

# Liquid ring vacuum pumps

in compact design



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

**Pressure range:** 33 to 1013 mbar  
**Suction volume flow:** 32 to 170 m<sup>3</sup>/h

## CONSTRUCTION TYPE

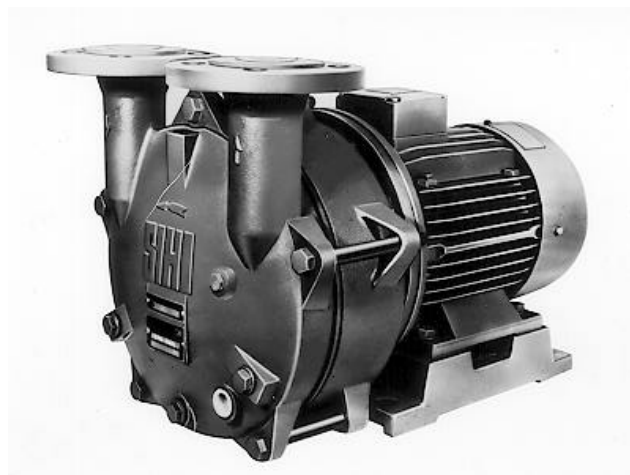
SIHI liquid ring vacuum pumps are displacement pumps of uncomplicated and robust construction with the following particular features:

- 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/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 90 LEL 90	LEM 125 LEL 125	LEM 150 LEL 150
Speed	50 Hz 60 Hz		1450 1750	
Max. compression over pressure	bar		LEM 0,3 / LEL 0,5	
Max. admissible pressure difference	bar		LEM 1,1 / LEL 1,5	
Hydraulic test (over pressure)	bar		3	
Moment of inertial of the rotating pump parts and of the water filling	kg · m <sup>2</sup>	0,035	0,053	0,069
Sound pressure level at a suction pressure of 80 mbar	dB (A)		65	
Max. gas temperature	dry saturated		200 100	
Service liquid				
max. admissible temperature	°C		80	
max. viscosity	mm <sup>2</sup> /s		4	
max. density	kg/m <sup>3</sup>		1200	
volume up to shaft level	liter	2,4	2,8	3,2
Max. flow resistance of the heat exchanger	bar		0,2	

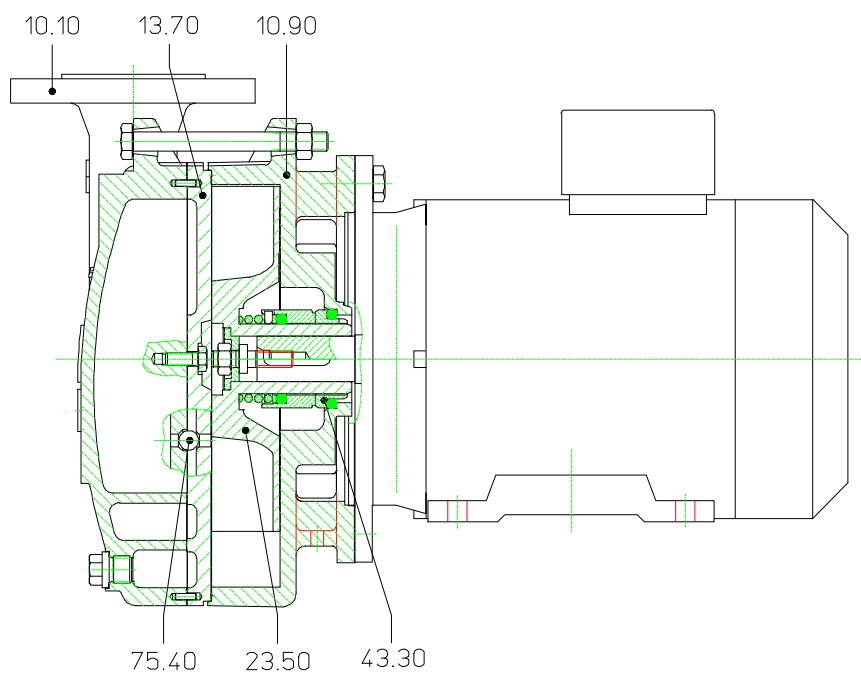
The combination of several limiting values is not admissible.

## Material design

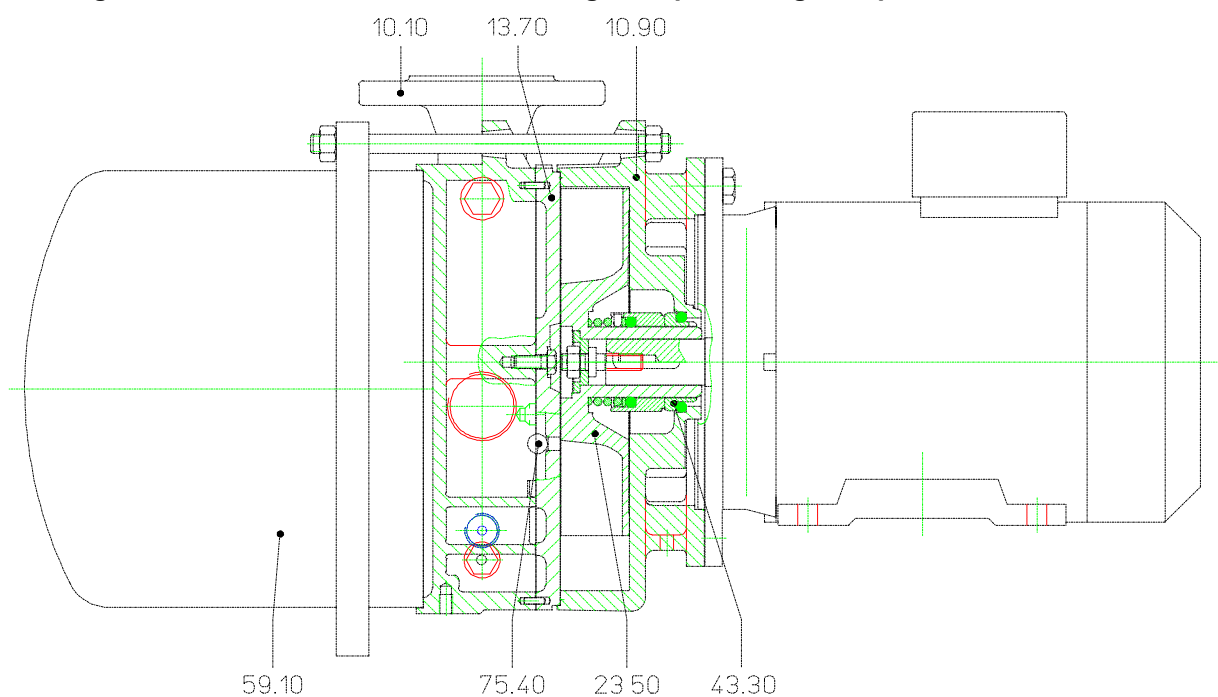
Item	COMPONENTS	MATERIAL DESIGN	
		0A	4B
10.10	Casing	0.6025	1.4408
10.90	Central body		
13.70	Guide disk		
21.00*	Shaft	1.0503	
23.50	Vane wheel impeller	2.1096.01	1.4517
34.01*	Motor carrier	0.6025	0.6025 (with annealing lacquer)
43.30	Standard mechanical seal	Cr-steel / carbon / Perbunan	Cr Ni Mo-steel / carbon / Viton
59.10	integrated pre-arranged separator	1.0038	1.4571
75.40	Valve balls	polyamide A	PTFE

\* only at LEL 90, 125, 150

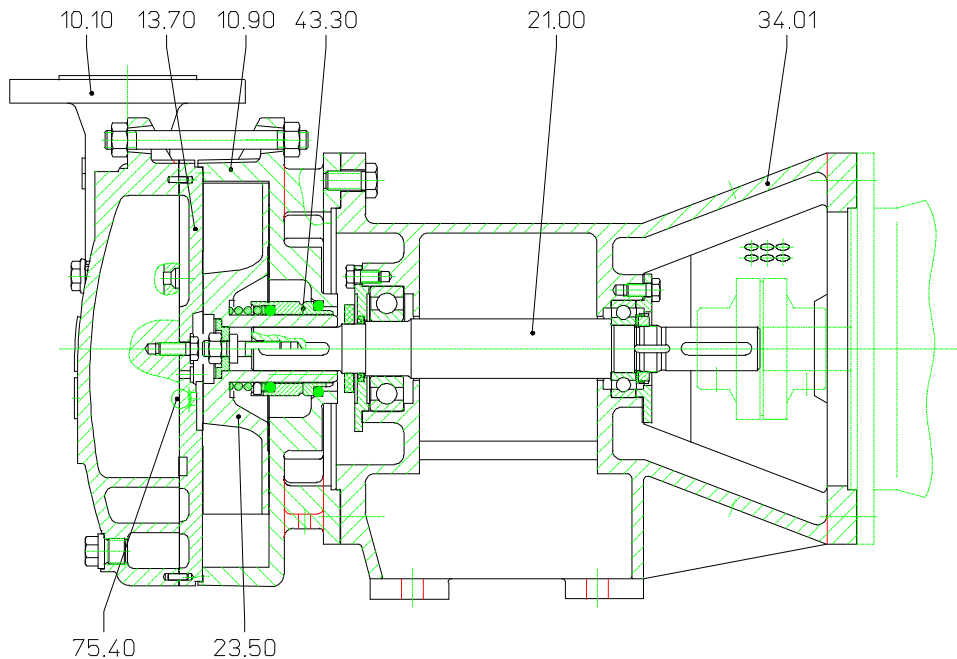
### Sectional drawing LEM 90, LEM 125, LEM 150



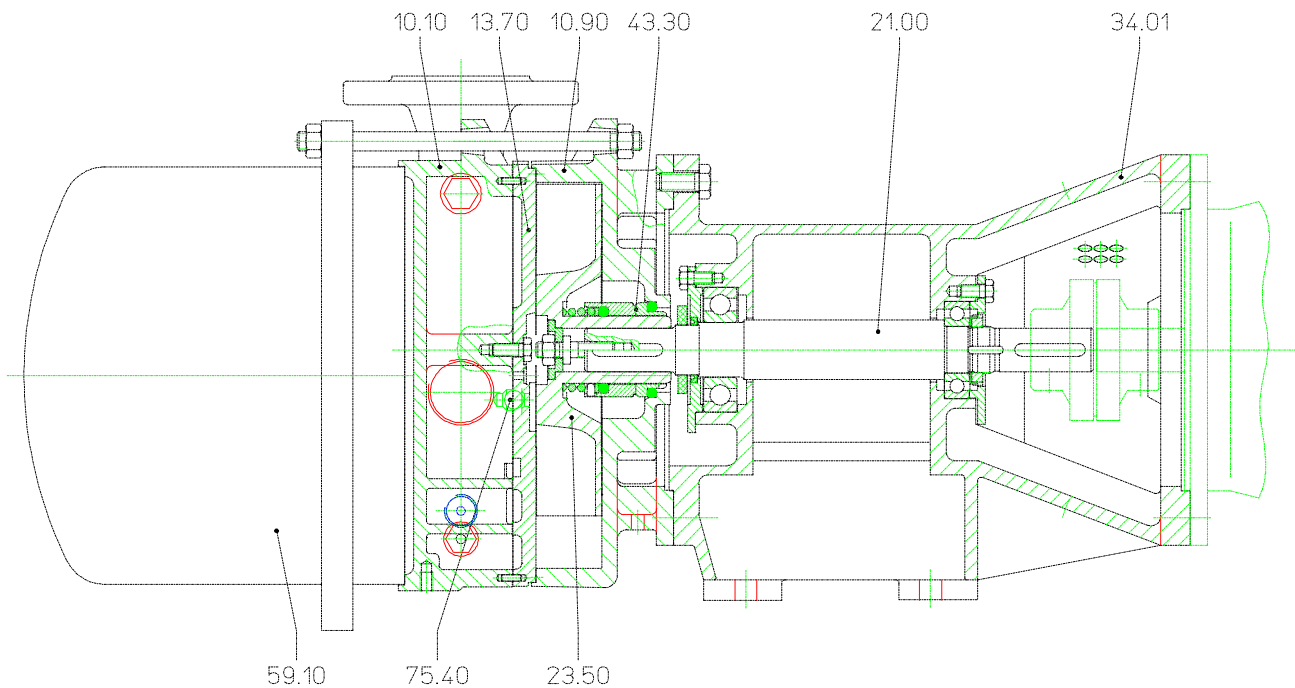
### Sectional drawing LEM 90, LEM 125, LEM 150 with integrated pre-arranged separator



**Sectional drawing LEL 90, LEL 125, LEL 150**



**Sectional drawing LEL 90, LEL 125, LEL 150 with integrated pre-arranged separator**



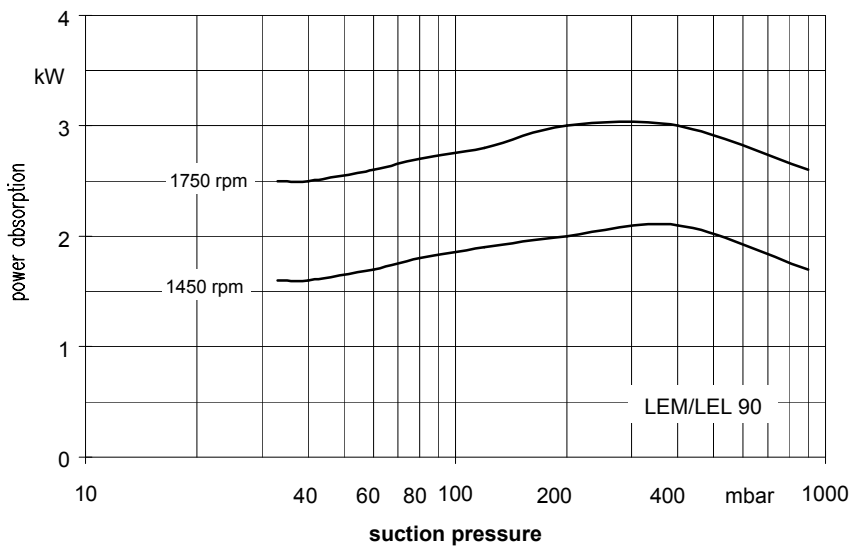
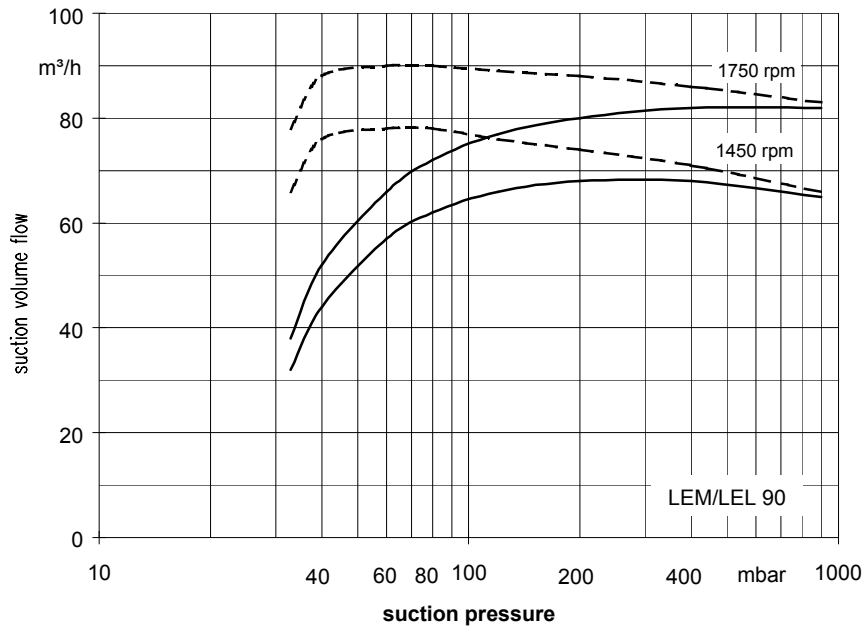
**Fresh water requirements** in [m³/h] dependent on suction pressure, speed, mode of operation and difference in temperature

suction pressure [mbar]		33				120				200				400			
pump	speed [rpm]	KB			FB	KB			FB	KB			FB	KB			FB
		difference in temperature [°C]				difference in temperature [°C]				difference in temperature [°C]				difference in temperature [°C]			
		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 = fresh liquid service

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

## Suction volume flow and power absorption LEM 90 / LEL 90

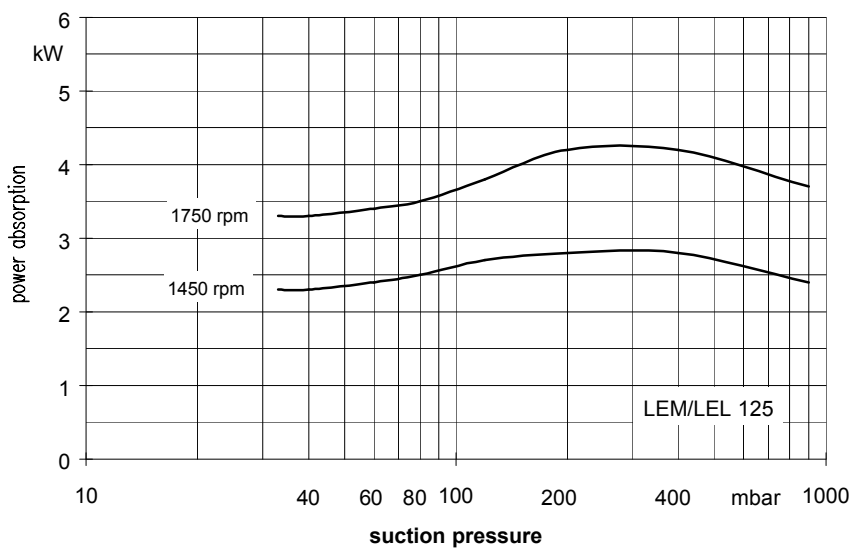
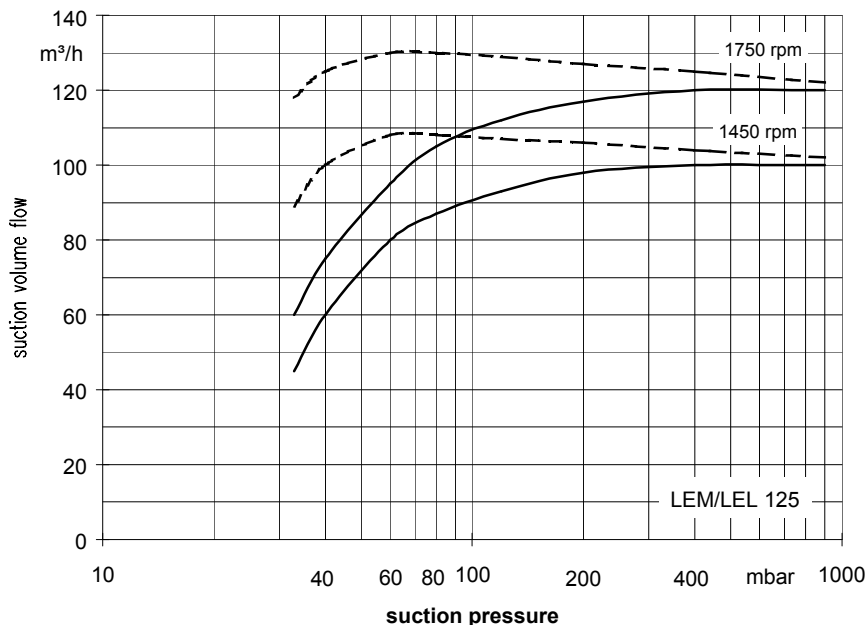


The operating data are applicable under the following conditions:

- 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

**Suction volume flow and power absorption LEM 125 / LEL 125**

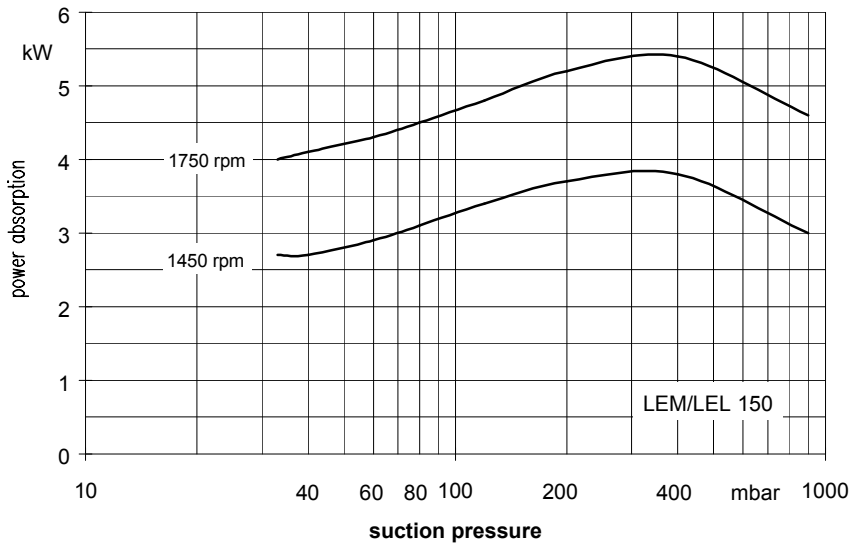
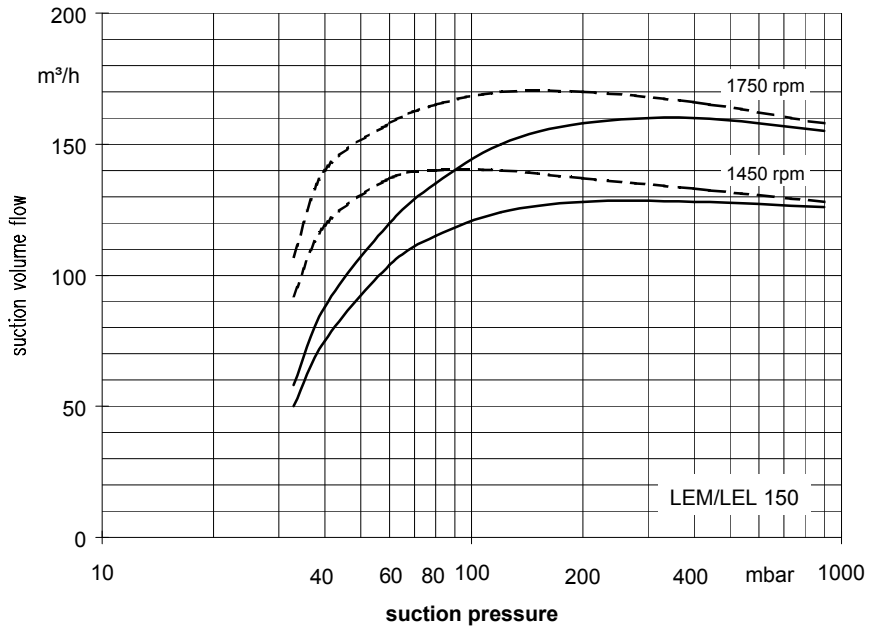


The operating data are applicable under the following conditions:

- 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

## Suction volume flow and power absorption LEM 150 / LEL 150

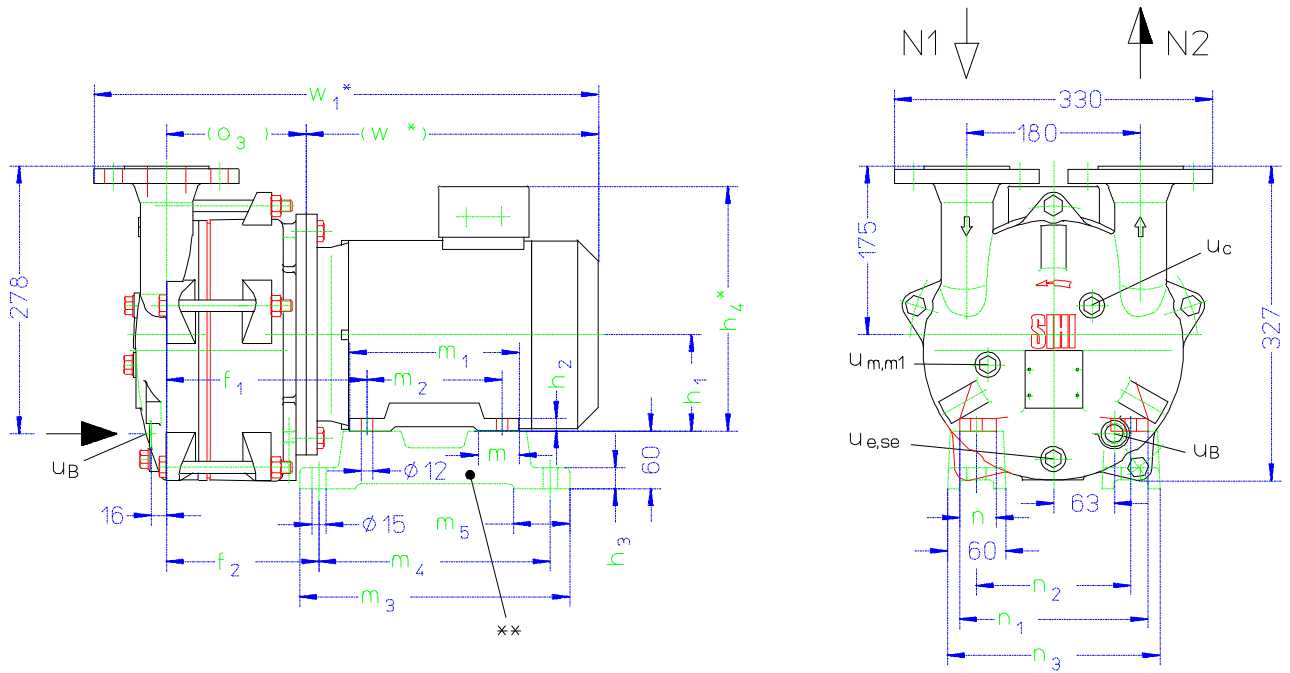


The operating data are applicable under the following conditions:

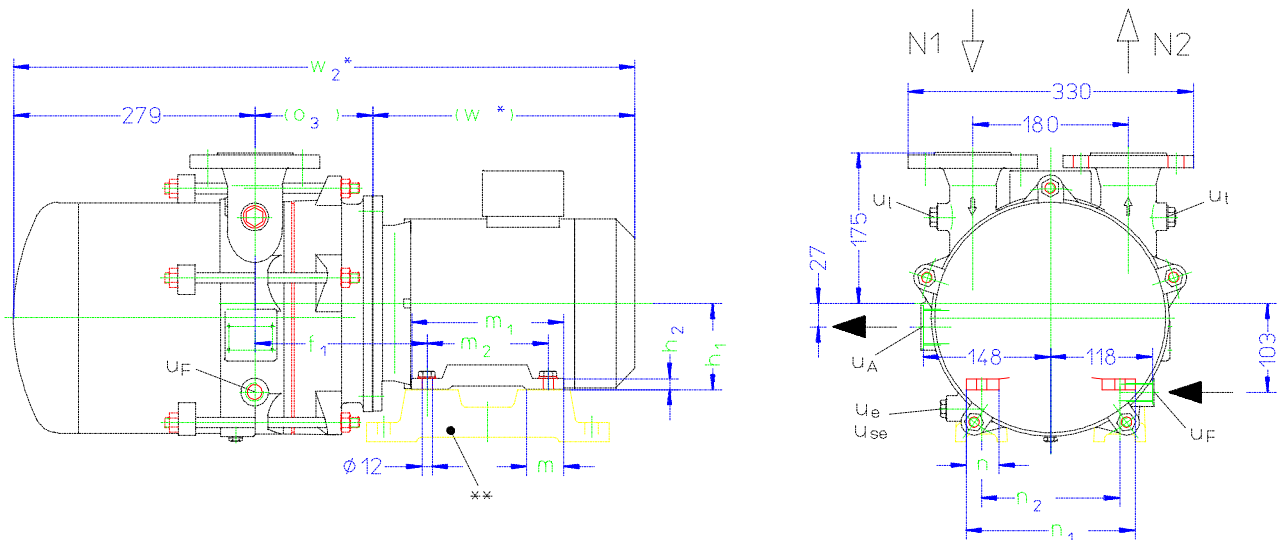
- pumping medium:
  - dry air: 20°C \_\_\_\_\_
  - water vapour saturated air: 20°C - - - - -
- service liquid:
  - water: 15°C

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**



**Dimension table LEM 90, LEM 125, LEM 150 with integrated pre-arranged separator**

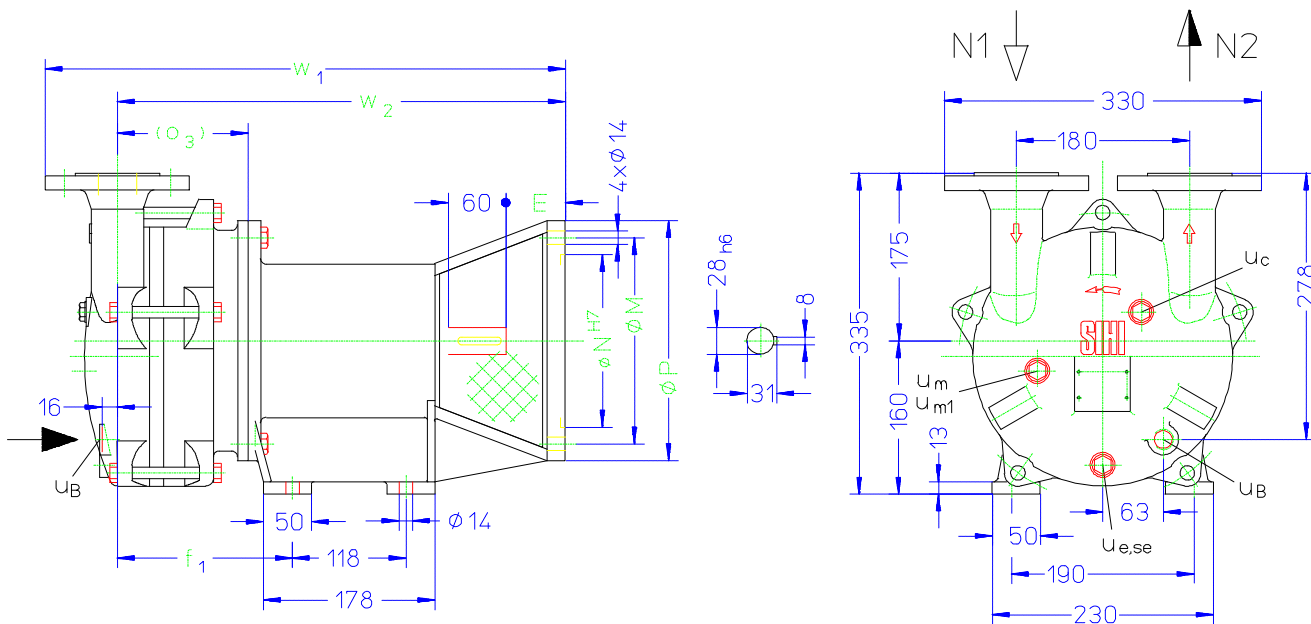


- N 1 = gas inlet DN 40
- N 2 = gas outlet DN 40
- U<sub>A</sub> = connection for liquid drain G 1¼
- U<sub>B</sub> = connection for service liquid G ½
- U<sub>C</sub> = connection for protection against cavitation G ¾
- U<sub>E</sub> = drain connection G ¾
- U<sub>se</sub> = connection for dirt drain G ¾
- U<sub>i</sub> = connection for vent cock G ½
- U<sub>m</sub> = connection for pressure gauge G ¾
- U<sub>m1</sub> = connection for drain valve G ¾
- U<sub>t</sub> = connection for thermometer G ½

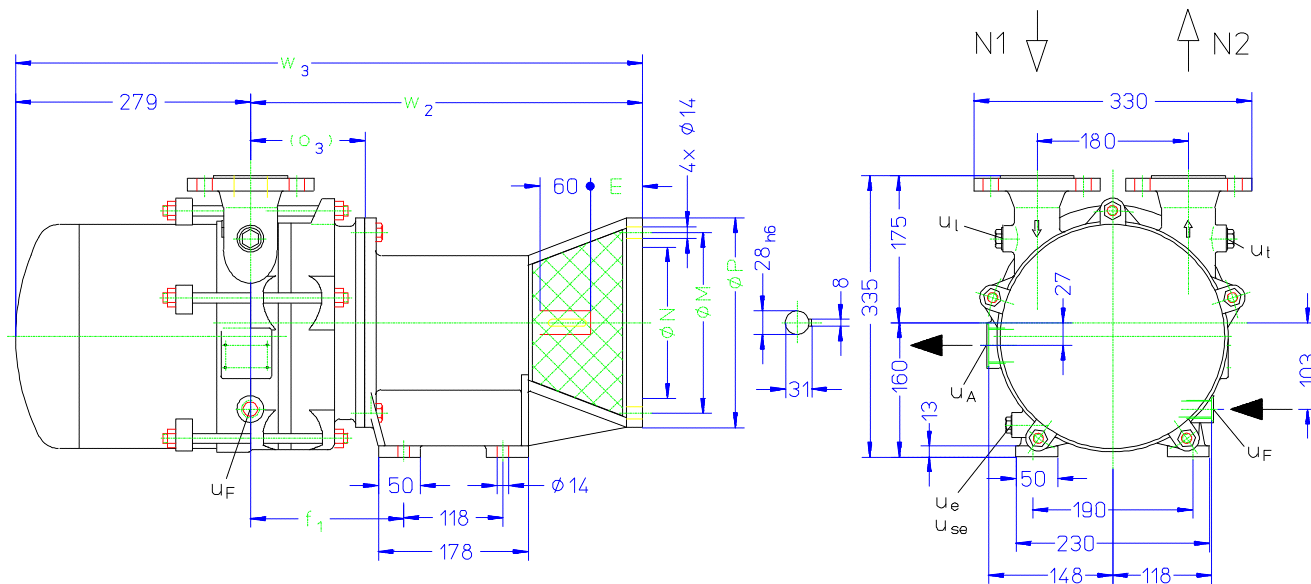
	electric motor IP 55		f <sub>1</sub>	f <sub>2</sub>	h <sub>1</sub>	h <sub>2</sub>	h <sub>3</sub>	h <sub>4</sub> *	m	m <sub>1</sub>	m <sub>2</sub>	m <sub>3</sub>	m <sub>4</sub>	m <sub>5</sub>	n	n <sub>1</sub>	n <sub>2</sub>	n <sub>3</sub>	o <sub>3</sub>	W*	W <sub>1</sub> *	W <sub>2</sub> *	weight abt. kg	
	size	kW																					LEM	+integr. pre-arranged separator
		50 Hz	60 Hz																					
LEM 90	100 L	2,2	3,3	199	149	100	13	254	43						38	195	160	220	136	303	514	718	55	64
LEM 125	100 L	3,0	-	208	158		22			176	140	280	240	58					145		523	727	62	71
	112 M	-	4,8	215	265	112	15	279	45					44	225	190	250		320	540	744	68	77	
LEM 150	112 M	4,0	-	232	282														162		557	761	70	79
	132 M	-	6,0	272	222	132	18	320	88	218	178	320	278	-	55	256	216	276	426	663	867	95	104	

\* dimensions dependent on the motor make  
 \*\* see list of accessories  
 other motors on request  
 flange connections see page 10

**Dimension table LEL 90, LEL 125, LEL 150**



**Dimension table LEL 90, LEL 125, LEL 150 with integrated pre-arranged separator**



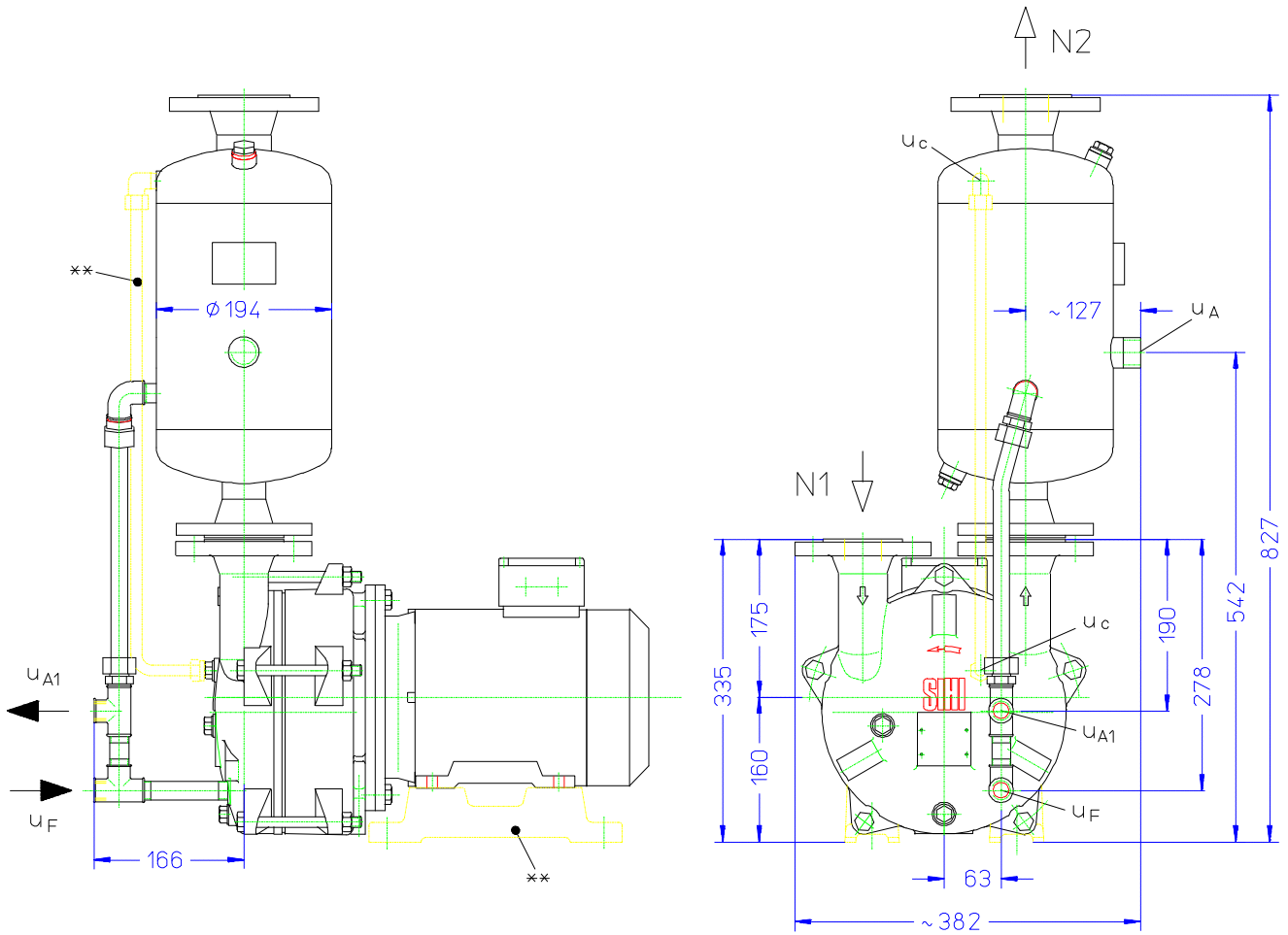
- N 1 = gas inlet DN 40
- N 2 = gas outlet DN 40
- UA = connection for liquid drain G 1¼
- UB = connection for service liquid G ½
- UC = connection for protection against cavitation G ¾
- UE = drain connection G ¾

- use = connection for dirt drain G ¾
- ul = connection for vent cock G ½
- um = connection for pressure gauge G ¾
- um1 = connection for drain valve G ¾
- ut = connection for thermometer G ½

	electric motor 50 Hz			f <sub>1</sub>	O <sub>3</sub>	w <sub>1</sub>	w <sub>2</sub>	w <sub>3</sub>	E	M	N	P	weight abt. kg	
	size	IP 55	EEe II T3										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
LEL 150	112 M	-	3,6	208	162	567	492	771	82	265	230	300	67	79
	132 S	-	5,0			587	512	791						

other motors on request  
 flange connections see page 10

Arrangement drawing LEM 90, LEM 125, LEM 150

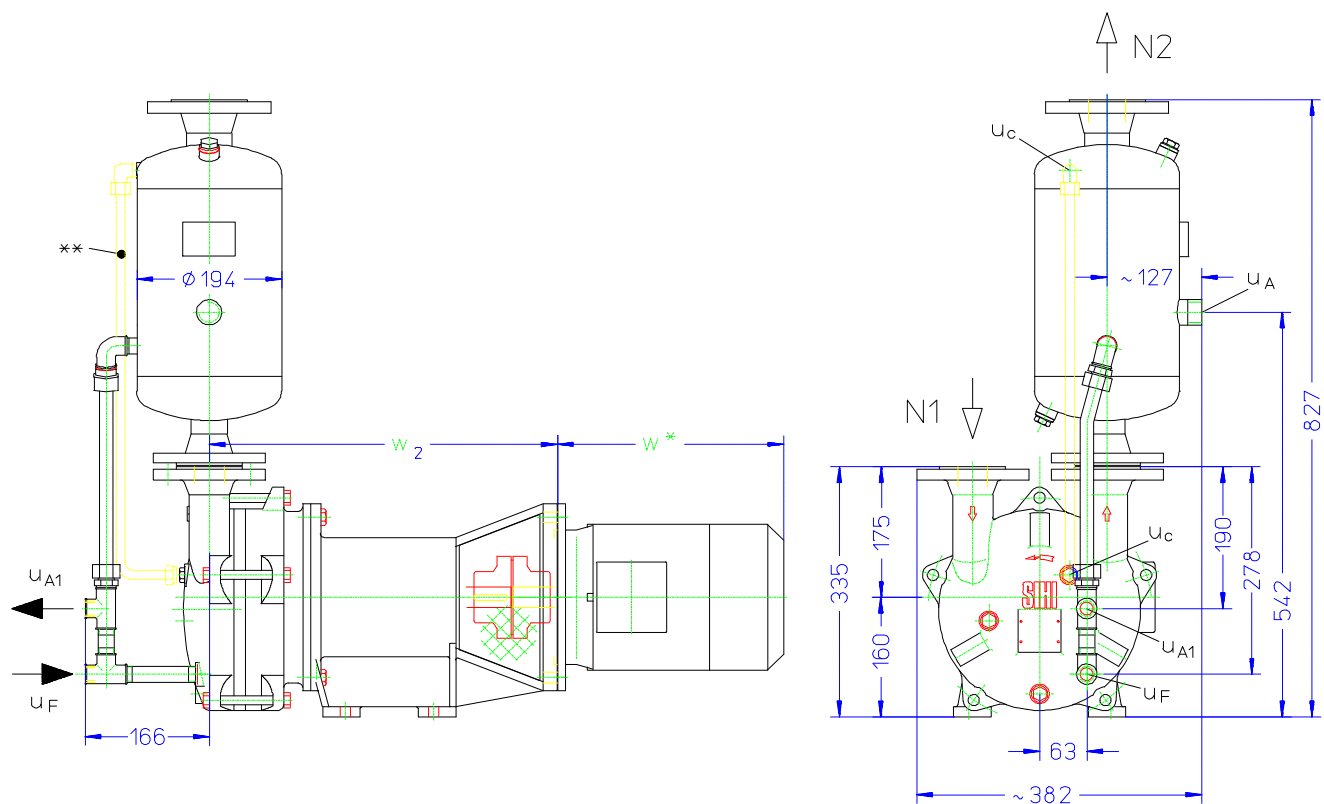


	size	electric motor IP 55 kW		weight abt. kg
		50 Hz	60 Hz	
LEM 90	100 L	2,2	3,3	65
LEM 125	100 L	3,0	-	72
	112 M	-	4,8	78
LEM 150	112 M	4,0	-	80
	132 M	-	6,0	105

\*\* see list of accessories  
other motors on request  
flange connections see page 10

- N 1 = gas inlet DN 40
- N 2 = gas outlet DN 50
- U<sub>A</sub> = connection for liquid drain G 1
- U<sub>A1</sub> = connection for liquid drain G ½
- U<sub>F</sub> = connection for fresh liquid G ½
- U<sub>c</sub> = connection for protection against cavitation G ¾

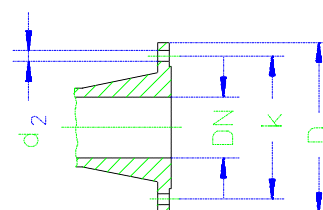
# Arrangement drawing LEL 90, LEL 125, LEL 150



	electric motor 50 Hz		w *	w <sub>2</sub>	weight abt. kg	
	size	kW				
		IP 55	EEx e II T3			
LEL 90	100 L	2,2	2,5	303	466	91
LEL 125	100 L	3,0	-	320	475	98
	112 M	-	3,6		104	
LEL 150	112 M	4,0	-	405	492	106
	132 S	-	5,0		512	141

- N 1 = gas inlet DN 40
- N 2 = gas outlet DN 50
- U<sub>A</sub> = connection for liquid drain G 1
- U<sub>A1</sub> = connection for liquid drain G ½
- U<sub>F</sub> = connection for fresh liquid G ½
- U<sub>C</sub> = connection for protection against cavitation G ¾

flange connections to DIN 2501 PN 10		
DN	40	50
k	110	125
D	150	165
number x d <sub>2</sub>	4 x 18	4 x 18



\* dimensions dependent on the motor make

\*\* see list of accessories

other motors on request

## Data regarding the pump size - order hints

series + size	hydraulics + bearings	shaft sealing	material design	casing seal
	<ul style="list-style-type: none"> <li>A• hydraulics A</li> <li>R• with integrated pre-arranged separator</li> <li>•Z two grease lubricated antifriction bearings arranged in the motor</li> <li>•B as •Z but arranged in the motor carrier</li> </ul>	AAE mechanical seal O-rings Perbunan  AA1 as AAE, but O-rings Viton	0A main parts of GG  4B main parts of Cr Ni Mo-cast steel	0 liquid seal
LEM 90 125 150	AZ, RZ	AAE, AA1	0A, 4B	0
LEL 90 125 150	AB, RB			

## Motor selection table for LEM

		motor enclosure IP 55 50 Hz					motor enclosure IP 55 60 Hz				
		Y-voltage V +/- 5%	Δ-voltage V +/- 5%	power kW	size	motor- design.	Y-voltage V +/- 5%	Δ-voltage V +/- 5%	power kW	size	motor- design.
LEM	90	346-440	200-254	2,2	100 L	BW	346-480	200-277	3,3	100 L	BX
LEM	125	346-440	200-254	3,0	100 L	KW	346-480	200-277	4,8	112 M	MX
LEM	150	660-725	380-420	4,0	112 M	CX	---	380-480	6,0	132 M	DX

### Example for ordering:

The construction size LEM 125 AZ AAE 0A 0 with 3 kW three-phase ac motor (50 Hz, 230 VΔ) 1450 rpm has the complete order number:

**LEM - 125 AZ AAE 0A 0 KW**

## Design for LEL

	designation	electric motor 50 Hz					
		motor enclosure IP 55			motor enclosure EEx e II T3		
		kW	size	designation	kW	size	designation
pump with free shaft end	01						
pump with coupling, pre-drilled at motor side	04						
as above, but with motor, for example		2,2	100 L	KB	2,5	100 L	LK
3,0 kW three-phase motor	i.e. LB	3,0	100 L	LB	3,6	112 M	MK
(50 Hz, 230 VΔ) at 1450 rpm		4,0	112 M	MB	5,0	132 S	NK

### Example for ordering:

The construction size LEL 125 AB AAE 0A 0 with 3 kW three-phase ac motor (50 Hz, 230 VΔ) 1450 rpm has the complete order number:

**LEL - 125 AB AAE 0A 0 LB**

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

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

## Accessories LEM 90, LEM 125, LEM 150

Recommended accessories		LEM 90 LEL 90	LEM 125 LEL 125	LEM 150 LEL 150
<b>Overhead liquid separator</b>  material design 130 / galvanized 172 / 1.4571  service liquid line material design 072 / St 37-0 172 / 1.4571  cavitation protection line material design 072 / St 37-0 172 / 1.4571	type	XBa 1042		
	weight	9,7 kg		
	SIHI part No.	35 000 396 35 000 397		
	SIHI part No.	35 003 244 35 007 969		
<b>Upright liquid separator</b>  material design 130 / galvanized 172 / 1.4571  service liquid line material design 072 / St 37-0 172 / 1.4571  discharge line (bend) material design 072 / St 37-0 172 / 1.4571  cavitation protection line material design 072 / St 37-0 172 / 1.4571	type	XBp 413		
	weight	28 kg		
	SIHI part No.	35 000 502 35 000 503		
	SIHI part No.	35 009 418 35 005 534		
<b>SIHI-gas ejector</b> at service liquid temperature at service liquid temperature	15 °C	GEV 90 A	GEV 125 A	GEV 150 A
	30 °C	GEV 90 B	GEV 125 B	GEV 150 B
<b>SIHI ball type non-return valve</b> material design 767 / GG 25 784 / 1.4408	type / weight	XCk 40 / 2,8 resp. 5,2 kg		
	SIHI part No.	43 016 890 43 030 996		
<b>Support foot</b> only for series 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
	<b>Standard motor</b> only for series LEL IP 55	size power weight	100 L 2,2 kW 18 kg	100 L 3,0 kW 20 kg
EEx e II T3	size power weight	100 L 2,5 kW 22 kg	112 M 3,6 kW 30 kg	132 S 5,0 kW 65 kg
<b>Coupling</b> only for series LEL for motor IP 55 pump side motor side  for motor EEx e II T3 pump side motor side	type / weight SIHI part No.	B 80 / 1,5 kg 43 021 414 43 021 417		
	type / weight SIHI part No.	BDS 88 / 1,9 kg 43 028 112 43 024 707	BDS 103 / 3,1 kg 43 026 564 43 025 941	
<b>Intermediate flange</b> only for series LEL for motor flange Ø 300	SIHI part No.	081 / 1.0038 058 / stove enamel		
	SIHI part No.	20 043 024 20 045 646		

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

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