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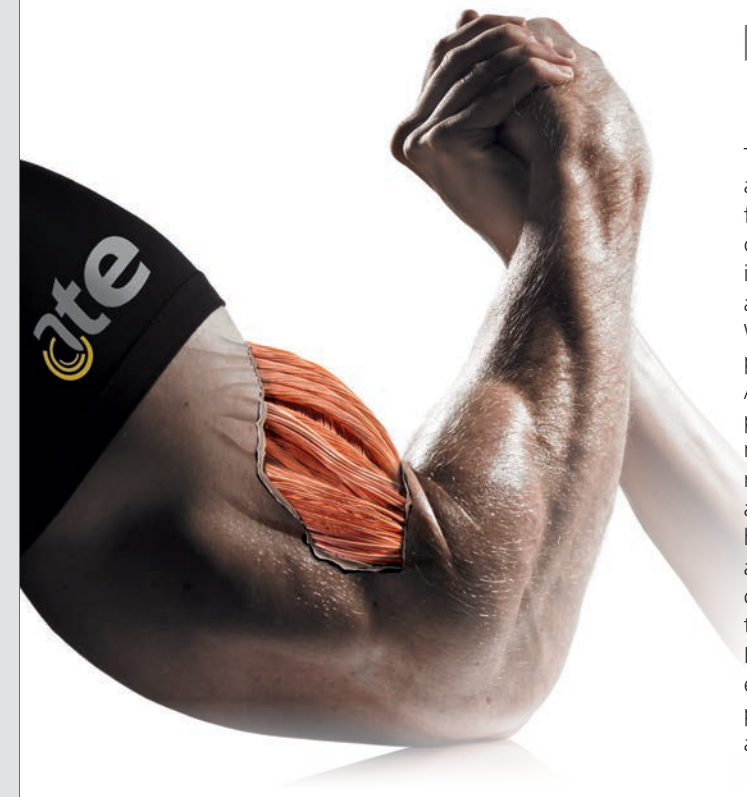
## PRODUCT INFORMATION



## OUR WORLD SPINS UP TO 1 MILLION REVOLUTIONS PER MINUTE.

It is universally accepted around the world, that the energy type of the 21st century will be electricity. Yet the issue is how they have done it. That is why we develop electrical drives having been created with complete new technologies the world has not seen yet. For applications unknown so far and for tomorrow's markets. All we need is copper wire, electrical steels and creative thinking.

Go ahead and let us convince you on the following pages.



## DEVELOPMENT. DON'T REINVENT – RETHINK.

The nucleus of our success is research and development. It has turned us from a start-up into a medium sized company. At ATE we are specialized in developing electric motor drives for any difficult or challenging application. We can provide prototype units and production quantities.

ATE engineers utilize the latest computer simulation tools to create our machine designs. We work in close relationship with leading universities and other partners to develop in-house software as needed plus in assistance with the implementation of new magnetic materials and technologies.

Highly efficient and innovative electrical machines are created by people with premium ideas, creativity and lots of experience.

It is unlikely that you will find large production volumes being made in our factory. We are a true think tank of ideas about motors. This can-do attitude of our employees makes us capable and ready to respond flexibly to your most demanding requirements. Sophisticated production processes such as vacuum casting and complete mechanical processing allows us to be very cost effective. At ATE the widely acclaimed German quality is maintained by our inspection procedures. All of our components (either purchased or made in-house) are subjected to stringent electrical and mechanical qualification testing and inspection before use in motor assemblies.

# APPLICATIONS. THE MOST EXCITING REVOLUTIONS WITH ATE.

You can find ATE motors in most places where the highest requirements of performance, quality and reliability have to be met and where extremely high speed and/or powerful torque motors are required.

At a time where electrical motors are being manufactured to higher efficiency standards (IE4 & IE5), eco-friendliness and sustainability; the fields of applications are expanding continuously. ATE considers themselves leaders in this effort to provide electrical machines that meet these new stand of efficiency.

Please visit us, as we are happy to demonstrate to you the wide range of possibilities of ATE drives and what we can offer.



MACHINE TOOL INDUSTRY



AIRCRAFT INDUSTRY



MEDICAL TECHNOLOGY



AUTOMOTIVE INDUSTRY



BOAT DRIVES



ENERGY RECOVERY



POSITIONING DRIVES



RENEWABLE ENERGY

PLEASE NOTE:  
These are just a few of possible applications for ATE drives. Don't hesitate to ask ATE for any other solution.

# INDUCTION MOTORS (AC)

The asynchronous motor is a highly sophisticated motor concept that is frequently given preference over other drive systems on account of its proven robust nature.

Stator diameter: 24 – 640 mm  
 Speed range: up to 300,000 rpm  
 Output: up to 500 kW  
 Continuous torque: up to 5,000 Nm



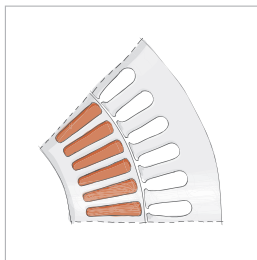
Stator resin varnished



Stator encapsulated



Stator encapsulated in cooling sleeve



Sectional drawing AC motor aluminum cast or copper barred or copper cast

- ☞ Low cost production
- ☞ Magnetless
- ☞ No speed sensor
- ☞ Robust
- ☞ No voltage protection module
- ☞ Field weakening easy
- ☞ Low losses at high speed because of field weakening



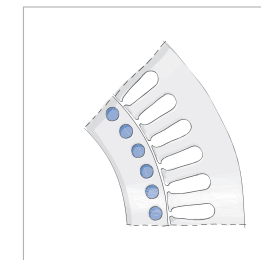
Aluminum rotor



Copper barred rotor



Copper cast rotor



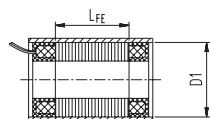
Sectional drawing AC motor copper barred or copper cast



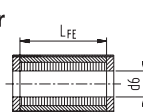
# INDUCTION MOTORS (AC)

## Dimensions (mm)

Stator



Rotor



The approximately reachable continuous power at water cooling can be calculated with below mentioned formula. The torque can be roughly calculated linearly to the iron length ( $L_{Fe}$ ). The calculated values are just approximated values. For detailed torque and power values please contact one of ATE engineers.

$$P_2 \text{ (kW)} = \frac{M \text{ (Nm)} \times n \text{ (rpm)}}{9550}$$

$$M \text{ (Nm)} = \frac{P_2 \text{ (kW)} \times 9550}{n \text{ (rpm)}}$$

*These types are just a combendium of the entire range.  
You can find other types and sizes on our website or you just contact ATE directly.*

Type D1 / $L_{Fe}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{Fe}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{Fe}$ max. (mm)
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### 2 pole

AC 24 / ... / 2	24.0	9	50	45,000	180,000	0.05
AC 30 / ... / 2	30.2	7.5	60	45,000	180,000	0.11
AC 40 / ... / 2	41.6	13	80	32,000	130,000	0.32
AC 48 / ... / 2	48.2	15	90	25,000	100,000	0.42
AC 54 / ... / 2	54.2	18	110	25,000	100,000	0.78
AC 60 / ... / 2	60.0	19	120	22,000	90,000	1.4
AC 70 / ... / 2	70.0	24	150	18,000	70,000	2.8
AC 83 / ... / 2	83.2	28	160	15,000	60,000	4.1
AC 90 / ... / 2	90.0	34	180	14,000	55,000	6.2
AC 106 / ... / 2	106.2	38	210	13,000	50,000	11
AC 120 / ... / 2	120.0	42	240	10,000	40,000	15
AC 135 / ... / 2	135.0	40	270	8,000	35,000	24
AC 140 / ... / 2	139.3	40	280	8,000	35,000	27

Type D1 / $L_{Fe}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{Fe}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{Fe}$ max. (mm)
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### 4 pole

AC 60 / ... / 4	60.2	19	150	12,000	70,000	2.1
AC 65 / ... / 4	65.0	18	160	12,000	70,000	3.0
AC 70 / ... / 4	70.3	25	175	12,000	70,000	4.8
AC 82 / ... / 4	82.5	34	200	10,000	60,000	8.5
AC 85 / ... / 4	85.0	39	210	10,000	55,000	9.2
AC 90 / ... / 4	90.0	42	225	10,000	55,000	11
AC 106 / ... / 4	106.5	46	265	7,500	45,000	25
AC 120 / ... / 4	120.0	47	300	7,000	40,000	34
AC 130 / ... / 4	130.0	60	325	5,500	33,000	54
AC 135 / ... / 4	135.0	60	325	5,500	33,000	60
AC 150 / ... / 4	150.0	56	375	5,000	30,000	96
AC 160 / ... / 4	160.0	78	400	5,000	28,000	127
AC 170 / ... / 4	170.0	78	425	5,000	28,000	169
AC 180 / ... / 4	180.0	75	450	5,000	25,000	209
AC 200 / ... / 4	200	85	500	4,000	22,000	286
AC 300 / ... / 4	300	110	750	2,500	15,000	1,047

*These types are just a combendium of the entire range.  
You can find other types and sizes on our website or you just contact ATE directly.*

Type D1 / $L_{Fe}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{Fe}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{Fe}$ max. (mm)
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### 6 pole

AC 106 / ... / 6	106.5	46	265	5,000	40,000	33
AC 120 / ... / 6	120	58	300	5,000	36,000	50
AC 140 / ... / 6	140	72	350	4,000	30,000	82
AC 150 / ... / 6	150	77	375	3,000	27,000	114
AC 170 / ... / 6	170	75	425	3,000	24,000	209
AC 240 / ... / 6	240	120	600	2,000	16,000	573

### 8 pole

AC 160 / ... / 8	160	80	400	2,000	18,000	173
AC 180 / ... / 8	180	90	450	1,500	16,000	285
AC 200 / ... / 8	200	100	500	1,500	15,000	466
AC 220 / ... / 8	220	110	550	1,300	13,000	577
AC 240 / ... / 8	240	130	600	1,200	12,000	700
AC 270 / ... / 8	270	140	675	1,000	10,000	1,130
AC 300 / ... / 8	300	152	750	1,000	9,000	1,736

## SYNCHRONOUS MOTORS (DC)

Since the permanent magnet is integrated into the synchronous motor, the motor's field need not be introduced into the motor via an external current source

(cf. asynchronous drive). This makes it possible to build drives with an high efficiency rating despite their small size. Synchronous motor technology yields fundamental

Stator diameter: 8 – 1,600 mm  
Speed range: up to 1,000,000 rpm  
Output: up to 500 kW  
Continuous torque: up to 30,000 Nm



*Stator resin varnished*



*Stator encapsulated*



*Stator encapsulated in cooling sleeve*



*Sectional drawing DC motor with surface magnets (bread loaf)*

advantages over the asynchronous motor in the form of more compact dimensions, higher efficiency and greater speed stability under load (such as for scanner operation).

- ☞ High power density
- ☞ Large shaft diameter
- ☞ Low inertia
- ☞ Solid magnet carrier
- ☞ High power factor
- ☞ Highest speed ranges



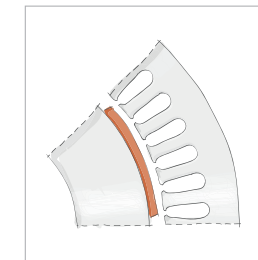
*Permanent magnet rotor on sleeve*



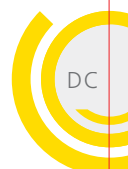
*Permanent magnet rotor on magnet carrier*



*Permanent magnet rotor on shaft*

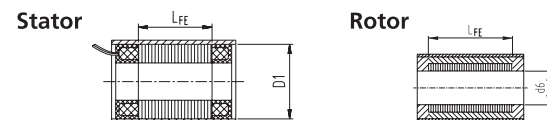


*Sectional drawing DC motor with surface magnets (arc)*



# SYNCHRONOUS MOTORS (DC)

## Dimensions (mm)



The approximately reachable continuous power at water cooling can be calculated with below mentioned formula. The torque can be roughly calculated linearly to the iron length ( $L_{FE}$ ). The calculated values are just approximated values. For detailed torque and power values please contact one of ATE engineers.

$$P2 \text{ (kW)} = \frac{M \text{ (Nm)} \times n \text{ (rpm)}}{9550}$$

$$M \text{ (Nm)} = \frac{P2 \text{ (kW)} \times 9550}{n \text{ (rpm)}}$$

These types are just a combendium of the entire range.  
You can find other types and sizes on our website or you just contact ATE directly.

Type D1 / $L_{FE}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{FE}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{FE}$ max. (mm)
2 pole						
DC 21 / ... / 2	21.5	6.2	40	60,000	120,000	0.04
DC 25 / ... / 2	25.4	6.2	50	40,000	100,000	0.07
DC 33 / ... / 2	33	7.6	55	60,000	100,000	0.20
DC 37 / ... / 2	37	15.1	60	60,000	100,000	0.30
DC 41 / ... / 2	41.7	13	70	100,000	200,000	0.25
DC 48 / ... / 2	48.2	19	80	80,000	120,000	0.35
DC 70 / ... / 2	70.0	27	140	80,000	120,000	1.9
DC 83 / ... / 2	83.2	38	160	75,000	75,000	3.5

Type D1 / $L_{FE}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{FE}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{FE}$ max. (mm)
4 pole						
DC 44 / ... / 4	44	21.2	90	40,000	60,000	1.0
DC 58 / ... / 4	58.5	29	110	30,000	60,000	3.7
DC 60 / ... / 4	60.2	23.6	120	30,000	60,000	4.3
DC 70 / ... / 4	70.3	31.5	150	20,000	40,000	7.5
DC 82 / ... / 4	82.5	40.6	160	20,000	40,000	12
DC 90 / ... / 4	90.0	50.4	220	20,000	50,000	22
DC 106 / ... / 4	106.5	55.4	260	15,000	40,000	50
DC 120 / ... / 4	120.0	63	300	10,000	30,000	75
DC 135 / ... / 4	135.0	68	330	10,000	30,000	105
DC 150 / ... / 4	150.0	76	375	8,000	25,000	150
DC 160 / ... / 4	160.0	95.8	400	8,000	25,000	184
DC 170 / ... / 4	170.0	95.8	425	4,000	25,000	263
DC 200 / ... / 4	200.0	114.6	500	4,000	20,000	383

These types are just a combendium of the entire range.  
You can find other types and sizes on our website or you just contact ATE directly.

Type D1 / $L_{FE}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{FE}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{FE}$ max. (mm)
6 pole						
DC 106 / ... / 6	106.5	54.2	265	10,000	30,000	68
DC 120 / ... / 6	120	67	300	8,000	25,000	100
DC 150 / ... / 6	150	90	375	6,000	17,000	215
DC 170 / ... / 6	170	107	425	4,000	14,000	320
DC 190 / ... / 6	190	114	475	3,000	13,000	420
DC 240 / ... / 6	240	157.6	600	3,000	8,000	980
8 pole						
DC 135 / ... / 8	135	79	330	2,000	15,000	165
DC 160 / ... / 8	160	96	400	4,000	15,000	270
DC 180 / ... / 8	180	117.4	450	3,000	12,000	393
DC 200 / ... / 8	200	127.4	500	2,000	10,000	550
DC 240 / ... / 8	240	160.2	600	1,500	7,000	975

DC

# TORQUE-MOTORS (MS)

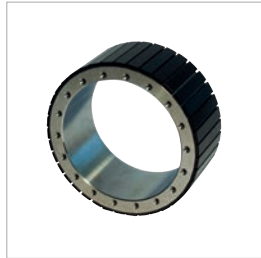
Do you also look for higher torque? Then talk to us.  
High pole torque motors (Direct Drives) from ATE offers various custom tailored solutions. ATE already realized motors with stator outside diameters from 21 – 1,200 mm and torque range up to 10,000 Nm.

- High power density
- Large shaft diameter
- Low inertia
- Solid magnet carrier
- High power factor

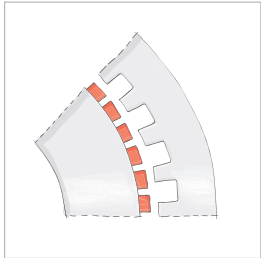
Stator diameter: 21 – 1,200 mm  
Number of poles: up to 132  
Speed range: up to 100,000 rpm  
Continuous torque: up to 10,000 Nm



Stator MS 210/70/44  
encapsulated in cooling sleeve



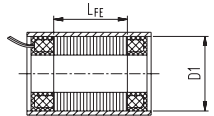
Rotor MS 210/70/44 on  
magnet carrier



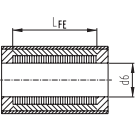
Sectional drawing MS motor with  
surface magnets and single tooth  
winding (internal rotor)

## Dimensions (mm)

Stator



Rotor



The approximately reachable continuous power at water cooling can be calculated with below mentioned formula. The torque can be roughly calculated linearly to the iron length ( $L_{FE}$ ). The calculated values are just approximated values. For detailed torque and power values please contact one of ATE engineers.

$$P_2 \text{ (kW)} = \frac{M \text{ (Nm)} \times n \text{ (rpm)}}{9550}$$

$$M \text{ (Nm)} = \frac{P_2 \text{ (kW)} \times 9550}{n \text{ (rpm)}}$$

These types are just a combendium of the entire range.  
You can find other types and sizes on our website or you just contact ATE directly.

Type D1 / $L_{FE}$ / number of poles	D1 (mm)	d6 (mm)	Length $L_{FE}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{FE}$ max. (mm)
<b>8 pole</b>						
MS 30 / ... / 8	30	12	60	1,000	6,000	0.26
MS 35 / ... / 8	35	16	70	1,000	6,000	0.70
MS 60 / ... / 8	60	32	100	1,000	6,000	4.6
MS 80 / ... / 8	80	45	160	1,000	6,000	18
<b>10 pole</b>						
MS 90 / ... / 10	90	44	150	1,000	4,800	20
MS 120 / ... / 10	120	60	200	1,000	4,800	41
<b>14 pole</b>						
MS 54 / ... / 14	54	25	100	750	3,400	4.0
MS 60 / ... / 14	60	32	120	750	3,400	5.0
MS 70 / ... / 14	70	40	140	750	3,400	7.0
MS 80 / ... / 14	80	46	160	750	3,400	25
MS 90 / ... / 14	90	52	200	750	3,400	40
<b>22 pole</b>						
MS 60 / ... / 22	60	38	120	600	2,200	7.0
MS 100 / ... / 22	100	52	200	600	2,200	60
MS 140 / ... / 22	140	65	280	600	2,200	200
MS 175 / ... / 22	175	90	350	600	2,200	380
<b>44 pole</b>						
MS 210 / ... / 44	210	140	420	400	1,100	840
MS 250 / ... / 44	250	150	500	400	1,100	1,500
<b>66 pole</b>						
MS 290 / ... / 66	290	200	580	200	700	2,400
MS 340 / ... / 66	340	240	680	200	700	4,200
MS 360 / ... / 66	360	265	720	200	700	5,470
<b>88 pole</b>						
MS 450 / ... / 88	450	345	900	100	550	10,680
MS 530 / ... / 88	530	420	900	100	550	16,320
MS 800 / ... / 88	800	620	1,200	100	550	40,000
<b>132 pole</b>						
MS 760 / ... / 132	760	650	1,200	50	350	58,000





# TORQUE-MOTORS (AL)

External rotor drives mainly are used for applications which requires high shaft stiffness.

- High short time torque
- Potentially advantages for the design

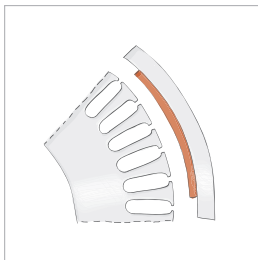
Stator diameter: 60 – 900 mm  
Number of poles: up to 66  
Speed range: up to 2,500 rpm  
Continuous torque: up to 5,000 Nm



Stator AL 200/15/44  
encapsulated on cooling sleeve

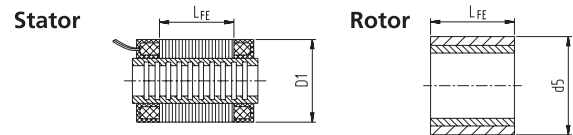


Rotor AL 200/15/44



Sectional drawing AL motor with surface magnets and single tooth winding (external rotor)

## Dimensions (mm)



The approximately reachable continuous power at water cooling can be calculated with below mentioned formula. The torque can be roughly calculated linearly to the iron length ( $L_{FE}$ ). The calculated values are just approximated values. For detailed torque and power values please contact one of ATE engineers.

$$P2 \text{ (kW)} = \frac{M \text{ (Nm)} \times n \text{ (rpm)}}{9550}$$

$$M \text{ (Nm)} = \frac{P2 \text{ (kW)} \times 9550}{n \text{ (rpm)}}$$

These types are just a combendium of the entire range. You can find other types and sizes on our website or you just contact ATE directly.

Type D1 / $L_{FE}$ / number of poles	D1 (mm)	d5 (mm)	Length $L_{FE}$ max. (mm)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (Nm) related to $L_{FE}$ max. (mm)
14 pole						
AL 47 / ... / 14	34	47	60	500	3,000	2.0
16 pole						
AL 450 / ... / 16	390	450	200	500	2,500	1,000
22 pole						
AL 60 / ... / 22	52	60	100	500	2,000	4.0
44 pole						
AL 160 / ... / 44	138	160	250	500	2,000	160
AL 200 / ... / 44	179.0	200	400	500	2,000	770
AL 270 / ... / 44	238	270	500	500	1,800	2,140
66 pole						
AL 435 / ... / 66	410	435	600	200	800	6,580
88 pole						
AL 555 / ... / 88	529	555	800	100	500	15,000

Higher speed and torque to be inquired



## SYNCHRONOUS MOTORS WITH INTERIOR PERMANENT MAGNETS (FS)

Field weakening synchronous motors offers a long field weakening range with constant high power density.

Stator diameter: 95 – 640 mm  
Speed range: up to 30,000 rpm  
Output: up to 400 kW  
Continuous torque: up to 2,400 Nm

- W/O Choke
- Big field weakening range
- High inductivity
- High speed range with constant power
- Low magnet volumina
- Low rotor losses (laminated)
- Efficiency optimized parameter possible
- High power factor



Stator resin varnished



Stator encapsulated in cooling sleeve



Sectional drawing FS motor with interior permanent magnets and reluctance torque use

## SYNCHRONOUS MOTORS WITH FIELD WEAKENING (RL)

Field weakening synchronuos motors as a reluctance motor are cost effective solutions for applications which requires lower torque density.

Dimensions and power information on request.

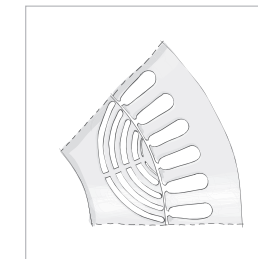
- Synchronous Speed
- Magnetless
- Low cost design
- Field weakening
- High inductivity
- Low rotor losses



FS/RL rotor on magnet carrier



FS/RL rotor on sleeve



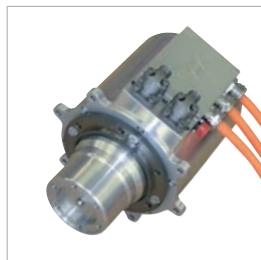
Sectional drawing RL motor with reluctance torque use, no magnets required

## COMPLETE DRIVES

In closed partnership with the customer, ATE develops, designs and manufactures also complete motor systems. At the beginning it has to be discussed and investigated whether ATE can realize the customers technical demands.



*Motor for medical application*



*Traction motor*



*Water pump automotive industry*

## MICRO DRIVES

The importance of micro motors becomes more and more in the industrial world. Also here ATE is your competent partner. The ATE range covers motors from stator outside diameter of 8 mm. Different sizes and versions are available depending on customers demand. Moreover the rotors can be offered in various, custom tailored designs.

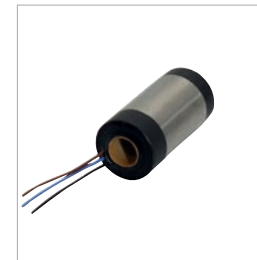
- ⌚ Drilling, grinding and engraving spindles
- ⌚ Micro machining (watch industry and medical equipment)
- ⌚ PCB machining
- ⌚ Micro gas turbines
- ⌚ Miniature compressors
- ⌚ Atomizers

Stator diameter:  
Speed range:

8 – 21 mm  
up to 1,000,000 rpm



*Stator for micro gas turbine*



*Stator for micro processing spindle*



*Rotor for micro processing spindle*



# ENGINEERING

As a competent partner for custom-tailored drive solutions, ATE offers innovative product solutions. Due to the longtime experience and Know-how you will be supervised with our possibilities by our engineers from the beginning of your idea until to the final product.

Highest priority of ATE is the development of an optimal solution for the requirements of an always contented customer.

Quality means for ATE: To recognize the requirements of our customer and to find solutions under consideration of the agreements. We offer our knowledge and our skills in a closed partnership. With high professional competence and major personal responsibility we contribute to the longtime and sustainable success of our customers.

- ☞ Usage of the most suitable motor topology for an ideal drive system
- ☞ Electro-magnetic consideration
- ☞ Stability calculations
- ☞ Production development
- ☞ Production of prototypes up to serial quantity
- ☞ Assurances during start-up operation
- ☞ Power measurements in the ATE test laboratory or on customer side

