

saia

Motors

SAIA Motor Catalog



Johnson Electric

**JOHNSON
ELECTRIC**

innovating motion

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Overview

The Johnson Electric Group is one of the world's largest providers of motion subsystems and motion components for automotive, medical and industrial applications.

Over the years, we have shipped billions of motors to more than thirty countries in over one hundred different applications. Johnson Electric has an annual production capacity of one billion motors and motion subsystems.

At the heart of Johnson Electric's success is our commitment to make our customers successful. Our customers include many of the world's leading industrial, consumer and automotive companies. We begin by understanding our customers' business needs, and the product application requirements of the end user of our customers' products. Then we design and deliver innovative motion solutions that help our customers to differentiate their products in the marketplace. Our goal is to be instrumental in the successful launch of our customers' products in their respective marketplaces.

Our Brand Promise Johnson Electric delivers competitive advantage

Johnson Electric delivers differentiation and innovation through its motion products – subsystems comprising of Stepper Motors, DC Motors, AC Motors, Piezo-electric Motors, Switches, Solenoids, Flexi Circuits, Motion Control, Precision Plastics and Precision Gears.

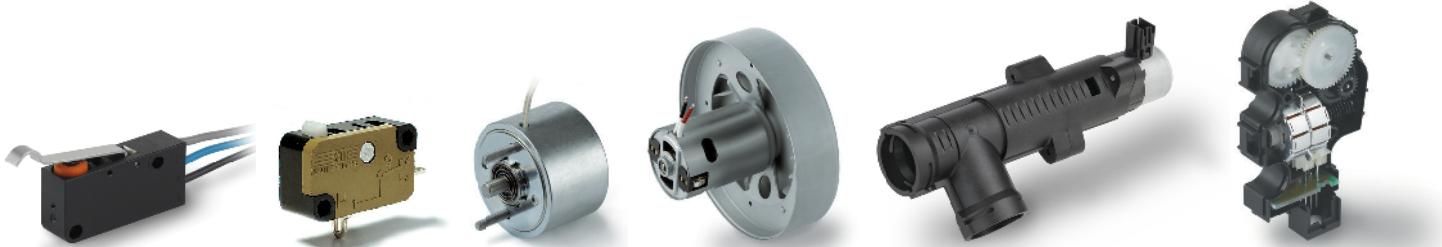
Johnson Electric is the most reliable partner

Johnson Electric is responsive and flexible; and has the financial stability and organizational integrity to meet all of our commitments and to support our customers' success. Product reliability and assurance of supply are our commitment.

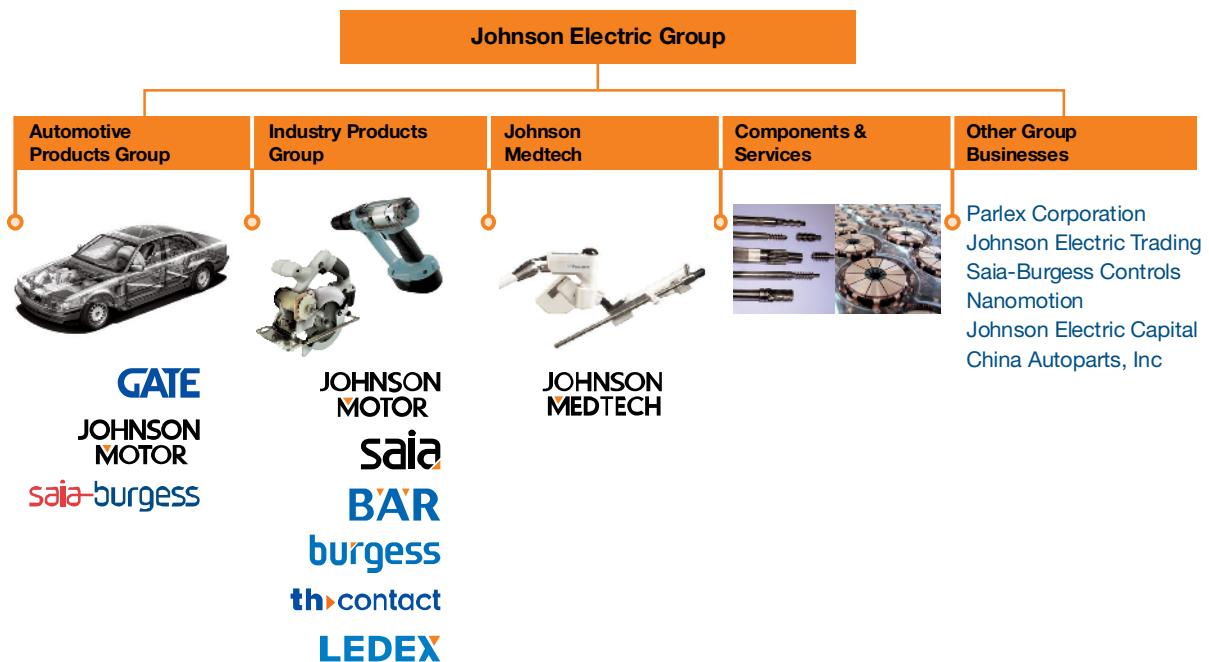
Johnson Electric is "The Safe Choice"

- Financial strength and long standing supplier relationships.
- Unmatched assurance of supply.
- Rigorous supply chain management and complete integrity in compliance with standards.
- Unsurpassed on-time delivery.
- Global logistics support 24/7.
- Collaborative design and project management process.
- Product life cycle support from creation to end-of-life.

Our business growth hinges with leading «branded» goods producers to deliver differentiation and innovation through our motion products. The core platform for delivering these solutions is a highly developed production base and focused customer support teams throughout the world. This combines scale advantages in production and procurement with skilled and dedicated motion application experts.



How we are organized



The Group's motion systems, motors and switches businesses are managed through three operating divisions: Automotive Products Group, Industry Products Group and Johnson Medtech.

The Automotive Products Group (APG) is focused on providing customized motion solutions for all major automotive applications. APG goes to market under three product brands: Saia-Burgess for custom actuators; GATE for engine cooling fan modules; and Johnson Motor for DC motors and brushless DC motors.

The Industry Products Group (IPG) provides motion products and solutions for various commercial and industrial application sectors, including home appliances, power tools, business equipment, personal care products, medical equipment, building automation, security, audio-visual and other industrial products. IPG goes to market under seven product brands: Johnson Motor for DC motors, AC motors and BLDC motors; Saia Motor for stepper motors and synchronous motors; Ledex and Dormeyer for solenoids; and Saia, Bär, Burgess, th-contact brands for switches.

Johnson Medtech is an ISO13485 certified designer and manufacturer of motion related products for the medical device industry. The focus of Johnson Medtech is

primarily in subsystem for medication delivery systems, surgical robotics and image guided surgery.

Supporting these three business units is the Components & Services division which produces metal and plastic parts, tooling and production equipment for the Group. Johnson Electric is a highly vertically integrated business that manufactures an exceptionally wide range of components that form the basis for its final products. We make magnets, bearings, shafts, housings, laminations, commutators and die cast parts. We also build tools, assembly fixtures, plastic molds as well as armature winding and other production machines.

Supporting our customers worldwide are sixteen R&D centres located in Hong Kong (China), Shenzhen (China), Shanghai (China), Nagano (Japan), Yokneam (Israel), Asti (Italy), Murten (Switzerland), Halver (Germany), Dresden (Germany), Isle of Wright (Parlex), San Jose (USA), Methuen (USA), Vandalia (USA), Springfield (USA) and Plymouth (USA).

The Group also includes a number of complementary subsidiary companies. These include an innovative provider of flexible printed circuits and interconnect solutions; a successful niche player in the programmable controls industry; and a rapidly growing China auto parts business.

Looking for a specialized motor solution?

Look no further.

We offer the industry's most comprehensive combination of technology, engineering and manufacturing to satisfy all your actuation design needs. From stand-alone motor products to complete value-added solutions; we can do it all for you. The images shown are just a few samples that demonstrate our design and value-added assembly capabilities.

If your application requires more than a standard product solution, please consider us early in your design process. Our application engineering staff will be happy to discuss your requirements.



Saia – a leading global motor brand

We offer the best design resources for actuating solutions – whether it's one motor delivered tomorrow morning or a half million delivered just-in-time over the next year.

Machine and process automation can range the most basic on-off function to extremely complex sequencing. When the process involves linear or rotary motion, motors are among the best actuation devices in terms of size, cost, simplified installation, and ease of use. On this page are some of the primary functions which are ideally suited for Saia motors, followed by several pages of current application examples of our products applied in a wide variety of industries. If your design includes linear or rotary operations, we can help you determine the best product to meet your application design requirements.

Variable Positioning

Stepper motor for linear applications and rotary applications provide variable positioning capabilities.

Uncompromising Reliability

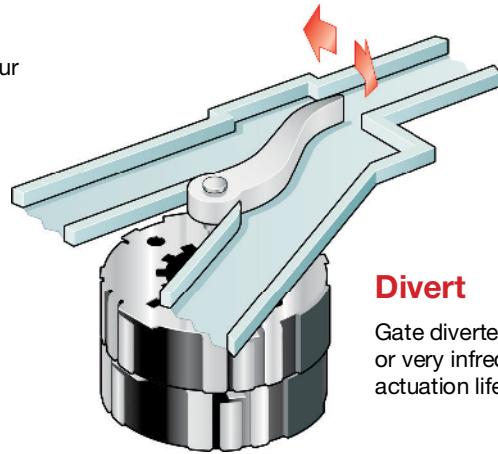
Saia motors provide repeatable, predictable performance.

Common Rotary Motor Applications

- Counters
- Circuit breakers
- Rotary valves
- Rotating lamps
- Textile machinery
- Flaps
- Level indicators
- Ticket machines
- Copiers

Common Linear Motor Applications

- Coffee machines
- Textile machinery
- Linear valves
- Vending machines

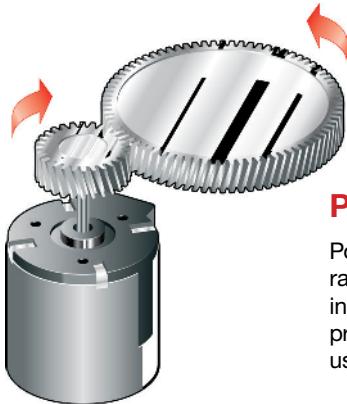


Divert

Gate diverters, depending on the application, can be used continuously or very infrequently. In this example, a stepper motor unit is chosen for its actuation life rating.

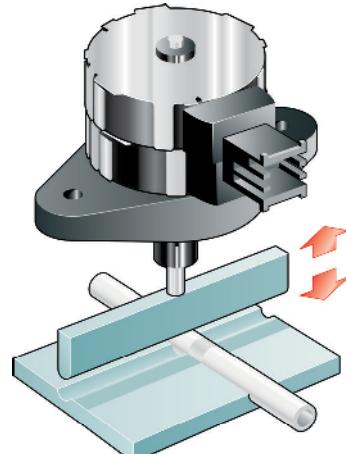
Pinch

In this example, a linear motor is utilized for its variable positioning capability to smoothly pinch the tube to the operator's precise demand.



Position

Positioning applications can range from a simple ratcheting device, such as this, to precise variable positioning using linear or rotary motor.



Motors for Pharmaceutical and Medical Equipment

Saia motors are ideally designed for precise, clean, quiet, reliable automation of a variety of medical equipment functions.

Inherent features which optimize linear and rotary motor use in the medical industry include:

- Easy control with simple electronics
- Instant actuation or smooth variable positioning
- High MTBF, reliable, repeatable operation without degradation due to wear
- Long, predictable life
- Ideal for both open loop or closed loop microprocessor controlled systems

Pharmaceutical Dispenser

- Locks storage trays closed
- Locks individual medicine compartments
- Counts tablets as dispensed

Surgical Laser

- Motors are commonly used as the shutter mechanism for surgical lasers.

Portable, Real-Time Blood Analyzer

- A bedside blood analyzer allows blood to be monitored during administration of medicines allowing doctors to prescribe medications in more exacting dosages based on the patient's condition

IV Fluid Metering

- Acting as pinch valves, motor offer a simple, direct, reliable means to start and stop fluid flow through valves or tubing
- Principle motor design advantages include non-contacting, quiet operation with minimal heat generation
- Also, depending on the design requirements of the application, either immediate on/off or slow, proportional actuation can be achieved

Intraocular Microsurgery

- Motors are used to control fluid flow through a series of tubes during intra-ocular surgery
- Reliability is a primary motor advantage because a malfunction during surgery could be detrimental

Motors as Locking Mechanism

Motors are found in numerous applications that require a locking device. Whether it is a medical application, an office automation application or a door lock, motors provide an effective, cost-efficient locking mechanism.

Security Applications

- Hotel room door lock
- Hotel safe lock
- Prison door lock
- Fire safety door opening lock

Office Automation

- Disk drive door lock
- Personal computer chassis lock
- Docking station lock
- Locks to hold peripherals in place
- Tape library index lock

Medical

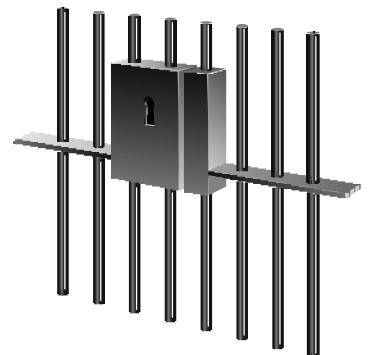
- Sterilizer lock
- Centrifuge lock
- Blood analysis machine lock

Consumer

- Oven door lock for self-cleaning function
- Garage door safety lock
- Home safe lock

Industrial

- Overhead door lock
- Fire safety door lock
- Prison locks
- Commercial laundry locks



Motors in the Appliance Industry

Motors are found in numerous applications in the appliance industry. AC and DC products are available for on/off operation on many types of consumer and commercial appliances.

Domestic Appliances

- Through the door refrigerator ice and water dispensers
- Door locks on self-cleaning ovens
- Gas valve control on gas ranges and ovens
- Drain control valves on domestic washing machines
- Brake motors on domestic washing machines



Commercial Appliances

- Dispensing valves
- Beverage dispensing valves
- Product dispensers on vending machines
- Coin changers on vending machines
- Actuating devices on commercial baking and food processing or packaging equipment
- Wrapping material cutters for food packaging
- Gas valve control on gas fired boilers and furnaces
- Industrial overhead door brake mechanisms

Table of typical applications & Saia Motor Series

In addition to the products shown in the Product Catalog pages, the Product Mapping table below shows a wide range of motor types for a selection of applications. Also, motors may be customized to fulfill your specific requirements, please feel free to contact us.

Application & Motor types	UAT3	UCM/UCR	UBR1/UBR2	UDR	UDS	UFM/UFU/UFR	UPU	UAG3/4	UCD/UCB	UBD/UBB	UDB	UFD/UFB	UPJ	UGD	UGM	UGB/UGF	UGW	UGO/UGP	UGJ	UGR	UCC/UCK	UAL	UCE/UCL	ULE
	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HVAC/Divertor valves	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
HVAC/Thermostatic valves	•																							
Coffee machines	•																							
HVAC / Air Flaps	•	•																						
Vending/Gaming	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Industrial Equipment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ATM																								
Medical																								
Commercial Equipment	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pellet stoves																								
Level indication					•																			
Textile machines									•													•	•	•
Credit card readers									•															
Pan and tilt cameras																								
Chart recorders									•															
Tachograph									•															
Conveying								•	•															
Mechanical handling																								•
Copier & Printer										•	•	•												
Distribution	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Home Appliances		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Industrial automation	•																							
Specialist vehicles									•	•	•													
Waterheaters/Showers	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Circuit Breaker	•								•	•	•							•	•	•				
HVAC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Page	22	25/28	31/33	35	37	39/41/43	47	52	56/60	64/67	70	73/76	81	85	88	91/94	97	99	104	107	122/126	131	135/140	146

Saia Motors Important notes

General

All specifications for torque, force and power are representative only and maybe subject to variation due to manufacturing tolerances.

Saia motors, except UR types, fulfill basis insulation requirements of EN 60335-1: 2004.

Application advice

The requirements for protection class I, II or III according to EN 60335-1: 2004 have to be fulfilled by customer application.

Stepper motors

Specified data for torque values is valid for

- a duty cycle of 100%, in Performance Charts additionally for 30% (cycle time:
5 min, type URG only 1 min.)
- an ambient temperature of $23 \pm 5^\circ\text{C}$
- a defined driver circuitry, with constant voltage supply
- at rated voltage

Depending from operational conditions, max. load torque must be lower than specified torque in catalogue. Please send us an enquiry.

If duty cycle or actual maximum ambient temperature is lower, the motor can be designed for higher performance (torque and power) by using a different winding.

Chopper driver circuits can be applied alternatively to a driver with constant voltage supply. They are more expensive, but bring higher performance. Additionally, they reduce the effects of temperature and supply voltage change.

Performance charts available on request.

Step angle tolerance is about $\pm 5\%$
(not cumulative)

Synchronous motors

Specified data for torque/power values are valid for

- a duty cycle of 100%
- an ambient temperature of $23 \pm 5^\circ\text{C}$
- at rated voltage
- synchronous torque (not starting torque)

Torque is specified with maximum values, overloading is not permissible.

Depending from operational conditions, max. load torque must be lower than specified torque in catalogue. Please send us an enquiry.

If duty cycle or actual maximum ambient temperature is lower, the motor can be designed with higher performance by using a different winding.

The basic design is the same as for our stepper motors, but the motors are operated by a sinus waveform voltage.

A capacitor, connected to one of the motor coils, is necessary for rotation in the appropriate direction.

Motor type UDS is a special design: It has only one coil, but is fitted with an internal backstop. This backstop forces the motor to rotate only in one direction.

Motor can be designed to rotate in CW or in CCW direction. A capacitor is not necessary.

Mechanical and electrical connections

On request we can deliver other options, e. g.

- special motor shafts
- pinions on shaft
- special cable lengths
- connectors

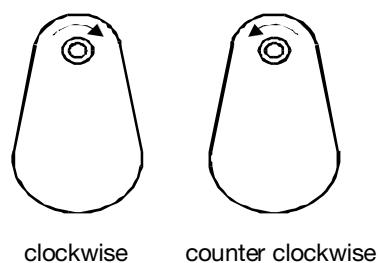
Gearboxes

Saia gearboxes are available in a variety of sizes to meet a wide range of torque requirements. Ratios from 4 1/6 to 6.048.000 are available. The basic design is a spur gearbox with gear wheels in metal, plastics and combinations of the two materials. A particular feature is the availability of freewheels and slipping clutches.

The gearboxes are turned by the motor, energy flow is from input to output shaft. That means, they are not allowed to be driven by the output shaft (for instance turning manually). This can lead to damage of some internal components!

Direction of rotation

As a function of the number of stages, the direction of rotation can be either clockwise or counter clockwise. The direction of rotation of motor gearbox units is generally specified by the gearbox output shaft (drive-side, see DIN EN60034-7, IEC 60050-411).



Ratio

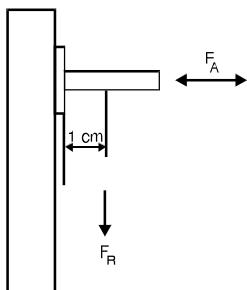
Gear ratio i is the ratio of input speed n_e and output speed n_a .

$$i = \frac{n_e}{n_a}$$

Permissible force FA and FR at the output shaft

Permissible force loads at the output shaft are:

- Axial load (or thrust) F_A , pulling or pushing in axial direction of the shaft
- Radial load F_R acting laterally on the shaft. The catalogue value is referred to a distance of 1 cm to the bearing



Permissible Torque

The lifetime of a gearbox is determined by the load on the gear teeth and the number of revolutions of the gear wheels.

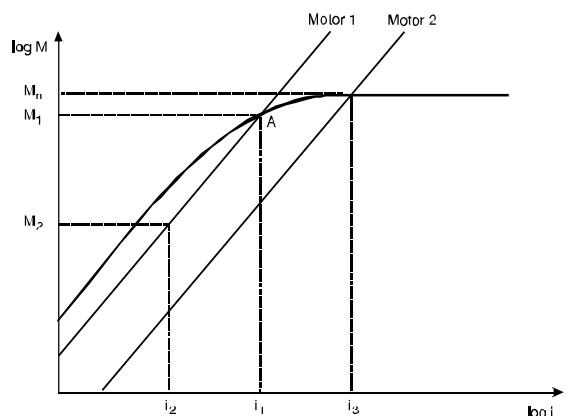
The maximum permissible torque M_n is defined by the load on the final stage of the gearbox and the stability of the housing.

Some gearboxes have lifetime graphs. It shows the relationship between ratio i and the associated torque for a fixed period of time, e.g. 1000 or 10000 hours. A conditional parameter is the input speed (equivalent to motor speed) corresponding to the total number of revolutions of all gear wheels. In the catalogue we show two curves – for a motor having 250/300 rpm and 500/600 rpm.

For example: Max. output torque M_{x1} is permissible at a ratio of $i \times i_1$. With smaller ratios the max. permissible torque has to be reduced, because otherwise the first stages of the gearbox would be overloaded.

Additionally to the lifetime curve the motor torque M_m , multiplied by gear ratio and reduced by the gear efficiency, is shown (resulting in output torque M_i).

$$M_i = M_m \times i \times \eta$$



Example 1: The application of Motor 1 combined with a gearbox of ratio i_1 leads to an output torque M_1 at point A. The gearbox can transmit this torque, meeting its lifetime.

If a ratio of $i > i_1$ is selected, actual torque would be $M > M_1$. However lifetime cannot be guaranteed, as the operating point lies above of the lifetime curve, now.

Example 2: Motor 1 with a ratio of i_2 . Torque generated is M_2 . This is below of the lifetime curve. Lifetime of gearbox is higher.

Example 3: Motor 2 and a ratio of i_3 generate a torque of M_n . When using a ratio of $i > i_3$ - the gearbox cannot be loaded more than M_n .

Efficiency

The efficiency is determined by the number of gearbox stages.

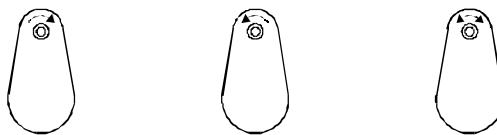
Efficiency of UGO/UGP and UGR is specified in catalogue

Efficiency of all other gearboxes on request.

Clutches

Gearbox types UGB and UGD can be fitted with freewheels or slipping clutches. Freewheels transmit the max. torque M in the locked direction, $<1 \text{ cNm}$ in the opposite direction. One way slipping clutches behave similarly except that the slip torque has a higher value. Two way slipping clutches can only transmit a limited torque value in either direction lower than the slip torque.

Slipping clutches are used to: Protect the gearbox against torque overloads, or to adjust the load by turning from the load side (remember: turning the output shaft directly can otherwise damage the gearbox).



Slipping clutch	One way	One way	Two way
Freewheel	yes	yes	no
Torque, clockwise	full torque	$<$ slipping torque	$<$ slipping torque
Torque, Anti clockwise	$<$ slipping torque	full torque	$<$ slipping torque
Output shaft turning, clockwise	slipping possible	blocking	slipping possible
Output shaft turning, anti clockwise	blocking	slipping possible	slipping possible

Explanation of specifications

Power consumption P_{in}

The power consumption (in W) was determined in no-load operation

Load

The total sum of all static and dynamic torques (e.g. friction torque, mass inertia, acting on the rotor).

Speed n

rmp revolution per minute

Torque

The running torque in cNm (also synchronous, braking or dynamic torque) defines the load at which the synchronous motor falls out of synchronism and stops.

Power output

The power output (in W) is determined according to the following formula

$$P_{out} = \frac{M \times 2 \pi \times n}{60} = [W]$$

M in Nm (1 cNm = 0,01 Nm), n in rpm

Pole pair number

The number of rotor pole pairs North/South.

Direction of rotation

This information always refers to the output shaft, either of the motor or of the gearbox.

Right = clockwise rotation (CW),
Left = counterclockwise rotation (CCW)

Gear torque

The maximum gear torque in cNm defines the maximum load for a required life of at least 1000 operating hours.

Running time

This value refers to the time (t) per revolution (U); it is calculated using the following formula

$$t/U = i \times 60 = [\text{sec.}]$$

i = gear ratio

n = motor speed in rpm

General technical terms relating to synchronous and torque limited synchronous motors

ED or Synchronous

The running of the rotor at the same speed as the stator field which is determined by the frequency of the supply.

Synchronous speed

Constant speed of rotation at constant frequency based upon the number of pole pairs of the motor

$$n = \frac{f \times 60}{p}$$

f = frequency (Hz), n = speed (rpm)

p = number of pole pairs

Synchronous torque

Load torque permissible without motor falling out of synchronism, once the synchronous speed has been reached.

Starting torque

Load torque the motor is capable to start.

It is influenced by the type and manner of coupling to the load, the load inertia, the gearbox design and the supply voltage. In the case of a very large reduction ratio a small external moment of inertia and nominal gearbox play the starting torque becomes equal to the synchronous torque.

Detent torque (static)

Defines the maximum torque which can be applied to a deenergised motor without causing the motor to rotate. Catalogue specifications refer to the static detent torque.

Detent torque (dynamic)

Defines the maximum torque at which the motor comes to an immediate standstill from synchronous running when the power supply is switched off.

Permissible load inertia

Is the maximum inertia load the motor can start without external help.

Stall-proof

Synchronous motors with permanent magnet rotors can be stalled without damage to the motor winding.

Design characteristics

The basic design is the same as for our stepper motors, but the motors are operated by a sinus waveform voltage.

General technical terms relating to stepper motors

Duty Cycle (ED)

Duty cycle of operation, based on a cycle time of 5 minutes (1 minute for URG) and a frequency f=0Hz; e.g. ED=30% means that the motor can be continuously powered 1.5 minutes (30% of 5 minutes) without overheating

Step angle

Rotary angle through which the motor shaft turns per controlled pulse.

Stepping frequency

Number of steps of the stepping motor in 1 sec.

Driver

Electronics which convert step and direction input signals to high power currents and voltages to drive a step motor.

Unipolar driver

Unipolar means that every coil end has one polarity only. A unipolar coil consists in fact of 2 coils. Alternating the current flows through each of these coils always in the same direction. Compared to a bipolar motor only half of the copper is used at time.

The motor phase winding must be center tapped. On the SAMOTRONIC101 this is already fixed on the board.

Often an additional Z-diode is used to ensure a fast current decay in the switched-off coil. This will give an increased motor torque especially at higher frequencies.

Torque graphs in this catalogue are measured with a 10 V diode.

Bipolar Driver

Bipolar indicates that every coil end is bipolar, during driving it will be „+“ as well as „-“. Since every coil is fully used the motor has a higher torque compared to a unipolar one.

Very often a bipolar driver has a constant current drive capability (also called chopper). That will give an increased torque output at higher frequencies and a lower influence of temperature and supply voltage variations. Typical applications use the SAMOTRONIC102.

Rotational speed

Revolutions of the motor per minute calculated from:

$$n = f \times \frac{\alpha \times 60}{360^\circ}$$

f = stepping frequency, α = step angle.

Detent torque (static)

Defines the maximum torque which can be applied to a deenergised motor without causing the motor to rotate. Catalogue specifications refer to the static detent torque.

Holding torque

Defines the maximum torque with which an energized motor can be loaded without giving rise to a continuous rotary movement.

Pull-in torque

Operation torque when switching on full step frequency at once, without a ramp.

Pull-out torque

Operation torque when applying an acceleration / deceleration ramp.

Load inertia moment

The sum of all the mass inertia moments occurring on the shaft of the stepping motor.

Steps/rev

The number of steps per 360° rotation.

Maximum operating torque

The maximum torque which a stepper motor without external mass inertia can generate without stepping losses.

Synchronous Motors

Rotational



Type **UAT3**



Type **UCM/UCR**



Type **UBR1/UBR2**



Type **UDR**

Dimensions (mm)	$\varnothing 20 \times 17$	$\varnothing 28 \times 24$	$\varnothing 36 \times 21$	$\varnothing 48 \times 24$
Characteristics	<ul style="list-style-type: none"> ■ long life ■ precision bearing ■ standard 24VAC motor ■ economic volume solution 	<ul style="list-style-type: none"> ■ standard modules ■ customer specific interfaces 	<ul style="list-style-type: none"> ■ wide range of customized versions available ■ up to 230 VAC supply voltage 	<ul style="list-style-type: none"> ■ compact reversible synchronous motor
Voltage (V)	12–60	12–230	12–230	12–230
Speed 50 Hz (rpm)	600	250/500	250/500	500
60 Hz (rpm)	720	300/600	300/600	600
Pole number	10	24/12	24/12	12
Running torque (cNm)				
50 Hz	0.31/0.32	0.89–1.98	0.75–0.9	1.5
60 Hz	0.3/0.3	0.85–1.98	0.72–0.9	1.4
Power output (W)				
50 Hz	0.19/0.2	0.36–0.74	0.24–0.39	0.77
60 Hz	0.23/0.23	0.43–0.77	0.28–0.45	0.87
Gear combination	on request	D, M, B, F	D, M, B, F, V, J	D, M, B, F, V, J
Page	22	25/28	31/33	35

Rotational



Type **UDS**



Type **UFM/UFU/UFR**



Type **UPU
(SM6443/SM6444)**

Dimensions (mm)	$\varnothing 48 \times 18.5$	$\varnothing 52 \times 28$ (56)	$\varnothing 64 \times 43$
Characteristics	<ul style="list-style-type: none"> ■ simple to connect, only two wires ■ no capacitor ■ uni-directional with anti-return mechanism 	<ul style="list-style-type: none"> ■ three-phase AC operation possible ■ for high power 2, 3 or 4 coils 	<ul style="list-style-type: none"> ■ most powerful package with UGO/P/R gearboxes
Voltage (V)	6–230	12–230	12–230
Speed 50 Hz (rpm)	500	250/375/500	375
60 Hz (rpm)	600	300/450/600	450
Pole number	12	24/12	16
Running torque (cNm)			
50 Hz	0.9	2.8–5.3	10.3–35
60 Hz	0.8	2.6–4.7	8.5–30
Power output (W)			
50 Hz	0.5	1–2.8	3.5–13.8
60 Hz	0.5	1.1–3	3.9–14.2
Gear combination	D, M, B, F, V, J	D, M, B, F, V, J ($i \leq 2k$), O, P	O, P, R
Page	37	39/41/43	47

Stepper Motors

Rotational



Type **UAG3/4**

UCD/UCB

UBD/UBB

Dimensions (mm)	Ø 20 × 17	Ø 28 × 24	Ø 36 × 21
Characteristics	<ul style="list-style-type: none"> ■ economic volume solution 	<ul style="list-style-type: none"> ■ standard modules ■ customer specific interfaces 	<ul style="list-style-type: none"> ■ wide range of customized versions available
Step angle(°)	18	7.5/15	7.5/15
Holding torque (cNm)	0.56/0.42	1.3–2.7	1.0–1.9
Detent torque (cNm)	> 0.06	0.26–0.42	0.22–0.36
Winding	bipolar/unipolar	bipolar/unipolar	bipolar/unipolar
Gear combination	on request	D, M, B, F	D, M, B, F, V
Page	52	56/60	64/67

Rotational



Type **UDB**

UFD/UFB

**UPJ
(ST6443/ST6444)**

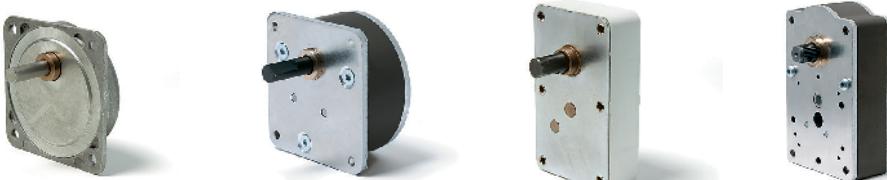
Dimensions (mm)	Ø 48 × 24	Ø 52 × 28 (56)	Ø 64 × 43
Characteristics	<ul style="list-style-type: none"> ■ compact reversible 15° stepper motor 	<ul style="list-style-type: none"> ■ two step angle motor 	<ul style="list-style-type: none"> ■ most powerful package with STG/V gearboxes
Step angle(°)	15	7.5/15	11.25
Holding torque (cNm)	2.2–2.7	6.4–45.3	30–45
Detent torque (cNm)	0.35	0.45–0.8	2–7
Winding	bipolar/unipolar	bipolar/unipolar	bipolar
Gear combination	D, M, B, F, V, J	D, M, B, F, V, J, O, P	O, P, R
Page	70	73/76	81

Gearboxes



Type	UGD	UGM	UGB/UGF
Dimensions (mm)	55 × 62/65.6	51 × 65.2	58 × 81
Characteristics	<ul style="list-style-type: none"> ■ established plastic gears ■ wide range of ratios ■ gears rotate on hardened steel shafts ■ optional integrated slipping clutches 	<ul style="list-style-type: none"> ■ volume metal and plastic spur gears ■ hardened steel shafts included in plastic housing and metal plate 	<ul style="list-style-type: none"> ■ robust metal spur gears ■ plastic primary gears ■ die-cast aluminium housing
Height	12/13	15	17
Max. torque (cNm) ¹⁾	32	100	250/500
Ratios	D: 4 ¹ / ₆ ...6.048.000	12 ¹ / ₂ ...4800	B: 41 ² / ₃ ...345.600 F: 4 ¹ / ₆ ...5000
Internal slipping clutch	optional	–	optional (UGB)
Standard shaft (mm)	Ø 4 × 10	Ø 4 × 10	Ø 8 × 12
Page	85	88	91/94

¹⁾ max. value, for higher ratios



Type	UGV	UGO/UGP (STG60/STG61)	UGJ	UGR (STG200)
Dimensions (mm)	70 × 70	Ø 65/68 × 68	65 × 107	70 × 130
Characteristics	<ul style="list-style-type: none"> ■ solid metal spur gears ■ die-cast aluminium housing 	<ul style="list-style-type: none"> ■ high performance hardened steel spur gears ■ low teeth profile ■ optional interface plates for DC motors ■ option additional housing for IP 65 	<ul style="list-style-type: none"> ■ the most extensive gear ratio range ■ medium torque two plate gear type with metal spur gears 	<ul style="list-style-type: none"> ■ high performance metal gear type ■ robust aluminium twin plate design ■ can be used with DC motors
Height	17	29.8–38.2	28	38
Max. torque (cNm) ¹⁾	500	600	1500	2000
Ratios	8 ¹ / ₃ ...2000	6 ¹ / ₄ ...3750	4 ¹ / ₆ ...36 Mill. ≥ 2500 with UGD	6 ¹ / ₄ ...375
Internal slipping clutch	–	–	–	–
Standard shaft (mm)	Ø 8 × 12	Ø 8 × 22	Ø 12 × 20	Ø 12 × 35
Page	97	99	104	107

¹⁾ max. value, for higher ratios ²⁾ depends on ratio

Gearboxes with DC and BLDC Motors



Type	UGM	UGB	UGF	UGO	UGP
With	DC Motor PC280LG	DC Motor PC280LG	DC Motor HC485G	BLDC Motor E9I	DC Motor HC785G
Characteristics	<ul style="list-style-type: none"> ■ Plastics and metal spur gear wheels ■ Bronze bearings 	<ul style="list-style-type: none"> ■ Plastics and metal spur gear wheels ■ Bronze bearings 	<ul style="list-style-type: none"> ■ Metal spur gear wheels ■ Bronze bearings 	<ul style="list-style-type: none"> ■ Metal spur gear wheels ■ Bronze bearings 	<ul style="list-style-type: none"> ■ Metal spur gear wheels ■ Bronze bearings
Voltage	12 Vdc and 24 Vdc	12 Vdc and 24 Vdc	12 Vdc and 24 Vdc	24 Vdc	24 Vdc
Max. torque (cNm) ¹⁾	60	200	400	600	600
Ratios	120 ... 1500	120 ... 1500	125 ... 1200	18.75 ... 750	18.75 ... 750
Internal slipping clutch	–	optional	–	–	–
Standard shaft (mm)	Ø 4 × 10	Ø 8 × 12	Ø 8 × 12	Ø 8 × 25	Ø 8 × 25
Page	111	113	115	117	119

¹⁾ max. value, for higher ratios

Synchronous Motors

Linear



Type **UCC/UCK**

Dimensions (mm) $\varnothing 28 \times 31$

- Characteristics
- linear motor using modules of the UC range
 - integrated non-rotational thread spindle

Travel (mm) 10/13

Voltage (V) 12–230

Thread pitch (mm) 1.0

Speed (mm/s)
50 Hz 4.16/8.33
60 Hz 5/10

Pole number 24/12

Max Force (N) 35

Page 122/126

Stepper Motors

Linear



Type **UAL**



UCE/UCL



ULE

Dimensions (mm) $\varnothing 20 \times 30$

$\varnothing 28 \times 33$

$\varnothing 55 \times 55$

- Characteristics
- small and compact design
 - screw or bayonet flange
 - integrated spindle with/without anti-rotation

- linear motor using modules of the UC range
- integrated non-rotating threaded spindle

- high force and speed
- integrated spindle with/without anti-rotation

Travel (mm) 15

10/13

10/95

Travel per step (mm) 6-24

0.021/0.041

0.031

Thread pitch (mm) 0.5

1.0

1.5

Speed (mm/s)

at 200 Hz 4.16

4.16/8.33

6.25

Step angle (°)

7.5/15

7.5

Max. Force (N) 28

35

400

Page 131

135/140

146

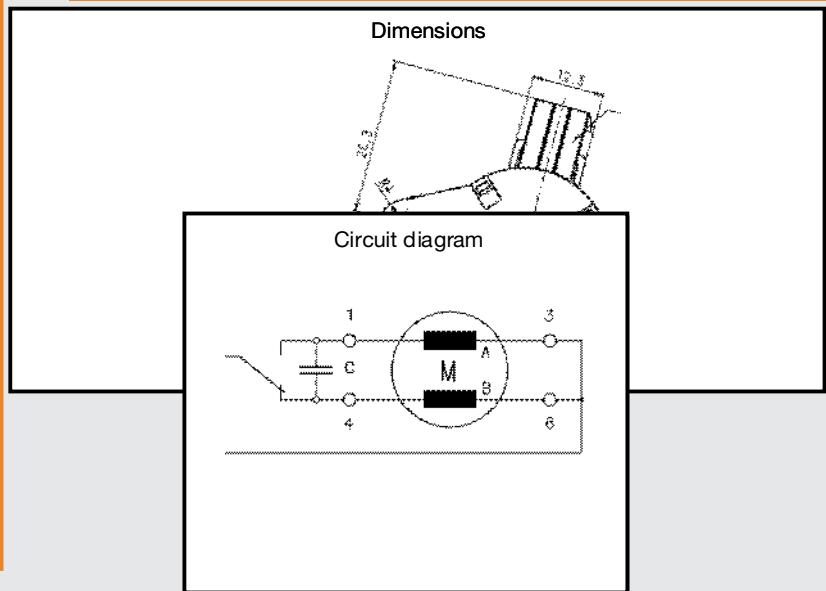
Electronics for Stepper Motors

Driver Boards



Type	Samotronic101	Samotronic102	Evaluation-Kit 2
Dimensions (mm)	55 × 40	84 × 54	metal case 164 × 130 × 45 (Euro-PCB)
Characteristics	<ul style="list-style-type: none"> ■ small unipolar board driver 	<ul style="list-style-type: none"> ■ small bipolar driver board ■ flash controller ■ optional customized software 	<ul style="list-style-type: none"> ■ tool for development, test and optimization of stepper drive systems ■ windows-based software ■ control and operation by computer ■ quick parameter setup ■ visualization of speed and position ■ positioning sequences capability
Driver	<ul style="list-style-type: none"> ■ for unipolar motors 	<ul style="list-style-type: none"> ■ for bipolar motors 	<ul style="list-style-type: none"> ■ for unipolar and bipolar motors
Supply voltage	10–24 VDC	standard version 10–24 VDC enhanced version 10–42 VDC	3–48 VDC (unipolar motors), 8–48 VDC (bipolar motors) 24 VAC
Motor current	constant voltage drive	constant current drive (chopper controlled) adjustable via potentiometer	constant voltage drive and constant current drive (chopper controlled)
Step mode	full/half step	full/half step	full/half/micro step
Clock source	internal or external	internal or external	internal, programmable
Control inputs to	<ul style="list-style-type: none"> ■ inhibit internal clock ■ inhibit motor current ■ change direction of rotation 	<ul style="list-style-type: none"> ■ inhibit internal clock ■ inhibit motor current ■ change direction of rotation 	<ul style="list-style-type: none"> ■ 3 digital inputs ■ 4 signal outputs ■ 1 analog input 0...10 VDC ■ 1 relay contact
Configuration	via DIP-switch potentiometer	via DIP-switch potentiometer	RS 232, USB
Page	150	151	152

Synchronous Motors Rotational



UAT3

UAT3

Dimensions (mm)	$\varnothing 20 \times 17.2$
Voltage (V)	12-60
Speed (rpm) 50 Hz	600
60 Hz	720
Pole number	10
Running torque (cNm) 50 Hz	0.32
60 Hz	0.3
Power output (W)	
50 Hz	0.20
60 Hz	0.23
Gear combination	on request



Standard Data

Climatic class	„wide-spread“ according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -20 ... +60
Ambient temperature storage	°C -40 ... +100
Thermal resistance at f=0 R _{therm}	47 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	lead wires AWG28, insulation Ø 0.82 mm
Protection	IP40 according to DIN EN 60529 : 2000
Weight	22 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating

Order Reference

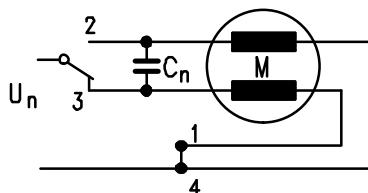
Type	Synchronous Motor	UAT3	3	N	B4	R	E
Rotor shaft, mounting	0 centring 8 mm, mounting plate with screw M2 3 centring 8 mm, mounting plate with long holes 5 centring 8 mm, mounting plate (for clipping) A centring 6 mm, mounting plate with screw M2 E centring 6 mm, mounting plate with long holes G centring 6 mm, mounting plate (for clipping)						
Approval	N Approval Standard						
Voltage/Frequency	See next page						
Direction	reversible						
Cable	E cable 150 mm with Tyco connector CT 173977-4 (other on request)						

UAT3

Technical Data

Rated frequency	Hz	50	60
Speed n	rpm	600	720
Power consumption	W	1.4	1.4
Power output	W	0.20	0.23
Running torque	cNm	0.32	0.30
Rotor inertia J _R	gcm ²	0.26	
Detent torque M _s	mNm	> 0.6	
Tolerance of voltage		standard power supply system + 10% / - 10%	
Duty cycle	%	100%	
Winding temperature T _{max}	°C	130	
Direction of rotation		reversible	
Rated voltage U _N	V	24	24
Duty cycle	%	100	100
Resistance R ₂₀	Ω	430	430
Capacitor C _n (50Hz)		3.3	2.7
Winding code	50Hz/60Hz	B4	G4

Circuit diagram Parallel circuit



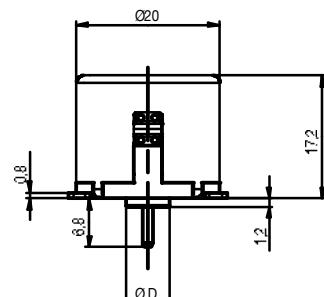
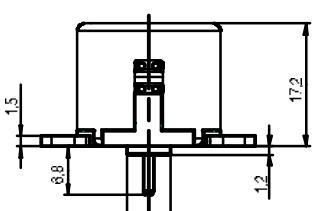
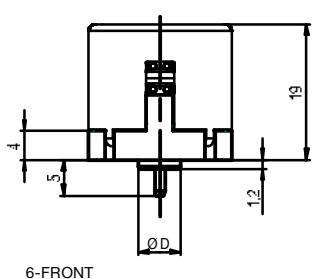
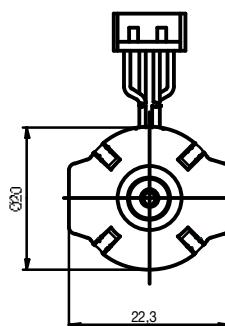
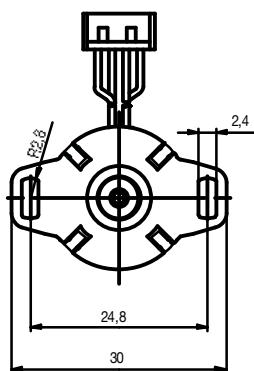
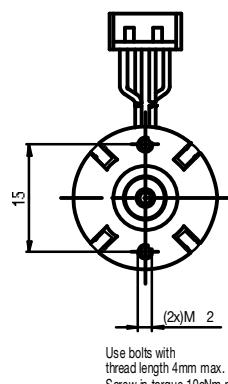
switch to
2 = clockwise rotation
3 = counter clockwise rotation

Dimensions

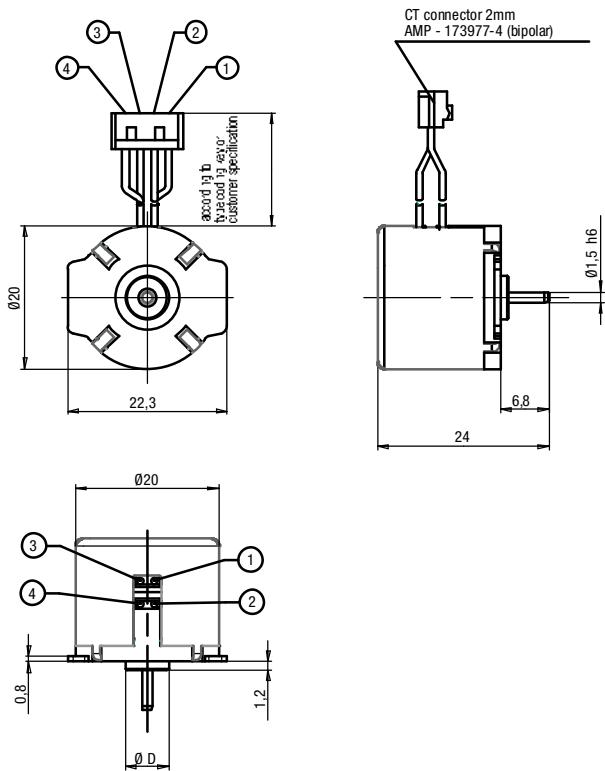
motor type	Ø D	
UAT30	Ø 8	0 -0.05
UAT3A	Ø 6	0 -0.05

motor type	Ø D	
UAT33	Ø 8	0 -0.05
UAT3E	Ø 6	0 -0.05

motor type	Ø D	
UAT35	Ø 8	0 -0.05
UAT3G	Ø 6	0 -0.05



UAT3

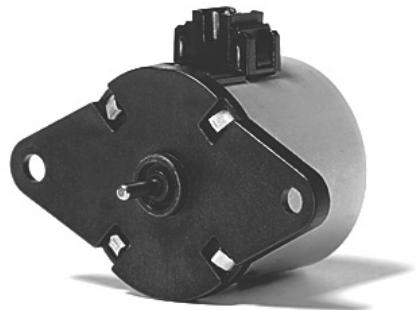


UCM

UCM1/7

Dimensions (mm)	\varnothing 28 x 24
Voltage (V) *	12–230
Speed (rpm) 50 Hz	250
Pole number	24
Running torque (cNm) 50 Hz	1.36–1.98
60 Hz	1.37–1.98
Power output (W)	
50 Hz	0.36–0.52
60 Hz	0.43–0.62
Gear combination	D, M, B, F

* regard circuit diagram and connector type



Standard Data

Climatic class	„wide-spread“ according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	connector type D or N
Protection	IP30 according to DIN EN 60529 : 2000
Weight	54 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	Sintered bronze, self-lubricating

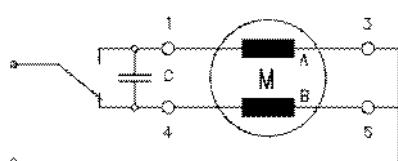
Order Reference

Type	Synchronous Motor	UCM	1	0	N	B4	R	D
Configuration	1 standard magnet 7 stronger magnet							
Rotor shaft, mounting	3 centring 8 mm, shaft 2.0 mm, screw plate 4 centring 8 mm, shaft 1.5 mm, screw plate 0 centring 8 mm, shaft 2.0 mm, clip 1 centring 8 mm, shaft 1.5 mm, clip	E K A C	centring 10 mm, shaft 2.0 mm, screw plate centring 10 mm, shaft 1.5 mm, screw plate centring 10 mm, shaft 2.0 mm, clip centring 10 mm, shaft 1.5 mm, clip					
Approval	N Approval Standard							
Voltage/Frequency	see next pages							
Direction	R reversible							
Connection	D see next pages “Connection Types” and page 145 “Connection Types” for B N							

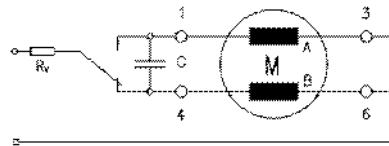
Technical Data

		UCM1	UCM1	UCM7	UCM7
Rated frequency	Hz	50	60	50	60
Speed n	rpm	250	300	250	300
Detent torque M _s	cNm	0.18	0.18	0.36	0.36
Power consumption	VA	2.2	2.2	2.2	2.2
Rotor inertia J _R	gcm ²	2.2	2.2	2.4	2.4
Tolerance of voltage		standard power supply system +10%/-10%			
Duty cycle		100%			
Winding temperature T _{max}	°C	130			
Direction of rotation		reversible			
Specific Technical Data Lead Wire Versions					
Performance	Running torque	cNm	1.36	1.37	1.71
	Power output	W	0.36	0.43	0.45
Capacitors	Rated voltage U _N	V	24	110	
	Duty cycle	%	100	100	
	Resistance R ₂₀	Ω	210	5000	
	Capacitor C _n (50Hz)	µF/V ±10%	4.7/40	0.22/200	
	Winding code	50Hz/60Hz	B4/G4	C8/H8	
Specific Technical Data Connector Versions					
Performance	Running torque	cNm	1.64	1.67	1.98
	Power output	W	0.43	0.52	0.62
Capacitors	Rated voltage U _N	V	12	24	
	Duty cycle	%	100	100	
	Resistance R ₂₀	Ω	53	210	
	Capacitor C ₅₀	µF/V ±10%	18/20	4.7/40	
	Winding code		B1	B4	

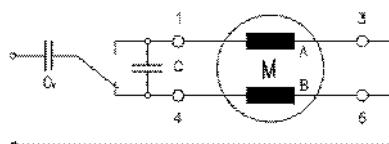
Circuit diagram Parallel circuit 12 V, 24 V, 48 V



Parallel circuit 230 V (only for lead wire versions)
with 110 V motor and resistor R_V



Parallel circuit 230 V (only for lead wire versions)
with 110 V motor and capacitor C_V



Series resistor R_V = 5.6 kΩ, 3 W

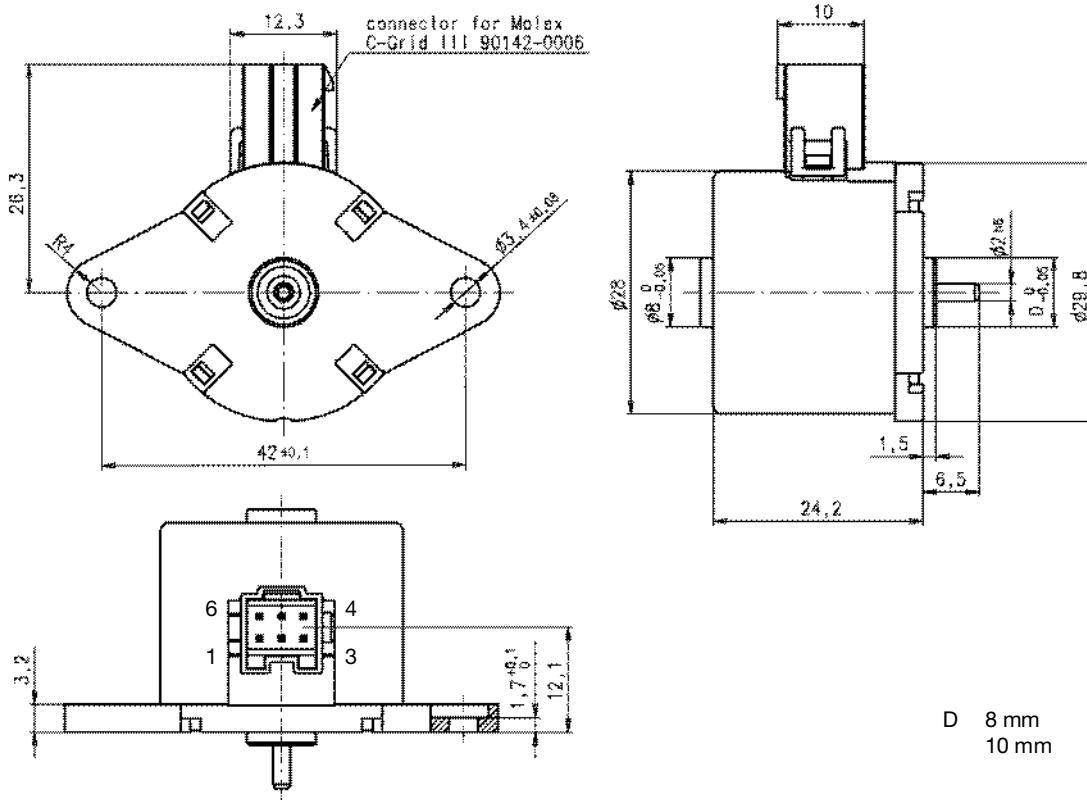
Series capacitor C_V = 0.33 µF, 250 VAC

switch to

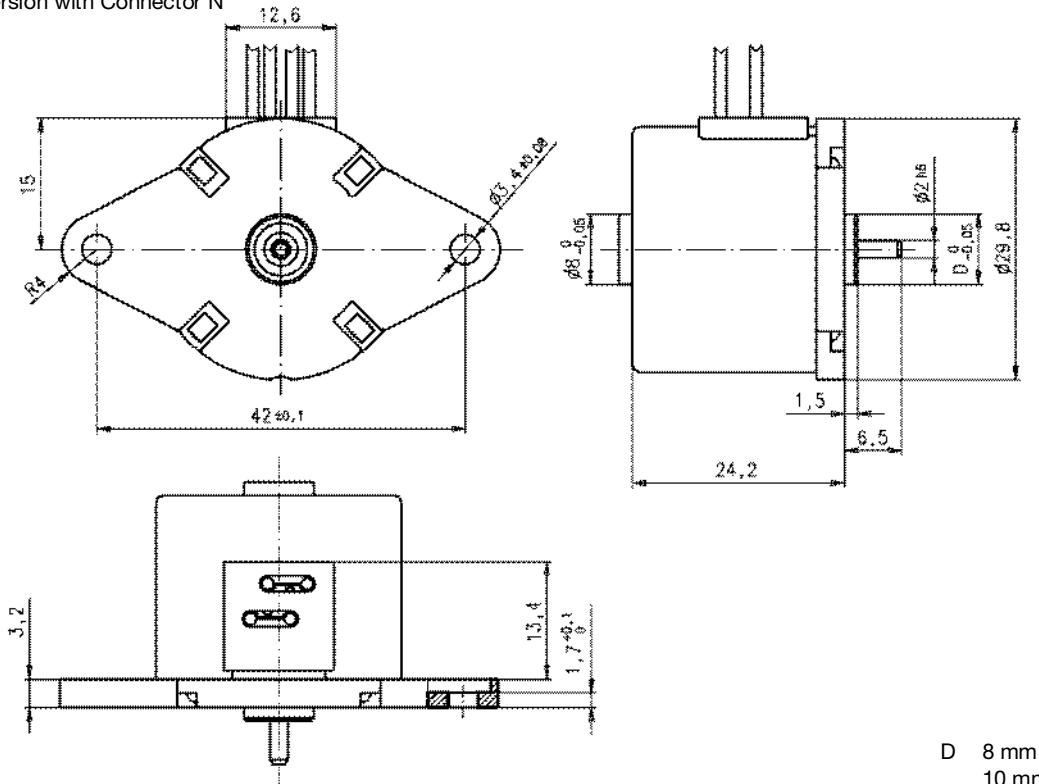
- 1 clockwise rotation
- 4 counter clockwise rotation
- 6 counter clockwise rotation
(for series circuit)

UCM

Dimensions Version with Connector D



Version with Connector N

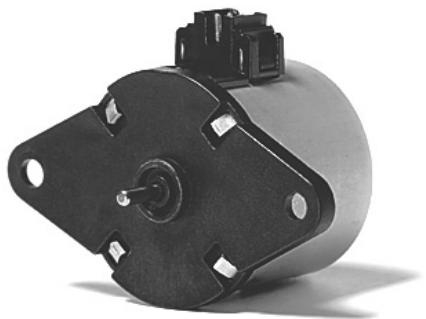


UCR

UCR1/7

Dimensions (mm)	\varnothing 28 x 24
Voltage (V) *	12–230
Speed (rpm) 50 Hz	500
Pole number	12
Running torque (cNm) 50 Hz	0.89–1.41
60 Hz	0.85–1.21
Power output (W)	
50 Hz	0.47–0.74
60 Hz	0.53–0.77
Gear combination	D, M, B, F

* regard circuit diagram and connector type



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	connector type D or N
Protection	IP30 according to DIN EN 60529 : 2000
Weight	54 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	Sintered bronze, self-lubricating

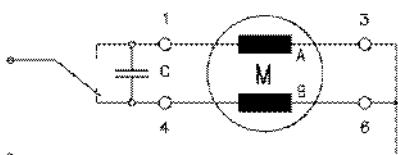
Order Reference

Type	Synchronous Motor	UCR	1	0	N	B4	R	D
Configuration	1 standard magnet 7 stronger magnet							
Rotor shaft, mounting	3 centring 8 mm, shaft 2.0 mm, screw plate 4 centring 8 mm, shaft 1.5 mm, screw plate 0 centring 8 mm, shaft 2.0 mm, clip 1 centring 8 mm, shaft 1.5 mm, clip	E K A C	centring 10 mm, shaft 2.0 mm, screw plate centring 10 mm, shaft 1.5 mm, screw plate centring 10 mm, shaft 2.0 mm, clip centring 10 mm, shaft 1.5 mm, clip					
Approval	N Approval Standard							
Voltage/Frequency	see next pages							
Direction	R reversible							
Connection	D see next pages "Connection Types" and page 145 "Connection Types" for B N Cable							

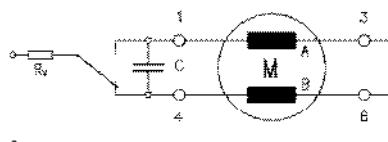
Technical Data

		UCR1	UCR1	UCR7	UCR7
Rated frequency	Hz	50	60	50	60
Speed n	rpm	500	600	500	600
Detent torque M _s	cNm	0.2	0.2	0.45	0.45
Power consumption	VA	2.4	2.5	2.3	2.4
Rotor inertia J _R	gcm ²	2.1	2.1	2.4	2.4
Tolerance of voltage		standard power supply system +10%/-10%			
Duty cycle		100%			
Winding temperature T _{max}	°C	130			
Direction of rotation		reversible			
Specific Technical Data Lead Wire Versions					
Performance	Running torque	cNm	0.89	0.85	1.41
	Power output	W	0.47	0.53	0.74
Capacitors	Rated voltage U _N	V	12	24	110
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	60	230	5500
	Capacitor C _r (50Hz)	µF/V ±10%	22/20	5.6/40	0.27/200
	Winding code	50Hz/60Hz	B1/G1	B4/G4	C8/H8
Specific Technical Data Connector Versions					
Performance	Running torque	cNm	1.1	1.02	1.41
	Power output	W	0.58	0.64	0.74
Capacitors	Rated voltage U _N	V	12	24	
	Duty cycle	%	100	100	
	Resistance R ₂₀	Ω	59	230	
	Capacitor C _r (50Hz)	µF/V ±10%	22/20	5.6/40	
	Winding code	50Hz/60Hz	B1	B4	

Circuit diagram Parallel circuit 12 V, 24 V, 48 V, 110 V



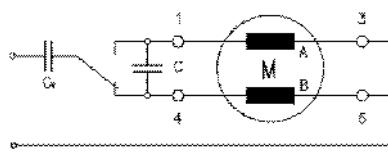
Parallel circuit 230 V (only for lead wire versions)
with 110 V motor and resistor R_V



switch to

- 1 clockwise rotation
- 4 counter clockwise rotation
- 6 counter clockwise rotation
(for series circuit)

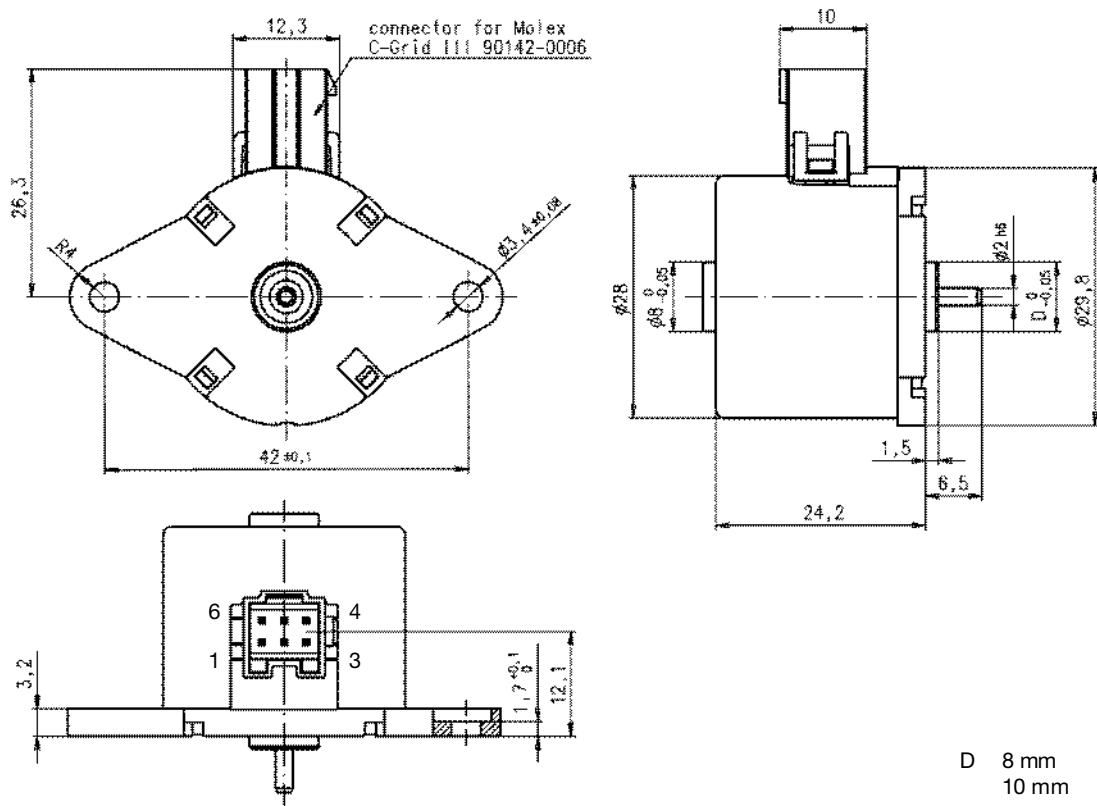
Parallel circuit 230 V (only for lead wire versions)
with 110 V motor and capacitor C_V



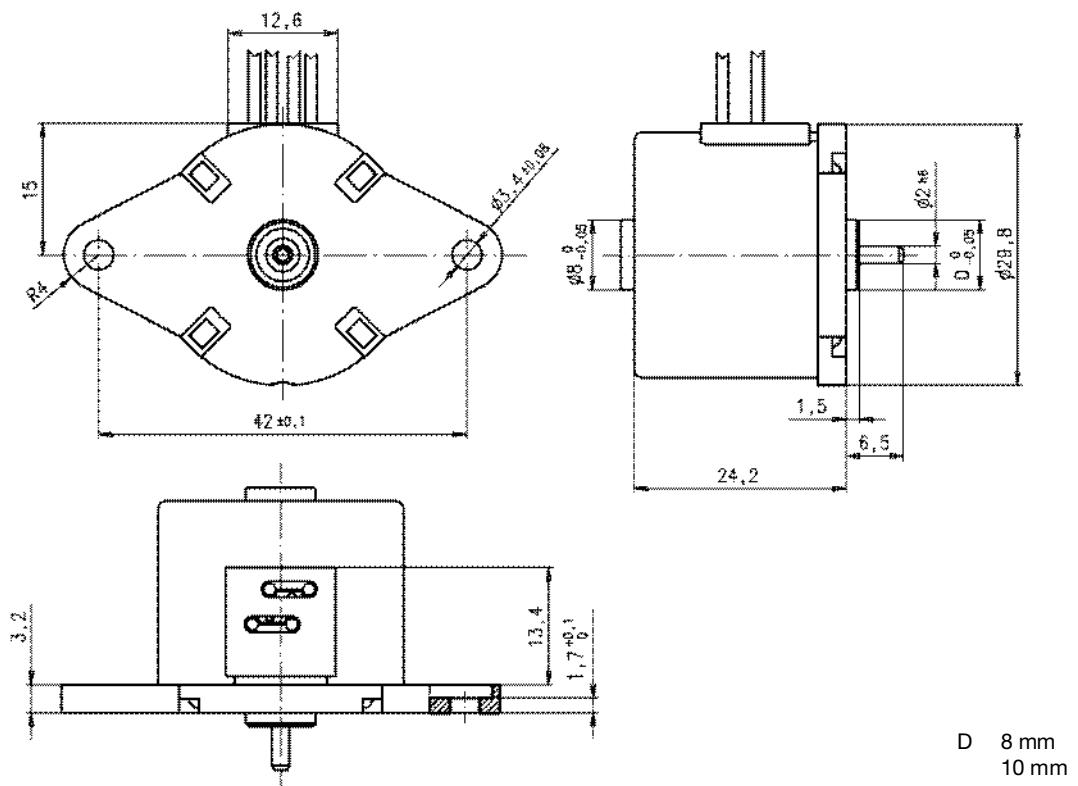
Series resistor R_V = 5.6 kΩ, 3 W

Series capacitor C_V = 0.33 µF, 250 VAC

Dimensions Version with Connector D



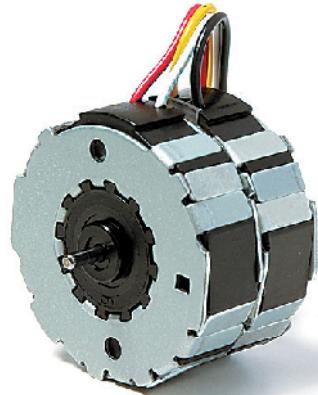
Version with Connector N



UBR1

UBR1

Dimensions (mm)	\varnothing 36 x 21
Voltage (V)	12–230
Speed (rpm) 50 Hz	250
60 Hz	300
Pole number	24
Running torque (cNm) 50 Hz	0.9
60 Hz	0.9
Power output (W)	
50 Hz	0.24
60 Hz	0.28
Gear combination	D, M, B, F, V, J



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R _{therm}	27 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	60 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

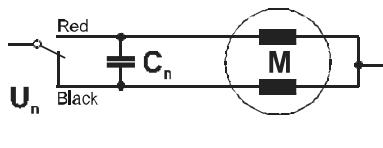
Type	Synchronous Motor	UBR1	0	N	B4	R	E
Rotor shaft, mounting	0 centring 8 mm, shaft 2.0 mm, clip 1 centring 8 mm, shaft 1.5 mm, clip 3 centring 8 mm, shaft 2.0 mm, screw plate 4 centring 8 mm, shaft 1.5 mm, screw plate	A centring 10 mm, shaft 2.0 mm, clip C centring 10 mm, shaft 1.5 mm, clip E centring 10 mm, shaft 2.0 mm, screw plate K centring 10 mm, shaft 1.5 mm, screw plate					
Approval	N Approval Standard						
Voltage/Frequency	See next page						
Direction	reversible						
Cable	E cable 150 mm (other on request)						

UBR1

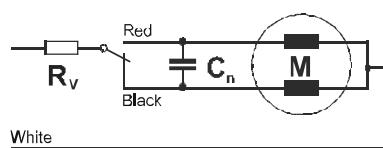
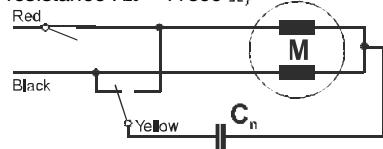
Technical Data

Rated frequency	Hz	50	60		
Speed n	rpm	250	300		
Power consumption	W	1.3	1.3		
Power output	W	0.24	0.28		
Running torque	cNm	0.9	0.9		
Rotor inertia J _R	gcm ²	2.8			
Detent torque M _s	cNm	0.22			
Tolerance of voltage		standard power supply system + 10% / - 10%			
Winding temperature T _{max}	°C	105			
Direction of rotation		reversible			
Rated voltage U _n	V	12	24	48	110
Duty cycle	%	100	100	100	100
Resistance R ₂₀	Ω	104	385	1580	9160
Capacitor C _n (50Hz)	μF/V ±10%	12/20	3.3/34	0.82/70	0.15/170
Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1	D1/J1
					D5/J5

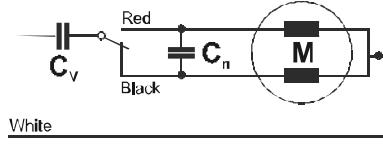
Circuit diagram Parallel circuit 12V, 24V, 48V, 110V



Parallel circuit 230V

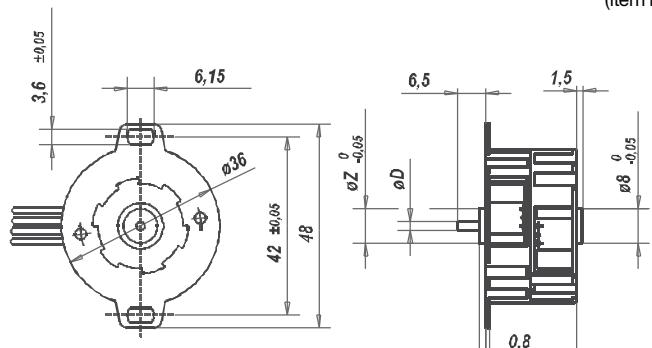
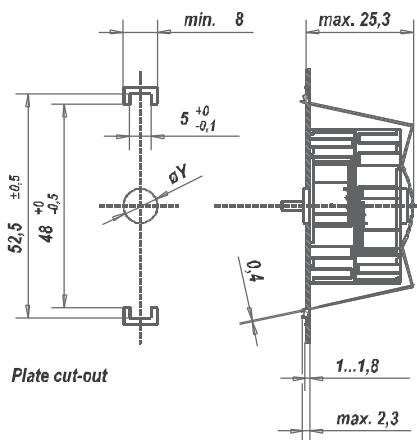
Series circuit 230V (for motors with resistance R₂₀ = 11800 Ω)

Parallel circuit 230V



Red = clockwise rotation
Black = counter clockwise rotation

Dimensions Mounting with screw plate

Mounting with snap-on clip
(item no. 4199 48230)

Screw clip: 4199 48450

ØD Rotor shaft

Ø 2 h6

Ø 1.5 js8

ØZ ØY

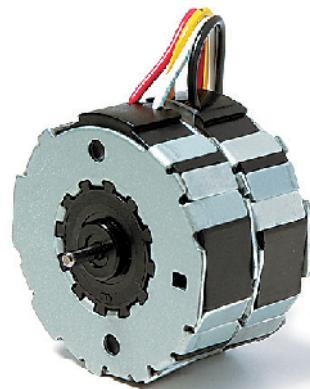
8 8F8

10 10F8

UBR2

UBR2

Dimensions (mm)	Ø 36 x 21
Voltage (V)	12–230
Speed (rpm) 50 Hz	500
60 Hz	600
Pole number	12
Running torque (cNm) 50 Hz	0.75
60 Hz	0.72
Power output (W)	
50 Hz	0.39
60 Hz	0.45
Gear combination	D, M, B, F, V, J



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R _{therm}	27 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	60 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

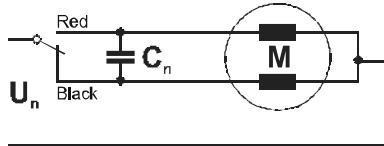
Type	Synchronous Motor	UBR2		0		N		B4		R		E
Rotor shaft, mounting	0 centring 8 mm, shaft 2.0 mm, clip	A centring 10 mm, shaft 2.0 mm, clip										
	1 centring 8 mm, shaft 1.5 mm, clip	C centring 10 mm, shaft 1.5 mm, clip										
	3 centring 8 mm, shaft 2.0 mm, screw plate	E centring 10 mm, shaft 2.0 mm, screw plate										
	4 centring 8 mm, shaft 1.5 mm, screw plate	K centring 10 mm, shaft 1.5 mm, screw plate										
Approval	N Approval Standard											
Voltage/Frequency	See next page											
Direction	reversible											
Cable	E cable 150 mm (other on request)											

UBR2

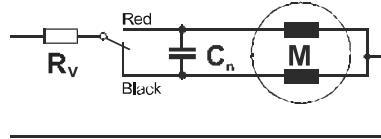
Technical Data

	Rated frequency	Hz	50	60			
	Speed n	rpm	500	600			
	Power consumption	W	1.6	1.6			
	Power output	W	0.39	0.45			
	Running torque	cNm	0.75	0.72			
	Rotor inertia J _R	gcm ²	2.8				
	Detent torque M _s	cNm	0.25				
	Tolerance of voltage		standard power supply system + 10% / - 10%				
	Winding temperature T _{max}	°C	105				
	Direction of rotation		reversible				
UBR2	Rated voltage U _N	V	12	24	48	110	230
	Duty cycle	%	100	100	100	100	100
	Resistance R ₂₀	Ω	87	344	1370	7650	12600
	Capacitor C _n (50Hz)	μF/V ±10%	15/20	3.9/40	1/70	0.18/170	0.27;0.22/170
	Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1	D1/J1	D5/J5
UBR3	Rated voltage U _N	V	12	24	48		
	Duty cycle	%	100	100	100		
	Resistance R ₂₀	Ω	87	344	1370		
	Capacitor C _n (50Hz)	μF/V ±10%	15/20	3.9/40	1/70		
	Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1		

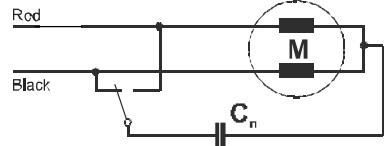
Circuit diagram Parallel circuit 12V, 24V, 48V, 110V



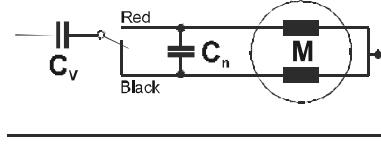
Parallel circuit 230V



Series circuit 230V (Rv = 12600 Ω)

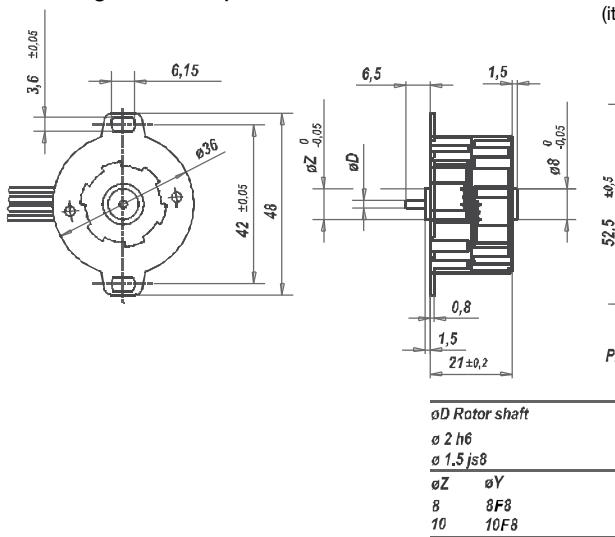
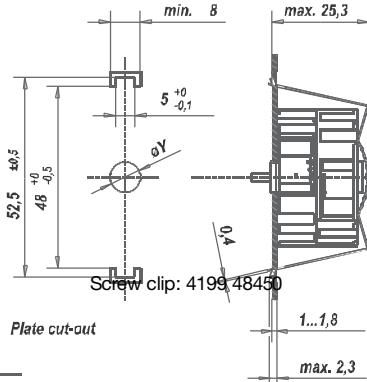


Parallel circuit 230V



Red = clockwise rotation
Black = counter clockwise rotation

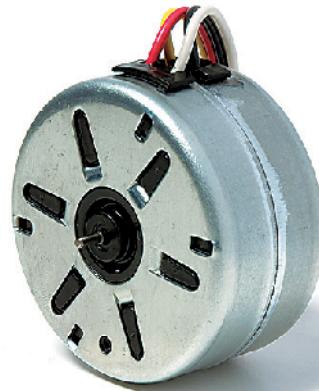
Dimensions Mounting with screw plate

Mounting with snap-on clip
(item no. 4199 48230)

UDR

UDR1

Dimensions (mm)	\varnothing 48 x 24
Voltage (V)	12–230
Speed (rpm) 50 Hz	500
60 Hz	600
Pole number	12
Running torque (cNm) 50 Hz	1.5
60 Hz	1.4
Power output (W)	
50 Hz	0.77
60 Hz	0.87
Gear combination	D, M, B, F, V, J



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+60
Ambient temperature storage	°C -20...+100
Thermal resistance at $f=0$ R_{therm}	18 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004
Approval	standard/UL/CSA
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	132 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

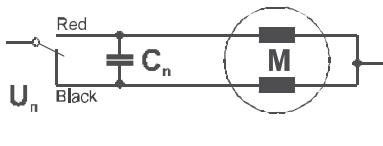
Type	Synchronous Motor	UDR1	:	00	N	:	B4	R	N
Rotor shaft, mounting	0 centring 8 mm, shaft 1.5 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip								
Approval	N Approval Standard U Approval UL/CSA								
Voltage/Frequency	See next page								
Direction	reversible								
Cable	N cable 150 mm (other on request)								

UDR

Technical Data

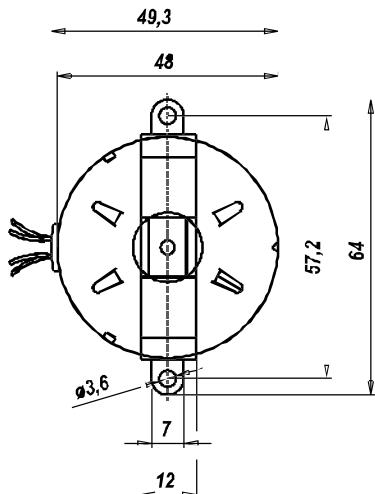
Rated frequency	Hz	50	60		
Speed n	rpm	500	600		
Power consumption	W	2.1	2.2		
Power output	W	0.77	0.87		
Running torque	cNm	1.5	1.4		
Rotor inertia J _R	gcm ²	6.3			
Detent torque M _s	cNm	0.35			
Tolerance of voltage		standard power supply system + 10% / - 10%			
Winding temperature T _{max}	°C	105			
Direction of rotation		reversible			
Rated voltage U _n	V	12	24	48	110-120
Duty cycle	%	100	100	100	100
Resistance R ₂₀	Ω	50	200	800	5000
Capacitor C _n (50Hz)	μF/V ±10%	27;22/20	6.8;4.7/34	1.5/70	0.27/170
Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1	D1/J1
					D5/J5

Circuit diagram Parallel circuit

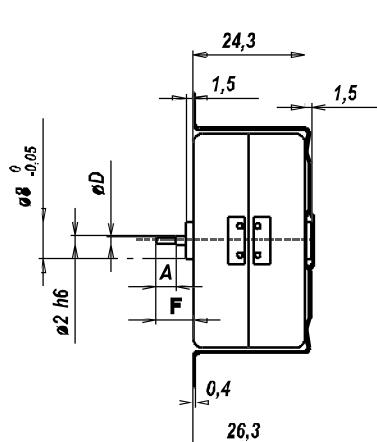


Red = clockwise rotation
Black = counter clockwise rotation

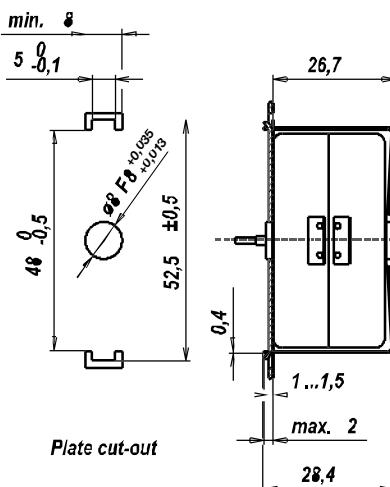
Dimensions



Mounting with screw clip
(item no. 4186 48080)



Mounting with snap-on clip
(item no. 4199 48040)



ΦD Rotor shaft

Φ 1,5 js8 ^{+0,007} _{-0,007}

Φ 2 h6 ⁰ _{-0,006}

Dimension A Dimension F

4,3 6,5

— 8,2

UDS1

Dimensions (mm) Ø 48 x 18.5

Voltage (V) 6–230

Speed (rpm) 50 Hz 500
60 Hz 600

Pole number 12

Running torque
(cNm) 50 Hz 0.9
60 Hz 0.8

Power output (W)

50 Hz 0.5
60 Hz 0.5

Gear combination D, M, B, F, V, J



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+60
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R _{therm}	17 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004 for approval standard 130 (B) according to DIN EN 60085 : 2004 for approval UL/CSA
Approval	standard/UL/CSA
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	102 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	plastic, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

Type	Synchronous Motor	UDS1	:	0	N	:	B4	:	R	:	N
Rotor shaft, mounting	0 centring 8 mm, shaft 1.5 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip										
Approval	N Approval Standard U Approval UL/CSA										
Voltage/Frequency	See next page										
Direction	R clockwise rotation L Counter-clockwise rotation										
Cable	N cable 150 mm (other on request)										

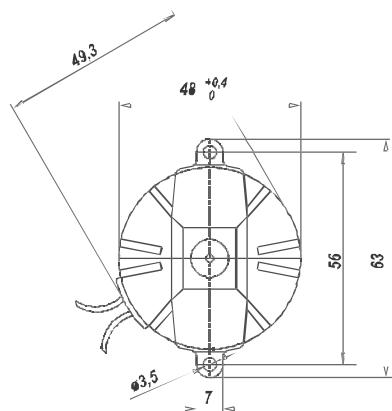
UDS

Technical Data

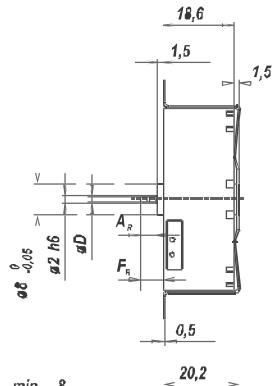
	Rated frequency	Hz	50	60										
	Speed n	rpm	500	600										
	Power consumption*	W	2.4	1.8										
	Power output	W	0.5	0.5										
	Running torque	cNm	0.9	0.8										
	Rotor inertia J _R	gcm ²	11											
	Detent torque M _S	cNm	0.27 (in direction of rotation)											
	Tolerance of voltage		standard power supply system + 10% / - 10%											
	Winding temperature T _{max}	°C	105 for approval Standard (N)											
			130 for approval UL/CSA											
	Direction of rotation		clockwise or counter-clockwise											
UDS1	Rated voltage U _N	V	6	12	24	36	42	48	60	110	110-120	230	110/230	24/48
	Duty cycle	%	100	100	100	100	100	100	100	100	100	100	100	100
	Resistance R ₂₀	Ω	5.5	24	78	193	285	330	500	1830	1830	7500	2180/5500	105/260
	Winding code		A6/F6	B1/G1	B4/G4	B6/G6	B8/G8	C1/H1	C2/H2	C8/H8	D1/J1	D5/J5	R1/S1	R4/S4
UDS1	Rated voltage U _N	V	6	12	24	48	100	110	110-120	230	110/230	24/48		
Approbation U	Duty cycle	%	100	100	100	100	100	100	100	100	100	100		
	Resistance R ₂₀	Ω	5.5	24	78	330	1350	1830	1830	7500	2180/5500	105/206		
	Winding code		A6/F6	B1/G1	B4/G4	C1/H1	C7/H7	C8/H8	D1/J1	D5/J5	R1/S1	R4/S4		
UDS3	Rated voltage U _N	V	6	12	24	36	42	48	60	110	230	110/230	24/48	
	Duty cycle	%	100	100	100	100	100	100	100	100	100	100		
	Resistance R ₂₀	Ω	5.5	24	78	193	285	330	500	1830	7500	2180/5500	105/260	
	Winding code		A6/F6	B1/G1	B4/G4	B6/G6	B8/G8	C1/H1	C2/H2	C8/H8	D5/J5	R1/S1	R4/S4	
UDS4	Rated voltage U _N	V	12	24	42	48	110-120	230						
	Duty cycle	%	100	100	100	100	100	100						
	Resistance R ₂₀	Ω	23	98	322	390	2200	8700						
	Winding code		B1/G1	B4/G4	B8/G8	C1/H1	D1/J1	D5/J5						

*can vary for different windings (rated voltages)

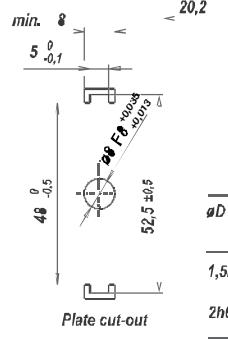
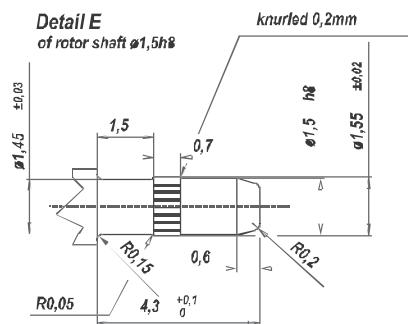
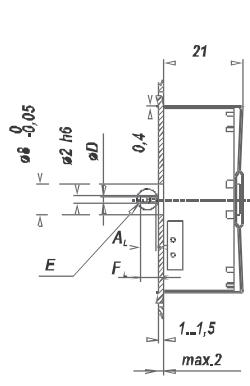
Dimensions



Mounting with screw clip
(item no. 4186 48200)



Mounting with snap-on clip
(item no. 4199 48000)

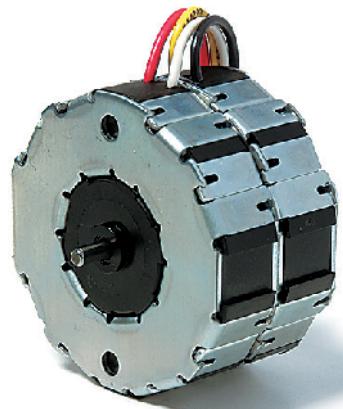


ØD Rotor shaft	Clockwise	counter clockwise	Dim. A _R	Dim. F _R	Dim. A _L	Dim. F _L
1,5h8 ^{0,-0,014}	4,3 ^{+0,1}	6,05	4,3 ^{+0,1}	6,45		
2h6 ^{0,-0,006}	—	6,05	—	6,45		

UFM

UFM1

Dimensions (mm)	\varnothing 52 x 28
Voltage (V)	12–230
Speed (rpm) 50 Hz	250
60 Hz	300
Pole number	24
Running torque (cNm)	
50 Hz	3.8
60 Hz	3.5
Power output (W)	
50 Hz	1
60 Hz	1.1
Gear combination	D, M, B, F, V, J ($i \leq 2k$), O, P



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at $f=0$ R_{therm}	13 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004 (130 / B on request)
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.72 ± 0.08 mm
Protection	IP40 according to DIN EN 60529 : 2000
Weight	180 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

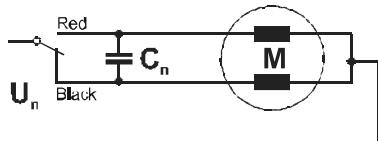
Order Reference

Type	Synchronous Motor	UFM1		0		N		B4		R		N
Rotor shaft, mounting	0 centring 8 mm, shaft 3.0 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip 2 centring 8 mm, shaft 1.5 mm, clip 3 centring 8 mm, shaft 3.0 mm, screw plate 4 centring 8 mm, shaft 2.0 mm, screw plate 5 centring 8 mm, shaft 1.5 mm, screw plate	E centring 10 mm, shaft 3.0 mm, screw plate K centring 10 mm, shaft 2.0 mm, screw plate M centring 10 mm, shaft 1.5 mm, screw plate B centring 10 mm, shaft 3.0 mm, clip A centring 10 mm, shaft 2.0 mm, clip C centring 10 mm, shaft 1.5 mm, clip										
Approval	N Approval Standard											
Voltage/Frequency	See next page											
Direction	reversible											
Cable	N cable 150 mm (other on request)											

Technical Data

Rated frequency	Hz	50	60		
Speed n	rpm	250	300		
Power consumption	W	4	3.1		
Power output	W	1	1.1		
Running torque	cNm	3.8	3.5		
Rotor inertia J _R	gcm ²	14.4			
Detent torque M _s	cNm	0.45			
Tolerance of voltage		standard power supply system + 10% / - 10%			
Winding temperature T _{max}	°C	105			
Direction of rotation		reversible			
Rated voltage U _N	V	12	24	48	110-120
Duty cycle	%	100	100	100	100
Resistance R ₂₀	Ω	15	59	240	1390
Capacitor C _n (50Hz)	μF/V ±10%	39;33/20	10;8.2/45	2.2;1.8/70	0.39;0.33/230
Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1	D1/J1
					D5/J5

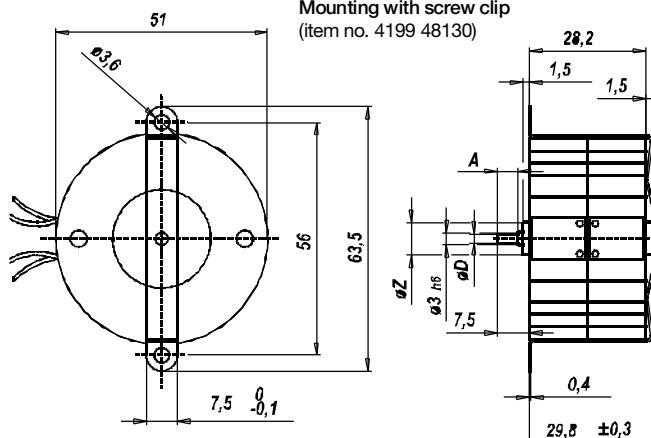
Circuit diagram Parallel circuit



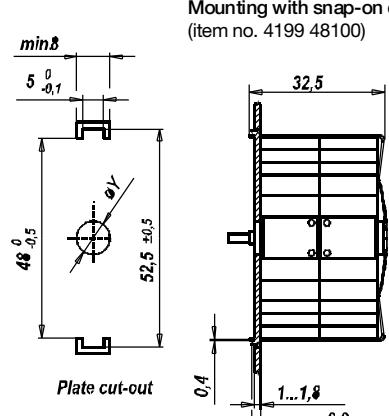
Red = clockwise rotation
Black = counter clockwise rotation

Dimensions

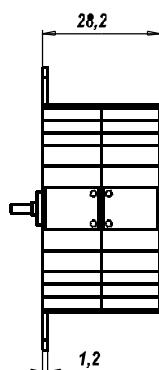
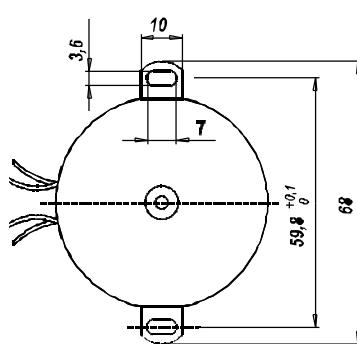
Mounting with screw clip
(item no. 4199 48130)



Mounting with snap-on clip
(item no. 4199 48100)



Mounting with screw plate

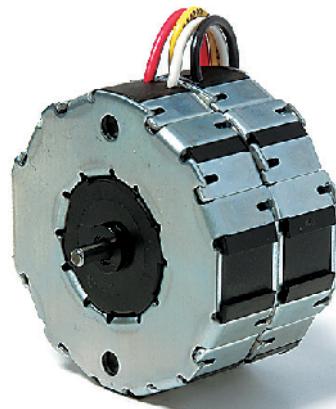


φRotor-shaft	φD	Dim. A
1,5	1,5js8	5
2	2js8	5
3	3h6	-
<hr/>		
φZ	φY	
8 ⁰ _{-0,05}	8F8	
10 ⁰ _{-0,05}	10F8	
<hr/>		

UFU

UFU1

Dimensions (mm)	\varnothing 52 x 28
Voltage (V)	24–230
Speed (rpm) 50 Hz	375
60 Hz	450
Pole number	16
Running torque (cNm)	
50 Hz	3,5
60 Hz	3,2
Power output (W)	
50 Hz	1,3
60 Hz	1,5
Gear combination	D, M, B, F, V, J ($i \leq 2k$), O, P



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at $f=0$ R_{therm}	13 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004 (130 / B on request)
Approval	standard
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	180 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

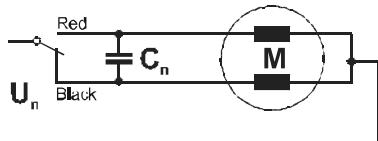
Order Reference

Type	Synchronous Motor	UFU1	;	00	N	B4	R	N
Rotor shaft, mounting	0 centring 8 mm, shaft 3.0 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip 2 centring 8 mm, shaft 1.5 mm, clip 3 centring 8 mm, shaft 3.0 mm, screw plate 4 centring 8 mm, shaft 2.0 mm, screw plate 5 centring 8 mm, shaft 1.5 mm, screw plate	E centring 10 mm, shaft 3.0 mm, screw plate K centring 10 mm, shaft 2.0 mm, screw plate M centring 10 mm, shaft 1.5 mm, screw plate B centring 10 mm, shaft 3.0 mm, clip A centring 10 mm, shaft 2.0 mm, clip C centring 10 mm, shaft 1.5 mm, clip D centring 12 mm, shaft 3.0 mm, clip						
Approval	N Approval Standard							
Voltage/Frequency	See next page							
Direction	reversible							
Cable	N cable 150 mm (other on request)							

Technical Data

Rated frequency	Hz	50	60
Speed n	rpm	375	450
Power consumption	W	3.2	3.5
Power output	W	1.3	1.5
Running torque	cNm	3,5	3.2
Rotor inertia J _R	gcm ²	14.4	
Detent torque M _s	cNm	0.45	
Tolerance of voltage		standard power supply system + 10% / - 10%	
Winding temperature T _{max}	°C	105	
Direction of rotation		reversible	
Rated voltage U _N	V	24	110
Duty cycle	%	100	100
Resistance R ₂₀	Ω	95	2200
Capacitor C _n (50Hz)	μF/V ±10%	10;8.2/48	0.47;0.39/220
Winding code	50Hz/60Hz	B4/G4	C8/H8
			D5/J5

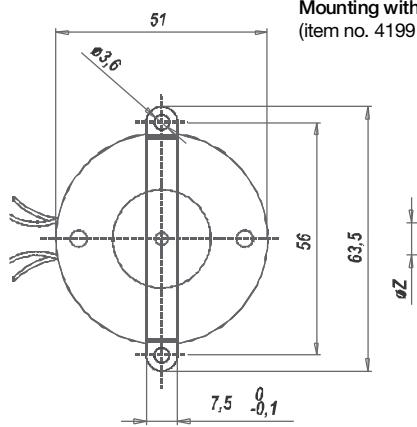
Circuit diagram Parallel circuit



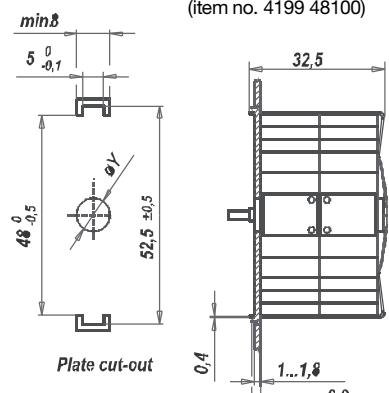
Red = clockwise rotation
Black = counter clockwise rotation

Dimensions

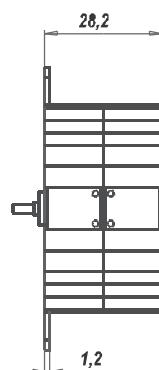
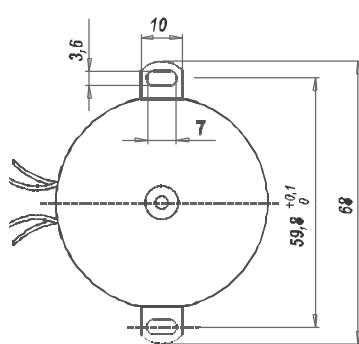
Mounting with screw clip
(item no. 4199 48130)



Mounting with snap-on clip
(item no. 4199 48100)



Mounting with screw plate



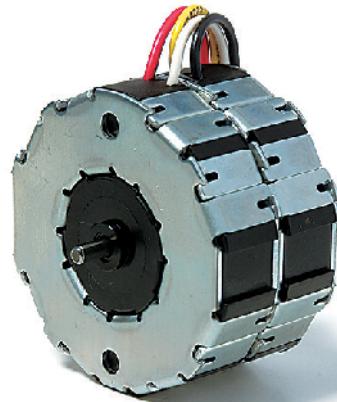
ØRotor-shaft	ØD	Dim. A
1,5	1,5js8	5
2	2js8	5
3	3h6	-
ØZ	ØY	
8 ⁰ _{-0,05}	8F8	
10 ⁰ _{-0,05}	10F8	
12 ⁰ _{-0,05}	12F8	

Lead wires: AWG 22 (0.34 mm²), insulation diameter Ø1.72 ±0.08 mm, 6 mm stripped

UFR

UFR1/UFR3/UFR4

Dimensions (mm)	$\varnothing 52 \times 28 / \varnothing 52 \times 42 / \varnothing 52 \times 56$
Voltage (V)	12–230
Speed (rpm)	50 Hz 500 60 Hz 600
Pole number	12
Running torque (cNm)	50 Hz 2.8 / 3.7 / 5.3 60 Hz 2.6 / 3.1 / 4.7
Power output (W)	50 Hz 1.5 / 1.9 / 2.8 60 Hz 1.6 / 2 / 3
Gear combination	D, M, B, F, V, J ($i \leq 2k$), O, P



UFR1

Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at $f=0$ R_{therm}	11 K/W (UFR1), 7 K/W (UFR4)
Thermal class	105 (A) according to DIN EN 60085 : 2004 (130 / B on request)
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.72 ± 0.08 mm
Protection	IP40 according to DIN EN 60529 : 2000
Weight	180 g (UFR1), 370 g (UFR4)
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

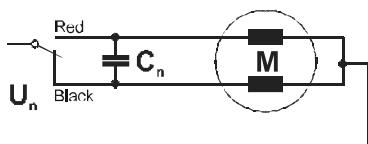
Type	Synchronous Motor	UFR	1	0	N	B4	R	N
Configuration	1 Two coils 3 Three coils 4 Four coils							
Rotor shaft, mounting	0 centring 8 mm, shaft 3.0 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip 2 centring 8 mm, shaft 1.5 mm, clip 3 centring 8 mm, shaft 3.0 mm, screw plate* 4 centring 8 mm, shaft 2.0 mm, screw plate* 5 centring 8 mm, shaft 1.5 mm, screw plate*	B	centring 10 mm, shaft 3.0 mm, clip A	centring 10 mm, shaft 2.0 mm, clip C	centring 10 mm, shaft 1.5 mm, clip D	centring 12 mm, shaft 3.0 mm, clip E	centring 10 mm, shaft 3.0 mm, screw plate* K	M
Approval	N Approval Standard							
Voltage/Frequency	See next page							
Direction	reversible							
Cable	N cable 150 mm (other on request)							

* screw plate not for UFR3 and UFR4

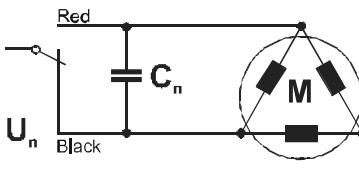
Technical Data

UFR1	Rated frequency	Hz	50	60		
	Speed n	rpm	500	600		
	Power output Pmech	W	1.5	1.6		
	Running torque Mn	cNm	2.8	2.6		
	Power consumption Pel	W	3.3	3.6		
	Detent torque Ms	cNm	0.46			
	Rotor inertia J _R	gcm ²	14.2			
	Rated voltage U _N	V	12	24	48	110
	Duty cycle	%	100	100	100	100
	Resistance R ₂₀	Ω	27	105	400	2400
	Capacitor C _n (50Hz)	μF/V ±10%	39;33/24	10;8.2/45	2.7;2.2/90	0.47;0.39/230
	Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1	C8/H8
						D5/J5
UFR3	Rated frequency	Hz	50	60		
	Speed n	rpm	500	600		
	Power output Pmech	W	1.9	2		
	Running torque Mn	cNm	3.7	3.1		
	Power consumption Pel	W	6.1	5.1		
	Detent torque Ms	cNm	0.54			
	Rotor inertia J _R	gcm ²	17			
	Rated voltage U _N	V	12	24	48	110
	Duty cycle	%	100	100	100	100
	Resistance R ₂₀	Ω	19	70	280	1520
	Capacitor C _n (50Hz)	μF/V ±10%	150;100/12	39;27/24	10;6.8/48	1.8;1.2/110
	Winding code	50Hz/60Hz	B1/G1	B4/G4	C1/H1	C8/H8
						D5/J5
UFR4	Rated frequency	Hz	50	60		
	Speed n	rpm	500	600		
	Power output Pmech	W	2.8	3		
	Running torque Mn	cNm	5.3	4.7		
	Power consumption Pel	W	6.4	6.9		
	Detent torque Ms	cNm	0.8			
	Rotor inertia J _R	gcm ²	24.2			
	Rated voltage U _N	V	24	48	110	230
	Duty cycle	%	100	100	100	100
	Resistance R ₂₀	Ω	56	210	1200	4800
	Capacitor C _n (50Hz)	μF/V ±10%	18;15/45	4.7;3.9/90	0.82;0.68/200	0.22;0.18/400
	Winding code	50Hz/60Hz	B4/G4	C1/H1	C8/H8	D5/J5
	Tolerance of voltage					standard power supply system + 10% ... - 10%
	Winding temperature T _{max}	°C				105
	Direction of rotation					reversible

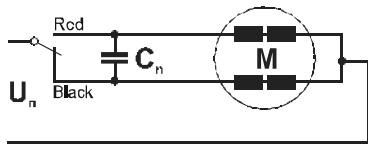
Circuit diagram UFR1 Parallel circuit



UFR3 Parallel circuit



UFR4 Parallel circuit

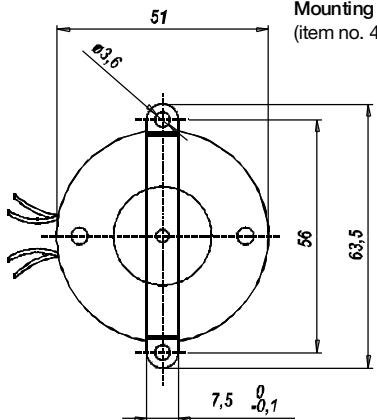
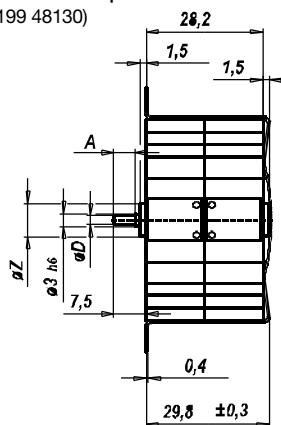
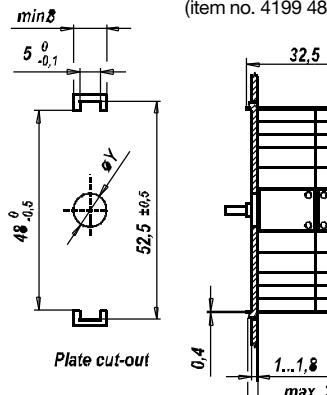


Red = clockwise rotation
Black = counter clockwise rotation

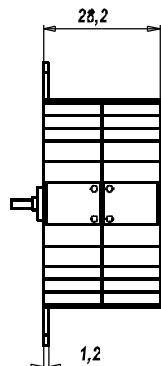
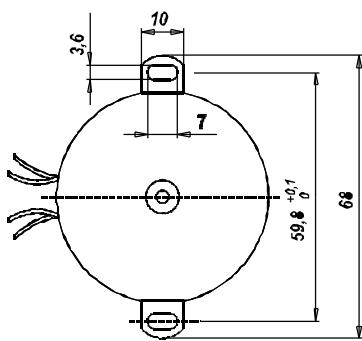
UFR

Dimensions

UFR1

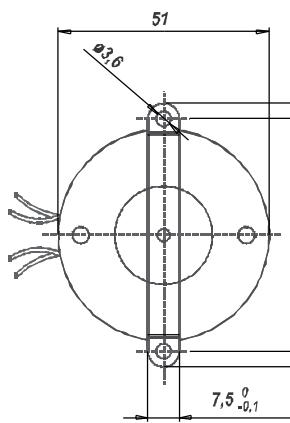
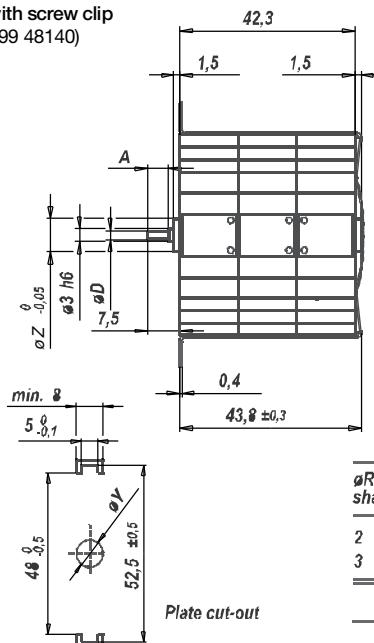
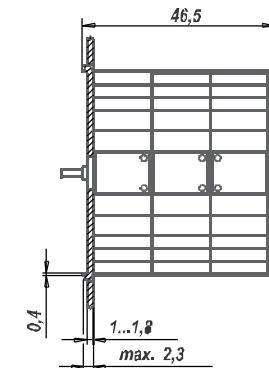
Mounting with screw clip
(item no. 4199 48130)Mounting with snap-on clip
(item no. 4199 48100)1...1,8
max. 2,3

Mounting with screw plate



\varnothing Rotor-shaft	\varnothing D	Dim. A
1,5	1,5js8	5
2	2js8	5
3	3h6	-
\varnothing Z	\varnothing Y	
8 $^0_{-0,05}$	8F8	
10 $^0_{-0,05}$	10F8	

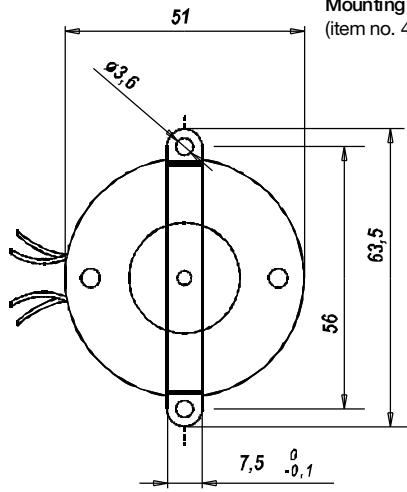
UFR3

Mounting with screw clip
(item no. 4199 48140)Mounting with snap-on clip
(item no. 4199 48110)

\varnothing Rotor-shaft	\varnothing D	Dim. A
2	2js8	5
3	3h6	-
\varnothing Z	\varnothing Y	
8 $^0_{-0,05}$	8F8	
10 $^0_{-0,05}$	10F8	

UFR

Dimensions



Mounting with screw clip
(item no. 4199 48150)

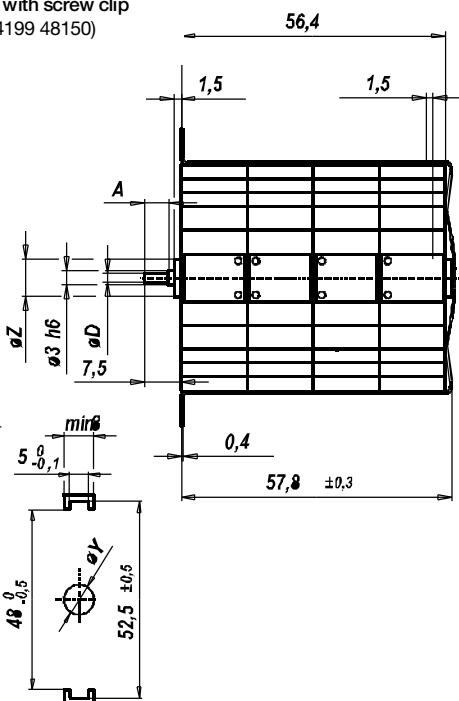
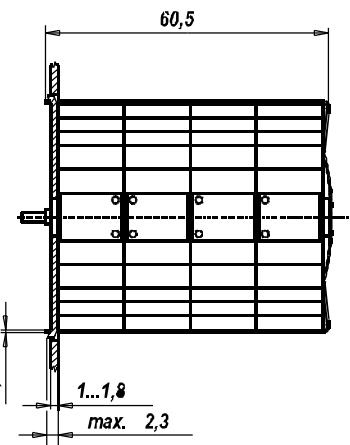


Plate cut-out

Mounting with snap-on clip
(item no. 4199 48120)



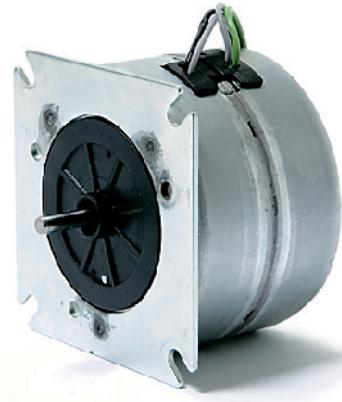
<i>Rotor-shaft</i>	<i>ØD</i>	<i>Dim. A</i>
2	2 <i>js8</i>	5
3	3 <i>h6</i>	-

<i>ØZ</i>	<i>ØY</i>
8 <i>0</i> _{-0,05}	8 <i>F8</i>
10 <i>0</i> _{-0,05}	10 <i>F8</i>

UPU

UP (SM6443; SM6444)

Dimensions (mm)	Ø 64 x 43
Voltage (V)	12–230
Speed (rpm) 50 Hz	375
60 Hz	450
Pole number	16
Running torque (cNm) 50 Hz	13–18.5 (UPU1); 28–35 (UPU5)
60 Hz	11–17 (UPU1); 21–30 (UPU5)
Power output (W)	
50 Hz	5.1–7.3 (UPU1); 11–13.8 (UPU5)
60 Hz	5.2–8.0 (UPU1); 9.9–14.2 (UPU5)
Gear combination	O, P, R



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +40
Ambient temperature storage	°C -20 ... +100
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.6 ± 0.1 mm
Protection	IP30 according to DIN EN 60529 : 2000
Weight	500 g (UPU1); 550 g (UPU5)
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	Sintered bronze, self-lubricating

Order Reference

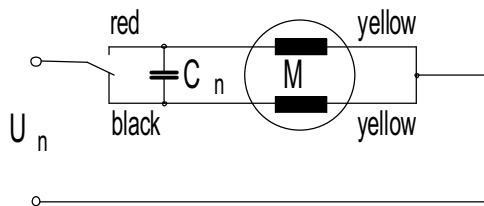
Type	Synchronous Motor	UPU	1	1	N	B4	R	E
Configuration	1 standard magnet 5 stronger magnet							
Rotor shaft, mounting	1 centring 10 mm, shaft length 8,1 mm, screw plate 2 centring 10 mm, shaft length 15,5 mm, screw plate A centring 14 mm, shaft length 8,1 mm, screw plate C centring 14 mm, shaft length 15,5 mm, screw plate							
Approval	N standard							
Voltage/Frequency	see next page							
Direction	R reversible							
Cable	E 150 mm (other upon request)							

UPU

Technical Data

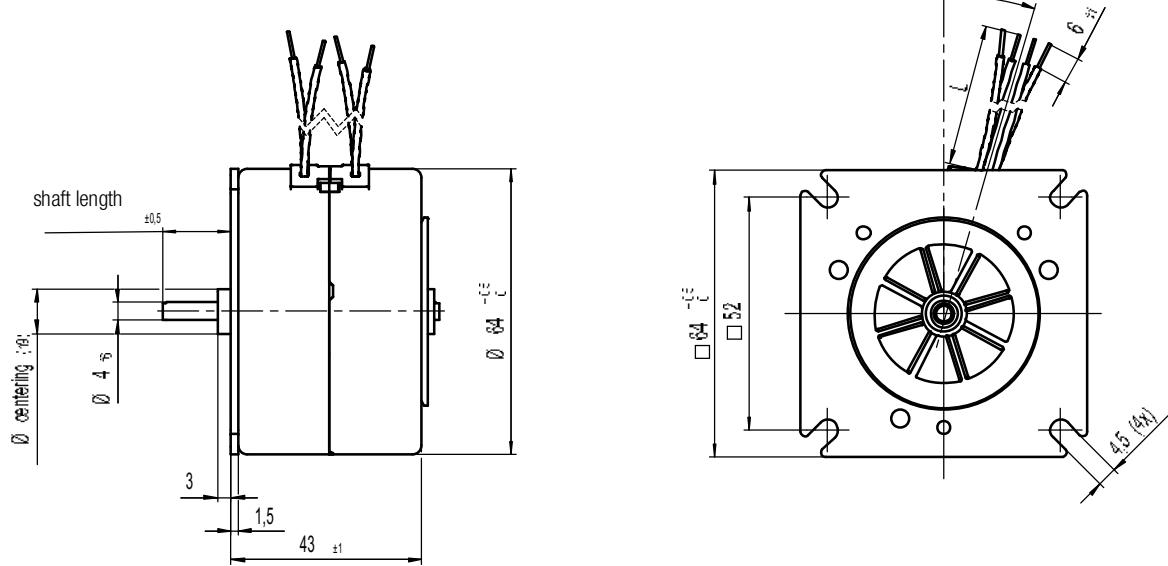
UPU1	Standard			S2 version (Z20)	
	Hz	50	60	50	60
Rated frequency	rpm	375	450	375	450
Speed	cNm	13	11	18,5	17
Running torque Mn	W	5,1	5,2	7,3	8
Power output	VA	11,7	12,65	18	21
Power consumption	mA	51	55	78,2	91,3
Nominal current at 230 V	gcm ²	100	50	130	60
Max. permissible ext. inertia	cNm	2	2	2	2
Detent torque MS	K	95	100	90 (S2 20 min)	
Winding temperature increase	g	500	500	500	500
Standard windings					
Rated voltage U _N	V	24	115	230	
Duty cycle	%	100	100	100	
Resistance R ₂₀	Ω	26	560	2450	
Winding code		B4/G4	D0/J0	D5/J5	
UPU5	Special version (Z21)			Standard	
	Hz	50	60	50	60
Rated frequency	rpm	375	450	375	450
Speed	cNm	28	21	35	30
Running torque Mn	W	11	9,9	13,8	14,2
Power output	VA	26	28	31	33,5
Power consumption	mA	113	122	135	145
Nominal current at 230 V	gcm ²	500	350	600	400
Max. permissible ext. inertia	cNm	7	7	7	7
Detent torque MS	K	85 (S2 6,5 min)		85 (S2 6,5 min)	95 (S2 5 min)
Winding temperature increase	g	550	550	550	550
Standard windings					
Rated voltage U _N	V	24	48	115	230
Duty cycle	%				
Resistance R ₂₀	Ω	9,5	37	230	810
Capacitor C ₅₀	μF/V ±10%	82/63	20/160	3,3/250	0,82/500
Winding code		B4/G4	C1/H1	D0/J0	D5/J5

Circuit diagram Clockwise rotation



UPU

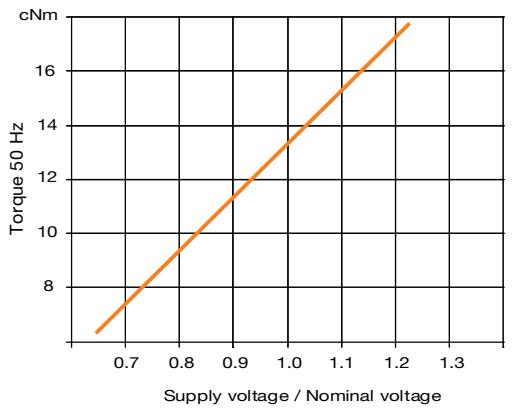
Dimensions mounting dimensions UP with screw plate



UPU

Chart: Torque versus Voltage

UPU1



UPU1 S2 version (Z20)

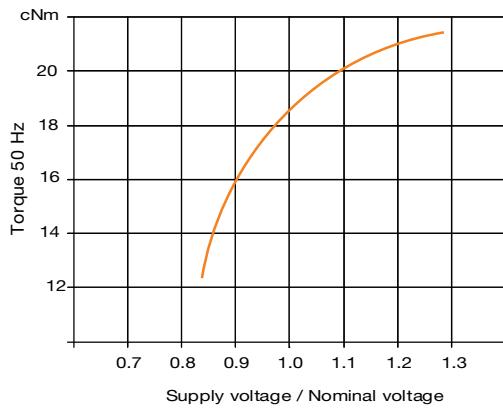
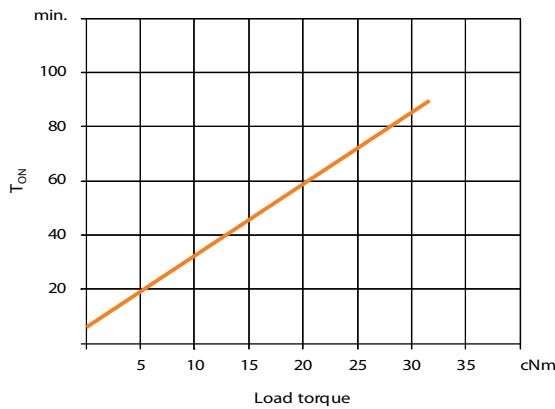


Chart: Possible S2 ON time versus load torque

UPU5 special version (Z21)



UPU5 standard

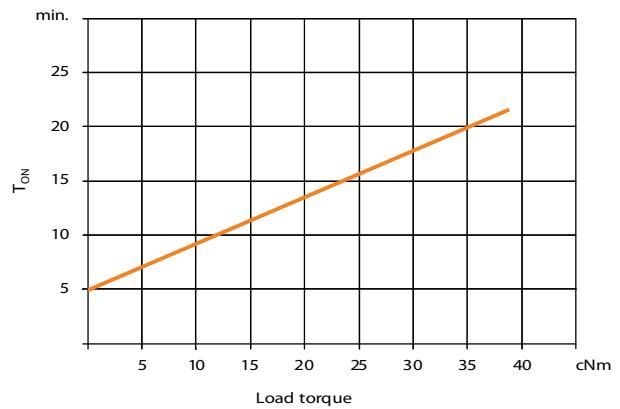
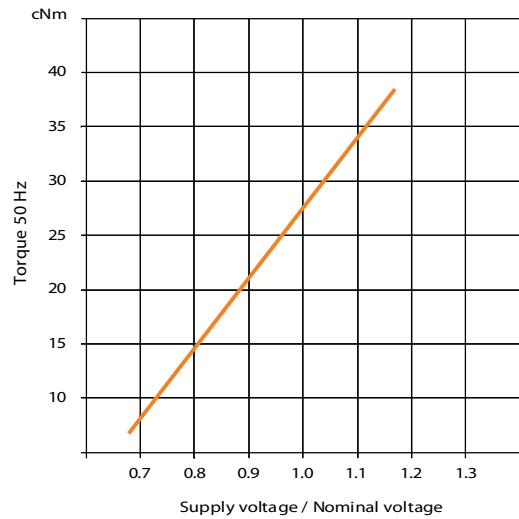
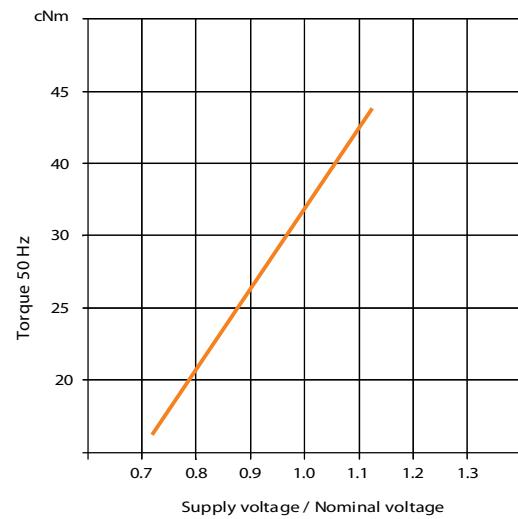


Chart: Torque versus Voltage

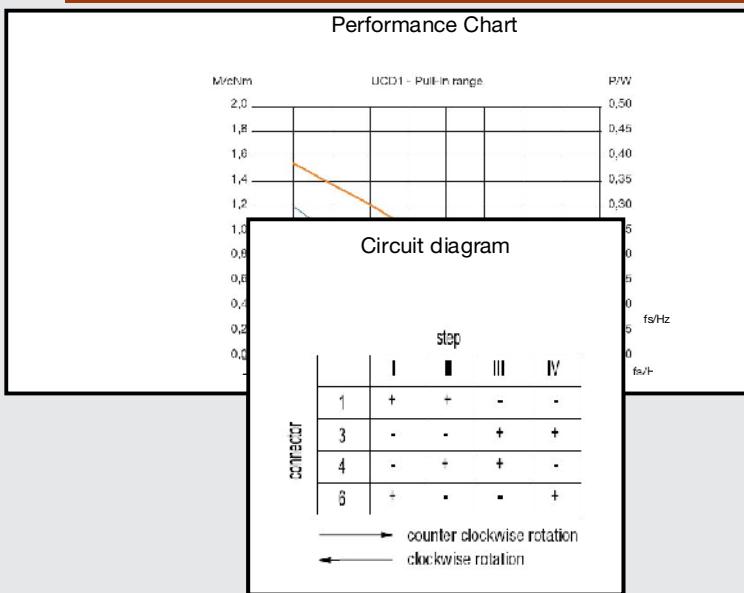
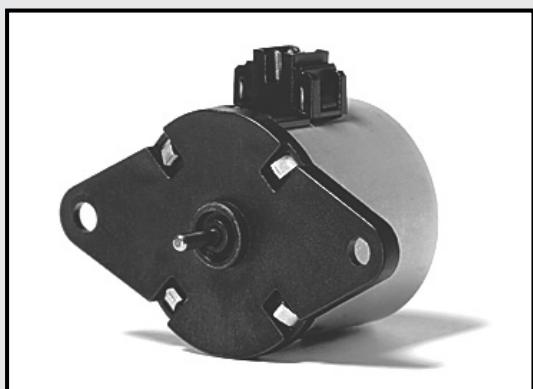
UPU5 special version (Z21)



UPU5 standard



Stepper Motors Rotational



 JOHNSON
ELECTRIC

innovating motion

UAG3/4

3/4

Dimensions (mm)	Ø 20 x 17
Step angle (°)	18
Holding torque (mNm)	5.6 / 4.2
Detent torque (mNm)	> 0.6
	bipolar/unipolar
Winding	on request
Gear combination	



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -20...+60
Ambient temperature storage	°C -40...+100
Thermal resistance at f=0 R _{therm}	47 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	lead wires AWG28, insulation Ø 0.82 mm
Protection	IP40 according to DIN EN 60529 : 2000
Weight	22 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating

Order Reference

Type	Stepper Motor	UAG 3 3 N 05 R E
Configuration	3 bipolar 4 unipolar	
Rotor shaft, mounting	3 centring 8 mm, mounting plate with long holes 5 centring 8 mm, mounting plate (for clipping) E centring 6 mm, mounting plate with long holes G centring 6 mm, mounting plate (for clipping)	
Approval	N Approval Standard	
Resistance	See next page Resistance per winding for bipolar or unipolar.	
Direction	reversible	
Cable	E cable 150 mm with Tyco connector CT 173977-4 1-6 (other on request)	

UAG3/4

Technical Data

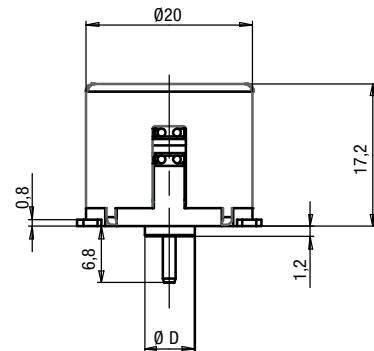
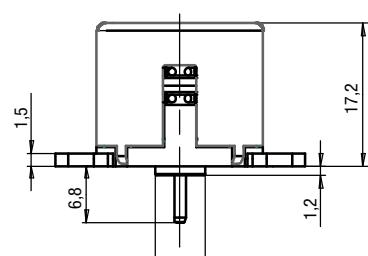
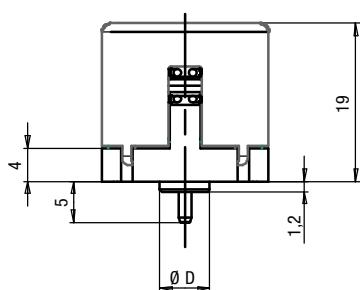
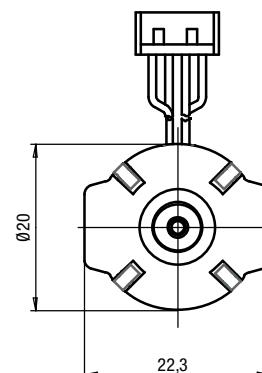
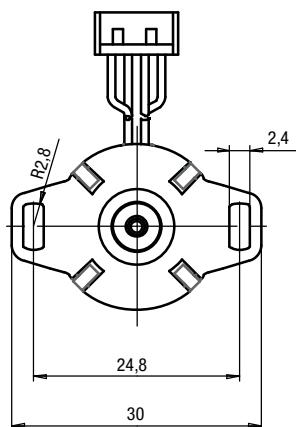
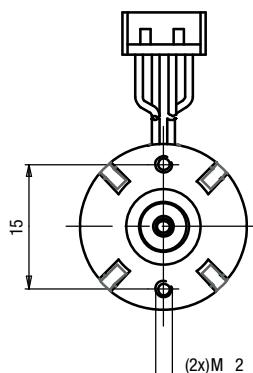
bipolar (UAG3)	Rated voltage UN	V	12	6
	Duty cycle	%	100	100
	Resistance R ₂₀	Ω	150	40
	Winding code		05	07
unipolar (UAG4)	Rated voltage UN	V	12	
	Duty cycle	%	100	
	Resistance R ₂₀	Ω	150	
	Winding code		06	
	Steps per revolution		20	
	Winding temperature T _{max}		130 °C	
	Rotor inertia J _R		0.26 gcm ²	
	Holding torque M _H		0.56 cNm (UAG3) 0.42 cNm (UAG4)	
	Detent torque M _H		> 0.6 mNm	
	Direction of rotation		reversible	

Dimensions

motor type	Ø D	
UAG30	Ø 8	0 -0.05
UAG3A	Ø 6	0 -0.05
UAG40	Ø 8	0 -0.05
UAG4A	Ø 6	0 -0.05

motor type	Ø D	
UAG33	Ø 8	0 -0.05
UAG3E	Ø 6	0 -0.05
UAG43	Ø 8	0 -0.05
UAG4E	Ø 6	0 -0.05

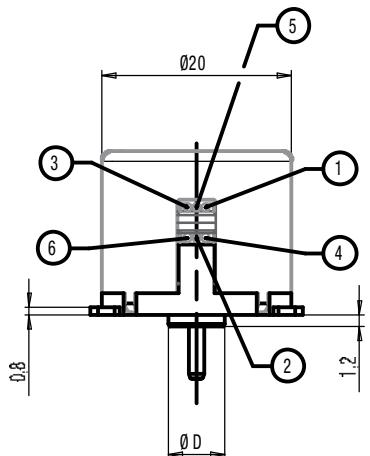
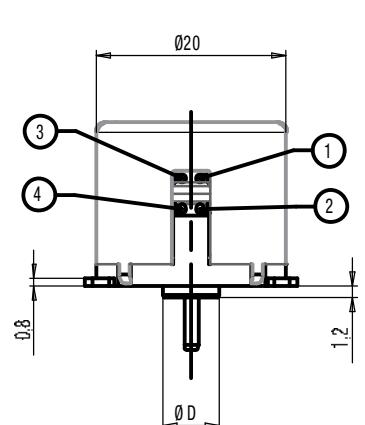
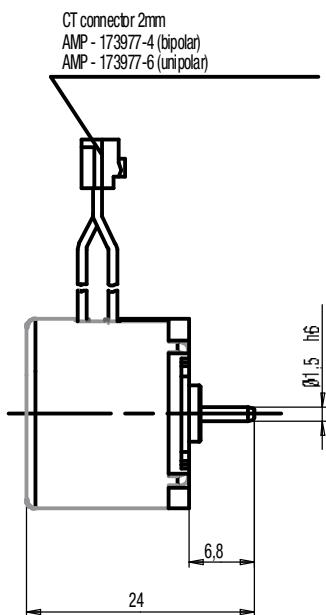
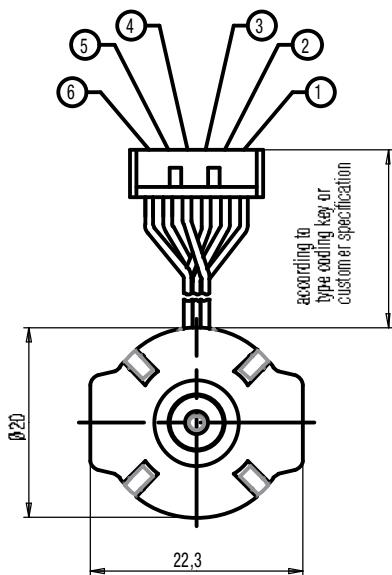
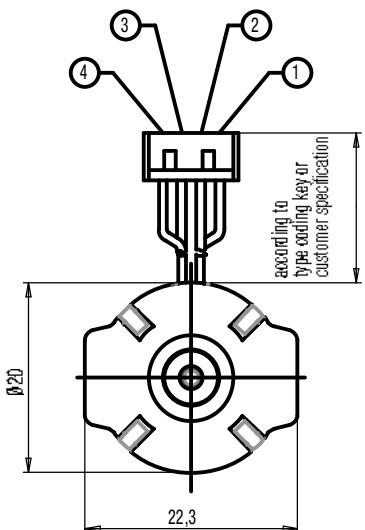
motor type	Ø D	
UAG35	Ø 8	0 -0.05
UAG3G	Ø 6	0 -0.05
UAG45	Ø 8	0 -0.05
UAG4G	Ø 6	0 -0.05



UAG3/4

Rotational

Dimensions



Circuit diagram

Wire	step				
	0	I	II	III	IV
1	+	+	-	-	+
2	+	-	-	+	+
3	-	-	+	+	-
4	-	+	+	-	-

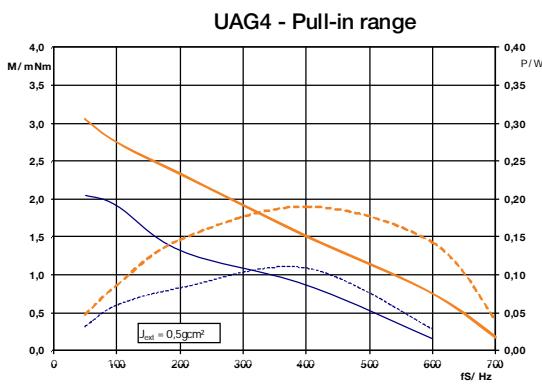
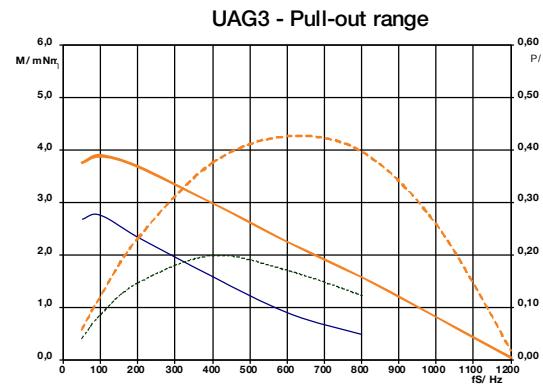
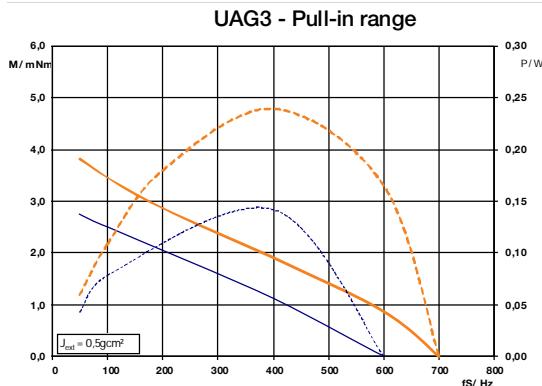
unipolar

Wire	step				
	0	I	II	III	IV
1	-	-	-	-	-
2	-	-	-	-	-
3	+	+	+	+	+
4	+	+	+	+	+
5	-	-	-	-	-
6	-	-	-	-	-

→ clockwise rotation

← counter clockwise rotation

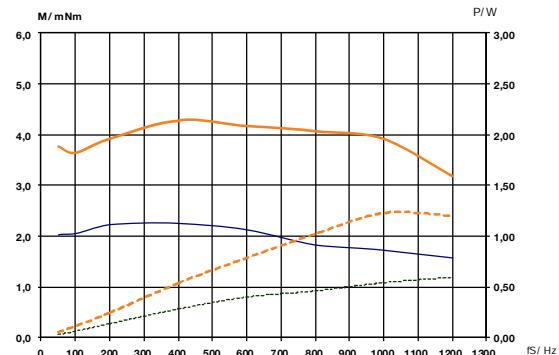
UAG3/4



— M - Duty cycle 30 %
— M - Duty cycle 100%

— P - Duty cycle 30 %
— P - Duty cycle 100 %

UAG3 - Pull-out range chopper (winding 40ohm, voltage 24Vdc)



— M - Duty cycle 30 %
— M - Duty cycle 100%

— P - Duty cycle 30 %
— P - Duty cycle 100 %

100% duty cycle: max. current per phase 110mA (RMS value)

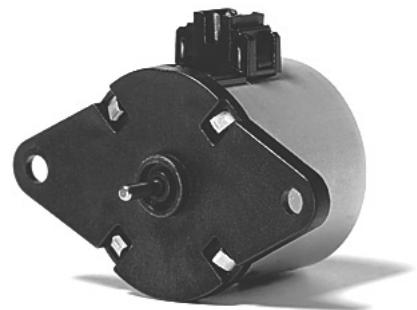
30% duty cycle: max. current per phase 190mA (RMS value)

UCD

UCD1/7; UCD2/8

Dimensions (mm)	$\varnothing 28 \times 24$
Step angle (°)	7.5
Holding torque *	
(cNm)	1.6–2.7
Detent torque (cNm)	0.26–0.42
Winding	bipolar/unipolar
Gear combination	on request

* values for connector version (connection B or D) / values of lead wire version (connection N) are up to 20 % lower



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at $f=0$ R_{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	connector type D or N
Protection	IP30 according to DIN EN 60529 : 2000
Weight	54 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	Sintered bronze, self-lubricating

Order Reference

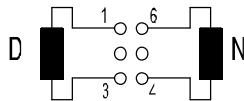
Type	Stepper Motor				UCD	1	0	N	18	R	B
Configuration	1	bipolar, standard magnet	7	bipolar, stronger magnet							
	2	unipolar, standard magnet	8	unipolar, stronger magnet							
Rotor shaft, mounting	3	centring 8 mm, shaft 2.0 mm, screw plate	E	centring 10 mm, shaft 2.0 mm, screw plate							
	4	centring 8 mm, shaft 1.5 mm, screw plate	K	centring 10 mm, shaft 1.5 mm, screw plate							
	0	centring 8 mm, shaft 2.0 mm, clip	A	centring 10 mm, shaft 2.0 mm, clip							
	1	centring 8 mm, shaft 1.5 mm, clip	C	centring 10 mm, shaft 1.5 mm, clip							
Approval	N	Approval Standard									
Resistance	see next pages; Resistance per winding for bipolar or unipolar										
Direction	R	reversible									
Connection	D	see next pages "Connection Types" and page 145 "Connection Types" for B									
	N										

Technical Data

bipolar	Configuration		UCD1	UCD7
	Holding torque M_H^*	cNm	1,9	2,7
	Detent torque M_S	cNm	0,18	0,35
	Rotor inertia J_R	gcm ²	2,2	2,4
	Steps per revolution		24	
	Direction of rotation	V	reversible	
Specific Technical Data Lead Wire Versions (Connection type N)				
	Rated voltage UN	V	6	12
	Duty cycle	%	100	100
	Resistance R_{20}	Ω	24	90
	Winding code		18	03
			04	
Specific Technical Data Connector Versions				
	Rated voltage UN	V	6	12
	Duty cycle	%	100	100
	Resistance R_{20}	Ω	24	90
	Winding code		07	01
			02	
unipolar	Configuration		UCD2	UCD8
	Holding torque M_H^*	mNm	1,6	2,3
	Detent torque M_S	mNm	0,18	0,35
	Rotor inertia J_R	gcm ²	2,1	2,4
	Steps per revolution		24	
	Direction of rotation	V	reversible	
Specific Technical Data Lead Wire Versions				
	Rated voltage UN	V	12	24
	Duty cycle	%	100	100
	Resistance R_{20}	Ω	90	380
	Winding code		10	11
			12	
Specific Technical Data Connector Versions				
	Rated voltage UN	V	12	24
	Duty cycle	%	100	100
	Resistance R_{20}	Ω	90	380
	Winding code		01	02

* values of connector version (connection B or D) / values of lead wire version are up to 20 % lower

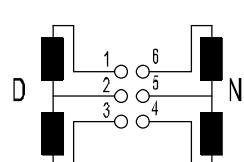
Circuit diagram bipolar



connector	step			
	I	II	III	IV
1	-	+	-	-
3	-	-	+	+
4	-	+	+	-
6	+	-	-	+

→ counter clockwise rotation
← clockwise rotation

unipolar



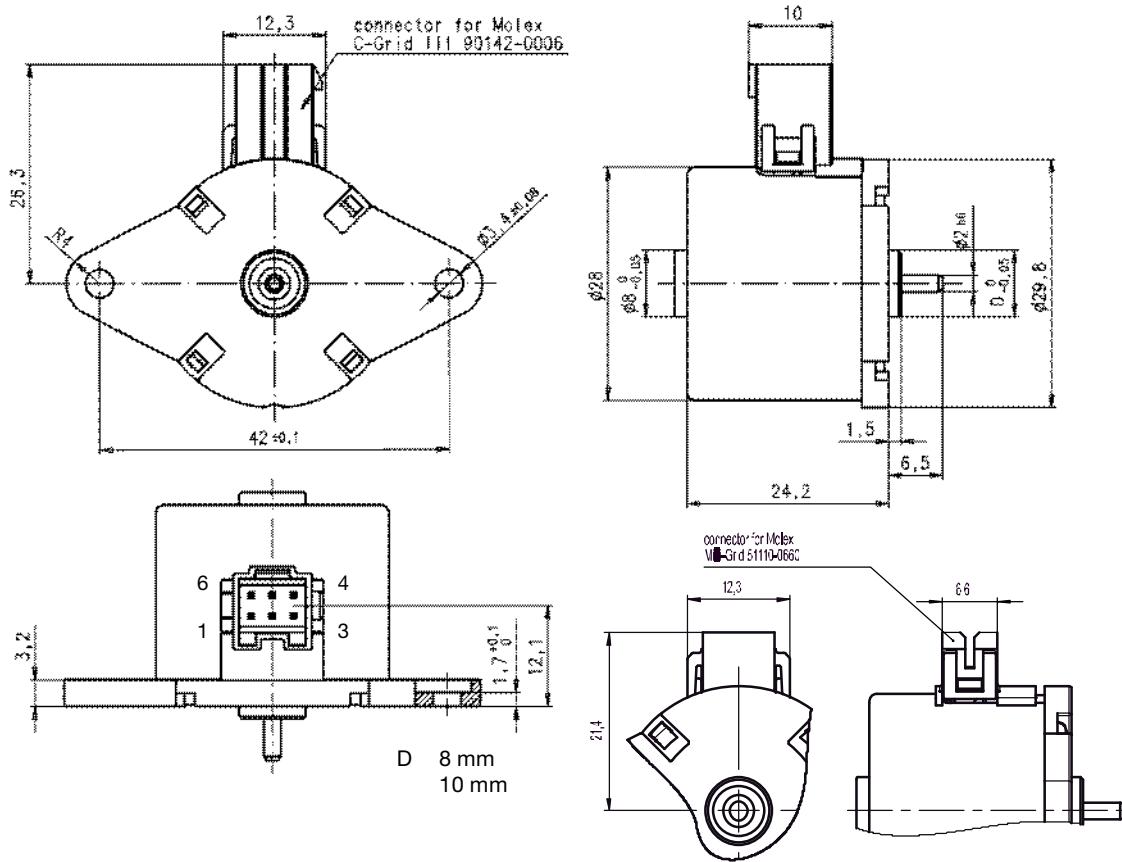
connector	step			
	I	II	III	IV
2	+	+	+	+
3	-	-		
4	-			-
5	+	+	+	+
6		-	-	

→ counter clockwise rotation
← clockwise rotation

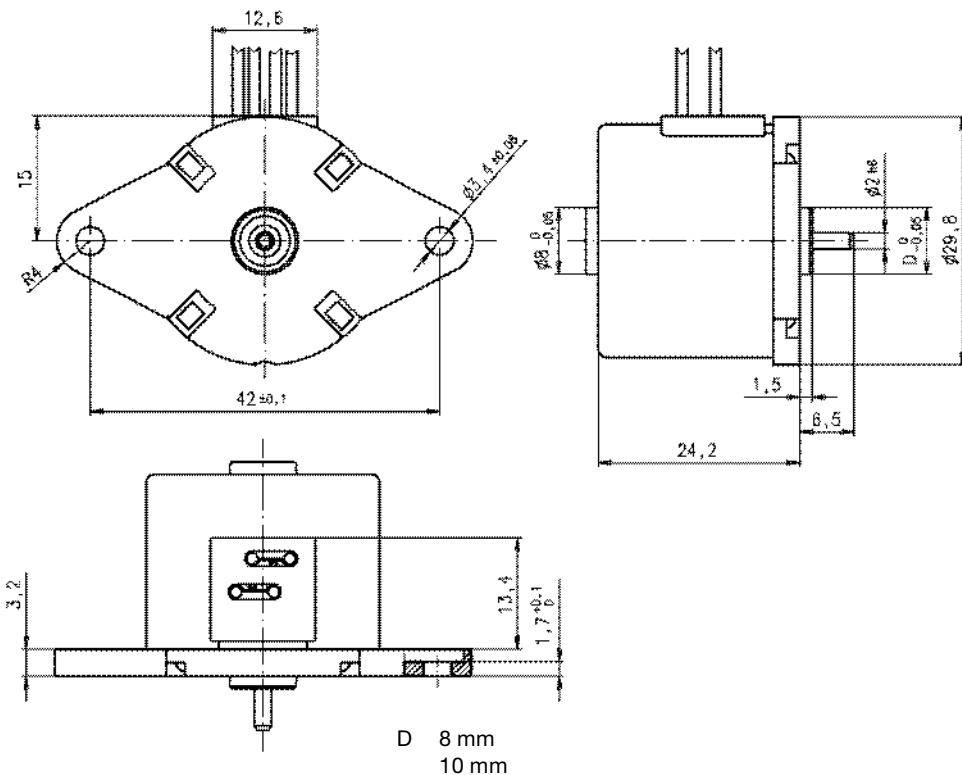
UCD

Rotational ●

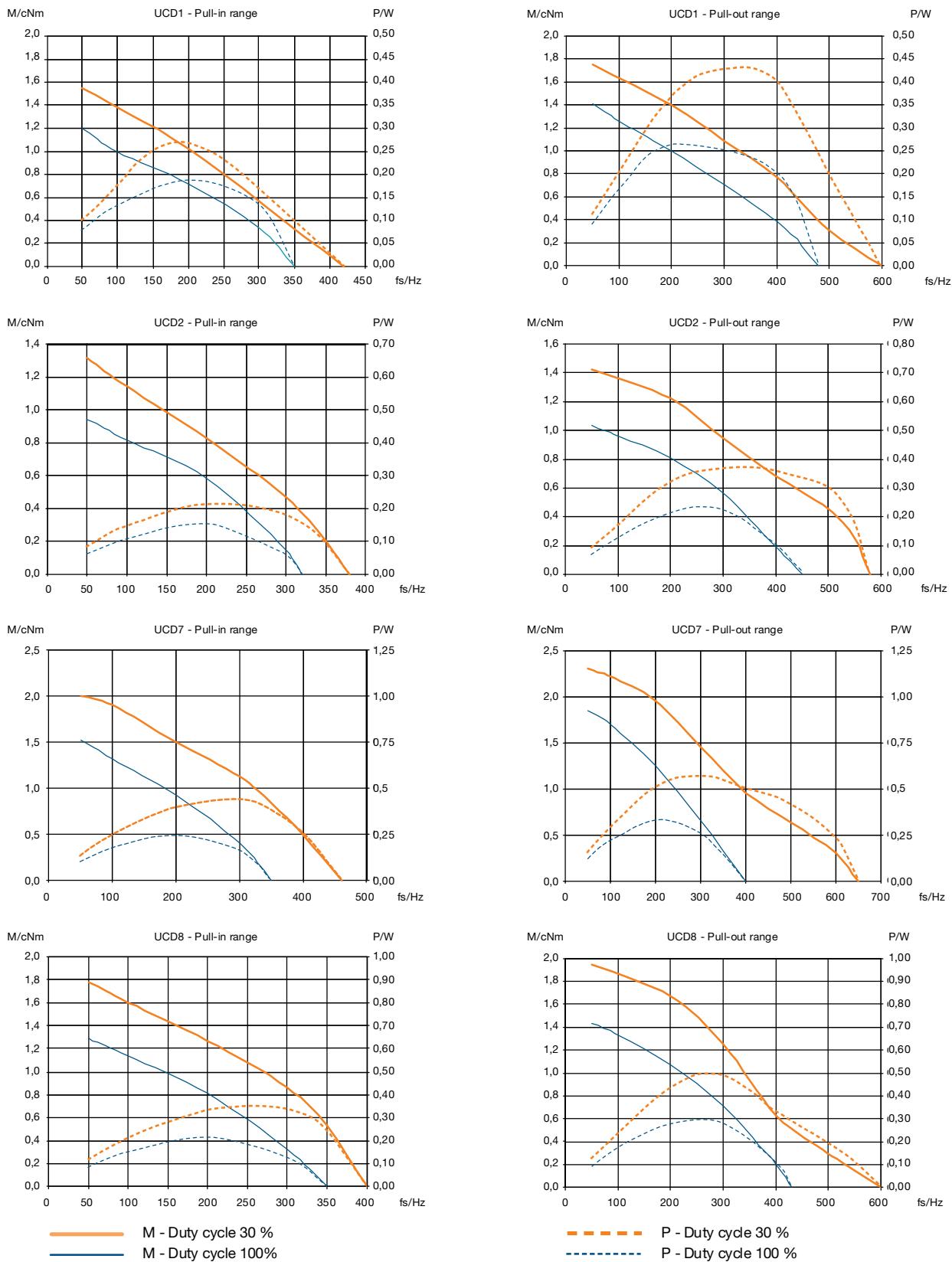
Dimensions Version with Connector D



Version with Connector N (Lead wire version)



Performance Chart

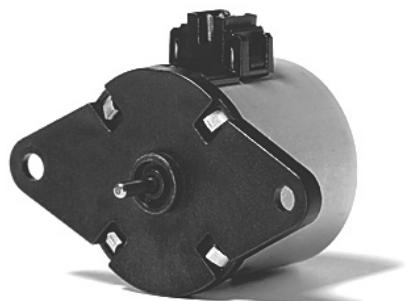


UCB

UCB1/7; UCB2/8

Dimensions (mm)	$\varnothing 28 \times 24$
Step angle (°)	15
Holding torque *	
(cNm)	1.3–2.3
Detent torque (cNm)	0.29
Winding	bipolar/unipolar
Gear combination	on request

* values for connector version (connection B or D) / values of lead wire version (connection N) are up to 20 % lower



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	connector type D or N
Protection	IP30 according to DIN EN 60529 : 2000
Weight	54 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	Sintered bronze, self-lubricating

Order Reference

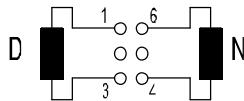
Type	Stepper Motor	UCB	1	0	N	18	R	B
Configuration	1 bipolar, standard magnet 2 unipolar, standard magnet	7 8	bipolar, stronger magnet unipolar, stronger magnet					
Rotor shaft, mounting	3 centring 8 mm, shaft 2.0 mm, screw plate 4 centring 8 mm, shaft 1.5 mm, screw plate 0 centring 8 mm, shaft 2.0 mm, clip 1 centring 8 mm, shaft 1.5 mm, clip	E K A C	centring 10 mm, shaft 2.0 mm, screw plate centring 10 mm, shaft 1.5 mm, screw plate centring 10 mm, shaft 2.0 mm, clip centring 10 mm, shaft 1.5 mm, clip					
Approval	N Approval Standard							
Resistance	see next pages; Resistance per winding for bipolar or unipolar							
Direction	R reversible							
Connection	D see next pages "Connection Types" and page 145 "Connection Types" for B N							

Technical Data

	Configuration	UCB1	UCB7		
bipolar	Holding torque M_H^*	cNm	1.7	2.8	
	Detent torque M_S	cNm	0.2	0.45	
	Rotor inertia J_R	gcm ²	2.1	2.4	
	Steps per revolution		24		
	Direction of rotation	V	reversible		
Specific Technical Data Lead Wire Versions (Connection type N)					
	Rated voltage UN	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R_{20}	Ω	24	90	380
	Winding code		18	03	04
Specific Technical Data Connector Versions					
	Rated voltage UN	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R_{20}	Ω	24	90	380
	Winding code		07	01	02
unipolar	Configuration		UCB2	UCB8	
	Holding torque M_H^*	mNm	1.3	2.1	
	Detent torque M_S	mNm	0	0.45	
	Rotor inertia J_R	gcm ²	2.1	2.4	
	Steps per revolution		24		
	Direction of rotation	V	reversible		
Specific Technical Data Lead Wire Versions					
	Rated voltage UN	V	12	24	6
	Duty cycle	%	100	100	100
	Resistance R_{20}	Ω	90	380	24
	Winding code		10	11	12
Specific Technical Data Connector Versions					
	Rated voltage UN	V	12	24	
	Duty cycle	%	100	100	
	Resistance R_{20}	Ω	90	380	
	Winding code		01	02	

* values of connector version (connection B or D) / values of lead wire version are up to 20 % lower

Circuit diagram bipolar



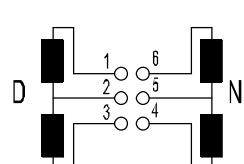
	I	II	III	IV
1	-	+	-	-
3	-	-	+	+
4	-	+	+	-
6	+	-	-	+

step

connector

→ counter clockwise rotation
← clockwise rotation

unipolar



	I	II	III	IV
2	+	+	+	+
3	-	-		
4	-			-
5	+	+	+	+
6		-	-	

step

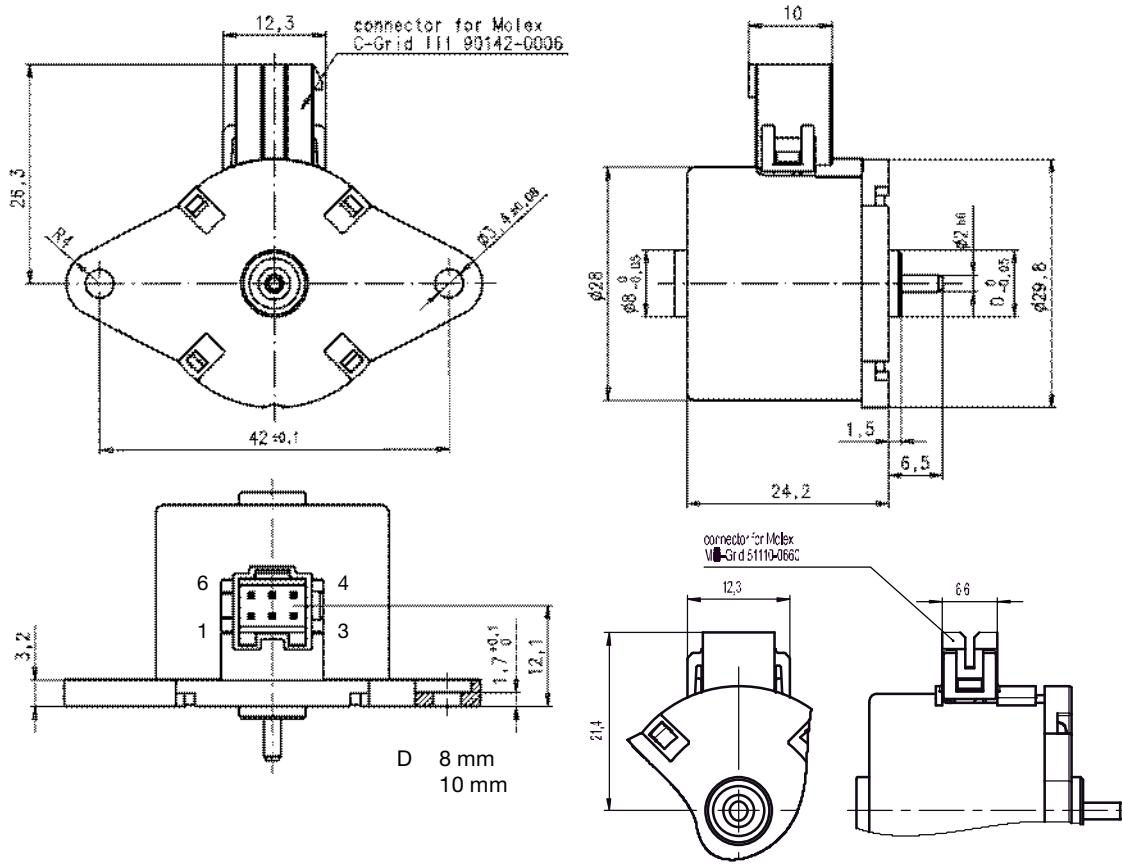
connector

→ counter clockwise rotation
← clockwise rotation

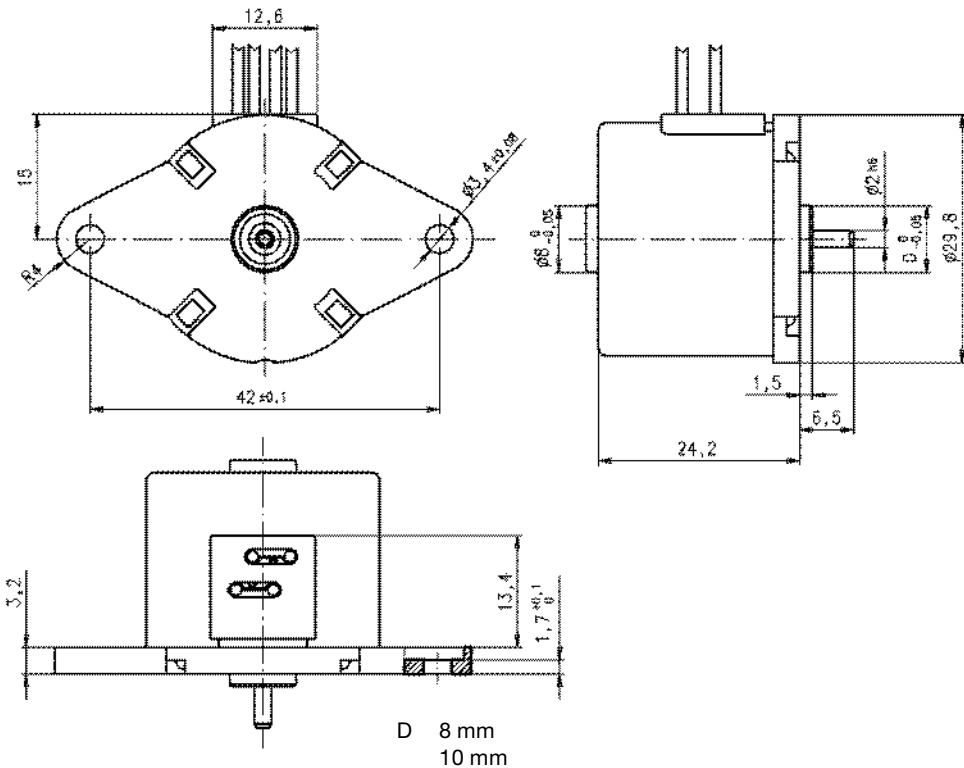
UCB

Rotational ●

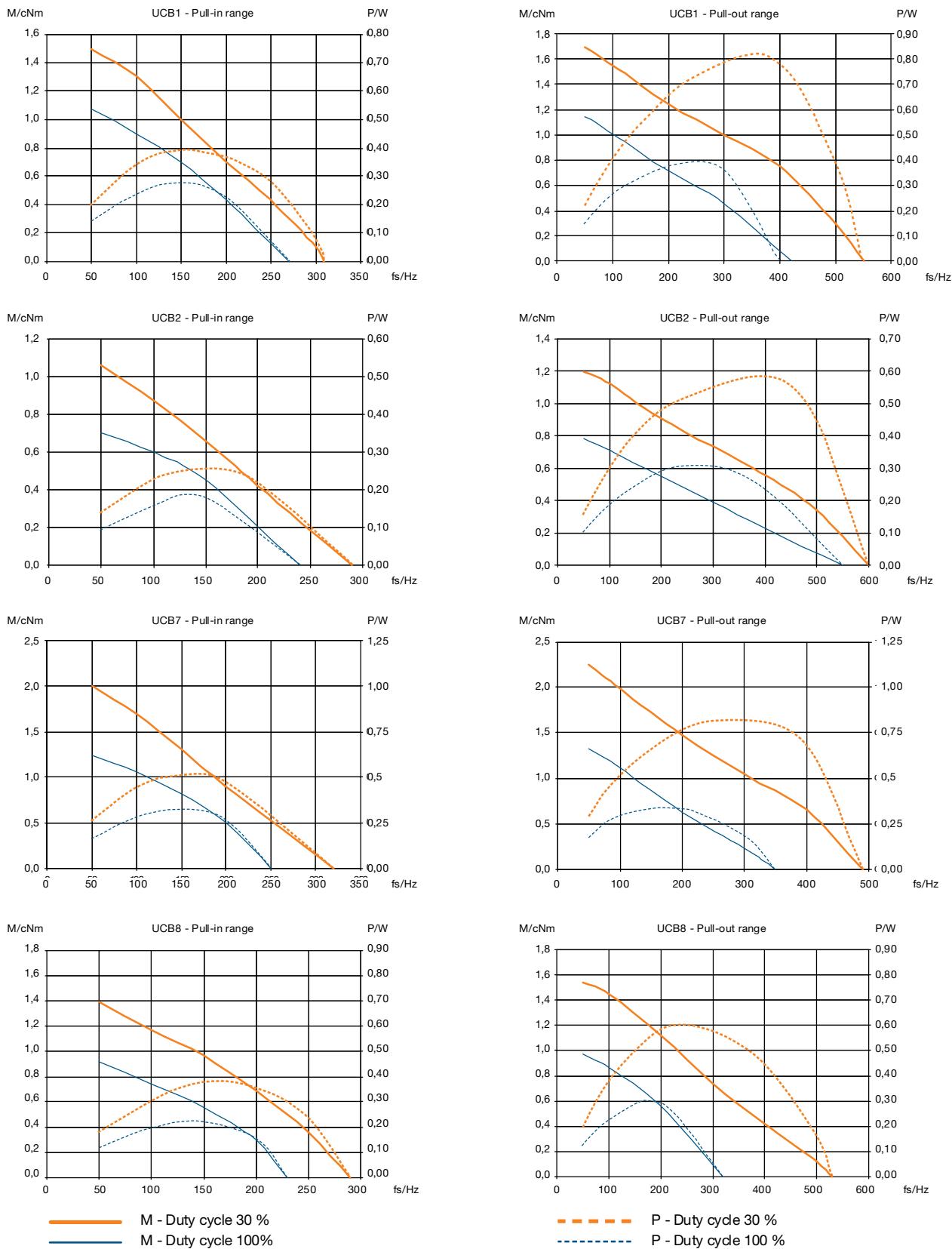
Dimensions Version with Connector D



Version with Connector N (Lead wire version)



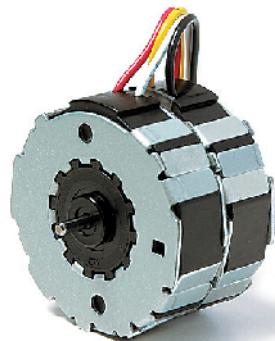
Performance Chart



UBD

UBD1/2/5/6

Dimensions (mm)	\varnothing 36 x 21
Step angle (°)	7.5
Holding torque (cNm)	1.3–1.9
Detent torque (cNm)	0.22/0.27
Winding	bipolar/unipolar
Gear combination	D, M, B, F, V



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R _{therm}	27 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	60 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

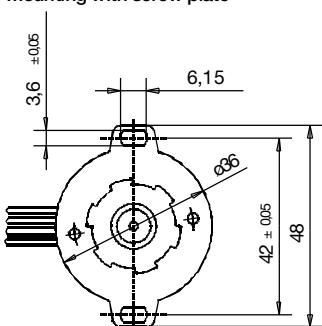
Order Reference

Type	Stepper Motor		UBD	1	0	N	03	R	E
Configuration	1	bipolar, standard magnet	5	bipolar, stronger magnet					
	2	unipolar, standard magnet	6	unipolar, stronger magnet					
Rotor shaft, mounting	0	centring 8 mm, shaft 2.0 mm, clip	A	centring 10 mm, shaft 2.0 mm, clip					
	1	centring 8 mm, shaft 1.5 mm, clip	C	centring 10 mm, shaft 1.5 mm, clip					
	3	centring 8 mm, shaft 2.0 mm, screw plate	E	centring 10 mm, shaft 2.0 mm, screw plate					
	4	centring 8 mm, shaft 1.5 mm, screw plate	K	centring 10 mm, shaft 1.5 mm, screw plate					
Approval	N	Approval Standard							
Resistance	See next page Resistance per winding for bipolar or unipolar.								
Direction	reversible								
Cable	E cable 150 mm (other on request)								

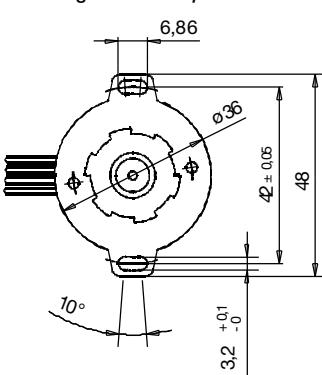
Technical Data

			UBD1	UBD5			
bipolar	Holding torque M _H	cNm	1.8	1.9			
	Detent torque M _S	cNm	0.22	0.27			
	Rotor inertia J _R	gcm ²	2.8	2.9			
UBD1/5	Rated voltage U _N	V	6	12	24	6	12
	Duty cycle	%	100	100	100	100	100
	Resistance R ₂₀	Ω	18.5	100	460	27.5	133
	Winding code		03	05	06	01	04
							07
unipolar			UBD2	UBD6			
	Holding torque M _H	cNm	1.3	1.6			
	Detent torque M _S	cNm	0.22	0.27			
	Rotor inertia J _R	gcm ²	2.8	2.9			
UBD2/6	Rated voltage U _N	V	6	12	24	6	12
	Duty cycle	%	100	100	100	100	100
	Resistance R ₂₀	Ω	28	120	500	41	172
	Winding code		07	08	09	01	02
							03
UBD3/7	Rated voltage U _N	V	6	12	24		
	Duty cycle	%	100	100	100		
	Resistance R ₂₀	Ω	18.5	100	460		
	Winding code		03	05	06		
UBD4/8	Rated voltage U _N	V	6	12	24		
	Duty cycle	%	100	100	100		
	Resistance R ₂₀	Ω	28	120	500		
	Winding code		07	08	09		
	Steps per revolution		48				
	Winding temperature T _{max}	°C	105				
	Direction of rotation		reversible				

Dimensions Mounting with screw plate



Mounting with screw plate



Mounting with snap-on clip (item no. 4199 48230)

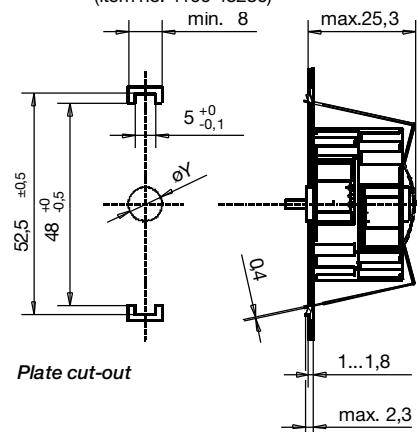


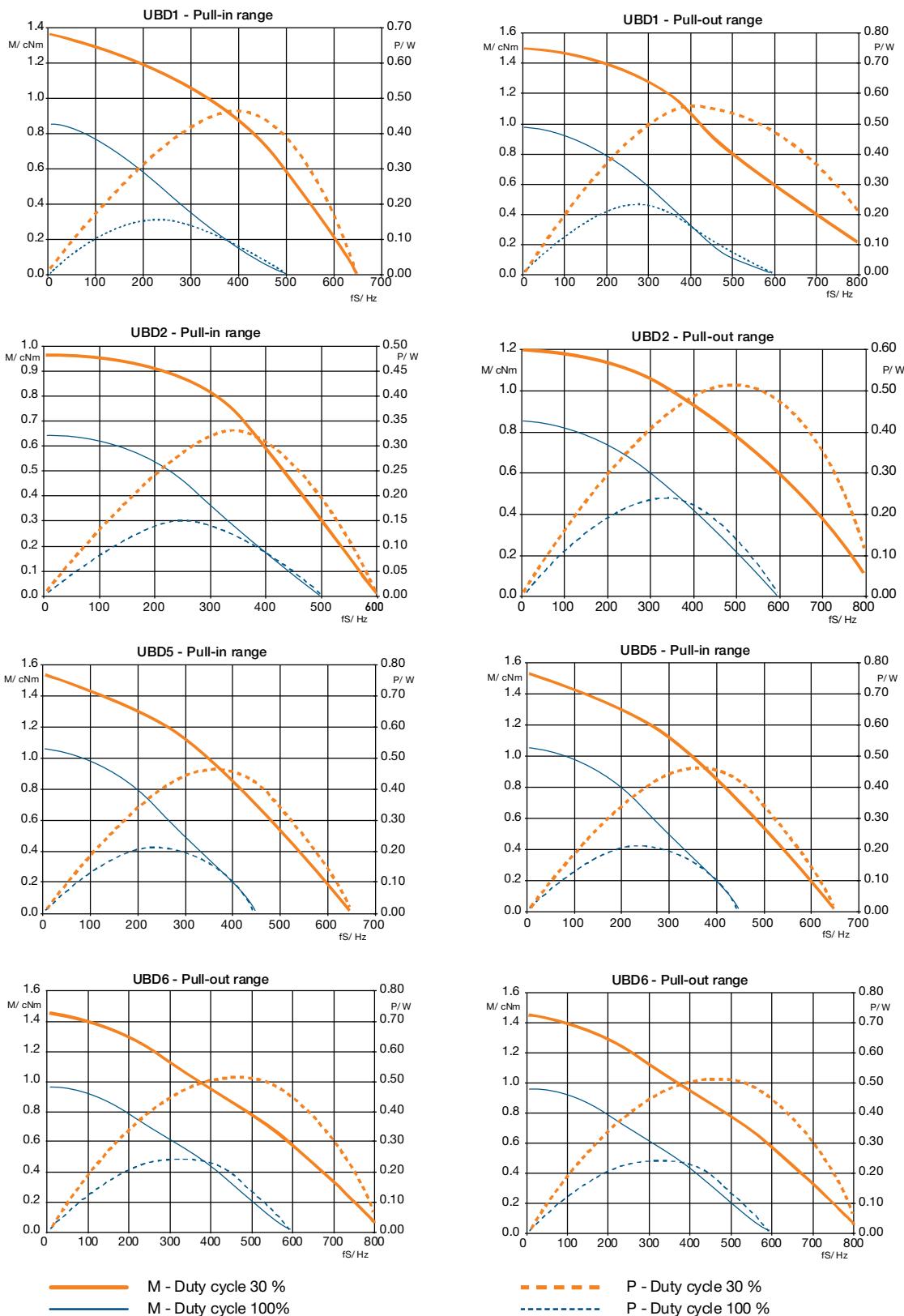
Plate cut-out

øD Rotor shaft
ø 2 h6
ø 1.5 js8

øZ øY
8 8F8
10 10F8

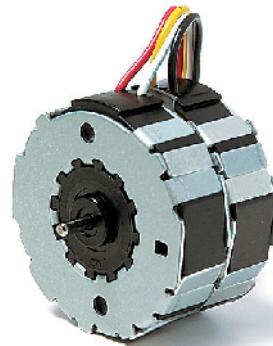
Screw clip: 4199 48450

Performance Chart



UBB1/2/5/6

Dimensions (mm)	$\varnothing 36 \times 21$
Step angle (°)	15
Holding torque (cNm)	1.0–1.9
Detent torque (cNm)	0.25/0.36
Winding	bipolar/unipolar
Gear combination	D, M, B, F, V



Standard Data

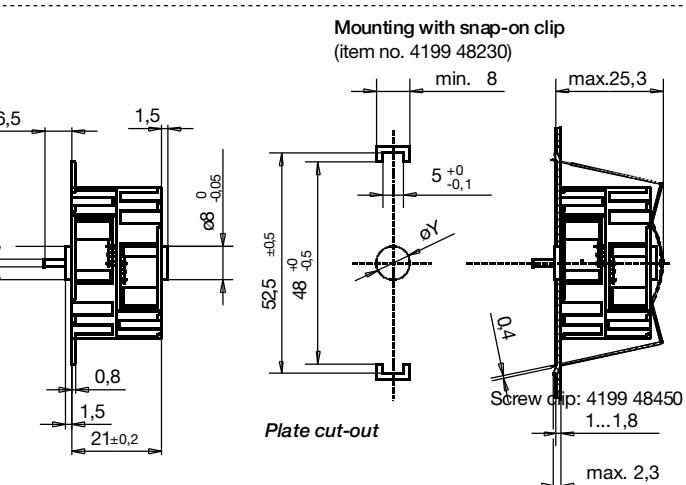
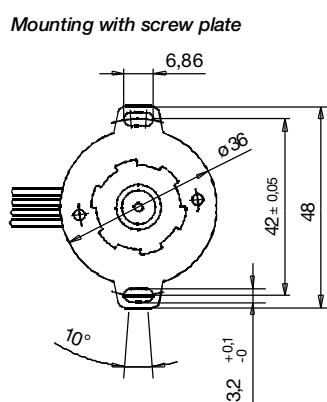
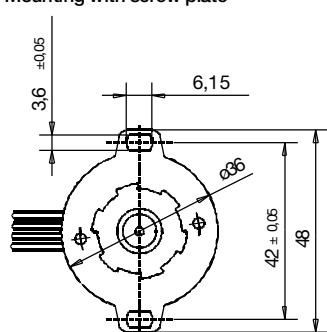
Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R _{therm}	27 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	60 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

Type	Stepper Motor	UBB	1	0	N	03	R	E
Configuration	1 bipolar, standard magnet 2 unipolar, standard magnet	5	bipolar, stronger magnet 6	unipolar, stronger magnet				
Rotor shaft, mounting	0 centring 8 mm, shaft 2.0 mm, clip 1 centring 8 mm, shaft 1.5 mm, clip 3 centring 8 mm, shaft 2.0 mm, screw plate 4 centring 8 mm, shaft 1.5 mm, screw plate	A	centring 10 mm, shaft 2.0 mm, clip C	centring 10 mm, shaft 1.5 mm, clip E	centring 10 mm, shaft 2.0 mm, screw plate K	centring 10 mm, shaft 1.5 mm, screw plate		
Approval	N Approval Standard							
Resistance	See next page	Resistance per winding for bipolar or unipolar.						
Direction	reversible							
Cable	E cable 150 mm (other on request)							

Technical Data

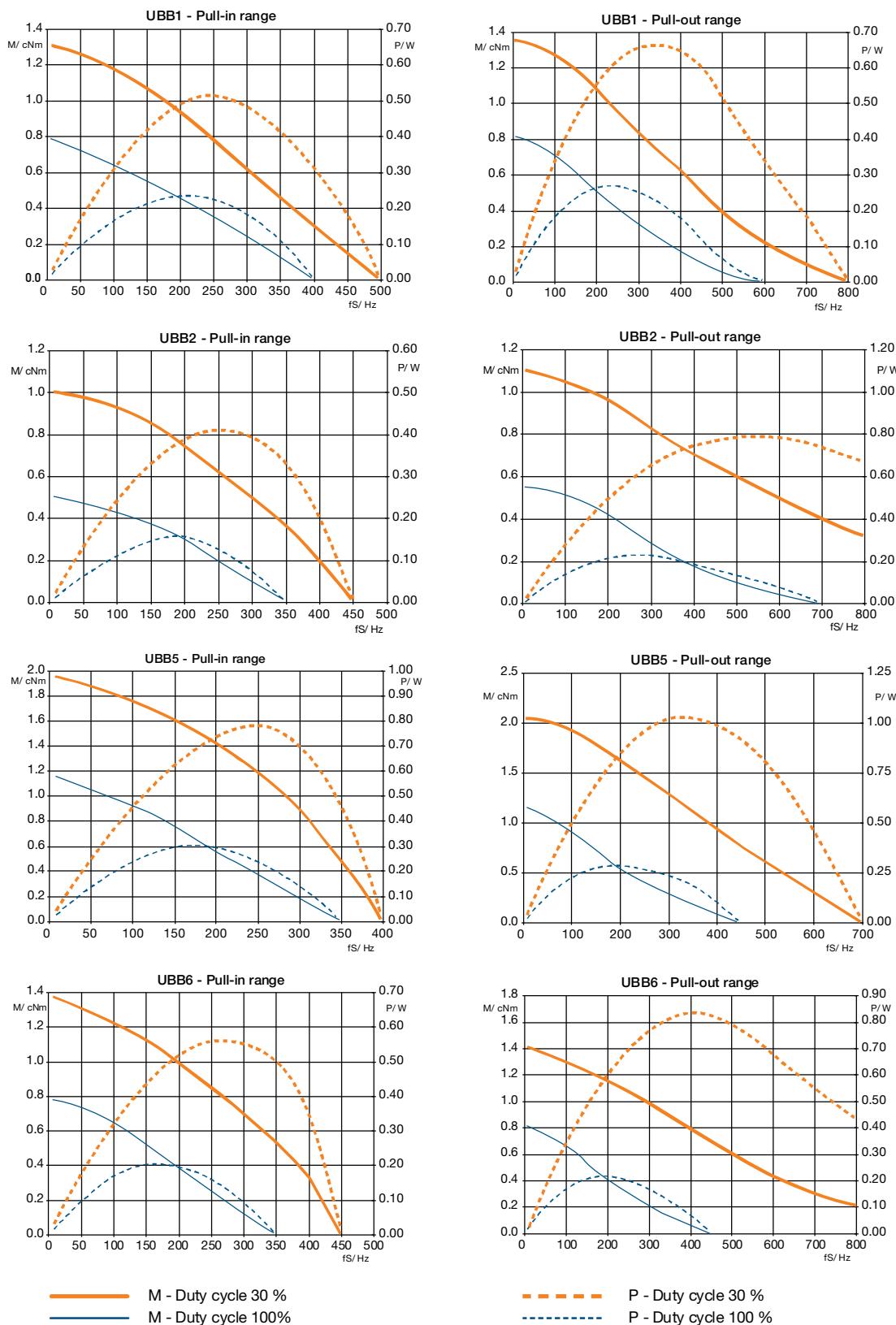
			UBB1	UBB5
bipolar	Holding torque M _H	cNm	1.5	1.9
	Detent torque M _S	cNm	0.25	0.36
	Rotor inertia J _R	gcm ²	2.8	2.9
UBB1/5	Rated voltage U _N	V	6	12
	Duty cycle	%	100	100
	Resistance R ₂₀	Ω	18.5	100
	Winding code		03	05
unipolar			UBB2	UBB6
	Holding torque M _H	cNm	1.0	1.4
	Detent torque M _S	cNm	0.25	0.36
	Rotor inertia J _R	gcm ²	2.8	2.9
UBB2/6	Rated voltage U _N	V	6	12
	Duty cycle	%	100	100
	Resistance R ₂₀	Ω	28	120
	Winding code		07	08
UBB3/7	Rated voltage U _N	V	6	12
	Duty cycle	%	100	100
	Resistance R ₂₀	Ω	18.5	100
	Winding code		03	05
UBB4/8	Rated voltage U _N	V	6	12
	Duty cycle	%	100	100
	Resistance R ₂₀	Ω	28	120
	Winding code		07	08
Dimensions	Steps per revolution		24	
	Winding temperature T _{max}	°C	105	
	Direction of rotation		reversible	



øD Rotor shaft
ø 2 h6
ø 1.5 js8
øZ øY
8 8F8
10 10F8

Plate cut-out

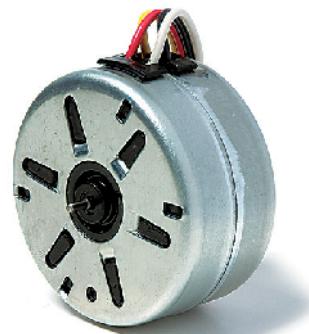
Performance Chart



UDB

UDB1/2

Dimensions (mm)	\varnothing 48 x 24
Step angle (°)	15
Holding torque (cNm)	2.7/2.2
Detent torque (cNm)	0.35
Winding	bipolar/unipolar
Gear combination	D, M, B, F, V, J



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+60
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R_{therm}	18 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	cable
Protection	IP40 according to DIN EN 60529 : 2000
Weight	132 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

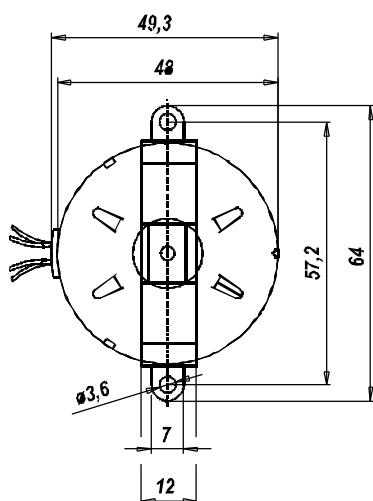
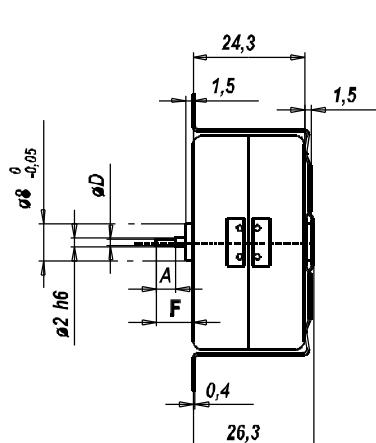
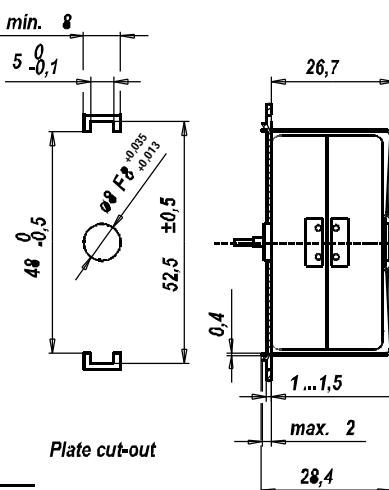
Order Reference

Type	Stepper Motor	UDB	:	1	:	0	:	N	:	02	:	R	:	N
Configuration	1 bipolar 2 unipolar													
Rotor shaft, mounting	0 centring 8 mm, shaft 1.5 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip													
Approval	N Approval Standard													
Resistance	See next page Resistance per winding for bipolar or unipolar.													
Direction	reversible													
Cable	N cable 150 mm (other on request)													

Technical Data

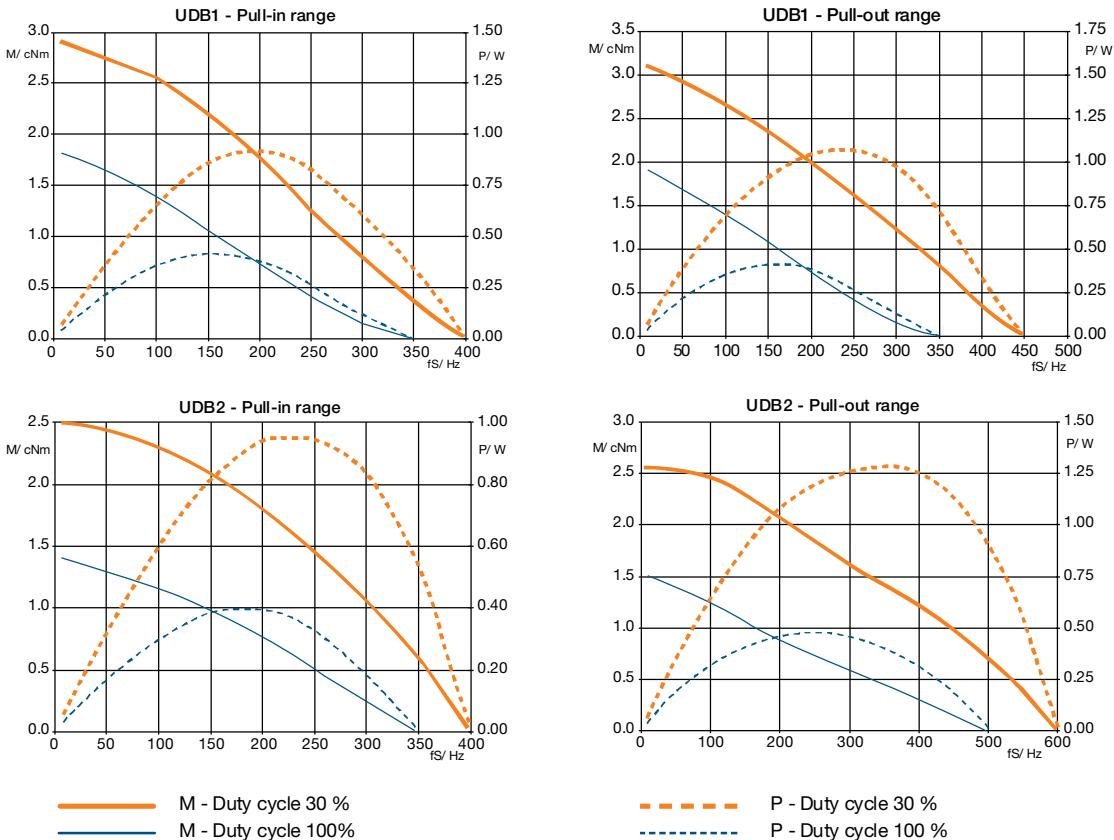
bipolar (UDB1)	Holding torque M _H	cNm	2.7	
	Detent torque M _s	cNm	0.35	
	Rotor inertia J _R	gcm ²	6.3	
	Rated voltage U _N	V	6 12 24	
	Duty cycle	%	100 100 100	
	Resistance R ₂₀	Ω	15 78 350	
	Winding code		01 02 03	
unipolar (UDB2)	Holding torque M _H	cNm	2.2	
	Detent torque M _s	cNm	0.35	
	Rotor inertia J _R	gcm ²	6.3	
	Rated voltage U _N	V	6 12 24	
	Duty cycle	%	100 100 100	
	Resistance R ₂₀	Ω	19 75 300	
	Winding code		01 02 04	
	Steps per revolution		24	
	Winding temperature T _{max}	°C	105	
	Direction of rotation		reversible	

Dimensions

Mounting with screw clip
(item no. 4186 48080)Mounting with snap-on clip
(item no. 4199 48040)

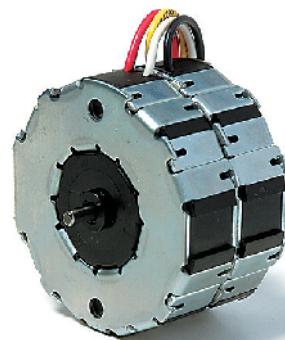
ØD Rotor shaft	Dimension A	Dimension F
1,5js8 ^{+0,007} _{-0,007}	4,3	6,5
2h6 ⁰ _{-0,006}	—	8,2

Performance Chart



UFD1/2

Dimensions (mm)	\varnothing 52 x 28
Step angle (°)	7.5
Holding torque (cNm)	6.4/6.4
Detent torque (cNm)	0.45
Winding	bipolar/unipolar
Gear combination	D, M, B, F, V, J, O, P

**Standard Data**

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R _{therm}	13 K/W
Thermal class	105 (A) according to DIN EN 60085 : 2004 (130 / B on request)
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.72 ± 0.08 mm
Protection	IP40 according to DIN EN 60529 : 2000
Weight	180 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

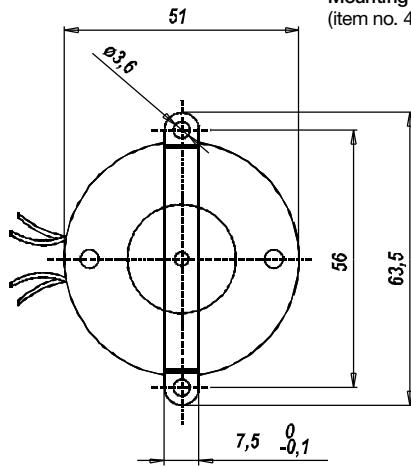
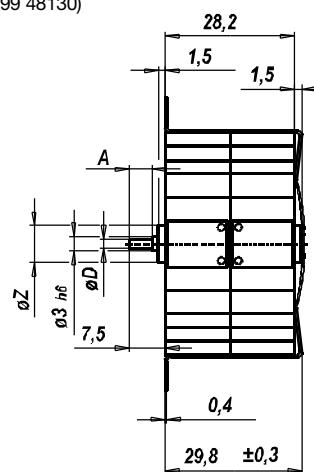
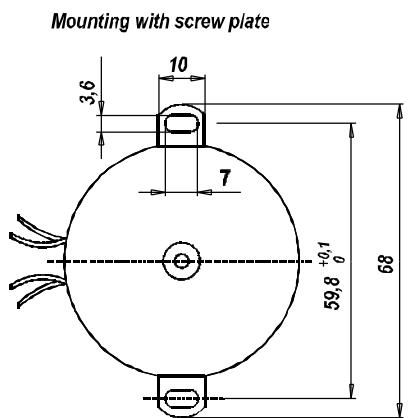
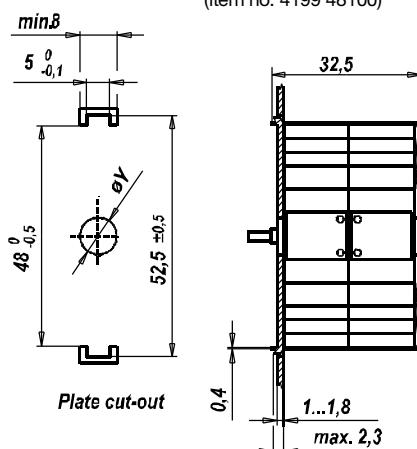
Order Reference

Type	Stepper Motor	UFD	1	0	N	02	R	N
Configuration	1 bipolar, two coils 2 unipolar, two coils							
Rotor shaft, mounting	0 centring 8 mm, shaft 3.0 mm, clip 1 centring 8 mm, shaft 2.0 mm, clip 2 centring 8 mm, shaft 1.5 mm, clip 3 centring 8 mm, shaft 3.0 mm, screw plate 4 centring 8 mm, shaft 2.0 mm, screw plate 5 centring 8 mm, shaft 1.5 mm, screw plate	E K M B A C	centring 10 mm, shaft 3.0 mm, screw plate centring 10 mm, shaft 2.0 mm, screw plate centring 10 mm, shaft 1.5 mm, screw plate centring 10 mm, shaft 3.0 mm, clip centring 10 mm, shaft 2.0 mm, clip centring 10 mm, shaft 1.5 mm, clip					
Approval	N Approval Standard							
Resistance	See next page Resistance per winding for bipolar or unipolar.							
Direction	reversible							
Cable	E cable 150 mm (other on request)							

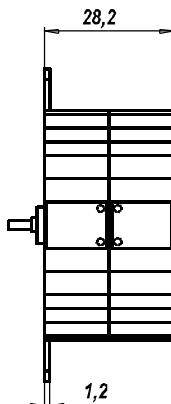
Technical Data

bipolar (UFD1)	Holding torque M _H	cNm	6.4		
	Detent torque M _s	cNm	0.45		
	Rotor inertia J _R	gcm ²	14.4		
	Rated voltage U _N	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	9.5	52	250
	Winding code		01	02	03
unipolar (UFD2)	Holding torque M _H	cNm	4.6		
	Detent torque M _s	cNm	0.45		
	Rotor inertia J _R	gcm ²	14.4		
	Rated voltage U _N	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	15	61	251
	Winding code		01	02	03
	Steps per revolution		48		
	Winding temperature T _{max}	°C	105		
	Direction of rotation		reversible		
	Rotor shaft		3, Ø D = 3h6, Dim. A = „-“		

Dimensions

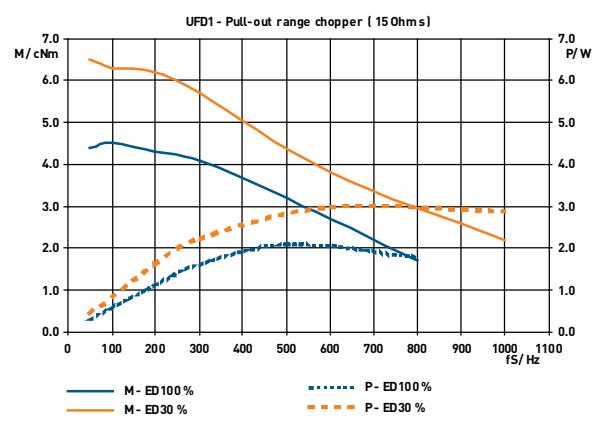
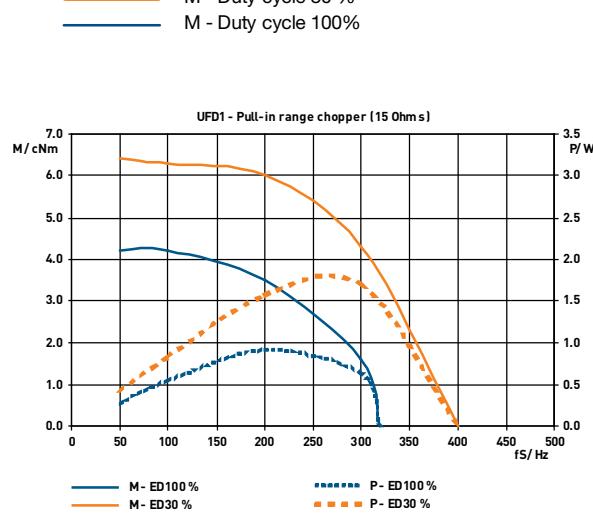
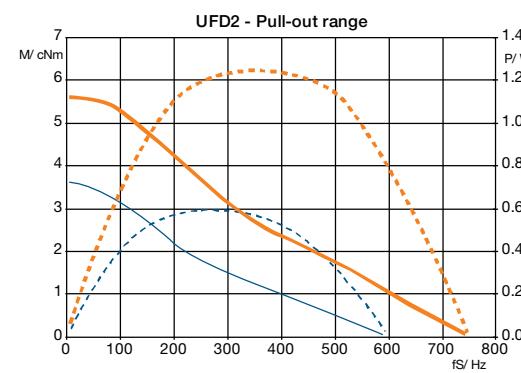
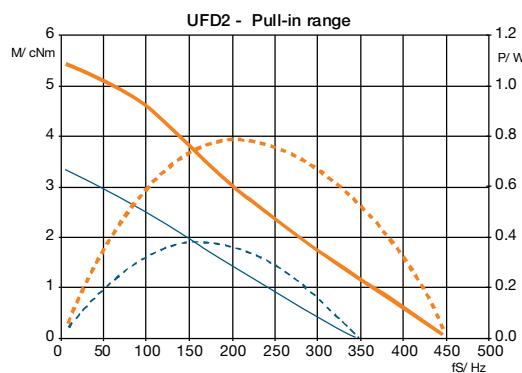
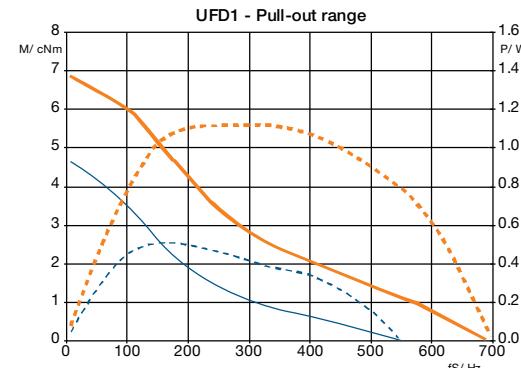
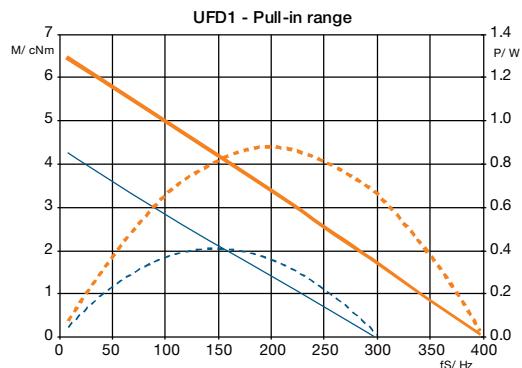
Mounting with screw clip
(item no. 4199 48130)Mounting with snap-on clip
(item no. 4199 48100)

Mounting with screw plate



øRotor-shaft	øD	Dim. A
1,5	1,5js8	5
2	2js8	5
3	3h6	-
Type	øZ	øY
	8 ⁰ _{-0,05}	8/8
UFD	10 ⁰ _{-0,05}	10F8

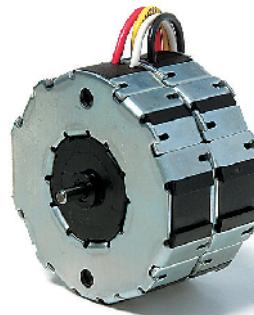
Performance Chart



UFB

UFB1/2/5; UFB3/4

Dimensions (mm)	$\varnothing 52 \times 28$ / $\varnothing 52 \times 56$
Step angle (°)	15
Holding torque (cNm)	4.3–5.5 (UFB1/2); 8.3 (UFB5); 7.6–10.4 (UFB3/4)
Detent torque (cNm)	0.45 (UFB1/2); 0.8 (UFB5); 0.8 (UFB3/4)
Winding	bipolar/unipolar
Gear combination	D, M, B, F, V, J, O, P



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15...+55
Ambient temperature storage	°C -20...+100
Thermal resistance at f=0 R_{therm}	11 K/W (UFB1/2/5), 7 K/W (UFB3/4)
Thermal class	105 (A) according to DIN EN 60085 : 2004 [130 (B) on request]
Approval	standard (UL/CSA on request)
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.75 ± 0.08 mm
Protection	IP40 according to DIN EN 60529 : 2000
Weight	180 g (UFB1/2/5), 350 g (UFB3/4)
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	sintered bronze, self-lubricating
Electric strength	according to DIN EN 60034-1/DIN EN 60335-1

Order Reference

Type	Stepper Motor		UFB	:	1	:	0	:	N	:	01	:	R	:	N
Configuration	1	bipolar, two coils, standard magnet	3	bipolar, four coils, standard magnet											
	2	unipolar, two coils, standard magnet	4	unipolar, four coils, standard magnet											
	5	bipolar, two coils, stronger magnet													
Rotor shaft, mounting	0	centring 8 mm, shaft 3.0 mm, clip	E	centring 10 mm, shaft 3.0 mm, screw plate *											
	1	centring 8 mm, shaft 2.0 mm, clip	K	centring 10 mm, shaft 2.0 mm, screw plate *											
	2	centring 8 mm, shaft 1.5 mm, clip	M	centring 10 mm, shaft 1.5 mm, screw plate *											
	3	centring 8 mm, shaft 3.0 mm, screw plate *	B	centring 10 mm, shaft 3.0 mm, clip											
	4	centring 8 mm, shaft 2.0 mm, screw plate *	A	centring 10 mm, shaft 2.0 mm, clip											
	5	centring 8 mm, shaft 1.5 mm, screw plate *	C	centring 10 mm, shaft 1.5 mm, clip											
Approval	N	Approval Standard													
Winding code	see next page														
Direction	reversible														
Cable	N	cable 150 mm (other on request)													

* screw plate not for UFB3 and UFB4

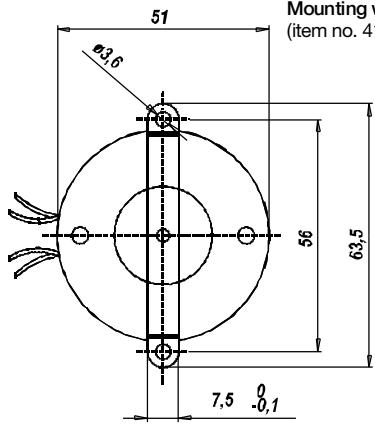
UFB

Technical Data

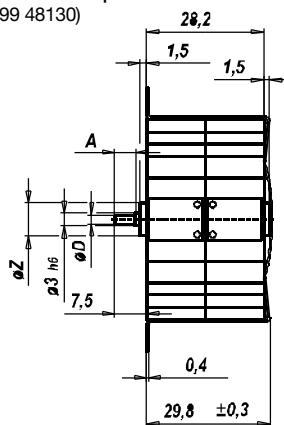
			UFB1	UFB3	UFB5
bipolar	Holding torque M _H	cNm	5.5	10.4	8.3
	Detent torque M _S	cNm	0.46	0.8	0.8
	Rotor inertia J _R	gcm ²	14.2	24.2	17.8
UFB1/5	Rated voltage U _N	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	9.5	52	250
	Winding code		01	02	04
UFB3	Rated voltage U _N	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	5	25.5	125
	Winding code		01	02	04
unipolar			UFB2	UFB4	
	Holding torque M _H	cNm	4.3	7.6	
	Detent torque M _S	cNm	0.46	0.8	
	Rotor inertia J _R	gcm ²	14.2	24.2	
UFB2	Rated voltage U _N	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	15	61	251
	Winding code		01	02	03
UFB4	Rated voltage U _N	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	7.5	30.5	125
	Winding code		01	02	03
	Steps per revolution		24		
	Winding temperature T _{max}		105° C		
	Direction of rotation		reversible		

Dimensions

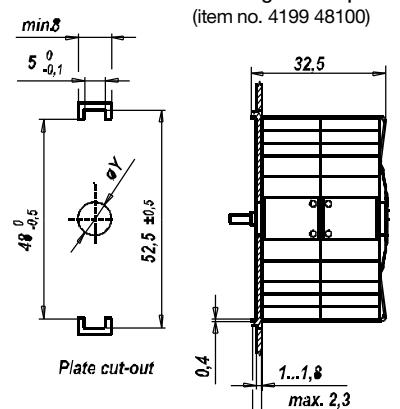
UFB1/2/5



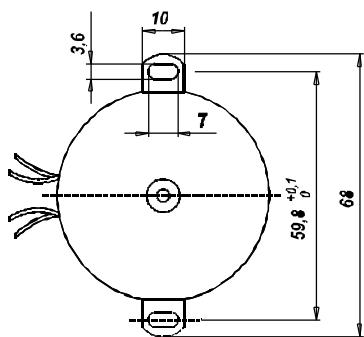
Mounting with screw clip
(item no. 4199 48130)



Mounting with snap-on clip
(item no. 4199 48100)

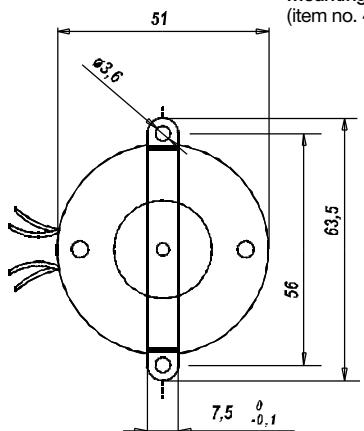


Mounting with screw plate

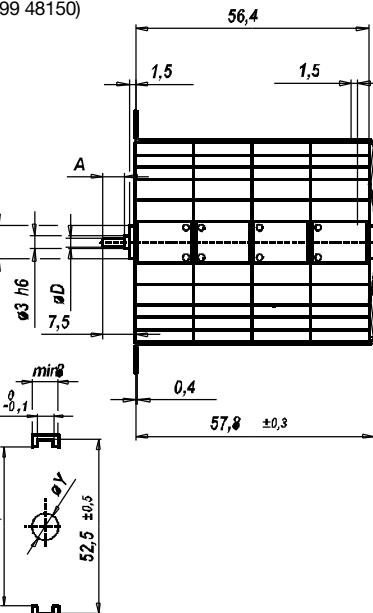


ϕ Rotor-shaft	ϕD	Dim. A
1,5	1,5js8	5
2	2js8	5
3	3h6	-
ϕZ	ϕY	
$8 \frac{0}{-0,05}$	8F8	
$10 \frac{0}{-0,05}$	10F8	

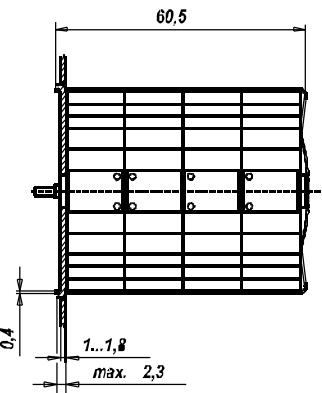
UFB3/4



Mounting with screw clip
(item no. 4199 48150)

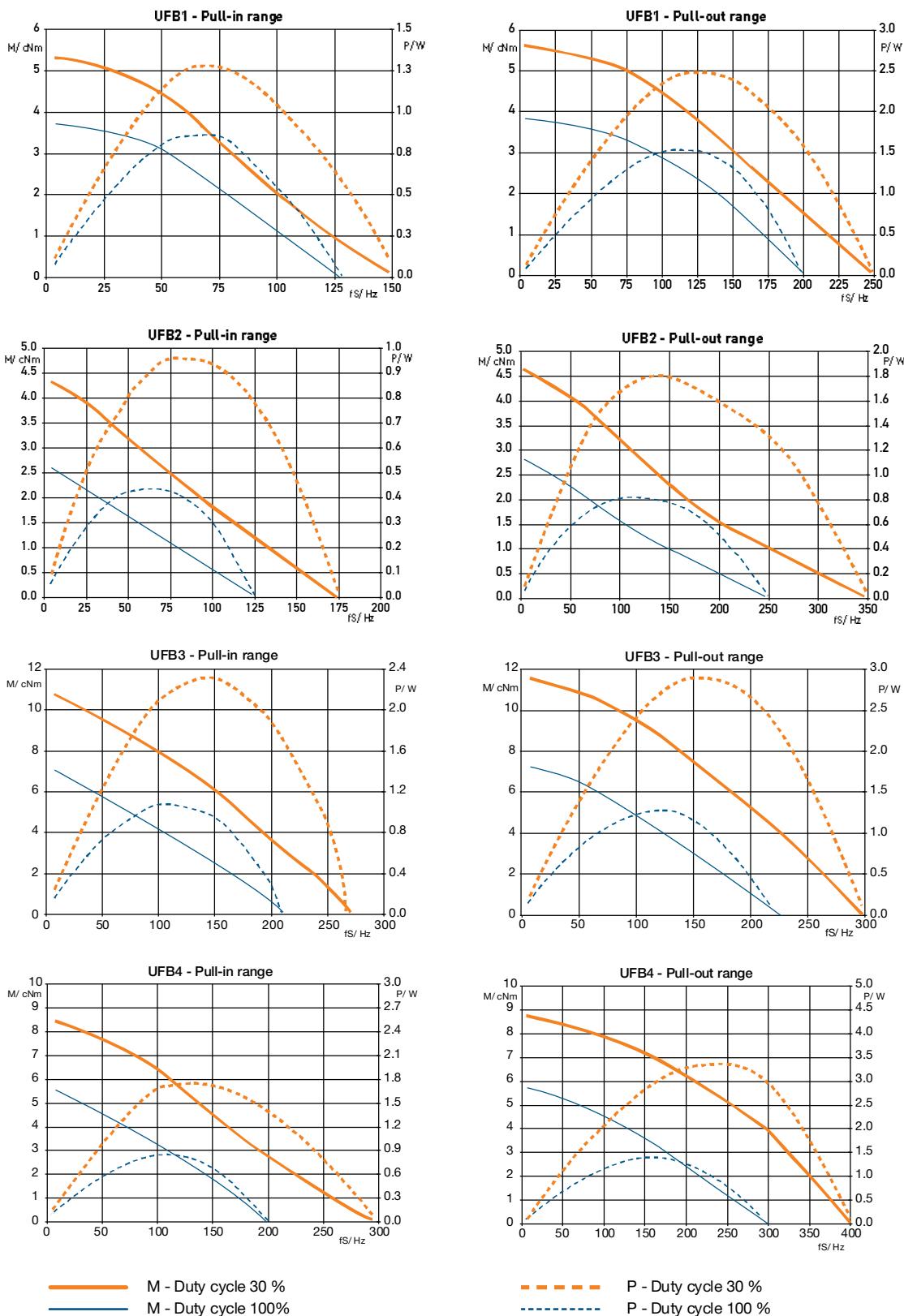


Mounting with snap-on clip
(item no. 4199 48120)

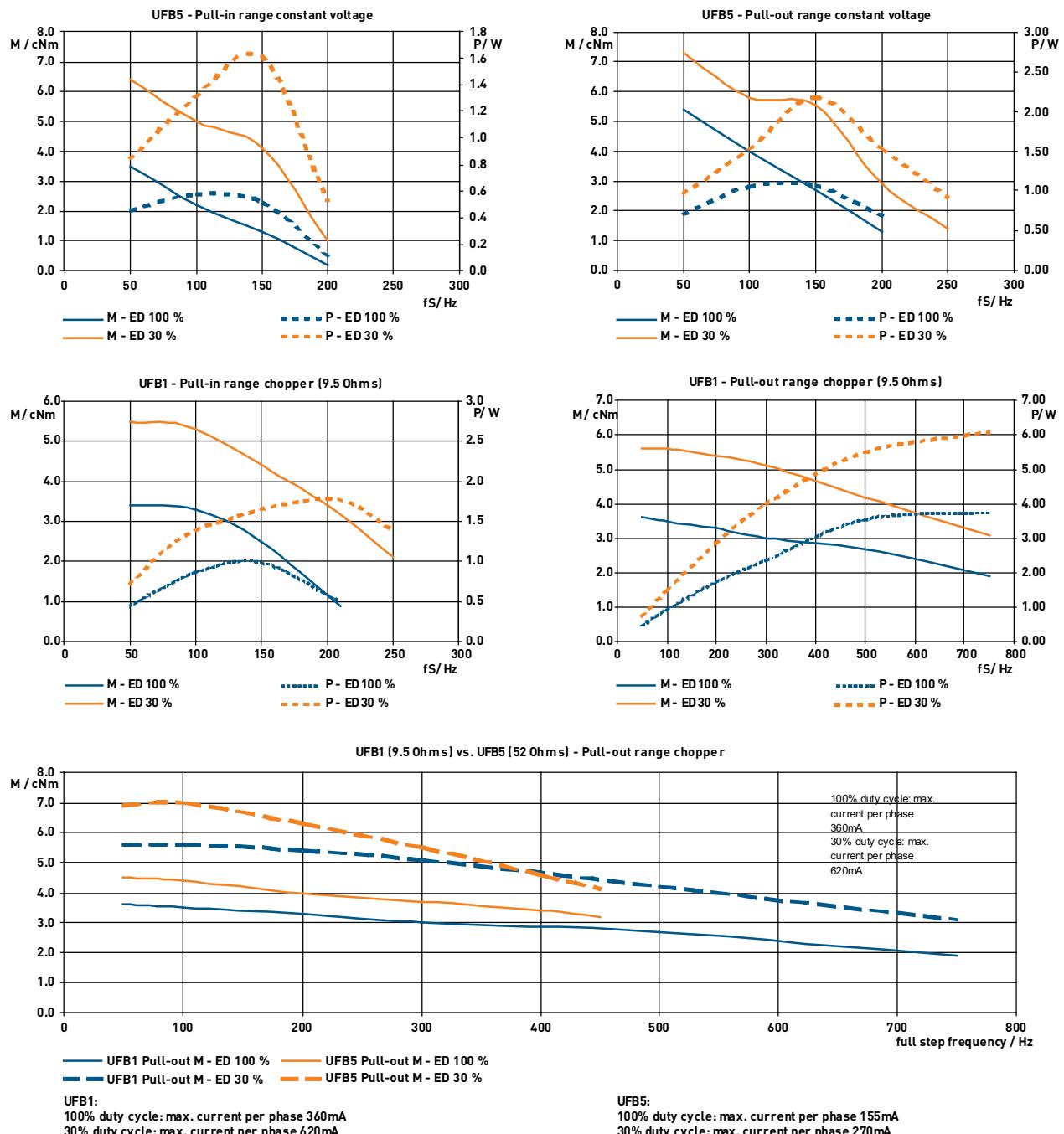


ϕ Rotor-shaft	ϕD	Dim. A
2	2js8	5
3	3h6	-
ϕZ	ϕY	
$8 \frac{0}{-0,05}$	8F8	
$10 \frac{0}{-0,05}$	10F8	

Performance Chart



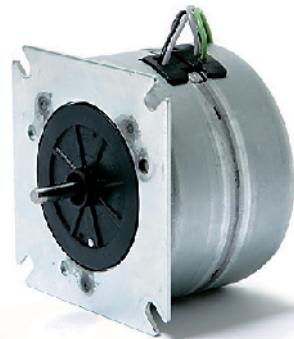
Performance Chart



UPJ

UPJ

Dimensions (mm)	\varnothing 64 x 43
Step angle (°)	11.25
Holding torque (cNm)	30 (UPJ1); 45 (UPJ5)
Detent torque (cNm)	2 (UPJ1); 7 (UPJ5)
Winding	bipolar
Gear combination	O, P, R



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +40
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.6 ± 0.1 mm
Protection	IP30 according to DIN EN 60529 : 2000
Weight	500 g (UPJ1); 550 g (UPJ5)
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	Sintered bronze, self-lubricating

Order Reference

Type	Stepper Motor	UPJ	1	1	N	01	R	E
Configuration	1 standard magnet 5 stronger magnet							
Rotor shaft, mounting	1 centring 10 mm, shaft length 8,1 mm, screw plate 2 centring 10 mm, shaft length 15,5 mm, screw plate A centring 14 mm, shaft length 8,1 mm, screw plate C centring 14 mm, shaft length 15,5 mm, screw plate							
Approval	N standard							
Winding code	see next page							
Direction	R reversible							
Cable	E 150 mm (other upon request)							

Technical Data

bipolar (UPJ1)	Step angle	°	11.25
	Holding torque MH	cNm	30
	Detent torque Ms	cNm	2
	Rotor inertia JR	gcm ²	85
	Steps per revolution		32
	Winding temperature increase	K	90
	Current per winding	A	1.25
	Inductance per winding	mH	9.5
	Power consumption	W	11.5
	Driver mode		Chopper drive
bipolar (UPJ5)	Step angle	°	11.25
	Holding torque MH	cNm	45
	Detent torque Ms	cNm	7
	Rotor inertia JR	gcm ²	180
	Steps per revolution		32
	Winding temperature increase	K	90
	Current per winding	A	1.25
	Inductance per winding	mH	8
	Power consumption	W	11.5
	Driver mode		Chopper drive
	Rated voltage U _N	V	4.5
	Duty cycle	%	100
	Resistance R ₂₀	Ω	3.7
	Winding code		01

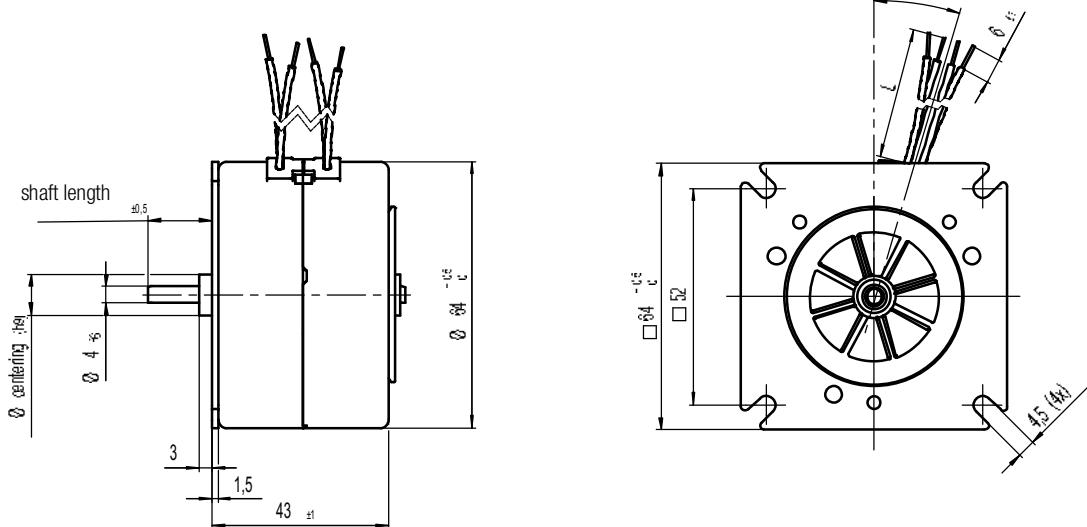
Circuit diagram Motor connections - bipolar

lead wire color	step			
	I	II	III	IV
red	+	+	-	-
blue	-	-	+	+
black	-	+	+	-
brown	+	-	-	+

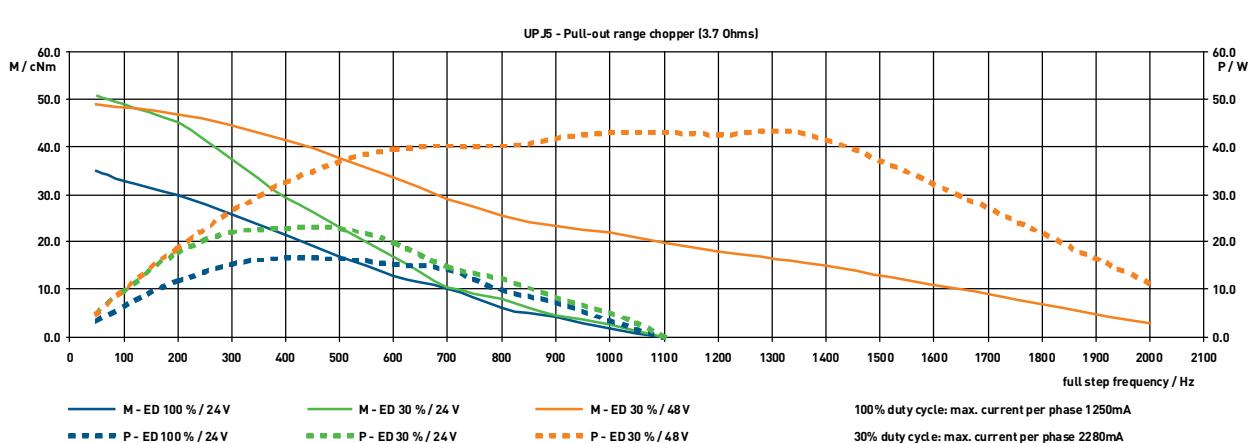
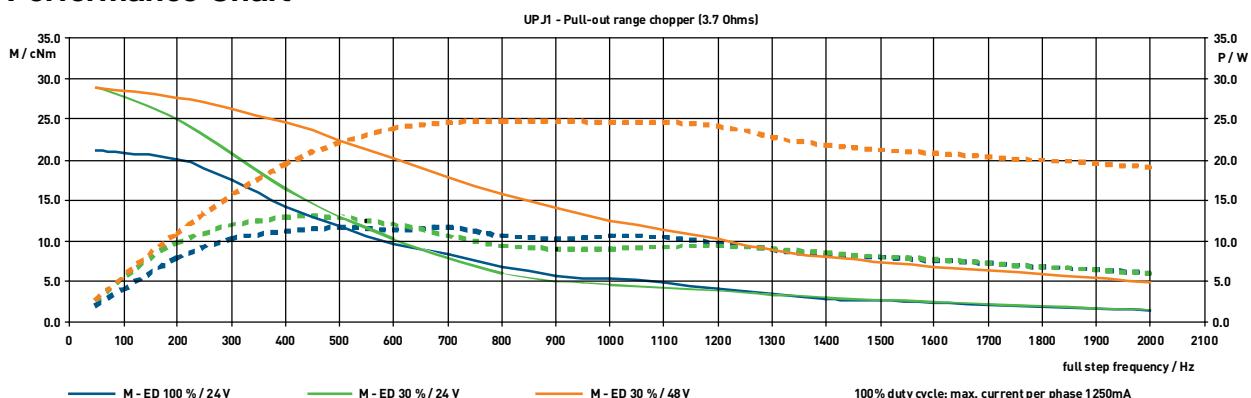
→ clockwise rotation

← counter-clockwise rotation

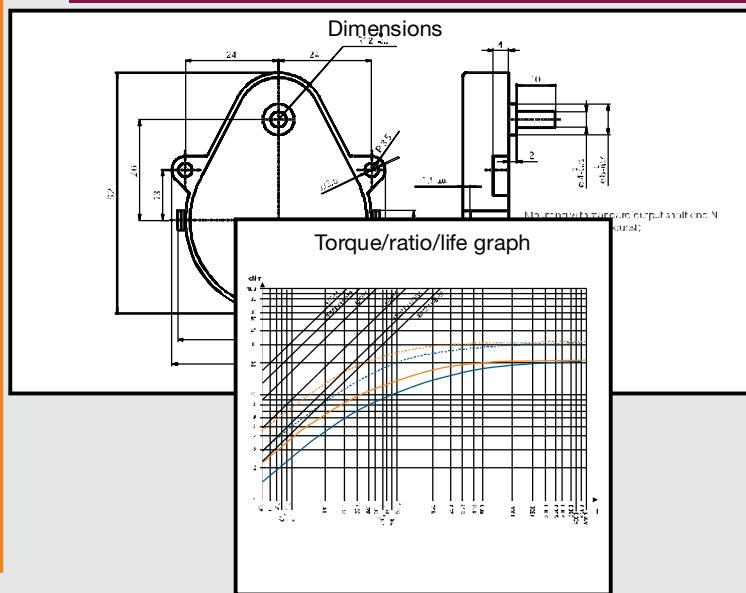
Dimensions mounting dimensions UP with screw plate



Performance Chart



Gearboxes for Motors



UGD

UGD

Dimensions (mm)	55 x 65.6
Height (mm)	13
Max. torque (cNm)	32
Ratios	4 1/6 ... 6.048.000
Internal slipping clutch	optional for ratios $\geq 33 \frac{1}{3}$
Standard shaft (mm)	$\emptyset 4 \times 10$
Weight (g)	35
Motor combination	Series UC, UB and UD; Series UF without UFR3/4 and UFB3/4



Standard Data

Mounting	any position
Axial thrust F_A	10 N
Lateral force F_R	50 N
Slipping clutches/free wheel	single-way clockwise/counter clockwise function and two way
Slipping-/free wheel torque	1 ... 40 cNm
Output shafts	$\emptyset 4 \times 10$, other on request
Climatic class	wide-spread according to DIN IEC 60721-2-1
Ambient temperature operation	$^{\circ}\text{C}$ -15 ... +55
Ambient temperature storage	$^{\circ}\text{C}$ -40 ... +80

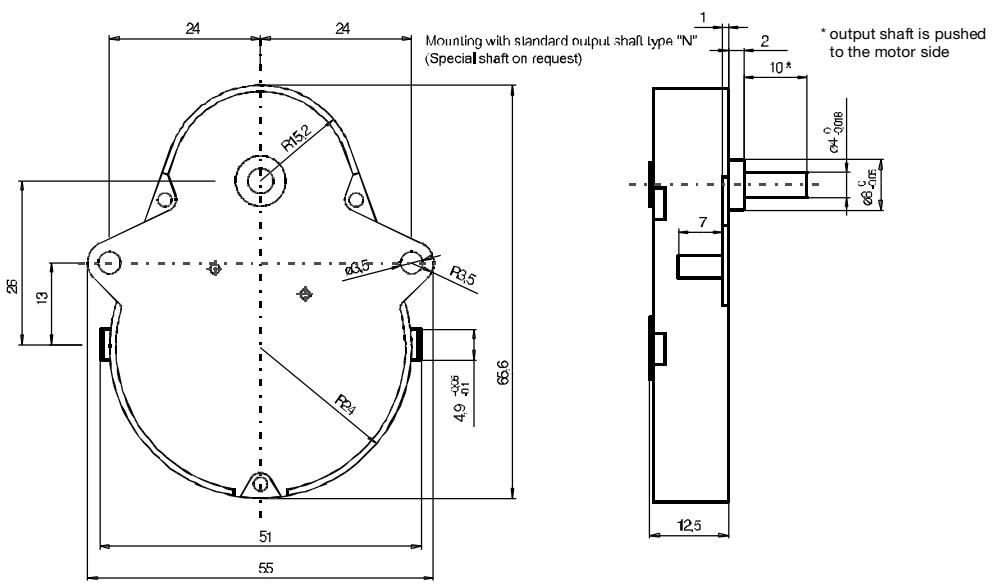
Ratios	4 1/6	5	8 1/3	10	12 1/2	15	16 2/3	20 5/6	25	30	33 1/3	40	41 2/3
	45	50	60	62 1/2	83 1/3	100	120	125	150	166 2/3	200	250	300
	375	500	600	625	750	900	1000	1200	1500	1800	2000	2400	2500
	3000	3600	3750	4500	5000	6000	7500	9000	10000	15000	18000	21600	22500
	30000	36000	45000	54000	60000	72000	90000	108000	112500	120000	180000	216000	225000
	270000	300000	360000	432000	450000	720000	864000	1800000	5040000	6048000			

Order Reference

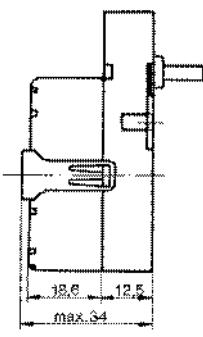
Type	Gearbox	UGD	;	100	;	N	;	5cNm	;	N
Ratio	100									
Slipping clutch	N	Without slipping clutch								
	ER	One-way slipping clutch, clockwise								
	EL	One-way slipping clutch, counter clockwise								
	Z	Two-way slipping clutch								
Slipping torque		5 cNm (for instance)								
Shaft end	N	$\emptyset 4 \times 10$, other on request								

UGD

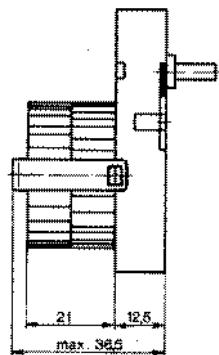
Dimensions



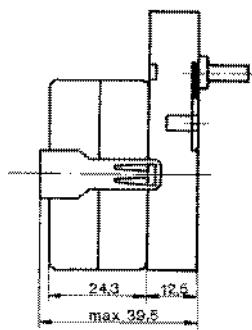
UDS 1..D



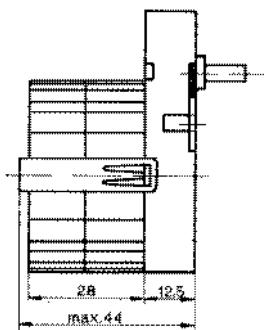
UBR 1/UBR 2..D



UDR 1..D



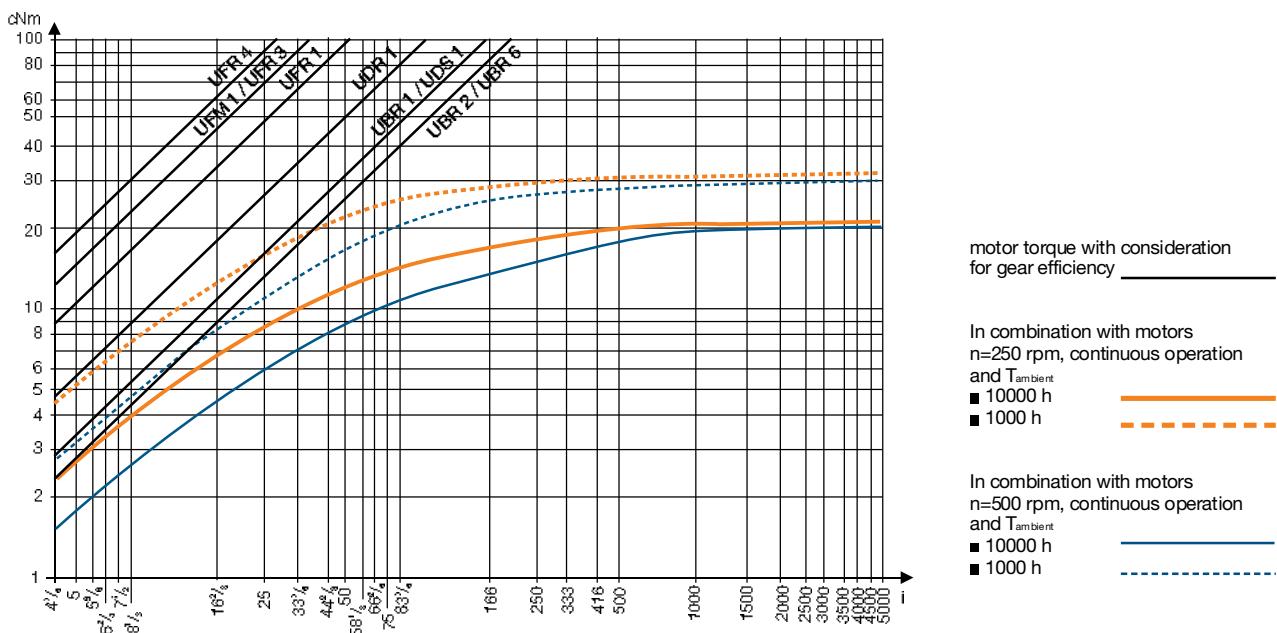
UFM 1/UFU 1/UFR 1..D



Slipping clutches

	max. torque available at output shaft (cNm)	free wheel-/clutch torque (cNm)
Roller-type free wheel	32	1
Single-way slipping clutches	32	4 ... 25 counter clockwise or clockwise function
Two-way slipping clutches	3 ... 15	4 ... 40

Torque / ratio / life graph



UGM

UGM

Dimensions (mm)	51 x 65.2
Height (mm)	15
Max. torque (cNm)	100
Ratios	12.5 ... 4800
Internal slipping clutch	none
Standard shaft (mm)	\varnothing 4 x 10
Weight (g)	45
Motor combination	Series UC, UB and UD; Series UF without UFR3/4 and UFB3/4



Standard Data

Mounting	any position
Axial thrust F_A	20 N
Lateral force F_R	100 N
Output shafts	\varnothing 4 x 10, other on request
Climatic class	wide-spread according to DIN IEC 60721-2-1
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -40 ... +80

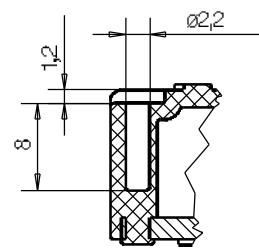
Ratios	12 1/2	16 2/3	25	50	100	120	150	200	240	300	400	450	500	600	
	750	1000	1200	1500	4800										

Order Reference

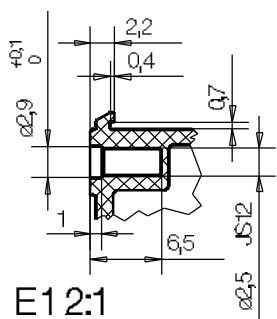
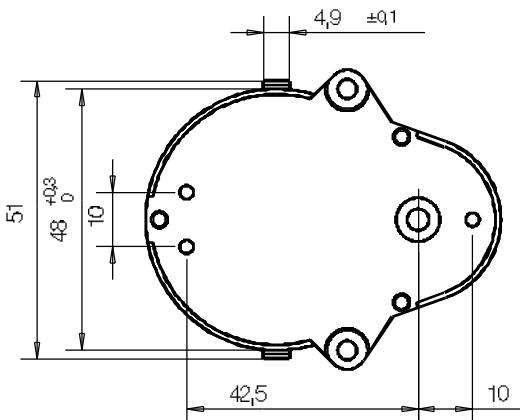
Type	Gearbox	UGM	:	100	N	N
Ratio	100					
Slipping clutch	N	Without slipping clutch				
Shaft end	N	\varnothing 4 x 10, other on request				

UGM

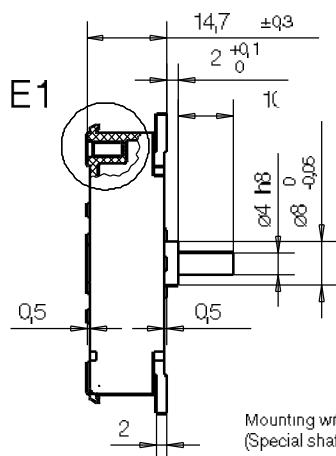
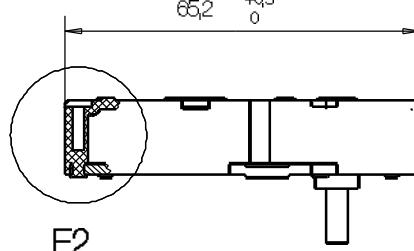
Dimensions



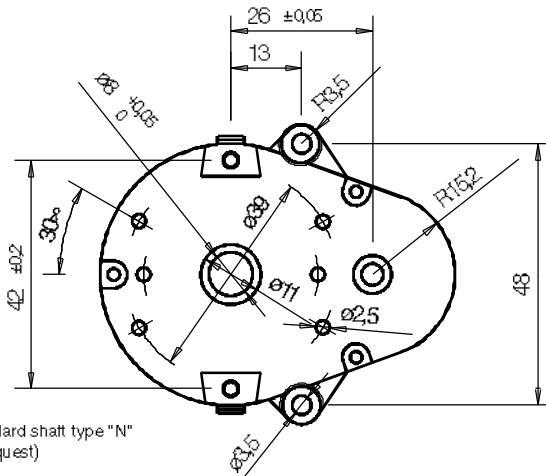
E22:1



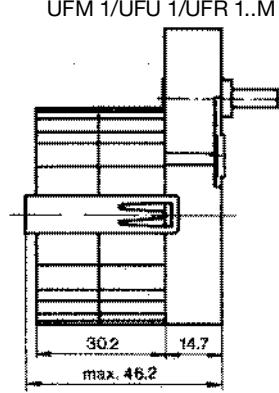
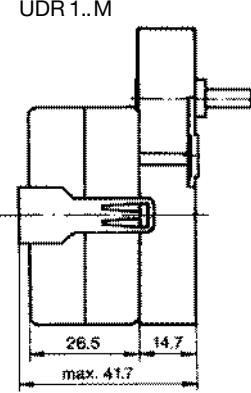
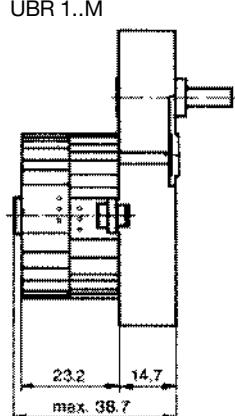
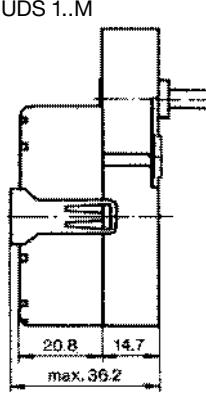
E12:1



E1



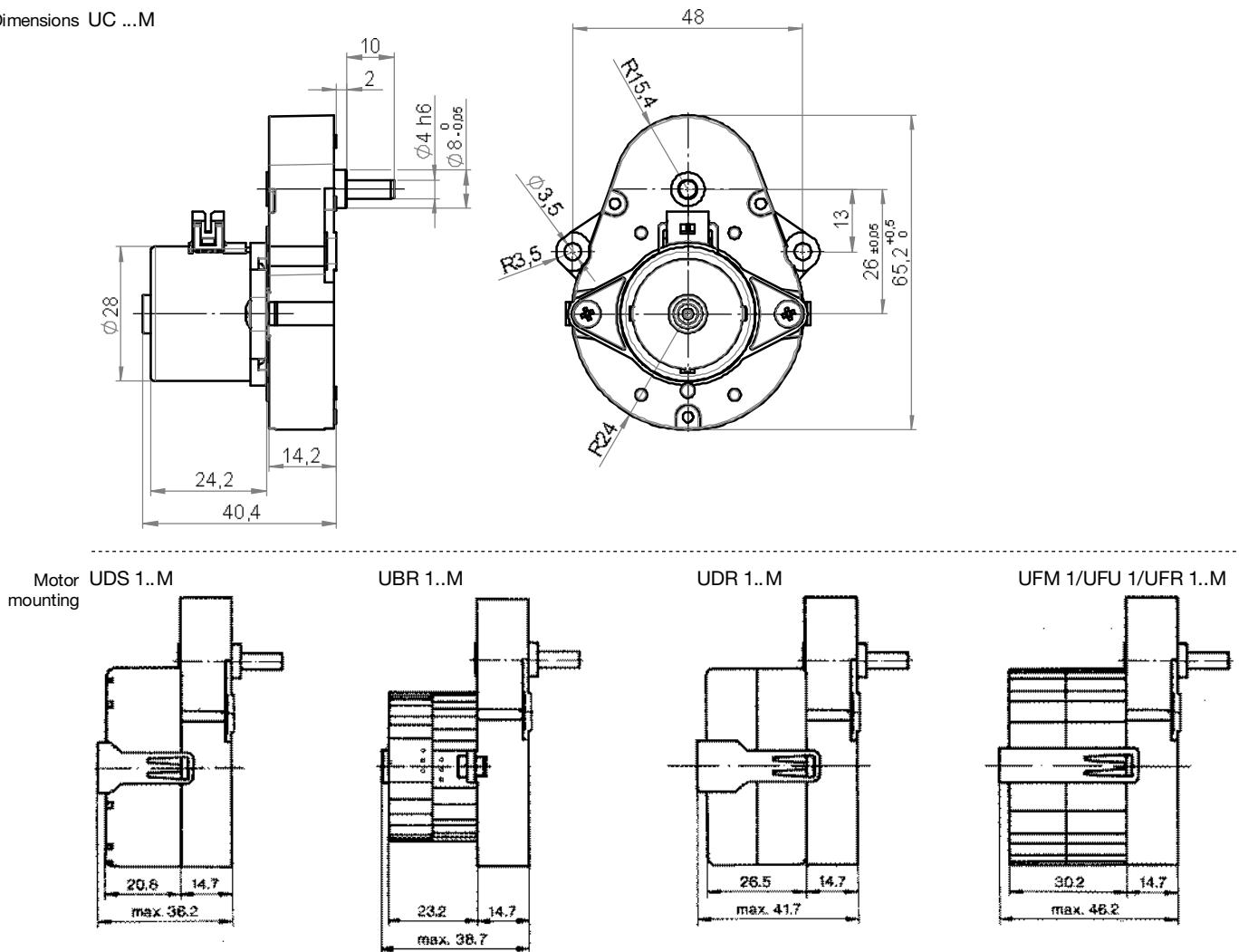
Mounting with standard shaft type "N"
(Special shaft on request)



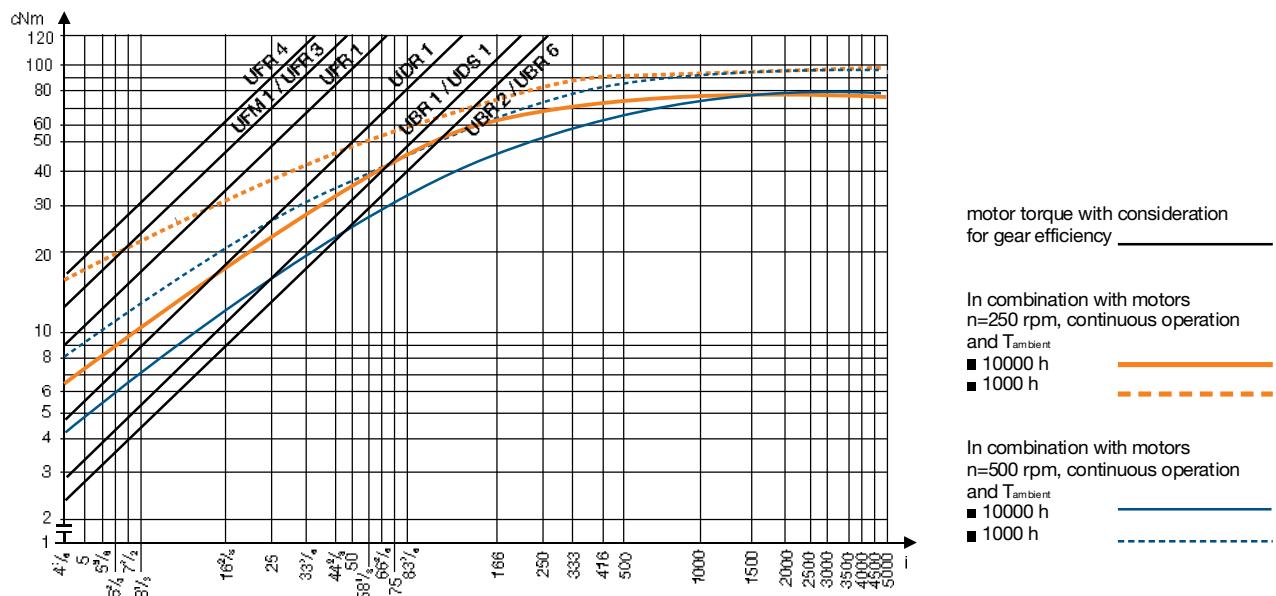
UGM

Gearboxes

Dimensions UC ...M



Torque / ratio / life graph



UGB

UGB

Dimensions (mm)	58 x 81
Height (mm)	17
Max. torque (cNm)	250
Ratios	41 ^{2/3} ... 345.600
Internal slipping clutch	optional
Standard shaft (mm)	Ø 8 x 12
Weight (g)	130
Motor combination	Series UC, UB and UD; Series UF without UFR3/4 and UFB3/4



Standard Data

Mounting	any position
Axial thrust F _A	100 N
Lateral force F _R	300 N
Slipping clutches/free wheel	single-way clockwise/counter clockwise function and two way
Slipping-/free wheel torque	4 ... 175 cNm
Output shafts	Ø 8 x 12, other on request
Climatic class	wide-spread according to DIN IEC 60721-2-1
Ambient temperature operation	°C -15 ... +55
Ambient temperature storage	°C -40 ... +80

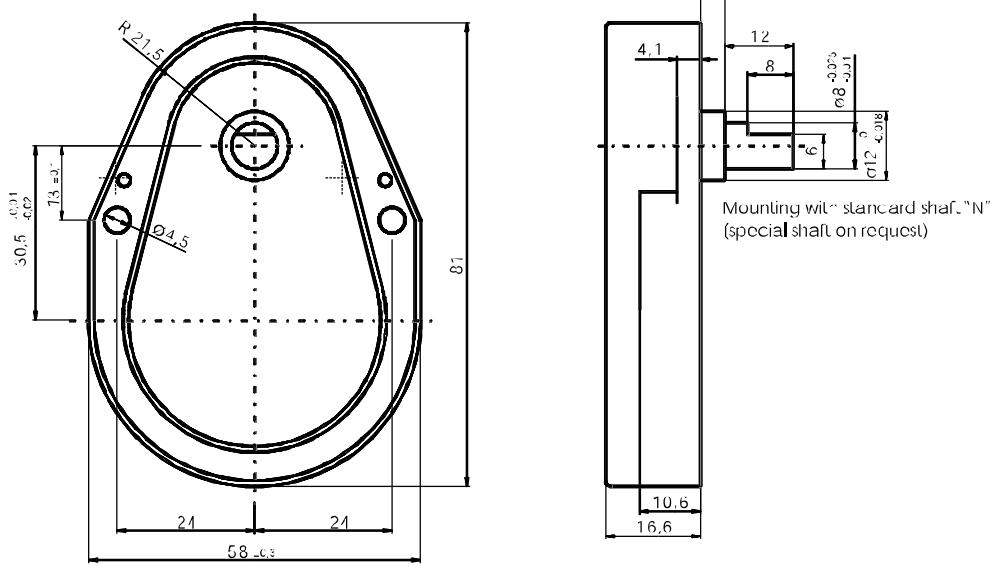
Ratios	41 2/3	83 1/3	100	125	150	166 2/3	200	250	300	500	600	750	900
	1000	1200	1500	1800	2000	2500	3000	3750	5000	6000	7500	12000	15000
	18000	30000	36000	60000	120000	266666 2/3	288000	320000	345600				

Order Reference

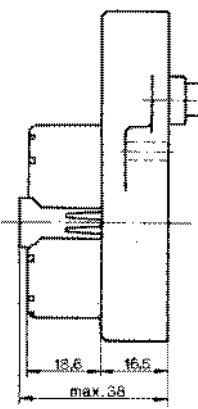
Type	Gearbox	UGB	100	N	5cNm	N
Ratio	100					
Slipping clutch	N Without slipping clutch ER One-way slipping clutch, clockwise EL One-way slipping clutch, counter clockwise Z Two-way slipping clutch					
Slipping torque	5 cNm					
Shaft end	N Ø 8 x 12, other on request					

UGB

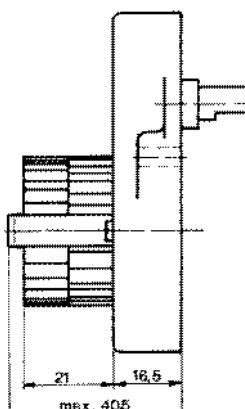
Dimensions



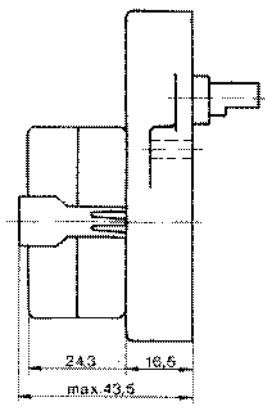
UDS 1..B



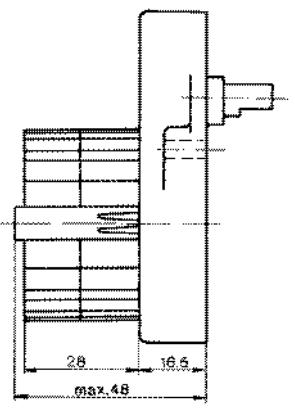
UBR 1/UBR 2..B



UDR 1..B



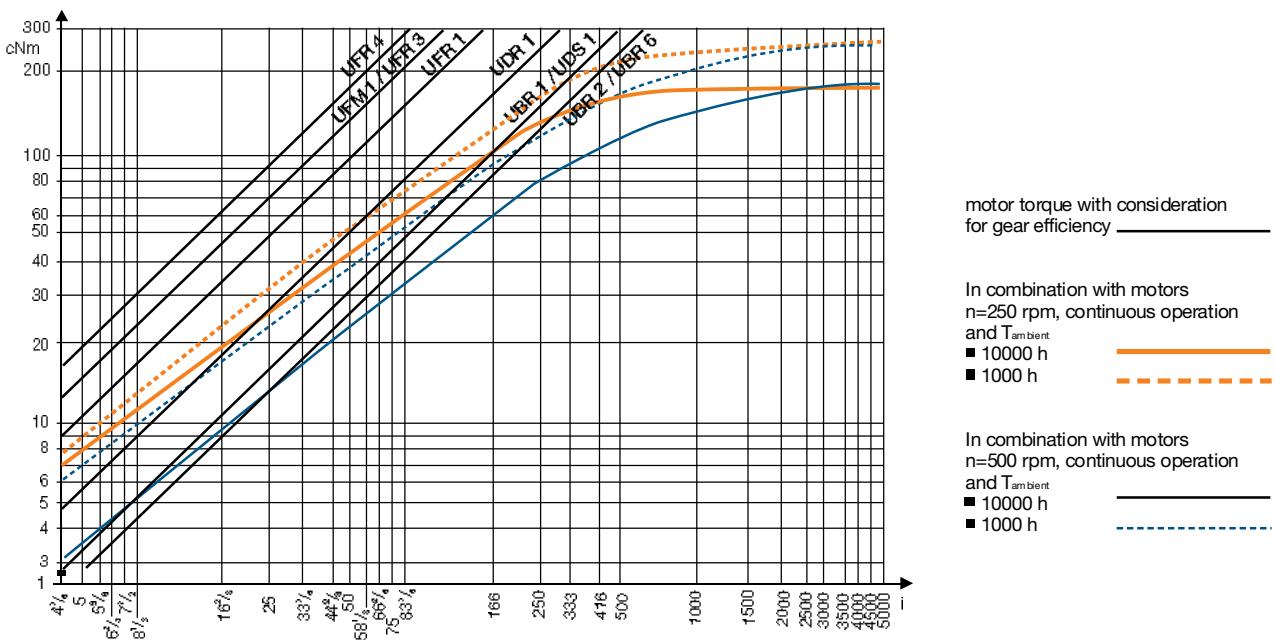
UFM 1/UFU 1/UFR 1..B



Slipping clutches

	max. torque available at output shaft (cNm)	free wheel-/clutch torque (cNm)
Roller-type free wheel		
Single-way slipping clutches	150	4 ... 50 counter clockwise or clockwise direction possible
Two-way slipping clutches	40 ... 70	60 ... 175

Torque / ratio / life graph



UGF

UGF

Dimensions (mm)	58 x 81
Height (mm)	17
Max. torque (cNm)	500
Ratios	4 1/6 ... 5000
Internal slipping clutch	none
Standard shaft (mm)	Ø 8 x 12
Weight (g)	130
Motor combination	Series UC, UB, UD, UF



Standard Data

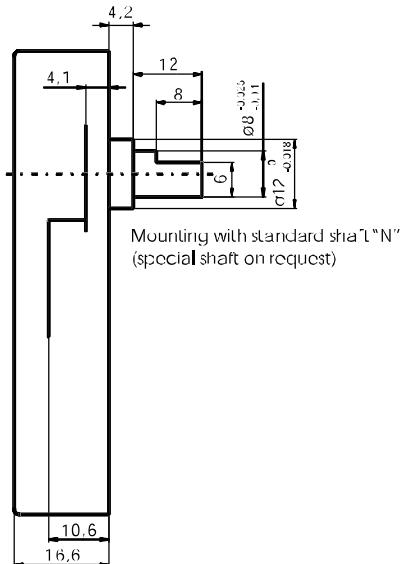
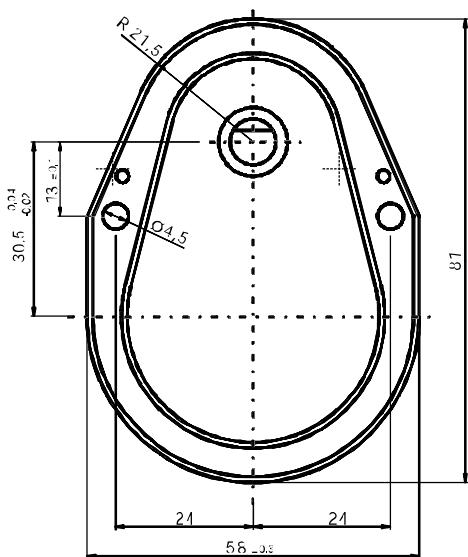
Mounting	any position
Axial thrust F _A	100 N
Lateral force F _R	400 N
Slipping clutches/free wheel	none
Slipping-/free wheel torque	cNm
Output shafts	Ø 8 x 12, other on request
Climatic class	wide-spread according to DIN IEC 60721-2-1
Ambient temperature operation	°C -15 ... +55
Ambient temperature storage	°C -40 ... +80
Ratios	4 1/6 8 1/3 16 2/3 20 5/6 25 30 41 2/3 50 62 1/2 83 1/3 100 125 166 2/3
	250 333 1/3 500 600 750 1000 1200 1500 4000 5000

Order Reference

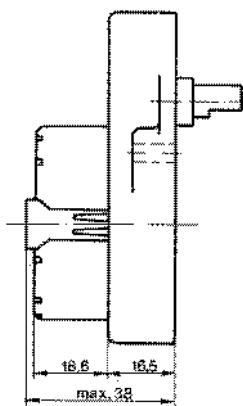
Type	Gearbox	UGF	:	100	:	N	:	N
Ratio	100							
Slipping clutch	N	Without slipping clutch						
Shaft end	N	Ø 8 x 12, other on request						

UGF

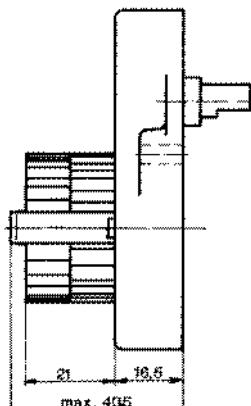
Dimensions



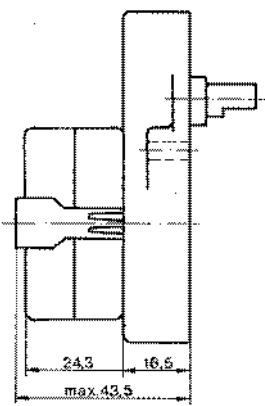
UDS 1..F



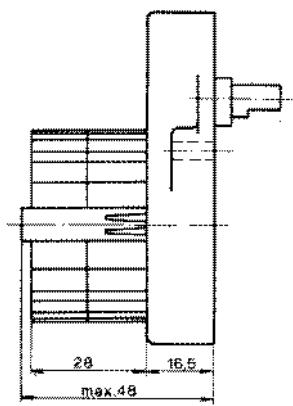
UBR 1/UBR 2..F



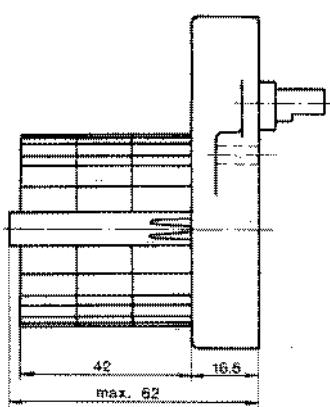
UDR 1..F



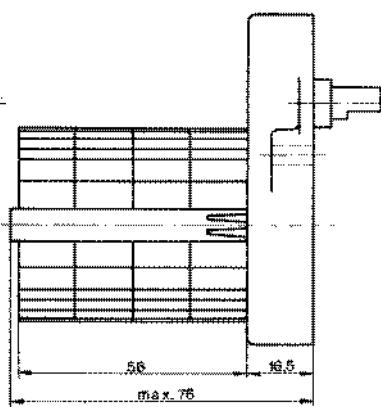
UFM 1/UFU 1/UFR 1..F



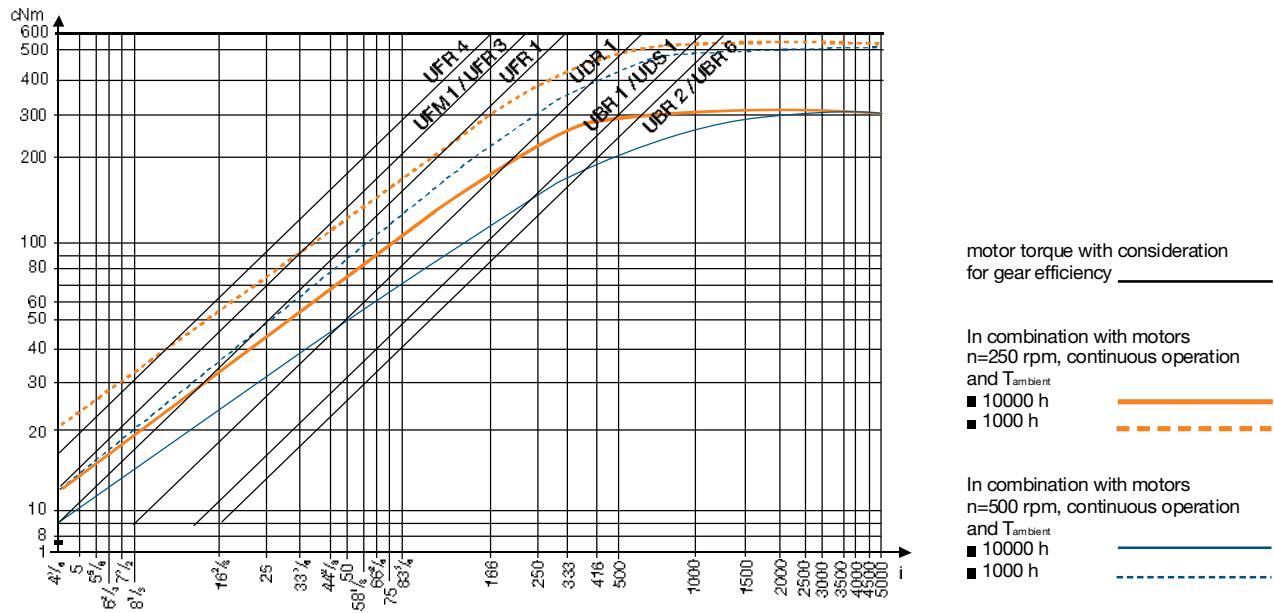
UFR 3..F



UFR 4..F



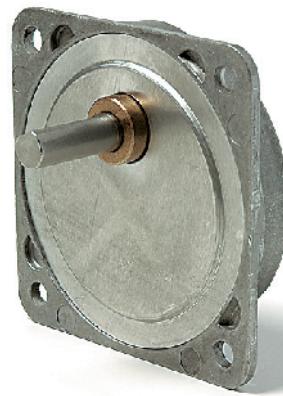
Torque / ratio / life graph



UGV

UGV

Dimensions (mm)	70 x 70
Height (mm)	17
Max. torque (cNm)	500
Ratios	8 $\frac{1}{3}$... 2000
Internal slipping clutch	none
Standard shaft (mm)	\varnothing 8 x 12
Weight (g)	130
Motor combination	Series UB, UD, UF



Standard Data

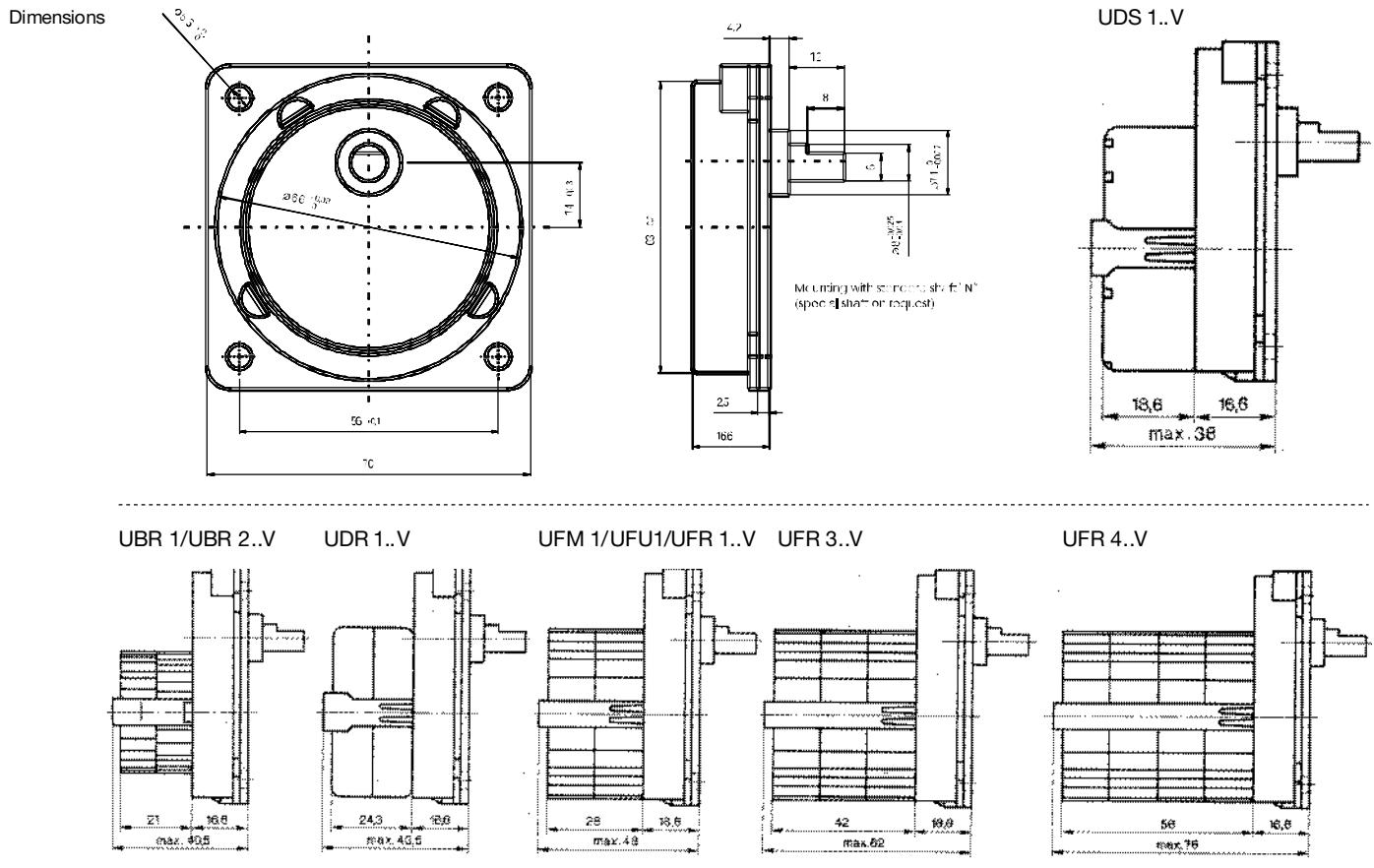
Mounting	any position
Axial thrust F _A	100 N
Lateral force F _R	400 N
Output shafts	\varnothing 8 x 12, other on request
Climatic class	wide-spread according to DIN IEC 60721-2-1
Ambient temperature operation	°C -15 ... +55
Ambient temperature storage	°C -40 ... +80

Ratios 8 1/3 16 2/3 25 41 2/3 83 1/3 100 125 250 500 2000

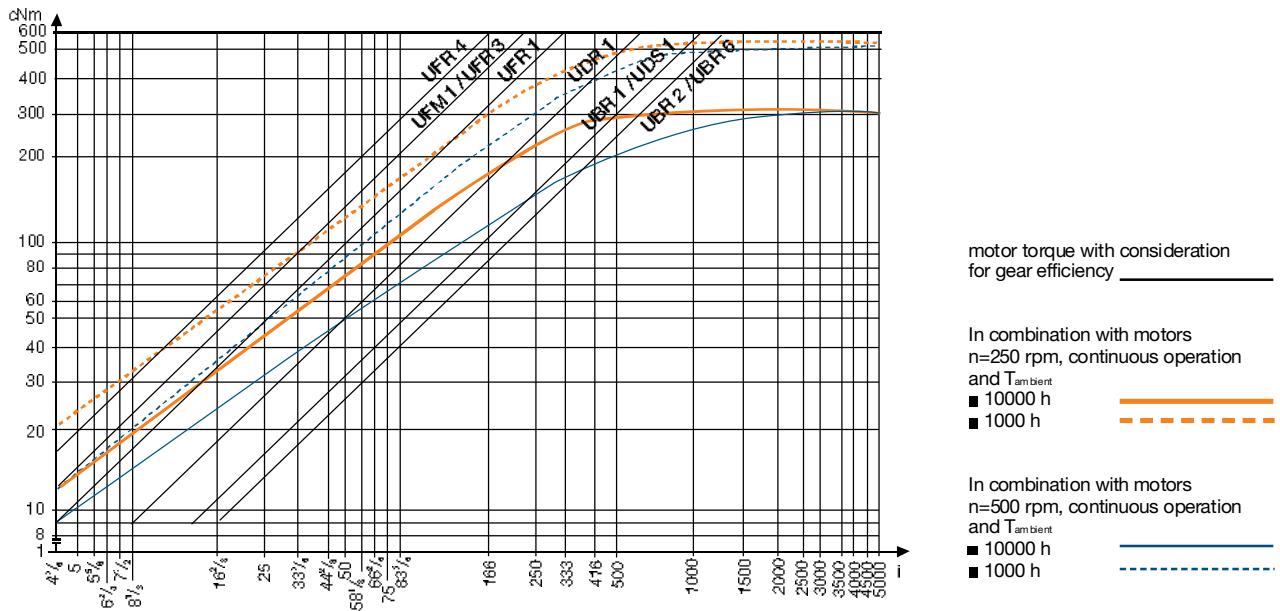
Order Reference

Type	Gearbox	UGV	:	100	N	N
Ratio	100					
Slipping clutch	N	Without slipping clutch				
Shaft end	N	\varnothing 8 x 12, other on request				

UGV



Torque / ratio / life graph



UGO/UGP

UGO/UGP (STG60/61)

Dimensions (mm)	65 x 65/68 x 68
Height (mm)	29.8–38
Max. torque (cNm)	600
Ratios	6 1/4 ... 3750
Internal slipping clutch	none
Standard shaft (mm)	Ø 8 x 22
Weight (g)	230–330
Motor combination	series UF and UP



UGO (STG 60)



UGP (STG 61)

Standard Data

Mounting	any position
Max. input speed*	3000 min ⁻¹
Max. output torque*	600 cNm
Max. input -and output power	please refer to table in Technical Data
Average back lash	unloaded 1.5 degree 2–4 stages with 6 Nm 3 degree 5–6 stages with 6 Nm 4 degree
Max. axial force F _A	30 N
Max. lateral force F _R , 12 mm from lange	80 N
Max. axial play	0.3 mm
Max. radial play	20 µm
Ambient temperature operation	–15...+60°C
Ambient temperature storage	–40 ... +100 °C

Ratio	6 1/4	12 1/2	18 3/4	25	31 1/4	37 1/2	46 7/8	50	62 1/2	75
	93 3/4	125	150	187 1/2	250	375	750	1500	2000	3750

* Depends on ratio, see next page

Order Reference

Type	Gearbox		STG60 UGO	6 1/4	M	N
Ratio	6 1/4					
Mounting layouts (fixing)	K	UGO				
	M	UGP	throughholes			
	R	M4	threads on gearbox flange side			
	T	M4	threads on motor side			
	V	M4	threads on both sides			
shaft end N Ø 8 x 25, other upon request						
motor pinion: see next pages	Motor Pinion Data					
optional adaptor plate: see next pages	for adaptor plate					

Ratio	Stages *	Efficiency	Pinion type	Weight	Max. torque (Nm)	Max. input speed (rpm)
6 1/4	2	0.77	1	190	1.0	750
12 1/2	3	0.68	2	220	1.8	1500
18 3/4	3	0.68	3	220	2.7	2250
25	3	0.68	3	220	3.6	3000
31 1/4	3	0.68	4	220	4.5	3000
37 1/2	3	0.68	4	220	5.4	3000
46 7/8	4	0.60	3	250	6	3000
50	4	0.60	2	250	6	3000
62 1/2	4	0.60	2	250	6	3000
75	4	0.60	3	250	6	3000
93 3/4	4	0.60	3	250	6	3000
125	4	0.60	2	250	6	3000
150	4	0.60	3	250	6	3000
187 1/2	4	0.60	4	250	6	3000
250	5	0.53	2	280	6	3000
375	5	0.53	3	280	6	3000
750	5	0.53	4	280	6	3000
1500	6	0.46	4	310	6	3000
2000	6	0.46	4	310	6	3000
3750	6	0.46	4	310	6	3000

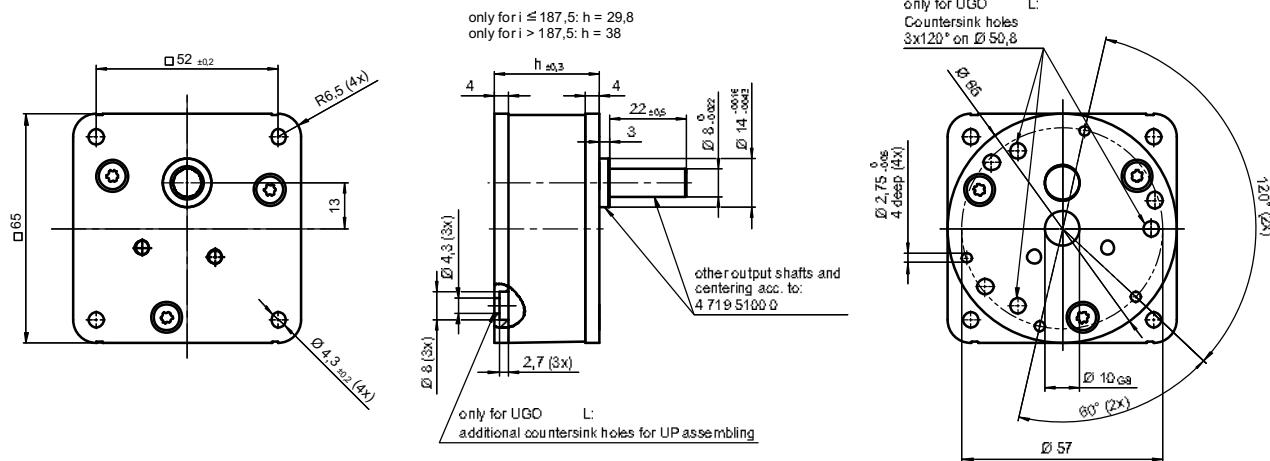
Additionally to the input speed limit: max. 120 rpm output speed

Technical Data valid for an ambient temperature operation: -15...+60°C

- * Direction of rotation of output- and motor-shaft at 2.4 and 6 stages - same
3 and 5 stages - opposite

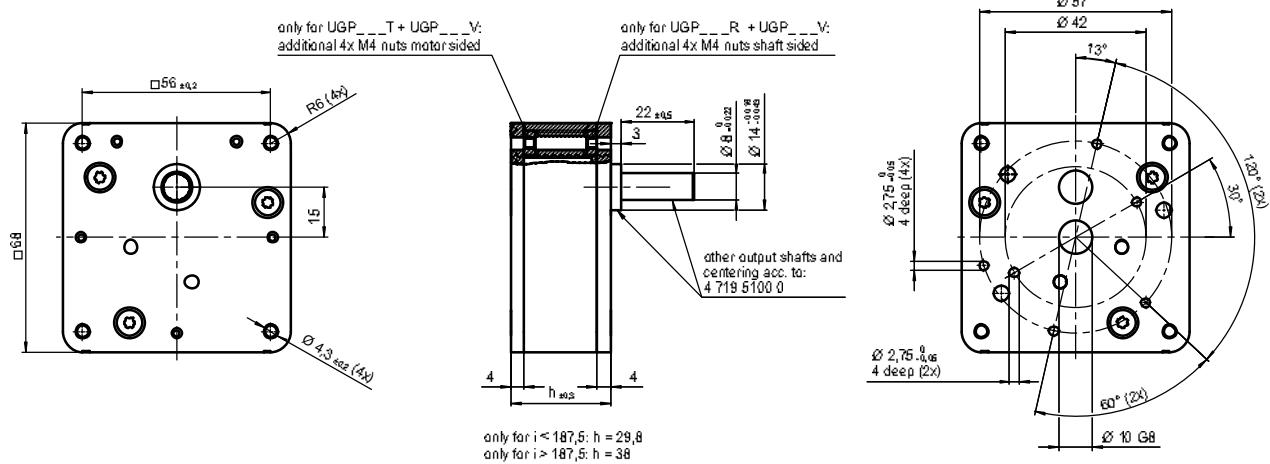
UGO/UGP

Dimensions UGO



not dimensioned holes suitable for adaptor plate AP60 (accessories)
holes $\varnothing 2.75$ are intended for thread forming screws M3

UGP



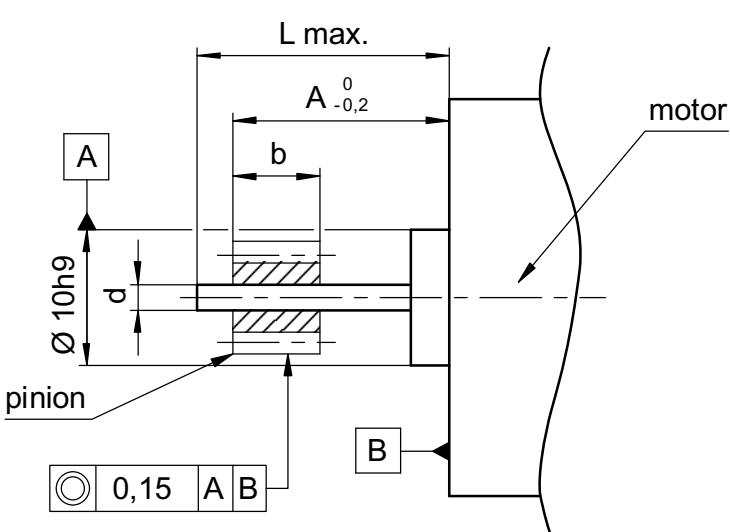
not dimensioned holes suitable for adaptor plate AP60 (accessories)
holes $\varnothing 2.75$ are intended for thread forming screws M3

Other shafts on request

UGO/UGP

Motor Pinion Data UGO/P (STG 60/61)

pinion type	pinion length b	motor pinion with hole d:			
		02.5S7	03S7	04X7	05S7
1	6	-	020	030	040
2	4.5	-	080	090	110
3	4.5	270	280	290	310
4	4.5	580	590	600	610



Pinion position	Dimension	A	L
2 gear stages		8,9 _{-0,2}	9,6 _{-0,7}
3-6 gear stages		7,6 _{-0,2}	7,6 _{-0,2}

AP 60

AP 60

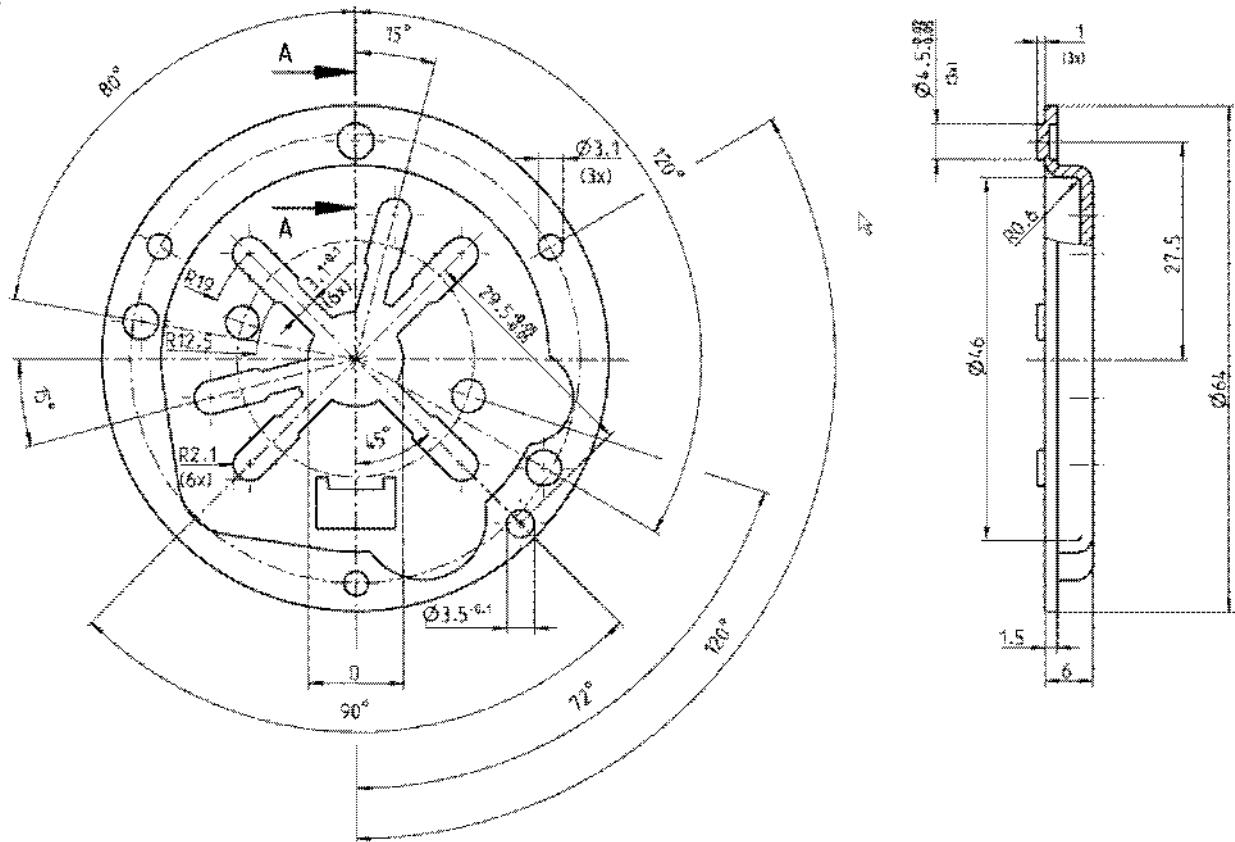
Dimensions (mm) 0 64

Height (mm) 6

Adaptor Plate Data AP 60

Adaptor plate	Motor type	Manufacturer	Centring Ø D	Order reference
AP 6012	G 30	Dunker	12	81B-001-002-010
AP 6022	G 42, GR 42		22	81B-001-002-016
AP 6014	M 28, M 32	GEFEG	14	81B-001-002-012
AP 6022	M 42, M 48		22	81B-001-002-016

Dimensions



UGJ

UGJ

Dimensions (mm)	65 x 107
Height (mm)	28
Max. torque (cNm)	1500
Ratios	4 ¹ / ₆ ... 36.000.000
Internal slipping clutch	none
Standard shaft (mm)	Ø 12 x 20
Weight (g)	480
Motor combination	Series UB, UD, UF



Standard Data

Mounting	any position
Axial thrust F _A	400 N
Lateral force F _R	600 N
Output shafts	Ø 12 x 20, other on request
Climatic class	wide-spread according to DIN IEC 60721-2-1
Ambient temperature operation	°C -15 ... +55
Ambient temperature storage	°C -40 ... +80

Ratios*	4 1/6	8 1/3	16 2/3	33 1/3	41 2/3	50	66 2/3	83 1/3	100	125	150	166 2/3	200
250	500	1000	2000	2500	3000	4000	5000	6250	8333 1/3	10000	12500	15000	
20000	25000	30000	37500	60000	75000	120000	150000	300000	375000	750000	1500000	1800000	
2250000	3000000	3600000	4500000	6000000	9000000	11250000	12000000	18000000	36000000				

* For ratio ≥ 2500 combination with UGD

Order Reference

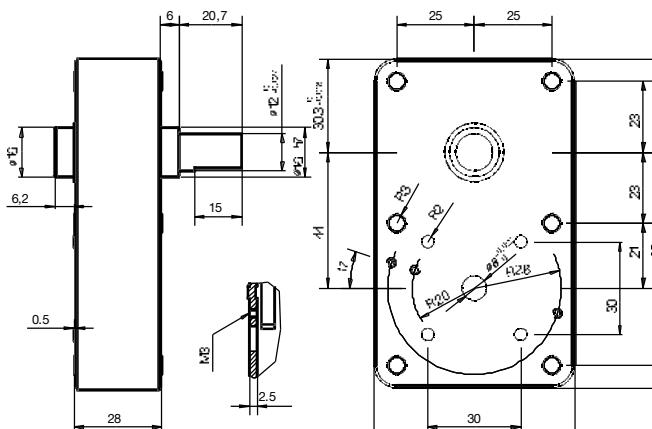
Type	Gearbox	UGJ	;	100	;	N	;	N
Ratio	100							
Slipping clutch	N	Without slipping clutch						
Shaft end	N	Ø 12 x 20, other on request						

UGJ

Dimensions

$i \leq 2000$

$i \geq 2500$



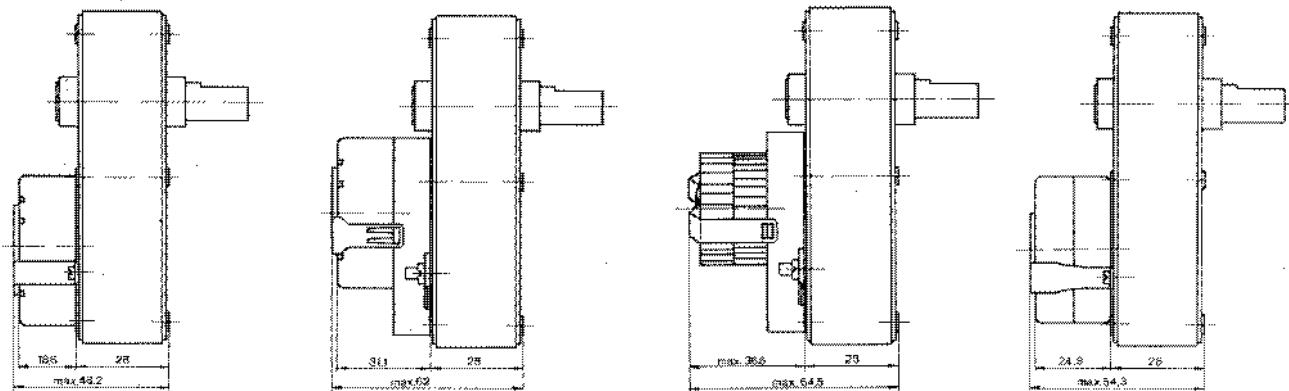
Lead outlet (A = standard position)

UDS 1..J, ≤ 2000

UDS 1..J, ≥ 2500

UBR 1/UBR 2..J, ≥ 2500

UDR 1..J, ≤ 2000

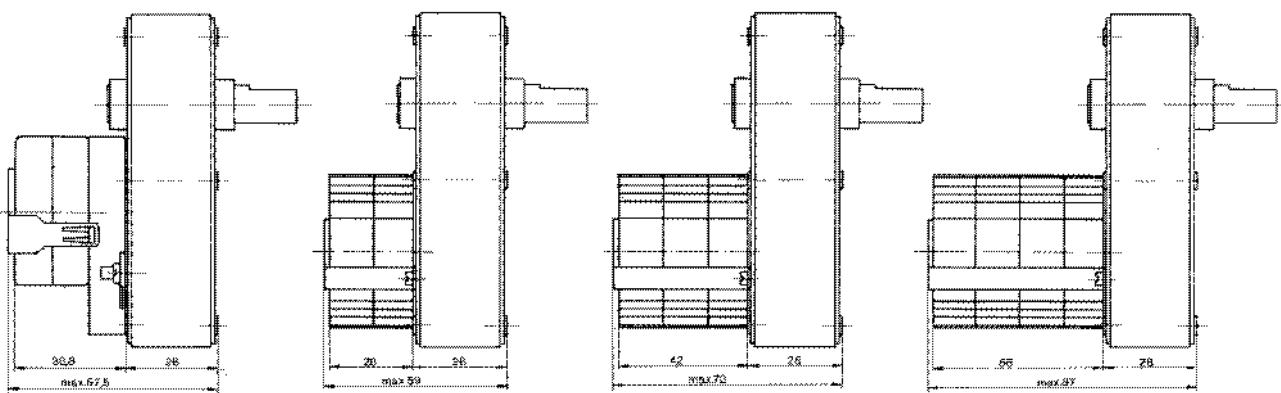


UDR 1..J, $i \geq 2500$

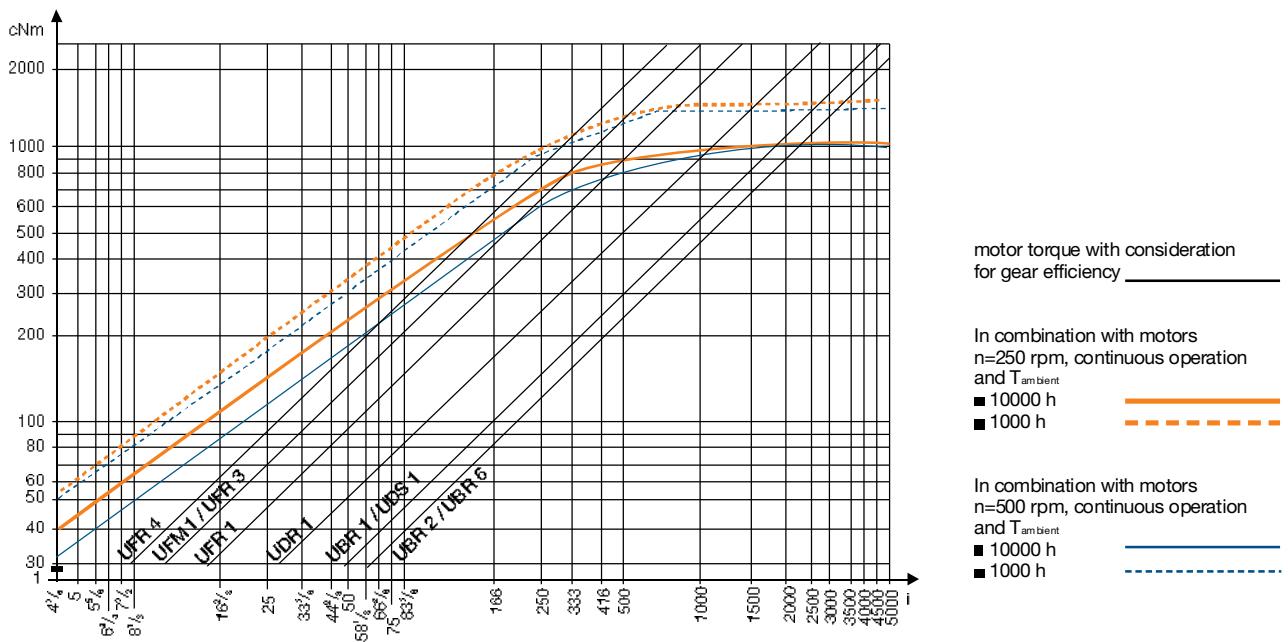
UFM 1/UFU 1/UFR 1..J, i ≤ 2000

UFR 3..J, $i \leq 2000$

UFR 4..J, i ≤ 2000



Torque / ratio / life graph



UGR

UGR (STG 200)

Dimensions (mm)	70 x 130
Height (mm)	38
Max. torque (cNm)	2000
Ratios	12.5 ... 375
Internal slipping clutch	none
Standard shaft (mm)	Ø 12 x 35
Weight (g)	depends on ratio
Motor combination	UP



Standard Data

Mounting	any position
Max. input speed *	3000 min ⁻¹
Max. output torque *	2000 cNm
Max. input -and output power *	please refer to table in Technical Data
Average back lash unload	0.75°
2/3 stages with 4/10 Nm	1.25°
4/5 stages with 15/20 Nm	2°
Max. axial force F _A	60 N
Max. lateral force F _R , 20 mm from lange	80 N
Max. axial play	0.3 mm
Max. radial play	83 µm
Ambient temperature operation	-15...+60°C
Ambient temperature storage	-40 ... +100 °C

Ratio	12 1/2	37 1/2	62 1/2	75	93 3/4	125	250	375
-------	--------	--------	--------	----	--------	-----	-----	-----

* Depends on ratio, see next page

Order Reference

Type	Gearbox		UGR	12 1/2	N	N
Ratio	12 1/2					
Mounting layouts	N standard					
Shaft end	N Ø 12 x 35, others upon request					
optional	motor pinion: see next pages		Motor Pinion Data			

Technical Data

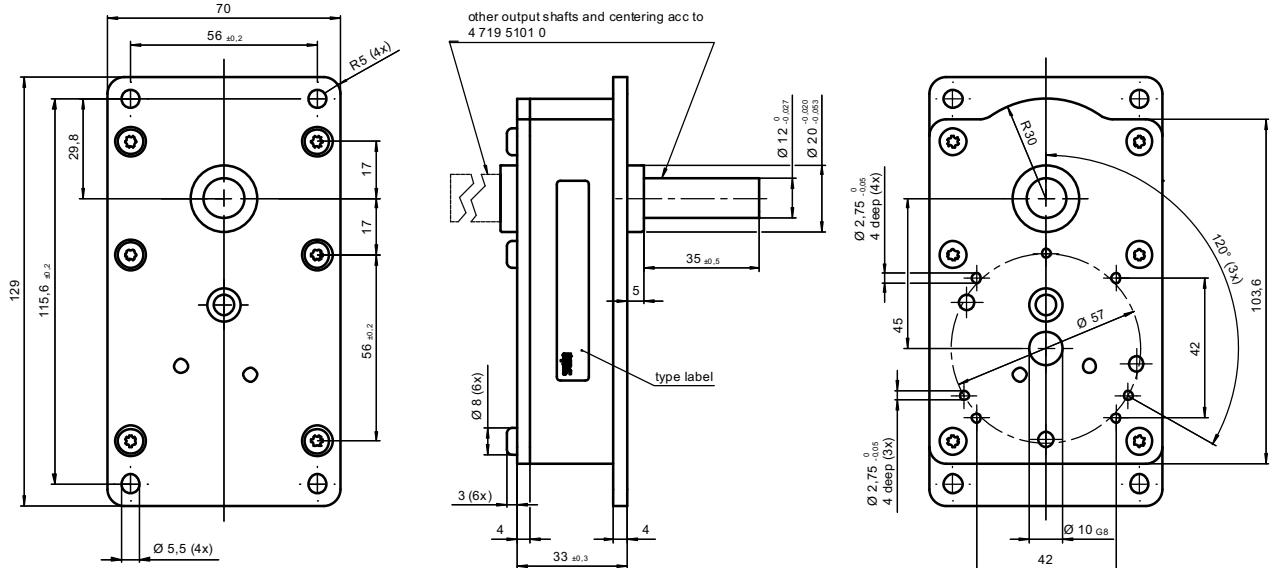
Ratio	Stages *	Efficiency	Pinion type	Weight	Max. torque (Nm)	Max. input speed (rpm)
12 1/2	2	0.77	1	560	3.6	1500
37 1/2	3	0.68	2	580	9.9	3000
62 1/2	4	0.60	3	600	14.6	3000
75	4	0.60	4	600	17.5	3000
93 3/4	4	0.60	4	600	20	3000
125	4	0.60	4	600	20	3000
250	5	0.53	5	620	20	3000
375	5	0.53	2	620	20	3000

Additionally to the input speed limit: max. 120 rpm output speed

Technical Data valid for an ambient temperature operation: -15...+60°C

- * Direction of rotation of output- and motor-shaft at 2 and 4 stages - same
3 and 5 stages - opposite

Dimensions other shafts on request

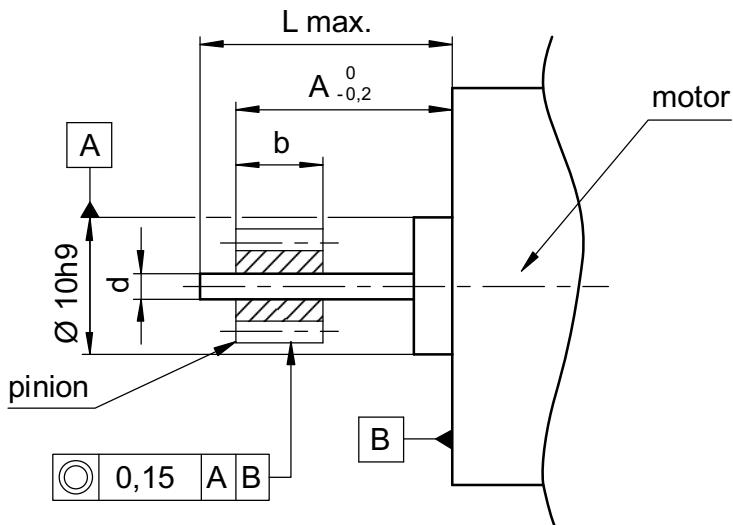


not dimensioned holes suitable for adaptor plate AP60 (accessories)
holes Ø2.75 are intended for thread forming screws M3

Motor Pinion Data

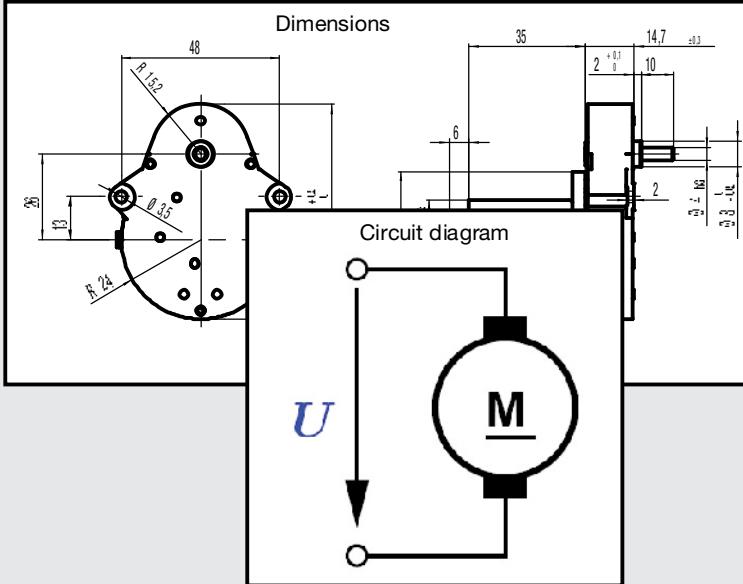
pinion type	pinion length b	motor pinion with hole d:		
		022 100 020 ...		
		Ø3S7	Ø4X7	Ø5S7
1	11.5	-	130	140
2	6.8	280	290	300
3	11.5	360	370	380
4	11.5	400	410	-
5	6.8	-	250	260

Dimensions for
motor assembly



Pinion position	Dimension	,,a“	,,b“ max.	,,b“ min.
2 gear stages		16.1-0.2	28	10
3 gear stages		10.3-0.2	10.3	8.1
4 gear stages		15.1-0.2	15	8.1 (13.5 bei Ø 5)
5 gear stages		10.9-0.2	11	8.1

Gearboxes with DC & BLDC Motors



 JOHNSON
ELECTRIC

innovating motion

UGM-DC

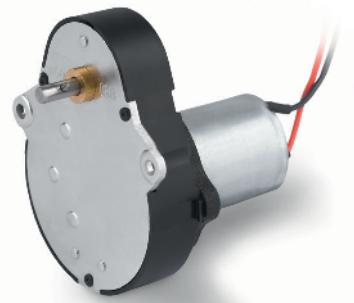
Gearbox UGM with DC Motor PC280LG

Voltage (Vdc)
Height (mm)

12/24

Max. torque
(cNm)

60



Standard Data

Ambient temperature operation	°C -10 ... +55
Ambient temperature storage	°C -20 ... +80
Rotor stalling	not permissible
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Electrical connection	terminals
Mounting	any position
Weight	105 g
Axial thrust	20 N
Lateral force	100 N
Output shaft	Ø 4 × 10 mm (others on request)
Slipping clutch	no
Bearings	sintered bronze, self-lubricating

Order Reference

Motor type	JP	DC Motor (brushed)	JP	2	A	N	M4	M	40C	N	N	N
Motor size	2	diameter 24.4 mm										
Motor version	A	12 V; no-load speed 3600 rpm										
	B	24 V; no-load speed 2400 rpm										
Approval	N	standard										
Voltage	M1	12 Vdc										
	M4	24 Vdc										
Gearbox size	M											
Gear ratio	40 C	400										
Connection	N	terminals, without lead wire										
	A	with lead wire and connector (on request)										
Slipping clutch	N	without slipping clutch										
Shaft end	N	standard shaft Ø 4 × 10, others on request										

Technical Data

Motor JP2A

Voltage supply	V	12
No-load motor speed	rpm	3600
Rated motor speed	rpm	2900
Rated motor current	mA	105
Rated motor torque	cNm	0.24

Gear ratio	120	150	240	300	400	500	1000	1500
Rated output speed	rpm	24	20	12	10	8	6	3
Rated output torque	cNm	18	23	36	45	60	60	60

Motor JP2B

Voltage supply	V	24
No-load motor speed	rpm	2400
Rated motor speed	rpm	1800
Rated motor current	mA	34
Rated motor torque	cNm	0.19

Gear ratio	120	150	240	300	400	500	1000	1500
Rated output speed	rpm	15	12	8	6	4.5	4	2
Rated output torque	cNm	14	18	28	36	48	59	60

All values approximate. Speed tolerance on request.

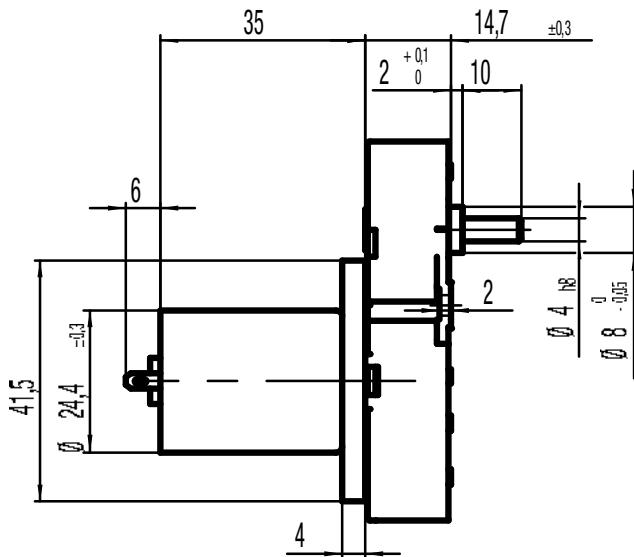
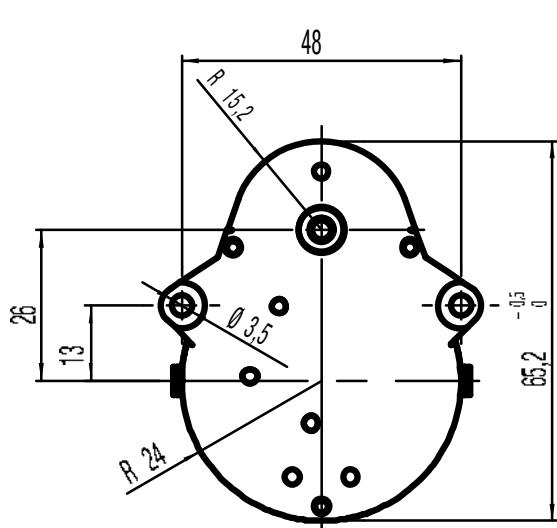
Output torque permissible max. 60cNm.

Continuous duty cycle permissible at rated torque.

Higher torque at lower duty cycle on request.

Lifetime on request.

Dimensions



UGB-DC

Gearbox with UGB DC Motor PC280LG

Voltage (Vdc)
Height (mm)

12/24

Max. torque
(cNm)

200



Standard Data

Ambient temperature operation	°C -10 ... +55
Ambient temperature storage	°C -20 ... +80
Rotor stalling	not permissible
Approval	standard
Electrical connection	terminals
Mounting	any position
Weight	200 g
Axial thrust	100 N
Lateral force	300 N
Output shaft	Ø 8 × 12 mm (others on request)
Slipping clutch	optional
Bearings	sintered bronze, self-lubricating

Order Reference

Motor type	JP	DC Motor (brushed)	JP	2	A	N	M4	B	30C	N	N	N
Motor size	2	diameter 24.4 mm										
Motor version	A	12 V; no-load speed 3600 rpm										
	B	24 V; no-load speed 2400 rpm										
Approval	N	standard										
Voltage	M1	12 Vdc										
	M4	24 Vdc										
Gearbox size	B											
Gear ratio	30 C	300										
Connection	N	terminals, without lead wire										
	A	with lead wire and connector (on request)										
Slipping clutch	N	without slipping clutch										
Shaft end	N	standard shaft Ø 8 × 12, others on request										

UGB-DC

Technical Data

Motor JP2A

Voltage supply	V	12
No-load motor speed	rpm	3600
Rated motor speed	rpm	2900
Rated motor current	mA	105
Rated motor torque	cNm	0.24

Gear ratio	150	200	300	500	600	750	1000	1500
Rated output speed	rpm	20	15	10	6	5	4	3
Rated output torque	cNm	23	30	45	75	90	115	150

Motor JP2B

Voltage supply	V	24
No-load motor speed	rpm	2400
Rated motor speed	rpm	1800
Rated motor current	mA	34
Rated motor torque	cNm	0.19

Gear ratio	150	200	300	500	600	750	1000	1500
Rated output speed	rpm	12	9	6	4	3	2.5	2
Rated output torque	cNm	18	24	36	59	70	90	120

All values approximate. Speed tolerance on request.

Output torque permissible max. 200cNm.

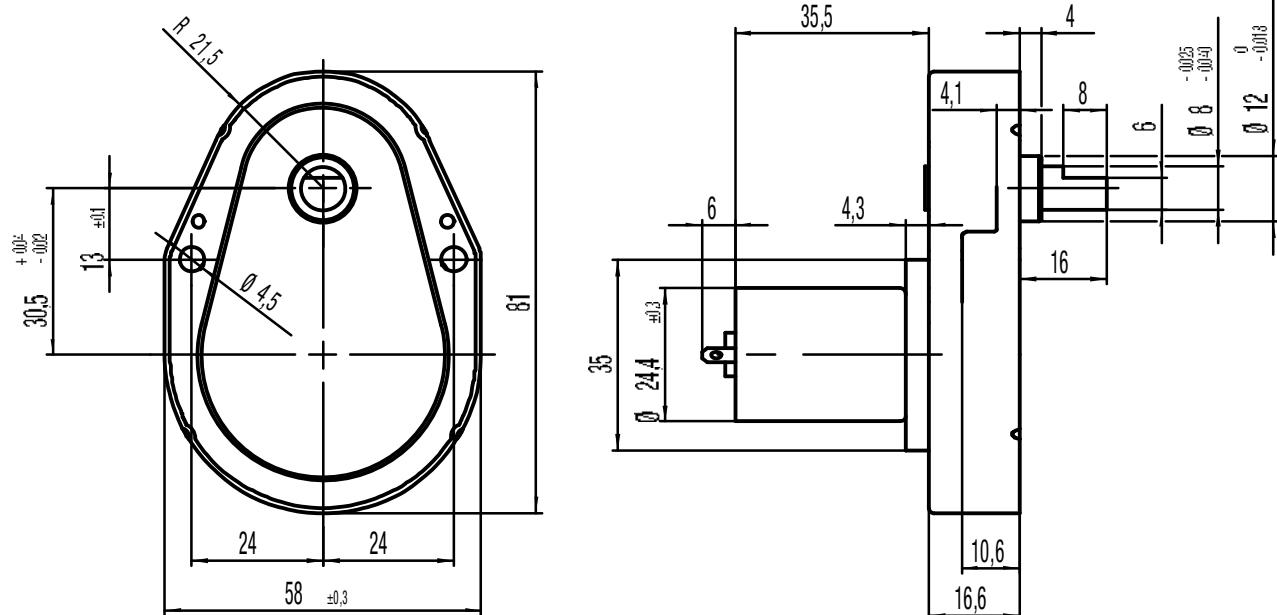
Continuous duty cycle permissible at rated torque.

Higher torque at lower duty cycle on request.

Lifetime on request.

Other gear ratios on request.

Dimensions



UGF-DC

Gearbox UGF with DC Motor HC485G

Voltage (Vdc) 12/24

Max. torque
(cNm) 400



Standard Data

Ambient temperature operation	°C -10 ... +55
Ambient temperature storage	°C -20 ... +80
Rotor stalling	not permissible
Approval	standard
Electrical connection	terminals
Mounting	any position
Weight	290 g
Axial thrust	100 N
Lateral force	400 N
Output shaft	Ø 8 × 12 mm (others on request)
Slipping clutch	no
Bearings	sintered bronze, self-lubricating

Order Reference

Motor type	JP	DC Motor (brushed)	JP	4	A	N	M4	F	33C	N	N	N
Motor size	4	diameter 31.2 mm										
Motor version	A	12 V; no-load speed 4500 rpm										
	B	24 V; no-load speed 4600 rpm										
Approval	N	standard										
Voltage	M1	12 Vdc										
	M4	24 Vdc										
Gearbox size	F											
Gear ratio	33C	333										
Connection	N	terminals, without lead wire										
	A	with lead wire and connector (on request)										
Slipping clutch	N	without slipping clutch										
Shaft end	N	standard shaft Ø 8 × 12, others on request										

Technical Data

Motor JP2A

Voltage supply	V	12
No-load motor speed	rpm	4500
Rated motor speed	rpm	3700
Rated motor current	mA	520
Rated motor torque	cNm	1.0

Gear ratio	125	166	250	333	500	750	1000	1200
Rated output speed	rpm	30	22	15	11	7.5	5	3.7
Rated output torque	cNm	80	100	150	200	300	400	400

Motor JP2B

Voltage supply	V	24
No-load motor speed	rpm	4600
Rated motor speed	rpm	3900
Rated motor current	mA	260
Rated motor torque	cNm	1.0

Gear ratio	125	166	250	333	500	750	1000	1200
Rated output speed	rpm	31	23	16	12	8	5.2	3.9
Rated output torque	cNm	80	100	150	200	300	400	400

All values approximate. Speed tolerance on request.

Output torque permissible max. 400cNm.

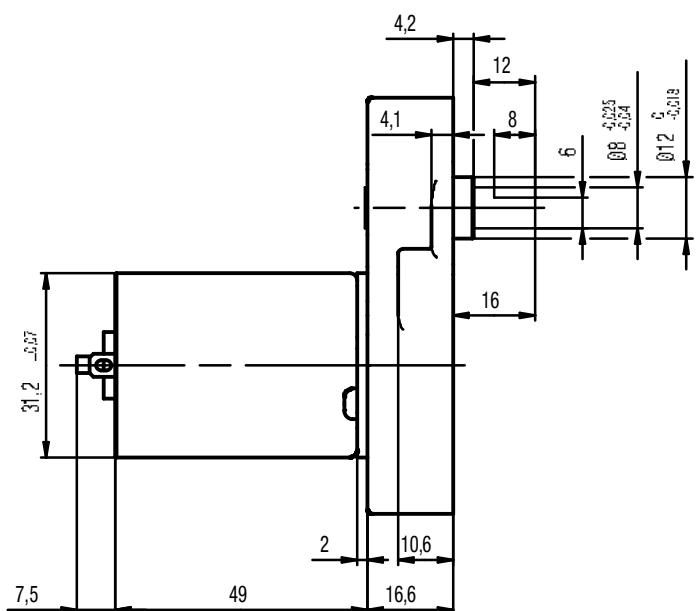
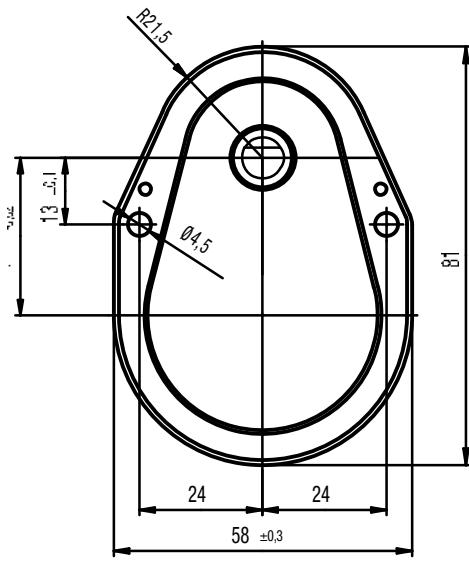
Continuous duty cycle permissible at rated torque.

Higher torque at lower duty cycle on request.

Lifetime on request.

Other gear ratios on request.

Dimensions



UGO-DC

Gearbox UGO with BLDC Motor E9IDS

Voltage (Vdc)	24
Max. torque (cNm)	600
Characteristics	Driver electronics integrated inside motor
Options	Closed loop speed control Brake feature by relay shortcut circuit



Standard Data

Ambient temperature operation	°C 0 ... +50
Ambient temperature storage	°C -20 ... +80
Rotor stalling	not permissible
Approval	standard
Electrical connection	connector at motor
Mounting	any position
Weight	500 – 600 g
Axial thrust	30 N
Lateral force	80 N
Output shaft	Ø 8 × 25 mm (others on request)
Slipping clutch	no
Bearings	bronze

Order Reference

Motor type	JP	BLDC Motor (brushed)	JP	9	B	N	M4	O	75C	A	N	N
Motor size	9	diameter 50 mm										
Motor version	B	24 V; no-load speed 5900 rpm										
Approval	N	standard										
Voltage	M4	24Vdc										
Gearbox size	O											
Gear ratio	75C	750										
Connection	N	lead wires										
	A	with connector at motor										
Slipping clutch	N	without slipping clutch										
Shaft end	N	standard shaft Ø 8 × 25, others on request										

UGO-DC

Technical Data

Motor JP2A

Voltage supply	V	24
No-load motor speed	rpm	5900
Rated motor speed	rpm	4600
Rated motor current	mA	850
Rated motor torque	cNm	3.0

Gear ratio	18.75	37.5	62.5	93.75	125	187.5	375	750
Rated output speed	rpm	240	120	74	48	37	24	12
Rated output torque	cNm	40	80	120	170	230	340	600

All values approximate. Speed tolerance on request.

Output torque permissible max. 600cNm.

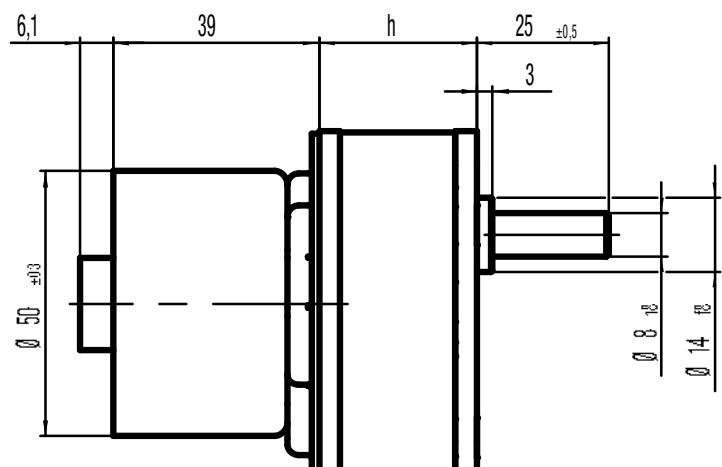
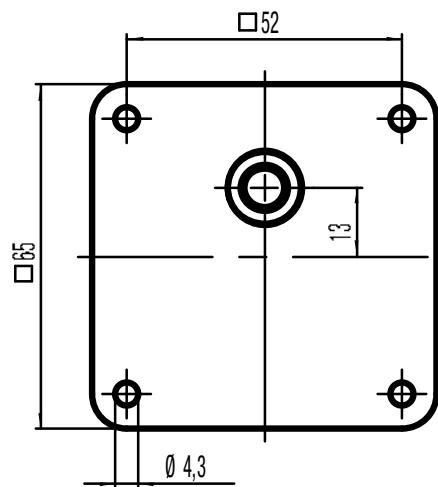
Continuous duty cycle permissible at rated torque.

Higher torque at lower duty cycle on request.

Lifetime on request.

Other gear ratios on request.

Dimensions



$h = 29.8$ (ratio max. 187,5)
 $h = 38$ (ratio >187,5)

UGP-DC

Gearbox UGP with DC Motor HC785G

Voltage (Vdc) 24

Max. torque
(cNm) 600



Standard Data

Ambient temperature operation	°C 0 ... +50
Ambient temperature storage	°C -20 ... +80
Rotor stalling	not permissible
Approval	standard
Electrical connection	terminals
Mounting	any position
Weight	500 – 600 g
Axial thrust	30 N
Lateral force	80 N
Output shaft	Ø 8 × 25 mm (others on request)
Slipping clutch	no
Bearings	bronze

Order Reference

Motor type	JP	DC Motor (brushed)	JP	7	B	N	M4	P	37C	N	N	N
Motor size	7	diameter 42 mm										
Motor version	B	24 V; no-load speed 4500 rpm										
Approval	N	standard										
Voltage	M4	24 Vdc										
Gearbox size	P											
Gear ratio	37C	375										
Connection	N	terminals, without lead wire										
	A	with lead wire and connector (on request)										
Slipping clutch	N	without slipping clutch										
Shaft end	N	standard shaft Ø 8 × 25, others on request										

Technical Data

Motor JP7B

Voltage supply	V	24
No-load motor speed	rpm	4500
Rated motor speed	rpm	3800
Rated motor current	mA	900
Rated motor torque	cNm	3.5
Gear ratio		18.75 37.5 62.5 93.75 125 187.5 375 750
Rated output speed	rpm	200 100 60 40 30 20 10 5
Rated output torque	cNm	45 90 140 200 270 400 600 600

All values approximate. Speed tolerance on request.

Output torque permissible max. 600cNm.

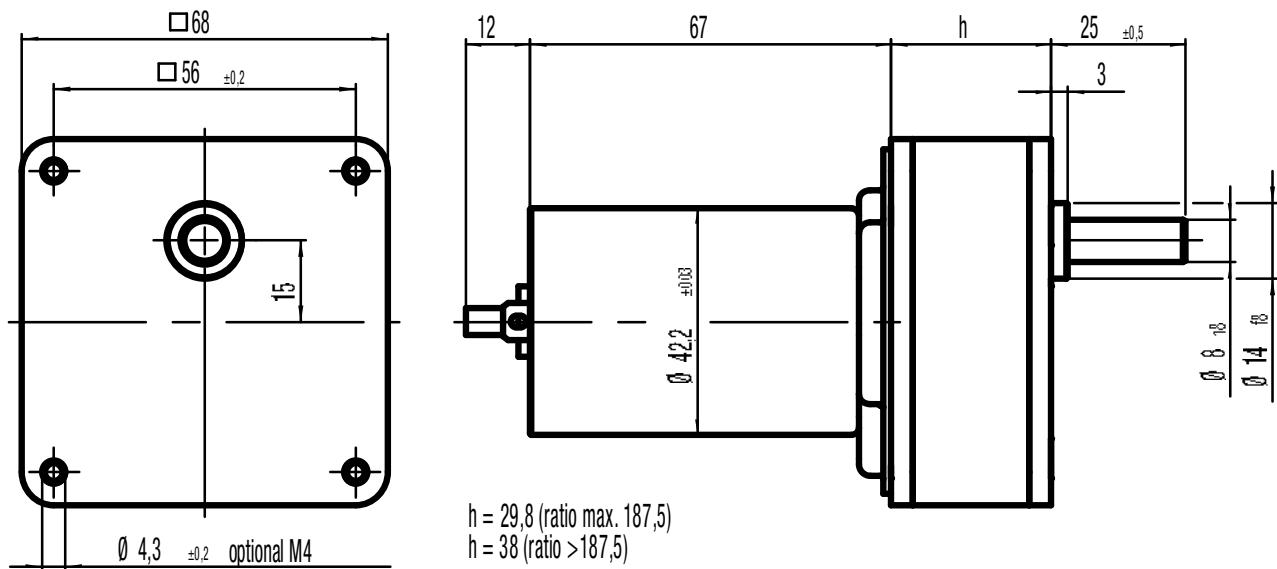
Continuous duty cycle permissible at rated torque.

Higher torque at lower duty cycle on request.

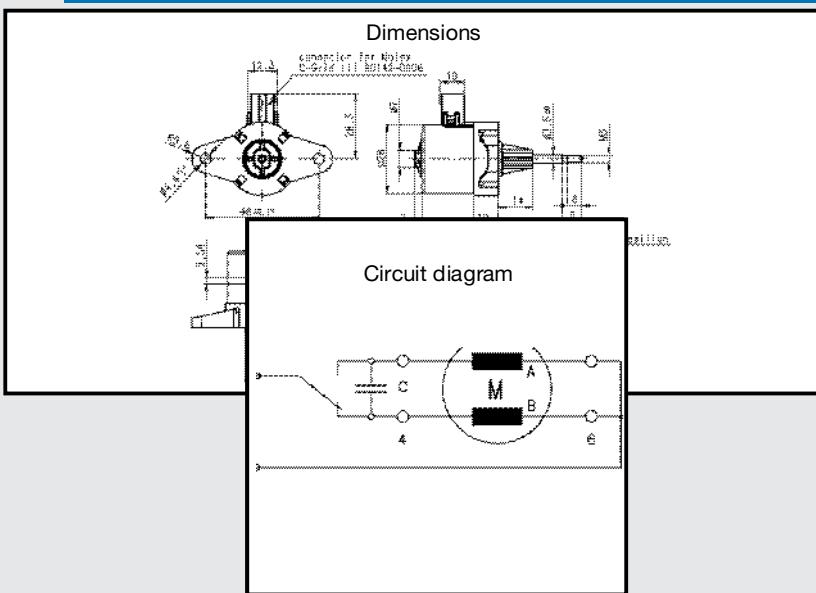
Lifetime on request.

Other gear ratios on request.

Dimensions



Synchronous Motors Linear



UCC1/7

Dimensions (mm)	\varnothing 28 x 31
Travel (mm)	10/13
Voltage (V) **	12–230
Speed (mm/s)	
50 Hz	4.16
60 Hz	5
Max. Force (N)*	35



* Depends on winding, frequency and lifetime required. Values for connector versions (C, D) / lead wire versions (N) up to 20 % lower.
Drive against end stops only permissible after clarification of operating conditions and approval by Saia motors.
Radial forces on the shaft will reduce life time and performance.

** regard circuit diagram and connector type

Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Winding coil temperature increase	K 60
Approval	standard
Mounting	any position
Electrical connection	connector type C, D, N
Protection	IP40 according to DIN EN 60529 : 2000
Weight	67 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	ball bearing

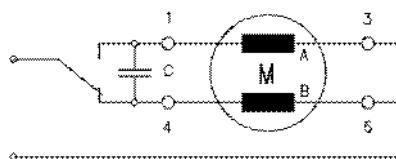
Order Reference

Type	Synchronous Motor	UCC	13	N	B4	D	1B
Configuration	13 standard magnet	73	stronger magnet				
Approval	N						
Voltage/frequency	see next pages						
Connection	C see next pages "Connection Types" and page 145 "Connection Types" for B						
	D						
Shaft	1B Travel 13 mm ± 0.7 mm (other standard shafts see under dimensions)						

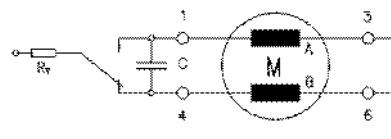
Technical Data

Rated frequency	Hz	50	
Axial speed	mm/s	4.16	
Tolerance of voltage		standard power supply system +10% / -10%	
Linear travel max.	mm	10/13	
Axial play at ± 20 N force	mm	< 0.25	
Winding temperature T_{max}		130	
Rated voltage U_N	V	12	24
Duty cycle	%	100	100
Resistance R_{20}	Ω	53	210
Capacitor C_{50}	$\mu F/V \pm 10\%$	18/20	4.7/40
Winding code		B1	B4
			C8

Circuit diagram Parallel circuit 12 V, 24 V, 48 V

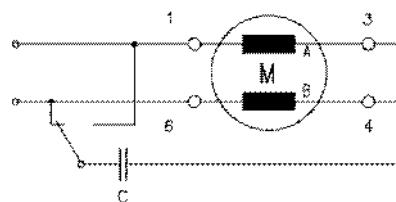


Parallel circuit 230 V (only for connector N)
with 110 V motor and resistor R_V

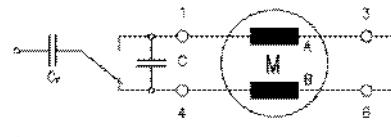


$$R_V = 5.6 \text{ k}\Omega, 3 \text{ W}$$

Series circuit 110 V (only for connector N)



Parallel circuit 230 V (only for connector N)
with 110 V motor and capacitor C_V



$$C_V = 0.33 \mu F, 250 \text{ VAC}$$

switch to

1 Pull (in)

4 Push (out)

6 Push (out)
(for series circuit)

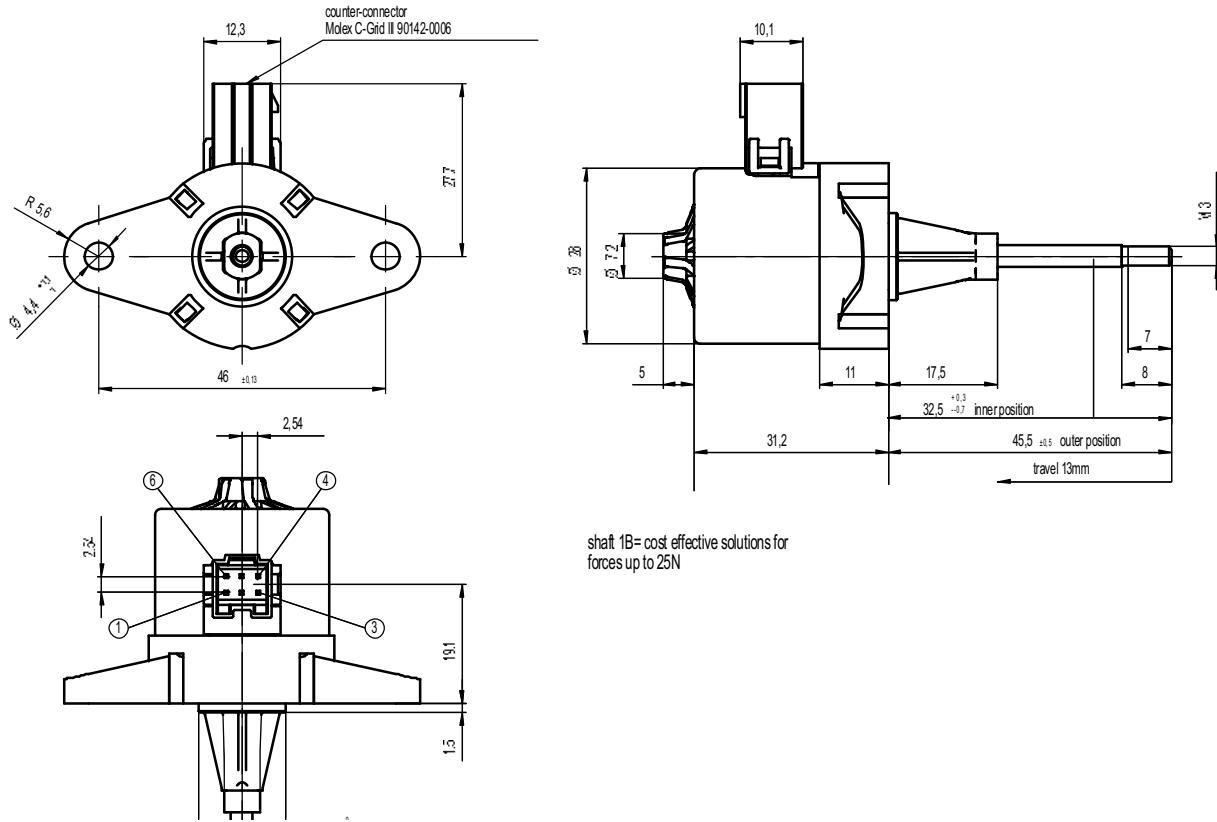
¹⁾ 110 V version available with 150 mm lead wires AWG26 only

Standard versions:

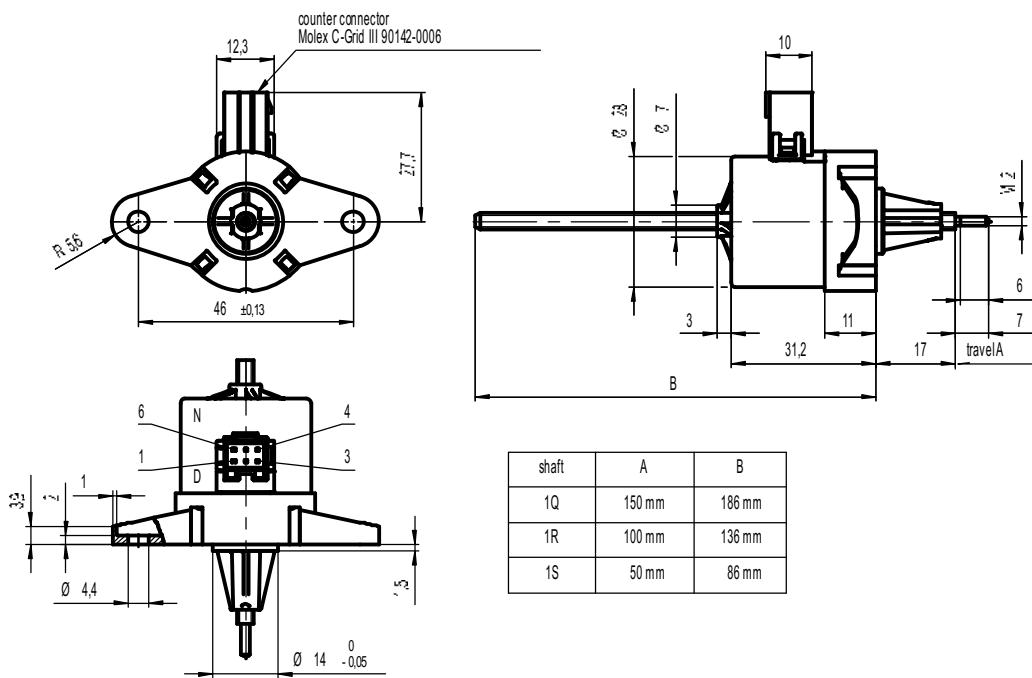
Shaft type (see dimensions)	Order code
1B	UCC13NC8N1BZ4
1E	UCC13NC8N1EZ4
1S	UCC13NC8N1SZ4
1R	UCC13NC8N1RZ4
1Q	UCC13NC8N1QZ4

UCC

Dimensions Version with Connector D, with 13 mm travel, shaft 1B and 1E

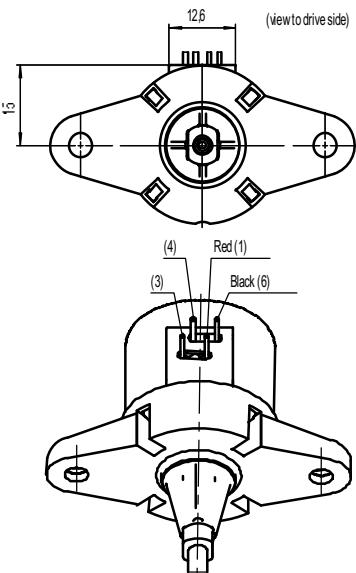


Version with Connector D, with 50..150 mm travel, shaft 1R, 1S, 1Q



UCC

Dimensions 110 V version with lead wires



different lead colours for 110V (230V)
for rotary synchronous motors in serials circuit

Force		connector version		lead wire version	
		50 Hz	60 Hz	50 Hz	60 Hz
UCC1	100 %	38 N	40 N	30 N	33 N
	30%	46 N	48 N	37 N	39 N
UCC7	100 %	45 N	47 N	37 N	40 N
	30%	55 N	56 N	46 N	48 N

UCK 1/7

Dimensions (mm)	Ø 28 x 31
Travel (mm)	10/13
Voltage (V) **	12–230
Speed (mm/s)	
50 Hz	8.33
60 Hz	10
Max. Force (N)*	35



* Depends on winding, frequency and lifetime required. Values for connector versions (C, D) / lead wire versions (N) up to 20 % lower.
Drive against end stops only permissible after clarification of operating conditions and approval by Saia motors.
Radial forces on the shaft will reduce life time and performance.

** regard circuit diagram and connector type

Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Winding coil temperature increase	K 60
Approval	standard
Mounting	any position
Electrical connection	connector type C, D, N
Protection	IP40 according to DIN EN 60529 : 2000
Weight	67 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	ball bearing

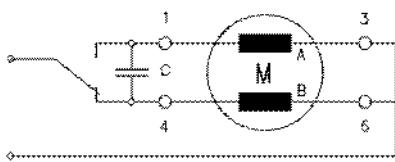
Order Reference

Type	Synchronous Motor	UCK	13	N	B4	D	1B
Configuration	13 standard magnet	73	stronger magnet				
Approval	N						
Voltage/frequency	see next page						
Connection	C see next pages "Connection Types" and page 145 "Connection Types" for B						
	D						
Shaft	1B Travel 13 mm ± 0.7 mm (other standard shafts see under dimensions)						

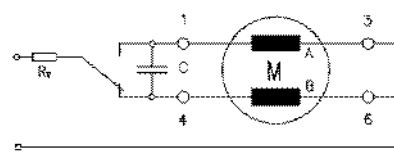
Technical Data

Rated frequency	Hz	50
Speed	mm/s	8.33
Tolerance of voltage		standard power supply system +10% / -10%
Axial play at 20 N force	mm	< 0.25
Duty cycle	%	100 %
Winding temperature T_{max}		130
Rated voltage U_N	V	12 24 110 ¹⁾
Duty cycle	%	100 100 100
Resistance R_{20}	Ω	59 230 5500
Capacitor C_{50}	μF / V $\pm 10\%$	22/20 5.6/40 0.27/200
Winding code		B1 B4 C8/H8

Circuit diagram Parallel circuit 12 V, 24 V, 48 V



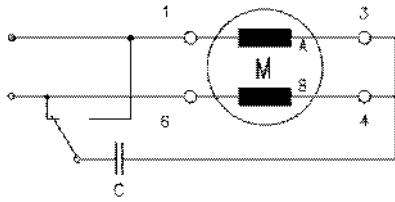
Parallel circuit 230 V (only for connector N)
with 110 V motor and resistor R_V



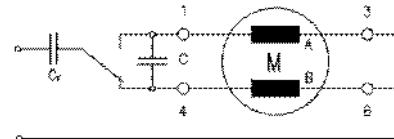
switch to
1 Pull (in)
4 Push (out)
6 Push (out)
(for series circuit)

$$R_V = 5.6 \text{ k}\Omega, 3 \text{ W}$$

Series circuit 110 V (only for connector N)



Parallel circuit 230 V (only for connector N)
with 110 V motor and capacitor C_V



$$C_V = 0.33 \mu F, 250 \text{ VAC}$$

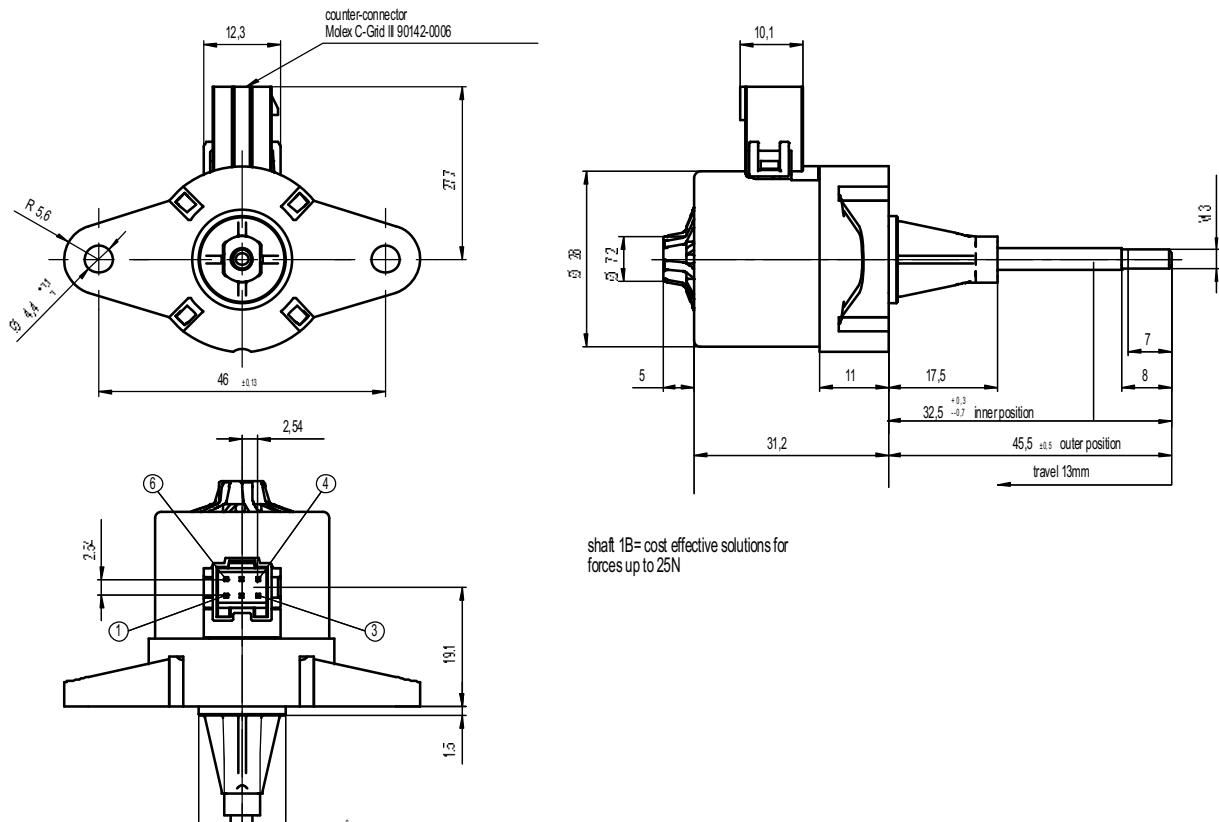
¹⁾ 110 V version available with 150 mm lead wires AWG26 only

Standard versions:

Shaft type (see dimensions)	Order code
1B	UCK13NC8N1BZ2
1E	UCK13NC8N1EZ2
1S	UCK13NC8N1SZ2
1R	UCK13NC8N1RZ2
1Q	UCK13NC8N1QZ2

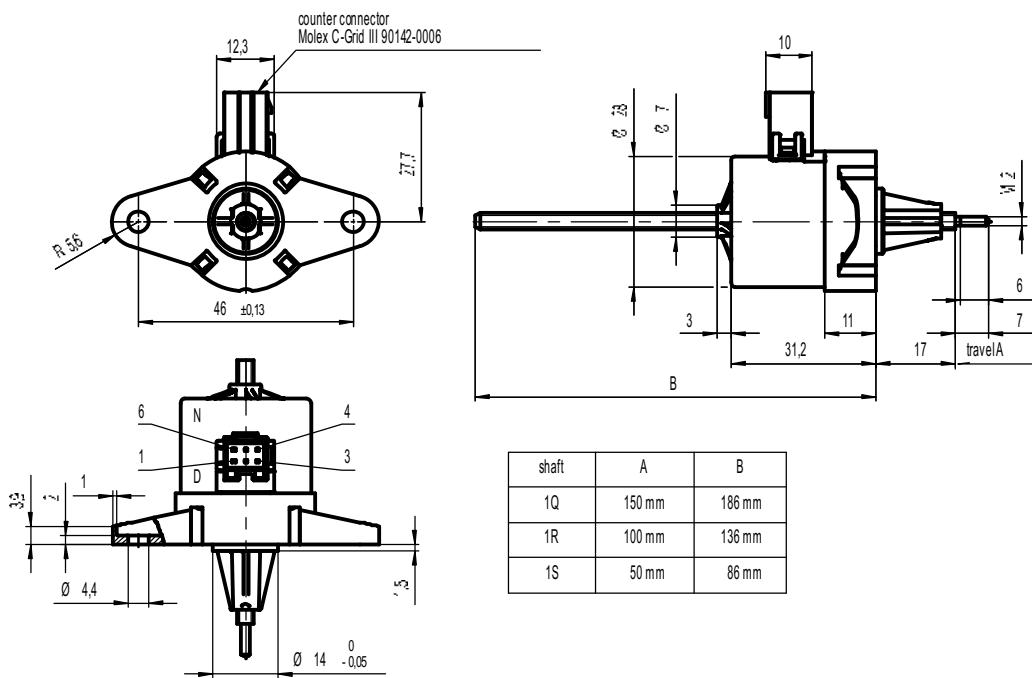
UCK

Dimensions Version with Connector D, with 13 mm travel, shaft 1B and 1E



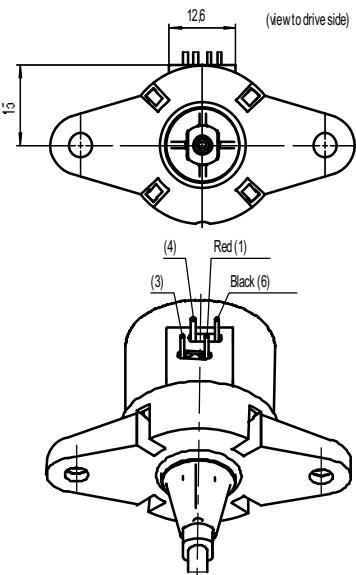
shaft 1B= cost effective solutions for forces up to 25N

Version with Connector D, with 50..150 mm travel, shaft 1R, 1S, 1Q



UCK

Dimensions 110 V version with lead wires

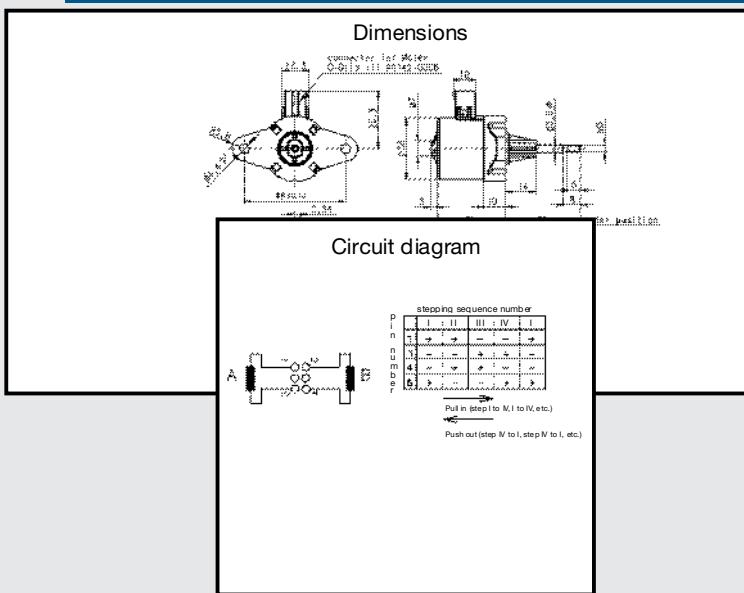


different lead colours for 110V (230V)
for rotary synchronous motors in serials circuit

Force		connector version		lead wire version	
		50 Hz	60 Hz	50 Hz	60 Hz
UCK1	100 %	31 N	32 N	21 N	21 N
	30%	41 N	48 N	27 N	30 N
UCK7	100 %	39 N	38 N	25 N	24 N
	30%	52 N	57 N	33 N	35 N

Stepper Motors

Linear



UAL 1/5; UAL 2/6

Dimensions (mm)	20 x 30
Travel (mm)	15
Travel per step (mm)	0,021
Thread pitch (mm)	0,5
Speed (mm/s) at 200 Hz	4,16
Step angle (°)	15
Max. Force (N)*	28



*Depends on winding, frequency and lifetime required.

Drive against end stops only permissible after clarification of operating conditions and approval by Saia Motor.

Radial forces on the shaft will reduce life time and performance.

Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	47 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	lead wire with CT connector
Protection	IP40 according to DIN EN 60529 : 2000
Weight	33 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	ball bearing

Order Reference

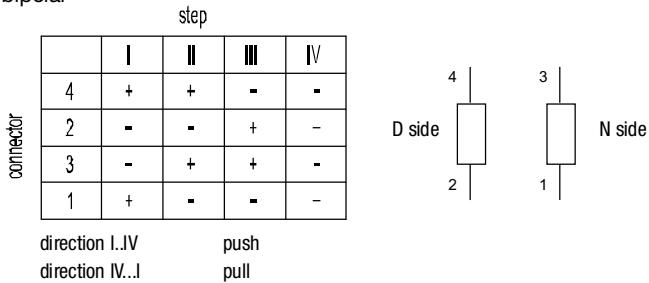
Type	Stepper Motor	UAL	1E	N	01	E	1A
Configuration	1A bipolar, standard magnet, screw flange 1E bipolar, standard magnet, bayonet flange 2A unipolar, standard magnet, screw flange 2E unipolar, standard magnet, bayonet flange 5A bipolar, stronger magnet, screw flange 5E bipolar, standard magnet, bayonet flange 6A unipolar, standard magnet, screw flange 6E unipolar, standard magnet, bayonet flange						
Approval	N standard						
Winding code	see next page, resistance per winding for bipolar or unipolar						
Connection	E 100 mm lead wire with CT connector						
Shaft	1A Travel 15 mm ± 0,7 mm (others on request)						

Technical Data

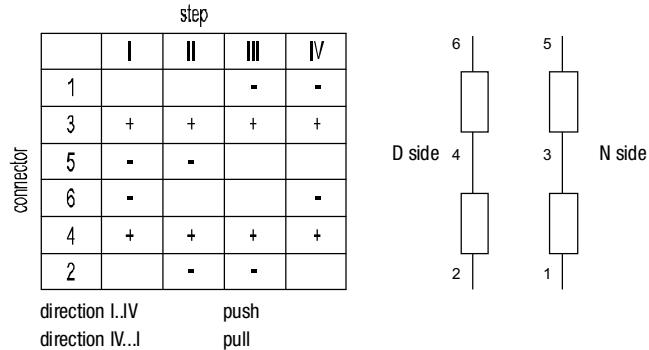
Steps per mm	48
Winding temperature T_{max}	°C 130
Linear travel max.	mm 15
Axial play at 20 N force	mm 0,25
unipolar versions available upon request	
bipolar	Rated voltage U_N V 6 12 24
	Duty cycle % 100 100 100
	Resistance R_{20} Ω 40 150 610
	Winding code 03 01 04

* measured at 23 °C, lifetime depends on load characteristics and ambient conditions

Circuit diagram bipolar

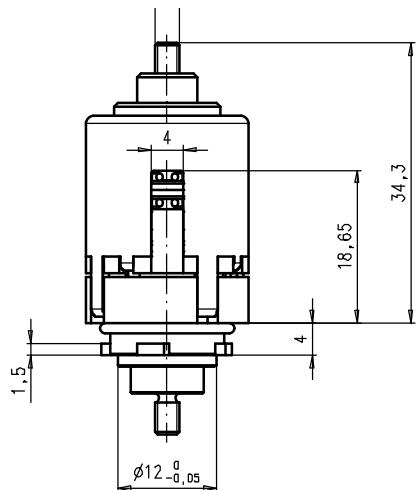
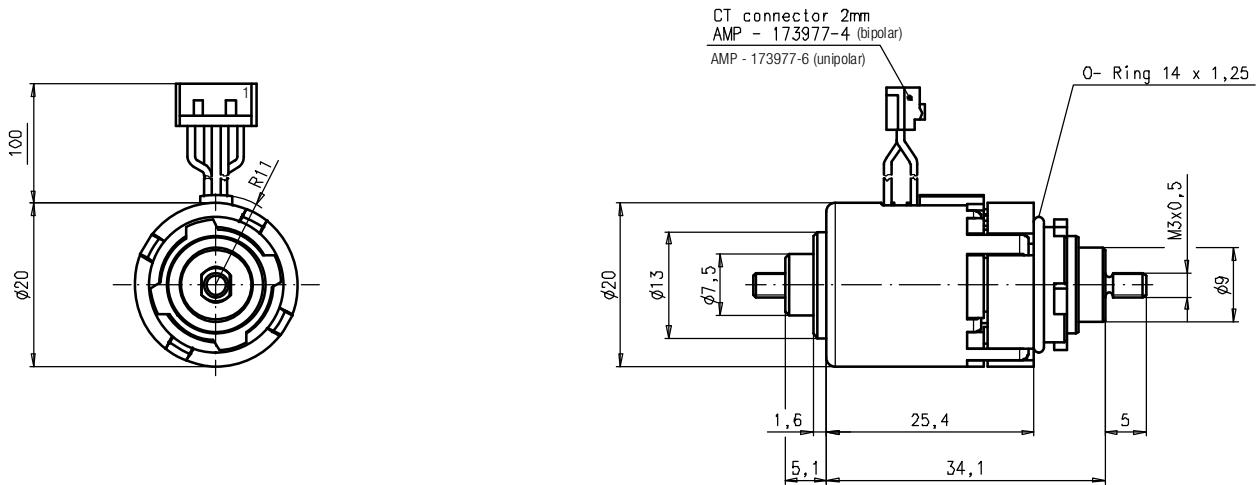


unipolar



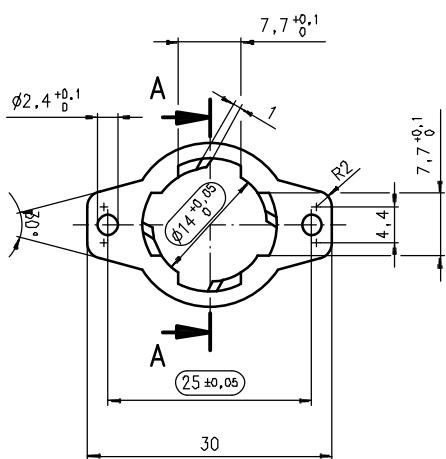
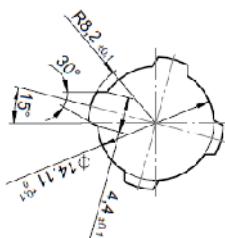
UAL

Dimensions Version with 100 mm leads and CT connector, 15 mm travel

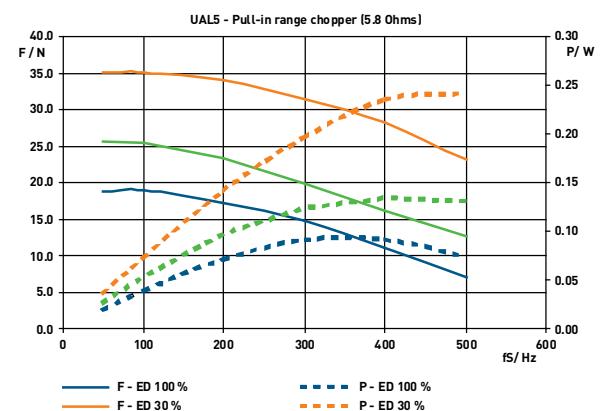
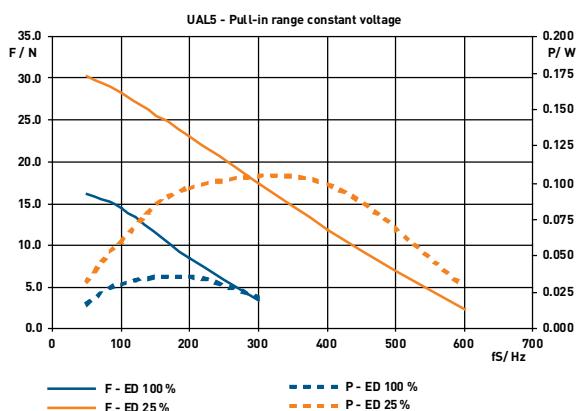
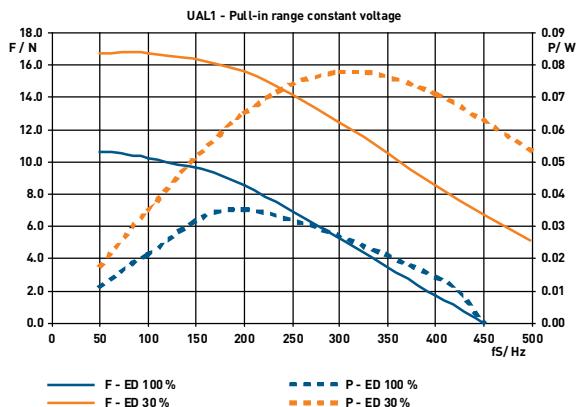


Connecting dimensions of direct bayonet mount

Material thickness 1,5 mm



Performance Chart



100% duty cycle: max. current per phase 300 mA

60% duty cycle: max. current per phase 360 mA

30% duty cycle: max. current per phase 500 mA

UCE1/7; UCE2/8

Dimensions (mm)	$\varnothing 28 \times 31$
Travel (mm)	10/13
Travel per step (mm)	0.021
Speed (mm/s) at 200 Hz	4.16
Max. Force (N)*	35

*Depends on winding, frequency and lifetime required.

Drive against end stops only permissible after clarification of operating conditions and approval by Saia Motors.

Radial forces on the shaft will reduce life time and performance.



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	connector type C, D
Protection	IP40 according to DIN EN 60529 : 2000
Weight	67 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	ball bearing

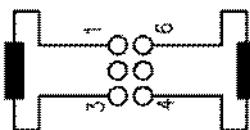
Order Reference

Type	Stepper Motor				UCE	13	N	01	D	1B
Configuration	13	bipolar, standard magnet	73	bipolar, stronger magnet						
	23	unipolar, standard magnet	83	unipolar, stronger magnet						
Approval	N									
Resistance		see next page, Resistance per winding for bipolar or unipolar								
Connection	C	see next pages "Connection Types" and page 145 "Connection Types" for B								
Shaft	1B	Travel 13 mm \pm 0.7 mm (other standard shafts see under dimensions)								

Technical Data

bipolar	Rated voltage U_N :	V	6	12	24
	Resistance per winding R_{20}	Ω	24	90	380
	Travel per step	mm	0.021		
	Winding temperature T_{max}	$^{\circ}C$	130		
	Axial play at ± 20 N force	mm	< 0.25		

Circuit diagram bipolar

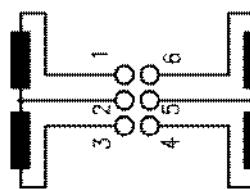


stepping sequence number	I	II	III	IV	I
1	+	+	-	-	+
3	-	-	+	+	-
4	-	+	+	-	-
6	+	-	-	+	+

Pull in (step I to IV, I to IV, etc.)

Push out (step IV to I, step IV to I, etc.)

unipolar



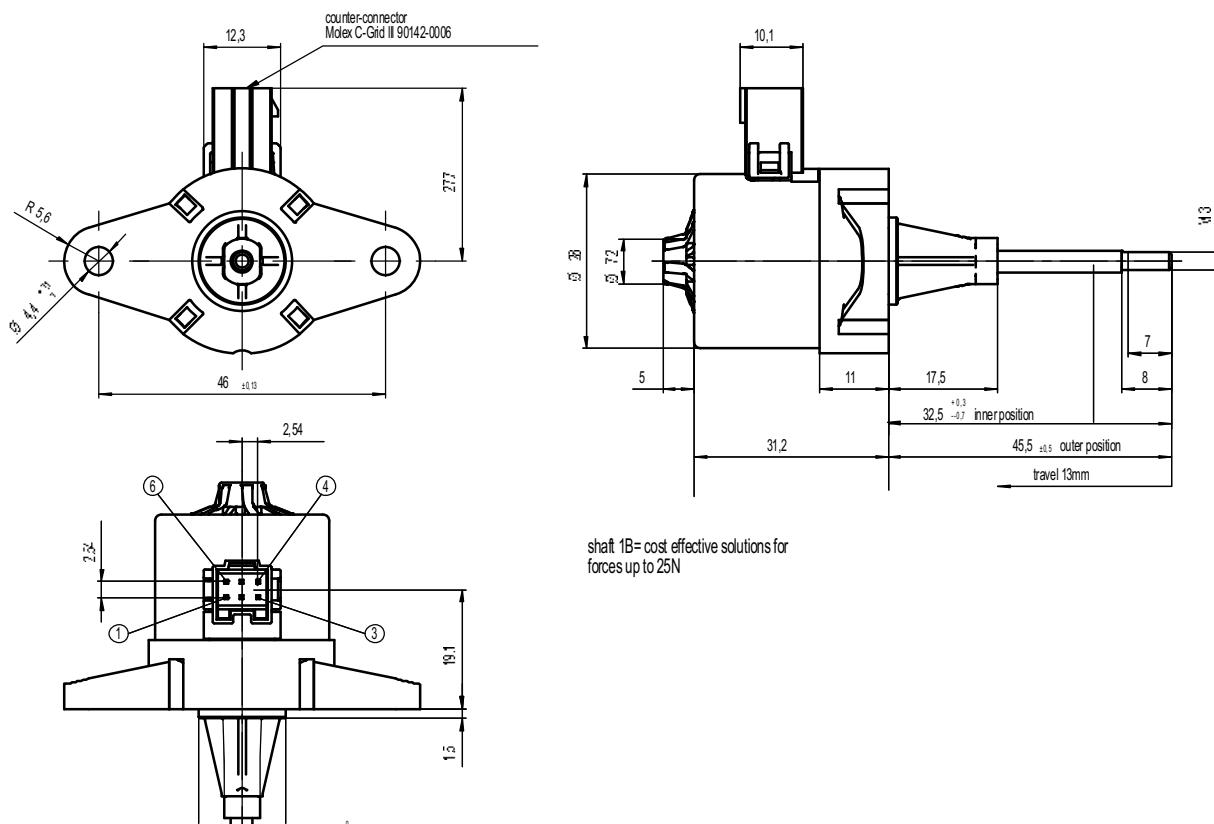
stepping sequence number	I	II	III	IV	I
1	-	-			-
2	+	+	+	+	+
3			-	-	
4		-	-		
5	+	+	+	+	+
6	-			-	-

Pull in (step I to IV, I to IV, etc.)

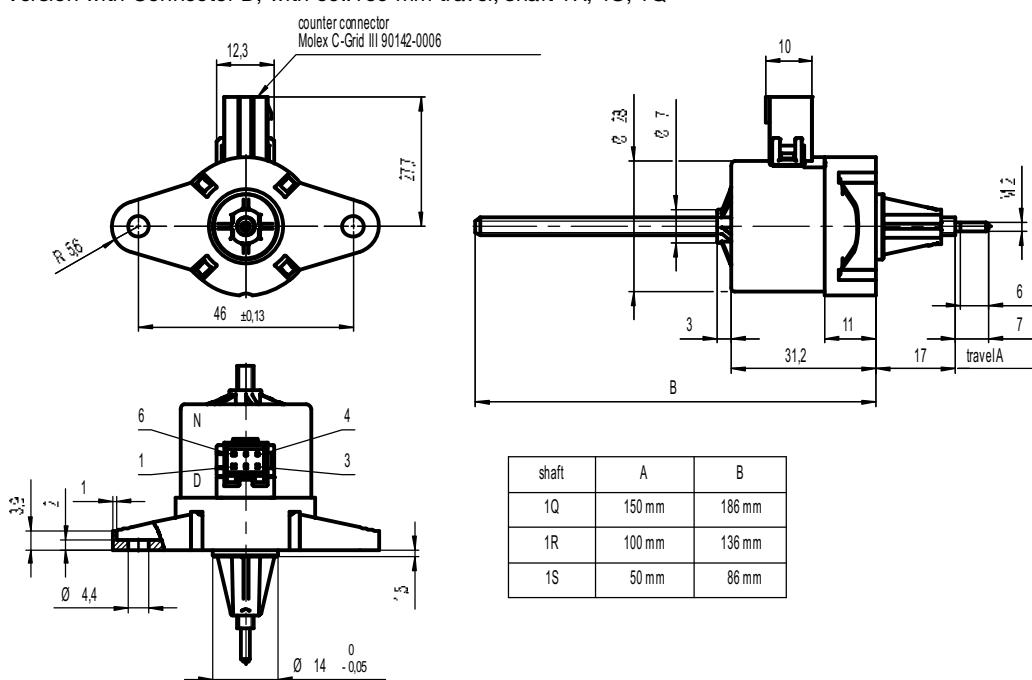
Push out (step IV to I, step IV to I, etc.)

UCE

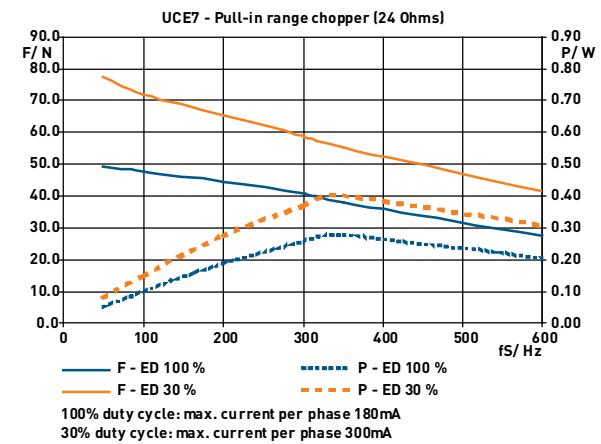
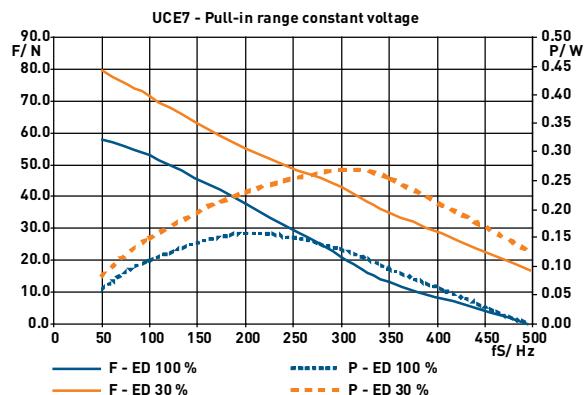
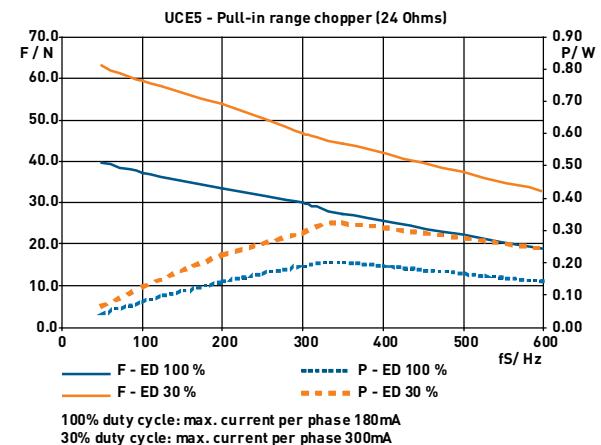
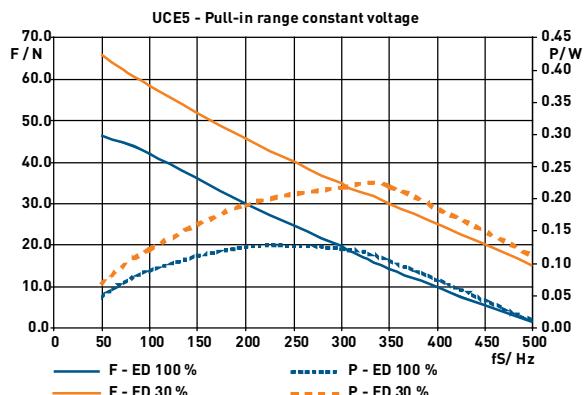
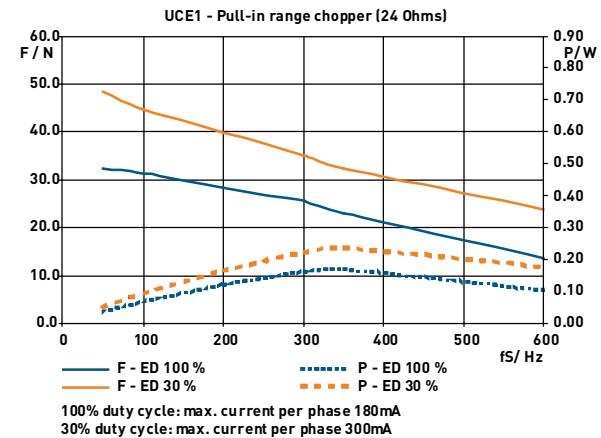
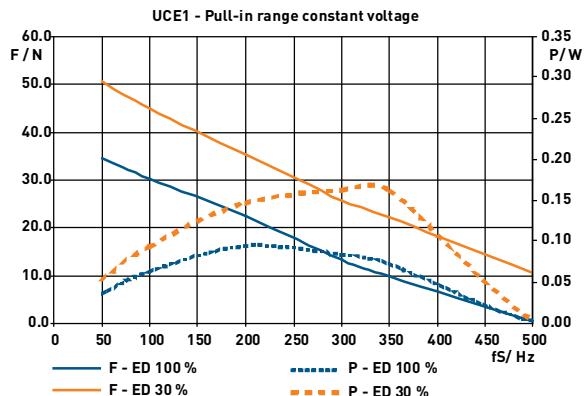
Dimensions



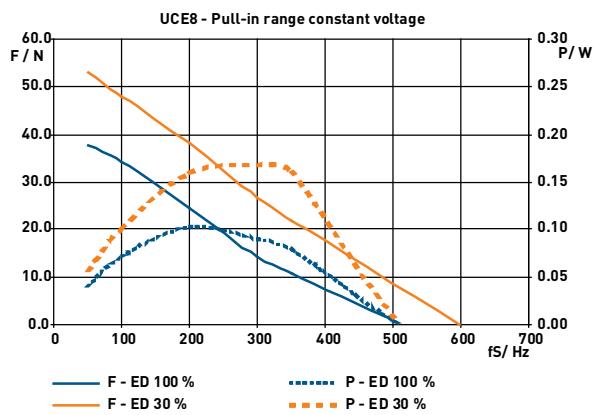
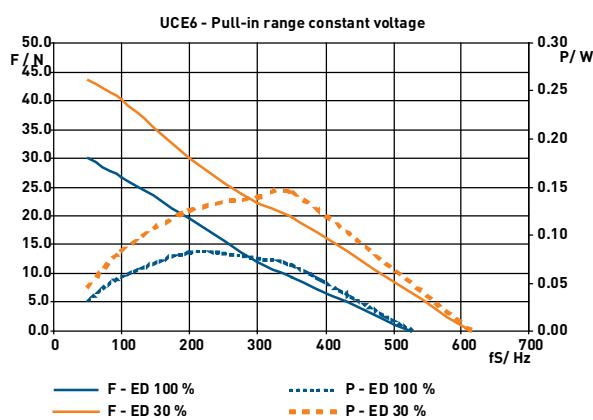
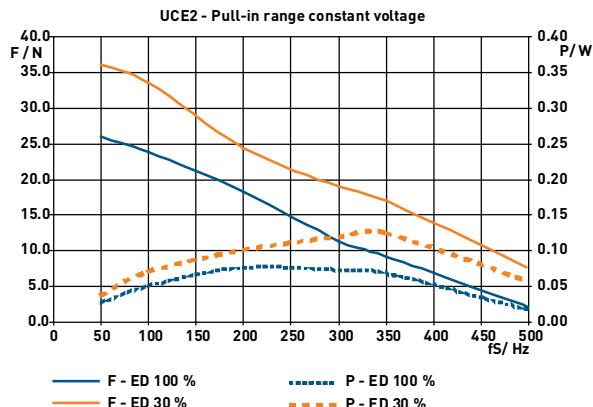
Version with Connector D, with 50..150 mm travel, shaft 1R, 1S, 1Q



Performance Chart



Performance Chart



UCL1/7; UCL2/8

Dimensions (mm)	$\varnothing 28 \times 31$
Travel (mm)	10/13
Travel per step (mm)	0.041
Speed (mm/s) at 200 Hz	8.33
Max. Force (N)*	35

*Depends on winding, frequency and lifetime required.

Drive against end stops only permissible after clarification of operating conditions and approval by Saia Motors.
Radial forces on the shaft will reduce life time and performance.



Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	29 K/W
Thermal class	130 (B) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	connector type C, D
Protection	IP40 according to DIN EN 60529 : 2000
Weight	67 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	ball bearing

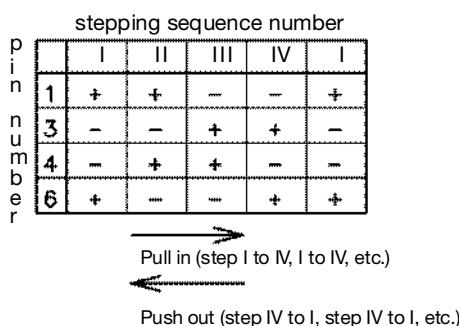
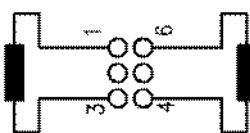
Order Reference

Type	Stepper Motor				UCL	13	N	01	D	1B
Configuration	13 bipolar, standard magnet 23 unipolar, standard magnet				73	bipolar, stronger magnet 83 unipolar, stronger magnet				
Approval	N									
Resistance	see next page, Resistance per winding for bipolar or unipolar									
Connection	C see pages 151, „Connection Types“ D									
Shaft	1B Travel 13 mm ± 0.7 mm (other standard shafts see under dimensions)									

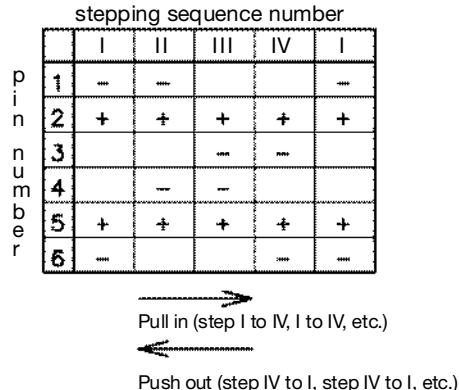
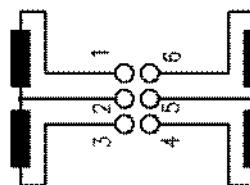
Technical Data

bipolar	Rated voltage U _N :	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	24	90	380
	Winding code		05	02	018
unipolar	Rated voltage U _N :	V	6	12	24
	Duty cycle	%	100	100	100
	Resistance R ₂₀	Ω	24	90	380
	Winding code		07	08	01
	Travel per step	mm	0.042		
	Winding temperature T _{max}	°C	130		
	Axial play at ± 20 N force	mm	< 0.25		

Circuit diagram bipolar

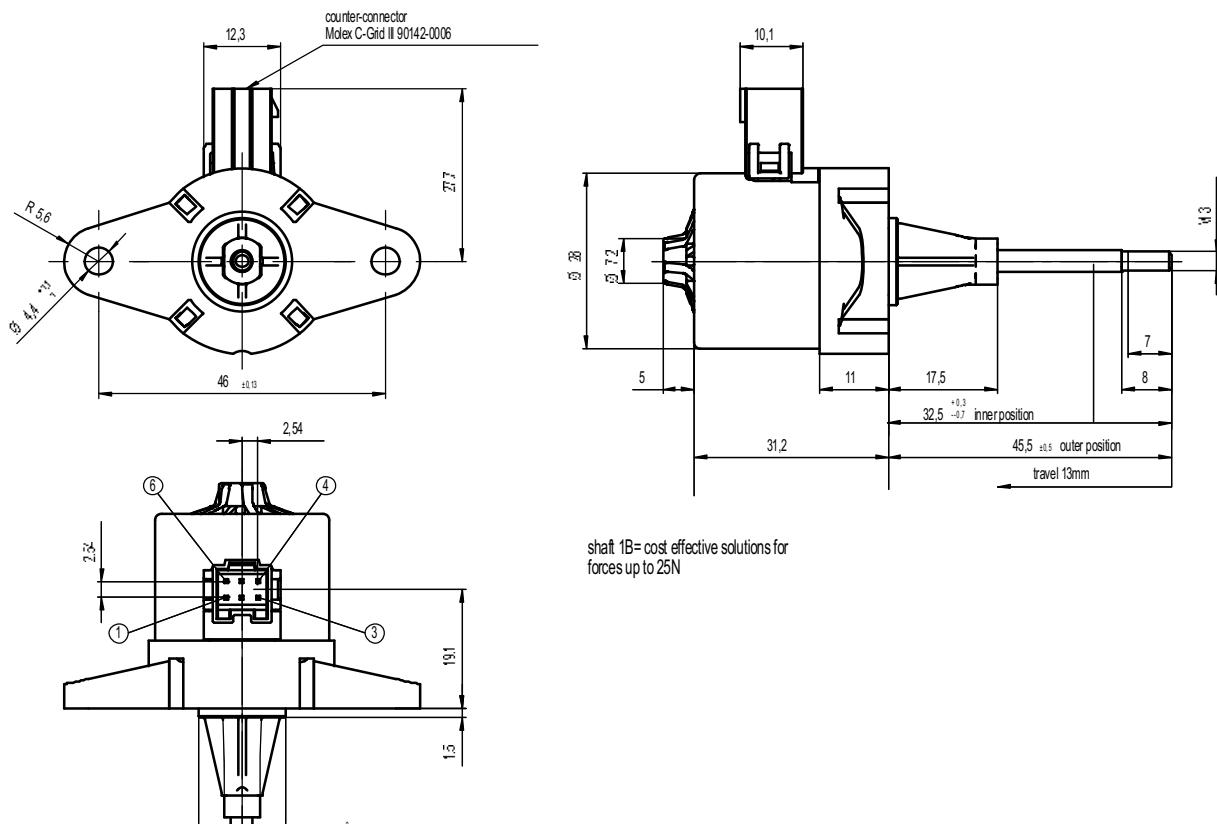


unipolar

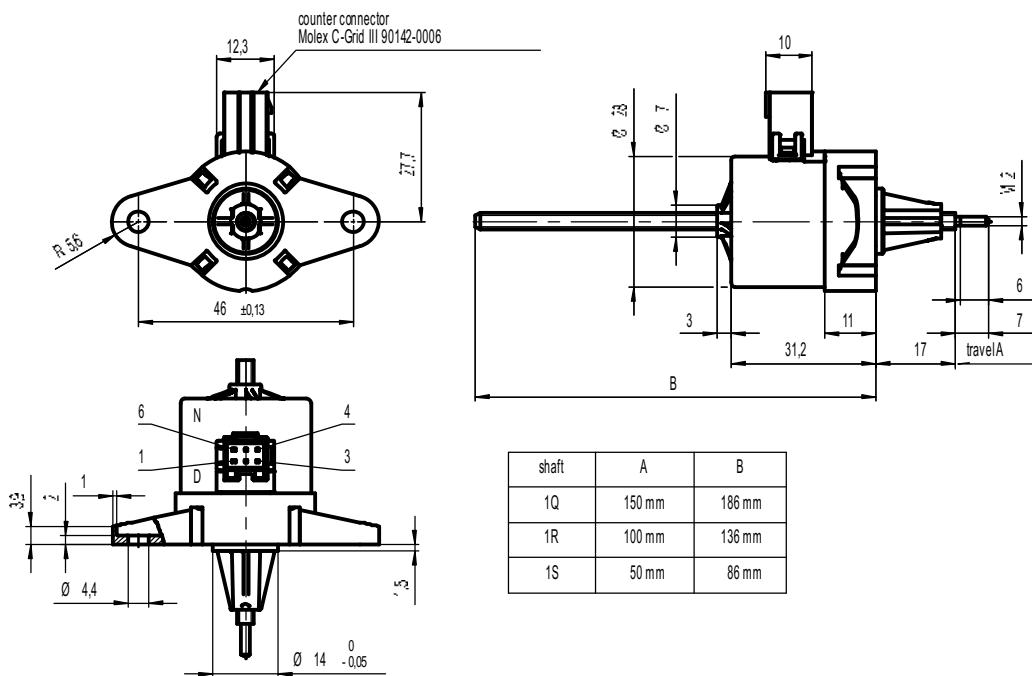


UCL

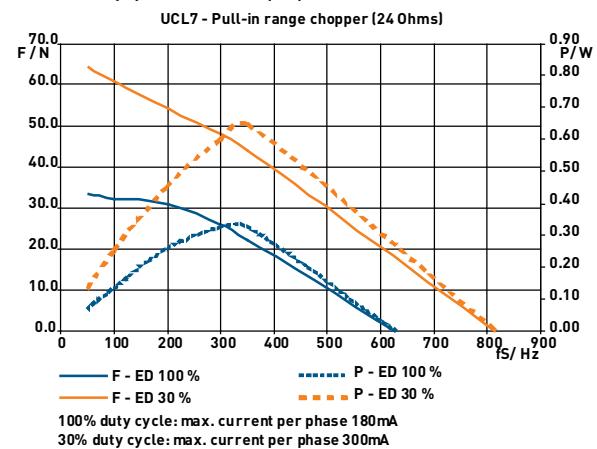
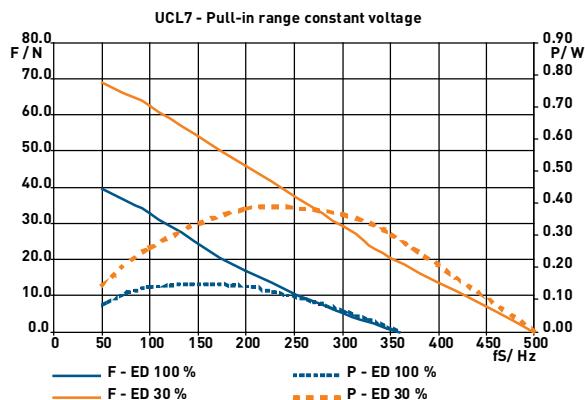
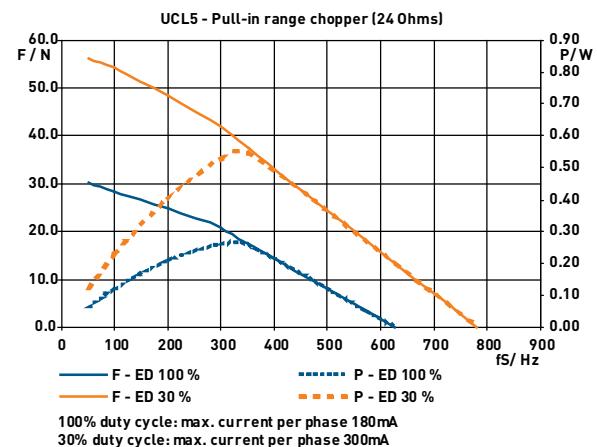
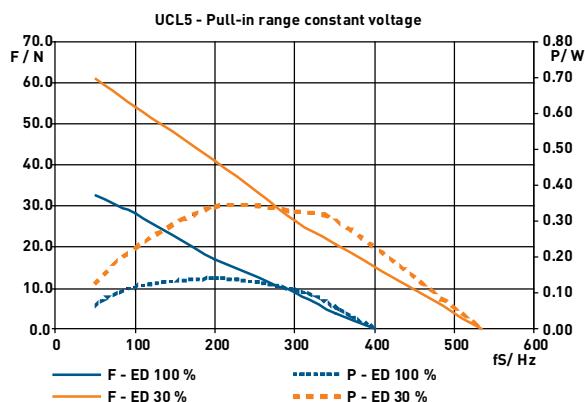
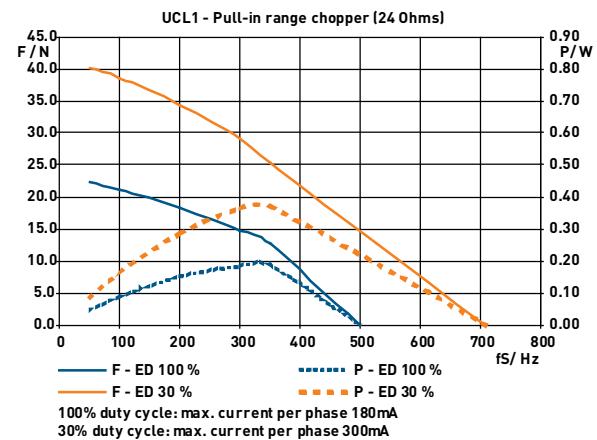
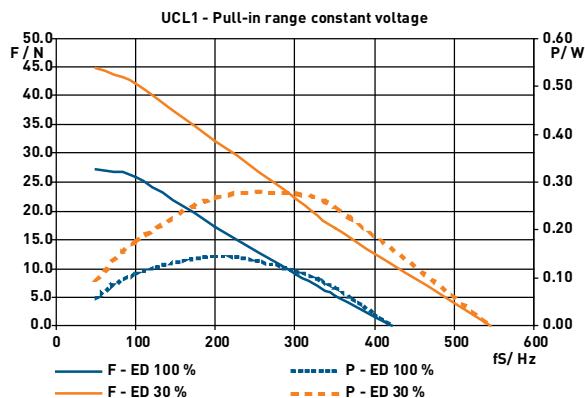
Dimensions Version with Connector D, with 13 mm travel, shaft 1B and 1E



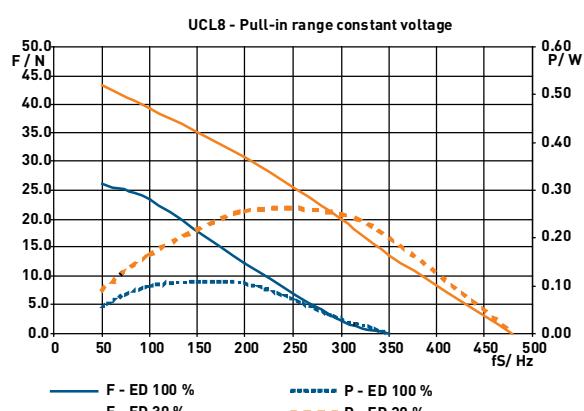
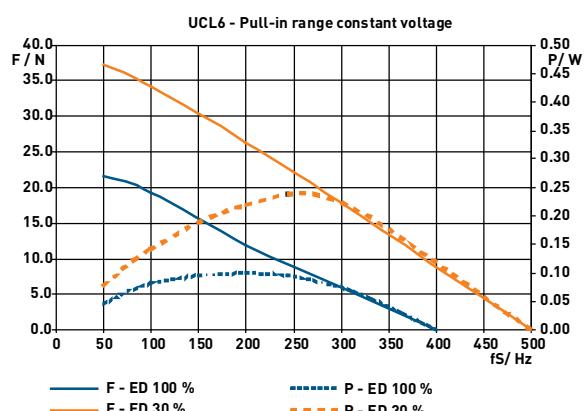
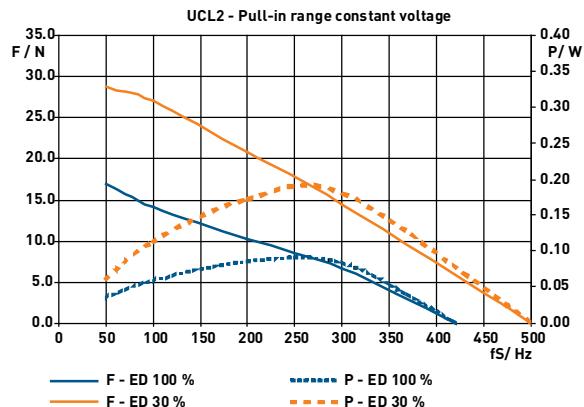
Version with Connector D, with 50..150 mm travel, shaft 1R, 1S, 1Q



Performance Chart



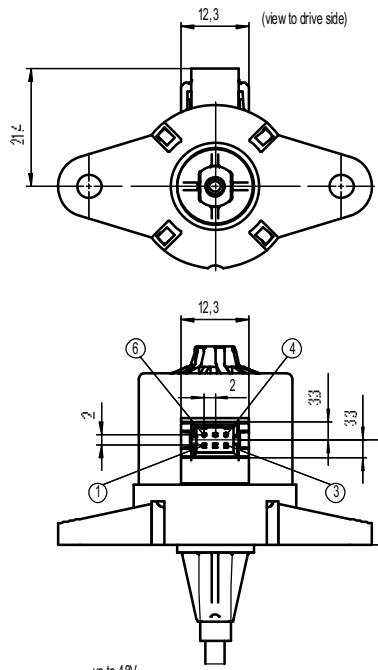
Performance Chart



Connection Types UC motors

Lead wire

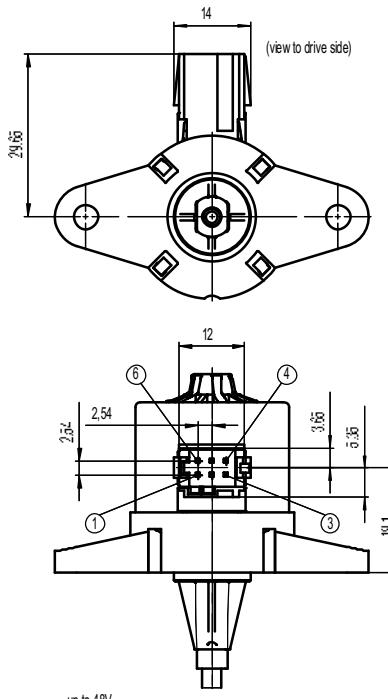
Connector B
for Molex MII-Grid 51110-0660



up to 48V
for rotary and linear motors
(bipolar, unipolar, synchronous)

Connector C

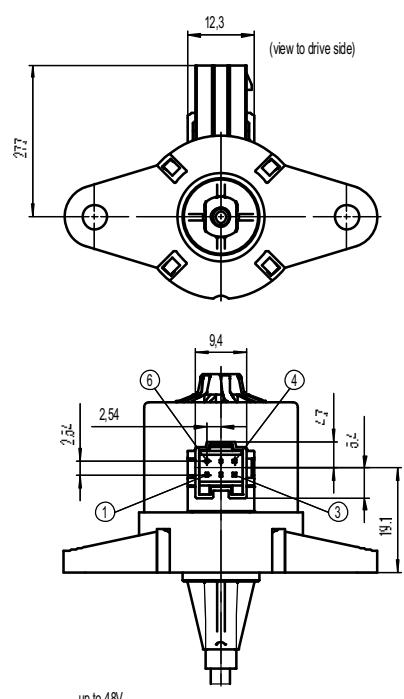
for TycoModu IV 0-1740209-6



up to 48V
for linear motors
(bipolar, unipolar, synchronous)

Connector D

for Molex C-Grid III 901424-006



up to 48V
for rotary and linear motors
(bipolar, unipolar, synchronous)

Linear

ULE

ULE 1

Dimensions (mm)	Ø 55 x 55
Travel (mm)	10, 95
Travel per step (mm)	0.031
Thread pitch (mm)	1.5
Speed (mm/s) at 200 Hz	6.25
Step angle (°)	7.5
Max. Force (N)*	400 (up to 400 N with special design)



*Depends on winding, frequency and lifetime required.

Drive against end stops only permissible after clarification of operating conditions and approval by Saia Motor.

Radial forces on the shaft will reduce life time and performance.

Standard Data

Climatic class	wide-spread according to DIN IEC 60721-2-1 : 1992
Ambient temperature operation	°C -15 ... +60
Ambient temperature storage	°C -20 ... +100
Thermal resistance at f=0 R _{therm}	9.0 K/W
Thermal class	155 (F) according to DIN EN 60085 : 2004
Approval	standard
Mounting	any position
Electrical connection	lead wires AWG22, insulation Ø 1.1 mm (connectors upon request)
Protection	IP40 according to DIN EN 60529 : 2000
Weight	550 g
Rotor stalling	motor can be stopped when voltage is applied, without being overheated
Bearings	ball bearings

Order Reference

Type	Stepper Motor	ULE	13	N	02	N	1A
Configuration	13 bipolar, standard magnet						
Approval	N standard						
Winding code	see next page						
Connection	N 150 mm lead wire (connectors upon request)						
Shaft	1A max. travel 10 mm, internal lock against rotation 1B max. travel 95 mm, external lock against rotation necessary (others upon request)						

ULE

Technical Data

Steps per mm		32		
Winding temperature Tmax	°C	155		
Linear travel max.	mm	95 (others upon request)		
Axial play at ± 50 N force	mm	0.3		
bipolar	Rated voltage U_N V	6	12	24
	Duty cycle %	100	100	100
	Resistance R_{20} Ω	5.1	21	82
	Winding code	02	03	04

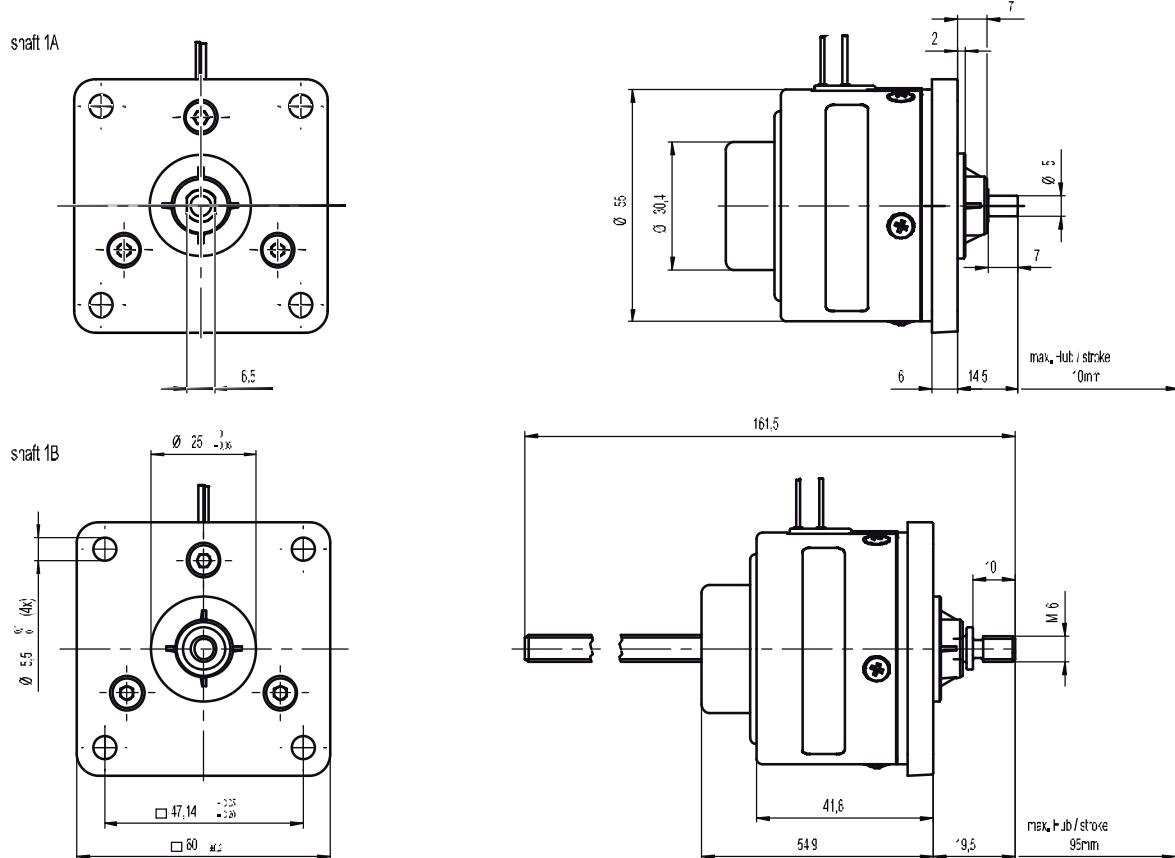
Circuit diagram bipolar

lead wire color	stepping sequence number				
	I	II	III	IV	I
red	+	+	-	-	+
yellow	-	-	+	+	-
black	-	+	+	-	-
blue	+	-	-	+	+

→ Pull in (step I to IV, I to IV, etc.)

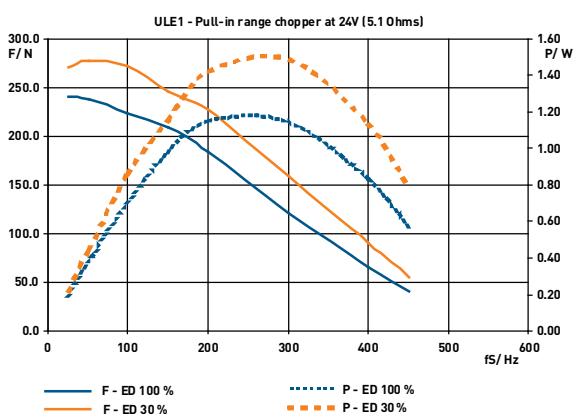
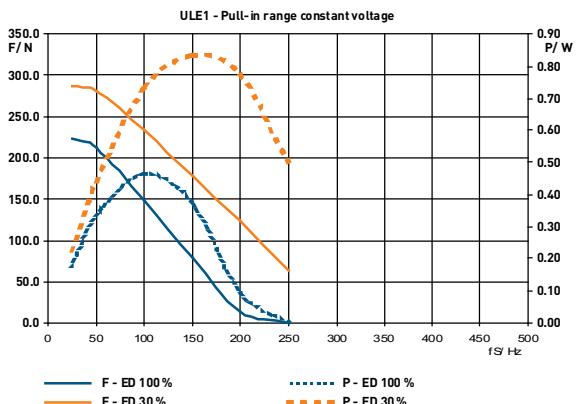
← Push out (step IV to I, step IV to I, etc.)

Dimensions Version with lead wires, 10 mm travel

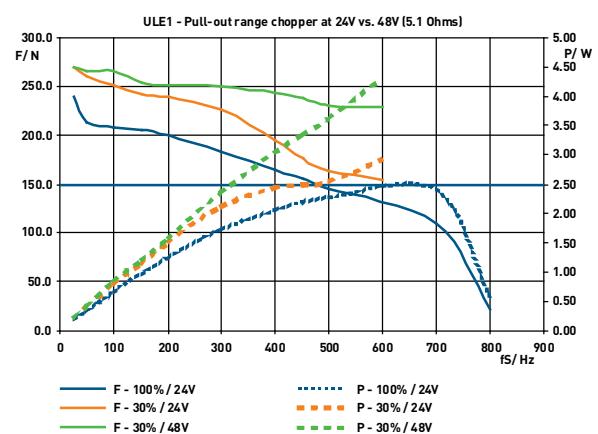


dimensions without tolerance are just for information

Performance Chart

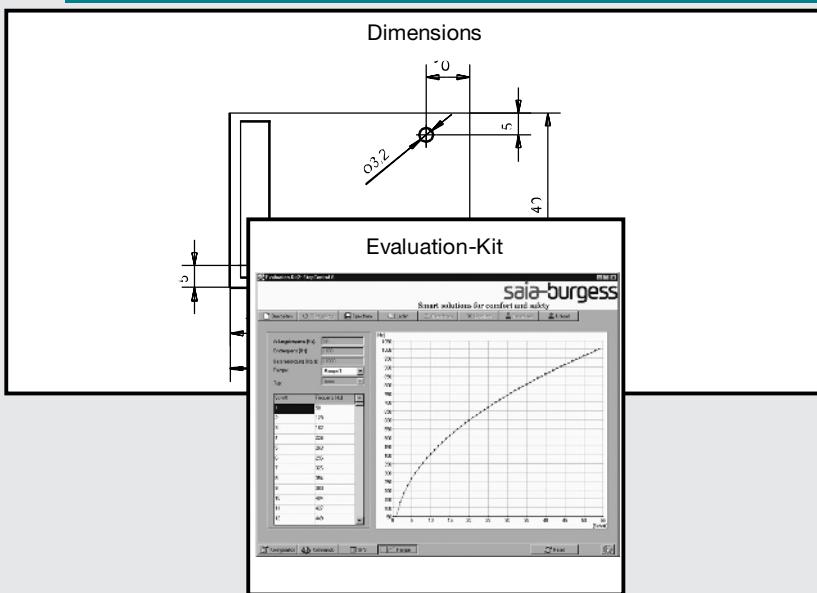
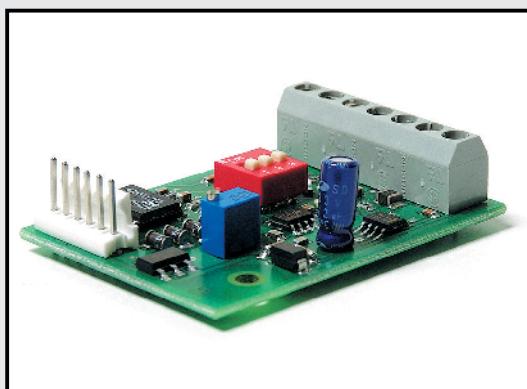


100% duty cycle: max. current per phase 825mA with holding current of 275mA
 30% duty cycle: max. current per phase 1500mA with holding current of 500mA



100% duty cycle: max. current per phase 825mA with holding current of 275mA
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Electronics for Stepper Motors



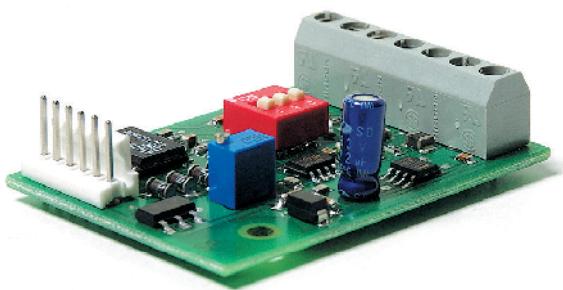
**JOHNSON
ELECTRIC**

innovating motion

Samotronic101

SAMOTRONIC101

Driver	for unipolar motors
Dimensions (mm)	55 x 40
Supply voltage (VDC)	10-24
Motor current	constant voltage drive
Step mode	full/half step
Clock source	internal or external
Control inputs to	<ul style="list-style-type: none">■ inhibit internal clock■ inhibit motor current■ change direction of rotations
Configuration	via DIP-switch, potentiometer



Preferred Range

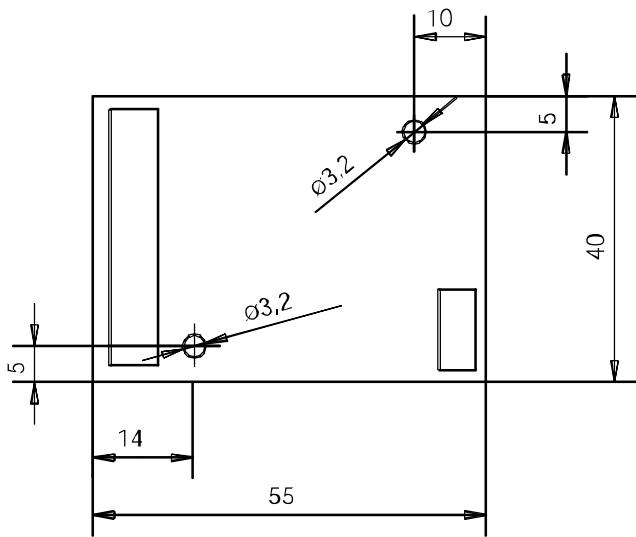
Ordering Reference

- 4 636 6608 0 If motors are also to be ordered please state: "with MTA-100 receptacles for use with SAMOTRONIC101".
- 4 636 6608 3 with screw terminal for motor connection, max 0.5 mm²

Technical Data

Supply voltage	10-24 VDC
Phase current	≤ 350 mA
Control signal level	LS-TTL (0-5V) for all control inputs
Internal clock	50-360 Hz
External clock	up to 2 kHz
Dimensions	55 x 40 mm
Operating temperature	-5 to +50 °C
Storage temperature	-20 to +70 °C

Dimensions



For latest technical and safety compliance information regarding these products, please download the relevant data sheet from our web site:
www.saia-burgess.com/drivers

Samotronic102

SAMOTRONIC102

Driver	for bipolar motors
Dimensions (mm)	84 x 54
Supply voltage (VDC)	<ul style="list-style-type: none">■ standard version 10 DC-24■ enhanced version 10 DC-42
Motor current	<ul style="list-style-type: none">■ constant current drive (chopper controlled)■ adjustable via potentiometer
Step mode	full/half step
Clock source	internal or external
Control inputs to	<ul style="list-style-type: none">■ inhibit internal clock■ inhibit motor current■ change direction of rotations
Configuration	via DIP-switch, potentiometer
Test pins	<ul style="list-style-type: none">■ motor current■ step frequency



Preferred Range

Ordering Reference

4 636 6733 0 10-24VDC supply voltage (standard version)

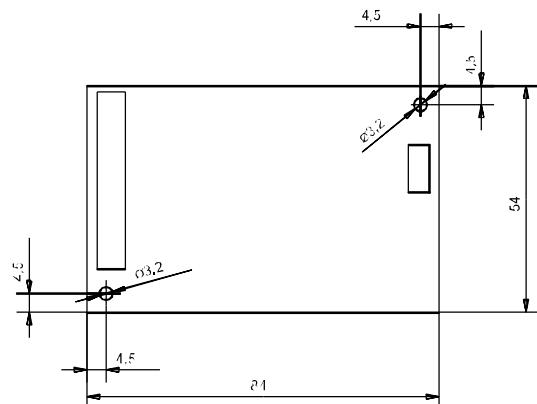
4 636 6733 3 10-42VDC supply voltage (enhanced version)

If motors are also to be ordered please state: "with MTA-100 receptacles for use with SAMOTRONIC102".

Technical Data

Supply voltage	10-24 (42)VDC
Phase current	71-500 mA, on request max. 735mA/ph
Chopper frequency	typ. 20kHz
Control signal level	LS-TTL (0-5V) for all control inputs
Internal clock	50-1325 Hz
External clock	up to 2 kHz
Dimensions	84 x 54 mm
Operating temperature	-20 to +60 °C
Storage temperature	-20 to +80 °C

Dimensions



For latest technical and safety compliance information regarding these products, please download the relevant data sheet from our web site:
www.saia-burgess.com/drivers

Evaluation-Kit 2

Evaluation-Kit 2

Driver	for unipolar and bipolar motors
Dimensions (mm)	metal case 164 x 130 x 45
Motor voltage	
(VDC)	3-48 Unipolar motors
(VAC)	8-48 Bipolar motors (< 8 on request)
Motor current	constant voltage drive and constant current drive (chopper controlled)
Step mode	full/half/micro step
Clock source	internal, programmable
Control inputs to	<ul style="list-style-type: none">■ 3 digital inputs■ 4 signal outputs■ 1 analog input 0...10 VDC■ relay contact
Configuration	RS 232, USB



Order Reference

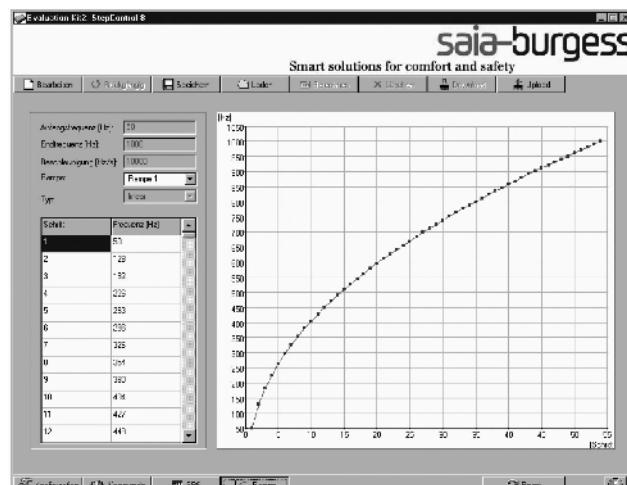
4 717 4898 0

Power supply (on request)

Technical Data

Supply voltage	10-48 VDC/24 VAC
Phase current	≤ up to 2.3 A
Step modes	11 (full, half, wave ... microstep)
Max. step frequency	10 kHz
PLC	max. 256 steps, 65536 loops
Operating temperature	0 ... +55 °C
Storage temperature	-20 to +80 °C

Test the Stepconfreeware without hardware in a special demo mode
www.saia-burgess.com/evaluationkit2.



For further information please contact your
Saia-Burgess sales company
or see our website www.saia-burgess.com.

The data used in this Product Overview may be used as a guideline only. Specific operational characteristics of our products may vary according to individual applications. It is strongly recommended that specific operating conditions are clarified with Johnson Electric before application.

Johnson Electric Terms and Conditions of Sale apply.

All data may be subject to change without notice.

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