PREMIUM

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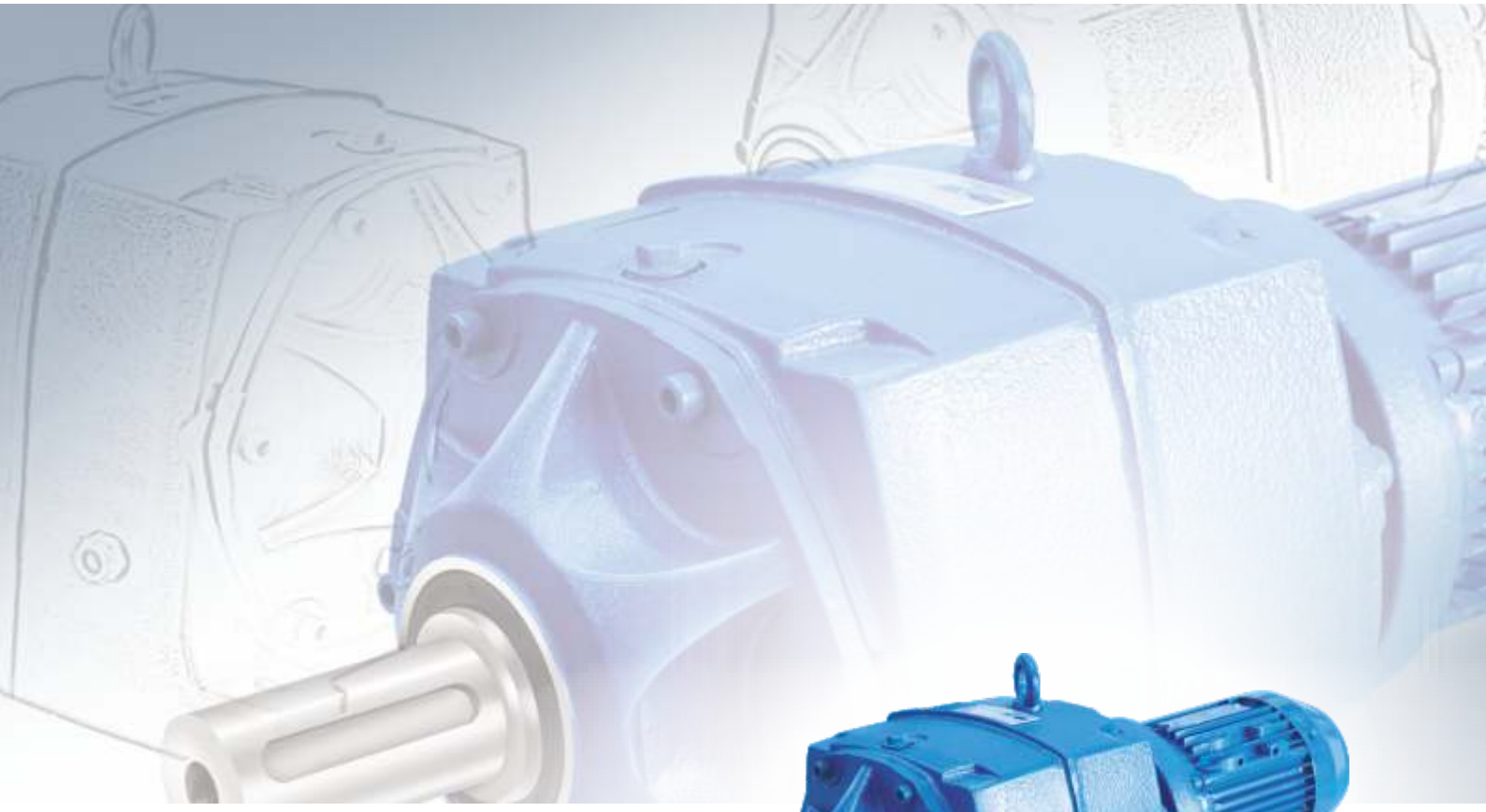
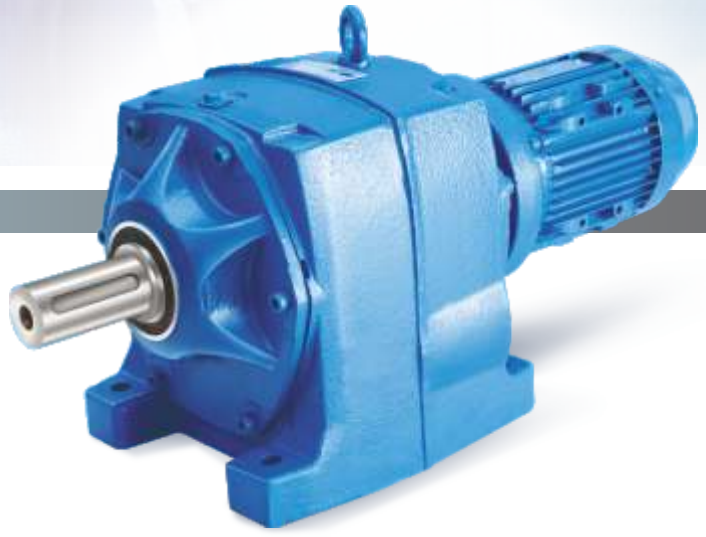




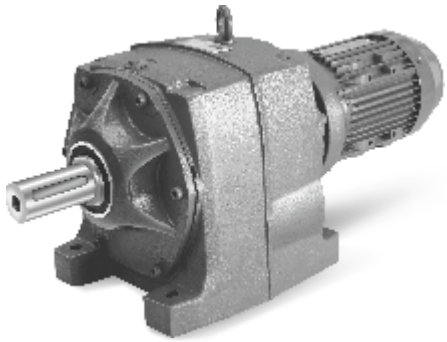
MI series

PREMIUM STEPHAN

GEARED MOTOR

PREMIUM STEPHAN

MI SERIES GEARED MOTORS



Contents

1. The Premium Group

Combined for better performance

Integrated solutions for mechanical drive technology are our strength. We have formed a group of top businesses which in cooperation with one other, offer economical solutions for your drive technology needs, everything from single products to integrated system solutions.

Your basis for success

High-quality products, application expertise and absolute dependability; your decision for the whole Spectrum of the Premium family is a decision for a strong and reliable partner.

The Premium Stephan Company

Premium Stephan, a member of the Premium group, has been developing and manufacturing a wide choice of gear units, geared motors and other products from the field of mechanical drive technology at the Hameln site for decades. Perfected design, computation and manufacturing technologies have contributed to Premium Stephan's outstanding reputation as a partner for individual drive solutions. Customer-oriented customised gear units or backlash-free precision gears for industrial robots are established components in our product assortment, along with the M4, C4 and E4 series. In our production area of 17,000 m², we manufacture according to the most modern, computer-assisted and especially "streamlined" management principles of the third century. Premium Stephan is an associated partner of the Premium group for mechanical drive technology. Along with planning, development and design, we offer our customers not only individual products, but customised solutions through worldwide distribution. Whether assemblies or closed systems, we have the correct solution for your application.

We possess outstanding references in the development, construction and manufacture of individual drive solutions. Through our worldwide distribution, we also offer package solutions for over-sized gear units and drive elements:

- Standard gear units
- Drive-Packages
- Complete solutions
- Customised gear units
- Low-backlash gear units

2. The M4 Product Family

Features	Strong	Advantages

The optimized gearing and shaft geometry compensates deflection under load. Application-hardened, hard-machined gear wheels correspond to high quality requirements.

Gear unit casings, covers, feet, flanges, and motor casings are heavily ribbed and securely connected to each other.

Carefully dimensioned shaft and roller bearings absorb high external loads. The components are dimensioned to withstand peak loads even under the most adverse operating conditions.

The Premium Stephan M4 transfers higher torques with a given shaft-center distance for a long, low-maintenance service life.

The ruggedly designed casing ensures maximum robustness under high load and failure-free operation.

High load-carrying capacities to absorb high external forces at the input and output shaft ensure a long bearing life of the Premium Stephan M4 geared motor.

Features	Silent	Advantages

Optimized gearing geometry and precise abrasive engineering practice create a smooth rolling of the tooth flanks involved in the engagement.

The inside of the casing was reinforced by ribs Similar to the star-shaped output cover.

Using high-precision machining of the motor flange, motor and gear unit were integrated into a harmonic unit.

The result is a nearly perfect tooth engagement, even load distribution across the complete face width, minimum vibrations and, therefore, a smooth, low-noise running.

Perfectly tied-in ribs dampen vibrations and ensure that vibrations are not passed on to the environment as noise.

The pinion mounted directly on the motor shaft engages in the gearing of the gear unit without angle error and does not create any disturbing noise.

Features	Standard	Advantages

Connection dimensions of shafts, feet, and flanges are identical with those of the market standard.

The Premium Stephan M4 program features a broad range of designs and numerous standard options. Additional information can be found in the overview of the product program.

The Premium Stephan M4 series corresponds to the market standard; based on the outstanding performance Specificityons, it is predestined to replace existing drives.

The most economical design for the respective application can be selected and is available worldwide.

Features	Smart	Advantages

The EasyFit System:

Pre-assembled gear units, motors and wheel sets are stocked in the Premium Stephan assembly centers throughout the world.

Short assembly time and high part interchangeability are granted at each assembly center side due to the unique EasyFit System.

Guaranteed High Quality.

Over millions of design variants can be quickly assembled through a corresponding combination of pre-assembly components which allows for worldwide availability.

Short delivery time.

2. The M4 Product Family

The Premium Stephan **M4** pre-assembly system offers the right components for every application.

The M4 series includes a complete range of coaxial helical geared motors, parallel shaft helical geared motors, and helical bevel geared motors.

The four **S**

Strong,
Silent,
Standard,
Smart

"**S**trong" because of the high rated torques that are above the market standard. They are the most powerful drives on the geared motor market.

"**S**ilent" because of the optimized gearing geometry and precision-finished face flanks that allow for an extremely smooth, low-noise running, and

"**S**tandard" because of market-oriented dimensions that facilitate the conversion to M4 and allow for a Simple assembly for a worldwide geared motor application.

"**S**mart" The unique EasyFit system allows in minutes to assembly a customize geared motor at dealers place (assembly house).

The modular M4 series was built using a minimum of components, thereby ensuring high reliability and Simple maintenance.

2.1 Use as prescribed

Gear units/geared motors are designed for the purpose of converting rotational Speed and torque. They are intended for use in industrial systems and may only be used as recommended in the Premium Stephan technical documentation and in accordance with the Specifications on the nameplate.

3. Product Description

3.1 Quality through innovation and control

The products manufactured by Premium Stephan meet very high quality requirements. Constant control with strict compliance of initiated quality guidelines meets highest demands. State-of-the-art processing centers, contiguous measuring and test technology, and distinctive quality awareness in all employees are a guarantor for efficient and function-oriented products.

Flexible production flows, supported by the Premium Stephan modular system, guarantee high availability while considering individual demands.

The torsionally-rigid gear unit casings are made of high-quality cast iron and guarantee a vibration-free operation. The robust structure of the M4 geared motors is based on ribbed castings and optimum roller bearings to allow for absorbing even high external loads.

A high efficiency is reached through helical, hardened and precision-machined gear wheels. The motor output becomes effective at the output shaft without nearly any losses.
The gear units are tested in the experimental test field and tested for extreme requirements. With standard motor type of enclosure IP 55 and insulation class F, our electric motors are even safe to operate under extreme opera- ting conditions.

Constant innovation and always looking for better manufacturing processes allow for withstanding the growing requirements of the market.

3.2 General technical data

3.2.1 Motor output and output torque

The motor output and torque values listed in the selection tables refer to normal operating conditions and the standard type of construction or to comparable types of construction of the respective type of gear unit. The decisive factor is that the drive stage does not completely run in the oil bath.

3.2.2 Output Speeds

The output Speeds listed in the selection tables are guide values and can be calculated using the Specified motor Speed n1 (for rated operation) and the respectively valid exact gear ratio iex. However, the actual output Speed depends on the effective motor load and the local supply conditions and, therefore, may deviate slightly.

3.2.3 Service Factor

The Service Factor SF listed in the selection tables is calculated using the maximum permissible torque of the gear unit and the output torque permitted by the installed motor output. Service Factors are not standardized and, therefore, may differ dependent upon the manufacturer. For Premium Stephan M4 geared motors, a gear unit with an application factor of SF = 1 already offers an enduring dimensioning and, therefore, ensures highest reliability. In case of doubt, we would gladly provide you with more information in a personal consultation.

3.2.4 Weights

The weights Specified are guide values for further dimensioning. Due to the variation in gear ratios and different types of construction (oil quantity), the exact weights may deviate slightly.

3. Product Description

3.3 General construction design and dimensioning

3.3.1 The gear unit

Gear wheels	Carburized and hardened helical and ground or rotary-beveled Spur gears. Bevel gear wheels with helical gearing, lapped bearing surfaces
Castings	GG-20 cast iron as standard
Adaptors	GG-15 cast iron IEC adaptors
Bearings	Sufficiently dimensioned roller bearings so that input and output shaft can absorb Significant external loads
Shafts	Output shafts made of quenched and tempered steel
Lubrication	Splash lubrication with gear unit oil or grease for designs with oil-feed tubing, the lubrication is carried out via integrated pump. Roller bearing at the output shaft end is lubricated for life with grease.
Seals	Radial shaft seals, with dust lip at the output Side
Efficiency	The efficiency of a gear unit is primarily determined by Splash losses, bearing and gearing friction. On an average across all sizes, the efficiency measures approx. 99 % for standard (or Similar) types of construction for each gear stage.

3.3.2 The Motor

Design	Geared motors with integrated motor up to 45 kW (pinion directly on motor shaft). For universal motor assembly (drive end U), a standard IEC motor of B5 may be attached.
Casting	Aluminum alloy as standard up to size 132. A motor housing of cast iron is available as an option. Cast iron is standard starting with Size 160.
Bearing	Deep-groove ball bearing lubricated for life. Starting at Size 200 with equipment for re-greasing.
Type of enclosure	IP 55, higher types of enclosure available upon request. Number of poles: Preferably 4-pole motors (1,500 rpm), other number of poles and pole changing motors are possible.
Voltages	up to 3 kW: 230/400 V ± 10% 50 Hz, 265/460 V ± 10% 60 Hz from 4 kW to 22 kW: 400/690 V ± 10% 50 Hz, 460 V delta ± 10% 60 Hz. Other voltages upon request
Insulation	Insulation class F, utilized to B. Suitable for humidity up to 95%.
Cable entries	On principle, the cable entries of the motors are implemented with the corresponding metric threads. Screwed cable glands are not part of the scope of delivery.
Efficiency class	The standard motors are manufactured according to efficiency class IE 2 . Energy efficient motors to efficiency class IE 3 are available as an option.
Standards	The motors in the range of 0.12 to 22 kW, are according to the standards to CE, CSA and UL. Country Specific executions for USA and Canada are possible on request.

3. Product Description

3.3.3 The brake motor

Deign	Integrated, DC-excited Spring-applied disk brake. Connection via a rectifier installed in the terminal box.
Voltage	Connection: 230 or 400 VAC corresponding to 102 or 178 V DC at the brake coil.
Type of enclosure	IP 55 as standard.

3.3.4 Operating conditions

Please consult page 14, chapter 2.5 for hazardous locations according to ATEX.
The geared motors are suited for use at ambient temperatures from -10 °C to +40 °C and installation altitudes up to 1.000 m.a.s.l..
As delivered with oil filling (see above), ambient temperatures from 0 °C to 40 °C are permitted as standard.
In case of deviating ambient temperatures and in aggressive environments (acid vapors or Similar), the manufacturer must be consulted first.

3.3.5 Outputs, torques and Speeds

The outputs and torques listed in the tables refer to a condition at operating temperature with permissible ambient temperatures and standard lubricants. The Specified output Speeds are rounded values and refer to the rated Speed of the motor at delivered rated output.

3.3.6 Installation instructions

The geared motor must be installed free of vibrations. Power transmission elements such as belt pulleys or Similar should be arranged as close to the gear unit housing as possible. The cooling air intake of the motor must not be obstructed by unfavorable installation or contamination. The brake must be accessible for maintenance work.

3.3.7 Reference to applicable standards

The gear unit components, such as shafts, pinions, gear wheels, and bearings are dimensioned according to perti- nent EN, ISO or DIN standards.

3.3.8 Delivery instructions

Lubricant	Sizes 1 and 2: Filled with lubricant for life, ventilation not necessary.
Gear unit oil	Starting with size 3: Gear units for Germany, Switzerland, and Austria are delivered in filled condition (except for SCA, SCP), otherwise unfilled (internally preserved). Before commissioning, the drain plug must be replaced by the supplied vent plug.
Coating	RAL 5002 top coat as standard.
Terminal box	Bores are closed with plastic plugs. Screwed glands are not supplied.
Corrosion protection	Uncoated parts of the drives (e.g. output shafts) are corrosion-protected.
Lifting Lugs	Starting with gear unit Size 3 and motor Size 112.

3.4 Notes about the operation in hazardous atmosphere (ATEX)

Attention! You cannot select gearboxes and geared motors for application in hazardous locations (ATEX) from this catalogue. Please advise requirements to your nearest Premium Stephan branch. In the framework of harmonizing European laws, the EC Directive 94/9/EG, generally known as ATEX 100a, has been in force since July 2003. Premium Stephan gear units and geared motors implemented as parallel shaft gear units, helical and bevel gear units in ATEX design meet all the requirements of EC Directive 94/9/EG for device category 2 and 3. The drives can be delivered for use in gaseous as well as dust atmosphere.

3. Product Description

3.4.1 Zonal classification

According to Directive 99/92 EG (ATEX 137), the system operator together with the controlling authority determines which zone must be taken into account. The zone definition is carried out according to different criteria, such as operating condition of the system, the period in which an explosive atmosphere may occur, and whether an air- dust or an air-gas mixture occurs.

Probability of occurrence	Air-gas mixture (G) zone	Air-dust mixture (D) zone
Continuous and long-term	0	20
Occasionally during normal operation	1	21
Rarely, without importance during normal operation	2	22

3.4.2 Device safety classified into categories

Electrical and mechanical equipment are classified into three categories according to the safety requirements. Assigning the devices to the categories is determined by the manufacturer based on a detailed danger analysis. The connection between the zones and the device category is Specified in Directive 94/9/EG.

Premium Stephan gear units meet all requirements of category 2 and 3. The design, dimensioning and classification- on into the corresponding category was performed in close collaboration with TÜV NORD CERT. Devices of category 1 are not supplied by Premium Stephan. Devices of category 2 meet all requirements of category 3 and may also be used here.

Category	Type of defect	Prerequisite/use
1 (no drives from Premium Stephan)	Safety in normal operation and also for rare faults (two errors occurring Simultaneously must be handled)	Devices of this category: • 1 G in zone 0, 1 and 2 for gas • 1 D in zone 20, 21 and 22 for dust
2	Safety in normal operation and in case of an expected fault	Devices of this category: • 2 G in zone 1 and 2 for gas • 2 D in zone 21 and 22 for dust
3	Safety in normal operation	Devices of this category: 3G in zone 2 for Gas 3D in zone 22 for dust

Premium Stephan gear units to Directive 94/9/EG for use in air-gas and air-dust mixture.
Premium Stephan has several decades of experience in the design, manufacture and use of drives in hazardous areas. With the introduction of Directive 94/9/EG, the standard series EN 13463 was issued as the basis for explosion protection for mechanical devices.

Premium Stephan M4 gear units in the designs MI, MP and MK meet all requirements of category 2. Requirements for dust protection and gas protection were taken into account for the approval. For this reason, no distinctions are made with respect to categories 2 and 3. Our gear units of category 2 also meet all requirements of category 3.

3.4.3 Type of protection for gear units

Protection through structural safety
EN 13463-5 (identifier "c")
For this type of explosion protection, the protection is ensured through design and construction measures at the devices as well as the experience of the manufacturer.

3. Product Description

Protection through liquid enclosure
EN 13463-8 (identifier "k")
Potential ignition sources inside the gear unit are rendered ineffective through complete or partial immersion in a protective liquid (gear unit oil) or through constant wetting with a liquid film, the protective liquid can be exclusively intended for preventing a potential ignition source to become effective. In devices such as gear units, it also serves the purpose of lubricating and cooling moving parts.

Premium Stephan gear units for category 2G and 2D
Gear units of category 2G can be used in zone 1 and 2 for gases and gear units of category 2D can be used in zone 21 and 22 for dust. For category 2, Premium Stephan issues a certificate of conformity and certifies the following:

- The compliance of the products with standard EN 13463 with the relevant sections.
- The internal manufacturing control according to Directive 94/9/EG Appendix VIII
- Filing the product documentation with the notified body, TÜV NORD CERT

Premium Stephan gear units for category 3G and 3D
Gear units of category 3 can be used in zone 2 for gases and zone 22 for dust. A separate certification for category 3 is not issued Since all devices for category 2 also meet the requirements of category 3.

Premium Stephan geared motors conforming to Directive 94/9/EG
The experiences collected over decade-long use in hazardous atmosphere also entered into the dimensioning and design according to the new ATEX directives. The following components were taken into account based on this experience:

- Shrink-fit ring covers according to the standard
- All bolts are secured against automatic loosening and protected against rust
- Stainless steel nameplates
- Proven shaft seals at input and output shaft
- High-quality lubricants
- Oil-level control for all Sizes

3.4.4 Type of protection for motors

Motors to Directive 94/9/EG for use with gas
The ATEX motors used by Premium Stephan are manufactured by a well-known German manufacturer. The EN 50014 standard is the basis for the approval. Supplementary standards Specify the measures of how an ignition is pre- vented.

Flameproof enclosure to EN 50018, type of protection "d"
Motors of this type of enclosure can be used for mains operation and inverter operation in zone 1. Motors with flame-proof enclosure can only be combined with the Premium Stephan gear unit in lantern version.

Increased safety to EN 50019, type of protection "e"
The basis of this type of enclosure is avoiding high temperatures at the surface and in the inside during normal operation and in case of a fault, such as a blocked rotor with applied supply voltage. Motors to EN 50019 can be used in zone 1 with mains operation.

Protection through non-sparking equipment to EN 50021, type of protection "n"
The motor design ensures that no gases are ignited during normal operation. A malfunction is not taken into account. Motors to "n" can be used in zone 2 with mains operation.

Motors to Directive 94/9/EG for use with dust
The EN 50281-1 standard serves as the basis for the approval of motors in an explosive dust-gas atmosphere. The decisive factor consists of meeting certain criteria against the intrusion of foreign particles in accordance with EN 60259 IP types of enclosure. Motors of category 3 require at least type of enclosure IP54 and category 2 type of enclosure IP6x.

Dust-proof motors to EN50281-1-1, type of enclosure IP65
Deign measures prevent any dust from entering into the inside of the motor. The surface temperature under normal operating conditions does not cause an ignition of dust deposits. A protection in case of faults is ensured through temperature monitoring. These motors correspond to category 2D and can be used in zone 21 and 22 with mains operation.

Dust-protected motors to EN50281-1-1, type of enclosure IP55
In this case, dust cannot enter the motor in dangerous quantities. Only the surface temperature represents an ignition risk and, for this reason, must be protected with temperature sensors. These motors are certified to category 3D and can be used for mains operation in zone 22. For inverter operation, Premium Stephan can perform a corresponding acceptance with the selected inverter.

4. Instructions for Drive Selection

4.1 Service factors / Applications / Operating conditions

4.1.1 Required Service Factor (SFmin)

Determine the required application factor according to the following formula:

$$SF_{min} = F \times C$$

Whereby the following applies:

F = application factor dependent upon the load characteristic values of the application and the operating time.

The values listed below can be used as guide values for applications that are not listed.
Both criteria - the "Load characteristics related to the application" as well as the "inertia factor M" - must be taken into account.
The criterion resulting in the highest F-value is decisive.

Load characteristics of the application	M	F		
		8h/24h	16h/24h	24h/24h
Uniform loads	<0,2	0.8 - 1*	1	1.2
Moderate shock load	<3	1.1	1.25	1.5
Heavy shock load	<10	1.4	1.6	1.7

M = Inertia factor

$$M = \frac{\text{Moment of inertia ofdriven machine releted to motor shaft}}{\text{Mass moments of inertia of the motor (+ brake)}}$$

C = correction factor dependent upon the number of start-ups per hour.

		C		
		8h/24h	16h/24h	24h/24h
	<10	1	1	1
Start-ups / hour	<100	1.1	1.1	1.15
	<500	1.1	1.15	1.25

4.1.2 Selecting the frame Size

A geared motor must be selected for the required motor output (Pm) and the output Speed (n2) who's Service Factor (SF) is greater than or equal to the required Service Factor (SFmin). The selection can also be made based on the available output torque (T2m) of the geared motor.

4. Instructions for Drive Selection

4.1.3 Required application factors for different applications

APPLICATION	Runtime hours/day		
	8h/24h	**16h/24h**	**24h/24h**
Construction and building materials machinery			
Mixer	1.25	1.5	1.75
Cement mills	1.5	1.75	2
Mortar guns	0.8 -1*	1	1.25
Breweries, distilleries			
Mills	0.8 - 1*	1	1.25
Bottling machinery	0.8 - 1*	1	1.25
Elevators			
Bucket elevators	1	1.25	1.5
Load elevators	1	1.25	1.5
Escalators	0.8 - 1*	1	1.25
Filters	1	1.25	1.5
Generators	0.8 - 1*	1	1.25
Wood and plastics processing			
Main drive for saws	1.5	1.75	2
Feed drives for saws	1	1.25	1.5
Crushers	1.5	1.75	2
Machines for gluing, veneering	0.8 - 1*	1	1.25
Drills	0.8 - 1*	1	1.25
Extruders	1.25	1.5	1.75
Machine tools			
Roller straightening, punching device, bending machines	1.25	1.5	1.75
Main and feed drives	1	1.25	1.5
Supply and servo drives	0.8 - 1*	1	1.25
Presses	1.75	2	2
Edging machines	1.5	1.75	2
Plate shears	1.75	2	2
Cranes and hoisting machines			
Hoisting gears, traveling drives	**	**	**
Packaging machines			
Packing machines	1.25	1.5	1.75
Wrapping machines	0.8 - 1*	1	1.25
Compressors			
Centrifugal compressors	1	1.25	1.5
Rotating screw compressors	1	1.25	1.5
Mixers			
Constant density	0.8 - 1*	1	1.25
Variable density	1	1.25	1.5
Iron and steel industry			
Wire-drawing benches	1.25	1.5	1.75
Winding drums	1	1.25	1.5
Roller-table drives	**	**	**

* = 0.8 if operating time < 3h/24h and no external loads occur
** = drives must be dimensioned by the manufacturer
\+ = it is recommended consulting the manufacturer for selecting the reverse lock

4. Instructions for Drive Selection

APPLICATION	Runtime hours/day		
	8h/24h	**16h/24h**	**24h/24h**
Iron and steel industry			
Non-reversible rolling mills - multi-operation	1.25	1.5	1.75
- single operation	1.5	1.75	2
Mills			
Ball mills, rod mills	1.75	1.75	1.75
Hammer mills, centrifugal mills	1.5	1.75	2
Winding drives			
Pumps			
Rotary pumps	1	1.25	1.5
Circulation, gear, vane pumps	0.8 - 1*	1	1.25
Piston pumps: 1 cylinder	**	**	**
2 cylinders or more	1	1.25	1.5
Screw pumps	1 +	1.25 +	1.5
Agitators			
Pure liquid (constant density)	0.8 - 1*	1	1.25
Liquid with variable density	1	1.25	1.5
Liquid mixed with solid bodies	1.25	1.5	1.75
Conveyor systems			
Even load	0.8 - 1*	1	1.25
Heavy operation, chain, screw conveyor	1	1.25	1.5
Shaker conveyor	1.5	1.75	2
Fans			
Radial	0.8 - 1*	1	1.25
Industrial fans	1	1.25	1.5
Fan drives in cooling towers	2	2	2
Food-processing industry			
Crusher	1.75	2	2.25
Root cutting, kneading machines	1.25	1.5	1.75
Meat grinders	1.25	1.5	1.5
Filling machines	0.8 - 1*	1	1.5
Dough kneading machine	1	1.25	1.5
Extruders	1.25	1.5	1.75
Sugar-cane cutter	1.75	1.75	1.75
Toaster	1.25	1.25	1.25
Waste water facilities			
Surface aerator	1.5	1.5	1.5
Revolving systems	1.75	1.75	1.75
Rakes and channels	0.8 - 1*	1	1.25
Screw pumps	1	1.25	1.5
Screens			
Revolving screens (stones, grit)	1	1.25	1.5
Screens with water circulation	0.8 - 1*	1	1.25
Servo drives for systems			
Service operation	0.8 - 1*	-	-
Setting-up mode, operation without load	1.25	1.25	1.25
Normal operation	Same as main drive		

* = 0.8 if operating time < 3h/24h and no external loads occur
** = drives must be dimensioned by the manufacturer
\+ = it is recommended consulting the manufacturer for selecting the reverse lock

4. Instructions for Drive Selection

APPLICATION		Runtime hours/day	
	8h/24h	**16h/24h**	**24h/24h**
Agricultural machines			
Mechanical gutter cleaners	0.8 - 1*	1	*
Harvesting machines	0.8 - 1*	1	*
Textile machinery			
Looms	1.25	1.5	1.75
Spinning machines	0.8 - 1*	1	1.25
Laundry machines	1	1.25	1.5
Print and paper technology			
Sheeting cutter	1	1.25	1.5
Winding drives	0.8 - 1*	1	1.25
Bale feeder	1	1.25	1.25

* = 0.8 if operating time < 3h/24h and no external loads occur
** = drives must be dimensioned by the manufacturer
\+ = it is recommended consulting the manufacturer for selecting the reverse lock

These Service factors (SF) are empirical values that are based on AGMA and ISO information and experience. They apply to driven machines corresponding to today's state of the art for normal opera- ting conditions and for actuating with electric motors. A consultation is required for Special applications, passenger elevators or Special operating conditions, e.g. high mass acceleration factors.

4.5 External loads, axial / radial, conversion, connections

The permissible radial loads listed in the selection tables are guide values and used only for rough orientation purposes. The data refer to action of load in the middle of the respective solid shaft. If no radial load is present, half the value of the radial load Specified in the selection tables is permitted as axial load. The resulting maximum value of a radial load for each gear unit Size generally occurs at low Speeds and is determined by the material and geometry of the shaft. For all lower values of the frame Size, the predetermined bearing life LH10 of the output shaft bearing is limiting. Since variables such as torque, Speed, direction of rotation and load angle of action enter into the calculation and Premium Stephan always assumes the worst-case scenario, Significantly higher external loads are permissible in most cases while giving the effective loads. Please contact us and we will gladly recalculate your Specific case.

4.6 Thermal break even performance

Torque and output stated in the selection charts are mechanical limit values. Depending on mounting position and mounting Situation it is possible that the gearbox will overload thermal before reaching the mechanical breakeven performance. Outputs marked (1) are exceeding the thermal break even performance already under normal application conditions.
If the real operation conditions are known, the heat breakeven performance can be recalculated by Premium Stephan. The heat breakeven performance can be increased by using appropriate measures (such as using synthetic lubricants with increased thermal consistency). The following data is necessary for recalculation:

Type or gearbox .....
Mounting position .....
Input Speed (range) 1/min
Ratio .....
Used output .....kW
Duty / power-on time .....
Ambient Temperature .....°C

Installation Site .....
O in a small, closed room
O large rooms
O outside
Mounting Situation (Sketch/drawing)
.....

4. Instructions for Drive Selection

Increased Splash losses may occur for mounting positions with high oil level.(MI all V-mountings, MP mounting pos. 2, 5 and 6, MK mounting pos. 2 and 4) or input Speed above 1800 1/min and may lead to excessive heating. Please contact Premium Stephan in these individual cases.

4.7 Notes about the dimensional drawings

The dimensional drawings featured in this catalog are nonbinding. In particular, slightly deviating dimensions may occur for motor dimensions dependent upon the technical requirements. Binding dimensional drawings can be created upon request.

Note:
The user is responsible for providing protective covers and professional setup of the complete equipment.

The flanges on the output Side are manufactured according to DIN 42955-N, whereby the tolerances of the center- ring gears correspond to DIN 42948.
Keyways of the output shafts are manufactured according to DIN 6885-T1-"Form A".

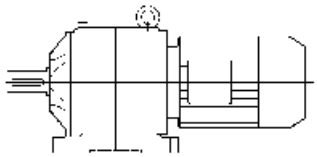
Detailed dimensions of the shafts and recommendations for the designs of the machine shafts can be found in the technical appendix of this catalog.

4.8 Delivery times

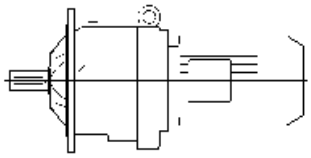
Manufacturing and stocking of M4 components are constantly adapted to customer demands. Modern control methods are used in the process. Delivery time for standard design is max. 3 weeks. If necessary we can also achieve 24h deli- very service. We can also achieve short delivery times for all remaining geared motors. Please contact us and we will gladly assist you.

5. MI4 Inline

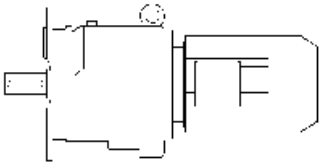
5.1.1 Version variants for MI4 helical geared motors



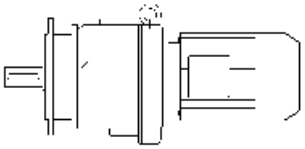
MIBS - Foot mounting



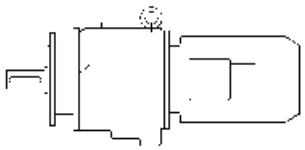
MIVS - Flange : large diameter with bearing neck



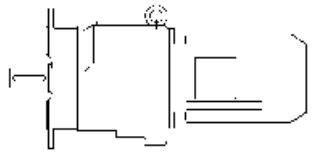
MIVA - Flange : large diameter



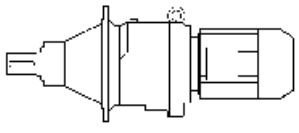
MIVA - Flange : medium diameter



MIVA - Flange : small diameter



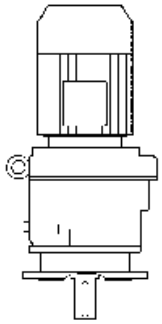
MIVA - Flange : reinforced version



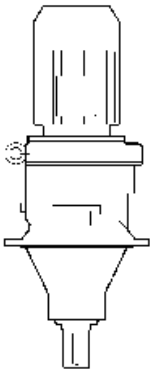
MIVA - Flange agitator version

5. MI4 Inline

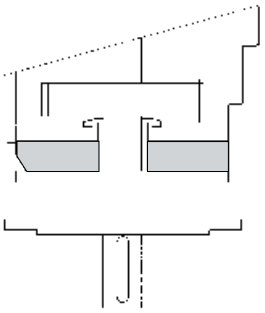
5.1.1 Version variants for MI4 helical geared motors



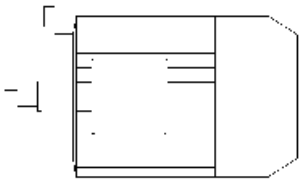
MIVA
Flange : reinforced version
Version with dry well integrated pump



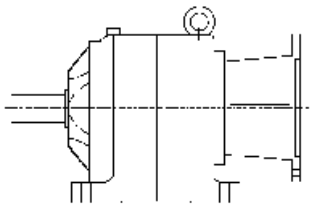
MIVA
Flange : agitator version
Version with tubing and integrated pump



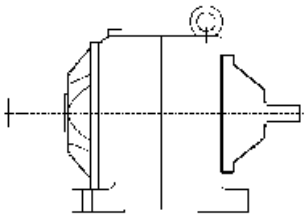
The dry well system



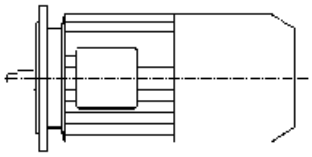
Integral motor



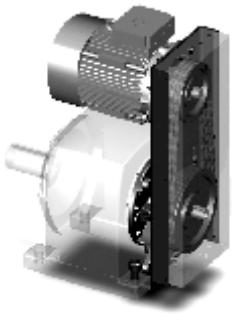
A to L
Adaptors for IEC standard motors



M
Gear unit with free input shaft



Integrated brake motor



N
Motor base version for V-belt drive
motor mounposition IM B5
(schematic drawing)

Overview

	4 Sizes			
	1	2	3	4
T2m (Nm)	200	420	820	1600
Pm (kW)	0.12 to 22 kW			
i	2.8 ... 63  2		17.9 ... 190  3	

5. MI4 Inline

5.2 Ordering information

Gear units with two and three stages

M	I	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

3	**Casing** B Foot Version V Flange Version
4	**Number of Stages** 2 2-stage 3 3-stage
5-6	**Size** 1-2-3-4
7	**Adaptor Size** A 140 - 11 B 160 - 14 C 200 - 19 D 200 - 24 E 250 - 28 F 300 - 38 G 350 - 42 H 350 - 48 I 400 - 55 J 450 - 60 K 500 - 65 L 550 - 75 M SISO
8-11	**Motor Frame Size** 0000 - No Motor
12	**Number of Motor Poles** 0 - No Motor T - Two Pole F - Four Pole S - Six Pole E - Eight Pole
13-17	**Total Gear Ratio**
18	**Supply Condition** S - Standard A - Additional Accessories e.g. Torque arm, hold back, Special motor etc.

Example

M	I	B	3	0	1	A	0	6	3	S	F	1	9	0	2	0	S

MI foot version, Three stage, Size 1, Adaptor 140-11 Motor frame size 063S, Four pole motor,
Total gear ratio I = 190.20, Standard Supply Condition.

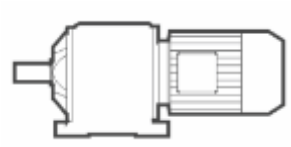
M	I	V	2	0	3	D	0	9	0	S	F	0	3	6	6	5	S

MI flange version, Two stage, Size 3, Adaptor 200-24 Motor frame size 090S, Four pole motor,
Total gear ratio I = 36.65, Standard Supply Condition.

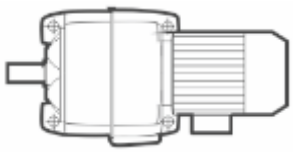
5. MI4 Inline

5.3 Mounting positions

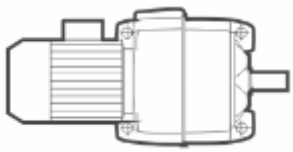
B3



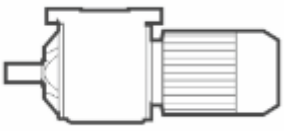
B6



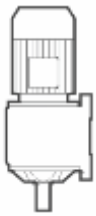
B7



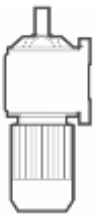
B8



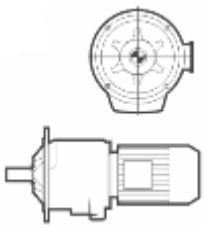
V5



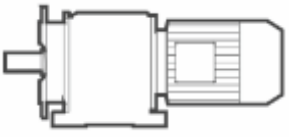
V6



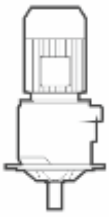
B5



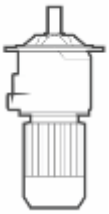
B35



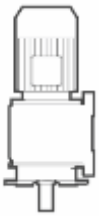
V1



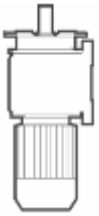
V3 *



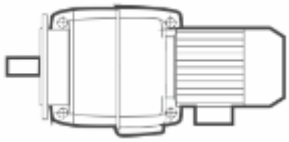
V15



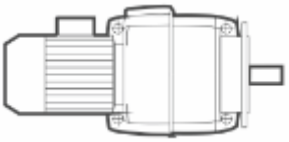
V36



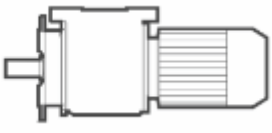
B65



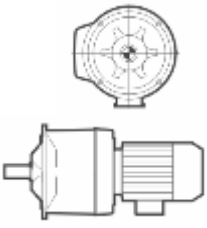
B75



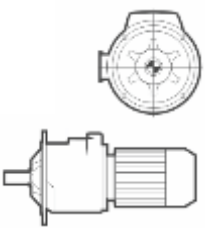
B85



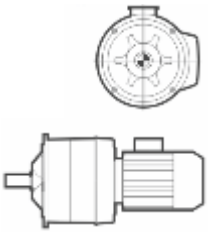
B5 I



B II



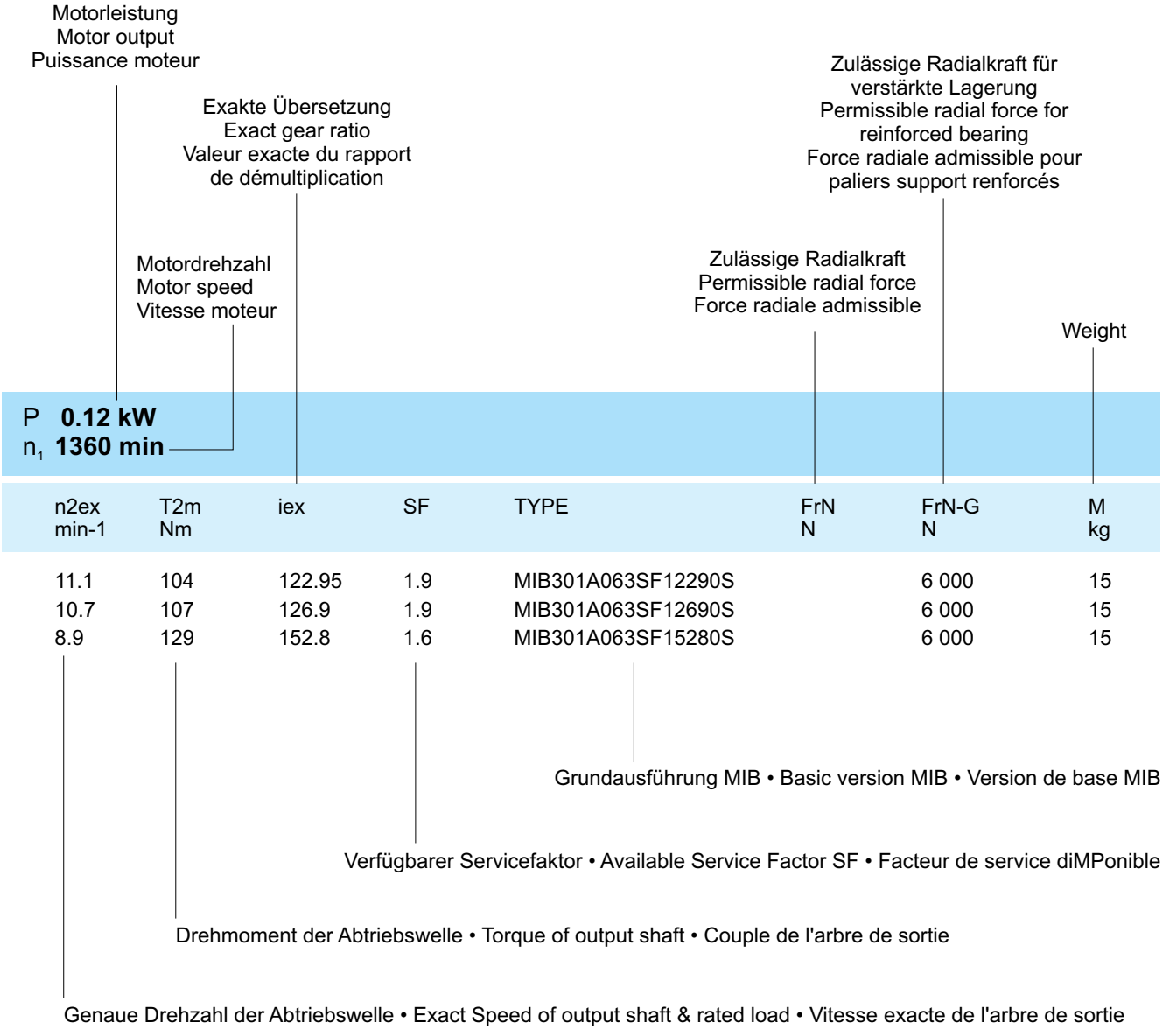
B III



5. MI4 Inline

5.4 Auswahltabellen Getriebemotoren MI4
Selection tables for MI4 geared motors
Tableaux de sélection pour les motoréducteurs MI4

Beispiel : Auswahltabelle Getriebemotoren
Example : Geared Motor selection table
Exemple de tableau de sélection pour motoréducteurs



P 0.12 kW n_1 **1360 min^{-1}**

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
485.6	2	2.8	42	MIB201A063SF00280S		3900	15
423.6	3	3.21	39	MIB201A063SF00321S		4100	15
395.3	3	3.44	38	MIB201A063SF00344S		4200	15
343.5	3	3.96	34	MIB201A063SF00396S		4400	15
297.1	4	4.58	31	MIB201A063SF00458S		4600	15
275.7	4	4.93	30	MIB201A063SF00493S		4800	15
237.8	5	5.72	27	MIB201A063SF00572S		5000	15
207.4	6	6.56	25	MIB201A063SF00656S		5200	15
193.5	6	7.03	24	MIB201A063SF00703S		5400	15
168.2	7	8.09	22	MIB201A063SF00809S		5600	15
145.5	8	9.35	20	MIB201A063SF00935S		5900	15
135	8	10.08	20	MIB201A063SF01008S		6000	15
125	9	10.88	20	MIB201A063SF01088S		6000	15
106.5	11	12.76	17	MIB201A063SF01276S		6000	15
97.9	12	13.89	15	MIB201A063SF01389S		6000	15
81.9	14	16.61	13	MIB201A063SF01661S		6000	15
74.4	15	18.28	12	MIB201A063SF01828S		6000	15
68.9	17	19.75	10	MIB301A063SF01975S		6000	15
67.2	17	20.24	11	MIB201A063SF02024S		6000	15
60.3	19	22.55	9.5	MIB201A063SF02255S		6000	15
64.3	18	21.17	10	MIB301A063SF02117S		6000	15
53.7	21	25.32	8.4	MIB201A063SF02532S		6000	15
55.8	21	24.36	9.3	MIB301A063SF02436S		6000	15
48.3	24	28.18	7.6	MIB201A063SF02818S		6000	15
48.3	24	28.16	8	MIB301A063SF02816S		6000	15
43.2	27	31.52	6.8	MIB201A063SF03152S		6000	15
44.8	26	30.35	7.8	MIB301A063SF03035S		6000	15
37.1	31	36.64	5.8	MIB201A063SF03664S		6000	15
41.5	28	32.76	7.2	MIB301A063SF03276S		6000	15
33.3	34	40.82	5.2	MIB201A063SF04082S		6000	15
35.4	32	38.45	6.2	MIB301A063SF03845S		6000	15
32.3	35	42.13	5.1	MIB201A063SF04213S		6000	15
32.5	35	41.82	5.7	MIB301A063SF04182S		6000	15
26.8	43	50.73	4.2	MIB201A063SF05073S		6000	15
27.2	42	50.02	4.7	MIB301A063SF05002S		6000	15
24.1	47	56.32	3.8	MIB201A063SF05632S		6000	15
24.7	46	55.07	4.3	MIB301A063SF05507S		6000	15
21.5	53	63.15	3.4	MIB201A063SF06315S		6000	15
22.3	51	60.95	3.9	MIB301A063SF06095S		6000	15
20	57	67.91	3.5	MIB301A063SF06791S		6000	15
17.8	64	76.26	3.1	MIB301A063SF07626S		6000	15
16	72	84.89	2.8	MIB301A063SF08489S		6000	15
14.3	80	94.93	2.5	MIB301A063SF09493S		6000	15
12.3	93	110.35	2.2	MIB301A063SF11035S		6000	15

P 0.12 kW n_1 1360 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
11.1	104	122.95	1.9	MIB301A063SF12295S		6000	15
10.7	107	126.9	1.9	MIB301A063SF12690S		6000	15
8.9	129	152.8	1.6	MIB301A063SF15280S		6000	15
8	143	169.63	1.4	MIB301A063SF16963S		6000	15
7.1	160	190.21	1.2	MIB301A063SF19021S		6000	15

P 0.18 kW n_1 1370 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
489.2	4	2.8	28	MIB201A063LF00280S		3900	15
426.7	4	3.21	26	MIB201A063LF00321S		4100	15
398.3	4	3.44	25	MIB201A063LF00344S		4200	15
346	5	3.96	23	MIB201A063LF00396S		4400	15
299.3	6	4.58	21	MIB201A063LF00458S		4600	15
277.8	6	4.93	20	MIB201A063LF00493S		4700	15
239.5	7	5.72	18	MIB201A063LF00572S		5000	15
208.9	8	6.56	17	MIB201A063LF00656S		5200	15
195	9	7.03	16	MIB201A063LF00703S		5300	15
169.4	10	8.09	15	MIB201A063LF00809S		5600	15
146.5	12	9.35	14	MIB201A063LF00935S		5800	15
136	13	10.08	13	MIB201A063LF01008S		6000	15
126	14	10.88	13	MIB201A063LF01088S		6000	15
107.3	16	12.76	11	MIB201A063LF01276S		6000	15
98.7	17	13.89	10	MIB201A063LF01389S		6000	15
82.5	21	16.61	8.6	MIB201A063LF01661S		6000	15
74.9	23	18.28	7.8	MIB201A063LF01828S		6000	15
69.4	25	19.75	6.9	MIB301A063LF01975S		6000	15
67.7	25	20.24	7.1	MIB201A063LF02024S		6000	15
60.8	28	22.55	6.4	MIB201A063LF02255S		6000	15
64.7	27	21.17	6.8	MIB301A063LF02117S		6000	15
54.1	32	25.32	5.7	MIB201A063LF02532S		6000	15
56.2	31	24.36	6.2	MIB301A063LF02436S		6000	15
48.6	35	28.18	5.1	MIB201A063LF02818S		6000	15
48.6	35	28.16	5.4	MIB301A063LF02816S		6000	15
43.5	40	31.52	4.6	MIB201A063LF03152S		6000	15
45.1	38	30.35	5.3	MIB301A063LF03035S		6000	15
37.4	46	36.64	3.9	MIB201A063LF03664S		6000	15
41.8	41	32.76	4.9	MIB301A063LF03276S		6000	15
33.6	51	40.82	3.5	MIB201A063LF04082S		6000	15
35.6	48	38.45	4.1	MIB301A063LF03845S		6000	15
32.5	53	42.13	3.4	MIB201A063LF04213S		6000	15
32.8	52	41.82	3.8	MIB301A063LF04182S		6000	15
27	64	50.73	2.8	MIB201A063LF05073S		6000	15
27.4	63	50.02	3.2	MIB301A063LF05002S		6000	15

P 0.18 kW n_1 1370 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
24.3	71	56.32	2.5	MIB201A063LF05632S		6000	15
24.9	69	55.07	2.9	MIB301A063LF05507S		6000	15
21.7	79	63.15	2.3	MIB201A063LF06315S		6000	15
22.5	76	60.95	2.6	MIB301A063LF06095S		6000	15
20.2	85	67.91	2.3	MIB301A063LF06791S		6000	15
18	96	76.26	2.1	MIB301A063LF07626S		6000	15
16.1	107	84.89	1.9	MIB301A063LF08489S		6000	15
14.4	119	94.93	1.7	MIB301A063LF09493S		6000	15
12.4	138	110.35	1.4	MIB301A063LF11035S		6000	15
11.1	154	122.95	1.3	MIB301A063LF12295S		6000	15
11.3	152	121.16	2.8	MIB302A063LF12116S		6500	23
10.8	159	126.9	1.3	MIB301A063LF12690S		6000	15
9.8	175	139.43	2.4	MIB302A063LF13943S		6500	23
9	192	152.8	1	MIB301A063LF15280S		6000	15
8.8	196	156.44	2.1	MIB302A063LF15644S		6500	23
8.1	213	169.63	0.94	MIB301A063LF16963S		6000	15
7.2	239	190.21	0.84	MIB301A063LF19021S		6000	15

P 0.25 kW n_1 1400 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
499.9	5	2.8	21	MIB201B071SF00280S		3900	16
436.1	5	3.21	19	MIB201B071SF00321S		4100	16
407	6	3.44	19	MIB201B071SF00344S		4200	16
353.6	7	3.96	17	MIB201B071SF00396S		4400	16
305.9	8	4.58	15	MIB201B071SF00458S		4600	16
283.8	8	4.93	15	MIB201B071SF00493S		4700	16
244.7	10	5.72	13	MIB201B071SF00572S		4900	16
213.5	11	6.56	12	MIB201B071SF00656S		5200	16
199.2	12	7.03	12	MIB201B071SF00703S		5300	16
173.1	14	8.09	11	MIB201B071SF00809S		5500	16
149.7	16	9.35	10	MIB201B071SF00935S		5800	16
139	17	10.08	9.9	MIB201B071SF01008S		5900	16
128.7	19	10.88	9.7	MIB201B071SF01088S		6000	16
109.7	22	12.76	8.3	MIB201B071SF01276S		6000	16
100.8	24	13.89	7.6	MIB201B071SF01389S		6000	16
84.3	28	16.61	6.4	MIB201B071SF01661S		6000	16
76.6	31	18.28	5.8	MIB201B071SF01828S		6000	16
70.9	34	19.75	5	MIB301B071SF01975S		6000	16
69.2	35	20.24	5.2	MIB201B071SF02024S		6000	16
62.1	38	22.55	4.7	MIB201B071SF02255S		6000	16
66.1	36	21.17	5	MIB301B071SF02117S		6000	16
55.3	43	25.32	4.2	MIB201B071SF02532S		6000	16
57.5	42	24.36	4.6	MIB301B071SF02436S		6000	16

P 0.25 kW n_1 1400 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
49.7	48	28.18	3.7	MIB201B071SF02818S		6000	16
49.7	48	28.16	4	MIB301B071SF02816S		6000	16
44.4	54	31.52	3.3	MIB201B071SF03152S		6000	16
46.1	52	30.35	3.9	MIB301B071SF03035S		6000	16
38.2	62	36.64	2.9	MIB201B071SF03664S		6000	16
42.7	56	32.76	3.6	MIB301B071SF03276S		6000	16
34.3	70	40.82	2.6	MIB201B071SF04082S		6000	16
36.4	66	38.45	3.1	MIB301B071SF03845S		6000	16
33.2	72	42.13	2.5	MIB201B071SF04213S		6000	16
33.5	71	41.82	2.8	MIB301B071SF04182S		6000	16
27.6	87	50.73	2.1	MIB201B071SF05073S		6000	16
28	85	50.02	2.3	MIB301B071SF05002S		6000	16
24.9	96	56.32	1.9	MIB201B071SF05632S		6000	16
25.4	94	55.07	2.1	MIB301B071SF05507S		6000	16
22.2	108	63.15	1.7	MIB201B071SF06315S		6000	16
23	104	60.95	1.9	MIB301B071SF06095S		6000	16
20.6	116	67.91	1.7	MIB301B071SF06791S		6000	16
18.4	130	76.26	1.5	MIB301B071SF07626S		6000	16
16.5	145	84.89	1.4	MIB301B071SF08489S		6000	16
15.9	150	87.84	2.8	MIB302B071SF08784S		6500	24
14.7	162	94.93	1.2	MIB301B071SF09493S		6000	16
14.3	167	98.16	2.5	MIB302B071SF09816S		6500	24
12.7	188	110.35	1.1	MIB301B071SF11035S		6000	16
12.9	185	108.76	2.3	MIB302B071SF10876S		6500	24
11.4	210	122.95	0.95	MIB301B071S12295S		6000	16
11.6	207	121.16	2	MIB302B071SF12116S		6500	24
11	216	126.9	0.92	MIB301B071SF012690S		6000	16
10	238	139.43	1.8	MIB302B071SF13943S		6500	24
8.9	267	156.44	1.6	MIB302B071SF15644S		6500	24
8.4	285	166.99	2.9	MIB303B071SF16699S		11000	44
6.8	353	207.24	2.3	MIB303B071SF20724S		11000	44

P 0.37 kW n_1 1400 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
499.9	7	2.8	14	MIB201B071LF00280S		3900	17
436.1	8	3.21	13	MIB201B071LF00321S		4100	17
407	9	3.44	13	MIB201B071LF00344S		4100	17
353.6	10	3.96	12	MIB201B071LF00396S		4300	17
305.9	12	4.58	10	MIB201B071LF00458S		4500	17
283.8	12	4.93	10	MIB201B071LF00493S		4600	17
244.7	14	5.72	9	MIB201B071LF00572S		4900	17
213.5	17	6.56	8.3	MIB201B071LF00656S		5100	17
199.2	18	7.03	8.2	MIB201B071LF00703S		5200	17

P 0.37 kW n_1 **1400 min^{-1}**

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
173.1	20	8.09	7.5	MIB201B071LF00809S		5500	17
149.7	24	9.35	6.8	MIB201B071LF00935S		5700	17
139	25	10.08	6.7	MIB201B071LF01008S		5900	17
128.7	27	10.88	6.6	MIB201B071LF01088S		6000	17
109.7	32	12.76	5.6	MIB201B071LF01276S		6000	17
100.8	35	13.89	5.1	MIB201B071LF01389S		6000	17
84.3	42	16.61	4.3	MIB201B071LF01661S		6000	17
76.6	46	18.28	3.9	MIB201B071LF01828S		6000	17
69.2	51	20.24	3.5	MIB201B071LF02024S		6000	17
62.1	57	22.55	3.2	MIB201B071LF02255S		6000	17
66.1	53	21.17	3.4	MIB301B071LF02117S		6000	17
55.3	64	25.32	2.8	MIB201B071LF02532S		6000	17
57.5	61	24.36	3.1	MIB301B071LF02436S		6000	17
49.7	71	28.18	2.5	MIB201B071LF02818S		6000	17
49.7	71	28.16	2.7	MIB301B071LF02816S		6000	17
44.4	80	31.52	2.3	MIB201B071LF03152S		6000	17
46.1	77	30.35	2.6	MIB301B071LF03035S		6000	17
38.2	92	36.64	1.9	MIB201B071LF03664S		6000	17
42.7	83	32.76	2.4	MIB301B071LF03276S		6000	17
34.3	103	40.82	1.7	MIB201B071LF04082S		6000	17
36.4	97	38.45	2.1	MIB301B071LF03845S		6000	17
33.2	106	42.13	1.7	MIB201B071LF04213S		6000	17
33.5	106	41.82	1.9	MIB301B071LF04182S		6000	17
27.6	128	50.73	1.4	MIB201B071LF05073S		6000	17
28	126	50.02	1.6	MIB301B071LF05002S		6000	17
28	126	50.07	2.8	MIB301B071LF05507S		6500	25
24.9	142	56.32	1.3	MIB201B071LF05632S		6000	17
25.2	140	55.6	3	MIB302B071LF05560S		6500	25
22.2	159	63.15	1.1	MIB201B071LF06315S		6000	17
23	154	60.95	1.3	MIB301B071LF06095S		6000	17
21.7	163	64.64	2.6	MIB302B071LF06464S		6500	25
20.6	171	67.91	1.2	MIB301B071LF06791S		6000	17
19.5	182	71.97	2.3	MIB302B071LF07197S		6500	25
18.4	192	76.26	1	MIB301B071LF07626S		6000	17
17.7	200	79.24	2.1	MIB302B071LF07924S		6500	25
16.5	214	84.89	0.93	MIB301B071LF08490S		6000	17
15.9	222	87.84	1.9	MIB302B071LF08784S		6500	25
14.7	240	94.93	0.83	MIB301B071LF09493S		6000	17
14.3	248	98.16	1.7	MIB302B071LF09816S		6500	25
12.9	274	108.76	1.5	MIB302B071LF10876S		6500	25
11.9	296	117.28	2.8	MIB303B071LF11728S		11000	45
11.6	306	121.16	1.4	MIB302B071LF12116S		6500	25
10.8	327	129.74	2.5	MIB303B071LF12974S		11000	45

P 0.37 kW n_1 1400 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
10	352	139.43	1.2	MIB302B071LF13943S		6500	25
9.7	364	144.13	2.3	MIB303B071LF14413S		11000	45
8.9	395	156.44	1.1	MIB302B071LF15644S		6500	25
8.4	421	166.99	1.9	MIB303B071LF16699S		11000	45
6.8	523	207.24	1.6	MIB303B071LF20724S		11000	45

P 0.55 kW n_1 1420 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
507.1	10	2.8	9.7	MIB201C080KF00280S		3800	19
442.3	12	3.21	8.8	MIB201C080KF00321S		4000	19
412.8	13	3.44	8.6	MIB201C080KF00344S		4100	19
358.7	15	3.96	7.9	MIB201C080KF00396S		4300	19
310.2	17	4.58	7.1	MIB201C080KF00458S		4500	19
287.9	18	4.93	6.9	MIB201C080KF00493S		4600	19
248.2	21	5.72	6.1	MIB201C080KF00572S		4800	19
216.5	24	6.56	5.6	MIB201C080KF00656S		5000	19
202.1	26	7.03	5.6	MIB201C080KF00703S		5100	19
175.6	30	8.09	5.1	MIB201C080KF00809S		5400	19
151.9	35	9.35	4.7	MIB201C080KF00935S		5600	19
140.9	37	10.08	4.6	MIB201C080KF01008S		5700	19
130.5	40	10.88	4.5	MIB201C080KF01088S		5900	19
111.2	47	12.76	3.8	MIB201C080KF01276S		6000	19
102.3	51	13.89	3.5	MIB201C080KF01389S		6000	19
85.5	61	16.61	2.9	MIB201C080KF01661S		6000	19
77.7	68	18.28	2.7	MIB201C080KF01828S		6000	19
70.2	75	20.24	2.4	MIB201C080KF02024S		6000	19
63	83	22.55	2.2	MIB201C080KF02255S		6000	19
56.1	94	25.32	1.9	MIB201C080KF02532S		6000	19
58.3	90	24.36	2.1	MIB301C080KF02436S		6000	19
50.4	104	28.18	1.7	MIB201C080KF02818S		6000	19
45.1	117	31.52	1.5	MIB201C080KF03152S		6000	19
46.8	112	30.35	1.8	MIB301C080KF03035S		6000	19
38.8	136	36.64	1.3	MIB201C080KF03664S		6000	19
43.3	121	32.76	1.7	MIB301C080KF03276S		6000	19
40.8	129	34.81	2.8	MIB202C080KF03481S		6500	27
34.8	151	40.82	1.2	MIB201C080KF04082S		6000	19
36.9	142	38.45	1.4	MIB301C080KF03845S		6000	19
36.6	143	38.78	2.5	MIB202C080KF03878S		6500	27
36.7	143	38.71	2.9	MIB302C080KF03871S		6500	27
33.7	156	42.13	1.2	MIB201C080KF04213S		6000	19
31.8	165	44.63	2.2	MIB202C080KF04463S		6500	27
32	164	44.4	2.6	MIB302C080KF04440S		6500	27

P 0.55 kW n_1 1420 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
28	188	50.73	0.96	MIB201C080KF05073S		6000	19
28.4	185	50.02	1.1	MIB301C080KF05002S		6000	19
28.4	185	50.07	1.9	MIB202C080KF05007S		6500	27
27.6	190	51.42	2.2	MIB302C080KF05142S		6500	27
25.2	208	56.32	0.86	MIB201C080KF05632S		6000	19
25.8	204	55.07	0.98	MIB301C080KF05507S		6000	19
25.5	206	55.6	2	MIB302C080KF05560S		6500	27
23.3	225	60.95	0.89	MIB301C080KF06095S		6000	19
22	239	64.64	1.8	MIB302C080KF06464S		6500	27
20.9	251	67.91	0.8	MIB301C080KF06791S		6000	19
19.7	266	71.97	1.6	MIB302C080KF07197S		6500	27
17.9	293	79.24	1.4	MIB302C080KF07924S		6500	27
17.8	295	79.73	2.8	MIB303C080KF07973S		11000	47
16.2	325	87.84	1.3	MIB302C080KF08784S		6500	27
16.1	326	88.04	2.5	MIB303C080KF08804S		11000	47
14.5	363	98.16	1.2	MIB302C080KF09816S		6500	27
13.5	390	105.33	2.1	MIB303C080KF10533S		11000	47
13.1	402	108.76	1	MIB302C080KF10876S		6500	27
12.1	434	117.28	1.9	MIB303C080KF11728S		11000	47
11.7	448	121.16	0.94	MIB302C080KF12116S		6500	27
10.9	480	129.74	1.7	MIB303C080KF12974S		11000	47
10.2	516	139.43	0.81	MIB302C080KF13943S		6500	27
9.9	533	144.13	1.5	MIB303C080KF14413S		11000	47
8.5	618	166.99	1.3	MIB303C080KF16699S		11000	47
9.1	580	156.72	2.8	MIB304C080KF15672S		21000	66
8.1	650	175.71	2.5	MIB304C080KF17571S		21000	66
6.9	767	207.24	1.1	MIB303C080KF20724S		11000	47

P 0.75 kW n_1 1415 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
505.3	14	2.8	7.1	MIB201C080NF00280S		3800	20
440.8	16	3.21	6.5	MIB201C080NF00321S		4000	20
411.3	17	3.44	6.3	MIB201C080NF00344S		4000	20
357.4	20	3.96	5.7	MIB201C080NF00396S		4200	20
309.2	23	4.58	5.2	MIB201C080NF00458S		4400	20
286.9	25	4.93	5	MIB201C080NF00493S		4500	20
247.4	29	5.72	4.5	MIB201C080NF00572S		4800	20
215.8	33	6.56	4.1	MIB201C080NF00656S		5000	20
201.4	36	7.03	4.1	MIB201C080NF00703S		5100	20
175	41	8.09	3.7	MIB201C080NF00809S		5300	20
151.3	47	9.35	3.4	MIB201C080NF00935S		5500	20
140.4	51	10.08	3.3	MIB201C080NF01008S		5600	20
130.1	55	10.88	3.3	MIB201C080NF01088S		5700	20

P 0.75 kW n_1 **1415 min^{-1}**

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
110.9	65	12.76	2.8	MIB201C080NF01276S		6000	20
101.9	70	13.89	2.6	MIB201C080NF01389S		6000	20
85.2	84	16.61	2.1	MIB201C080NF01661S		6000	20
77.4	93	18.28	1.9	MIB201C080NF01828S		6000	20
69.9	102	20.24	1.8	MIB201C080NF02024S		6000	20
62.8	114	22.55	1.6	MIB201C080NF02255S		6000	20
55.9	128	25.32	1.4	MIB201C080NF02532S		6000	20
55.8	128	25.36	2.8	MIB202C080NF02536S		6500	28
50.2	143	28.18	1.3	MIB201C080NF02818S		6000	20
50.3	142	28.12	2.5	MIB202C080NF02812S		6500	28
50	143	28.31	2.9	MIB302C080NF02831S		6500	28
44.9	160	31.52	1.1	MIB201C080NF03152S		6000	20
46.6	154	30.35	1.3	MIB301C080NF03035S		6000	20
45	159	31.42	2.3	MIB202C080NF03142S		6500	28
47.1	152	30.06	2.8	MIB302C080NF03006S		6500	28
38.6	185	36.64	0.97	MIB201C080NF03664S		6000	20
43.2	166	32.76	1.2	MIB301C080NF03276S		6000	20
40.6	176	34.81	2	MIB202C080NF03481S		6500	28
39	183	36.25	2.3	MIB302C080NF03625S		6500	28
34.7	207	40.82	0.87	MIB201C080NF04082S		6000	20
36.8	195	38.45	1	MIB301C080NF03845S		6000	20
36.5	196	38.78	1.8	MIB202C080NF03878S		6500	28
36.6	196	38.71	2.1	MIB302C080NF03871S		6500	28
33.6	213	42.13	0.84	MIB201C080NF04213S		6000	20
31.7	226	44.63	1.6	MIB202C080NF04463S		6500	28
31.9	225	44.4	1.9	MIB302C080NF04440S		6500	28
28.3	253	50.07	1.4	MIB202C080NF05007S		6500	28
27.5	260	51.42	1.6	MIB302C080NF05142S		6500	28
28.2	254	50.15	2.8	MIB203C080NF05015S		11000	48
25.5	281	55.6	1.5	MIB302C080NF05560S		6500	28
24.4	294	58.11	2.4	MIB203C080NF05811S		11000	48
25.4	282	55.78	2.9	MIB303C080NF05578S		11000	48
21.9	327	64.64	1.3	MIB302C080NF06464S		6500	28
22.4	320	63.17	2.6	MIB303C080NF06317S		11000	48
19.7	364	71.97	1.2	MIB302C080NF07197S		6500	28
20.5	349	68.88	2.4	MIB303C080NF06888S		11000	48
17.9	401	79.24	1	MIB302C080NF07924S		6500	28
17.7	404	79.73	2	MIB303C080NF07973S		11000	48
16.1	445	87.84	0.94	MIB302C080NF08784S		6500	28
16.1	446	88.04	1.8	MIB303C080NF08804S		11000	48
14.4	497	98.16	0.85	MIB302C080NF09816S		6500	28
13.4	533	105.33	1.5	MIB303C080NF10533S		11000	48
12.1	594	117.28	1.4	MIB303C080NF11728S		11000	48

P 0.75 kW n_1 1415 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
10.9	657	129.74	1.2	MIB303C080NF12974S		11000	48
11.8	605	119.59	2.6	MIB304C080NF11959S		21000	67
9.8	730	144.13	1.1	MIB303C080NF14413S		11000	48
10.8	665	131.33	2.4	MIB304C080NF13130S		21000	67
8.5	845	166.99	0.97	MIB303C080NF16699S		11000	48
9	793	156.72	2	MIB304C080NF15672S		21000	67
8.1	889	175.71	1.8	MIB304C080NF17571S		21000	67

P 1.1 kW n_1 1410 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
503.5	21	2.8	4.8	MIB201D090SF00280S		3700	25
439.2	24	3.21	4.4	MIB201D090SF00321S		3900	25
409.9	26	3.44	4.3	MIB201D090SF00344S		4000	25
356.1	29	3.96	3.9	MIB201D090SF00396S		4100	25
308.1	34	4.58	3.5	MIB201D090SF00458S		4300	25
285.9	37	4.93	3.4	MIB201D090SF00493S		4400	25
246.5	43	5.72	3.1	MIB201D090SF00572S		4600	25
215	49	6.56	2.8	MIB201D090SF00656S		4800	25
200.7	52	7.03	2.8	MIB201D090SF00703S		4900	25
174.4	60	8.09	2.5	MIB201D090SF00809S		5100	25
150.8	70	9.35	2.3	MIB201D090SF00935S		5300	25
140	75	10.08	2.3	MIB201D090SF01008S		5400	25
129.6	81	10.88	2.2	MIB201D090SF01088S		5500	25
110.5	95	12.76	1.9	MIB201D090SF01276S		5800	25
101.5	103	13.89	1.7	MIB201D090SF01389S		5900	25
84.9	124	16.61	1.5	MIB201D090SF01661S		6000	25
85.7	123	16.46	2.9	MIB202D090SF01646S		6300	33
77.1	136	18.28	1.3	MIB201D090SF01828S		6000	25
79.2	133	17.8	2.7	MIB202D090SF01780S		6500	33
82.5	127	17.09	2.9	MIB302D090SF01709S		6400	33
69.7	151	20.24	1.2	MIB201D090SF02024S		6000	25
68.2	154	20.69	2.3	MIB202D090SF02069S		6500	33
74	142	19.06	2.7	MIB302D090SF01906S		6500	33
62.5	168	22.55	1.1	MIB201D090SF02255S		6000	25
61.2	172	23.03	2.1	MIB202D090SF02303S		6500	33
62.7	168	22.49	2.5	MIB302D090SF02249S		6500	33
55.7	189	25.32	0.95	MIB201D090SF02532S		6000	25
55.6	189	25.36	1.9	MIB202D090SF02536S		6500	33
56	188	25.2	2.2	MIB302D090SF02520S		6500	33
50	210	28.18	0.86	MIB201D090SF02818S		6000	25
50.1	209	28.12	1.7	MIB202D090SF02812S		6500	33
49.8	211	28.31	2	MIB302D090SF02831S		6500	33

P 1.1 kW n_1 1410 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
46.5	226	30.35	0.88	MIB301D090SF03035S		6000	25
44.9	234	31.42	1.5	MIB202D090SF03142S		6500	33
46.9	224	30.06	1.9	MIB302D090SF03006S		6500	33
43	244	32.76	0.82	MIB301D090SF03276S		6000	25
40.5	259	34.81	1.4	MIB202D090SF03481S		6500	33
38.9	270	36.25	1.6	MIB302D090SF03625S		6500	33
38.5	273	36.65	2.6	MIB203D090SF03665S		11000	53
38.7	271	36.41	3	MIB303D090SF03641S		11000	53
36.4	289	38.78	1.2	MIB202D090SF03878S		6500	33
36.4	288	38.71	1.5	MIB302D090SF03871S		6500	33
34.6	304	40.81	2.4	MIB203D090SF04081S		11000	53
36.2	291	39	2.8	MIB303D090SF03900S		11000	53
31.6	332	44.63	1.1	MIB202D090SF04463S		6500	33
31.8	331	44.4	1.3	MIB302D090SF04440S		6500	33
31.2	336	45.14	2.1	MIB203D090SF04514S		11000	53
30.9	340	45.6	2.4	MIB303D090SF04560S		11000	53
28.2	373	50.07	0.97	MIB202D090SF05007S		6500	33
27.4	383	51.42	1.1	MIB302D090SF05142S		6500	33
28.1	374	50.15	1.9	MIB203D090SF05015S		11000	53
28.7	366	49.12	2.2	MIB303D090SF04912S		11000	53
25.4	414	55.6	1	MIB302D090SF05560S		6500	33
24.3	433	58.11	1.7	MIB203D090SF05811S		11000	53
25.3	416	55.78	2	MIB303D090SF05578S		11000	53
21.8	482	64.64	0.87	MIB302D090SF06464S		6500	33
22.3	471	63.17	1.7	MIB303D090SF06317S		11000	53
20.5	513	68.88	1.6	MIB303D090SF06888S		11000	53
17.7	594	79.73	1.4	MIB304D090SF07973S		11000	53
18.8	559	74.99	2.9	MIB304D090SF07499S		21000	72
16	656	88.04	1.3	MIB303D090SF08804S		11000	53
16.8	624	83.75	2.6	MIB304D090SF08375S		21000	72
13.4	785	105.33	1	MIB303D090SF10533S		11000	53
14.8	712	95.56	2.2	MIB304D090SF09556S		21000	72
12	874	117.28	0.94	MIB303D090SF11728S		11000	53
13.6	772	103.6	2.1	MIB304D090SF10360S		21000	72
10.9	967	129.74	0.85	MIB303D090SF12974S		11000	53
11.8	891	119.59	1.8	MIB304D090SF11959S		21000	72
10.7	978	131.33	1.6	MIB304D090SF13133S		21000	72
8	1309	175.71	1.2	MIB304D090SF17571S		21000	72

P 1.5 kW n_1 1410 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
503.5	28	2.8	3.5	MIB201D090LF00280S		3600	26
439.2	33	3.21	3.2	MIB201D090LF00321S		3800	26

P 1.5 kW n_1 **1410 min^{-1}**

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
409.9	35	3.44	3.1	MIB201D090LF00344S		3900	26
356.1	40	3.96	2.9	MIB201D090LF00396S		4000	26
308.1	46	4.58	2.6	MIB201D090LF00458S		4200	26
285.9	50	4.93	2.5	MIB201D090LF00493S		4200	26
246.5	58	5.72	2.2	MIB201D090LF00572S		4500	26
215	67	6.56	2.1	MIB201D090LF00656S		4700	26
200.7	71	7.03	2	MIB201D090LF00703S		4800	26
174.4	82	8.09	1.9	MIB201D090LF00809S		4900	26
150.8	95	9.35	1.7	MIB201D090LF00935S		5100	26
140	102	10.08	1.7	MIB201D090LF01008S		5200	26
129.6	110	10.88	1.6	MIB201D090LF01088S		5300	26
110.5	130	12.76	1.4	MIB201D090LF01276S		5500	26
113.8	126	12.39	2.9	MIB202D090LF01239S		5700	34
101.5	141	13.89	1.3	MIB201D090LF01389S		5600	26
99.2	144	14.21	2.5	MIB202D090LF01421S		5900	34
84.9	169	16.61	1.1	MIB201D090LF01661S		5800	26
85.7	167	16.46	2.2	MIB202D090LF01646S		6100	34
77.1	186	18.28	0.97	MIB201D090LF01828S		5900	26
79.2	181	17.8	2	MIB202D090LF01780S		6200	34
69.7	206	20.24	0.88	MIB201D090LF02024S		6000	26
68.2	210	20.69	1.7	MIB202D090LF02069S		6400	34
74	194	19.06	2	MIB302D090LF01906S		6300	34
66.6	215	21.17	0.84	MIB301D090LF02117S		6000	26
61.2	234	23.03	1.5	MIB202D090LF02303S		6500	34
62.7	229	22.49	1.8	MIB302D090LF02249S		6500	34
55.6	258	25.36	1.4	MIB202D090LF02536S		6500	34
56	256	25.2	1.6	MIB302D090LF02520S		6500	34
58.8	243	23.97	3	MIB203D090LF02397S		11000	54
50.1	286	28.12	1.3	MIB202D090LF02812S		6500	34
49.8	288	28.31	1.5	MIB302D090LF02831S		6500	34
50.8	282	27.74	2.6	MIB203D090LF02774S		11000	54
44.9	319	31.42	1.1	MIB202D090LF03142S		6500	34
46.9	305	30.06	1.4	MIB302D090LF03006S		6500	34
46	311	30.63	2.3	MIB203D090LF03063S		11000	54
43	333	32.8	2.5	MIB303D090LF03280S		11000	54
40.5	354	34.81	1	MIB202D090LF03481S		6500	34
38.5	372	36.65	1.9	MIB203D090LF03665S		11000	54
38.7	370	36.41	2.2	MIB303D090LF03641S		11000	54
36.4	394	38.78	0.91	MIB202D090LF03878S		6500	34
36.4	393	38.71	1.1	MIB302D090LF03871S		6500	34
34.6	415	40.81	1.7	MIB203D090LF04081S		11000	54
36.2	396	39	2.1	MIB303D090LF03900S		11000	54
31.8	451	44.4	0.93	MIB302D090LF04440S		6500	34
31.2	459	45.14	1.6	MIB203D090LF04514S		11000	54

P 1.5 kW — n_1 1410 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
30.9	463	45.6	1.8	MIB303D090LF04560S		11000	54
30.3	472	46.48	3	MIB204D090LF04648S		21000	73
27.4	522	51.42	0.8	MIB302D090LF05142S		6500	34
28.1	509	50.15	1.4	MIB203D090LF05015S		11000	54
28.7	499	49.12	1.6	MIB303D090LF04912S		11000	54
27.1	529	52.12	2.6	MIB204D090LF05212S		21000	73
24.3	590	58.11	1.2	MIB203D090LF05811S		11000	54
25.3	567	55.78	1.4	MIB303D090LF05578S		11000	54
27.1	529	52.1	3	MIB304D090LF05210S		21000	73
22.3	642	63.17	1.3	MIB303D090LF06317S		11000	54
23.6	606	59.67	2.6	MIB304D090LF05967S		21000	73
20.5	700	68.88	1.2	MIB303D090LF06888S		11000	54
20.1	712	70.07	2.2	MIB304D090LF07007S		21000	73
17.7	810	79.73	1	MIB303D090LF07973S		11000	54
18.8	762	74.99	2.1	MIB304D090LF07499S		21000	73
16	894	88.04	0.92	MIB303D090LF08804S		11000	54
16.8	851	83.75	1.9	MIB304D090LF08375S		21000	73
14.8	971	95.56	1.6	MIB304D090LF09556S		21000	73
13.6	1052	103.6	1.5	MIB304D090LF10360S		21000	73
11.8	1215	119.59	1.3	MIB304D090LF11959S		21000	73
10.7	1334	131.33	1.2	MIB304D090LF13133S		21000	73
9	1592	156.72	1	MIB304D090LF15672S		21000	73
8	1785	175.71	0.9	MIB304D090LF17571S		21000	73

P 2.2 kW — n_1 1420 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
507.1	41	2.8	2.4	MIB201E100LF00280S		3500	29
442.3	47	3.21	2.2	MIB201E100LF00321S		3600	29
412.8	51	3.44	2.2	MIB201E100LF00344S		3700	29
358.7	59	3.96	2	MIB201E100LF00396S		3800	29
345.7	61	4.11	3	MIB202E100LF00411S		4000	37
310.2	68	4.58	1.8	MIB201E100LF00458S		4000	29
307.7	68	4.62	2.7	MIB202E100LF00462S		4100	37
287.9	73	4.93	1.7	MIB201E100LF00493S		4000	29
289.8	72	4.9	2.6	MIB202E100LF00490S		4200	37
248.2	85	5.72	1.5	MIB201E100LF00572S		4300	29
216.5	97	6.56	1.4	MIB201E100LF00656S		4400	29
232.8	90	6.1	3	MIB202E100LF00610S		4500	37
202.1	104	7.03	1.4	MIB201E100LF00703S		4500	29
197.2	107	7.2	2.7	MIB202E100LF00720S		4700	37
175.6	120	8.09	1.3	MIB201E100LF00809S		4600	29
176.1	119	8.06	2.6	MIB202E100LF00806S		4900	37
151.9	138	9.35	1.2	MIB201E100LF00935S		4800	29

P 2.2 kW n_1 **1420 min^{-1}**

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
156.7	134	9.06	2.4	MIB202E100LF00906S		5000	37
140.9	149	10.08	1.1	MIB201E100LF01008S		4800	29
147.6	142	9.62	2.4	MIB202E100LF00962S		5100	37
130.5	161	10.88	1.1	MIB201E100LF01088S		4900	29
122.4	172	11.6	2.1	MIB202E100LF01160S		5300	37
111.2	189	12.76	0.95	MIB201E100LF01276S		5000	29
114.6	183	12.39	2	MIB202E100LF01239S		5300	37
102.3	205	13.89	0.88	MIB201E100LF01389S		5100	29
99.9	210	14.21	1.7	MIB202E100LF01421S		5500	37
86.3	244	16.46	1.5	MIB202E100LF01646S		5600	37
90.2	233	15.74	2.9	MIB303E100LF01574S		11000	57
79.8	263	17.8	1.4	MIB202E100LF01780S		5700	37
77.7	270	18.27	2.6	MIB303E100LF01827S		11000	57
83.1	253	17.09	2.8	MIB203E100LF01709S		11000	57
68.6	306	20.69	1.2	MIB202E100LF02069S		5800	37
74.5	282	19.06	1.4	MIB302E100LF01906S		5700	37
73.2	287	19.41	2.5	MIB203E100LF01941S		11000	57
61.6	341	23.03	1.1	MIB202E100LF02303S		5800	37
63.1	333	22.49	1.3	MIB302E100LF02249S		5800	37
64.6	325	21.98	2.2	MIB203E100LF02198S		11000	57
56	375	25.36	0.96	MIB202E100LF02536S		5900	37
56.4	373	25.2	1.1	MIB302E100LF02520S		5900	37
59.2	355	23.97	2	MIB203E100LF02397S		11000	57
50.5	416	28.12	0.87	MIB202E100LF02812S		5900	37
50.2	419	28.31	1	MIB302E100LF02831S		5900	37
51.2	410	27.74	1.8	MIB203E100LF02774S		11000	57
47.2	445	30.06	0.94	MIB302E100LF03006S		6000	37
46.4	453	30.63	1.6	MIB203E100LF03063S		11000	57
38.7	542	36.65	1.3	MIB203E100LF03665S		11000	57
39	539	36.41	1.5	MIB303E100LF03641S		11000	57
40	525	35.47	2.7	MIB204E100LF03547S		21000	76
34.8	604	40.81	1.2	MIB203E100LF04081S		11000	57
36.4	577	39	1.4	MIB303E100LF03900S		11000	57
36.5	576	38.96	2.4	MIB204E100LF03896S		21000	76
37.5	561	37.89	2.9	MIB304E100LF03789S		21000	76
31.5	668	45.14	1.1	MIB203E100LF04514S		11000	57
30.5	688	46.48	2	MIB204E100LF04648S		21000	76
34.1	617	41.69	2.6	MIB304E100LF04169S		21000	76
28.3	742	50.15	0.97	MIB203E100LF05015S		11000	57
28.9	727	49.12	1.1	MIB303E100LF04912S		11000	57
27.2	771	52.12	1.8	MIB204E100LF05212S		21000	76
30.2	695	46.97	2.3	MIB304E100LF04697S		21000	76
24.4	860	58.11	0.84	MIB203E100LF05811S		11000	57
25.5	825	55.78	0.99	MIB303E100LF05578S		11000	57

P 2.2 kW n_1 1420 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
27.3	771	52.1	2.1	MIB304E100LF05210S		21000	76
22.5	935	63.17	0.88	MIB303E100LF06317S		11000	57
23.8	883	59.67	1.8	MIB304E100LF05967S		21000	76
20.6	1019	68.88	0.8	MIB303E100LF06888S		11000	57
20.3	1037	70.07	1.5	MIB304E100LF07007S		21000	76
18.9	1109	74.99	1.4	MIB304E100LF07499S		21000	76
17	1239	83.75	1.3	MIB304E100LF08375S		21000	76
14.9	1414	95.56	1.1	MIB304E100LF09556S		21000	76
13.7	1533	103.6	1	MIB304E100LF10360S		21000	76
11.9	1769	119.59	0.9	MIB304E100LF11959S		21000	76
10.8	1943	131.33	0.82	MIB304E100LF13133S		21000	76

P 3.7 kW n_1 1420 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
507.1	70	2.8	1.41	MIB201E112MF00280S		3200	37
509.70	69	2.79	1.95	MIB202E112MF00279S		3400	45.00
442.30	80	3.21	1.30	MIB201E112MF00321S		3300	37.00
457.20	77	3.11	1.95	MIB202E112MF00311S		3500	45.00
412.8	86	3.44	1.30	MIB201E112MF00344S		3300	37
387.3	91	3.67	1.95	MIB202E112MF00367S		3600	45
358.7	99	3.96	1.19	MIB201E112MF00396S		3400	37.00
345.7	102	4.11	1.84	MIB202E112MF00411S		3700	45.00
310.2	114	4.58	1.05	MIB201E112MF00458S		3400	37.00
307.7	115	4.62	1.62	MIB202E112MF00462S		3700	45.00
287.90	123	4.93	1.02	MIB201E112MF00493S		3500	37.00
289.80	122	4.90	1.51	MIB202E112MF00490S		3800	45.00
248.20	142	5.72	0.91	MIB201E112MF00572S		3800	37.00
259.60	136	5.47	1.95	MIB202E112MF00547S		4000	45.00
232.80	152	6.10	1.84	MIB202E112MF00610S		4100	45.00
197.20	179	7.20	1.62	MIB202E112MF00720S		4200	45.00
199.50	177	7.12	3.24	MIB203E112MF00712S		9400	65.00
176.10	201	8.06	1.51	MIB202E112MF00806S		4300	45.00
174.30	203	8.15	3.03	MIB203E112MF00815S		9700	65.00
156.70	225	9.06	1.41	MIB202E112MF00906S		4300	45.00
158.80	222	8.94	2.92	MIB203E112MF00894S		10000	65.00
147.60	239	9.62	1.41	MIB202E112MF00962S		4300	45.00
137.50	257	10.33	2.59	MIB203E112MF01033S		10300	65.00
122.40	289	11.6	1.30	MIB202E112MF01160S		4400	45.00
124.40	284	11.41	2.49	MIB203E112MF01141S		10600	65.00
114.60	308	12.39	1.19	MIB202E112MF01239S		4400	45.00
112.10	315	12.67	2.27	MIB203E112MF01267S		10900	65.00
99.90	354	14.21	1.02	MIB202E112MF01421S		4400	45.00
104.60	338	13.57	2.16	MIB203E112MF01357S		11000	65.00

P 3.7 kW n_1 1420 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
86.30	409	16.46	0.88	MIB202E112MF01646S		4400	45.00
89.50	395	15.87	1.84	MIB203E112MF01587S		11000	65.00
83.10	425	17.09	0.86	MIB202E112MF01709S		4400	45.00
77.70	455	18.27	1.51	MIB203E112MF01827S		11000	65.00
83.10	425	17.09	1.73	MIB203E112MF01709S		11000	65.00
80.20	441	17.7	3.14	MIB204E112MF01770S		17200	84.00
73.20	483	19.41	1.51	MIB203E112MF01941S		11000	65.00
68.30	517	20.78	2.70	MIB204E112MF02078S		18000	84.00
78.1	452	18.19	2.92	MIB204E112MF01819S		17400	84.00
64.6	547	21.98	1.30	MIB203E112MF02198S		11000	65
63.8	554	22.24	2.49	MIB204E112MF02224S		18300	84
69.6	508	20.4	2.81	MIB204E112MF02040S		17900	84
59.2	597	23.97	1.19	MIB203E112MF02397S		11000	65
57.2	618	24.84	2.27	MIB204E112MF02484S		18800	84
51.2	690	27.74	1.04	MIB203E112MF02774S		11000	65
50.1	705	28.34	1.95	MIB204E112MF02834S		19400	84
53.3	663	26.62	2.27	MIB204E112MF02662S		19100	84
46.4	761	30.63	0.94	MIB203E112MF03063S		11000	65
46.2	765	30.73	1.84	MIB204E112MF03073S		19800	84
47.4	745	29.94	2.16	MIB204E112MF02994S		19700	84
39	906	36.41	0.91	MIB203E112MF03641S		11000	65
40	883	35.47	1.62	MIB204E112MF03547S		20400	84
41.4	853	34.34	1.84	MIB204E112MF03434S		20300	84
36.5	968	38.96	1.41	MIB204E112MF03896S		20800	84
37.5	942	37.89	1.73	MIB204E112MF03789S		20700	84
30.5	1158	46.48	1.19	MIB204E112MF04648S		21000	84
34.1	1036	41.69	1.51	MIB204E112MF04169S		21000	84
27.2	1299	52.12	1.08	MIB204E112MF05212S		21000	84
30.2	1170	46.97	1.41	MIB204E112MF04697S		21000	84
27.3	1294	52.1	1.19	MIB204E112MF05210S		21000	84
23.8	1485	59.67	1.08	MIB204E112MF05967S		21000	84
20.3	1741	70.07	0.92	MIB204E112MF07007S		21000	84

P 5.5 kW n_1 1440 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
516.9	102	2.79	1.3	MIB202F132SF00279S		3200	56
517.2	102	2.78	2.5	MIB203F132SF00278S		6900	76
463.6	113	3.11	1.3	MIB202F132SF00311S		3200	56
445.6	118	3.23	2.5	MIB203F132SF00323S		7200	76
392.7	134	3.67	1.3	MIB202F132SF00367S		3300	56
398	132	3.62	2.5	MIB202F132SF00362S		7400	76
350.6	150	4.11	1.2	MIB202F132SF00411S		3300	56
347.6	151	4.14	2.4	MIB203F132SF00414S		7700	76

P 5.5 kW n_1 **1440 min^{-1}**

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
312	168	4.62	1.1	MIB202F132SF00462S		3400	56
316.8	166	4.55	2.4	MIB203F132SF00455S		7900	76
293.9	179	4.9	1	MIB202F132SF00547S		3400	56
274.3	191	5.25	2.5	MIB203F132SF00525S		8200	76
263.2	200	5.47	1.3	MIB202F132SF00547S		3700	56
263	200	5.48	2.6	MIB203F132SF00548S		8400	76
236.1	222	6.1	1.2	MIB202F132SF00610S		3700	56
226.6	232	6.36	2.4	MIB203F132SF00636S		8800	76
200	263	7.2	1.1	MIB202F132SF00720S		3800	56
202.4	260	7.12	2.2	MIB203F132SF00712S		9000	76
178.6	294	8.06	1	MIB202F132SF00806S		3800	56
176.7	297	8.15	2.1	MIB203F132SF00815S		9300	76
158.9	331	9.06	0.98	MIB202F132SF00906S		3800	56
161.1	326	8.94	2	MIB203F132SF00894S		9500	76
149.7	351	9.62	0.97	MIB202F132SF00962S		3800	56
139.5	377	10.33	1.8	MIB203F132SF01033S		9800	76
124.1	423	11.6	0.85	MIB202F132SF01160S		3700	56
126.2	416	11.41	1.7	MIB203F132SF01141S		10000	76
116.2	452	12.39	0.8	MIB202F132SF01239S		3700	56
113.7	462	12.67	1.6	MIB203F132SF01267S		10200	76
116.4	451	12.37	2.9	MIB204F132SF01237S		15100	95
106.1	495	13.57	1.5	MIB203F132SF01357S		10400	76
103.4	508	13.93	2.8	MIB204F132SF01393S		15600	95
90.8	579	15.87	1.2	MIB203F132SF01587S		10700	76
93.2	564	15.45	2.5	MIB204F132SF01545S		16000	95
78.8	666	18.27	1	MIB303F132SF01827S		10900	76
84.3	623	17.09	1.2	MIB203F132SF01709S		10800	76
81.4	646	17.7	2.2	MIB204F132SF01770S		16500	95
74.2	708	19.41	1	MIB203F132SF01941S		11000	76
69.3	758	20.78	1.8	MIB204F132SF02078S		17100	95
79.1	664	18.19	2	MIB304F132SF01819S		16600	95
65.5	802	21.98	0.9	MIB203F132SF02198S		11000	76
64.7	811	22.24	1.7	MIB204F132SF02224S		17400	95
70.6	744	20.4	1.9	MIB304F132SF02040S		17100	95
60.1	874	23.97	0.82	MIB203F132SF02397S		11000	76
58	906	24.84	1.5	MIB204F132SF02484S		17800	95
50.8	1034	28.34	1.4	MIB204F132SF02834S		18300	95
46.9	1121	30.73	1.2	MIB204F132SF03073S		18500	95
48.1	1092	29.94	1.5	MIB304F132SF02994S		18500	95
40.6	1294	35.47	1.1	MIB204F132SF03547S		19000	95
41.9	1252	34.34	1.3	MIB304F132SF03434S		19000	95
37	1421	38.96	0.99	MIB204F132SF03896S		19300	95
38	1382	37.89	1.2	MIB304F132SF03789S		19300	95

P 5.5 kW — n_1 1440 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
31	1695	46.48	0.83	MIB204F132SF04648S		19800	95
34.5	1521	41.69	1.1	MIB304F132SF04169S		19500	95
30.7	1713	46.97	0.93	MIB304F132SF04697S		19900	95
27.6	1900	52.1	0.84	MIB304F132SF05210S		20100	95

P 7.5 kW — n_1 1445 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
518.7	138	2.79	0.98	MIB202F132MF00279S		2900	57
519	138	2.78	1.8	MIB203F132MF00278S		6700	77
515.2	139	2.8	2.7	MIB204F132MF00280S		9600	96
465.2	154	3.11	0.97	MIB202F132MF00311S		2900	57
447.1	160	3.23	1.8	MIB203F132MF00323S		7000	77
459.4	156	3.15	2.7	MIB204F132MF00315S		9900	96
394.1	182	3.67	0.99	MIB202F132MF00367S		2900	57
399.3	179	3.62	1.8	MIB203F132MF00362S		7200	77
399.1	179	3.62	2.7	MIB204F132MF00362S		10300	96
351.8	204	4.11	0.91	MIB202F132MF00411S		2900	57
348.8	205	4.14	1.8	MIB203F132MF00414S		7400	77
352.1	203	4.1	2.7	MIB204F132MF00410S		10700	96
313.1	229	4.62	0.81	MIB202F132MF00462S		2900	57
317.9	225	4.55	1.8	MIB203F132MF00455S		7500	77
313	229	4.62	2.7	MIB204F132MF00462S		11000	96
275.2	260	5.25	1.8	MIB203F132MF00525S		7800	77
273	262	5.29	2.7	MIB204F132MF00529S		11500	96
264.2	271	5.47	0.96	MIB202F132MF00547S		3200	57
263.9	271	5.48	1.9	MIB203F132MF00548S		8100	77
236.9	302	6.1	0.91	MIB202F132MF00610S		3200	57
227.4	315	6.36	1.7	MIB203F132MF00636S		8400	77
238.8	300	6.05	3	MIB204F132MF00605S		12100	96
200.7	357	7.2	0.81	MIB202F132MF00720S		3200	57
203.1	353	7.12	1.6	MIB203F132MF00712S		8600	77
207.5	345	6.97	2.8	MIB204F132MF00697S		12600	96
177.4	404	8.15	1.5	MIB203F132MF00815S		8800	77
183	391	7.9	2.7	MIB204F132MF00790S		13000	96
161.6	443	8.94	1.5	MIB203F132MF00894S		9000	77
162.7	440	8.88	2.6	MIB204F132MF00888S		13400	96
140	512	10.33	1.3	MIB203F132MF01033S		9200	77
141.9	505	10.18	2.4	MIB204F132MF01018S		13800	96
126.6	566	11.41	1.3	MIB203F132MF01141S		9300	77
128.6	557	11.24	2.3	MIB204F132MF01124S		14200	96
114.1	628	12.67	1.1	MIB203F132MF01267S		9500	77
116.9	613	12.37	2.1	MIB204F132MF01237S		14500	96

P 7.5 kW — n_1 1445 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
106.5	673	13.57	1.1	MIB203F132MF01357S		9500	77
103.7	690	13.93	2	MIB204F132MF01393S		14900	96
91.1	786	15.87	0.92	MIB203F132MF01587S		9700	77
93.5	766	15.45	1.8	MIB204F132MF01545S		15200	96
84.5	847	17.09	0.85	MIB203F132MF01709S		9700	77
81.6	877	17.7	1.6	MIB204F132MF01770S		15600	96
69.5	1030	20.78	1.4	MIB204F132MF02078S		16100	96
65	1102	22.24	1.3	MIB204F132MF02224S		16300	96
58.2	1231	24.84	1.1	MIB204F132MF02484S		16500	96
51	1405	28.34	1	MIB204F132MF02834S		16800	96
47	1523	30.73	0.92	MIB204F132MF03073S		17000	96
48.3	1484	29.94	1.1	MIB304F132MF02994S		17000	96
40.7	1758	35.47	0.8	MIB204F132MF03547S		17200	96
42.1	1702	34.34	0.94	MIB304F132MF03434S		17300	96
38.1	1878	37.89	0.85	MIB304F132MF03789S		17400	96

P 9.3 kW — n_1 1435 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
515.1	172	2.79	0.78	MIB202G160SF00279S		2700	59
515.4	172	2.78	1.45	MIB203G160SF00278S		6600	79
511.6	174	2.8	2.13	MIB204G160SF00280S		9500	98
462	192	3.11	0.78	MIB202G160SF00311S		2700	59
444	200	3.23	1.45	MIB203G160SF00323S		6800	79
456.2	195	3.15	2.12	MIB204G160SF00315S		9800	98
391.4	227	3.67	0.80	MIB202G160SF00367S		2700	59
396.6	224	3.62	1.45	MIB203G160SF00362S		7000	79
396.4	224	3.62	2.13	MIB204G160SF00462S		10200	98
346.4	256	4.14	1.45	MIB203G160SF00414S		7200	79
349.6	254	4.1	2.13	MIB204G160SF00410S		10500	98
315.7	281	4.55	1.45	MIB203G160SF00455S		7300	79
310.8	286	4.62	2.12	MIB204G160SF00462S		10900	98
273.3	325	5.25	1.45	MIB203G160SF00525S		7500	79
271.1	328	5.29	2.13	MIB204G160SF00529S		11300	98
262.1	339	5.48	1.55	MIB203G160SF00548S		7900	79
265.9	334	5.4	2.51	MIB204G160SF00540S		11500	98
225.8	393	6.36	1.36	MIB203G160SF00636S		8100	79
237.1	375	6.05	2.42	MIB204G160SF00605S		11900	98
201.7	440	7.12	1.35	MIB203G160SF00712S		8300	79
206	431	6.97	2.22	MIB204G160SF00697S		12300	98
176.1	504	8.15	1.26	MIB203G160SF00815S		8400	79
181.7	489	7.9	2.13	MIB204G160SF00790S		12700	98
160.5	553	8.94	1.16	MIB203G160SF00894S		8600	79
161.6	550	8.88	2.03	MIB204G160SF00888S		13100	98

P 9.3 kW n_1 1435 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
139	639	10.33	1.06	MIB203G160SF01033S		8700	79
40.9	630	10.18	1.94	MIB204G160SF01018S		13500	98
125.7	707	11.41	1.06	MIB203G160SF01141S		8800	79
127.7	695	11.24	1.84	MIB204G160SF01124S		13800	98
113.3	784	12.67	0.92	MIB203G160SF01267S		8900	79
116	766	12.37	1.74	MIB204G160SF01237S		14000	98
105.7	840	13.57	0.86	MIB203G160SF01357S		8900	79
103	862	13.93	1.64	MIB204G160SF01393S		14400	98
92.9	956	15.45	1.45	MIB204G160SF01545S		14600	98
81.1	1095	17.7	1.26	MIB204G160SF01770S		15000	98
69	1287	20.78	1.06	MIB204G160SF02078S		15300	98
64.5	1377	22.24	1.06	MIB204G160SF02224S		15500	98
57.8	1536	24.84	0.91	MIB204G160SF02484S		15600	98
50.6	1755	28.34	0.79	MIB204G160SF02834S		15800	98
53.9	1648	26.62	0.91	MIB304G160SF02662S		15800	98
47.9	1854	29.94	0.86	MIB304G160SF02994S		15900	98

P 11.0 kW n_1 1465 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
526.2	200	2.78	1.3	MIB203G160MF00278S		6300	148
522.3	201	2.8	1.9	MIB204G160MF00280S		9300	167
453.3	232	3.23	1.3	MIB203G160MF00323S		6500	148
465.8	226	3.15	1.9	MIB204G160MF00315S		9600	167
404.9	259	3.62	1.3	MIB203G160MF00362S		6700	148
404.7	260	3.62	1.9	MIB204G160MF00362S		9900	167
353.6	297	4.14	1.2	MIB203G160MF00414S		6800	148
356.9	294	4.1	1.9	MIB204G160MF00410S		10300	167
322.3	326	4.55	1.2	MIB203G160MF00455S		7000	148
317.3	331	4.62	1.9	MIB204G160MF00462S		10600	167
279	376	5.25	1.2	MIB203G160MF00525S		7100	148
276.7	380	5.29	1.9	MIB204G160MF00529S		10900	167
267.6	393	5.48	1.3	MIB203G160MF00548S		7500	148
271.5	387	5.4	2.2	MIB204G160MF00540S		11200	167
230.5	456	6.36	1.2	MIB203G160MF00636S		7700	148
242.1	434	6.05	2.1	MIB204G160MF00605S		11500	167
205.9	510	7.12	1.1	MIB203G160MF00712S		7800	148
210.3	499	6.97	2	MIB204G160MF00697S		11900	167
179.8	584	8.15	1	MIB203G160MF00815S		7900	148
185.5	566	7.9	1.9	MIB204G160MF00790S		12300	167
163.9	641	8.94	1	MIB203G160MF00894S		8000	148
164.9	637	8.88	1.8	MIB204G160MF00888S		12600	167
141.9	740	10.33	0.92	MIB203G160MF01033S		8100	148
143.8	730	10.18	1.7	MIB204G160MF01018S		12900	167

P 11.0 kW n_1 1465 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
128.4	818	11.41	0.88	MIB203G160MF01141S		8100	148
130.4	806	11.24	1.6	MIB204G160MF01124S		13200	167
118.5	887	12.37	1.5	MIB204G160MF01237S		13400	167
105.2	999	13.93	1.4	MIB204G160MF01393S		13600	167
94.8	1108	15.45	1.3	MIB204G160MF01545S		13800	167
82.8	1269	17.7	1.1	MIB204G160MF01770S		14100	167
70.5	1490	20.78	0.94	MIB204G160MF02078S		14300	167
65.9	1595	22.24	0.88	MIB204G160MF02224S		14300	167
62.4	1684	23.48	0.83	MIB304G160MF02348S		14500	167

P 15.0 kW n_1 1460 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
524.4	273	2.78	0.92	MIB203G160LF00278S		5900	168
520.5	275	2.8	1.4	MIB204G160LF00280S		9000	187
451.8	317	3.23	0.91	MIB203G160LF00323S		6100	168
464.2	309	3.15	1.4	MIB204G160LF00315S		9200	187
403.5	355	3.62	0.92	MIB203G160LF00362S		6100	168
403.3	355	3.62	1.4	MIB204G160LF00362S		9500	187
352.4	406	4.14	0.91	MIB203G160LF00414S		6200	168
355.7	403	4.1	1.4	MIB204G160LF00410S		9800	187
321.2	446	4.55	0.91	MIB203G160LF00455S		6300	168
316.3	453	4.62	1.4	MIB204G160LF00462S		10000	187
278.1	515	5.25	0.91	MIB203G160LF00525S		6300	168
275.8	519	5.29	1.4	MIB204G160LF00529S		10300	187
266.6	537	5.48	0.97	MIB203G160LF00548S		6800	168
270.6	529	5.4	1.6	MIB204G160LF00540S		10700	187
229.7	624	6.36	0.88	MIB203G160LF00636S		6900	168
241.3	594	6.05	1.5	MIB204G160LF00605S		10900	187
205.2	698	7.12	0.83	MIB203G160LF00712S		6900	168
209.6	683	6.97	1.4	MIB204G160LF00697S		11200	187
184.9	775	7.9	1.4	MIB204G160LF00790S		11500	187
164.4	871	8.88	1.3	MIB204G160LF00888S		11700	187
143.4	999	10.18	1.2	MIB204G160LF01018S		11900	187
129.9	1103	11.24	1.2	MIB204G160LF01124S		12100	187
118.1	1213	12.37	1.1	MIB204G160LF01237S		12200	187
104.8	1367	13.93	1	MIB204G160LF01393S		12300	187
94.5	1516	15.45	0.92	MIB204G160LF01545S		12300	187
82.5	1737	17.7	0.81	MIB204G160LF01770S		10700	187

P 18.5 kW n_1 1455 min^{-1}

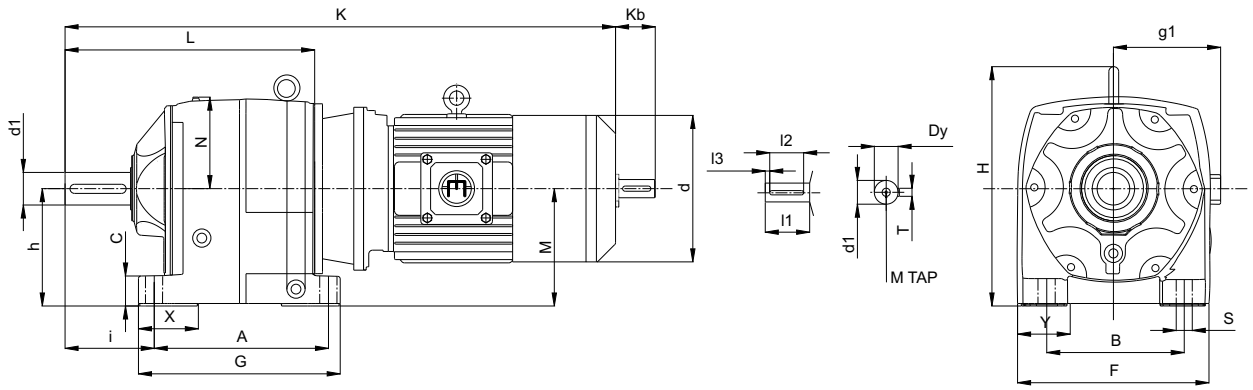
n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
518.7	341	2.8	1.1	MIB204H180MF00280S		8700	217
462.6	382	3.15	1.1	MIB204H180MF00315S		8900	217
401.9	440	3.62	1.1	MIB204H180MF00362S		9100	217
354.5	498	4.1	1.1	MIB204H180MF00410S		9400	217
315.2	561	4.62	1.1	MIB204H180MF00462S		9500	217
274.9	643	5.29	1.1	MIB204H180MF00529S		9700	217
269.6	655	5.4	1.3	MIB204H180MF00540S		10200	217
240.4	735	6.05	1.2	MIB204H180MF00605S		10400	217
208.9	846	6.97	1.2	MIB204H180MF00697S		10600	217
184.3	959	7.9	1.1	MIB204H180MF00790S		10800	217
163.8	1078	8.88	1	MIB204H180MF00888S		10900	217
142.9	1237	10.18	0.98	MIB204H180MF01018S		11000	217
129.5	1364	11.24	0.95	MIB204H180MF01124S		11100	217

P 22.0 kW n_1 1460 min^{-1}

n2ex min-1	T2m Nm	iex	SF	TYPE	Fr NN	FrN-G N	M kg
520.5	404	2.8	0.93	MIB204H180LF00280S		8400	247
464.2	453	3.15	0.93	MIB204H180LF00315S		8600	247
403.3	521	3.62	0.93	MIB204H180LF00362S		8800	247
355.7	591	4.1	0.93	MIB204H180LF00410S		8900	247
316.3	664	4.62	0.93	MIB204H180LF00462S		9100	247
275.8	762	5.29	0.93	MIB204H180LF00529S		9200	247
270.6	776	5.4	1.1	MIB204H180LF00540S		9800	247
241.3	871	6.05	1	MIB204H180LF00605S		9900	247
209.6	1002	6.97	0.98	MIB204H180LF00697S		10000	247
184.9	1136	7.9	0.92	MIB204H180LF00790S		10100	247
164.4	1278	8.88	0.88	MIB204H180LF00888S		10200	247
143.4	1465	10.18	0.83	MIB204H180LF01018S		9100	247
129.9	1617	11.24	0.8	MIB204H180LF01124S		7600	247

5. MI4

MIB2/3 S



5.5 DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	h	C	i	X	A	L	M	N	H	Y	B	S	F	G
MI01	90	18	75	40	130	201	90	76	166	35	110	10	154	160
MI02	115	22	90	60	165	251	115	94	209	55	135	14	199	200
MI03	140	30	115	70	205	307	140	119	298	60	170	18	244	245
MI04	180	45	140	90	260	386	180	146.5	366	75	215	19	294	310

O/P SHAFT DETAILS

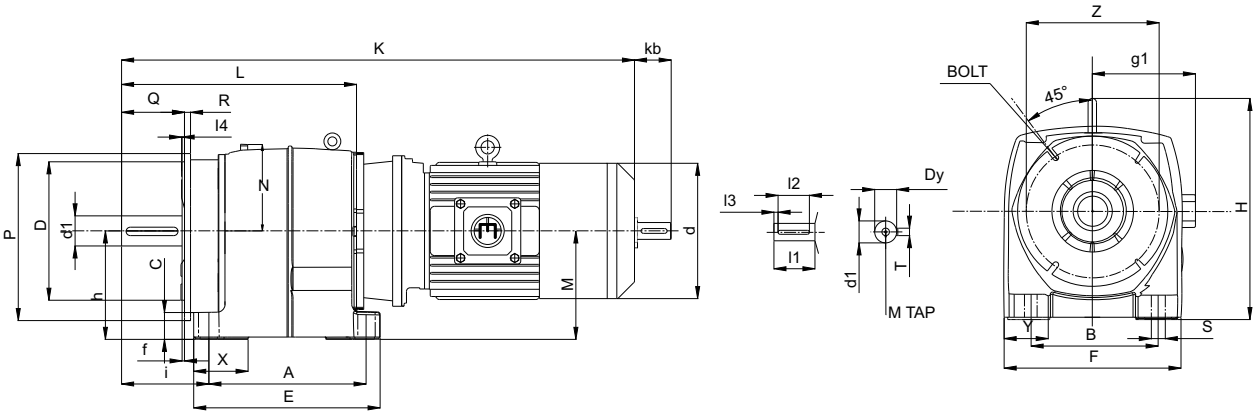
MODEL	d1	l1	l2	l3	Dy	T	MTAP
MI01	25k6	50	40	7	28	8	M10X22
MI02	30k6	60	50	7	33	8	M10X22
MI03	40k6	80	70	5	43	12	M16X36
MI04	50k6	100	80	10	53.5	14	M16X36

MOTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	124	140	157	174	174	195	220	260	260	316	316	354	354
	Kb	35	44	57	72	72	82	83	103	103	136	136	120	121
	g1	116	124	134	140	140	162	170	206	206	226	226	265	265
Model														
MI01	**K**	443.5	477.99	482.2	520.5	545.5	581.5	603.5	-	-	-	-	-	-
MI02	**K**	485.5	517.8	524.3	562.5	587.5	634.2	656.2	718.5	756.5	858.8	902.8	-	-
MI03	**K**	541.5	573.8	580.3	618.5	643.5	690.2	712.2	774.5	812.5	914.8	958.8	-	-
MI04	**K**	-	-	652.5	689.33	714.33	763.33	785.33	852.32	890.32	992	1036	1086	1124

5. MI4

MIB2/3 A - Medium Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	h	C	i	X	A	E	L	M	N	H	Y	B	F	S	Q	R	I4	Z	BOLT
MI01	160	110j6	90	18	93	40	130	160	219	90	76	166	35	110	154	10	55	9	3.5	130	4Xø9
MI02	200	130j6	115	22	108	60	165	200	270	115	94	209	55	135	199	14	65	10	3.5	165	4Xø11
MI03	250	180j6	140	30	133	70	205	245	325	140	119	298	60	170	244	18	86	13	4	215	4Xø13.5
MI04	300	230j6	180	45	151	90	260	310	397	180	146.5	366	75	215	294	19	110	15	4	265	4Xø13.5

O/P SHAFT DETAILS

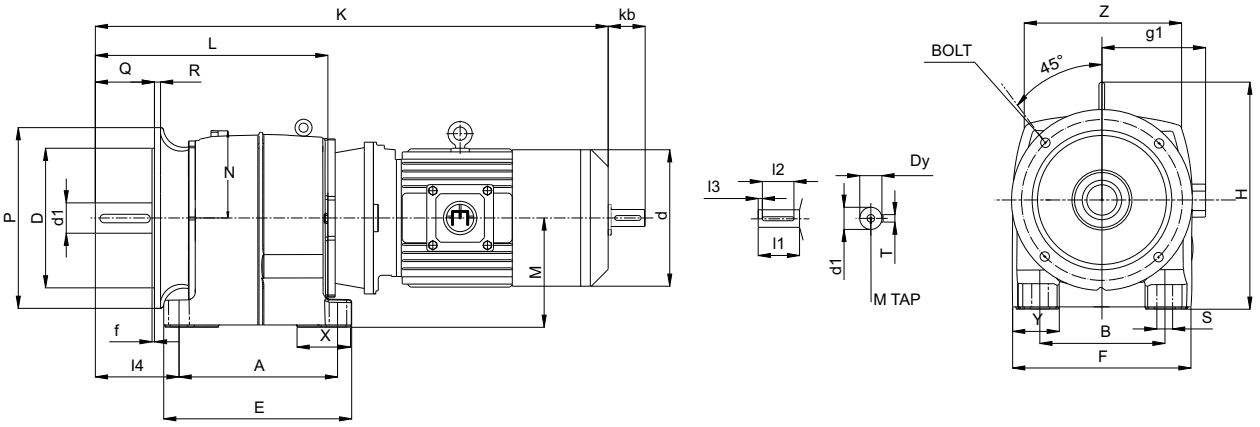
MODEL	d1	I1	I2	I3	Dy	T	MTAP
MI01	25k6	50	40	7	28	8	M10X22
MI02	30k6	60	50	7	33	8	M10X22
MI03	40k6	80	70	5	43	12	M16X36
MI04	50k6	100	80	10	53.5	14	M16X36

MOTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	124	140	157	174	174	195	220	260	260	316	316	354	354
	Kb	35	44	57	72	72	82	83	103	103	136	136	120	121
	g1	116	124	134	140	140	162	170	206	206	226	226	265	265
Model														
MI01	**K**	461.5	495.99	500.2	538.5	563.5	599.5	621.5	-	-	-	-	-	-
MI02	**K**	504.5	536.8	543.3	581.5	606.5	653.2	675.2	737.5	775.5	877.8	921.8	-	-
MI03	**K**	559.5	591.8	598.3	636.5	661.5	708.2	730.2	792.5	830.5	932.8	976.8	-	-
MI04	**K**	-	-	663.5	700.33	725.33	774.33	796.33	863.32	901.32	1003	1047	1097	1135

5. MI4

MIB2/3 A - Large Reinforced Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	L	Q	R	f	l4	A	E	X	M	N	Z	S	Y	H	B	F	BOLT
MI01	NOT APPLICABLE																		
MI02	NOT APPLICABLE																		
MI03	250	180j6	366	90	12	4	174	205	245	70	140	119	215	18	60	298	170	244	4Xø13.5
MI04	300	230j6	436	110	15	4	190	260	310	90	180	146.5	265	18	75	366	215	294	4Xø13.5

O/P SHAFT DETAILS

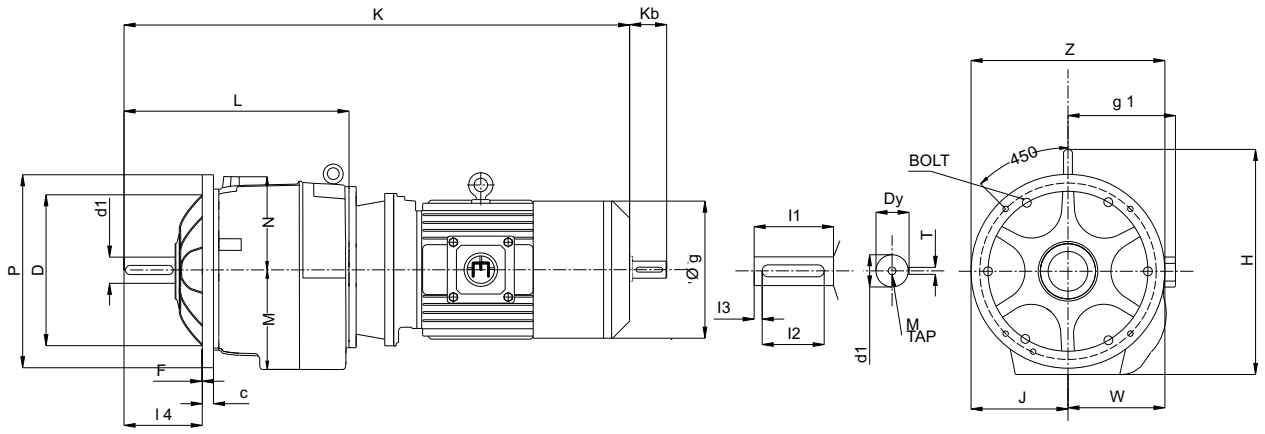
MODEL	d1	l1	l2	l3	Dy	T	MTAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	45k6	90	80	5	48.5	14	M16X36
MI04	55k6	110	90	10	59	16	M20X42

MOTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	124	140	157	174	174	195	220	260	260	316	316	354	354
	Kb	35	44	57	72	72	82	83	103	103	136	136	120	121
	g1	116	124	134	140	140	162	170	206	206	226	226	265	265
Model														
MI01	**K**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI02	**K**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI03	**K**	600.5	632.8	639.3	677.5	702.5	749.2	771.2	833.5	871.5	973.8	1017.8	-	-
MI04	**K**	-	-	702.5	739.33	764.33	813.33	835.33	902.32	940.32	1042	1086	1136	1174

5. MI4

MIV2/3 A - Large Diameter with Bearing Neck



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	F	l4	C	L	N	M	Z	J	W	H	BOLT
MI01	NOT APPLICABLE												
MI02	250	180j6	4	80	13	251	94	117	215	95	104	211	4Xø13.5
MI03	300	230j6	4	130	13	325	119	143	265	115	129	301	4Xø13.5
MI04	350	250h6	5	160	15	397	146.5	184	300	145	149	370	4Xø17.5

O/P SHAFT DETAILS

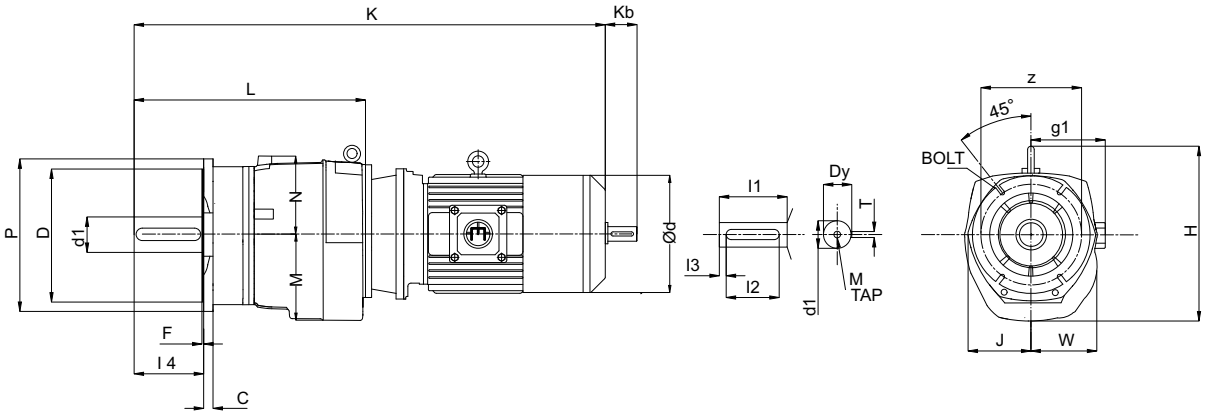
MODEL	d1	I1	I2	I3	Dy	T	MTAP
MI01	NOT APPLICABLE						
MI02	30k6	60	50	7	33	8	M10X22
MI03	40k6	80	70	5	43	12	M16X36
MI04	50k6	100	80	10	53.5	14	M16X36

MOTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	124	140	157	174	174	195	220	260	260	316	316	354	354
	Kb	35	44	57	72	72	82	83	103	103	136	136	120	121
	g1	116	124	134	140	140	162	170	206	206	226	226	265	265
Model														
MI01	**K**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI02	**K**	485.5	517.8	524.3	562.5	587.5	634.2	656.2	718.5	756.5	858.8	902.8	-	-
MI03	**K**	559.5	591.8	598.3	636.5	661.5	708.2	730.2	792.5	830.5	932.8	976.8	-	-
MI04	**K**	-	-	663.5	700.33	725.33	774.33	796.33	863.32	901.32	1003	1047	1097	1135

5. MI4

MIV2/3 A - Vertical Medium Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	F	l4	C	L	N	M	Z	J	W	H	BOLT
MI01	160	110j6	3.5	55	9	219	76	94	130	73	81	170	4Xø9
MI02	200	130j6	3.5	65	10	270	94	117	165	95	104	211	4Xø11
MI03	250	180j6	4	86	13	325	119	143	215	115	129	301	4Xø13.5
MI04	300	230j6	4	110	15	397	146.5	184	265	145	149	370	4Xø13.5

O/P SHAFT DETAILS

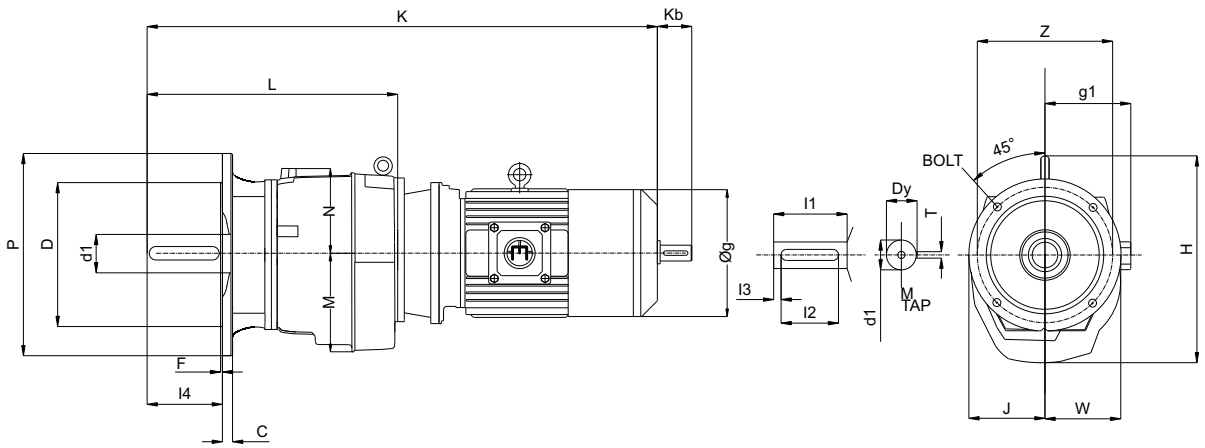
MODEL	d1	l1	l2	l3	Dy	T	MTAP
MI01	25k6	50	40	7	28	8	M10X22
MI02	30k6	60	50	7	33	8	M10X22
MI03	40k6	80	70	5	43	12	M16X36
MI04	50k6	100	80	10	53.5	14	M16X36

MOTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	124	140	157	174	174	195	220	260	260	316	316	354	354
	Kb	35	44	57	72	72	82	83	103	103	136	136	120	121
	g1	116	124	134	140	140	162	170	206	206	226	226	265	265
Model														
MI01	**K**	461.5	495.99	500.2	538.5	563.5	599.5	621.5	-	-	-	-	-	-
MI02	**K**	504.5	536.8	543.3	581.5	606.5	653.2	675.2	737.5	775.5	877.8	921.8	-	-
MI03	**K**	559.5	591.8	598.3	636.5	661.5	708.2	730.2	792.5	830.5	932.8	976.8	-	-
MI04	**K**	-	-	663.5	700.33	725.33	774.33	796.33	863.32	901.32	1003	1047	1097	1135

5. MI4

MIV2/3 S - Vertical Large Reinforced Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	F	I4	C	L	N	M	Z	J	W	H	BOLT
MI01	NOT APPLICABLE												
MI02	NOT APPLICABLE												
MI03	250	180j6	4	90	12	366	115	143	215	115	129	301	4Xø13.5
MI04	300	230j6	4	110	15	436	146.5	184	265	145	149	371	4Xø13.5

O/P SHAFT DETAILS

MODEL	d1	I1	I2	I3	Dy	T	MTAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	45k6	90	80	5	48.5	14	M16X36
MI04	55k6	110	90	10	59	16	M20X42

MOTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	124	140	157	174	174	195	220	260	260	316	316	354	354
	Kb	35	44	57	72	72	82	83	103	103	136	136	120	121
	g1	116	124	134	140	140	162	170	206	206	226	226	265	265
Model														
MI01	**K**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI02	**K**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI03	**K**	600.5	632.8	639.3	677.5	702.5	749.2	771.2	833.5	871.5	973.8	1017.8	-	-
MI04	**K**	-	-	702.5	739.33	764.33	813.33	835.33	902.32	940.32	1042	1086	1136	1174

5. MI4

5.6 Auswahl Getriebe MI4
Selection of gear unit MI4
Sélection d'un réducteur MI4

Beispiel: Auswahltabellen Getriebe
Example: Gear unit selection table
Exemple de tableau de sélection pour réducteurs

Getriebeart und -größe
Gear unit type and size
Type et taille du réducteur

Synchrondrehzahl des Motors
Synchronous speed of motor
Vitesse synchrone du moteur

Gewichte
Weights
Poids

MI..01

Type	m [kg]
MI..01M···	12
MI..01M···	14

200 Nm

Type	...	n_{syn} =	1500 min^{-1}				1000 1/min				750 1/min			
		i_{ex}	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N
	2.8	2.78	539	14	250									
	3.15	3.23	464	14	290									
	3.55	3.62	415	14	325									
	4	4.14	362	14	370									
	4.5	4.55	330	14	405									

Max. Nenndrehmoment
Max. rated torque
Couple nominal maxi.

Zulässige Radialkraft
Permissible radial force
Force radiale admissible

Drehmoment an der Abtriebswelle
Torque at output shaft
Couple au niveau de l'arbre de sortie

Mechanische Nennleistung des Getriebes
Mechanical rated power of gear unit
Puissance nominale mécanique du réducteur

Auswahldrehzahl der Abtriebswelle
Selection speed of output shaft
Vitesse de l'arbre de sortie

Exakte Übersetzung
Exact gear ratio
Valeur exacte du rapport de démultiplication

Nenn Übersetzung
Rated gear ratio
Réduction nominale

5. MI4

MI..01	**Type**	**m [kg]**	**200 Nm**
	MI..01⋯	**12**	
	MI..01M⋯	**14**	

Type	⋯	n_{syn} =	1500 min^{-1}				1000 1/min				750 1/min			
		i_{ex}	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N
MI.201M00000.....	2.8	2.80	536	5.6	100	3270								
	3.15	3.21	467	5.1	105	3880								
	3.55	3.44	436	5.0	110	3960								
	4	3.96	379	4.6	115	4000								
	4.5	4.58	328	4.1	120	4000								
	5	4.93	304	4.0	125	4000								
	5.6	5.72	262	3.6	130	4000	175	2.4	130	4000	131	1.8	130	4000
	6.3	6.56	229	3.2	135	4000	153	2.2	135	4000	114	1.6	135	4000
	7.1	7.03	213	3.2	145	4000	142	2.2	145	4000	107	1.6	145	4000
	8	8.09	185	3.0	155	4000	124	2.0	155	4000	93	1.5	155	4000
	9	9.35	160	2.7	160	4000	107	1.8	160	4000	80	1.3	160	4000
	10	10.08	149	2.6	170	4000	99	1.8	170	4000	74	1.3	170	4000
	11.2	10.88	138	2.6	180	4000	92	1.7	180	4000	69	1.3	180	4000
	12.5	12.76	118	2.2	180	4000	78	1.5	180	4000	59	1.1	180	5000
	14	13.89	108	2.0	180	4000	72	1.4	180	4500	54	1.0	180	5000
	16	16.61	90	1.7	180	4000	60	1.1	180	4500	45	0.9	180	5000
	18	18.28	82	1.5	180	4500	55	1.0	180	5000	41	0.8	180	5000
	20	20.24	74	1.4	180	4500	49	0.9	180	5000	37	0.7	180	5500
	22.4	22.55	67	1.3	180	4500	44	0.8	180	5000	33	0.6	180	5500
	25	25.32	59	1.1	180	5000	39	0.7	180	5000	30	0.6	180	5500
	28	28.18	53	1.0	180	5000	35	0.7	180	5500	27	0.5	180	5500
	31.5	31.52	48	0.9	180	5000	32	0.6	180	5500	24	0.4	180	5500
	35.5	36.64	41	0.8	180	5000	27	0.5	180	5500	20	0.4	180	5500
	40	40.82	37	0.7	180	5500	24	0.5	180	5500	18	0.3	180	5500
	45	42.13	36	0.7	180	5500	24	0.5	180	5500	18	0.3	180	5500
	50	50.73	30	0.6	180	5500	20	0.4	180	5500	15	0.3	180	5500
	56	56.32	27	0.5	180	5500	18	0.3	180	5500	13	0.3	180	5500
	63	63.15	24	0.4	180	5500	16	0.3	180	5500	12	0.2	180	5500
MI.301M00000.....	12.5													
	14													
	16													
	18													
	20													
	22.4													
	25	24.36	62	1.2	190	4500	41	0.8	190	5500	31	0.6	190	6000
	28	28.16	53	1.1	190	5000	36	0.7	190	5500	27	0.5	190	6000
	31.5	30.35	49	1.0	200	5000	33	0.7	200	5500	25	0.5	200	6000
	35.5	32.76	46	1.0	200	5500	31	0.6	200	6000	23	0.5	200	6000
	40	38.45	39	0.8	200	5500	26	0.5	200	6000	20	0.4	200	6000
	45	4182	36	0.8	200	5500	24	0.5	200	6000	18	0.4	200	6000
	50	50.02	30	0.6	200	6000	20	0.4	200	6000	15	0.3	200	6000
	56	55.07	27	0.6	200	6000	18	0.4	200	6000	14	0.3	200	6000
	63	60.95	25	0.5	200	6000	16	0.3	200	6000	12	0.3	200	6000
	71	67.91	22	0.5	200	6000	15	0.3	200	6000	11	0.2	200	6000
	80	76.26	20	0.4	200	6000	13	0.3	200	6000	10	0.2	200	6000
	90	84.89	18	0.4	200	6000	12	0.2	200	6000	9	0.2	200	6000
	100	94.93	16	0.3	200	6000	11	0.2	200	6000	8	0.2	200	6000
	112	110.40	14	0.3	200	6000	9	0.2	200	6000	7	0.14	200	6000
	125	122.90	12	0.3	200	6000	8	0.2	200	6000	6	0.13	200	6000
	140	126.90	12	0.2	200	6000	8	0.2	200	6000	6	0.12	200	6000
	160	152.80	10	0.2	200	6000	7	0.1	200	6000	5	0.10	200	6000
	180	169.60	9	0.2	200	6000	6	0.12	200	6000	4	0.09	200	6000
	200	190.20	8	0.2	200	6000	5	0.11	200	6000	4	0.08	200	6000
	224													

5. MI4

MI..02

Type	m [kg]
MI..02···	22
MI..02M···	26

420 Nm

Type	...	n_{syn} = i_{ex}	1500 min^{-1} n_2 min^{-1}	P kW	T_2 Nm	F_r N	1000 1/min n_2 min^{-1}	P kW	T_2 Nm	F_r N	750 1/min n_2 min^{-1}	P kW	T_2 Nm	F_r N
MI.202M00000.....	2.8	2.79	538	7.6	135	2890								
	3.15	3.11	483	7.6	150	2910								
	3.55	3.67	409	7.7	180	2940								
	4	4.11	365	7.1	185	2950								
	4.5	4.62	325	6.3	185	2940								
	5	4.90	306	5.9	185	2940								
	5.6	5.47	274	7.5	260	3000	183	5.0	260	3500	137	3.7	260	4000
	6.3	6.10	246	7.1	275	3000	164	4.7	275	4000	123	3.5	275	4500
	7.1	7.20	208	6.3	290	3000	139	4.2	290	4000	104	3.2	290	4500
	8	8.07	186	5.9	305	3500	124	4.0	305	4000	93	3.0	305	4500
	9	9.06	166	5.6	325	3500	110	3.8	325	4000	83	2.8	325	5000
	10	9.62	156	5.6	340	3500	104	3.7	340	4000	78	2.8	340	5000
	11.2	11.60	129	4.9	360	3500	86	3.2	360	4500	65	2.4	360	5000
	12.5	12.39	121	4.6	360	4000	81	3.0	360	4500	61	2.3	360	5500
	14	14.21	106	4.0	360	4000	70	2.7	360	5000	53	2.0	360	5500
	16	16.46	91	3.4	360	4500	61	2.3	360	5000	46	1.7	360	5500
	18	17.80	84	3.2	360	4500	56	2.1	360	5500	42	1.6	360	5500
	20	20.69	72	2.7	360	5000	48	1.8	360	5500	36	1.4	360	6000
	22.4	23.03	65	2.5	360	5000	43	1.6	360	5500	33	1.2	360	6000
	25	25.36	59	2.2	360	5500	39	1.5	360	6000	30	1.1	360	7500
	28	28.12	53	2.0	360	5500	36	1.3	360	6000	27	1.0	360	7500
	31.5	31.42	48	1.8	360	5500	32	1.2	360	6000	24	0.9	360	7500
	35.5	34.81	43	1.6	360	5500	29	1.1	360	7500	22	0.8	360	7500
	40	38.78	39	1.5	360	6000	26	1.0	360	7500	19	0.7	360	7500
	45	44.63	34	1.3	360	7500	22	0.8	360	7500	17	0.6	360	7500
	50	50.07	30	1.1	360	7500	20	0.8	360	7500	15	0.6	360	7500
	56													
	63													
MI302M00000.....	12.5													
	14													
	16													
	18	17.09	88	3.4	370	4500	59	2.6	420	5000	44	1.9	420	5500
	20	19.06	79	3.2	385	4500	52	2.3	420	5000	39	1.7	420	6000
	22.4	22.49	67	2.9	420	4500	44	2.0	420	5000	33	1.5	420	6500
	25	25.20	60	2.6	420	5000	40	1.7	420	5500	30	1.3	420	6500
	28	28.31	53	2.3	420	5000	35	1.6	420	6000	26	1.2	420	6500
	31.5	30.06	50	2.2	420	5000	33	1.5	420	6500	25	1.1	420	6500
	35.5	36.25	41	1.8	420	5500	28	1.2	420	6500	21	0.9	420	6500
	40	38.71	39	1.7	420	6000	26	1.1	420	6500	19	0.9	420	6500
	45	44.40	34	1.5	420	6500	23	1.0	420	6500	17	0.7	420	6500
	50	51.42	29	1.3	420	6500	19	0.9	420	6500	15	0.6	420	6500
	56	55.60	27	1.2	420	6500	18	0.8	420	6500	13	0.6	420	6500
	63	64.64	23	1.0	420	6500	15	0.7	420	6500	12	0.5	420	6500
	71	71.97	21	0.9	420	6500	14	0.6	420	6500	10.4	0.5	420	6500
	80	79.24	19	0.8	420	6500	13	0.6	420	6500	9.5	0.4	420	6500
	90	87.84	17	0.8	420	6500	11	0.5	420	6500	8.5	0.4	420	6500
	100	98.16	15	0.7	420	6500	10.2	0.4	420	6500	7.6	0.3	420	6500
	112	108.80	14	0.6	420	6500	9.2	0.4	420	6500	6.9	0.3	420	6500
	125	121.20	12	0.5	420	6500	8.3	0.4	420	6500	6.2	0.3	420	6500
	140	139.40	11	0.5	420	6500	7.2	0.3	420	6500	5.4	0.2	420	6500
	160	156.40	9.6	0.4	420	6500	6.4	0.3	420	6500	4.8	0.2	420	6500

5. MI4

MI..03	**Type**	**m [kg]**	**820 Nm**
	MI..03⋯	**42**	
	MI..03M⋯	**46**	

Type	⋯	n_{syn} =	1500 min^{-1}				1000 1/min				750 1/min			
		i_{ex}	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N
MI.203M00000.....	2.8	2.78	539	14(1)	250	6560								
	3.15	3.23	464	14(1)	290	6790								
	3.55	3.62	415	14(1)	325	6970								
	4	4.14	362	14(1)	370	7000								
	4.5	4.55	330	14(1)	405	7000								
	5	5.25	286	14(1)	470	7000								
	5.6	5.48	274	15(1)	520	7000	183	9.9	520	8500	137	7.5	520	9500
	6.3	6.36	236	14(1)	550	7000	157	9.1	550	8500	118	6.8	550	9500
	7.1	7.12	211	13(1)	580	7500	141	8.5	580	9000	105	6.4	580	10000
	8	8.15	184	12(1)	610	7500	123	7.8	610	9000	92	5.9	610	10500
	9	8.94	168	11(1)	645	8000	112	7.6	645	9500	84	5.7	645	11000
	10	10.33	145	10(1)	680	8500	97	6.9	680	10000	73	5.2	680	11000
	11.2	11.41	131	9.9	720	8500	88	6.6	720	10000	66	5.0	720	11000
	12.5	12.67	118	8.9	720	9000	79	6.0	720	11000	59	4.5	720	12000
	14	13.57	111	8.3	720	9500	74	5.6	720	11000	55	4.2	720	12000
	16	15.87	95	7.1	720	10000	63	4.8	720	11000	47	3.6	720	12000
	18	17.09	88	6.6	720	10500	59	4.4	720	11500	44	3.3	720	12000
	20	19.41	77	5.8	720	11000	52	3.9	720	12000	39	2.9	720	12000
	22.4	21.98	68	5.1	720	12000	45	3.4	720	12000	34	2.6	720	12000
	25	23.97	63	4.7	720	12000	42	3.1	720	12000	31	2.4	720	12000
	28	27.74	54	4.1	720	12000	36	2.7	720	12000	27	2.0	720	12000
	31.5	30.63	49	3.7	720	12000	33	2.5	720	12000	24	1.8	720	12000
	35.5	36.65	41	3.1	720	12000	27	2.1	720	12000	20	1.5	720	12000
	40	40.81	37	2.8	720	12000	25	1.8	720	12000	18	1.4	720	12000
	45	45.14	33	2.5	720	12000	22	1.7	720	12000	17	1.3	720	12000
	50	50.15	30	2.3	720	12000	20	1.5	720	12000	15	1.1	720	12000
	56													
	63													
	12.5													
	14													
	16													
	18													
	20													
MI.303M00000.....	22.4	23.42	64	5.1	755	10500	43	3.6	800	11000	32	2.7	820	11000
	25	25.69	58	4.8	780	10000	39	3.3	820	11000	29	2.5	820	11000
	28	29.67	51	4.2	800	10000	34	2.9	820	11000	25	2.2	820	11000
	31.5	32.80	46	3.9	820	11000	30	2.6	820	11000	23	2.0	820	11000
	35.5	36.41	41	3.5	820	11000	27	2.4	820	11000	21	1.8	820	11000
	40	39.00	38	3.3	820	11000	26	2.2	820	11000	19	1.7	820	11000
	45	45.60	33	2.8	820	11000	22	1.9	820	11000	16	1.4	820	11000
	50	49.12	31	2.6	820	11000	20	1.7	820	11000	15	1.3	820	11000
	56	55.78	27	2.3	820	11000	18	1.5	820	11000	13	1.2	820	11000
	63	63.17	24	2.0	820	11000	16	1.4	820	11000	12	1.0	820	11000
	71	68.88	22	1.9	820	11000	15	1.2	820	11000	11	0.9	820	11000
	80	79.73	19	1.6	820	11000	13	1.1	820	11000	9.4	0.8	820	11000
	90	88.04	17	1.5	820	11000	11	1.0	820	11000	8.5	0.7	820	11000
	100	105.30	14	1.2	820	11000	9.5	0.8	820	11000	7.1	0.6	820	11000
	112	117.30	13	1.1	820	11000	8.5	0.7	820	11000	6.4	0.5	820	11000
	125	129.70	12	1.0	820	11000	7.7	0.7	820	11000	5.8	0.5	820	11000
	140	144.10	10	0.9	820	11000	6.9	0.6	820	11000	5.2	0.4	820	11000
	160													
	180													
	200													
	224													

(1) Achtung! Maximale Thermische Leistung beachten Attention! Please consult page 12 for thermal break even performance.
Attention! Vérifier svp la puissance thermique maximum.

5. MI4

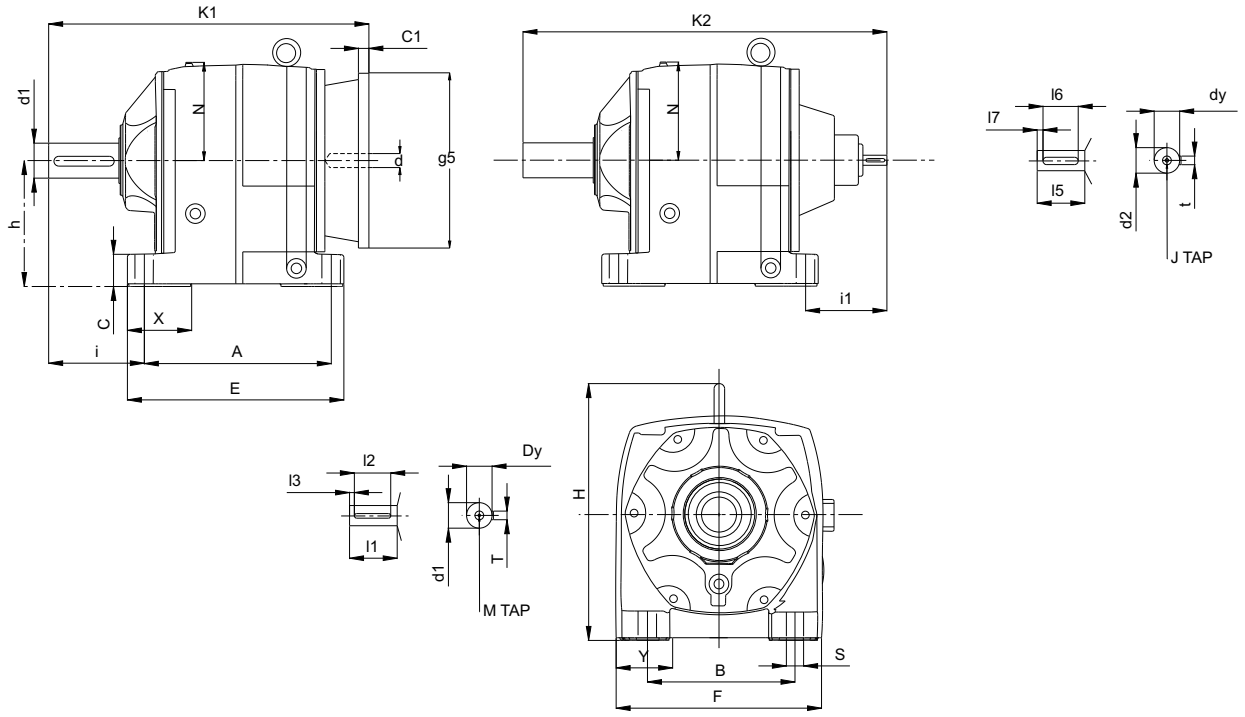
MI..04	**Type**	**m [kg]**	**1600 Nm**
	MI..04⋯	**71**	
	MI..04 ⋯	**85**	

Type	⋯	n_{syn}=	1500 min^{-1}				1000 1/min				750 1/min			
		i_{ex}	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N	n_2 min^{-1}	P kW	T_2 Nm	F_r N
MI.204M00000.....	2.8	2.80	535	21(1)	375	8690								
	3.15	3.15	477	21(1)	420	8890								
	3.55	3.62	414	21(1)	485	9000								
	4	4.10	365	21(1)	550	9000								
	4.5	4.62	325	21(1)	620	9000								
	5	5.29	283	21(1)	710	9000								
	5.6	5.40	278	25(1)	850	9000	185	16	850	10000	139	12	850	11000
	6.3	6.05	248	24(1)	910	9000	165	16	910	10500	124	12	910	12000
	7.1	6.97	215	22(1)	980	9000	144	15	980	11000	108	11	980	12000
	8	7.90	190	21(1)	1050	9000	127	14	1050	11000	95	10	1050	12500
	9	8.88	169	20(1)	1130	9500	113	13	1130	11500	84	10	1130	13000
	10	10.18	147	19(1)	1210	9500	98	12	1210	11500	74	9.3	1210	13000
	11.2	11.24	133	18(1)	1300	10000	89	12	1300	12000	67	9.1	1300	13500
	12.5	12.37	121	17(1)	1300	10500	81	11	1300	12500	61	8.3	1300	14000
	14	13.93	108	16	1400	10500	72	11	1400	13000	54	7.9	1400	14500
	16	15.45	97	14	1400	11000	65	9.5	1400	13500	49	7.1	1400	15500
	18	17.70	85	12	1400	12000	56	8.3	1400	14000	42	6.2	1400	16000
	20	20.78	72	11	1400	12500	48	7.1	1400	14000	36	5.3	1400	17000
	22.4	22.24	67	9.9	1400	13000	45	6.6	1400	16000	34	4.9	1400	18000
	25	24.84	60	8.9	1400	14000	40	5.9	1400	16500	30	4.4	1400	19000
	28	28.34	53	7.8	1400	14500	35	5.2	1400	17500	26	3.9	1400	19000
	31.5	30.73	49	7.2	1400	15000	33	4.8	1400	18000	24	3.6	1400	19000
	35.5	35.47	42	6.2	1400	16000	28	4.1	1400	19000	21	3.1	1400	19000
	40	38.96	39	5.6	1400	17000	26	3.8	1400	19000	19	2.8	1400	19000
	45	46.48	32	4.7	1400	18000	22	3.2	1400	19000	16	2.4	1400	19000
	50	52.12	29	4.2	1400	19000	19	2.8	1400	19000	14	2.1	1400	19000
	56													
	63													
MI.304M00000.....	12.5													
	14													
	16													
	18													
	20													
	22.4													
	25													
	28	26.62	56	8.9	1500	14000	38	6.3	1600	16500	28	4.7	1600	17500
	31.5	29.94	50	8.4	1600	14500	33	5.6	1600	17500	25	4.2	1600	17500
	35.5	34.34	44	7.3	1600	15500	29	4.9	1600	17500	22	3.7	1600	17500
	40	37.89	40	6.6	1600	16000	26	4.4	1600	17500	20	3.3	1600	21000
	45	41.69	36	6.0	1600	17500	24	4.0	1600	17500	18	3.0	1600	21000
	50	46.97	32	5.4	1600	17500	21	3.6	1600	17500	16	2.7	1600	21000
	56	52.10	29	4.8	1600	17500	19	3.2	1600	19000	14	2.4	1600	21000
	63	59.67	25	4.2	1600	17500	17	2.8	1600	21000	13	2.1	1600	21000
	71	70.07	21	3.6	1600	18000	14	2.4	1600	21000	11	1.8	1600	21000
	80	74.99	20	3.4	1600	19000	13	2.2	1600	21000	10.0	1.7	1600	21000
	90	83.75	18	3.0	1600	21000	12	2.0	1600	21000	9.0	1.5	1600	21000
	100	95.56	16	2.6	1600	21000	10.5	1.8	1600	21000	7.8	1.3	1600	21000
	112	103.60	14	2.4	1600	21000	9.7	1.6	1600	21000	7.2	1.2	1600	21000
	125	119.60	13	2.1	1600	21000	8.4	1.4	1600	21000	6.3	1.1	1600	21000
	140	131.30	11	1.9	1600	21000	7.6	1.3	1600	21000	5.7	1.0	1600	21000
	160	158.20	9.5	1.6	1600	21000	6.3	1.1	1600	21000	4.7	0.8	1600	21000
	180	175.70	8.5	1.4	1600	21000	5.7	1.0	1600	21000	4.3	0.7	1600	21000
	200													
	224													

(1) Achtung! Maximale Thermische Leistung beachten Attention! Please consult page 12 for thermal break even performance.
Attention! Vérifier svp la puissance thermique maximum.

5. MI4

MIB2/3 S - Standard Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	h	X	i	C	A	E	N	H	F	y	s	B	k2	i1
MI01	90	40	75	18	130	160	76	166	154	35	10	110	311.5	106.5
MI02	115	60	90	22	165	200	94	209	199	55	14	135	372.5	117.5
MI03	140	70	115	30	205	245	119	298	244	60	18	170	428.5	108.5
MI04	180	90	140	45	260	310	146.5	366	294	75	19	215	532	132

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP
MI01	8	28	25k6	50	40	7	M10X22
MI02	8	33	30k6	60	50	7	M10X22
MI03	12	43	40k6	80	70	5	M16X36
MI04	14	53.5	50k6	100	80	10	M16X36

I/P SHAFT

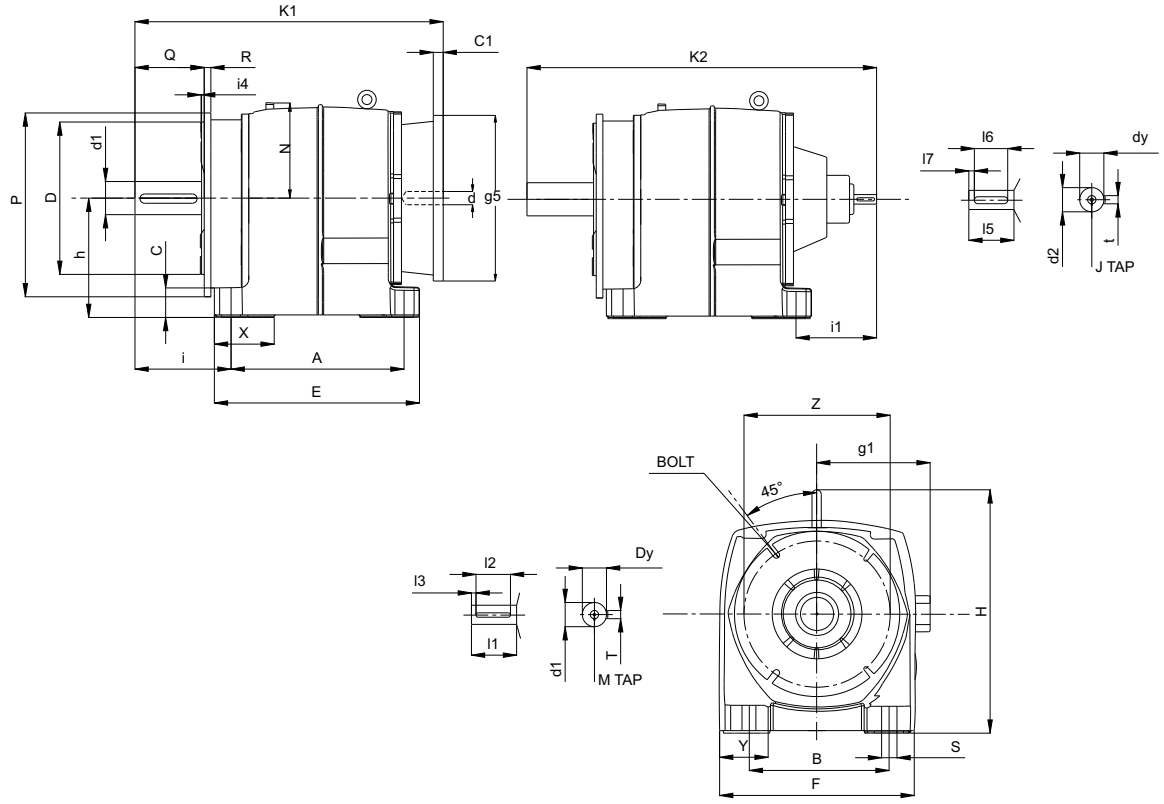
MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	6	21.5	19k6	40	32	4	M6X16
MI02	8	31	28k6	60	50	5	M10X22
MI03	8	31	28k6	60	50	5	M10X22
MI04	10	41	38k6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	**K1**	241.5	246.99	255.2	268.5	268.5	275.5	275.5	-	-	-	-	-	-
MI02	**K1**	283.5	286.8	297.3	310.5	310.5	328.2	328.2	349.5	349.5	383.8	383.8	-	-
MI03	**K1**	339.5	342.8	353.3	366.5	366.5	384.2	384.2	405.5	405.5	439.8	439.8	-	-
MI04	**K1**	-	-	425.5	437.33	437.33	457.33	457.33	483.32	483.32	517	517	517	517

5. MI4

MIB2/3 A - Medium Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	h	X	i	C	A	E	N	Z	H	B	F	Q	R	i4	k2	i1	Y	S	BOLT
MI01	160	110j6	90	40	93	18	130	160	76	130	166	110	154	55	9	3.5	329.5	106.5	35	10	4Xø9
MI02	200	130j6	115	60	108	22	165	200	94	165	209	135	199	65	10	3.5	391.5	118.5	55	14	4Xø11
MI03	250	180j6	140	70	133	30	205	245	119	215	298	170	244	86	13	4	446.5	108.5	60	18	4Xø13.5
MI04	300	230j6	180	90	151	45	260	310	146.5	265	366	215	294	110	15	4	543	132	75	19	4Xø13.5

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP
MI01	8	28	25k6	50	40	7	M10X22
MI02	8	33	30k6	60	50	7	M10X22
MI03	12	43	40k6	80	70	5	M16X36
MI04	14	53.5	50k6	100	80	10	M16X36

I/P SHAFT

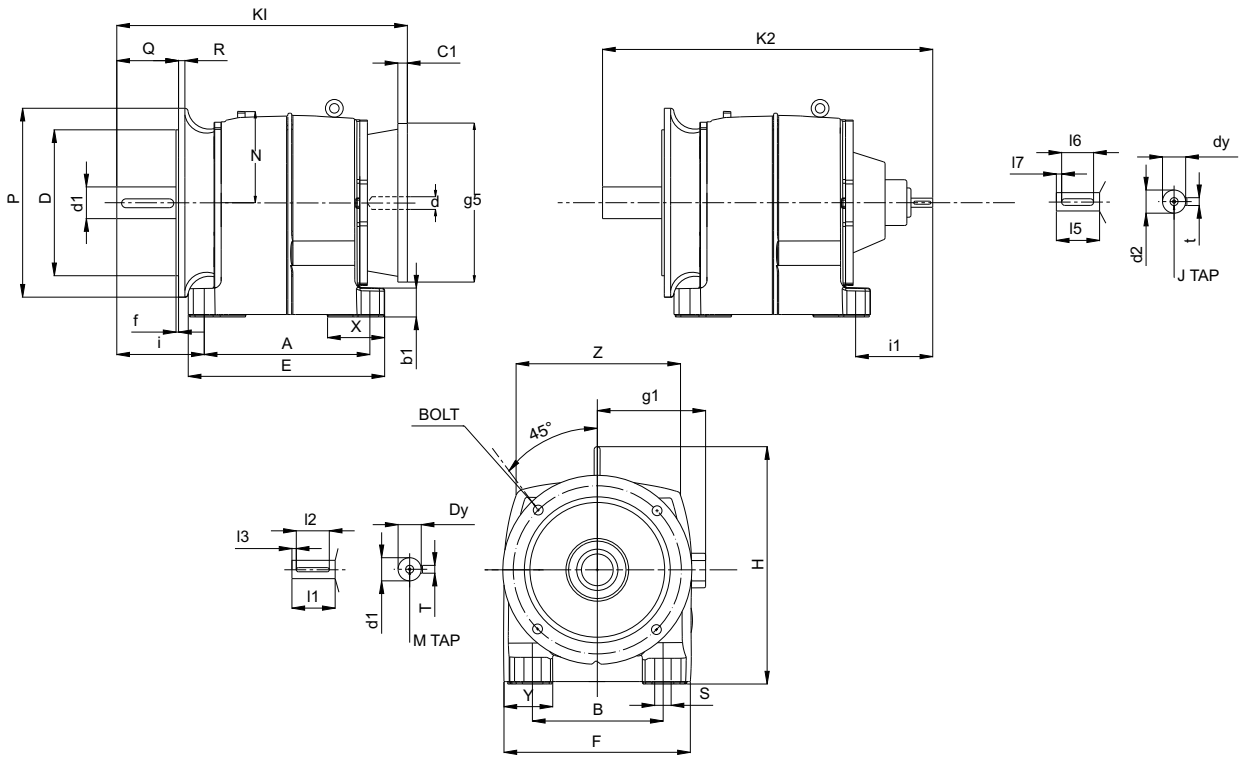
MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	6	21.5	19k6	40	32	4	M6X16
MI02	8	31	28k6	60	50	5	M10X22
MI03	8	31	28k6	60	50	5	M10X22
MI04	10	41	38k6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	K1	259.5	264.99	273.2	286.5	286.5	293.5	293.5	-	-	-	-	-	-
MI02	K1	302.5	305.8	316.3	329.5	329.5	347.2	347.2	368.5	368.5	402.8	402.8	-	-
MI03	K1	357.5	360.8	371.3	384.5	384.5	402.2	402.2	423.5	423.5	457.8	457.8	-	-
MI04	K1	-	-	436.5	448.33	448.33	468.33	468.33	494.32	494.32	528	528	528	528

5. MI4

MIB2/3 A - Large Reinforced Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	f	i	A	E	X	N	Z	H	B	F	Q	R	Y	S	b1	K2	i1
MI01	NOT APPLICABLE																		
MI02	NOT APPLICABLE																		
MI03	250	180	4	174	205	245	70	119	215	298	170	244	90	12	60	18	30	487.5	108.5
MI04	300	230	4	190	260	310	90	146.5	265	366	215	294	110	15	75	18	45	582	132

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP	BOLT
MI01	NOT APPLICABLE							
MI02	NOT APPLICABLE							
MI03	14	48.5	45k6	90	80	5	M16X36	4Xø13.5
MI04	16	59	55k6	110	90	10	M20X42	4Xø13.5

I/P SHAFT

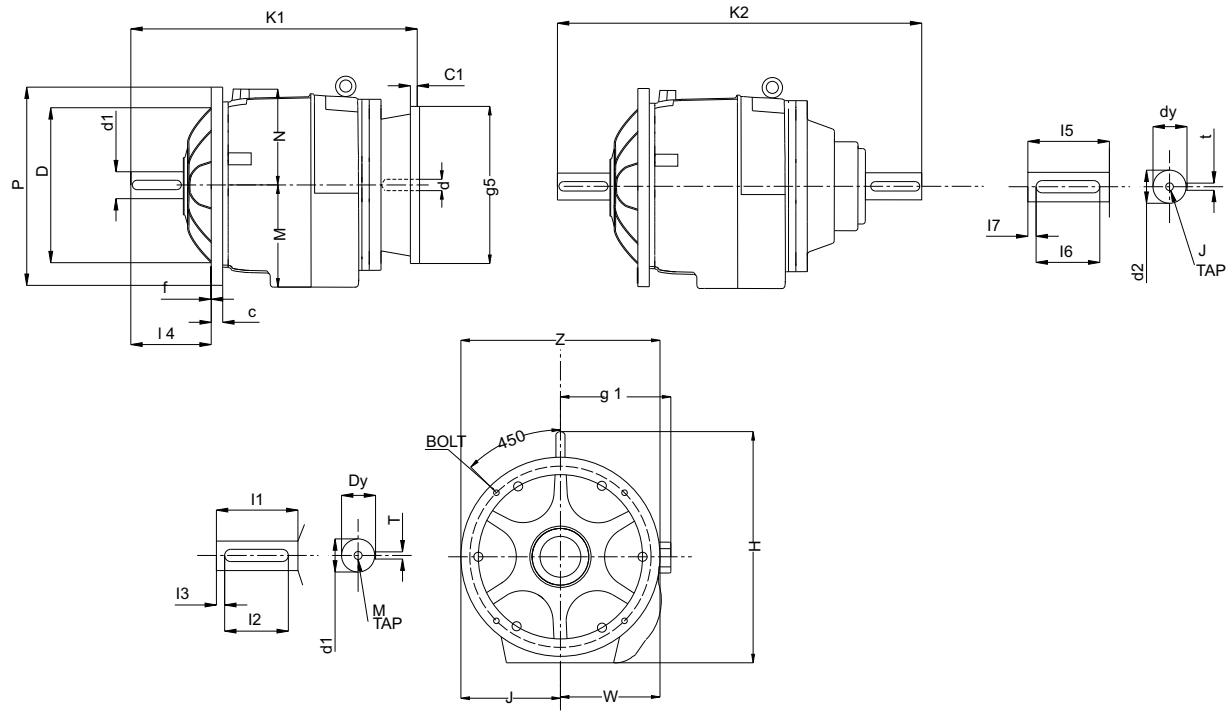
MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	8	31	28K6	60	50	5	M10X22
MI04	10	41	38K6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	K1	-	-	-	-	-	-	-	-	-	-	-	-	-
MI02	K1	-	-	-	-	-	-	-	-	-	-	-	-	-
MI03	K1	398.5	401.8	412.3	425.5	425.5	443.2	443.2	464.5	464.5	498.8	498.8	-	-
MI04	K1	-	-	475.5	487.33	487.33	507.33	507.33	533.32	533.32	567	567	567	567

5. MI4

MIV2/3 A - Large Diameter with Bearing Neck



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	f	l4	C	N	M	Z	H	J	W	K2	BOLT
MI01	NOT APPLICABLE												
MI02	250	180j6	4	80	13	94	117	215	242	95	104	372.5	4Xø13.5
MI03	300	230j6	4	130	13	119	143	265	301	115	129	446.5	4Xø13.5
MI04	350	250h6	5	160	15	146.5	184	300	370	145	149	543	4Xø17.5

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP
MI01	NOT APPLICABLE						
MI02	8	33	30k6	60	50	7	M10X22
MI03	12	43	40k6	80	70	5	M16X36
MI04	14	53.5	50k6	100	80	10	M16X36

I/P SHAFT

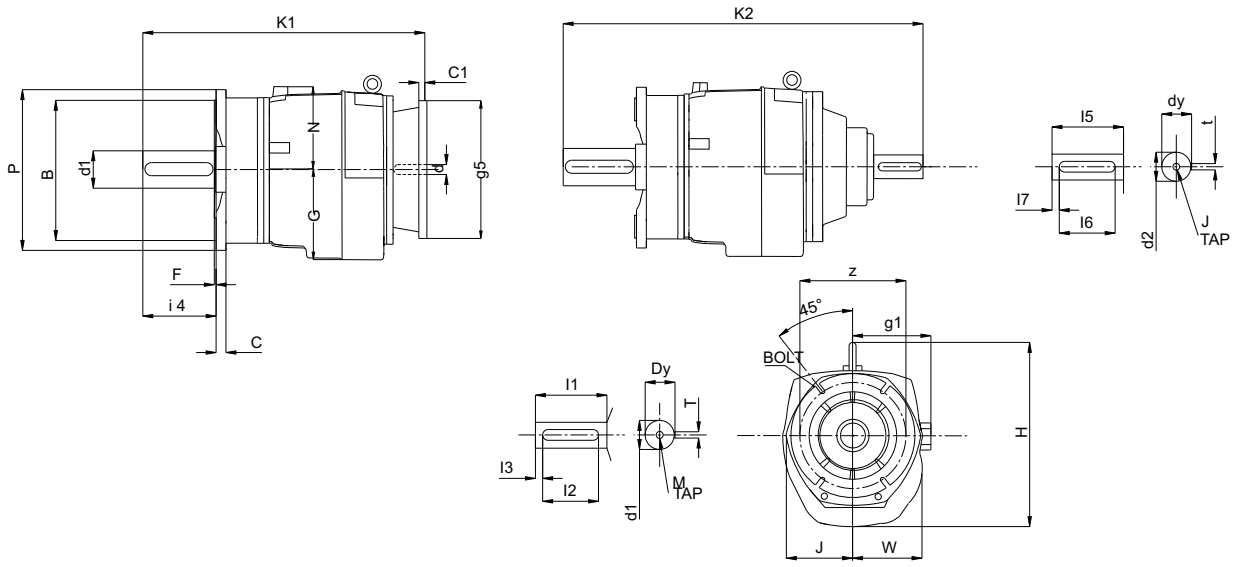
MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	NOT APPLICABLE						
MI02	8	31	28k6	60	50	5	M10X22
MI03	8	31	28k6	60	50	5	M10X22
MI04	10	41	38k6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	**K1**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI02	**K1**	283.5	286.8	297.3	310.5	310.5	328.2	328.2	349.5	349.5	383.8	383.8	-	-
MI03	**K1**	357.5	360.8	371.3	384.5	384.5	402.2	402.2	423.5	423.5	457.8	457.8	-	-
MI04	**K1**	-	-	436.5	448.33	448.33	468.33	468.33	494.32	494.32	528	528	528	528

5. MI4

MIV2/3 A - Medium Flange



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	B	C	N	G	Z	H	F	i4	k2	J	W	BOLT
MI01	160	110j6	9	76	94	130	170	3.5	55	329.5	73	81	4Xø9
MI02	200	130j6	10	94	117	165	211	3.5	65	391.5	95	104	4Xø11
MI03	250	180j6	13	119	143	215	301	4	86	446.50	115	129	4Xø13.5
MI04	300	230j6	15	146.50	184	265	370	4	110	543	145	149	4Xø13.5

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP
MI01	8	28	25k6	50	40	7	M10X22
MI02	8	33	30k6	60	50	7	M10X22
MI03	12	43	40k6	80	70	5	M16X36
MI04	14	53.5	50k6	100	80	10	M16X36

I/P SHAFT

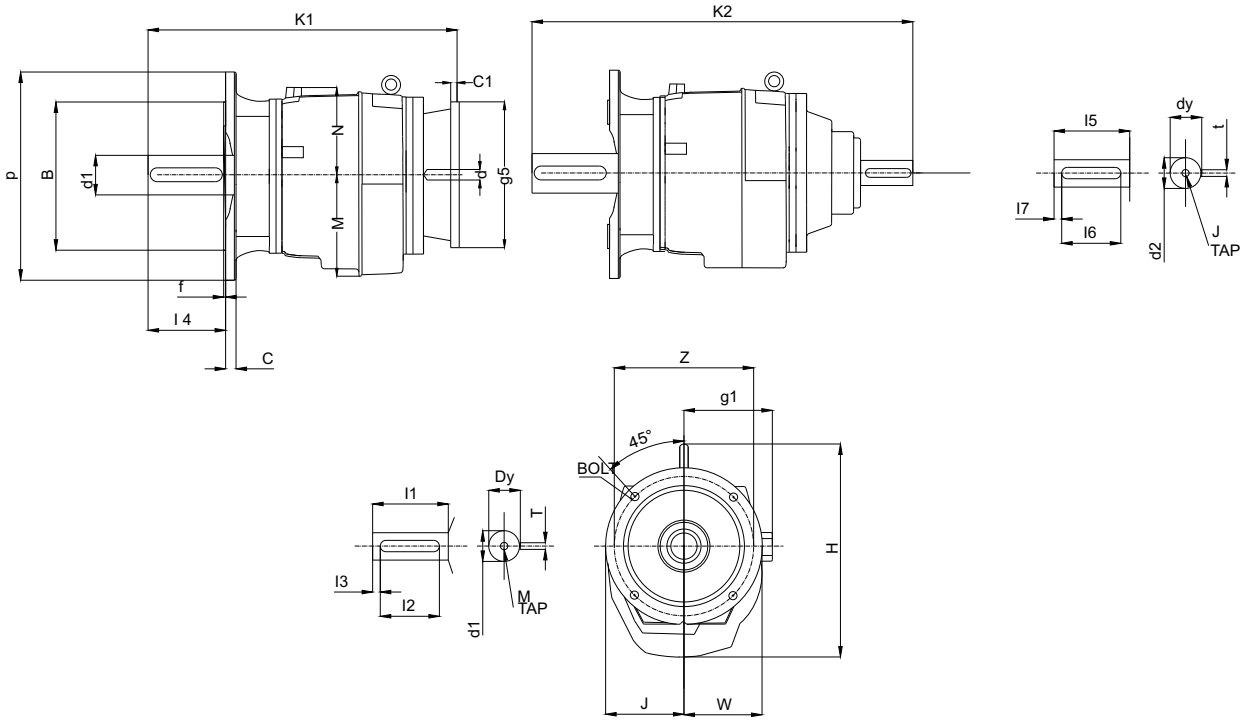
MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	6	21.5	19k6	40	32	4	M6X16
MI02	8	31	28k6	60	50	5	M10X22
MI03	8	31	28k6	60	50	5	M10X22
MI04	10	41	38k6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	**K1**	259.5	264.99	273.2	286.5	286.5	293.5	293.5	-	-	-	-	-	-
MI02	**K1**	302.5	305.8	316.3	329.5	329.5	347.2	347.2	368.5	368.5	402.8	402.8	-	-
MI03	**K1**	357.5	360.8	371.3	384.5	384.5	402.2	402.2	423.5	423.5	457.8	457.8	-	-
MI04	**K1**	-	-	436.5	448.33	448.33	468.33	468.33	494.32	494.32	528	528	528	528

5. MI4

MIV2/3 A - Vertical Reinforced



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	B	f	l4	C	N	M	Z	H	J	W	K2	BOLT
MI01	NOT APPLICABLE												
MI02	NOT APPLICABLE												
MI03	250	180j6	4	90	12	115	143	215	301	115	129	487.5	4Xø13.5
MI04	300	230j6	4	110	15	146.5	184	265	371	145	149	582	4Xø13.5

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	14	48.5	45k6	80	90	5	M16X36
MI04	16	59	55k6	110	90	10	M20X42

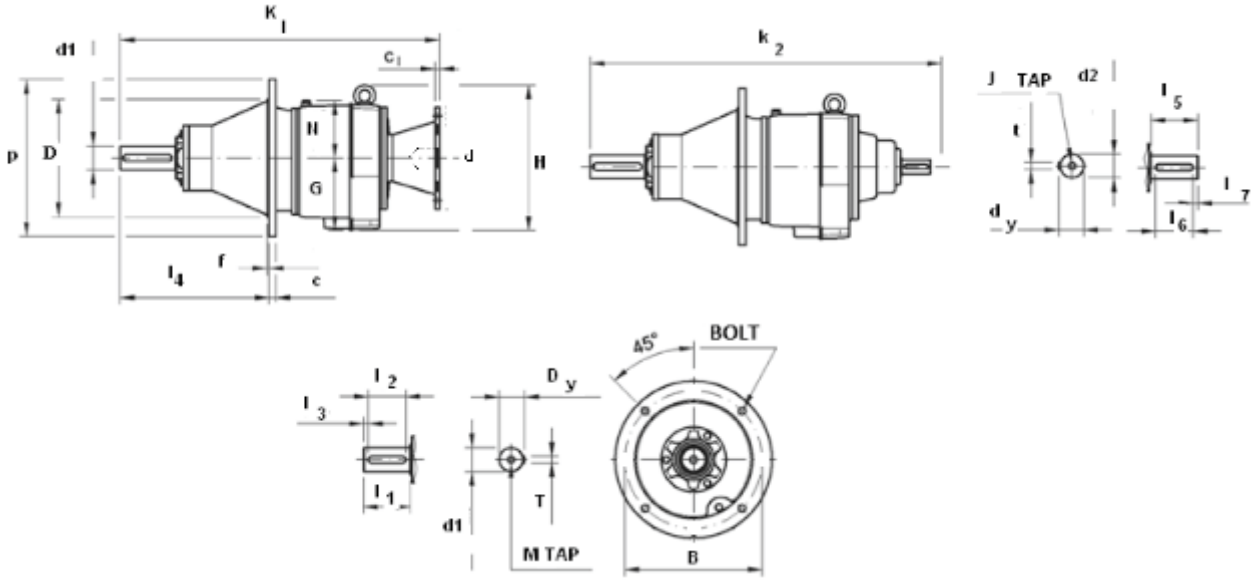
MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	8	31	28k6	60	50	5	M10X22
MI04	10	41	38k6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	**K1**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI02	**K1**	-	-	-	-	-	-	-	-	-	-	-	-	-
MI03	**K1**	398.5	401.8	412.3	425.5	425.5	443.2	443.2	464.5	464.5	498.8	498.8	-	-
MI04	**K1**	-	-	475.5	487.33	487.33	507.33	507.33	533.32	533.32	567	567	567	567

5. MI4

MIV2/3 A - Vertical Agitator



DIMENSIONAL DRAWINGS OF GEARED MOTORS

MODEL	P	D	f	l4	C	N	G	B	H	K2	BOLT
MI01	NOT APPLICABLE										
MI02	NOT APPLICABLE										
MI03	NOT APPLICABLE										
MI04	400	300h6	5	380	17	146.5	184	350	370	815	4Xø17.5

O/P SHAFT

MODEL	T	Dy	d1	l1	l2	l3	M TAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	NOT APPLICABLE						
MI04	18	64	60m6	140	125	7.5	M20X42

MODEL	t	dy	d2	l5	l6	l7	J TAP
MI01	NOT APPLICABLE						
MI02	NOT APPLICABLE						
MI03	NOT APPLICABLE						
MI04	10	41	38k6	80	70	5	M12X28

ADAPTOR DETAILS

MOTOR FRAME		63	71	80	90S	90L	100	112	132S	132M	160M	160L	180M	180L
	d	11	14	19	24	24	28	28	38	38	42	42	48	48
	C1	16	17	17.5	17.5	17.5	22	22	22	22	24	24	24	24
	g5	140	160	200	200	200	250	250	300	300	350	350	350	350
Model														
MI01	K1	-	-	-		-	-	-	-	-	-	-	-	-
MI02	K1	-	-	-	-	-	-	-	-	-	-	-	-	-
MI03	K1	-	-	-	-	-	-	-	-	-	-	-	-	-
MI04	K1	-	-	708.5	720.33	720.33	740.33	740.33	766.32	766.32	800	800	800	800

6. Technical Appendix

6. Technical Appendix

6.1 Technical Appendix, General

6.1.1 *Symbols used*

Formula sign	Description
C	Correction factor
cos n	Power factor
d	Speed of runner
F	Application factor
F_2	Factor dependent upon stray mass moment of inertia
F_b	Factor dependent upon output and operating time
F_m	Factor dependent upon load torque
F_{rN}	Permissible rated external load
F_{rN-G}	Permissible rated external load for reinforced bearing
F_p	Calculated radial load
f_r	Factor for the radial load
Fr	Calculated radial load (N)
F_x	Axial load
F_x	N Rated axial load
F_z	Dependent upon additional mass moment of inertia
i	Gear ratio
I_A	Starting current
i_{ex}	Exact gear ratio
i_N	Rated gear ratio
I_n	Rated current
J1	Inertia of brake hub and brake disk
J2	Inertia of the motor without brake
J3	Inertia of the motor with brake
JE	Inertia of the motor
J_{zus}	Inertia of the additional mass
M	Mass acceleration factor
m	Mass
M_b	Calculated bending moment
M_{bn}	Rated bending moment
η	Efficiency
n_1	Rated speed of the motor
n_2	Selection of the output speed
n_{2ex}	Exact speed of output shaft (full load)
Lp	Mean sound pressure level at 1 m, without load
n_{max}	Max. permissible speed
n_{syn}	Synchronous speed of the motor
P	Mechanical rated output of the gear unit
P_a	Output power
P_m	Motor output
P_N	Rated switching capacity (motor brake)

6. Technical Appendix

6. Technical Appendix

6.1 Technical Appendix, General

6.1.1 *Symbols used*

Formula sign	Description
P_{zo}	Drive power
r	Pitch circle radius of power transmission element
SF	Available service factor
SF_{min}	Required service factor
Sr	Speed range for motors with inverter
t_b	Brake time
t_1	Operating time of the single-disc safety brake
t_2	Braking time of the single-disc safety brake
T_2	Torque at the output shaft
t_3	Braking time of single-disc safety brakes switching at the AC side
T_A	Starting torque of the motor
T_a	Output torque (load torque)
T_B	Braking torque of the motor
T_K	Breakdown torque of the motor
T_n	Rated torque
T_S	Pull-up torque of the motor
W_{max}	Energy capability per braking
Z	Max. permissible operating frequency of brake motors
Z_B	No. of brakings per hour
Z_{o1}	No-load operating frequency per hour without brake
Z_{o2}	No-load operating frequency per hour with brake

6. Technical Appendix

6.2 Project planning checklist

Data

1. Load

Motor output	P_m	=	kW
Motor speed			min^{-1}
Output power	P_a	=	kW
Output torque	T_a	=	Nm

Operating time in hours/day

≤ 8h	≤16h	≤ 24h

Torque peaks Ta	T_a	=	Nm
Frequency			/h
Duration			S
Operating frequency			c/h
Inertia of driven machine			kgm^2
Acceleration time			s
Reversing operation			
Backstop required			

2. Speed

Constant speed	
Variable speed	
Direction of rotation: CW = clockwise	
CCW = counter clockwise	

3. Connection of motor/gear unit

Geared motor (integrated assembly)			
Gear unit for IEC motors			
Free drive shaft			
Coupling			
V-belt drive:			
Diameter of belt pulley :			
Motor	Ø		mm
Gear unit	Ø		mm
Belt profile			
Number of belts			
Other: please specify			

4. Connection of gear unit/driven machine

Coupling		
Sprocket, diameter	Ø	mm
Pinion, diameter	Ø	mm
Other : please specify		

6. Technical Appendix

6.2 Project planning checklist

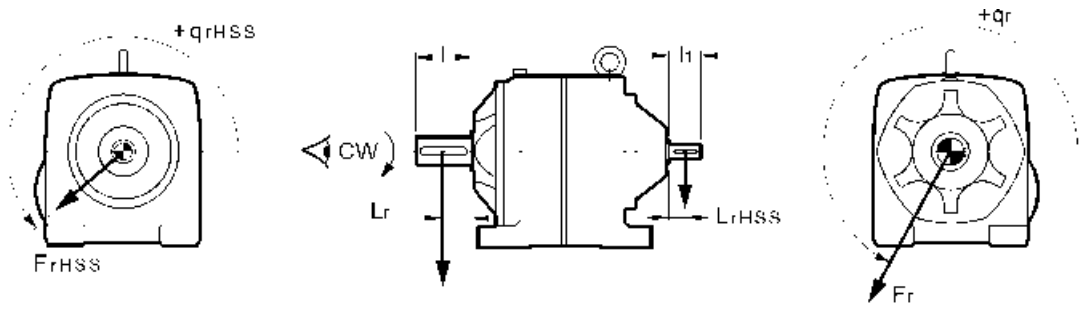
Data

5. External load on output shaft			
Radial load			
Distance between point of action	F_r	=	N
and shaft shoulder	L_r	=	mm
Direction of load (see below)	Qr	=	°
Axial load			
Pointing to the gear unit	F_x	= +	N
Pointing away from the gear unit	F_x	= -	N

6. External load on drive shaft			
Radial load			
Distance between point of action	F_{rHSS}	=	N
and shaft shoulder	L_{rHSS}	=	mm
Direction of load	Q_{rHSS}	=	° Axial load
Axial load			
Pointing to the gear unit	Fx	= +	NP
Pointing away from the gear unit	Fx	= -	N

Definitions :

MI4



6. Technical Appendix

6.2 Project planning checklist

Data

7. Brake

Braking torque TB	T_B	=	Nm
Braking time	T_b	=	s

8. Mounting parameters

Mounting position			
Ambient temperature (°C)	min/max	=	/ °C
Exposure to solar radiation			
Max. noise emission			dB(A)
Measuring distance			M
Environmental conditions			
Air humidity in %			%
Dust			
Aggressive atmosphere, please specify			

Electrical details

AC		DC	V	Hz
3ph	1ph			

Voltage and frequency

Operating mode		S	%
		/	
Type of enclosure	IP		
Insulation class			
Drive: Type			
Order No.:			

Sketch :

6. Technical Appendix

6.2.1 Coating Systems

The standard available coatings for the different types of applications from Premium Stephan are summarized in the following tables. Before the dip primer coating, all castings undergo grit blasting for surface preparation (SA 2 ½). If no special coating is defined, the delivery features system 1 in RAL 5002. For high-quality coatings (4...6), the final color tone can be defined by the customer. If no color tine is specified, the final coating is done in RAL 5002 (blue).

Deviating versions are possible in addition to the listed coatings (e.g. through customer regulations). However, they must be checked by Premium Stephan for feasibility in each case before placing an order. It is possible that it may result in significant deviations with respect to extra prices and delivery time. Please contact us.

Table : 1

System no.:	**0**		**1**		**2**		**3**	
Paint coat								
1	Dip primer coating Color : Red- brown	20 µm	Dip primer coating Color : Red- brown	20 µm	Dip primer coating Color : Red- brown	20 µm	Dip primer coating Color : Red- brown	20 µm
2			1C top coat Color: RAL 5002 Acrylic/PVC	40 µm	1C top coat Color: RAL 7035 Acrylic/PVC	40 µm	1C top coat Color: RAL 7035 Acrylic/PVC	40 µm
3							1C top coat Color: RAL 5002 Acrylic/PVC	40 µm
4								
5								
6								
Total coating thickness		**20 µm**		**60 µm**		**60 µm**		**100 µm**
Additional paint coats							1	
Drying time less than			1 day		1 day		1 day	
Corrosion protection	++		+++		++		++++	
Temperature resistance								
Continuous load up to	100 °C		100 °C		100 °C		100 °C	
Short-term load up to	160 °C		160 °C		160 °C		160 °C	
Chemical resistance	-		+		-		++	
Mechanical resistance	-		+		-		++	
UV resistance	-		+		-		++	
Application	Only S4 - gear heads for assembly center		Standard coating for S4 indoor installation		Pre-coating for final coating at customer		High-quality coating for S4 indoor installation	
Extra price	No		No		No		Yes	

6. Technical Appendix

6.2.1 Coating Systems

Table : 2

System no.:	**4**		**5**		**6**	
Paint coat						
1	Dip primer coat Color: Red-brown	20 µm	Dip primer coat Color: Red-brown	20 µm	Dip primer coat Color: Red-brown	20 µm
2	2C paint base Color: RAL 7035 Polyurethane (Derocryl)	40 µm	2C paint base Color: RAL 7035 Epoxy	40 µm	2C paint base Color: RAL 7035 Epoxy	40 µm
3	2C top coat Color: NKW Polyurethane (Derocryl)		2C paint base Color RAL 7035 Epoxy	40 µm	2C paint base Color RAL 7035 Epoxy	40 µm
4			2C top coat Color: NKW Epoxy	40 µm	2C top coat Color: NKW Epoxy	40 µm
5			2C top coat Color: NKW Epoxy	40 µm	2C top coat Color: NKW Epoxy	40 µm
6					2C top coat Color: NKW Polyurethane (Derocryl)	30 µm
Total coating thickness		**100 µm**		**180 µm**		**210 µm**
Additional paint coats	1		3		4	
Drying time less than	2 days		3 days		4 days	
Corrosion protection	+++++		+++++		+++++	
Temperature resistance						
Continuous load up to	100 °C		100 °C		100 °C	
Short-term load up to	160 °C		160 °C		160 °C	
Chemical resistance	+++		++++		+++++	
Mechanical resistance	+++		++++		+++++	
UV resistance	++++		++++		++++	
Application	Standard coating for S4 outdoor installation		High-quality coating for S4 indoor and outdoor installation at average environmental loads		High-quality coating for S4 indoor and outdoor installation in extremeapplications	
Extra price	Yes		Yes		Yes	

Key				
-	Insufficient		NKW	Per customer request
+	Available			
++	Sufficient			
+++	Satisfactory			
++++	Good			
	Excellent			

6. Technical Appendix

6.2.3 Type of enclosure

The motors correspond to type of enclosure IP55 to IEC 34 - 5 as standard, i.e. they are protected against harmful penetration of dust and water.

The first code number IP5* identifies the protection against harmful dust accumulations inside the motor. The second code IP*5 identifies the protection against the penetration of jet water from all directions. Higher types of enclosure can be supplied upon request.

6.2.4 Insulation class

Proven insulation materials according to class F are used for all motors (limiting temperature 155 °C). However, the actual heating corresponds only to insulation class B (limiting temperature 130 °C). Exception: size 132MG-4G (9 kW).

This ensures high reliability and long service life. It is also possible to operate the motors under special conditions, such as an unfavorable electrical supply, an ambient temperature of 55 °C, or a permanently increased load of up to 110 % of the rated output.

6.2.5 Protection against tropical influences

All motors are designed in type of enclosure IP55 to IEC 34 - 5. They are suitable for use under dusty and humid environmental influences and, to a limited extent, in tropical environments.

If the environmental conditions promote the formation of mildew, algae or condensate, an additional tropical insulation should be provided.

If motors are exposed to humid or condensate-forming conditions for an extended period of time, an electrical space heater (option) is recommended to avoid moisture condensate inside the motor windings. A control device must ensure that the space heater is switched off during operation and switched on during standstill. The standard supply voltage is 230 V ± 10 %.

6.2.6 Protection of motors against non-permissible loads

Selecting the correct protective device largely determines the operational reliability and service life of the motor. Suitable overcurrent release devices (motor protecting switches) are placed in the supply line for direct protection against overload and blocking.

Motors with an output starting at 4 kW are equipped with thermistors (PTC thermistors) as standard. Motors with lower outputs can be supplied with thermistors or thermostats (thermal contacts) upon request (option). Standard motors can be retrofitted with thermostats.

Thermistors (PTC thermistors) are temperature-dependent resistors to IEC 34-11 and DIN 44081 / 44082. Technical data: see below.

Thermostats (thermo switches, thermal contacts) are temperature-dependent bimetal switches. The response temperature is 150 °C and cannot be adjusted. Technical data: see below.

Selecting the correct motor protection is dependent upon the application:

- Possible causes of a thermal overload in each specific application
- Value of product being manufactured
- Costs arising from loss of production
- Possible dangers due to a motor fault

6. Technical Appendix

6.2.7 Type of enclosure

Motor fault	Motor protecting switch		Built into the motor windings	
	Thermal	Magnetic	Thermostats	Thermistors
Continuous overload	G	G	G	G
High operating frequency, unsuitable operating mode	A	A	A	G
Continuous undervoltage or overvoltage or incorrect supply frequency	A	A	G	G
High ambient temperature at motor installation site	P	P	G	G
Insufficient ventilation, blockage of air flow	P	P	G	G
Failure of a supply phase	P	P	A	G
Blockage of rotor	G	G	A	G

Key	
G	Good
A	Acceptable
P	Poor or no protection
Thermistor	Response temperature 160 °C, design to IEC34-11 and DIN 44081 / 44082
Thermostat	Response temperature 150 °C, max. 250 VAC, 1.6 A, cos n_0.6

6.2.8 Safe switching of high inductances

a) Switching of multi-pole motor windings.
Switching a multi-pole motor winding in conjunction with unfavorable conductor routing may lead to voltage peaks that can damage or destroy the winding insulation. It is recommended to equip the supply lines with varistors.

b) Switching of brake coils.
Varistors must be used to avoid damaging switching over voltages when switching brake coils on the DC side. The brake rectifiers and brake controllers used by Premium-Stephan feature varistors as standard. On principle, special braking contactors or contacts of category AC3 according to IEC158 must be used for switching of brake coils.

6.2.9 50-Hz motors on a 60-Hz supply system

Motors dimensioned for 50 Hz can also be operated on 60-Hz supply networks without any problems. In this case, the rated speed increases by 20%. At the same time, current and power factor remain unchanged. The additional information can be found in the table.

Motor winding 50 Hz	**Connection to 60 Hz**	**Power P**	**Torque T**
400 V ± 10 %	380/400 V ± 5 % 50 Hz	0.90 x P(50 Hz)	0.75 x T(50 Hz)
400 V ± 10 %	400 V -10 % / + 25 %	1.00 x P(50 Hz)	0.83 x T(50 Hz)
400 V ± 10 %	440 V -10 % / +15 %	1.10 x P(50 Hz)	0.92 x T(50 Hz)
400 V ± 10 %	460 V ± 10 %	1.15 x P(50 Hz)	0.96 x T(50 Hz)
400 V ± 10 %	480 V - 10 % + 5%	1.20 x P(50 Hz)	1.00 x T(50 Hz)
500 V ± 10 %	500 V -10 % / + 25 %	1.00 x P(50 Hz)	0.83 x T(50 Hz)
500 V ± 10 %	575 V ± 10 %	1.15 x P(50 Hz)	0.96 x T(50 Hz)

6. Technical Appendix

6.2.10 Operation with inverter

The operation of three-phase AC induction motors with frequency inverter (variable voltage and frequency) causes stray losses in the motor. For this reason, it is generally required to reduce the rated torque of the motors so that the permissible winding temperature is not exceeded. An additional reduction of the output is required due to reduced motor speed and, therefore, reduced self-cooling. The output reduction is dependent upon the torque demand of the driven machine and the speed setting range.

For vertical versions with tubing (SCA, SFA, SCP), the output speed ranges according to chapter 7.4.7 must be taken into account. In case of doubt, a consultation with our plant is required.

High speeds

Standard motors can generally also be operated above their rated speed. If standard motors must be operated with frequencies above 60 Hz, please consult our plant.

Power tables

Rated powers of 4-pole motors from the Premium Stephan series are listed for various applications. Data for other pole numbers are available upon request.

The powers apply to correctly installed frequency inverters with characteristics of column A or B.

	A	B
Complete harmonic distortion	< 2.5%	< 6%
Maximum peak voltage	1600 V	1400 V
Max. voltage rise du / dt	1.0 kV / s	5.6 kV / s
Max. carrier switching frequency	5 kHz	5 kHz
Max. motor to inverter cable length	30 m	60 M

6.2.11 Standard version

Our motors and geared motors correspond to the relevant standards. The most important ones are:

	IEC (CEI)	DIN	VDE
Rated output	IEC 34 - 1, IEC 85	DIN EN 60034 - 1	VDE 0530 - 1
Dimensions	IEC 72	DIN 42673 / 42677	
Mounting position	IEC 34 - 7	DIN EN 60034 - 7	VDE 0530 - 7
Cylindrical shaft ends	IEC 72	DIN 748 - 3	
Terminal designations	IEC 34 - 8	DIN VDE 0530 - 8	VDE 0530 - 8
Enclosure types (IP code)	IEC 34 - 5	DIN VDE 0530 - 5	VDE 0530 - 5
Cooling types (IC code)	IEC 34 - 6	DIN EN 60034 - 6	VDE 0530 - 6
Noise limits	IEC 34 - 9	DIN EN 60034 - 9	VDE 0530 - 9
Supply voltage	IEC 38	DIN IEC 38	

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6.2.12 Explosion-protected motors

	IEC (CEI)	DIN
General	IEC 79 - 0	DIN EN 50014
Increased safety (EEx e)	IEC 79 - 7	DIN EN 50019
Flame-proof enclosure (EEx d)	IEC 34 - 1	DIN EN 50018
Non sparking (EEx n)		DIN EN 50021
Electrical equipment for use in areas with combustible dust		DIN EN 50281

6.2.13 Thermal standards

Three-phase AC squirrel-cage motors from Premium-Stephan correspond to the thermal regulations of the relevant national and international standards for permissible over temperature.

Standard	**Permissible ambient temperature**	**Permissible over temperature in K (measured using the resistance method) Insulation class**	
	°C	**B**	**F**
DIN, VDE, IEC	40	80	105
British Standards (BS)	40	80	105
Canadian Standards (CSA)	40	80	105
USA (NEMA)	40	80	105
American Bureau of shipping (ABS)	50	75	95
Bureau Veritas (BV)	50	70	90
Det Norske Veritas	45	70	90
Germanischer Lloyd (GL)	45	75	95
Lloyds Register (LR)	45	70	90

6.2.14 Tolerances

The following tolerances apply to the performance specifications of electrical machines to DIN EN 60034:

- Efficiency 0 — -0.15 (1 - 0) — for rated outputs $\leq$ 50 kW
  -0.10 (1 - 0) — for rated outputs > 50 kW
- Power factor cos n: — - (1-cos n) / 6
- Slip: — ± 20 % — for rated outputs > 1 kW
  ± 30 % — for rated outputs 1 kW
- Starting current: — + 20%
- Starting torque: — - 15% ... + 25%
- Mass moment of inertia: — ± 10%
- Sound pressure level: — + 3 dB(A)

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6.2.15 Calculation of maximum permissible operating frequency of motors:

The maximum permissible operating frequency of a brake motor is dependent upon:
- the size of the accelerated mass moments of inertia
- the relative operating time
- the relative load, i.e. the ratio of actual output power and
- rated output of the motor
- load torque during acceleration

The no-load operating frequency listed in the tables can be converted to the actual application using the following formula :

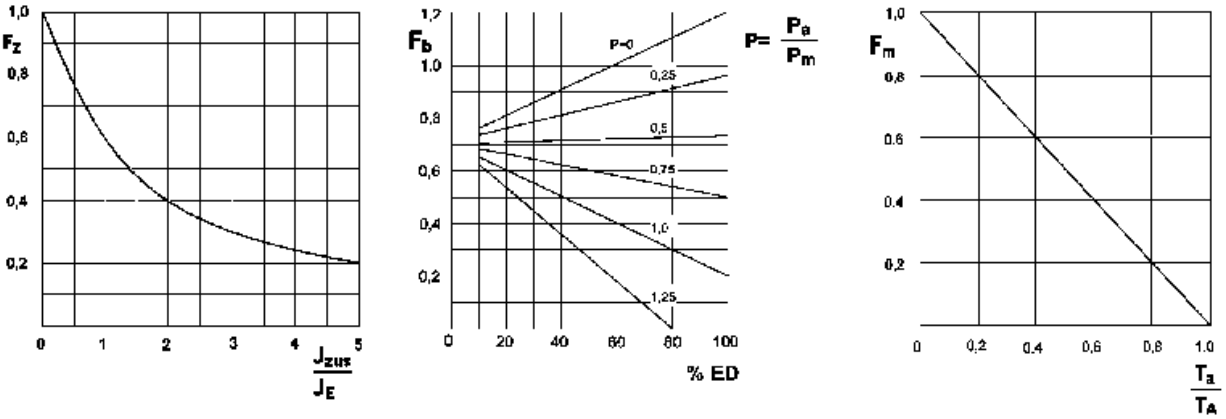
$$Z = Z_o \times F_z \times F_b \times F_m$$

F_z	Dependent upon additional mass moment of inertia
F_b	Dependent upon output and operating time
F_m	Dependent upon load torque
Z_o	No-load operating frequency at 60% operating time
JE	Mass moment of inertia of the motor
J_{zus}	Mass moment of inertia of driven machine referenced to the motor shaft
T_a	Load torque
TA	Acceleration torque (motor)
ED	Operating time

$$\text{whereby } P = P_a / P_m$$

P_a	Power demand after completed acceleration
P_m	Rated motor output

Technical Appendix



6.2.16 Spring-applied single-disk safety brake for direct current and dry run

In the electromagnetic single-disk brake, the braking force is applied through springs and the brake is electrically released. In case of a power failure, the brake is applied. This allows it to meet the predetermined safety require- ments. The brakes can be supplied with a manual release upon request.

The brakes are manufactured and tested according to VDE 0580 and correspond to CENELEC Memorandum no. 3, part 3, par. 2.3 of the EC safety directives.

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6.2.16 Spring-applied single-disk safety brake for direct current and dry run

In the electromagnetic single-disk brake, the braking force is applied through springs and the brake is electrically released. In case of a power failure, the brake is applied. This allows it to meet the predetermined safety requirements. The brakes can be supplied with a manual release upon request.

The brakes are manufactured and tested according to VDE 0580 and correspond to CENELEC Memorandum no. 3, part 3, par. 2.3 of the EC safety directives.

Standard voltages:

102 VDC / 230 VAC	for motor output up to 3 kW
178 VDC / 400 VAC	for motor output starting at 4 kW

Other voltages can be supplied and must be specified when ordering.

Technical data:

The response times apply to normal operating temperatures and rated voltage with adjusted gap. The values listed are subject to the regular tolerances.

t_1 *(operating time)* is the time from switching on the voltage to the drop-off of the brake torque to 10% of the rated torque T_B.

t_2 *or* t_3 *(breaktime)* is the time from switching off the voltage to an increase of the brake torque to 90% of its rated value. t_2 applies to switching on the DC side, t_3 to switching on the AC side.

T29The brakes correspond to enclosure type IP55 and, therefore are protected against damaging dust accumulations and jet water.

P_R is the permissible braking energy in Joule per second. The permissible braking energy per braking W_{Rmax} is dependent upon the operating frequency. The listed values apply to a motor speed of 1500 min^{-1}.

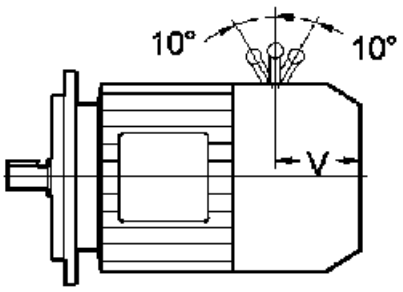
The dynamic braking torque TB applies to dry run, run in brake and normal operating conditions. The braking torque decreases with increasing motor speed.

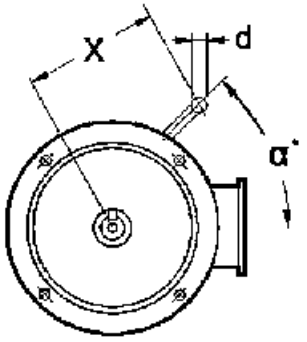
If the friction areas contain oil or grease, the braking torque is reduced down to 50%. If the brake is not run in, the braking torque may be 20% less than the rated torque.

6.2.17 Brake kit

Standard motors of size 63 to 180 can be converted to brake motors. *Brake kits* are available for this purpose. The brake hub is installed on the motor shaft to ensure an operationally reliable design. Only the plastic fan blade is driven by a screw-in shaft.

Position of the manual release lever





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Motor Size	Brake Size	TB Nm	"0	X mm	d mm	Vmm
63	08	4	0	85	25	75
71	08	4	0	85	25	75
80	10	10	0	98	25	91
90	13	20	0	117	25	93
100	15	40	30	128	32	97
112	15	40	30	128	32	115
132	20	80	30	166	40	122
160	23	150	30	210	40	161
180	26	240	30	230	40	183
200 / 225	458-25	400	0	500	24	
250 / 280	Upon request					

6.2.18 Brake data

Motor Size	Brake Size	T_B Nm	$n_{max.}$ min^{-1}	P_R J/ s	W_{Rmax} J	W_{RN} J	P_{zo} W	t_1 ms	t_2 ms	t_3 ms	J_1 kg*cm²	m kg
63	08	5	10000	80	3×10^3	5×10^7	22	35	30	70	0,15	0,8
71	08	5	10000	80	3×10^3	5×10^7	22	35	30	70	0,15	0,8
80	10	10	5400	100	6×10^3	12×10^7	28	45	45	95	0,45	1,4
90	13	20	5400	130	12×10^3	20×10^7	34	60	60	140	1,72	2,5
100	15	40	4000	160	25×10^3	35×10^7	42	80	75	175	4,5	4,0
112	15	40	4000	160	25×10^3	35×10^7	42	80	75	175	4,5	4,0
132	20	100	3500	250	50×10^3	125×10^7	100	160	120	280	12,2	10
160	23	150	3000	300	75×10^3	200×10^7	150	200	150	350	28,5	12.6
180	26	250	3000	350	105×10^3	340×10^7	250	220	180	500	66,5	19,5
200	458-25	400	3000	520	125×10^3		110	110	375	950	200	29
225	458-25	400	3000	520	125×10^3		110	110	375	950	200	29
250	Upon request											
280	Upon request											

T_B	Rated torque
$n_{max.}$	Max. speed
P_R	Max. friction power
W_{Rmax}	Max. friction energy per operation
W_{RN}	Friction energy until re-adjustment
P_{zo}	Coil power
t_1	Operating time
t_2	Break time (switching on DC side)
t_3	Break time (switching on AC side)
J_1	Moment of inertia of the brake
m	Weight

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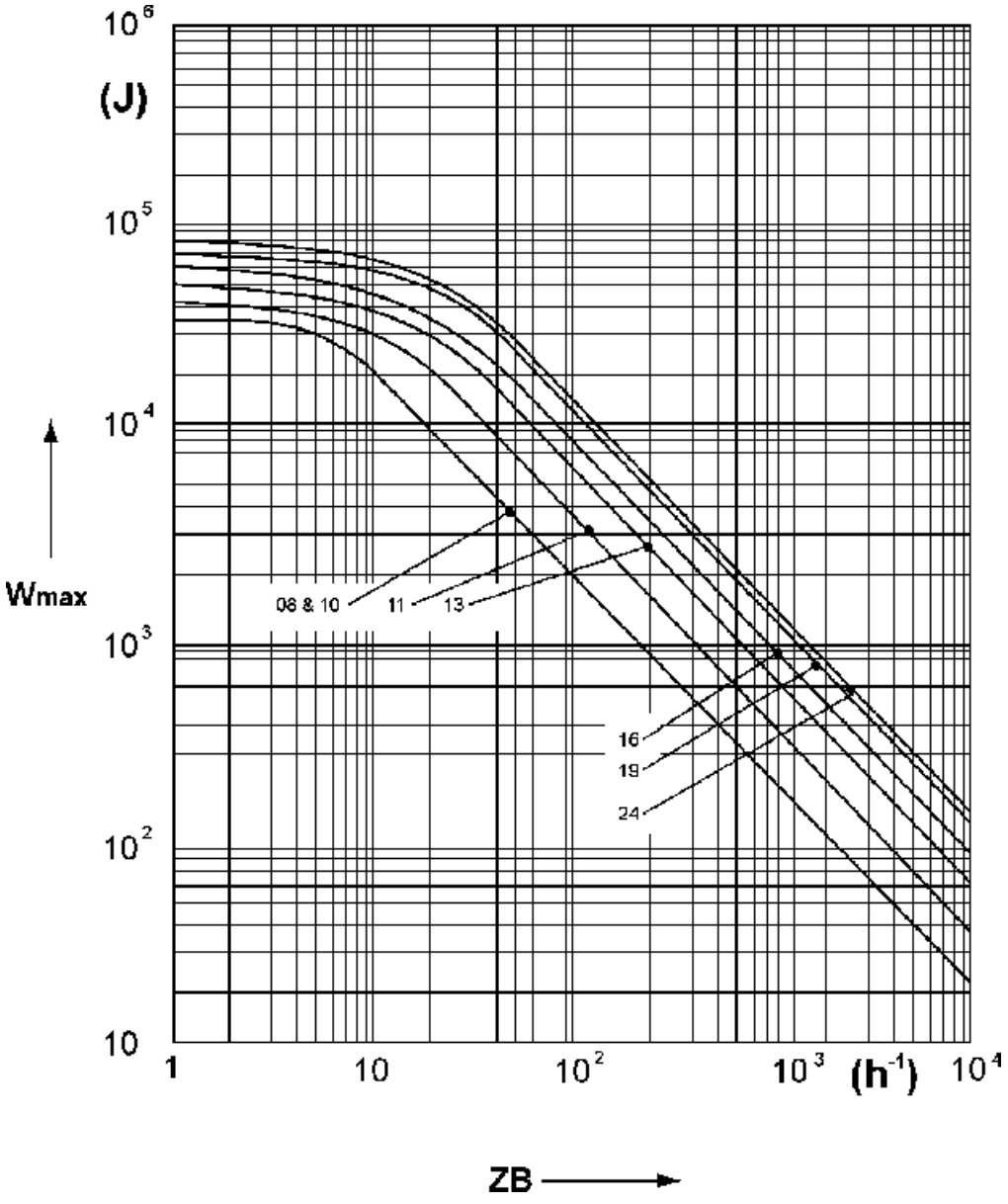
6.2.19 Power capability per braking

In general, the permissible operating frequency of a brake motor is limited by the heating of the motor. The brake output should be determined for each braking W for control purposes.

$1W = 0.0055 \times n^2 \times (J_{zus} + JE)$

The permissible value W_{Rmax} can be found in the diagram.



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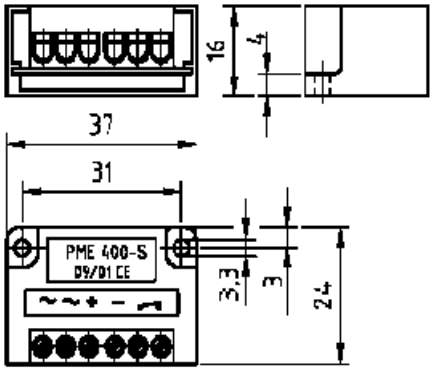
6.2.20 Brake rectifier

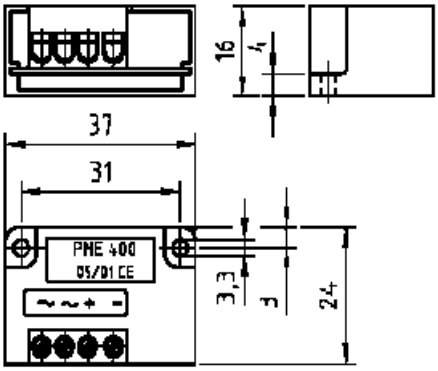
The brake rectifiers being used generate the necessary direct voltage (DC) for operating the brake from the AC supply voltage (AC).

Dependent upon the voltage applied, one-way or bridge rectifiers are used. The brakes are usually switched on the AC side. However, the brakes can also be switched on the DC side for short brake application times. For this purpose, the built-in switching bridge must be removed.

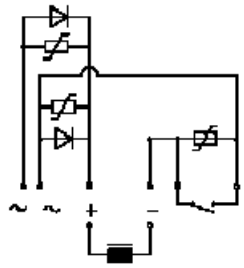
Rectifier for switching at the DC side or at the AC side



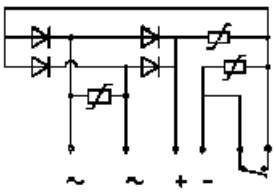
Rectifier for switching at the AC side



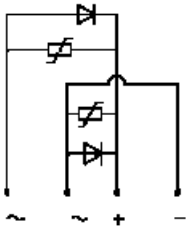
Half wave rectifier
Switching at the DC side
PME 400-S



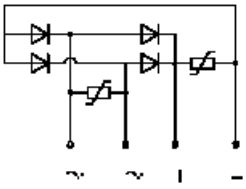
Full wave rectifier
Switching at the DC side
PMB 400 – S



Half wave rectifier
Switching at the AC side
PME 400



Full wave rectifier
Switching at the AC side
PMB 400



6.2.21 Tachometer generator

T33If speed control or synchronous control is required, the motors can be equipped with tachometer generators or pulse generators.

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Notizen / Notice / Notes :

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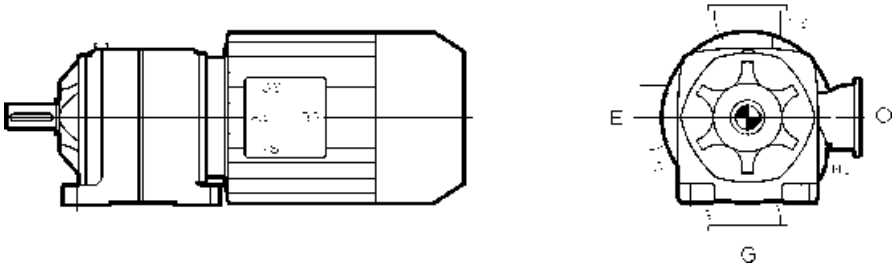
6.2.21 Terminal box position

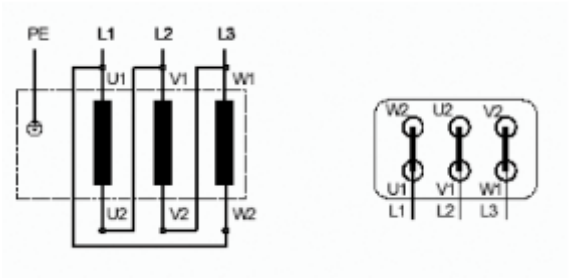
MI4



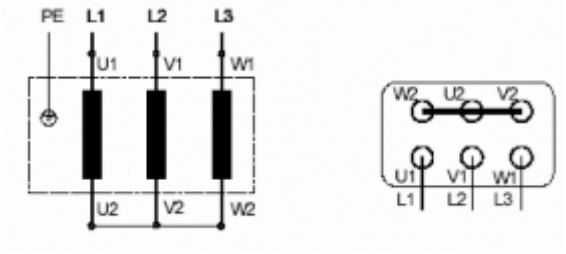
The terminal box position is independent of the mounting position. The normal position is "O". The cable entry is arranged in position "NS" as standard.

6.2.22 Connection diagrams

Motor connection diagrams



Delta Connection - Low Voltage



Star Connection - HIgh Voltage

Connection designations of add-on devices

	IEC standard	UK standard
PTC thermistor	10 - 11	TP1 - TP2
Thermal contacts (NC contact)	20 - 21	TB1 - TB2
Thermal contacts (NO contact)	30 - 31	
Magnetic brake	60 - 61	BR1 - BR2
Space heater	70 - 71	H1 - H2
Three-phase AC external fan	U - V - W	
Single-phase external fan	U1 - U2	

6.2.23 2nd shaft end

The motors can be supplied with a second shaft end upon request. Please contact us.

6.2.24 Plug connectors (Harting)

The motors can be supplied with plug connectors upon request. Please contact us.

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6.2.25 Cast iron fan

The motors can be supplied with cast iron fan upon request. Please contact us.

6.2.26 Cable entries

Size	Cable entry
63 to 90	1 x M20X1.5
100	1 x M20X1.5
112 to 132	1 x M25X1.5
160 to 180	2 x M32X1.5

Cable entries are closed during transport.
Screwed cable glands are not part of the scope of delivery!

6.3.1 Technical Appendix, Mechanical

6.3.2 Backstops in the input lantern

Backstops are used to limit the direction of rotation to a freely selectable direction of rotation. In the opposite direction, backstops act as a blocker. Backstops are frequently used for conveyor drives that are operated in a tilt position or for fan drives. In both cases, there is only one free direction of rotation, whereby a spinning of the drive is desired for the opposite direction.

In certain applications, backstops can be an alternative to an electromagnetic brake on the motor.

The backstops are placed at the drive shaft (U/L-lantern) between the regular bearing and are mounted dependent upon the desired free direction of rotation according to the order. The free direction of rotation must be specified at ordering.

If speed-disengaging backstops are used, this safety component needs to be checked only every 6 000 operating hours or no later than every 3 years. The system operator must take all the necessary safety precautions to avoid failure of the backstop that may result in personal injuries and/or damages to the drive unit and/or the application.

It is necessary to replace the backstop under the following conditions:

- In the event of observing unusually high wear of the gear unit.
- When the oil in the gear unit is contaminated.
- In the event of unusually high load.

This may have had an adverse effect on the condition of the clamping elements and bearing races in the integrated backstop.

CAUTION!

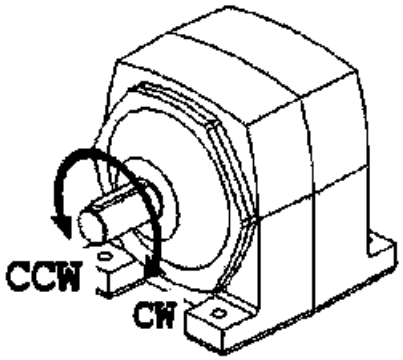
Only authorized, qualified personnel is permitted to replace the backstop or change the direction of rotation of the backstop while complying with the operating instructions for the respective backstop.

Never loosen or release any part of the backstop facility while the drive is under load: This could affect the reversal action of the drive and load; the drive unit must be in a no-load condition and secured against inadvertent movements.

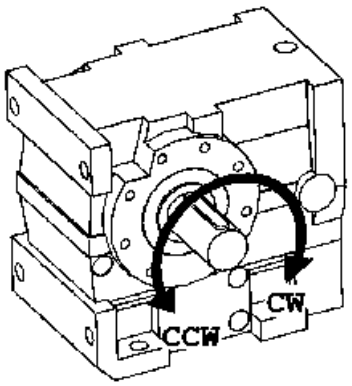
6.3.3 Indication of output rotating direction when using backstops

For the order of a gearbox with backstop you have to indicate the required direction of rotation, viewed at output shaft on output side of gearbox. For drives with left and right output shaft the direction of rotation is given viewed at side L. To avoid damage to the gearbox or the unit , the direction of rotation needs to be checked before operating.

6. Technical Appendix



CW = rotation right, CCW = rotation left



CW = rotation right, CCW = rotation left

6.3.4 Motor base versions

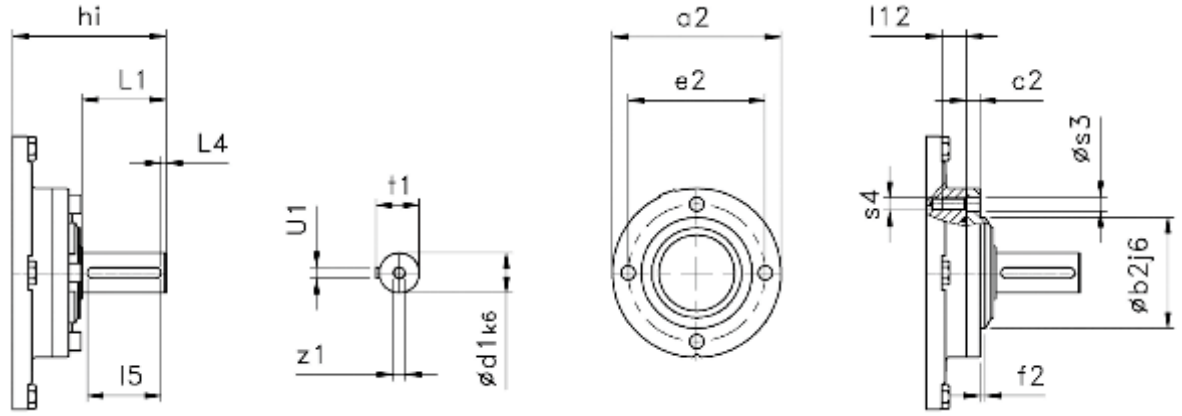
Our motor base version is a special variant to connect or drive a gear unit with a motor by means of belt drive. This provides the following advantages:

- Compact version - an advantage, for example, if structural conditions do not allow for an integral mounting of the motor.
- After installing the drive in the machine or system, the total gear ratio can be adjusted using a simple change in the belt drive gear ratio.

6. Technical Appendix

6.3.5 Gear unit with free drive shaft

All gear units of the S4 family can also be designed with free drive shaft. In this case, there is a standard for the shaft dimensions of the drive shaft dependent upon the gear unit type (MI4) and the gear unit size. This standard is also shown in the dimensioned drawings of the gear units. In addition to these standard dimensions, alternate dimensions are possible or even required, based on applied external loads. The following table provides an overview of the options in the design of the drive shafts. Lines with a light-gray background contain the values for our standard dimensions.



Mounting flange

Gear unit connection	Mounting dimensions								Mounting flange on the drive end							
	$Ød_1$	L_1	L_4	l_5	t_1	U_1	z_1	h_i	a_2	b_2	e_2	f_2	c_2	l_{12}	S_4	s_4
	mm	mm	mm	mm	mm	mm	mm	mm	mm	j6	mm	mm	mm	mm	mm	mm
S115	**19**	**40**	**4**	**32**	**21.5**	**6**	**M6x16**	**110.5**	**130**	**85**	**105**	**14**	**11**	**19**	**11**	**M10**
	28	60	5	50	31	8	M10x22	110.5	130	85	105	14	11	19	11	M10
S162	19	40	4	32	21.5	6	M6x16	101.5	130	85	105	14	11	19	11	M10
	28	**60**	**5**	**50**	**31**	**8**	**M10x22**	**121.5**	**130**	**85**	**105**	**14**	**11**	**19**	**11**	**M10**
	38	80	5	70	41	10	M12x28	158	160	105	130	13	13	23	13.5	M12
S235	28	60	5	50	31	8	M10x22	109.5	130	85	105	14	11	19	11	M10
	38	**80**	**5**	**70**	**41**	**10**	**M12x28**	**146**	**160**	**105**	**130**	**13**	**13**	**23**	**13.5**	**M12**
S300	38	80	5	70	41	10	M12x28	138	160	105	130	13	13	23	13.5	M12

T43For permissible loads at the drive shaft please contact *Premium-Stephan*.

Gear unit connection - Dimensional assignment

Gear unit connection	MI4
S115	MI..1.
S162	MI..2 / MI..3
S235	MI..4

For permissible loads at the drive shaft please contact *Premium-Stephan*.

6. Technical Appendix

6.3.6 MI4 gear units SCA, SFA and SCP with integrated oil pump

Some types of construction of MI4 gear units offer the possibility of supplying an absolutely oil-proof version for vertical mounting positions (output shaft is down).

For some applications, particularly in chemistry, pharmacy, food processing technology and wastewater treatment and drinking water purification, it is desirable to use absolutely leak-free drives. Since radial shaft seal rings are always wear parts and will eventually leak dependent upon the loads that occur, the regular sealing system may cause danger of oil leakage via the shaft seal.

With our design, the output shaft is safely blocked from the oil supply by means of a tubing. To ensure sufficient lubrication of all relevant components, such as roller bearing and gearing, an additional oil pump (gear pump) is integrated at the intermediate shaft of the gear unit. Using a corresponding inner tubing system, the lubricant is distributed inside the gear unit.

To ensure a sufficient flow rate, the following speed ranges must be taken into account at the output shaft.

Version	(2 - stage)		(3 - stage)	
	n_{2min}	n_{2max}	n_{2min}	n_{2max}
	1/min	1/min	1/min	1/min
SCP	30	270	10	80
SCA	30	270	10	80
SFA	30	270	10	80

This version offers an additional advantage on top of the absolute oil-tightness. Due to the low oil level, no gearing moves directly in oil. This results in nearly no splash losses that could lead to a heating of the gear unit. Particularly with low gear ratios, i.e. high output speeds, splash lubrications frequently lead to thermal limits due to occurring splash losses in vertical types of construction. This tubing version allows for largely eliminating the influence of splash losses. This, in turn, allows the drive to be used at relatively high output speeds. Expensive cooling systems can be eliminated.

6.3.7 Noise level

This chapter discusses the noise levels (sound pressure levels) of the S4 gear unit series of size 1 to 9. design index 6 and 7. Motor noises are not taken into account.

Table 1 listed below shows sound pressure level Lp' that can be expected with high probability for standardized conditions. Slight deviations are possible due to manufacturing tolerances.

To obtain values from other conditions, correcting factors must be added according to Tables 2-4.

$$L_p = L_p' + K_1 + K_2 + K_3$$

If the noise level must be guaranteed, 3 dBA must be added at the top tolerance limit. See also the attached examples.

The listed values refer only to the gear units and are intended for an initial orientation. Lower values are partially possible for the noise level. Please contact us.

Sound pressure under standardized conditions:

Table 1 shows values and tolerances for sound pressure Lp' in dBA at a distance of 1 meter from the gear unit (Input speed n1 = 1500 1/min gear ratio i = 11.2). The reference power is dependent upon the service factor SF.

6. Technical Appendix

Table -1

Gear unit size	for SF = 2: Consumed power in kW for SF > 2: Half the catalog power data, ½ P in kW							
	1 kW	2 kW	5 kW	10 kW	20 kW	50 kW	75 kW	100 kW
1...4	58 +/- 1	62 +/- 1	66 +/- 1.5	69.5 +/- 1.5	73 +/- 2			
5...7	57 +/- 1	61 +/- 1	65 +/- 1.5	68.5 +/- 1.5	72 +/- 2	77 +/- 2	79 +/- 3	
8...9	56 +/- 1	60 +/- 1	64 +/- 1.5	68.5 +/- 1.5	71 +/- 2	76 +/- 2	78 +/- 3	80 +/- 3

Correcting factor for non-standard conditions:

Table 2: Correcting factor K_1 in dBA for distance from gear unit

Gear unit size	Distance from gear unit [m]					
	1 m	3 m	5 m	10 m	30 m	50 m
1...4	0	-6	-10	-16	-26	-30
5...7	0	-5	-9	-15	-25	-29
8...9	0	-4	-8	-14	-24	-28

Table 3: Correcting factor K_2 in dBA for input speed n1

Gear unit size	Input speed n_1 [1/min]						
	500 RPM	750 RPM	1000 RPM	1500 RPM	1800 RPM	2400 RPM	3000 RPM
1...9	-7	-5	-3	0	1.5	5	8

Table 4: Correcting factor K_3 in dBA for gear ratio

Gear unit size	Gear unit ratio i	
	2.8...10	>= 11.2
1...9	2	0

Examples

Example 1

MIB304F132MF02500S, consumed power P_a = 7.5 kW
Expected sound pressure level at 1 meter?
Service factor SF=1.2 ' use consumed power according to Table 1 (interpolate and round the values)
Lp' = (67.8 +/- 1.5) dBA
Distance = 1 m, n1 = 1500 1/min i = 11.2 ' K_1=K_2=K_3 = 0
$L_p = L_p'$
Guaranteed value = (67.8 + 1.5 + 3) dBA = 72.3 **dBA**

Example 2

MIV204G160MF00800A, consumed power P_a = 11kW
Expected sound pressure level at 1 meter?
Service factor SF = 3.45 ' Use half the catalog power data (see Gear unit selection tables)
P/2 = (39/2) kW = 19.5 kW ---> L_p' = (72 +/- 2) dBA
Distance = 1 m, n1 = 1500 1/min, i < 11.2 ' $K_1 = K_2 = 0$, K_3 = 2 dBA
$L_p = (L_p' + 2)$ dBA = (74 +/- 2) dBA
Guaranteed value = (74 +2 + 3) dBA = 79 dB

6. Technical Appendix

6.3.8 Mass moments of inertia J (10^{-3} kgm^2)

The listed values each refer to the drive shaft of the gear unit.

MI4

2/3-stage gear units J (10^{-3} kgm^2)

i_N	Size							
	M -201	MI-301	MI-202	MI-302	MI-203	MI-303	MI-204	MI-304
5								
5.6	0.085		0.22		0.81		1.85	
6.3	0.077		0.2		0.73		1.65	
7.1	0.069		0.18		0.64		1.5	
8	0.059		0.16		0.58		1.25	
9	0.055		0.135		0.53		1.15	
10	0.049		0.12		0.47		1.05	
11.2	0.045		0.11		0.44		0.89	
12.5	0.043		0.093		0.4		0.82	
14	0.04		0.085		0.37		0.71	
16	0.036		0.077		0.35		0.64	
18	0.033		0.069	0.21	0.32		0.58	
20	0.031		0.062	0.195	0.3		0.53	
22.4	0.029		0.055	0.18	0.28	0.62	0.47	
25	0.0275	0.065	0.048	0.17	0.26	0.59	0.42	
28	0.0265	0.061	0.045	0.155	0.255	0.55	0.37	1.14
31.5	0.0255	0.057	0.041	0.14	0.235	0.52	0.35	1.08
35.5	0.0245	0.053	0.037	0.125	0.23	0.48	0.31	1.02
40	0.023	0.048	0.032	0.11	0.22	0.45	0.27	0.96
45		0.044	0.028	0.1	0.215	0.42	0.23	0.84
50		0.042	0.024	0.086	0.205	0.38	0.2	0.77
56		0.039		0.08		0.36		0.67
63		0.035		0.072		0.34		0.61
71		0.032		0.065		0.32		0.56
80		0.031		0.059		0.295		0.51
90		0.0285		0.052		0.275		0.45
100		0.0275		0.047		0.26		0.41
112		0.0265		0.044		0.255		0.36
125		0.0255		0.04		0.235		0.35
140				0.035		0.23		0.31
160				0.03				0.29
180								0.27
200								
224								

6. Technical Appendix

6.3.9 External loads at the output shaft

Calculation

Occurring radial load

The radial load exerted through a power transmission element is derived from the following formula:

$$F_r = \frac{9550 \times P_a \times f_r}{n_2 \times r} \quad \text{or} \quad F_r = \frac{T_a \times f_r}{r}$$

whereby

F_r = calculated radial load (N)
T_a = output torque (Nm)
n_2 = output speed (min-1)
r = pitch circle radius of power transmission element (m)
f_r = factor for the radial load
= 1 for a sprocket (single string)
= 1.25 for a gear wheel or sprocket (double string)
= 1.5 for a V-belt pulley
= 2.5 for a flat belt pulley

6. Technical Appendix

Point of action of the radial load

The distance of the point of action to the shaft shoulder must be as small as possible.
The following tables provide the permissible rated external loads (FrN) at four different points of action. For other points of action, the values can be determined through interpolation.

Check:

Check whether $F_rN = F_r \times SF_{min}$

whereby

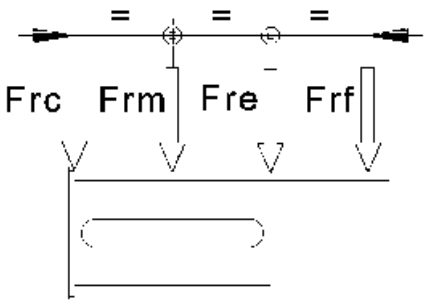
SF_{min} = required Service Factor

F_{rN} = permissible rated external load

Permissible rated external loads F_{rN} (N) at the output shaft for multi-stage gear units (entire S4 family).

Point of action Ar

n_2	Ar	Size			
min-1		MI01	MI02	MI03	MI04
	A_{rc}	1.4	1.25	1.25	1.25
≤ 20	A_{rm}	1	1	1	1
	A_{re}	0.55	0.5	0.5	0.8
	A_{rf}	0.4	0.3	0.3	0.55
	A_{rc}	1.4	1.25	1.25	1.25
45	A_{rm}	1	1	1	1
	A_{re}	0.55	0.5	0.5	0.8
	A_{rf}	0.4	0.3	0.3	0.55
	A_{rc}	1.4	1.25	1.25	1.25
60	A_{rm}	1	1	1	1
	A_{re}	0.55	0.5	0.5	0.8
	A_{rf}	0.4	0.3	0.3	0.55
	A_{rc}	1.25	1.25	1.3	1.25
75	A_{rm}	1	1	1	1
	A_{re}	0.6	0.75	0.55	0.85
	A_{rf}	0.4	0.45	0.35	0.6
	A_{rc}	1.25	1.25	1.25	1.25
95	A_{rm}	1	1	1	1
	A_{re}	0.6	0.8	0.6	0.8
	A_{rf}	0.45	0.5	0.4	0.6
	A_{rc}	1.25	1.2	1.2	1.25
150	A_{rm}	1	1	1	1
	A_{re}	0.65	0.85	0.7	0.85
	A_{rf}	0.45	0.65	0.45	0.6
	A_{rc}	1.25	1.25	1.15	1.25
240	A_{rm}	1	1	1	1
	A_{re}	0.65	0.85	0.8	0.85
	A_{rf}	0.45	0.75	0.55	0.7



$F_{rc} = F_{rN} \times A_{rc}$

$F_{rm} = F_{rN} \times A_{rm}$

$F_{re} = F_{rN} \times A_{re}$

$F_{rf} = F_{rN} \times A_{rf}$

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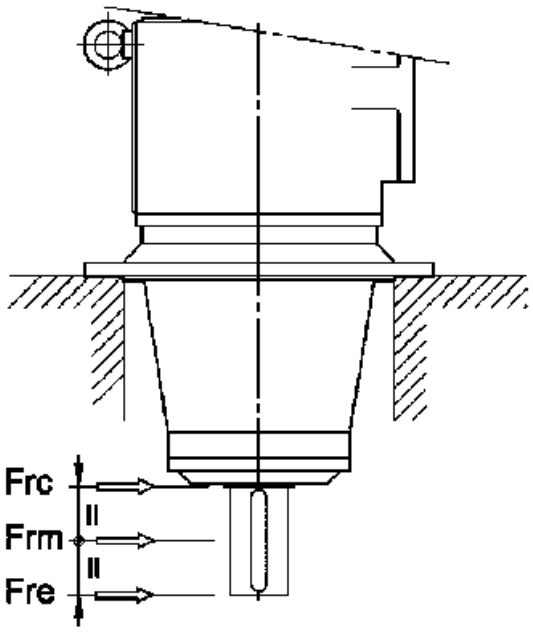
Permissible rated external loads FrN (N) at the output shaft for multi-stage gear units with elongated bearing casing (MI4 only)

		Version MIBA - MIVA for MI4	
n_2	F_{rN}	Size	
min $^{-1}$	(N)	MI.204	MI.304
	F_{rc}	32500	19000
≤ 60	F_{rm}	15000	8900
	F_{re}	9900	5800
	F_{rc}	32500	19000
75	F_{rm}	15000	8900
	F_{re}	9900	5800
	F_{rc}	28000	15500
95	F_{rm}	13500	6500
	F_{re}	9000	5000
	F_{rc}	26000	-
150	F_{rm}	13500	-
	F_{re}	9000	-
	F_{rc}	26000	-
240	F_{rm}	13500	-
	F_{re}	9000	-



F_{rc} = FrN x A_{rc}

F_{rm} = FrN x A_{rm}

F_{re} = FrN x A_{re}

6.3.10 Installation, General Conditions

The drive units must be installed or attached free of vibration or mounted on a flat, rigid and solid frame or foundation in order to avoid vibrations.

CAUTION!
The drive units must be aligned with utmost care! Stress and strain in the housing must be avoided.

To align the gear unit, place it on 3 of the 4 mounting points and use shims to match the fourth point to an accuracy of less than 0.2 mm.

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After the gear unit has been aligned correctly and after the shims have been fitted, the gear unit must be firmly screwed down to the foundation. Screw class 8.8 in accordance with DIN 267. Screw size: see dimensional drawings. The screws must be tightened to the torque requirements as specified by the manufacturer. Trouble-free lubrication and ventilation are ensured only when the gear unit is mounted in the correct position.

It is necessary to correct the amount of lubricant and the position of the breather screw if the mounting position of the gear unit is changed.

Before start-up, check the position-dependent oil level by loosening the oil level plug of the drive unit.

CAUTION!
Sizes 1 and 2 are lubricated for life. In this case, the surface temperature and the noise level emitted by the gear unit must be constantly monitored during the procedure.

Intermediate inserts or pads made of plastic must be used if there is a risk of electrochemical corrosion between the gear unit and system. Gear unit casings must be grounded.

The cooling air intake of the motor must not be obstructed.

6.3.11 Mounting power transmission elements

Observe the operating instructions provided with the power transmission elements. Use elastic couplings for direct power transmission from gear unit to driven machine, while slip couplings are required in case of a blocking risk. Only use rigid couplings in connection with unsupported or overhanging shafts (e.g. with agitators or aerators).
Due to the radial loads that occur, power transmission elements such as flat belts or V-belts, gearwheels and sprockets, cranks, eccentric cams etc. are to be arranged as close to the gear unit housing as possible. Consequently, the bearings and drive shaft are then subject to the lowest load. Refer to the technical sales documentation for the maximum permissible load values.

The protective coating on the end of the shaft must be removed by suitable means prior to mounting the transmission elements. The same procedure applies for transmitting the drive power to the gear unit in connection with a free drive shaft. Great care must be taken while fitting power transmission elements onto the ground output shaft of the gear unit, and can be carried out using the threaded hole provided for this purpose on the end face of the shaft. Preferably, the power transmission element should be heated to a temperature of approx. 100 C°. The hole is to be dimensioned in accordance with ISO H7. All parts must be thoroughly deburred, cleaned and the fit locations lightly greased. Avoid all knocks and impact to the end of the shaft.

6.3.12 Mounting coupling on output shaft

Observe the operating instructions from the coupling manufacturer.
Accurate alignment and regular inspection are necessary.

The maximum permissible shaft extensions of the coup- ling used must be maintained and checked.

The specified distance between the coupling halves should be maintained.

Only adjust the radial offset after the angle offset and the distance between the shaft ends have been checked.
Recheck the angle offset after correcting the radial offset.

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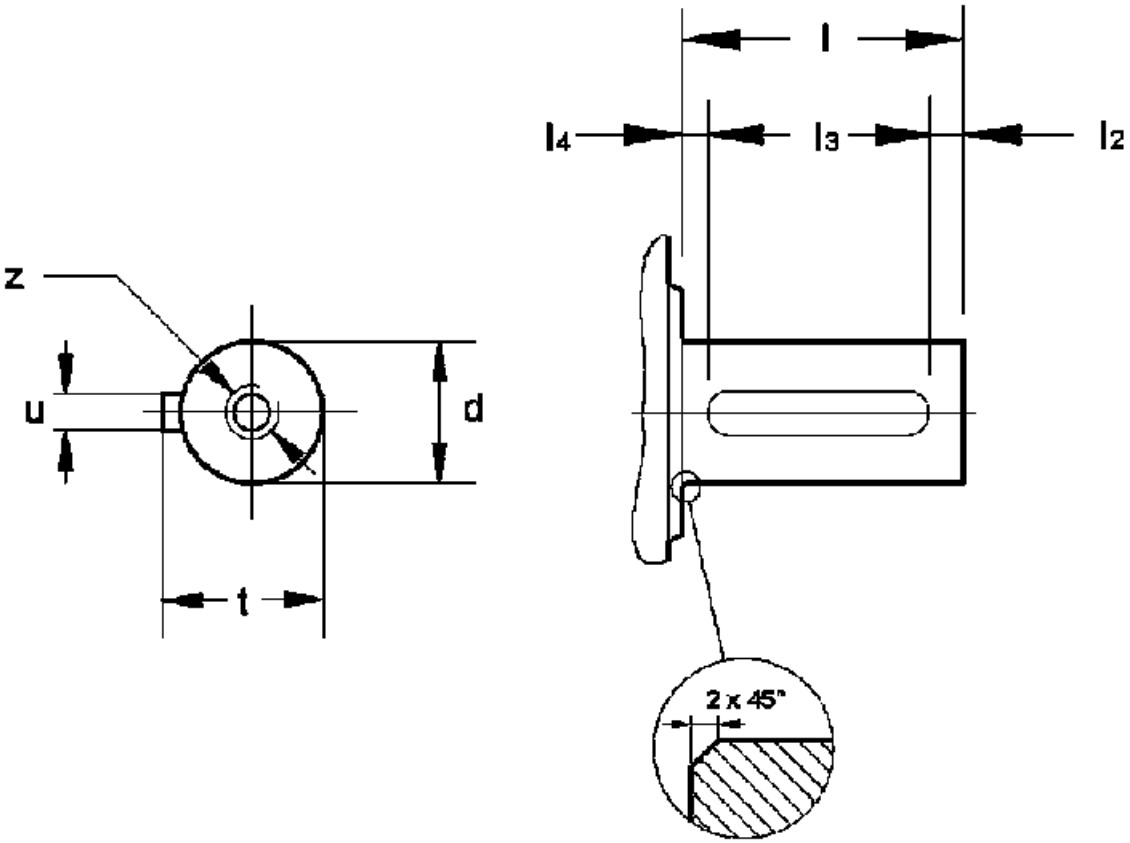
6.3.13 Mounting gear units with solid shaft

Shaft dimensions



Size	d	L	l_2	l_3	l_4	t	u	z
MI01	25k6	50	5	40	5	28	8	M10x22
MI02	30k6	60	3,5	50	6,5	33	8	M10x22
MI03	40k6	80	2	70	8	43	12	M16x36
MI04	50k6	100	10	80	10	53,5	14	M16x36

Feather key to DIN 6885-T1-"Form A"

Notes

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