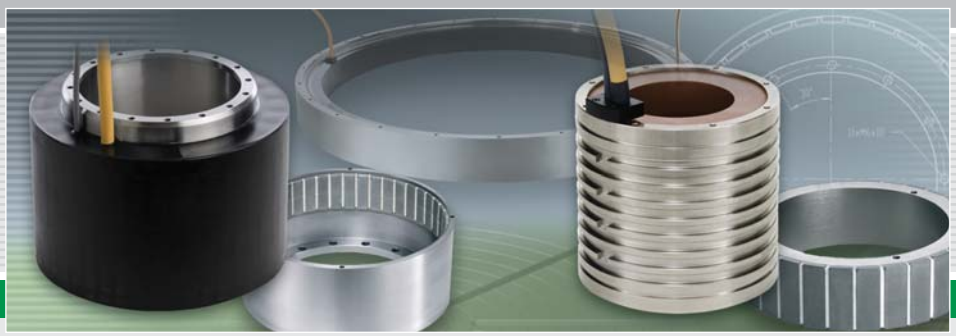
IDAM
INA Drives & Mechatronics



RDDM

Rotary Direct Drive Motors

SCHAEFFLER GROUP

The Perfect Drive for Every Application

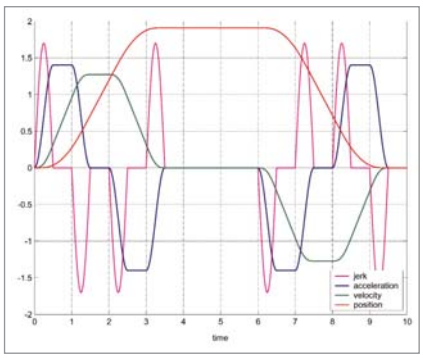
INA - Drives & Mechatronics GmbH & Co. oHG, a company of the Schaeffler Group, specializes in linear and rotary direct drives. These products are supplemented by directly driven positioning systems and related controllers and mechatronics assemblies.
In addition to standard products, IDAM also develops and produces customized drive solutions.
Due to the increasing demands in terms of dynamic performance, precision and cost reduction, direct drives are becoming increasingly more popular in modern machinery and equipment.

The direct connection between motor and accelerated mass increases dynamic and static rigidity, reduces elasticity and therefore enables an extremely high level of positioning performance. Direct drives are non-wearing, as a result of which maintenance and operating costs can be reduced whilst simultaneously increasing availability. In the industries of machine tools and production machinery, automation, productronics/semicon, measuring technology and medical technology, teams at IDAM have been developing direct drives and complex drive systems since 1990.

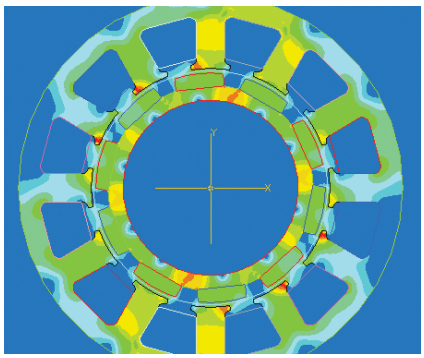
The development of the direct drives and the positioning systems is efficiently supported by the integration of models and simulations.

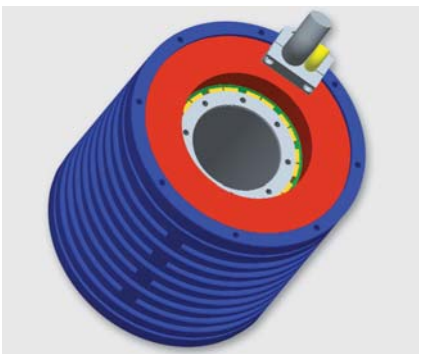
IDAM employs a state-of-the-art quality management system. At IDAM, quality management is a dynamic process which is examined on a daily basis and is thus continuously improved. IDAM is certified according to standard DIN EN ISO 9001:2008.

IDAM has developed a standard series of highly efficient rotary motors that are shown in this catalog. With this standard motor series as a starting point, customer specific, customized motors can be developed and produced in low or high volume.



(1-cos)-shaped acceleration for high-precision applications, since with very small changes in target


FEM model


CAD model

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Product Range

Availability/Selection of Sizes: Series RI 20
Designation: Series RI 21
Motor Specifications: Series RI 22
Availability/Selection of Sizes: Series RE 54
Designation: Series RE 55
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Advantages of Rotary Direct Drives

Increases dynamic capacity

1. **No conversion of motion form**
   - With a direct drive motor system, there is no need for mechanical linkage (gearbox, belt, etc.) between the payload and the motor. Thus there are no backlash, clearance, friction, or elasticity problems. This makes for a much stiffer and more easily controlled system.
2. **Multi-pole motor**
   - With a multi-pole design, IDAM motors are capable of producing very high torque. In addition, this high torque can also be sustained over a much greater speed range.
3. **Thin, ring-shaped rotor**
   - Thanks to the thin, ring-shaped design with a large, open inner diameter, the motor is able to produce high torque with a very low rotor inertia. This allows for very high motor acceleration capabilities.
4. **External rotor design option**
   - With an external rotor, the motor can produce higher torque in a smaller package than to an internal rotor motor.
5. **Direct position measurement**
   - Thanks to the direct position measurement of the feedback system combined with a rigid mechanical structure, highly accurate and dynamic positioning is possible.

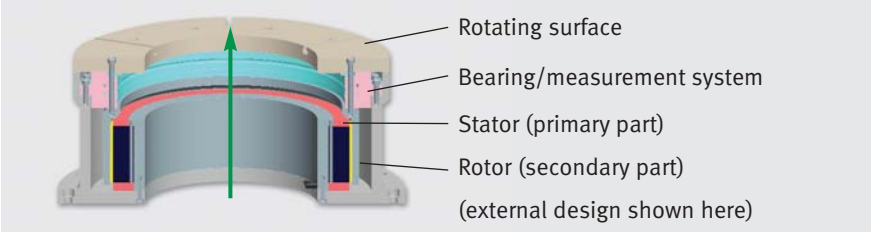
Reduces operating costs

1. **Fewer components**
   - With a direct drive system, fewer components are required. This allows for easier assembly and alignment along with a substantial reduction in maintenance. The reduced number of components enables a much more streamlined supply chain. Also,with fewer components, the modes of failure are greatly reduced and thus greatly increases the MTBF*.
2. **No wear in the drive train**
   - Because motor power is transmitted through an air gap and not through mechanical components, a direct drive motor system has an extremely long life even with very demanding duty cycles.
   - This substantially reduces machine down-time.
3. **Reduces machine down-time**
   - In addition to the increased life and reduced wear, the robustness of a torque motor substantially reduces machine down-time.
   - With direct drive torque motors, mechanical overload does not damage the drive train as is the case with geared motors.

Increases design flexibility

1. **Hollow shaft**
   - With its large, open, inner diameter, the hollow shaft design of a torque motor allows for much greater design flexibility. The hollow shaft allows for tubing, fixtures, rotary unions and wiring to travel up through the center of the motor. This adds to the versatility of design capabilities.
2. **Installation of primary**
   - Thanks to the smaller space required, the primary can be easily integrated into the machine design.
3. **Reduce overall height**
   - Along with the large, open inner diameter (hollow shaft), torque motors are very compact in the axial (height) direction relative to the torque output.

*MTBF: Mean Time Between Failures



Large, open inner diameter allows for greater design flexibility

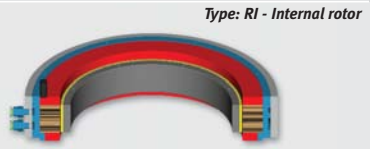
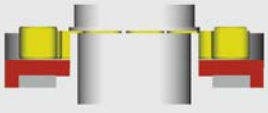
Characteristics of Frameless Motors

Rotary frameless motors consist of a primary winding and a secondary winding. The primary contains an active coil system and the secondary has a permanent magnet system.
The rotor can be either internal or external (RI series and RE series) relative to the primary (stator).
When current is supplied to the primary (coil system), electromagnetic force produces torque in the secondary.
A guidance system (rolling element or air bearing) is required to maintain a consistent air gap between the primary and the secondary. A measuring system is also needed for determining rotor position for motor commutation purposes. The proper selection of these and other essential motor system components is based on many years of IDAM application experience.

IDAM offers different motor designs for different customer application requirements. Rotary, frameless motors mainly differ in design by whether the motor is slotted, slotless or ironless. These motors produce a high, consistent torque across a wide range of speeds. The torque output is determined by the active air gap surface area between the primary (stator) and the secondary (rotor).

The proper motor selection depends on the required performance.

Unlike conventional motors, frameless motors are classified according to the required torque, not to the electrical rating.

Motor types	*Criteria*	*Construction*
Slotted motors		
RI/RE series	Internal rotor/external rotor | high torque up to Ø 1000 mm | T_p to 15000 Nm, if required, up to 100000 Nm | low cogging	 *Type: RI - Internal rotor* *Type: RE - External rotor*
HSR/HSRE series	Internal rotor/external rotor | high speed, up to 50 m/s peripheral speed	
HSRV/HSRVE series	Internal rotor/external rotor | high speed, up to 50 m/s peripheral speed | for spindle applications | customer-specific | low cogging	
Slotless motors		
RMK/RMF series	Customer-specific or integrated motors | no cogging with any diameter up to 2.5 m | for peripheral speeds up to 15 m/s	*Type: RMK*  *Type: RMF*
Ironless motors		
URM series	Customer-specific high-end solutions | high dynamic | best synchronous running | cogging-free | for precision machines	*Type: URM*

General Motor Characteristics – Efficiency

Part 1 of the technical parameters (starting on page 23) shows the power loss (copper losses) for different working torque outputs (T_p, T_{pl}, T_{cw}, T_c).

Since torque motors generate a high torque but do not deliver any mechanical power, an efficiency specification is not necessary.

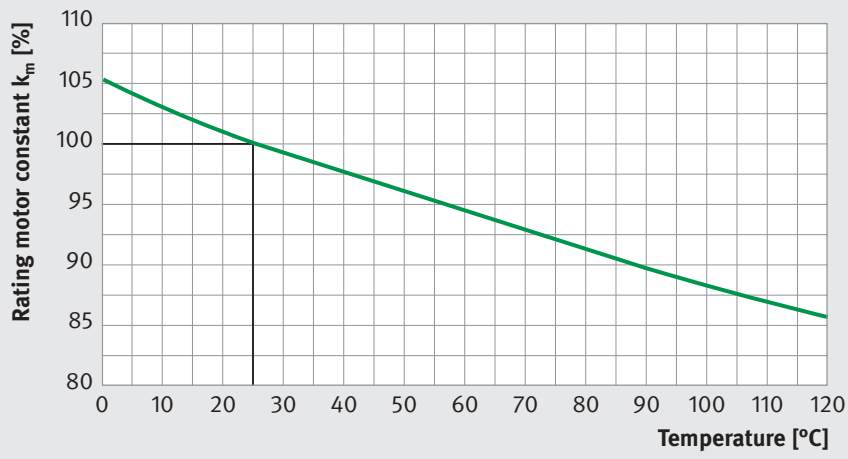
However, for an efficiency comparison, the motor constant (k_m) can be used. The motor constant can be expressed in terms of the torque and the power loss, at room temperature, over the linear, full power range. When the motor heats up, its efficiency reduces due to the increase in winding resistance. See the figure below.

$$P_l = \left(\frac{T}{k_m}\right)^2$$

P_l - copper loss power
T - torque

Not included in the motor constant, k_m, is iron (core) loss. Iron loss is dependent on the motor frequency (rotational speed), and has 2 components; hysteresis and eddy current. As the motor speed increases, the iron loss must be taken into account. The motor constant $k_{m,}$ refers only to the linear range of the 3-phase current.

The motor constant k_m depends on the ohmic resistance and hence on the winding temperature of a motor.
The k_m shown in the motor data section is specified for 25 °C. The diagram shows the motor constant, k_m, derating factor for different motor winding temperatures.

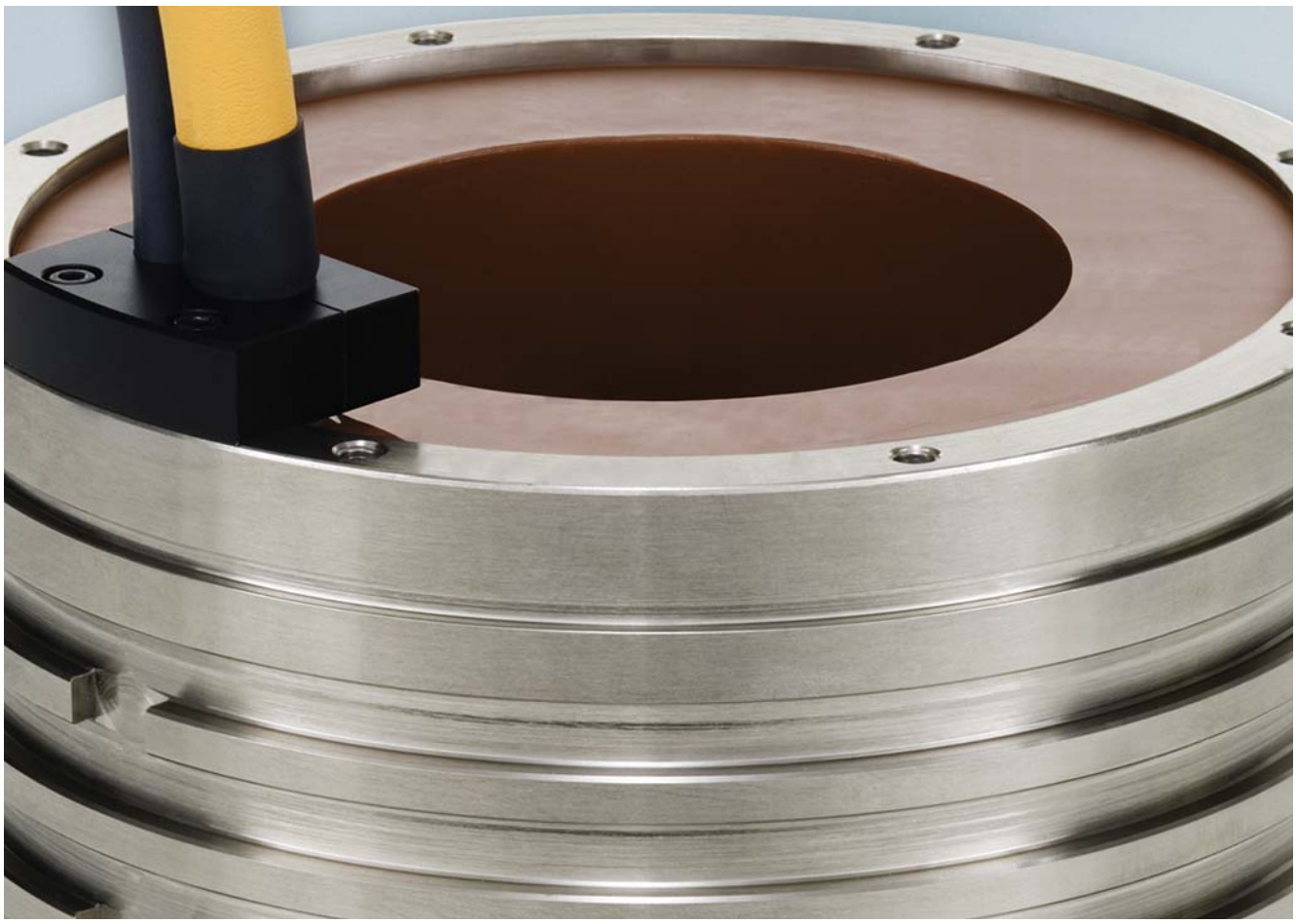


Motor constant vs. temperature

Winding Options

The maximum rotational speed of a torque motor depends mainly on the winding configuration and the operating voltage (U_{DCL}).
As rotational speed increases, the Back EMF voltage also increases, which counters the input voltage. At the rotational speed limits (n_d, n_{lp}, n_{lk}, n_{ln}) shown in the data sheets, the voltage requirement, with field oriented regulation, corresponds to the intermediate circuit voltage of the servo rectifier. Thereafter, the rotational speed falls sharply.

For a given motor, the higher the DC link voltage (U_{DCL}) and the smaller the winding-dependent voltage (Back EMF) constant (k_u), the higher the maximum achievable rotational speed.
Since voltage and torque constants have a correlation, with higher rotary speed requirements, the required current increases at identic torque.
In part 2 of the technical parameters (winding options), for every motor size there are 3 standard winding options; WL for low dynamic applications, WM for medium dynamic applications and WH for high dynamic applications. The maximum rotational speed is then shown for 2 fixed DC link voltage levels (280 V and 600 V) and for 3 different current levels (I_p, I_{cw} and I_c).
The DC link voltage is proportional to the rotational speed. From the torque-current curve, one can see the resulting torque given a specific motor current.
From the torque-speed curve, one can see the when constant torque output begins to decline relative to rotary speed.

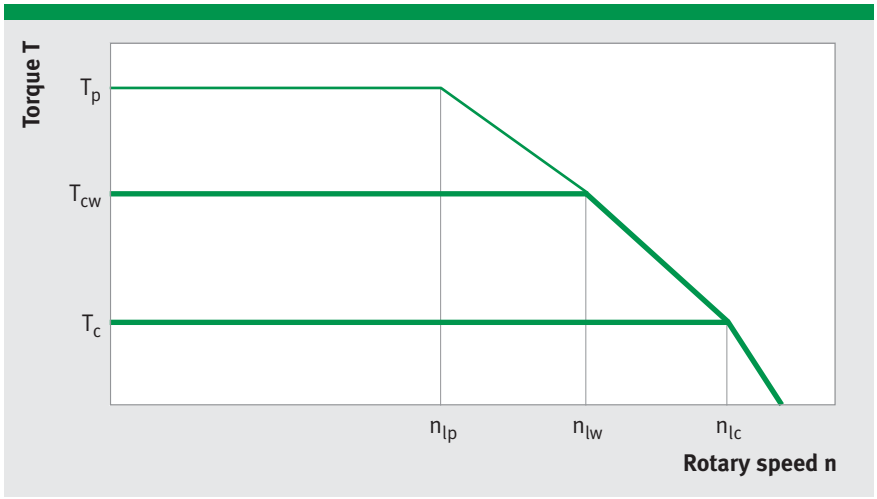


Torque-Rotary Speed Characteristic

The speed limits n_{lp}, n_{lw}, n_{lc} are calculated only with respect of winding specific parameters. If no field weakening operation occurs due to speed induced voltage drops the motor speed can be maintained at any torque T_p, T_{cw}, T_c up to the listed speed limits n_{lp}, n_{lw}, n_{lc}. The motor speed finally drops down to zero, depending on the DC link voltage.

With higher speeds and torques the motor produces additional (to copper losses) frequency-dependent losses (caused by eddy currents and cyclic magnetization loss). With respect of these thermal losses there is an additional speed limit in a range of n_{cr} for a continuous running (definition see glossary).

Regulated motor movements require a sufficient distance (0.8 times the relevant maximum rotary speed) of the possible operating points from the dropping range of the T(n)-characteristic.
A continuous characteristic means continuous operation. A dashed characteristic means short-burst operation.



Torque vs. rotary speed

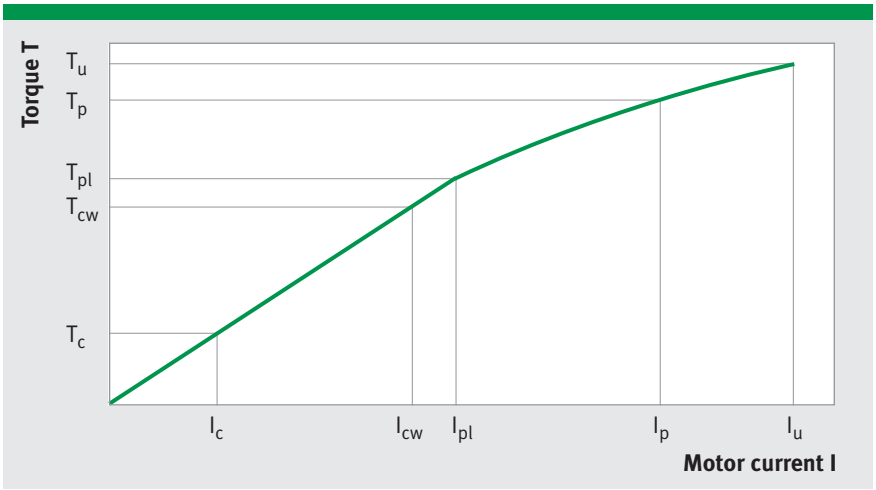
Winding specific speed limits are quiet proportional to U_{DCL}.
A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary). Then a further reduction of duty cycle or current is required.

Torque-Current Characteristic

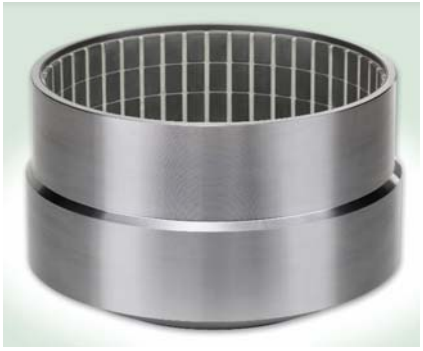
The linear characteristic ranges from the origin (0,0) to the point (T_{pl}, I_{pl}), which is characterized by the torque constant k_T. This is where the operating points of the motor for uncooled operation (T_c, I_c) and cooled operation (T_{cw}, I_{cw}) are located.

The non-linearity of the M-I-characteristic for larger currents results from the saturation of the magnetic circuit of a motor. The naturally curved part of the characteristic is described in the data sheet and in the diagram by the torque-current points (T_p, I_p) and (T_u, I_u).
It has an inconstant and significant smaller slope than k_T.

The motor can be run briefly (matter of seconds) up to the operating point (T_p, I_p).
For acceleration processes this operating point may be maximally used.
The limiting point (T_u, I_u) must not be exceeded under any circumstances (not even for a short time) because of the danger of demagnetizing the permanent magnets .



Torque vs. motor current



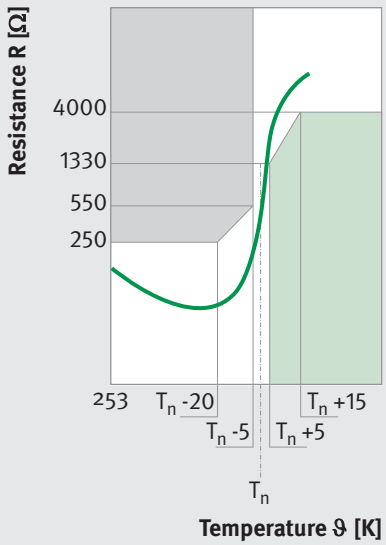
All characteristics are explained in the glossary.

Thermal Motor Protection Cutout

Direct drives are often operated at their thermal capacity limit.
In addition, there can be overloads in the process which were not anticipated or planned for. This can result in an additional current load which exceeds the permissible rated current. Therefore, the servo control for motors should, in general, have an overload protection for checking the motor current. Here, the effective value (square root of the mean) of the motor current may exceed the permissible rated motor current for only a short while. This type of temperature monitoring is very fast and reliable.
By default, IDAM motors have another additional thermal motor protection cutout using PTC and KTY sensors, as well.

Monitoring circuit I

For protection of the motor, there are three series-connected PTCs at the three phase windings. In addition, there is a KTY84-130 present in one phase in the motor.

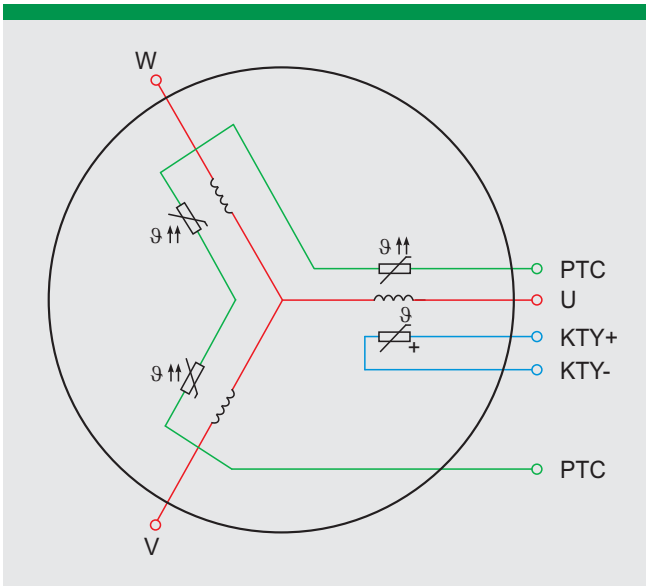


Temperature characteristics PTC

A PTC is a posistor (barretter). Its thermal time constant in the built-in state is below 5 s. In contrast to the KTY, its resistance increases very steeply upon the rated actuation temperature T_n being exceeded, and increases to a multiple of its value in the cold state. This behavior results in a significant change in the total resistance upon three series-connecting PTC elements, when only one of the elements exceeds the actuation temperature of the T_n. The use of the three sensors guarantees a safe switch-off of the motor, even at a standstill of the motor at asymmetric phase load. A downstream common commercial motor protection cutout typically gets triggered between 1.5 to 3.5 kOhm.

Thus, up to a deviation of a few degrees, the overtemperature of every winding is acquired.
The triggering devices also react to an extreme small resistance in the PTC circuit, which is normally an indication of an error in the monitoring circuit.
In addition, they ensure a safe electrolytic isolation of the controller from the sensors in the motor.
The motor protection triggering devices are not a part of the standard supplied kit. PTCs are not suitable for temperature measurements. The KTY should be used if required.
If the customer so wishes, additional monitor sensors can be integrated.

Basically, the PTC sensors must only be evaluated for the temperature protection.

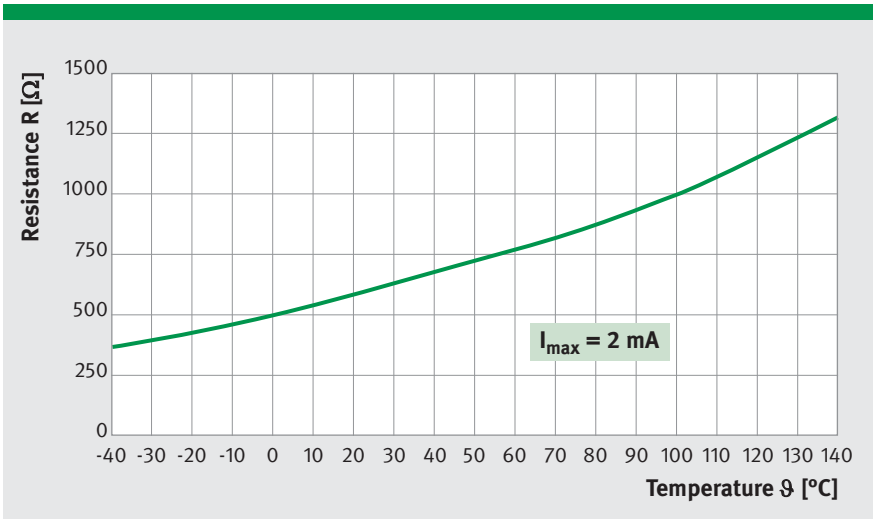


Standard connection, PTC and KTY

Monitoring circuit II

The KTY84-130 is a semiconductor resistance with positive temperature coefficients. The measurement is carried out depending on the motor type, with possible delay.

For protecting the motor from overtemperature, a cut-out limit is defined in the controller. The sensor can only measure in one phase.



Temperature characteristics KTY

While the motor is at standstill, constant currents flow through the windings, whose magnitude depends on the respective pole position. As a result, the motor is not heated homogeneously, which can lead to overheating of windings that are not being monitored.

The PTC and KTY sensors have a basic insulation to the motor. They are not suitable for direct connection to PELV/SELV circuits, according to DIN EN 50178.

Electrical Connections

The standard cable connections of the IDAM motors are axial in nature.
Their relative position to the radiator connections is defined in the drawings. The cable length from the motor output is 1000 mm, or according to the customer's wishes. The cross-section of the power connection cable is dependent upon the rated motor current and documented in the catalog drawing. By default, the dimensioning is done on the rated current I_{cw} at P_{lw} (cooled). The motor cables are available from 4G0.75 mm² onwards. The sensor cable 0.14 mm² (d = 6.0 mm; r_d = 45 mm; r_s = 24 mm; m = 67 g/m) makes temperature monitoring with PTC and KTY possible. The design of the cable ends is open with strand end-sleeves. The cables used are UL-approved and can withstand drag chains.
The axial cable outlets for the winding WM are depicted and dimensioned in the data sheets (page 22 onwards). From motor currents above 70 A onwards, the cable outlets are matched in an application-specific manner.

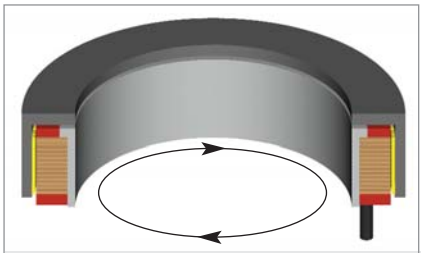
Pin layout

Motor	
U	Phase U
VV	Phase V
WWW	Phase W
GNYE	PE
BK	Shield
Sensor	
WH	PTC
BN	PTC
GN	+ KTY
YE	- KTY

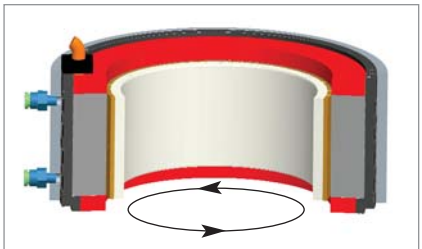
Positive direction of rotation of the motor

The electrically positive direction of rotation corresponds, in the case of all three-phase motors, to a right-hand rotary field, i. e. the phase voltages are induced in the sequence U, V, W.
IDAM motors have this positive direction of rotation for rotor movement

- in the clockwise direction when viewing away the side from the cable outlet
- counter-clockwise when viewing towards the side of the cable outlet



Direction of rotation in cable outlet, bottom.
Example: external running rotor



Direction of rotation in cable outlet, top.
Example: inside running rotor

Rated motor current (cooled) I_{cw} in A	Motor cable cross-section A in mm²	Cable diameter d in mm	Bending radius, dynamically moved r_d in mm	Bending radius in mm, statically laid r_s in mm	Weight m in g/m
≤ 9	0.75	7.3	73	44	110
≤ 16	1.5	10	100	60	160
≤ 22	2.5	11.6	120	70	240
≤ 30	4	12.7	130	89	310
≤ 37	6	15.3	170	92	430
≤ 52	10	18	210	108	630
≤ 70	16	24.5	294	137	1100

Commutation

Synchronous motors are preferably operated with commutation. IDAM torque motors do not have, by default, any Hall-sensors. IDAM recommends the measurement system-based commutation because it is supported by modern servo-inverters and controllers.

Insulation Strength

Insulation strength for intermediate - circuit voltages up to 600 V_{DC}

IDAM motors are tested, before shipping, with differentiated high-voltage testing methods and cast in vacuum.
IDAM motors are thus in agreement with the EC directive 73/23/EWG and the standards EN 50178, EN 60204.
Please pay attention, to the type-based voltages with which the motors can be rotated.

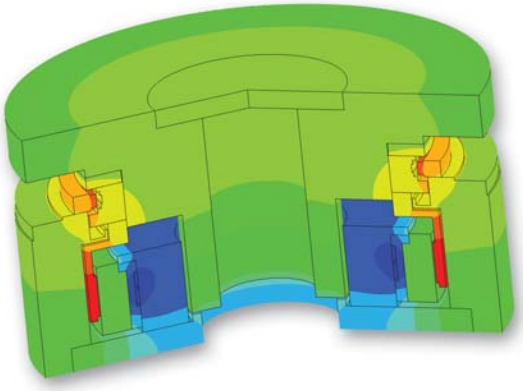
Overvoltages at the motor terminals under inverter operation

By means of extremely fast-switching power semiconductors, which results in high du/dt loads, far higher voltage values than the actual inverter voltage can exist at the motor terminals, especially in conjunction with longer connecting cables (from ca. 5 m) between the motor and inverter. This puts a great deal of stress on the motor insulation.
The du/dt values of the PWM-modules should not be greater than 8 kV/µs.
The motor connecting cables should be kept as short as possible.

For protecting the motors, an oscillographic measurement is necessary for the actual configuration of the voltage, existing at the motor, (PWM) across the winding and against PE. The voltage peaks that are present should not be much greater than 1 kV.
From about 2 kV, gradual damage to the insulation is expected.
IDAM engineers will support you in your application for determining and reducing excessively high voltages.

In this context, attention must be paid to the recommendations and projection instructions of the controller manufacturers.

Cooling and the Cooling Circuits



Power loss and lost heat

Apart from the power loss, which is described by the motor constant k_m additional frequency-dependent losses occur in the motor, especially at high control frequencies (in the range from 150 - 200 Hz). These losses contribute jointly to the heating of the motor and the system assemblies.

At low control frequencies of the motors, the following applies: motors with a high k_m produce, as compared to motors with a lower k_m, less power loss.

For the unrestricted thermal examination of the motor, bearing, and system assemblies, IDAM offers comprehensive thermal simulations.

The power loss that occurs during the operation of the motor gets transferred to the machine through the motor assemblies. This heat distribution through convection, conduction, and radiation can be purposefully influenced and controlled by a constructive design of the overall system.

The nominal torques of the motors are approx. 50% higher with liquid cooling than in uncooled operation. Depending on the mounting space, accuracy requirements, and the necessity for cooling, the motors should be designed and integrated into the machine design.

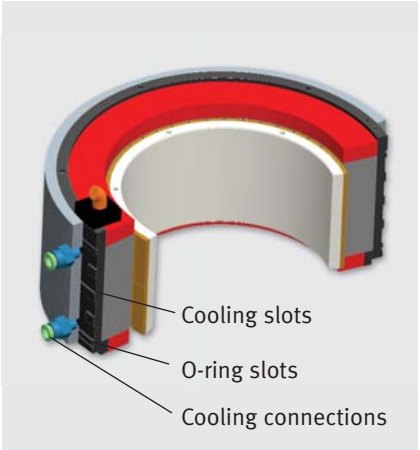
In production machines with a high rating or devices with very high dynamics, and hence higher bearing loading, it is preferable to work with cooling.

If a complete thermal de-coupling of the motor and the machine is required (for example, to avoid thermal deformation of the machine construction in precision machines), a precision cooling is additionally necessary. The actual cooling is then called the main cooling or power cooling.

The cooling of the motors is designed as jacket cooling, which the user must connect to the cooling circuit of a cooling assembly. The cooling jacket is optionally supplied as a part of the motor, or is already an integral part of the machine construction for the customer.

The cooling medium goes from the inlet to the outlet through holes in the cooling fins at different levels.

The inlet and outlet can be connected at will to the two connections. The flow area is sealed to the outside with O-rings.



Cooling of RDDM

Air gap diameter	Name of the O-ring	Order number
89	155x2.5 NBR70	107112
168	225x2 NBR70	01684
250	300x2.5 NBR90	107632
298	375x3 NBR70	102178
370	448x4 NBR70	01686
460	554x4 NBR70	03391
690	785x5 NBR70	105935
920	1017x5 NBR70	111128

O-ring types of water cooled RI motors

If water is used as the cooling medium, additives that prevent corrosion and biological deposits in the cooling circuit should be used.

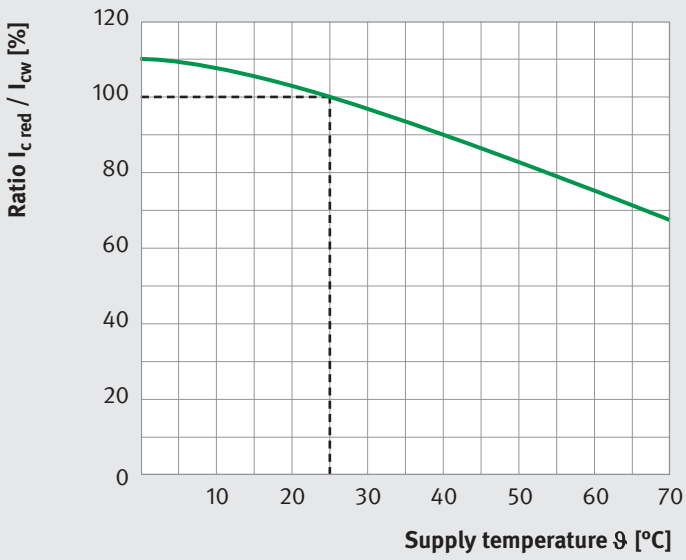
Dependency of the Rating Data on the Supply Temperature

The continuous current I_{cw} indicated in the data sheet for water cooled operation can be achieved at a rated supply temperature ϑ_{nV} of 25 °C. Higher supply temperatures ϑ_V result in a reduction of the cooling performance and therefore also the nominal current. The reduced continuous current $I_{c\,red}$ can be calculated from the following quadratic equation:

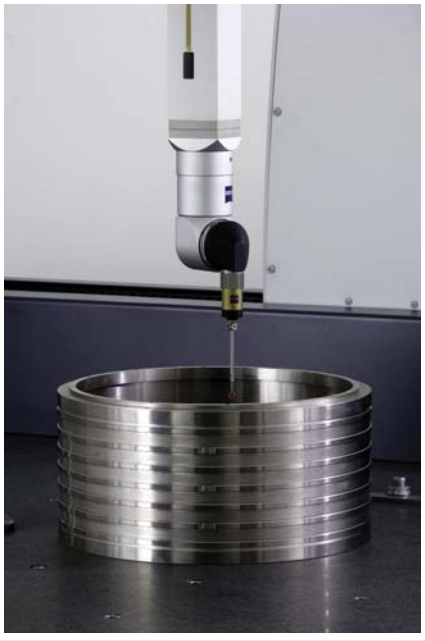
$$\frac{I_{c\,red}}{I_{cw}} = \sqrt{\frac{\vartheta_{max} - \vartheta_V}{\vartheta_{max} - \vartheta_{nV}}}$$

$I_{c\,red}$	Reduced continuous current [A]
I_{cw}	Continuous current, cooled at ϑ_{nV} [A]
ϑ_V	Current supply temperature [°C]
ϑ_{nV}	Rated supply temperature [°C]
ϑ_{max}	Maximum permissible winding temperature [°C]

(applies to a constant motor current)



Relative continuous current $I_{c\,red}$ / I_{cw} vs. supply temperature ϑ_V (ϑ_{nV} = 25 °C)



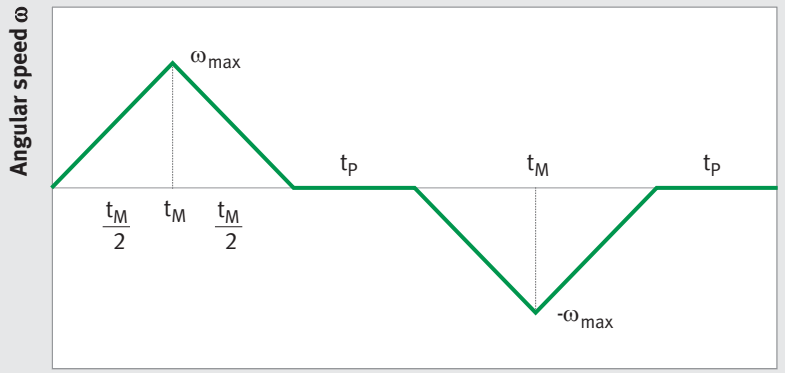
Selection of Direct Drives for Rotary Applications

Cycle applications

The cyclical operation consists of positioning movements following one another with movement pauses interspersed.

A simple positioning takes place as a positively accelerated movement with subsequent braking (negative acceleration, usually of the same amount as positive acceleration; then applies acceleration time is equal to braking time).

The maximum angular speed ω_{max} is reached at the end of an acceleration phase.

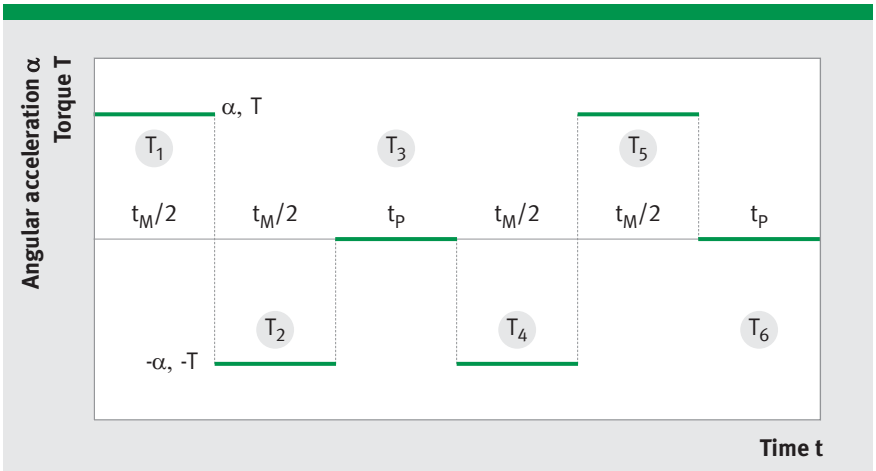


ω-t diagram for cycled operation

A rhythm cycle is described in the ω(t)-Diagram (ω: angular speed, t: time). The diagram shows a forward-reverse movement with pauses (t_M: movement time, t_P: pause time).

This gives the following α(t)-diagram (α: angular acceleration) as well as the flow of the torque required for the movement : $T = J \times \alpha$

(T: torque in Nm, J: mass moment of inertia in kgm², α: angular acceleration in rad/s²).



α-t diagram for cycled operation

According to the torque flow of the desired rhythm cycle, the motor is selected according to three criteria:

- maximum torque in the cycle ≤ T_P according to data sheet
- effective torque in the cycle ≤ T_c (motor uncooled) or T_{cw} (water cooling) according to data sheet
- maximum rotary speed in the cycle ≤ n_{lp} according to data sheet

The effective torque equals the root mean square of the torque flow (six torque cycles) in the rhythm cycle.

$$T_{rms} = \sqrt{\frac{T_1^2 \cdot t_1 + T_2^2 \cdot t_2 + \ldots + T_6^2 \cdot t_6}{t_1 + t_2 + \ldots + t_6}}$$

The factor of safety 1.4 in the calculation example (pages 18 and 19) takes into consideration, among other things, the motor operation in non-linear range of the torque-current characteristic, for which the equation for T_{rms} is only approximate.

With the torques
$T_1 = T$; $T_2 = -T$; $T_3 = 0$; $T_4 = -T$;
$T_5 = T$; $T_6 = 0$ and the times
$t_1 = t_M/2$; $t_2 = t_M/2$; $t_3 = t_P$; $t_4 = t_M/2$;
$t_5 = t_M/2$; $t_6 = t_P$ the effective torque is calculated.

$$T_{rms} = T \cdot \sqrt{\frac{t_M}{t_M + t_P}}$$

This equation is applied to the effective torque, if torques of the same magnitude act in the rhythm cycle (mass moment of inertia and angular accelerations are constant). Below the root sign appears: “sum of the movement times divided by the total of the movement and pause times”. The denominator is thus the cycle time.

Angular acceleration, maximum angular speed and maximum rotary speed of a positioning movement are calculated with:

$$\alpha = \frac{4 \cdot \varphi}{t_M^2}$$

$$\omega_{max} = \frac{2 \cdot \varphi}{t_M}$$

$$n_{max} = \frac{30}{\pi} \cdot \omega_{max}$$

φ	Movement angle (positioning angle) in rad
t_M	Movement time in s
α	Angular acceleration in rad/s²
ω_{max}	Maximum angular speed in rad/s
n_{max}	Maximum rotary speed in rpm

The positioning movement described takes place with a (theoretically) unending jerk. If a jerk limit is programmed in the servo-inverter, the positioning times extend accordingly. Constant positioning times require, in this case, greater accelerations.

Selection of Direct Drives for Rotary Applications

Example: Cycle applications

Pre-specified values:

Movement angle φ in °	180	Mass moment of inertia J in kgm²	2.5
Movement time t_M in s	0.5	Friction torque T_F in Nm	8
Cycle time in s	1.35	Factor of safety	1.4

Calculation:

Conversion of movement angle in rad

$$\varphi = \frac{\pi}{180} \cdot 180° = 3.142 \text{ rad}$$

Maximum angular speed

$$\omega_{max} = \frac{2 \cdot 3.142}{0.5} \text{ rad/s} = 12.57 \text{ rad/s}$$

Maximum rotary speed

$$n_{max} = \frac{30}{\pi} \cdot 12.57 \text{ rad/s} = 120.0 \text{ rpm}$$

Angular acceleration

$$\alpha = \frac{4 \cdot 3.142}{0.5^2} \text{ rad/s}^2 = 50.27 \text{ rad/s}^2$$

With friction torque and safety factor we get: maximum torque

$$T_{max} = (2.5 \cdot 50.27 + 8) \cdot 1.4 = 187.1 \text{ Nm}$$

Effective torque

$$T_{rms} = \left(2.5 \cdot 50.27 \cdot \sqrt{\frac{0.5}{1.35}} + 8\right) \cdot 1.4 = 118.3 \text{ Nm}$$

Taking into consideration the friction torque T_F and factor of safety, the motor is selected with the requirements

$T_{max} \leq T_p \quad | \quad T_{rms} \leq T_{cw} \quad | \quad 1.4 \cdot n_{max} \leq n_{lp}$

The motor RI17-3P-168x75-WM with water cooling has the calculated parameters.

NC indexing table applications

For indexing table applications, the rotary speed n, the mass moment of inertia J, the machining torque T_M (in movement) and T_s (standstill), as well, as the angular accelerations α (S1-operation) and α_{max} (S6-operation) are known mostly.

The machining times, i.e. the action times of the torques change often. Nonetheless, it is necessary to determine the effective torque in terms of continuous torque and the maximum torque as accurately as possible.

This is for choosing the optimum motor and for prevention of the maximum permissible winding temperature.
All the load torques occurring in the motor operation are included in the torque calculation.

Example: Indexing table applications

Given values:

Rotary speed n in rpm	75
Mass moment of inertia J in kgm²	4
Machining torque T_M in Nm	300
Friction torque T_F in Nm	50

Angular acceleration (S1) α in °/s²	9000
Max. angular acceleration (S6, 3 s) α_{max} in °/s²	20000
Factor of safety	1.4

Calculation:

Calculation of the accelerations in rad/s²

$$\alpha = \frac{\pi}{180} \cdot 9000 = 157 \text{ rad/s}^2$$

$$\alpha_{max} = \frac{\pi}{180} \cdot 20000 = 349 \text{ rad/s}^2$$

The motor is selected according to the torque T_s, as well, as the torques in motion for S1 and S6 operation T_c and T_p with factor of safety (stable regulation):

$$T_{sw} = (T_M + T_F) \cdot 1.4 = 490 \text{ Nm (with water cooling)}$$

$$T_{cw} = (J \cdot \alpha + T_M + T_F) \cdot 1.4 = 1369 \text{ Nm (with water cooling)}$$

$$T_p = (J \cdot \alpha_{max} + T_M + T_F) \cdot 1.4 = 2444 \text{ Nm}$$

To reach the rotary speed n at the end of the accelerated movement with a defined rotary speed-time function (exact ramp), the motor must be selected according to the rotary speed for the torque T_p (with factor of safety):

Calculation of rotary speed

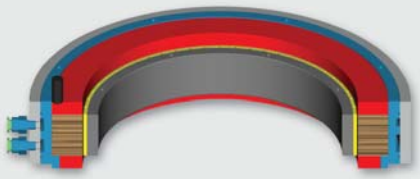
$$n_{lp} = 1.4 \cdot n = 105 \text{ rpm}$$

The motor RI19-3P-460x100-WH with water cooling fulfills these requirements.

Availability/Selection of Sizes
Series RI

IDAM standard series for quick availability

RI torque motors are slotted, permanent magnet-excited AC synchronous motors with inside rotors.
The coils of the primary are placed in grooves of the laminated ferrite core.
The secondary is an iron ring with permanent magnets fastened on it. This series of motor models is optimized for the maximum efficiency, which means: maximum torque for available installation space with nominal rotary speed and low power loss.
The usable torque is available linearly across a very large area.
The definition of the torque characteristics across the significant operating points allows an advance design with the help of our dimensioning examples.
The low torque variations allow the use of the motors for precision applications.



RI (internal rotor) motors are available in grades
- with 11 fixed diameters from 100 to 1260 mm outer diameter
- with stators at 6 different heights in 25 mm steps
- with 3 standard windings for low, medium and high rotary speeds

Advantages

- Rotary speed range 0 - 100% of the nominal rotary speed
- High dynamics and stiffness
- Higher rotary speeds are possible
- Higher torque as compared to DC motors of the same size
- Due to cooling from the outside, completely protected designs are always possible
- Low heat entry into foundation plate
- Higher acceleration and braking capacity due to more favorable ratio of torque to moment of inertia
- Compact construction
- Practically free of maintenance
- No limit for the motor diameter
- Good synchronism properties

Applications

- Automation technology
- Pressing and packing machines
- Presses
- In machine tools as CNC axis
- NC indexing tables
- Other exact radial trackers

Designation

Series RI

XXXX - 3P - DxH - X-X-X-X - XXX

PRIM Primary
SEK Secondary

Model variant
O Built-in set (motor is integrated in customer's system)
M Complete motor (parts are manufactured by IDAM)
K With cooling in the ring (additional ring is provided by IDAM)

Commutation type
O Without sensors, measurement system commutated
XX Other designs after discussion

Temperature monitoring
O Standard (KTY84-130 and 3x PTC in series at the phases 1, 2, 3 | 1x KTY84 at phase 2 as reserve)
S Special design after discussion with the manufacturer

Winding types
WL Low speed, low current requirement
WM Medium speed
WH High speed, higher current requirement
XX Other winding designs, e. g. LDX ... HDX

Dimensions
Effective diameter in the air gap x package size (mm)

Number of motor phases
3P 3-phase

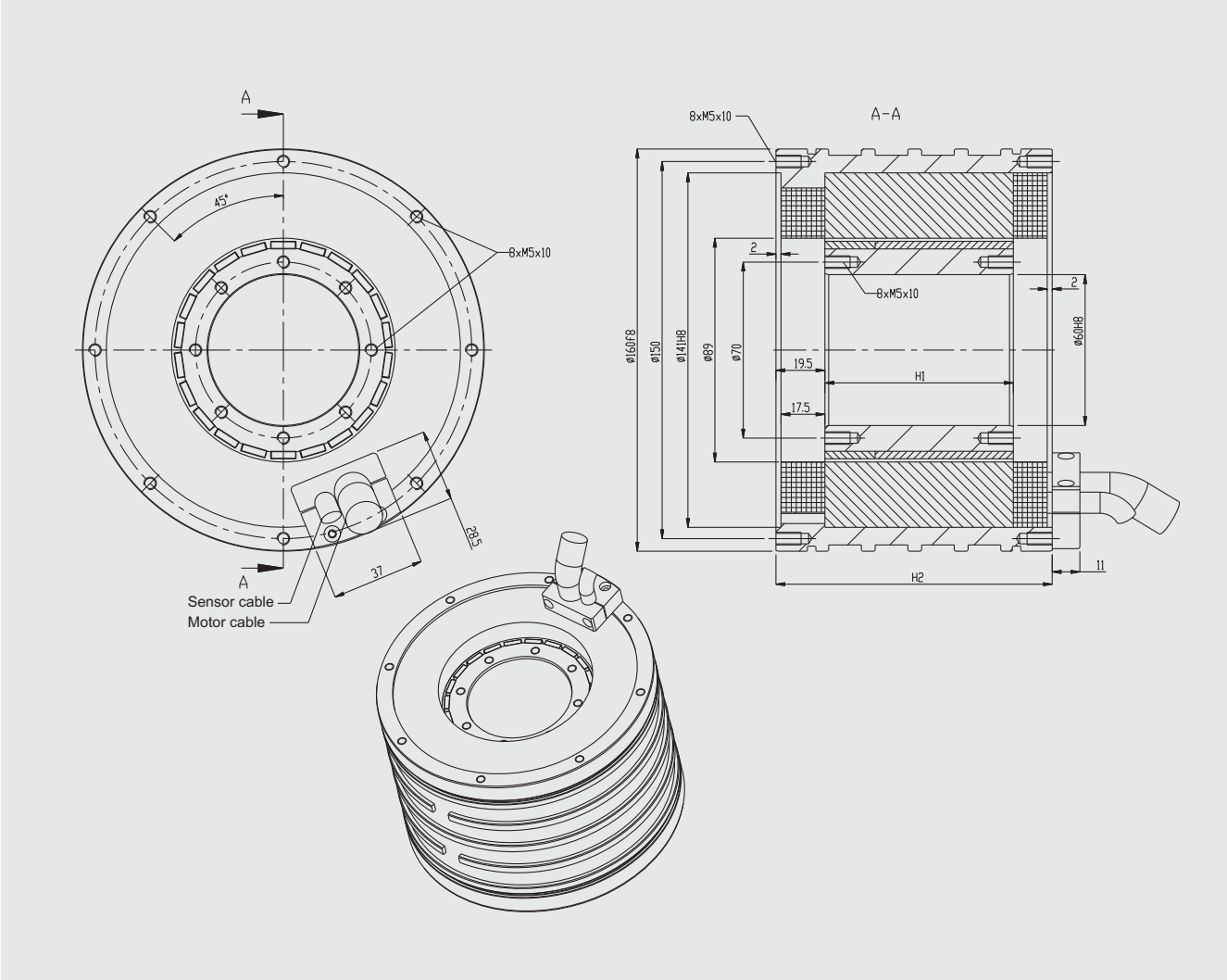
Model code

Motor type
RI Rotary internal (inside running rotor)

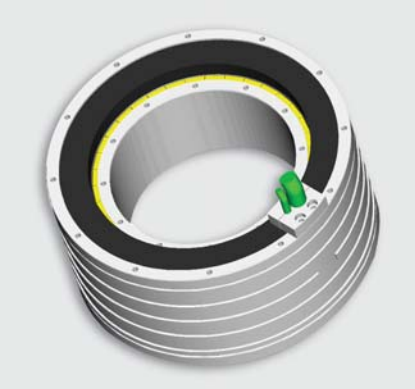
For unique identification of the motor, the 6-digit IDAM item-number of the order confirmation is binding.

Motor Specifications: Series RI11-3P-89xH

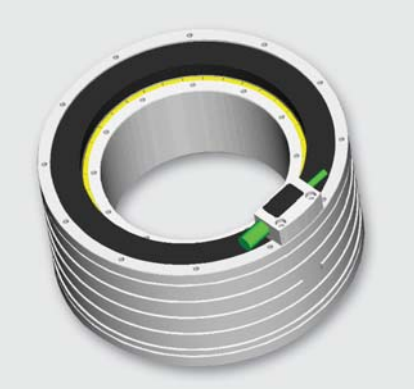
Drawing



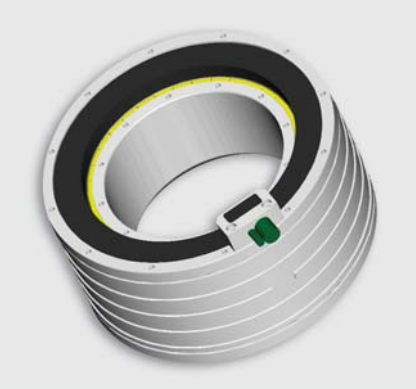
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI11-3P-89xH

Independent of winding

Motor specifications	Symbol	Unit	RI11-3P-89x25	RI11-3P-89x50	RI11-3P-89x75	RI11-3P-89x100	RI11-3P-89x125	RI11-3P-89x150	RI11-3P-89x175
Number of pole pairs	P		11	11	11	11	11	11	11
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	32.4	64.9	97.3	130	162	195	227
Peak torque (saturation range) at I_p	T_p	Nm	23.5	46.9	70.4	94	117	141	164
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	17.2	34.5	51.7	69	86	103	121
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	12.6	29.2	46.7	64	82	100	118
Continuous torque (not cooled) at I_c	T_c	Nm	4.9	11.0	17.1	23	28	33	38
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	8.9	20.8	33.2	46	59	71	84
Stall torque (not cooled) at I_s	T_s	Nm	3.4	7.8	12.2	16	20	24	27
Ripple torque (cogging) at I = 0	T_r	Nm	0.07	0.14	0.21	0.3	0.4	0.4	0.5
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	1130	1669	2207	2745	3283	3821	4360
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	442	652	862	1072	1283	1493	1703
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	304	609	913	1218	1522	1826	2131
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	35	66	94	120	140	155	171
Thermical resistance (water cooled)	R_{th}	K/W	0.329	0.164	0.110	0.082	0.066	0.055	0.047
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	0.82	1.35	1.76	2.11	2.41	2.68	2.93
Water flow (cooling)	dV/dt	l/min	0.87	1.74	2.61	3.48	4.35	5.22	6.09
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00

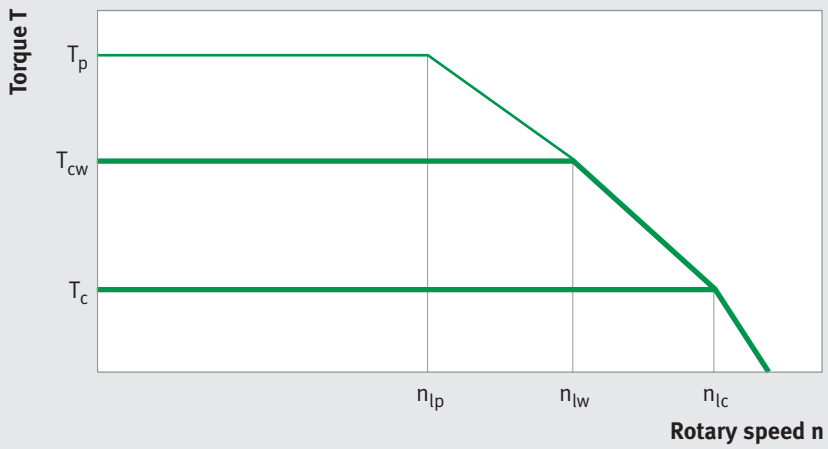
Mechanical interface	Symbol	Unit	RI11-3P-89x25	RI11-3P-89x50	RI11-3P-89x75	RI11-3P-89x100	RI11-3P-89x125	RI11-3P-89x150	RI11-3P-89x175
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	70.0	90.0	110.0	140.0	165.0	190.0	215.0
Mass of rotor	m_1	kg	0.5	1.1	1.6	2.2	2.7	3.2	3.8
Mass of stator	m_2	kg	5.3	7.4	9.4	11.9	14.3	16.5	18.8
Inertia of rotor	J	kgm^2	0.00075	0.0015	0.00225	0.0030	0.00375	0.0045	0.00525

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI11-3P-89

Winding dependent specifications	Symbol	Unit	RI11-3P-89x25-WL	RI11-3P-89x25-WM	RI11-3P-89x25-WH	RI11-3P-89x50-WL	RI11-3P-89x50-WM	RI11-3P-89x50-WH	RI11-3P-89x75-WL
Torque constant	k_T	Nm/A_{rms}	2.43	1.22	0.61	4.86	2.43	1.22	7.30
Back EMF constant	k_u	Vs/rad	1.99	0.99	0.50	3.98	1.99	0.99	5.97
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	531	1184	2471	232	564	1211	128
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	922	1955	4023	397	881	1848	234
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	1217	2497	5057	581	1213	2477	373
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	1253	2610	5315	599	1281	2635	380
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	2065	4238	8595	933	1948	3984	582
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	2634	5329	10725	1274	2600	5254	829
Limiting speed for continuous running*	n_{cr}	rpm	818	818	818	818	818	818	818
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	5.85	1.46	0.37	8.64	2.16	0.54	11.43
Inductance, phase to phase	L	mH	24.0	6.0	1.5	47.9	12.0	3.0	71.9
Ultimate current	I_u	A_{rms}	19.1	38.1	76.2	19.1	38.1	76.2	19.1
Peak current (saturation range)	I_p	A_{rms}	11.3	22.7	45.4	11.3	22.7	45.4	11.3
Peak current (linear range)	I_{pl}	A_{rms}	7.1	14.2	28.4	7.1	14.2	28.4	7.1
Continuous current (water cooled)	I_{cw}	A_{rms}	5.2	10.3	20.6	6.0	12.0	23.9	6.4
Continuous current (not cooled)	I_c	A_{rms}	2.0	4.0	7.9	2.3	4.5	9.0	2.3
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	3.7	7.3	14.6	4.3	8.5	17.0	4.5
Stall current at zero speed (not cooled)	I_s	A_{rms}	1.4	2.8	5.6	1.6	3.2	6.4	1.7
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

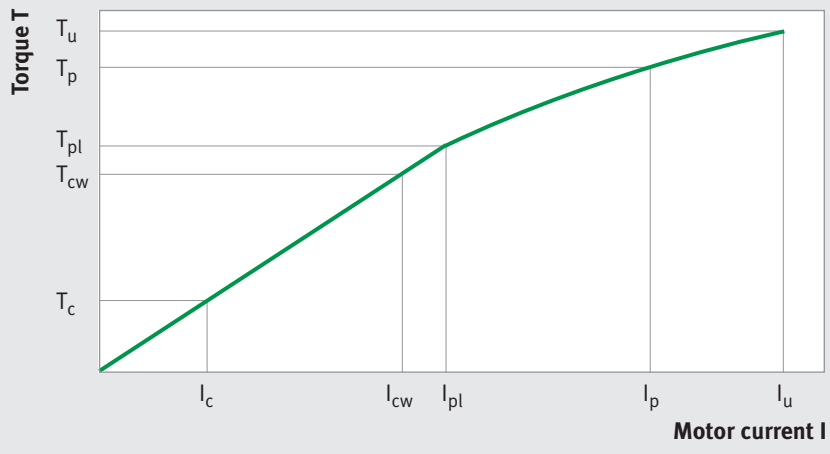


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

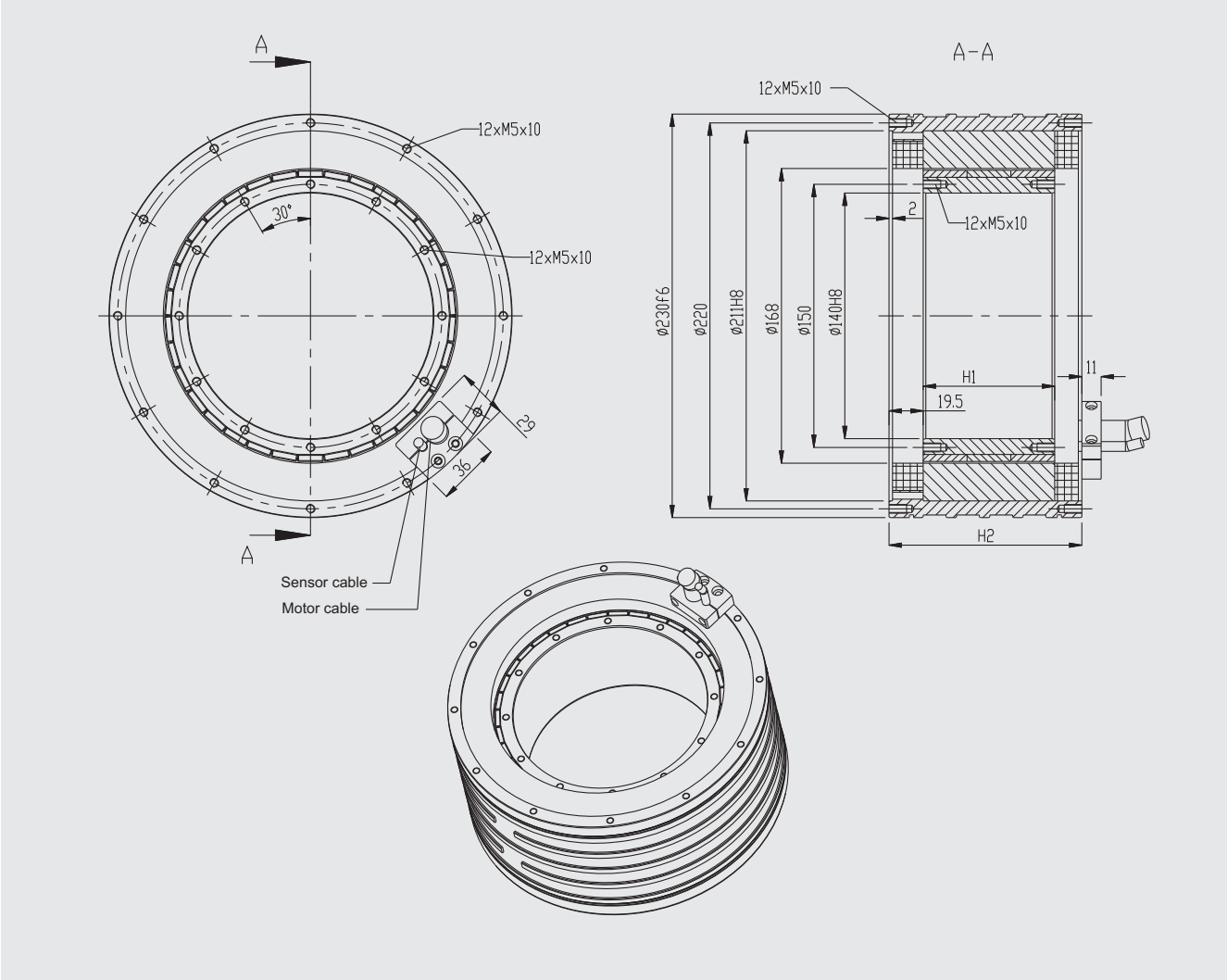
Then a further reduction of duty cycle or current is required.

RI11-3P-89x75-WM	RI11-3P-89x75-WH	RI11-3P-89x100-WL	RI11-3P-89x100-WM	RI11-3P-89x100-WH	RI11-3P-89x125-WL	RI11-3P-89x125-WM	RI11-3P-89x125-WH	RI11-3P-89x150-WL	RI11-3P-89x150-WM	RI11-3P-89x150-WH	RI11-3P-89x175-WL	RI11-3P-89x175-WM	RI11-3P-89x175-WH	Symbol
3.65	1.82	9.73	4.86	2.43	12.16	6.08	3.04	14.59	7.30	3.65	17.02	8.51	4.26	k_T
2.98	1.49	7.96	3.98	1.99	9.95	4.97	2.49	11.94	5.97	2.98	13.93	6.96	3.48	k_u
356	790	72	251	579	34	187	452	4	143	367	-	111	306	n_{lp}
549	1174	154	388	850	107	294	660	75	232	536	51	188	448	n_{lw}
792	1630	270	584	1212	210	462	965	171	381	802	142	323	684	n_{lc}
837	1741	269	615	1294	201	481	1025	155	391	846	122	327	718	n_{lp}
1239	2555	413	898	1867	314	698	1465	249	567	1201	202	475	1015	n_{lw}
1705	3460	608	1263	2572	477	999	2043	390	824	1692	328	699	1442	n_{lc}
818	818	-	818	818	-	818	818	-	818	818	-	-	818	n_{cr}
2.86	0.72	14.21	3.55	0.90	17.00	4.25	1.07	19.79	4.95	1.25	22.57	5.64	1.42	R_{25}
18.0	4.5	95.9	24.0	6.0	119.9	30.0	7.5	143.8	36.0	9.0	167.8	41.9	10.5	L
38.1	76.2	19.1	38.1	76.2	19.1	38.1	76.2	19.1	38.1	76.2	19.1	38.1	76.2	I_u
22.7	45.4	11.3	22.7	45.4	11.3	22.7	45.4	11.3	22.7	45.4	11.3	22.7	45.4	I_p
14.2	28.4	7.1	14.2	28.4	7.1	14.2	28.4	7.1	14.2	28.4	7.1	14.2	28.4	I_{pl}
12.8	25.5	6.6	13.3	26.4	6.8	13.6	27.0	6.9	13.8	27.4	7.0	13.9	27.7	I_{cw}
4.7	9.3	2.4	4.7	9.5	2.3	4.7	9.3	2.3	4.6	9.1	2.2	4.5	9.0	I_c
9.1	18.1	4.7	9.4	18.7	4.8	9.6	19.2	4.9	9.8	19.5	4.9	9.9	19.7	I_{sw}
3.3	6.6	1.7	3.4	6.7	1.7	3.3	6.6	1.6	3.2	6.5	1.6	3.2	6.4	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

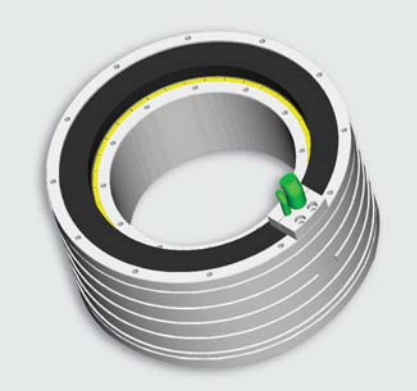


Motor Specifications: Series RI17-3P-168xH

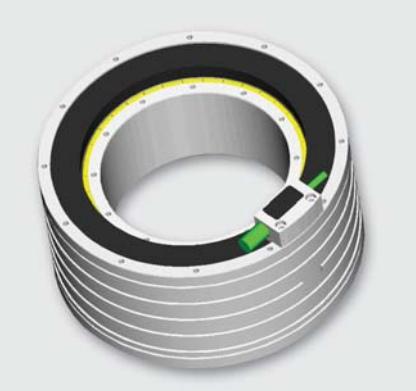
Drawing



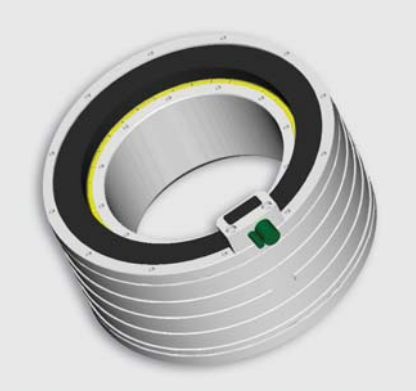
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI17-3P-168xH

Independent of winding

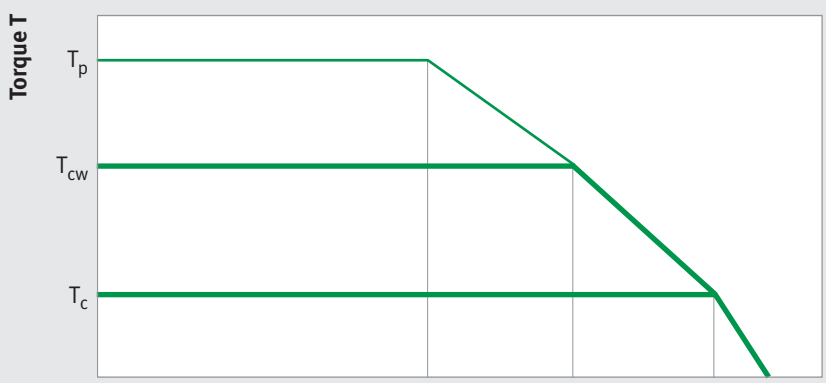
Motor specifications	Symbol	Unit	RI17-3P-168x25	RI17-3P-168x50	RI17-3P-168x75	RI17-3P-168x100	RI17-3P-168x125	RI17-3P-168x150	RI17-3P-168x175
Number of pole pairs	P		17	17	17	17	17	17	17
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	110	220	327	436	539	647	755
Peak torque (saturation range) at I_p	T_p	Nm	93	186	276	369	456	547	639
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	65	129	192	256	317	380	443
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	36	85	135	187	238	290	343
Continuous torque (not cooled) at I_c	T_c	Nm	16	36	56	75	92	108	124
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	25	60	96	133	169	206	243
Stall torque (not cooled) at I_s	T_s	Nm	11	25	39	53	65	77	88
Ripple torque (cogging) at I = 0	T_r	Nm	0.3	0.6	0.8	1.1	1.4	1.6	1.9
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	2909	4173	5438	6702	7967	9232	10496
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1136	1630	2124	2618	3112	3606	4100
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	455	911	1366	1822	2277	2733	3188
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	66	124	178	227	264	293	323
Thermical resistance (water cooled)	R_{th}	K/W	0.220	0.110	0.073	0.055	0.044	0.037	0.031
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	1.92	3.20	4.17	5.00	5.68	6.33	6.92
Water flow (cooling)	dV/dt	l/min	1.30	2.60	3.90	5.21	6.51	7.81	9.11
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mechanical interface	**Symbol**	**Unit**	**RI17-3P-168x25**	**RI17-3P-168x50**	**RI17-3P-168x75**	**RI17-3P-168x100**	**RI17-3P-168x125**	**RI17-3P-168x150**	**RI17-3P-168x175**
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	70.0	90.0	110.0	140.0	165.0	190.0	215.0
Mass of rotor	m_1	kg	1.2	2.4	3.6	4.8	6.0	7.2	8.4
Mass of stator	m_2	kg	7.5	10.4	13.3	16.8	20.1	23.3	26.6
Inertia of rotor	J	kgm^2	0.007	0.014	0.021	0.028	0.035	0.042	0.049

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI17-3P-168xH

Winding dependent specifications	Symbol	Unit	RI17-3P-168x25-WL	RI17-3P-168x25-WM	RI17-3P-168x25-WH	RI17-3P-168x50-WL	RI17-3P-168x50-WM	RI17-3P-168x50-WH	RI17-3P-168x75-WL
Torque constant	k_T	Nm/A_{rms}	6.73	3.37	1.82	13.47	6.73	3.65	20.00
Back EMF constant	k_u	Vs/rad	5.51	2.75	1.49	11.02	5.51	2.98	16.36
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	168	484	1000	44	212	473	-
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	365	810	1564	151	368	733	83
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	438	915	1723	205	443	845	130
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	523	1162	2238	232	555	1095	134
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	857	1790	3372	391	844	1611	242
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	966	1971	3673	467	965	1811	304
Limiting speed for continuous running*	n_{cr}	rpm	529	529	529	-	529	529	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	8.22	2.06	0.60	11.80	2.95	0.87	15.37
Inductance, phase to phase	L	mH	21.9	5.5	1.6	43.7	10.9	3.2	65.6
Ultimate current	I_u	A_{rms}	19.5	38.9	71.9	19.5	38.9	71.9	19.5
Peak current (saturation range)	I_p	A_{rms}	15.4	30.7	56.7	15.4	30.7	56.7	15.4
Peak current (linear range)	I_{pl}	A_{rms}	9.6	19.2	35.5	9.6	19.2	35.5	9.6
Continuous current (water cooled)	I_{cw}	A_{rms}	5.3	10.7	19.7	6.3	12.6	23.2	6.8
Continuous current (not cooled)	I_c	A_{rms}	2.3	4.6	8.5	2.6	5.3	9.8	2.8
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	3.8	7.6	14.0	4.5	8.9	16.5	4.8
Stall current at zero speed (not cooled)	I_s	A_{rms}	1.6	3.3	6.1	1.9	3.8	6.9	2.0
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

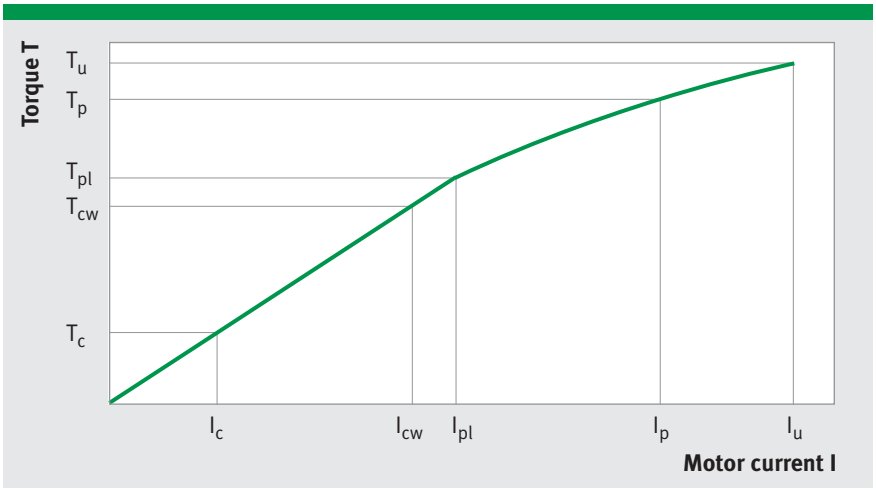


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

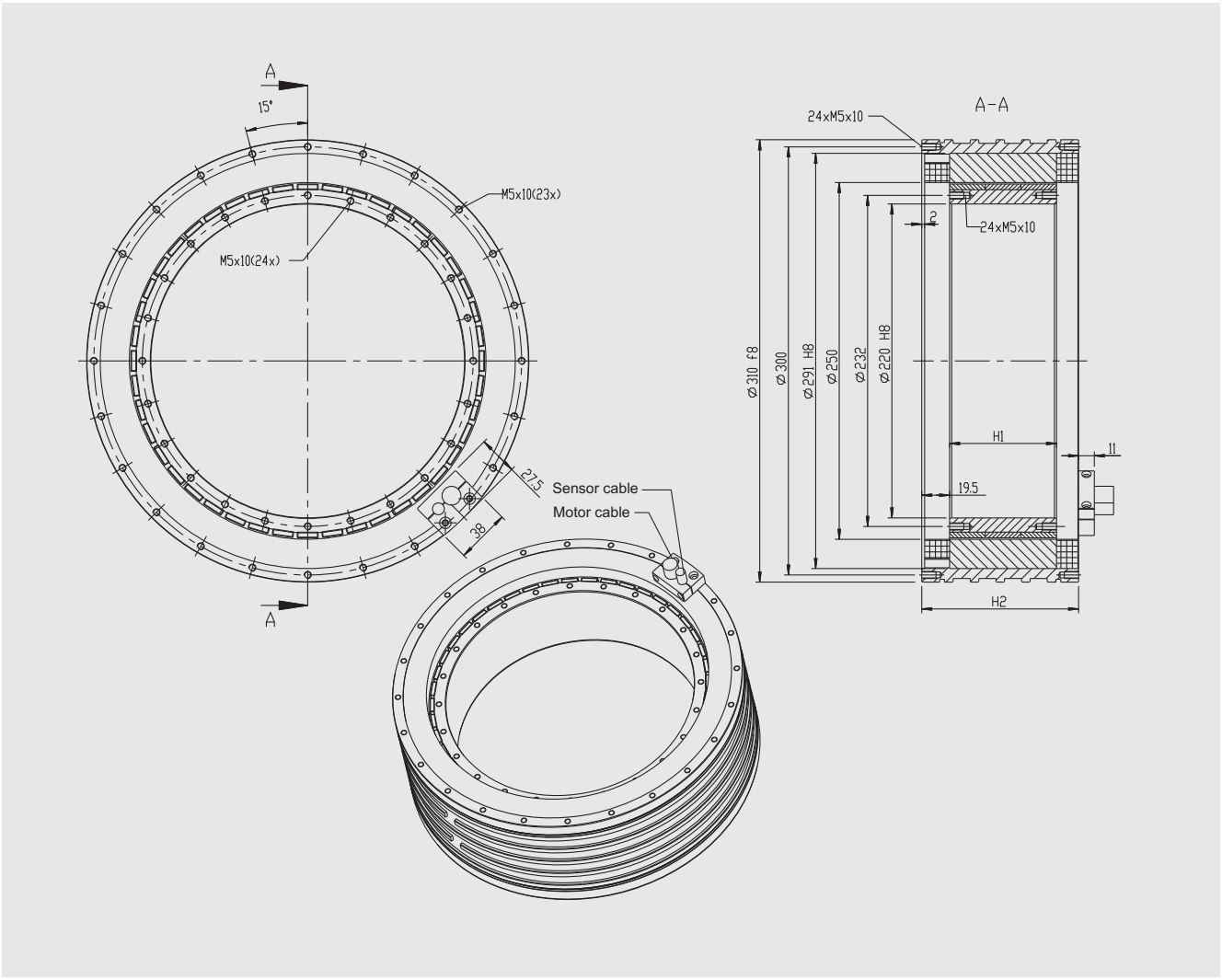
Then a further reduction of duty cycle or current is required.

RI17-3P-168x75-WM	RI17-3P-168x75-WH	RI17-3P-168x100-WL	RI17-3P-168x100-WM	RI17-3P-168x100-WH	RI17-3P-168x125-WL	RI17-3P-168x125-WM	RI17-3P-168x125-WH	RI17-3P-168x150-WL	RI17-3P-168x150-WM	RI17-3P-168x150-WH	RI17-3P-168x175-WL	RI17-3P-168x175-WM	RI17-3P-168x175-WH	Symbol
10.00	5.41	26.67	13.33	7.22	33.00	16.50	8.93	39.60	19.80	10.72	46.20	23.10	12.50	k_T
8.18	4.43	21.81	10.91	5.90	26.99	13.50	7.31	32.39	16.19	8.77	37.79	18.89	10.23	k_u
120	298	-	71	209	-	41	155	-	19	119	-	-	92	n_{lp}
227	469	48	156	337	27	115	260	13	87	208	3	67	171	n_{lw}
290	559	92	211	414	70	167	331	56	136	273	45	114	231	n_{lc}
354	716	83	251	524	51	190	411	28	148	333	9	117	278	n_{lp}
542	1050	168	391	769	125	304	607	95	244	496	74	202	417	n_{lw}
639	1206	221	472	896	173	375	717	140	308	593	116	260	504	n_{lc}
529	529	-	-	529	-	-	529	-	-	529	-	-	-	n_{cr}
3.84	1.13	18.95	4.74	1.39	22.52	5.63	1.65	26.09	6.52	1.92	29.67	7.42	2.18	R_{25}
16.4	4.8	87.5	21.9	6.4	109.3	27.3	8.0	131.2	32.8	9.6	153.0	38.3	11.2	L
38.9	71.9	19.5	38.9	71.9	19.5	38.9	71.9	19.5	38.9	71.9	19.5	38.9	71.9	I_u
30.7	56.7	15.4	30.7	56.7	15.4	30.7	56.7	15.4	30.7	56.7	15.4	30.7	56.7	I_p
19.2	35.5	9.6	19.2	35.5	9.6	19.2	35.5	9.6	19.2	35.5	9.6	19.2	35.5	I_{pl}
13.5	24.9	7.0	14.0	25.9	7.2	14.4	26.6	7.3	14.7	27.0	7.4	14.8	27.4	I_{cw}
5.6	10.3	2.8	5.7	10.4	2.8	5.6	10.3	2.7	5.5	10.1	2.7	5.4	9.9	I_c
9.6	17.7	5.0	10.0	18.4	5.1	10.2	18.9	5.2	10.4	19.2	5.3	10.5	19.4	I_{sw}
3.9	7.3	2.0	4.0	7.4	2.0	4.0	7.3	1.9	3.9	7.2	1.9	3.8	7.1	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

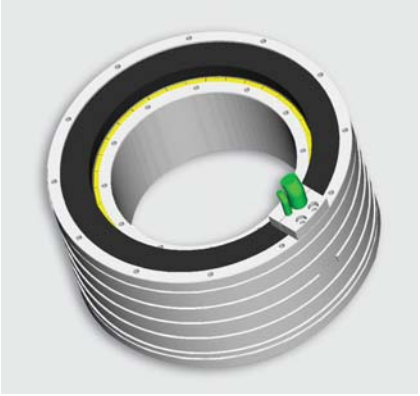


Motor Specifications: Series RI11-3P-250xH

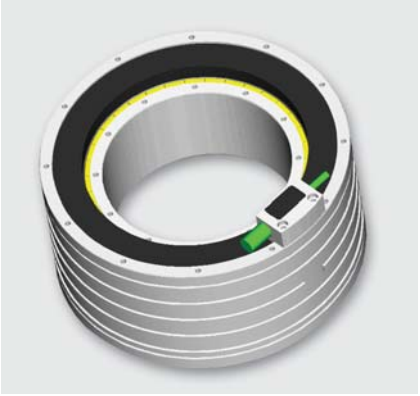
Drawing



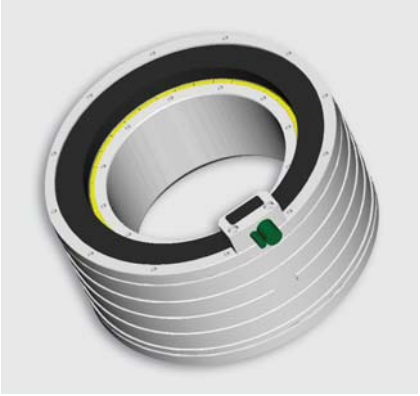
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI11-3P-250xH

Independent of winding

Motor specifications	Symbol	Unit	RI11-3P-250x25	RI11-3P-250x50	RI11-3P-250x75	RI11-3P-250x100	RI11-3P-250x125	RI11-3P-250x150	RI11-3P-250x175
Number of pole pairs	P		22	22	22	22	22	22	22
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	211	422	626	835	1033	1240	1447
Peak torque (saturation range) at I_p	T_p	Nm	176	353	524	699	865	1038	1211
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	114	228	339	451	559	670	782
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	76	182	291	404	514	628	743
Continuous torque (not cooled) at I_c	T_c	Nm	34	79	124	169	207	243	280
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	54	129	206	287	365	446	527
Stall torque (not cooled) at I_s	T_s	Nm	24	56	88	120	147	173	199
Ripple torque (cogging) at I = 0	T_r	Nm	0.5	1.1	1.6	2.1	2.6	3.1	3.6
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	3473	4920	6367	7814	9261	10708	12155
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1072	1519	1965	2412	2858	3305	3752
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	628	1256	1885	2513	3141	3769	4397
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	98	184	265	338	393	436	481
Thermical resistance (water cooled)	R_{th}	K/W	0.159	0.080	0.053	0.040	0.032	0.027	0.023
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	3.48	5.85	7.64	9.19	10.45	11.66	12.77
Water flow (cooling)	dV/dt	l/min	1.79	3.59	5.38	7.18	8.97	10.77	12.56
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00

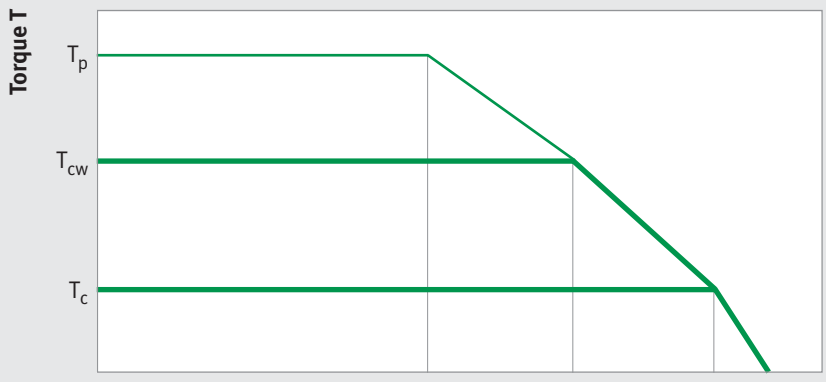
Mechanical interface	Symbol	Unit	RI11-3P-250x25	RI11-3P-250x50	RI11-3P-250x75	RI11-3P-250x100	RI11-3P-250x125	RI11-3P-250x150	RI11-3P-250x175
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	70.0	90.0	110.0	140.0	165.0	190.0	215.0
Mass of rotor	m_1	kg	1.9	3.8	5.7	7.6	9.6	11.5	13.4
Mass of stator	m_2	kg	10.3	14.1	18.0	22.8	27.1	31.5	35.8
Inertia of rotor	J	kgm^2	0.026	0.052	0.078	0.104	0.131	0.157	0.183

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI11-3P-250xH

Winding dependent specifications	Symbol	Unit	RI11-3P-250x25-WL	RI11-3P-250x25-WM	RI11-3P-250x25-WH	RI11-3P-250x50-WL	RI11-3P-250x50-WM	RI11-3P-250x50-WH	RI11-3P-250x75-WL
Torque constant	k_T	Nm/A_{rms}	8.44	6.78	4.22	16.88	13.56	8.44	25.06
Back EMF constant	k_u	Vs/rad	6.90	5.55	3.45	13.81	11.09	6.90	20.50
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	169	232	424	64	97	195	27
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	303	390	657	130	172	302	75
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	354	447	734	168	214	356	107
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	454	583	979	210	275	474	129
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	694	875	1437	320	408	680	201
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	774	970	1574	375	472	772	246
Limiting speed for continuous running*	n_{cr}	rpm	409	409	409	409	409	409	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	3.92	2.53	0.98	5.56	3.58	1.39	7.19
Inductance, phase to phase	L	mH	12.6	8.2	3.2	25.3	16.3	6.3	37.9
Ultimate current	I_u	A_{rms}	31.2	38.9	62.5	31.2	38.9	62.5	31.2
Peak current (saturation range)	I_p	A_{rms}	24.3	30.3	48.6	24.3	30.3	48.6	24.3
Peak current (linear range)	I_{pl}	A_{rms}	13.5	16.8	27.0	13.5	16.8	27.0	13.5
Continuous current (water cooled)	I_{cw}	A_{rms}	9.1	11.3	18.1	10.8	13.4	21.5	11.6
Continuous current (not cooled)	I_c	A_{rms}	4.1	5.1	8.2	4.7	5.9	9.4	5.0
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	6.4	8.0	12.9	7.6	9.5	15.3	8.2
Stall current at zero speed (not cooled)	I_s	A_{rms}	2.9	3.6	5.8	3.3	4.2	6.7	3.5
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

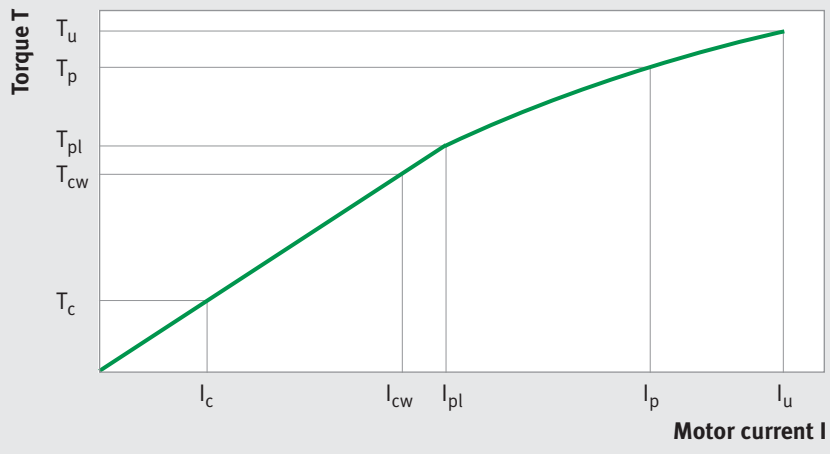


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

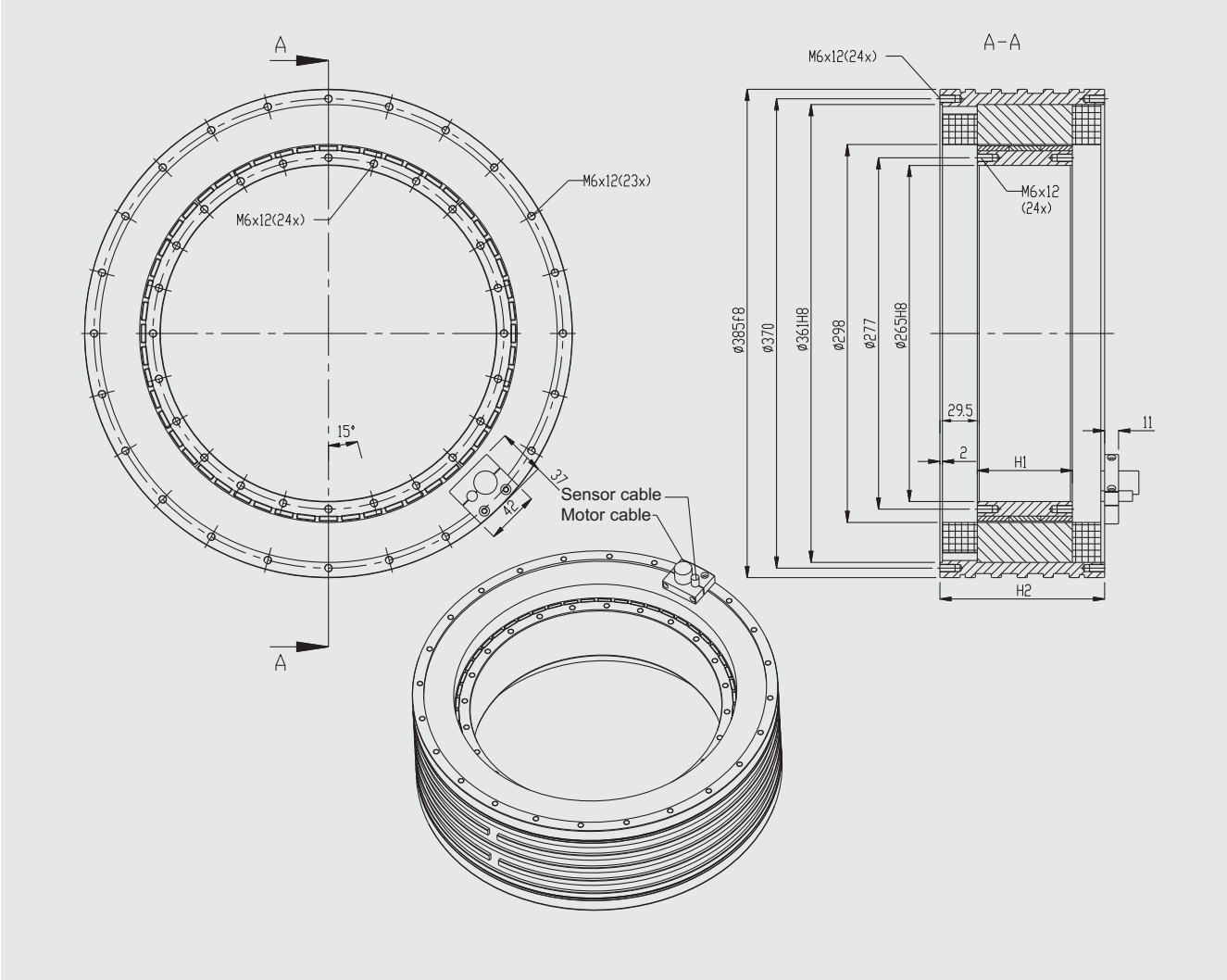
Then a further reduction of duty cycle or current is required.

RI11-3P-250x75-WM	RI11-3P-250x75-WH	RI11-3P-250x100-WL	RI11-3P-250x100-WM	RI11-3P-250x100-WH	RI11-3P-250x125-WL	RI11-3P-250x125-WM	RI11-3P-250x125-WH	RI11-3P-250x150-WL	RI11-3P-250x150-WM	RI11-3P-250x150-WH	RI11-3P-250x175-WL	RI11-3P-250x175-WM	RI11-3P-250x175-WH	Symbol
20.14	12.53	33.42	26.85	16.71	41.35	33.23	20.68	49.62	39.87	24.81	57.89	46.52	28.95	k_T
16.47	10.25	27.33	21.97	13.67	33.82	27.18	16.91	40.59	32.62	20.29	47.35	38.05	23.68	k_u
51	118	6	26	79	-	10	55	-	-	38	-	-	26	n_{lp}
103	189	48	69	133	32	49	100	21	35	78	12	25	62	n_{lw}
138	234	77	100	172	60	78	136	48	63	112	39	53	94	n_{lc}
173	307	87	121	222	62	90	172	44	68	137	31	52	113	n_{lp}
260	439	142	185	319	108	142	249	84	113	202	67	92	168	n_{lw}
311	512	180	229	379	142	181	302	115	148	249	96	124	211	n_{lc}
-	409	-	-	409	-	-	-	-	-	-	-	-	-	n_{cr}
4.64	1.80	8.83	5.69	2.21	10.46	6.74	2.61	12.09	7.80	3.02	13.73	8.85	3.43	R_{25}
24.5	9.5	50.6	32.6	12.6	63.2	40.8	15.8	75.8	49.0	19.0	88.5	57.1	22.1	L
38.9	62.5	31.2	38.9	62.5	31.2	38.9	62.5	31.2	38.9	62.5	31.2	38.9	62.5	I_u
30.3	48.6	24.3	30.3	48.6	24.3	30.3	48.6	24.3	30.3	48.6	24.3	30.3	48.6	I_p
16.8	27.0	13.5	16.8	27.0	13.5	16.8	27.0	13.5	16.8	27.0	13.5	16.8	27.0	I_{pl}
14.4	23.2	12.1	15.0	24.2	12.4	15.5	24.8	12.6	15.7	25.3	12.8	16.0	25.6	I_{cw}
6.2	9.9	5.0	6.3	10.1	5.0	6.2	10.0	4.9	6.1	9.8	4.8	6.0	9.7	I_c
10.3	16.5	8.6	10.7	17.2	8.8	11.0	17.6	9.0	11.2	18.0	9.1	11.3	18.2	I_{sw}
4.4	7.0	3.6	4.5	7.2	3.6	4.4	7.1	3.5	4.3	7.0	3.4	4.3	6.9	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

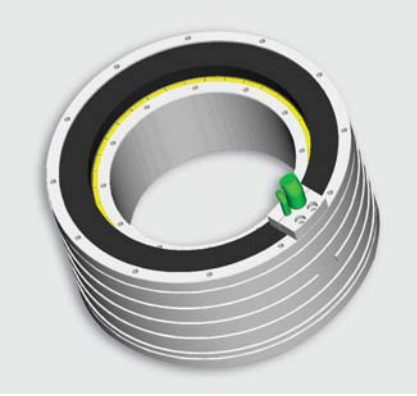


Motor Specifications: Series RI13-3P-298xH

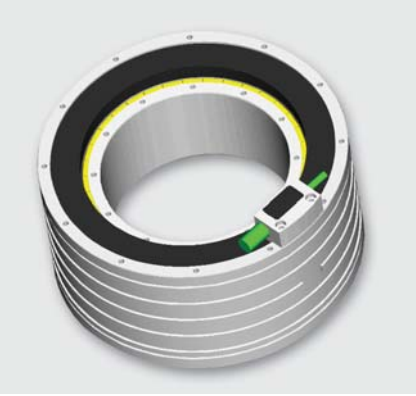
Drawing



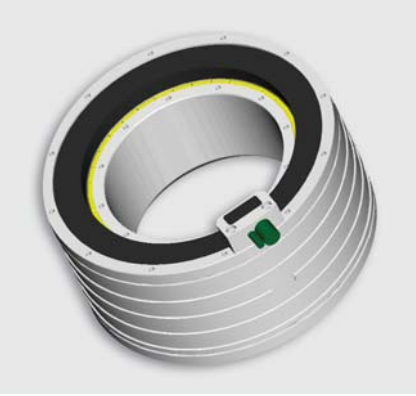
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI13-3P-298xH

Independent of winding

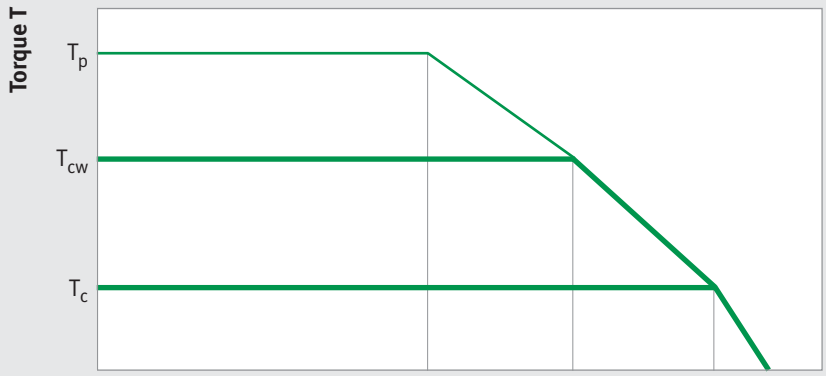
Motor specifications	Symbol	Unit	RI13-3P-298x25	RI13-3P-298x50	RI13-3P-298x75	RI13-3P-298x100	RI13-3P-298x125	RI13-3P-298x150	RI13-3P-298x175
Number of pole pairs	P		26	26	26	26	26	26	26
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	357	715	1062	1415	1752	2102	2452
Peak torque (saturation range) at I_p	T_p	Nm	262	524	779	1039	1286	1543	1800
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	191	381	566	755	934	1121	1308
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	142	338	541	752	959	1173	1387
Continuous torque (not cooled) at I_c	T_c	Nm	63	145	227	308	379	446	513
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	101	240	384	534	681	833	985
Stall torque (not cooled) at I_s	T_s	Nm	44	103	161	219	269	316	364
Ripple torque (cogging) at I = 0	T_r	Nm	0.8	1.6	2.3	3.1	3.9	4.6	5.4
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	2774	3911	5047	6184	7275	8412	9549
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1083	1528	1972	2416	2842	3286	3730
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	779	1559	2338	3117	3897	4676	5455
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	117	220	316	402	468	519	573
Thermical resistance (water cooled)	R_{th}	K/W	0.128	0.064	0.043	0.032	0.026	0.021	0.018
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	5.79	9.75	12.75	15.36	17.52	19.56	21.42
Water flow (cooling)	dV/dt	l/min	2.23	4.45	6.68	8.91	11.13	13.36	15.59
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mechanical interface	**Symbol**	**Unit**	**RI13-3P-298x25**	**RI13-3P-298x50**	**RI13-3P-298x75**	**RI13-3P-298x100**	**RI13-3P-298x125**	**RI13-3P-298x150**	**RI13-3P-298x175**
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	90.0	110.0	130.0	160.0	185.0	210.0	235.0
Mass of rotor	m_1	kg	2.6	5.1	7.7	10.2	12.8	15.3	17.9
Mass of stator	m_2	kg	21.8	28.9	35.9	45.1	52.9	60.7	68.6
Inertia of rotor	J	kgm^2	0.05	0.10	0.15	0.20	0.25	0.30	0.35

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI13-3P-298xH

Winding dependent specifications	Symbol	Unit	RI13-3P-298x25-WL	RI13-3P-298x25-WM	RI13-3P-298x25-WH	RI13-3P-298x50-WL	RI13-3P-298x50-WM	RI13-3P-298x50-WH	RI13-3P-298x75-WL
Torque constant	k_T	Nm/A_{rms}	9.8	4.9	3.5	19.5	9.8	7.0	29.0
Back EMF constant	k_u	Vs/rad	8.0	4.0	2.9	16.0	8.0	5.7	23.7
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	163	363	518	73	174	252	43
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	253	536	757	111	245	350	67
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	306	628	880	146	305	430	95
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	385	802	1129	185	395	558	119
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	565	1159	1624	259	540	760	164
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	662	1341	1872	321	655	917	211
Limiting speed for continuous running*	n_{cr}	rpm	346	346	346	-	346	346	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	1.90	0.47	0.25	2.68	0.67	0.35	3.46
Inductance, phase to phase	L	mH	11.0	2.7	1.4	22.0	5.5	2.8	33.0
Ultimate current	I_u	A_{rms}	48.8	97.5	135.7	48.8	97.5	135.7	48.8
Peak current (saturation range)	I_p	A_{rms}	31.2	62.4	86.8	31.2	62.4	86.8	31.2
Peak current (linear range)	I_{pl}	A_{rms}	19.5	39.0	54.3	19.5	39.0	54.3	19.5
Continuous current (water cooled)	I_{cw}	A_{rms}	14.5	29.0	40.3	17.3	34.6	48.1	18.6
Continuous current (not cooled)	I_c	A_{rms}	6.4	12.8	17.8	7.4	14.8	20.6	7.8
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	10.3	20.6	28.6	12.3	24.5	34.1	13.2
Stall current at zero speed (not cooled)	I_s	A_{rms}	4.5	9.1	12.7	5.3	10.5	14.6	5.5
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

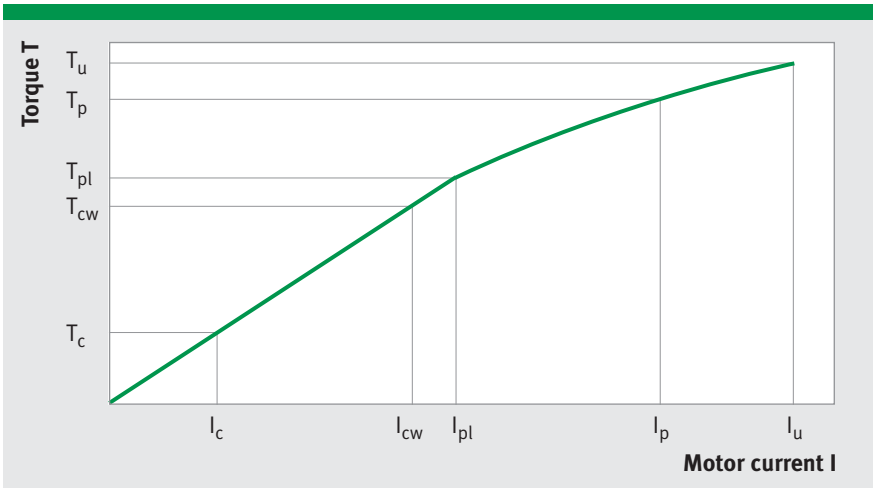


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

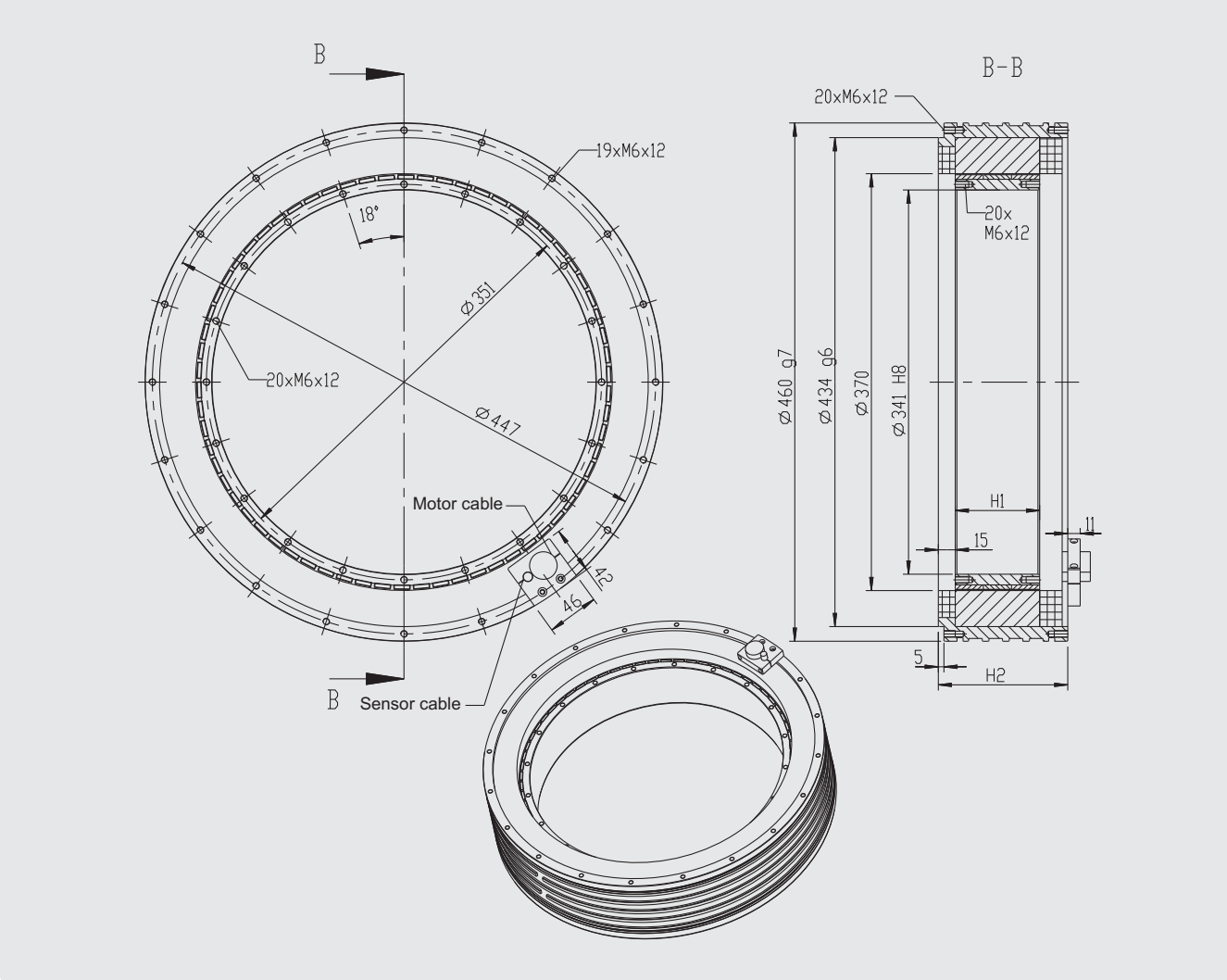
Then a further reduction of duty cycle or current is required.

RI13-3P-298x75-WM	RI13-3P-298x75-WH	RI13-3P-298x100-WL	RI13-3P-298x100-WM	RI13-3P-298x100-WH	RI13-3P-298x125-WL	RI13-3P-298x125-WM	RI13-3P-298x125-WH	RI13-3P-298x150-WL	RI13-3P-298x150-WM	RI13-3P-298x150-WH	RI13-3P-298x175-WL	RI13-3P-298x175-WM	RI13-3P-298x175-WH	Symbol
14.5	10.4	38.7	19.4	13.9	47.9	24.0	17.2	57.5	28.7	20.7	67.1	33.5	24.1	k_T
11.9	8.5	31.7	15.8	11.4	39.2	19.6	14.1	47.0	23.5	16.9	54.9	27.4	19.7	k_u
112	164	27	80	119	17	61	93	10	48	75	5	38	62	n_{lp}
154	223	45	110	160	32	84	124	23	67	100	17	55	83	n_{lw}
201	284	69	148	211	54	118	169	44	98	140	36	83	119	n_{lc}
259	369	85	191	273	65	151	217	51	123	178	41	103	151	n_{lp}
347	490	117	252	358	90	197	282	71	161	230	59	135	194	n_{lw}
434	608	155	321	451	122	256	361	100	211	298	84	179	254	n_{lc}
346	346	-	346	346	-	-	-	-	-	-	-	-	-	n_{cr}
0.86	0.45	4.23	1.06	0.55	4.98	1.25	0.64	5.76	1.44	0.74	6.54	1.63	0.85	R_{25}
8.2	4.3	43.9	11.0	5.7	54.9	13.7	7.1	65.9	16.5	8.5	76.9	19.2	9.9	L
97.5	135.7	48.8	97.5	135.7	48.8	97.5	135.7	48.8	97.5	135.7	48.8	97.5	135.7	I_u
62.4	86.8	31.2	62.4	86.8	31.2	62.4	86.8	31.2	62.4	86.8	31.2	62.4	86.8	I_p
39.0	54.3	19.5	39.0	54.3	19.5	39.0	54.3	19.5	39.0	54.3	19.5	39.0	54.3	I_{pl}
37.3	51.8	19.4	38.9	54.0	20.0	40.1	55.7	20.4	40.8	56.8	20.7	41.4	57.5	I_{cw}
15.6	21.7	8.0	15.9	22.1	7.9	15.8	22.0	7.8	15.5	21.6	7.6	15.3	21.3	I_c
26.5	36.8	13.8	27.6	38.4	14.2	28.4	39.6	14.5	29.0	40.3	14.7	29.4	40.8	I_{sw}
11.1	15.4	5.7	11.3	15.7	5.6	11.2	15.6	5.5	11.0	15.3	5.4	10.9	15.1	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

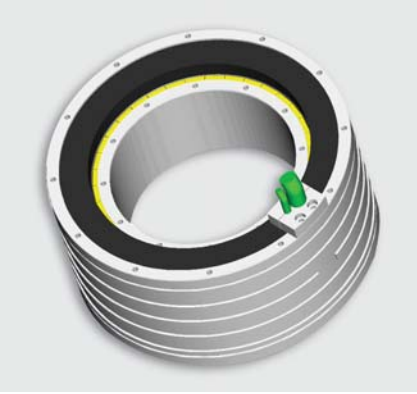


Motor Specifications: Series RI11-3P-370xH

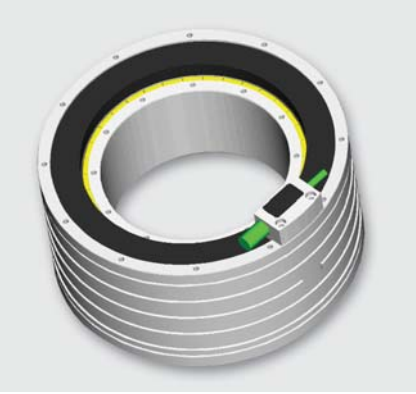
Drawing



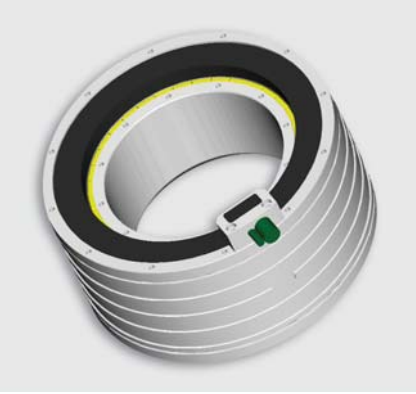
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI11-3P-370xH

Independent of winding

Motor specifications	Symbol	Unit	RI11-3P-370x25	RI11-3P-370x50	RI11-3P-370x75	RI11-3P-370x100	RI11-3P-370x125	RI11-3P-370x150	RI11-3P-370x175
Number of pole pairs	P		33	33	33	33	33	33	33
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	584	1168	1735	2313	2863	3435	4008
Peak torque (saturation range) at I_p	T_p	Nm	424	847	1258	1678	2076	2492	2907
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	312	623	925	1234	1527	1832	2137
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	216	509	812	1125	1428	1744	2061
Continuous torque (not cooled) at I_c	T_c	Nm	97	222	346	469	573	673	774
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	153	362	576	799	1014	1238	1463
Stall torque (not cooled) at I_s	T_s	Nm	69	157	245	333	407	478	550
Ripple torque (cogging) at I = 0	T_r	Nm	1.3	2.5	3.8	5.0	6.2	7.5	8.7
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	3852	5522	7196	8869	10542	12216	13889
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1504	2157	2811	3464	4118	4772	5426
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	937	1874	2811	3748	4684	5621	6558
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	145	273	392	500	581	645	712
Thermical resistance (water cooled)	R_{th}	K/W	0.107	0.053	0.036	0.027	0.021	0.018	0.015
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	8.03	13.41	17.45	20.96	23.79	26.52	29.02
Water flow (cooling)	dV/dt	l/min	2.68	5.35	8.03	10.71	13.38	16.06	18.74
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00

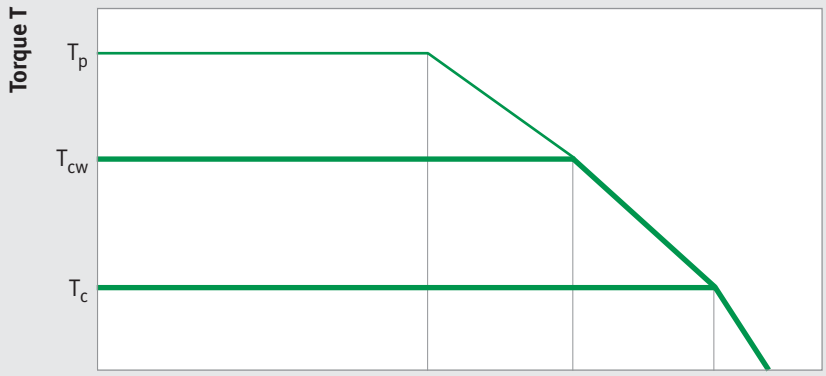
Mechanical interface	Symbol	Unit	RI11-3P-370x25	RI11-3P-370x50	RI11-3P-370x75	RI11-3P-370x100	RI11-3P-370x125	RI11-3P-370x150	RI11-3P-370x175
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	64.0	89.0	114.0	139.0	164.0	189.0	214.0
Mass of rotor	m_1	kg	2.8	5.6	8.4	11.2	14.0	16.7	19.5
Mass of stator	m_2	kg	20.9	31.4	41.3	51.1	60.9	70.8	80.6
Inertia of rotor	J	kgm^2	0.087	0.174	0.261	0.348	0.435	0.522	0.609

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI11-3P-370xH

Winding dependent specifications	Symbol	Unit	RI11-3P-370x25-WL	RI11-3P-370x25-WM	RI11-3P-370x25-WH	RI11-3P-370x50-WL	RI11-3P-370x50-WM	RI11-3P-370x50-WH	RI11-3P-370x75-WL
Torque constant	k_T	Nm/A_{rms}	18.0	9.6	4.8	36.0	19.2	9.6	53.5
Back EMF constant	k_u	Vs/rad	14.7	7.9	3.9	29.5	15.7	7.9	43.8
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	77	177	385	29	81	186	12
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	133	272	568	56	122	264	31
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	162	316	646	76	153	316	48
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	203	408	845	94	197	416	58
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	309	600	1225	140	279	578	87
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	357	682	1377	172	332	676	112
Limiting speed for continuous running*	n_{cr}	rpm	273	273	273	-	273	273	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	3.35	0.95	0.24	4.81	1.37	0.34	6.27
Inductance, phase to phase	L	mH	17.2	4.9	1.2	34.4	9.8	2.4	51.6
Ultimate current	I_u	A_{rms}	43.2	81.0	162.1	43.2	81.0	162.1	43.2
Peak current (saturation range)	I_p	A_{rms}	27.7	51.9	103.7	27.7	51.9	103.7	27.7
Peak current (linear range)	I_{pl}	A_{rms}	17.3	32.4	64.8	17.3	32.4	64.8	17.3
Continuous current (water cooled)	I_{cw}	A_{rms}	12.0	22.4	44.9	14.1	26.5	53.0	15.2
Continuous current (not cooled)	I_c	A_{rms}	5.4	10.1	20.1	6.2	11.5	23.1	6.5
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	8.5	15.9	31.9	10.0	18.8	37.6	10.8
Stall current at zero speed (not cooled)	I_s	A_{rms}	3.8	7.2	14.3	4.4	8.2	16.4	4.6
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

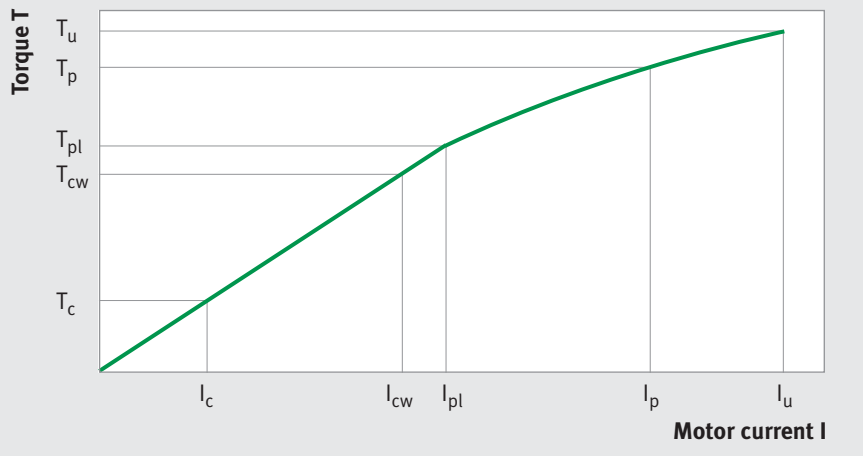


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

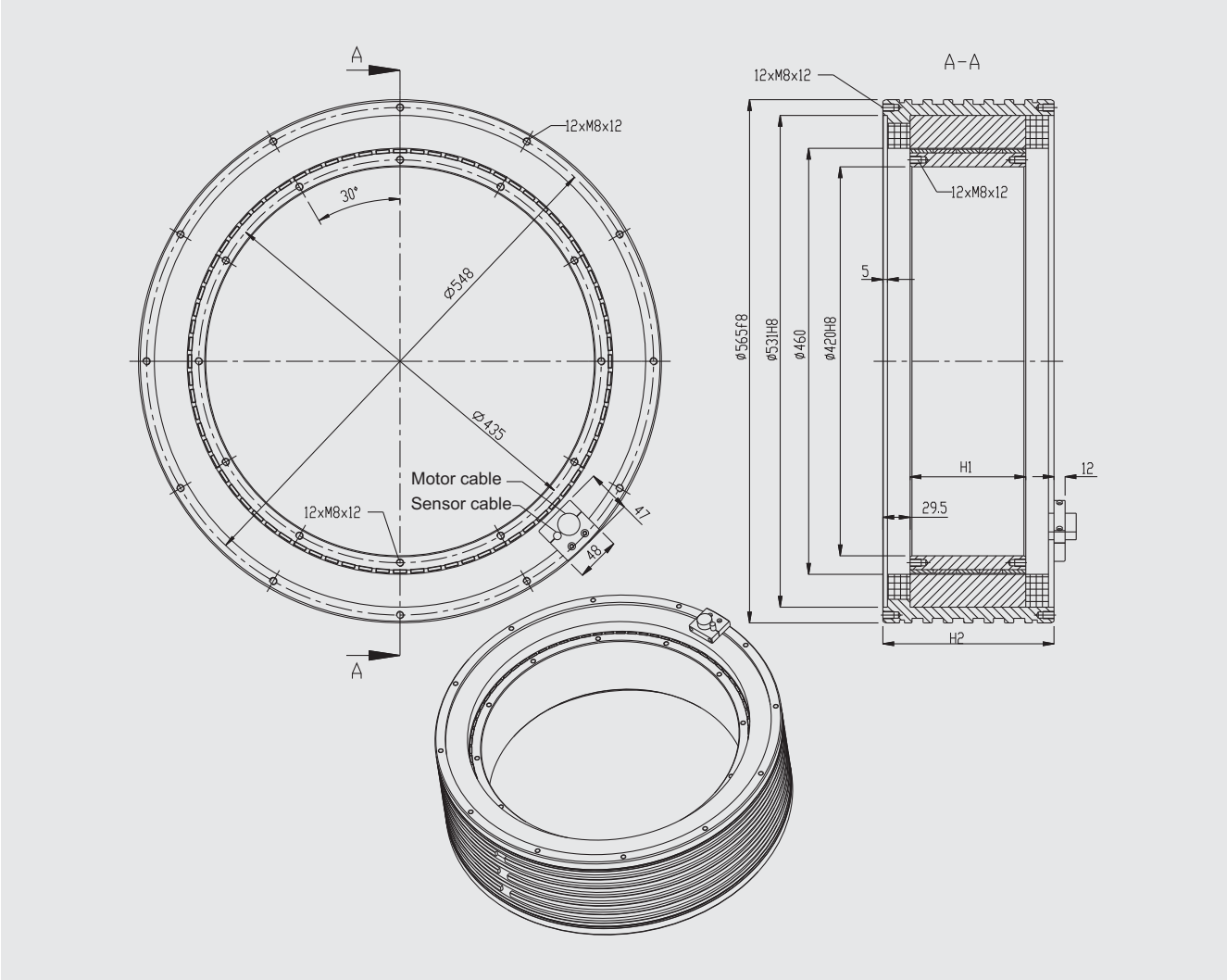
Then a further reduction of duty cycle or current is required.

RI11-3P-370x75-WM	RI11-3P-370x75-WH	RI11-3P-370x100-WL	RI11-3P-370x100-WM	RI11-3P-370x100-WH	RI11-3P-370x125-WL	RI11-3P-370x125-WM	RI11-3P-370x125-WH	RI11-3P-370x150-WL	RI11-3P-370x150-WM	RI11-3P-370x150-WH	RI11-3P-370x175-WL	RI11-3P-370x175-WM	RI11-3P-370x175-WH	Symbol
28.5	14.3	71.4	38.1	19.0	88.3	47.1	23.6	106.0	56.5	28.3	123.6	65.9	33.0	k_T
23.4	11.7	58.4	31.1	15.6	72.2	38.5	19.3	86.7	46.2	23.1	101.1	53.9	27.0	k_u
49	120	3	32	86	-	22	66	-	15	53	-	9	43	n_{lp}
75	169	19	52	121	12	39	94	7	29	75	3	23	62	n_{lw}
100	209	34	73	155	26	57	124	21	47	102	17	39	87	n_{lc}
127	274	39	92	202	28	71	160	20	56	131	14	46	110	n_{lp}
179	375	61	129	274	45	100	216	35	80	176	28	67	148	n_{lw}
219	449	82	162	333	64	128	267	52	105	220	43	89	187	n_{lc}
-	273	-	-	273	-	-	-	-	-	-	-	-	-	n_{cr}
1.78	0.45	7.73	2.20	0.55	9.19	2.61	0.65	10.64	3.03	0.76	12.10	3.45	0.86	R_{25}
14.7	3.7	68.8	19.6	4.9	86.0	24.5	6.1	103.2	29.3	7.3	120.4	34.2	8.6	L
81.0	162.1	43.2	81.0	162.1	43.2	81.0	162.1	43.2	81.0	162.1	43.2	81.0	162.1	I_u
51.9	103.7	27.7	51.9	103.7	27.7	51.9	103.7	27.7	51.9	103.7	27.7	51.9	103.7	I_p
32.4	64.8	17.3	32.4	64.8	17.3	32.4	64.8	17.3	32.4	64.8	17.3	32.4	64.8	I_{pl}
28.4	56.8	15.8	29.6	59.1	16.2	30.3	60.6	16.5	30.8	61.7	16.7	31.2	62.5	I_{cw}
12.1	24.2	6.6	12.3	24.6	6.5	12.2	24.3	6.4	11.9	23.8	6.3	11.7	23.5	I_c
20.2	40.4	11.2	21.0	42.0	11.5	21.5	43.0	11.7	21.9	43.8	11.8	22.2	44.4	I_{sw}
8.6	17.2	4.7	8.7	17.5	4.6	8.6	17.3	4.5	8.5	16.9	4.4	8.3	16.7	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

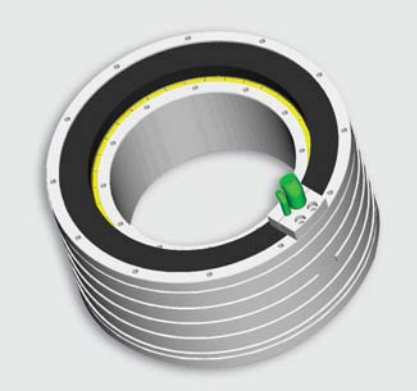


Motor Specifications: Series RI19-3P-460xH

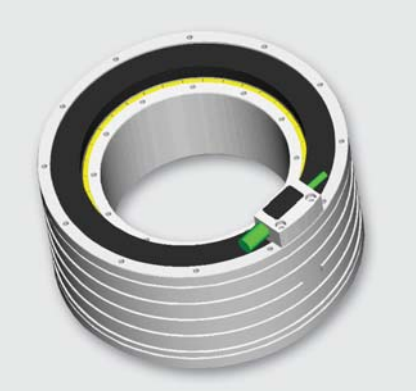
Drawing



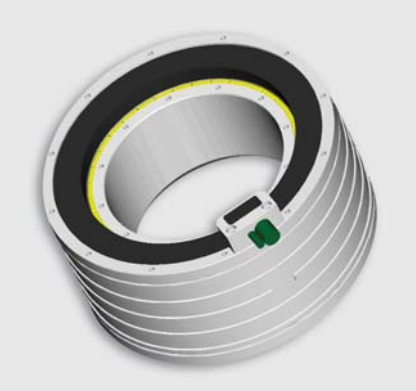
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI19-3P-460xH

Independent of winding

Motor specifications	Symbol	Unit	RI19-3P-460x25	RI19-3P-460x50	RI19-3P-460x75	RI19-3P-460x100	RI19-3P-460x125	RI19-3P-460x150	RI19-3P-460x175
Number of pole pairs	P		38	38	38	38	38	38	38
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	838	1675	2488	3317	4105	4926	5747
Peak torque (saturation range) at I_p	T_p	Nm	642	1284	1906	2542	3145	3774	4403
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	472	944	1402	1869	2313	2775	3238
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	323	783	1252	1740	2211	2703	3197
Continuous torque (not cooled) at I_c	T_c	Nm	146	344	537	730	895	1052	1210
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	229	556	889	1235	1570	1919	2270
Stall torque (not cooled) at I_s	T_s	Nm	104	244	382	518	635	747	859
Ripple torque (cogging) at I = 0	T_r	Nm	1.9	3.9	5.7	7.6	9.4	11.3	13.2
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	4824	6560	8489	10419	12348	14278	16207
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1884	2563	3316	4070	4824	5577	6331
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	1146	2293	3439	4585	5731	6878	8024
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	181	339	487	621	722	802	885
Thermical resistance (water cooled)	R_{th}	K/W	0.087	0.044	0.029	0.022	0.017	0.015	0.012
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	10.87	18.65	24.34	29.30	33.30	37.16	40.69
Water flow (cooling)	dV/dt	l/min	3.28	6.55	9.83	13.10	16.38	19.65	15.28
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	7.50

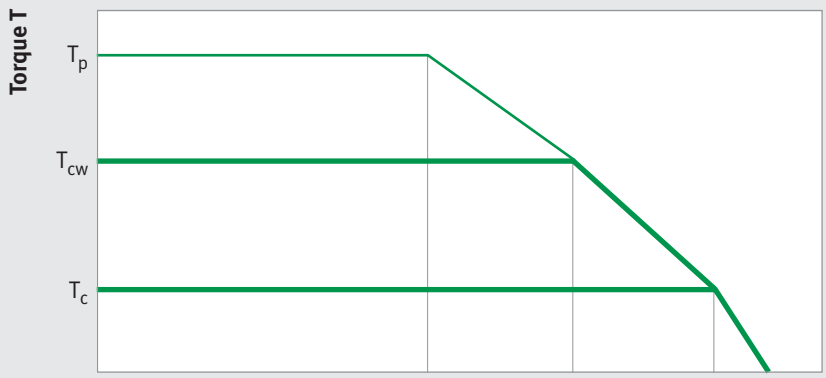
Mechanical interface	Symbol	Unit	RI19-3P-460x25	RI19-3P-460x50	RI19-3P-460x75	RI19-3P-460x100	RI19-3P-460x125	RI19-3P-460x150	RI19-3P-460x175
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	90.0	110.0	130.0	160.0	185.0	210.0	235.0
Mass of rotor	m_1	kg	4.9	9.8	14.6	19.5	24.4	29.3	34.2
Mass of stator	m_2	kg	41.1	53.9	66.8	83.2	97.6	111.8	126.2
Inertia of rotor	J	kgm^2	0.24	0.47	0.71	0.94	1.18	1.41	1.65

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI19-3P-460xH

Winding dependent specifications	Symbol	Unit	RI19-3P-460x25-WL	RI19-3P-460x25-WM	RI19-3P-460x25-WH	RI19-3P-460x50-WL	RI19-3P-460x50-WM	RI19-3P-460x50-WH	RI19-3P-460x75-WL
Torque constant	k_T	Nm/A_{rms}	37.4	18.7	8.4	74.9	37.4	16.8	111.2
Back EMF constant	k_u	Vs/rad	30.6	15.3	6.9	61.2	30.6	13.7	90.9
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	21	74	196	2	32	94	-
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	54	128	309	19	55	140	8
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	73	157	364	33	74	176	20
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	80	184	437	35	88	214	19
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	136	290	669	59	132	311	35
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	166	342	777	78	165	379	50
Limiting speed for continuous running*	n_{cr}	rpm	-	237	237	-	-	237	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	7.90	1.98	0.40	10.75	2.69	0.54	13.91
Inductance, phase to phase	L	mH	49.0	12.2	2.5	97.9	24.5	4.9	146.9
Ultimate current	I_u	A_{rms}	31.5	63.0	140.7	31.5	63.0	140.7	31.5
Peak current (saturation range)	I_p	A_{rms}	20.2	40.3	90.0	20.2	40.3	90.0	20.2
Peak current (linear range)	I_{pl}	A_{rms}	12.6	25.2	56.3	12.6	25.2	56.3	12.6
Continuous current (water cooled)	I_{cw}	A_{rms}	8.6	17.3	38.5	10.5	20.9	46.7	11.3
Continuous current (not cooled)	I_c	A_{rms}	3.9	7.8	17.4	4.6	9.2	20.5	4.8
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	6.1	12.2	27.3	7.4	14.9	33.1	8.0
Stall current at zero speed (not cooled)	I_s	A_{rms}	2.8	5.5	12.4	3.3	6.5	14.5	3.4
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

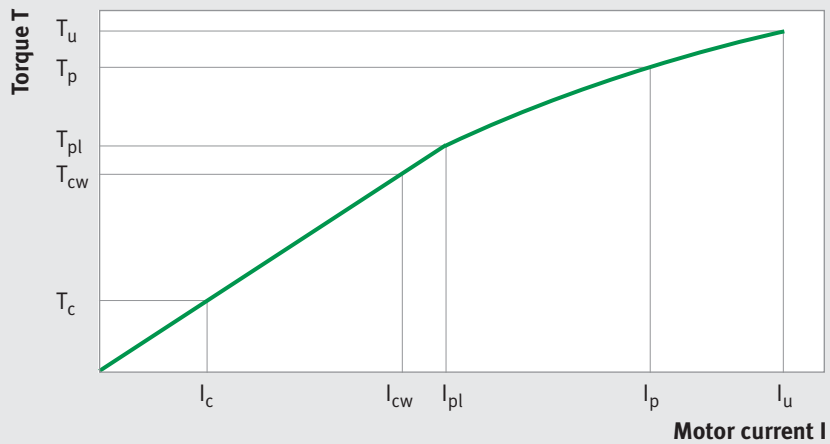


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

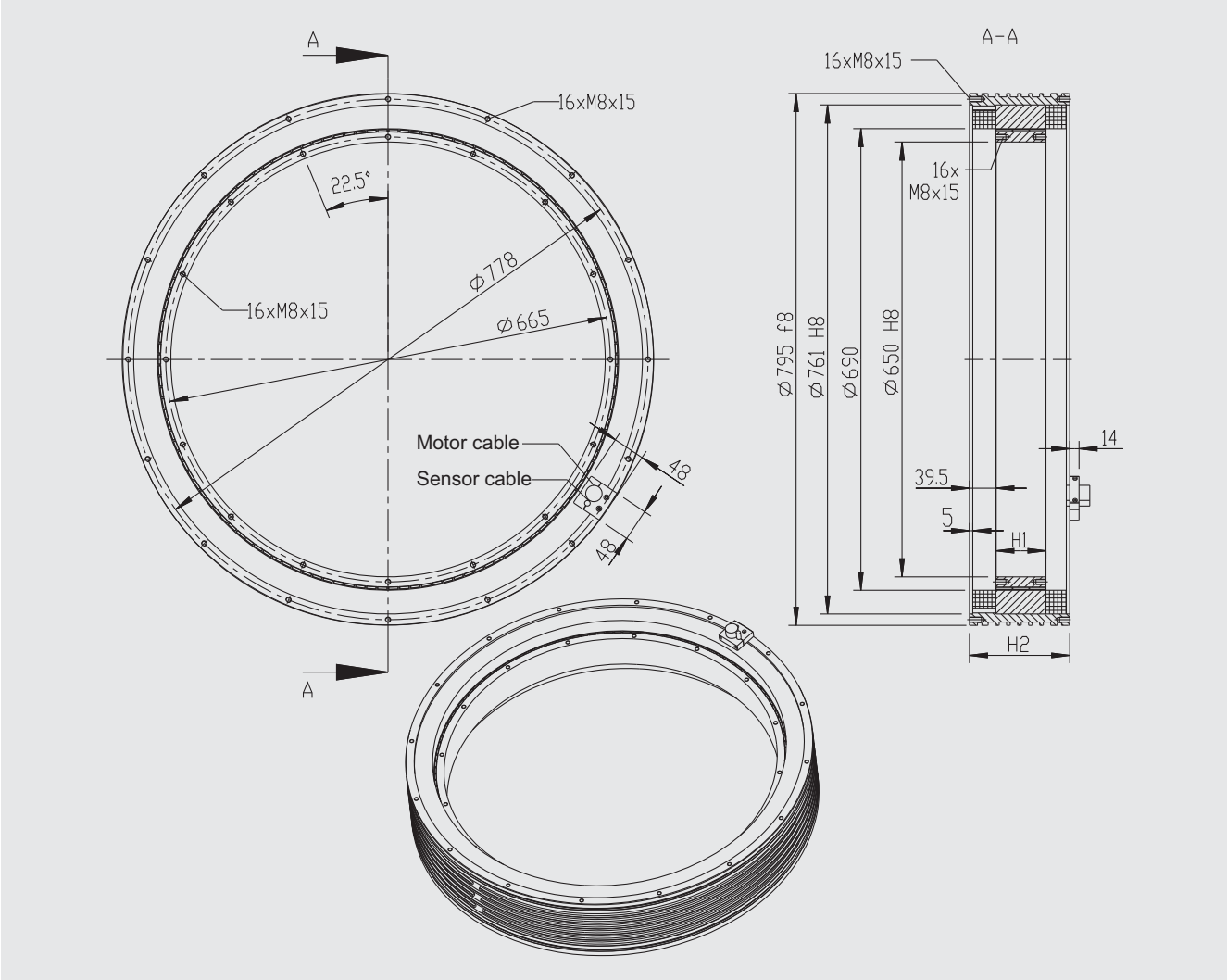
Then a further reduction of duty cycle or current is required.

RI19-3P-460x75-WM	RI19-3P-460x75-WH	RI19-3P-460x100-WL	RI19-3P-460x100-WM	RI19-3P-460x100-WH	RI19-3P-460x125-WL	RI19-3P-460x125-WM	RI19-3P-460x125-WH	RI19-3P-460x150-WL	RI19-3P-460x150-WM	RI19-3P-460x150-WH	RI19-3P-460x175-WL	RI19-3P-460x175-WM	RI19-3P-460x175-WH	Symbol
55.6	24.9	148.2	74.1	33.2	183.4	91.7	41.1	220.1	110.1	49.3	256.8	128.4	57.5	k_T
45.5	20.4	121.2	60.6	27.2	150.0	75.0	33.6	180.0	90.0	40.3	210.0	105.0	47.1	k_u
17	59	-	9	42	-	3	31	-	-	24	-	-	19	n_{lp}
32	88	3	21	62	-	14	48	-	10	38	-	6	31	n_{lw}
48	116	13	34	85	10	27	68	7	21	56	6	18	47	n_{lc}
55	140	10	39	103	5	29	81	1	22	66	-	17	55	n_{lp}
82	199	23	58	144	16	44	113	11	35	92	7	28	77	n_{lw}
108	250	36	79	185	27	62	148	22	50	122	17	42	103	n_{lc}
-	237	-	-	-	-	-	-	-	-	-	-	-	-	n_{cr}
3.48	0.70	17.07	4.27	0.86	20.23	5.06	1.02	23.39	5.85	1.18	26.55	6.64	1.33	R_{25}
36.7	7.4	195.9	49.0	9.8	244.8	61.2	12.3	293.8	73.5	14.8	342.8	85.7	17.2	L
63.0	140.7	31.5	63.0	140.7	31.5	63.0	140.7	31.5	63.0	140.7	31.5	63.0	140.7	I_u
40.3	90.0	20.2	40.3	90.0	20.2	40.3	90.0	20.2	40.3	90.0	20.2	40.3	90.0	I_p
25.2	56.3	12.6	25.2	56.3	12.6	25.2	56.3	12.6	25.2	56.3	12.6	25.2	56.3	I_{pl}
22.5	50.2	11.7	23.5	52.4	12.1	24.1	53.8	12.3	24.6	54.8	12.4	24.9	55.5	I_{cw}
9.7	21.6	4.9	9.9	22.0	4.9	9.8	21.8	4.8	9.6	21.3	4.7	9.4	21.0	I_c
16.0	35.7	8.3	16.7	37.2	8.6	17.1	38.2	8.7	17.4	38.9	8.8	17.7	39.4	I_{sw}
6.9	15.3	3.5	7.0	15.6	3.5	6.9	15.5	3.4	6.8	15.1	3.3	6.7	14.9	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

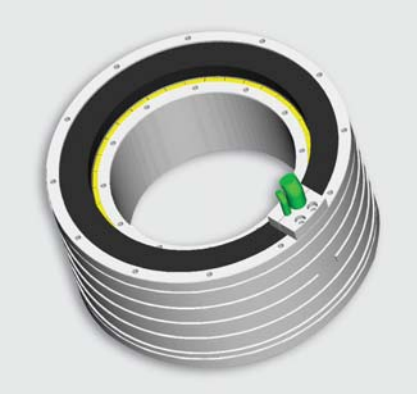


Motor Specifications: Series RI13-3P-690xH

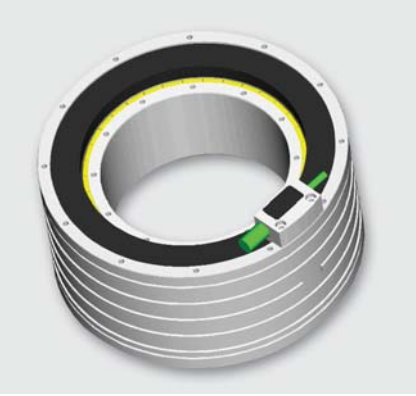
Drawing



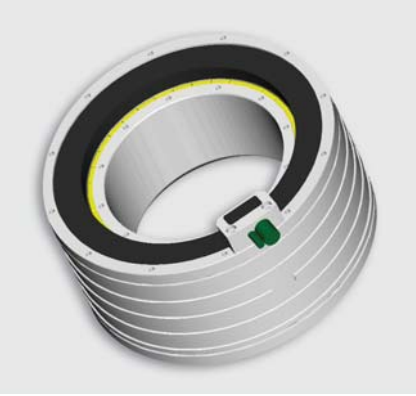
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI13-3P-690xH

Independent of winding

Motor specifications	Symbol	Unit	RI13-3P-690x25	RI13-3P-690x50	RI13-3P-690x75	RI13-3P-690x100	RI13-3P-690x125	RI13-3P-690x150	RI13-3P-690x175
Number of pole pairs	P		65	65	65	65	65	65	65
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	1947	3894	5782	7709	9539	11447	13355
Peak torque (saturation range) at I_p	T_p	Nm	1471	2942	4369	5825	7208	8649	10091
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	1082	2163	3212	4283	5300	6360	7420
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	708	1683	2691	3740	4752	5810	6871
Continuous torque (not cooled) at I_c	T_c	Nm	328	755	1182	1606	1968	2314	2661
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	503	1195	1911	2655	3374	4125	4879
Stall torque (not cooled) at I_s	T_s	Nm	233	536	839	1140	1397	1643	1890
Ripple torque (cogging) at I = 0	T_r	Nm	4.4	8.8	13.1	17.5	21.6	25.9	30.3
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	7544	10687	13830	16973	20116	23259	26403
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	2947	4175	5402	6630	7858	9086	10314
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	1643	3286	4928	6571	8214	9857	11500
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	271	509	731	932	1083	1202	1327
Thermical resistance (water cooled)	R_{th}	K/W	0.061	0.030	0.020	0.015	0.012	0.010	0.009
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	19.92	33.48	43.70	52.60	59.79	66.72	73.06
Water flow (cooling)	dV/dt	l/min	4.69	9.39	14.08	18.77	15.65	18.77	16.43
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	7.50	7.50	10.00

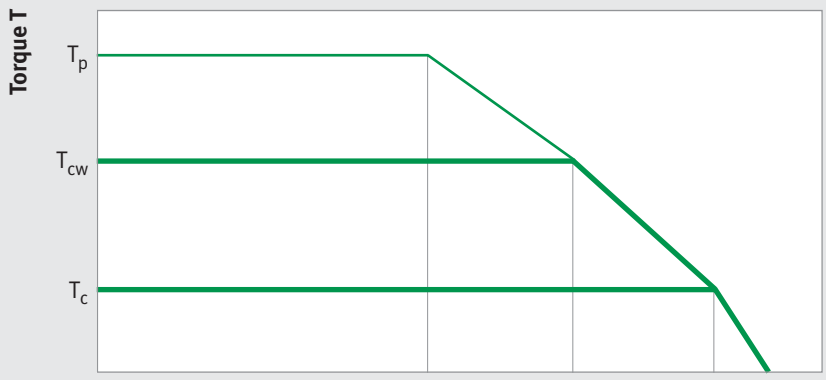
Mechanical interface	Symbol	Unit	RI13-3P-690x25	RI13-3P-690x50	RI13-3P-690x75	RI13-3P-690x100	RI13-3P-690x125	RI13-3P-690x150	RI13-3P-690x175
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	110.0	130.0	150.0	180.0	205.0	230.0	255.0
Mass of rotor	m_1	kg	7.6	15.2	22.8	30.4	38.0	45.6	53.2
Mass of stator	m_2	kg	69.7	88.1	106.4	129.0	149.3	169.8	190.2
Inertia of rotor	J	kgm^2	0.85	1.70	2.55	3.40	4.25	5.10	5.95

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI13-3P-690xH

Winding dependent specifications	Symbol	Unit	RI13-3P-690x25-WL	RI13-3P-690x25-WM	RI13-3P-690x25-WH	RI13-3P-690x50-WL	RI13-3P-690x50-WM	RI13-3P-690x50-WH	RI13-3P-690x75-WL
Torque constant	k_T	Nm/A_{rms}	35.9	25.0	20.0	71.8	49.9	39.9	106.6
Back EMF constant	k_u	Vs/rad	29.4	20.4	16.3	58.7	40.8	32.7	87.2
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	33	56	74	12	24	33	4
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	64	98	126	26	43	56	15
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	80	118	150	37	56	72	24
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	89	135	172	41	64	83	25
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	149	220	278	67	101	128	41
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	177	257	324	85	124	157	55
Limiting speed for continuous running*	n_{cr}	rpm	138	138	138	-	-	138	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	2.17	1.05	0.67	3.07	1.49	0.95	3.97
Inductance, phase to phase	L	mH	12.0	5.8	3.7	24.0	11.6	7.4	36.0
Ultimate current	I_u	A_{rms}	75.3	108.4	135.4	75.3	108.4	135.4	75.3
Peak current (saturation range)	I_p	A_{rms}	48.2	69.3	86.7	48.2	69.3	86.7	48.2
Peak current (linear range)	I_{pl}	A_{rms}	30.1	43.3	54.2	30.1	43.3	54.2	30.1
Continuous current (water cooled)	I_{cw}	A_{rms}	19.7	28.3	35.4	23.4	33.7	42.1	25.2
Continuous current (not cooled)	I_c	A_{rms}	9.1	13.1	16.4	10.5	15.1	18.9	11.1
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	14.0	20.1	25.1	16.6	23.9	29.9	17.9
Stall current at zero speed (not cooled)	I_s	A_{rms}	6.5	9.3	11.6	7.5	10.7	13.4	7.9
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

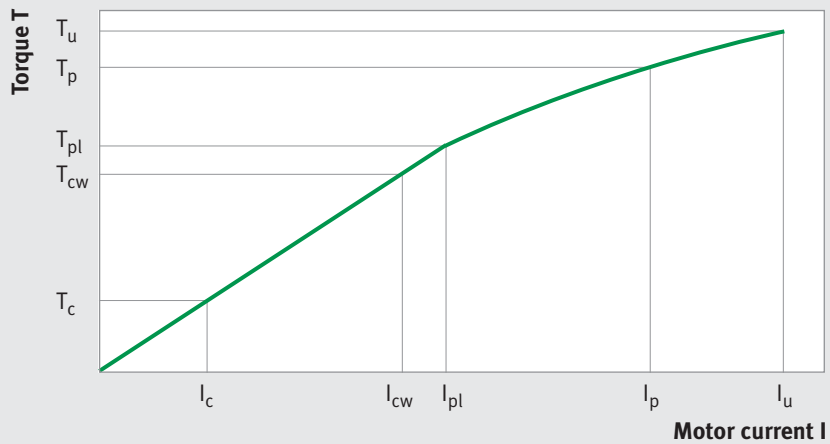


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

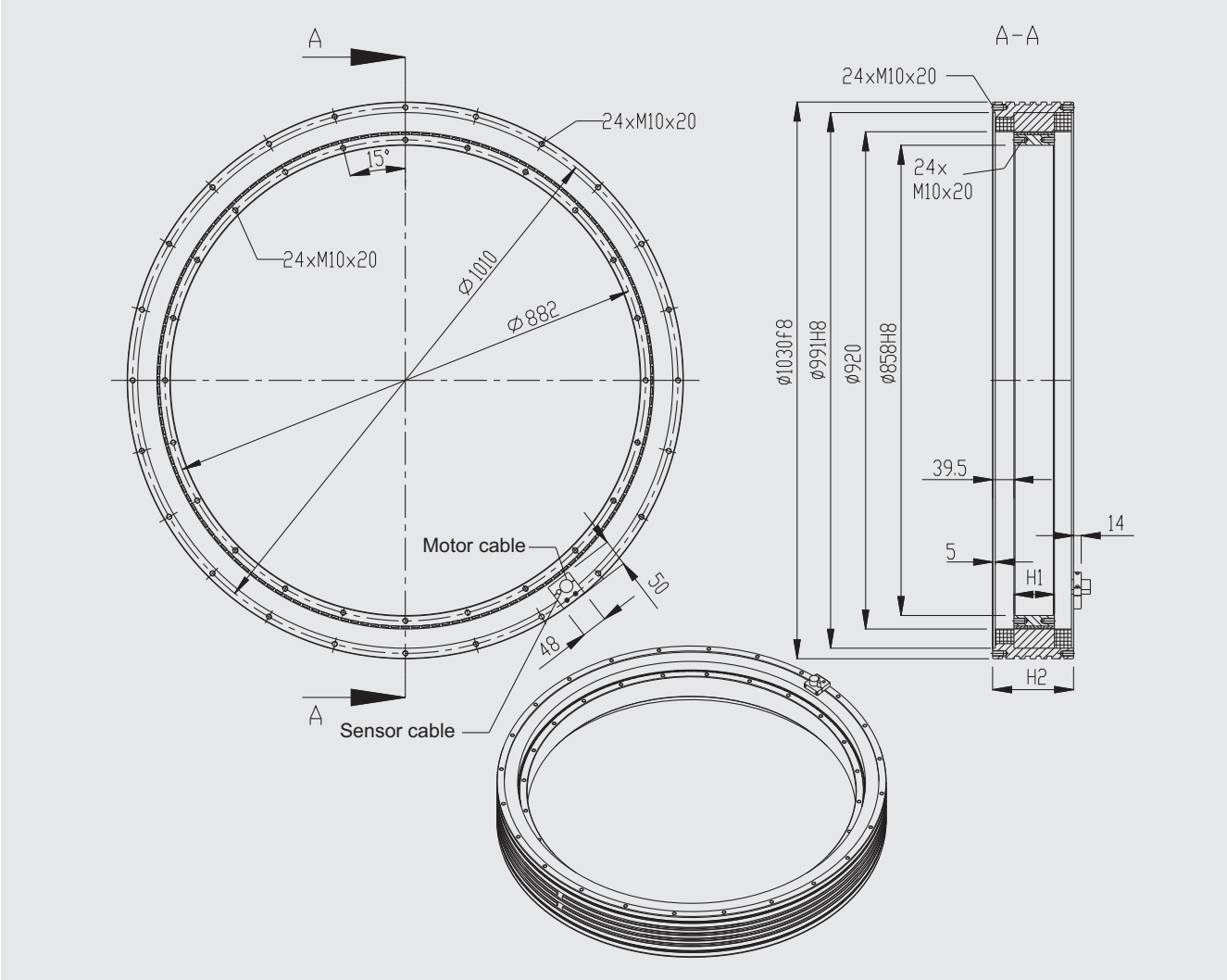
Then a further reduction of duty cycle or current is required.

RI13-3P-690x75-WM	RI13-3P-690x75-WH	RI13-3P-690x100-WL	RI13-3P-690x100-WM	RI13-3P-690x100-WH	RI13-3P-690x125-WL	RI13-3P-690x125-WM	RI13-3P-690x125-WH	RI13-3P-690x150-WL	RI13-3P-690x150-WM	RI13-3P-690x150-WH	RI13-3P-690x175-WL	RI13-3P-690x175-WM	RI13-3P-690x175-WH	Symbol
74.1	59.3	142.2	98.8	79.1	175.9	122.3	97.8	211.1	146.7	117.4	246.3	171.2	137.0	k_T
60.6	48.5	116.3	80.8	64.7	143.9	100.0	80.0	172.7	120.0	96.0	201.5	140.0	112.0	k_u
13	20	-	7	13	-	3	8	-	-	5	-	-	2	n_{lp}
25	34	9	17	23	5	12	17	3	8	13	1	6	10	n_{lw}
36	47	17	26	34	13	20	27	10	17	22	8	14	18	n_{lc}
41	54	17	29	39	12	22	30	8	17	23	5	13	19	n_{lp}
63	81	29	45	58	21	34	45	17	27	36	13	22	30	n_{lw}
81	103	40	60	76	31	47	60	25	38	49	21	32	41	n_{lc}
-	-	-	-	-	-	-	-	-	-	-	-	-	-	n_{cr}
1.92	1.23	4.87	2.36	1.51	5.77	2.80	1.79	6.68	3.24	2.07	7.58	3.67	2.35	R_{25}
17.4	11.1	48.1	23.2	14.9	60.1	29.0	18.6	72.1	34.8	22.3	84.1	40.6	26.0	L
108.4	135.4	75.3	108.4	135.4	75.3	108.4	135.4	75.3	108.4	135.4	75.3	108.4	135.4	I_u
69.3	86.7	48.2	69.3	86.7	48.2	69.3	86.7	48.2	69.3	86.7	48.2	69.3	86.7	I_p
43.3	54.2	30.1	43.3	54.2	30.1	43.3	54.2	30.1	43.3	54.2	30.1	43.3	54.2	I_{pl}
36.2	45.3	26.3	37.8	47.2	27.0	38.8	48.5	27.5	39.5	49.4	27.9	40.1	50.1	I_{cw}
15.9	19.9	11.3	16.2	20.3	11.2	16.1	20.1	11.0	15.7	19.7	10.8	15.5	19.4	I_c
25.7	32.1	18.7	26.8	33.5	19.2	27.5	34.4	19.5	28.1	35.1	19.8	28.4	35.5	I_{sw}
11.3	14.1	8.0	11.5	14.4	7.9	11.4	14.2	7.8	11.2	14.0	7.7	11.0	13.8	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

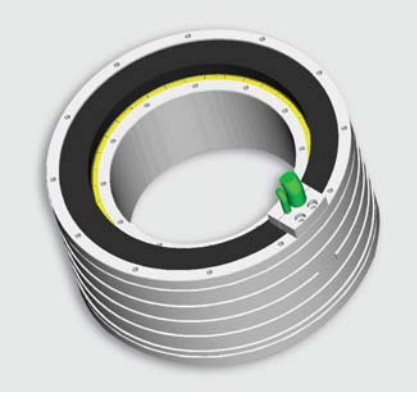


Motor Specifications: Series RI11-3P-920xH

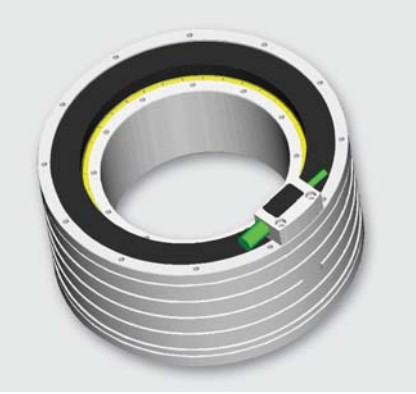
Drawing



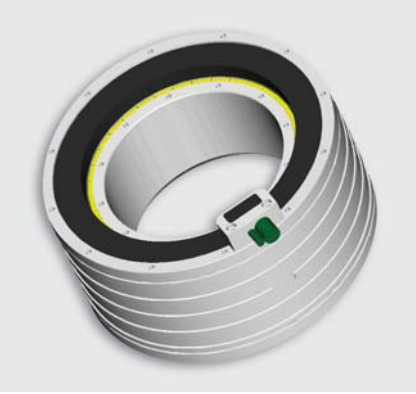
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RI11-3P-920xH

Independent of winding

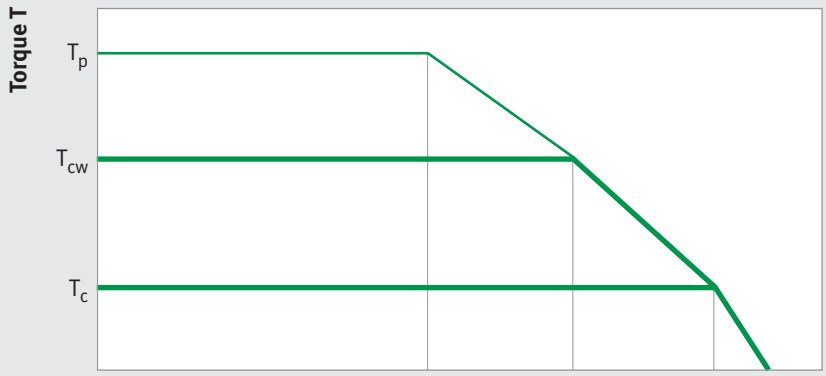
Motor specifications	Symbol	Unit	RI11-3P-920x25	RI11-3P-920x50	RI11-3P-920x75	RI11-3P-920x100	RI11-3P-920x125	RI11-3P-920x150	RI11-3P-920x175
Number of pole pairs	P		66	66	66	66	66	66	76
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	3681	7363	11044	14725	18406	22088	25769
Peak torque (saturation range) at I_p	T_p	Nm	3323	6645	9968	13290	16613	19936	23258
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	1888	3776	5664	7551	9439	11327	13215
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	1249	2967	4792	6660	8549	10451	12361
Continuous torque (not cooled) at I_c	T_c	Nm	585	1348	2130	2893	3582	4211	4845
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	887	2107	3402	4728	6070	7420	8777
Stall torque (not cooled) at I_s	T_s	Nm	415	957	1512	2054	2543	2990	3440
Ripple torque (cogging) at I = 0	T_r	Nm	10.0	19.9	29.9	39.9	49.8	59.8	69.8
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	15046	21315	27584	33853	40122	46392	52661
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	3761	5329	6896	8463	10031	11598	13165
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	2139	4279	6418	8557	10697	12836	14975
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	361	679	975	1242	1444	1603	1769
Thermical resistance (water cooled)	R_{th}	K/W	0.047	0.023	0.016	0.012	0.009	0.008	0.007
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	30.78	51.72	68.20	82.08	94.25	105.18	115.17
Water flow (cooling)	dV/dt	l/min	6.11	12.22	18.34	16.30	15.28	18.34	17.11
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	7.50	10.00	10.00	12.50
Mechanical interface	**Symbol**	**Unit**	**RI11-3P-920x25**	**RI11-3P-920x50**	**RI11-3P-920x75**	**RI11-3P-920x100**	**RI11-3P-920x125**	**RI11-3P-920x150**	**RI11-3P-920x175**
Height of rotor	H_1	mm	25.0	51.0	75.0	101.0	125.0	151.0	175.0
Height of stator	H_2	mm	110.0	130.0	150.0	180.0	205.0	230.0	255.0
Mass of rotor	m_1	kg	15.6	31.1	46.7	62.3	77.8	93.4	109.0
Mass of stator	m_2	kg	100.9	127.2	152.6	184.0	212.5	241.0	269.4
Inertia of rotor	J	kgm^2	3.07	6.14	9.21	12.28	15.35	18.42	21.49

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RI11-3P-920xH

Winding dependent specifications	Symbol	Unit	RI11-3P-920x25-WLZ	RI11-3P-920x25-WMZ	RI11-3P-920x25-WHZ	RI11-3P-920x50-WLZ	RI11-3P-920x50-WMZ	RI11-3P-920x50-WHZ	RI11-3P-920x75-WLZ
Torque constant	k_T	Nm/A_{rms}	59.2	36.0	21.4	118.3	72.1	42.9	177.5
Back EMF constant	k_u	Vs/rad	48.4	29.5	17.5	96.8	59.0	35.1	145.2
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	13	36	73	-	14	33	-
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	39	72	127	16	31	58	8
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	48	83	143	22	39	69	14
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	51	95	170	22	44	82	12
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	95	162	280	42	75	132	26
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	108	181	308	52	88	151	33
Limiting speed for continuous running*	n_{cr}	rpm	-	136	136	-	136	136	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	2.5	0.9	0.3	3.5	1.3	0.5	4.6
Inductance, phase to phase	L	mH	13.5	5.0	1.8	27.0	10.0	3.6	40.6
Ultimate current	I_u	A_{rms}	79.8	130.9	220.1	79.8	130.9	220.1	79.8
Peak current (saturation range)	I_p	A_{rms}	63.8	104.7	176.1	63.8	104.7	176.1	63.8
Peak current (linear range)	I_{pl}	A_{rms}	31.9	52.4	88.0	31.9	52.4	88.0	31.9
Continuous current (water cooled)	I_{cw}	A_{rms}	21.0	34.6	58.1	24.9	41.2	69.1	26.8
Continuous current (not cooled)	I_c	A_{rms}	9.8	16.2	27.2	11.3	18.7	31.4	11.9
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	14.9	24.6	41.3	17.7	29.2	49.0	19.1
Stall current at zero speed (not cooled)	I_s	A_{rms}	7.0	11.5	19.3	8.0	13.3	22.3	8.5
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

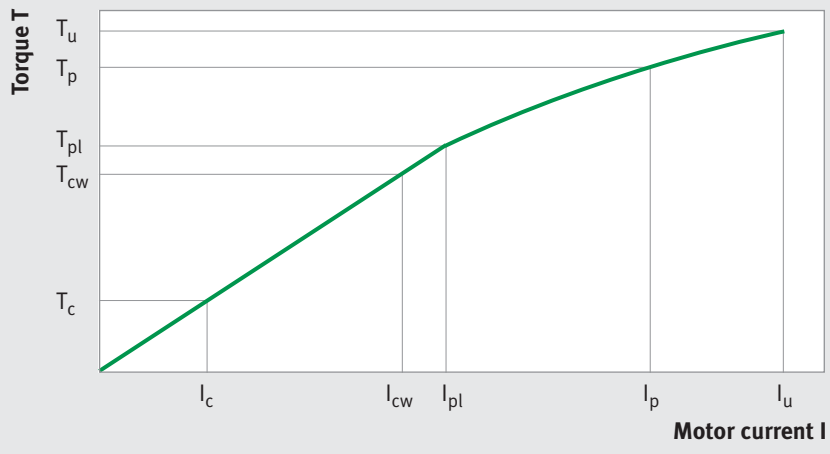


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

Then a further reduction of duty cycle or current is required.

RI11-3P-920x75-WMZ	RI11-3P-920x75-WHZ	RI11-3P-920x100-WLZ	RI11-3P-920x100-WMZ	RI11-3P-920x100-WHZ	RI11-3P-920x125-WLZ	RI11-3P-920x125-WMZ	RI11-3P-920x125-WHZ	RI11-3P-920x150-WLZ	RI11-3P-920x150-WMZ	RI11-3P-920x150-WHZ	RI11-3P-920x175-WLZ	RI11-3P-920x175-WMZ	RI11-3P-920x175-WHZ	Symbol
108.1	64.3	236.6	144.2	85.8	295.8	180.2	107.2	354.9	216.3	128.7	414.1	252.3	150.1	k_T
88.5	52.6	193.5	117.9	70.2	241.9	147.4	87.7	290.3	176.9	105.2	338.7	206.4	122.8	k_u
6	19	-	1	12	-	-	8	-	-	5	-	-	2	n_{lp}
18	36	4	12	25	2	8	19	-	6	15	-	4	11	n_{lw}
25	45	9	18	33	7	14	26	5	11	21	4	9	18	n_{lc}
27	52	6	18	38	3	13	29	-	9	23	-	7	18	n_{lp}
47	84	17	33	61	13	25	47	9	20	38	7	16	32	n_{lw}
57	99	24	42	74	19	33	58	15	27	48	13	23	41	n_{lc}
136	136	-	136	136	-	136	136	-	136	136	-	136	136	n_{cr}
1.7	0.6	5.6	2.1	0.7	6.6	2.4	0.9	7.7	2.8	1.0	8.7	3.2	1.1	R_{25}
15.1	5.3	54.1	20.1	7.1	67.6	25.1	8.9	81.1	30.1	10.7	94.7	35.1	12.4	L
130.9	220.1	79.8	130.9	220.1	79.8	130.9	220.1	79.8	130.9	220.1	79.8	130.9	220.1	I_u
104.7	176.1	63.8	104.7	176.1	63.8	104.7	176.1	63.8	104.7	176.1	63.8	104.7	176.1	I_p
52.4	88.0	31.9	52.4	88.0	31.9	52.4	88.0	31.9	52.4	88.0	31.9	52.4	88.0	I_{pl}
44.3	74.4	28.0	46.2	77.5	28.7	47.4	79.6	29.3	48.3	81.1	29.7	49.0	82.2	I_{cw}
19.7	33.0	12.2	20.1	33.7	12.0	19.9	33.3	11.8	19.5	32.7	11.6	19.2	32.2	I_c
31.5	52.8	19.9	32.8	55.0	20.4	33.7	56.5	20.8	34.3	57.6	21.1	34.8	58.4	I_{sw}
14.0	23.5	8.6	14.2	23.9	8.5	14.1	23.7	8.4	13.8	23.2	8.3	13.6	22.9	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ



Availability/Selection of Sizes
Series RE

IDAM standard series for quick availability

RE torque motors are slotted permanent magnet-excited AC synchronous motors with external running rotors.
The coils of the primary are placed in slots of the laminated ferrite core. The secondary is an iron ring with permanent magnets fastened on it. This series of motor models is optimized for the maximum efficiency, which means: maximum torque for the available installation space with nominal rotary speed and low power loss.
The useful torque is available linearly across a very wide range. The definition of the torque characteristics across the significant operating points allows an advance design with the help of our dimensioning examples. The low torque variations allow the use of the motors for precision applications.

RE (external rotor) motors are offered in grades

- with 7 fixed diameters from 200 to 700 mm outer diameter
- with stators at 6 different heights in 25 mm steps
- with 3 standard windings

Advantages

- Highest power density in the smallest installation space due to individual components matched to one another
- Compact construction
- High dynamics and stiffness
- Highly efficient cooling
- Top values at synchronism due to optimized running
- Practically free of maintenance
- Matched rotary speeds and windings
- As compared to the RI series, higher torques with the same motor volume

Applications

- Grinding machines
- Milling machines
- Machining centers
- HSC machines
- Tool changer
- Milling heads
- Swiveling axes
- Indexing table

Designation

Series RE

XXXX - 3P - DxH - X-X-X-X - XXX

PRIM Primary
SEK Secondary

Model variant
O Built-in set (motor is integrated in customer's system)
M Complete motor (parts are manufactured by IDAM)
K With cooling in the ring (additional ring is provided by IDAM)

Commutation type
O Without sensors, measurement system commutated
XX Other designs after discussion

Temperature monitoring
O Standard (KTY84-130 and 3x PTC in series at the phases 1, 2, 3 | 1x KTY84 phase 2 as reserve)
S Special design after discussions with manufacturer

Winding designs
WL Low speed, low current requirement
WM Medium speed
WH High speed, large current requirement
XX Other winding designs, e.g. LDX ... HDX

Dimensions
Effective diameter in the air gap x package height (mm)

Number of motor phases
3P 3-phase

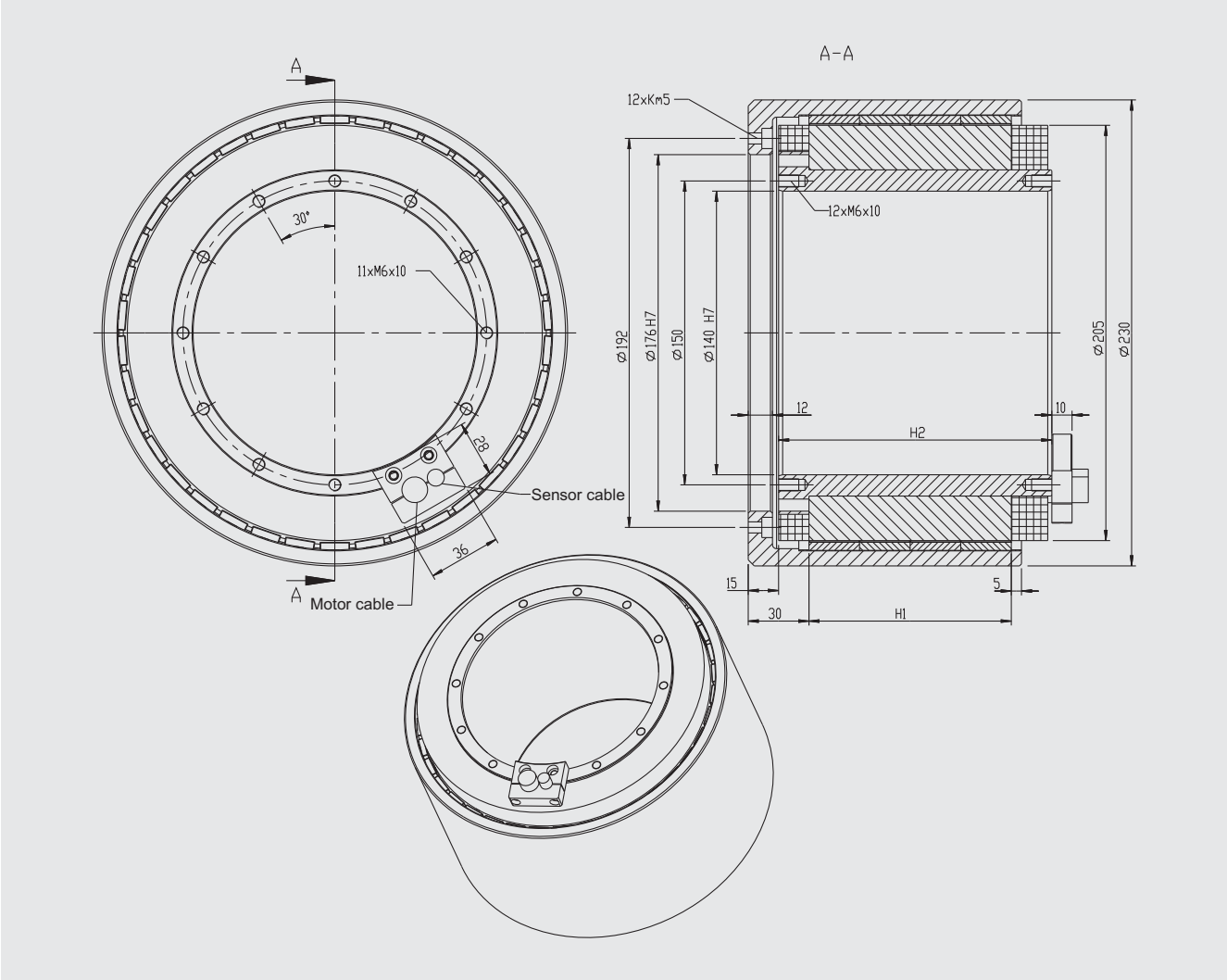
Construction characteristics

Motor type
RE Rotary external (external running)

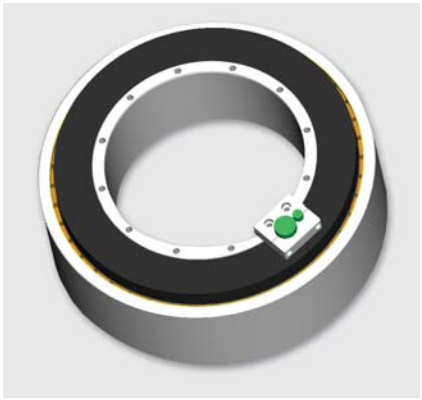
For unique identification of the motor, the 6-digit IDAM item-number of the order confirmation is binding.

Motor Specifications: Series RE19-3P-205xH

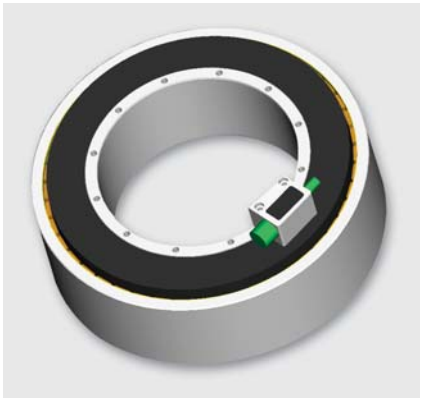
Drawing



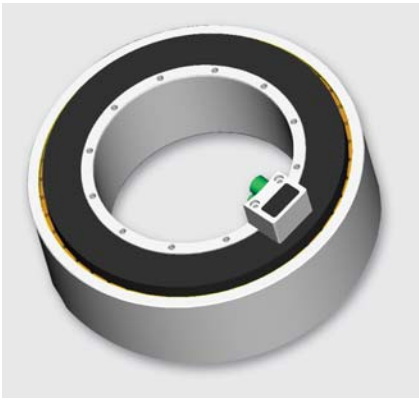
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE19-3P-205xH

Independent of winding

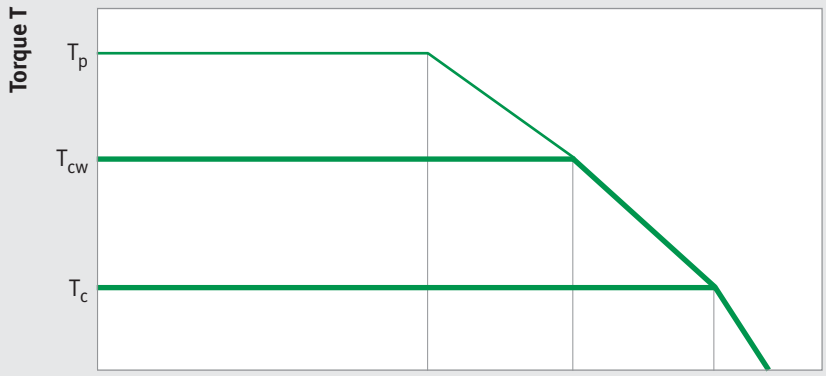
Motor specifications	Symbol	Unit	RE19-3P-205x25	RE19-3P-205x50	RE19-3P-205x75	RE19-3P-205x100	RE19-3P-205x125	RE19-3P-205x150	RE19-3P-205x175
Number of pole pairs	P		19	19	19	19	19	19	19
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	134	252	379	505	631	757	883
Peak torque (saturation range) at I_p	T_p	Nm	114	215	322	429	536	644	751
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	79	158	237	315	394	473	552
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	39	90	144	198	254	309	365
Continuous torque (not cooled) at I_c	T_c	Nm	21	48	75	101	124	146	167
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	27	64	102	141	180	219	259
Stall torque (not cooled) at I_s	T_s	Nm	15	34	53	72	88	104	119
Ripple torque (cogging) at I = 0	T_r	Nm	0.3	0.6	1.0	1.3	1.6	1.9	2.3
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	2848	4205	5561	6918	8274	9630	10987
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1113	1643	2172	2702	3232	3762	4292
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	348	695	1043	1390	1738	2085	2433
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	80	151	217	277	322	357	394
Thermical resistance (water cooled)	R_{th}	K/W	0.288	0.144	0.096	0.072	0.058	0.048	0.041
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	2.36	3.89	5.08	6.07	6.94	7.72	8.43
Water flow (cooling)	dV/dt	l/min	0.99	1.99	2.98	3.97	4.97	5.96	6.95
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mechanical interface	**Symbol**	**Unit**	**RE19-3P-205x25**	**RE19-3P-205x50**	**RE19-3P-205x75**	**RE19-3P-205x100**	**RE19-3P-205x125**	**RE19-3P-205x150**	**RE19-3P-205x175**
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	60.0	85.0	110.0	135.0	160.0	185.0	210.0
Mass of rotor	m_1	kg	4.0	5.5	6.9	8.4	9.8	11.3	12.7
Mass of stator	m_2	kg	6.2	9.3	12.5	15.6	18.6	21.7	24.8
Inertia of rotor	J	kgm^2	0.0461	0.0636	0.0811	0.0986	0.1161	0.1336	0.1511

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RE19-3P-205xH

Winding dependent specifications	Symbol	Unit	RE19-3P-205x25-WL	RE19-3P-205x25-WM	RE19-3P-205x25-WH	RE19-3P-205x50-WL	RE19-3P-205x50-WM	RE19-3P-205x50-WH	RE19-3P-205x75-WL
Torque constant	k_T	Nm/A_{rms}	7.66	3.83	2.07	15.32	7.66	4.14	22.98
Back EMF constant	k_u	Vs/rad	6.27	3.13	1.69	12.53	6.27	3.39	18.80
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	160	437	892	46	192	423	2
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	340	739	1416	146	342	673	83
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	383	801	1511	179	387	740	112
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	465	1029	1980	207	492	969	119
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	781	1620	3048	362	773	1471	226
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	845	1725	3223	407	844	1587	263
Limiting speed for continuous running*	n_{cr}	rpm	474	474	474	-	474	474	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	7.00	1.75	0.51	10.33	2.58	0.76	13.66
Inductance, phase to phase	L	mH	20.7	5.2	1.5	41.3	10.3	3.0	62.0
Ultimate current	I_u	A_{rms}	20.6	41.2	76.2	20.6	41.2	76.2	20.6
Peak current (saturation range)	I_p	A_{rms}	16.5	32.9	61.0	16.5	32.9	61.0	16.5
Peak current (linear range)	I_{pl}	A_{rms}	10.3	20.6	38.1	10.3	20.6	38.1	10.3
Continuous current (water cooled)	I_{cw}	A_{rms}	5.0	10.1	18.6	5.9	11.7	21.7	6.3
Continuous current (not cooled)	I_c	A_{rms}	2.8	5.5	10.2	3.1	6.2	11.5	3.3
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	3.6	7.2	13.2	4.2	8.3	15.4	4.4
Stall current at zero speed (not cooled)	I_s	A_{rms}	2.0	3.9	7.3	2.2	4.4	8.2	2.3
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

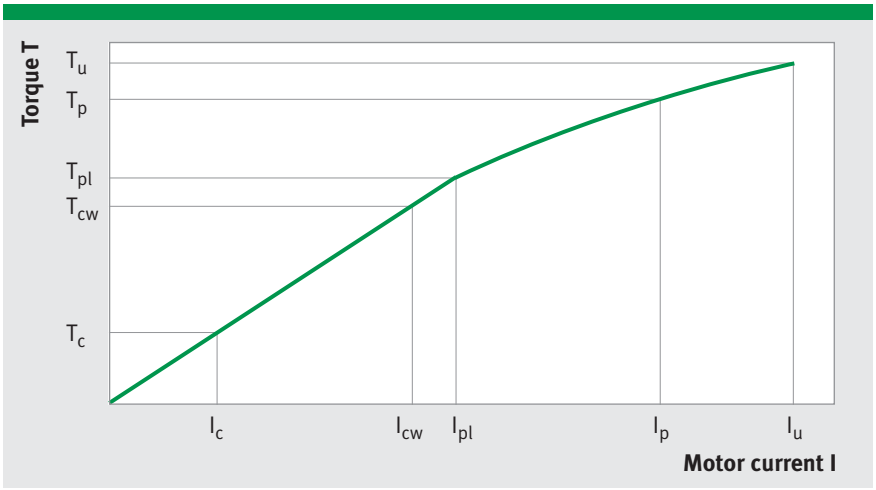


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

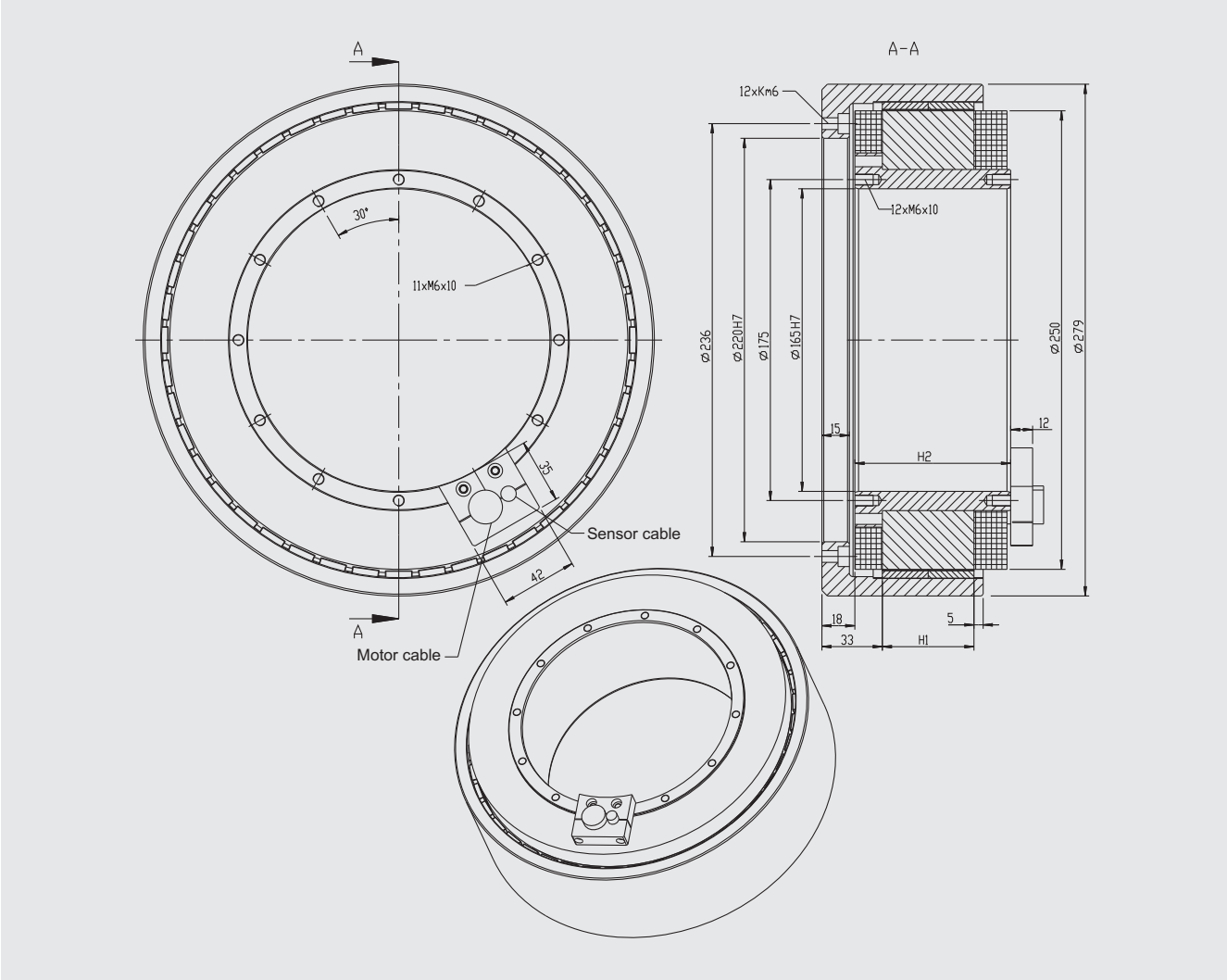
Then a further reduction of duty cycle or current is required.

RE19-3P-205x75-WM	RE19-3P-205x75-WH	RE19-3P-205x100-WL	RE19-3P-205x100-WM	RE19-3P-205x100-WH	RE19-3P-205x125-WL	RE19-3P-205x125-WM	RE19-3P-205x125-WH	RE19-3P-205x150-WL	RE19-3P-205x150-WM	RE19-3P-205x150-WH	RE19-3P-205x175-WL	RE19-3P-205x175-WM	RE19-3P-205x175-WH	Symbol
11.49	6.21	30.65	15.32	8.28	38.31	19.15	10.35	45.97	22.98	12.42	53.63	26.81	14.49	k_T
9.40	5.08	25.07	12.53	6.77	31.33	15.67	8.47	37.60	18.80	10.16	43.87	21.93	11.85	k_u
109	265	-	66	186	-	39	138	-	19	105	-	3	82	n_{lp}
213	431	52	149	312	33	111	241	21	86	194	12	68	161	n_{lw}
250	485	79	182	358	59	142	283	47	116	234	38	97	198	n_{lc}
312	631	74	221	462	45	167	360	25	130	292	9	103	244	n_{lp}
497	957	159	361	704	119	280	554	93	227	454	74	189	383	n_{lw}
553	1046	191	408	777	148	321	616	119	263	509	99	222	432	n_{lc}
474	474	-	-	474	-	-	474	-	-	-	-	-	-	n_{cr}
3.42	1.00	17.00	4.25	1.25	20.33	5.08	1.49	23.66	5.92	1.74	26.99	6.75	1.98	R_{25}
15.5	4.5	82.6	20.7	6.0	103.3	25.8	7.5	123.9	31.0	9.0	144.6	36.2	10.6	L
41.2	76.2	20.6	41.2	76.2	20.6	41.2	76.2	20.6	41.2	76.2	20.6	41.2	76.2	I_u
32.9	61.0	16.5	32.9	61.0	16.5	32.9	61.0	16.5	32.9	61.0	16.5	32.9	61.0	I_p
20.6	38.1	10.3	20.6	38.1	10.3	20.6	38.1	10.3	20.6	38.1	10.3	20.6	38.1	I_{pl}
12.5	23.1	6.5	13.0	23.9	6.6	13.2	24.4	6.7	13.4	24.8	6.8	13.6	25.1	I_{cw}
6.5	12.0	3.3	6.6	12.2	3.2	6.5	12.0	3.2	6.3	11.7	3.1	6.2	11.5	I_c
8.9	16.4	4.6	9.2	17.0	4.7	9.4	17.4	4.8	9.5	17.6	4.8	9.7	17.8	I_{sw}
4.6	8.5	2.3	4.7	8.6	2.3	4.6	8.5	2.3	4.5	8.3	2.2	4.4	8.2	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

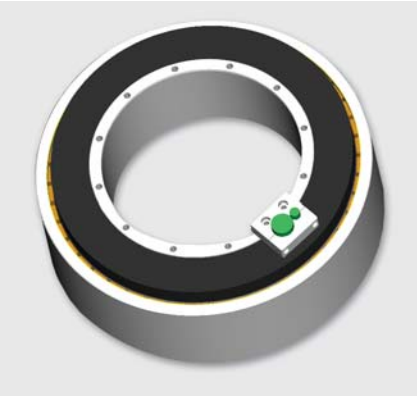


Motor Specifications: Series RE11-3P-250xH

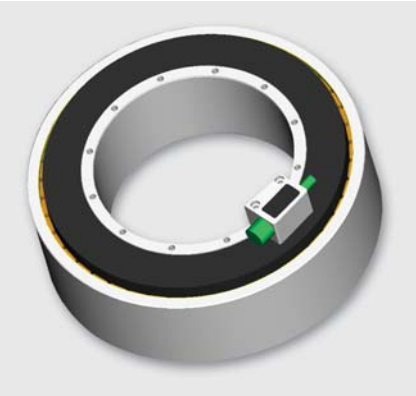
Drawing



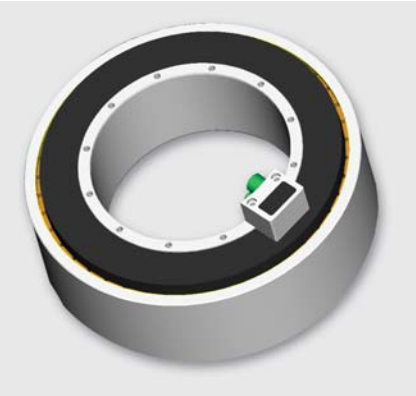
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE11-3P-250xH

Independent of winding

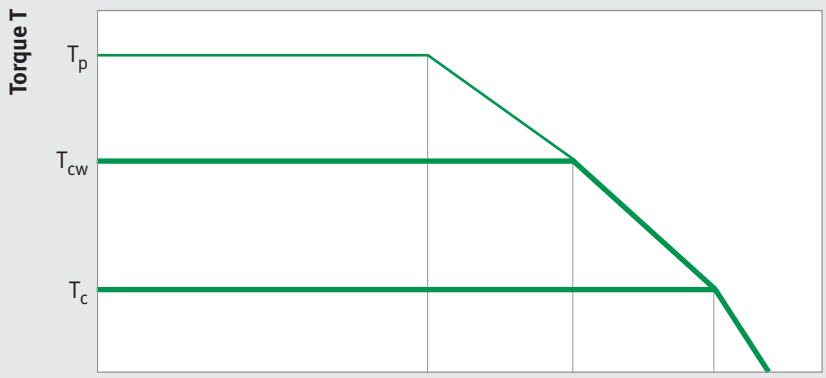
Motor specifications	Symbol	Unit	RE11-3P-250x25	RE11-3P-250x50	RE11-3P-250x75	RE11-3P-250x100	RE11-3P-250x125	RE11-3P-250x150	RE11-3P-250x175
Number of pole pairs	P		22	22	22	22	22	22	22
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	249	497	738	984	1218	1462	1706
Peak torque (saturation range) at I_p	T_p	Nm	178	356	528	705	872	1047	1221
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	131	262	389	518	641	770	898
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	69	162	258	358	455	556	657
Continuous torque (not cooled) at I_c	T_c	Nm	39	89	138	187	229	269	310
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	49	115	184	255	323	394	466
Stall torque (not cooled) at I_s	T_s	Nm	27	63	98	133	163	191	220
Ripple torque (cogging) at I = 0	T_r	Nm	0.5	1.1	1.6	2.1	2.6	3.1	3.7
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	2867	4114	5361	6607	7854	9101	10347
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1120	1607	2094	2581	3068	3555	4042
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	402	803	1205	1606	2008	2409	2811
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	98	184	265	338	393	436	481
Thermical resistance (water cooled)	R_{th}	K/W	0.249	0.125	0.083	0.062	0.050	0.042	0.036
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	3.91	6.53	8.49	10.20	11.58	12.91	14.12
Water flow (cooling)	dV/dt	l/min	1.15	2.29	3.44	4.59	5.74	6.88	8.03
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mechanical interface	**Symbol**	**Unit**	**RE11-3P-250x25**	**RE11-3P-250x50**	**RE11-3P-250x75**	**RE11-3P-250x100**	**RE11-3P-250x125**	**RE11-3P-250x150**	**RE11-3P-250x175**
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	60.0	85.0	110.0	135.0	160.0	185.0	210.0
Mass of rotor	m_1	kg	6.2	8.3	10.4	12.4	14.5	16.6	18.7
Mass of stator	m_2	kg	9.4	14.2	19.0	23.8	28.6	33.5	38.3
Inertia of rotor	J	kgm^2	0.1056	0.1424	0.1792	0.2160	0.2528	0.2896	0.3264

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RE11-3P-250xH

Winding dependent specifications	Symbol	Unit	RE11-3P-250x25-WL	RE11-3P-250x25-WM	RE11-3P-250x25-WH	RE11-3P-250x50-WL	RE11-3P-250x50-WM	RE11-3P-250x50-WH	RE11-3P-250x75-WL
Torque constant	k_T	Nm/A_{rms}	12.50	6.25	3.13	25.00	12.50	6.25	37.14
Back EMF constant	k_u	Vs/rad	10.23	5.11	2.56	20.45	10.23	5.11	30.38
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	102	278	620	32	124	296	6
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	206	451	939	88	208	446	50
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	233	488	999	108	235	489	68
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	299	659	1375	135	316	675	79
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	476	989	2015	220	471	971	138
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	516	1054	2130	248	515	1048	161
Limiting speed for continuous running*	n_{cr}	rpm	409	409	409	-	409	409	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	6.82	1.70	0.43	9.78	2.45	0.61	12.75
Inductance, phase to phase	L	mH	26.7	6.7	1.7	53.3	13.3	3.3	80.0
Ultimate current	I_u	A_{rms}	26.2	52.3	104.6	26.2	52.3	104.6	26.2
Peak current (saturation range)	I_p	A_{rms}	16.7	33.5	67.0	16.7	33.5	67.0	16.7
Peak current (linear range)	I_{pl}	A_{rms}	10.5	20.9	41.9	10.5	20.9	41.9	10.5
Continuous current (water cooled)	I_{cw}	A_{rms}	5.5	11.0	22.0	6.5	13.0	26.0	7.0
Continuous current (not cooled)	I_c	A_{rms}	3.1	6.2	12.4	3.5	7.1	14.2	3.7
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	3.9	7.8	15.6	4.6	9.2	18.4	4.9
Stall current at zero speed (not cooled)	I_s	A_{rms}	2.2	4.4	8.8	2.5	5.0	10.1	2.6
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

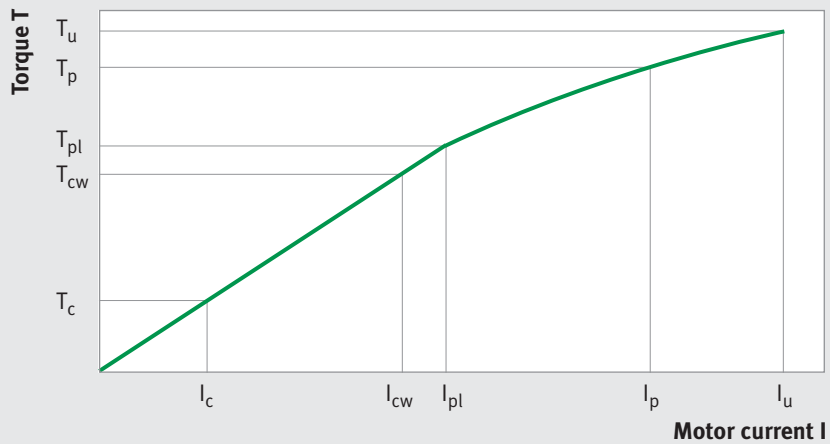


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

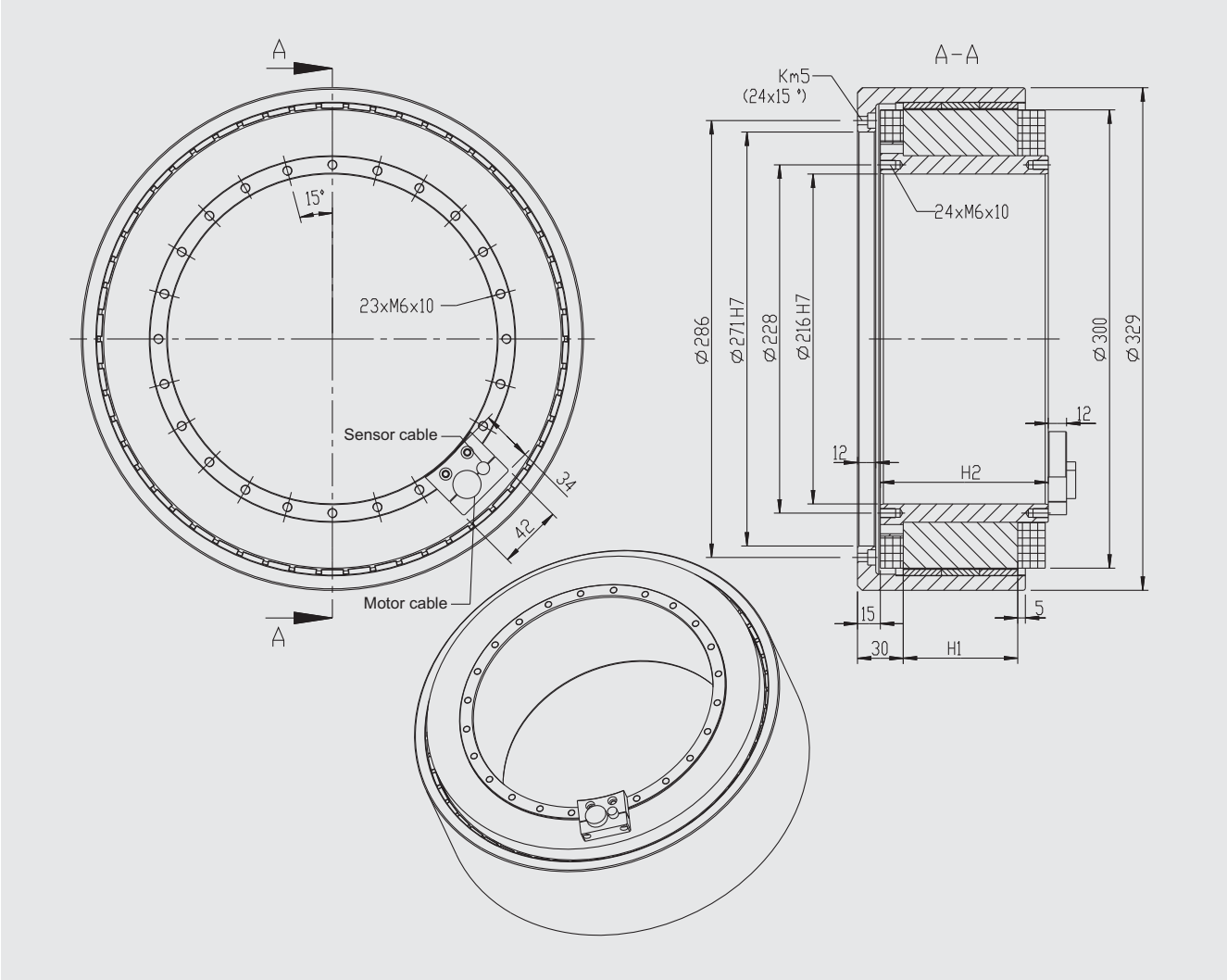
Then a further reduction of duty cycle or current is required.

RE11-3P-250x75-WM	RE11-3P-250x75-WH	RE11-3P-250x100-WL	RE11-3P-250x100-WM	RE11-3P-250x100-WH	RE11-3P-250x125-WL	RE11-3P-250x125-WM	RE11-3P-250x125-WH	RE11-3P-250x150-WL	RE11-3P-250x150-WM	RE11-3P-250x150-WH	RE11-3P-250x175-WL	RE11-3P-250x175-WM	RE11-3P-250x175-WH	Symbol
18.57	9.28	49.52	24.76	12.38	61.28	30.64	15.32	73.54	36.77	18.38	85.79	42.90	21.45	k_T
15.19	7.59	40.50	20.25	10.13	50.13	25.06	12.53	60.15	30.08	15.04	70.18	35.09	17.54	k_u
72	189	-	45	134	-	28	102	-	16	80	-	7	63	n_{lp}
130	288	31	91	209	20	68	163	12	52	131	7	41	109	n_{lw}
153	323	48	111	239	36	88	191	28	72	158	23	60	134	n_{lc}
202	443	51	145	326	33	110	256	21	87	209	11	69	175	n_{lp}
305	637	97	221	468	73	173	371	57	140	305	45	116	257	n_{lw}
340	697	117	250	517	91	199	414	73	163	342	61	137	291	n_{lc}
-	409	-	-	409	-	-	-	-	-	-	-	-	-	n_{cr}
3.19	0.80	15.71	3.93	0.98	18.68	4.67	1.17	21.64	5.41	1.35	24.61	6.15	1.54	R_{25}
20.0	5.0	106.6	26.7	6.7	133.3	33.3	8.3	160.0	40.0	10.0	186.6	46.7	11.7	L
52.3	104.6	26.2	52.3	104.6	26.2	52.3	104.6	26.2	52.3	104.6	26.2	52.3	104.6	I_u
33.5	67.0	16.7	33.5	67.0	16.7	33.5	67.0	16.7	33.5	67.0	16.7	33.5	67.0	I_p
20.9	41.9	10.5	20.9	41.9	10.5	20.9	41.9	10.5	20.9	41.9	10.5	20.9	41.9	I_{pl}
13.9	27.8	7.2	14.5	29.0	7.4	14.8	29.7	7.6	15.1	30.2	7.7	15.3	30.6	I_{cw}
7.4	14.9	3.8	7.6	15.1	3.7	7.5	15.0	3.7	7.3	14.7	3.6	7.2	14.4	I_c
9.9	19.8	5.1	10.3	20.6	5.3	10.5	21.1	5.4	10.7	21.5	5.4	10.9	21.7	I_{sw}
5.3	10.6	2.7	5.4	10.7	2.7	5.3	10.6	2.6	5.2	10.4	2.6	5.1	10.2	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

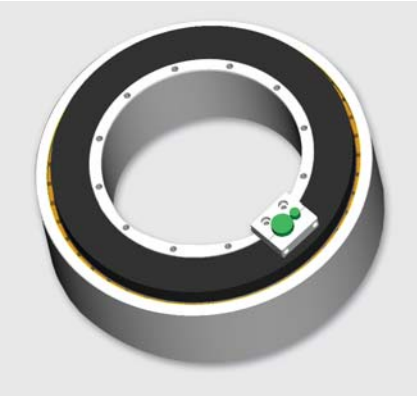


Motor Specifications: Series RE13-3P-300xH

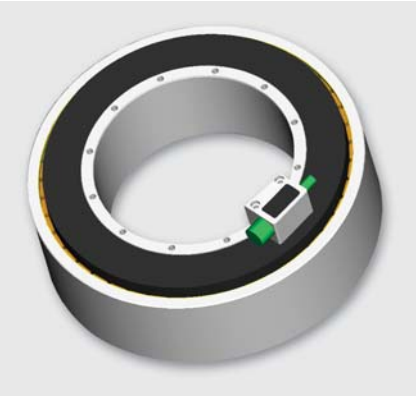
Drawing



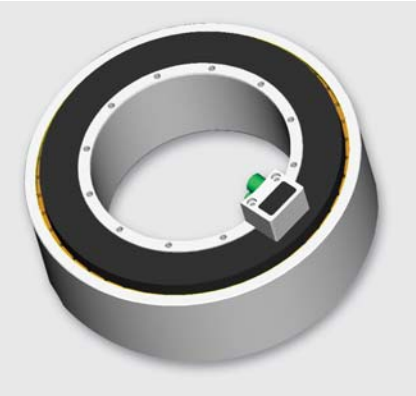
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE13-3P-300xH

Independent of winding

Motor Specifications	Symbol	Unit	RE13-3P-300x25	RE13-3P-300x50	RE13-3P-300x75	RE13-3P-300x100	RE13-3P-300x125	RE13-3P-300x150	RE13-3P-300x175
Number of pole pairs	P		26	26	26	26	26	26	26
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	308	617	916	1221	1511	1814	2094
Peak torque (saturation range) at I_p	T_p	Nm	244	488	725	967	1197	1436	1658
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	158	316	470	626	775	930	1074
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	97	231	369	513	651	796	932
Continuous torque (not cooled) at I_c	T_c	Nm	53	122	190	258	317	372	424
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	69	164	262	364	463	565	662
Stall torque (not cooled) at I_s	T_s	Nm	37	86	135	183	225	264	301
Ripple torque (cogging) at I = 0	T_r	Nm	0.7	1.5	2.2	2.9	3.6	4.3	5.0
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	3489	4943	6396	7850	9304	10758	12211
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1058	1498	1939	2380	2821	3261	3702
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	518	1036	1554	2072	2591	3109	3627
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	118	221	318	405	471	523	577
Thermical resistance (water cooled)	R_{th}	K/W	0.193	0.097	0.064	0.048	0.039	0.032	0.028
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	4.86	8.17	10.67	12.84	14.59	16.29	17.65
Water flow (cooling)	dV/dt	l/min	1.48	2.96	4.44	5.92	7.40	8.88	10.36
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00

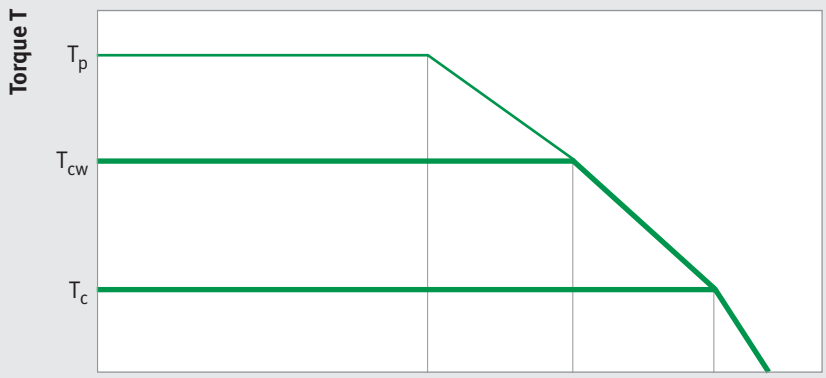
Mechanical interface	Symbol	Unit	RE13-3P-300x25	RE13-3P-300x50	RE13-3P-300x75	RE13-3P-300x100	RE13-3P-300x125	RE13-3P-300x150	RE13-3P-300x175
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	60.0	85.0	110.0	135.0	160.0	185.0	210.0
Mass of rotor	m_1	kg	6.7	9.2	11.6	14.1	16.5	19.0	21.4
Mass of stator	m_2	kg	11.9	17.8	23.7	29.9	35.8	41.7	47.6
Inertia of rotor	J	kgm^2	0.1629	0.2244	0.2859	0.3474	0.4089	0.4704	0.5319

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RE13-3P-300xH

Winding dependent specifications	Symbol	Unit	RE13-3P-300x25-WL	RE13-3P-300x25-WM	RE13-3P-300x25-WH	RE13-3P-300x50-WL	RE13-3P-300x50-WM	RE13-3P-300x50-WH	RE13-3P-300x75-WL
Torque constant	k_T	Nm/A_{rms}	13.74	6.87	3.44	27.49	13.74	6.87	40.82
Back EMF constant	k_u	Vs/rad	11.24	5.62	2.81	22.48	11.24	5.62	33.39
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	89	234	516	30	106	248	8
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	183	399	831	78	183	391	45
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	211	441	903	98	212	441	62
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	254	550	1140	116	266	561	70
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	420	871	1773	193	411	847	121
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	466	950	1920	224	463	942	145
Limiting speed for continuous running*	n_{cr}	rpm	346	346	346	-	346	346	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	5.32	1.33	0.33	7.54	1.89	0.47	9.76
Inductance, phase to phase	L	mH	23.3	5.8	1.5	46.6	11.6	2.9	69.8
Ultimate current	I_u	A_{rms}	28.8	57.5	115.1	28.8	57.5	115.1	28.8
Peak current (saturation range)	I_p	A_{rms}	20.9	41.8	83.6	20.9	41.8	83.6	20.9
Peak current (linear range)	I_{pl}	A_{rms}	11.5	23.0	46.0	11.5	23.0	46.0	11.5
Continuous current (water cooled)	I_{cw}	A_{rms}	7.1	14.1	28.3	8.4	16.8	33.6	9.0
Continuous current (not cooled)	I_c	A_{rms}	3.8	7.7	15.4	4.4	8.8	17.7	4.7
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	5.0	10.0	20.1	6.0	11.9	23.8	6.4
Stall current at zero speed (not cooled)	I_s	A_{rms}	2.7	5.5	10.9	3.1	6.3	12.6	3.3
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

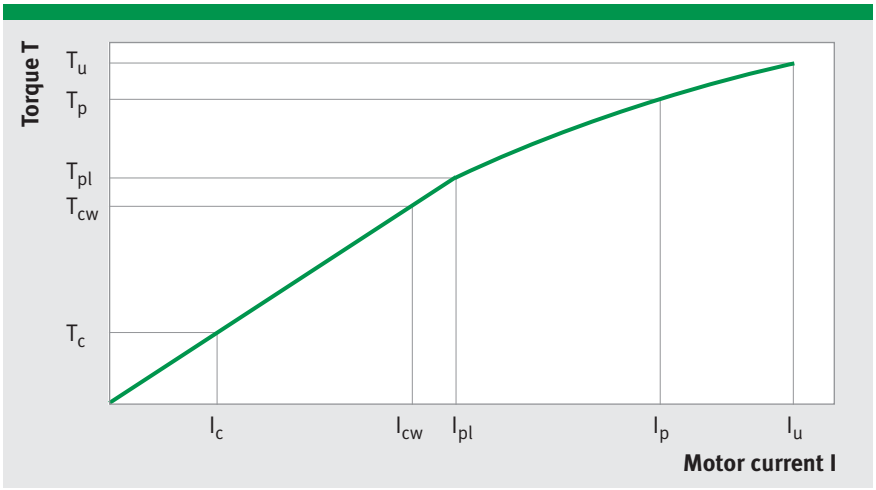


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

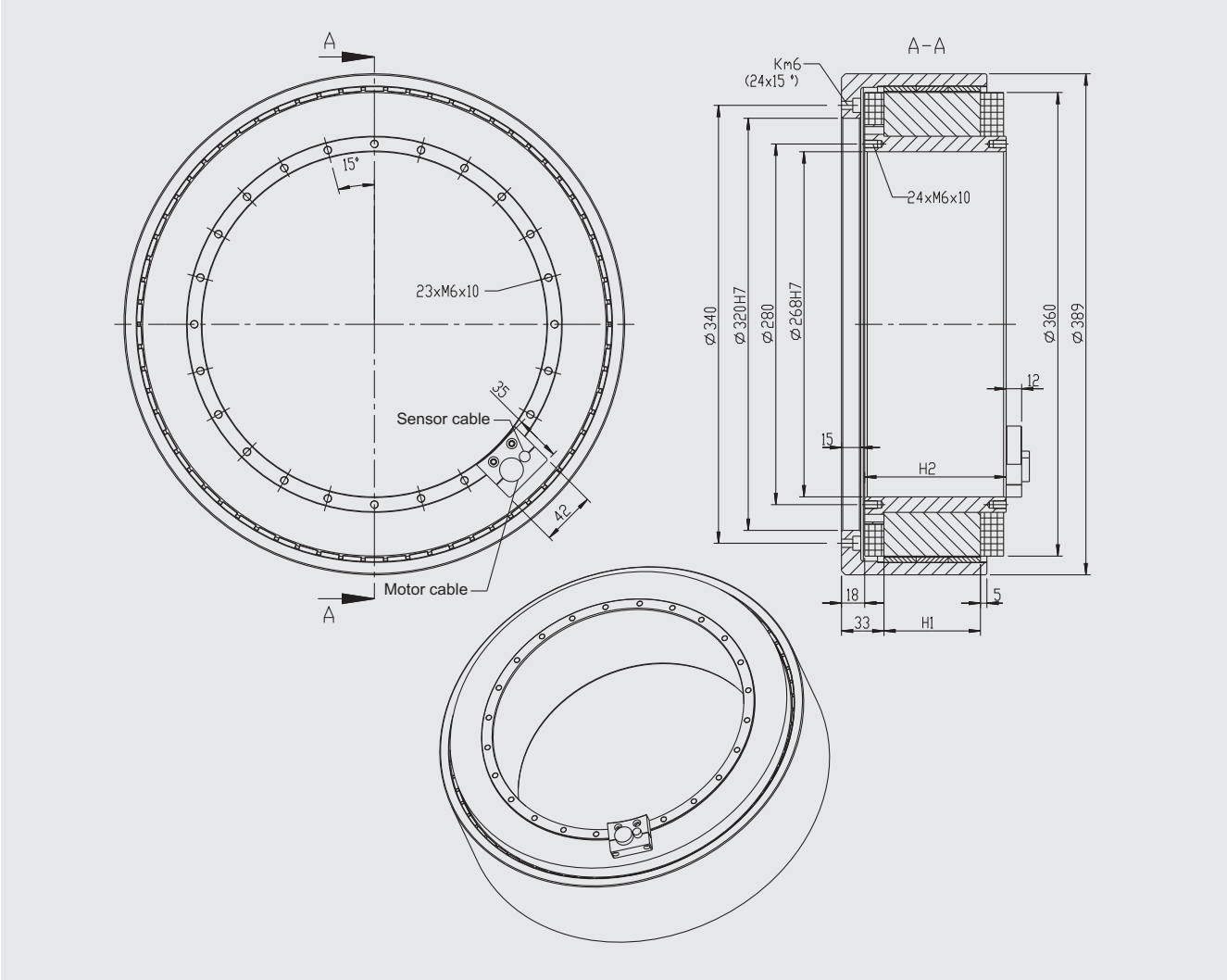
Then a further reduction of duty cycle or current is required.

RE13-3P-300x75-WM	RE13-3P-300x75-WH	RE13-3P-300x100-WL	RE13-3P-300x100-WM	RE13-3P-300x100-WH	RE13-3P-300x125-WL	RE13-3P-300x125-WM	RE13-3P-300x125-WH	RE13-3P-300x150-WL	RE13-3P-300x150-WM	RE13-3P-300x150-WH	RE13-3P-300x175-WL	RE13-3P-300x175-WM	RE13-3P-300x175-WH	Symbol
20.41	10.20	54.42	27.21	13.61	67.34	33.67	16.84	80.81	40.41	20.20	93.32	46.66	23.33	k_T
16.69	8.35	44.52	22.26	11.13	55.08	27.54	13.77	66.10	33.05	16.53	76.33	38.17	19.08	k_u
63	160	-	40	114	-	27	87	-	17	69	-	9	56	n_{lp}
114	252	28	80	182	18	60	142	11	46	114	6	37	96	n_{lw}
138	292	44	101	216	33	80	172	26	65	142	21	55	122	n_{lc}
171	369	46	123	272	31	95	215	21	75	176	13	61	148	n_{lp}
265	553	85	192	406	64	150	321	50	121	263	40	102	224	n_{lw}
305	626	105	225	464	82	179	371	66	147	307	56	125	263	n_{lc}
-	346	-	-	346	-	-	346	-	-	-	-	-	-	n_{cr}
2.44	0.61	11.98	2.99	0.75	14.20	3.55	0.89	16.41	4.10	1.03	18.63	4.66	1.16	R_{25}
17.5	4.4	93.1	23.3	5.8	116.4	29.1	7.3	139.7	34.9	8.7	163.0	40.7	10.2	L
57.5	115.1	28.8	57.5	115.1	28.8	57.5	115.1	28.8	57.5	115.1	28.8	57.5	115.1	I_u
41.8	83.6	20.9	41.8	83.6	20.9	41.8	83.6	20.9	41.8	83.6	20.9	41.8	83.6	I_p
23.0	46.0	11.5	23.0	46.0	11.5	23.0	46.0	11.5	23.0	46.0	11.5	23.0	46.0	I_{pl}
18.1	36.1	9.4	18.8	37.7	9.7	19.3	38.7	9.9	19.7	39.4	10.0	20.0	40.0	I_{cw}
9.3	18.6	4.7	9.5	19.0	4.7	9.4	18.8	4.6	9.2	18.4	4.5	9.1	18.2	I_c
12.8	25.7	6.7	13.4	26.8	6.9	13.7	27.5	7.0	14.0	28.0	7.1	14.2	28.4	I_{sw}
6.6	13.2	3.4	6.7	13.5	3.3	6.7	13.4	3.3	6.5	13.1	3.2	6.5	12.9	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

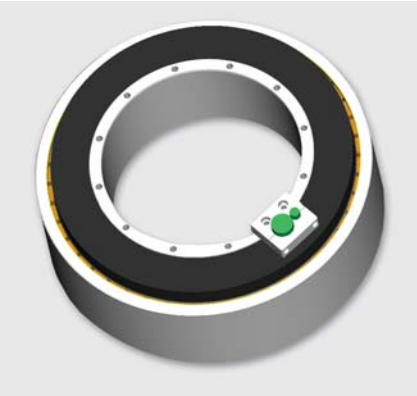


Motor Specifications: Series RE11-3P-360xH

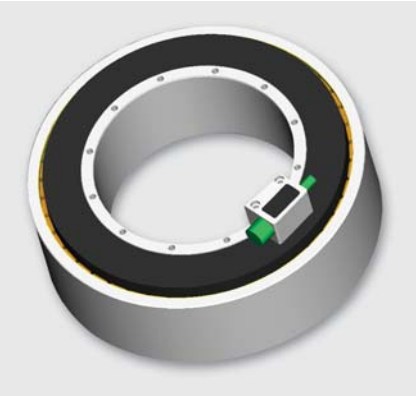
Drawing



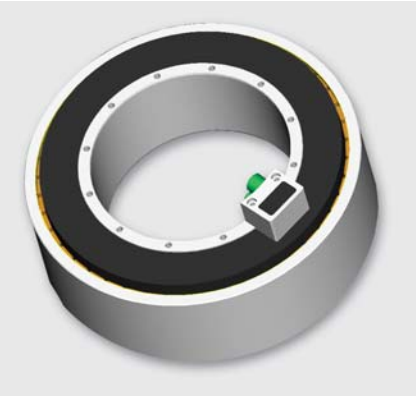
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE11-3P-360xH

Independent of winding

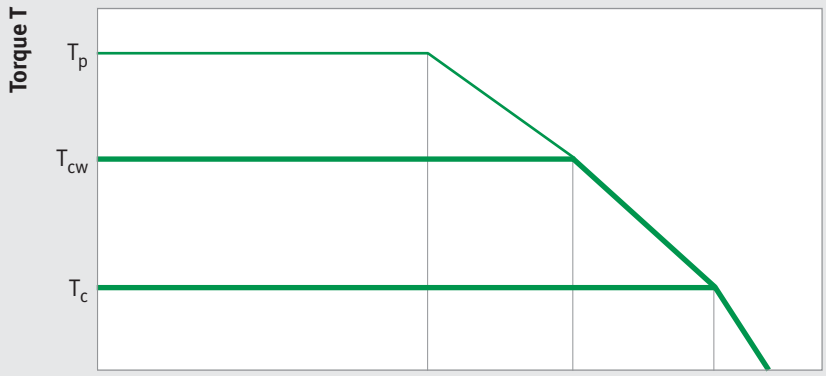
Motor specifications	Symbol	Unit	RE11-3P-360x25	RE11-3P-360x50	RE11-3P-360x75	RE11-3P-360x100	RE11-3P-360x125	RE11-3P-360x150	RE11-3P-360x175
Number of pole pairs	P		33	33	33	33	33	33	33
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	467	924	1372	1829	2262	2715	3167
Peak torque (saturation range) at I_p	T_p	Nm	437	866	1285	1714	2120	2544	2968
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	267	528	784	1045	1293	1551	1810
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	160	374	595	826	1047	1279	1511
Continuous torque (not cooled) at I_c	T_c	Nm	86	196	305	413	506	594	683
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	114	265	423	586	744	908	1073
Stall torque (not cooled) at I_s	T_s	Nm	61	139	216	293	359	422	485
Ripple torque (cogging) at I = 0	T_r	Nm	1.3	2.6	3.9	5.1	6.4	7.6	8.9
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	5395	7740	10086	12431	14777	17122	19468
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1349	1935	2521	3108	3694	4281	4867
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	630	1261	1891	2521	3152	3782	4412
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	141	266	382	486	565	627	692
Thermical resistance (water cooled)	R_{th}	K/W	0.159	0.079	0.053	0.040	0.032	0.026	0.023
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	7.26	12.00	15.61	18.74	21.27	23.71	25.94
Water flow (cooling)	dV/dt	l/min	1.80	3.60	5.40	7.20	9.01	10.81	12.61
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mechanical interface	**Symbol**	**Unit**	**RE11-3P-360x25**	**RE11-3P-360x50**	**RE11-3P-360x75**	**RE11-3P-360x100**	**RE11-3P-360x125**	**RE11-3P-360x150**	**RE11-3P-360x175**
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	60.0	85.0	110.0	135.0	160.0	185.0	210.0
Mass of rotor	m_1	kg	9.5	12.4	15.4	18.4	21.3	24.3	27.2
Mass of stator	m_2	kg	15.8	23.7	31.6	39.5	48.0	56.0	63.9
Inertia of rotor	J	kgm^2	0.3188	0.4234	0.5280	0.6326	0.7372	0.8418	0.9464

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RE11-3P-360xH

Winding dependent specifications	Symbol	Unit	RE11-3P-360x25-WL	RE11-3P-360x25-WM	RE11-3P-360x25-WH	RE11-3P-360x50-WL	RE11-3P-360x50-WM	RE11-3P-360x50-WH	RE11-3P-360x75-WL
Torque constant	k_T	Nm/A_{rms}	12.35	8.24	4.12	24.46	16.30	8.15	36.31
Back EMF constant	k_u	Vs/rad	10.10	6.74	3.37	20.00	13.34	6.67	29.70
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	109	184	403	45	83	195	22
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	216	337	698	98	157	333	60
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	242	371	756	117	181	374	75
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	273	426	884	129	206	437	81
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	483	736	1497	228	351	722	146
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	527	797	1610	258	393	798	169
Limiting speed for continuous running*	n_{cr}	rpm	273	273	273	-	273	273	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	1.93	0.86	0.21	2.77	1.23	0.31	3.61
Inductance, phase to phase	L	mH	8.9	3.9	1.0	17.8	7.9	2.0	26.7
Ultimate current	I_u	A_{rms}	54.0	80.9	161.9	54.0	80.9	161.9	54.0
Peak current (saturation range)	I_p	A_{rms}	43.2	64.8	129.5	43.2	64.8	129.5	43.2
Peak current (linear range)	I_{pl}	A_{rms}	21.6	32.4	64.8	21.6	32.4	64.8	21.6
Continuous current (water cooled)	I_{cw}	A_{rms}	12.9	19.4	38.8	15.3	22.9	45.8	16.4
Continuous current (not cooled)	I_c	A_{rms}	7.0	10.5	21.0	8.0	12.0	24.0	8.4
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	9.2	13.8	27.6	10.8	16.3	32.5	11.6
Stall current at zero speed (not cooled)	I_s	A_{rms}	5.0	7.4	14.9	5.7	8.5	17.0	6.0
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

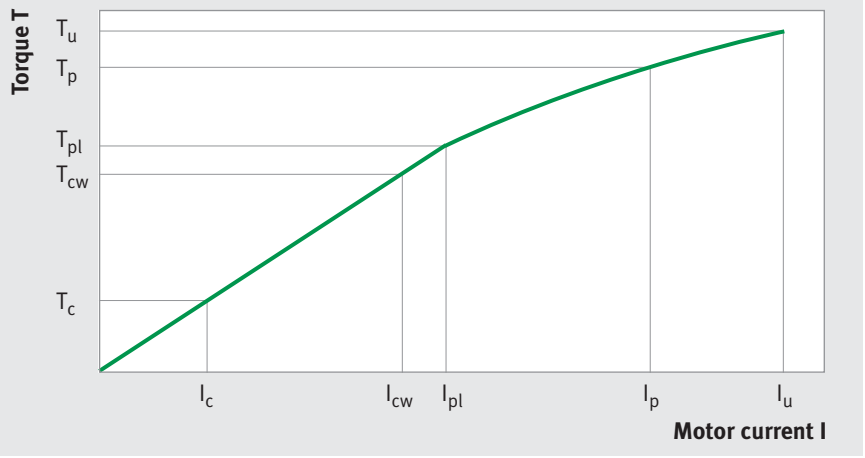


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

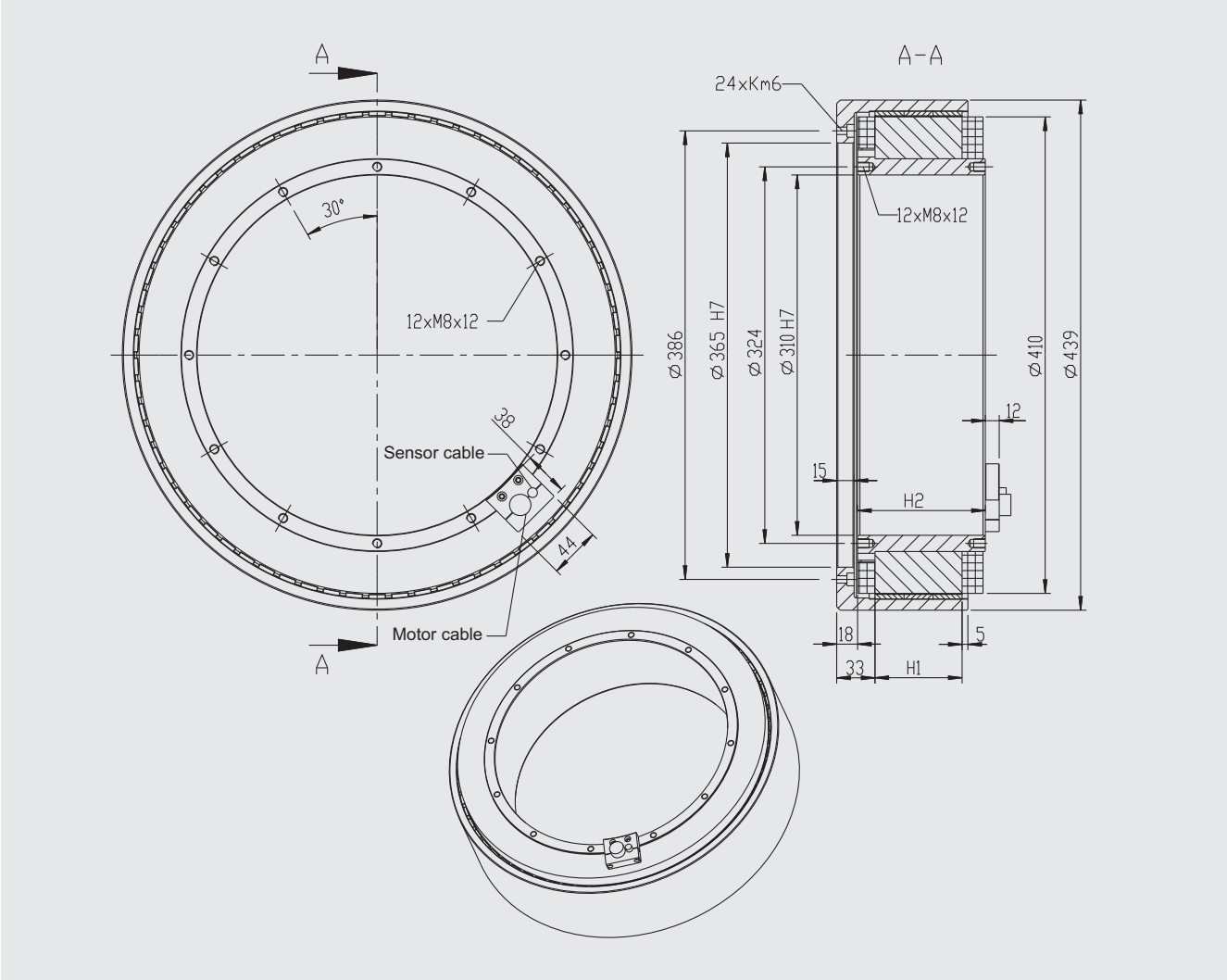
Then a further reduction of duty cycle or current is required.

RE11-3P-360x75-WM	RE11-3P-360x75-WH	RE11-3P-360x100-WL	RE11-3P-360x100-WM	RE11-3P-360x100-WH	RE11-3P-360x125-WL	RE11-3P-360x125-WM	RE11-3P-360x125-WH	RE11-3P-360x150-WL	RE11-3P-360x150-WM	RE11-3P-360x150-WH	RE11-3P-360x175-WL	RE11-3P-360x175-WM	RE11-3P-360x175-WH	Symbol
24.21	12.10	48.41	32.27	16.14	59.89	39.93	19.96	71.87	47.91	23.96	83.85	55.90	27.95	k_T
19.80	9.90	39.60	26.40	13.20	48.99	32.66	16.33	58.79	39.19	19.60	68.59	45.72	22.86	k_u
49	125	9	32	90	-	21	68	-	13	54	-	6	43	n_{lp}
98	215	40	69	156	29	53	122	22	41	99	16	33	82	n_{lw}
118	248	54	87	183	42	68	147	34	56	121	28	47	103	n_{lc}
133	287	56	96	212	41	73	167	30	58	137	23	47	115	n_{lp}
227	472	104	165	347	81	129	275	64	105	226	53	87	191	n_{lw}
260	531	124	192	394	98	152	316	80	125	261	67	106	222	n_{lc}
-	273	-	-	273	-	-	273	-	-	-	-	-	-	n_{cr}
1.60	0.40	4.45	1.98	0.49	5.29	2.35	0.59	6.13	2.72	0.68	6.96	3.10	0.77	R_{25}
11.8	3.0	35.5	15.8	3.9	44.4	19.7	4.9	53.3	23.7	5.9	62.2	27.6	6.9	L
80.9	161.9	54.0	80.9	161.9	54.0	80.9	161.9	54.0	80.9	161.9	54.0	80.9	161.9	I_u
64.8	129.5	43.2	64.8	129.5	43.2	64.8	129.5	43.2	64.8	129.5	43.2	64.8	129.5	I_p
32.4	64.8	21.6	32.4	64.8	21.6	32.4	64.8	21.6	32.4	64.8	21.6	32.4	64.8	I_{pl}
24.6	49.2	17.1	25.6	51.2	17.5	26.2	52.5	17.8	26.7	53.4	18.0	27.0	54.1	I_{cw}
12.6	25.2	8.5	12.8	25.6	8.4	12.7	25.3	8.3	12.4	24.8	8.1	12.2	24.4	I_c
17.5	34.9	12.1	18.2	36.3	12.4	18.6	37.2	12.6	19.0	37.9	12.8	19.2	38.4	I_{sw}
8.9	17.9	6.1	9.1	18.2	6.0	9.0	18.0	5.9	8.8	17.6	5.8	8.7	17.3	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

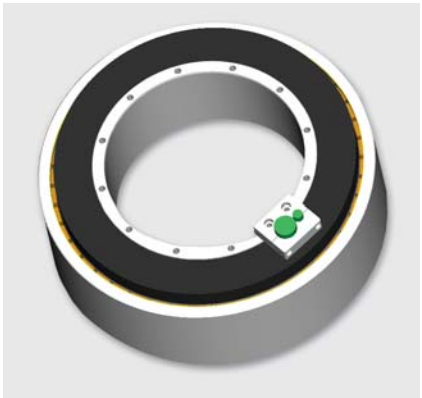


Motor Specifications: Series RE11-3P-410xH

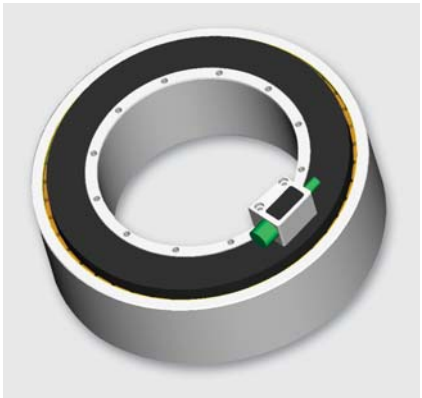
Drawing



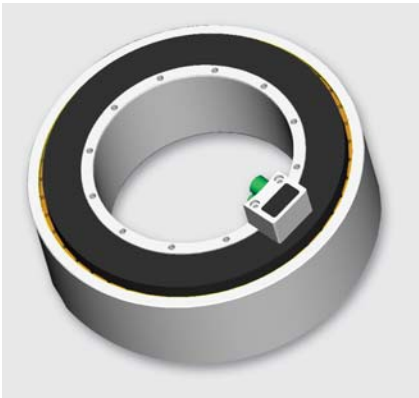
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE11-3P-410xH

Independent of winding

Motor specifications	Symbol	Unit	RE11-3P-410x25	RE11-3P-410x50	RE11-3P-410x75	RE11-3P-410x100	RE11-3P-410x125	RE11-3P-410x150	RE11-3P-410x175
Number of pole pairs	P		33	33	33	33	33	33	33
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	586	1172	1741	2321	2871	3445	4019
Peak torque (saturation range) at I_p	T_p	Nm	439	879	1305	1740	2152	2583	3013
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	335	670	995	1326	1641	1969	2297
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	214	505	805	1116	1416	1729	2043
Continuous torque (not cooled) at I_c	T_c	Nm	115	262	409	554	678	796	915
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	152	359	571	792	1005	1228	1451
Stall torque (not cooled) at I_s	T_s	Nm	81	186	290	393	481	565	650
Ripple torque (cogging) at I = 0	T_r	Nm	1.3	2.6	3.9	5.2	6.5	7.7	9.0
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	3521	5052	6583	8114	9646	11177	12708
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1376	1974	2572	3170	3768	4366	4964
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	730	1459	2189	2919	3648	4378	5108
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	161	303	434	554	644	715	789
Thermical resistance (water cooled)	R_{th}	K/W	0.137	0.069	0.046	0.034	0.027	0.023	0.020
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	9.03	15.08	19.61	23.55	26.73	29.79	32.60
Water flow (cooling)	dV/dt	l/min	2.08	4.17	6.25	8.34	10.42	12.51	14.59
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00

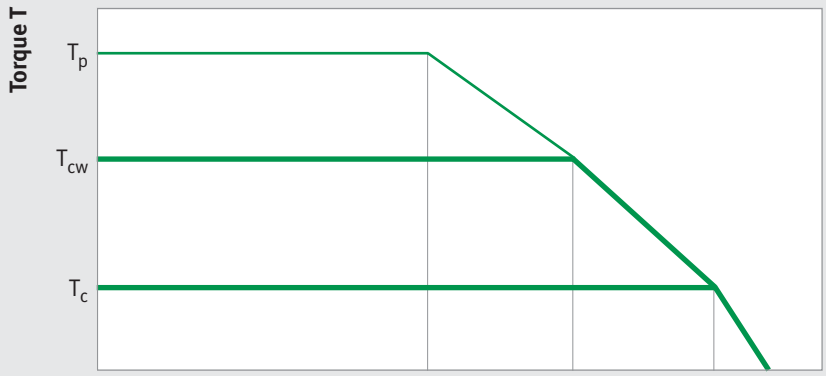
Mechanical interface	Symbol	Unit	RE11-3P-410x25	RE11-3P-410x50	RE11-3P-410x75	RE11-3P-410x100	RE11-3P-410x125	RE11-3P-410x150	RE11-3P-410x175
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	60.0	85.0	110.0	135.0	160.0	185.0	210.0
Mass of rotor	m_1	kg	11.0	14.3	17.6	20.8	24.1	27.3	30.6
Mass of stator	m_2	kg	19.8	29.7	39.6	49.6	59.5	70.1	80.0
Inertia of rotor	J	kgm^2	0.4762	0.6247	0.7732	0.9217	1.0702	1.2187	1.3672

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Serie RE11-3P-410xH

Winding dependent specifications	Symbol	Unit	RE11-3P-410x25-WL	RE11-3P-410x25-WM	RE11-3P-410x25-WH	RE11-3P-410x50-WL	RE11-3P-410x50-WM	RE11-3P-410x50-WH	RE11-3P-410x75-WL
Torque constant	k_T	Nm/A_{rms}	16.95	11.30	5.65	33.91	22.60	11.30	50.34
Back EMF constant	k_u	Vs/rad	13.87	9.25	4.62	27.74	18.49	9.25	41.18
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	93	156	342	39	71	165	20
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	153	240	501	67	109	235	40
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	174	268	548	82	129	267	53
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	233	362	751	110	175	370	69
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	345	527	1073	160	248	512	101
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	381	577	1166	184	281	572	120
Limiting speed for continuous running*	n_{cr}	rpm	273	273	273	-	273	273	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	2.35	1.04	0.26	3.37	1.50	0.37	4.39
Inductance, phase to phase	L	mH	13.2	5.9	1.5	26.3	11.7	2.9	39.5
Ultimate current	I_u	A_{rms}	49.4	74.1	148.2	49.4	74.1	148.2	49.4
Peak current (saturation range)	I_p	A_{rms}	31.6	47.4	94.8	31.6	47.4	94.8	31.6
Peak current (linear range)	I_{pl}	A_{rms}	19.8	29.6	59.3	19.8	29.6	59.3	19.8
Continuous current (water cooled)	I_{cw}	A_{rms}	12.6	18.9	37.9	14.9	22.4	44.7	16.0
Continuous current (not cooled)	I_c	A_{rms}	6.8	10.1	20.3	7.7	11.6	23.2	8.1
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	9.0	13.4	26.9	10.6	15.9	31.7	11.4
Stall current at zero speed (not cooled)	I_s	A_{rms}	4.8	7.2	14.4	5.5	8.2	16.5	5.8
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

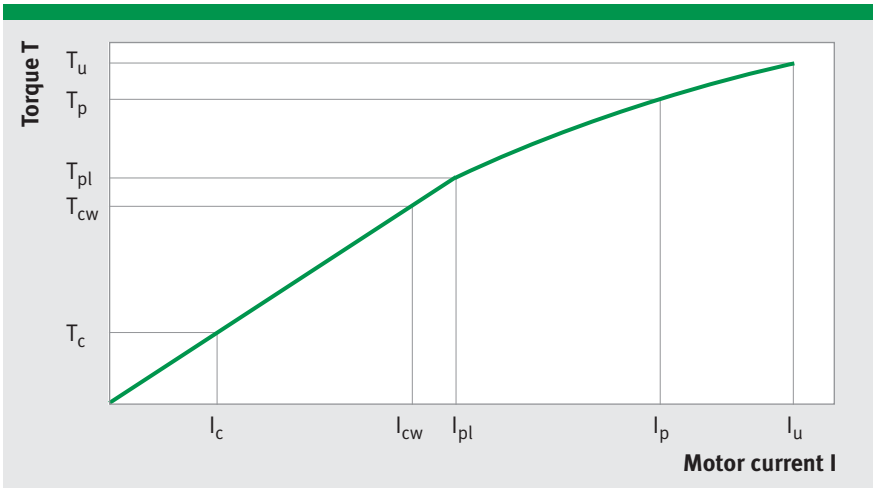


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

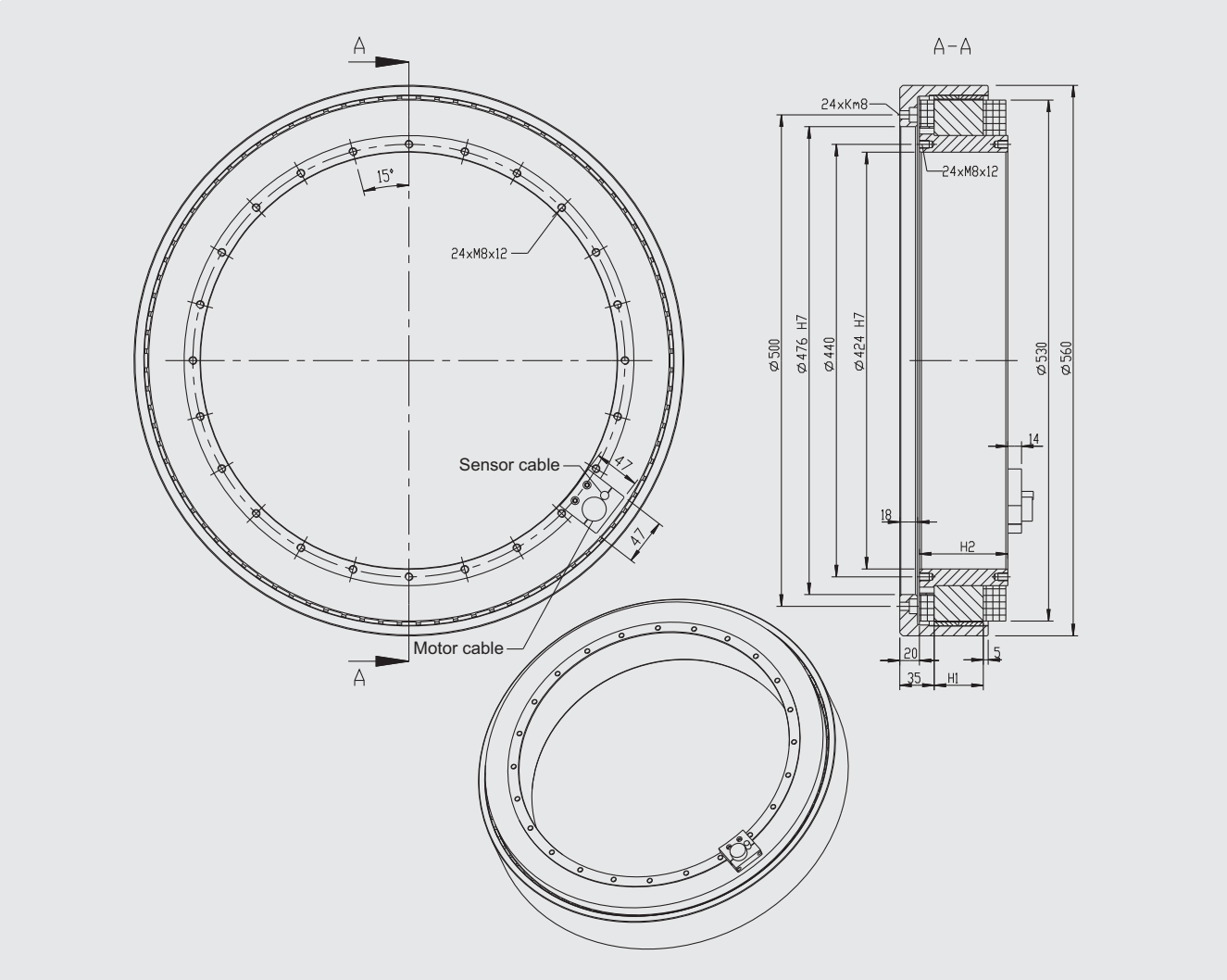
Then a further reduction of duty cycle or current is required.

RE11-3P-410x75-WM	RE11-3P-410x75-WH	RE11-3P-410x100-WL	RE11-3P-410x100-WM	RE11-3P-410x100-WH	RE11-3P-410x125-WL	RE11-3P-410x125-WM	RE11-3P-410x125-WH	RE11-3P-410x150-WL	RE11-3P-410x150-WM	RE11-3P-410x150-WH	RE11-3P-410x175-WL	RE11-3P-410x175-WM	RE11-3P-410x175-WH	Symbol
33.56	16.78	67.12	44.75	22.37	83.04	55.36	27.68	99.65	66.43	33.22	116.25	77.50	38.75	k_T
27.45	13.73	54.90	36.60	18.30	67.92	45.28	22.64	81.51	54.34	27.17	95.09	63.39	31.70	k_u
43	106	11	28	76	4	19	58	-	13	46	-	8	38	n_{lp}
68	151	26	47	109	18	35	85	13	27	68	9	21	57	n_{lw}
84	177	38	61	131	29	48	104	23	39	86	19	33	73	n_{lc}
113	244	48	81	180	36	63	142	27	50	116	21	41	98	n_{lp}
160	334	72	115	245	55	90	193	44	73	158	36	60	134	n_{lw}
185	380	88	136	282	69	108	225	56	89	186	47	75	158	n_{lc}
-	273	-	-	273	-	-	-	-	-	-	-	-	-	n_{cr}
1.95	0.49	5.41	2.41	0.60	6.44	2.86	0.72	7.46	3.31	0.83	8.48	3.77	0.94	R_{25}
17.6	4.4	52.7	23.4	5.9	65.8	29.3	7.3	79.0	35.1	8.8	92.2	41.0	10.2	L
74.1	148.2	49.4	74.1	148.2	49.4	74.1	148.2	49.4	74.1	148.2	49.4	74.1	148.2	I_u
47.4	94.8	31.6	47.4	94.8	31.6	47.4	94.8	31.6	47.4	94.8	31.6	47.4	94.8	I_p
29.6	59.3	19.8	29.6	59.3	19.8	29.6	59.3	19.8	29.6	59.3	19.8	29.6	59.3	I_{pl}
24.0	48.0	16.6	24.9	49.9	17.1	25.6	51.2	17.4	26.0	52.1	17.6	26.4	52.7	I_{cw}
12.2	24.4	8.3	12.4	24.8	8.2	12.2	24.5	8.0	12.0	24.0	7.9	11.8	23.6	I_c
17.0	34.1	11.8	17.7	35.4	12.1	18.2	36.3	12.3	18.5	37.0	12.5	18.7	37.4	I_{sw}
8.6	17.3	5.9	8.8	17.6	5.8	8.7	17.4	5.7	8.5	17.0	5.6	8.4	16.8	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

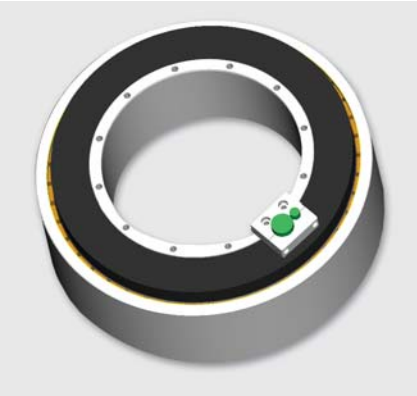


Motor Specifications: Series RE11-3P-530xH

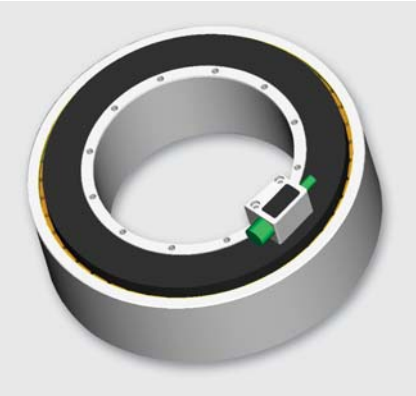
Drawing



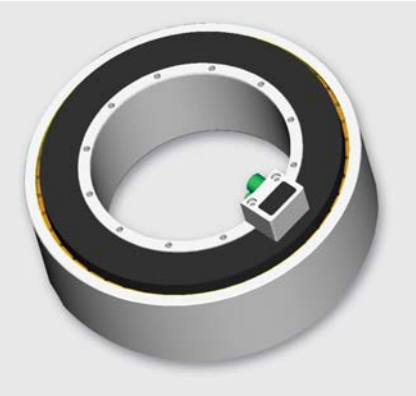
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE11-3P-530xH

Independent of winding

Motor specifications	Symbol	Unit	RE11-3P-530x25	RE11-3P-530x50	RE11-3P-530x75	RE11-3P-530x100	RE11-3P-530x125	RE11-3P-530x150	RE11-3P-530x175
Number of pole pairs	P		44	44	44	44	44	44	44
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	1148	2296	3410	4547	5683	6752	7877
Peak torque (saturation range) at I_p	T_p	Nm	870	1740	2584	3445	4307	5116	5969
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	656	1312	1949	2598	3248	3858	4501
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	340	808	1292	1795	2304	2789	3299
Continuous torque (not cooled) at I_c	T_c	Nm	178	410	641	871	1078	1255	1443
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	241	574	917	1275	1636	1980	2342
Stall torque (not cooled) at I_s	T_s	Nm	126	291	455	618	765	891	1025
Ripple torque (cogging) at I = 0	T_r	Nm	2.6	5.2	7.8	10.3	12.9	15.3	17.9
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	7592	10755	13918	17081	20245	23408	26571
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	2832	4012	5192	6373	7553	8733	9913
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	989	1977	2966	3955	4944	5932	6921
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	208	391	562	716	832	924	1019
Thermical resistance (water cooled)	R_{th}	K/W	0.101	0.051	0.034	0.025	0.020	0.017	0.014
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	12.33	20.71	27.04	32.55	37.37	41.29	45.21
Water flow (cooling)	dV/dt	l/min	2.82	5.65	8.47	11.30	14.12	16.95	19.77
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	5.00	5.00

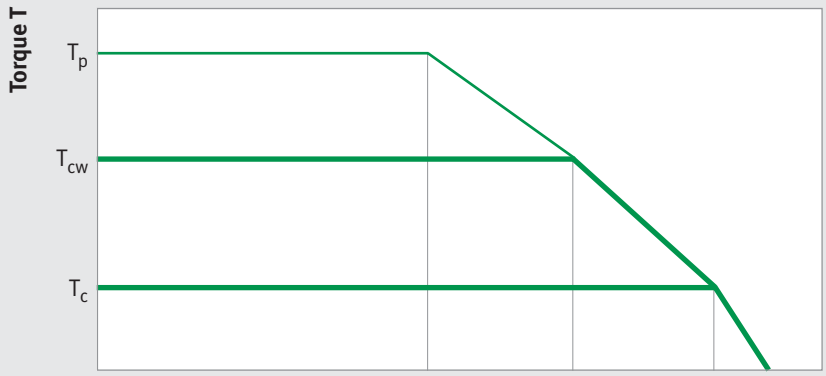
Mechanical interface	Symbol	Unit	RE11-3P-530x25	RE11-3P-530x50	RE11-3P-530x75	RE11-3P-530x100	RE11-3P-530x125	RE11-3P-530x150	RE11-3P-530x175
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	60.0	85.0	110.0	135.0	160.0	185.0	210.0
Mass of rotor	m_1	kg	16.8	21.2	25.5	29.9	34.3	38.7	43.1
Mass of stator	m_2	kg	28.7	42.8	58.0	72.1	86.2	100.4	114.5
Inertia of rotor	J	kgm^2	1.1860	1.5135	1.8410	2.1685	2.4960	2.8235	3.1510

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RE11-3P-530xH

Winding dependent specifications	Symbol	Unit	RE11-3P-530x25-WL	RE11-3P-530x25-WM	RE11-3P-530x25-WH	RE11-3P-530x50-WL	RE11-3P-530x50-WM	RE11-3P-530x50-WH	RE11-3P-530x75-WL
Torque constant	k_T	Nm/A_{rms}	24.74	12.37	6.18	49.48	24.74	12.37	73.48
Back EMF constant	k_u	Vs/rad	20.23	10.12	5.06	40.47	20.23	10.12	60.10
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	48	129	287	15	58	138	3
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	103	225	467	44	103	221	25
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	118	247	505	55	119	247	35
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	140	306	635	64	147	312	38
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	237	491	998	109	232	478	69
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	261	532	1074	126	260	528	82
Limiting speed for continuous running*	n_{cr}	rpm	-	205	205	-	205	205	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	2.68	0.67	0.17	3.80	0.95	0.24	4.92
Inductance, phase to phase	L	mH	11.8	3.0	0.7	23.7	5.9	1.5	35.5
Ultimate current	I_u	A_{rms}	66.3	132.6	265.2	66.3	132.6	265.2	66.3
Peak current (saturation range)	I_p	A_{rms}	43.4	86.8	173.7	43.4	86.8	173.7	43.4
Peak current (linear range)	I_{pl}	A_{rms}	26.5	53.0	106.1	26.5	53.0	106.1	26.5
Continuous current (water cooled)	I_{cw}	A_{rms}	13.7	27.5	55.0	16.3	32.7	65.3	17.6
Continuous current (not cooled)	I_c	A_{rms}	7.2	14.4	28.7	8.3	16.6	33.1	8.7
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	9.8	19.5	39.0	11.6	23.2	46.4	12.5
Stall current at zero speed (not cooled)	I_s	A_{rms}	5.1	10.2	20.4	5.9	11.8	23.5	6.2
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

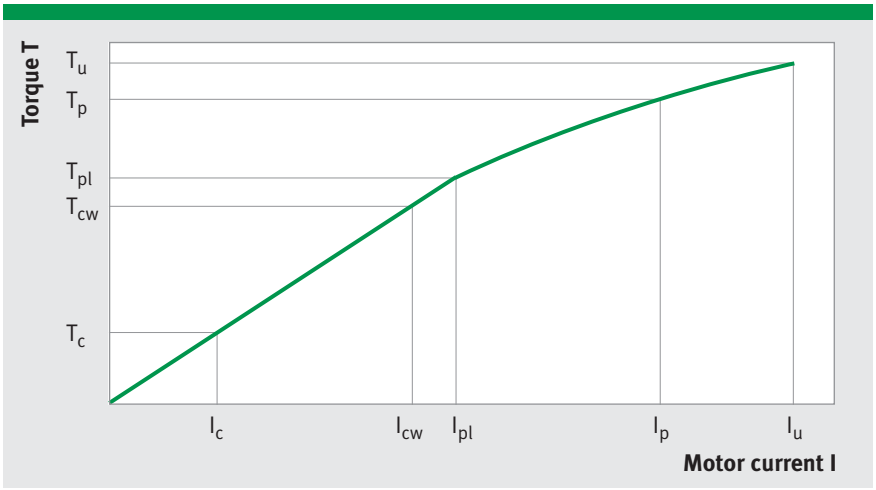


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

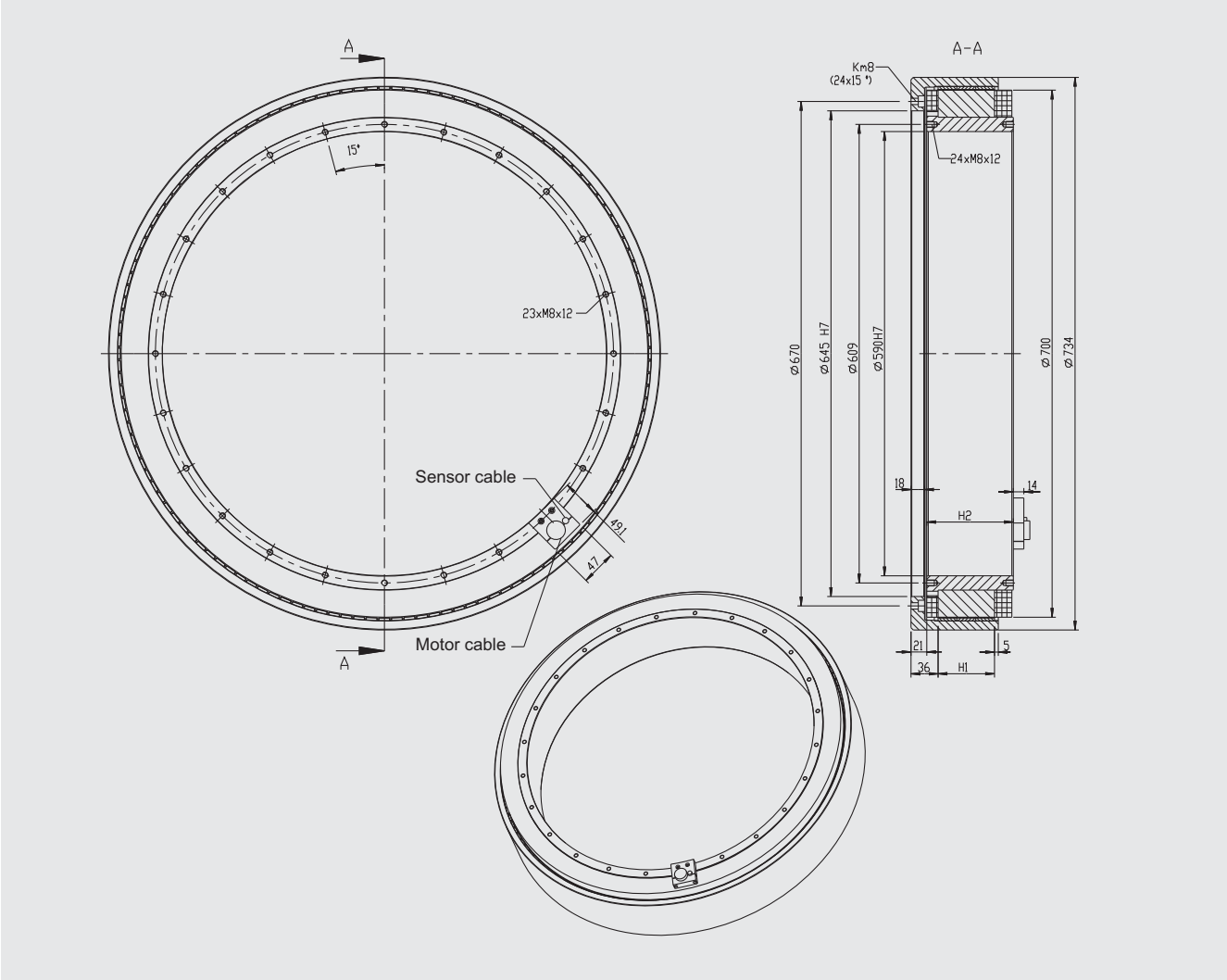
Then a further reduction of duty cycle or current is required.

RE11-3P-530x75-WM	RE11-3P-530x75-WH	RE11-3P-530x100-WL	RE11-3P-530x100-WM	RE11-3P-530x100-WH	RE11-3P-530x125-WL	RE11-3P-530x125-WM	RE11-3P-530x125-WH	RE11-3P-530x150-WL	RE11-3P-530x150-WM	RE11-3P-530x150-WH	RE11-3P-530x175-WL	RE11-3P-530x175-WM	RE11-3P-530x175-WH	Symbol
36.74	18.37	97.97	48.99	24.49	122.46	61.23	30.62	145.49	72.74	36.37	169.73	84.87	42.43	k_T
30.05	15.03	80.14	40.07	20.03	100.17	50.09	25.04	119.00	59.50	29.75	138.84	69.42	34.71	k_u
34	88	-	21	63	-	14	48	-	8	38	-	4	30	n_{lp}
65	142	16	45	103	10	34	80	7	26	65	4	21	54	n_{lw}
78	164	25	57	121	19	45	96	15	37	80	12	31	68	n_{lc}
95	205	25	68	151	16	52	119	11	41	97	6	33	82	n_{lp}
150	313	48	109	230	36	85	181	28	69	149	23	57	126	n_{lw}
172	351	60	127	261	46	100	207	38	83	173	31	70	147	n_{lc}
-	205	-	-	205	-	-	205	-	-	-	-	-	-	n_{cr}
1.23	0.31	6.04	1.51	0.38	7.16	1.79	0.45	8.28	2.07	0.52	9.40	2.35	0.59	R_{25}
8.9	2.2	47.4	11.8	3.0	59.2	14.8	3.7	71.1	17.8	4.4	82.9	20.7	5.2	L
132.6	265.2	66.3	132.6	265.2	66.3	132.6	265.2	66.3	132.6	265.2	66.3	132.6	265.2	I_u
86.8	173.7	43.4	86.8	173.7	43.4	86.8	173.7	43.4	86.8	173.7	43.4	86.8	173.7	I_p
53.0	106.1	26.5	53.0	106.1	26.5	53.0	106.1	26.5	53.0	106.1	26.5	53.0	106.1	I_{pl}
35.2	70.3	18.3	36.6	73.3	18.8	37.6	75.3	19.2	38.3	76.7	19.4	38.9	77.7	I_{cw}
17.4	34.9	8.9	17.8	35.5	8.8	17.6	35.2	8.6	17.2	34.5	8.5	17.0	34.0	I_c
25.0	49.9	13.0	26.0	52.0	13.4	26.7	53.4	13.6	27.2	54.4	13.8	27.6	55.2	I_{sw}
12.4	24.8	6.3	12.6	25.2	6.2	12.5	25.0	6.1	12.2	24.5	6.0	12.1	24.2	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ

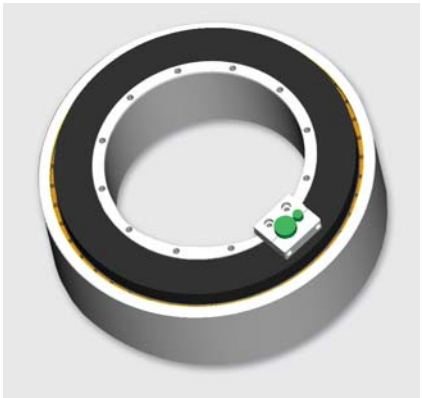


Motor Specifications: Series RE13-3P-700xH

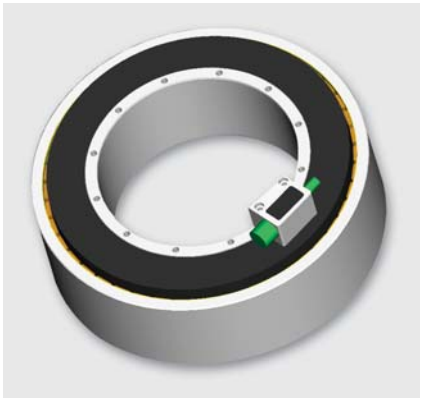
Drawing



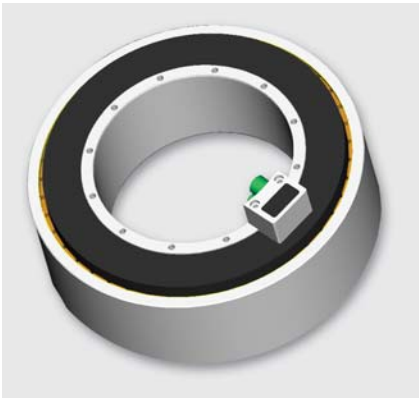
Note: The number of threads is doubled from the height of 100 mm up to 175 mm.



Standard: cable terminal axial



Option: cable terminal tangential



Option: cable terminal radial

Motor Specifications: Series RE13-3P-700xH

Independent of winding

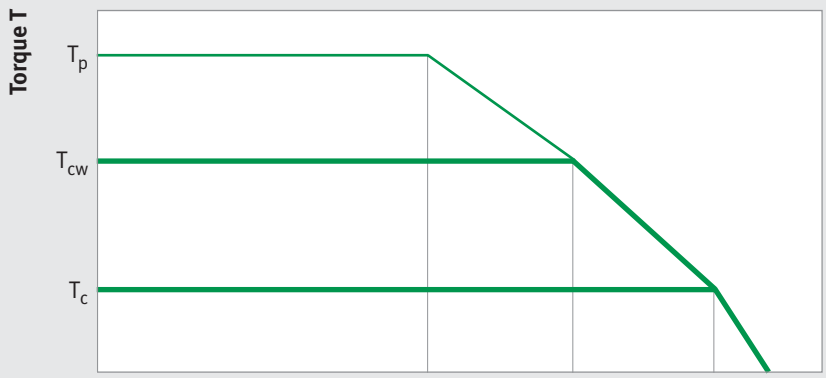
Motor specifications	Symbol	Unit	RE13-3P-700x25	RE13-3P-700x50	RE13-3P-700x75	RE13-3P-700x100	RE13-3P-700x125	RE13-3P-700x150	RE13-3P-700x175
Number of pole pairs	P		65	65	65	65	65	65	65
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	1616	3232	4848	6399	7999	9599	11199
Peak torque (saturation range) at I_p	T_p	Nm	1178	2356	3534	4664	5830	6996	8162
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	898	1796	2693	3555	4444	5333	6221
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	662	1563	2515	3453	4426	5405	6387
Continuous torque (not cooled) at I_c	T_c	Nm	340	778	1225	1643	2032	2386	2743
Stall torque (water cooled) at I_{sw}	T_{sw}	Nm	470	1109	1786	2451	3142	3837	4535
Stall torque (not cooled) at I_s	T_s	Nm	241	552	869	1167	1443	1694	1948
Ripple torque (cogging) at I = 0	T_r	Nm	3.5	7.1	10.6	14.0	17.5	21.0	24.5
Power loss (copper) at T_p (statical at 25 °C)	P_{lp}	W	4913	7049	9185	11321	13458	15594	17730
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1919	2754	3588	4422	5257	6091	6926
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	1356	2711	4067	5423	6778	8134	9490
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	275	517	742	945	1099	1220	1346
Thermical resistance (water cooled)	R_{th}	K/W	0.074	0.037	0.025	0.018	0.015	0.012	0.011
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	20.49	34.22	44.96	53.46	61.29	68.33	74.76
Water flow (cooling)	dV/dt	l/min	3.87	7.75	11.62	15.49	19.37	15.49	18.08
Water temperature difference (cooling)	$\Delta\vartheta$	K	5.00	5.00	5.00	5.00	5.00	7.50	7.50
Mechanical interface	**Symbol**	**Unit**	**RE13-3P-700x25**	**RE13-3P-700x50**	**RE13-3P-700x75**	**RE13-3P-700x100**	**RE13-3P-700x125**	**RE13-3P-700x150**	**RE13-3P-700x175**
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	65.0	90.0	115.0	140.0	165.0	190.0	215.0
Mass of rotor	m_1	kg	25.1	31.9	38.7	45.4	52.2	59.0	65.7
Mass of stator	m_2	kg	42.5	62.5	82.1	102.6	122.3	141.9	161.5
Inertia of rotor	J	kgm^2	3.111	3.986	4.861	5.736	6.611	7.486	8.361

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “power loss”: ±10%
IDAM will provide additional specifications and drawings per customer request. IDAM recommends that all motor applications be reviewed by an IDAM specialist.

Winding Configuration: Series RE13-3P-700xH

Winding dependent specifications	Symbol	Unit	RE13-3P-700x25-WL	RE13-3P-700x25-WM	RE13-3P-700x25-WH	RE13-3P-700x50-WL	RE13-3P-700x50-WM	RE13-3P-700x50-WH	RE13-3P-700x75-WL
Torque constant	k_T	Nm/A_{rms}	25.04	19.97	9.99	50.07	39.94	19.97	75.11
Back EMF constant	k_u	Vs/rad	20.48	16.34	8.17	40.96	32.67	16.34	61.43
Limiting speed at I_p and U_{DCL} = 280 V	n_{lp}	rpm	67	88	190	30	40	92	17
Limiting speed at I_{cw} and U_{DCL} = 280 V	n_{lw}	rpm	101	130	272	45	59	126	27
Limiting speed at I_c and U_{DCL} = 280 V	n_{lc}	rpm	118	150	307	56	72	149	36
Limiting speed at I_p and U_{DCL} = 600 V	n_{lp}	rpm	159	202	416	76	98	205	49
Limiting speed at I_{cw} and U_{DCL} = 600 V	n_{lw}	rpm	224	284	579	104	132	273	66
Limiting speed at I_c and U_{DCL} = 600 V	n_{lc}	rpm	256	323	652	124	157	319	80
Limiting speed for continuous running*	n_{cr}	rpm	-	138	138	-	138	138	-
Electrical resistance, phase to phase (25 °C)	R_{25}	Ω	0.99	0.64	0.16	1.43	0.91	0.23	1.86
Inductance, phase to phase	L	mH	5.7	3.6	0.9	11.4	7.2	1.8	17.0
Ultimate current	I_u	A_{rms}	89.6	112.4	224.8	89.6	112.4	224.8	89.6
Peak current (saturation range)	I_p	A_{rms}	57.4	71.9	143.8	57.4	71.9	143.8	57.4
Peak current (linear range)	I_{pl}	A_{rms}	35.9	45.0	89.9	35.9	45.0	89.9	35.9
Continuous current (water cooled)	I_{cw}	A_{rms}	26.4	33.1	66.2	31.2	39.1	78.1	33.5
Continuous current (not cooled)	I_c	A_{rms}	13.6	17.0	34.0	15.5	19.4	38.9	16.3
Stall current at zero speed (water cooled)	I_{sw}	A_{rms}	18.8	23.5	47.0	22.2	27.7	55.5	23.8
Stall current at zero speed (not cooled)	I_s	A_{rms}	9.6	12.1	24.1	11.0	13.8	27.6	11.6
Maximum winding temperature	ϑ	°C	130	130	130	130	130	130	130
Interrupting sensor temperature	ϑ	°C	100	100	100	100	100	100	100

*See glossary • Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value “resistance”: ±10% • Tolerance range for value “inductance”: ±15%

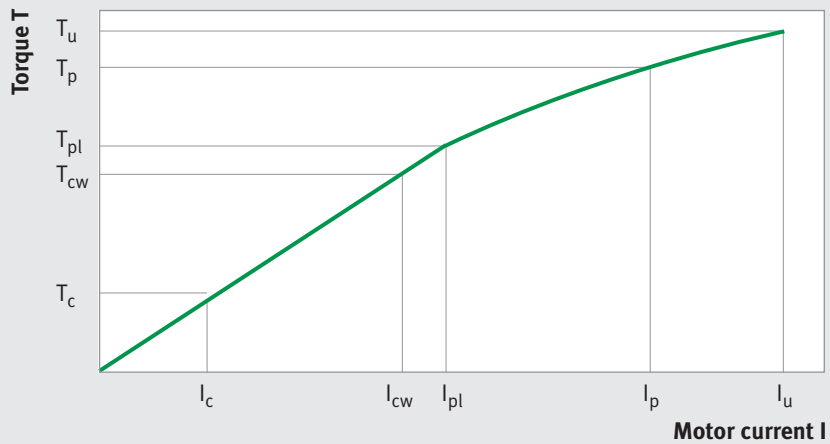


Winding specific speed limits are quiet proportional to U_{DCL}.

A continuous running of these motors could be limited in a range around n_{cr} because of additional frequency-dependent losses (see glossary).

Then a further reduction of duty cycle or current is required.

RE13-3P-700x75-WM	RE13-3P-700x75-WH	RE13-3P-700x100-WL	RE13-3P-700x100-WM	RE13-3P-700x100-WH	RE13-3P-700x125-WL	RE13-3P-700x125-WM	RE13-3P-700x125-WH	RE13-3P-700x150-WL	RE13-3P-700x150-WM	RE13-3P-700x150-WH	RE13-3P-700x175-WL	RE13-3P-700x175-WM	RE13-3P-700x175-WH	Symbol
59.92	29.96	99.14	79.09	39.54	123.92	98.86	49.43	148.71	118.63	59.32	173.49	138.41	69.20	k_T
49.01	24.50	81.09	64.69	32.35	101.37	80.87	40.43	121.64	97.04	48.52	141.91	113.21	56.61	k_u
25	59	11	17	43	7	12	33	4	8	26	2	6	21	n_{lp}
36	80	18	25	58	13	18	45	10	14	36	7	11	30	n_{lw}
46	98	26	34	73	20	26	58	16	22	48	14	18	40	n_{lc}
63	135	35	46	100	27	35	79	21	28	65	17	23	55	n_{lp}
84	176	47	61	130	36	47	102	29	38	83	24	32	70	n_{lw}
102	209	59	76	157	46	60	124	38	49	102	32	41	87	n_{lc}
-	138	-	-	138	-	-	-	-	-	-	-	-	-	n_{cr}
1.19	0.30	2.29	1.46	0.37	2.73	1.74	0.44	3.16	2.02	0.50	3.59	2.29	0.57	R_{25}
10.8	2.7	22.7	14.4	3.6	28.4	18.1	4.5	34.1	21.7	5.4	39.7	25.3	6.3	L
112.4	224.8	89.6	112.4	224.8	89.6	112.4	224.8	89.6	112.4	224.8	89.6	112.4	224.8	I_u
71.9	143.8	57.4	71.9	143.8	57.4	71.9	143.8	57.4	71.9	143.8	57.4	71.9	143.8	I_p
45.0	89.9	35.9	45.0	89.9	35.9	45.0	89.9	35.9	45.0	89.9	35.9	45.0	89.9	I_{pl}
41.9	83.8	34.8	43.6	87.2	35.7	44.7	89.4	36.3	45.5	91.0	36.8	46.1	92.1	I_{cw}
20.4	40.8	16.6	20.7	41.5	16.4	20.5	41.0	16.0	20.1	40.2	15.8	19.8	39.6	I_c
29.7	59.5	24.7	30.9	61.9	25.4	31.7	63.5	25.8	32.3	64.6	26.1	32.7	65.4	I_{sw}
14.5	29.0	11.8	14.7	29.5	11.6	14.6	29.1	11.4	14.3	28.5	11.2	14.0	28.1	I_s
130	130	130	130	130	130	130	130	130	130	130	130	130	130	ϑ
100	100	100	100	100	100	100	100	100	100	100	100	100	100	ϑ



Availability/Selection of Sizes

Type RMK • RMF

RMK/RMF built-in motors are slotless, iron-core permanent magnet-excited AC synchronous motors. In slotless motors, the coil windings are located in an air gap between the magnetic ring and the primary ring.
Slotless motors do not generate any cogging forces. This outstanding property of this motor series guarantees a very uniform movement.

Through coreless windings and the bigger air gap, these motors offer the following special characteristics in the application:

- very small electric time constant
- high dynamics in regulated operation
- high end-speed
- relatively low forces of attraction
- force output of about 2.5 to 3 N/cm² per active air gap surface
- high flexibility in the construction and in the diameter size, to be able to fulfill customer-specific requirements.

RM motors can be built as flat-design variant (RMF) and as coaxial-design variant (RMK). The RMK motors in turn can be provided with an inner rotor or with an external rotor. The motors, which are custom-built, are characterized by the following parameters.

Diameter range:	0.07 m to 2.5 m
Torque range:	2 Nm to 15000 Nm
Speed range :	Up to 15 m/s peripheral speed

RMF advantages

- Flat design
- Mean torque requirements in machines with less force or no forces in the direction of movement
- Applications with high accuracy
- High synchronism

RMK advantages

- Coaxial design
- Mean torque requirements in machines with less force or no forces in the direction of movement
- Applications with high accuracy
- High synchronism

RMK/RMF applications

- In pivots
- In grinding machines
- In measurement machines
- In high-precision positioning axes

Designation

Type RMK • RMF

XXX - XP - DxB - X-X-X-X - XXX

PRIM Primary
SEK Secondary

Model variant
O Without ring (customer provides the ring)
M With ring (ring will be manufactured by IDAM)
K With cooling in the ring (additional outer ring required)
S Special design

Commutation type
O Without sensors, measurement system commutated
K Sensor commutated, analog, 2x 90° (2P) or 3x 120° (3P)
S Sensor box (C+D), measurement system commutated
E Special design, custom-built

Temperature monitoring
O Standard (KTY84-130 + 2x NC in series | 3x PTC in series in phases 1, 2, 3 | 1x KTY in phase 2, if no sensor commutation takes place)
E Extra (special design, according to customer requirements

Connection variant
LD, LD1...LDX Low dynamic (low electrical energy requirement)
HD, HD1...HDX High dynamic

Dimensions
D Average air gap diameter (mm)
B Magnet track width (mm)

Number of motor phases
2P 2-phase
3P 3-phase

Motor type
RMF Ring motor, flat windings
RMK Ring motor, windings glued in cylinder jacket
RMD Ring motor flat, winding arrangement double
URM Ring motor flat, magnet arrangement double

Availability/Selection of Sizes

Type HSR • HSRV

HSR/HSRV motors are constructed similarly to the motors of the RI/RE series. Due to specially developed construction of the coil system, this motor series is constructed for high-speed applications.

These motors reach high peripheral speeds (up to 50 m/s) at a simultaneous high available torque and are extremely silent running. HSR/HSRV motors are custom-built according to the relevant requirements.

HSR/HSRV motors are custom-developed and built.

Diameter range:	0.1 m to 2.5 m
Torque range:	2 Nm to 6000 Nm

Advantages

- Highest peripheral speeds, at a simultaneous high available torques
- Low vibration and low noise
- Special winding structures
- No cogging effects

Applications

- In the area of medical engineering
- In spindles
- In honing heads
- In fast rotary indexing tables

Designation

Type HSR • HSRV

XXXX - 3P - DxH - X-X-X-X - XXX

PRIM Primary
SEK Secondary

Model variant
O Housing set (customer provides housing parts)
M Complete motor (parts are made by IDAM)
K With cooling in the ring (additional ring is provided by IDAM)

Commutation type
O Without sensors, measurement system commutated
S Special design, custom-built

Temperature monitoring
O Standard (KTY84-130 + 2x NC in series | 3x PTC in series in phases 1, 2, 3 | 1x KTY84 in phase 2 as reserve)
S Special design, custom-built

Connection variant
LD, LD1...LDX Low dynamic (low electrical energy requirement)
HD, HD1...HDX High dynamic

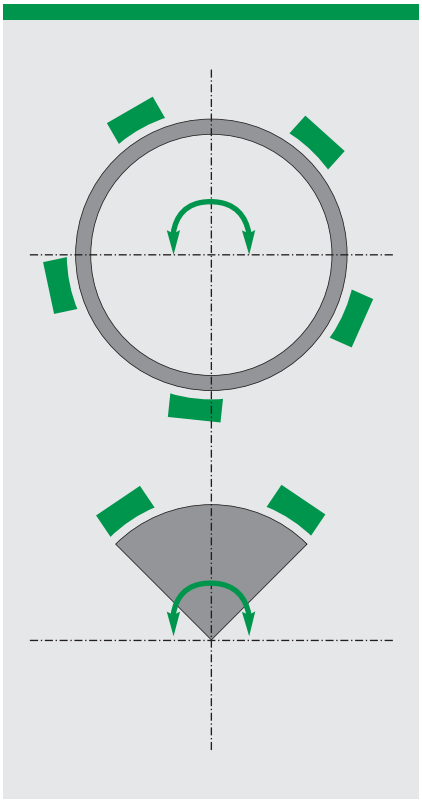
Dimensions
Effective diameter in the air gap x packet height (mm)

Number of motor phases
3P 3-phase

Motor type
HSR, HSRV Internal (internal rotor)
HSRE, HSRVE External (external rotor)

Optional additional model code (e.g. HSRV5)

Segment Motors



The IDAM built-in motors of all structural shapes can also be made customized in segment construction.
In contrast to the continuous rings of the previously mentioned motors, the primary and/or the secondary parts are formed as segments in these motors.
This construction gives particular advantages in motors with diameters above 1260 mm or in case of special geometric requirements.

- Motor segments (primaries) are easy to manufacture.
- The torque can be scaled via the number of segments.
- Very big diameters can be realized economically.
- A redundant construction of torque motors in segment construction is thus possible.
- In case of movements less than 180°, secondary parts can be segmented.
- Very suitable for small drives due to the reduction of mass.

In combination with HSR magnet systems, very large segment motors are suitable for high-speed motors with large diameters.

This construction has the following advantages:

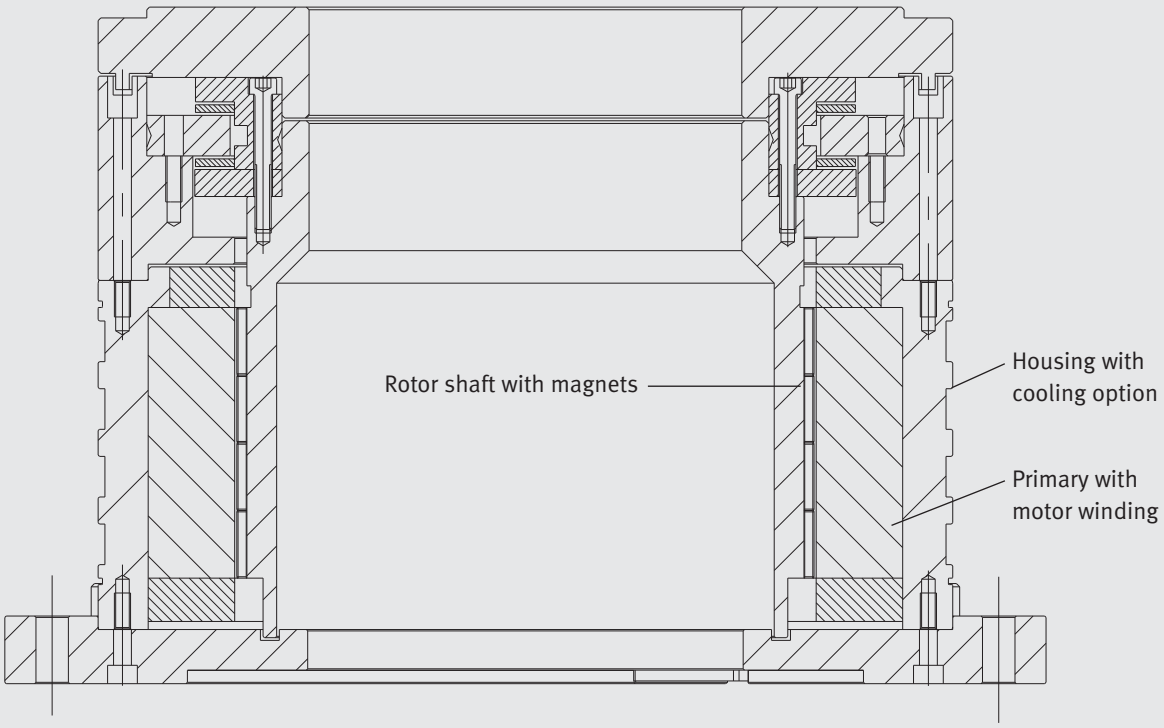
- Cost-effective segment construction
- Variation of the number of segments
- Implementation of large motors
- Redundant construction possible
- Reduction of the service costs
- Mass reduction.

Motors in Special Structural Shapes

Apart from the design of the motors as built-in motors, for customized solutions, function integrations - of machine parts and motor parts - can be realized. This allows the optimum integration in the user's machine.
The electromagnetic system of the primary part can be integrated into the housing of a revolving table or a machine assembly, without loss of installation space.

The magnet system of the secondary part can be mounted directly on to the shaft.

All technical data and dimensions can be taken from the standard data sheets. An intensive technical consultancy by our engineers supports successful implementation.
The increased design effort is already economical even with small lot sizes.
In all cases, the advantages of the direct drives can be utilized to the advantage of the performance.



Check List for Your Enquiry

Send by fax to: +49 3681 7574-30

This check list can also be downloaded from the download centre at www.ina-dam.de.

Company	**Contact person**	**Industry/appellation of project**
Telephone	**Fax**	**E-mail**

Brief description

Motor ☐ **System** ☐ **Axis within a multi-axis system** ☐

Position of the rotary axis in the space

Type of weight compensation: _____

Installation conditions for drive

(if required, diagram or drawing)

Max. installation dimensions [mm]: _____

(length/width/height)

Mechanical interface: _____

Ambient conditions

Temperature [K]: _____

Contamination: _____

Degree of protection (IP): _____

Movement quantities

Angle of rotation φ [degrees]: _____

Additional mass moment of inertia [kgm²]: _____

Interfering forces [Nm]: _____

Maximum rotary speed [rpm]: _____

Synchronism variations [%] at rotary speed: _____

Shortest acceleration

or delay time [ms]: _____

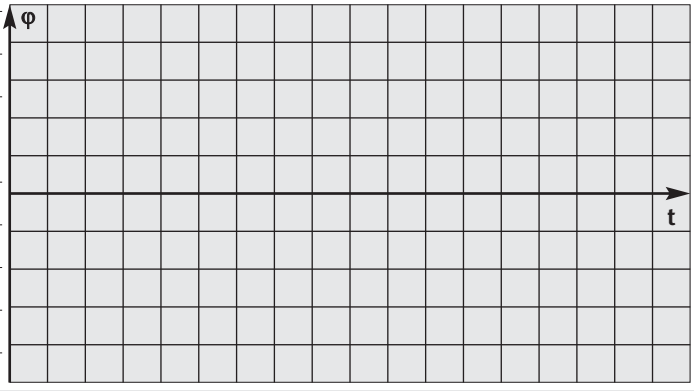
Overswinging in position [degrees]: _____

Response time [ms]: _____

Typical cycle per unit of time (diagram): _____

Life/operating hours [h]: _____

drawing



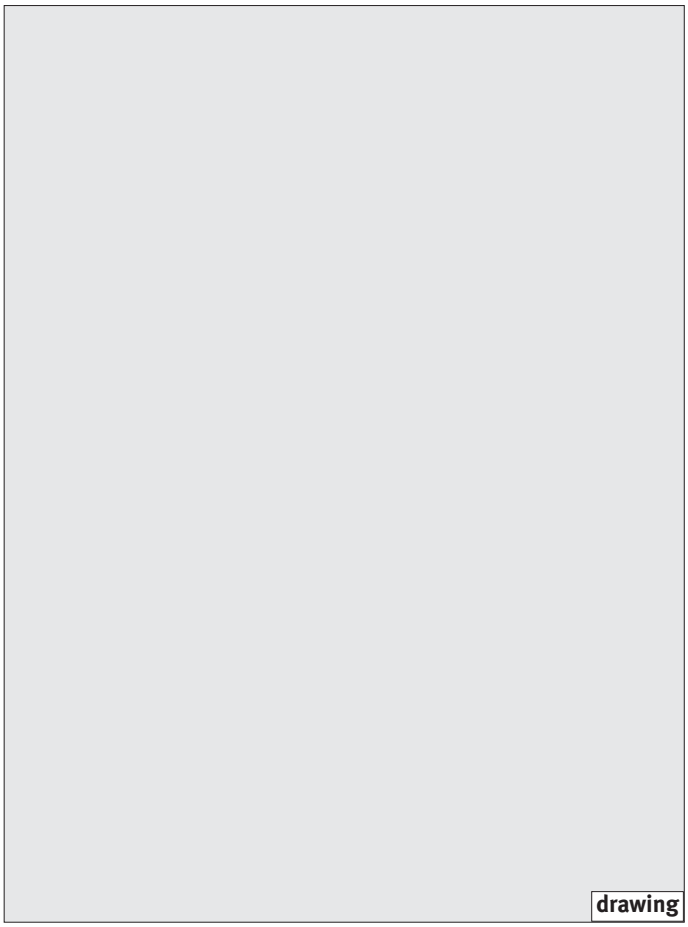
Required accuracies

(if applicable, diagram or drawing)

Over diameter [mm]: _____

Radial accuracy [µm]: _____

Axial accuracy [µm]: _____



Cooling

Cooling permissible

Yes ☐ No ☐

Oil ☐ Water ☐ Air ☐

Max. permissible heating of the

primary [K]: _____

secondary [K]: _____

Controller

Present

Yes ☐ No ☐

Controller type:

Components: Only servo-regulator ☐

Complete controller ☐

Positioning: Point-to-point controller ☐

Track control ☐

Interfaces: _____

Options: _____

General information

Accessories: _____

Individual pieces ☐ Series ☐ Prototype for series ☐

Probable annual requirement: _____

Planned start of production: _____

Price expectation or

costs for existing solution: _____

Desired quotation deadline: _____

Further processing by: _____ Date: _____

Generated by: _____ Date: _____

Feasibility checked by: _____ Date: _____

Technical Information and Consulting Services

Class-leading technology and competent consulting services are two of the major benefits of working with IDAM.
IDAM application engineers are looking forward to support you choose the perfect drive for your application.

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Glossary
Winding independent parameters

Saturation behavior

The torque increases with growing effective current linearly at first, next, the torque changes into the bent part, and then increases in a flat, linear fashion.

The bend results from the magnetic saturation of the entire magnetic circuit. (see diagram)

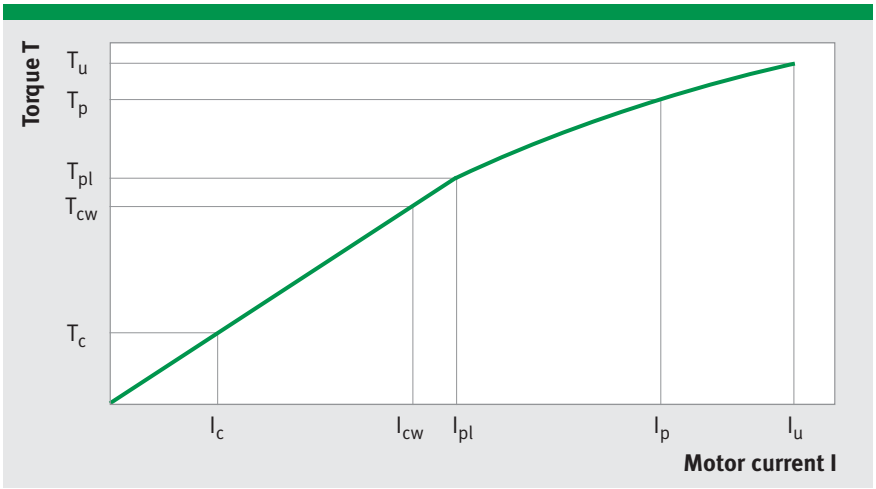

Diagram: Torque in relation to the current

Symbol	Meaning	Unit	Explanation
T_u	Ultimate torque	Nm	Ultimate torque at strong saturation of the magnetic circuit. When this value is surpassed, for the heated motor (magnet temperature 80 °C), there is a danger of demagnetization or thermal destruction within a short time. It must not be used as a dimensioning quantity, but in case of short-circuit braking, attention needs to be paid.
T_p	Peak torque	Nm	Peak torque that can be generated for a short time (range of seconds) at I_p, which is reached in the saturation range and at all operating temperatures with certainty. At magnet temperatures up to 60 °C and in pulse operation, T_p can be increased up to the value of T_u.
T_{pl}	Peak torque, linear range	Nm	Motor torque that can be reached for a short time (a few seconds), which is reached at the end of the linear full output range at $I_{pl} \cdot k_T$.
T_c	Continuous torque, uncooled	Nm	Motor rated torque at rated current I_c, at which the motor can be operated without cooling in a thermally stable manner, but gets heated thereby.
T_{cw}	Continuous torque, cooled	Nm	Motor torque at I_{cw}, which is available at rated operation with water cooling as the continuous torque and at which a temperature drop of about 100 K is obtained between the winding and the cooling system.

Symbol	Meaning	Unit	Explanation
T_s	Stall torque	Nm	Standstill torque at rest and at triggering frequency up to about 1 Hz, which appears at a respective standstill current value, due to the non-uniform current distribution in the individual motor phases.
P_l	Power loss	W	The heat that is generated in the motor winding, which depends on the operating method (current) and the ambient conditions (cooling) results in a time-dependent temperature increase. In the upper full power range (at T_p), P_l is particularly high because of the quadratic dependency on the current, whereas in the range of the rated current, only a relatively low heating occurs. P_l is calculated with the help of the motor constant k_m for a movement range with the required torque T: $P_l = (T/k_m)^2$
P_{lp}	Power loss	W	Peak power loss at I_p
P_{lpl}	Power loss	W	Peak power loss at I_{pl}
P_{lc}	Power loss	W	Power loss at I_c
P_{lw}	Power loss	W	Power loss at I_{cw}
ϑ	Winding temperature	°C	Permissible winding temperature that is acquired by means of sensors with a certain offset. The motor surface temperature that results depends on: • the specific installation conditions (dimension of the machine construction) • heat carrying conditions • method of operation and hence the average power inflow and can only be determined when this parameter is known.
R_{th}	Thermical resistance	K/W	Thermal resistance with which the temperature difference between winding - housing or the cooling base can be determined at a certain power loss.
τ_{el}	Electrical time constant	ms	Electrical time constant that describes the ratio L/R. The ratio is - independently of the winding design – approximately constant. The effect on the control circuit (closed loop) is less than the constant itself and depends on the degree of voltage overstepping.

Symbol	Meaning	Unit	Explanation
k_m	Motor constant	Nm/√W	Motor constant that expresses the relation between the generated torque and the power loss, i. e. the efficiency. It depends on the temperature, and can only be used in the static operation case, as well, as in the linear full output range of the motor, e.g. in case of positioning processes with low speeds. At 130 °C winding temperature, it gets reduced to about 0.85 times the value.
T_r	Ripple torque	Nm	Ripple torque as the sum of reluctance-dependent torques (cogging), which upon movement of the powerless motor, works in the direction of thrust and acts as the torque ripple in operation.

Thermal behavior

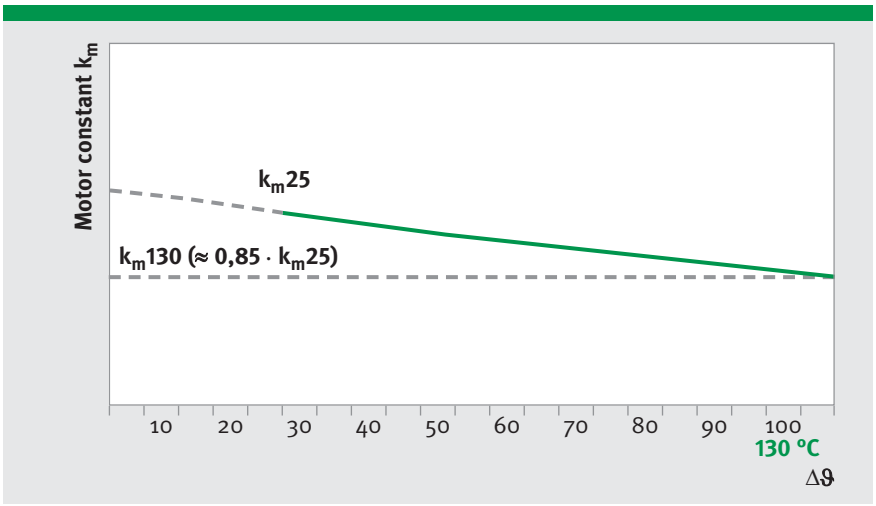

Diagram: k_m25 in relation to the temperature

- k_m is a motor constant that expresses the relation between the generated torque and the loss of power.
- It is temperature-dependent.

Because of a temperature increase, the winding resistance increases, which results in a drop in k_m.

At 130 °C, the motor constant gets reduced to about 0.85 times the value (see diagram).

At a constant current or torque, in the motor that is already warmed up, as compared to the motor that is still cold, an increased power loss is generated which results in an even higher motor temperature.

Glossary
Winding dependent parameters

Symbol	Meaning	Unit	Explanation
k_T	Torque constant	Nm/A_{rms}	Torque constant, which is in linear full power range multiplied by the current gives the resultant motor torque: $T_c = I_c \cdot k_T$
k_u	Back EMF constant	Vs/rad	Voltage constant that is obtained in generator operation, and when multiplied by the rotational speed gives the armature counter voltage resulting at the motor terminals: $U_{EMF} = k_u \cdot n$
n_{lp}	Limiting speed	rpm	Winding dependent limit speed without consideration of the dynamic heat losses when peak current I_p without field weakening is applied. After this point the motor torque decreases strongly (see diagram).
n_{lw}	Limiting speed	rpm	Winding dependent limit speed without consideration of the dynamic heat losses when water cooled continuous current I_{cw} without field weakening is applied. After this point the motor torque decreases strongly (see diagram).
n_{lc}	Limiting speed	rpm	Winding dependent limit speed without consideration of the dynamic heat losses when air cooled continuous current I_c without field weakening is applied. After this point the motor torque decreases strongly (see diagram).
n_{cr}	Limiting speed	rpm	Limit speed under consideration of additional frequency dependent heat losses (causes by eddy current and cyclic magnetization loss). A continuous, water cooled operation at limit speed n_{cr} is possible if the applied current is not exceeding approx. 45% of the water cooled current I_{cw}. Speed n_{cr} at water cooled current I_{cw} can be operated at a duty-cycle of approx. 20%. In order to reach a duty cycle of 100% at current I_{cw}, a speed reduction to 0.2 x n_{cr} is necessary. The torque (current) or the duty-cycle at speed ncr can be increased by use of a special winding variant (Z winding).
U_{DCL}	Direct current link voltage	V	Intermediate circuit voltage or supply voltage of the power control elements. The higher the speed and the concomitantly rising counter-voltage and frequency-dependent losses are the higher this voltage must be.
R_{25}	Electrical resistance	Ω	Winding resistance at 25 °C At 130 °C, this increases to about 1.4 times the value.

Symbol	Meaning	Unit	Explanation
I_u	Ultimate current	A_{rms}	Limiting current at which the magnetic circuit is strongly saturated. It is either determined by the maximum current density in the winding or through starting demagnetization danger at a magnet temperature of 80 °C (also see T_u).
I_p	Peak current	A_{rms}	Peak effective current that is in the range of iron saturation and is to be used as a dimensioning quantity (also see T_p). In case of an only moderately hot rotor (magnet temperature max. 60 °C) and pulse operation (max. 1 s), I_p can be increased up to the limiting value I_u.
I_{pl}	Peak current, linear range	A_{rms}	Effective peak current up to which a more or less proportional torque curve occurs.
I_c	Continuous current, uncooled	A_{rms}	Effective rated current, at which the relevant loss power, depending on the size of the screw-on base, without forced cooling, results in a relatively small heating up of the motor.
I_{cw}	Continuous current, cooled	A_{rms}	Effective rated current that is permissible in case of water cooling in continuous operation.
I_s	Stall current, uncooled	A_{rms}	Effective standstill current at rest and at control frequencies up to about 1 Hz. Due to the different current distribution in the motor phases, for preventing local overheating, the motor current has to be reduced to this value, if no noticeable movement takes place beyond a pole pair.

At a Glance: IDAM Brochures

You are interested in more detailed technical information?

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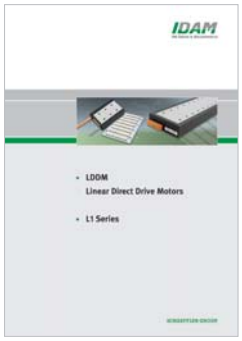
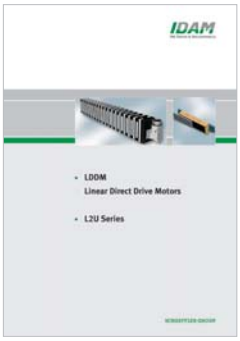


LDDM

Linear motors: L1



LDDM

Linear motors: L2U

LDDM

Linear motors: FSM

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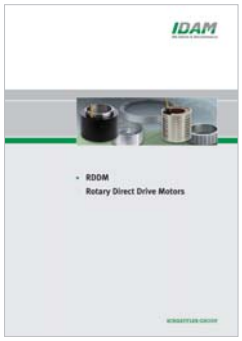
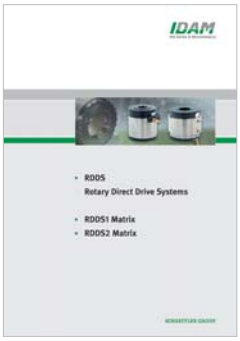
Linear motors: ULIM



RDDM

Rotary direct drive motors



RDDS

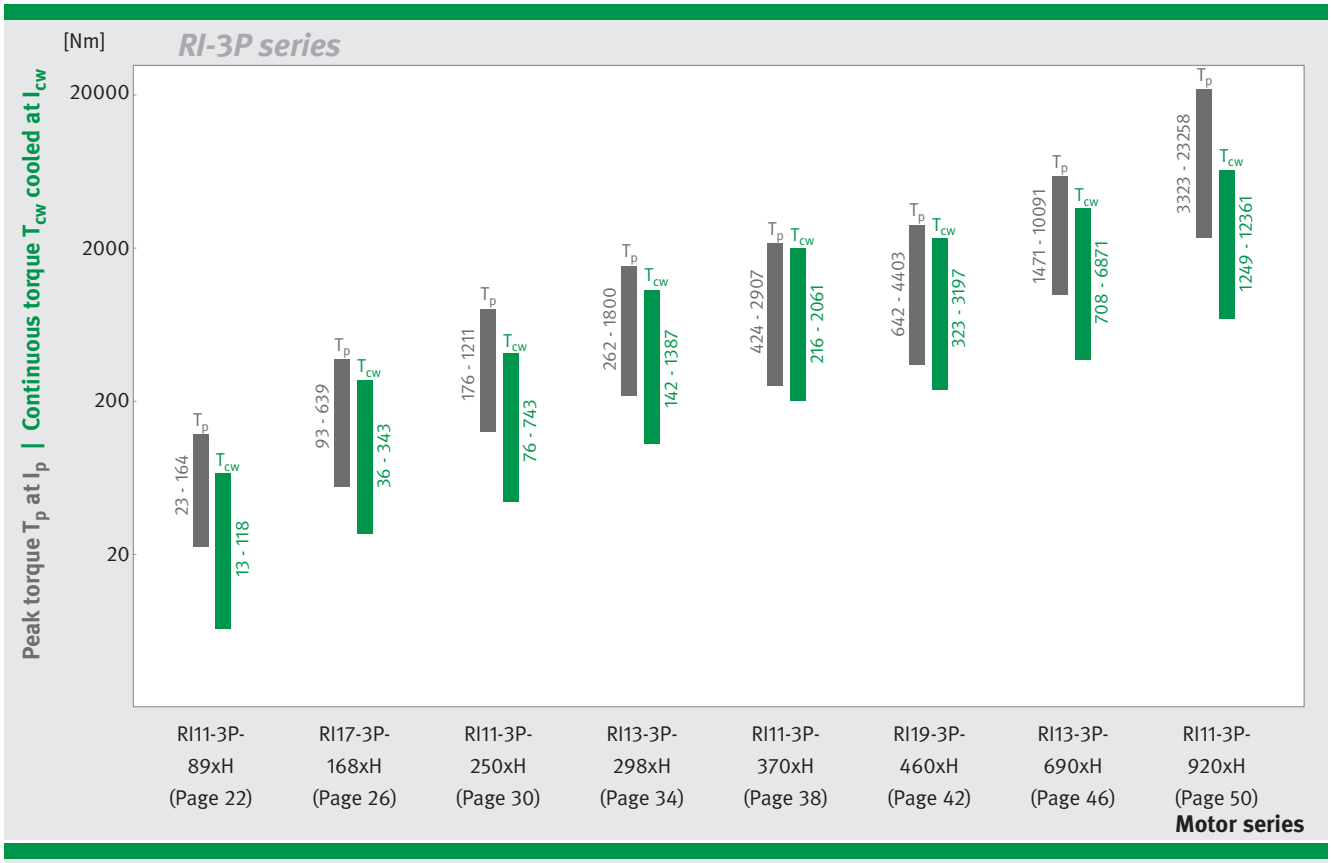
Rotary direct drive systems

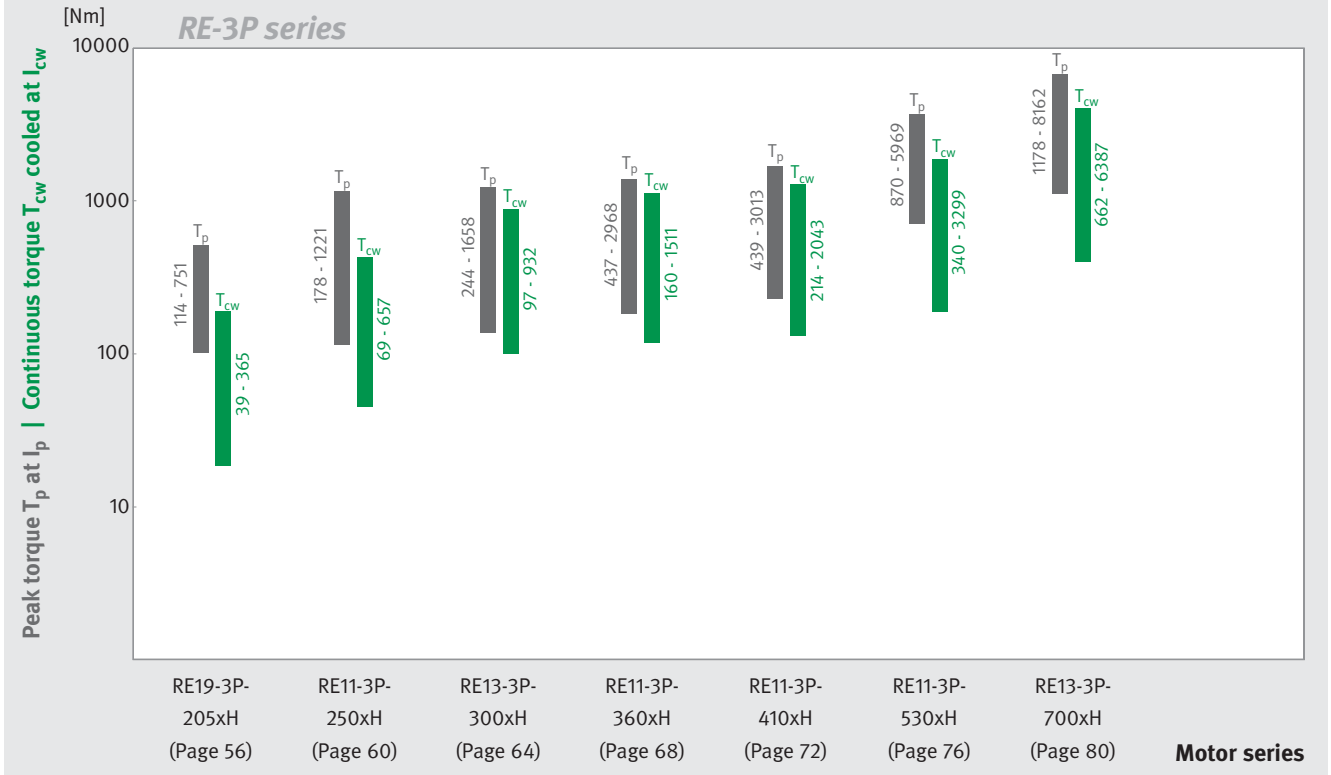
Planar reluctance motors

Image brochure: „Direct Drive Technology“

All information about our motors and systems you can download on IDAM website: www.ina-dam.de

At a Glance: Torque Ranges of the RI/RE Motors



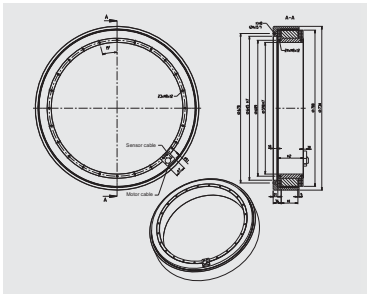


At a glance: Torque Ranges, RI/RE Motors

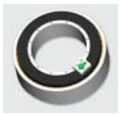
To help you select the most suitable rotary motor for your application, an overview of the torques of RI and RE motors is provided in the following.

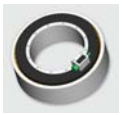
Please fold out this page to see the overview.

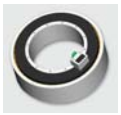
Motor Specifications: Series RE13-3P-700xH
Drawing



Note: The number of threads is doubled from the height of 100 mm up to 175 mm.


Standard: cable terminal axial


Option: cable terminal tangential

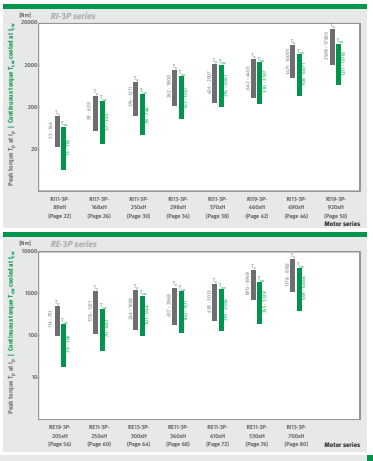

Option: cable terminal radial

Motor Specifications: Series RE13-3P-700xH
Independent of winding

Motor specifications	Symbol	Unit	RE13-3P-700x25	RE13-3P-700x50	RE13-3P-700x75	RE13-3P-700x100	RE13-3P-700x125	RE13-3P-700x150	RE13-3P-700x175
Number of pole pairs	P		65	65	65	65	65	65	65
Maximum operating voltage	U_{DCL}	V_{DC}	600	600	600	600	600	600	600
Ultimate torque at I_u	T_u	Nm	1616	3232	4848	6399	7999	9599	11199
Peak torque (saturation range) at I_p	T_p	Nm	1178	2356	3534	4664	5830	6996	8162
Peak torque (linear range) at I_{pl}	T_{pl}	Nm	898	1796	2693	3555	4444	5333	6221
Continuous torque (water cooled) at I_{cw}	T_{cw}	Nm	662	1563	2515	3453	4426	5405	6387
Continuous torque (not cooled) at I_c	T_c	Nm	340	778	1225	1643	2032	2386	2743
Stall torque (water cooled) at I_{cw}	T_{sw}	Nm	670	1109	1786	2451	3142	3837	4535
Stall torque (not cooled) at I_c	T_s	Nm	261	552	869	1167	1443	1694	1948
Ripple torque (cogging) at I = 0	T_r	Nm	3.5	7.1	10.6	14.0	17.5	21.0	24.5
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	4913	7049	9185	11321	13458	15594	17730
Power loss (copper) at T_{pl} (statical at 25 °C)	P_{lpl}	W	1999	2754	3588	4422	5257	6091	6926
Power loss (copper) at T_{cw} (statical at 100 °C)	P_{lw}	W	1356	2711	4067	5423	6778	8134	9490
Power loss (copper) at T_c (statical at 25 °C)	P_{lc}	W	275	537	742	945	1099	1220	1346
Thermical resistance (water cooled)	R_{th}	K/W	0.074	0.037	0.025	0.018	0.015	0.012	0.011
Motor constant (at 25 °C; valid up to I_{pl})	k_m	Nm/√W	20.49	34.22	44.96	53.46	61.29	68.33	74.76
Water flow (cooling)	dV/dt	l/min	3.87	7.75	11.62	15.49	19.37	15.49	18.08
Water temperature difference (cooling)	Δϑ	K	5.00	5.00	5.00	5.00	5.00	7.50	7.50
Mechanical interface	**Symbol**	**Unit**	**RE13-3P-700x25**	**RE13-3P-700x50**	**RE13-3P-700x75**	**RE13-3P-700x100**	**RE13-3P-700x125**	**RE13-3P-700x150**	**RE13-3P-700x175**
Height of rotor	H_1	mm	25.0	50.0	75.0	100.0	125.0	150.0	175.0
Height of stator	H_2	mm	65.0	90.0	115.0	140.0	165.0	190.0	215.0
Mass of rotor	m_1	kg	25.1	31.9	38.7	45.4	52.2	59.0	65.7
Mass of stator	m_2	kg	42.5	62.5	82.1	102.6	122.3	141.9	161.5
Inertia of rotor	J	kgm²	3.111	3.986	4.861	5.736	6.611	7.486	8.361

Subject to modification without previous notice. • Tolerance range for values: ±5% • Tolerance range for value "power loss": +10%
ISMA will provide additional specifications and drawings per customer request. ISMA recommends that all motor applications be reviewed by an ISMA specialist.

At a Glance: Torque Ranges of the RI/RE Motors



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