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		$\frac{\text{mbar} \cdot \text{l}}{\text{s}}$	$< 1 \cdot 10^{-3}$			

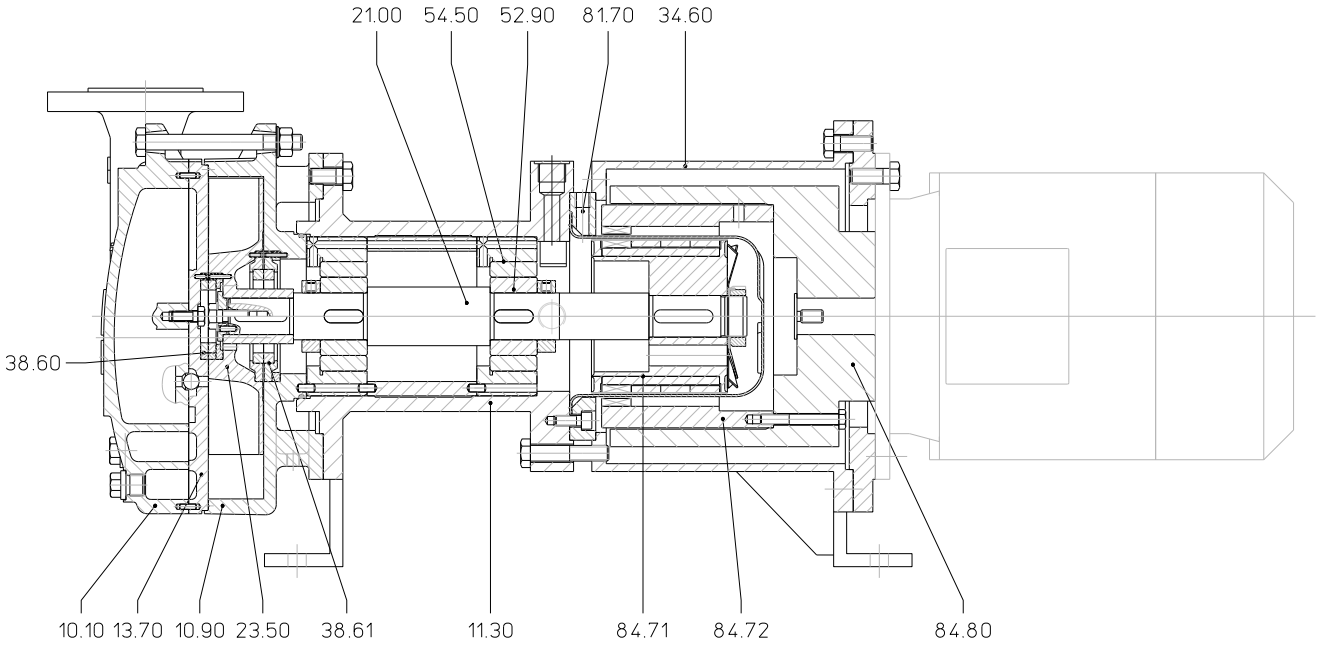
The combination of several limiting values is not admissible.

[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	

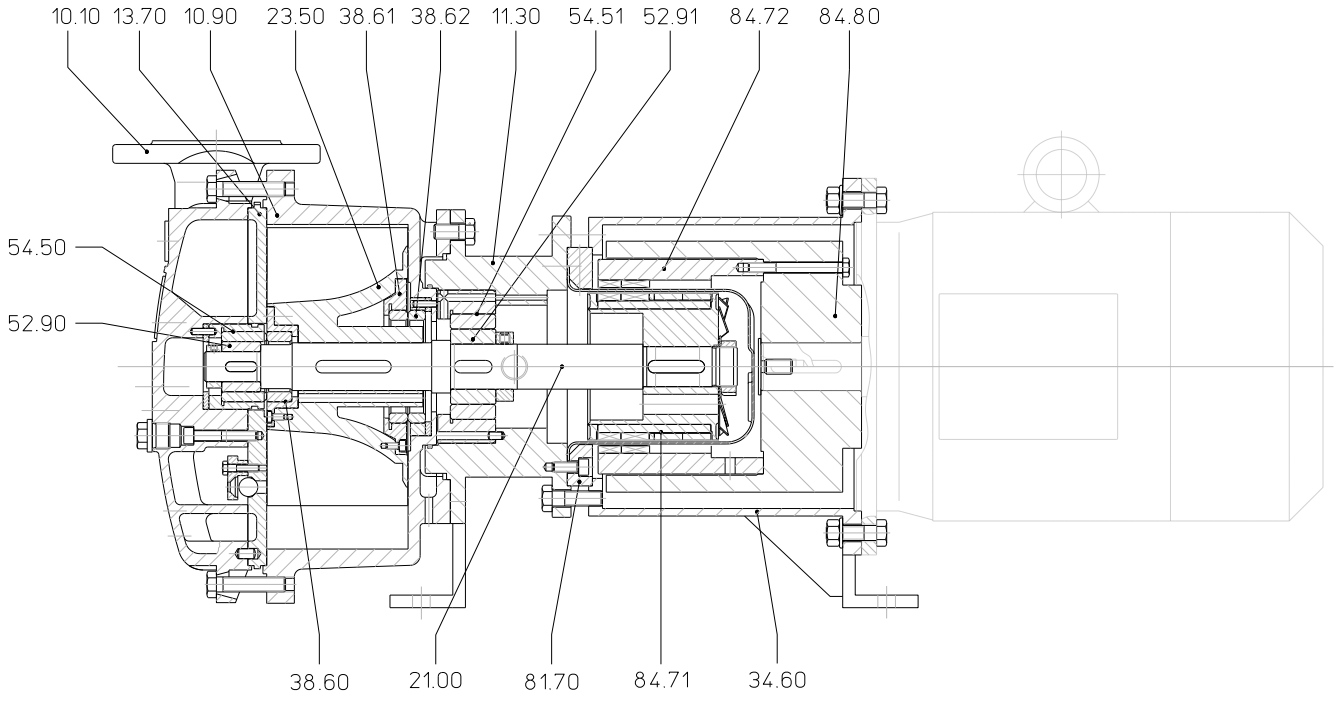
Sectional drawing LEM 90, LEM 125, LEM 150 with magnetic coupling



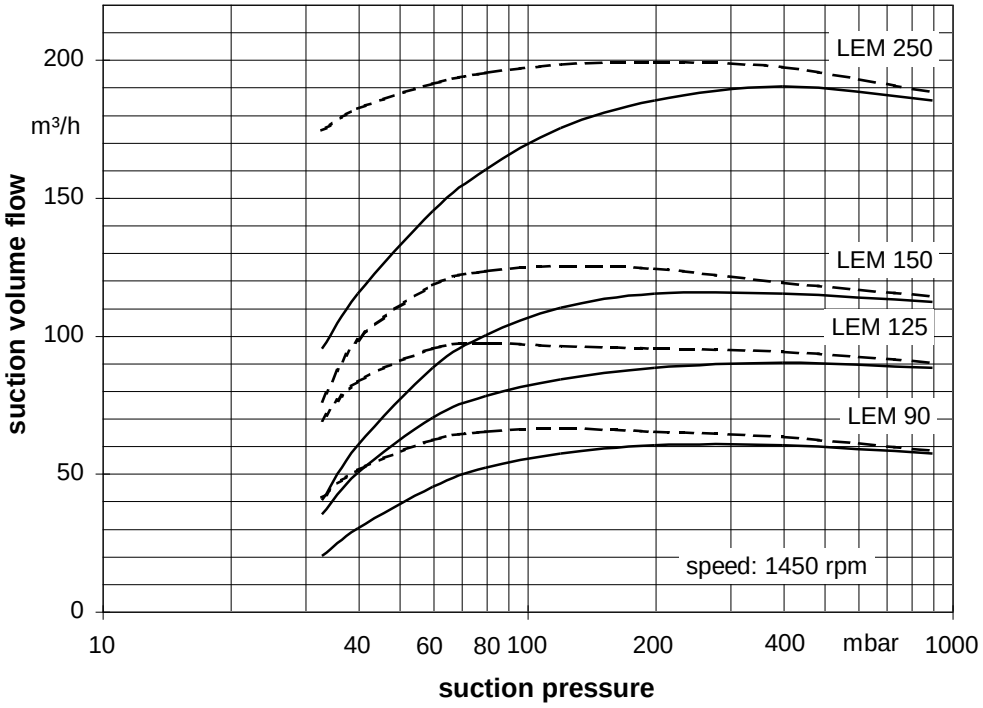
Material design LEM 250 with magnetic coupling

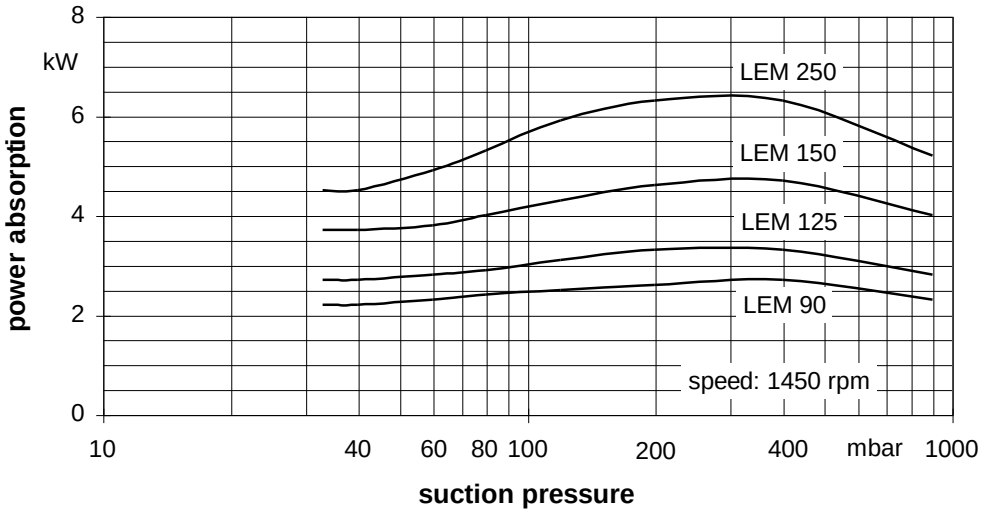
Item	COMPONENTS	MATERIAL DESIGN 0B	4B
10.10	Casing	0.6025	1.4408
10.90	Central body		
13.70	Guide disk		
11.30	Bearing bracket casing	1.0553	1.4571
21.00	Shaft	1.4021	
23.50	Vane wheel impeller	1.4027.05	1.4517
34.60	Stool	1.0038	1.0038 stove enamelling
38.60, 38.61, 38.62	Thrust bearing	1.4462 / silicon 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



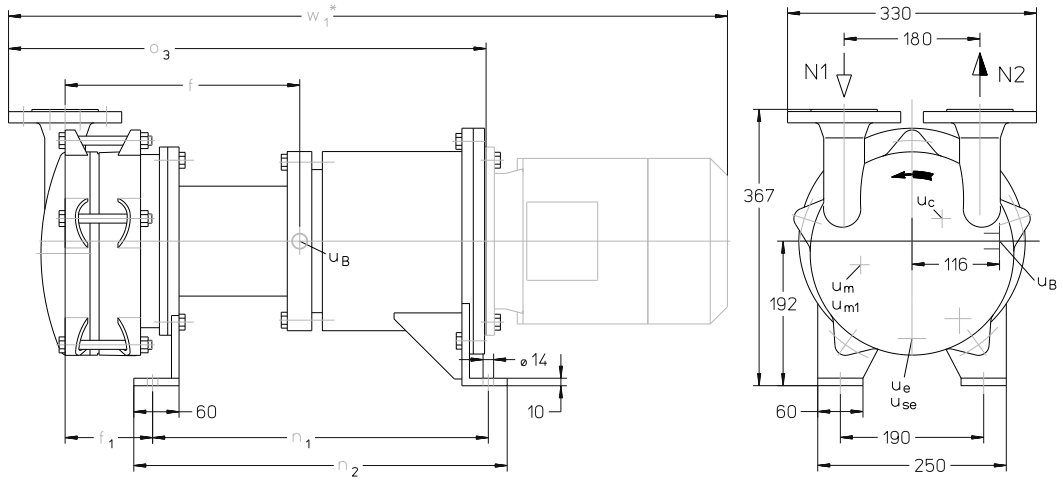


The operating data are applicable under the following conditions:

- 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

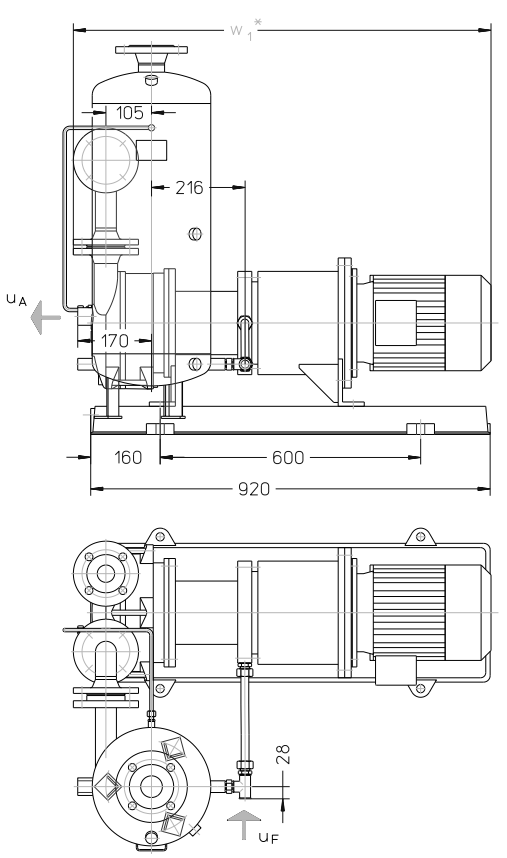


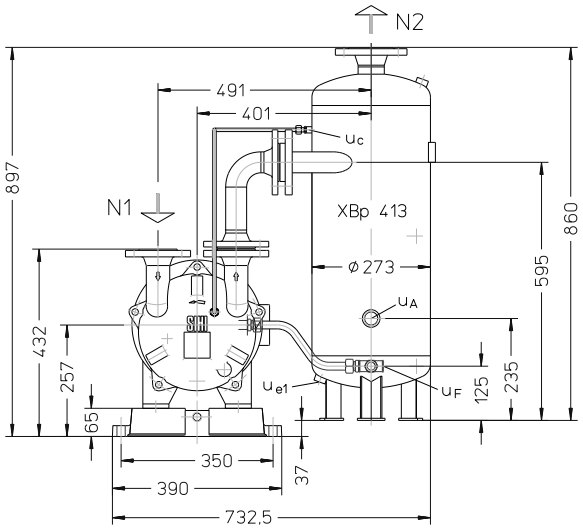
	f	f_1	n_1	n_2	o_3	w_1*	weight out motor app. kg
LEM 90	311	116	445	495	633	950	80
LEM 125	320	125			642	980	89
LEM 150	337	142	462	512	659	1080	96

* 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



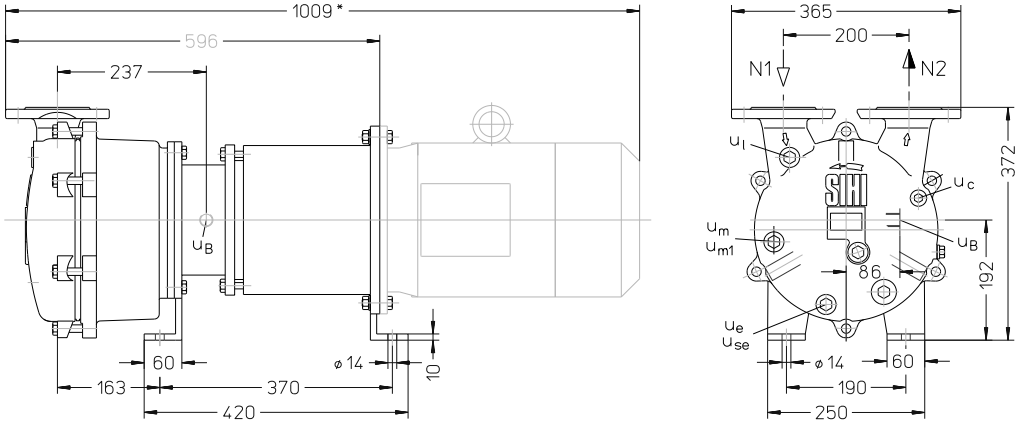


	w_1*	weight app. kg
LEM 90	950	168
LEM 125	980	185
LEM 150	1080	210

* 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



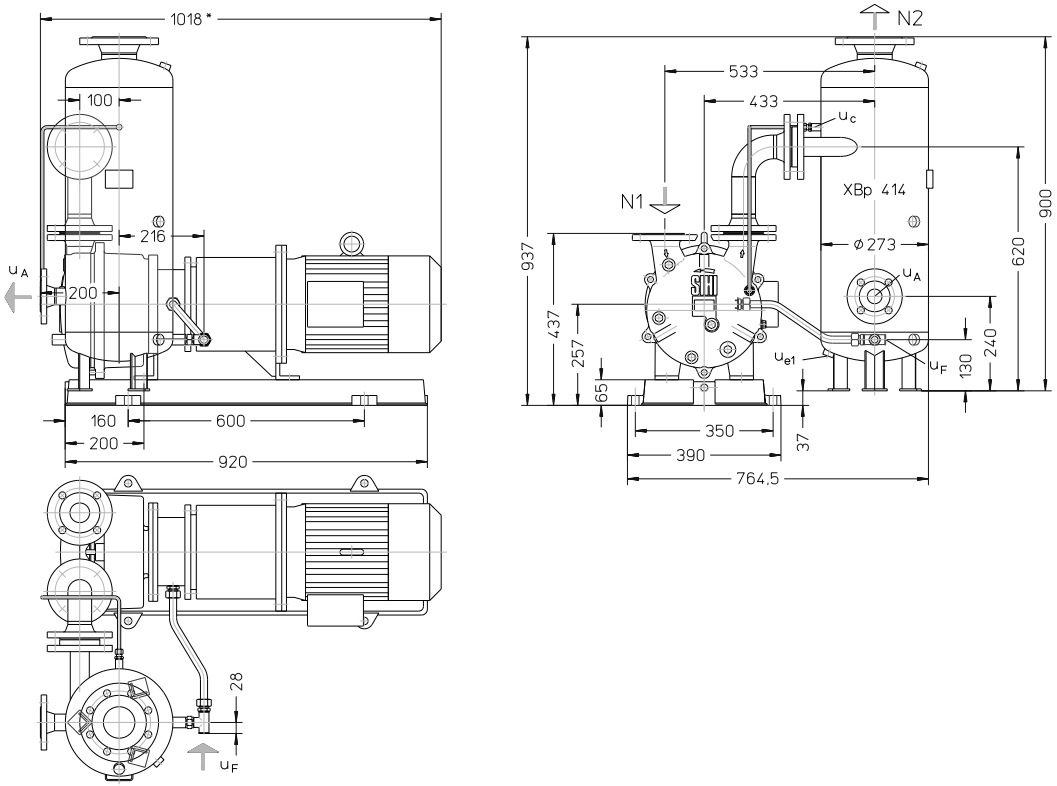
N 1 = gas inlet DN 50
N 2 = gas outlet DN 50

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



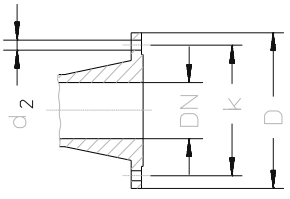
N 1 = gas inlet DN 50
N 2 = gas outlet DN 80

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 • • Z magnetic coupling • • 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.

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