

# SIHI<sup>compact</sup> - Vacuum Compact Units

One stage



SIHI® Pumps

## PLC

Sizes 26, 51, 91, 126, 161, 251, 325, 425

**Pressure range:** 33 to 1013 mbar  
**Suction capacity:** 22 to 473 m<sup>3</sup>/h

### CONSTRUCTION

The SIHI<sup>compact</sup> vacuum units consist of various components which are assembled together to form a compact unit with an optional function range. The LEM liquid ring vacuum pump utilised in these units is of a single stage design and of a simple and robust construction with the following features:

- Non polluting due to near isothermal compression
- Oil free, no lubrication in the working chamber
- Capable of handling nearly all gases and vapours
- Small quantities of entrained liquid can be handled
- Easy to maintain and reliable operation
- Low noise and virtually free from vibration
- Cavitation protection as standard

The SIHI<sup>compact</sup> vacuum units are produced as a service liquid saving arrangement and can be supplied with or without a heat exchanger.

### APPLICATION

For handling dry and saturated forms of gases. Small quantities of entrained liquid in the suction gas stream can also be dealt with. The SIHI<sup>compact</sup> is designed for vacuum applications of between 33 and 900 mbar. This range can be extended when used in conjunction with the respective gas operated ejector (up to 8 mbar).



### NOTE

During its operation, the liquid ring vacuum pump must be continuously supplied with service liquid, normally water, in order to eliminate the heat resulting from the gas compression and to prevent the pump from dry running operation. The service liquid is separated from the process gas in a separator. Depending on the chosen arrangement and application the service liquid can be either totally or partially re-used within the system (combined- or circulating operation). In the case of circulating operation with heat exchanger the pressure difference between the suction inlet and discharge outlet should be 200 mbar at minimum.

The direction of rotation is clockwise when viewed from the drive end of the pump.

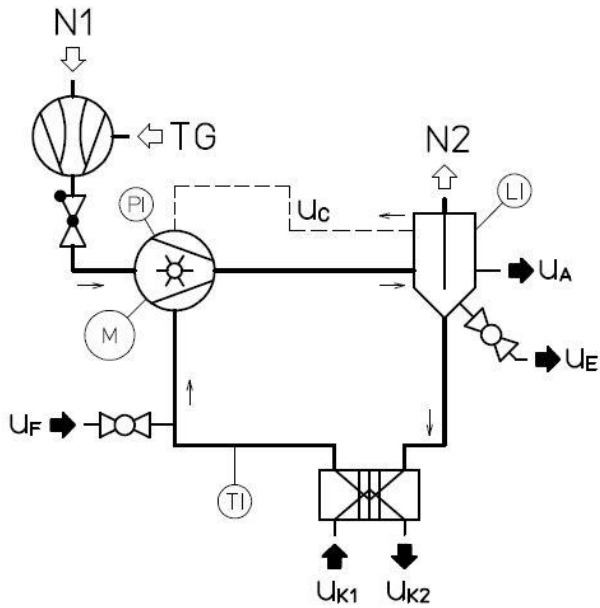
### GENERAL TECHNICAL DATA

Pump type	Unit	PLC 26	PLC 51	PLC 91	PLC 126	PLC 161	PLC 251	PLC 325	PLC 425
Speed	50 Hz 60 Hz	2900			1450				
	rmp	3500			1750				
overpressure on compression	max.	bar			0,3				
permissible pressure difference	max.	bar			1,1				
Hydraulic test pressure of the pump (overpressure)	bar				3				
Moment of inertia of rotating parts of pump and water content	kg · m <sup>2</sup>	0,003	0,005	0,007	0,009	0,070	0,097	0,14	0,21
Noise level at 80 mbar suction pressure (standard values)	dB (A)	68		72		65		70	72
max. gas temperature	dry saturated	°C			200				
		°C			100				
Service liquid									
max. permissible temperature	°C				80				
min. permissible temperature	°C				10				
max. viscosity	mm <sup>2</sup> /s				4				
max. density	kg/m <sup>3</sup>				1200				
liquid capacity of the unit up to middle of shaft	litre	6,5	7	14,5	14,5	26	26,5	50	50,5
max. flow resistance of the heat exchanger	bar				0,2				

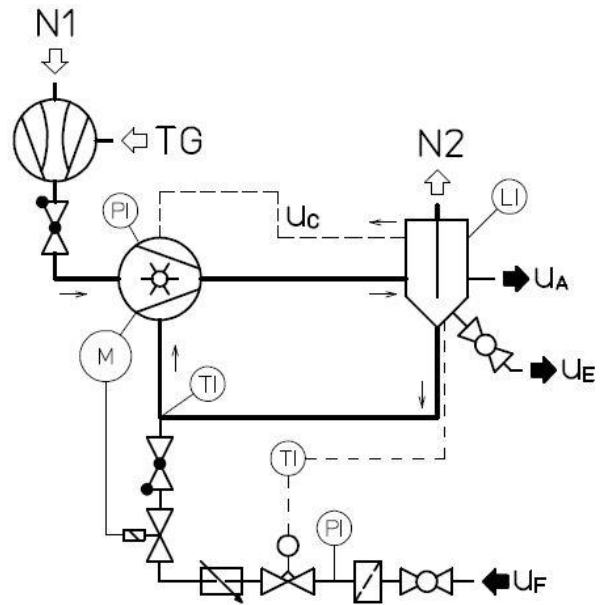
The combination of several limiting values is not admissible.

## Flow diagram

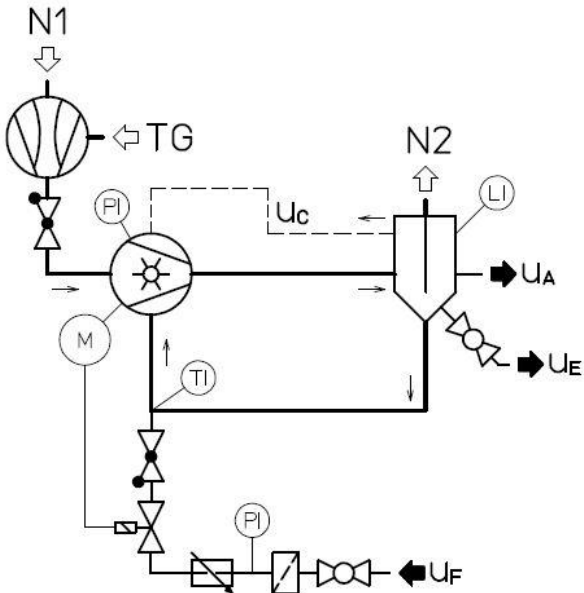
Operating mode: Circulating operation - Type H



Operating mode: Combined operation, thermostatic control - Type T



Operating mode: Combined liquid operation - Type C

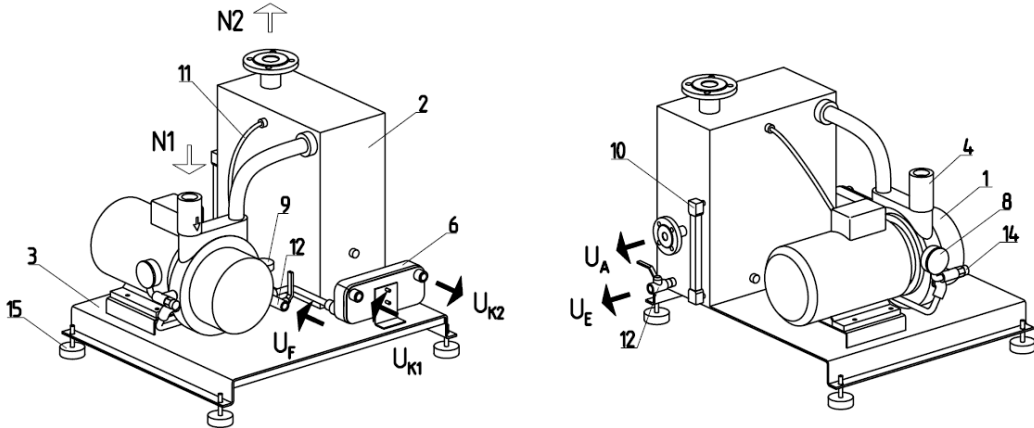


## Connections

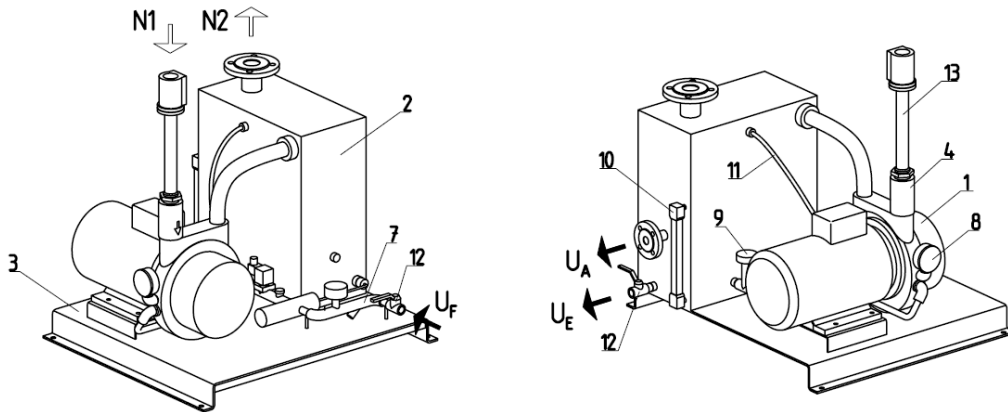
N1	gas inlet
N2	gas outlet
TG	motive gas inlet
UA	overflow
Uc	cavitation protection
UE	drainage
UF	make-up liquid
Uk1	cooling water inlet
Uk2	cooling water outlet

## Material design of the unit

Operating mode: Circulating operation - Type H



Operating mode: Combined operation - Type C / T



Item	Components	Material Design**	
		0	4
1	Vacuum pump - LEM	see material design of the pump	
2	Liquid separator	1.4301	
3	Base plate	1.4301	
4	Ball-type non-return valve – XCK	Brass / NBR PLC 26 to 161	1.4571 / PTFE
		0.6025 / NBR PLC 251 to 425	
5	Small fittings / Pipework	Brass / Steel, galvanized 1.4571 / 1.4408	
6	Heat exchanger	1.4401, Copper brazed	
7	Thermostatic control unit*	Brass / 0.8035, galvanized	Messing / 0.8035, verzinkt / 1.4571
8	Vacuum gauge	Brass / Stainless steel 1.4571	
9	Thermometer	Brass / Steel, galvanized 1.4571	
10	Liquid level indicator	synthetic material	
11	Cavitation protection pipework***	synthetic material / Nickel plated, chromated brass	
12	Cut-off valves	Brass, chrome-plated 1.4408	
13	Gas ejector – GEV	see datasheet gas ejector	
14	Vacuum relief valve	Brass 1.4301	
15	Machine feet	1.4301 / NBR / Steel, galvanized	

\* Voltage for 2/2-ways solenoid valve, 24 V DC, combined operation

\*\* Other material combinations upon request

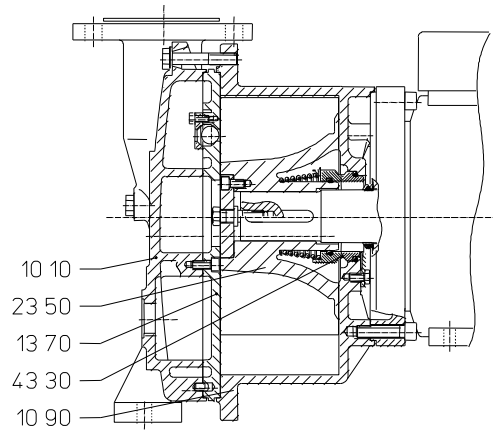
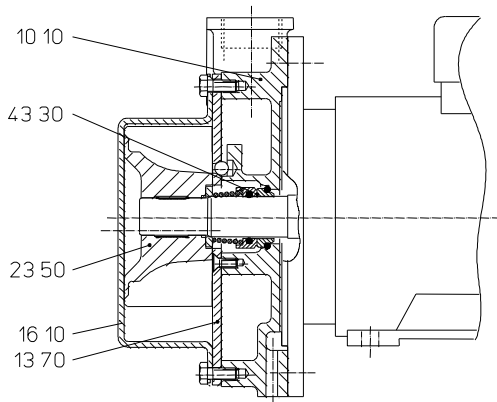
\*\*\* Not in combination with gas ejector resp. vacuum relief valve

**Material design of the pump**

Standard design

LEM 26, 51, 91, 126, 161, 251

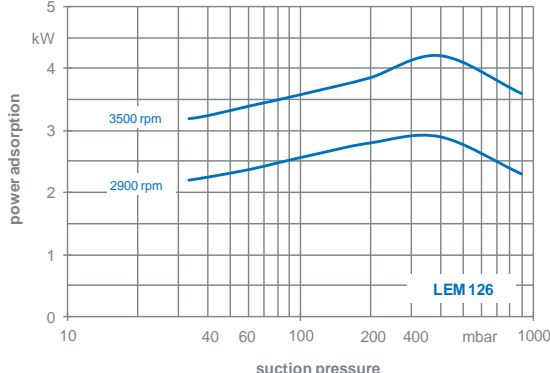
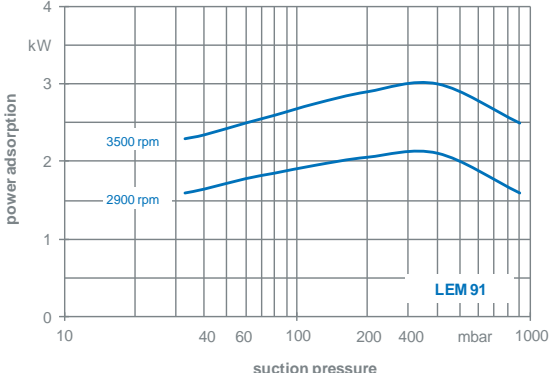
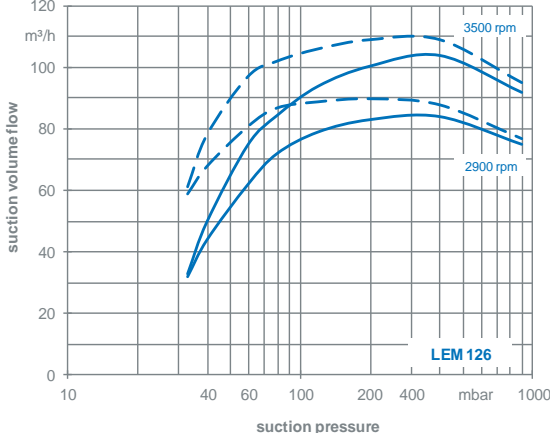
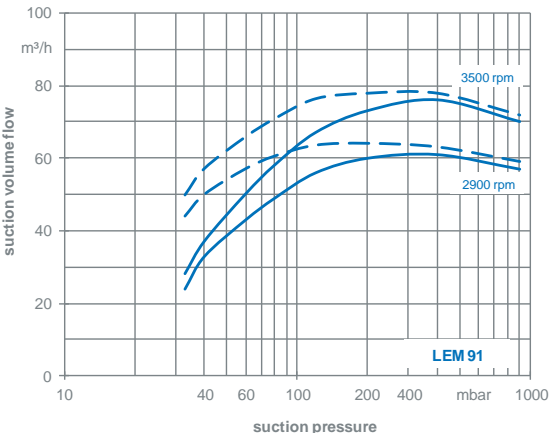
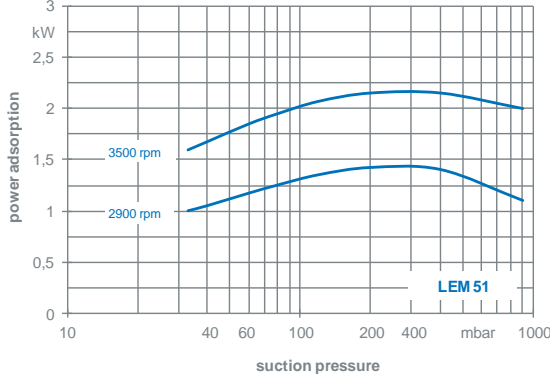
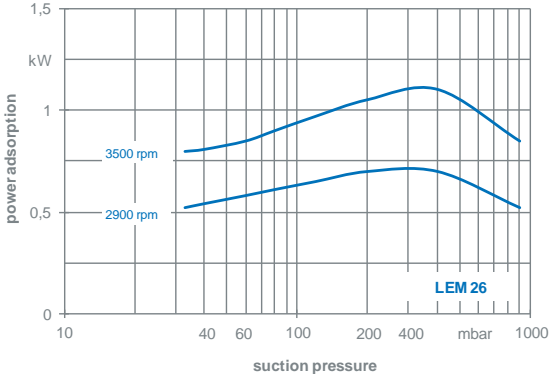
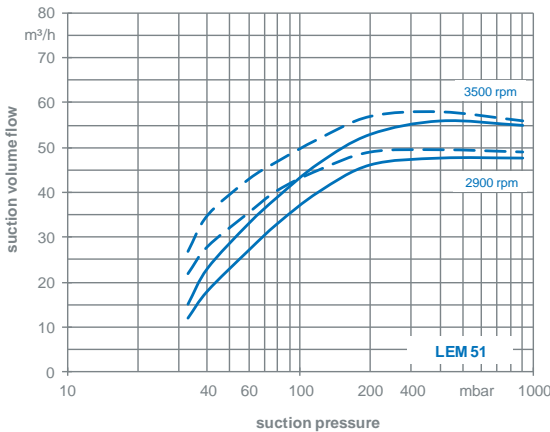
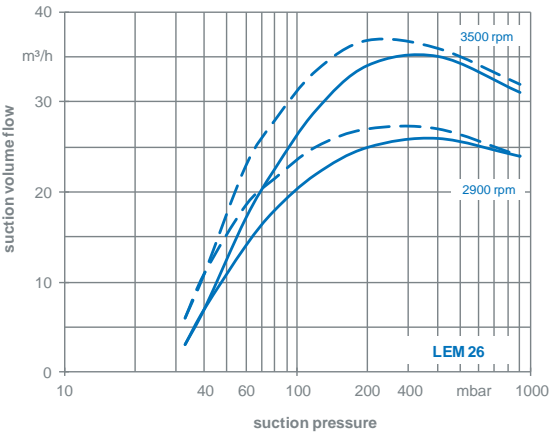
LEM 325, 425



Item	COMPONENTS	MATERIAL DESIGN 0							
		LEM							
		26	51	91	126	161	251	325	425
10.10	Casing	0.6025							
13.70	Guide disc	1.4301						0.6025	
10.90	Central body	-						0.6025	
16.10	Cover	1.4301						-	
23.50	Impeller	1.4308	2.1096.01	1.4308			0.7043		
43.30	Mechanical seal	EBPGG					BVFFF	EBPGG	

Item	COMPONENTS	MATERIAL DESIGN 4							
		LEM							
		26	51	91	126	161	251	325	425
10.10	Casing	1.4408							
13.70	Guide disc	1.4404						1.4408	
10.90	Central body	-						1.4408	
16.10	Cover	1.4404						-	
23.50	Impeller	1.4517		1.4408			1.4517		
43.30	Mechanical seal	GBVGG					AQ1VGG	GBVGG	

Suction volume flow and power absorption



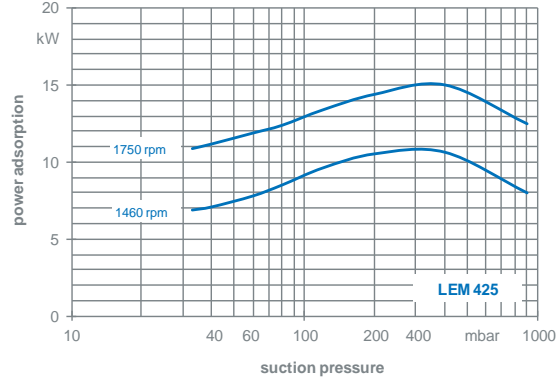
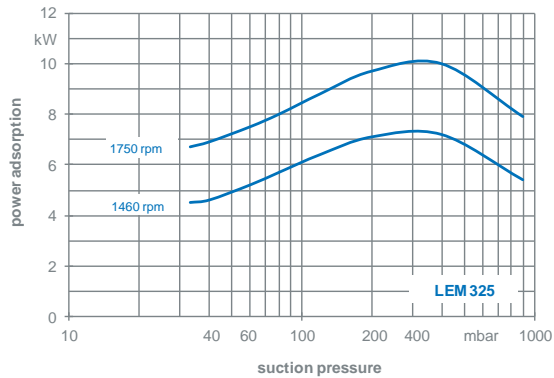
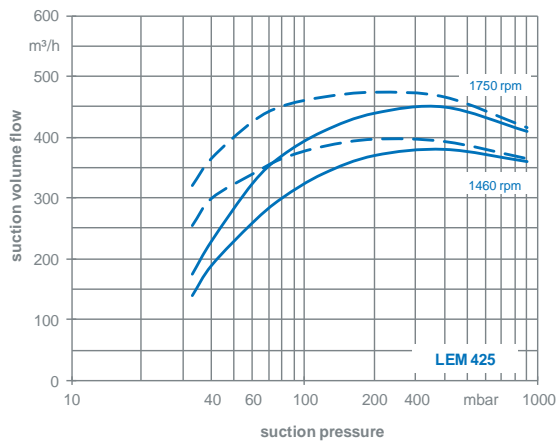
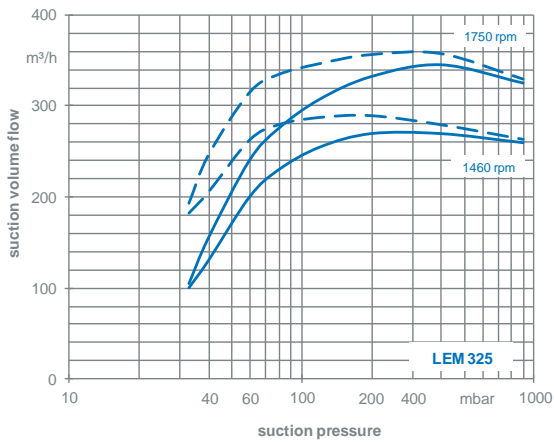
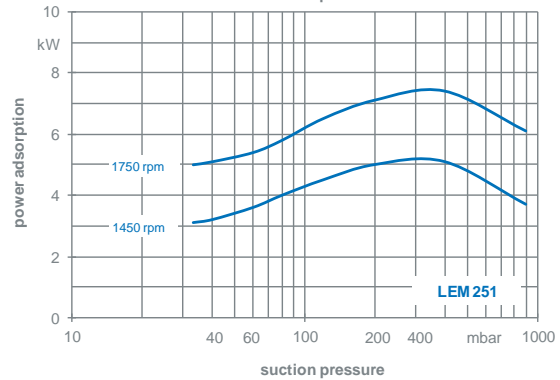
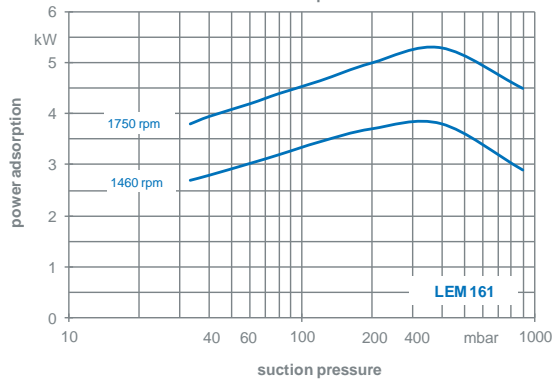
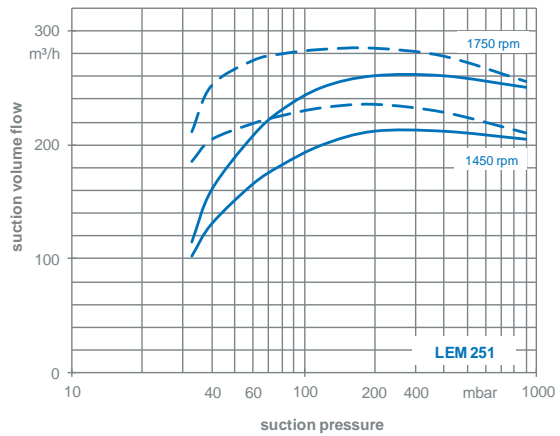
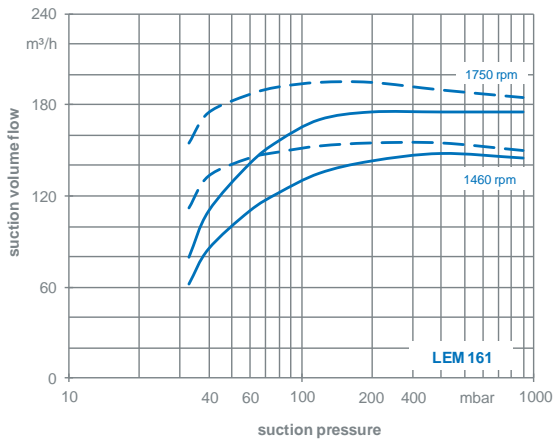
The operating data are applicable under the following conditions:

- Pumping medium:
  - dry air:
  - saturated air:
- Service liquid:
  - water:

Discharge pressure: 1013 mbar (atmospheric pressure)  
 Tolerance of the operating data 10%

20°C ———  
 20°C - - - -  
 15°C

## Suction volume flow and power absorption



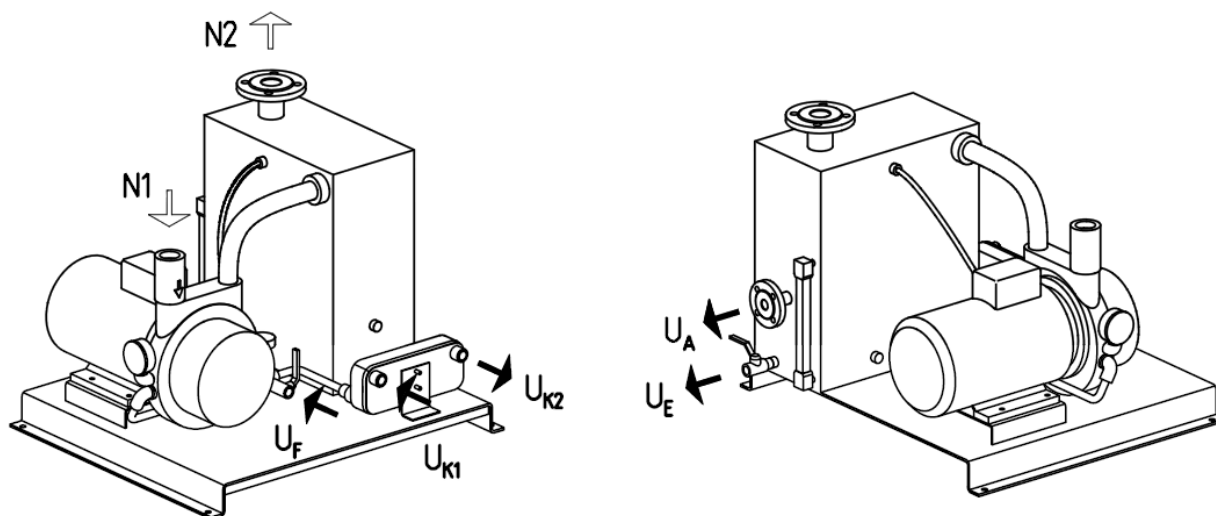
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- Pumping medium:
    - dry air:
    - saturated air:
  - Service liquid:
    - water:
- Discharge pressure: 1013 mbar (atmospheric pressure)  
 Tolerance of the operating data 10%

20°C ———  
 20°C - - - -  
 15°C ———

## Connections

Operating mode: Circulating operation - Type H



	PLC	26 / 51	91 / 126	161	251	325 / 425
N1	Gas inlet	G 1	G 1 1/4	G 1 1/2	DN 50 DIN EN 1092-1	DN 65 DIN EN 1092-1
N2	Gas outlet	G 1 1/4	G 1 1/2	DN 50 DIN EN 1092-1	DN 50 DIN EN 1092-1	DN 80 DIN EN 1092-1
UA	Overflow	G 3/4	G 3/4	DN 25 DIN EN 1092-1	DN 25 DIN EN 1092-1	DN 40 DIN EN 1092-1
UE	Drainage	G 1/2	G 1/2	G 1/2	G 1/2	G 3/4
UF	Make-up liquid inlet	G 1/2	G 1/2	G 1/2	G 1/2	G 3/4
UK1	Cooling water inlet	G 3/4	G 3/4	G 1	G 1	G 1
UK2	Cooling water outlet	G 3/4	G 3/4	G 1	G 1	G 1

## Cooling liquid data

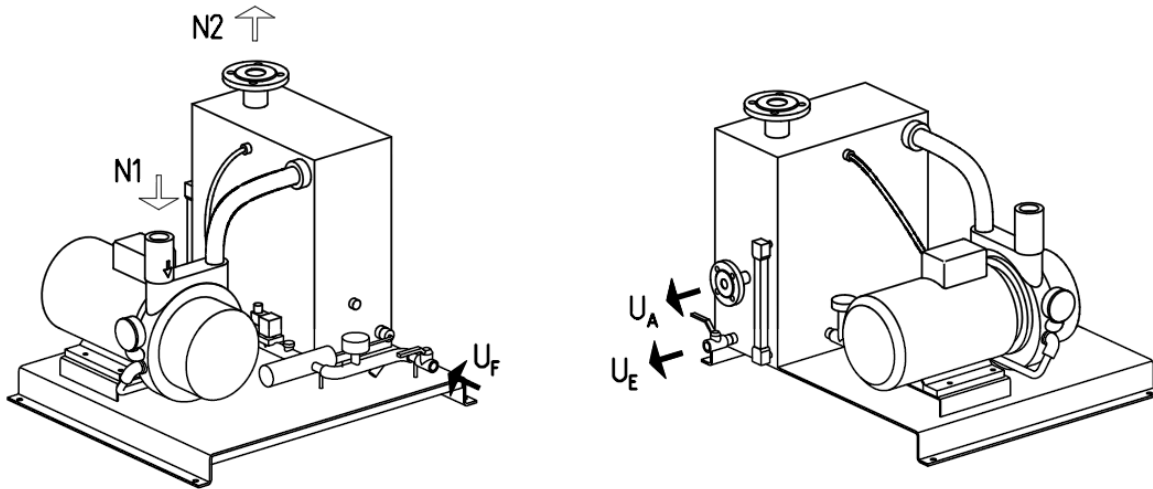
For the cold side of the heat exchanger

Example for an inlet temperature of the cooling liquid of 12°C and an outlet temperature of 15°C.  
For the maximum power consumption for the dry air feed.

	PLC	26		51		91		126		161		251		325		425	
Frequency	[Hz]	50	60	50	60	50	60	50	60	50	60	50	60	50	60	50	60
Cooling liquid		Water															
Inlet temperature Service liquid	[°C]	17.2	18.4	18.5	20.5	18.4	19.8	19.6	21.7	18.4	19.8	19.6	21.7	20.4	22.5	22.1	24.9
Outlet temperature Service liquid	[°C]	15															
Flow rate	[m³/h]	0.20	0.32	0.40	0.62	0.60	0.86	0.83	1.21	1.09	1.52	1.46	2.12	2.06	2.87	3.04	4.30
Pressure loss	[bar]	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.06	0.07	0.13	0.12	0.25	0.08	0.14	0.16	0.30

Connections

Operating mode: Combined operation - Type C / T



PLC		26 / 51	91 / 126	161	251	325 / 425
N1	Gas inlet	G 1	G 1 1/4	G 1 1/2	DN 50 DIN EN 1092-1	DN 65 DIN EN 1092-1
N2	Gas outlet	G 1 1/4	G 1 1/2	DN 50 DIN EN 1092-1	DN 50 DIN EN 1092-1	DN 80 DIN EN 1092-1
U <sub>A</sub>	Overflow	G 3/4	G 3/4	DN 25 DIN EN 1092-1	DN 25 DIN EN 1092-1	DN 40 DIN EN 1092-1
U <sub>E</sub>	Drainage	G 1/2	G 1/2	G 1/2	G 1/2	G 3/4
U <sub>F</sub>	Make-up liquid inlet	G 1/2	G 1/2	G 1/2	G 1/2	G 1/2

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

Pump type	Suction pressure [mbar]	Speed [1/min]	33			FB	120			FB	200			FB	400			FB
			KB				KB				KB				KB			
			Temperature difference [°C]				Temperature difference [°C]				Temperature difference [°C]				Temperature difference [°C]			
10	5	2	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						
LEM 51	2900	0,07	0,13	0,23	0,48	0,09	0,15	0,24	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		0,12	0,19	0,28		0,12	0,18	0,26						
LEM 91	2900	0,11	0,19	0,34	0,66	0,13	0,22	0,36	0,62	0,14	0,22	0,36	0,6	0,14	0,22	0,34	0,54	
	3500	0,15	0,25	0,40		0,17	0,27	0,40		0,18	0,28	0,40						
LEM 126	2900	0,15	0,25	0,39	0,66	0,16	0,26	0,40	0,62	0,17	0,28	0,40	0,6	0,17	0,26	0,38	0,54	
	3500	0,19	0,29	0,44		0,21	0,31	0,44		0,21	0,31	0,44						
LEM 161	1460	0,20	0,34	0,61	1,3	0,23	0,39	0,66	1,2	0,25	0,41	0,66	1,14	0,24	0,39	0,60	0,96	
	1750	0,26	0,43	0,72		0,30	0,48	0,75		0,31	0,49	0,74						
LEM 251	1460	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						
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	0,40	0,60	0,84	1,15	
	1750	0,42	0,67	1,03		0,50	0,75	1,07		0,52	0,76	1,05						
LEM 425	1460	0,46	0,74	1,19	2,0	0,56	0,85	1,23	1,75	0,57	0,84	1,18	1,6	0,54	0,76	1,01	1,3	
	1750	0,64	0,97	1,40		0,69	0,99	1,34		0,70	0,97	1,27						

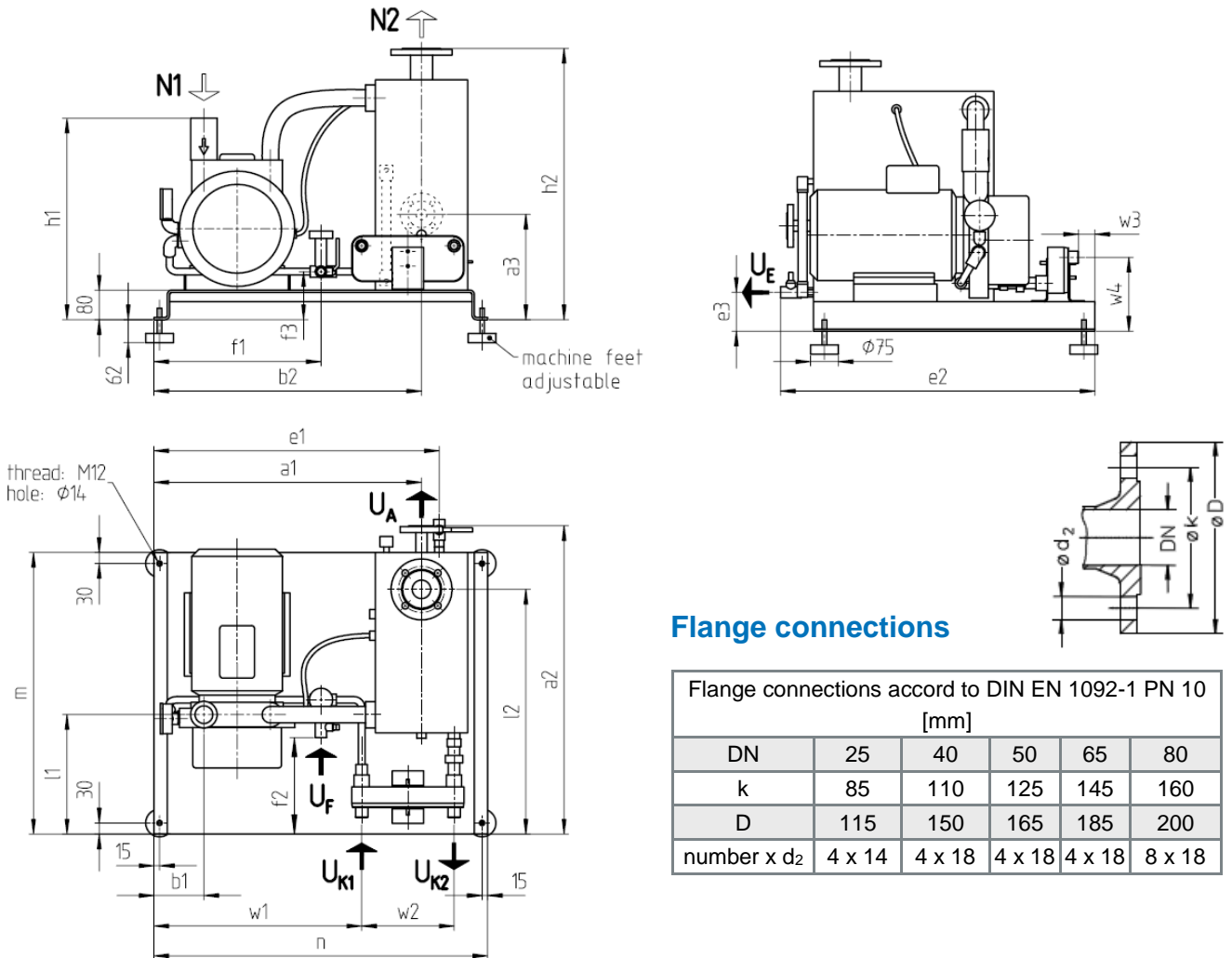
FB = Total service liquid flow rate on once-through system

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



## Dimensions

Operating mode: Circulating operation - Type H, Material design: Basic - Type 0



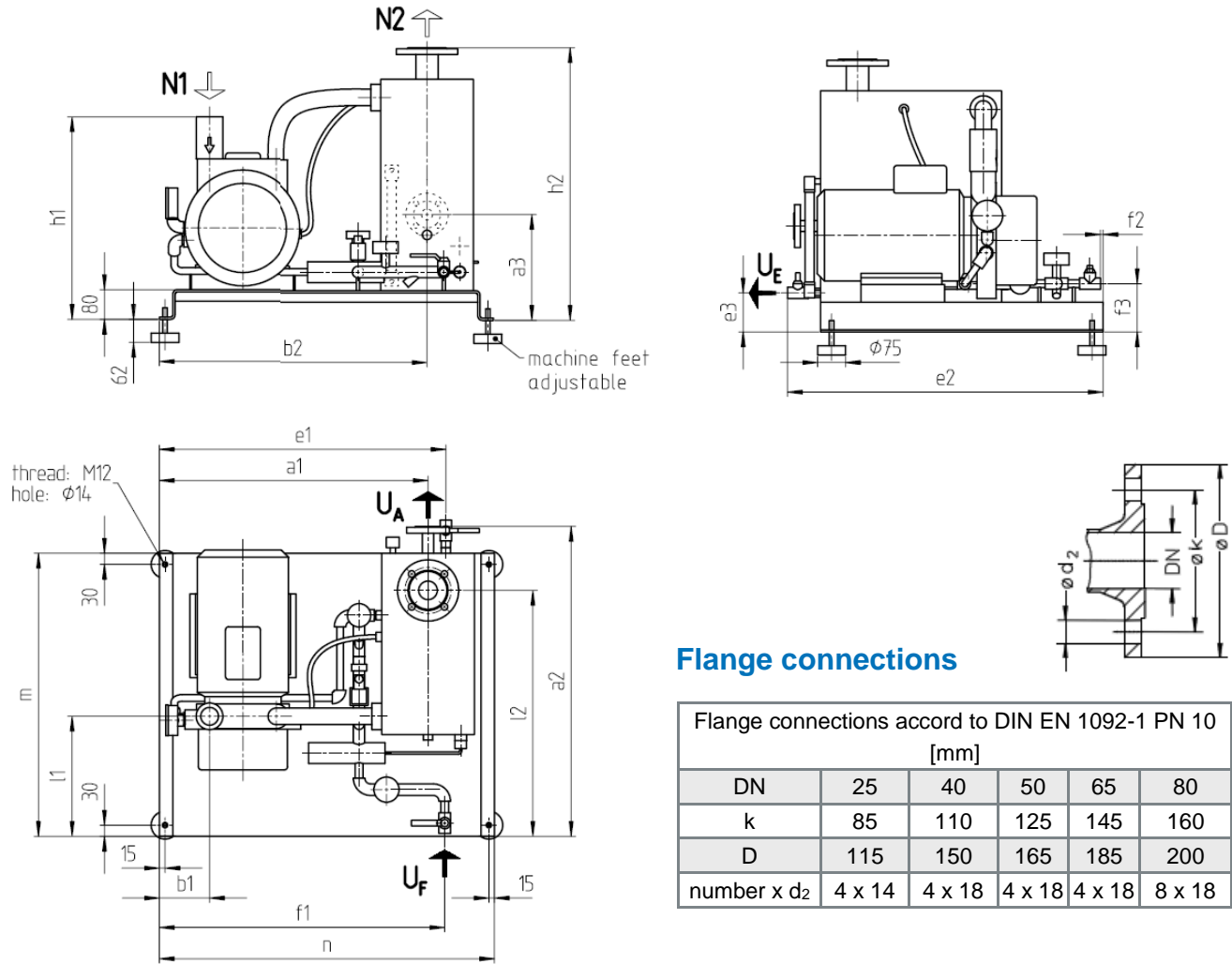
Flange connections accord to DIN EN 1092-1 PN 10 [mm]					
DN	25	40	50	65	80
k	85	110	125	145	160
D	115	150	165	185	200
number x $d_2$	4 x 14	4 x 18	4 x 18	4 x 18	8 x 18

Size	Frequency	Dimensions in mm												
		a1	a2	a3	b1	b2	e1	e2	e3	f1	f2	f3	h1	h2
PLC 26	50 Hz	530	649	186	105	530	583	702	105	322	140	126	336	432
PLC 51	50 Hz	530	649	186	103	530	583	702	105	322	140	126	349	432
PLC 91	50 Hz	632	726	257	162	632	665	779	105	429	135	126	491	578
PLC 126	50 Hz	632	726	257	162	632	665	779	105	429	135	126	491	578
PLC 161	50 Hz	724	843	285	135	724	772	851	105	453	262	130	545	734
PLC 251	50 Hz	724	843	285	125	724	772	851	105	488	127	130	551	734
PLC 325	50 Hz	771	1187	325	108	751	779	1203	105	439	60	130	633	789
PLC 425	50 Hz	771	1187	325	108	751	779	1203	105	439	60	130	633	789

Size	Frequency	Dimensions in mm								Weight approx. kg
		l1	l2	m	n	w1	w2	w3	w4	
PLC 26	50 Hz	320	528	613	675	396	154	55	166	63
PLC 51	50 Hz	320	528	613	675	396	154	55	166	71
PLC 91	50 Hz	324	605	690	782	503	154	27	166	95
PLC 126	50 Hz	331	605	690	782	503	154	27	166	100
PLC 161	50 Hz	323	662	762	903	562	250	45	200	147
PLC 251	50 Hz	323	662	762	903	562	250	45	200	215
PLC 325	50 Hz	365	955	1105	930	589	250	20	200	301
PLC 425	50 Hz	365	955	1105	930	589	250	20	200	346

Dimensions

Operating mode: Combined operation - Type C / T, Material design: Basic - Type 0



Flange connections accord to DIN EN 1092-1 PN 10 [mm]

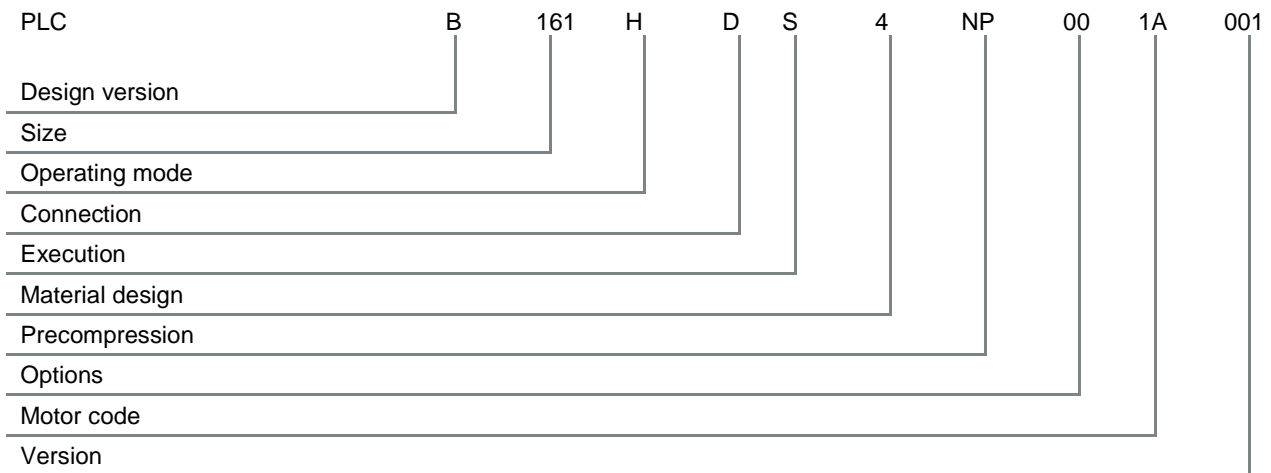
DN	25	40	50	65	80
k	85	110	125	145	160
D	115	150	165	185	200
number x d <sub>2</sub>	4 x 14	4 x 18	4 x 18	4 x 18	8 x 18

Size	Frequency	Dimensions in mm												
		a1	a2	a3	b1	b2	e1	e2	e3	f1	f2	f3	h1	h2
PLC 26	50 Hz	530	649	186	105	530	583	702	105	605	3	126	336	432
PLC 51	50 Hz	530	649	186	103	530	583	702	105	605	3	126	349	432
PLC 91	50 Hz	632	726	257	162	632	665	779	105	702	16	126	491	578
PLC 126	50 Hz	632	726	257	162	632	665	779	105	702	16	126	491	578
PLC 161	50 Hz	724	843	285	135	724	772	851	105	769	8	130	545	734
PLC 251	50 Hz	724	843	285	125	724	772	851	105	769	8	130	551	734
PLC 325	50 Hz	771	1187	325	108	751	779	1203	105	791	3	130	633	789
PLC 425	50 Hz	771	1187	325	108	751	779	1203	105	791	3	130	633	789

Size	Frequency	Dimensions in mm				Weight approx. kg
		l1	l2	m	n	
PLC 26	50 Hz	320	528	613	675	63
PLC 51	50 Hz	320	528	613	675	71
PLC 91	50 Hz	324	605	690	782	95
PLC 126	50 Hz	331	605	690	782	100
PLC 161	50 Hz	323	662	762	903	147
PLC 251	50 Hz	323	662	762	903	215
PLC 325	50 Hz	365	955	1105	930	301
PLC 425	50 Hz	365	955	1105	930	346

## Structure of the type code

Example: Size PLC 161



## Motor selection

Standard delivery program

Range + Size	Frequency [Hz]	Speed [rpm]	Power [kW]	Y-voltage [V +/- 10%]	Δ-voltage [V +/- 10%]	Motor Size
PLC 26	50	3000	0,75	400	230	80
	60	3600	1,10	460	265	80
PLC 51	50	3000	1,50	400	230	90L
	60	3600	2,20	460	265	90L
PLC 91	50	3000	2,20	400	230	90L
	60	3600	3,30	460	265	100L
PLC 126	50	3000	3,00	400	230	100L
	60	3600	4,80	460	265	112M
PLC 161	50	1500	4,00	690	400	112M
	60	1800	6,00	-	460	132M
PLC 251	50	1500	5,50	690	400	132S
	60	1800	8,00	-	460	132M
PLC 325	50	1500	7,50	690	400	132M
	60	1800	13,20	-	460	160M
PLC 425	50	1500	11,00	690	400	160M
	60	1800	18,00	-	460	160L

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

Designs subject to change without prior notice.

### Sterling SIHI GmbH

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