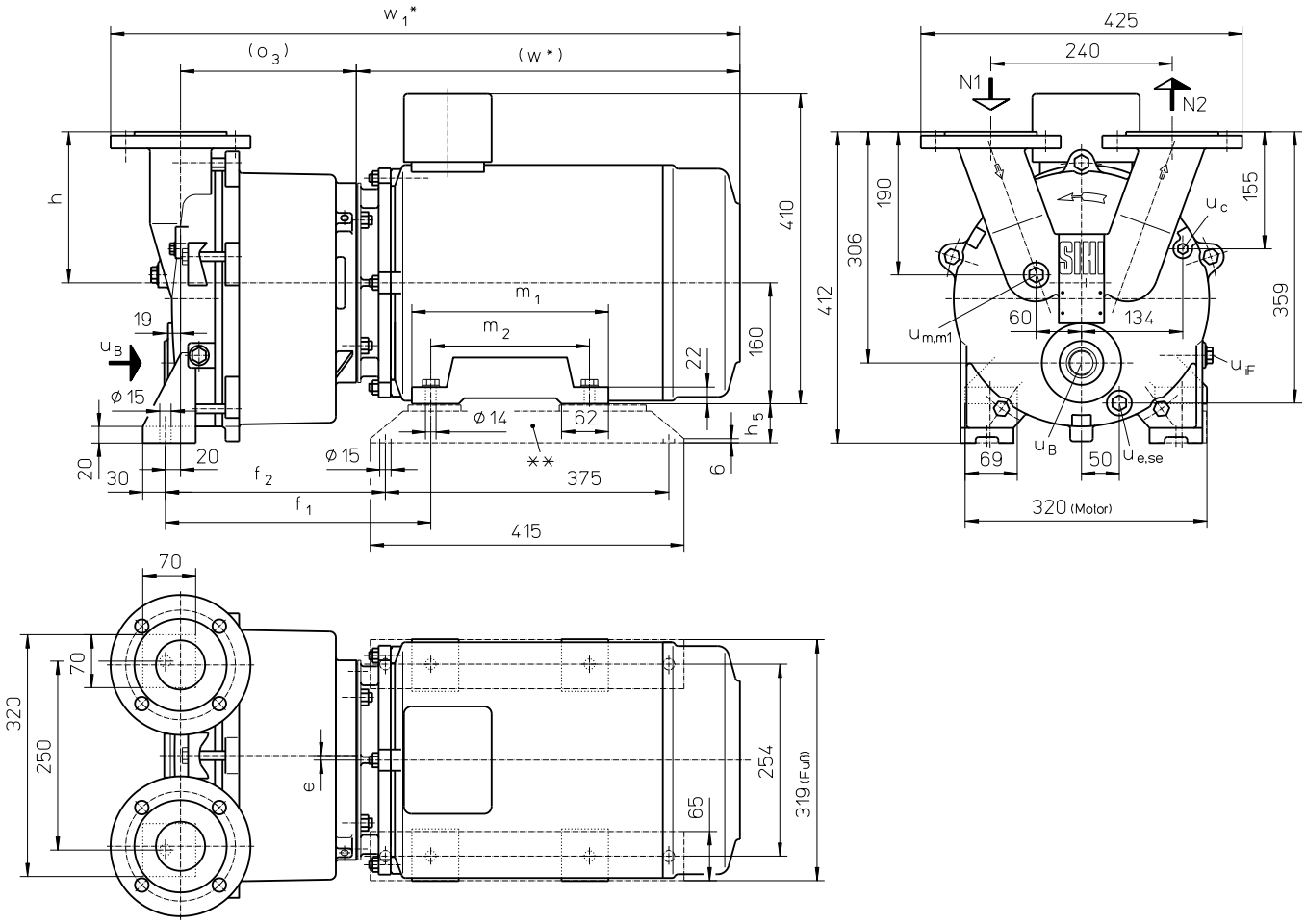


The operating data is valid under the following conditions:

- Process media: - dry air: 20°C
  - steam saturated air: 20°C
- Service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 325, LEM 425

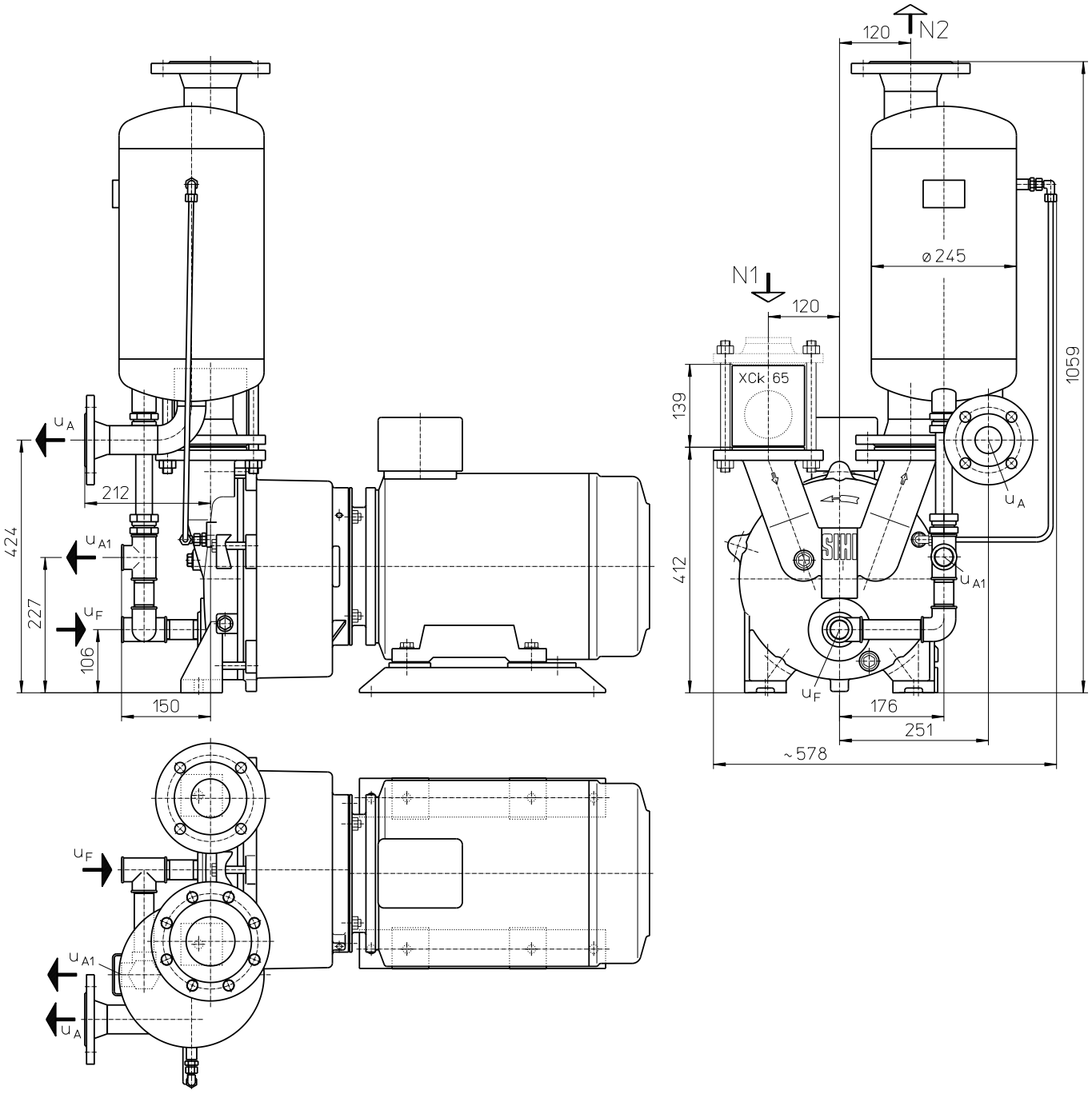


N 1 = gas inlet DN 65
N 2 = gas outlet DN 65
u_B = connection for service liquid G 1
u_c = connection for cavitation protection G ¼
u_e = connection for drain G ½
u_{iF} = adjusting screw for internal liquid return
u_{se} = connection for dirt drain G ½
u_m = connection for pressure gauge G ½
u_{m1} = connection for drain valve G ½

	electric motor IP 55			e	f_1	f_2	h	h_5	m_1	m_2	o_3	w *	w_1 *	approx. weight [kg]
	size	kW 50 Hz	kW 60 Hz											
LEM 325	160 M	7.5	12.8	4	337	277	202	50	260	210	219	508	819	185
LEM 425	160 M	11.0	-	6	351	291	200	52			233		833	190
	160 L	-	16.5						304	254		538	863	215

other motors on request
* dimensions dependent upon motor supplier
** see list of accessories
flange connections see page 7

Arrangement drawing LEM 325, LEM 425



N 1 = gas inlet DN 65

N 2 = gas outlet DN 80

u_A = liquid drain DN 40

u_{A1} = liquid drain G 1

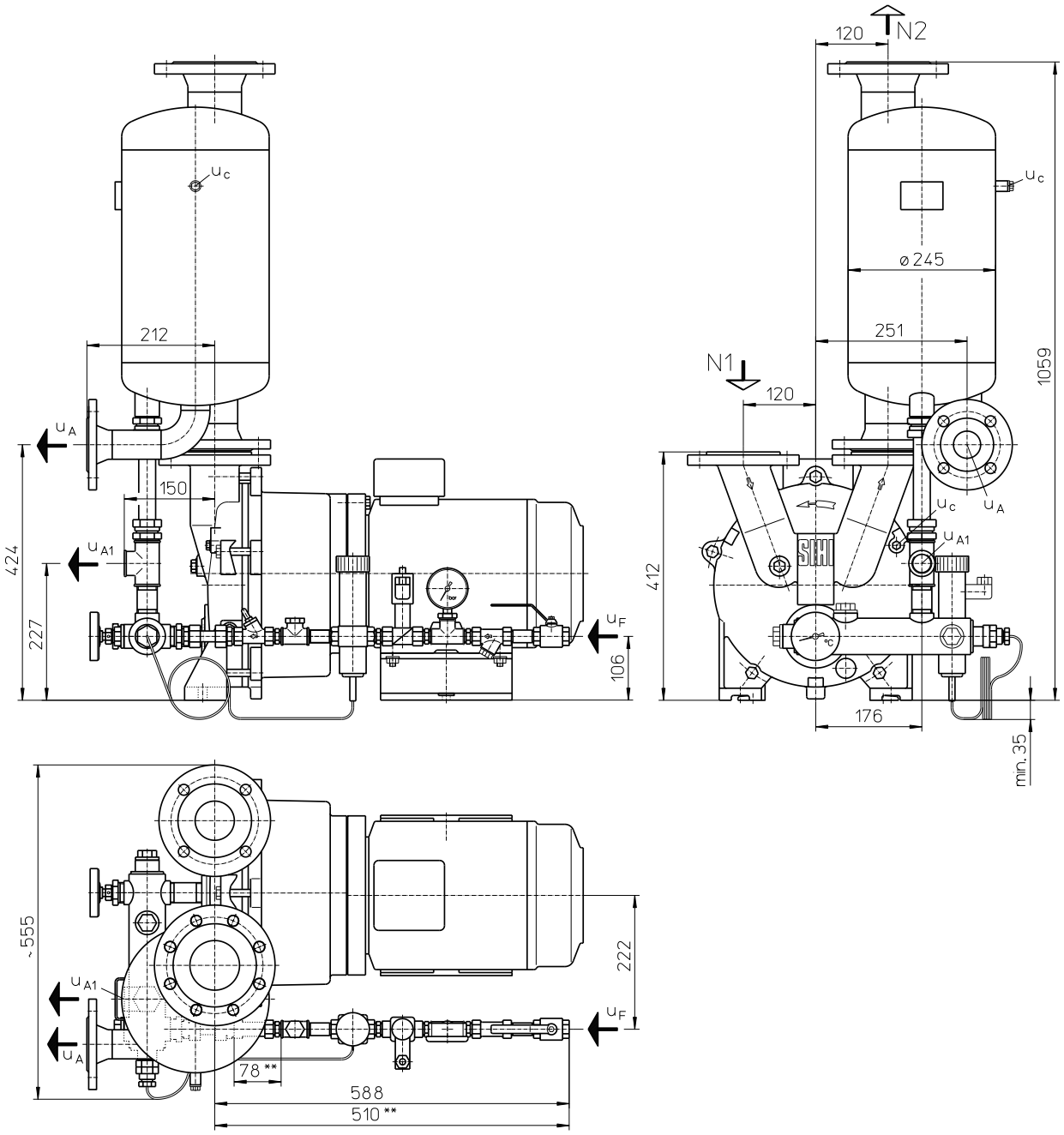
u_F = connection for make-up liquid G 1

	electric motor IP 55 size	kW 50 Hz	kW 60 Hz	approx. weight [kg]
LEM 325	160 M	7.5	12.8	215
LEM 425	160 M	11.0	-	220
	160 L	-	16.5	245

other motors on request

flange connections see page 7

Arrangement drawing LEM 325, LEM 425 with thermostatic control



support for service liquid line is necessary

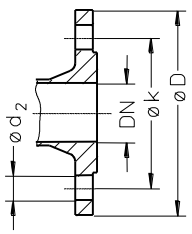
	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	approx. weight [kg]
LEM 325	160 M	7.5	13.2	220
LEM 425	160 M	11.0	-	225
	160 L	-	18.0	250

other motors on request

** only at material 1.4571 the line

N 1 = gas inlet DN 65
N 2 = gas outlet DN 80
u_A = liquid drain DN 40
u_{A1} = liquid drain G 1
u_F = connection for make-up liquid G ½
u_c = connection for cavitation protection G ¼

flange connections according to DIN 2501 PN 10 [mm]			
DN	40	65	80
k	110	145	160
D	150	185	200
number x d_2	4 x 18	4 x 18	8 x 18



Data regarding the pump size - order notes

range + size	hydraulic + bearings	shaft seal	materials	casing sealing
	A• hydraulic A •Z two grease lubricated antifriction bearings arranged in the motor	AAE standard mechanical seal, o-rings butadiene rubber AA1 similar to AAE, but o-rings Viton	0B main parts out of cast iron, without non-ferrous metal 4B main parts out of stainless steel	0 liquid seal 4 soft teflon
LEM 325	AZ	AAE, AA1	0B	4
LEM 425			4B	0

Motor Selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example of an Order:

LEM 325 AZ AAE 0B 4 **with** 7.5 kW AC motor, 50 Hz, 400 V∆, IP55

Accessories LEM 325, LEM 425

Recommended Accessory	Material Execution		LEM 325	LEM 425
Top Mounted Liquid Separator		Type weight	XBa 2040 20 kg	
Top mounted separator	1.4571	SIHI-Part No.	43 132 217	
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 073 878 20 068 903	
Service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	20 081 109 20 060 509	
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 027 915 20 027 916	
SIHI – Gas Ejector see Technical Catalogue – Gas Ejector				
at service liquid temperature 15 °C		Type / weight	GEV 325 A / 28 kg	GEV 425 A / 30 kg
at service liquid temperature 30 °C		Type / weight	GEV 325 B / 27 kg	GEV 425 B / 28 kg
SIHI – Non Return Ball Valve				
Intermediate flange execution XCk 65	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4571 + Teflon	SIHI-Part No. weight	20 072 794 / 5.6 kg 20 072 793 / 5.6 kg 20 029 500 / 15.8 kg	
Flange execution with glass cylinder XCk 656	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4408 + Teflon	SIHI-Part No. weight	20 072 851 / 10 kg 20 072 852 / 10 kg 20 072 850 / 10 kg	
Support foot				
for motor size 160 M, 160 L		SIHI-Part No. weight	20 047 014 4 kg	20 047 015 4 kg

Designs subject to change without prior notice.

Flowserve SIHI Germany GmbH
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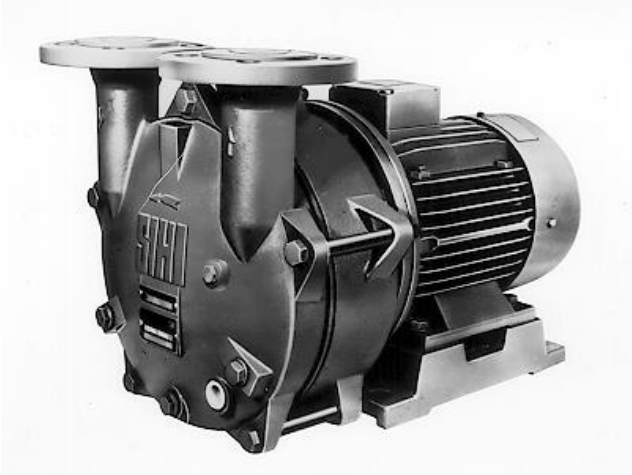
Liquid ring vacuum pumps
in compact design

LEM 90, LEM 125, LEM 150
LEL 90, LEL 125, LEL 150

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **25 to 165 m³/h**



CONSTRUCTION

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- shaft not contact with the medium
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM/LEL are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

Pump Type		Units	LEM 90 LEL 90	LEM 125 LEL 125	LEM 150 LEL 150
Speed	50 Hz 60 Hz	rpm	1450 1750		
Maximum overpressure on compression		bar	LEM 0.3 / LEL 0.5		
Permissible pressure difference between suction and discharge side	max. min.	bar	LEM 1.1 / LEL 1.3 0.2		
Hydraulic test pressure (overpressure)		bar	3		
Moment of inertia of rotating parts of pump and water content		kg · m²	0.035	0.053	0.069
Noise level at 80 mbar suction pressure		dB (A)	65		
Maximum gas temperature	dry saturated	°C °C	200 100		
Service liquid Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C °C mm²/s kg/m³ litre	 2.4	 80 10 4 1200 2.8	 3.2
Maximum flow resistance of the heat exchanger		bar	0.2		

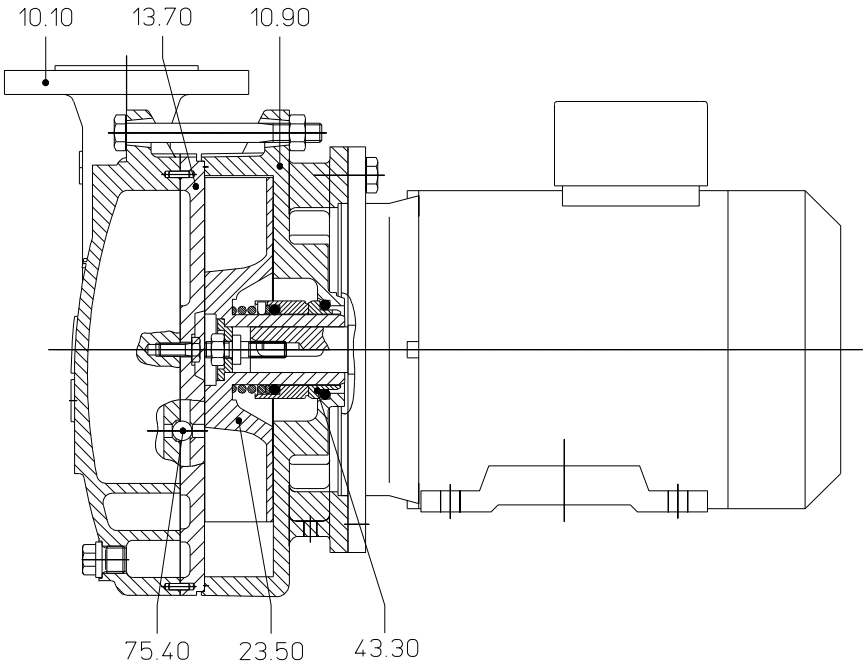
The combination of several limiting values is not admissible.

Materials

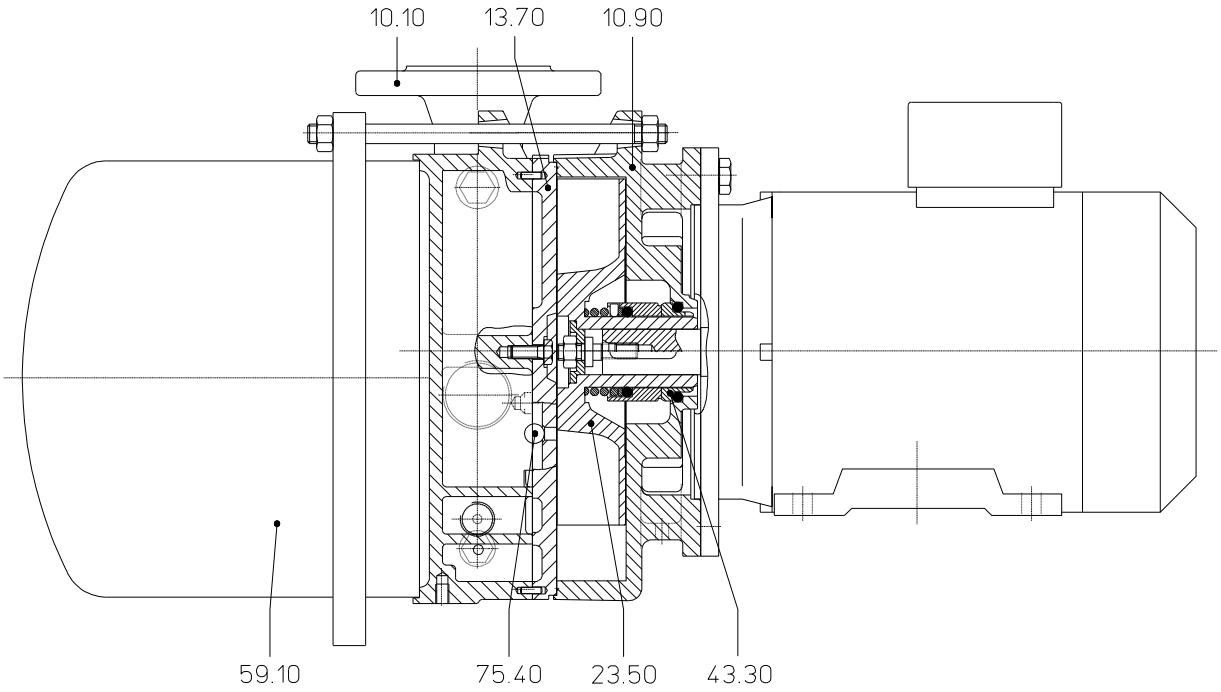
Item	COMPONENTS	MATERIALS 0K
10.10	Vacuum casing	0.6025
10.90	Central body	
13.70	Guide disc	
21.00*	Shaft	1.1191+N
23.50	Vane wheel impeller	1.4308
34.01*	Motor carrier	0.6025
43.30	Standard mechanical seal	Cr-steel / Carbon / Butadiene rubber
59.10	Integrated pre-arranged separator	1.0038
75.40	Valve balls	Polyamide A

* only at LEL 90, 125, 150

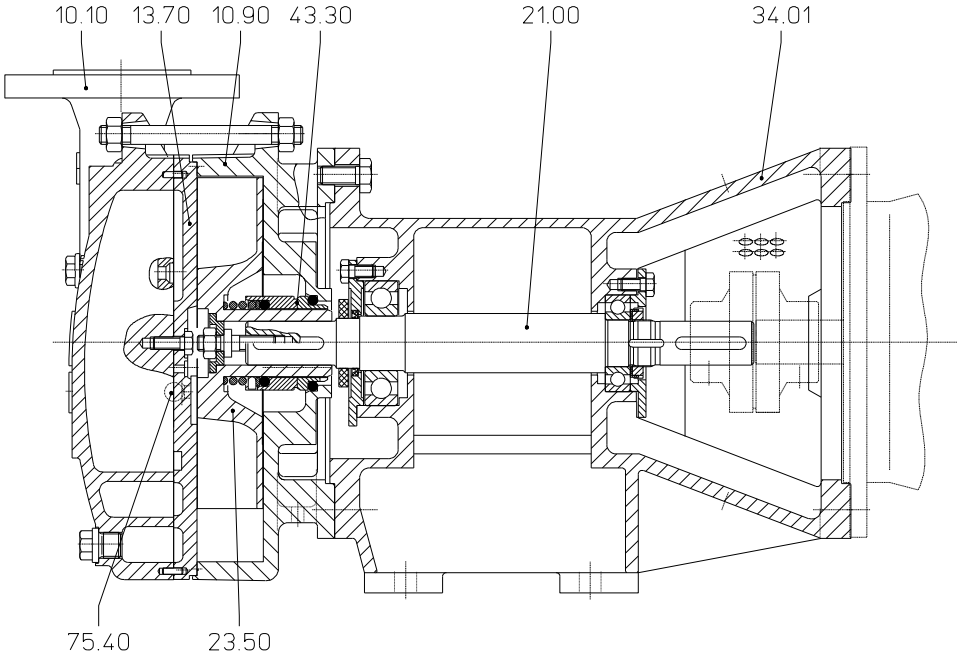
Cut-away diagram LEM 90, LEM 125, LEM 150



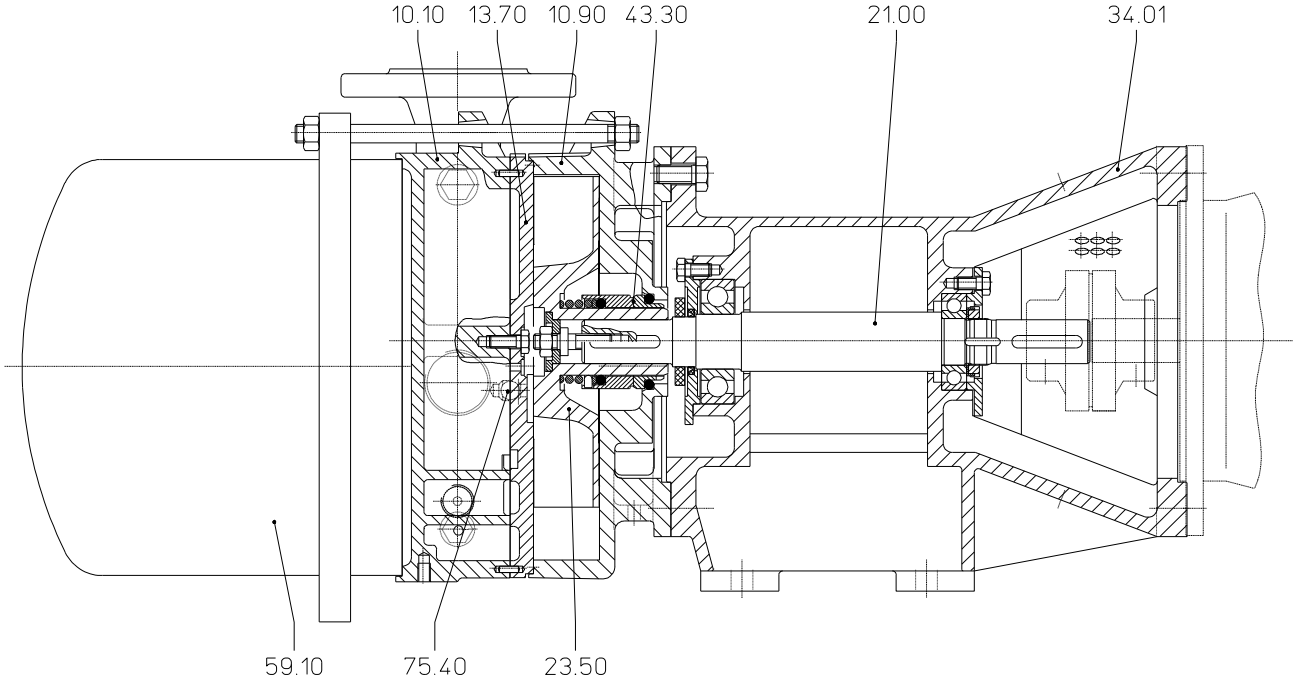
Cut-away diagram LEM 90, LEM 125, LEM 150 with integrated pre-arranged separator



Cut-away diagram LEL 90, LEL 125, LEL 150



Cut-away diagram LEL 90, LEL 125, LEL 150 with integrated pre-arranged separator



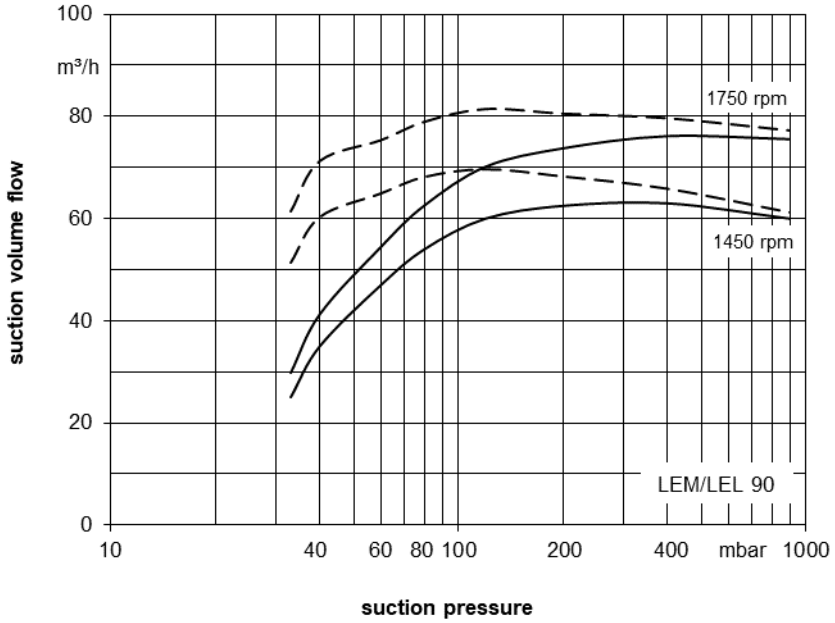
Make-up liquid consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference

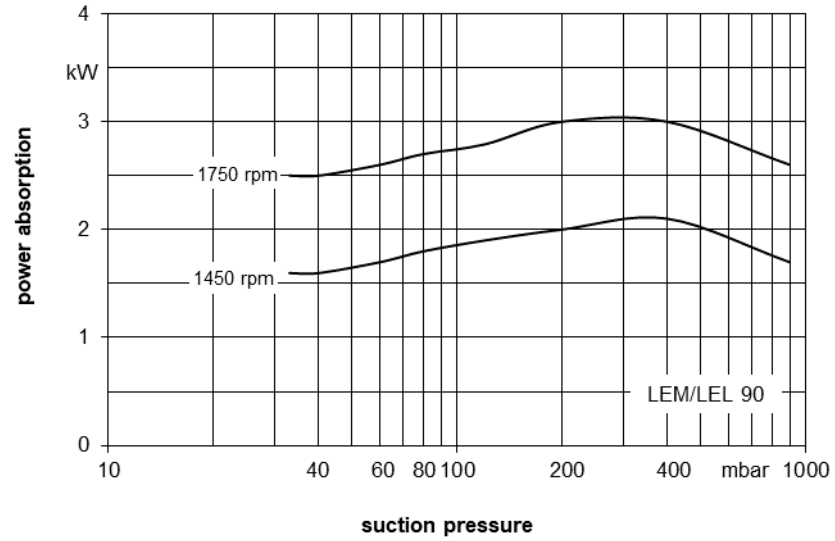
Suction pressure [mbar]		33				120				200				400			
pump type	speed	KB Temperature difference [°C]			FB	KB Temperature difference [°C]			FB	KB Temperature difference [°C]			FB	KB Temperature difference [°C]			FB
	[rpm]	10	5	2		10	5	2		10	5	2		10	5	2	
LEM / LEL 90	1450	0.12	0.22	0.41	1.0	0.14	0.24	0.44	0.95	0.14	0.25	0.44	0.9	0.15	0.24	0.41	0.75
	1750	0.18	0.30	0.52		0.19	0.32	0.53		0.20	0.33	0.53		0.19	0.31	0.47	
LEM / LEL 125	1450	0.17	0.28	0.50	1.0	0.19	0.31	0.52	0.95	0.19	0.31	0.51	0.9	0.18	0.29	0.46	0.75
	1750	0.22	0.36	0.59		0.24	0.39	0.60		0.26	0.40	0.60		0.24	0.37	0.53	
LEM / LEL 150	1450	0.19	0.32	0.54	1.0	0.22	0.36	0.58	0.95	0.23	0.37	0.57	0.9	0.23	0.35	0.51	0.75
	1750	0.26	0.41	0.63		0.29	0.44	0.65		0.30	0.45	0.64		0.29	0.41	0.57	

FB = total service liquid flow rate on once-through system

KB = flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C warmer than make-up water

Performance Characteristics LEM 90 / LEL 90



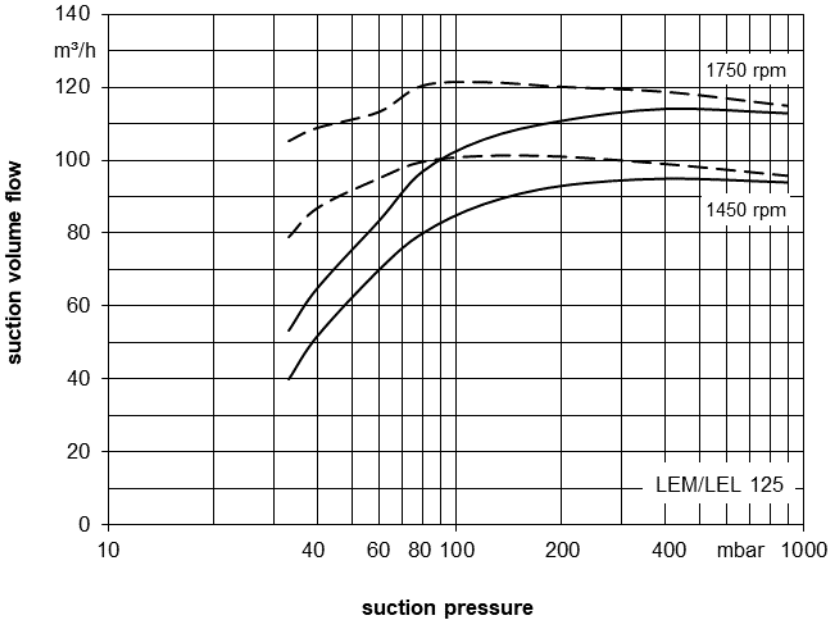


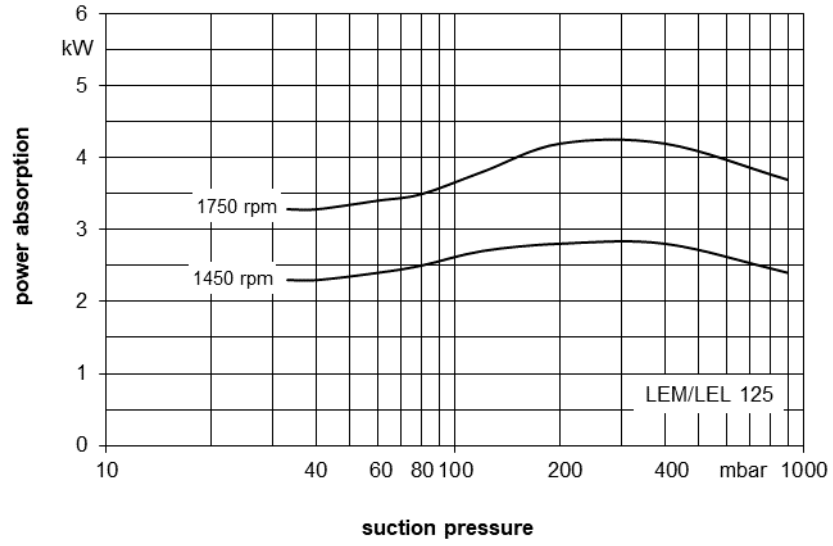
The operating data is valid under the following conditions:

- Process media: - dry air: 20°C
  - steam saturated air: 20°C
- Service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 125 / LEL 125



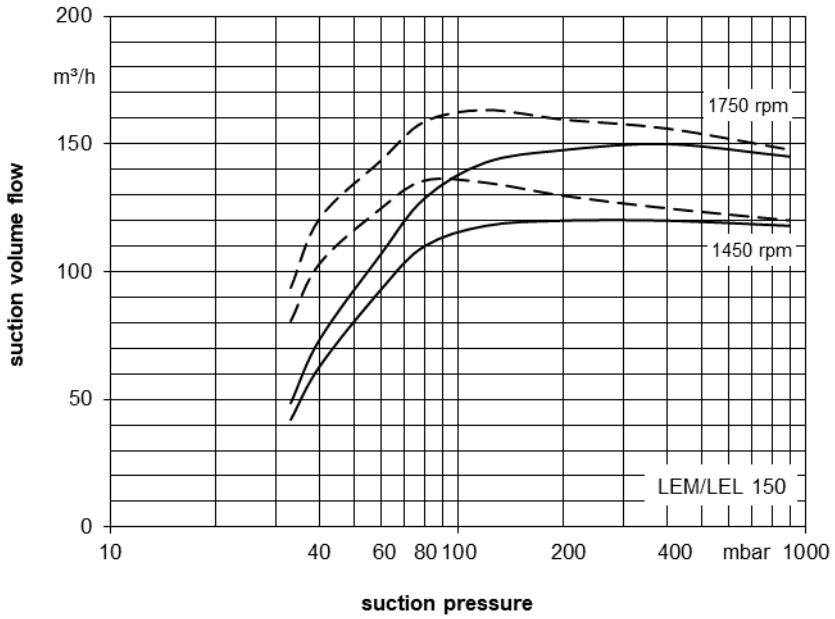


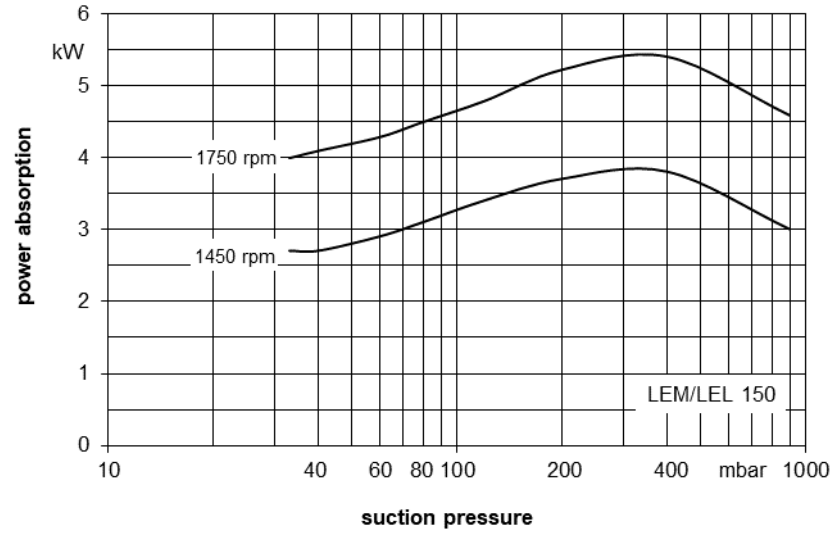
The operating data is valid under the following conditions:

- Process media: - dry air: 20°C
  - steam saturated air: 20°C
- Service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 150 / LEL 150



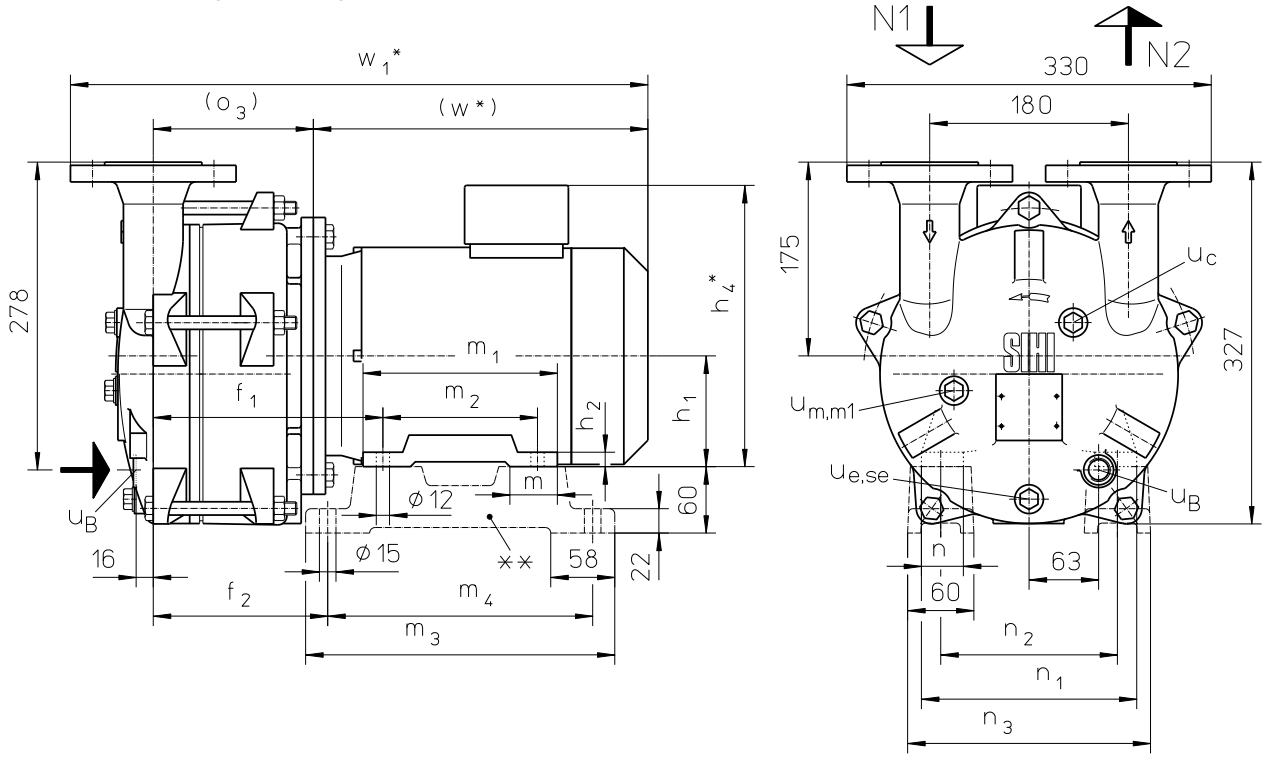


The operating data is valid under the following conditions:

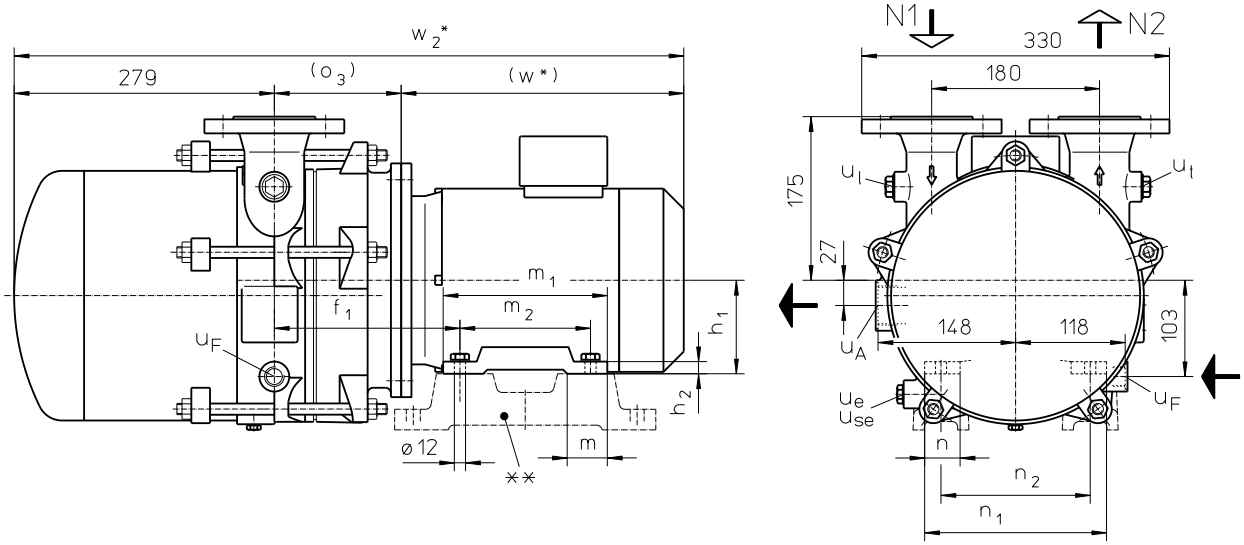
- Process media: - dry air: 20°C
  - steam saturated air: 20°C
- Service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 90, LEM 125, LEM 150



Dimensions LEM 90, LEM 125, LEM 150 with integrated pre-arranged separator

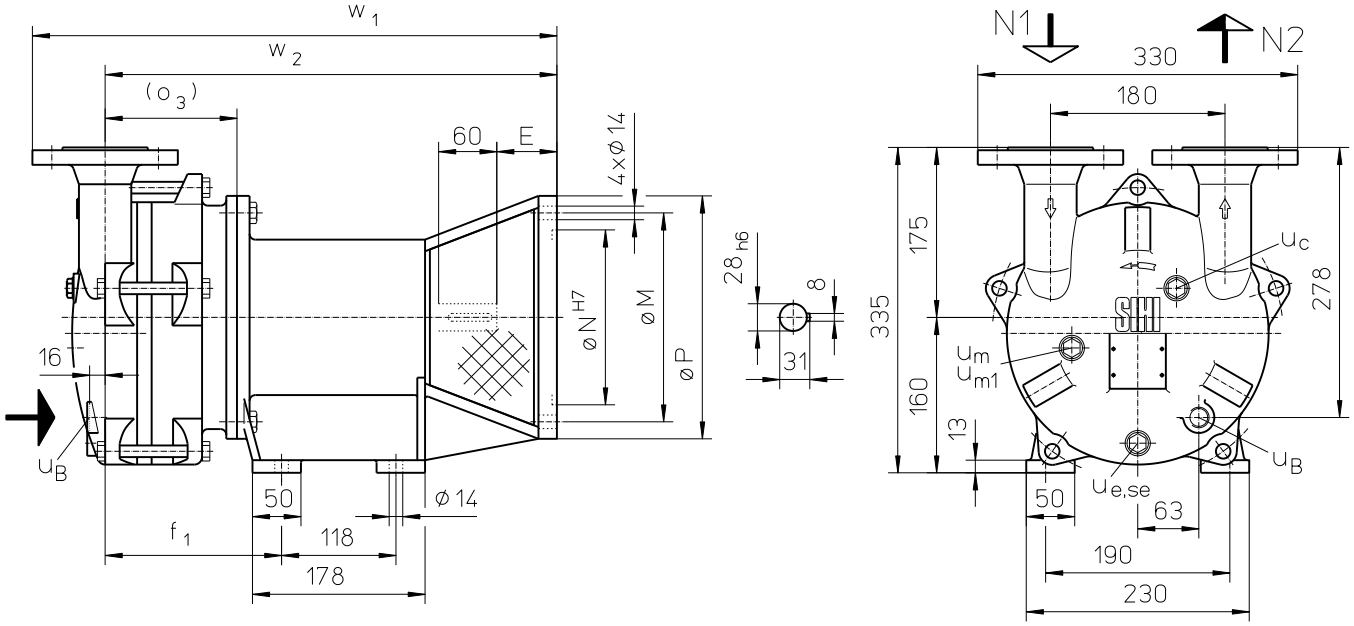


N 1 = gas inlet DN 40
N 2 = gas outlet DN 40
u_A = liquid drain G 1 ¼
u_B = connection for service liquid G ½
u_F = connection for make-up liquid G ½
u_c = connection for protection against cavitation G 3/8
$u_{e, se}$ = connection for drain, dirt drain G 3/8
u_l = connection for air cock G ½
$u_{m, m1}$ = connection for pressure gauge, drainage valve G 3/8
u_t = connection for thermometer G ½

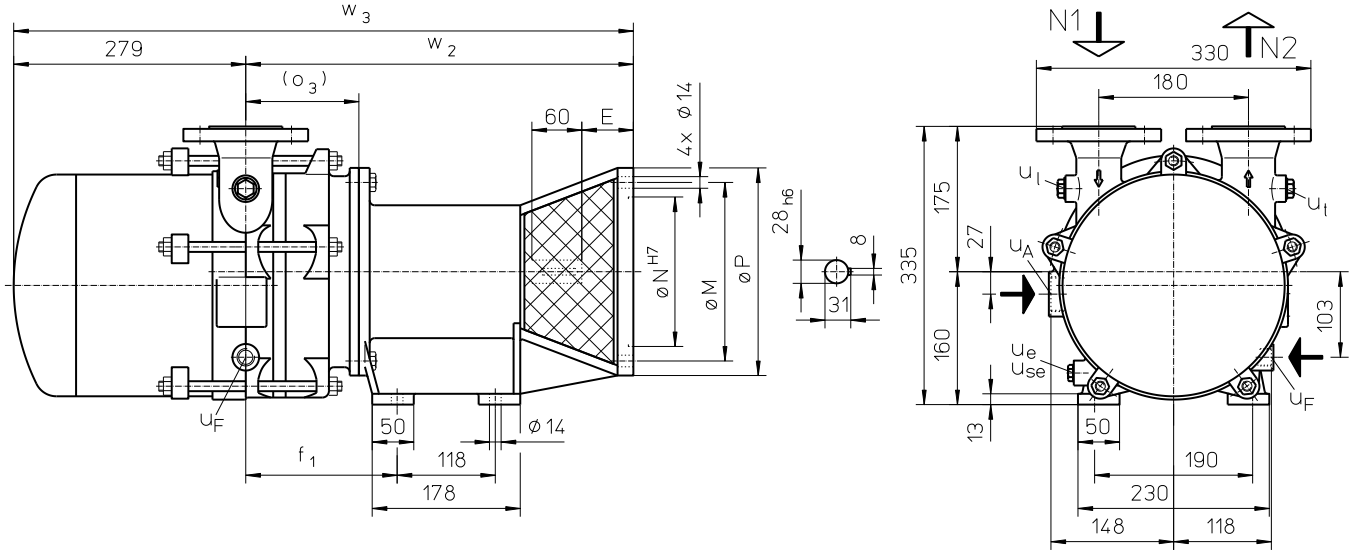
	electric motor IP 55			f_1	f_2	h_1	h_2	h_4*	m	m_1	m_2	m_3	m_4	n	n_1	n_2	n_3	o_3	w*	w_1*	w_2*	approx. weight [kg]	
	size	kW 50 Hz	kW 60 Hz	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	LEM	+ integr. pre-arranged separator
LEM 90	100 L	2.2	-	199	149	100	13	253	43	176	140	280	240	38	195	160	220	136	303	514	718	59	68
		-	3.3					255											343	554	758	71	80
LEM 125	100 L	3.0	-	208	158													145		563	767	73	82
	112 M	-	4.8	215	165	112	15	279	45					44	225	190	250		380	600	784	101	110
LEM 150	112 M	4.0	-	232	182													162	340	577	781	77	86
	132 M	-	6.0	272	222	132	18	320	88	218	178	320	278	55	256	216	276		426	663	867	102	111

other motors on request
* dimensions dependent upon motor supplier
** see list of accessories
Flange connections see page 10

Dimensions LEL 90, LEL 125, LEL 150



Dimensions LEL 90, LEL 125, LEL 150 with integrated pre-arranged separator

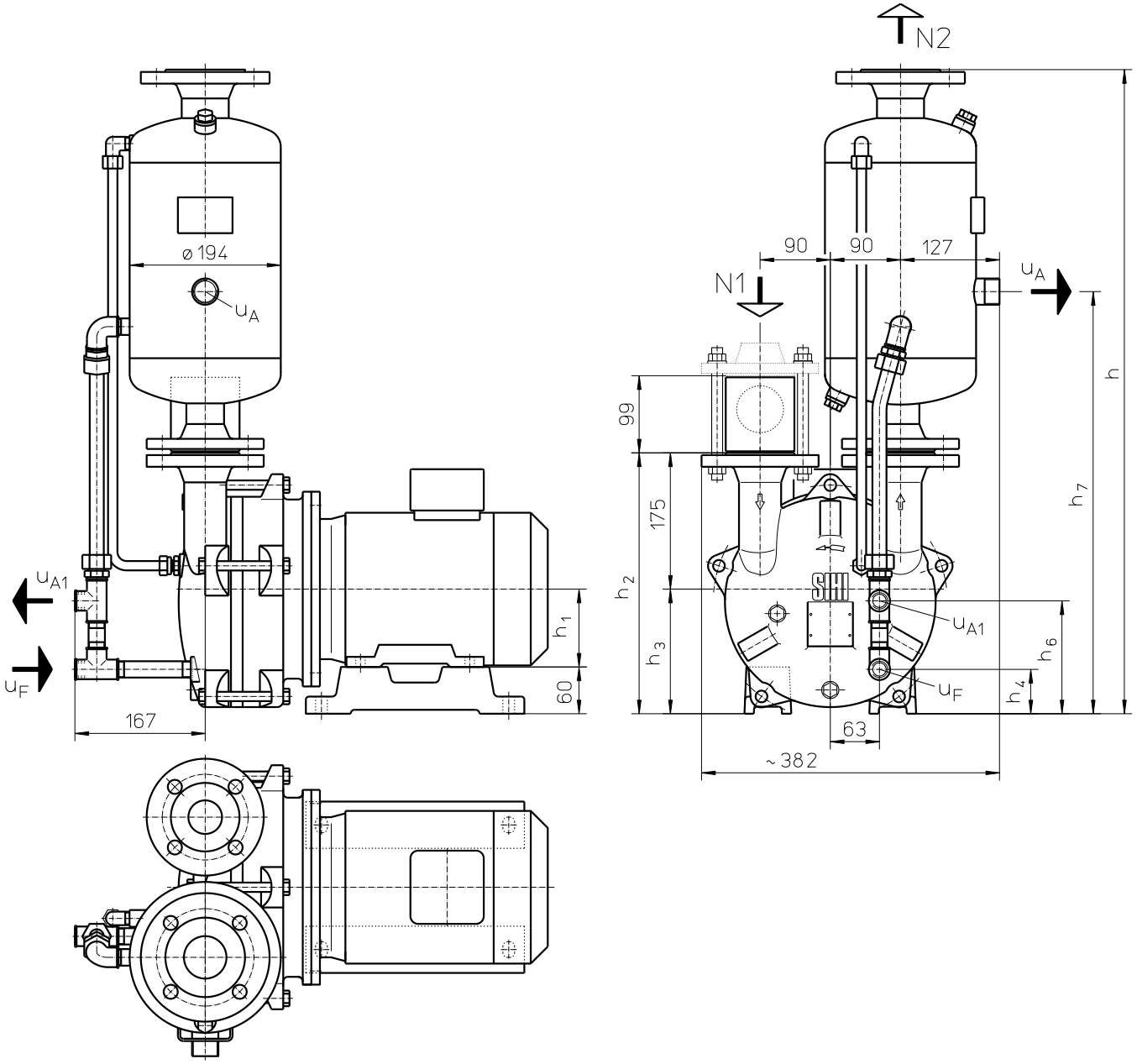


N 1 = gas inlet DN 40
N 2 = gas outlet DN 40
u_A = liquid drain G 1¼
u_B = connection for service liquid G ½
u_F = connection for make-up liquid G ½
u_c = connection for protection against cavitation G $^3/_8$
u_e = connection for drain G $^3/_8$
u_{se} = connection for dirt drain G $^3/_8$
u_l = connection for air cock G ½
u_m = connection for pressure gauge G $^3/_8$
u_{m1} = connection for drainage valve G $^3/_8$
u_t = connection for thermometer G ½

	electric motor 50 Hz			f_1	o_3	w_1	w_2	w_3	E	M	N	P	approx. weight [kg]	
	size	kW IP 55	kW EEx e II T3	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	LEL	+ integr. pre-arranged separator
LEL 90	100 L	2.2	2.5	182	136	541	466	745	62	215	180	250	60	72
LEL 125	100 L	3.0	-	191	145	550	475	754					63	75
	112 M	-	3.6											
LEL 150	112 M	4.0	-	208	162	567	492	771					67	79
	132 S	-	5.0			587	512	791	82	265	230	300		

other motors on request
flange connections see page 10

Arrangement drawing LEM 90, LEM 125, LEM 150

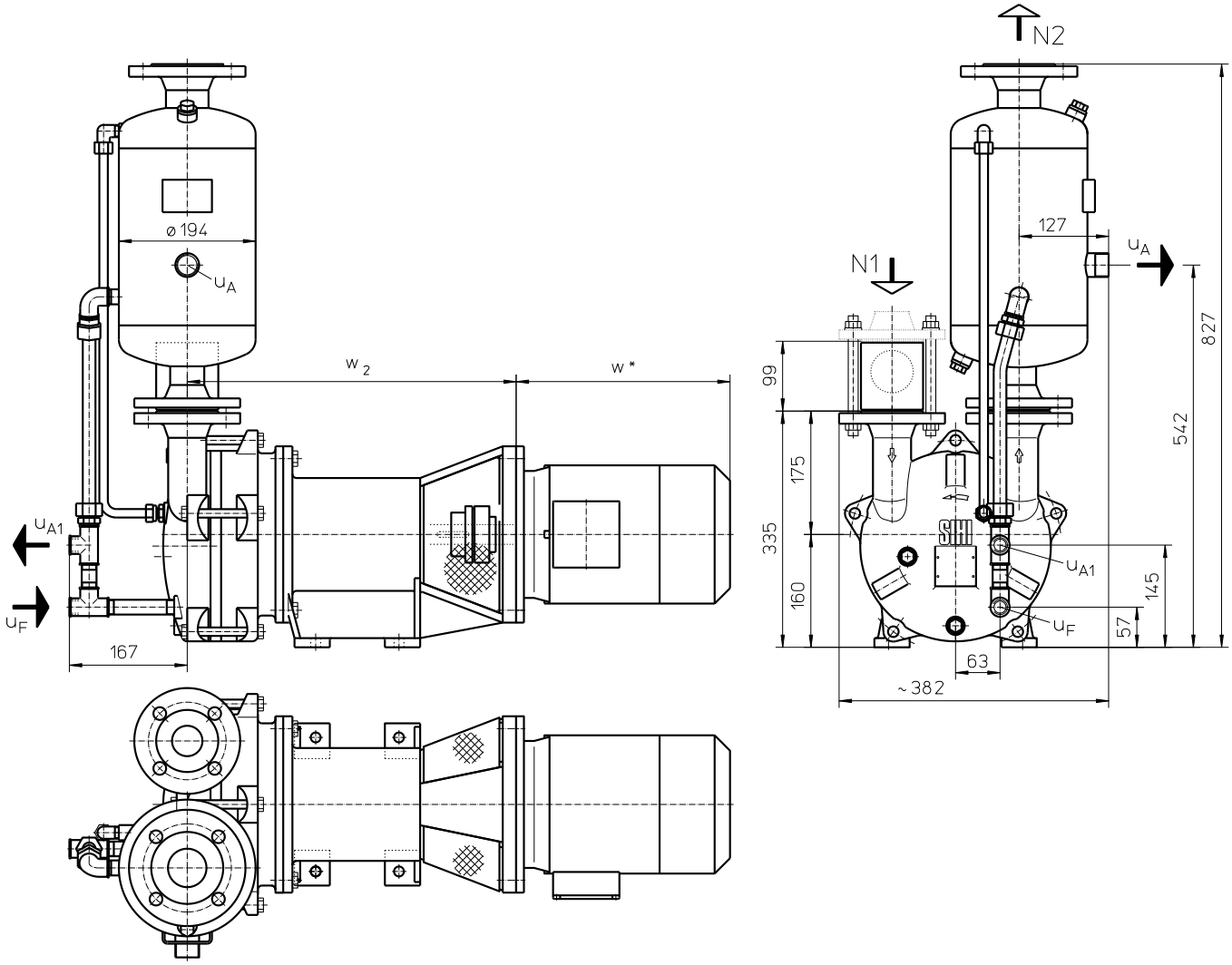


N 1 = gas inlet DN 40
N 2 = gas outlet DN 50
u_A = liquid drain G 1 A
u_{A1} = liquid drain G ½
u_F = connection for make-up liquid G ½

	electric motor IP 55			h	h_1	h_2	h_3	h_4	h_6	h_7	approx. weight
	size	kW 50 Hz	kW 60 Hz	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
LEM 90	100 L	2.2	-	827	100	335	160	57	145	542	69
		-	3.3								81
LEM 125	100 L	3.0	-								83
	112 M	-	4.8	839	112	347	172	69	157	554	111
LEM 150	112 M	4.0	-								87
	132 M	-	6.0	859	132	367	192	89	177	574	112

other motors on request
flange connections see page 10

Arrangement drawing LEL 90, LEL 125, LEL 150



N 1 = gas inlet DN 40

N 2 = gas outlet DN 50

u_A = liquid drain G 1 A

u_{A1} = liquid drain G ½

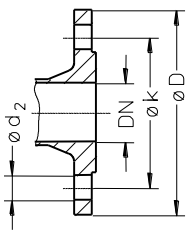
u_F = connection for make-up liquid G ½

	electric motor 50 Hz size	kW IP 55	kW EEx e II T3	w *	w_2	approx. weight [kg]
LEL 90	100 L	2.2	2.5	303	466	91
LEL 125	100 L	3.0	-		475	98
	112 M	-	3.6	320		104
LEL 150	112 M	4.0	-		492	106
	132 S	-	5.0	405	512	141

other motors on request

* dimensions dependent upon motor supplier

flange connections according to DIN EN 1092 PN 10 [mm]		
DN	40	50
k	110	125
D	150	165
number x d_2	4 x 18	4 x 18



Data regarding the pump size - order notes

Range + Size		Hydraulic + Bearings	Shaft Seal	Materials	Casing Sealing
		A• hydraulic A R• with integrated pre-arranged separator •Z two grease lubricated antifriction bearings arranged in the motor •B similar to •Z, but arranged in the motor carrier	AAE mechanical seal, o-rings butadiene rubber	0K main parts out of cast iron, impeller in low alloyed steel	0 liquid seal
LEM	90	AZ, RZ	AAE	0K	0
	125				
	150				
LEL	90	AB, RB			
	125				
	150				

Motor Selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example for ordering LEM:

LEM 125 AZ AAE 0K 0 **with** 3 kW AC motor 50 Hz, 230 V∆, IP55

Example for ordering LEL:

LEL 125 AB AAE 0K 0 **for** 3 kW AC motor 50 Hz, 230 V∆, IP55 has the complete designation:

LEL 125 AB AAE 0K 0

Accessories LEM 90, LEM 125, LEM 150

Recommended Accessory	Material Execution		LEM 90 LEL 90	LEM 125 LEL 125	LEM 150 LEL 150
Top Mounted Liquid Separator		Type weight	XBa 1042 9.7 kg		
Top mounted separator	1.4571	SIHI-Part No.	43 133 504		
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 098 538 35 007 969		
Service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	20 075 142 20 053 908		
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 054 959 20 054 960		
Side Mounted Liquid Separator		Type weight	XBp 0413 28 kg		
Side mounted separator	1.4571	SIHI-Part No.	43 132 218		
Pressure pipework (bend)	1.0254 1.4571	SIHI-Part No.	35 003 172 35 005 535		
Service liquid pipework, standard execution	1.0254 1.4571	SIHI-Part No.	20 054 572 20 054 573		
Cavitation protection pipework	1.0254 1.4571	SIHI-Part No.	20 041 543 20 041 544		
SIHI – Gas Ejector see Technical Catalogue – Gas Ejector					
at service liquid temperature 15 °C		Type / weight	GEV 90A / 9 kg	GEV 125A / 9 kg	GEV 150A / 9 kg
at service liquid temperature 30 °C		Type / weight	GEV 90B / 9 kg	GEV 125B / 9 kg	GEV 150B / 9 kg
SIHI – Non Return Ball Valve					
Intermediate flange execution XCk 40	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4571 + Teflon	SIHI-Part No. weight	20 072 746 / 2.8 kg 20 072 745 / 2.8 kg 20 029 494 / 5.2 kg		
Flange execution with glass cylinder XCk 406	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4408 + Teflon	SIHI-Part No. weight	20 072 835 / 7 kg 20 072 836 / 7 kg 20 072 834 / 7 kg		
Support foot	only for LEM				
for motor size 100 L, 112 M for motor size 132 M		SIHI-Part No.	20 047 010 -		20 047 010 20 047 012
Motor standard execution IP 55	only for LEL	Size Power Weight	100 L 2.2 kW 21 kg	100 L 3.0 kW 24 kg	112 M 4.0 kW 31 kg
Coupling for motor IP 55 pump side motor side		Type / weight SIHI-Part No.	B 80 / 1.5 kg 43 021 414 43 021 417		
Motor in EEx e II T3 execution	only for LEL	Size Power Weight	100 L 2.5 kW 23 kg	112 M 3.6 kW 29 kg	132 S 5.0 kW 42 kg
Coupling for motor EEx e II T3 pump side motor side		Type / weight SIHI-Part No.	BDS 88 / 1.9 kg 43 111 058 43 111 029		BDS 103 / 3.1 kg 43 111 051 43 111 040
Intermediate flange	only for LEL				
for motor flange Ø 300mm	1.0553 1.0553, stove enamelling	SIHI-Part No.	20 043 024 20 045 646		

Any changes in the interest of the technical development are reserved.

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www.flowserve.com

Liquid ring vacuum pumps
in compact design

LEM 91, LEM 126, LEM 161
LEL 91, LEL 126, LEL 161
with flange connection

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **20 to 185 m³/h**

CONSTRUCTION

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM/LEL are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

Pump type		unit	LEM 91 LEL 91	LEM 126 LEL 126	LEM 161 LEL 161
Speed	50 Hz 60 Hz	rpm rpm	2900 3500		1450 1750
Maximum overpressure on compression		bar	LEM 0.3 / LEL 0.5		
Permissible pressure difference between suction and discharge side	max. min.	bar	LEM 1.1 / LEL 1.3 0.2		
Hydraulic test pressure (overpressure)		bar	3		
Moment of inertia of rotating parts of pump and water content		kg · m²	0.007	0.009	0.070
Noise level at 80 mbar suction pressure		dB (A)	72 (67)*		65
Maximum gas temperature	dry saturated	°C °C	200 100		
Service liquid Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C °C mm²/s kg/m³ litre	 80 10 4 1200 0.5	 0.6	 2.0
Maximum flow resistance of the heat exchanger		bar	0.2		

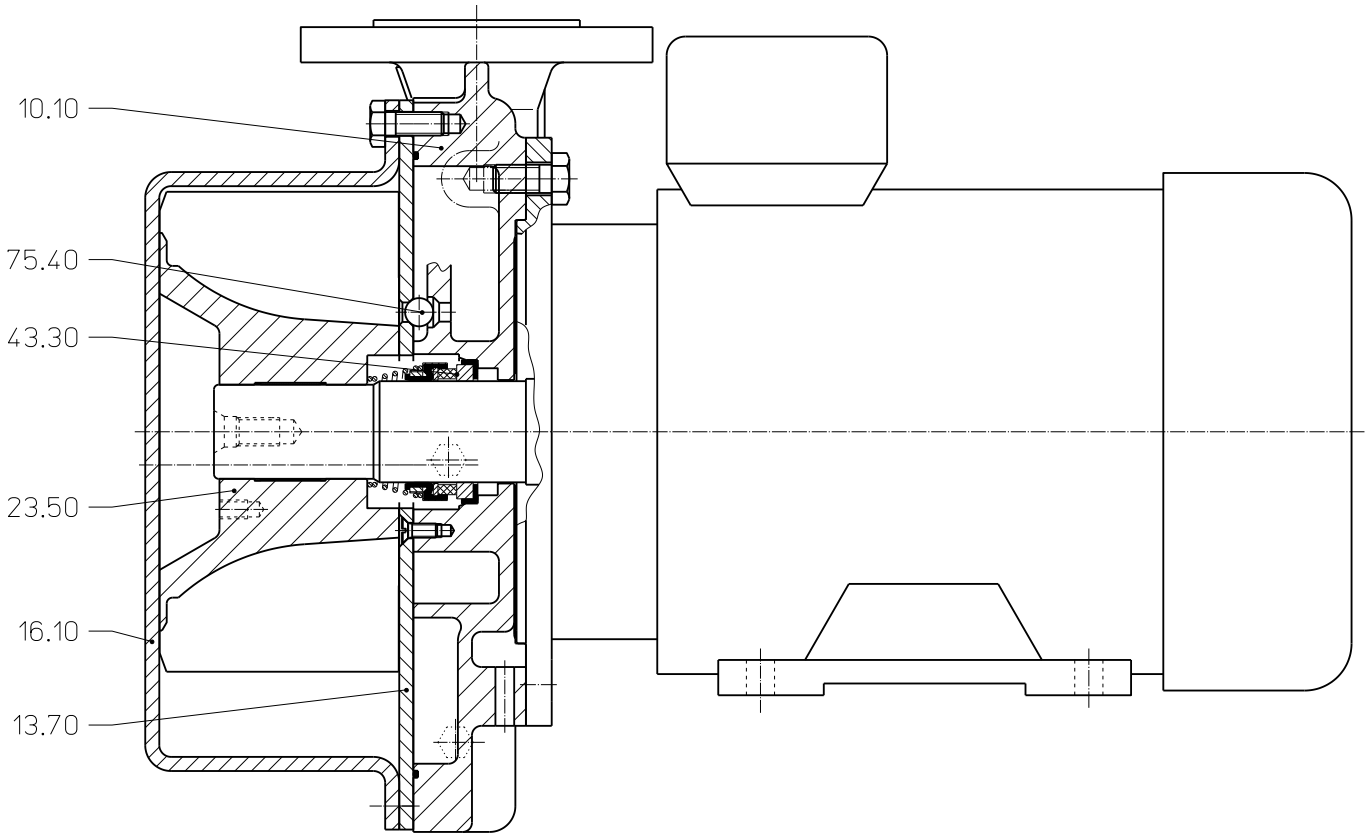
The combination of several limiting values is not admissible.
* value in parenthesis for measuring with sound insulation cup

Materials

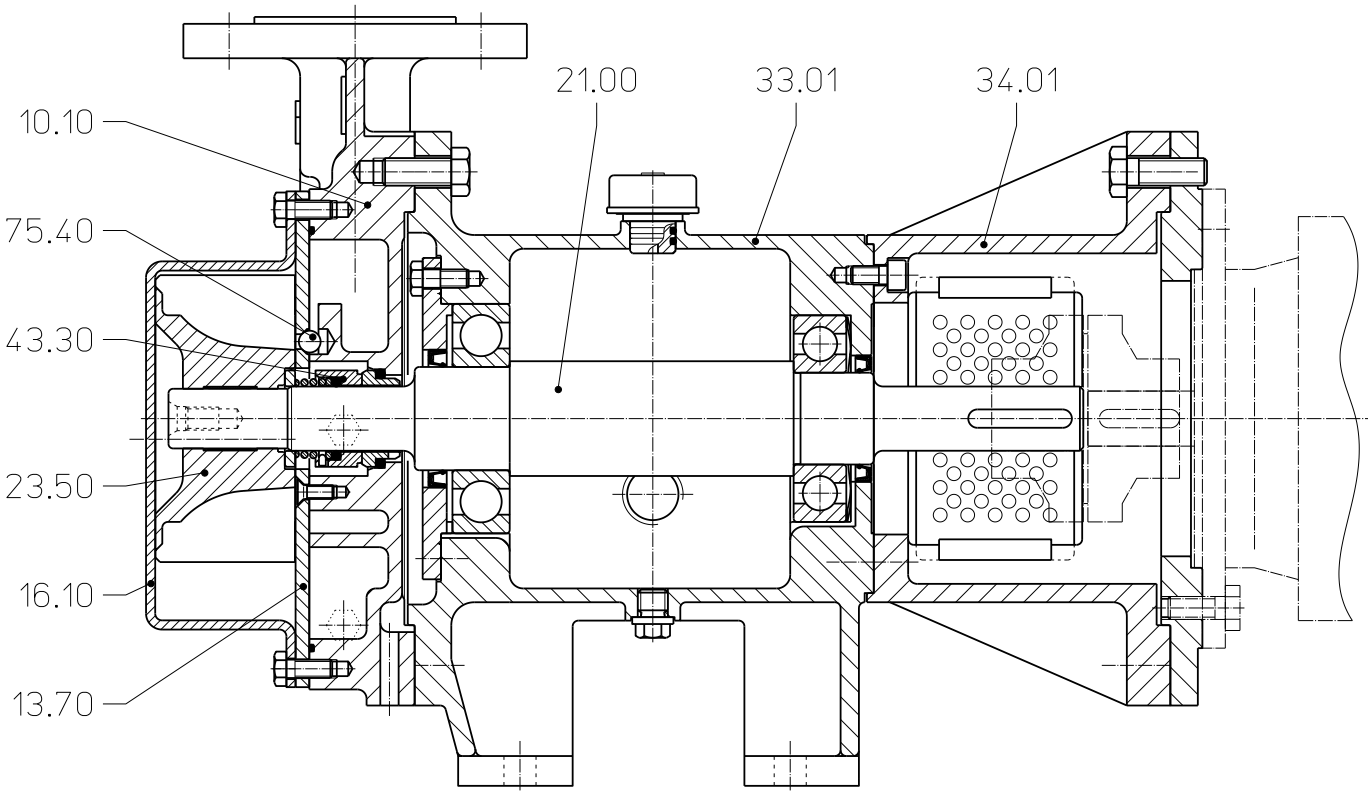
Item	COMPONENTS	MATERIALS 0K
10.10	Vacuum casing	0.6025
13.70	Guide disc	1.4301
16.10	Cover	
21.00 *	Shaft	1.4571
23.50	Vane wheel impeller	1.4308
33.01 *	Bearing bracket	0.6025
34.01 *	Motor carrier	
43.30	Mechanical seal	Carbon / ceramic / Viton
75.40	Valve balls	Polyamide A

* only for LEL 91, 126, 161

Cut-away diagram LEM 91, 126, 161



Cut-away diagram LEL 91, 126, 161



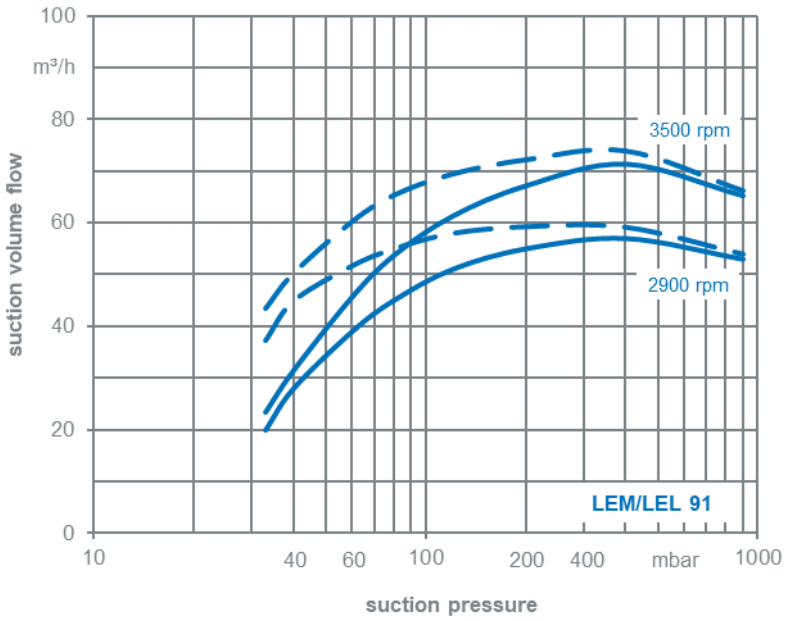
Make-up Liquid Consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference.

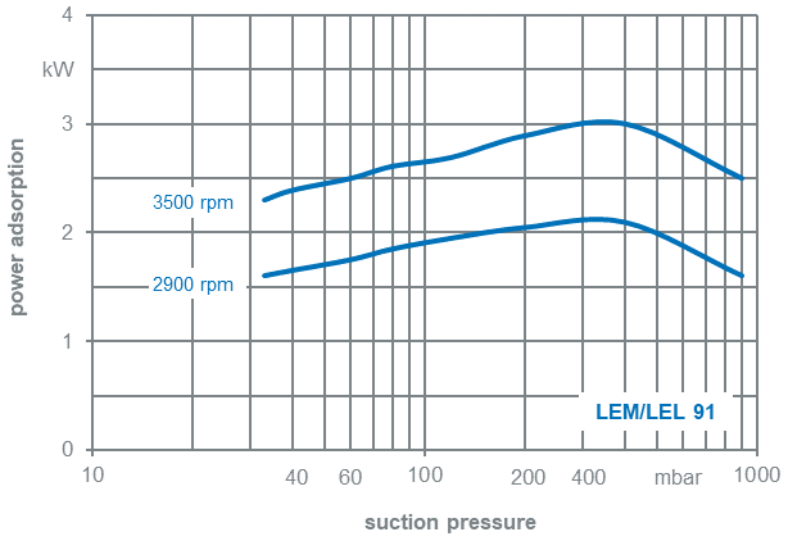
Suction Pressure in [mbar]		33				120				200				400			
Pump Type	Speed [rpm]	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB
		10	5	2		10	5	2		10	5	2		10	5	2	
LEM/LEL	2900	0.11	0.19	0.33	0.63	0.13	0.22	0.36	0.62	0.14	0.23	0.36	0.6	0.14	0.22	0.34	0.54
91	3500	0.15	0.24	0.38		0.17	0.27	0.40		0.18	0.27	0.40		0.17	0.26	0.38	
LEM/LEL	2900	0.15	0.24	0.39	0.66	0.16	0.26	0.40	0.62	0.17	0.27	0.40	0.6	0.17	0.26	0.38	0.54
126	3500	0.19	0.30	0.45		0.21	0.31	0.44		0.21	0.31	0.44		0.22	0.31	0.42	
LEM/LEL	1460	0.19	0.34	0.59	1.2	0.23	0.37	0.59	1.0	0.23	0.37	0.57	0.9	0.24	0.37	0.56	0.85
161	1750	0.26	0.43	0.70		0.28	0.44	0.66		0.29	0.44	0.63		0.30	0.44	0.62	

FB = Total service liquid flow rate on once-through system

KB = Flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C, warmer than make-up water

Performance Characteristics LEM 91 / LEL 91



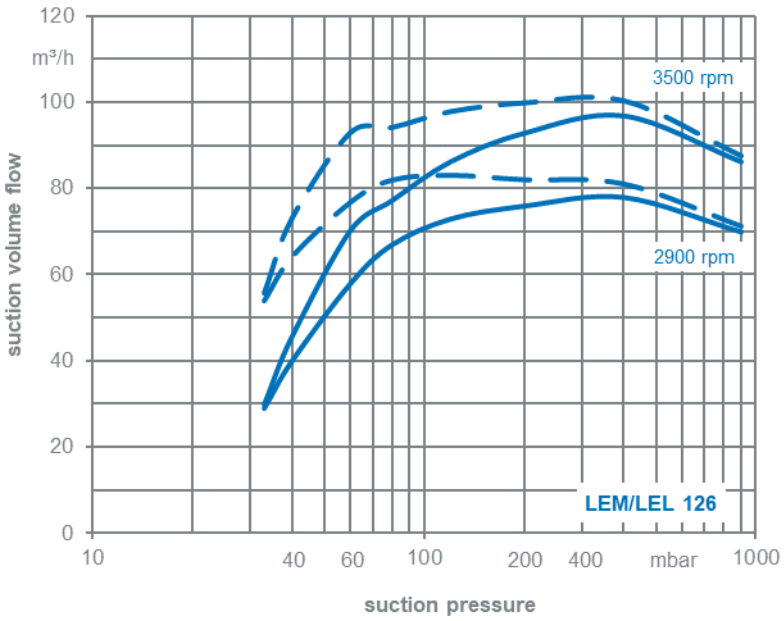


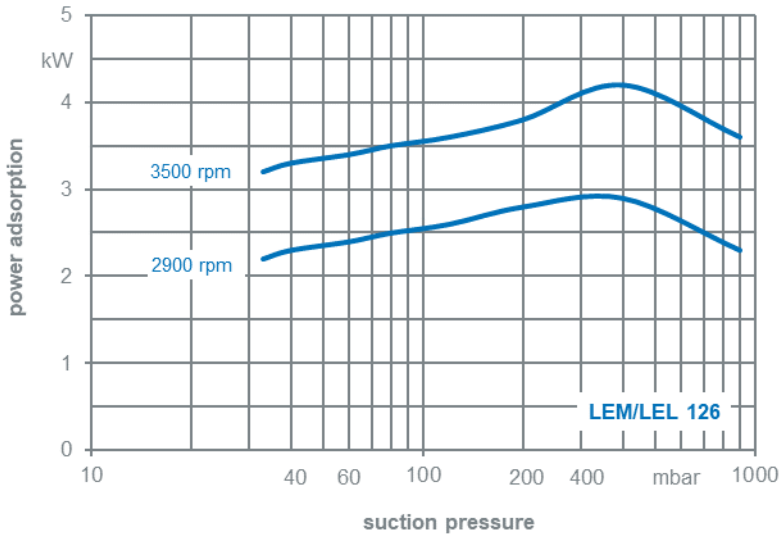
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 126 / LEL 126



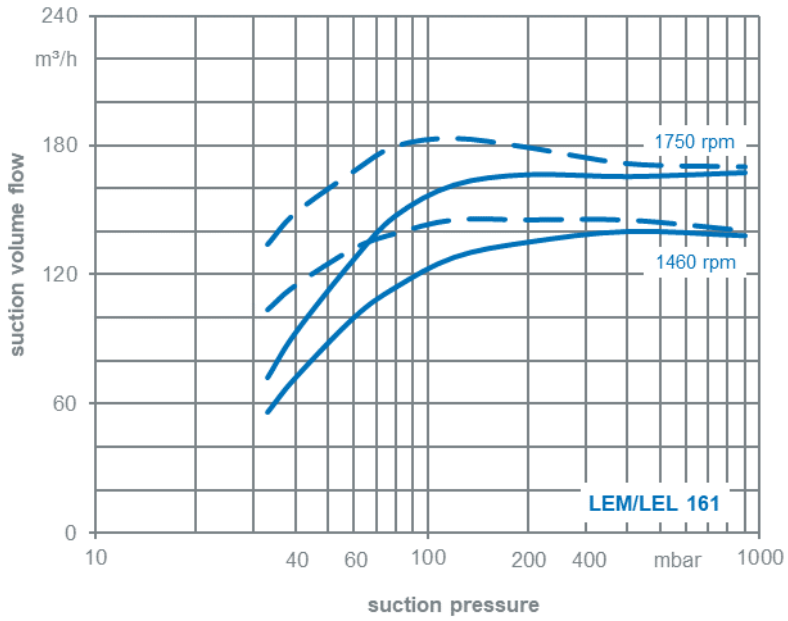


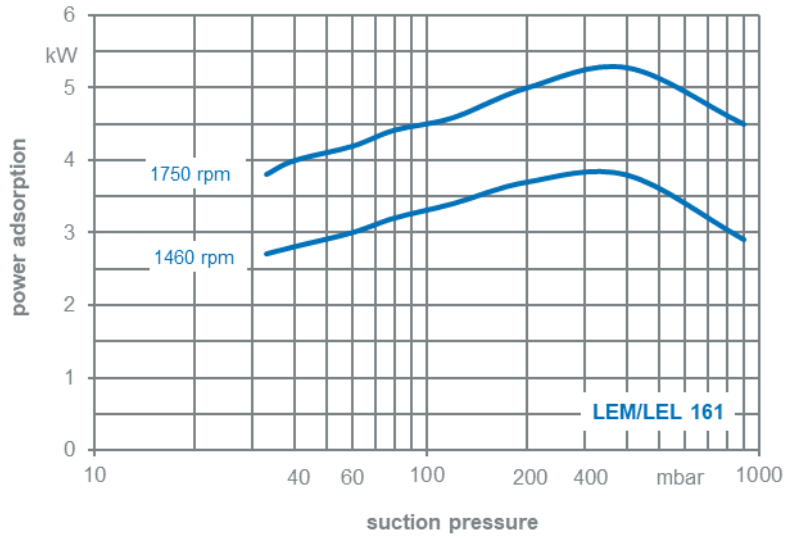
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 161 / LEL 161



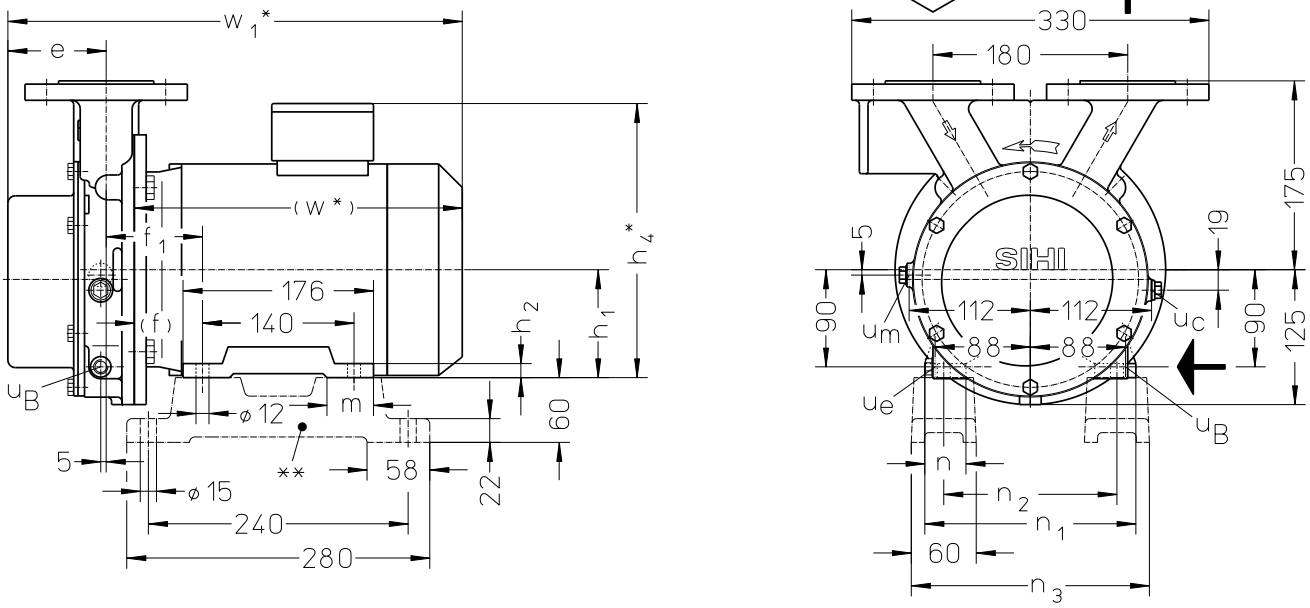


The operating data is valid under the following conditions:

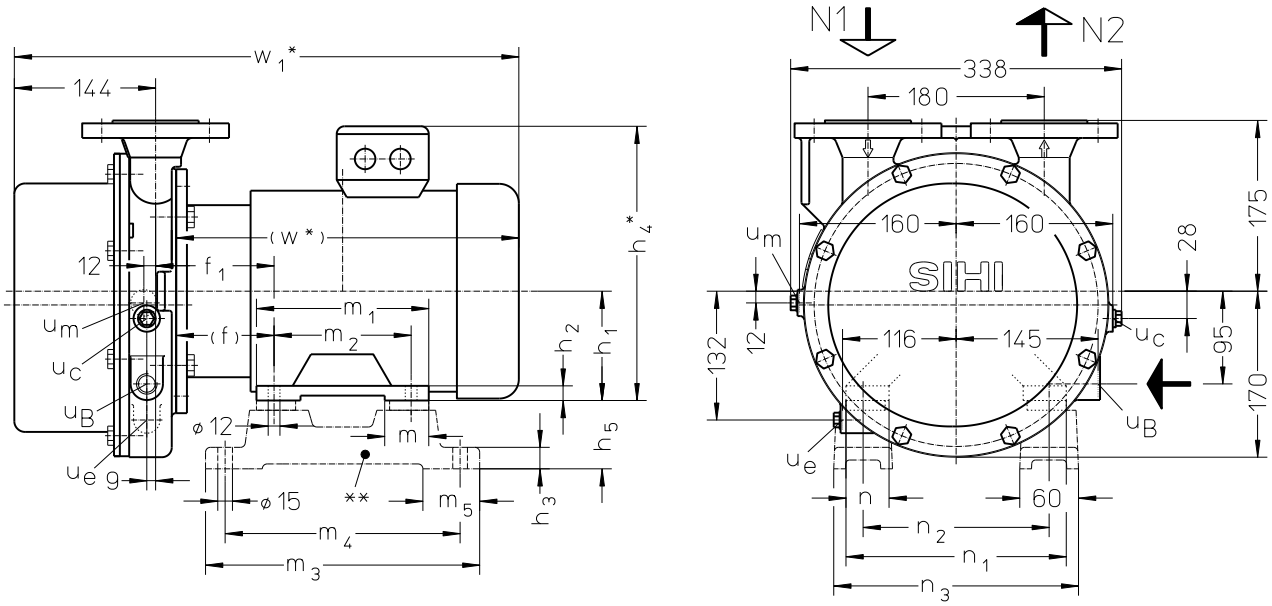
- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 91, 126, 161



	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	e [mm]	f [mm]	f_1 [mm]	h_1 [mm]	h_2 [mm]	h_4* [mm]	m [mm]	n [mm]	n_1 [mm]	n_2 [mm]	n_3 [mm]	w * [mm]	w_1* [mm]	approx. weight [kg]
LEM 91	100 L	2.2	-	91	63	89	100	13	256	43	38	195	160	220	303	420	40
		-	3.3												324	441	46
LEM 126	100 L	3.0	-	95											303	424	42
	112 M	-	4.8		70	96	112	15	278	45	44	225	190	250	320	441	49



N 1 = gas inlet DN 40

N 2 = gas outlet DN 40

u_B = connection for service liquid G ¼ (LEM 91/126)
G ½ (LEM 161)

u_c = connection for cavitation protection G ¼

u_e = connection for drain G ¼

u_m = connection for pressure gauge G ¼

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f [mm]	f_1 [mm]	h_1 [mm]	h_2 [mm]	h_4* [mm]	h_5 [mm]	m [mm]	m_1 [mm]	m_2 [mm]	m_3 [mm]	m_4 [mm]	m_5 [mm]	n [mm]	n_1 [mm]	n_2 [mm]	n_3 [mm]	w * [mm]	w_1* [mm]	approx. weight [kg]
LEM 161	112 M	4.0	-	100	121	112	15	281	70	45	176	140	280	240	58	44	225	190	250	390	555	77
	132 M	-	6.0	110	131	132	18	320	60	88	218	178	320	278	-	55	256	216	276	426	591	97

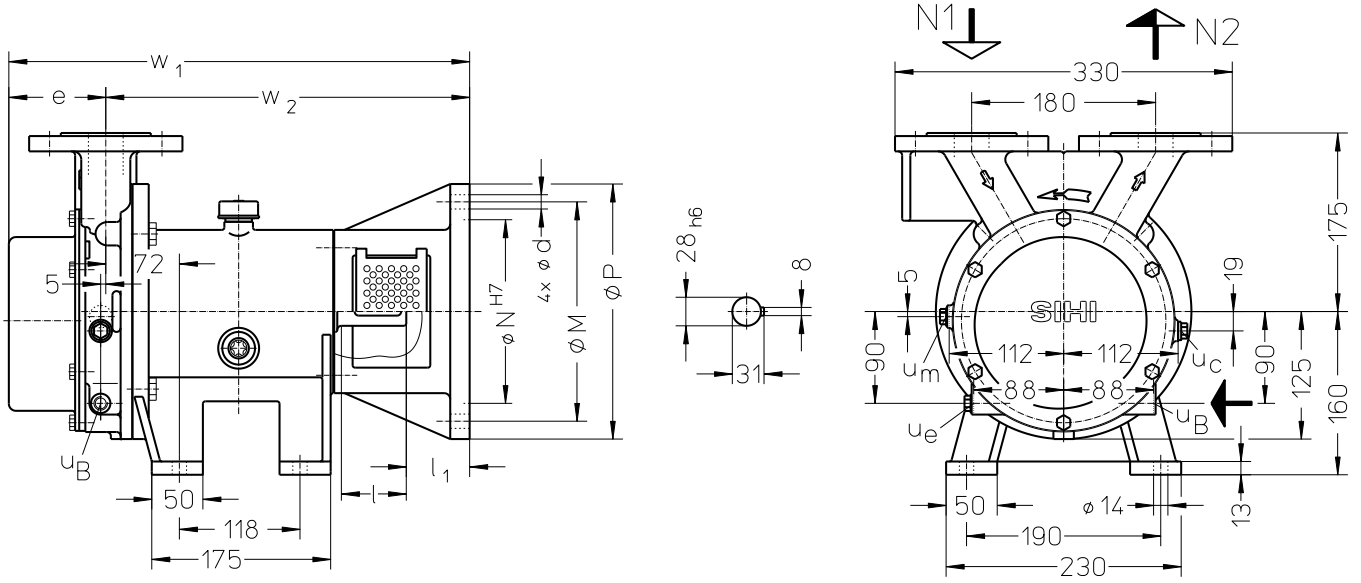
other motors on request

* dimensions dependent upon motor supplier

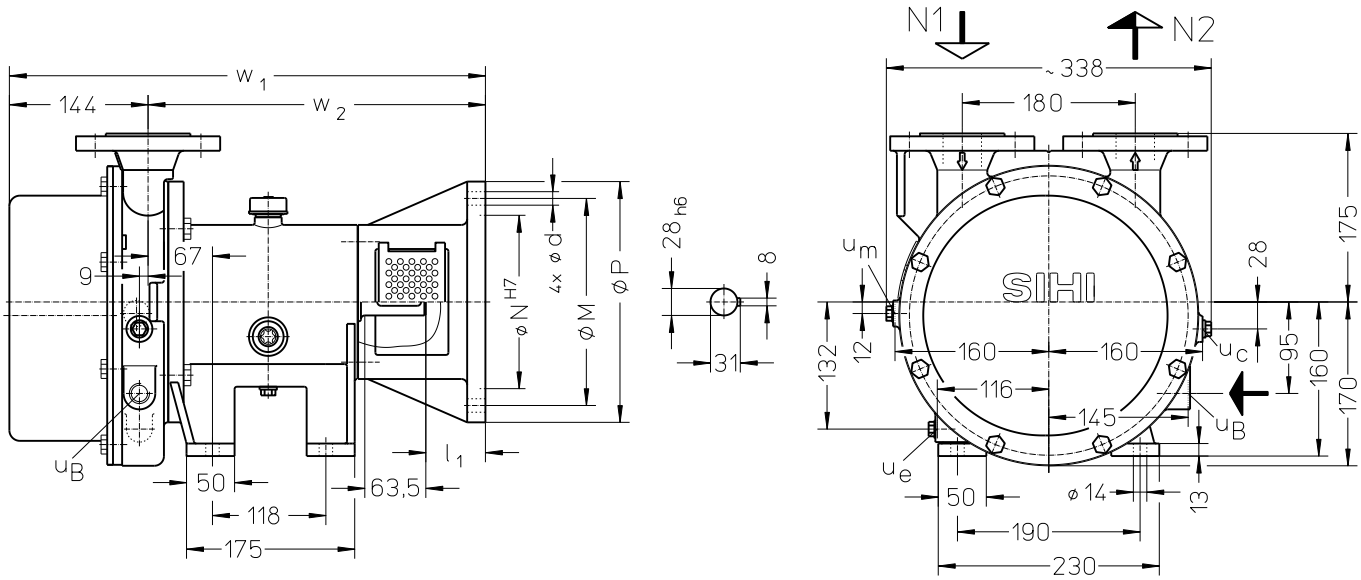
** see list of accessories

flange connections see page 11

Dimensions LEL 91, 126, 161



	size	electric motor 50 Hz kW IP 55	kW EEx e II T3	d [mm]	e [mm]	l [mm]	l_1 [mm]	M [mm]	N [mm]	P [mm]	w_1 [mm]	w_2 [mm]	approx. weight [kg]
LEL 91	90 L	2.2	-	M10	91	87.5	52	165	130	200	461	370	57
	100 L	-	2.5	14		63.5	62	215	180	250	446	356	53
LEL 126	100 L	3.0	-		95						451		
	112 M	-	3.3										



N 1 = gas inlet DN 40

N 2 = gas outlet DN 40

u_B = connection for service liquid G ¼ (LEL 91/126), G ½ (LEL 161)

u_c = connection for cavitation protection G ¼

u_e = connection for drain G ¼

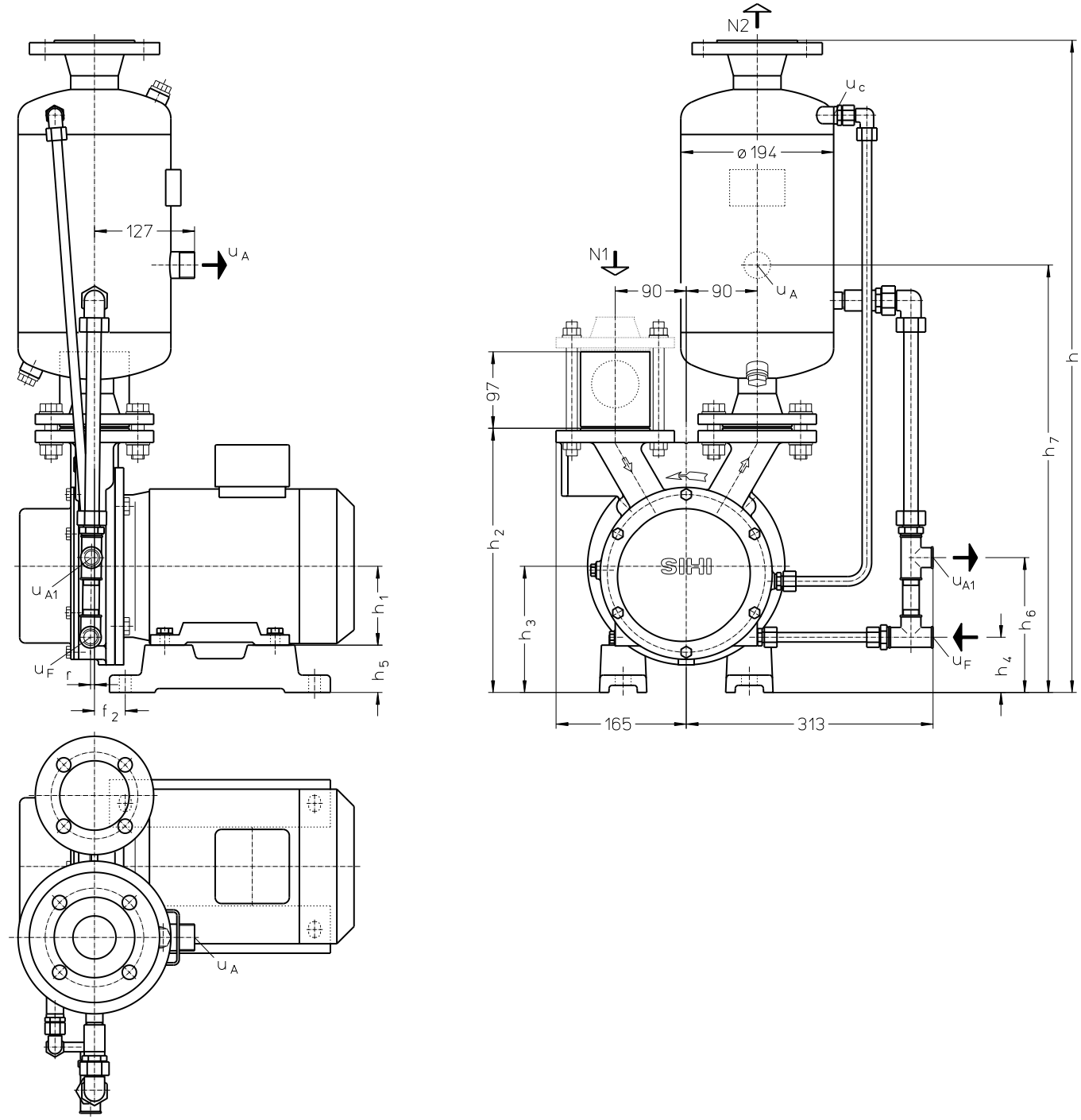
u_m = connection for pressure gauge G ¼

	size	electric motor 50 Hz kW IP 55	kW EEx e II T3	d [mm]	l_1 [mm]	M [mm]	N [mm]	P [mm]	w_1 [mm]	w_2 [mm]	approx. weight [kg]
LEL 161	112 M	4.0	-	14	62	215	180	250	495	351	71
	132 S	-	5.0	M12	82	265	230	300	515	371	78

other motors on request

flange connections see page 11

Arrangement drawing LEM 91, 126, 161



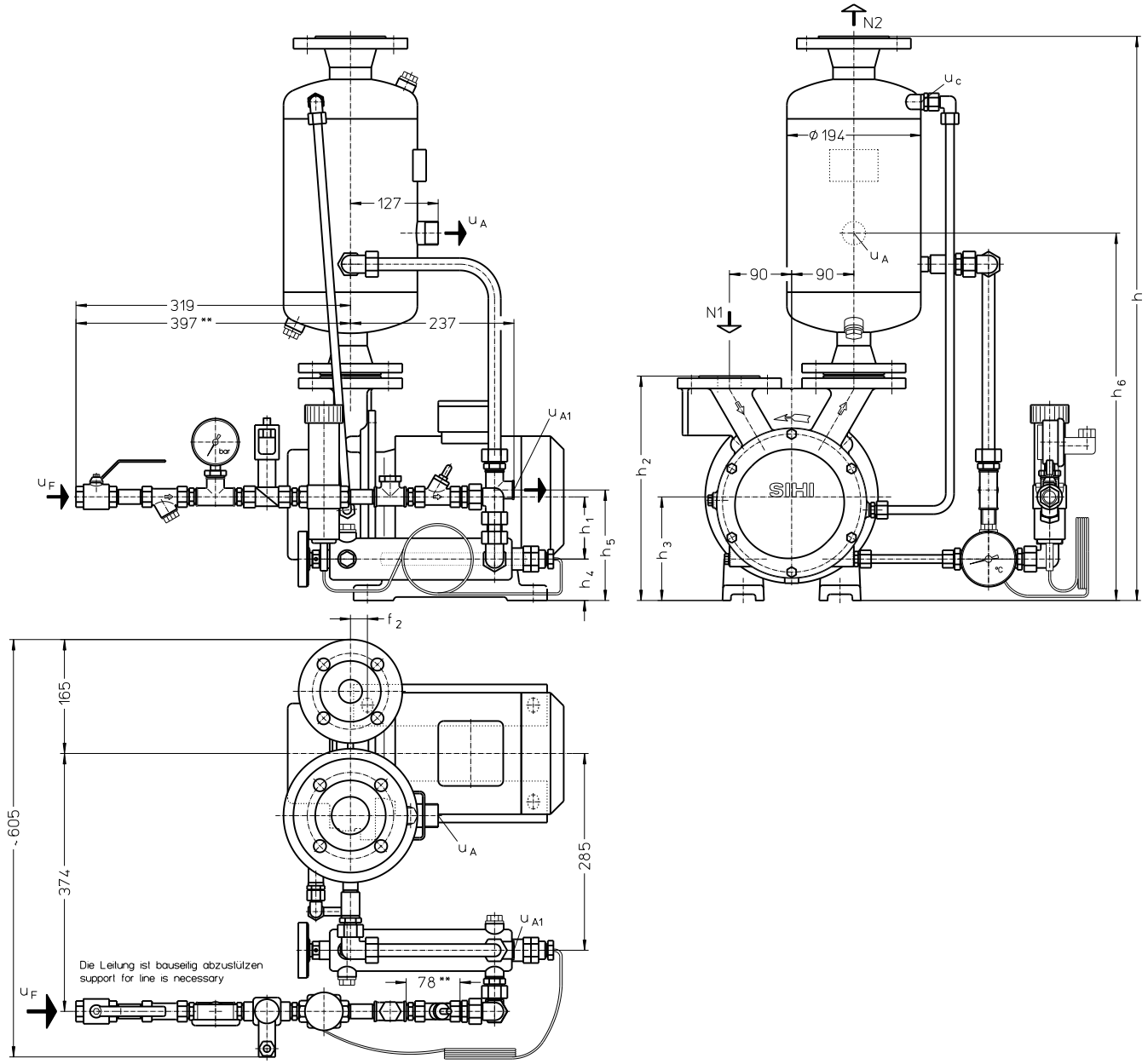
N 1 = gas inlet DN 40
N 2 = gas outlet DN 50
u_c = connection for cavitation protection G $^3/_8$
u_A = liquid drain G 1
u_{A1} = liquid drain G ½
u_F = connection for make-up liquid G ½

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f_2 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	h_4 [mm]	h_5 [mm]	h_6 [mm]	h_7 [mm]	r [mm]	approx. weight [kg]
LEM 91	100 L	2.2	-	39	827	100	335	160	70	60	171	542	5	52
		-	3.3											58
LEM 126	100 L	3.0	-											54
	112 M	-	4.8	46	839	112	347	172	82		183	554		61
LEM 161	112 M	4.0	-	71	849		357	182	87	70	193	564	9	91
	132 M	-	6.0	81	859	132	367	192	97	60	203	574		111

other motors on request

flange connections see page 11

Arrangement drawing LEM 91, 126, 161 with thermostatic control



N 1 = gas inlet DN 40

N 2 = gas outlet DN 50

u_A = liquid drain G 1

u_{A1} = liquid drain G ½

u_C = connection for cavitation protection G $^3/_8$

u_F = connection for make-up liquid G ½

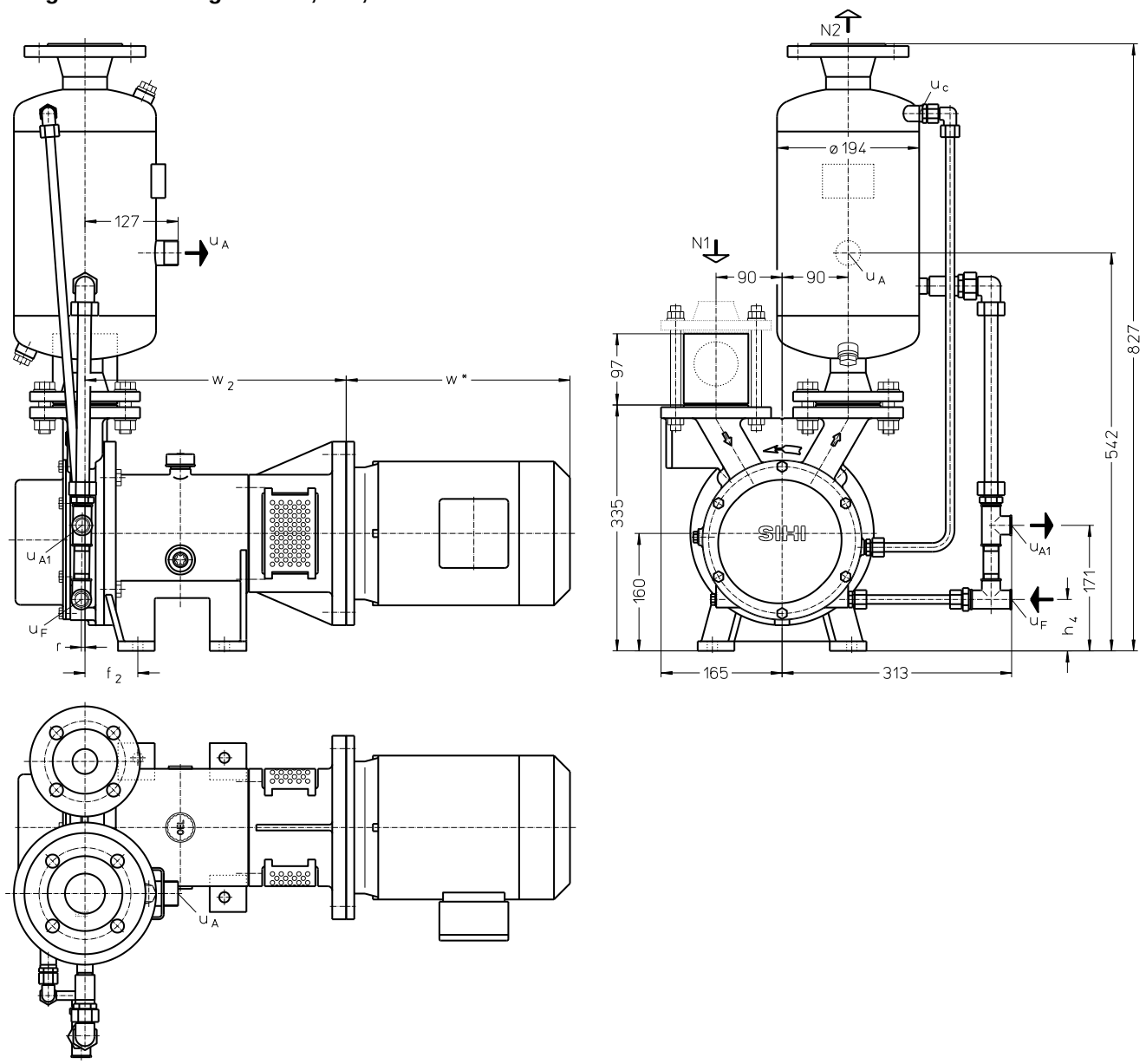
	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f_2 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	h_4 [mm]	h_5 [mm]	h_6 [mm]	approx. weight [kg]
LEM 91	100 L	2.2	-	39	827	100	335	160	60	170	542	57
		-	3.3									63
LEM 126	100 L	3.0	-									59
	112 M	-	4.8	46	839	112	347	172		182	554	66
LEM 161	112 M	4.0	-	71	849		357	182	70	192	564	96
	132 M	-	6.0	81	859	132	367	192	60	202	574	116

other motors on request

** only at material 1.4571 the line

flange connections see page 11

Arrangement drawing LEL 91, 126, 161

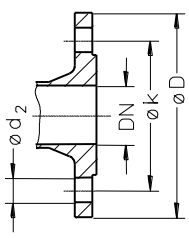


N 1 = gas inlet DN 40
N 2 = gas outlet DN 50
u_C = connection for cavitation protection G 3/8

u_A = liquid drain G 1
u_{A1} = liquid drain G ½
u_F = connection for make-up liquid G ½

	size	electric motor 50 Hz kW IP 55	kW EEx e II T3	f_2 [mm]	h_4 [mm]	r [mm]	w * [mm]	w_2 [mm]	approx. weight [kg]
LEL 91	90 L	2.2	-	72	70	5	269	370	86
	100 L	-	2.5				303	356	91
LEL 126	100 L	3.0	-						87
	112 M	-	3.3				320		97
LEL 161	112 M	4.0	-	67	65	9		351	114
	132 M	-	5.0				405	371	158

flange connections according to DIN EN 1092-1/2 PN 10 [mm]		
DN	40	50
k	110	125
D	150	165
number x d_2	4 x 18	4 x 18



other motors on request
* dimension dependent upon motor supplier

Data regarding the pump size - order notes

range + size		hydraulic + bearings	shaft seal	materials	casing sealing	*code of motor connection*
		C• hydraulic A, 9• with flange connection •Z two grease lubricated antifriction bearings arranged in the motor •B similar to •Z, but arranged in the motor carrier	B3N mechanical seal, o-rings Viton	0K main parts out of cast iron, impeller in low alloyed steel	7 o-rings, Teflon cord	ES for IMB5 motor 90L flange ø200 FS for IMB5 motor 100L resp. 112M flange ø250 GS for IMB5 motor 132S flange ø300
LEM	91	CZ	B3N	0K	0	
	126					
	161	9Z				
LEL	91	CB				ES, FS
	126					FS
	161	9B				FS, GS

* = only LEL

Motor selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example for ordering LEM:

LEM 126 CZ B3N 0K 7 **with** 3.0 kW AC motor 50 Hz, 230 VΔ, IP55

Example for ordering LEL:

LEL 161 9B B3N 0K 7 **for** 4.0 kW AC motor 50 Hz, 230 VΔ, IP55 (motor size 112) has the complete designation:

LEL 161 9B B3N 0K 7 **FS**

Accessories LEM 91, 126, 161; LEL 91, 126, 161 with flange connection

Recommended Accessory	Material Execution		LEM 91 LEL 91	LEM 126 LEL 126	LEM 161 LEL 161
Top Mounted Liquid Separator		Type / weight	XBa 1042 / 9.7 kg		
Top mounted separator	1.4571	SIHI-Part No.	43 133 504		
Service liquid pipework, standard execution	Steel, galvanised	SIHI-Part No.	20 055 588		20 055 587
Service liquid pipework, thermostatic control 24V	1.0254 + Brass	SIHI-Part No.	20 048 239		20 048 241
Cavitation protection pipework	Steel, galvanised	SIHI-Part No.	20 055 586		20 055 585
Side Mounted Liquid Separator		Type / weight	XBp 0413 / 28 kg		
Side mounted separator	1.4571	SIHI-Part No.	35 000 503		
Pressure pipework (bend)	1.0254	SIHI-Part No.	35 003 172		
service liquid pipework, standard execution	1.0254	SIHI-Part No.	35 012 172		20 061 807
Cavitation protection pipework	1.0254	SIHI-Part No.	20 045 648		20 045 647
SIHI – Gas Ejector see Technical Catalogue – Gas Ejector					
at service liquid temperature 15 °C		Type weight	GEV 91 E 7 kg	GEV 90 A 9 kg	GEV 150 A 12 kg
at service liquid temperature 30 °C		Type weight	GEV 91 F 7 kg	GEV 90 B 9 kg	GEV 150 B 12 kg
SIHI – Non Return Ball Valve					
Intermediate flange execution XCk 40	0.6025 + butadiene rubber 0.6025 + Teflon	SIHI-Part No. weight	20 072 746 / 2.8 kg 20 072 745 / 2.8 kg		
Flange execution with glass cylinder XCk 406	0.6025 + butadiene rubber 0.6025 + Teflon	SIHI-Part No. weight	20 072 835 / 7.0 kg 20 072 836 / 7.0 kg		
Support foot	only for LEM				
for motor size 100 L, 112 M		SIHI-Part No.	20 047 010	20 047 010	20 047 011
for motor size 132 M			-	-	20 047 012
Motor standard execution IP 55	only for LEL	Size Power Weight	90 L 2.2 kW 19 kg	100 L 3.0 kW 26 kg	112 M 4.0 kW 34 kg
Coupling for motor IP 55 pump side motor side		Type / weight SIHI-Part No.	B 68 / 1.5 kg 43 028 149 43 021 405	B 80 / 1.5 kg 43 021 414 43 021 417	
Motor in EEx e II T3 execution	only for LEL	Size Power Weight	100 L 2.5 kW 21 kg	112 M 3.3 kW 27 kg	132 S 5.0 kW 42 kg
Coupling for motor EEx e II T3 pump side motor side		Type / weight SIHI-Part No.	BDS 88 / 1.9 kg 43 111 058 43 111 029		BDS 103 / 3.1 kg 43 111 051 43 111 040

Designs subject to change without prior notice.

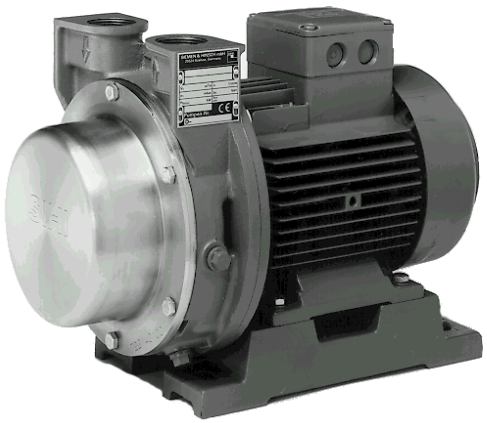
Flowserve SIHI Germany GmbH
Lindenstraße 170, D-25524 Itzehoe, Germany
Tel. +49 (0) 4821 / 77101, Fax +49 (0) 48 21 / 771274
www.flowserve.com

Liquid ring vacuum pumps
in compact design

FLOWSERVE
SIHI® Pumps

LEM 91, LEM 126, LEM 161
LEL 91, LEL 126, LEL 161
with threaded connection

Pressure range: **33 to 1013 mbar**
Suction volume flow: **20 to 185 m³/h**



CONSTRUCTION

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM/LEL are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

Pump type		unit	LEM 91 LEL 91	LEM 126 LEL 126	LEM 161 LEL 161
Speed	50 Hz 60 Hz	rpm rpm	2900 3500		1450 1750
Maximum overpressure on compression		bar	LEM 0.3 / LEL 0.5		
Permissible pressure difference between suction and discharge side	max. min.	bar	LEM 1.1 / LEL 1.3 0.2		
Hydraulic test pressure (overpressure)		bar	3		
Moment of inertia of rotating parts of pump and water content		kg · m²	0.007	0.009	0.070
Noise level at 80 mbar suction pressure		dB (A)	72 (67)*		65
Maximum gas temperature	dry saturated	°C °C	200 100		
Service liquid Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C mm²/s kg/m³ litre	 80 10 4 1200 0.5	 0.6	 2.0
Maximum flow resistance of the heat exchanger		bar	0.2		

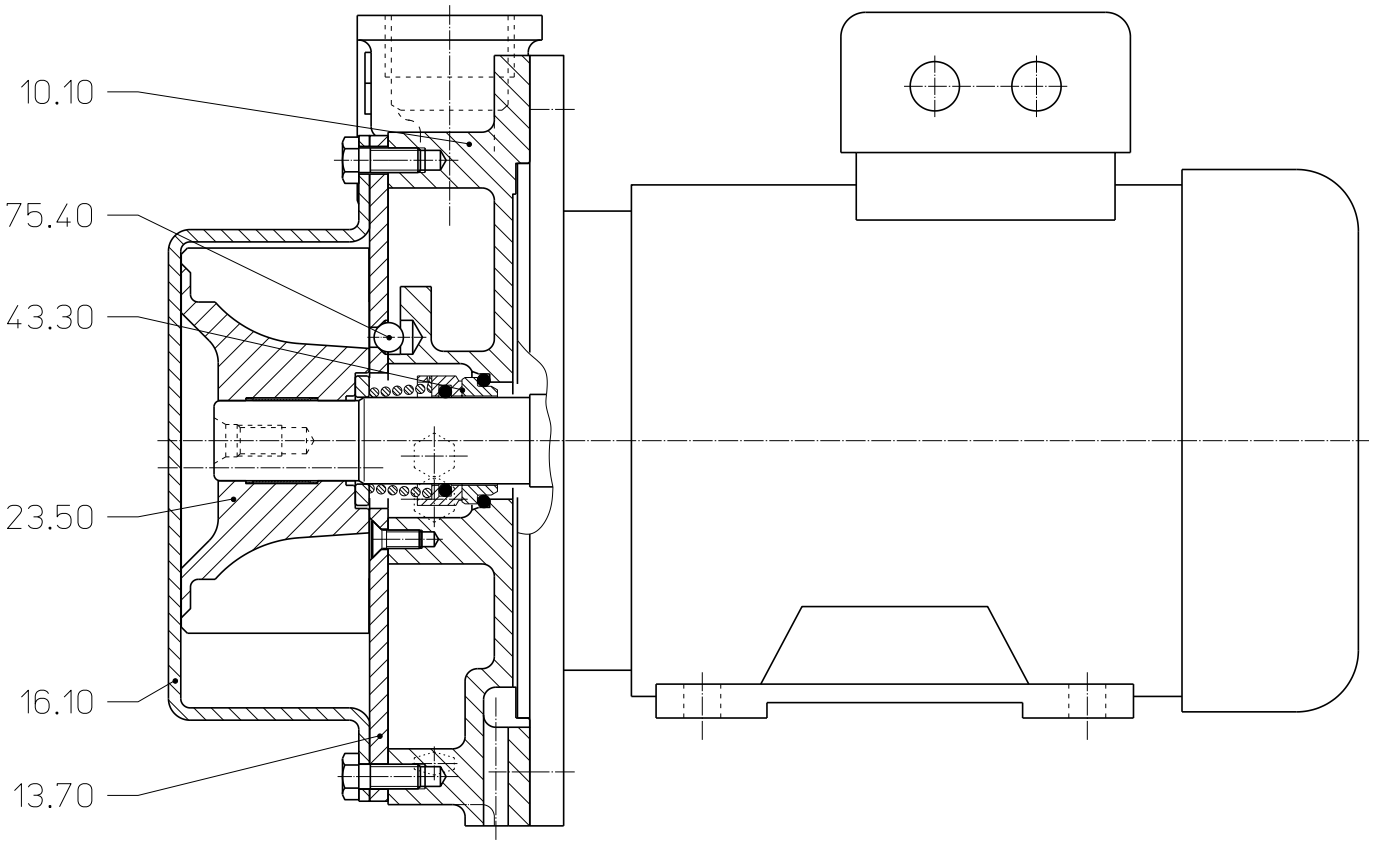
The combination of several limiting values is not admissible.
* Value in parenthesis for measuring with sound insulation cup

Materials

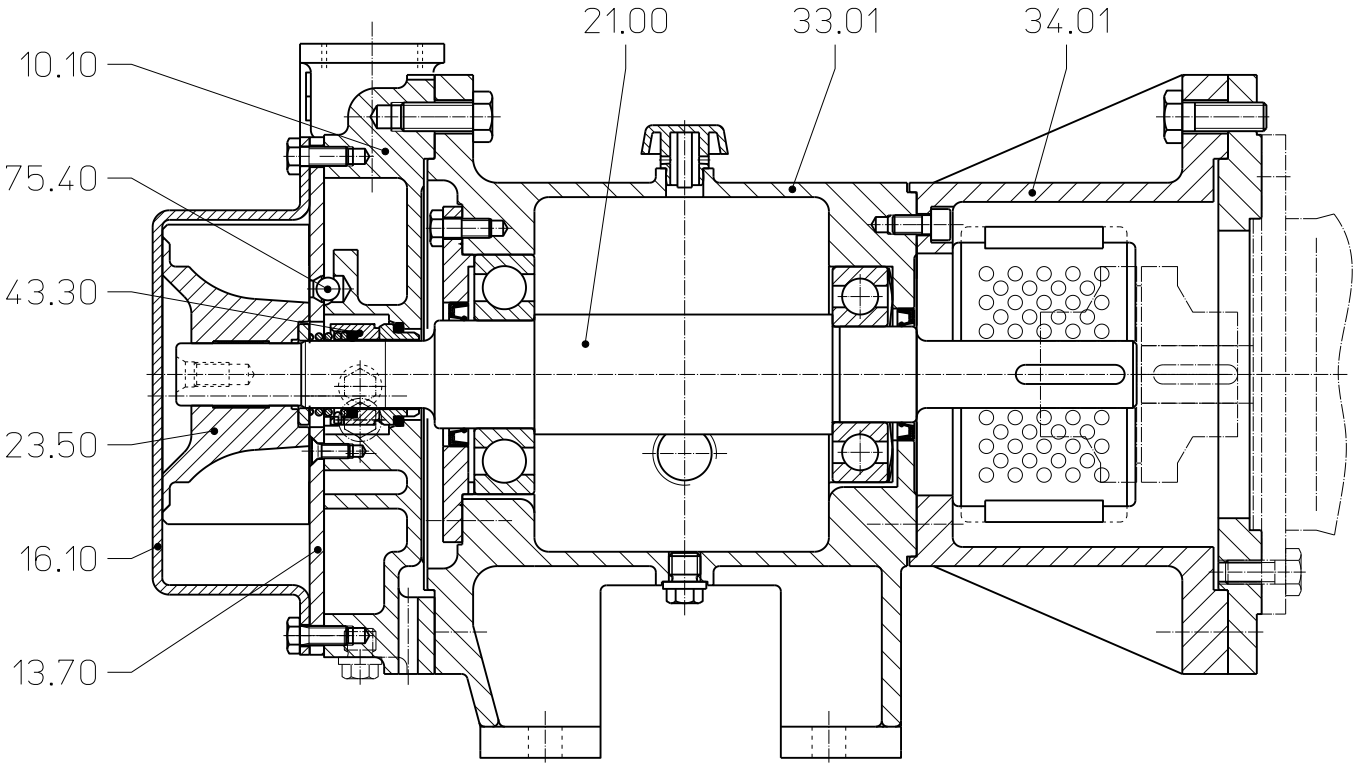
Item	COMPONENTS	MATERIALS 0K	4B
10.10	Vacuum casing	0.6025	1.4408
13.70	Guide disc	1.4301	1.4404
16.10	Cover		
21.00 *	Shaft	1.4571	
23.50	Vane wheel impeller	1.4308	1.4408
33.01 *	Bearing bracket	0.6025	0.6025 (stove enamelling)
34.01 *	Motor carrier		
43.30	Mechanical seal	Cr-steel / carbon / butadiene rubber	Cr Ni Mo-steel / carbon / Viton
75.40	Valve balls	Polyamide A	PTFE

* only for LEL 91, 126, 161

Cut-away diagram LEM 91, 126, 161



Cut-away diagram LEL 91, 126, 161



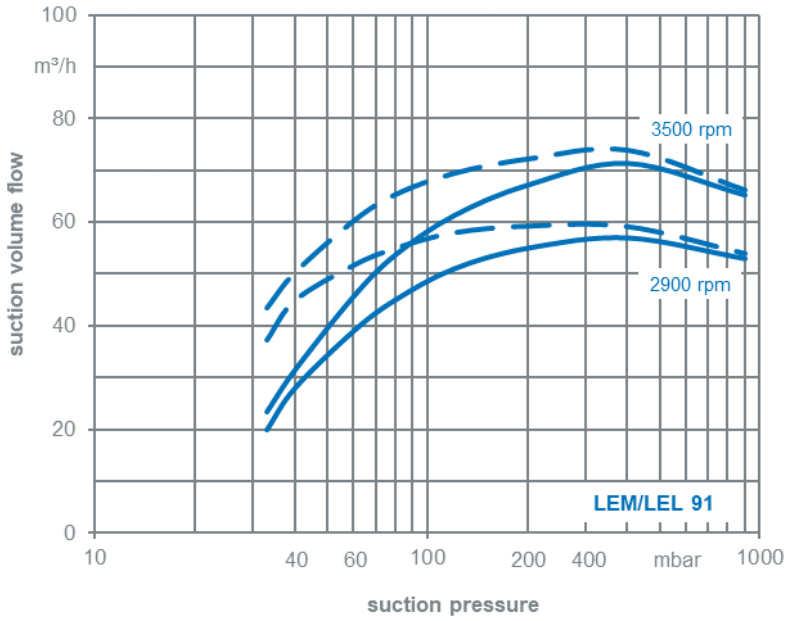
Make-up Liquid Consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference.

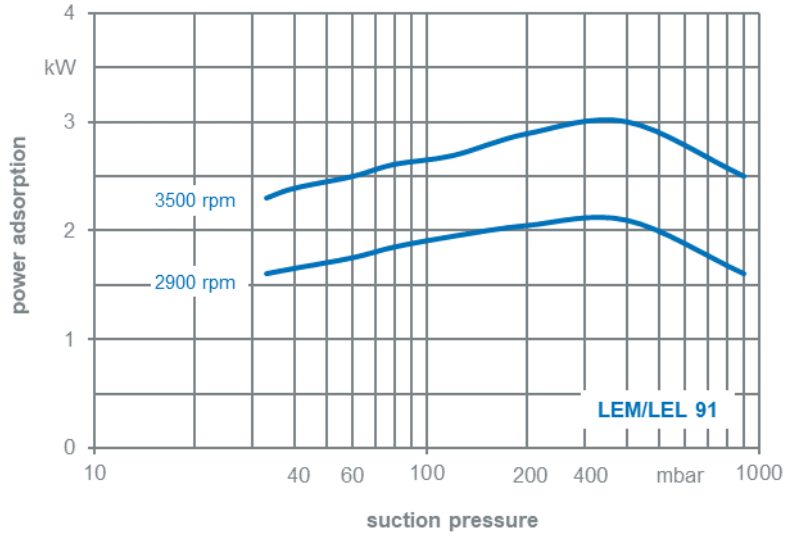
Suction Pressure in [mbar]		33				120				200				400			
Pump Type	Speed [rpm]	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB	KB Temperature Difference [°C]			FB
		10	5	2		10	5	2		10	5	2		10	5	2	
LEM/LEL	2900	0.11	0.19	0.33	0.63	0.13	0.22	0.36	0.62	0.14	0.23	0.36	0.6	0.14	0.22	0.34	0.54
91	3500	0.15	0.24	0.38		0.17	0.27	0.40		0.18	0.27	0.40		0.17	0.26	0.38	
LEM/LEL	2900	0.15	0.24	0.39	0.66	0.16	0.26	0.40	0.62	0.17	0.27	0.40	0.6	0.17	0.26	0.38	0.54
126	3500	0.19	0.30	0.45		0.21	0.31	0.44		0.21	0.31	0.44		0.22	0.31	0.42	
LEM/LEL	1460	0.19	0.34	0.59	1.2	0.23	0.37	0.59	1.0	0.23	0.37	0.57	0.9	0.24	0.37	0.56	0.85
161	1750	0.26	0.43	0.70		0.28	0.44	0.66		0.29	0.44	0.63		0.30	0.44	0.62	

FB = total service liquid flow rate on once-through system

KB = flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C, warmer than make-up water

Performance Characteristics LEM 91 / LEL 91



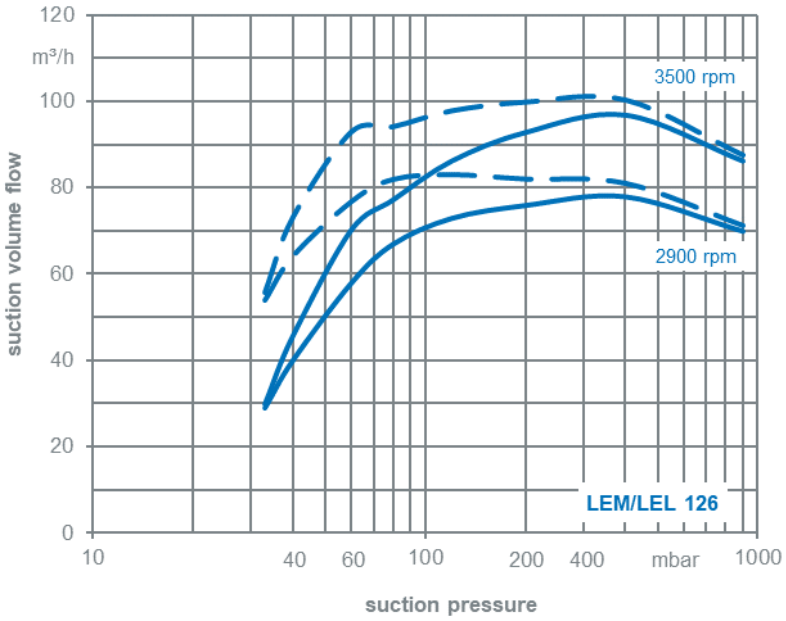


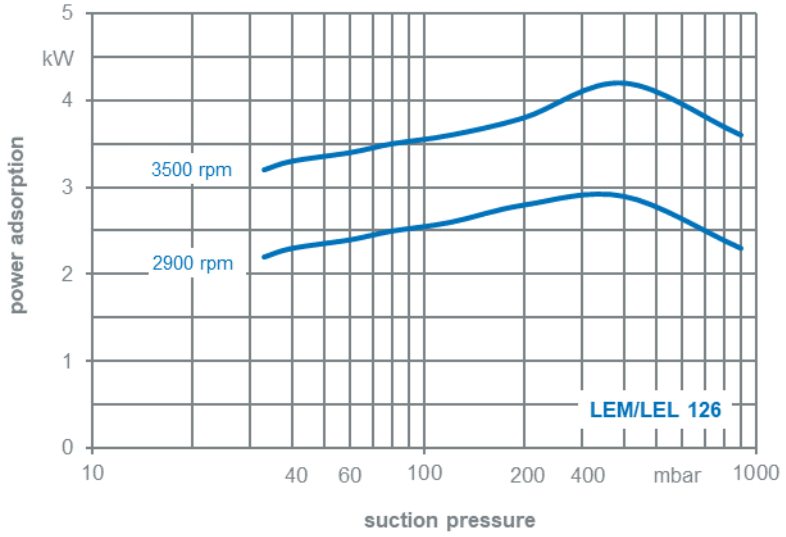
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 126 / LEL 126



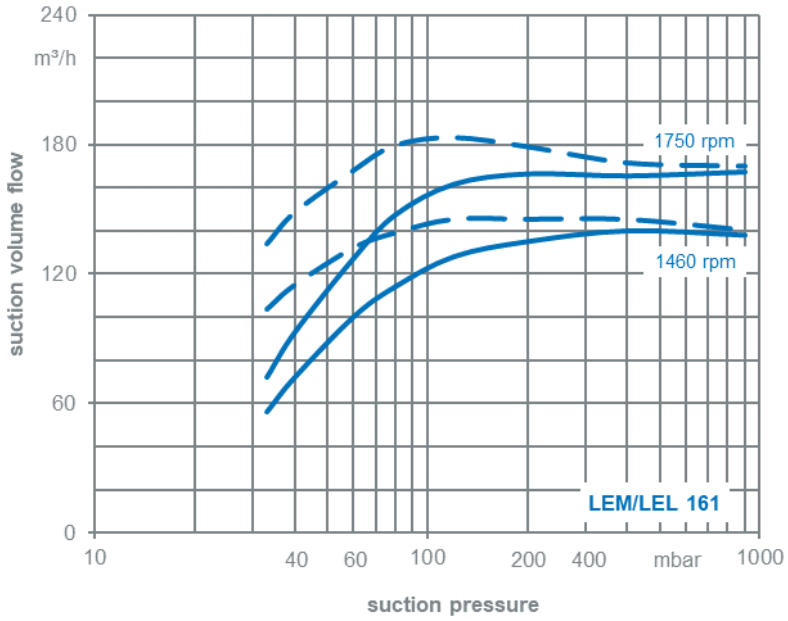


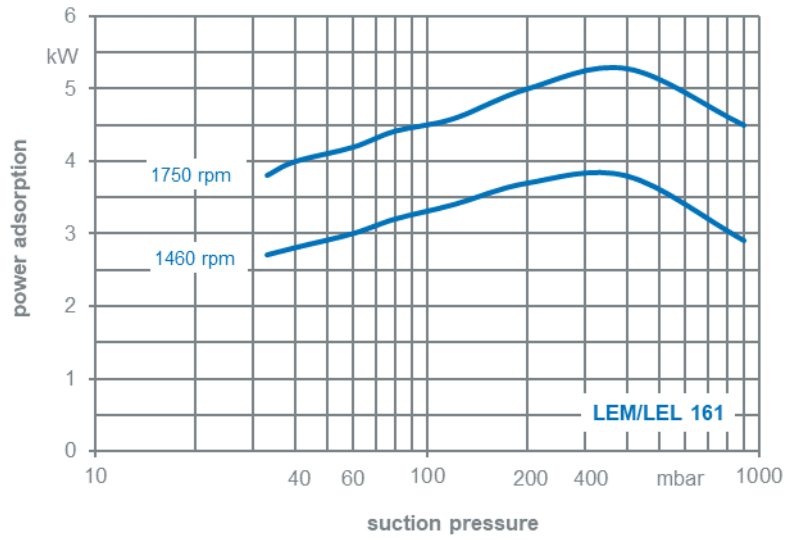
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Performance Characteristics LEM 161 / LEL 161



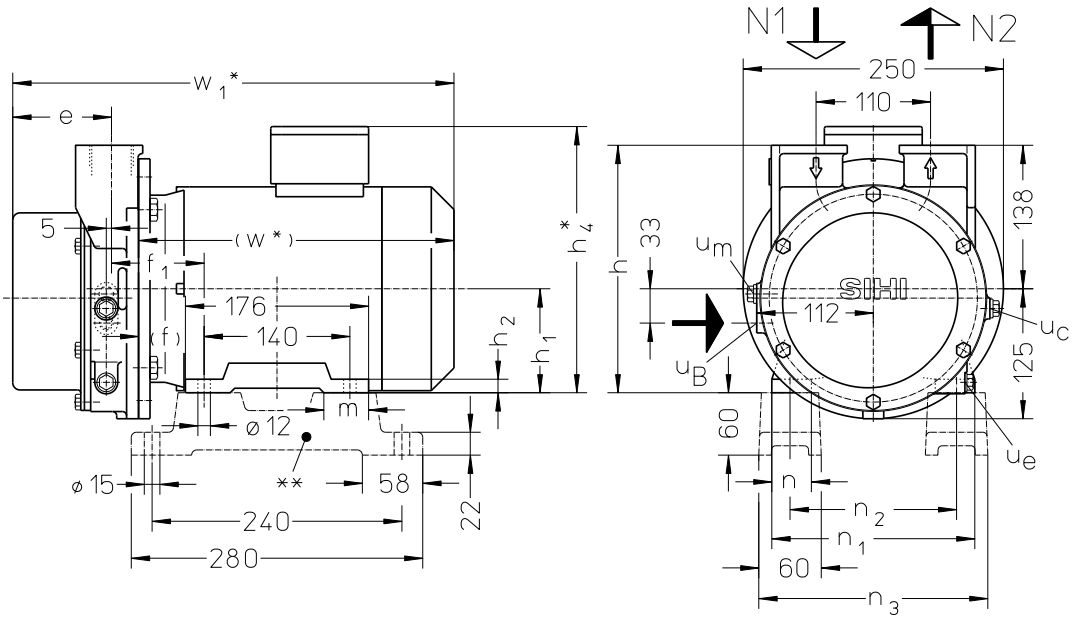


The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

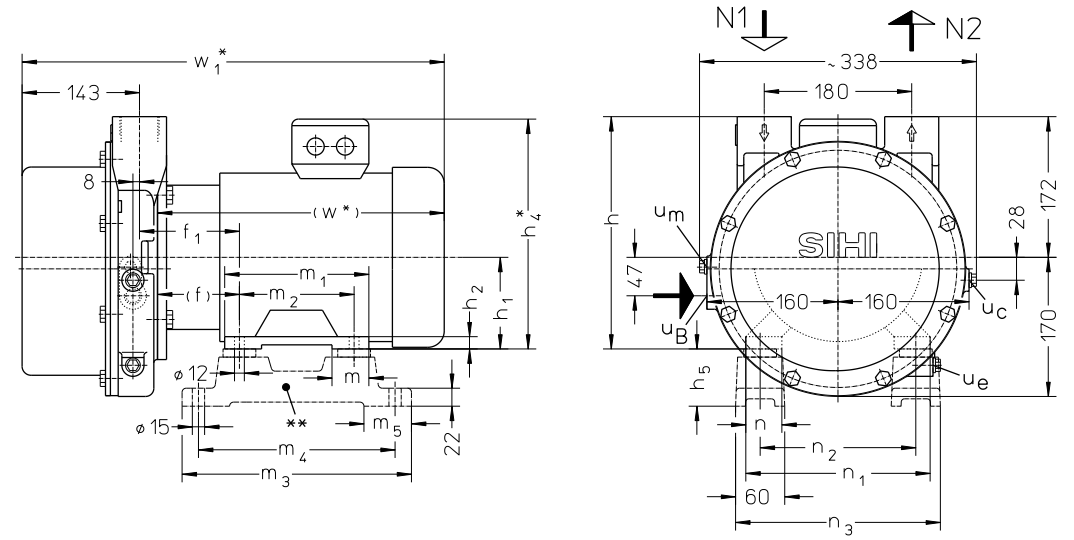
Dimensions LEM 91, 126, 161



N 1 = gas inlet G 1¼
N 2 = gas outlet G 1¼
u_B = connection for service liquid G ¼
u_c = connection for cavitation protection G ¼
u_e = connection for drain G ¼
u_m = connection for pressure gauge G ¼

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	e [mm]	f [mm]	f_1 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_4* [mm]	m [mm]	n [mm]	n_1 [mm]	n_2 [mm]	n_3 [mm]	w * [mm]	w_1* [mm]	approx. weight [kg]
LEM 91	100 L	2.2	-	91	63	89	238	100	13	253	43	38	195	160	220	303	420	35
		-	3.3													324	441	41
LEM 126	100 L	3.0	-	95												303	424	37
	112 M	-	4.5		70	96	250	112	15	278	45	44	225	190	250	320	441	44

other motors on request
* dimensions dependent upon motor supplier
** see list of accessories

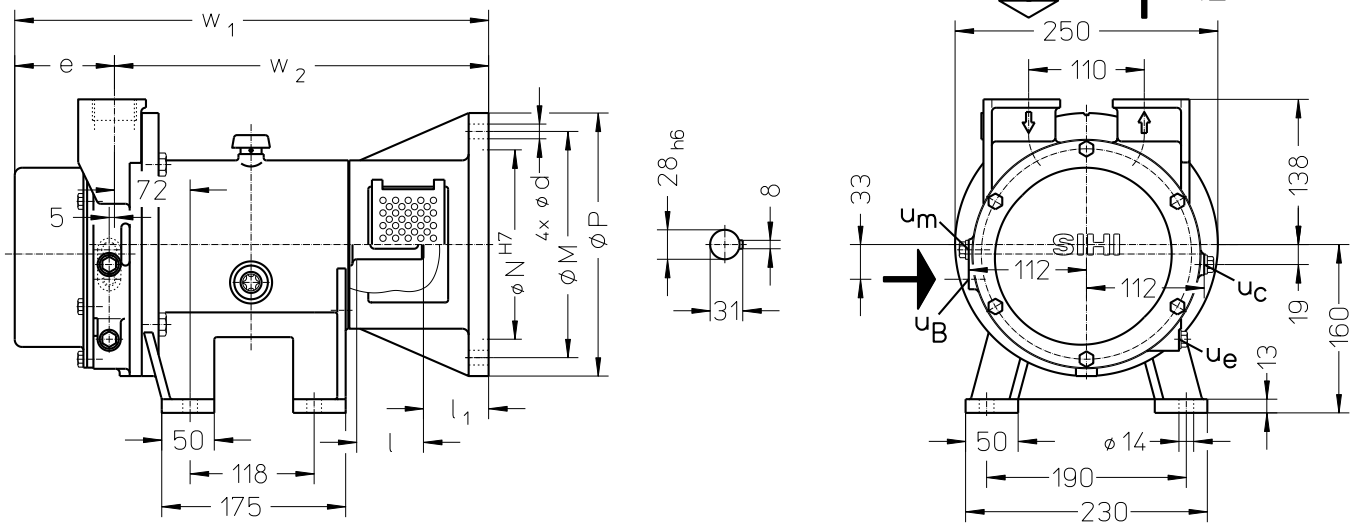


N 1 = gas inlet G 1½
N 2 = gas outlet G 1½
u_B = connection for service liquid G ½
u_c = connection for cavitation protection G ¼
u_e = connection for drain G ¼
u_m = connection for pressure gauge G ¼

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f [mm]	f_1 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_4* [mm]	h_5 [mm]	m [mm]	m_1 [mm]	m_2 [mm]	m_3 [mm]	m_4 [mm]	m_5 [mm]	n [mm]	n_1 [mm]	n_2 [mm]	n_3 [mm]	w * [mm]	w_1* [mm]	approx. weight [kg]
LEM 161	112 M	4.0	-	100	122	284	112	15	280	70	45	176	140	280	240	58	44	225	190	250	380	545	73
	132 M	-	6.0	110	132	304	132	18	330	60	88	218	178	320	278	-	55	256	216	276	461	626	119

other motors on request
* dimensions dependent upon motor supplier
** see list of accessories

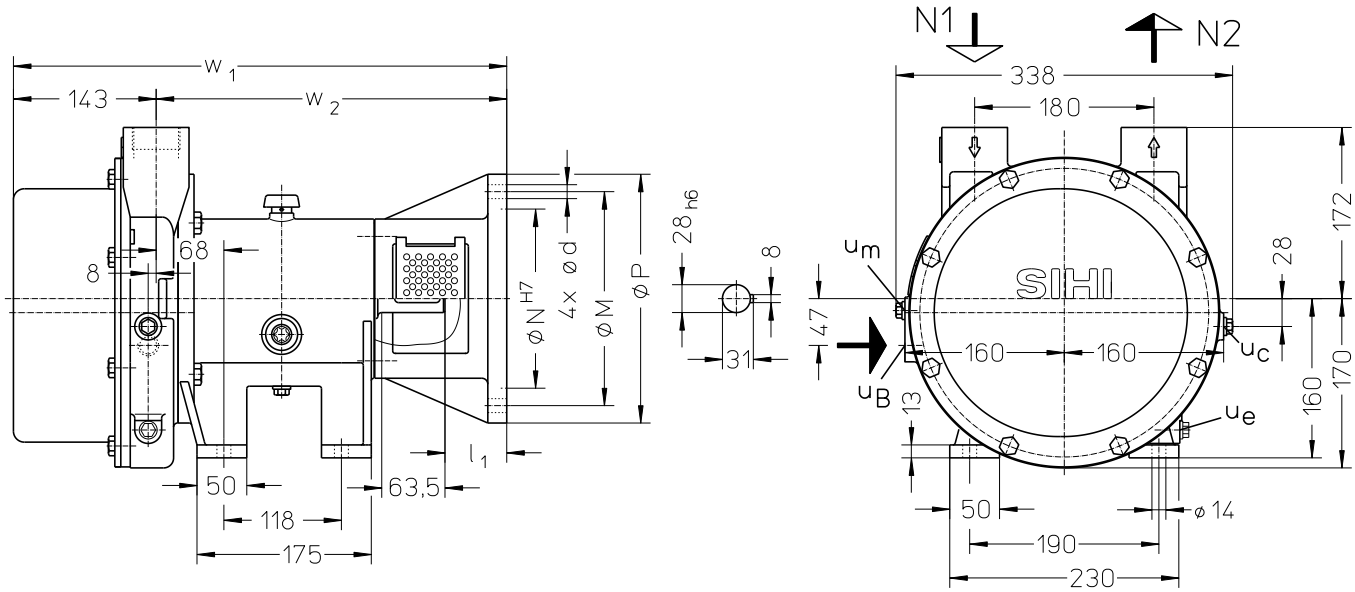
Dimensions LEL 91, LEL 126, LEL 161



N 1 = gas inlet G 1¼
N 2 = gas outlet G 1¼
u_B = connection for service liquid G ¼
u_c = connection for cavitation protection G ¼
u_e = connection for drain G ¼
u_m = connection for pressure gauge G ¼

	electric motor 50 Hz size	kW IP 55	kW EEx e II T3	d [mm]	e [mm]	l [mm]	l_1 [mm]	M [mm]	N [mm]	P [mm]	w_1 [mm]	w_2 [mm]	approx. weight [kg]
LEL 91	90 L	2.2	-	M10	91	87,5	52	165	130	200	461	370	52
	100 L	-	2.5	14		63,5	62	215	180	250	446	356	48
LEL 126	100 L	3.0	-		95						451		
	112 M	-	3.3										

other motors on request

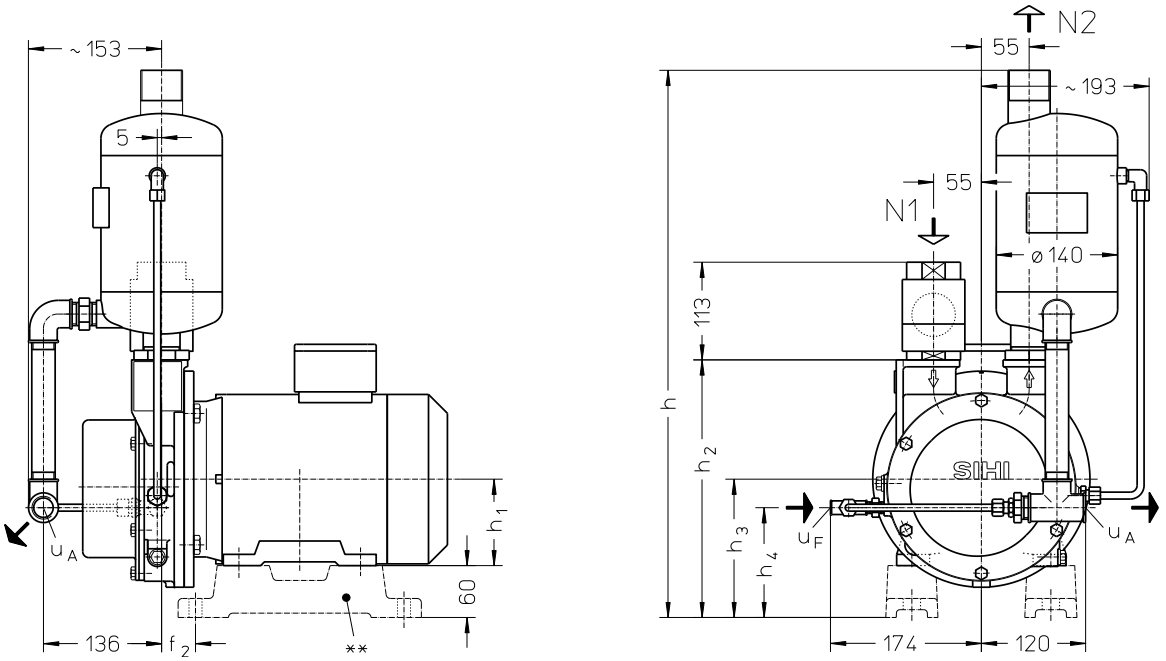


N 1 = gas inlet G 1½
N 2 = gas outlet G 1½
u_B = connection for service liquid G ½
u_c = connection for cavitation protection G ¼
u_e = connection for drain G ¼
u_m = connection for pressure gauge G ¼

	electric motor 50 Hz size	kW IP 55	kW EEx e II T3	d [mm]	l_1 [mm]	M [mm]	N [mm]	P [mm]	w_1 [mm]	w_2 [mm]	approx. weight [kg]
LEL 161	112 M	4.0	-	14	62	215	180	250	495	352	64
	132 S	-	5.0	M12	82	265	230	300	515	372	72

other motors on request

Arrangement drawing LEM 91, 126, 161

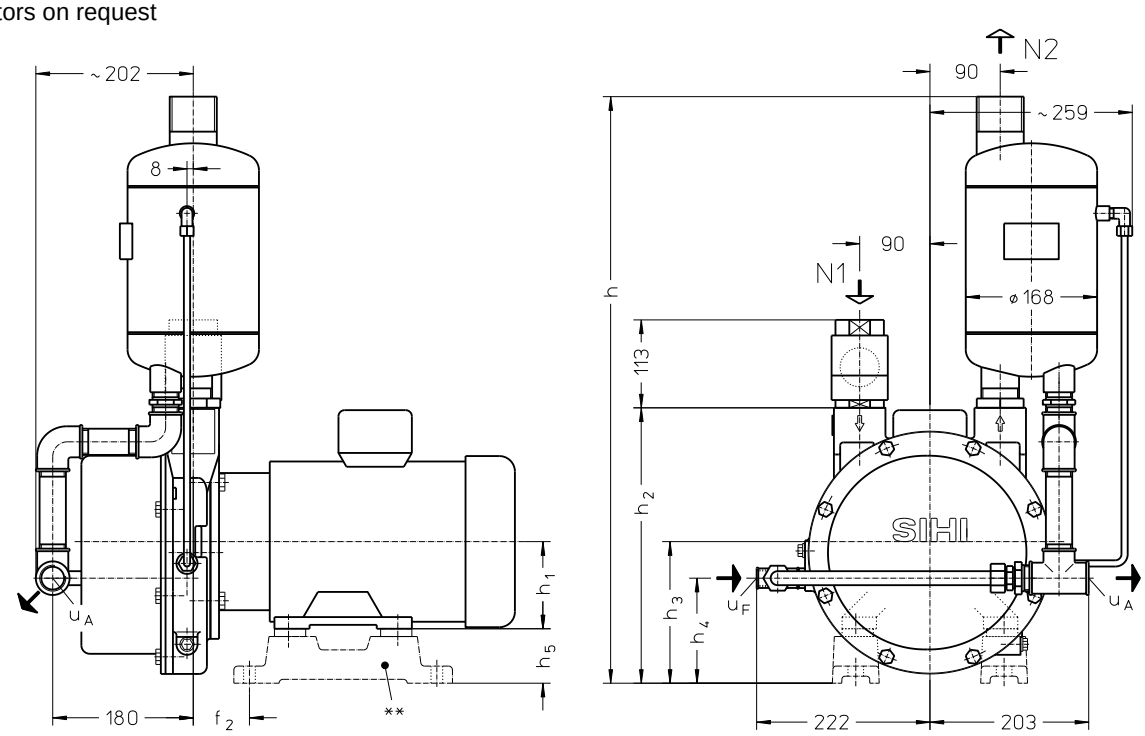


N 1 = gas inlet G 1¼ u_A = liquid drain G ¾

N 2 = gas outlet G 1½ u_F = connection for make-up liquid G ¼

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f_2 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	h_4 [mm]	approx. weight [kg]
LEM 91	100 L	2.2	-	39	633	100	298	160	127	49
		-	3.3							55
LEM 126	100 L	3.0	-							51
	112 M	-	4.5	46	645	112	310	172	139	58

other motors on request



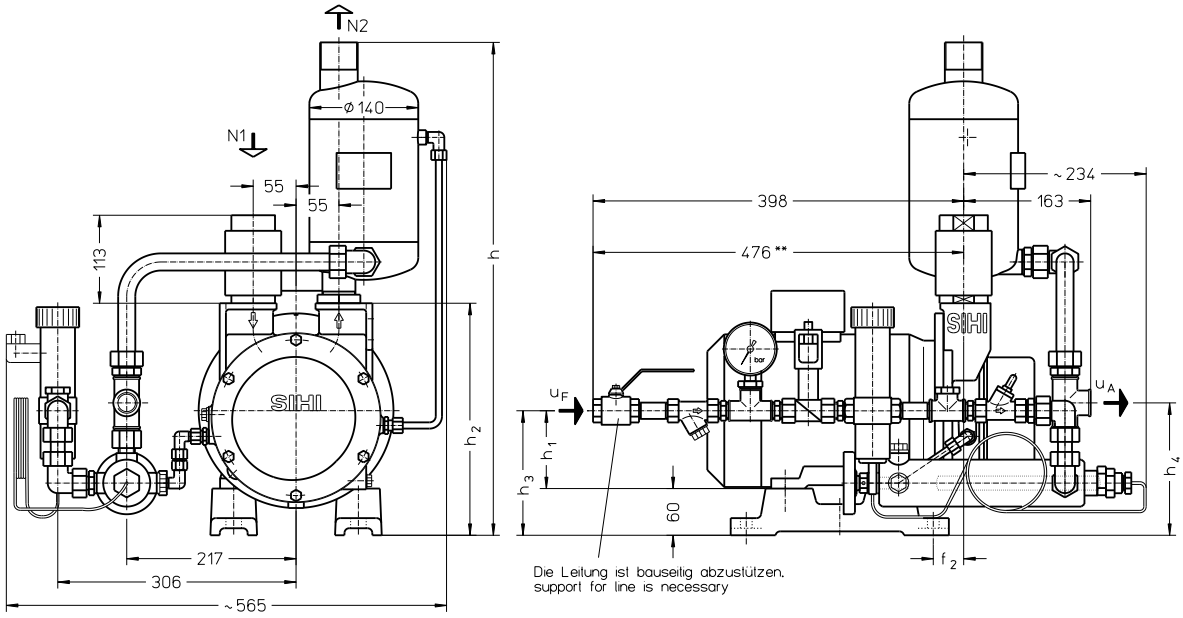
N 1 = gas inlet G 1½ u_A = liquid drain G 1

N 2 = gas outlet G 2 u_F = connection for make-up liquid G ½

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f_2 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	h_4 [mm]	h_5 [mm]	approx. weight [kg]
LEM 161	112 M	4,0	-	72	754	112	354	182	135	70	87
	132 M	-	6,0	82	764	132	364	192	145	60	133

other motors on request

Arrangement drawing LEM 91, 126, 161 with thermostatic control



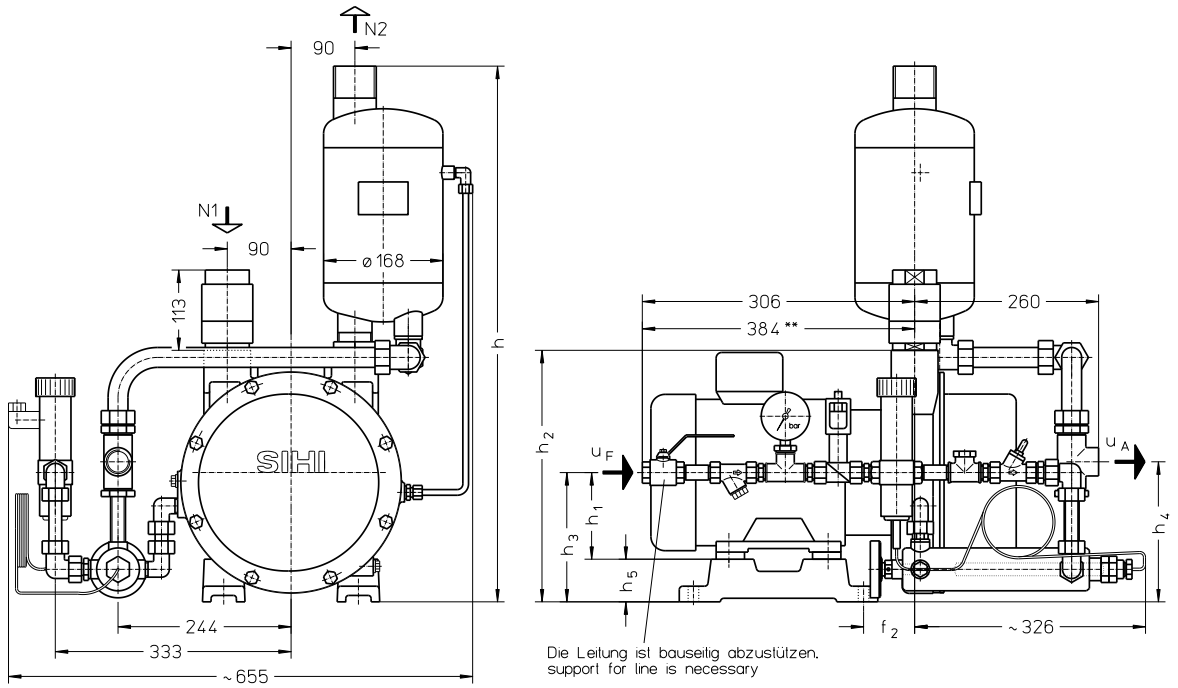
N 1 = gas inlet G 1¼ u_A = liquid drain G ¾

N 2 = gas outlet G 1½ u_F = connection for make-up liquid G ½

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f_2 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	h_4 [mm]	approx. weight [kg]
LEM 91	100 L	2.2	-	39	633	100	298	160	170	52
		-	3.3							58
LEM 126	100 L	3.0	-							54
	112 M	-	4.5	46	645	112	310	172	182	61

other motors on request

** only at material 1.4571 the line



N 1 = gas inlet G 1½ u_A = liquid drain G 1

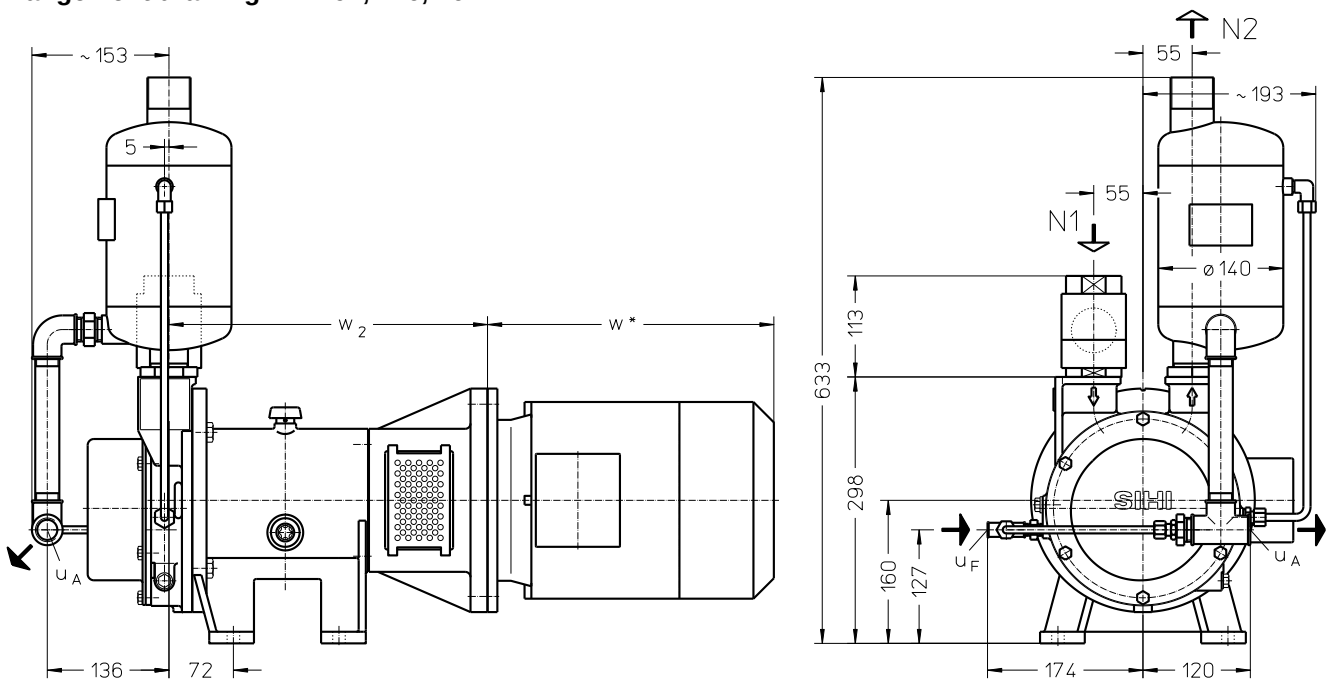
N 2 = gas outlet G 2 u_F = connection for make-up liquid G ½

	size	electric motor IP 55 kW 50 Hz	kW 60 Hz	f_2 [mm]	h [mm]	h_1 [mm]	h_2 [mm]	h_3 [mm]	h_4 [mm]	h_5 [mm]	approx. weight [kg]
LEM 161	112 M	4.0	-	72	754	112	354	182	197	70	92
	132 M	-	6.0	82	764	132	364	192	207	60	138

other motors on request

** only at material 1.4571 the line

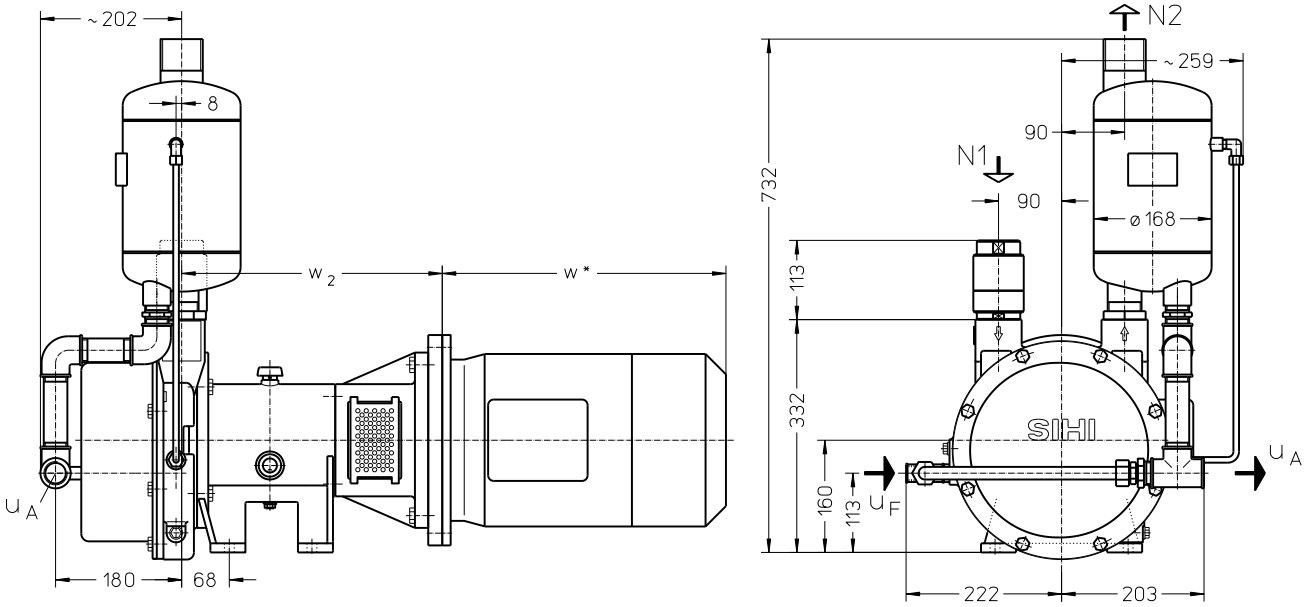
Arrangement drawing LEL 91, 126, 161



	size	electric motor 50 Hz kW IP 55	kW EEx e II T3	w * [mm]	w 2 [mm]	approx. weight [kg]
LEL 91	90 L	2.2	-	269	370	76
	100 L	-	2.5	303	356	81
LEL 126	100 L	3.0	-			77
	112 M	-	3.3	320		87

other motors on request
* dimension dependent upon motor supplier

N 1 = gas inlet G 1¼
N 2 = gas outlet G 1½
u_A = liquid drain G ¾
u_F = connection for make-up liquid G ¼



	size	electric motor 50 Hz kW IP 55	kW EEx e II T3	w * [mm]	w 2 [mm]	approx. weight [kg]
LEL 161	112 M	4.0	-	320	352	104
	132 S	-	5.0	405	372	150

other motors on request
* dimension dependent upon motor supplier

N 1 = gas inlet G 1½
N 2 = gas outlet G 2
u_A = liquid drain G 1
u_F = connection for make-up liquid G ½

Data regarding the pump size - order notes

range + size		hydraulic + bearings	shaft seal	materials	casing sealing	*code of motor connection*
		A• hydraulic A, 8• with threaded connection •Z two grease lubricated antifriction bearings arranged in the motor •B similar to •Z, but arranged in the motor carrier	AAE standard mechanical seal, o-rings butadiene rubber AA1 similar to AAE, but o-rings Viton	0K main parts out of cast iron, impeller in low alloyed steel 4B main parts out of stainless steel	0 liquid seal	ES for IMB5 motor 90L flange ø200 FS for IMB5 motor 100L resp. 112M flange ø250 GS for IMB5 motor 132S flange ø300
LEM	91	AZ	AAE, AA1	0K, 4B	0	
	126					
	161	8Z				
LEL	91	AB				ES, FS
	126					FS
	161	8B				FS, GS

* = only LEL

Motor selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example for ordering LEM:

LEM 126 AZ AAE 0K 0 **with** 3.0 kW AC motor 50 Hz, 230 V∆, IP55

Example for ordering LEL:

LEL 161 8B AAE 0K 0 **for** 4.0 kW AC motor 50 Hz, 230 V∆, IP55 (motor size 112) has the complete designation:

LEL 161 8B AAE 0K 0 **FS**

Accessories LEM 91, 126, 161; LEL 91, 126, 161 with threaded connection

Recommended Accessory	Material Execution		LEM 91 LEL 91	LEM 126 LEL 126	LEM 161 LEL 161
Top Mounted Liquid Separator		Type / weight	XBa 440 / 5 kg		XBa 640 / 7 kg
Top mounted separator	1.4571	SIHI-Part No.	43 132 178		43 132 179
service liquid pipework, standard execution	1.0254 1.4571	SIHI-Part No.	20 037 865 20 038 838		20 059 452 20 061 181
service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	20 048 243 20 048 244		20 048 245 20 048 246
Cavitation protection pipework	1.0254 1.4571	SIHI-Part No.	20 027 918 20 050 497		20 050 498 20 027 919
Side Mounted Liquid Separator		Type / weight			
Side mounted separator	1.4571	SIHI-Part No.			
service liquid pipework, standard execution	1.0254 1.4571	SIHI-Part No.	on request		
Cavitation protection pipework	1.0254 1.4571	SIHI-Part No.			
SIHI – Gas Ejector					
at service liquid temperature 15 °C		Type Weight	GEV 91 A 3.6 resp. 3.8 kg	GEV 126 A 3.9 resp. 4.2 kg	GEV 161 A 4.7 resp. 5.0 kg
at service liquid temperature 30 °C		Type Weight	GEV 91 B 3.6 resp. 3.8 kg	GEV 126 B 3.9 resp. 4.2 kg	GEV 161 B 4.7 resp. 5.0 kg
SIHI – Non Return Ball Valve		Size Weight	G 1 ¼ 1.0 resp. 1.6 kg		G 1 ½ 1.9 kg
	Brass + Butadiene Rubber Brass + Teflon 1.4571 + Teflon	SIHI-Part No.	20 069 579 20 069 525 20 072 819		20 082 115 20 082 117 20 072 820
Support foot	only for LEM				
for motor size 100 L, 112 M		SIHI-Part No.	20 047 010	20 047 010	20 047 011
for motor size 132 M			-	-	20 047 012
Motor standard execution IP 55	only for LEL	Size Power Weight	90 L 2.2 kW 19 kg	100 L 3.0 kW 26 kg	112 M 4.0 kW 34 kg
Coupling for motor IP 55 pump side motor side		Type / weight SIHI-Part No.	B 68 / 1.5 kg 43 028 149 43 021 405	B 80 / 1.5 kg 43 021 414 43 021 417	
Motor in EEx e ll T3 execution	only for LEL	Size Power Weight	100 L 2.5 kW 22 kg	112 M 3.3 kW 28 kg	132 S 5.0 kW 65 kg
Coupling for motor EEx e ll T3 pump side motor side		Type / weight SIHI-Part No.	BDS 88 / 1.9 kg 43 111 058 43 111 029		BDS 103 / 3.1 kg 43 111 051 43 111 040

Designs subject to change without prior notice.

Flowserve SIHI Germany GmbH
Lindenstraße 170, D-25524 Itzehoe, Germany
Tel. +49 (0) 4821 / 77101, Fax +49 (0) 4821 / 771274
www.flowserve.com

Liquid ring vacuum pumps
in compact design

LEM 250
LEL 250

FLOWSERVE
SIHI® Pumps

Pressure range: **33 to 1013 mbar**
Suction volume flow: **100 to 260 m³/h**

CONSTRUCTION

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- shaft not contact with the medium
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM/LEL are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

Pump type		unit	LEM 250 LEL 250
Speed	50 Hz 60 Hz	rpm	1450 1750
Maximum overpressure on compression		bar	LEM 0.3 / LEL 0.5
Permissible pressure difference between suction and discharge side	max. min.	bar	LEM 1.1 / LEL 1.3 0.2
Hydraulic test pressure (overpressure)		bar	3
Moment of inertia of rotating parts of pump and water content		kg · m²	0.097
Noise level at 80 mbar suction pressure		dB (A)	65
Maximum gas temperature	dry saturated	°C °C	200 100
Service liquid Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C °C mm²/s kg/m³ litre	 80 10 4 1200 4
Maximum flow resistance of the heat exchanger		bar	0.2

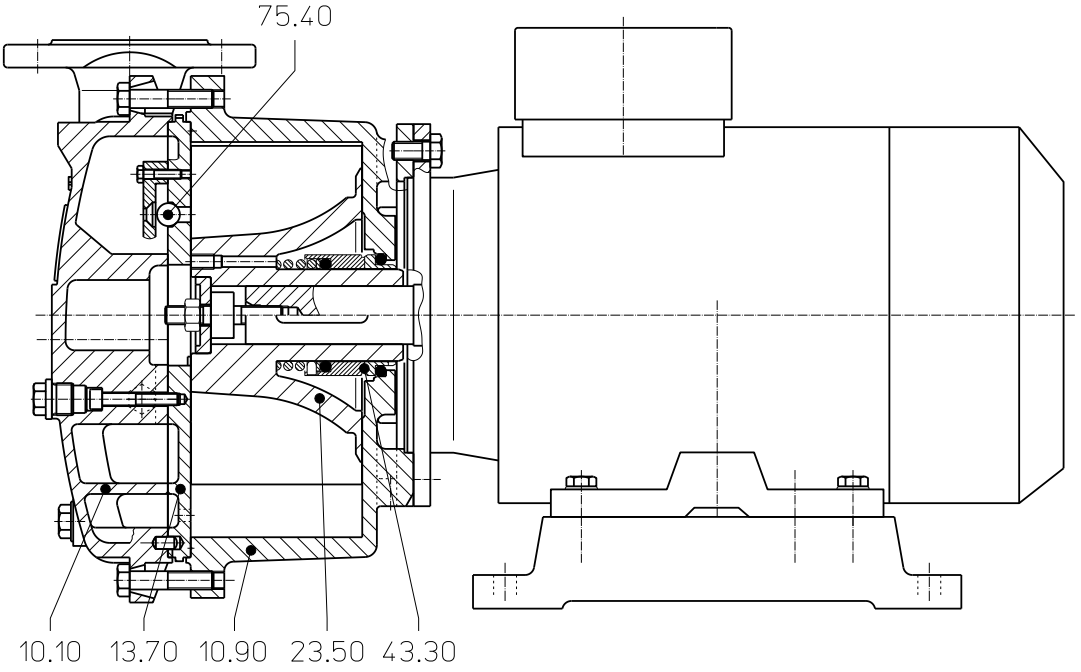
The combination of several limiting values is not admissible.

Materials

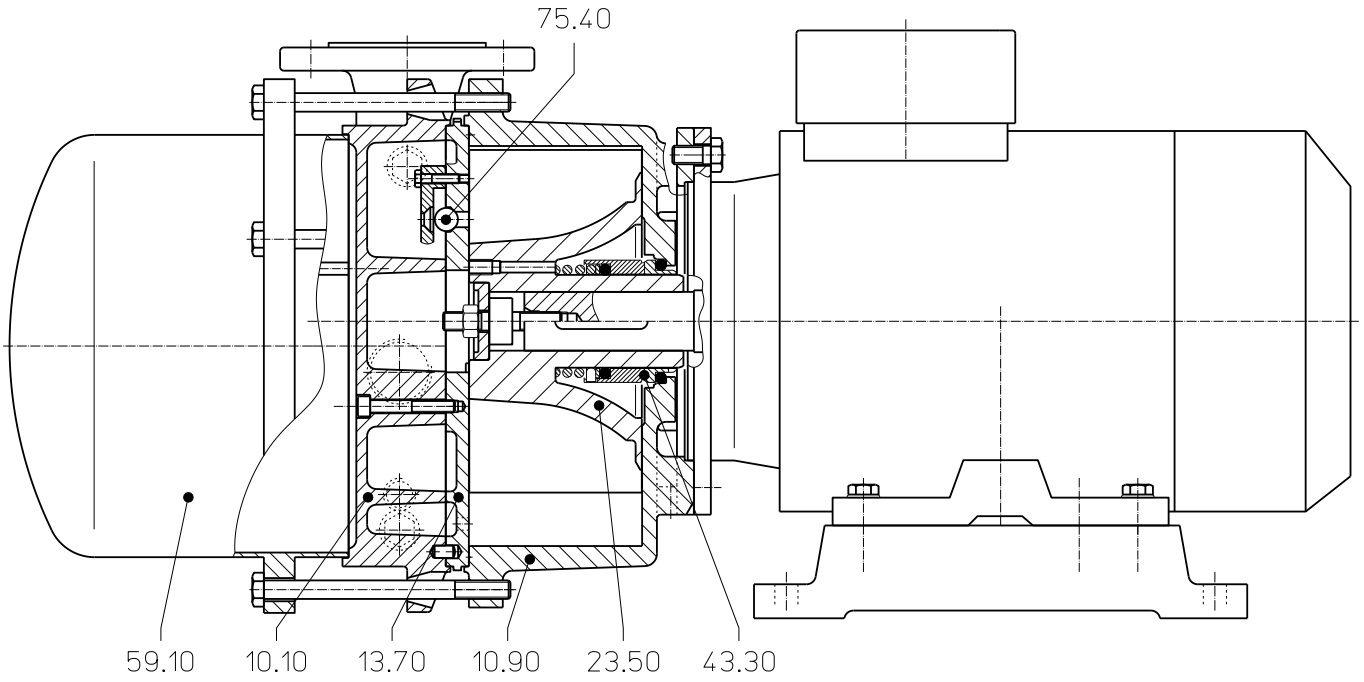
Item	COMPONENTS	MATERIALS 0K
10.10	Vacuum casing	0.6025
10.90	Central body	
13.70	Guide disc	
21.00*	Shaft	1.0503
23.50	Vane wheel impeller	1.4308
34.01*	Motor carrier	0.6025
43.30	Mechanical seal	Cr-Steel / Carbon / Butadiene rubber
59.10	Integrated pre-arranged separator	1.0038
75.40	Valve balls	Polyamide A

* only for LEL 250

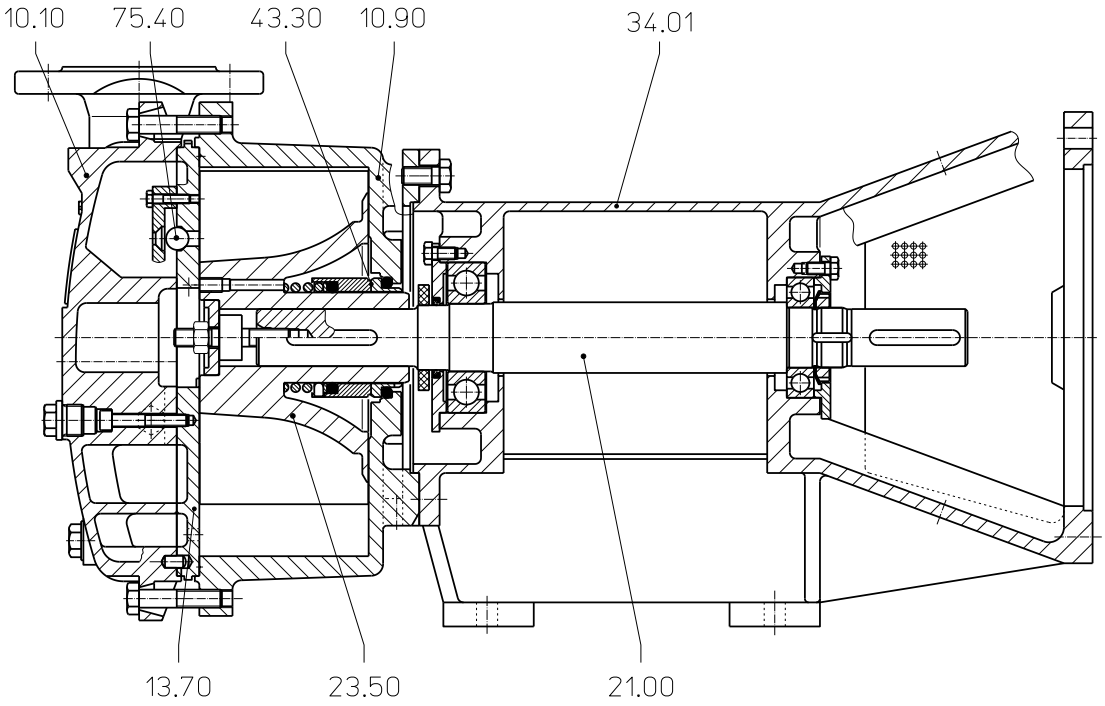
Cut-away diagram LEM 250



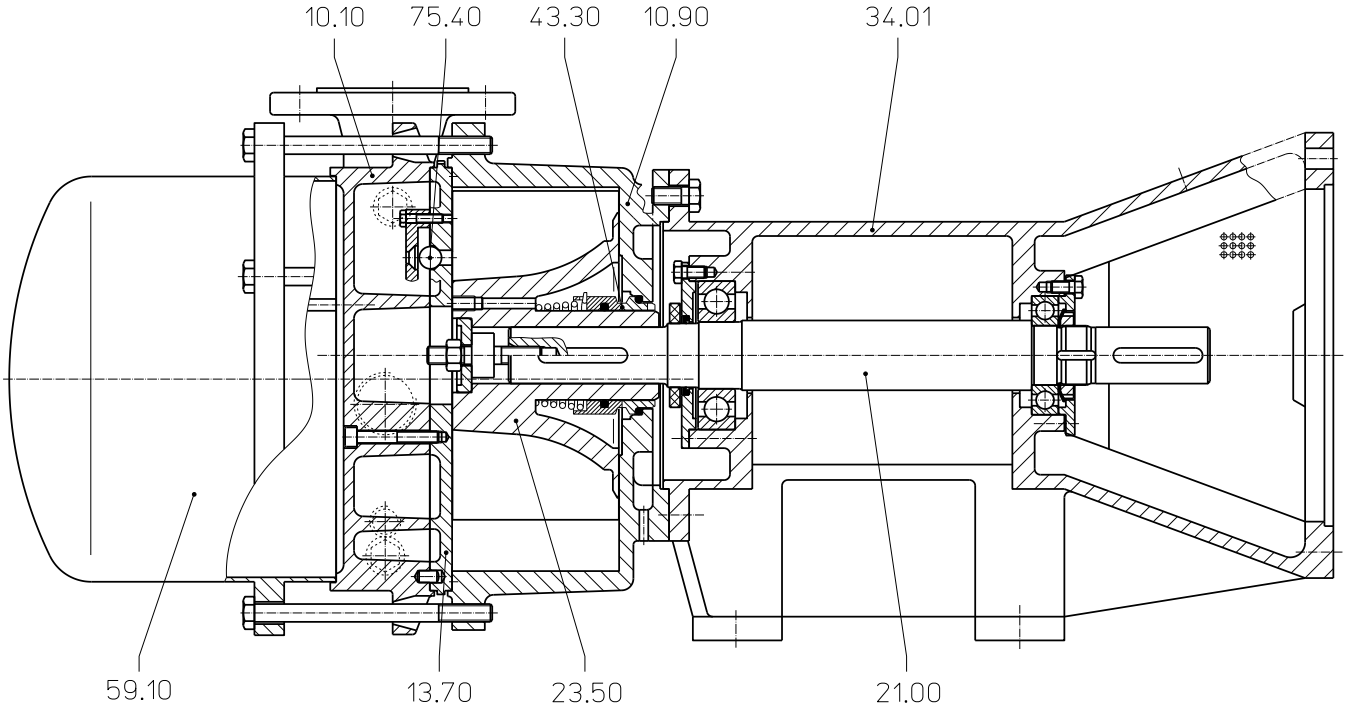
Cut-away diagram LEM 250 with integrated pre-arranged separator



Cut-away diagram LEL 250



Cut-away diagram LEL 250 with integrated pre-arranged separator



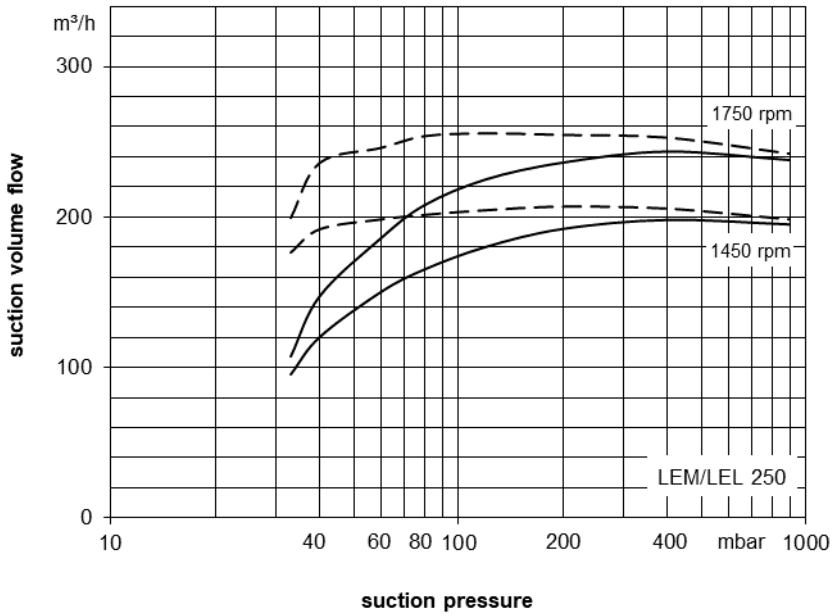
Make-up Liquid Consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference.

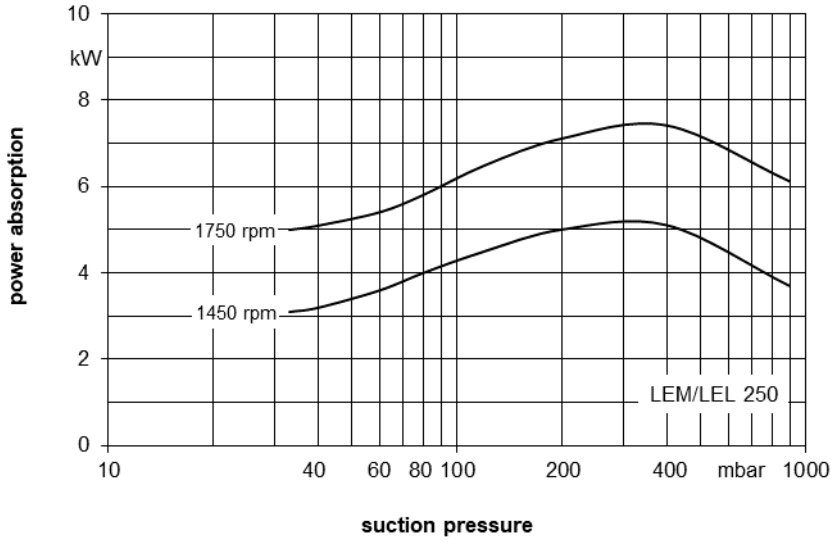
Suction pressure in [mbar]		33				120				200				400			
Pump type	speed [rpm]	KB temperature difference [°C] 10	5	2	FB	KB temperature difference [°C] 10	5	2	FB	KB temperature difference [°C] 10	5	2	FB	KB temperature difference [°C] 10	5	2	FB
LEM/LEL 250	1450	0.22	0.37	0.63	1.2	0.29	0.45	0.70	1.1	0.30	0.46	0.68	1.0	0.28	0.42	0.59	0.8
	1750	0.32	0.50	0.77		0.37	0.55	0.79		0.38	0.55	0.75		0.35	0.49	0.64	

FB = total service liquid flow rate on once-through system

KB = flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C, warmer than make-up water.

Performance Characteristics LEM 250 / LEL 250



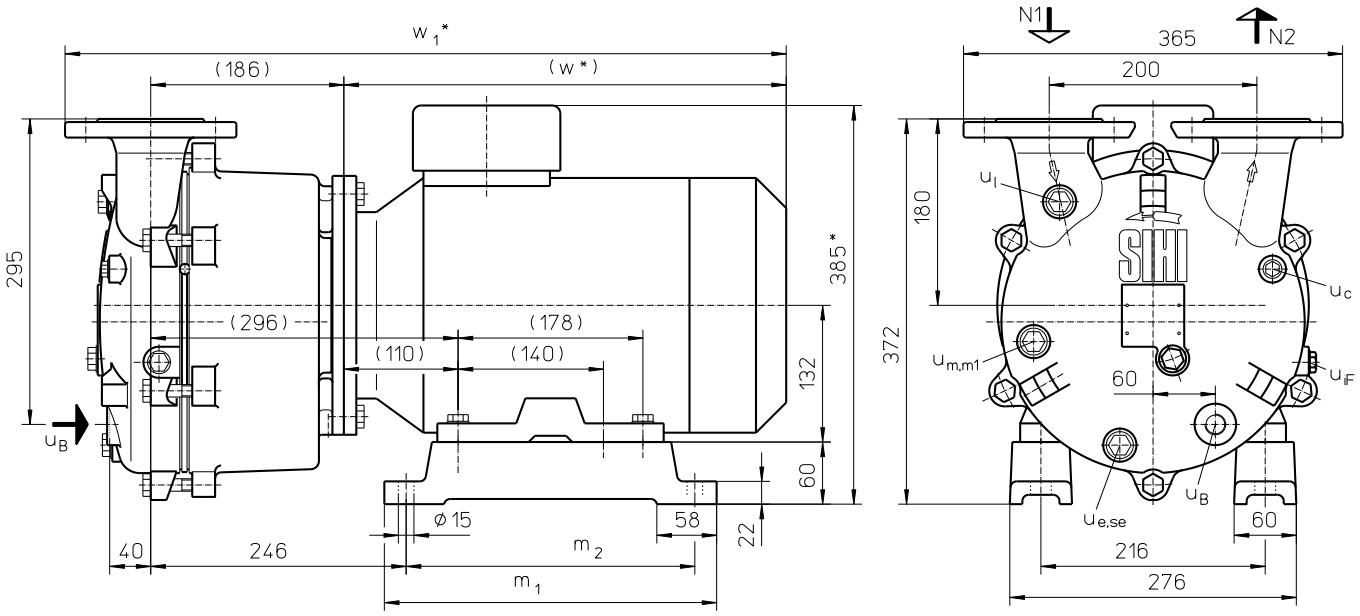


The operating data is valid under the following conditions:

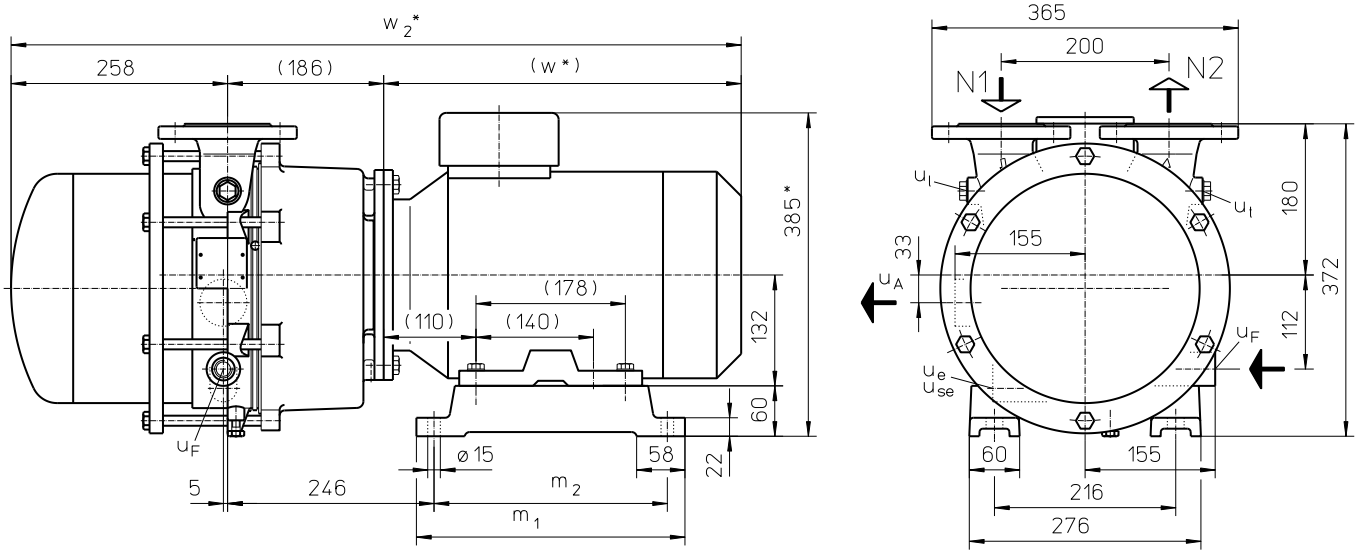
- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 250



Dimensions LEM 250 with integrated pre-arranged separator



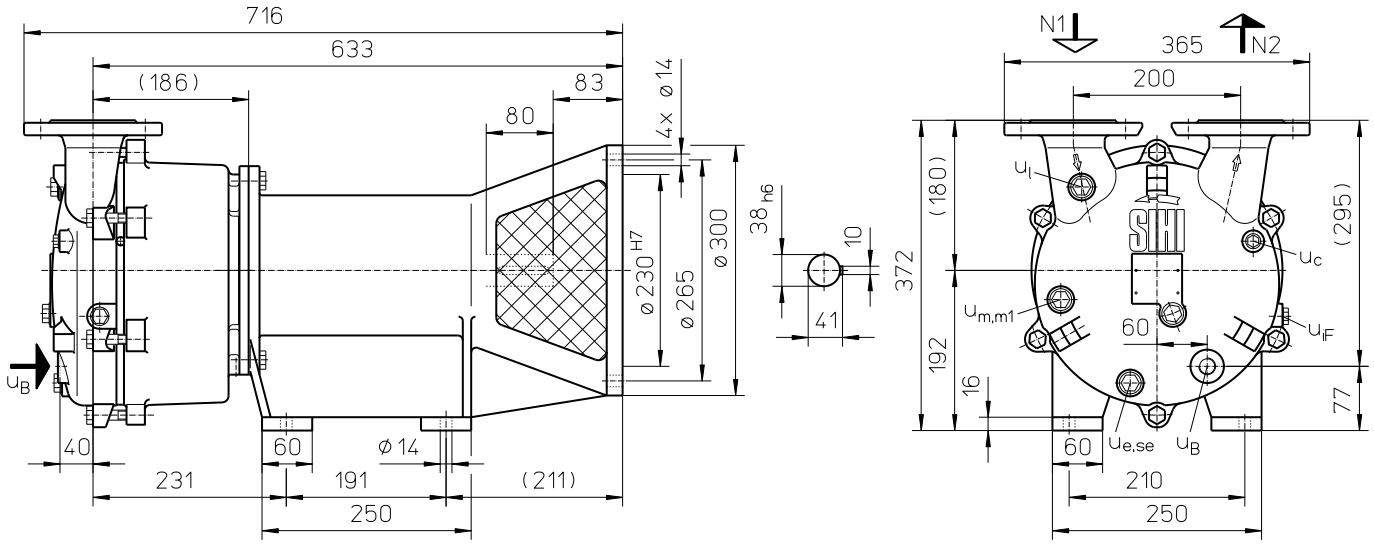
N 1 = gas inlet DN 50
N 2 = gas outlet DN 50
u_A = liquid drain G 1¼
u_B = connection for service liquid G ½
u_F = connection for make-up liquid G ½
u_c = connection for protection against cavitation G ¼
u_e = connection for drain G ½
u_{se} = connection for dirt drain G ½
u_l = connection for air cock G ½
u_m = connection for pressure gauge G ½
u_{m1} = connection for drainage valve G ½
u_t = connection for thermometer G ½
u_{iF} = adjusting screw for internal liquid return

	electric motor IP 55								approx. weight [kg]	
	size	kW 50 Hz	kW 60 Hz	m_1 [mm]	m_2 [mm]	w * [mm]	w_1* [mm]	w_2* [mm]	LEM	+ integr. pre-arranged separator
LEM 250	132 S	5.5	-	280	240	426	695	870	115	124
	132 M	-	8.0	320	278	476	745	920	130	139

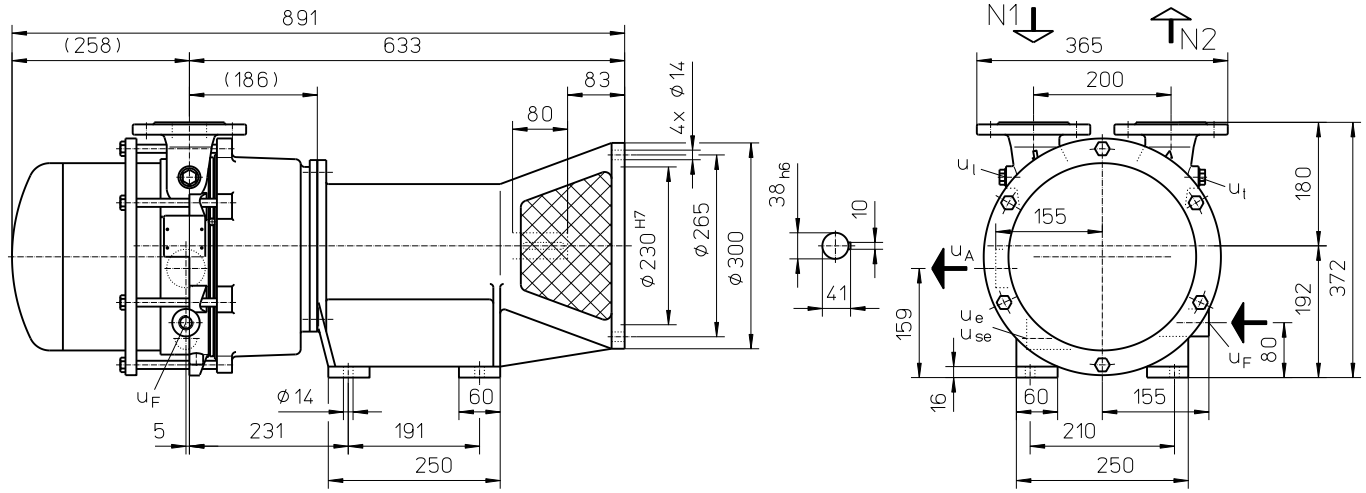
other motors on request
* dimensions dependent upon motor supplier

flange connections see page 8

Dimensions LEL 250



Dimensions LEL 250 with integrated pre-arranged separator

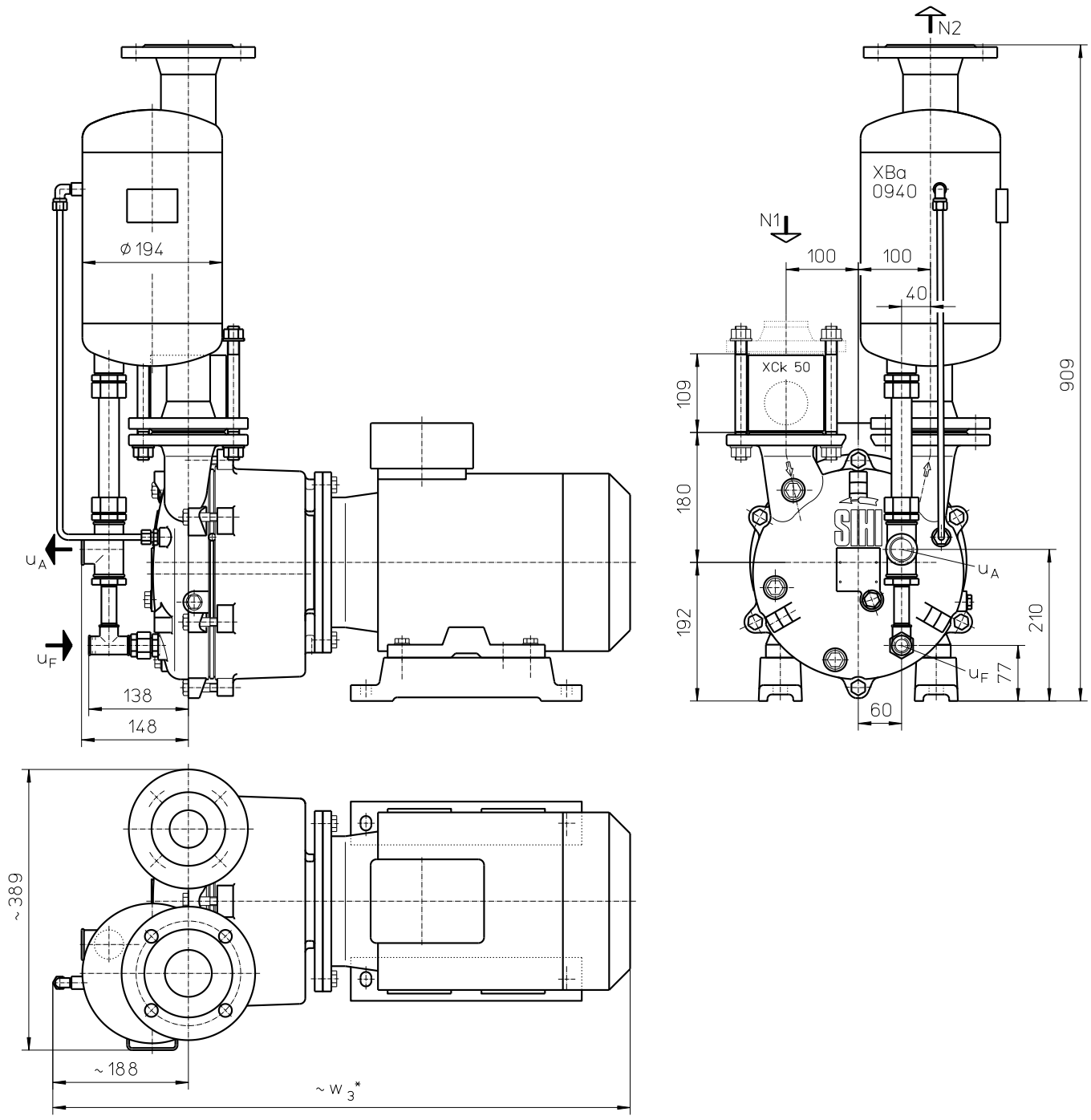


N 1 = gas inlet DN 50
N 2 = gas outlet DN 50
u_A = liquid drain G 1¼
u_B = connection for service liquid G ½
u_F = connection for make-up liquid G ½
u_c = connection for protection against cavitation G ¼
u_e = connection for drain G ½
u_{se} = connection for dirt drain G ½
u_l = connection for air cock G ½
u_m = connection for pressure gauge G ½
u_{m1} = connection for drainage valve G ½
u_t = connection for thermometer G ½
u_{iF} = adjusting screw for internal liquid return

	approx. weight [kg]	
	LEL	+ integr. pre-arranged separator
LEL 250	91	100

flange connections see page 8

Arrangement drawing LEM 250



N 1 = gas inlet DN 50

N 2 = gas outlet DN 65

u_A = liquid drain G 1

u_F = connection for make-up liquid G ½

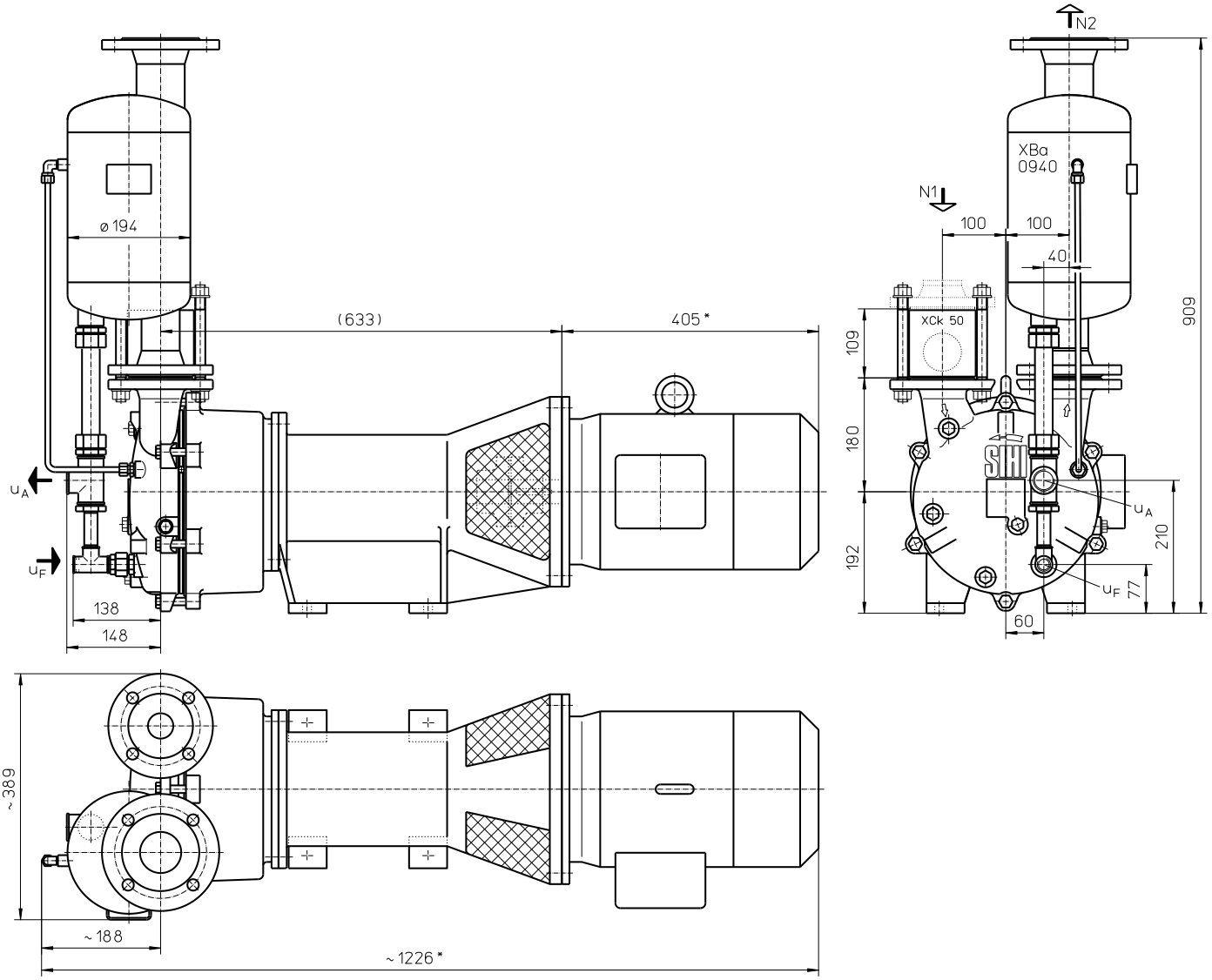
	electric motor IP 55				
	size	kW		w 3*	approx. weight
		50 Hz	60 Hz	[mm]	[kg]
LEM 250	132 S	5.5	-	800	129
	132 M	-	8.0	850	144

other motors on request

* dimensions dependent upon motor supplier

flange connections see page 8

Arrangement drawing LEL 250

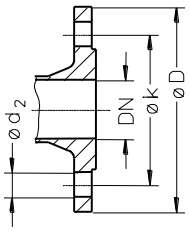


N 1 = gas inlet DN 50
N 2 = gas outlet DN 65
u_A = liquid drain G 1
u_F = connection for make-up liquid G ½

	electric motor 50 Hz			
	size	kW		approx. weight
		IP 55	EEx e II T3	[kg]
LEL 250	132 S	5.5	-	150
	132 M	-	6.8	185

other motors on request
* dimensions dependent upon motor supplier

flange connections according to DIN 2501 PN 10 [mm]		
DN	50	65
k	125	145
D	165	185
number x d_2	4 x 18	4 x 18



Data regarding the pump size - order notes

range + size	hydraulic + bearings	shaft seal	materials	casing sealing
	A• hydraulic A R• with integrated pre-arranged separator •Z two grease lubricated antifriction bearings arranged in the motor •B similar to •Z, but arranged in the motor carrier	AAE standard mechanical seal, o-rings Perbunan	0K main parts out of cast iron, impeller in low alloyed steel	0 liquid seal
LEM 250	AZ, RZ	AAE	0K	0
LEL 250	AB, RB			

Motor Selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example for ordering LEM:

LEM 250 AZ AAE 0K 0 **with** 5.5 kW AC motor 50 Hz, 400 VΔ, IP55

Example for ordering LEL:

LEL 250 AB AAE 0K 0 **for** 5.5 kW AC motor 50 Hz, 400 VΔ, IP55 has the complete designation:

LEL 250 AB AAE 0K 0

Accessories LEM 250, LEL 250

Recommended Accessory	Material Execution		LEM 250 LEL 250
Top Mounted Liquid Separator		Type weight	XBa 0940 10.5 kg
Top mounted separator	1.4571	SIHI-Part No.	43 132 190
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 060 809 20 060 810
Service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	20 051 110 20 051 111
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 050 494 20 050 495
Side Mounted Liquid Separator		Type weight	XBp 0414 31 kg
Side mounted separator	1.4571	SIHI-Part No.	35 000 505
Pressure pipework (bend)	1.0254 1.4571	SIHI-Part No.	35 003 214 35 003 215
Service liquid pipework, standard execution	1.0254 1.4571	SIHI-Part No.	20 054 574 20 054 575
Cavitation protection pipework	1.0254 1.4571	SIHI-Part No.	20 041 563 20 041 564
Sterling SIHI – Gas Ejector see Technical Catalogue – Gas Ejector			
at service liquid temperature 15 °C		Type / weight	GEV 250 A / 13 kg
at service liquid temperature 30 °C		Type / weight	GEV 250 B / 13 kg
Sterling SIHI – Non Return Ball Valve			
Intermediate flange execution XCk 50	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4571 + Teflon	SIHI-Part No. weight	20 072 792 / 3.6 kg 20 072 791 / 3.8 kg 20 029 498 / 10.8 kg
Flange execution with glass cylinder XCk 506	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4408 + Teflon	SIHI-Part No. weight	20 072 838 / 8.5 kg 20 072 849 / 8.5 kg 20 072 837 / 8.5 kg
Motor standard execution IP 55	only for LEL	Size Power Weight	132 S 5.5 kW 45 kg
Coupling for motor IP 55 pump side motor side		Type / weight SIHI-Part No.	B 95 / 2.6 kg 43 021 429 43 021 433
Motor in EEx e ll T3 execution	only for LEL	Size Power Weight	132 M 6.8 kW 61 kg
Coupling for motor EEx e ll T3 pump side motor side		Type / weight SIHI-Part No.	BDS 103 / 3.1 kg 43 111 064 43 111 040

Any changes in the interest of the technical development are reserved.

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www.flowserve.com

Liquid ring vacuum pumps
in compact design

FLOWSERVE
SIHI® Pumps

LEM 251
LEL 251

Pressure range: **33 to 1013 mbar**
Suction volume flow: **100 to 260 m³/h**

CONSTRUCTION

Flowserve SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- non-polluting due to nearly isothermal compression
- oil-free, as no lubrication in the working chamber
- handling of nearly all gases and vapours
- small quantities of entrained liquid can be handled
- easy maintenance and reliable operation
- low noise and nearly free from vibration
- wide choice of material, therefore applicable nearly everywhere
- protection against cavitation as standard
- incorporated dirt drain
- incorporated central drain
- no metallic contact of the rotating parts

The Flowserve SIHI liquid ring vacuum pumps LEM/LEL are single-stage ones.

APPLICATION

Handling and exhausting of dry and humid gases; entrained liquid can be handled during normal duty. The pumps are applied in all fields where a pressure of 33 to 900 mbar must be created by robust vacuum pumps.

NOTE

During operation the pump must continuously be supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to replenish the liquid ring, because part of the liquid is leaving the pump together with the gas. This liquid can be separated from the gas in a liquid separator (see catalogue part accessories).
It is possible to reuse the service liquid. The pumps are equipped with a device by which the contaminated service liquid can continuously be drained during operation (dirt drain), if necessary.

The direction of rotation is clockwise, when looking from the drive on the pump.

GENERAL TECHNICAL DATA

Pump type		unit	LEM 251 LEL 251
Speed	50 Hz 60 Hz	rpm	1450 1750
Maximum overpressure on compression		bar	LEM 0.3 / LEL 0.5
Permissible pressure difference between suction and discharge side	max. min.	bar	LEM 1.1 / LEL 1.3 0.2
Hydraulic test pressure (overpressure)		bar	3
Moment of inertia of rotating parts of pump and water content		kg · m²	0.097
Noise level at 80 mbar suction pressure		dB (A)	65
Maximum gas temperature	dry saturated	°C °C	200 100
Service liquid Maximum permissible temperature Minimum permissible temperature Maximum viscosity Maximum density Liquid capacity up to middle of shaft		 °C °C mm²/s kg/m³ litre	 80 10 4 1200 2.7
Maximum flow resistance of the heat exchanger		bar	0.2

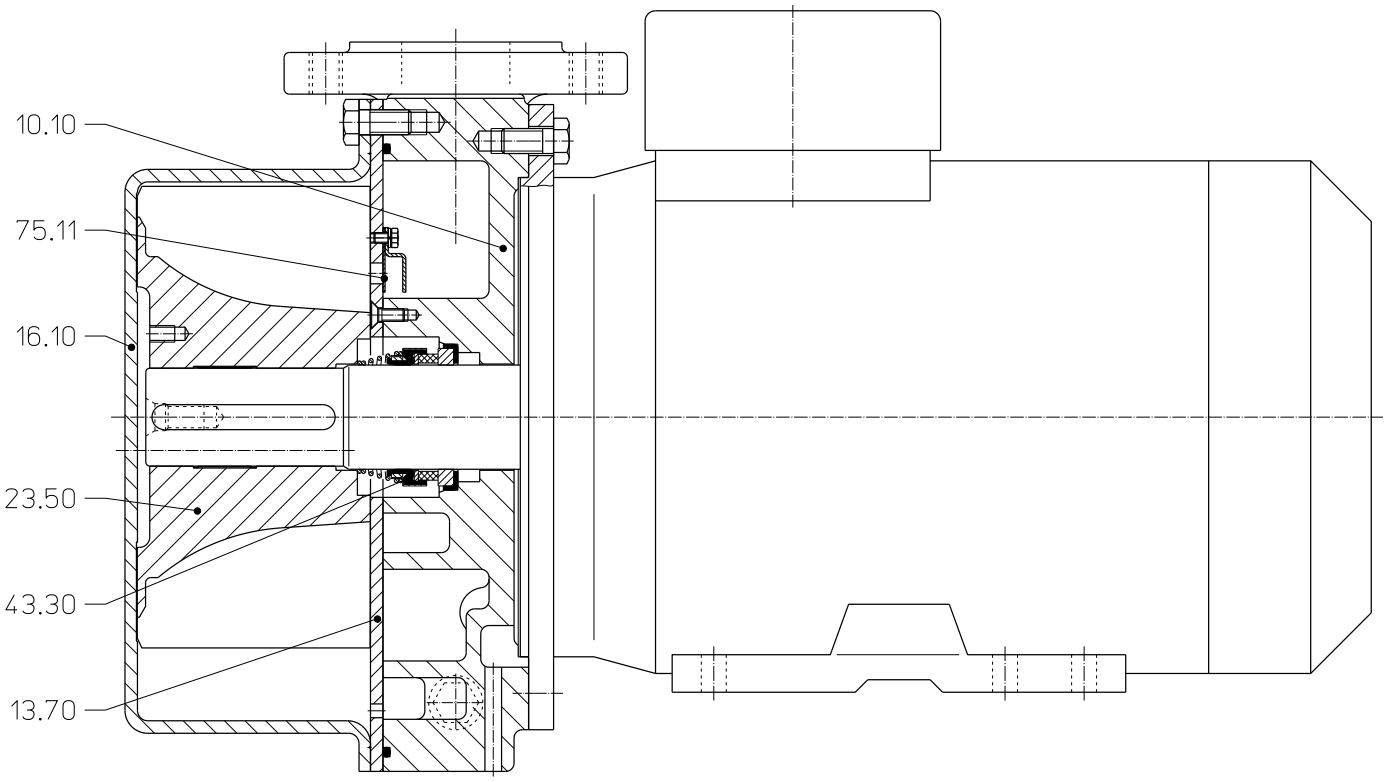
The combination of several limiting values is not admissible.

Materials

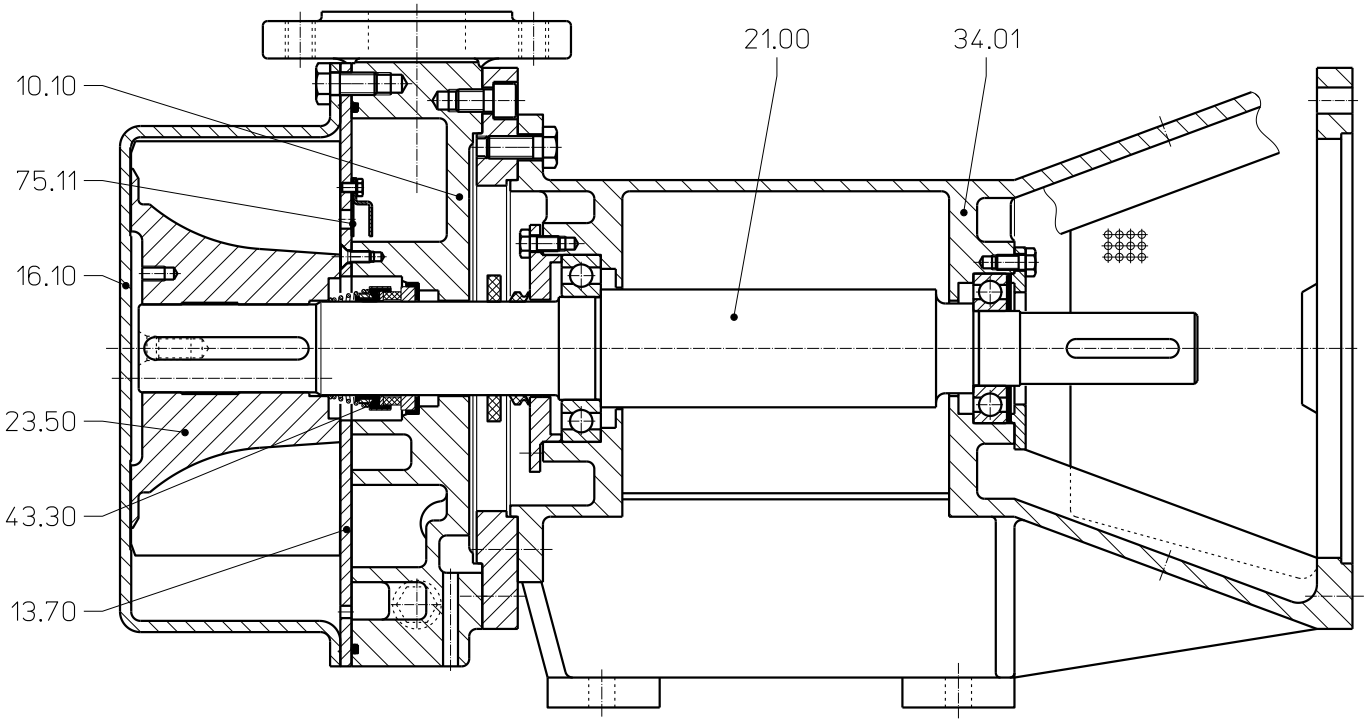
Item	COMPONENTS	MATERIALS 0K	MATERIALS 4B
10.10	Vacuum casing	0.6025	1.4408
13.70	Guide disc	1.4301	1.4404
16.10	Cover		
21.00 *	Shaft	1.4021	1.4571
23.50	Vane wheel impeller	1.4308	1.4408
34.01 *	Motor carrier	0.6025	0.6025 (stove enamelling)
43.30	Mechanical seal	ceramic / carbon / Viton	SiC / carbon / Viton
75.11	Valve plate	PTFE	

* only LEL 251

Cut-away diagram LEM 251



Cut-away diagram LEL 251



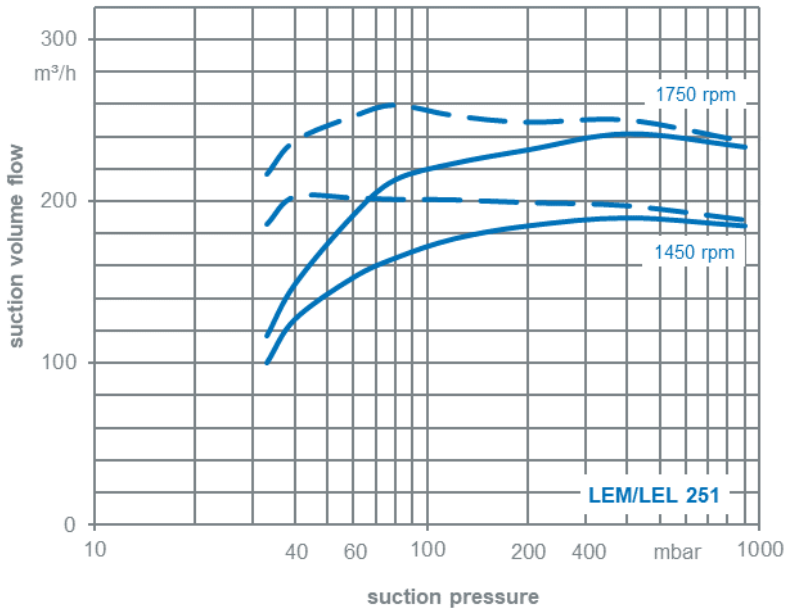
Make-up Liquid Consumption in [m³/h] dependent upon suction pressure, speed, drive type and temperature difference

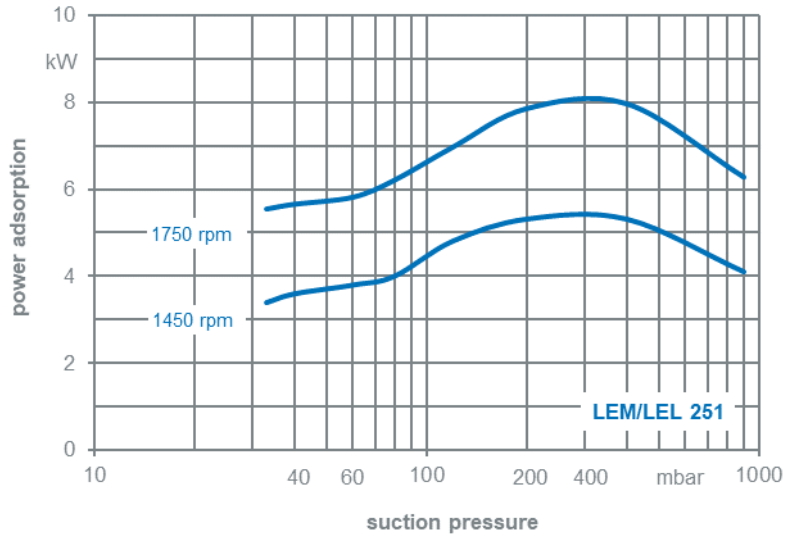
Suction pressure in [mbar]		33				120				200				400			
Pump type	speed	KB temperature difference [°C]			FB	KB temperature difference [°C]			FB	KB temperature difference [°C]			FB	KB temperature difference [°C]			FB
	[rpm]	10	5	2		10	5	2		10	5	2		10	5	2	
LEM/LEL	1450	0.24	0.41	0.71	1.4	0.31	0.50	0.80	1.3	0.33	0.51	0.76	1.15	0.31	0.46	0.67	0.95
251	1750	0.36	0.57	0.88		0.41	0.62	0.91		0.42	0.62	0.86		0.40	0.56	0.74	

FB = total service liquid flow rate on once-through system

KB = flow of make-up water when combined with partial recirculation liquid at a temperature of 10 °C, 5 °C, 2 °C, warmer than make-up water

Performance Characteristics LEM 251 / LEL 251



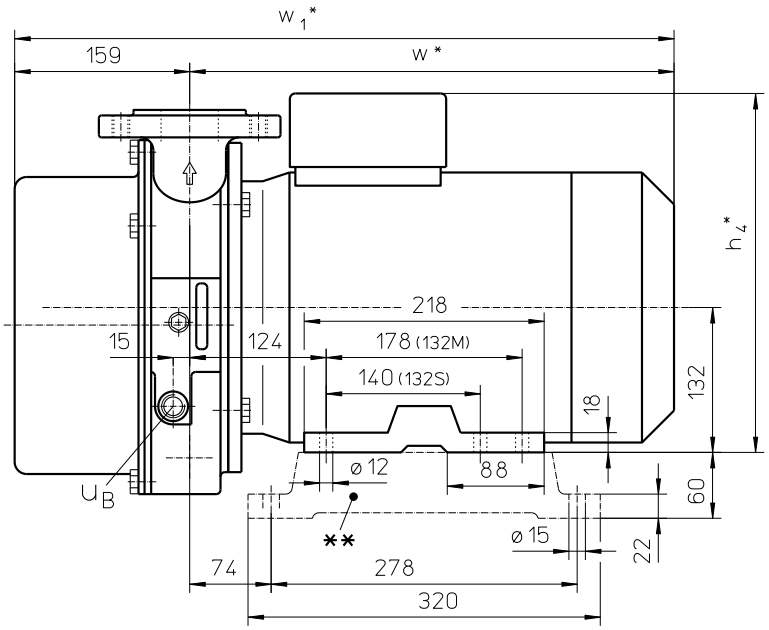


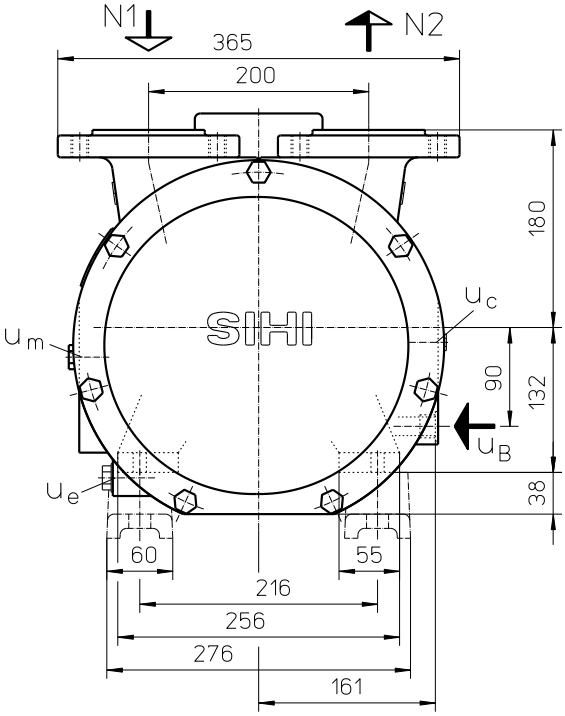
The operating data is valid under the following conditions:

- process media: - dry air: 20°C
  - steam saturated air: 20°C
- service liquid: - water: 15°C

Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)
The suction volume is related to the suction pressure.
Tolerance on operating data is 10%.
The maximum consumption of make-up water occurs at the lowest suction pressure.

Dimensions LEM 251



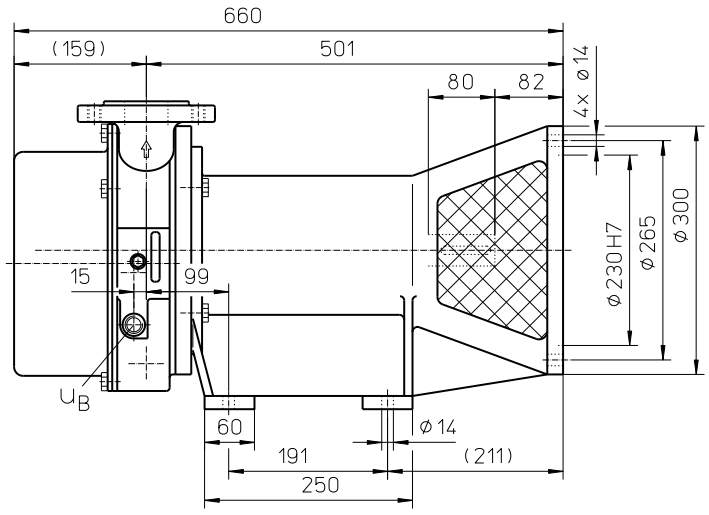


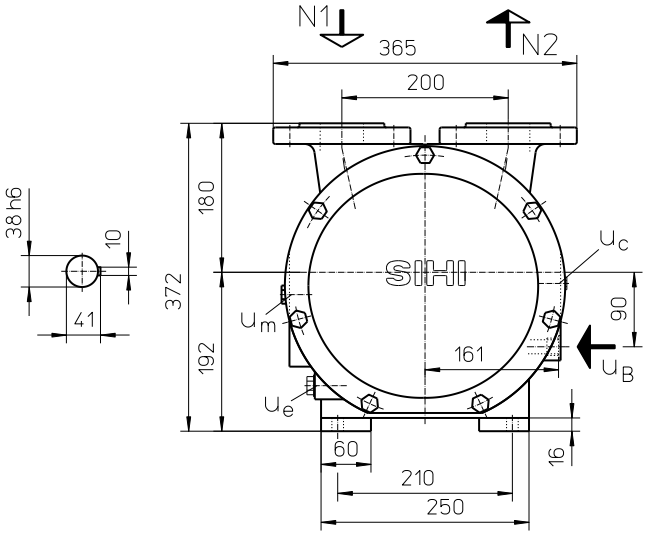
	electric motor IP 55			h 4*	w *	w 1*	approx.
	size	kW 50 Hz	kW 60 Hz	[mm]	[mm]	[mm]	weight [kg]
LEM 251	132 S	5.5	-	320	435	594	121
	132 M	-	8.0	330	470	629	130

other motors on request
* dimensions dependent upon motor supplier
** see list of accessories

N 1 = gas inlet DN 50
N 2 = gas outlet DN 50
u_B = connection for service liquid G ½
u_c = connection for protection against cavitation G ¼
u_e = connection for drain G ½
u_m = connection for pressure gauge G ½

Dimensions LEL 251



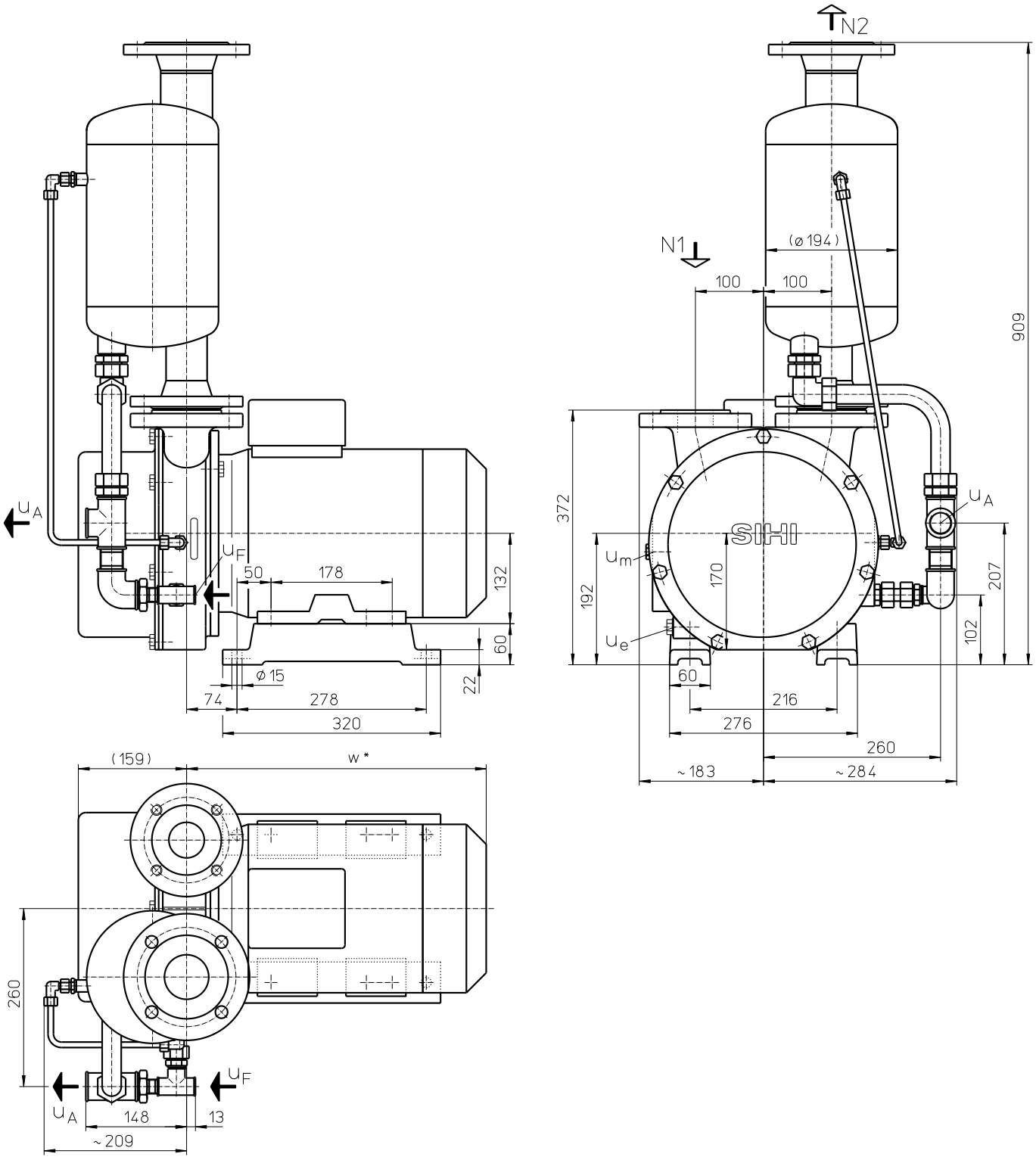


N 1 = gas inlet DN 50
N 2 = gas outlet DN 50
u_B = connection for service liquid G ½
u_c = connection for protection against cavitation G ¼
u_e = connection for drain G ½
u_m = connection for pressure gauge G ½

weight: 92 kg

flange connections see page 8

Arrangement drawing LEM 251



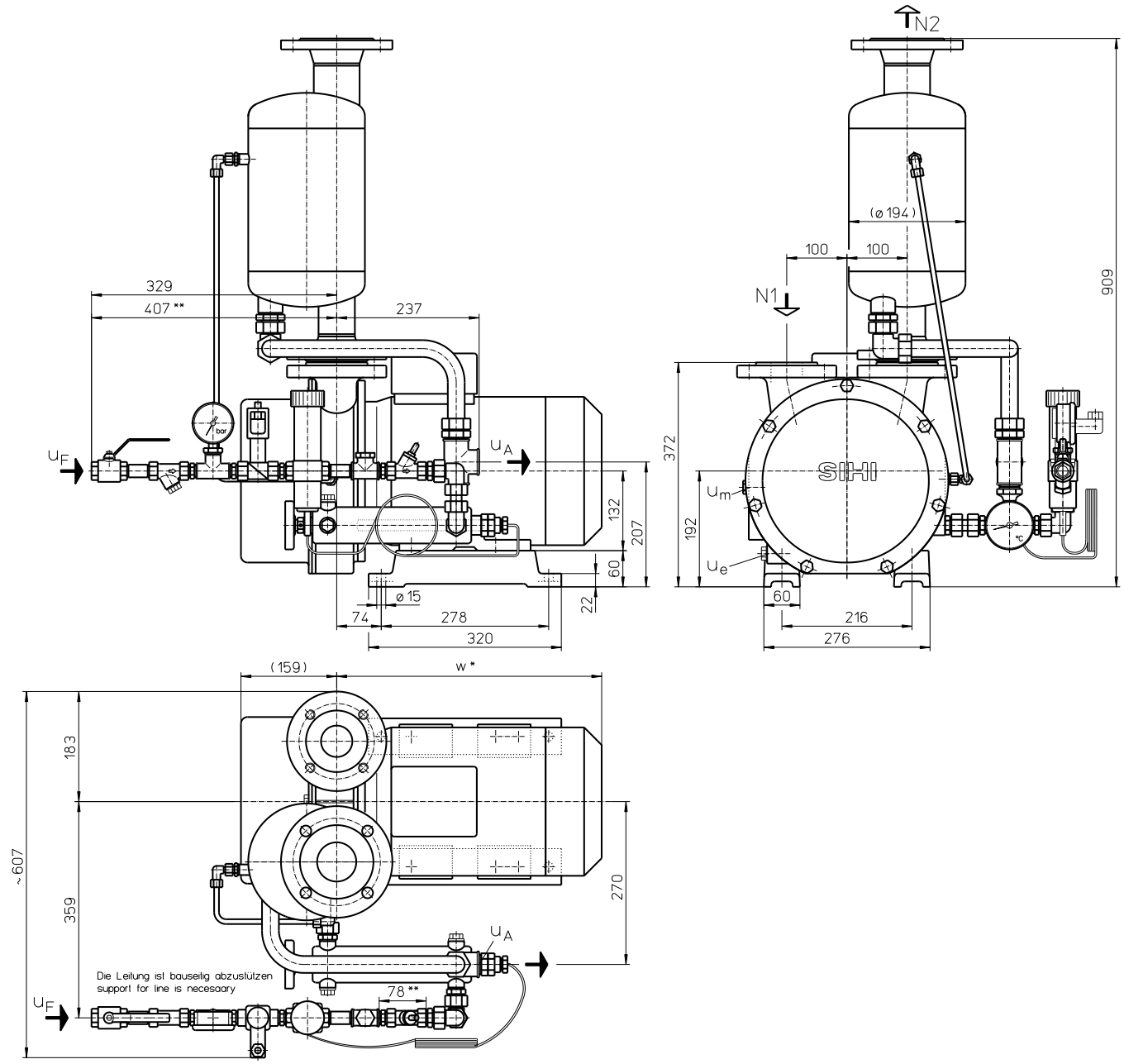
	electric motor IP 55				
	size	kW		w *	approx. weight
		50 Hz	60 Hz	[mm]	[kg]
LEM 251	132 S	5.5	-	440	145
	132 M	-	8.0	491	154

other motors on request
* dimensions dependent upon motor supplier

N 1 = gas inlet DN 50
N 2 = gas outlet DN 65 (4 bolt)
u_A = liquid drain G 1
u_F = connection for make-up liquid G ½
u_e = connection for drain G ½
u_m = connection for pressure gauge G ½

flange connections see page 8

Arrangement drawing LEM 251 with thermostatic control



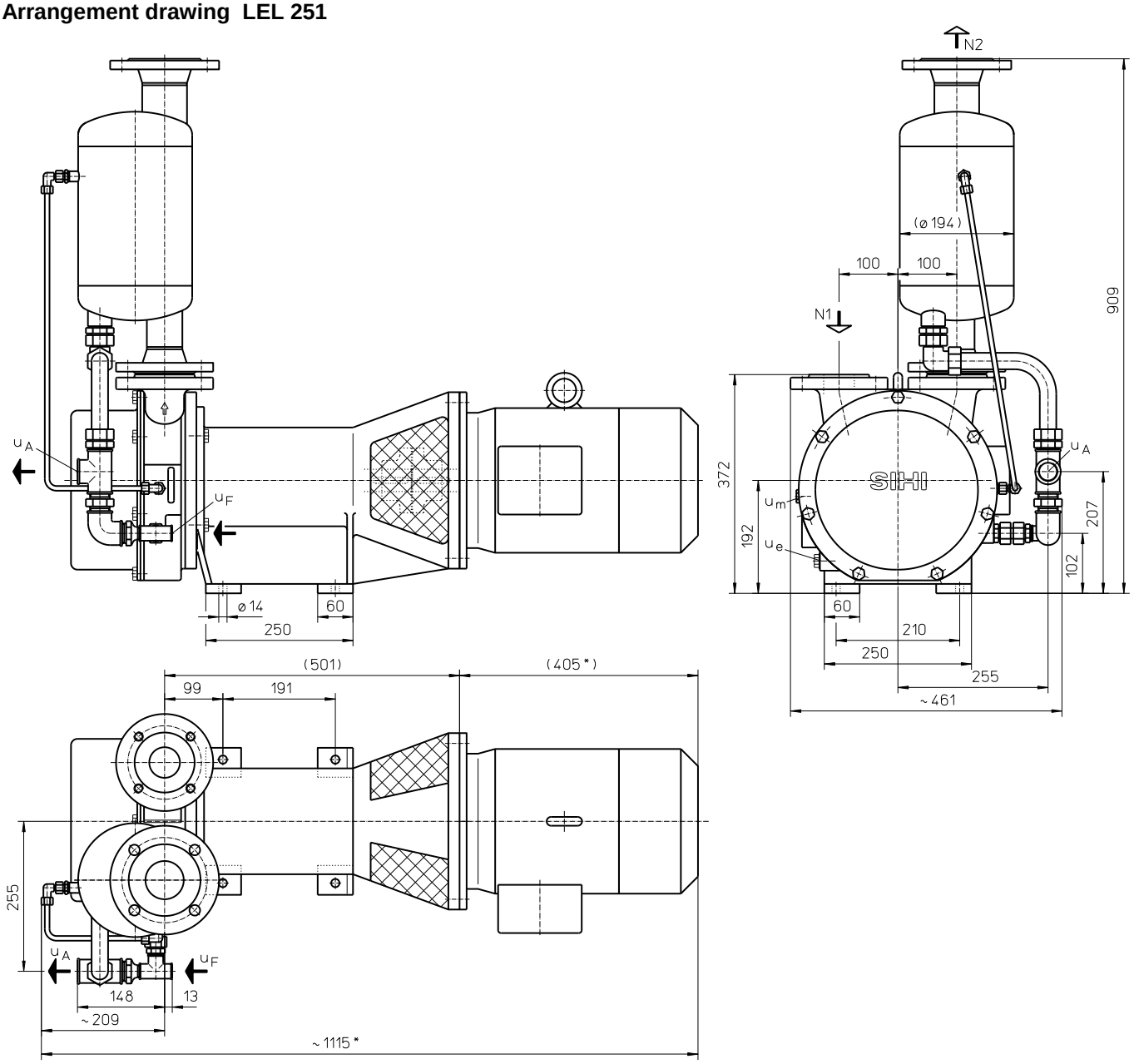
N 1 = gas inlet DN 50
N 2 = gas outlet DN 65 (4 bolt)
u_A = liquid drain G 1
u_F = connection for make-up liquid G ½
u_e = connection for drain G ½
u_m = connection for pressure gauge G ½

	electric motor IP 55				approx.
	size	kW		w *	weight
		50 Hz	60 Hz	[mm]	[kg]
LEM 251	132 S	5.5	-	440	150
	132 M	-	8.0	491	159

other motors on request
* dimensions dependent upon motor supplier
** only at material 1.4571 the line

flange connections see page 8

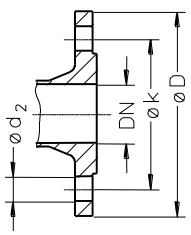
Arrangement drawing LEL 251



	electric motor 50 Hz			approx.
	size	kW		weight
		IP 55	EEx e II T3	[kg]
LEL 251	132 S	5.5	-	176
	132 M	-	6.8	173

N 1 = gas inlet DN 50
N 2 = gas outlet DN 65 (4 bolt)
u_A = liquid drain G 1
u_F = connection for make-up liquid G ½
u_e = connection for drain G ½
u_m = connection for pressure gauge G ½

flange connections according to DIN EN 1092 PN 10 [mm]		
DN	50	65
k	125	145
D	165	185
number x d_2	4 x M16	4 x 18



other motors on request
* dimensions dependent upon motor supplier

Data regarding the pump size - order notes

range + size	hydraulic + bearings	shaft seal	materials	casing sealing	*code of motor connection*
	9• hydraulic A, with flange connection •Z two grease lubricated antifriction bearings arranged in the motor •B similar to •Z, but arranged in the motor carrier	B3N mechanical seal, o-rings Viton BLU mechanical seal, o-rings Viton	0K main parts out of cast iron, impeller in low alloyed steel 4B main parts out of stainless steel	7 o-rings, Teflon cord	GS for IMB5 motor 132S flange ø300
LEM 251	9Z	B3N, BLU	0K, 4B	7	
LEL 251	9B				GS

* = only LEL

Motor selection

For our products we offer a lot of different motor types.
To identify the right motor please specify frequency, voltage and protection class.

Example for ordering LEM:

LEM 251 9Z B3N 0K 7 **with** 5.5 kW AC motor 50 Hz, 400 V∆, IP55

Example for ordering LEL:

LEL 251 9B B3N 0K 7 **for** 5.5 kW AC motor 50 Hz, 400 V∆, IP55 has the complete designation:

LEL 251 9B B3N 0K 7 **GS**

Accessories LEM 251, LEL 251

Recommended Accessory	Material Execution		LEM 251 LEL 251
Top Mounted Liquid Separator		Type weight	XBa 0940 14 kg
Top mounted separator	1.4571	SIHI-Part No.	43 212 719
Service liquid pipework, standard execution	Steel, galvanised 1.4571	SIHI-Part No.	20 054 035 20 054 036
Service liquid pipework, thermostatic control 24V	1.0254 + Brass 1.4571 + Brass	SIHI-Part No.	20 048 237 20 048 238
Cavitation protection pipework	Steel, galvanised 1.4571	SIHI-Part No.	20 047 177 20 047 178
Side Mounted Liquid Separator		Type weight	XBp 0414 35 kg
Side mounted separator	1.4571	SIHI-Part No.	43 105 714
Pressure pipework (bend)	1.0254 1.4571	SIHI-Part No.	35 003 214 35 003 215
Service liquid pipework, standard execution	1.0254 1.4571	SIHI-Part No.	20 056 679 20 072 536
Cavitation protection pipework	1.0254 1.4571	SIHI-Part No.	20 047 179 20 047 180
SIHI – Gas Ejector see Technical Catalogue – Gas Ejector			
at service liquid temperature 15 °C		Type / weight	GEV 250 A / 13 kg
at service liquid temperature 30 °C		Type / weight	GEV 250 B / 13 kg
SIHI – Non Return Ball Valve			
Intermediate flange execution XCk 50	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4571 + Teflon	SIHI-Part No. weight	20 072 792 / 3.6 kg 20 072 791 / 3.8 kg 20 029 498 / 10.8 kg
Flange execution with glass cylinder XCk 506	0.6025 + Butadiene rubber 0.6025 + Teflon 1.4408 + Teflon	SIHI-Part No. weight	20 072 838 / 8.5 kg 20 072 849 / 8.5 kg 20 072 837 / 8.5 kg
Support foot	only for LEM		
for motor size 132 M		SIHI-Part No. weight	20 047 012 6 kg
Motor standard execution IP 55	only for LEL	Size Power Weight	132 S 5.5 kW 64 kg
Coupling for motor IP 55 pump side motor side		Type / weight SIHI-Part No.	B 95 / 2.6 kg 43 021 429 43 021 433
Motor in EEx e ll T3 execution	only for LEL	Size Power Weight	132 M 6.8 kW 61 kg
Coupling for motor EEx e ll T3 pump side motor side		Type / weight SIHI-Part No.	BDS 103 / 3.1 kg 43 111 064 43 111 040

Designs subject to change without prior notice.

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