

# Liquid-cooled motors

## Impressive benefits



# SERVAX

## Always in motion

**Swiss Family business with proven international success.** Our industrial products are in use all over the world. The formula for success is the unique combination of Swiss innovative capacity together with an international value chain. We are fond of our highly skilled employees that work at innovation and research projects at our Zurich development facilities. Production sites in Switzerland and other Europe allow us to react flexibly to requirements of our customers. We deliver solutions for a broad market segment and highly demanding applications.

**Challenges inspire us.** One can always improve. This is why we are constantly on the lookout for new ways to optimise our performance. One example of this is that we are continuously making our well-designed platform even more efficient for individual customer solutions in the drive segment. Our most recent projects strengthen us in our strategy to offer our customers unique, high-quality solutions within the shortest time possible. True to our guiding principles: **together, clear, focussed.**



**Intelligent**



**Individual**



**Environmentally friendly**



**Dependable**

**Esteem and trust.** Pleasure in finding the right solution is what drives us forward. When we collaborate with our employees, partners and customers, we use the power of working constructively with each other. **Openness, trust, partnership, customer orientation** and **effectiveness** are values we believe in. This is how we learn from each other, grow together and continue to develop our strengths. This inspires customers, partners and employees while establishing the foundation for creating the perfect point of departure for drive solutions with added value.

**Our contribution to the environment.** Your decision to work with us is also a decision for responsible environmental management. Thanks to the high quality and effectiveness of our drives and components, our products are characterised by a very high level of efficiency (up to 98 %). This is an important contribution to the sustainable use of resources. Because we use modern materials, our products have a long life cycle – this means we are able to keep spare parts deliveries to an absolute minimum. Further, our module system guarantees that individual components can be targeted for replacement. We properly dispose of worn-out parts in an environmentally friendly manner. We also apply the principles of sustainability to transport; for example, we keep CO<sub>2</sub> emissions to a minimum by grouping deliveries to our end customers. And finally, **SERVAX** products are up to 98 % recyclable.

# Innovative solutions

## Asynchronous and synchronous versions

By using liquid-cooled motors, machine manufacturers have additional flexibility when searching for constructive and innovative solutions in electric motor technology. When compared to air-cooled versions, liquid-cooled motors offer the following advantages:

### Compact design

Liquid cooling allows heat to be dissipated optimally. This means that **SERVAX** electric drives can be operated at a significantly higher capacity when compared to air-cooled motors working at the same power, resulting in a more compact design.

### High dynamics

The compact design and high torque available across the entire speed range (including at zero speed) mean that **SERVAX** electric motors have extremely good dynamic behaviour. The synchronous motor versions can be field-weakened at up to 1.5 times the rated speed, with an optional range of up to 1:4 possible. On asynchronous motors, a constant power range of up to four times the rated speed can be achieved.

### Large speed setting range

An intensive surface cooling is guaranteed on **SERVAX** electric motors at both low and high speed ranges. The motor can then be operated optimally over a large speed range.

### No heat emissions

**SERVAX** electric motors do not emit heat and therefore do not adversely affect the environment. The undesirable heating of your machine or adverse effects on air-conditioned environments are thus avoided.

### Low noise emissions

By omitting the fan unit, **SERVAX** electric motors offer a significant reduction in noise emissions, whilst the surrounding area is not affected by dust in the air.

### Connections

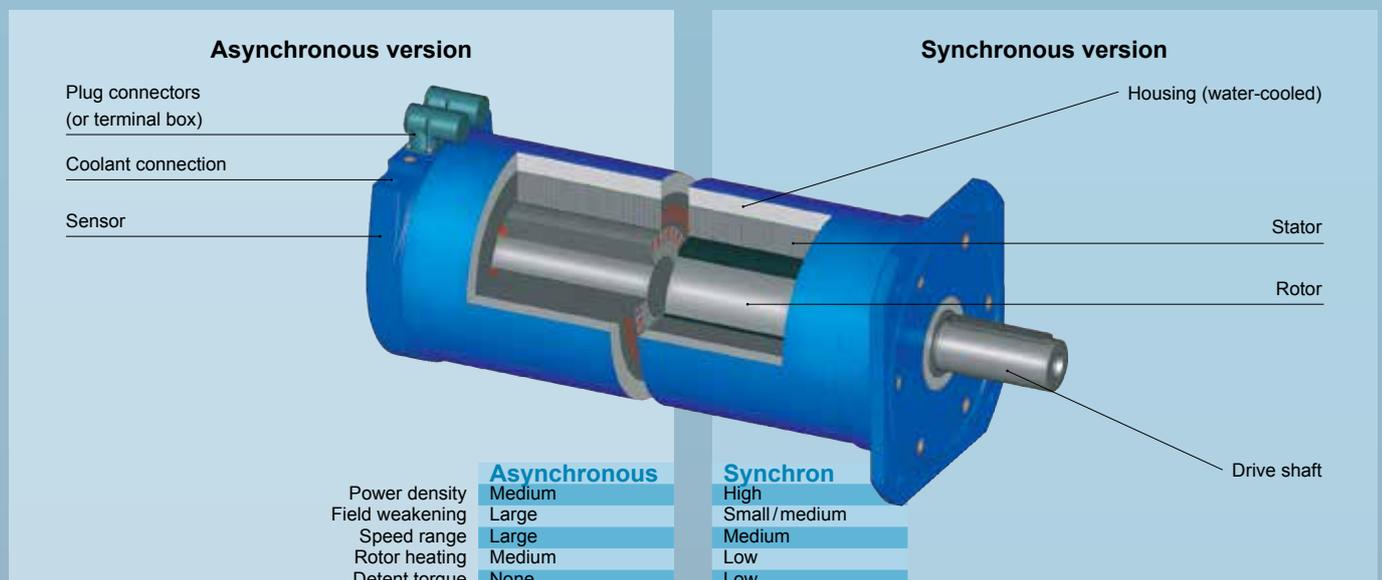
Depending on the customer requirements, **SERVAX** electric motors can be equipped with plug connectors, terminal boxes or cable outlets.

### Drive control

Asynchronous **SERVAX** electric motors can be operated via the mains power or a frequency converter. Synchronous models are operated via a regulated frequency converter. On both versions, the winding is designed to the required speed and voltage range according to customer demands. The feedback system is designed according to customer wishes.

### Cooling concept

**SERVAX** electric motors are equipped with a cooling system integrated in the housing and end shields. The rotors have a low-loss design, meaning the highest possible power densities can be reached.



# Your requirements – our solutions

## Basic and customised versions

**SERVAX** electric motors have a modular design. They can be configured as follows:

	Basic version	Customised version
<b>SIZE</b>	71 to 160 mm shaft height	71 to 160 mm shaft height
<b>FIELD WEAKENING</b>	Technology-dependent	Customer-specific
<b>POLE NUMBERS</b>	See «Power ranges»	Customer-specific
<b>DRIVE FASTENING</b>	Flange	Flange/foot, ground according to customer wishes
<b>PROTECTION CLASS</b>	IP54	Up to IP69K
<b>INSULATION CLASS</b>	F	F–H
<b>HOUSING</b>	Aluminium	Aluminium
<b>SHAFT END</b>	See «Dimensions»	Customer-specific
<b>CONNECTIONS</b>	Terminal box (plug for size 71)	Plug / terminal box / cable
<b>BEARING</b>	Grooved ball bearing	Cylindrical roller bearing, spindle bearing, double-row grooved ball bearing
<b>COOLANT</b>	Water	Customer-specific
<b>BRAKE</b>	None	Customer-specific
<b>ROTARY ENCODER</b>	Resolver (encoder on request)	Customer-specific
<b>COATING</b>	Black	Customer-specific



The high level of vertical integration in our production – one of the core competencies at **SERVAX** – increases our flexibility when meeting customer requests. We are also able to manufacture smaller batch sizes economically according to customer specifications.

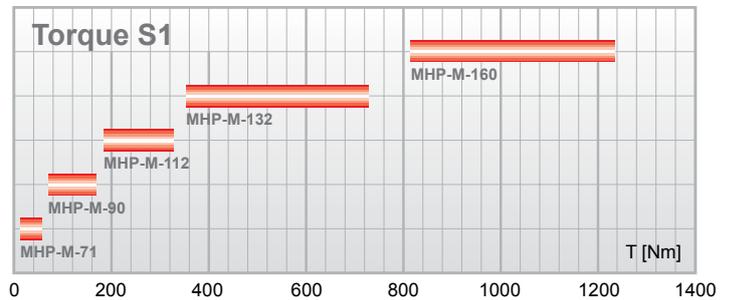
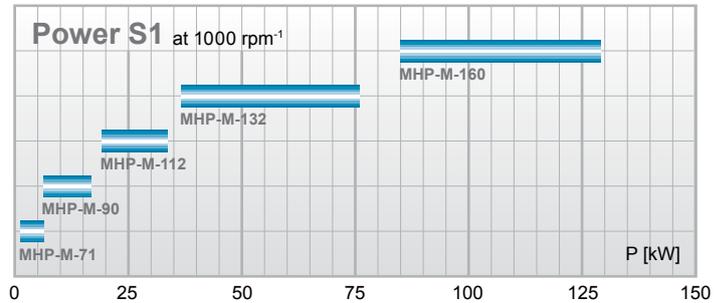
In the interests of constant product improvements, we reserve the right to change the specifications at any time and without prior notice, without the obligation of upgrading previously delivered products.

# Power ranges

## Basic versions

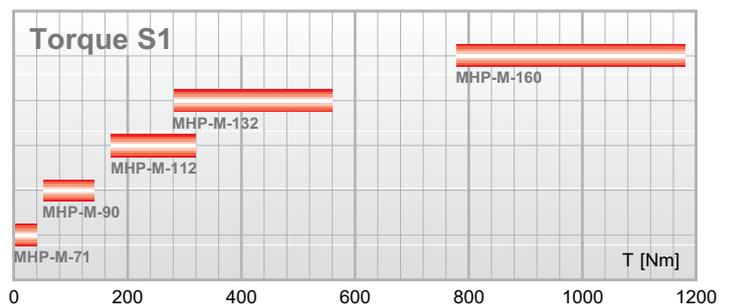
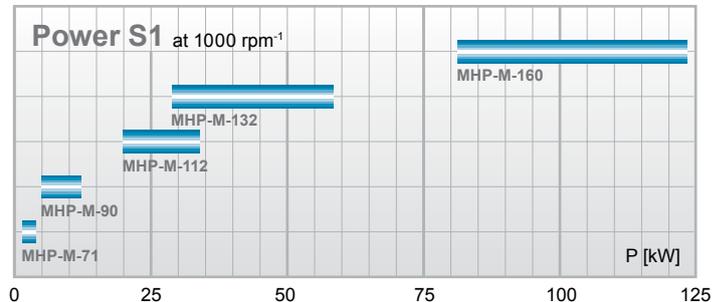
### Synchronous high-power motors

Drive type	$P_n$ [kW] at 1000 rpm <sup>-1</sup>	$T_n$ [Nm] at 1000 rpm <sup>-1</sup>	$T_{max}$ [Nm]	Inertia J [10 <sup>-3</sup> kgm <sup>2</sup> ]
MHP-M-71-06AA	1.8	17.4	30.8	1.5
⋮				
MHP-M-71-06AE	6.0	57.2	101.0	2.7
MHP-M-90-06AA	7.3	70.1	127.0	7.9
⋮				
MHP-M-90-06AF	17.1	164.0	297.0	15.4
MHP-M-112-06AA	19.5	187.0	318.0	31.0
⋮				
MHP-M-112-06AF	34.0	324.0	553.0	49.8
MHP-M-132-08AA	37.0	353.0	620.0	116.0
⋮				
MHP-M-132-08AF	75.5	721.0	1265.0	210.0
MHP-M-160-08AA	84.3	805.0	1193.0	330.0
⋮				
MHP-M-160-08AE	128.0	1218.0	1804.0	474.0



### Synchronous high-power motors with reduced moment of inertia

Drive type	$P_n$ [kW] at 1000 min <sup>-1</sup>	$T_n$ [Nm] at 1000 min <sup>-1</sup>	$T_{max}$ [Nm]	Inertia J [10 <sup>-3</sup> kgm <sup>2</sup> ]
MHP-M-71-08AA	1.4	13.5	51.3	1.1
⋮				
MHP-M-71-08AE	4.7	44.5	169.0	2.5
MHP-M-90-08AA	5.5	52.2	174.0	5.1
⋮				
MHP-M-90-08AF	12.7	122.0	406.0	9.1
MHP-M-112-12AA	19.3	185.0	570.0	20.1
⋮				
MHP-M-112-12AF	33.7	322.0	992.0	31.6
MHP-M-132-12AA	28.7	274.0	705.0	52.8
⋮				
MHP-M-132-12AF	58.7	560.0	1440.0	87.4
MHP-M-160-12AA	82.0	783.0	1855.0	187.0
⋮				
MHP-M-160-12AE	124.0	1185.0	2807.0	261.0



 Basic versions (special lengths available on request)

Voltage = 3 × 400 V

Water inlet temperature = 25 °C

All values apply for continuous operation S1.

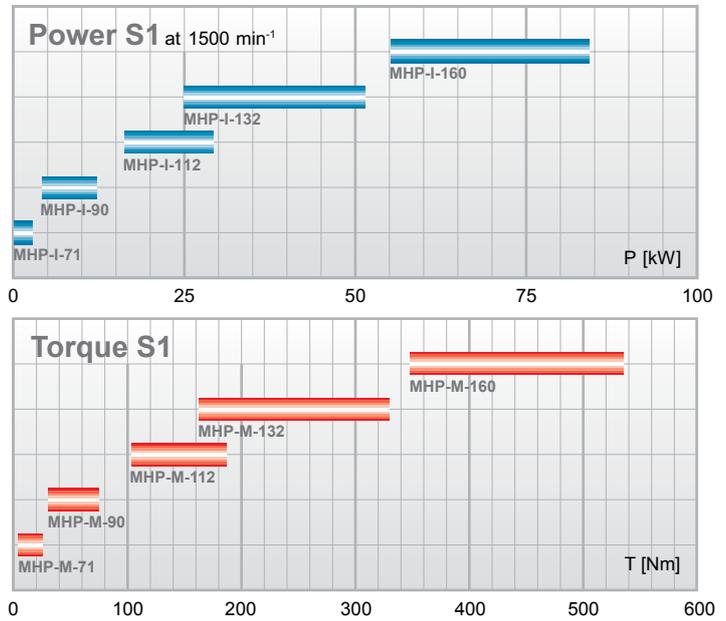
For S3-60 % operation, values of approximately 30 % higher are permissible.

# Dimensions

## Basic versions

### Asynchronous high-power motors

Drive type	$P_n$ [kW] at 1500 min <sup>-1</sup>	$T_n$ [Nm] at 1500 min <sup>-1</sup>	$T_{max}$ [Nm]	Inertia J [10 <sup>-3</sup> kgm <sup>2</sup> ]
MHP-I-71-04-AA	1.1	6.7	11.0	0.7
⋮				
MHP-I-71-04-AE	3.8	24.2	38.0	2.3
MHP-I-90-04-AA	4.9	31.2	60.0	6.9
⋮				
MHP-I-90-04-AF	12.1	77.2	155.0	16.0
MHP-I-112-04-AA	16.7	106.0	266.0	30.5
⋮				
MHP-I-112-04-AF	29.0	185.0	463.0	53.0
MHP-I-132-04-AA	25.5	162.0	431.0	72.9
⋮				
MHP-I-132-04-AF	52.0	332.0	882.0	149.0
MHP-I-160-04-AA	55.0	350.0	962.0	256.0
⋮				
MHP-I-160-04-AE	84.4	537.0	1478.0	388.0

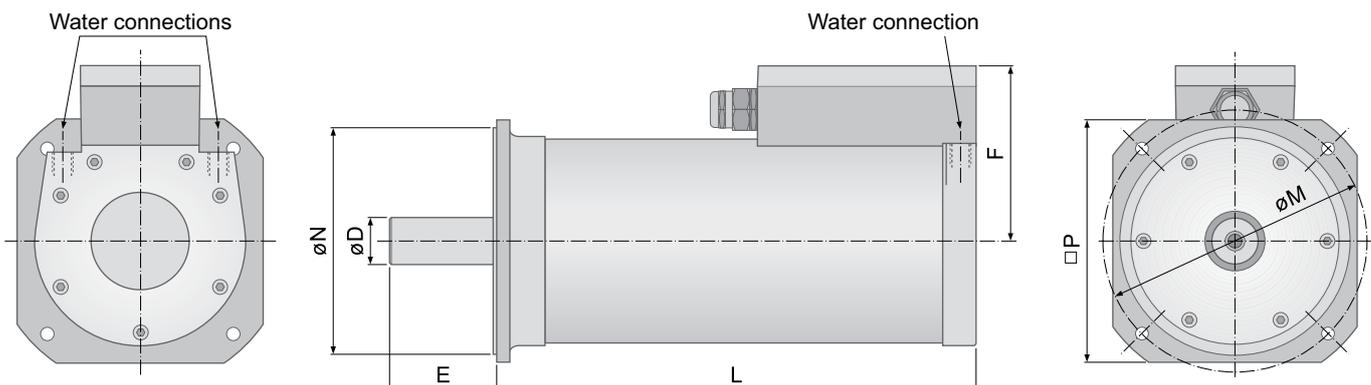


  Basic versions (special lengths available on request)

### Synchronous and asynchronous high-power motors MHP

HEIGHT	LENGTH	L [mm]	E [mm]	D [mm]	P [mm]	N [mm]	M [mm]	F [mm]	WEIGHT [kg]
71	AA	203	50	24	148	130	165	*	10
	AE	363	50	24	148	130	165	*	22
90	AA	318	80	38	194	180	215	*	32
	AF	516	80	38	194	180	215	*	57
112	AA	467	110	48	246	230	265	186	76
	AF	667	110	48	246	230	265	186	116
132	AA	472	140	65	272	250	300	234	124
	AF	722	140	65	272	250	300	234	208
160	AA	666	140	75	340	300	350	261	265
	AE	866	140	75	340	300	350	261	365

\* with plug (no terminal box)



# Proven a thousand times over

## Thanks to years of experience

### The key benefits at a glance:

- Compact design and low noise emissions
- High dynamics and large speed range
- Liquid cooling

### Typical areas of application:

- Construction industry
- Plastics industry
- Process technology
- Machine tools
- Rail industry
- Print machine industry
- Textile machine industry
- Medical technology
- Automotive industry



Multi-spindle lathe



Injection moulding machine



Textile machine

## Quality

### Our commitment

**We are committed to quality.** Since 1994, we have maintained a quality management system that is ISO 9001 certified and defines our everyday work.

**Motors at their very best.** In our in-house laboratory, we test the practicality of the theoretical calculations on fully equipped test stands. Our customers then benefit from permanent product improvements.

**Service tailored to your needs.** Spare parts and servicing are in the safe hands of the machine manufacturer. It goes without saying that we guarantee the fast delivery of spare parts and are there to help if you have any questions.

### SERVAX – customised electric drives

- Air-cooled electric drives
- Liquid-cooled electric drives
- Asynchronous motors
- Permanent-magnet synchronous motors
- Motors with hybrid technology
- **JANUS** machine door actuator

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