



**High efficiency  
permanent magnet-synchronous-  
submersible motors 6"**

**po-mo-s6.2**

## High efficiency permanent magnet-synchronous-submersible motors 6"

### Design

The **oddesse** permanent magnet-synchronous-submersible motor is a rewindable motor designed as a wet-running motor with a watertight insulated winding. The motor connection is according to NEMA-standard. The bearings are lubricated by the motor filling. It is a mixture of glycerine and water. Glycerine is biodegradable and secures the frost protection up to -25 °C. If necessary, it can be replaced by pure drinking water.

Axial down thrusts are absorbed by the axial thrust bearing with individual tilting pads. Motors are encapsulated by a high quality mechanical seal. The pressure compensation between motor and its environment is granted by a reliable balance system. The motors are completed with water pressure-tight cables. They are earthed inside. The motors comply with the VDE-directives and the EC safety requirements for machinery.

Motors are usable in horizontal and diagonal position depending on the nominal power. **oddesse** motors work in both rotating directions. A high efficiency guarantees lowest operating costs.

- Motor connection 6" Nema
- Degree of protection IP68 (EN60034-5)
- Cable length 10 m, other lengths on request
- Cable version flat cable, suitable for drinking water, optional round cable or shielded cable
- Temperature control PTC / PT100 optional
- Materials AISI 316 / AISI 904L

For all motors a wide range of control and monitoring systems is available.

### Applications

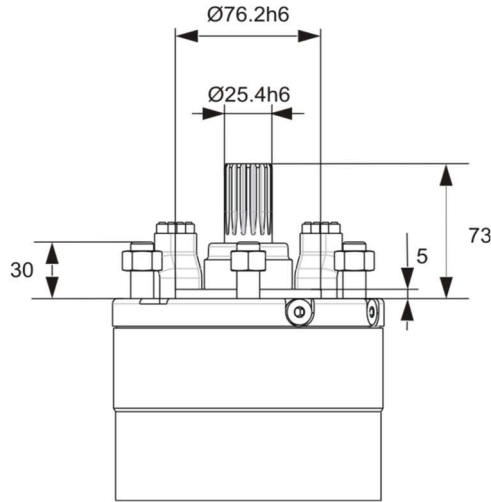
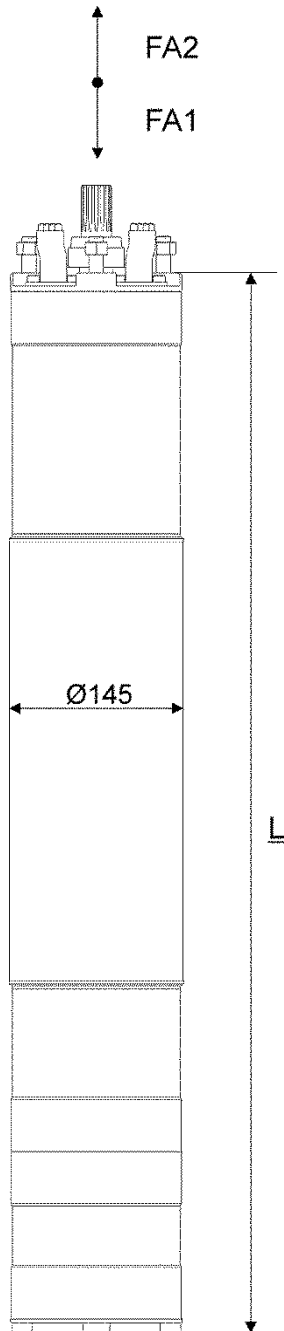
The **oddesse** submersible motors of the series po-mo-s are designed as drive unit for submersible pumps. They are also applicable for other submersible machines and for offshore operation.

### Operating data

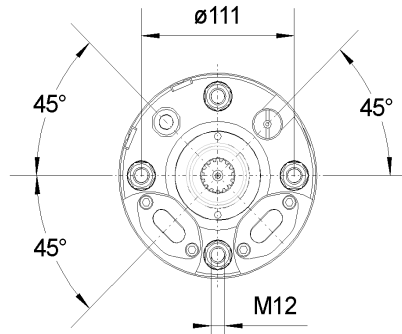
For the operation of the motor it is necessary to use a suitable frequency converter programmed with special software. Additionally it is advisable to use a sine-wave filter or dU/dt-filter. The max. useable frequency of 120 Hz should be considered in the system design.

Additional parameters are:

- Acceleration time to minimum frequency  $\leq 3$  s
- Stopping time to zero frequency  $\leq 3$  s
- Switching frequency max. 20/h, switching pause  $\geq 1$  min
- Use horizontal / vertical
- Nominal speed horizontal 1800 ... 3600 1/min (60 ... 120 Hz)  
vertical 1500 ... 3600 1/min (50 ... 120 Hz)
- Ambient temperature max. 50 °C
- Cooling flow 0 - 0.5 m/s (see table)
- Tolerances DIN VDE 0530 / IEC 34
- Voltage tolerances  $\pm 10$  % System (power)-supply
- Frequency tolerances -5 ... +10 % System (power)-supply
- Max. rate of the increase in voltage  $dU/dt \leq 500$  V/ $\mu$ s
- Max. voltage peaks to ground  $\leq 1000$  V



Pump connection acc. to **NEMA**-standards



Main dimensions [mm]

**po-mo-s6.2 • Grid 400 - 500 V • 50/60 Hz • 3 ~**

Type	Power P		Length L		Weight m	
	kW	HP	mm	inch	kg	lbs
M/BOM255P2x	4 - 11	5.5 - 15	780	30,7	55	121
M/BOM460P2x	13 - 26	17.5 - 35	985	38,8	79	174
M/BOM665P2x	30 - 45	40 - 60	1190	46,9	96	211

**FA1** Downthrust capacity: 23 kN / 5100 lbs  
**FA2** Upthrust capacity: 0,5 kN / 110 lbs

Components	Design	
	X (AISI 316)	Y (AISI 904L)
Shaft	Stainless steel / 1.4462	
Motor flange	Stainless steel / 1.4571	Stainless steel / 1.4539
Motor casing	Stainless steel / 1.4571	Stainless steel / 1.4539
Radial bearing	Steel / carbon	
Thrust bearing	Steel / carbon	
Screws, Nuts, Bolts	Stainless steel / 1.4401	Stainless steel / 1.4539
Mechanical seal	SiC / SiC	

po-mo-s6.2 • Grid 400 - 500 V • 50/60 Hz • 3 ~

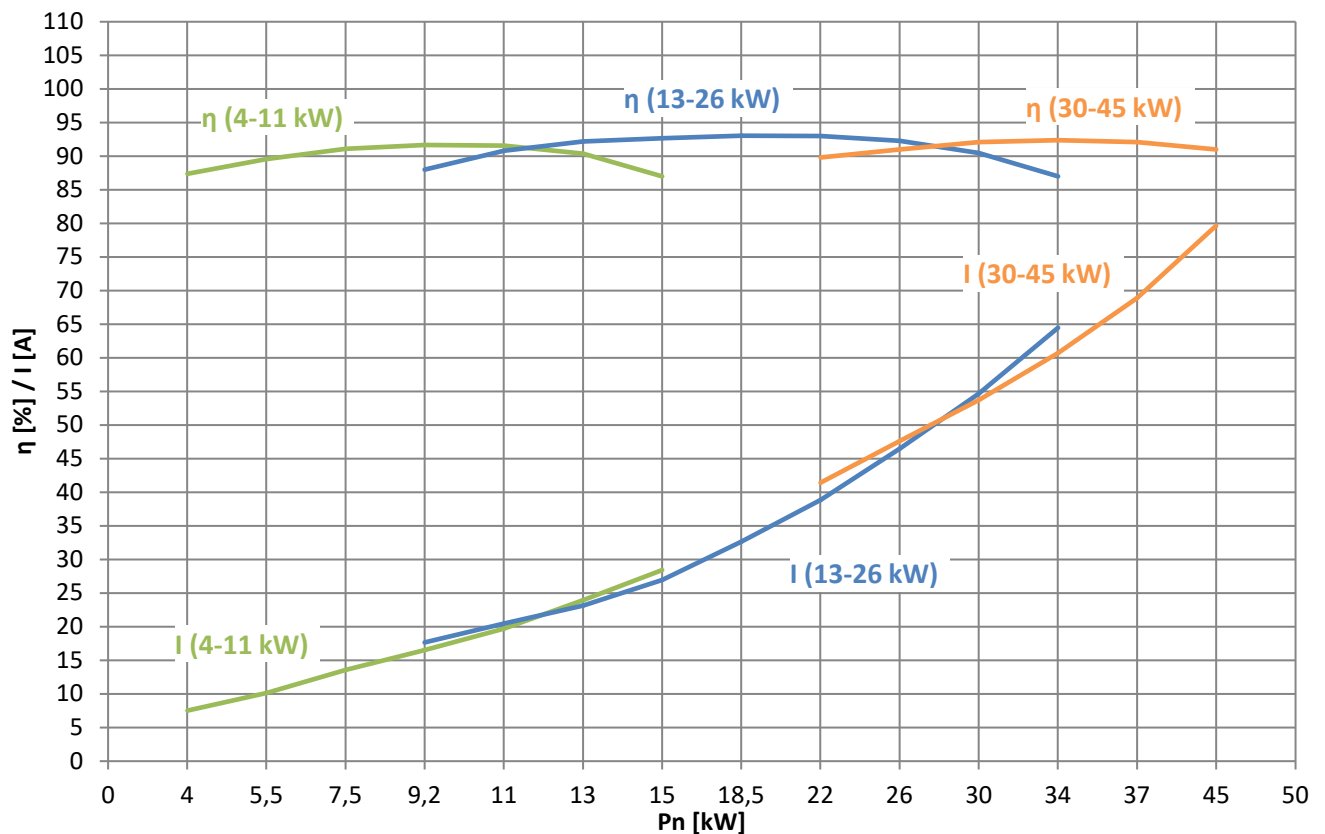
Type	Pn		In	$\eta$	$\cos \varphi$	n	Flat cable**	vmin [m/s]	
	kW	HP						A	%
M/BOM255P2x	4	5,5	8	87,4	0,99	3000	1x fl4G2,5	0,0	0,5
	5,5	7,5	10	89,6	0,99	3000	1x fl4G2,5	0,0	0,5
	7,5	10	14	91,1	0,99	3000	1x fl4G2,5	0,0	0,5
	9,2	12,5	17	91,7	0,99	3000	1x fl4G2,5	0,0	0,5
	11	15	20	91,6	0,99	3000	1x fl4G2,5	0,0	0,5
M/BOM460P2x	13	17,5	23	92,2	0,99	3000	1x fl4G4	0,2	0,5
	15	20	27	92,7	0,99	3000	1x fl4G4	0,2	0,5
	18,5	25	33	93,1	0,99	3000	1x fl4G4	0,5	0,5
	22	30	39	93,0	0,99	3000	1x fl4G4	0,5	0,5
	26	35	46	92,3	0,99	3000	1x fl4G4	0,5	0,5
M/BOM665P2x	30	40	54	92,1	0,99	3000	1x fl4G6	0,5	0,5
	34	45	61	92,4	0,99	3000	1x fl4G6	0,5	0,5
	37	50	69	92,1	0,99	3000	1x fl4G6	0,5	0,5
	45	60	80	91,0	0,99	3000	1x fl4G6	0,5	0,5

la/In \* = 1, Mn/Ma\* = 1; Performance data were determined with oddesse system components.

\* referred to the inverter inputs (mains side) and therefore to the overall system

\*\* other cable versions on request

Pn Rated output                      In Rated current                      la/In Starting-/rated current  
 $\eta$  Efficiency                               $\cos \varphi$  Power factor                      Ma/Mn Starting-/rated torque  
n Rated speed                              vmin min. cooling flow                      T Ambient temperature



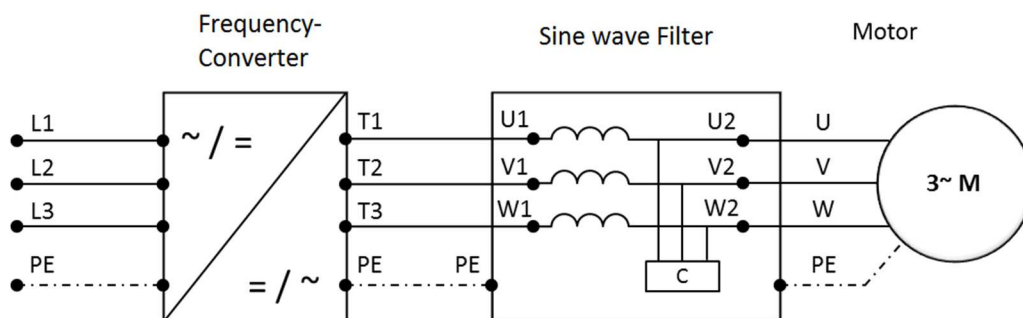
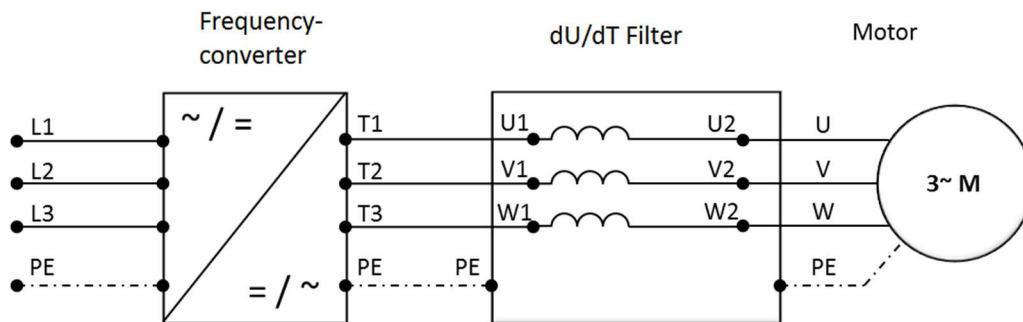
**System components**

po-mo-s6.2 • 400 - 500 V • 50/60 Hz • 3 ~

Type	Pn		Frequency converter		dU/dt Filter		Sine-wave Filter	
	kW	HP	REFU		REDU		REFS	
			IP21	IP54	IP00	IP54	IP00	IP54
M/BOM255P2x	4	5,5	21 009	54 009	00 012	54 012	00 018	54 012
	5,5	7,5	21 016	54 016	00 025	54 034	00 018	54 016
	7,5	10	21 016	54 016	00 025	54 034	00 032	54 023
	9,2	12,5	21 023	54 023	00 055	54 034	00 032	54 032
	11	15	21 023	54 023	00 055	54 034	00 032	54 032
M/BOM460P2x	13	17,5	21 031	54 031	00 055	54 034	00 048	54 038
	15	20	21 038	54 038	00 055	54 055	00 048	54 038
	18,5	25	21 038	54 038	00 055	54 055	00 048	54 046
	22	30	21 046	54 046	00 055	54 055	00 075	54 055
	26	35	21 061	54 061	00 080	54 100	00 075	54 072
M/BOM665P2x	30	40	21 061	54 061	00 080	54 100	00 110	54 180
	34	45	21 072	54 072	00 130	54 100	00 110	54 180
	37	50	21 072	54 072	00 130	54 100	00 110	54 180
	45	60	21 087	54 087	00 130	54 130	00 110	54 180

The dimensioning of the system components is related to the rated data of the motor at a rated frequency of 100 Hz. For higher frequencies please consult with the oddesse service.

**Electrical Connection**



**Frequency converter**



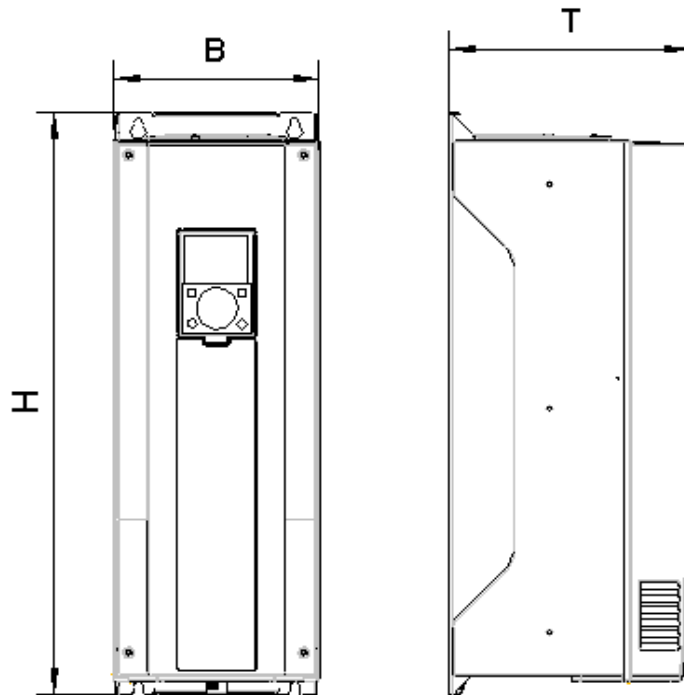
**Design**

The fully equipped frequency converter is dedicated to improve flow control and to save energy for use in water and waste water applications. It is designed for wall or switch cabinet installation. An EMC filter and an integrated DC reactor are included.

Main connection	Input voltage $U_{in}$	380 - 500 V; optional up to 690 V; $\pm 10$ % tolerance
	Input frequency $f_{in}$	50 - 60 Hz, -5...+10 %
Motor connection	Output voltage	0 – $U_{in}$
	Continuous output current	$I_n$ : ambient temperature max. +40 °C overload 1,5 x $I_n$ (1 min/10 min)
	Output frequency	0 – 320 Hz (standard)
	Frequency resolution	0,01 Hz
Control characteristics	Switching frequency	1,5 – 6 kHz
	Acceleration time	0,1 – 3000 s
	Stopping time	0,1 – 3000 s
Environment characteristics	Temperature	-10 °C ... +40 °C at 100% $I_n$ > 40 °C power reduction 1,5 % each 1 °C
	Storage temperature	-40 °C ... +70 °C
	Installation altitude	at 100 % $I_n$ up to 1000 m; max. 4000 m > 1000 m power reduction 1,0 % per 100m
Control Interfaces	I/O	2 x analog input
		1 x analog output
		6 x digital input
		1 x 24V input
		2 x 24V output
		2 x relay output
		1 x thermistor input (PTC)
	Ethernet	Modbus TCP/IP
	RS485	Modbus RTU
Real time clock	including backup battery	
EMC	Immunity	IEC 61800-3, first and second environment
	Emissions	IEC 61800-3, class C2

For further details please contact odesse.

**Dimensions**



Type	In	Dimension				Weight m [kg]
		A	B [mm]	H [mm]	T [mm]	
REFU21... / REFU54...	009	9	128	328	190	6
	016	16	144	419	214	10
	023	23	144	419	214	10
	031	31	144	419	214	10
	038	38	195	557	229	20
	046	46	195	557	229	20
	061	61	195	557	229	20
	072	72	237	660	259	37,5
087	87	237	660	259	37,5	

**Options**

- Additional card 3 x input for temperature sensors (PT100, ...)
- Additional card 3 x Relay outputs
- Additional card Profibus DPV1
- Marine version
- Door installation kit for control panel (2-15m cable)
- PC-interface cable (USB-RS485)

**dU/dt-Filter**



**Design**

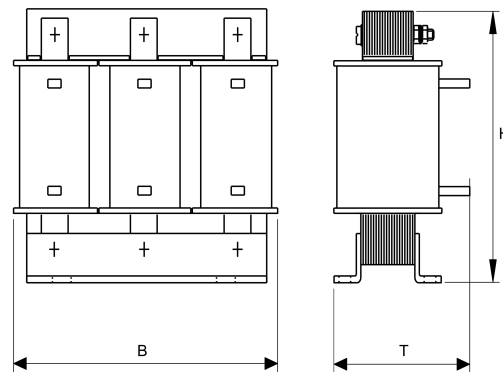
By using a dU/dt Filter the slew rate on the motor terminals is reduced in a simple way to values < 500 V/μs. It protects the motor insulation against breakdown (especially old and weak motor insulation). This is particularly important for short motor cables.

The motor losses and the heating of the motor are minimized and the leakage current is reduced, which increases the lifetime of submersible motors.

**Electrical data**

- Voltage 3 x 500V
- Frequency 100 Hz
- Max. cable length 90-150 m (depending on power range)
- Overload 1,6 x I<sub>n</sub> (1 min); every 10min
- Clock frequency 3,6 kHz
- Operating temperature 40 °C; without power reduction
- Operating altitude 1000 m, without power reduction

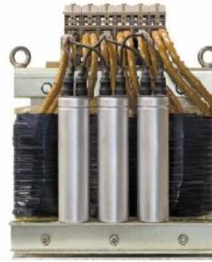
**Dimensions**



Type	In	Dimension			Weight m [kg]	
		A	B [mm]	H [mm]		T [mm]
REDU00...	012	9	125	190	110	3
	025	18	155	220	130	6
	055	40	190	250	130	10
	080	58	210	280	135	13
	0130	95	240	300	160	22
REDU54...	012	9	150	135	150	5,5
	034	25	200	135	200	11
	055	40	300	215	300	26
	100	73	300	215	300	35
	0130	95	610	460	440	60



**Sine-wave filter**



**Design**

Sine-wave filters can be connected between inverter output and submersible motor. The pulse-width modulated (PWM) inverter output voltage is converted into a sinus voltage.

Especially with long motor cables sinusoidal filters should be used to reduce parasitic capacities of the motor cable. It helps to reduce noise levels. Not only emissions on the motor cables are significantly attenuated, but also the voltage peaks, which are caused by the inverter switching frequency.

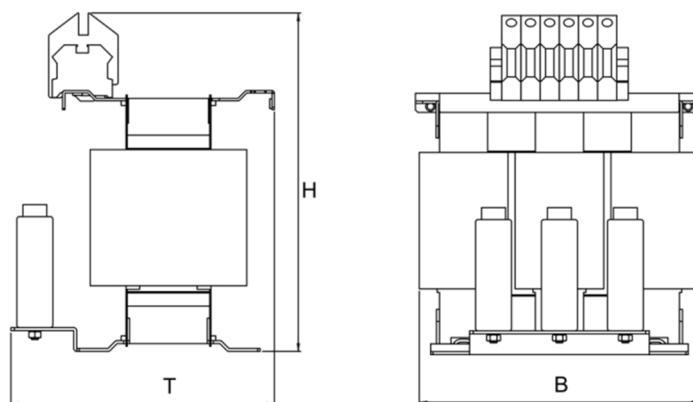
The purpose of a sine-wave filter is to prevent damage to the motors` winding insulation.

By using a sine-wave filter additional losses and motor noises are reduced. The use of shielded cables may be dispensed with in certain cases.

**Electrical data**

- |                         |   |
|-------------------------|---|
| • Voltage               | 3 x 500V                                  |
| • Frequency             | 100 Hz                                    |
| • Max. cable length     | 500 m (depending on power range)          |
| • Overload              | 1,6 x I <sub>n</sub> (1 min); every 10min |
| • Clock frequency       | ≥ 3,6 kHz                                 |
| • Operating temperature | 40 °C; without power reduction            |
| • Operating altitude    | 1000 m, without power reduction           |

**Dimensions**



Type	In	Dimensions			Weight	
		A	B [mm]	H [mm]	T [mm]	m [kg]
REFS00...	018	13	210	240	154	12,5
	032	12	240	270	180	19
	048	35	240	270	200	24
	075	55	300	330	230	48
	110	80	360	460	290	71,5
	180	131	360	460	330	90,5
REFS54...	012	9	300	215	300	23,5
	016	12	300	215	300	29
	023	17	300	215	300	34
	032	23	300	215	300	37
	038	28	520	480	480	60
	046	34	520	480	480	75
	055	40	660	590	560	95
	072	53	660	590	560	110
	180	131	760	690	640	215

**oddesse**

Pumpen- und Motorenfabrik GmbH  
Am Pappelwald 12  
39387 Oschersleben (Bode), Germany

Phone: +49 3949 932-0

Fax: +49 3949 932-463

eMail: [info@oddesse.de](mailto:info@oddesse.de)

[www.oddesse.de](http://www.oddesse.de)