



**High efficiency
permanent magnet-synchronous-
submersible motors 8"**

po-mo-s8.1

High efficiency permanent magnet-synchronous-submersible motors 8"

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 8" 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

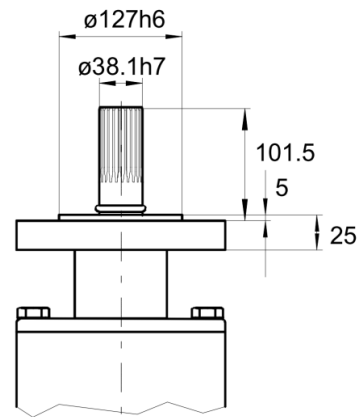
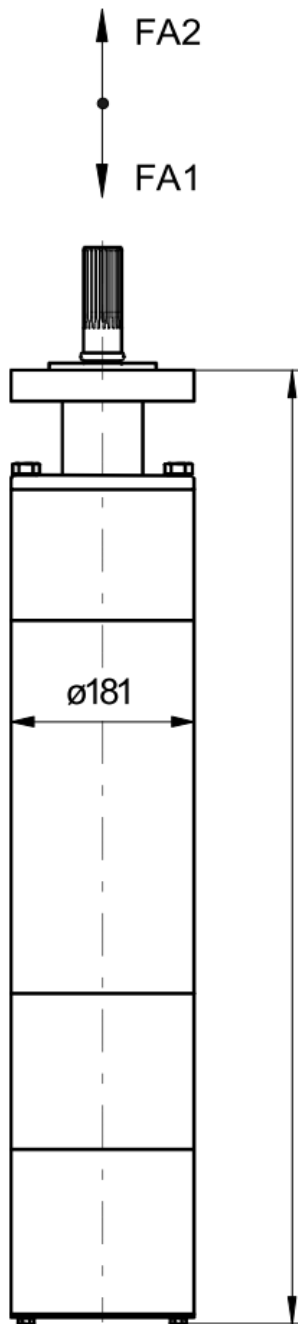
The **oddesse** submersible motors of the series po-mo-s are designed as drive unit for submersible pumps. They are also applicable for other submersible machines and for offshore operation.

Operating data

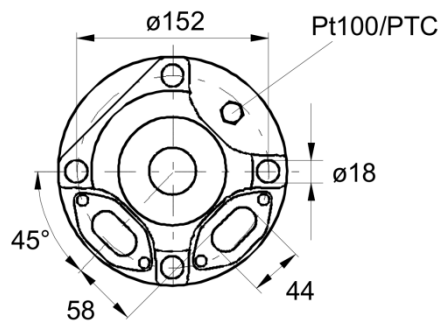
For the operation of the motor it is necessary to use a suitable frequency converter programmed with special software. Additionally it is advisable to use a sine-wave filter or dU/dt-filter. The max. useable frequency of 120 Hz should be considered in the system design.

Additional parameters are:

- Acceleration time to minimum frequency ≤ 3 s
- Stopping time to zero frequency ≤ 3 s
- Switching frequency max. 20/h, switching pause ≥ 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 0.5 - 0.8 m/s (see table)
- Tolerances DIN VDE 0530 / IEC 34
- Voltage tolerances ±10 % System (power)-supply
- Frequency tolerances -5 ... +10 % System (power)-supply
- Max. rate of the increase in voltage dU/dt ≤ 500 V/μs
- Max. voltage peaks to ground ≤ 1000 V



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



Main dimensions [mm]

po-mo-s8.1 • Grid 400 - 500 V • 50/60 Hz • 3 ~

Type	Power P		Length L		Weight m	
	kW	HP	mm	inch	kg	lbs
M/COM740P1x	45 - 100	65 - 135	1442	56,9	176	388
M/COM950P1x	75 - 150	100 - 200	1652	65,0	210	463

x – Material design (see table below)

FA1 Downthrust capacity: 45 kN / 10000 lbs
FA2 Upthrust capacity: 1 kN / 220 lbs

Components	Design		
	C (AISI 304)	X (AISI 316)	Y (AISI 904L)
Shaft	Stainless steel / 1.4301	Stainless steel / 1.4462	
Motor flange	Stainless steel / 1.4301	Stainless steel / 1.4571	Stainless steel / 1.4539
Motor casing	Stainless steel / 1.4306	Stainless steel / 1.4571	Stainless steel / 1.4539
Radial bearing	Steel / carbon		
Thrust bearing	Steel / carbon		
Screws, Nuts, Bolts	Stainless steel / 1.4301/1.4303	Stainless steel / 1.4401	Stainless steel / 1.4539
Mechanical seal	carbon / ceramics	SiC / SiC	
	optional: SiC / SiC available for all designs		

po-mo-s8.1 • Grid 400 - 500 V • 50/60 Hz • 3 ~

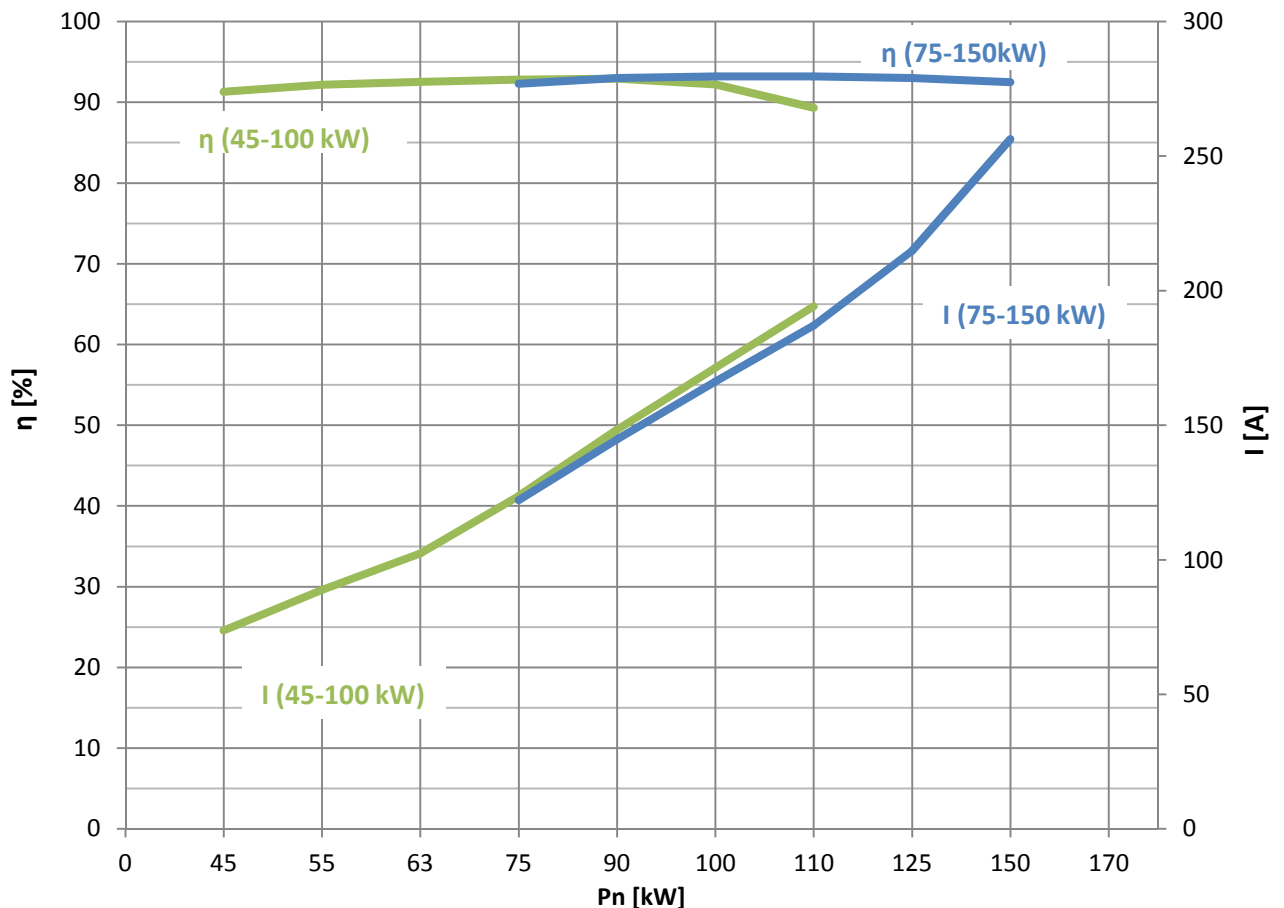
Type	Pn		In	η	cos φ	n	Round cable**	vmin [m/s]	
	kW	HP						A	%
M/COM740P1x	45	60	74	91,3	0,99	3000	3x rd1x35/25	0,5	0,8
	55	75	89	92,2	0,99	3000	3x rd1x35/25	0,5	0,8
	63	85	102	92,5	0,99	3000	3x rd1x35/25	0,5	0,8
	75	100	124	92,8	0,99	3000	3x rd1x35/25	0,5	0,8
	90	125	148	92,9	0,99	3000	3x rd1x35/25	0,5	0,8
	100	135	171	92,2	0,99	3000	3x rd1x35/25	0,5	0,8
M/COM950P1x	75	100	122	92,3	0,99	3000	3x rd1x50/25	0,5	0,8
	90	125	145	93,0	0,99	3000	3x rd1x50/25	0,5	0,8
	100	135	166	93,2	0,99	3000	3x rd1x50/25	0,5	0,8
	110	150	187	93,2	0,99	3000	3x rd1x50/25	0,5	0,8
	125	170	215	93,0	0,99	3000	3x rd1x50/25	0,5	0,8
	150	200	256	92,5	0,99	3000	3x rd1x50/25	0,5	0,8

Ia/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 Ia/In Starting-/rated current
 η Efficiency cos φ Power factor Ma/Mn Starting-/rated torque
n Rated speed vmin min. cooling flow T Ambient temperature



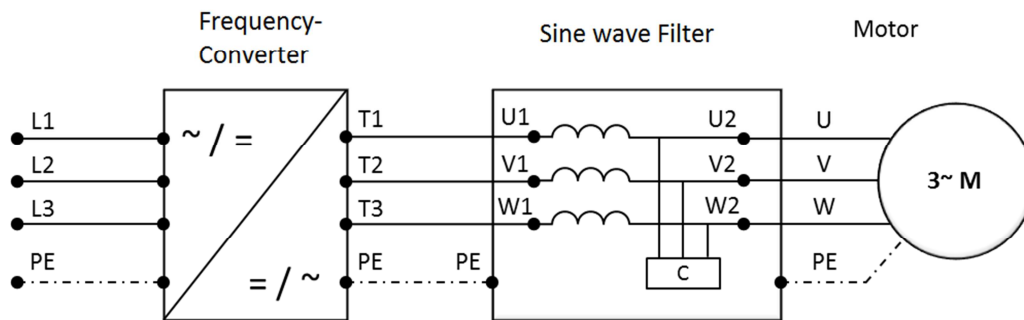
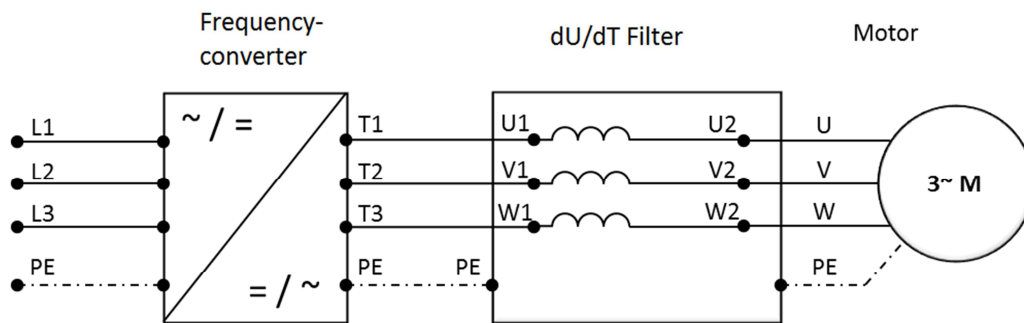
System components

po-mo-s8.1 • 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/COM740P1x	45	60	21 087	54 087	00 130	54 130	00 110	54 180
	55	75	21 105	54 105	00 210	on req.	00 180	54 180
	63	85	21 140	54 140	00 210	on req.	00 180	54 180
	75	100	21 140	54 140	00 210	on req.	00 180	54 180
	90	125	21 170	54 170	00 280	on req.	00 270	54 270
	100	135	21 205	54 205	00 280	on req.	00 270	54 270
M/COM950P1x	75	100	21 140	54 140	00 210	on req.	00 180	54 180
	90	125	21 170	54 170	00 210	on req.	00 270	54 270
	100	135	21 205	54 205	00 280	on req.	00 270	54 270
	110	150	21 205	54 205	00 280	on req.	00 270	54 270
	125	170	21 261	54 261	00 350	on req.	00 410	on req.
	150	200	21 310	54 310	00 420	on req.	00 410	on req.

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

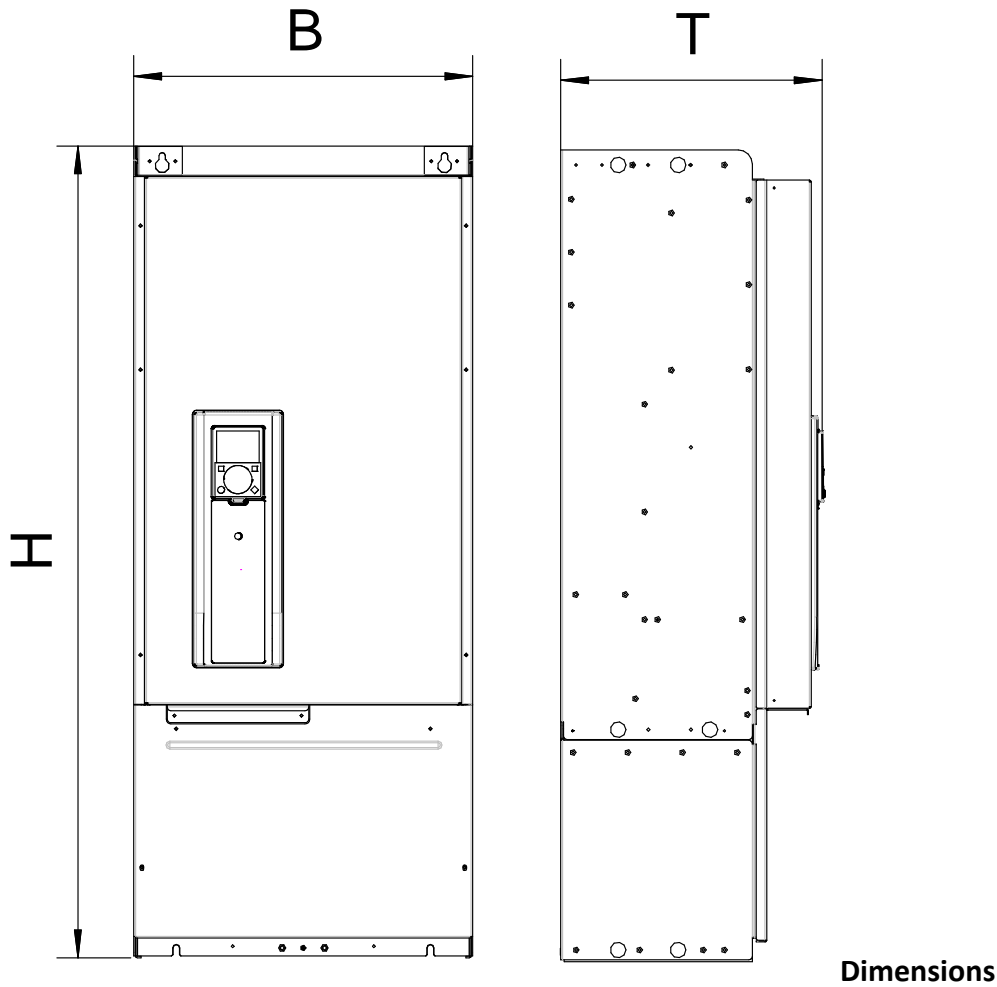
The fully equipped frequency converter is dedicated to improve flow control and to save energy for use in water and waste water applications.

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 %
	Main connection	max. once per minute
Motor connection	Output voltage	0 - U_{in}
	Continuous output current	In: 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 % je 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 oddesse.

Dimensions



Type	In	Dimension			Weight m [kg]	
		A	B [mm]	H [mm]		T [mm]
REFU21... / REFU54...	087	87	237	660	259	37,5
	105	105	237	660	259	37,5
	140	140	290	966	343	66
	170	170	290	966	343	66
	205	205	290	966	343	66
	261	261	480	1150	365	120
	310	310	480	1150	365	120

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

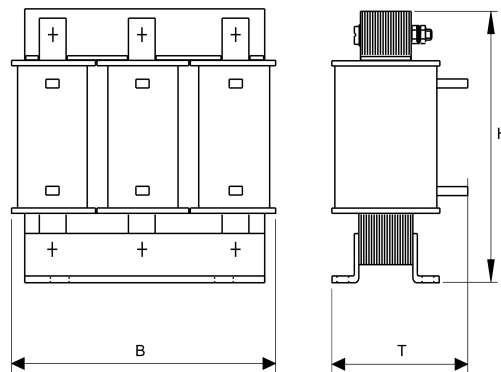
By using a dU/dt Filter the slew rate on the motor terminals is reduced in a simple way to values < 500 V/μs. It protects the motor insulation against breakdown (especially old and weak motor insulation). This is particularly important for short motor cables.

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 500 V
- Frequency 100 Hz
- Max. cable length 90-150 m (depending on power range)
- Overload 1,6 x I_n (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...	130	95	240	300	160	22
	210	153	240	320	185	32
	280	204	300	299	235	40
	350	256	300	299	240	50
	420	307	300	349	220	52
REDU54...	130	95	610	460	440	60
	210	153	on req.	on req.	on req.	on req.
	280	204	on req.	on req.	on req.	on req.
	350	256	on req.	on req.	on req.	on req.
	420	307	on req.	on req.	on req.	on req.

Sine-wave filter



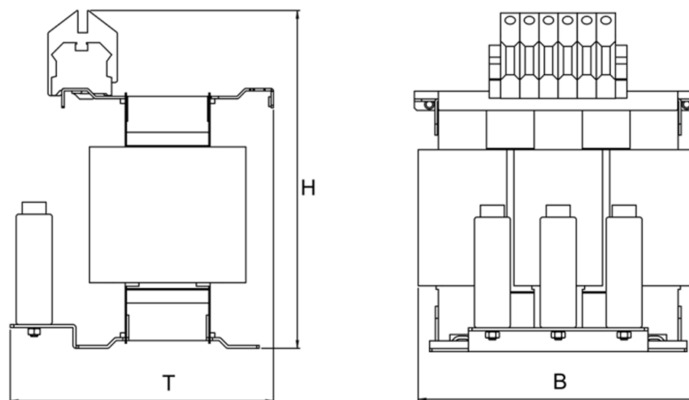
Design

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 500 V
- Frequency 100 Hz
- Max. cable length 500 m (depending on power range)
- Overload 1,6 x In (1 min); every 10 min
- 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...	110	80	360	460	290	71,5
	180	131	360	460	330	90,5
	270	197	360	500	350	122
	410	263	420	525	380	190
REFS54...	180	131	760	690	640	215
	270	197	760	690	640	280
	410	263	on req.	on req.	on req.	on req.

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

www.oddesse.de