

# Liquid ring vacuum pumps

in compact design



## LEM 251 LEL 251

**Pressure range:** 33 to 1013 mbar  
**Suction volume flow:** 100 to 280 m<sup>3</sup>/h

### CONSTRUCTION

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 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 · m <sup>2</sup>	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		°C	80
Minimum permissible temperature		°C	10
Maximum viscosity		mm <sup>2</sup> /s	4
Maximum density		kg/m <sup>3</sup>	1200
Liquid capacity up to middle of shaft		litre	2.7
Maximum flow resistance of the heat exchanger		bar	0.2

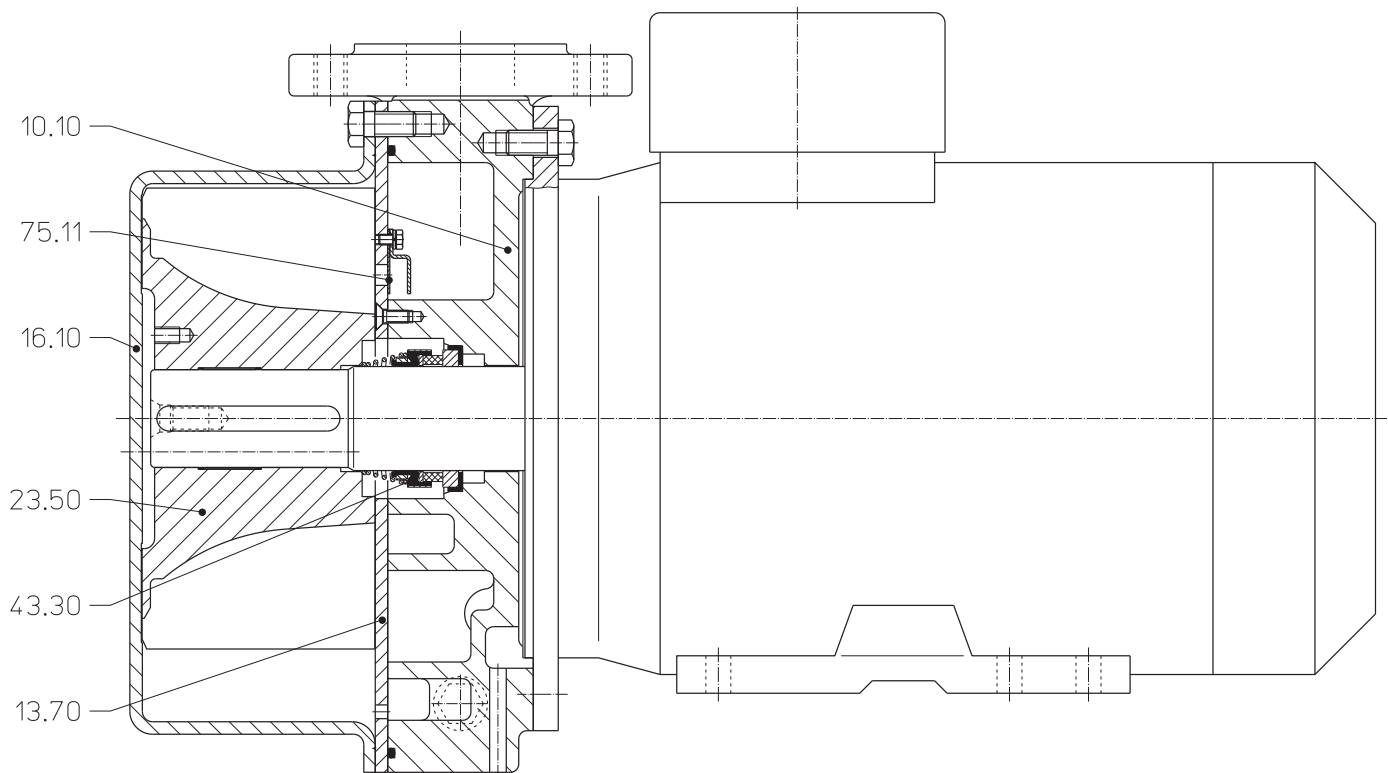
The combination of several limiting values is not admissible.

## Materials

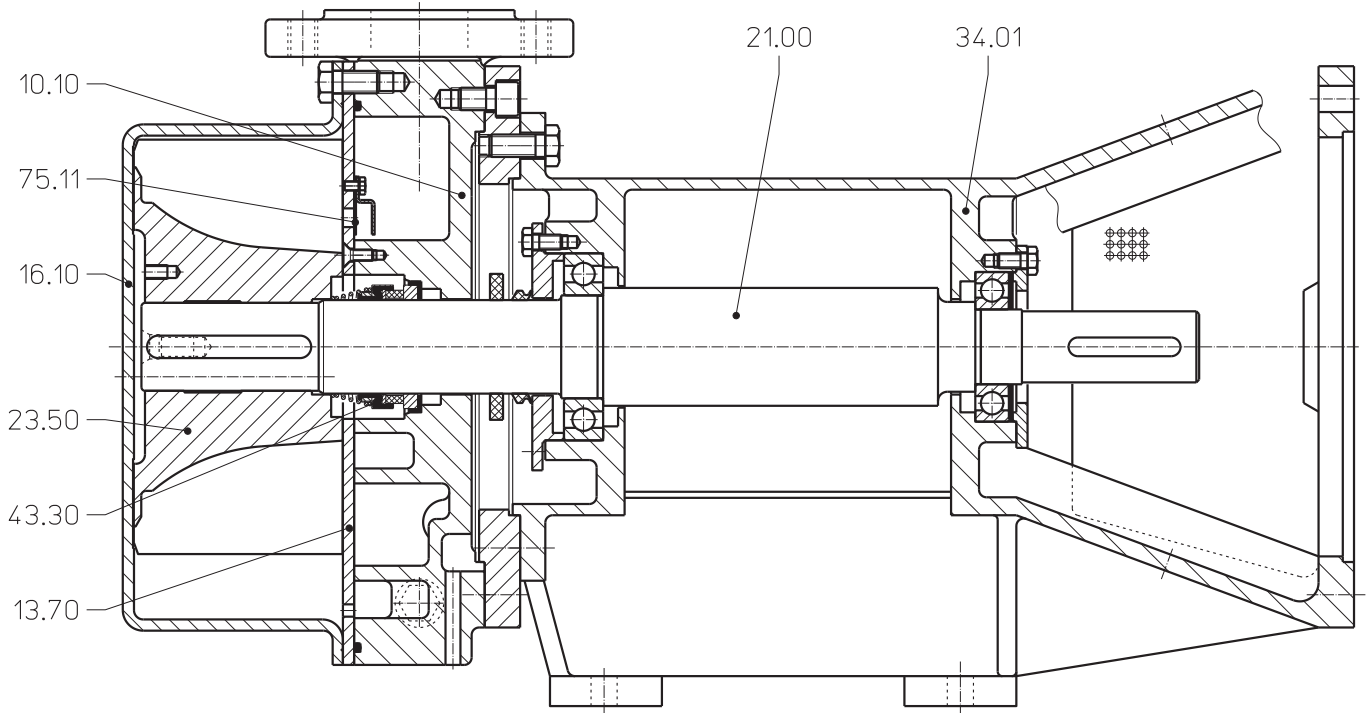
Item	COMPONENTS	MATERIALS	
		0K	4B
10.10	Vacuum casing	0.6025	1.4408
13.70	Guide disc	1.4301	1.4404
16.10	Cover		
21.00 *	Shaft	1.4021	1.4571
23.50	Vane wheel impeller	1.4308	1.4517
34.01 *	Motor carrier	0.6025	0.6025 (stove enamelling)
43.30	Mechanical seal	ceramic / carbon / Viton	SiC / carbon / Viton
75.11	Valve plate	PTFE	

\* only LEL 251

## Cut-away diagram LEM 251



**Cut-away diagram LEL 251**



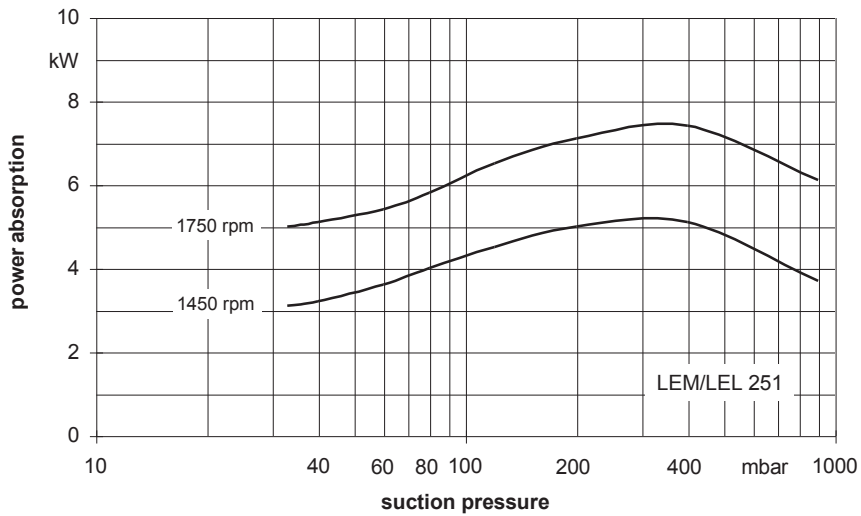
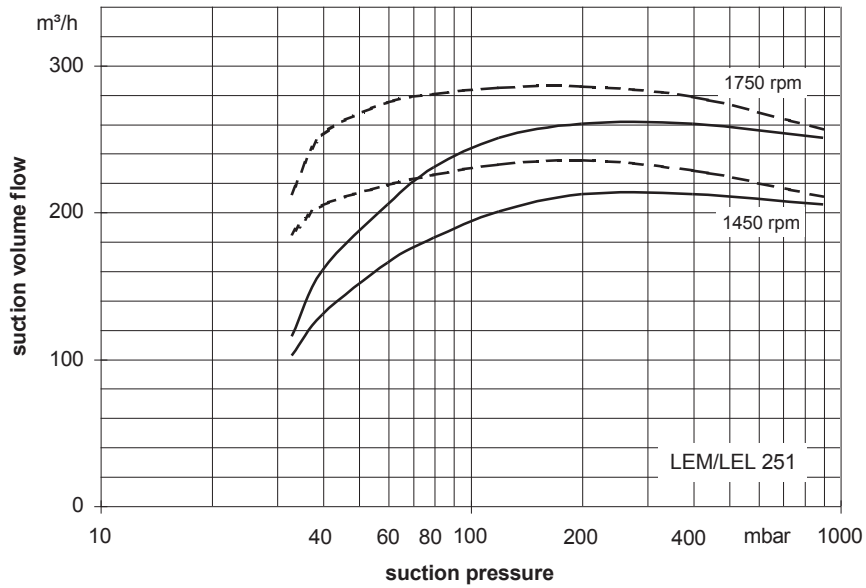
**Make-up Liquid Consumption** in [m<sup>3</sup>/h] dependent upon suction pressure, speed, drive type and temperature difference.

suction pressure in [mbar]		33				120				200				400			
Pump type	speed [rpm]	KB			FB	KB			FB	KB			FB	KB			FB
		temperature difference [°C]				temperature difference [°C]				temperature difference [°C]				temperature difference [°C]			
		10	5	2		10	5	2		10	5	2		10	5	2	
LEM/LEL 251	1450	0.22	0.39	0.68	1.4	0.30	0.48	0.78	1.3	0.31	0.49	0.75	1.15	0.30	0.46	0.66	0.95
	1750	0.33	0.53	0.85		0.39	0.60	0.89		0.40	0.59	0.84		0.38	0.54	0.73	

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 ..... (dotted line)
- service liquid:
  - water: 15°C

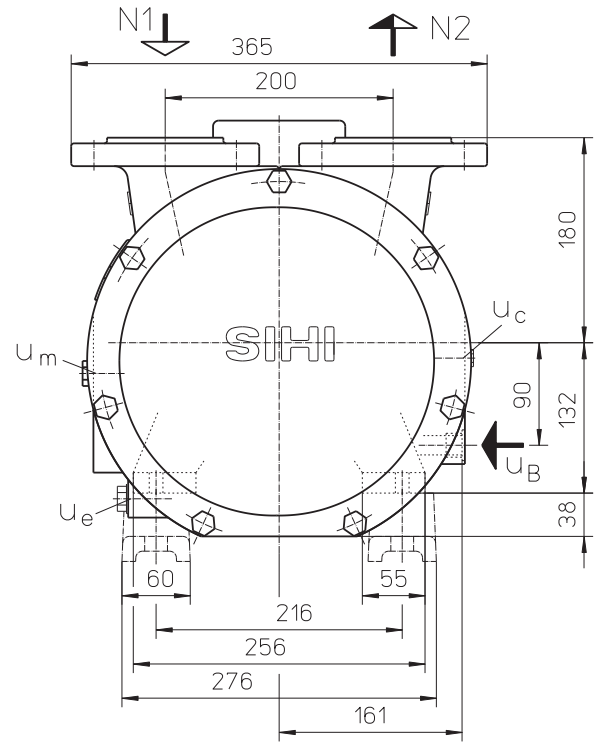
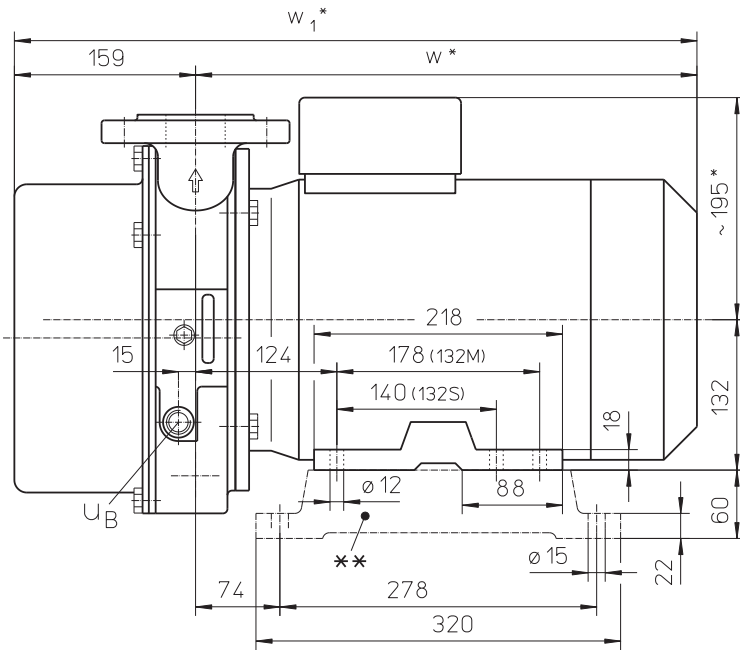
Pressure of gas to be evacuated: 1013 mbar (atmospheric pressure)

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		w* [mm]	w1* [mm]	approx. weight [kg]
	size	kW			
LEM 251	132 S	5.5	-	440	115
	132 M	-	8.0	491	120

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

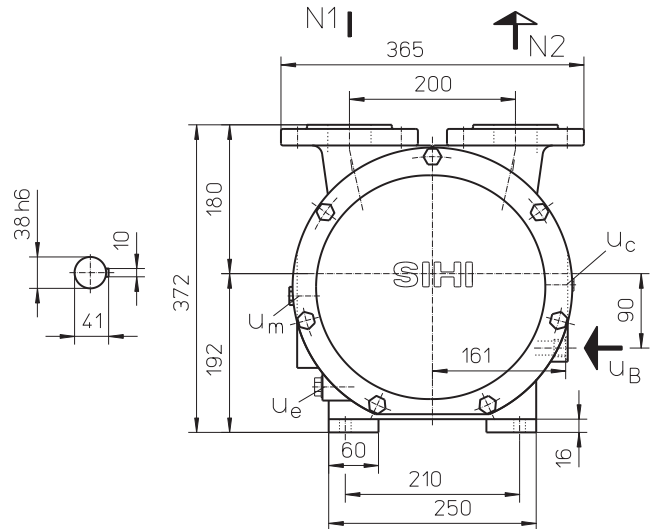
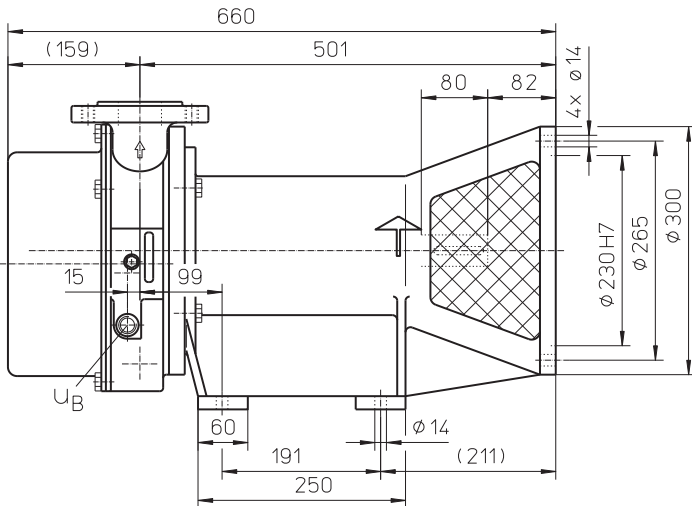
UB = connection for service liquid G ½

UC = connection for protection against cavitation G ¼

UE = connection for drain G ½

UM = connection for pressure gauge G ½

### Dimensions LEL 251



N 1 = gas inlet DN 50

N 2 = gas outlet DN 50

UB = connection for service liquid G ½

UC = connection for protection against cavitation G ¼

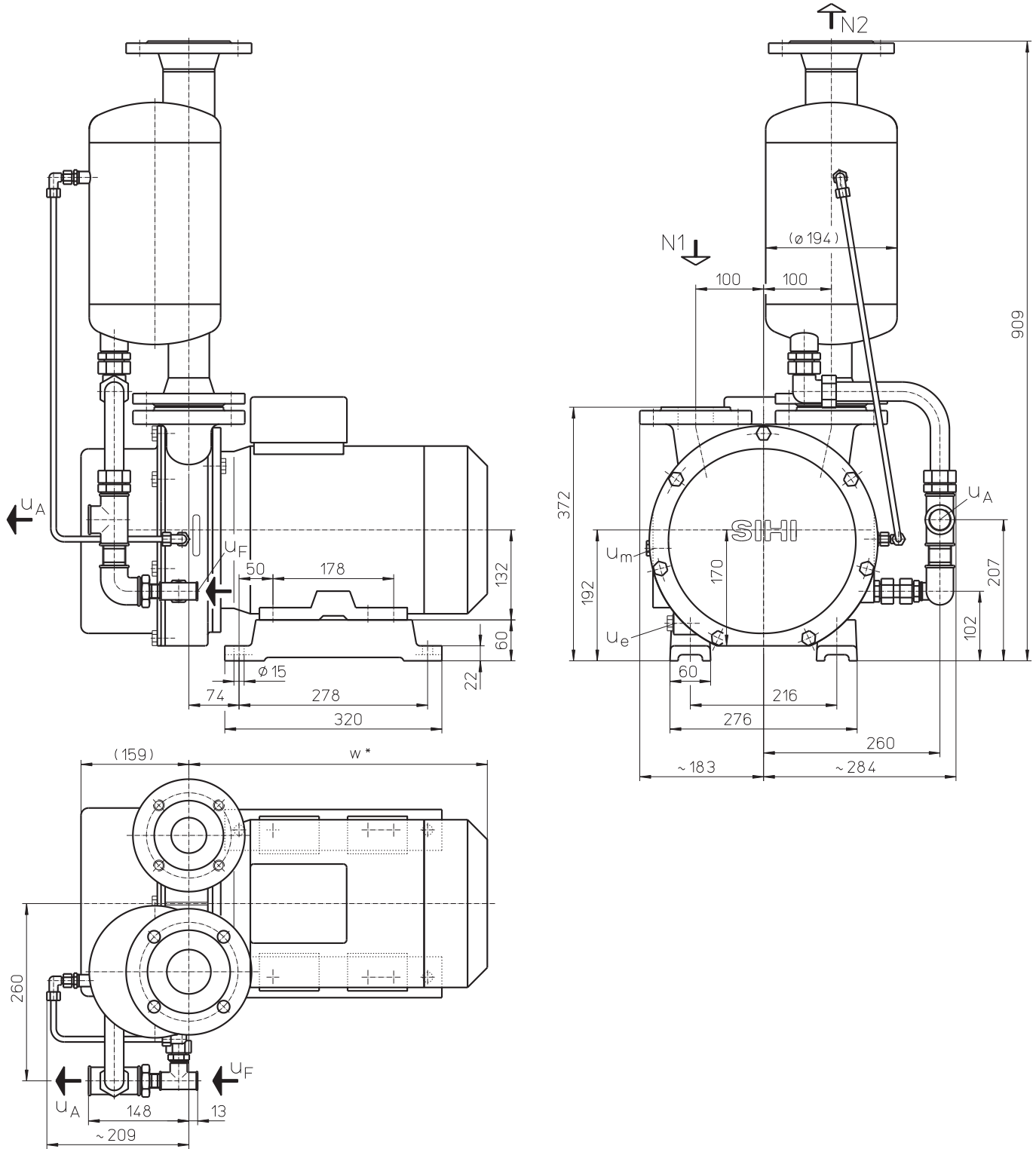
UE = connection for drain G ½

UM = connection for pressure gauge G ½

weight: 92 kg

flange connections see page 8

# Arrangement drawing LEM 251



	electric motor IP 55			w * [mm]	approx. weight [kg]
	size	kW			
		50 Hz	60 Hz		
LEM 251	132 S	5.5	-	440	135
	132 M	-	8.0	491	140

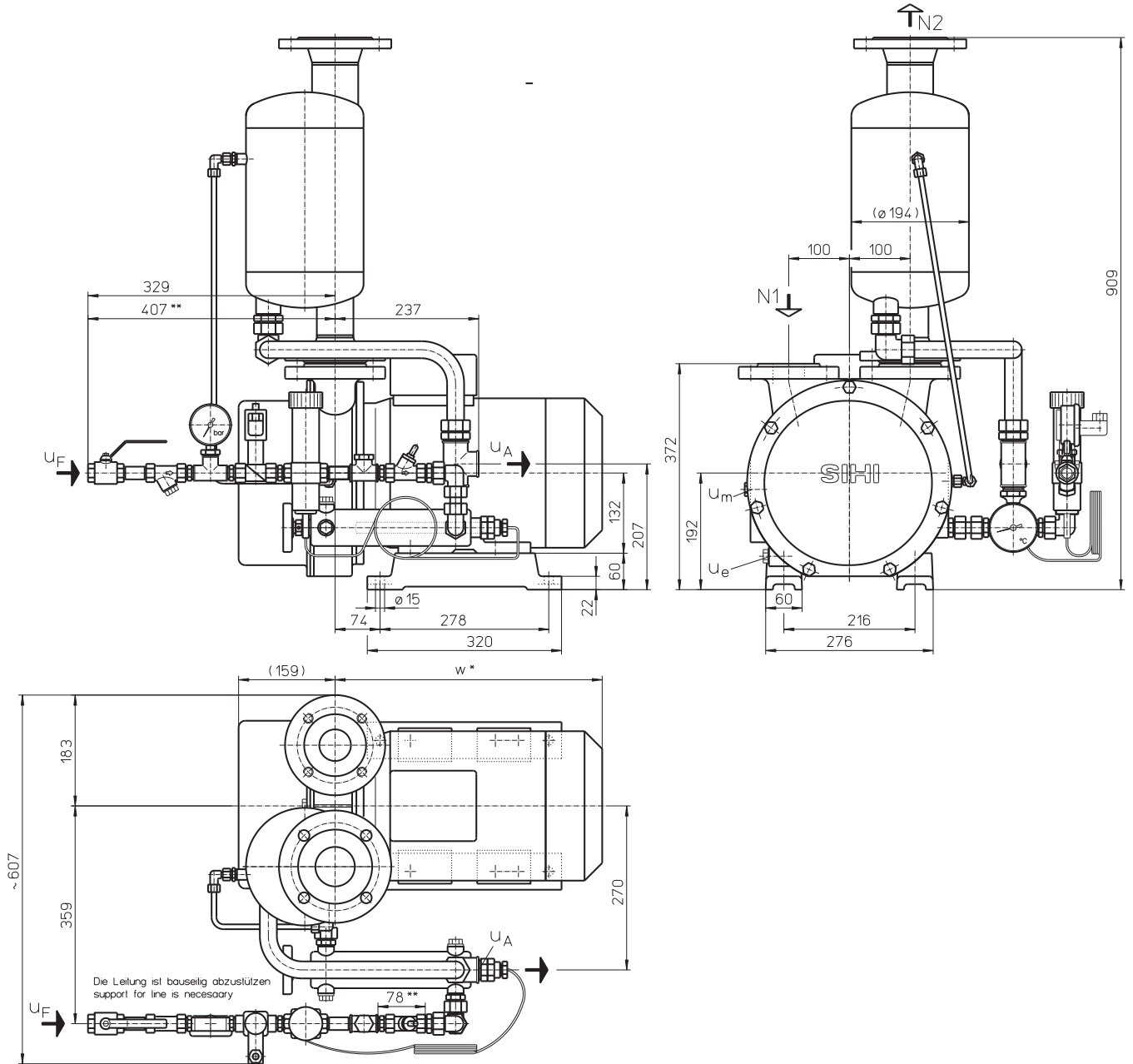
other motors on request

\* dimensions dependent upon motor supplier

- N 1 = gas inlet DN 50
- N 2 = gas outlet DN 65
- U<sub>A</sub> = liquid drain G 1
- U<sub>F</sub> = connection for make-up liquid G ½
- U<sub>e</sub> = connection for drain G ½
- U<sub>m</sub> = 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
- U<sub>A</sub> = liquid drain G 1
- U<sub>F</sub> = connection for make-up liquid G ½
- U<sub>e</sub> = connection for drain G ½
- U<sub>m</sub> = connection for pressure gauge G ½

	electric motor IP 55			w *	approx. weight [kg]
	size	kW			
		50 Hz	60 Hz	[mm]	
LEM 251	132 S	5.5	-	440	140
	132 M	-	8.0	491	145

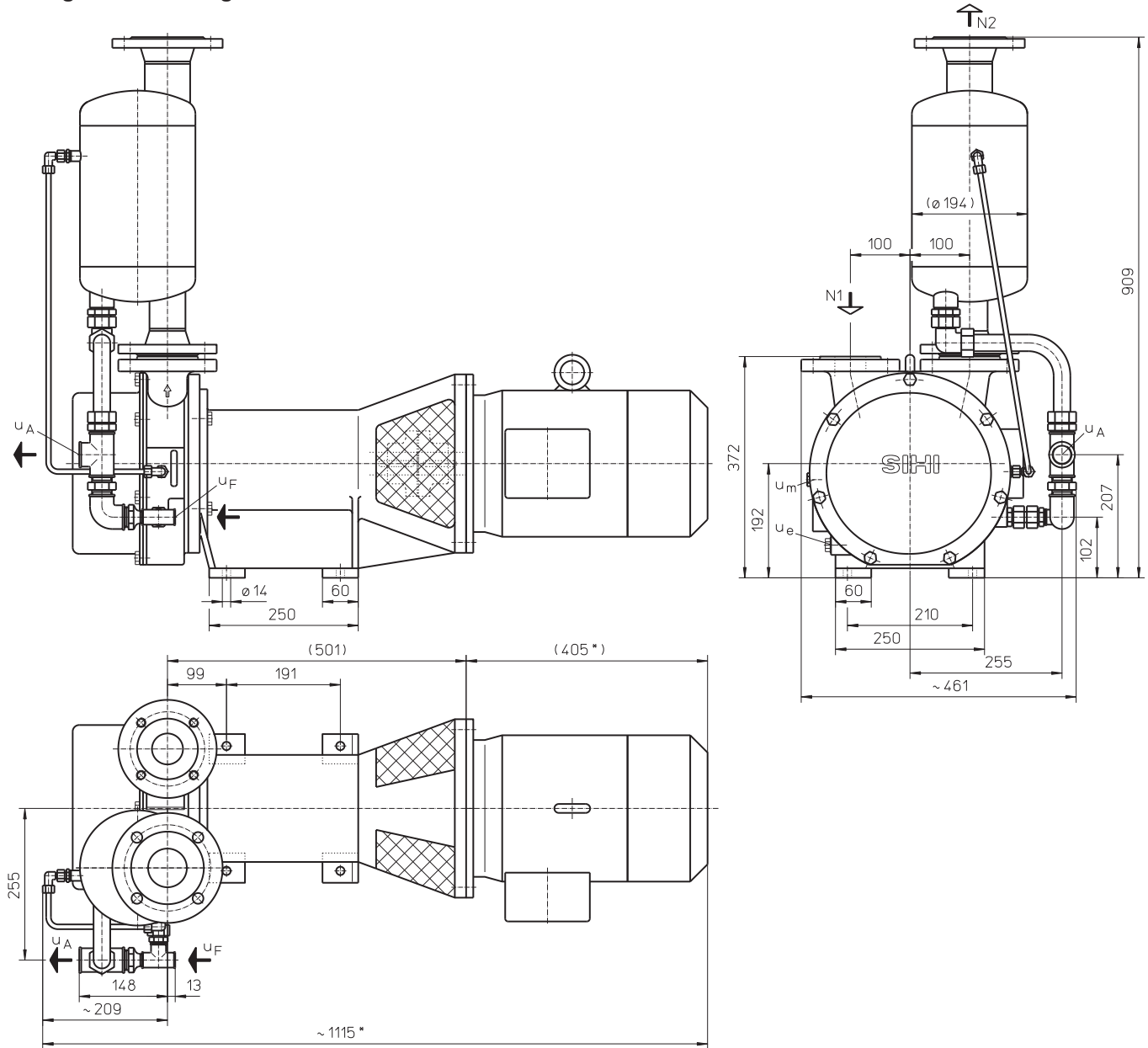
other motors on request

\* dimensions dependent upon motor supplier

\*\* only at material 1.4571 the line

flange connections see page 8

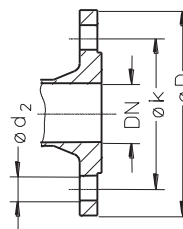
# Arrangement drawing LEL 251



	electric motor 50 Hz			approx. weight [kg]
	size	kW		
		IP 55	EEx e II T3	
LEL 251	132 S	5.5	-	151
	132 M	-	6.8	186

- 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
- $U_e$  = connection for drain G ½
- $U_m$  = connection for pressure gauge G ½

flange connections according to DIN 2501 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*
	<ul style="list-style-type: none"> <li>9• hydraulic A, with flange connection</li> <li>•Z two grease lubricated antifriction bearings arranged in the motor</li> <li>•B similar to •Z, but arranged in the motor carrier</li> </ul>	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	GS
LEL 251	9B				

\* = 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 VΔ, IP55

#### Example for ordering LEL:

LEL 251 9B B3N 0K 7 **for** 5.5 kW AC motor 50 Hz, 400 VΔ, 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
<b>Top Mounted Liquid Separator</b>		Type	XBa 0940
		weight	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.	20 054 035 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
<b>Side Mounted Liquid Separator</b>		Type	XBp 0414
		weight	35 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.	20 056 679 20 072 536
Cavitation protection pipework	1.0254 1.4571	SIHI-Part No.	20 047 179 20 047 180
<b>Sterling SIHI – Gas Ejector</b> 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
<b>Sterling SIHI – Non Return Ball Valve</b>			
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
<b>Support foot</b> for motor size 132 M	only for LEM	SIHI-Part No. weight	20 047 012 6 kg
<b>Motor</b> 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
<b>Motor</b> in EEx e II T3 execution	only for LEL	Size Power Weight	132 M 6.8 kW 61 kg
Coupling for motor EEx e II 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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