

# TECHNICAL CATALOGUE



## PLANETARY GEARED MOTORS

STANDARD **IEC**



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Motovario® corporate philosophy aims to promote the company's brand and products at an international level with determination and transparency, while constantly striving to offer innovative solutions for satisfying and anticipating the demand of the market. Motovario® provides technologically advanced solutions in the transmission components field for industrial and civil applications worldwide.

### The company

At Formigine, the heart of Modena's industrial district, Motovario® boasts a production plant spanning 50,000 m<sup>2</sup> that employs 500 people.

1965 Foundation of Motovario

1998 Acquisition of Spaggiari Trasmissioni, an important brand in the mechanical technology sector.

2006 Motovario acquisition by a private investment fund managed by Synergo SGR, in order to guarantee its development and support its expansion throughout the world.

2014 Acquisition of Pujol.

2015 Acquisition by TECO.

At the core of Motovario® lies an evolved production process based on technological solutions that convert power into movement. Motovario® is at the heart of the production processes that drive industries worldwide. Quality and reliability are the company's fundamental assets. Motovario® is present throughout the world with branches in France, Spain, Germany, England, China, the United States and India. The sales network and customer service guarantee immediate and high-quality support to all customers. In addition, the company boasts a worldwide network of MAC (Motovario Assembly Centre). Qualified assembly centres are present, in Italy, Australia, Benelux, Bulgaria, China, Finland, France, India, Ireland, Israel, Malaysia, Poland, Portugal, South Korea, Spain, Sweden, Turkey, United Kingdom, Ukraine and USA. The company is able to offer a wide range of products: speed variators, right-angle, helical-bevel, shaft-mounted, worm gear reducers and gearmotors, electric motors, inverter and inverter drives. Maximum quality and precision are ensured by the cutting-edge technologies implemented in the production process. 170 numerical control machines, served by LGV lines for storage in automatic warehouses, ensure a high standard of efficiency for the Motovario® production department.

The highly automated assembly lines are supported by a specific computerised system. The process statistical control system manages the production process to avoid rejects, by enabling the operator to monitor all the processing phases. The annealing, tempering, hardening and carburizing treatments are carried out inside the plant. The plant operates on a 24-hour basis, including holidays. Reliability, resilience and versatility are the distinctive features of Motovario® products, the most qualified solution to any power transmission requirement.

### Main fields OF APPLICATIONS

- Mechanical-electromechanical industry (car washing, pumps, barriers & automatic doors, circuit breakers)
- Ceramic industry (ovens, press feeding systems)
- Food, farming, oenology industry
- Wood, marble, glass industry
- Packaging & bottling industry
- Textile, shoes, leather industry
- Transport, logistic industry
- Construction industry
- Milling, animal husbandry, flower industry
- Machine tools & steel industry
- Mining, quarry, cement industry
- Energy industry (solar, nuclear, biomass, wind)
- Amusement industry (theatres, leisure parks, kiddy rides)
- Chemical & pharmaceuticals industry
- Paper & printing industry
- Plastic & rubber industry
- Telecommunications industry (satellite orientation systems, military radar)
- Engineering and consultant companies

### Certifications

Our products can be manufactured to conform with the ATEX Directive 2014/34/UE. In addition, the safety and quality of our motors, geared motors and motovariators is guaranteed by the EAC (EurAsian Conformity) certification, an essential requirement for products exported to the Russian Federation. Our motors are UL certified, which guarantees their safety and quality requirements for the North American market.

### Quality CONCEPT

Motovario® has obtained the quality certification renewal of its production system in conformity to the UNI EN ISO 9001:2008 standard. This internationally recognised certification acknowledges the company's commitment and drive geared towards constantly improving products, projects and services offered. Moreover, the company has obtained the OHSAS 18001:1999 (Occupational Health and Safety Assessment Series) certification, which defines the requirements of the workplace safety and health management system.

### Research & DEVELOPMENT

Technological innovation: a crucial factor for competing in the market. In the company's 50-year history, research and change have been the pivotal factors in guaranteeing competitiveness at a global level, thanks to increasingly advanced products in terms of performance and reliability. Each year the company invests an increasing amount of its turnover in research and development, geared towards promoting the constant study and analysis of products, control processes and performance certification. In order to ensure that customers receive products that comply with the requested performance levels, the company carries out simulations on all new products, including NVH (Noise, Vibration, Harshness) tests effected in the advanced semi-anechoic chamber.

### Customer CARE

Innovative instruments and software applications supporting the technical and logistic requirements of our partners worldwide guarantee a timely and customised service. The experience acquired by Motovario® has led to the creation of the new online portal MyMotovario 4.0, which allows for selecting products and exporting their 3D file. As a result, designers and engineering departments can download the three-dimensional model of the requested product and implement it directly in their own layout. In order to maximise customer service and quality, Motovario® offers all its customers the following online services: Order Tracking, which allows for monitoring the progress of an order in real time, and the Stock Availability service, through which users may check the availability (stock) of our products, both in the Italian plant and in the various branches.

### Motovario chooses technological evolution.

Motovario® has chosen technological evolution and actively collaborates with the Faculty of Engineering of the University of Modena and Reggio Emilia and of the University of Bologna.

**Reliability, sturdiness, versatility**

These are the distinctive traits of Motovario products. A broad range of transmission products that provide a competent, innovative solution to each and every power application need. Cutting-edge tools, unrelenting research efforts and ongoing commitment to upgrading manufacturing equipment to the latest state-of-the-art enable us to offer high quality and performance standards to cater to industry requirements and the broadest variety of applications. Motovario ranks among the leading, well-reputed companies in Italy engaged in the design, manufacture and sales of transmission products for industrial and civil applications. The entire manufacturing process takes place in Formigine and Ubersetto plants, in Modena area, with an overall surface area of over 50.000 sq m. and a workforce of about 500 people. 170 numerically controlled machines and cutting-edge handling, storage and assembly automated systems ensure that all products meet high quality standards. The network includes more than 40 Motovario-certified assembly centres, with the capability to supply products in a broad range of versions, including customised versions, high service capacity and fast response. As a result, our product offering can cater to the needs of all plant engineering sectors, in all industries and for different applications, and includes: speed variators, helical, bevel-helical, parallel helical, worm gear reducers and gearmotors, electric motors and motor-inverters. All of the products we manufacture share such common features as reliability, sturdiness and versatility, topped with a high innovation content. At the heart of a company's technological innovation is the ability to develop integrated tools for computer-aided calculation simulation and management of different processes as part of product development. When simulating operating, setup and process conditions, it is also necessary to analyse and optimize the overall functional design of a product using a synergistic approach. This is achieved by implementing an exhaustive experimental plan, without using interpolation or approximation, as they frequently allow criticalities or any oversizing which is not conducive to maximising quality/cost ratio to go unnoticed.

**High-efficiency method for calculation according to standards**

A set of specific functions have been developed to this end. A few significant examples include functions to:

- Optimise individual reduction ratios and the combinations of the different reduction stages based on parametrisable target normal series;
- Calculate torque values and maximum permissible external forces for gear reducer units, using iterative numeric algorithms to confirm target life/safety values of components;
- Create databases for loading a FEM structural analysis model by automatically writing all reaction components of bearings under all load conditions to a specific file, with automatic selection of critical cases that need to be verified.

Another goal of the method is to create synergy between calculation according to standards and FEM structural calculation and the implementation of FEM model loading procedures, so as to simplify input data, meshing and constraint criteria

**Competitiveness and operational benefits of the new method**

This method offers many practical advantages over traditional calculation procedures within the company, namely:

- Iterative optimisation of project since setup stage;
- Accurate assessment of the various service factors and reliability levels for the entire gear reducer unit and for all operating conditions as per catalogue rating or customer specific requirements;
- Faster support to customers in analysing tailored product configurations;
- Integrated corporate databases that can be updated in real-time.

**Range extension and ongoing evolution**

The steady, significant growth of Motovario Group is achieved thanks to an ongoing search for new calculation and design tools, as well as to customer service. The new tools identified have led to innovation, improved product reliability as well as positive developments in market management. The following software products are used for design, calculation and management:

- Solidworks;
- Kisoft;
- Kissys;
- Ansys;
- FEM modelling analysis software;
- Circuit design and simulation software;
- Specific spreadsheets;
- SAP.

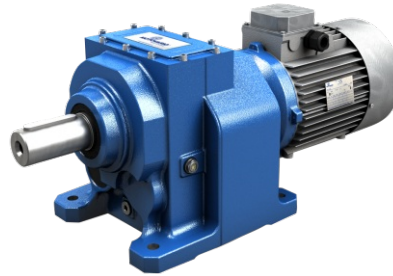
In MyMotovario 4.0 portal, PRODUCT SELECTION includes a section named APPLICATIONS where customers can enter application data and find out which gear reducer suits them best in a matter of minutes.



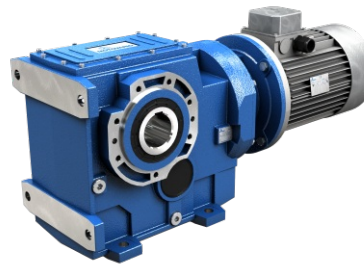
## MOTOVARIO Products

**HELICAL GEAR REDUCERS**

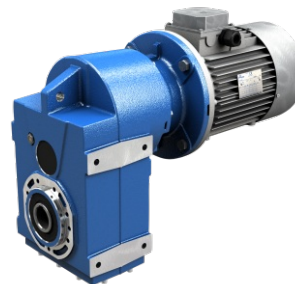
Cast iron or aluminum casing  
 Output shaft up to 90 mm  
 Mn<sub>2</sub> up to 8.600 Nm  
 Reduction stages 1, 2, 3  
 Ratios up to 354  
 Atex units

**HELICAL BEVEL GEAR REDUCERS**

Cast iron or aluminum casing  
 Output shaft up to 110 mm  
 Mn<sub>2</sub> up to 14.000 Nm  
 Reduction stages 2, 3  
 Ratios up to 443  
 Atex units

**SHAFT MOUNTED GEAR REDUCERS**

Cast iron  
 Output shaft up to 60 mm  
 Mn<sub>2</sub> up to 3.225 Nm  
 Reduction stages 2, 3  
 Ratios up to 395  
 Atex units

**WORM GEAR REDUCERS**

Cast iron or aluminum casing  
 Output shaft up to 50 mm  
 Mn<sub>2</sub> up to 2.700 Nm  
 Ratios up to 1083  
 Atex units

**PLANETARY GEARED UNITS**

Cast iron  
 Output shaft up to 80 mm  
 Mn<sub>2</sub> up to 10000 Nm  
 Reduction stages 1, 2, 3, 4  
 Ratios up to 2700



<p><b>PARALLEL HELICAL AND BEVEL HELICAL GEAR REDUCERS FOR MIDDLE HEAVY INDUSTRY</b></p> <p>Cast iron casing                  Output shaft up to 180 mm                  Mn<sub>2</sub> up to 110.000 Nm                  Reduction stages 2, 3, 4                  Ratios up to 431                  Atex units</p>	
<p><b>MOTOVARIATORS AND MOTOVARIATOR-GEAR REDUCERS</b></p> <p>Cast iron or aluminum casing                  Mn<sub>2</sub> up to 5.000 Nm                  Atex units</p>	
<p><b>ELECTRIC MOTORS</b></p> <p>Power ratings up to 90 kW                  Poles 2, 4, 6                  Three-phase and single-phase, built-in brake, dual polarity                  Protection class up to IP66</p>	
<p><b>SELF POWER® SELF-STARTING SYNCHRONOUS ELECTRIC MOTORS</b></p> <p>Power ratings up to 7,5 kW                  Poles 4                  Three-phase, built-in brake                  Protection class up to IP66</p>	
<p><b>DRIVES</b></p> <p><b>DRIVON - motoinverter</b></p> <p>Three phase and single phase power supply                  High dynamics sensorless vectorial control                  Power ratings up to 5,5 kW                  Standard integrated STO                  Integrated field bus                  Optional field bus</p>	

## 1.3.1 Symbols

Physical dimension	Symbol	Symbol units of measure	Input	Output
Power	P	[kW]	P <sub>1</sub>	P <sub>2</sub>
Requested power	Pr	[kW]	Pr <sub>1</sub>	Pr <sub>2</sub>
Nominal power	Pn	[kW]	Pn <sub>1</sub>	Pn <sub>2</sub>
Torque	M	[Nm]	M <sub>1</sub>	M <sub>2</sub>
Nominal torque	Mn	[Nm]	/	Mn <sub>2</sub>
Requested torque	Mr	[Nm]	Mr <sub>1</sub>	Mr <sub>2</sub>
Speed	n	[rpm]	n <sub>1</sub>	n <sub>2</sub>
Force	F	[N]	/	/
Radial load	Fr	[N]	Fr <sub>1</sub>	Fr <sub>2</sub>
Axial load	Fa	[N]	Fa <sub>1</sub>	Fa <sub>2</sub>
Reduction ratio	i	[ ]	/	/
Dynamic efficiency	η <sub>d</sub>	[ ]	/	/
Service factor	f.s.	[ ]	/	/
Life factor	Fh	[ ]	Fh <sub>1</sub>	Fh <sub>2</sub>
Corrective factor	fh	[ ]	fh <sub>1</sub>	fh <sub>2</sub>
Static	s	[ ]	/	/
Dynamic	d	[ ]	/	/
Calculated	c	[ ]	/	/
Maximum	max	[ ]	/	/
Minimum	min	[ ]	/	/
Moment of inertia	J	[kgm <sup>2</sup> ]	J <sub>1</sub>	J <sub>2</sub>
Ambient temperature	T <sub>amb</sub>	[°C]	/	/
Dimension		[mm]	/	/
Angular backlash	y	[arcmin]	y <sub>1</sub>	y <sub>2</sub>

## 1.3.2 Formulas

REDUCER		
Starting or stopping time	$t = v / a$	[s]
Velocity in rotary motion	$v = \pi * d * n / 60$ $v = \omega * r$	[m/s]
Speed velocity Angular velocity	$n = 60 * v / (\pi * d)$ $\omega = v / r$	[rpm] [rad/s]
Acceleration or deceleration according to a starting / stopping time	$a = v / t$	[m/s <sup>2</sup> ]
Angular acceleration	$\alpha = n / (9,55 * t)$ $\alpha = \omega / t$	[rad/s <sup>2</sup> ]
Starting or stopping distance (according to acceleration / deceleration or angular velocity)	$s = a * t^2 / 2$ $s = v * t / 2$	[m]
Horizontal translation force	$F = \mu * m * g$	[N]
Vertical translation force (lifting)	$F = m * g$	
Inclined plane translation force	$F = m * g (\mu * \cos\beta + \sin\beta)$	
m= mass [kg]; g= gravity acceleration [m/s <sup>2</sup> ]; $\mu$ = friction coefficient; $\beta$ = angle of inclination		
Moment of inertia	$J = m * v^2 / \omega^2$	[kgm <sup>2</sup> ]
Torque	$M = F * d / 2$ $M = J * \omega / t$	[Nm]

MOTOR and GEARMOTOR		
Starting time	$t_a = (J_{ext} + J_m) * n_n / 9,55 + (M_{peak} - M_r)$	[s]
Braking time	$t_s = (J_{ext} + J_m) * n_n / 9,55 + (M_{peak} + M_r)$	[s]
Motor rotation angle during starting	$\varphi = n_n * t_a / 19,1$	[rad]
Motor rotation angle during braking	$\varphi = n_n * t_s / 19,1$	[rad]
Power available at the shaft of single phase motor	$P = V * I * \eta * \cos\omega$	[W]
Power available at the shaft of three phase motor	$P = 1,73 * V * I * \eta * \cos\omega$	[W]

RUNNING at 60Hz		
Speed velocity at 60Hz	$n_{60Hz} = 1,2 * n_{50Hz}$	[rpm]
Power at 60Hz	$P_{1\ 60Hz} = P_{1\ 50Hz} * V_{60Hz} / V_{50Hz}$	[kW]
If input voltage at 60 Hz ( $V_{60Hz}$ ) corresponds to winding voltage at 50 Hz ( $V_{50Hz}$ ), power doesn't change $P_{1\ 60Hz} = P_{1\ 50Hz}$		
If input voltage at 60 Hz ( $V_{60Hz}$ ) is 20% higher than winding voltage at 50 Hz ( $V_{50Hz}$ ), power increases by 20% $P_{1\ 60Hz} = 1,2 P_{1\ 50Hz}$		
Torque at 60Hz	$M_{60Hz} = M_{50Hz} * P_{1\ 60Hz} / (1,2 * P_{1\ 50Hz})$	[Nm]
Service factor at 60Hz	$f.s_{60Hz} = f.s_{50Hz} * 1,175 * P_{1\ 50Hz} / P_{1\ 60Hz}$	-

For correctly selecting a gear reducer or geared motor, several essential pieces of data are required:

1. The rotational input speed to the gear reducer ( $n_1$ ) and the rotational output speed ( $n_2$ ). Through these two values it is possible to calculate the reduction ratio ( $i$ ) of the gear reducer using the following formula:  $i=n_1/n_2$
2. The torque required by the application ( $Mr_2$ ).

The geared motor or gear reducer can be selected once this data is known.

This guide helps you to select the right product in just a few steps:

#### Geared motor selection

1. Determine the application's actual service factor (**s.f.**). This parameter depends on the type of load of the powered machine, the number of starts per hour and the hours of operation (refer to the "Service factor" paragraph).
2. Calculate the input power  $Pr_1$  using the required torque value  $Mr_2$ , the speed  $n_2$  and dynamic efficiency value.  $Pr_1=(Mr_2*n_2)/(9550*\eta_d)$ . The dynamic efficiency value depends on the type of gear reducer and on the number of gear reduction stages. (To calculate the efficiency value see its page).
3. Consult the geared motor performance tables and identify a nominal power value  $Pn_1$  exceeding the required power  $Pr_1$ , such that:  $Pn_1 \geq Pr_1$
4. Once the suitable nominal power has been identified, select the geared motor capable of generating the rotational speed closest to the desired  $n_2$  value and with service factor s.f. greater or equal to that required by the application.

In the geared motor selection tables the combinations include 2-pole, 4-pole and 6-pole motors powered at 50Hz.

#### Gear reducer selection

1. Determine the application's service factor ( $f_s$ ) (consult to the "Service factor" paragraph on its page).
2. Calculate the reduction ratio  $i$  from the requested output speed  $n_2$  and from the input speed  $n_1$ .  $i=n_1/n_2$
3. Calculate the torque  $M_{c2}$  for selecting the gear reducer through the torque required by the application  $Mr_2$  and the service factor s.f.:  $M_{c2}=Mr_2*(f_s)$
4. Consult the Gear Reducer Performance tables looking for the reducer that, with the reduction ratio closer to the calculated one, has a nominal torque  $Mn_2$  so that:  $Mn_2 \geq M_{c2}$

#### Selection of gear reducers according to number of work cycles:

1. Determine the application's actual service factor (**s.f.**). This parameter depends on the type of load of the powered machine, the number of starts per hour and the hours of operation (refer to the "Service factor" paragraph).
2. Determine the duration of operation in hours  $hc$  for the application and, therefore, required of the gear reducer.
3. Calculate the torque  $M_{c2}$  for selecting the gear reducer through the torque required by the application  $Mr_2$  and the service factor s.f.:  $M_{c2}=Mr_2*(f_s)$
4. Calculate the reduction ratio  $i$  from the requested output speed  $n_2$  and from the input speed  $n_1$ .  $i=n_1/n_2$
5. Calculate the duration factor  $Fh_2=(n_2*hc)$ , which represents the envisaged number of work cycles, on the basis of the required output speed  $n_2$  and the duration of operation  $h$ .
6. Consult the work cycle performance tables to find the gear reducer which, with the reduction ratio closest to the calculated one, has a rated torque  $Mn_2$  whereby:  $Mn_2 \geq M_{c2}$  and  $(n_2*h) \geq Fh_2$ . The Duty Cycle Performance tables refer to both motor flange (HL) and solid input shaft (IHL) configurations: for the latter, check the availability of the ratio and applicable  $M_{2max}$  value in the IHL Gear Reducer Performance tables. If the  $M_{2max}$  value is lower than the value in the performance tables, always use  $M_{2max}$  as the highest value.

**Checks**

Once the gear reducer or geared motor has been selected, the following checks should be performed:

**A. Thermal power**

The gear reducer's thermal power must be equal to or greater than the installed mechanical power, or the power required by the application according to the indications contained in the section (refer to the "Thermal power" paragraph).

**B. Maximum torque**

It is the value of the output torque that the gear reducer withstands under static conditions and is intended as instantaneous load or starting torque under load. Check that the starting torque and instantaneous torque do not exceed the  $M_{2max}$  value in the table.

$M_{2max}$ [Nm]													
HPL 010		HPL 020		HPL 030		HPL 050		HPL 080		HPL 130		HPL 180	
CS SS HS	HM	CS SS HS	HM	CS SS HS	HM	CS SS HS	HM	CS SS HS	HM	CS SS HS	HM	CS SS HS	HM
2400	2400	3400	2400	5200	5200	8800	7500	14900	11100	21000	20100	29000	29000

In the ECE gearbox version, for the ratios in the tables below the  $M_{2max}$  values are those shown.

IHL 010	1				2	3	
i	4,32	5,37	7,38	9,30	11,8	87,4	188
$M_{2max}$ [Nm]	790	990	1360	1710	2000	2000	2000

IHL 020	1		2
i	7,38	9,30	11,8
$M_{2max}$ [Nm]	1360	1710	2120

IHL 030	1	2			
i	9,30	18,7	21,3	23,2	26,7
$M_{2max}$ [Nm]	1710	3340	3810	4150	4780

IHL 050	2			
i	31,9	33,2	39,6	45,7
$M_{2max}$ [Nm]	5700	5940	7090	8170

IHL 080	2		3	
i	55,4	69,8	79,3	83,5
$M_{2max}$ [Nm]	9900	12470	13750	14480

IHL 130	3	
i	104	112
$M_{2max}$ [Nm]	18030	19390

IHL 180	3		
i	140	151	162
$M_{2max}$ [Nm]	24340	26240	28130

In the geared motor version, if the service factor is  $< 1.5$  and the starting torque under load of the motor is  $> 1.5 M_n$ , please contact the MOTOVARIO TECHNICAL SERVICE.

#### C. Radial loads

1. Verify that the radial loads acting on the input and/or output shafts are within with the values indicated in the catalogue. If they exceed these values, increase the size of the gear reducer or modify the external load capacity. During the checking phase, it is important to remember that the values indicated in the catalogue refer to loads acting on the mid-point of the shaft protrusion, therefore, if the load is applied to a different position, appropriate formulas must be used to calculate the admissible load in the desired position (refer to the "Radial loads" paragraph).
2. If accessory output shafts are present, make sure that the applied load is compatible with shaft size. If help is needed: contact MOTOVARIO TECHNICAL SERVICE.

D. If an electric motor is going to be fitted to the selected gear reducer, check for its applicability by referring to the configuration table (see paragraph "Motor flange availability"). From IEC 180 motors, verify if necessary to support the motor with feet. In case of need please contact MOTOVARIO TECHNICAL SERVICE.

### 1.5.1 Service factor

The service factor required by application is defined by this formula  $f_s = f_{sa} * f_{sb} * f_{sc}$  (see relevant tables).

It takes into account how heavy-duty the application is; it depends on operating conditions, inverter type and frequency of gear reducer starts. The service factor of a gear reducer is calculated by dividing its nominal power  $P_{n1}$  by installed power  $P_1$ . The parameters that need to be taken into account in order to select the most suitable service factor are reported in tables  $f_{sa}$ ,  $f_{sb}$  and  $f_{sc}$ .

**Table  $f_{sa}$**

Nature of load applied	Daily operating hours [h/d]				
	2	4	8	16	24
Uniform	0,80	0,90	1,00	1,25	1,35
Moderate	1,00	1,20	1,30	1,60	1,80
Heavy	1,30	1,60	1,80	2,25	2,50

**Table  $f_{sb}$**

Nature of load applied	Frequency of starts per hour [st/h]			
	< 6	6 ... 20	20 ... 60	60 ... 120
Uniform	1	1,25	1,35	1,5
Moderate	1	1,15	1,25	1,35
Heavy	1	1,05	1,15	1,25

**Table  $f_{sc}$**

Type of motor used	$f_{sc}$
Electric motor	1,00
Reciprocating multiple-cylinder motor	1,25
Reciprocating single-cylinder motor	1,50



Table APPLICATION CLASSIFICATION

Application	Type of load
<b>CONVEYORS (for heavy, not uniform loads)</b>	
Scraper	Moderate
Belt	Moderate
Bucket	Moderate
Elevators (Redler)	Moderate
Roller	Moderate
For furnaces	Moderate
Reciprocating	Heavy
Oscillating	Heavy
Screw	Heavy
Application	Type of load
<b>PUMPS</b>	
Centrifugal	Moderate
Rotary (gear and screw) (for heavy, not uniform loads)	Uniform
Rotary (gear and screw) (variable density)	Moderate
Reciprocating	Uniform
Reciprocating double-acting multiple-cylinder	Moderate
Reciprocating single-cylinder	Heavy
Application	Type of load
<b>MILLS</b>	
Rotary ball	Heavy
Hammer	Heavy
Rolling	Heavy
Cement	Moderate
Application	Type of load
<b>COMPRESSORS</b>	
Centrifugal	Uniform
Sliding-vane positive-displacement	Moderate
Reciprocating multiple-cylinder	Moderate
Reciprocating single-cylinder	Heavy
Application	Type of load
<b>BATCHERS</b>	
Rotary	Moderate
Reciprocating, vibrating	Moderate

Application	Type of load
<b>TEXTILE INDUSTRY</b>	
Washing machines	Moderate
Rotary presses	Moderate
Carding machines	Moderate
Dyeing machines	Moderate
Looms	Moderate
Picking machines	Moderate
Spinning machines	Moderate

Application	Type of load
<b>PAPER INDUSTRY</b>	
Mixers (stirrers)	Moderate
Conveyor belts	Moderate
Drying cylinders	Moderate
Felt stretchers	Moderate
Rotary presses	Heavy
Presses	Heavy
Winders	Heavy

Application	Type of load
<b>FOOD INDUSTRY</b>	
Mixers	Moderate
Kneading machines	Moderate
Sugar beet cutters	Moderate
Meat grinders	Moderate

Application	Type of load
<b>RUBBER AND PLASTIC MACHINES</b>	
Mixers (palletizers)	Heavy
Rotary presses	Heavy
Mills (crushers)	Heavy
Tyre machines	Moderate

Application	Type of load
<b>STIRRERS</b>	
Variable-density	Moderate
Variable-density with suspended solids	Moderate

Table APPLICATION CLASSIFICATION

Application	Type of load
<b>MACHINE TOOLS</b>	
Punching presses	Heavy
Cutting	Heavy
Planers	Heavy
Main drives	Moderate
Auxiliary drives (feeders, workpieces, conveyor)	Uniform
Bending machines	Moderate
Application	Type of load
<b>FANS (regular, balanced speed)</b>	
Centrifugal	Uniform
Lightweight, small-diameter	Uniform
Cooling towers	Moderate
Large-diameter turbo fans (mining)	Moderate
Application	Type of load
<b>CRANES AND STACKER CRANES</b>	
Arm rotation	Uniform
Sideshifter	Moderate
Basket drive control	Heavy
Application	Type of load
<b>CRUSHERS</b>	
Ore	Moderate
Stone	Moderate
Application	Type of load
<b>PACKAGING MACHINES</b>	Uniform
Application	Type of load
<b>WOOD WORKING</b>	
Debarkers	Heavy

Application	Type of load
<b>EXTRACTORS AND DREDGERS</b>	
Rope winders	Moderate
Rail-mounted conveyors	Moderate
Pumps	Moderate
Stackers	Moderate
Material hoisting	Moderate
Bucket extractors	Heavy

Application	Type of load
<b>METAL-WORKING</b>	
Drawbenches	Heavy
Forging presses	Heavy
Cutting machines	Heavy
Rolling mills	Heavy

Application	Type of load
<b>MIXERS</b>	
Steady-density	Uniform
Variable-density	Moderate
For concrete	Moderate

Application	Type of load
<b>ELEVATORS</b>	
Hoists	Moderate
Lifts, ski lifts (cableways)	Heavy

Application	Type of load
<b>WASHING MACHINES AND PUMPS</b>	Moderate

Application	Type of load
<b>WATER TREATMENT</b>	
Mud scraper machines	Moderate
Machines thickeners	Uniform
Sedimentation machines	Moderate
Machines digesters	Moderate
Machines augers	Moderate

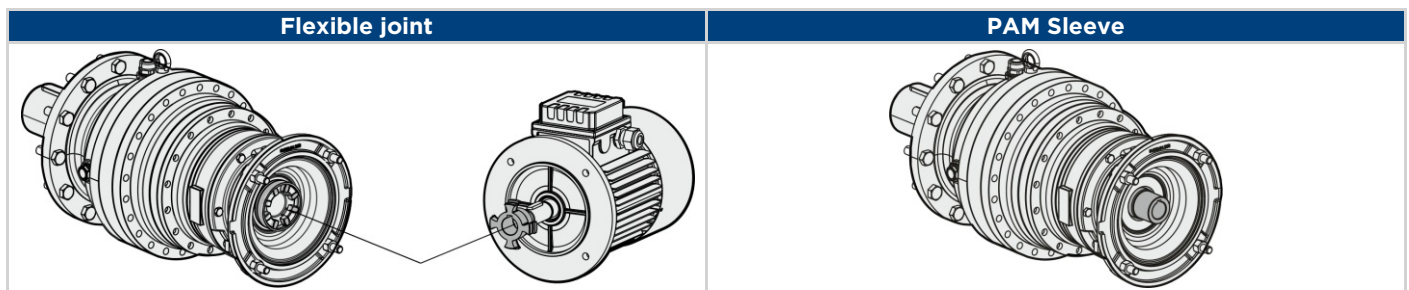
### 1.6.1 Installation

To install the gear reducer it is necessary to note the following recommendations:

- Check the correct direction of rotation of the gear reducer output shaft before fitting the unit to the machine.
- In the case of particularly lengthy periods of storage (4/6 months), if the oil seal is not immersed in the lubricant inside the unit, it is recommended to change it since the rubber could stick to the shaft or may even have lost the elasticity it needs to function properly.
- Whenever possible, protect the gear reducer against solar radiation and bad weather.
- Ensure the motor cools correctly by ensuring good passage of air from the fan side.
- In the case of ambient temperatures  $< -15^{\circ}\text{C}$  or  $> +50^{\circ}\text{C}$  call MOTOVARIO TECHNICAL SERVICE.
- The various parts (pulleys, gear wheels, couplings, shafts, etc.) must be mounted on the solid or hollow shafts using special threaded holes or other systems that anyhow ensure correct operation without risking damage to the bearings or external parts of the units. Lubricate the surfaces in contact to avoid seizure or oxidation.
- Painting must definitely not go over rubber parts and the holes on the breather plugs, if any.
- Replace the closed plug used for shipping with the special breather plug.
- Choose the most appropriate lubricant (see Lubrication chapter) and fill the gear reducer properly using the appropriate oil level plug.
- Starting must take place gradually, without immediately applying the maximum load.
- When there are parts, objects or materials under the motor drive that can be damaged by even limited spillage of oil, special protection should be fitted.

#### Assembling motor on pam flange

When the unit is supplied without motor, it is necessary to follow these recommendation to ensure the correct assembly of the electric motor. Check that the tolerances for the motor shaft and flange correspond to the "standard". Carefully clean the shaft, spigot and surfaces of the flange removing traces of paint and dirt, and confirm the key is fitted correctly. Fit the half coupling/sleeve to the motor shaft (see picture) taking care to ensure the motor shaft and bearings are not damaged by avoiding excessive force and where necessary using assembly equipment. Place the couplings elastic element onto the motor half coupling and position the motor up to the gear unit ensuring the coupling element is aligned with the driven half coupling. Complete the assembly using the fixing bolts. Key-ways with tightened tolerances.



MOTOVARIO products are supplied with the following surface treatment characteristics:

**External ring gear in nitrided steel**

**Sun and planetary gears in case-hardened steel**

**High-resistance spheroidal cast-iron struts**

**Connection rings and planet-carriers in ductile iron or structural steel, depending on the size of the gear reducer**

**Versions available (output modules):**

- Version for flange fastening;
- Root-mounting version, integral.

High-resistance spheroidal **cast-iron output module housings:**

- The castings are supplied protected by an antirust primer, in Black-Grey RAL 7021.

**Input versions available:**

- PAM flange for coupling with IEC motor;
- PAM flange for coupling with IEC motor with coupling;
- Compact gear motor;
- Input shaft.

**Performance:**

- Loading capacity verifiable in accordance with DIN 3990, ISO 6336, AGMA 2101, ISO 10300, DIN 3991, ISO 281, DIN 743.

**Dynamic  $\eta$ :**

- The efficiency is the ratio between the output power  $P_2$  and the power absorbed by the gear reducer  $P_1$ :  $\eta = P_2/P_1$ .

HPL-range helical gear reducers have an average value equal to:

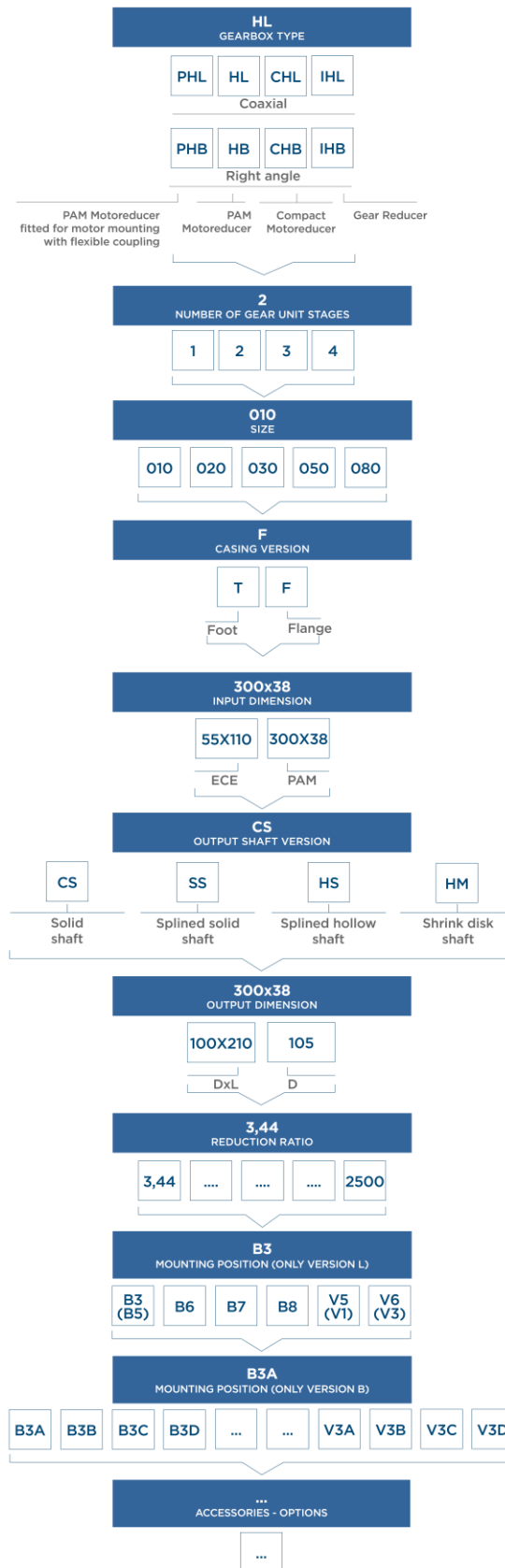
HPL..1 stages = 0,97

HPL..2 stages = 0,94

HPL..3 stages = 0,91

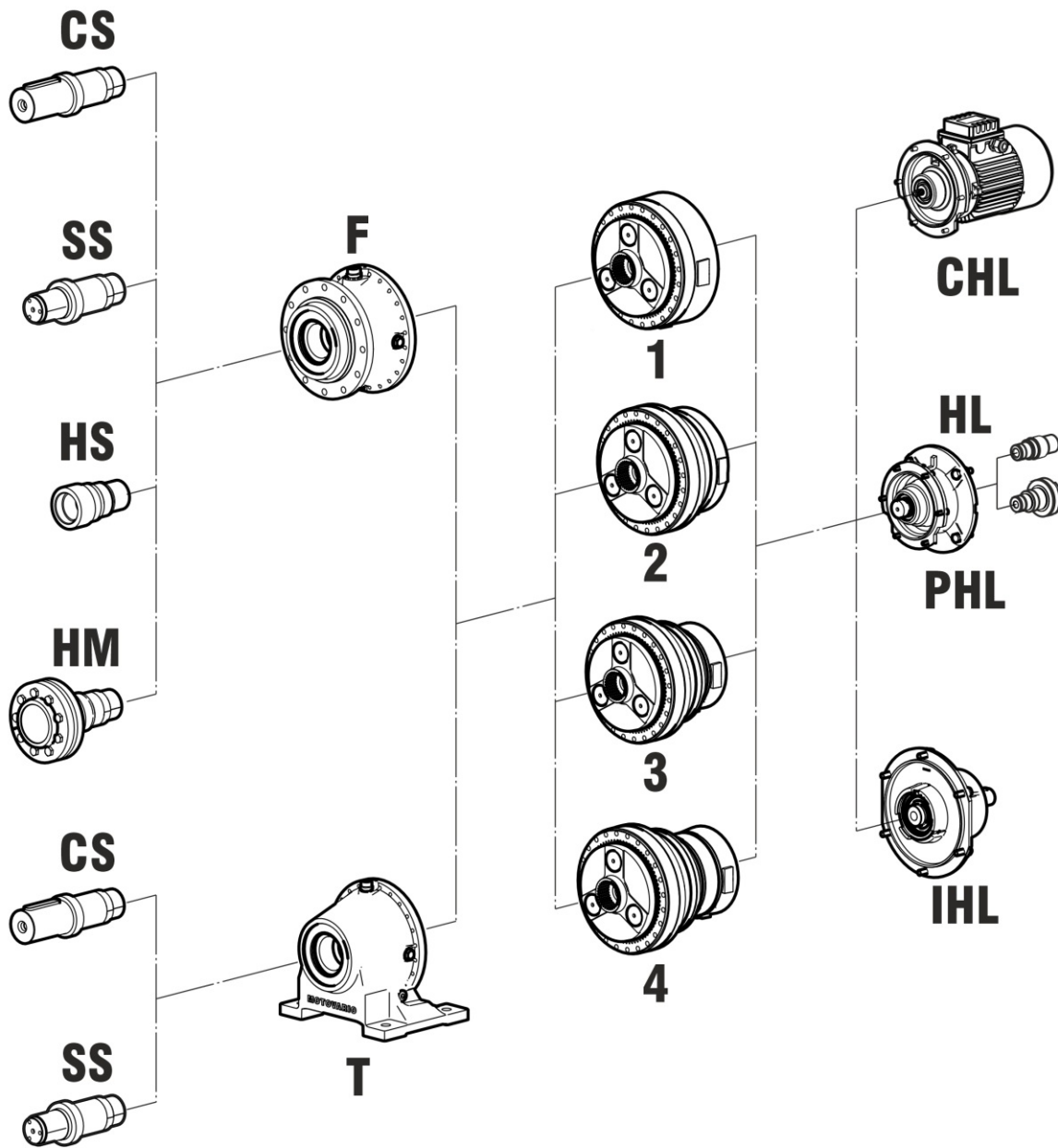
HPL..4 stages = 0,88

## 2.2.1 Designation



## 2.2 TYPOLOGY

### 2.2.2 Versions



<b>CS</b>	Solid shaft
<b>SS</b>	Splined solid shaft
<b>HS</b>	Splined hollow shaft
<b>HM</b>	Shrink disk shaft

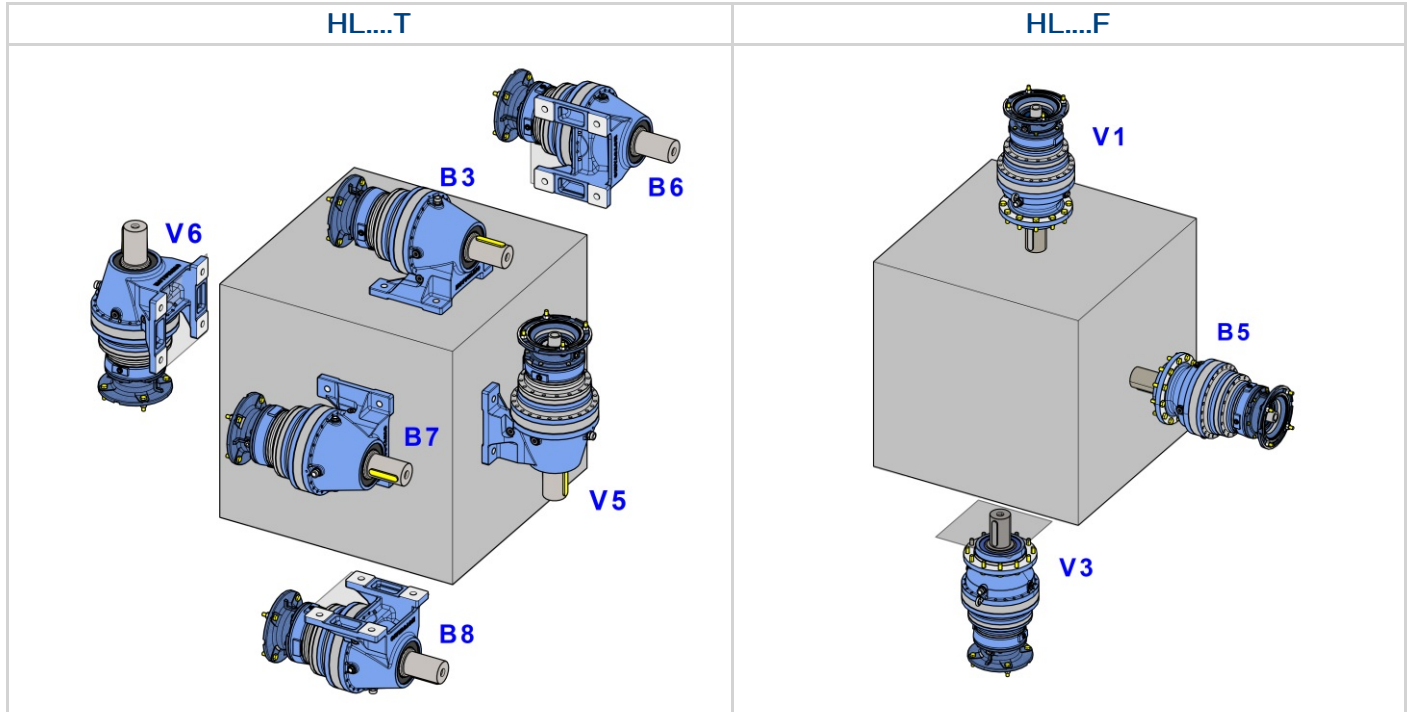
<b>F</b>	Flange
<b>T</b>	Foot

<b>1</b>	Number of gear unit stages
<b>2</b>	
<b>3</b>	
<b>4</b>	

<b>CHL</b>	Compact electric motor version
<b>HL</b>	Fitted for motor coupling version (PAM)
<b>PHL</b>	Fitted for motor mounting with flexible coupling
<b>IHL</b>	Input shaft version

## 2.3.1 Mounting positions

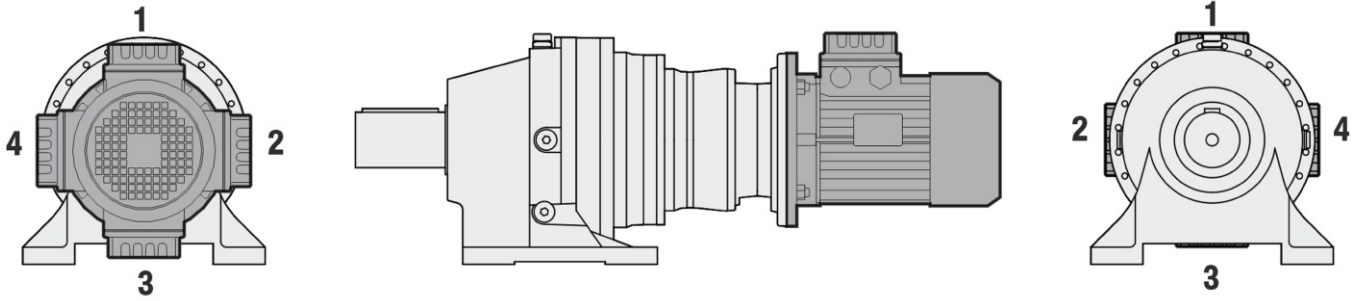
The mounting position of the gear unit identifies its space orientation. B3 mounting position, as from a technical point of view, ensures lower oil splash, better lubrication and less heating.



## 2.3 MOUNTING POSITIONS

### 2.3.2 Position of terminal box

Unless otherwise specified when ordering, the gear reducer is supplied with terminal box in position 1.





### 2.4.1 Information

The scheme below indicates the nominal thermal power Pth capacity [kW] according to the following conditions:

- mounting position B3
- continuous operation at input speed  $\leq 1500$  rpm
- environment temperature  $T_{amb}=25^{\circ}\text{C}$
- sea level altitude
- air speed around the gear reducer  $\geq 1\text{m/s}$
- absence of external radial and/or axial loads

n <sub>1</sub> = 1500rpm							
	Pth [kW]		Pth [kW]		Pth [kW]		Pth [kW]
HPL 1-010	9,2	HPL 2-010	5,2	HPL 3-010	3,9	HPL 4-010	3,2
HPL 1-020	9,4	HPL 2-020	5,3	HPL 3-020	4	HPL 4-020	3,3
HPL 1-030	11,1	HPL 2-030	6,1	HPL 3-030	4,5	HPL 4-030	3,7
HPL 1-050	-	HPL 2-050	6,5	HPL 3-050	4,8	HPL 4-050	3,9
HPL 1-080	17,2	HPL 2-080	7,9	HPL 3-080	5,7	HPL 4-080	4,6

**A correct lubrication and a proper running condition of the gearbox are guaranteed only applying an input power not exceeding Pth (at the above reference conditions)(T oil max=95°C).**

## 2.4.2 Verification

## Verification of the application

Except for continuous operating times below two hours and successive pauses capable of bringing the gear reducer back to ambient temperature, for each application it is peremptory to verify the gear reducer's thermal limit according to the following formula:

$P_1 < P_{th} * f_{ta} * f_{tc} * f_{tn} * f_{tv}$ , where:

- $P_1$  = installed power [kW]
- $P_{th}$  = thermal capacity under reference conditions [kW] (see table "Nominal thermal capacity");
- $f_{ta}$  = sea-level elevation correction factor (see table);
- $f_{tc}$  = ambient and operating temperature correction factor (see table);
- $f_{tn}$  = input speed  $n_1$  correction factor;
- $f_{tv}$  = airflow speed correction factor around the gear reducer (see table).

Correction factors reflect operating conditions other than the reference conditions and are obtained from the following ISO14179 tables:

**Table  $f_{ta}$**   
Sea-level elevation correction factor

Altitude [m]	$f_{ta}$
0 - 1000	1
1000 - 2000	0,9
2000 - 3000	0,8
> 3000	*

**Table  $f_{tc}$**   
Ambient and operating temperature correction factor

Ambient temperature °C	$F_c$	% Duty per hour of operation				
		100	80	70	40	20
10	1,21	1,28	1,40	1,64	2,19	
20	1,07	1,13	1,23	1,45	1,93	
25	1,00	1,05	1,15	1,35	1,80	
30	0,93	0,98	1,07	1,25	1,67	
40	0,79	0,83	0,90	1,06	1,41	
45	0,71	0,75	0,82	0,96	1,29	
50	0,64	0,68	0,74	0,87	1,16	

**Table  $f_{tn}$**   
Input speed  $n_1$  correction factor

$f_{tn}$	$n_1$ [rpm]							
	500	700	900	1150	1400	1750	2250	2800
B3/B5								
B6 - B7	1,73	1,41	1,3	1,16	1	0,81	0,65	0,5
B8								
V5/V1	1,3	1,16	1	0,81	0,65	0,5	0,4	0,25
V6/V3								

**Table  $f_{tv}$**   
Airflow speed correction factor around the gear reducer

Ventilation correction factor	$f_{tv}$
Stagnant air (<0,5 m/s)	0,75
Indoor installation with slight ventilation	1
Indoor installation with good ventilation (>1,4 m/s)	1,4
Outdoor installation (>3,7 m/s)	1,9

\* Please contact MOTOVARIO TECHNICAL SERVICE.

In case of operation at input speeds exceeding 1800 rpm, or ambient temperatures greater than 40°C, please contact MOTOVARIO TECHNICAL SERVICE.

## 2.5.1 Critical applications

	HPL				
	010	020	030	050	080
<b>n1 &lt; 1800 rpm</b>	✓	✓	✓	✓	✓
<b>1800 rpm &lt; n1 &lt; 3000 rpm</b>	B	B	B	B	B
<b>n1 &gt; 3000 rpm</b>	A	A	A	A	A

		HPL				
		010	020	030	050	080
<b>FS &lt; 1,25</b>	<b>B3/B5-B6-B7-B8 : n2 &lt; 0,5 rpm</b>	A	A	A	A	A
	<b>V5/V1 - V3/V6 : n2 &lt; 0,3 rpm</b>	A	A	A	A	A

✓ Verified application.

**A** Application not recommended.

**B** Check the application and/or call MOTOVARIO TECHNICAL SERVICE.

## 2.5.2 Information

The performance indicated in the catalogue correspond to position B3 or similar. For other mounting contexts and/or particular input and output speeds, please refer to the tables highlighting the main critical situations for each gear reducer size. It is also necessary to take due consideration of and carefully assess the following applications by contacting MOTOVARIO TECHNICAL ASSISTANCE:

- Use in services that could be hazardous for people if the gear reducer fails
- Use as a lifting winch.
- Use in places with Ambient T° below -15°C or over 50°C.
- Use in chemically-aggressive environments.
- Use in a brackish environments.
- Use in radioactive environments.
- Use in environments with pressures other than atmospheric pressure.
- Applications with especially high inertia.
- Applications with high dynamic strain on the casing of the gear reducer.
- Applications where even partial immersion of the gear reducer is required.
- Mounting positions not envisaged in the catalogue.

Pay particular attention in the following conditions:

- Avoid use as multiplier.
- Do not use in an environment with an explosive or potentially-explosive atmosphere.

In the presence of overloads due to starting at full load, braking, shocks or other static and dynamic causes, check that the peak torque is always lower than the maximum torque  $M_{2max}$  (see the table in the paragraph on Product Selection).

# 2.6 MOTOR FLANGE AVAILABILITY

**B11** = Compact electric motor versions.

These tables report all possible dimensions. Please verify service factor.

## HL 010

CHL - HL - PHL - CHB - HB - PHB 1-010							
i	071	080	090	100	112	132	160
<b>3,44</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>4,32</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>5,37</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>7,38</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>9,3</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 2-010							
i	071	080	090	100	112	132	160
<b>11,8</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>14,9</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>18,7</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>23,2</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>28,8</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>31,9</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>39,6</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>40,2</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>49,9</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>68,7</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 3-010							
i	071	080	090	100	112	132	160
<b>51,2</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>64,2</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>80,6</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>87,4</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>100</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>110</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>125</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>138</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>155</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>174</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>188</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>216</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>236</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>297</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>369</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 4-010							
i	071	080	090	100	112	132	160
<b>348</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>433</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>474</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>538</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>668</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>740</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>811</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>919</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1018</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1158</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1265</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1439</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1593</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1740</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2162</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2723</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

# 2.6 MOTOR FLANGE AVAILABILITY

## HL 020

CHL - HL - PHL - CHB - HB - PHB 1-020				
i	100	112	132	160
<b>3,44</b>	B5-B11	B5-B11	B5-B11	B5
<b>4,32</b>	B5-B11	B5-B11	B5-B11	B5
<b>5,37</b>	B5-B11	B5-B11	B5-B11	B5
<b>7,38</b>	B5-B11	B5-B11	B5-B11	B5
<b>9,3</b>	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 2-020							
i	071	080	090	100	112	132	160
<b>11,8</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>14,9</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>18,7</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>23,2</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>28,8</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>31,9</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>39,6</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>40,2</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>49,9</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>68,7</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 3-020							
i	071	080	090	100	112	132	160
<b>51,2</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>64,2</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>80,6</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>87,4</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>100</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>110</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>125</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>138</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>155</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>174</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>188</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>216</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>236</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>297</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>369</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 4-020							
i	071	080	090	100	112	132	160
<b>348</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>433</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>474</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>538</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>668</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>740</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>811</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>919</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1018</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1158</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1265</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1439</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1593</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1740</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2162</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2723</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

# 2.6 MOTOR FLANGE AVAILABILITY

## HL 030

CHL - HL - PHL - CHB - HB - PHB 1-030				
i	100	112	132	160
3,44	B5-B11	B5-B11	B5-B11	
4,32	B5-B11	B5-B11	B5-B11	B5
5,37	B5-B11	B5-B11	B5-B11	B5
6,19	B5-B11	B5-B11	B5-B11	B5
7,38	B5-B11	B5-B11	B5-B11	B5
9,3	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 2-030							
i	071	080	090	100	112	132	160
11,8		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
14,9		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
18,7	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
21,3		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
23,2	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
26,7	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
28,8	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
31,9	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
33,2	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
39,6	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
45,7	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
57,5	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 3-030							
i	071	080	090	100	112	132	160
51,2		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
64,2		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
73,3		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
80,6	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
92,0	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
100	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
114	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
125	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
138	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
155	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
171	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
197	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
216	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
249	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
293	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
309	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
369	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
425	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 4-030							
i	071	080	090	100	112	132	160
348	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
433	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
474	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
538	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
668	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
740	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
831	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
919	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1018	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1143	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1265	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1439	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1593	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1740	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1979	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2191	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2281	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2492	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2723	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

# 2.6 MOTOR FLANGE AVAILABILITY

## HL 050

CHL - HL - PHL - CHB - HB - PHB 2-050				
	100	112	132	160
<b>11,8</b>	B5-B11	B5-B11	B5-B11	B5
<b>14,9</b>	B5-B11	B5-B11	B5-B11	B5
<b>18,7</b>	B5-B11	B5-B11	B5-B11	B5
<b>21,3</b>	B5-B11	B5-B11	B5-B11	B5
<b>23,2</b>	B5-B11	B5-B11	B5-B11	B5
<b>26,7</b>	B5-B11	B5-B11	B5-B11	B5
<b>28,8</b>	B5-B11	B5-B11	B5-B11	B5
<b>31,9</b>	B5-B11	B5-B11	B5-B11	B5
<b>33,2</b>	B5-B11	B5-B11	B5-B11	B5
<b>39,6</b>	B5-B11	B5-B11	B5-B11	B5
<b>45,7</b>	B5-B11	B5-B11	B5-B11	B5
<b>57,5</b>	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 3-050							
i	071	080	090	100	112	132	160
<b>51,2</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>64,2</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>73,3</b>		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>80,6</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>92,0</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>100</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>114</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>125</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>138</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>155</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>171</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>197</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>216</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>249</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>293</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>309</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>369</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>425</b>	B5-B11	B5-B11	B5-B11				

CHL - HL - PHL - CHB - HB - PHB 4-050							
i	071	080	090	100	112	132	160
<b>348</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>433</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>474</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>538</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>668</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>740</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>831</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>919</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1018</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1143</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1265</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1439</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1593</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1740</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>1979</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2191</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2281</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2492</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
<b>2723</b>	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

# 2.6 MOTOR FLANGE AVAILABILITY

## HL 080

CHL - HL - PHL - CHB - HB - PHB 1-080	
i	200
7,5	B5

CHL - HL - PHL - CHB - HB - PHB 2-080				
	100	112	132	160
12,4	B5-B11	B5-B11	B5-B11	
14,6	B5-B11	B5-B11	B5-B11	
18,4	B5-B11	B5-B11	B5-B11	B5
22,8	B5-B11	B5-B11	B5-B11	B5
26,3	B5-B11	B5-B11	B5-B11	B5
28,6	B5-B11	B5-B11	B5-B11	B5
33,0	B5-B11	B5-B11	B5-B11	B5
38,4	B5-B11	B5-B11	B5-B11	B5
45,8	B5-B11	B5-B11	B5-B11	B5
55,4	B5-B11	B5-B11	B5-B11	B5
69,8	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 3-080							
i	071	080	090	100	112	132	160
53,5		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
63,2		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
79,3	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
83,5	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
90,5		B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
98,6	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
114	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
122	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
143	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
168	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
194	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
211	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
232	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
244	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
266	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
291	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
307	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
357	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
409	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5

CHL - HL - PHL - CHB - HB - PHB 4-080							
i	071	080	090	100	112	132	160
395	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
467	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
529	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
586	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
658	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
728	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
825	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
905	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1001	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1139	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1261	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1429	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1567	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
1800	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2092	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2266	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2497	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5
2705	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5-B11	B5



## 2.7 OUTPUT SHAFT BEARINGS

CS - SS				
HPL 010	HPL 020	HPL 030	HPL 050	HPL 080
Standard	Standard	Standard	Standard	Standard
2	2	2	2	2

HS - HM				
HPL 010	HPL 020	HPL 030	HPL 050	HPL 080
Standard	Standard	Standard	Standard	Standard
1	1	1	1	1

1 - Ball Bearing

2 - Roller bearings

/ - Not available

## 2.8.1 Information

The value of the admissible radial load [N] is given in the tables relating to the performance of the gear reducer at issue. It is related to the load applied on the centre line of the shaft and in the most unfavourable conditions of angle of application and direction of rotation. The admissible maximum axial loads are given in the table below for each direction of application of force. The admissible maximum value must never be exceeded. Up to 20% of the maximum axial load permitted under the conditions of application is admissible in the case of combined loads. Particular conditions of radial load higher than the limits of the catalogue may occur. In this case, call our Technical Service and provide details on the application: direction of the load, direction of rotation of the shaft, type of service. The radial load on the shaft is calculated with the following formula:  $Fr_e = (2000 * M * fz) / D \leq Fr_1$  or  $Fr_2$

- **Fr<sub>e</sub>** [N] Resulting radial load
- **M** [Nm] Torque on the shaft
- **D** [mm] Diameter of the transmission member mounted on the shaft
- **Fr<sub>1</sub>-Fr<sub>2</sub>** [N] Value of the maximum admitted radial load (see relative tables)
- **fz** = 1,1 gear pinion - 1,4 chain wheel - 1,7 v-pulley - 2,5 flat pulley

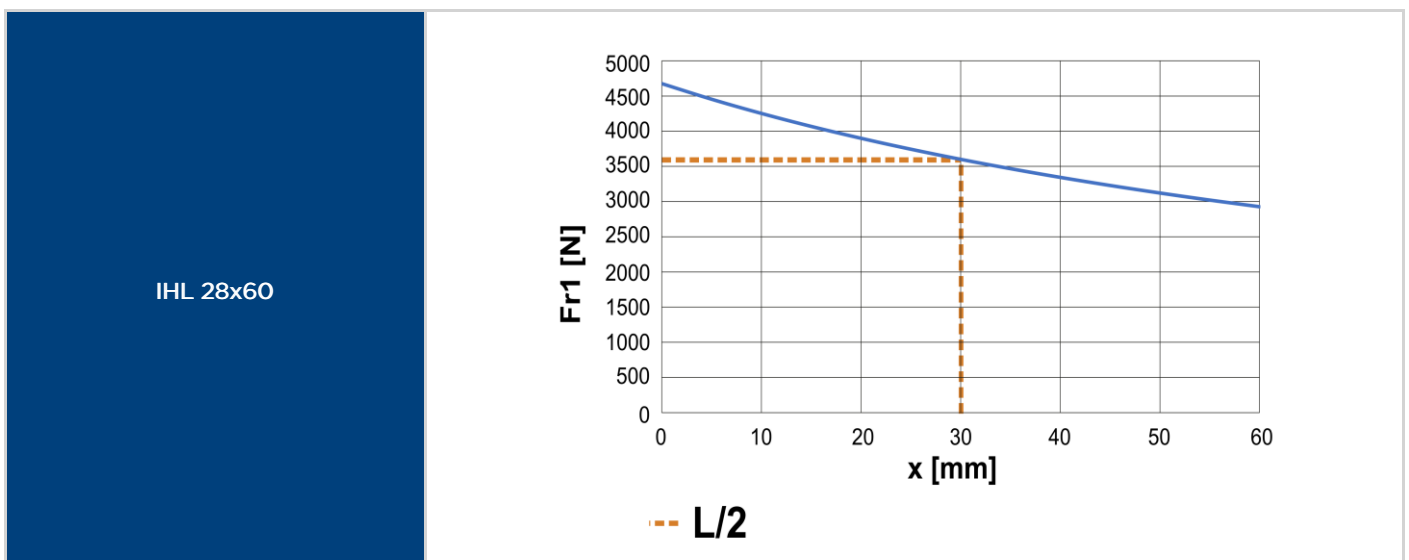
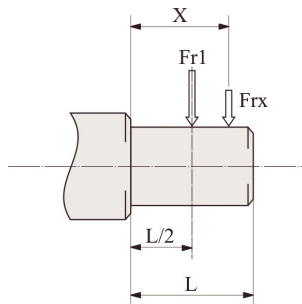
## 2.8.2 Input

When the radial load is on the centre line of the shaft:

IHL 28x60	3600 N
-----------	--------

When the radial load is not on the centre line of the shaft, it is necessary to light the admissible radial load Fr<sub>1</sub> with the following graph.

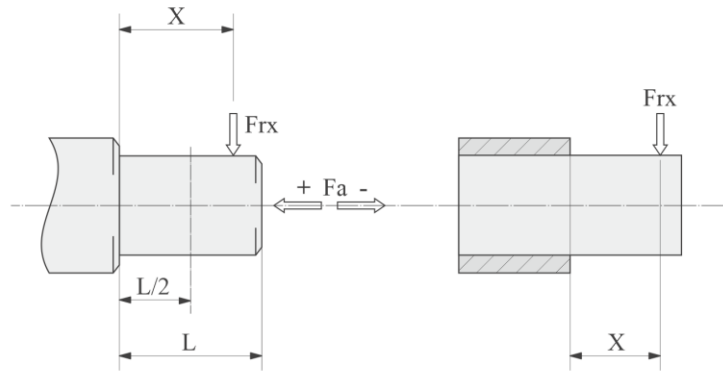
- **x** = distance from the point of application of the load to the shaft shoulder



## 2.8.3 Output - Radial/Axial load

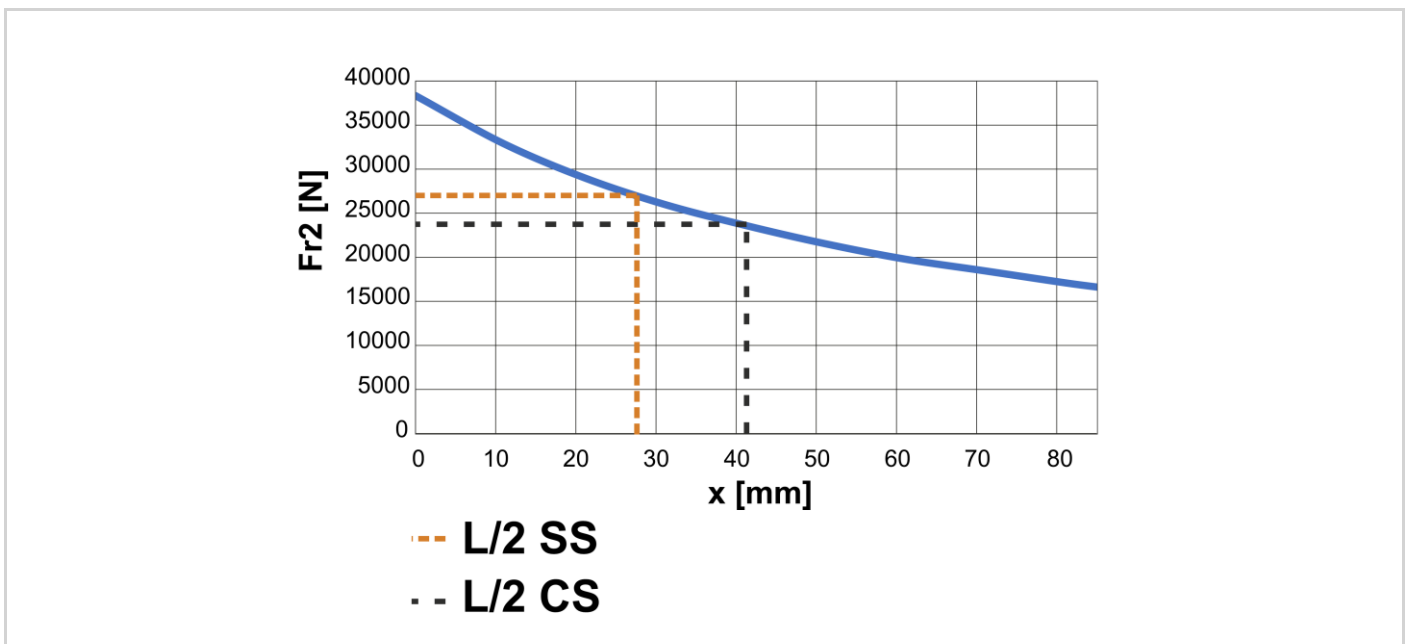
When the radial load is not on the centre line of the shaft, it is necessary to light the admissible radial load  $F_{r2}$  with the following graph.

- $x$  = distance from the point of application of the load to the shaft shoulder



Allowable overhung and axial loads on the output shaft **Fh2:n2\*h=100000**

### 010-020



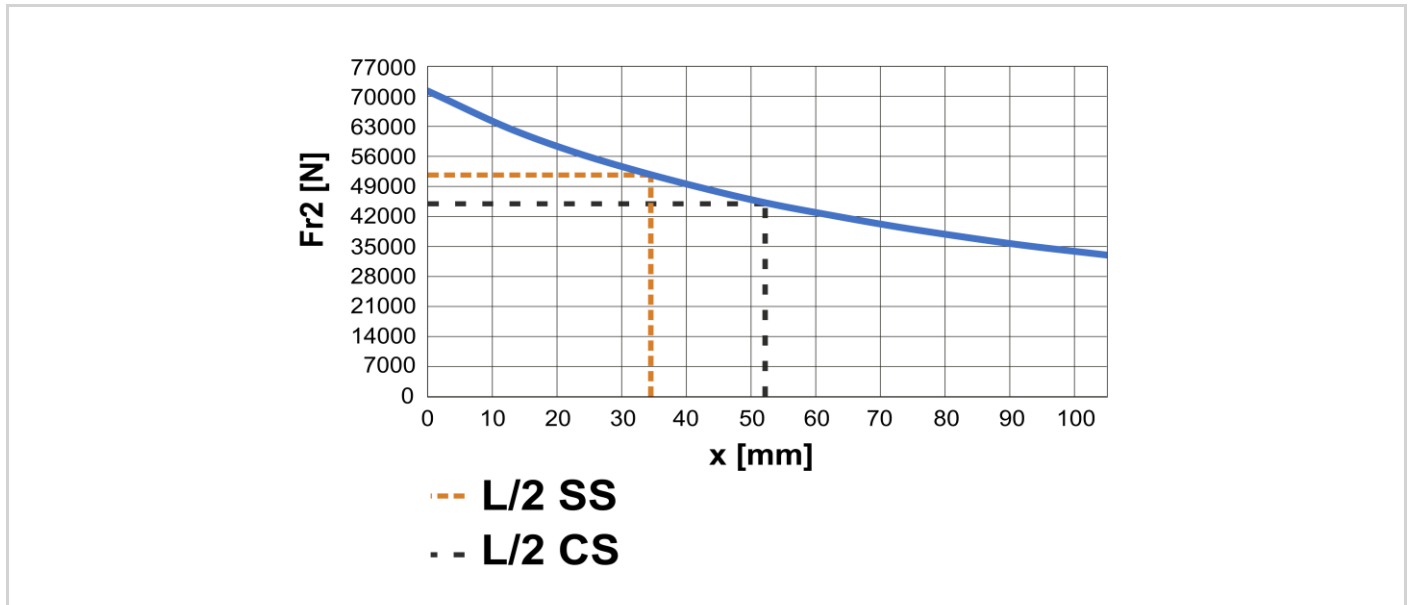
	$F_{a2} +$ [N]	$F_{a2} -$ [N]
<b>CS - SS</b>	20000	20000

For  $F_{h2} \neq 100000$ , multiply the radial or axial load by the coefficient  $f_{h2}$ .

Corrective factor $f_{h2}$ for overhung and axial loads on shafts							
$F_{h2} = n2 \cdot h$	10000	25000	50000	100000	300000	500000	1000000
<b>CS - SS</b>	1,15	1,14	1,13	1	0,72	0,62	0,5

## 2.8 RADIAL LOAD

### 030-050



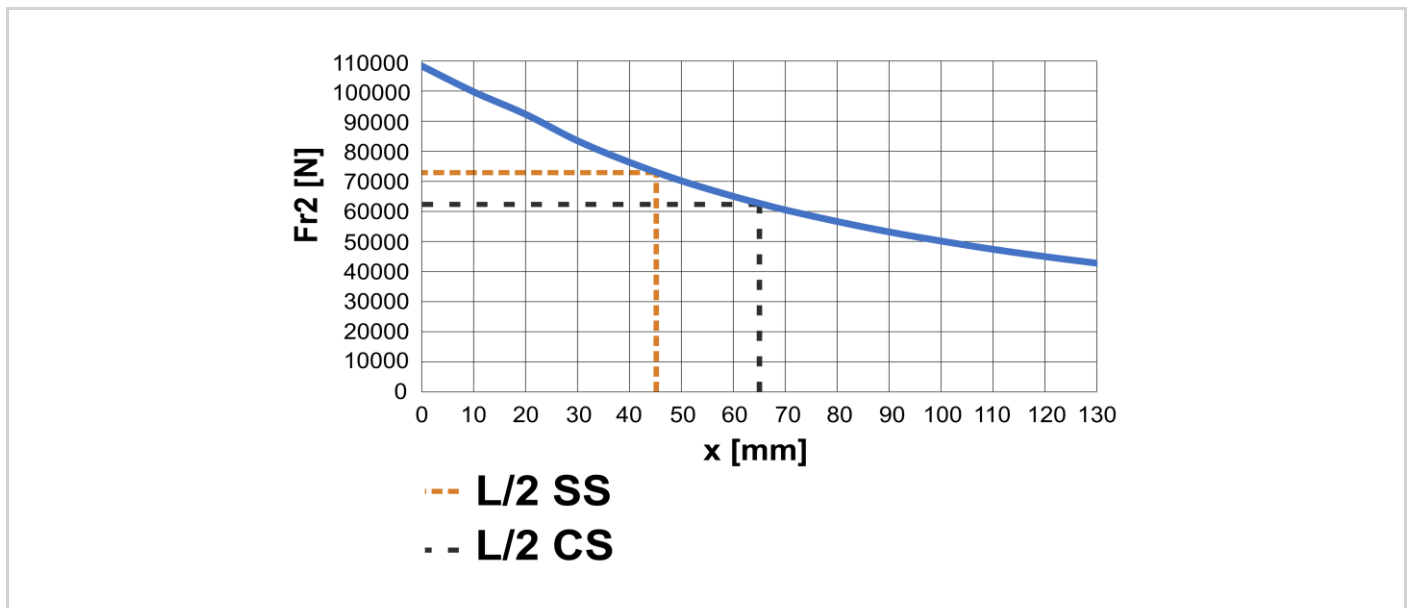
	Fa <sub>2</sub> + [N]	Fa <sub>2</sub> - [N]
CS - SS	27500	22000

For Fh<sub>2</sub> ≠ 100000, multiply the radial or axial load by the coefficient fh<sub>2</sub>.

Corrective factor fh <sub>2</sub> for overhung and axial loads on shafts							
Fh <sub>2</sub> = n <sup>2</sup> ·h	10000	25000	50000	100000	300000	500000	1000000
CS - SS	1,34	1,33	1,12	1	0,72	0,62	0,5

## 2.8 RADIAL LOAD

080



	Fa <sub>2</sub> + [N]	Fa <sub>2</sub> - [N]
CS - SS	60000	30000

For Fh<sub>2</sub> ≠ 100000, multiply the radial or axial load by the coefficient fh<sub>2</sub>.

Corrective factor fh <sub>2</sub> for overhung and axial loads on shafts							
Fh <sub>2</sub> = n <sup>2</sup> ·h	10000	25000	50000	100000	300000	500000	1000000
CS - SS	1,22	1,21	1,12	1	0,72	0,62	0,5

### 2.9.1 Information

Proper lubrication makes for:

- Lower friction;
- Less heating;
- Increased efficiency;
- Lower oil temperature;
- Less wear.

In cases of ambient temperatures not envisaged in the table, please contact MOTOVARIO TECHNICAL SERVICE. In the case of temperatures under -30°C or over 60°C it is necessary to use oil seals with special properties. For operating ranges with temperatures under 0°C it is necessary to consider the following:

1. The motors need to be suitable for operation at the envisaged ambient temperature.
2. The power of the electric motor needs to be adequate for exceeding the higher starting torques required.
3. Pay attention to impact loads since cast iron may have problems of fragility at temperatures under -15°C.
4. During the early stages of service, problems of lubrication may arise due to the high level of viscosity taken on by the oil and so it is wise to have a few minutes of rotation under no load.

For the recommended oil change frequencies, please refer to the Product Use and Maintenance Manual.

### 2.9.2 Lubricants

MOTOVARIO epicycloidal gear reducers in Series HPL have been designed for oil bath lubrication.

The **HPL** reducers are supplied without lubricant, whilst the initial fill of lubricant can be requested as an option when ordering.

In the event of a request for a gear reducer supplied complete with lubricant, this is to be established by MOTOVARIO and can be seen on the Order Confirmation and on the plate.

If different lubricants and/or lubricants with temperature ranges other than those recommended by MOTOVARIO are utilised, the warranty shall be void, with the exception of any authorisations provided in accordance with the applications and granted in writing.

The lubricants listed in the table must not be interpreted as a guarantee of quality, given that they are supplied by the lubricant manufacturer who remains responsible for their product.

Do not mix different synthetic lubricants with each other or even with the minerals! Additionally, lubricants with the same viscosity class yet produced by different manufacturers do not bear the same characteristics.

Choose the lubricant only after having conducted the necessary thermal check of the gear reducer (see the Thermal Power paragraph).

#### Specifications of LUBRICANTS RECOMMENDED BY MOTOVARIO

	* Polyalphaolefin synthetic oil (PAO)	Mineral oil
<b>ENI</b>	BLASIA SX	BLASIA
<b>SHELL</b>	OMALA S4 GXV	OMALA S2 GX
<b>KLUBER</b>	Klubersynth GEM 4-...N	Kluberoil GEM 1-...N
<b>MOBIL</b>	SHC GEAR	MOBILGEAR XMP
<b>CASTROL</b>	ALPHASYN T	ALPHA SP
<b>BP</b>	ENERSYN EPX	ENERGOL GR-XP
<b>TOTAL</b>	CARTER SH	CARTER EP
<b>ESSO</b>	SPARTAN S-EP	SPARTAN EP

\* Recommended

Based on the output speed  $n_2$ , check the oil type to be used in table ISO VISCOSITY GRADES, that provides the average kinematic speed value [cSt] at 40 °C.

**Table ISO VISCOSITY GRADES**

$n_2$ [rpm]	$T_{amb}$ °C	
	Synthetic oil	Mineral oil
	(-15) ÷ (+50)	(-5) ÷ (+40)
> 150	220	220
150 ÷ 5	320	320
< 5	460	460

### 2.9.3 Special lubricants

If 'special' lubricant is required please contact MOTOVARIO TECHNICAL SERVICE.

### 2.9.4 Quantity

For the gear reducers of the HPL series, the expected mounting position must be always specified. The amount of oil in the table are indicative only and for the proper topping up you will have to refer to the level cap or the dipstick, if any. Any deviations in level can depend on construction tolerances, transmission ratio but also on the placement on the unit or by the mounting surface at the customers' premises. For this reason it is appropriate that the customer checks and, if necessary, restores the level when the unit is installed.

Table OIL CAPACITIES IN LITRES ~ [l]

HPL-1	010	020	030	050	080
B3/B5 B6/B7 B8	0,69	0,82	1,21	1,35	2,63
V1/V5	0,77	0,92	1,61	1,82	2,96
V3/V6	1,04	1,04	1,64	1,63	4,03

HPL-2	010	020	030	050	080
B3/B5 B6/B7 B8	0,95	1,09	1,32	1,49	2,54
V1/V5	1,31	1,44	2,09	2,21	4,19
V3/V6	1,58	1,72	1,88	1,88	3,88

HPL-3	010	020	030	050	080
B3/B5 B6/B7 B8	1,2	1,38	1,57	1,78	2,66
V1/V5	1,85	1,99	2,63	2,75	4,67
V3/V6	2,13	2,26	2,42	2,42	4,12

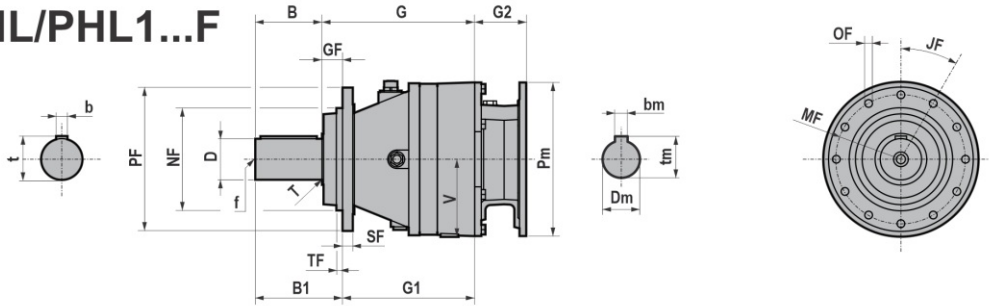
HPL-4	010	020	030	050	080
B3/B5 B6/B7 B8	1,46	1,67	1,82	2,07	2,91
V1/V5	2,39	2,53	3,21	3,29	5,17
V3/V6	2,67	2,8	2,96	2,96	4,67



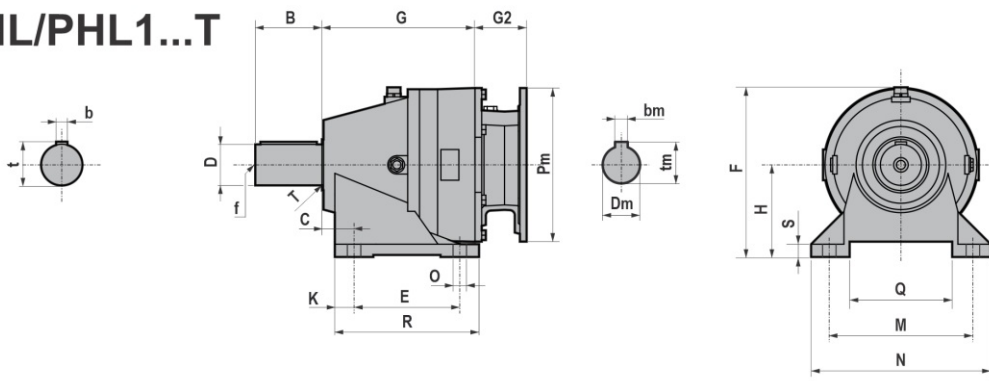
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.1 HL/PHL 1

### HL/PHL1...F



### HL/PHL1...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
010	50	h6	82	14	53,5	M16	88	183	177	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
020	50	h6	82	14	53,5	M16	88	197	191	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
030	60	h6	105	18	64	M20	120	231	216	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
080	80	h6	130	22	85	M20	170	297,5	257,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
010 020	186	165	110	6	45°	10,5	12	5
030	222	195	150	15	36°	12,5	15	13
080	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

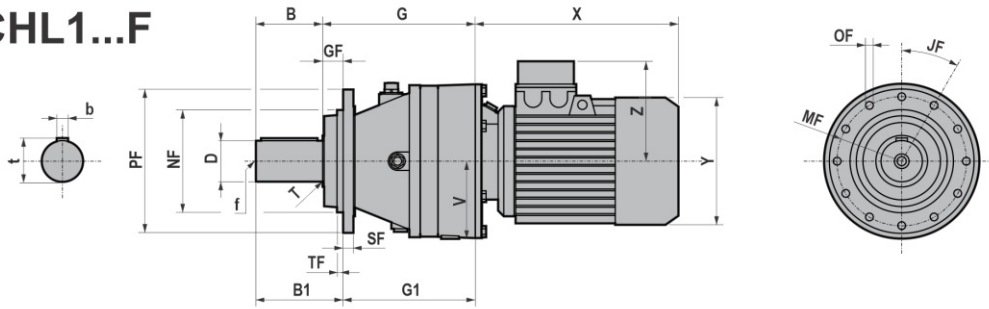
IEC	Pm x Dm	G2			
		HL/PHL 1 010	HL/PHL 1 020	HL/PHL 1 030	HL/PHL 1 080
71	160x14	49	/	/	/
80	200x19	70	/	/	/
90	200x24	70	/	/	/
100-112	250x28	85	85	85	/
132	300x38	110	110	110	/
160	350x42	157,5	157,5	157,5	/
180	350x48	/	/	/	/
200	400x55	/	/	/	185
225	450x60	/	/	/	/

B5	Pm	Dm	bm	tm
071	160	14	5	16,3
080	200	19	6	21,8
090	200	24	8	27,3
100	250	28	8	31,3
112	250	28	8	31,3
132	300	38	10	41,3
160	350	42	12	45,3
180	350	48	14	51,8
200	400	55	16	59,3
225	450	60	18	64,4

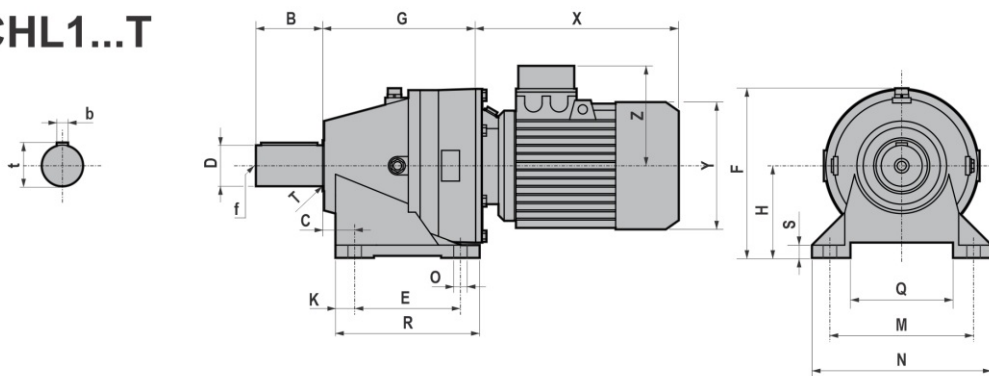
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.2 CHL 1

### CHL1...F



### CHL1...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V	
010	50	h6	82	14	53,5	M16	88	183	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
020	50	h6	82	14	53,5	M16	88	197	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
030	60	h6	105	18	64	M20	120	231	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128

	PF	MF	NF f7	GF	JF	OF	SF	TF
010 020	186	165	110	6	45°	10,5	12	5
030	222	195	150	15	36°	12,5	15	13

\*V - Max. overall dimensions

		T (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
010/ .../030	X	221	248	276	301	335	356	405	443
	*X		271	309	334		380		
	Y	139	158	173	173	191	211	249	249
	Z	112	122	130	130	139	154	194	194

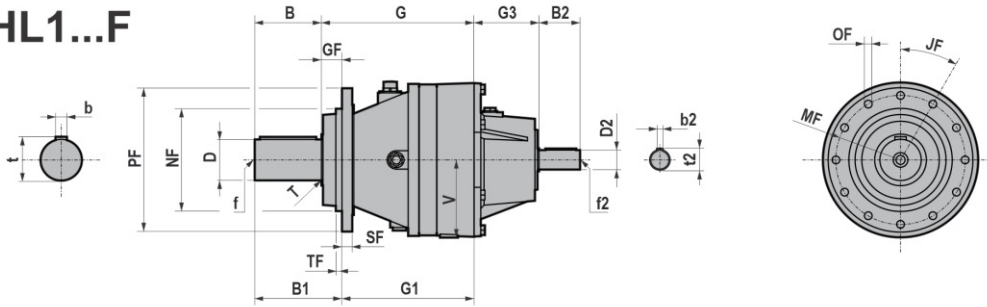
		TB (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
010/ .../030	X	286.5	321	353	378	417	453	505	547
	*X		344	386	411		477		
	Y	139	158	173	173	191	211	249	249
	Z	129	137	157	157	168	183	230	230

\*X - TP80B4, SH80B4, HSH80B4, TP90S4, SH90S4, HSH90S4, TP90L4, SH90L4, HSH90L4, TP90S6, TP112M4, TP112M6

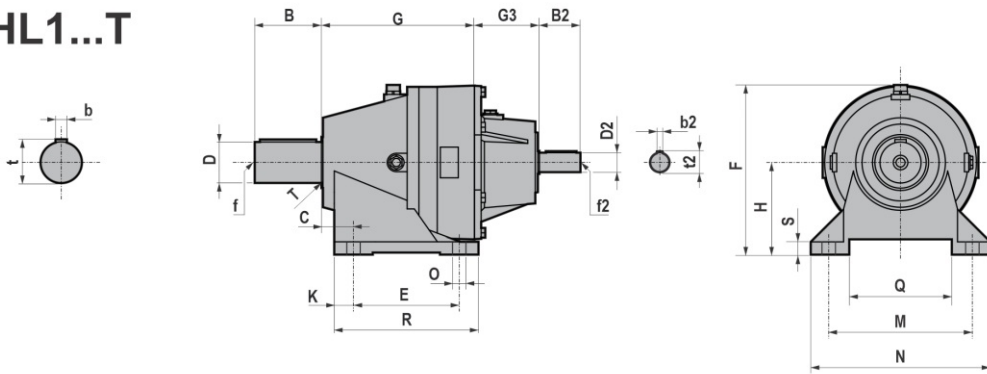
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.3 IHL 1

### IHL1...F



### IHL1...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	183	177	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	197	191	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	231	216	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b>	222	195	150	15	36°	12,5	15	13

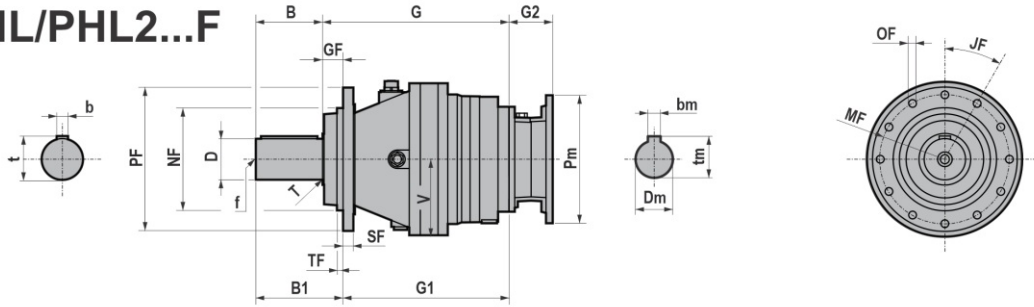
\*V - Max. overall dimensions

	G3	D2	B2	b2	t2	f2
<b>010/.../030</b>	113	28 j6	60	8	31	M10

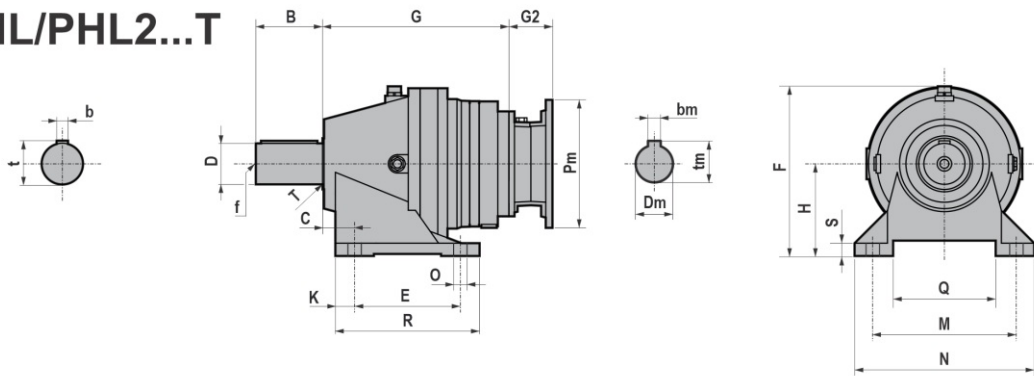
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.4 HL/PHL 2

### HL/PHL2...F



### HL/PHL2...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	238	232	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	252	246	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	281	266	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	315	300	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	359,5	319,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

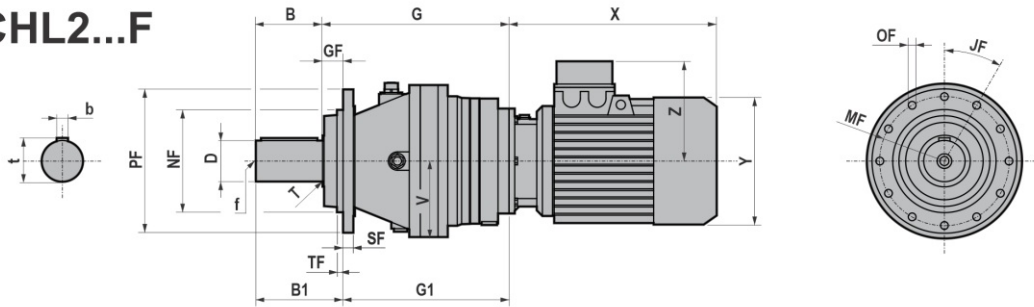
IEC	Pm x Dm	G2				
		HL/PHL 2 010	HL/PHL 2 020	HL/PHL 2 030	HL/PHL 2 050	HL/PHL 2 080
<b>71</b>	160x14	49	49	49	/	/
<b>80</b>	200x19	70	70	70	/	/
<b>90</b>	200x24	70	70	70	/	/
<b>100-112</b>	250x28	85	85	85	85	85
<b>132</b>	300x38	110	110	110	110	110
<b>160</b>	350x42	157,5	157,5	157,5	157,5	157,5
<b>180</b>	350x48	/	/	/	/	/
<b>200</b>	400x55	/	/	/	/	/
<b>225</b>	450x60	/	/	/	/	/

B5	Pm	Dm	bm	tm
<b>071</b>	160	14	5	16,3
<b>080</b>	200	19	6	21,8
<b>090</b>	200	24	8	27,3
<b>100</b>	250	28	8	31,3
<b>112</b>	250	28	8	31,3
<b>132</b>	300	38	10	41,3
<b>160</b>	350	42	12	45,3
<b>180</b>	350	48	14	51,8
<b>200</b>	400	55	16	59,3
<b>225</b>	450	60	18	64,4

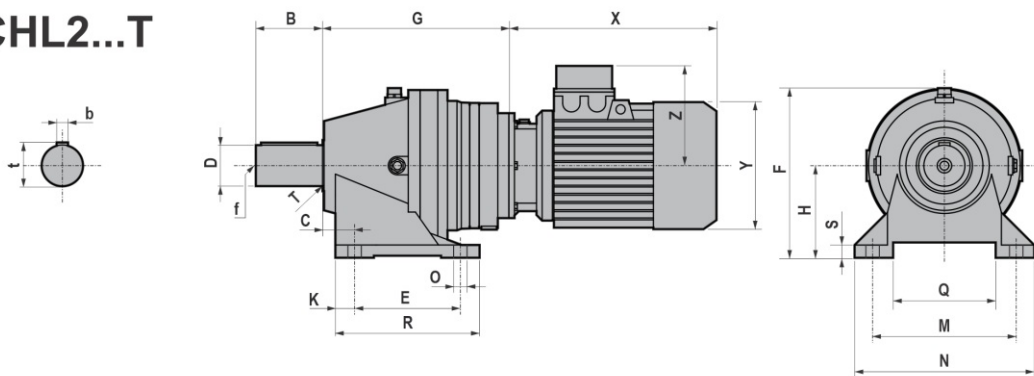
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.5 CHL 2

### CHL2...F



### CHL2...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	238	232	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	252	246	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	281	266	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	315	300	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	359,5	319,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

		T (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
<b>010/.../180</b>	<b>X</b>	221	248	276	301	335	356	405	443
	<b>*X</b>		271	309	334		380		
	<b>Y</b>	139	158	173	173	191	211	249	249
	<b>Z</b>	112	122	130	130	139	154	194	194

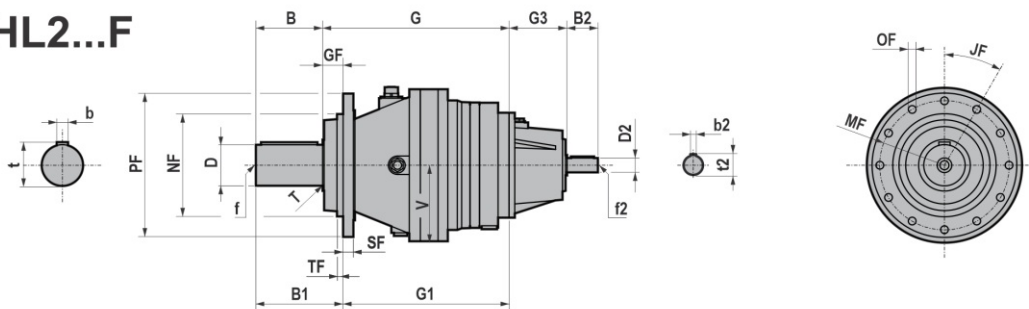
		TB (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
<b>010/.../180</b>	<b>X</b>	286.5	321	353	378	417	453	505	547
	<b>*X</b>		344	386	411		477		
	<b>Y</b>	139	158	173	173	191	211	249	249
	<b>Z</b>	129	137	157	157	168	183	230	230

\*X - TP80B4, SH80B4, HSH80B4, TP90S4, SH90S4, HSH90S4, TP90L4, SH90L4, HSH90L4, TP90S6, TP112M4, TP112M6

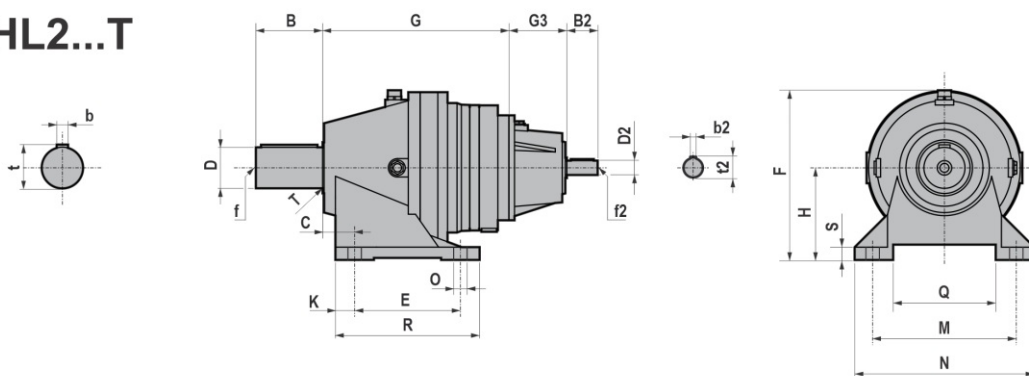
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.6 IHL 2

### IHL2...F



### IHL2...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	238	232	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	252	246	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	281	266	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	315	300	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	359,5	319,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

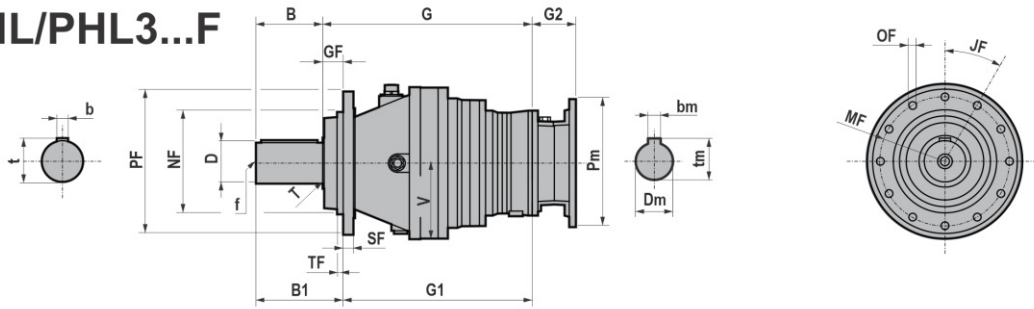
\*V - Max. overall dimensions

	G3	D2	B2	b2	t2	f2
<b>010/.../080</b>	113	28 j6	60	8	31	M10

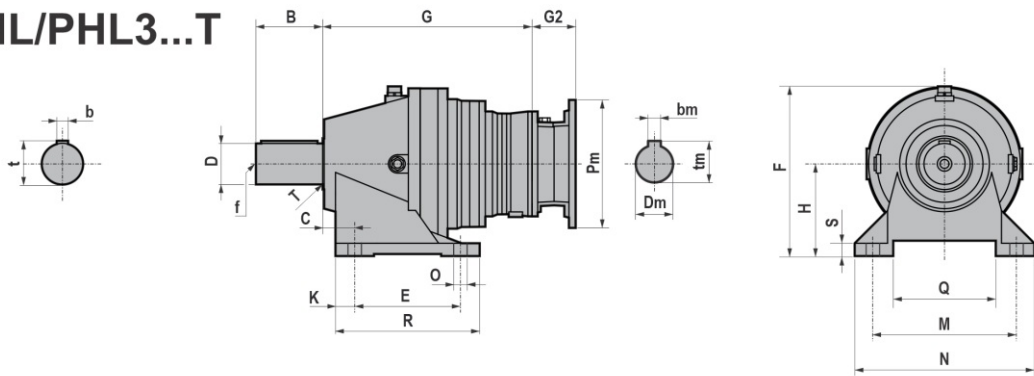
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.7 HL/PHL 3

### HL/PHL3...F



### HL/PHL3...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	293	287	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	307	301	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	336	321	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	340	335	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	409,5	369,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

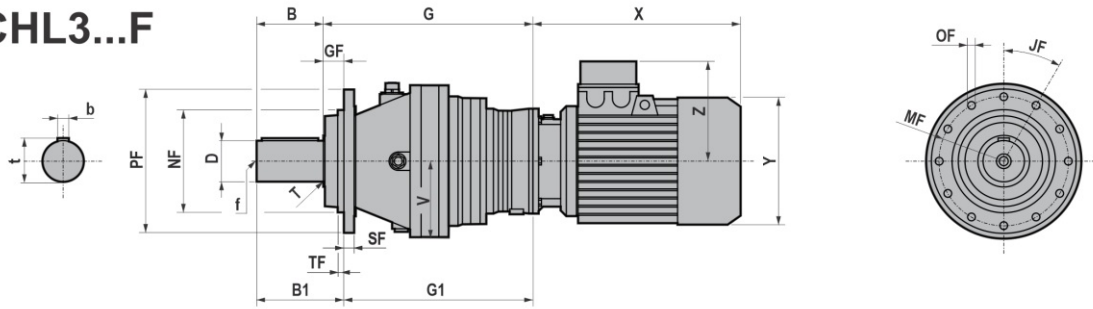
IEC	Pm x Dm	G2				
		HL/PHL 3 010	HL/PHL 3 020	HL/PHL 3 030	HL/PHL 3 050	HL/PHL 3 080
<b>71</b>	160x14	49	49	49	49	49
<b>80</b>	200x19	70	70	70	70	70
<b>90</b>	200x24	70	70	70	70	70
<b>100-112</b>	250x28	85	85	85	85	85
<b>132</b>	300x38	110	110	110	110	110
<b>160</b>	350x42	157,5	157,5	157,5	157,5	157,5
<b>180</b>	350x48	/	/	/	/	/

B5	Pm	Dm	bm	tm
<b>071</b>	160	14	5	16,3
<b>080</b>	200	19	6	21,8
<b>090</b>	200	24	8	27,3
<b>100</b>	250	28	8	31,3
<b>112</b>	250	28	8	31,3
<b>132</b>	300	38	10	41,3
<b>160</b>	350	42	12	45,3
<b>180</b>	350	48	14	51,8

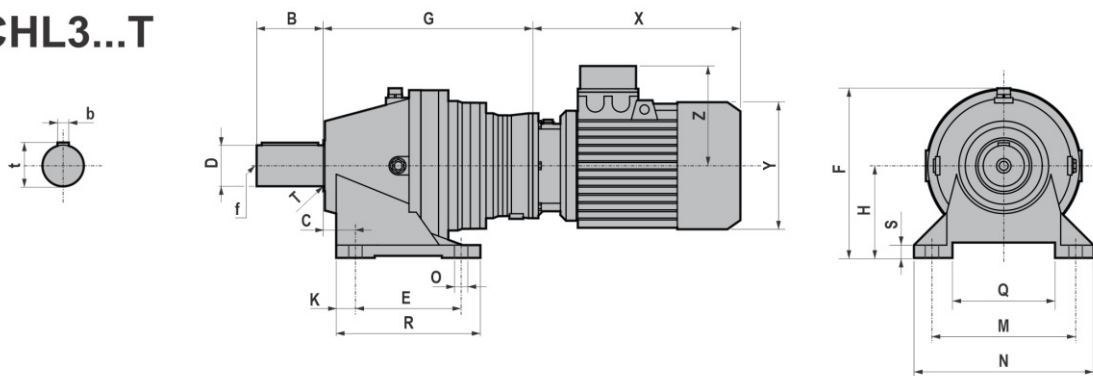
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.8 CHL 3

### CHL3...F



### CHL3...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
010	50	h6	82	14	53,5	M16	88	293	287	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
020	50	h6	82	14	53,5	M16	88	307	301	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
030	60	h6	105	18	64	M20	120	336	321	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
050	60	h6	105	18	64	M20	120	340	335	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
080	80	h6	130	22	85	M20	170	409,5	369,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
010 020	186	165	110	6	45°	10,5	12	5
030 050	222	195	150	15	36°	12,5	15	13
080	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

		T (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
010/ .../080	X	221	248	276	301	335	356	405	443
	*X		271	309	334		380		
	Y	139	158	173	173	191	211	249	249
	Z	112	122	130	130	139	154	194	194

		TB (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
010/ .../080	X	286.5	321	353	378	417	453	505	547
	*X		344	386	411		477		
	Y	139	158	173	173	191	211	249	249
	Z	129	137	157	157	168	183	230	230

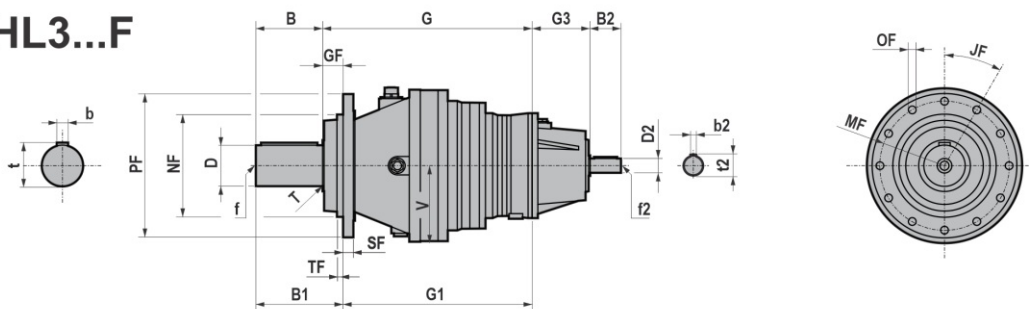
\*X - TP80B4, SH80B4, HSH80B4, TP90S4, SH90S4, HSH90S4, TP90L4, SH90L4, HSH90L4, TP90S6, TP112M4, TP112M6



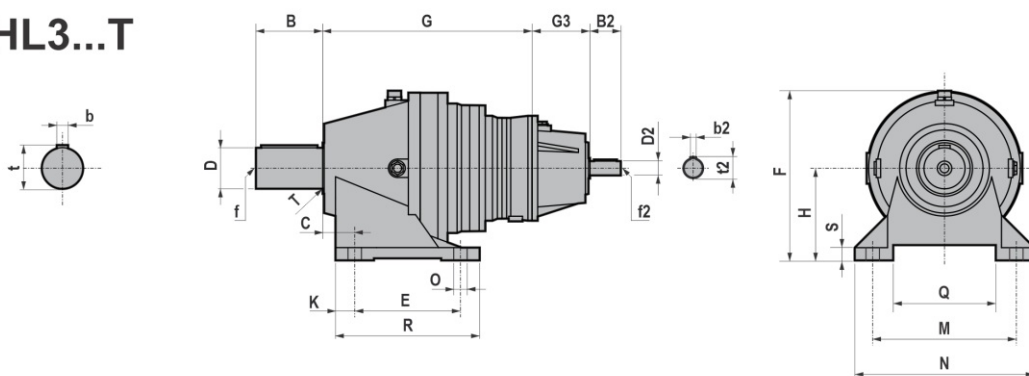
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.9 IHL 3

### IHL3...F



### IHL3...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	293	287	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	307	301	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	336	321	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	340	335	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	409,5	369,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

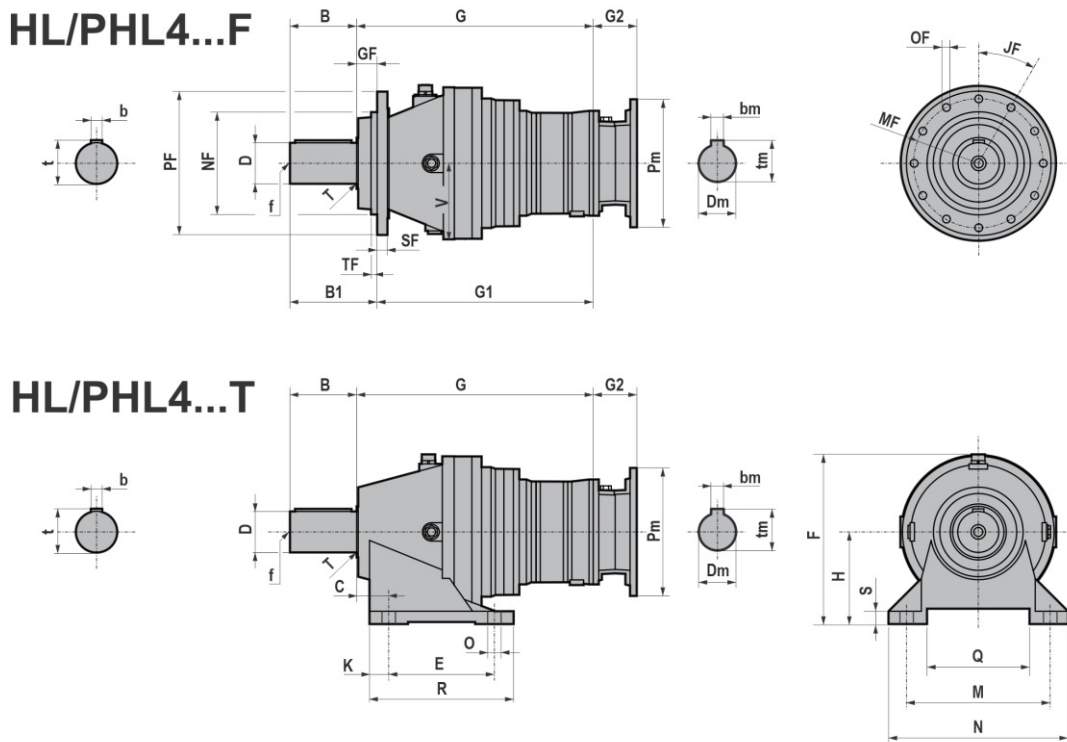
	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

	G3	D2	B2	b2	t2	f2
<b>010/.../080</b>	113	28 j6	60	8	31	M10

# 3.1 REDUCERS/GEARED MOTORS

## 3.1.10 HL/PHL 4



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	348	342	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	362	356	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	391	376	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	425	410	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	464,5	424,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF	
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	n°8	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	n°10	15	13
<b>080</b>	280	250	200	40	30°	15	n°12	20	12

\*V - Max. overall dimensions

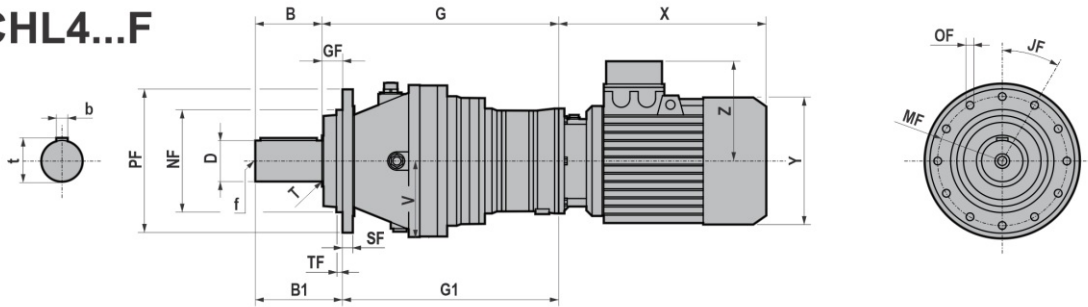
IEC	Pm x Dm	G2				
		HL/PHL 4 010	HL/PHL 4 020	HL/PHL 4 030	HL/PHL 4 050	HL/PHL 4 080
<b>71</b>	160x14	49	49	49	49	49
<b>80</b>	200x19	70	70	70	70	70
<b>90</b>	200x24	70	70	70	70	70
<b>100-112</b>	250x28	85	85	85	85	85
<b>132</b>	300x38	110	110	110	110	110
<b>160</b>	350x42	157,5	157,5	157,5	157,5	157,5

B5	Pm	Dm	bm	tm
<b>071</b>	160	14	5	16,3
<b>080</b>	200	19	6	21,8
<b>090</b>	200	24	8	27,3
<b>100</b>	250	28	8	31,3
<b>112</b>	250	28	8	31,3
<b>132</b>	300	38	10	41,3
<b>160</b>	350	42	12	45,3

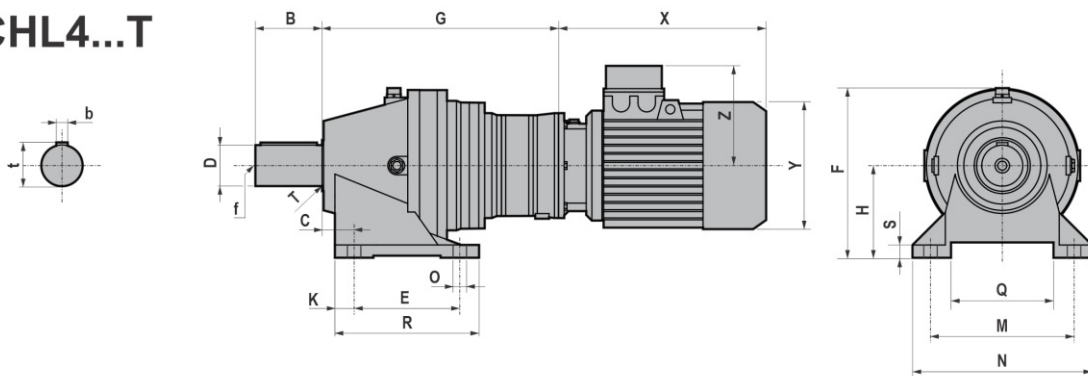
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.11 CHL 4

### CHL4...F



### CHL4...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	348	342	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	362	356	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	391	376	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	425	410	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	464,5	424,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

		T (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
<b>010/.../080</b>	<b>X</b>	221	248	276	301	335	356	405	443
	<b>*X</b>		271	309	334		380		
	<b>Y</b>	139	158	173	173	191	211	249	249
	<b>Z</b>	112	122	130	130	139	154	194	194

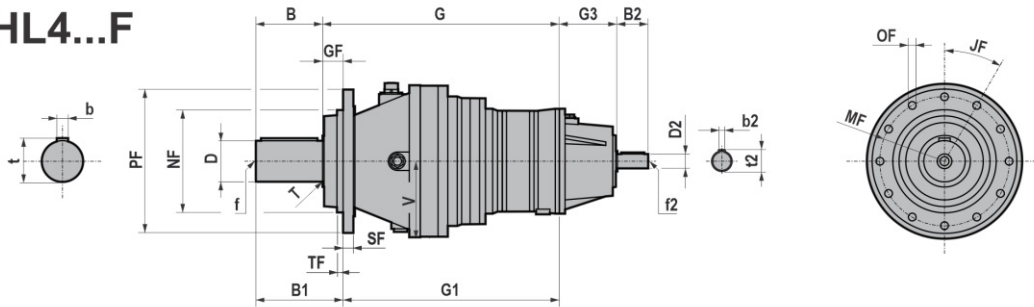
		TB (IE1 - IE2 - IE3)							
		71	80	90S	90L	100	112	132S	132M/L
<b>010/.../080</b>	<b>X</b>	286.5	321	353	378	417	453	505	547
	<b>*X</b>		344	386	411		477		
	<b>Y</b>	139	158	173	173	191	211	249	249
	<b>Z</b>	129	137	157	157	168	183	230	230

\*X - TP80B4, SH80B4, HSH80B4, TP90S4, SH90S4, HSH90S4, TP90L4, SH90L4, HSH90L4, TP90S6, TP112M4, TP112M6

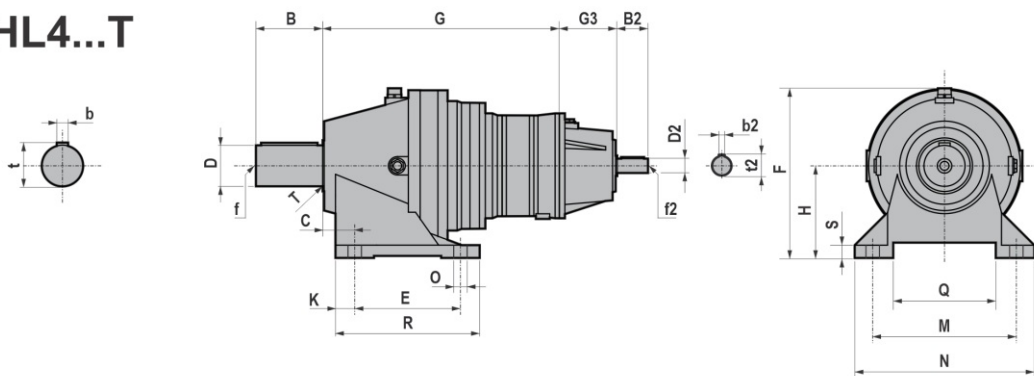
# 3.1 REDUCERS/GEARED MOTORS

## 3.1.12 IHL 4

### IHL4...F



### IHL4...T



	D	B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O	Q	R	S	T	*V		
<b>010</b>	50	h6	82	14	53,5	M16	88	348	342	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>020</b>	50	h6	82	14	53,5	M16	88	362	356	24	138	233	132	21	216	260	17	n°4	148	180	16	1,5	111
<b>030</b>	60	h6	105	18	64	M20	120	391	376	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>050</b>	60	h6	105	18	64	M20	120	425	410	39	169	284	160	33	254	312	18	n°4	172	235	20	2	128
<b>080</b>	80	h6	130	22	85	M20	170	464,5	424,5	65	201	330,5	180	40	279	350	22	n°4	185	281	25	2	163

	PF	MF	NF f7	GF	JF	OF	SF	TF
<b>010</b> <b>020</b>	186	165	110	6	45°	10,5	12	5
<b>030</b> <b>050</b>	222	195	150	15	36°	12,5	15	13
<b>080</b>	280	250	200	40	30°	15	20	12

\*V - Max. overall dimensions

	G3	D2	B2	b2	t2	f2
<b>010/.../080</b>	113	28 j6	60	8	31	M10

## 3.2 WEIGHTS

The values reported in the tables are referred to the weight of the gearbox without lubricant.

\*Weight without motor

* HL/PHL	IEC -[kg]								IHL	-[kg]
	71	80	90	100-112	132	160	180	200		
1-010	24	30	30	32	35	41	/	/	1-010	35
1-020	27	32	32	34	37	43	/	/	1-020	37
1-030	/	/	/	56	59	65	/	/	1-030	59
1-050	/	/	/	/	/	/	/	/	1-050	/
1-080	/	/	/	/	/	/	/	122	1-080	/
2-010	32	38	38	40	43	49	/	/	2-010	43
2-020	35	40	40	42	46	52	/	/	2-020	45
2-030	56	61	61	63	67	73	/	/	2-030	66
2-050	/	/	/	71	74	80	/	/	2-050	74
2-080	/	/	/	110	113	119	/	/	2-080	113
3-010	44	46	46	48	51	57	/	/	3-010	51
3-020	47	48	48	50	54	60	/	/	3-020	53
3-030	68	69	69	71	75	81	/	/	3-030	74
3-050	72	77	77	79	82	89	/	/	3-050	82
3-080	112	117	117	119	123	129	/	/	3-080	122
4-010	52	54	54	56	59	65	/	/	4-010	59
4-020	55	56	56	58	62	68	/	/	4-020	61
4-030	76	77	77	79	83	89	/	/	4-030	82
4-050	84	85	85	87	91	97	/	/	4-050	90
4-080	124	125	125	127	131	137	/	/	4-080	130

### 3.2 WEIGHTS

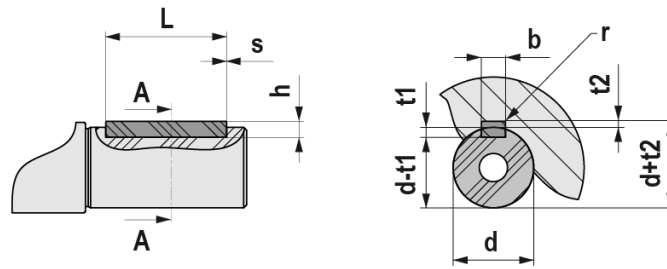
CHL	TH -[kg]	
	71	80
1-010	33	33
1-020	/	/
1-030	/	/
1-050	/	/
1-080	/	/
2-010	41	41
2-020	43	43
2-030	64	64
2-050	/	/
2-080	/	/
3-010	49	49
3-020	51	51
3-030	72	72
3-050	80	80
3-080	120	120
4-010	57	57
4-020	59	59
4-030	80	80
4-050	88	88
4-080	128	128

CHL	TP -[kg]						
	80	090S	090L	100	112	132S	132M
1-010	38	42	44	48	59	85	88
1-020	/	/	/	/	62	88	91
1-030	/	/	/	72	83	109	112
1-050	/	/	/	/	/	/	/
1-080	/	/	/	/	/	/	/
2-010	46	50	52	56	67	93	96
2-020	48	53	55	59	70	96	99
2-030	69	73	76	80	91	117	120
2-050	/	/	/	88	99	125	128
2-080	/	/	/	126	137	163	166
3-010	54	58	60	64	75	101	104
3-020	56	61	63	67	78	104	107
3-030	77	82	84	88	99	125	128
3-050	85	89	91	96	107	133	136
3-080	125	130	132	136	147	173	176
4-010	62	66	68	73	84	110	113
4-020	64	69	71	75	86	112	115
4-030	85	90	92	96	107	133	136
4-050	93	97	99	104	115	141	144
4-080	133	138	140	144	155	181	184

CHL	TBH -[kg]	
	71	80
1-010	35	36
1-020	/	/
1-030	/	/
1-050	/	/
1-080	/	/
2-010	43	44
2-020	45	47
2-030	66	68
2-050	/	/
2-080	/	/
3-010	51	52
3-020	53	55
3-030	74	76
3-050	82	84
3-080	122	124
4-010	59	60
4-020	61	63
4-030	82	84
4-050	90	92
4-080	130	132

CHL	TBP -[kg]						
	80	090S	090L	100	112	132S	132M
1-010	41	46	50	55	69	99	102
1-020	/	/	/	/	72	102	105
1-030	/	/	/	79	93	123	126
1-050	/	/	/	/	/	/	/
1-080	/	/	/	/	/	/	/
2-010	49	54	58	63	77	107	110
2-020	52	56	60	66	80	110	113
2-030	73	77	81	87	101	131	134
2-050	/	/	/	95	109	139	142
2-080	/	/	/	133	147	177	180
3-010	57	62	66	71	85	115	118
3-020	60	64	68	74	88	118	121
3-030	81	85	89	95	109	139	142
3-050	88	93	97	103	117	147	150
3-080	129	133	137	143	157	187	190
4-010	65	70	74	80	94	124	127
4-020	68	72	76	82	96	126	129
4-030	89	93	97	103	117	147	150
4-050	97	101	105	111	125	155	158
4-080	137	141	145	151	165	195	198

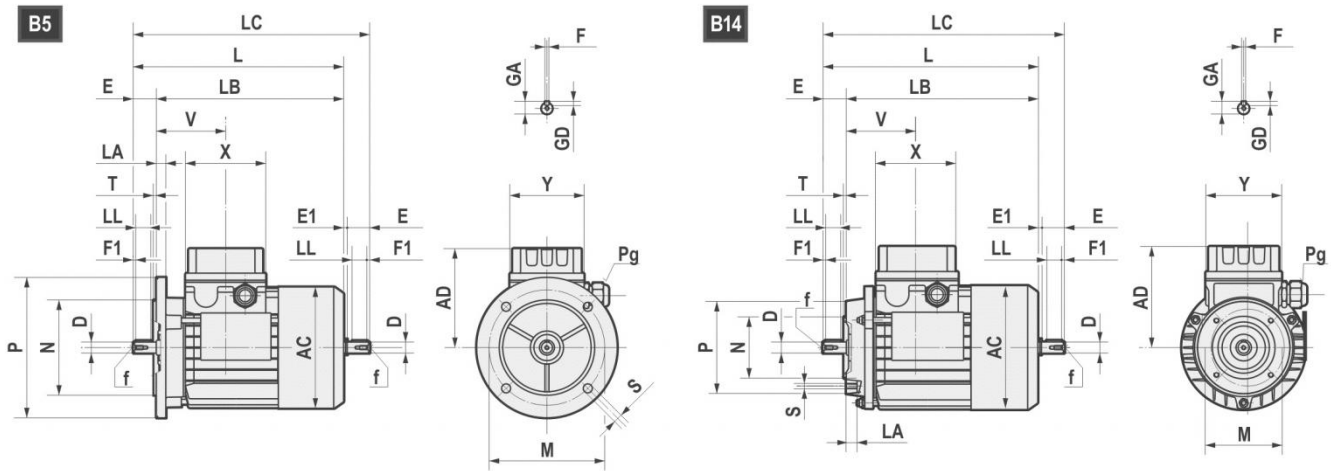
### 3.3 SHAFT END



UNI 6604 - DIN 6885														
d		b x h			Tol. b/h	L		s min / max	b	t1	t2	Tol. t1/t2	r max	
	6	8	2	x	2	h9 / h9	6	20	0,16 0,25	2	1,2	1	0,1 0	0,08 0,16
>	8	10	3	x	3		6	36		3	1,8	1,4		
>	10	12	4	x	4		8	45		4	2,5	1,8		
>	12	17	5	x	5		10	56		5	3	2,3		
>	17	22	6	x	6		14	70		6	3	2,8		
>	22	30	8	x	7	h9 / h11	18	90	0,25 0,4	8	4	3,3	0,2 0	0,16 0,25
>	30	38	10	x	8		22	110		10	5	3,3		
>	38	44	12	x	8		28	140		12	5	3,3		
>	44	50	14	x	9		36	160		14	5,5	3,8		
>	50	58	16	x	10		45	180		16	6	4,3		
>	58	65	18	x	11		50	200		18	7	4,4		
>	65	75	20	x	12		56	110		20	7,5	4,9		
>	75	85	22	x	14		63	140		22	9	5,4		
>	85	95	25	x	14		70	160		25	9	5,4		
>	95	110	28	x	16		80	180		28	10	6,4		
>	110	130	32	x	18	h9 / h11	90	200	0,4 0,6	32	11	7,4	0,2 0	0,25 0,4
>	130	150	36	x	20		100	160		36	12	8,4		
>	150	170	40	x	22		110	180		40	13	9,4		
>	170	200	45	x	25		125	200		45	14	10,4		
>	150	170	40	x	22		110	180		40	13	9,4		
>	170	200	45	x	25	125	200	45	14	10,4				

# 3.4 ELECTRIC MOTORS

## 3.4.1 Electric motors



	AC	AD	L	LB	LC	X	Y	V	D	E	E1	f	F1	GA	F	GD
<b>63</b>	121	104	211	188	235,5	80	74	69	11 j6	23	1,5	M4x10	2,5	12,5	4	4
<b>71</b>	139	112	238,5	208,5	271	80	74	74,5	14 j6	30	2,5	M5x12,5	3	16	5	5
<b>80</b>	158	122	272,5 *296	232,5 *256	314 *337	80	74	78	19 j6	40	1,5	M6x16	5	21,5	6	6
<b>90S</b>	173	148	298 *331	248 *281	349,5 *381	98	98	89,5	24 j6	50	1,5	M8x19	5	27	8	7
<b>90L</b>	173	148	323 *356	273 *306	374,5 *408	98	98	89,5	24 j6	50	1,5	M8x19	5	27	8	7
<b>100</b>	191	156	368	308	431,5	98	98	97,5	28 j6	60	3,5	M10x22	7,5	31	8	7
<b>112</b>	211	171	382,5 *408	322,5 *348	447 *472	98	98	100	28 j6	60	3,5	M10x22	7,5	31	8	7
<b>132S</b>	249	195	452	372	536,5	118	118	115,5	38 k6	80	4	M12x28	10	41	10	8
<b>132L</b>	249	195	490	410	574,5	118	118	115,5	38 k6	80	4	M12x28	10	41	10	8
<b>160S</b>	249	195	520	410	/	118	118	115,5	42k6	100	/	M16x36	10	45	12	8

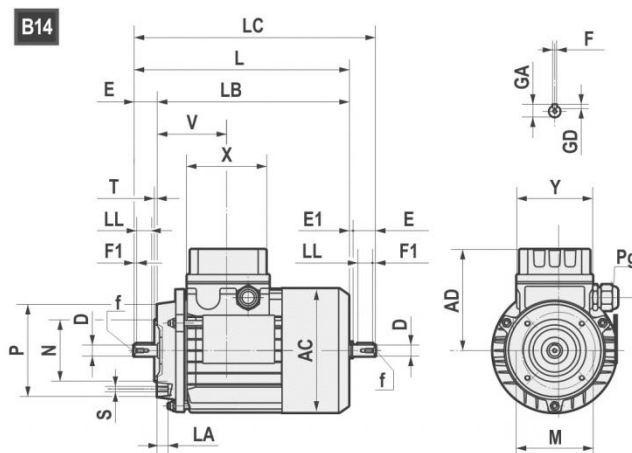
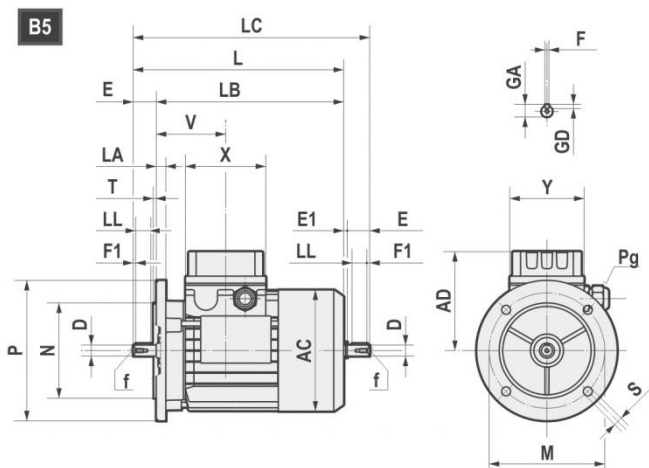
\*TP80B4, SH80B4, HSH80B4, TP90S4, SH90S4, HSH90S4, TP90L4, SH90L4, HSH90L4, TP90S6, TP112M4, TP112M6

B5	M	N	P	LA	S	T
<b>63</b>	115	95	140	10	9	3
<b>71</b>	130	110	160	10	9,5	3,5
<b>80</b>	165	130	200	12	11	3,5
<b>90</b>	165	130	200	12	11	3,5
<b>100</b>	215	180	250	15	14	4
<b>112</b>	215	180	250	14,5	14	4
<b>132</b>	265	230	300	20	14	3,5
<b>160</b>	300	250	350	13	18,5	3,5

B14	M	N	P	LA	S	T
<b>63</b>	75	60	90	10	M5	2,5
<b>71</b>	85	70	105	10,5	M6	2,5
<b>80</b>	100	80	120	10,5	M6	3
<b>90</b>	115	95	140	11,5	M8	3
<b>100</b>	130	110	160	15	M8	3,5
<b>112</b>	130	110	160	11,5	M8	3,5
<b>132</b>	165	130	200	20,5	M10	3,5
<b>160</b>	215	180	250	-	M12	4



# 3.4 ELECTRIC MOTORS



		AC	AD	L	LB	X	D	E	f	GA	F	GD	LL	Pg	
<b>160M</b>	2-4-6	314	251	600	490	158	42	110	M16	45	12	8	90	2-M40x1,5	1-M16x1,5
<b>160L</b>	2-4-6	314	251	645	535	158	42	110	M16	45	12	8	90	2-M40x1,5	1-M16x1,5
<b>180M</b>	2-4	355	267	680	570	158	48	110	M16	51,5	14	9	100	2-M40x1,5	1-M16x1,5
<b>180L</b>	4-6	355	267	720	610	158	48	110	M16	51,5	14	9	100	2-M40x1,5	1-M16x1,5
<b>200L</b>	2-4-6	397	300	785	675	187	55	110	M20	59	16	10	100	2-M50x1,5	1-M16x1,5
<b>225S</b>	4	446	325	820	680	187	60	140	M20	64	18	11	125	2-M50x1,5	1-M16x1,5
<b>225M</b>	2	446	325	815	705	187	55	110	M20	59	16	10	100	2-M50x1,5	1-M16x1,5
<b>225M</b>	4-6	446	325	845	705	187	60	140	M20	64	18	11	125	2-M50x1,5	1-M16x1,5
<b>250M</b>	2-4-6	485	360	910	770	238	60	140	M20	64	18	11	125	2-M63x1,5	1-M16x1,5
<b>250M</b>	2-4-6	485	360	910	770	238	65	140	M20	69	18	11	125	2-M63x1,5	1-M16x1,5
<b>280S</b>	2-4-6	547	390	970	830	238	65	140	M20	69	18	11	125	2-M63x1,5	1-M16x1,5
<b>280S</b>	2-4-6	547	390	970	830	238	75	140	M20	79,5	20	12	125	2-M63x1,5	1-M16x1,5
<b>280M</b>	2-4-6	547	390	1025	885	238	65	140	M20	69	18	11	125	2-M63x1,5	1-M16x1,5
<b>280M</b>	2-4-6	547	390	1025	885	238	75	140	M20	79,5	20	12	125	2-M63x1,5	1-M16x1,5

B5	M	N	P	LA	S	T
<b>160</b>	300	250	350	13	19	5
<b>180</b>	300	250	350	15	19	5
<b>200</b>	350	300	400	17	19	5
<b>225</b>	400	350	450	20	19	5
<b>250</b>	500	450	550	22	19	5
<b>280</b>	500	450	550	22	19	5

### 3.4.2 Standard high efficiency (TS), high (TH, SH, HSH) and premium (TP) motors

Motovario, three-phase, single polarity motors are available in three different versions (IE1-IE2-IE3) in compliance with standard 60034-30-1. The efficiency value is calculated according to the method set forth in standard IEC 60034-2-1.

1. IE1: TS series (standard efficiency) for nominal power less than 0.12 kW,;
2. IE2: TH series (high efficiency) for nominal power greater than or equal to 0.12 kW and less than 0.75 kW;
3. IE3: TP series (premium efficiency) (\*) 4 poles for nominal power greater than or equal to 0.12 kW, 2 and 6 poles for nominal power greater than or equal to 0.75 kW.

Motovario single-phase, single-polarity motors are available in IE2 efficiency class according to IEC 60034-30-1 for nominal power ratings higher than or equal to 0.12 kW and lower than or equal to 2.2 kW. The efficiency value is calculated according to the method set forth in standard IEC 60034-2-1.

Table of Motovario commercial availability

NOMINAL POWER [kW]	EFFICIENCY LEVEL		
	IE1	IE2	IE3
$P_n < 0,12$	TS-TBS	-	-
$0,12 \leq P_n < 0,75$	-	TH-TBH SH-HSH	TP-TBP (**)
$P_n \geq 0,75$	-	SH-HSH	TP-TBP

(\*) Motor TP100LA4 2,2 kW and all TP 6 poles motors are available at 60Hz only upon request. As a consequence, these motors are in IE3 efficiency level at 50 Hz and IE2 at 60 Hz in case of bifrequency electrical design (standard 230/400-265/460V 50-60Hz and optional 200/346-220/380V 50-60Hz, 290/500-330/575V 50-60Hz and 400/690-460/800V 50-60Hz, see chapter on input voltage and frequency).

(\*\*) Only 4 poles.

## 3.4 ELECTRIC MOTORS

## 3.4.3 Nominal power - [kW]

P.	63A			63B		63C	63D	71A		71B		71C
	TS	TH	TP	TH	TP	TH	TH	TH	TP	TH	TP	TH
2	-	0,18	-	0,25	-	0,37	-	0,37	-	0,55	-	-
4	-	0,12	0,12	0,18	0,18	-	0,25	0,25	0,25	0,37	0,37	0,55
6	0,09	-	-	0,12	-	-	-	0,18	-	0,25	-	0,37

P.	80A		80B		90S	90L	100LR	100LA	100L	112MR	112MS	112M
	TH	TP	TH	TP	TP	TP	TP	TP	TP	TP	TP	TP
2	-	0,75	-	1,1	1,5	2,2	-	-	3	-	-	4
4	0,55	0,55	-	0,75	1,1	1,5	-	2,2	-	2,2	3	4
6	0,37	-	0,55	-	0,75	-	1,1	-	1,5	-	-	2,2

P.	132S	132MS	132MA	132MB	132M
	TP	TP	TP	TP	TP
2	5,5	-	-	-	7,5
4	-	5,5	-	-	7,5
6	3	-	4	5,5	-

P.	160M	160MA	160MB	160L	160LA	180M	180L
	TP	TP	TP	TP	TP	TP	TP
2	-	11	15	18,5	-	22	-
4	-	11	-	-	15	18,5	22
6	7,5	-	-	11	-	-	15

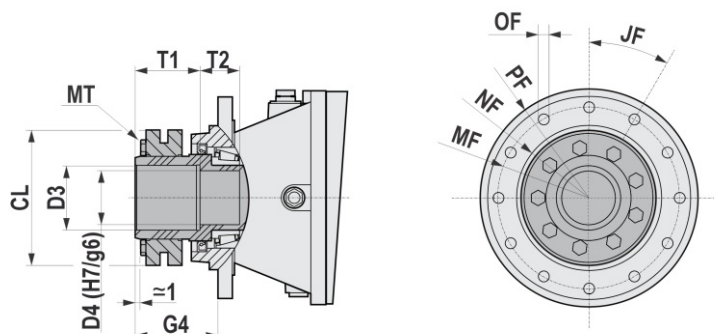
P.	200L	200LA	200LB	225S	225M	250M	280S	280M
	TP	TP	TP	TP	TP	TP	TP	TP
2	-	30	37	-	-	-	-	-
4	30	-	-	37	45	55	75	90
6	-	18,5	22	-	-	-	-	-

## 4.1.1 Shrink disk shaft HM

The standard supply of gear reducers with HM output with hollow shaft for shrink disc does not envisage a locking unit. Specify when placing the order whether you wish the locking unit to be included in the configuration. Clean and degrease the surfaces of the shaft to be fitted to. Comply with the indicated tightening torque of screws ( $M_T$ ).

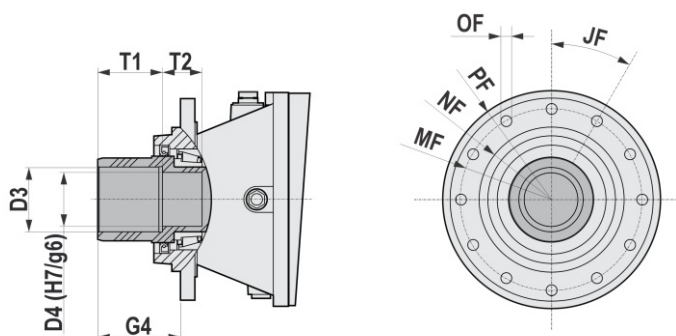
### Hollow shaft with shrink disk

010-080



### Hollow shaft for shrink disk

010-080



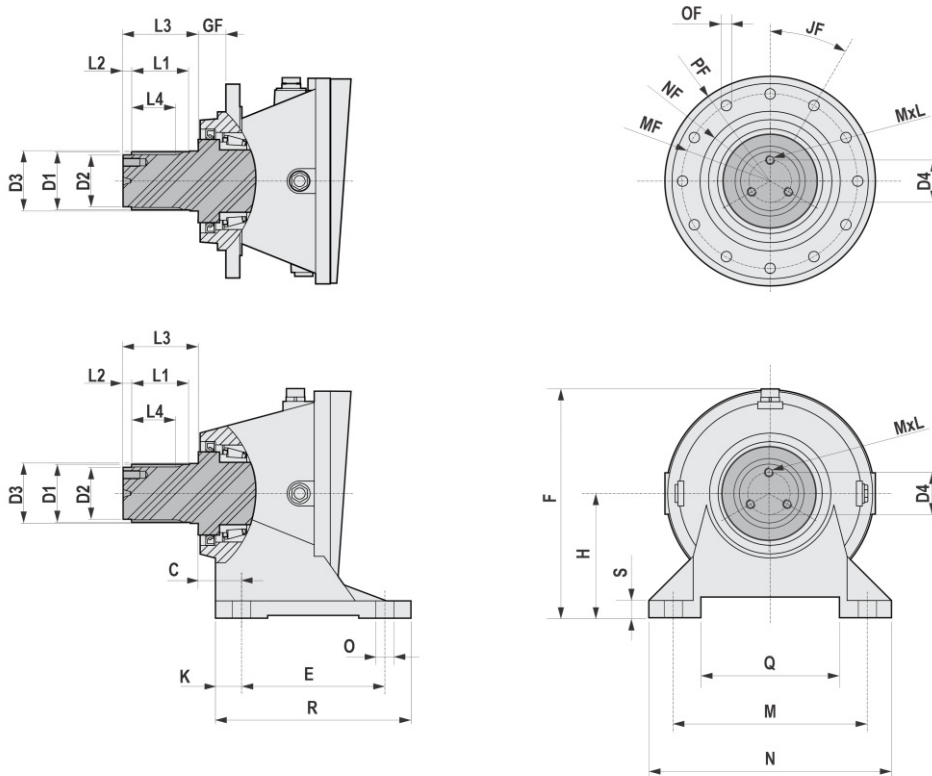
HPL	D3	D4	G4	T1	T2	CL	$M_T$ 12,9 [Nm]	$M2_{max}$ [Nm]
010	52 (H6/g6)	35	50	42	18	110	12	2400
020	52 (H6/g6)	35	50	42	18	110	12	3090
030	75 (H6/g6)	65	85	70	30	170	30	5200
050	75 (H6/g6)	65	85	70	30	170	30	8800
080	90 (H7/g6)	75	115	90	55	188	59	14600

	PF	MF	NF f7	GF	JF	OF
010 020	186	165	110	6	45°	10,5
030 050	222	195	150	15	36°	12,5
080	280	250	200	40	30°	15

# 4.1 LOW SPEED SHAFTS

## 4.1.2 Splined solid shaft SS

010-080



HPL	D1 (DIN5482)	D2 (f7)	D3 (f7)	D4	L1	L2	L3	L4	MxL
010	B40x36 DIN5482	35	42	24	43	5	55	31	M6x13
020	B40x36 DIN5482	35	42	24	43	5	55	31	M6x13
030	B58x53 DIN5482	50	60	32	52	8	68	38	M10x20
050	B58x53 DIN5482	50	60	32	52	8	68	38	M10x20
080	B70x64 DIN5482	62	72	45	70	10	90	53	M10x20

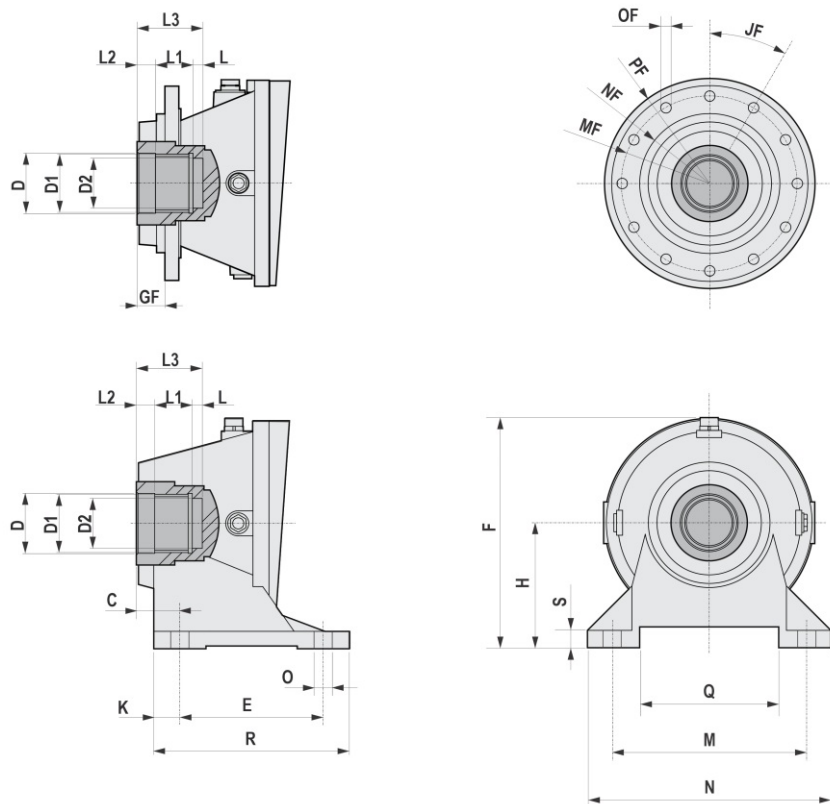
  

	PF	MF	NF f7	GF	JF	OF	C
010 020	186	165	110	6	45°	10,5	n°8
030 050	222	195	150	15	36°	12,5	n°10
080	280	250	200	40	30°	15	n°12

# 4.1 LOW SPEED SHAFTS

## 4.1.3 Splined hollow shaft HS

010-080

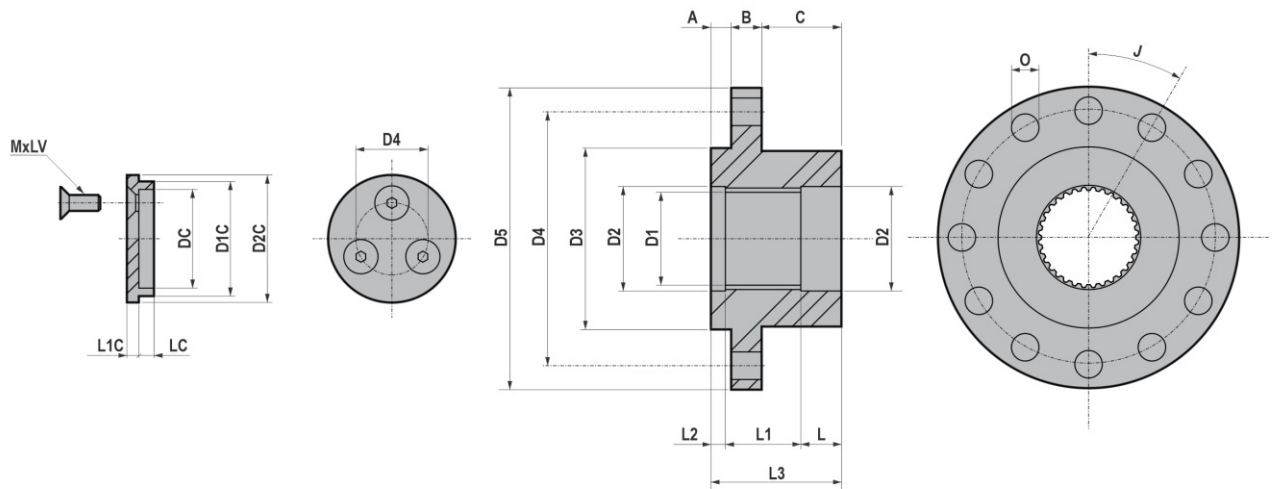


HPL	D1 (DIN5482)	D	D2 (H8)	L	L1	L2	L3
010	A40x36 DIN5482	42 H7	35	12,5	22	8	42,5
020	A40x36 DIN5482	42 H7	35	12,5	22	8	42,5
030	A58x53 DIN5482	60 H8	50	10	29	15	54
050	A58x53 DIN5482	60 H8	50	10	29	15	54
080	A70x64 DIN5482	72 H8	60	12	45	22	79

	C	E	F	H	K	M	N	O	Q	R	S	
010	24	138	233	132	21	216	260	17	n°4	148	180	16
020	24	138	233	132	21	216	260	17	n°4	148	180	16
030	39	169	284	160	33	254	312	18	n°4	172	235	20
050	39	169	284	160	33	254	312	18	n°4	172	235	20
080	65	201	330,5	180	40	279	350	22	n°4	185	281	25

	PF	MF	NF f7	GF	JF	OF
010 020	186	165	110	6	45°	10,5 n°8
030 050	222	195	150	15	36°	12,5 n°10
080	280	250	200	40	30°	15 n°12

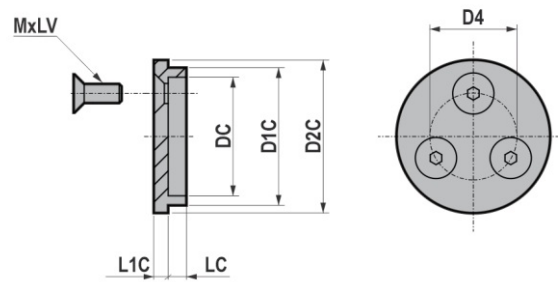
# 4.2 WHEEL FLANGE



HPL	D1 (DIN5482)	D2 (H7)	D3 (f7)	D4	D5	A	B	C	L	L1	L2	L3	J	O
010	A40x36 H10 DIN 5482	42	60	125	147	8	10	37	21	29	5	55	60	10,5 (n°6)
020	A40x36 H10 DIN 5482	42	60	125	147	8	10	37	21	29	5	55	60	10,5 (n°6)
030	A58x53 H10 DIN5482	60	95	145	165	10	14	44	24	35	9	68	30	12,5 (n°12)
050	A58x53 H10 DIN5482	60	95	145	165	10	14	44	24	35	9	68	30	12,5 (n°12)
080	A70x64 H10 DIN 5482	72	125	175	208	14	21	45	28	52	10	90	30	19 (n°12)

HPL	DC (H7)	D1C (f7)	D2C	D4	LC	L1C	MxLV
010	35	42	52	24	4,5	4,5	M6x16 (n°3)
020	35	42	52	24	4,5	4,5	M6x16 (n°3)
030	50	62	70	32	7,5	7,5	M10x25 (n°3)
050	50	62	70	32	7,5	7,5	M10x25 (n°3)
080	62	72	80	45	8,5	7,5	M10x25 (n°3)

## 4.3 AXIAL FIXING WASHER

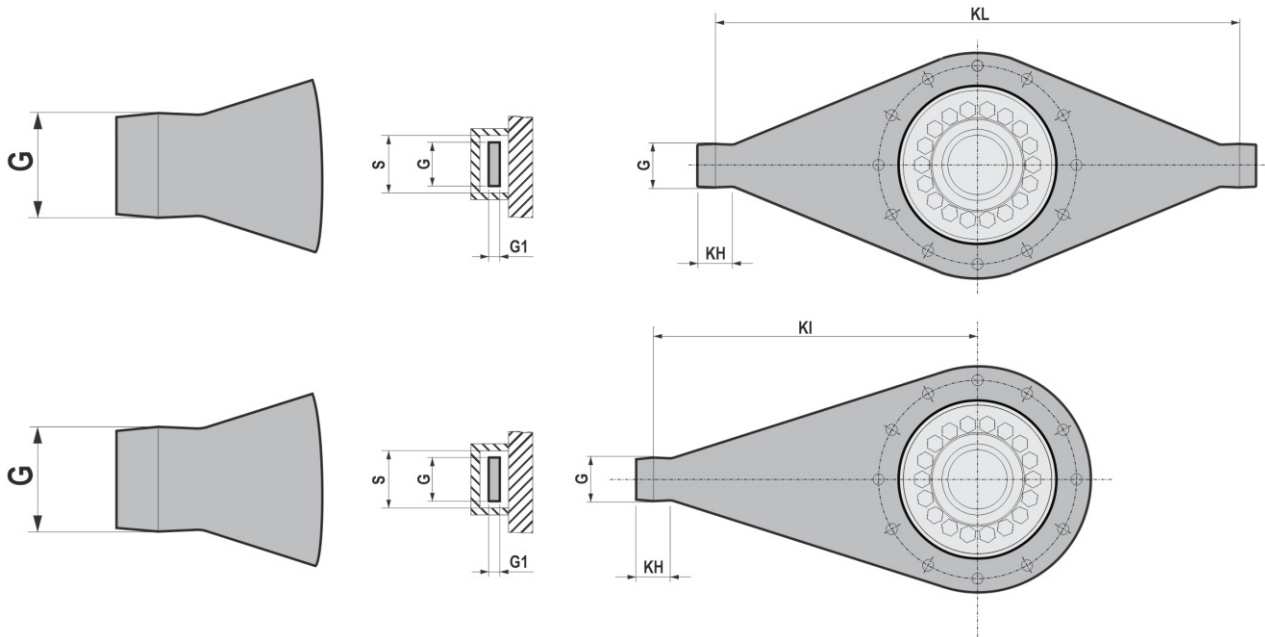


HPL	DC (H7)	D1C (f7)	D2C	D4	LC	L1C	MxLV
<b>010</b>	35	42	52	24	4,5	4,5	M6x16 (n°3)
<b>020</b>	35	42	52	24	4,5	4,5	M6x16 (n°3)
<b>030</b>	50	62	70	32	7,5	7,5	M10x25 (n°3)
<b>050</b>	50	62	70	32	7,5	7,5	M10x25 (n°3)
<b>080</b>	62	72	80	45	8,5	7,5	M10x25 (n°3)



# 4.4 SHAFT MOUNTING FASTENING

At customer's charge.



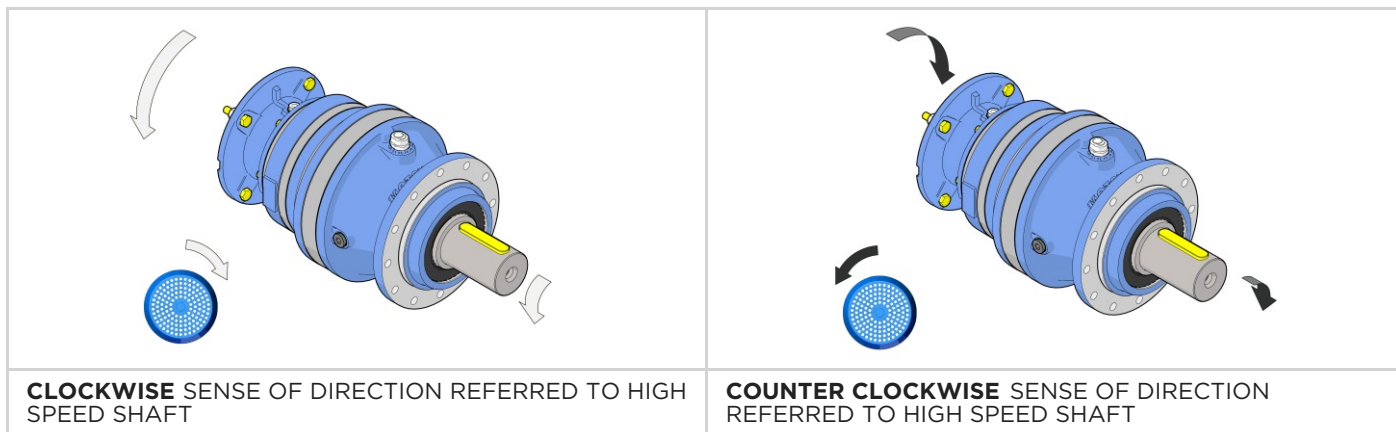
HPL	KI	KL	KH	G	G1	S
010	325	260	30	40	8	42
020	325	260	30	40	8	42
030	400	320	35	44	12	46
050	400	320	35	44	12	46
080	490	400	45	55	14	57

Suggested values.

# 4.5 BACKSTOP DEVICE

The gear reducer can be supplied with backstop device on input shaft. Backstop device allows output shaft rotation in only one sense of direction; according to the size, it is available in the input flange or in the motor with the same dimensions. It is important to specify the required sense of direction on the order. The backstop device is not available for mounting position V1/V5 with motor size IEC 100...225.

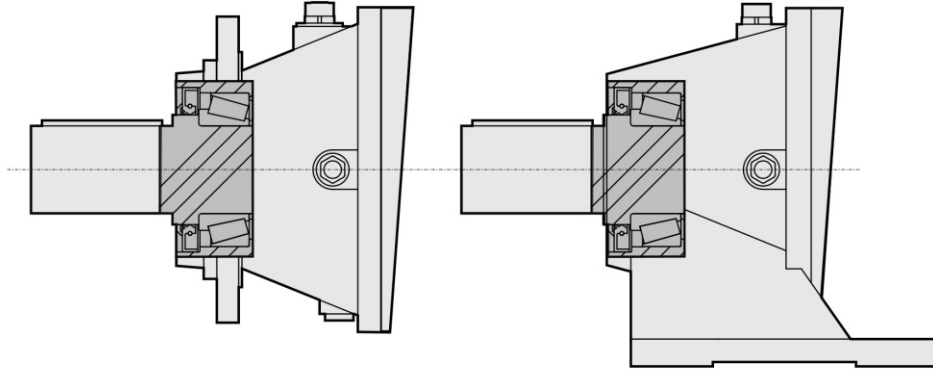
### SENSE OF DIRECTION AVAILABLE



		71	80	90	100-112	132	160	180	200
		160x14	200x19	200x24	250x28	300x38	350x42	350x48	400x55
HL 1	010/020/030	/	/	/	B5	B5	B5	/	/
	050	/	/	/	/	/	B5	/	/
	080	/	/	/	/	/	/	/	B5
HL 2	010	/	B5	B5	B5	B5	/	/	/
	020	/	B5	B5	B5	B5	B5	/	/
	030	/	/	B5	B5	B5	B5	/	/
	050/080	/	/	/	B5	B5	B5	/	/
HL 3	010	B5	B5	B5	/	/	/	/	/
	020/030	B5	B5	B5	B5	/	/	/	/
	050/080	/	B5	B5	B5	B5	B5	/	/
HL 4	020/030	B5	B5	/	/	/	/	/	/
	050	B5	B5	B5	/	/	/	/	/
	080	B5	B5	B5	B5	/	/	/	/

## 4.6 REINFORCED OIL SEALS FOR OUTPUT SHAF.

The reinforced seal can be done through the standard oil seal with VRM ring.  
On request the gear reducer can be supplied with fluoroelastomer FPM (FKM) seals.



HPL	VRM ring
010	x
020	x
030	x
050	x
080	x

## 5.1 HL GEARED MOTORS

## 0,25 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Motor Size	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
7,4	296	2,6	188	HL3 010	71A	4	23650	27000
6,4	341	2,8	216	HL3 010	71A	4	23650	27000
5,9	372	2,6	236	HL3 010	71A	4	23650	27000
4,7	468	2,1	297	HL3 010	71A	4	23800	27150
4,0	533	1,9	348	HL4 010	71A	4	24600	28100
3,7	582	1,5	369	HL3 010	71A	4	24700	28250
3,7	582	2,8	369	HL3 020	71A	4	24700	28250
3,2	663	1,6	433	HL4 010	71A	4	25000	28500
2,9	726	1,5	474	HL4 010	71A	4	25200	28800
2,9	726	2,8	474	HL4 020	71A	4	25200	28800
2,6	824	1,3	538	HL4 010	71A	4	25850	29300
2,6	824	2,6	538	HL4 020	71A	4	25850	29300
2,1	1024	1,1	668	HL4 010	71A	4	26200	29650
2,1	1024	2,1	668	HL4 020	71A	4	26200	29650
2,1	1024	2,8	668	HL4 030	71A	4	49750	57300
1,9	1133	1,0	740	HL4 010	71A	4	27000	30150
1,9	1133	2,0	740	HL4 020	71A	4	27000	30150
1,9	1133	2,5	740	HL4 030	71A	4	50500	58600
1,7	1242	0,9	811	HL4 010	71A	4	27300	30900
1,7	1242	1,8	811	HL4 020	71A	4	27300	30900
1,7	1272	2,1	831	HL4 030	71A	4	51400	59700
1,5	1408	1,6	919	HL4 020	71A	4	27400	31000
1,5	1408	2,0	919	HL4 030	71A	4	52150	60400
1,4	1559	1,5	1020	HL4 020	71A	4	27450	31050
1,4	1559	1,9	1020	HL4 030	71A	4	53000	61650
1,2	1773	1,4	1160	HL4 020	71A	4	27550	31200
1,2	1750	1,6	1140	HL4 030	71A	4	53600	62200
1,1	1937	1,3	1270	HL4 020	71A	4	27600	31350
1,1	1937	1,5	1270	HL4 030	71A	4	54800	63500
1,0	2204	1,3	1440	HL4 030	71A	4	55300	64200
1,0	2204	2,5	1440	HL4 050	71A	4	55300	64200
0,9	2439	1,0	1590	HL4 020	71A	4	27700	31800
0,9	2439	1,2	1590	HL4 030	71A	4	55850	65600
0,9	2439	2,4	1590	HL4 050	71A	4	55850	65600
0,8	2664	0,9	1740	HL4 020	71A	4	27800	32000
0,8	2664	1,0	1740	HL4 030	71A	4	56400	67100
0,8	2664	1,9	1740	HL4 050	71A	4	56400	67100
0,7	3031	0,9	1980	HL4 030	71A	4	56950	67750
0,7	3031	1,8	1980	HL4 050	71A	4	56950	67750
0,7	3204	2,7	2090	HL4 080	71A	4	78700	90700
0,6	3355	1,5	2190	HL4 050	71A	4	57500	68900
0,6	3494	1,3	2280	HL4 050	71A	4	57500	68900

## 0,25 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
0,6	3816	1,2	2490	HL4 050	71A	4	57500	68900
0,6	3471	2,9	2270	HL4 080	71A	4	79000	91100
0,6	3824	2,3	2500	HL4 080	71A	4	79000	91100
0,5	4170	1,3	2720	HL4 050	71A	4	58600	69800
0,5	4142	2,2	2710	HL4 080	71A	4	79500	91600
0,5	3843	2,9	2510	HL4 130	71A	4	95000	125000

## 0,37 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
10,2	317	2,8	138	HL3 010	71B	4	23200	26300
9,0	356	2,3	155	HL3 010	71B	4	23650	27000
8,1	400	2,3	174	HL3 010	71B	4	23650	27000
7,5	432	1,7	188	HL3 010	71B	4	23650	27000
6,5	497	1,9	216	HL3 010	71B	4	23650	27000
5,9	543	1,8	236	HL3 010	71B	4	23650	27000
4,7	683	1,4	297	HL3 010	71B	4	23800	27150
4,7	683	2,9	297	HL3 020	71B	4	23800	27150
4,5	712	2,8	309	HL3 030	71B	4	45550	52400
4,0	778	1,3	348	HL4 010	71B	4	24600	28100
4,0	778	2,6	348	HL4 020	71B	4	24600	28100
3,8	849	1,0	369	HL3 010	71B	4	24650	28150
3,8	849	1,9	369	HL3 020	71B	4	24650	28150
3,8	849	2,8	369	HL3 030	71B	4	46200	53650
3,3	979	2,1	425	HL3 030	71B	4	47100	54650
3,2	967	1,1	433	HL4 010	71B	4	25000	28500
3,2	967	2,1	433	HL4 020	71B	4	25000	28500
3,2	967	2,9	433	HL4 030	71B	4	47200	54800
3,0	1060	1,0	474	HL4 010	71B	4	25150	28600
3,0	1060	1,9	474	HL4 020	71B	4	25150	28600
3,0	1060	2,7	474	HL4 030	71B	4	47850	55100
2,6	1202	1,8	538	HL4 020	71B	4	25850	29300
2,6	1202	2,3	538	HL4 030	71B	4	48600	56450
2,1	1493	1,4	668	HL4 020	71B	4	26200	29650
2,1	1493	1,9	668	HL4 030	71B	4	49750	57300
1,9	1653	1,3	740	HL4 020	71B	4	27000	30150
1,9	1653	1,7	740	HL4 030	71B	4	50500	58600
1,7	1811	1,2	811	HL4 020	71B	4	27300	30900
1,7	1856	1,4	831	HL4 030	71B	4	51400	59700
1,7	1856	2,7	831	HL4 050	71B	4	51400	59700
1,5	2054	1,1	919	HL4 020	71B	4	27400	31000
1,5	2054	1,4	919	HL4 030	71B	4	52150	60400

## 5.1 HL GEARED MOTORS

## 0,37 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
1,5	2054	2,7	919	HL4 050	71B	4	52150	60400
1,4	2274	1,0	1020	HL4 020	71B	4	27450	31050
1,4	2274	1,3	1020	HL4 030	71B	4	53000	61650
1,4	2274	2,5	1020	HL4 050	71B	4	53000	61650
1,2	2587	0,9	1160	HL4 020	71B	4	27550	31200
1,2	2553	1,1	1140	HL4 030	71B	4	53600	62200
1,2	2553	2,1	1140	HL4 050	71B	4	53600	62200
1,1	2826	1,0	1270	HL4 030	71B	4	54800	63500
1,1	2826	2,0	1270	HL4 050	71B	4	54800	63500
1,0	3215	1,7	1440	HL4 050	71B	4	55300	64200
0,9	3559	1,6	1590	HL4 050	71B	4	55850	65600
0,9	3501	2,8	1570	HL4 080	71B	4	78000	90000
0,8	3887	1,3	1740	HL4 050	71B	4	56400	67100
0,8	4021	2,5	1800	HL4 080	71B	4	78300	90300
0,7	4422	1,2	1980	HL4 050	71B	4	56950	67750
0,7	4674	1,8	2090	HL4 080	71B	4	78700	90700
0,6	4895	1,0	2190	HL4 050	71B	4	57500	68900
0,6	5097	0,9	2280	HL4 050	71B	4	57500	68900
0,6	5064	2,0	2270	HL4 080	71B	4	79000	91100
0,6	5578	1,5	2500	HL4 080	71B	4	79000	91100
0,6	5606	2,0	2510	HL4 130	71B	4	92600	122000
0,5	6043	1,5	2710	HL4 080	71B	4	79500	91600

## 0,55 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
20,4	242	2,4	68,7	HL2 010	71C/80A	4	18400	20850
16,0	299	2,5	87,4	HL3 010	71C/80A	4	20200	22800
14,0	343	2,6	100	HL3 010	71C/80A	4	21200	24050
12,8	376	2,3	110	HL3 010	71C/80A	4	21900	24750
11,2	426	2,1	125	HL3 010	71C/80A	4	22650	25750
10,2	472	1,9	138	HL3 010	71C/80A	4	23200	26300
9,0	530	1,5	155	HL3 010	71C/80A	4	23650	27000
9,0	530	2,9	155	HL3 020	71C/80A	4	23650	27000
8,1	594	1,5	174	HL3 010	71C/80A	4	23650	27000
7,5	643	1,2	188	HL3 010	71C/80A	4	23650	27000
7,5	643	2,2	188	HL3 020	71C/80A	4	23650	27000
7,1	676	2,9	197	HL3 030	71C/80A	4	45100	51700
6,5	738	1,3	216	HL3 010	71C/80A	4	23650	27000
6,5	738	2,6	216	HL3 020	71C/80A	4	23650	27000
5,9	807	1,2	236	HL3 010	71C/80A	4	23650	27000
5,9	807	2,4	236	HL3 020	71C/80A	4	23650	27000

## 5.1 HL GEARED MOTORS

## 0,55 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Motor Size	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
5,6	851	2,3	249	HL3 030	71C/80A	4	45100	51700
4,8	1002	2,3	293	HL3 030	71C/80A	4	45300	52000
4,7	1016	0,9	297	HL3 010	71C/80A	4	23800	27150
4,7	1016	1,9	297	HL3 020	71C/80A	4	23800	27150
4,5	1058	1,9	309	HL3 030	71C/80A	4	45550	52400
4,0	1157	1,7	348	HL4 020	71C/80A	4	24600	28100
4,0	1157	2,4	348	HL4 030	71C/80A	4	46000	53450
3,8	1262	1,3	369	HL3 020	71C/80A	4	24650	28150
3,8	1262	1,9	369	HL3 030	71C/80A	4	46200	53650
3,3	1455	1,4	425	HL3 030	71C/80A	4	47100	54650
3,3	1455	2,7	425	HL3 050	71C/80A	4	47100	54650
3,2	1437	1,4	433	HL4 020	71C/80A	4	25000	28500
3,2	1437	2,0	433	HL4 030	71C/80A	4	47200	54800
3,0	1575	1,3	474	HL4 020	71C/80A	4	25150	28600
3,0	1575	1,8	474	HL4 030	71C/80A	4	47850	55100
2,6	1786	1,2	538	HL4 020	71C/80A	4	25850	29300
2,6	1786	1,6	538	HL4 030	71C/80A	4	48600	56450
2,1	2220	1,0	668	HL4 020	71C/80A	4	26200	29650
2,1	2220	1,3	668	HL4 030	71C/80A	4	49750	57300
2,1	2220	2,5	668	HL4 050	71C/80A	4	49750	57300
1,9	2457	0,9	740	HL4 020	71C/80A	4	27000	30150
1,9	2457	1,2	740	HL4 030	71C/80A	4	50500	58600
1,9	2457	2,3	740	HL4 050	71C/80A	4	50500	58600
1,7	2759	0,9	831	HL4 030	71C/80A	4	51400	59700
1,7	2759	1,8	831	HL4 050	71C/80A	4	51400	59700
1,5	3053	0,9	919	HL4 030	71C/80A	4	52150	60400
1,5	3053	1,8	919	HL4 050	71C/80A	4	52150	60400
1,4	3380	1,7	1020	HL4 050	71C/80A	4	53000	61650
1,2	3795	1,4	1140	HL4 050	71C/80A	4	53600	62200
1,2	3783	2,5	1140	HL4 080	71C/80A	4	75450	87100
1,1	4200	1,4	1270	HL4 050	71C/80A	4	54800	63500
1,1	4188	2,5	1260	HL4 080	71C/80A	4	76400	88500
1,0	4779	1,1	1440	HL4 050	71C/80A	4	55300	64200
1,0	4748	2,1	1430	HL4 080	71C/80A	4	77500	89400
0,9	5290	1,1	1590	HL4 050	71C/80A	4	55850	65600
0,9	5204	1,9	1570	HL4 080	71C/80A	4	78000	90000
0,9	5173	2,9	1560	HL4 130	71C/80A	4	86500	114400
0,8	5977	1,7	1800	HL4 080	71C/80A	4	78300	90300
0,8	5883	2,5	1770	HL4 130	71C/80A	4	88000	116100
0,7	6948	1,2	2090	HL4 080	71C/80A	4	78700	90700
0,7	6429	2,3	1940	HL4 130	71C/80A	4	89100	117800
0,6	7527	1,3	2270	HL4 080	71C/80A	4	79000	91100

## 0,55 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
0,6	8292	1,0	2500	HL4 080	71C/80A	4	79000	91100
0,6	8333	1,3	2510	HL4 130	71C/80A	4	92600	122000
0,6	8333	2,0	2510	HL4 180	71C/80A	4	94400	122000
0,5	8983	1,0	2710	HL4 080	71C/80A	4	79500	91600

## 0,75 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
28,8	234	2,9	49,9	HL2 010	80B	4	16950	19250
22,4	292	2,9	64,2	HL3 010	80B	4	18200	20550
21,0	321	1,8	68,7	HL2 010	80B	4	18350	20750
17,9	366	2,3	80,6	HL3 010	80B	4	19600	22250
16,5	397	1,8	87,4	HL3 010	80B	4	20200	22800
14,4	455	1,9	100	HL3 010	80B	4	21000	23800
13,1	498	1,7	110	HL3 010	80B	4	21700	24500
11,6	565	1,5	125	HL3 010	80B	4	22450	25500
10,4	626	1,4	138	HL3 010	80B	4	23050	26150
10,4	626	2,8	138	HL3 020	80B	4	23050	26150
9,3	702	1,1	155	HL3 010	80B	4	23650	27000
9,3	702	2,1	155	HL3 020	80B	4	23650	27000
8,3	788	1,1	174	HL3 010	80B	4	23650	27000
8,3	788	2,3	174	HL3 020	80B	4	23650	27000
7,7	852	1,6	188	HL3 020	80B	4	23650	27000
7,3	896	2,1	197	HL3 030	80B	4	45100	51700
6,7	979	0,9	216	HL3 010	80B	4	23650	27000
6,7	979	1,9	216	HL3 020	80B	4	23650	27000
6,7	979	2,7	216	HL3 030	80B	4	45100	51700
6,1	1069	1,7	236	HL3 020	80B	4	23650	27000
5,8	1128	1,7	249	HL3 030	80B	4	45100	51700
4,9	1347	1,4	297	HL3 020	80B	4	23700	27050
4,9	1329	1,7	293	HL3 030	80B	4	45200	51850
4,7	1402	1,4	309	HL3 030	80B	4	45350	52100
4,7	1402	2,6	309	HL3 050	80B	4	45350	52100
4,1	1534	1,3	348	HL4 020	80B	4	24200	27650
4,1	1534	1,8	348	HL4 030	80B	4	45900	53250
3,9	1674	0,9	369	HL3 020	80B	4	24600	28100
3,9	1674	1,4	369	HL3 030	80B	4	46100	53550
3,9	1674	2,7	369	HL3 050	80B	4	46100	53550
3,5	1857	3,0	409	HL3 080	80B	4	65100	75150
3,4	1929	1,0	425	HL3 030	80B	4	47000	54500
3,4	1929	2,0	425	HL3 050	80B	4	47000	54500
3,3	1906	1,0	433	HL4 020	80B	4	24900	28400



## 5.1 HL GEARED MOTORS

## 0,75 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
3,3	1906	1,4	433	HL4 030	80B	4	47100	54650
3,3	1906	2,8	433	HL4 050	80B	4	47100	54650
3,0	2088	0,9	474	HL4 020	80B	4	25150	28600
3,0	2088	1,3	474	HL4 030	80B	4	47850	55100
3,0	2088	2,6	474	HL4 050	80B	4	47850	55100
2,7	2368	1,2	538	HL4 030	80B	4	48450	56100
2,7	2368	2,3	538	HL4 050	80B	4	48450	56100
2,2	2943	0,9	668	HL4 030	80B	4	49500	57200
2,2	2943	1,8	668	HL4 050	80B	4	49500	57200
2,0	3205	3,0	728	HL4 080	80B	4	70300	81150
1,9	3258	1,7	740	HL4 050	80B	4	50500	58600
1,7	3657	1,4	831	HL4 050	80B	4	51400	59700
1,7	3633	2,5	825	HL4 080	80B	4	72250	83400
1,6	4048	1,3	919	HL4 050	80B	4	51800	60050
1,6	3983	2,3	905	HL4 080	80B	4	72650	83900
1,4	4481	1,2	1020	HL4 050	80B	4	53000	61650
1,4	4408	2,2	1000	HL4 080	80B	4	74600	86150
1,3	5031	1,0	1140	HL4 050	80B	4	53300	62000
1,3	5016	1,8	1140	HL4 080	80B	4	75050	86650
1,3	4986	2,8	1130	HL4 130	80B	4	82300	107700
1,2	5446	2,6	1240	HL4 130	80B	4	83000	109300
1,1	5569	1,0	1270	HL4 050	80B	4	54800	63500
1,1	5552	1,8	1260	HL4 080	80B	4	76400	88500
1,0	6294	1,5	1430	HL4 080	80B	4	77500	89400
1,0	6196	2,3	1410	HL4 130	80B	4	85100	112000
0,9	6899	1,4	1570	HL4 080	80B	4	78000	90000
0,9	6858	2,1	1560	HL4 130	80B	4	86500	114400
0,8	7924	1,2	1800	HL4 080	80B	4	78300	90300
0,8	7800	1,8	1770	HL4 130	80B	4	88000	116100
0,8	7800	2,4	1770	HL4 180	80B	4	90300	116100
0,7	9211	0,9	2090	HL4 080	80B	4	78700	90700
0,7	8523	1,7	1940	HL4 130	80B	4	89100	117800
0,7	8523	2,5	1940	HL4 180	80B	4	91200	117800
0,6	9979	1,0	2270	HL4 080	80B	4	79000	91100
0,6	11048	1,0	2510	HL4 130	80B	4	92600	122000
0,6	11048	1,5	2510	HL4 180	80B	4	94400	122000

## 1,10 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
36,1	274	2,4	39,6	HL2 010	90S	4	15900	18000
28,6	345	2,0	49,9	HL2 010	90S	4	17000	19350

## 1,10 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
28,0	343	2,5	51,2	HL3 010	90S	4	17150	19500
22,3	431	2,0	64,2	HL3 010	90S	4	18200	20550
20,8	475	1,2	68,7	HL2 010	90S	4	18400	20850
20,8	475	2,4	68,7	HL2 020	90S	4	18400	20850
17,7	540	1,6	80,6	HL3 010	90S	4	19600	22250
16,4	586	1,3	87,4	HL3 010	90S	4	20200	22800
16,4	586	2,4	87,4	HL3 020	90S	4	20200	22800
14,3	672	1,3	100	HL3 010	90S	4	21100	23900
14,3	672	2,6	100	HL3 020	90S	4	21100	23900
13,0	736	1,2	110	HL3 010	90S	4	21750	24600
13,0	736	2,4	110	HL3 020	90S	4	21750	24600
12,5	766	2,5	114	HL3 030	90S	4	40450	46900
11,5	835	1,0	125	HL3 010	90S	4	22500	25600
11,5	835	2,1	125	HL3 020	90S	4	22500	25600
10,4	924	0,9	138	HL3 010	90S	4	23050	26150
10,4	924	1,9	138	HL3 020	90S	4	23050	26150
10,4	924	2,8	138	HL3 030	90S	4	43350	50300
9,2	1037	1,4	155	HL3 020	90S	4	23650	27000
9,2	1037	2,1	155	HL3 030	90S	4	45100	51700
8,3	1148	2,3	171	HL3 030	90S	4	45100	51700
8,2	1164	1,5	174	HL3 020	90S	4	23650	27000
7,6	1258	1,1	188	HL3 020	90S	4	23650	27000
7,2	1323	1,5	197	HL3 030	90S	4	45100	51700
7,2	1323	2,8	197	HL3 050	90S	4	45100	51700
6,6	1446	1,3	216	HL3 020	90S	4	23650	27000
6,6	1446	1,9	216	HL3 030	90S	4	45100	51700
6,1	1579	1,2	236	HL3 020	90S	4	23650	27000
5,8	1667	1,2	249	HL3 030	90S	4	45100	51700
5,8	1667	2,2	249	HL3 050	90S	4	45100	51700
4,9	1963	1,1	293	HL3 030	90S	4	45200	51850
4,9	1963	2,2	293	HL3 050	90S	4	45200	51850
4,8	1989	1,0	297	HL3 020	90S	4	23750	27100
4,6	2071	0,9	309	HL3 030	90S	4	45450	52250
4,6	2071	1,8	309	HL3 050	90S	4	45450	52250
4,1	2265	1,2	348	HL4 030	90S	4	45900	53250
4,1	2265	2,4	348	HL4 050	90S	4	45900	53250
4,0	2392	2,8	357	HL3 080	90S	4	64600	74400
3,9	2472	0,9	369	HL3 030	90S	4	46100	53550
3,9	2472	1,8	369	HL3 050	90S	4	46100	53550
3,5	2742	2,0	409	HL3 080	90S	4	65100	75150
3,4	2849	1,3	425	HL3 050	90S	4	47000	54500
3,3	2815	1,0	433	HL4 030	90S	4	47100	54650

## 5.1 HL GEARED MOTORS

## 1,10 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
3,3	2815	1,9	433	HL4 050	90S	4	47100	54650
3,0	3084	1,7	474	HL4 050	90S	4	47850	55100
2,7	3498	1,5	538	HL4 050	90S	4	48450	56100
2,7	3441	2,8	529	HL4 080	90S	4	67750	78150
2,4	3809	2,5	586	HL4 080	90S	4	69100	79750
2,2	4276	2,1	658	HL4 080	90S	4	69600	80250
2,1	4346	1,2	668	HL4 050	90S	4	49750	57300
2,0	4733	2,0	728	HL4 080	90S	4	70300	81150
1,9	4811	1,1	740	HL4 050	90S	4	50500	58600
1,8	5282	2,5	812	HL4 130	90S	4	78300	103100
1,7	5401	0,9	831	HL4 050	90S	4	51400	59700
1,7	5366	1,7	825	HL4 080	90S	4	72250	83400
1,6	5979	0,9	919	HL4 050	90S	4	51800	60050
1,6	5882	1,6	905	HL4 080	90S	4	72650	83900
1,6	5847	2,3	899	HL4 130	90S	4	80000	104800
1,5	6267	2,4	964	HL4 130	90S	4	81000	105900
1,5	6371	2,5	980	HL4 180	90S	4	82100	105900
1,4	6511	1,5	1000	HL4 080	90S	4	74600	86150
1,3	7408	1,3	1140	HL4 080	90S	4	75050	86650
1,3	7364	1,9	1130	HL4 130	90S	4	82300	107700
1,3	7364	2,8	1130	HL4 180	90S	4	84000	107700
1,2	8043	1,8	1240	HL4 130	90S	4	83000	109300
1,2	8043	2,6	1240	HL4 180	90S	4	84900	109300
1,1	8200	1,2	1260	HL4 080	90S	4	76400	88500
1,0	9296	1,0	1430	HL4 080	90S	4	77500	89400
1,0	9151	1,6	1410	HL4 130	90S	4	85100	112000
1,0	9151	2,4	1410	HL4 180	90S	4	87100	112000
0,9	10190	0,9	1570	HL4 080	90S	4	78000	90000
0,9	10129	1,4	1560	HL4 130	90S	4	86500	114400
0,9	10129	2,1	1560	HL4 180	90S	4	88500	114400
0,8	11520	1,3	1770	HL4 130	90S	4	88000	116100
0,8	11520	1,6	1770	HL4 180	90S	4	90300	116100
0,7	12587	1,2	1940	HL4 130	90S	4	89100	117800
0,7	12587	1,7	1940	HL4 180	90S	4	91200	117800
0,6	16317	1,0	2510	HL4 180	90S	4	94400	122000

## 1,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
49,6	272	2,3	28,8	HL2 010	90L	4	14650	16550
44,8	301	2,8	31,9	HL2 010	90L	4	15050	17950
36,1	374	1,8	39,6	HL2 010	90L	4	15900	18000

## 5.1 HL GEARED MOTORS

## 1,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
35,6	379	2,2	40,2	HL2 010	90L	4	15900	18000
28,6	471	1,4	49,9	HL2 010	90L	4	17000	19350
28,6	471	3,0	49,9	HL2 020	90L	4	17000	19350
28,0	468	1,8	51,2	HL3 010	90L	4	17150	19500
22,3	587	1,4	64,2	HL3 010	90L	4	18200	20550
22,3	587	2,9	64,2	HL3 020	90L	4	18200	20550
20,8	647	1,8	68,7	HL2 020	90L	4	18400	20850
19,5	670	2,8	73,3	HL3 030	90L	4	35550	41300
17,7	737	1,2	80,6	HL3 010	90L	4	19600	22250
17,7	737	2,3	80,6	HL3 020	90L	4	19600	22250
16,4	799	0,9	87,4	HL3 010	90L	4	20200	22800
16,4	799	1,8	87,4	HL3 020	90L	4	20200	22800
15,5	841	2,3	92,0	HL3 030	90L	4	37900	43900
14,3	916	0,9	100	HL3 010	90L	4	21100	23900
14,3	916	1,9	100	HL3 020	90L	4	21100	23900
14,3	916	2,8	100	HL3 030	90L	4	39200	45500
13,0	1004	1,7	110	HL3 020	90L	4	21750	24600
12,5	1045	1,8	114	HL3 030	90L	4	40450	46900
11,5	1138	1,5	125	HL3 020	90L	4	22500	25600
11,5	1138	2,3	125	HL3 030	90L	4	41750	48450
10,4	1260	1,4	138	HL3 020	90L	4	23050	26150
10,4	1260	2,1	138	HL3 030	90L	4	43350	50300
9,2	1414	1,0	155	HL3 020	90L	4	23650	27000
9,2	1414	1,6	155	HL3 030	90L	4	45100	51700
8,3	1566	1,7	171	HL3 030	90L	4	45100	51700
8,2	1587	1,1	174	HL3 020	90L	4	23650	27000
7,2	1805	1,1	197	HL3 030	90L	4	45100	51700
7,2	1805	2,0	197	HL3 050	90L	4	45100	51700
6,6	1972	0,9	216	HL3 020	90L	4	23650	27000
6,6	1972	1,4	216	HL3 030	90L	4	45100	51700
6,6	1972	2,7	216	HL3 050	90L	4	45100	51700
5,8	2273	1,6	249	HL3 050	90L	4	45100	51700
4,9	2676	1,6	293	HL3 050	90L	4	45200	51850
4,7	2806	2,9	307	HL3 080	90L	4	63250	73050
4,6	2824	1,3	309	HL3 050	90L	4	45450	52250
4,2	3106	2,8	340	HL3 130	90L	4	70150	91100
4,1	3089	1,7	348	HL4 050	90L	4	45900	53250
4,0	3262	2,1	357	HL3 080	90L	4	64600	74400
3,9	3371	1,4	369	HL3 050	90L	4	46100	53550
3,6	3505	2,3	395	HL4 080	90L	4	65050	75000
3,5	3739	1,5	409	HL3 080	90L	4	65100	75150
3,4	3885	1,0	425	HL3 050	90L	4	47000	54500

## 1,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
3,3	3838	1,4	433	HL4 050	90L	4	47100	54650
3,1	4137	2,3	467	HL4 080	90L	4	66150	76300
3,0	4205	1,3	474	HL4 050	90L	4	47850	55100
2,7	4770	1,1	538	HL4 050	90L	4	48450	56100
2,7	4692	2,1	529	HL4 080	90L	4	67750	78150
2,5	5000	2,9	564	HL4 130	90L	4	75150	98300
2,4	5194	1,9	586	HL4 080	90L	4	69100	79750
2,3	5613	2,6	633	HL4 130	90L	4	75700	99600
2,2	5831	1,6	658	HL4 080	90L	4	69600	80250
2,1	5927	0,9	668	HL4 050	90L	4	49750	57300
2,0	6454	1,5	728	HL4 080	90L	4	70300	81150
2,0	6213	2,4	701	HL4 130	90L	4	77100	101600
1,8	7203	1,8	812	HL4 130	90L	4	78300	103100
1,8	7203	2,7	812	HL4 180	90L	4	80100	103100
1,7	7317	1,2	825	HL4 080	90L	4	72250	83400
1,6	8021	1,1	905	HL4 080	90L	4	72650	83900
1,6	7973	1,7	899	HL4 130	90L	4	80000	104800
1,6	7973	2,5	899	HL4 180	90L	4	81600	104800
1,5	8546	1,8	964	HL4 130	90L	4	81000	105900
1,5	8688	1,8	980	HL4 180	90L	4	82100	105900
1,4	8879	1,1	1000	HL4 080	90L	4	74600	86150
1,3	10101	0,9	1140	HL4 080	90L	4	75050	86650
1,3	10041	1,4	1130	HL4 130	90L	4	82300	107700
1,3	10041	2,1	1130	HL4 180	90L	4	84000	107700
1,2	10968	1,3	1240	HL4 130	90L	4	83000	109300
1,2	10968	1,9	1240	HL4 180	90L	4	84900	109300
1,1	11181	0,9	1260	HL4 080	90L	4	76400	88500
1,0	12478	1,2	1410	HL4 130	90L	4	85100	112000
1,0	12478	1,7	1410	HL4 180	90L	4	87100	112000
0,9	13812	1,1	1560	HL4 130	90L	4	86500	114400
0,9	13812	1,6	1560	HL4 180	90L	4	88500	114400
0,8	15709	0,9	1770	HL4 130	90L	4	88000	116100
0,8	15709	1,2	1770	HL4 180	90L	4	90300	116100
0,7	17164	1,3	1940	HL4 180	90L	4	91200	117800

## 2,20 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
154,8	132	2,4	9,30	HL1 010	100LA/112MR	4	10200	11500
77,2	256	3,0	18,7	HL2 010	100LA/112MR	4	12400	14150
62,1	318	2,5	23,2	HL2 010	100LA/112MR	4	13650	15500
50,0	396	1,6	28,8	HL2 010	100LA/112MR	4	14600	16500

## 2,20 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Motor Size	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
45,1	438	1,9	31,9	HL2 010	100LA/112MR	4	15050	17950
36,3	544	1,2	39,6	HL2 010	100LA/112MR	4	15900	18000
36,3	544	2,5	39,6	HL2 020	100LA/112MR	4	15900	18000
35,8	551	1,5	40,2	HL2 010	100LA/112MR	4	15900	18000
35,8	551	2,4	40,2	HL2 020	100LA/112MR	4	15900	18000
31,5	627	2,9	45,7	HL2 030	100LA/112MR	4	30200	35000
28,8	685	1,0	49,9	HL2 010	100LA/112MR	4	16950	19250
28,8	685	2,0	49,9	HL2 020	100LA/112MR	4	16950	19250
28,1	681	1,2	51,2	HL3 010	100LA/112MR	4	17150	19500
28,1	681	2,4	51,2	HL3 020	100LA/112MR	4	17150	19500
25,0	790	2,4	57,5	HL2 030	100LA/112MR	4	33000	38350
22,4	855	1,0	64,2	HL3 010	100LA/112MR	4	18200	20550
22,4	855	1,9	64,2	HL3 020	100LA/112MR	4	18200	20550
22,4	855	3,0	64,2	HL3 030	100LA/112MR	4	33950	39400
21,0	943	1,2	68,7	HL2 020	100LA/112MR	4	18350	20750
19,7	976	1,9	73,3	HL3 030	100LA/112MR	4	35400	41100
17,9	1073	1,6	80,6	HL3 020	100LA/112MR	4	19600	22250
17,9	1073	2,4	80,6	HL3 030	100LA/112MR	4	37000	42900
16,5	1164	1,2	87,4	HL3 020	100LA/112MR	4	20200	22800
15,7	1225	1,5	92,0	HL3 030	100LA/112MR	4	37700	43700
15,7	1225	2,9	92,0	HL3 050	100LA/112MR	4	37700	43700
14,4	1334	1,3	100	HL3 020	100LA/112MR	4	21000	23800
14,4	1334	1,9	100	HL3 030	100LA/112MR	4	39100	45400
13,1	1462	1,2	110	HL3 020	100LA/112MR	4	21700	24500
12,6	1522	1,3	114	HL3 030	100LA/112MR	4	40300	46750
12,6	1522	2,4	114	HL3 050	100LA/112MR	4	40300	46750
11,6	1658	1,0	125	HL3 020	100LA/112MR	4	22450	25500
11,6	1658	1,6	125	HL3 030	100LA/112MR	4	41600	48300
10,4	1835	0,9	138	HL3 020	100LA/112MR	4	23050	26150
10,4	1835	1,4	138	HL3 030	100LA/112MR	4	43350	50300
10,4	1835	2,8	138	HL3 050	100LA/112MR	4	43350	50300
9,3	2060	1,1	155	HL3 030	100LA/112MR	4	45100	51700
9,3	2060	2,1	155	HL3 050	100LA/112MR	4	45100	51700
8,4	2280	1,2	171	HL3 030	100LA/112MR	4	45100	51700
8,4	2280	2,3	171	HL3 050	100LA/112MR	4	45100	51700
7,4	2586	2,9	194	HL3 080	100LA/112MR	4	62700	72500
7,3	2628	1,4	197	HL3 050	100LA/112MR	4	45100	51700
6,8	2815	2,8	211	HL3 080	100LA/112MR	4	62700	72500
6,7	2872	0,9	216	HL3 030	100LA/112MR	4	45100	51700
6,7	2872	1,8	216	HL3 050	100LA/112MR	4	45100	51700
6,2	3086	2,1	232	HL3 080	100LA/112MR	4	62700	72500
5,9	3245	2,5	244	HL3 080	100LA/112MR	4	62700	72500

## 2,20 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Motor Size	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
5,8	3310	1,1	249	HL3 050	100LA/112MR	4	45100	51700
5,4	3545	2,3	266	HL3 080	100LA/112MR	4	62700	72500
5,0	3873	2,1	291	HL3 080	100LA/112MR	4	62700	72500
5,0	3812	2,9	286	HL3 130	100LA/112MR	4	67500	88800
4,9	3898	1,1	293	HL3 050	100LA/112MR	4	45200	51850
4,7	4086	2,0	307	HL3 080	100LA/112MR	4	63250	73050
4,2	4524	1,9	340	HL3 130	100LA/112MR	4	70150	91100
4,2	4524	2,9	340	HL3 180	100LA/112MR	4	70700	91100
4,1	4498	1,2	348	HL4 050	100LA/112MR	4	45900	53250
4,0	4750	1,4	357	HL3 080	100LA/112MR	4	64600	74400
3,9	4909	0,9	369	HL3 050	100LA/112MR	4	46100	53550
3,6	5104	1,5	395	HL4 080	100LA/112MR	4	65050	75000
3,5	5446	1,0	409	HL3 080	100LA/112MR	4	65100	75150
3,5	5294	2,7	410	HL4 130	100LA/112MR	4	70900	93500
3,3	5590	1,0	433	HL4 050	100LA/112MR	4	47100	54650
3,2	5800	2,5	449	HL4 130	100LA/112MR	4	71800	94500
3,1	6026	1,6	467	HL4 080	100LA/112MR	4	66150	76300
2,8	6578	2,2	509	HL4 130	100LA/112MR	4	73550	96500
2,7	6834	1,4	529	HL4 080	100LA/112MR	4	67750	78150
2,6	7282	2,0	564	HL4 130	100LA/112MR	4	74450	97600
2,6	7282	2,8	564	HL4 180	100LA/112MR	4	76000	97600
2,5	7565	1,3	586	HL4 080	100LA/112MR	4	68650	79200
2,3	8175	1,8	633	HL4 130	100LA/112MR	4	75700	99600
2,2	8493	1,1	658	HL4 080	100LA/112MR	4	69600	80250
2,2	8442	2,2	654	HL4 180	100LA/112MR	4	77800	100200
2,1	9049	1,6	701	HL4 130	100LA/112MR	4	76500	100700
2,1	9049	2,3	701	HL4 180	100LA/112MR	4	78200	100700
2,0	9401	1,0	728	HL4 080	100LA/112MR	4	70300	81150
1,8	10491	1,3	812	HL4 130	100LA/112MR	4	78300	103100
1,8	10491	1,9	812	HL4 180	100LA/112MR	4	80100	103100
1,6	11613	1,2	899	HL4 130	100LA/112MR	4	80000	104800
1,6	11613	1,7	899	HL4 180	100LA/112MR	4	81600	104800
1,5	12447	1,2	964	HL4 130	100LA/112MR	4	81000	105900
1,5	12653	1,2	980	HL4 180	100LA/112MR	4	82100	105900
1,3	14625	1,0	1130	HL4 130	100LA/112MR	4	82300	107700
1,3	14625	1,4	1130	HL4 180	100LA/112MR	4	84000	107700
1,2	15974	1,3	1240	HL4 180	100LA/112MR	4	84900	109300
1,0	18174	1,2	1410	HL4 180	100LA/112MR	4	87100	112000
0,9	20117	1,1	1560	HL4 180	100LA/112MR	4	88500	114400

## 5.1 HL GEARED MOTORS

## 3,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
155,9	178	1,7	9,30	HL1 010	112MS	4	10200	11500
97,5	276	2,7	14,9	HL2 010	112MS	4	11700	13200
77,7	347	2,2	18,7	HL2 010	112MS	4	12350	14100
62,5	431	1,8	23,2	HL2 010	112MS	4	13600	15450
50,3	536	1,2	28,8	HL2 010	112MS	4	14600	16500
50,3	536	2,4	28,8	HL2 020	112MS	4	14600	16500
45,5	593	1,4	31,9	HL2 010	112MS	4	15050	17950
45,5	593	2,6	31,9	HL2 020	112MS	4	15050	17950
43,7	617	2,9	33,2	HL2 030	112MS	4	27750	32150
36,6	737	1,8	39,6	HL2 020	112MS	4	15850	17950
36,6	737	2,8	39,6	HL2 030	112MS	4	29350	33850
36,1	747	1,1	40,2	HL2 010	112MS	4	15900	18000
36,1	747	1,7	40,2	HL2 020	112MS	4	15900	18000
31,7	849	2,1	45,7	HL2 030	112MS	4	30150	34950
29,0	928	1,5	49,9	HL2 020	112MS	4	16950	19250
28,3	922	0,9	51,2	HL3 010	112MS	4	17100	19450
28,3	922	1,8	51,2	HL3 020	112MS	4	17100	19450
28,3	922	2,7	51,2	HL3 030	112MS	4	31600	36650
25,2	1070	1,7	57,5	HL2 030	112MS	4	33000	38350
22,6	1158	1,4	64,2	HL3 020	112MS	4	17900	20300
22,6	1158	2,2	64,2	HL3 030	112MS	4	33850	39250
19,8	1321	1,4	73,3	HL3 030	112MS	4	35300	41000
19,8	1321	2,7	73,3	HL3 050	112MS	4	35300	41000
18,0	1454	1,1	80,6	HL3 020	112MS	4	19600	22250
18,0	1454	1,7	80,6	HL3 030	112MS	4	36900	42800
15,8	1659	1,1	92,0	HL3 030	112MS	4	37700	43700
15,8	1659	2,1	92,0	HL3 050	112MS	4	37700	43700
14,5	1807	1,0	100	HL3 020	112MS	4	21000	23800
14,5	1807	1,4	100	HL3 030	112MS	4	39000	45300
14,5	1807	2,7	100	HL3 050	112MS	4	39000	45300
12,7	2061	0,9	114	HL3 030	112MS	4	40250	46650
12,7	2061	1,7	114	HL3 050	112MS	4	40250	46650
11,6	2245	1,1	125	HL3 030	112MS	4	41600	48300
11,6	2245	2,3	125	HL3 050	112MS	4	41600	48300
10,5	2485	1,0	138	HL3 030	112MS	4	43100	50050
10,5	2485	2,1	138	HL3 050	112MS	4	43100	50050
10,2	2571	3,0	143	HL3 080	112MS	4	62150	71850
9,4	2790	1,5	155	HL3 050	112MS	4	45100	51700
8,6	3038	2,8	168	HL3 080	112MS	4	62700	72500
8,5	3088	1,7	171	HL3 050	112MS	4	45100	51700
7,5	3502	2,1	194	HL3 080	112MS	4	62700	72500
7,3	3559	1,0	197	HL3 050	112MS	4	45100	51700



## 3,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
7,0	3753	2,8	208	HL3 130	112MS	4	67500	88800
6,9	3813	2,1	211	HL3 080	112MS	4	62700	72500
6,7	3889	1,3	216	HL3 050	112MS	4	45100	51700
6,5	4023	3,0	223	HL3 130	112MS	4	67500	88800
6,3	4179	1,6	232	HL3 080	112MS	4	62700	72500
6,0	4394	1,8	244	HL3 080	112MS	4	62700	72500
6,0	4326	2,5	240	HL3 130	112MS	4	67500	88800
5,4	4801	1,7	266	HL3 080	112MS	4	62700	72500
5,1	5162	2,1	286	HL3 130	112MS	4	67500	88800
5,1	5134	2,5	285	HL3 180	112MS	4	69000	88800
5,0	5244	1,5	291	HL3 080	112MS	4	62700	72500
4,7	5534	1,5	307	HL3 080	112MS	4	63250	73050
4,4	5769	2,5	330	HL4 130	112MS	4	68800	90500
4,3	6127	1,4	340	HL3 130	112MS	4	69000	90700
4,3	6127	2,1	340	HL3 180	112MS	4	70500	90700
4,1	6433	1,0	357	HL3 080	112MS	4	64400	74200
4,1	6257	2,3	358	HL4 130	112MS	4	70250	91500
3,7	6912	1,1	395	HL4 080	112MS	4	64950	74900
3,5	7169	2,0	410	HL4 130	112MS	4	70900	93500
3,5	7169	2,7	410	HL4 180	112MS	4	72550	93500
3,2	7855	1,8	449	HL4 130	112MS	4	71800	94500
3,2	7855	2,5	449	HL4 180	112MS	4	73500	94500
3,1	8161	1,2	467	HL4 080	112MS	4	66150	76300
2,8	8909	1,6	509	HL4 130	112MS	4	73550	96500
2,8	8909	2,3	509	HL4 180	112MS	4	75150	96500
2,7	9255	1,0	529	HL4 080	112MS	4	67750	78150
2,6	9861	1,5	564	HL4 130	112MS	4	74450	97600
2,6	9861	2,1	564	HL4 180	112MS	4	76000	97600
2,5	10245	0,9	586	HL4 080	112MS	4	68650	79200
2,3	11071	1,3	633	HL4 130	112MS	4	75700	99600
2,2	11433	1,6	654	HL4 180	112MS	4	77800	100200
2,1	12254	1,2	701	HL4 130	112MS	4	76500	100700
2,1	12254	1,7	701	HL4 180	112MS	4	78200	100700
1,8	14207	0,9	812	HL4 130	112MS	4	78300	103100
1,8	14207	1,4	812	HL4 180	112MS	4	80100	103100
1,6	15726	1,2	899	HL4 180	112MS	4	81600	104800
1,5	17136	0,9	980	HL4 180	112MS	4	82100	105900
1,3	19805	1,0	1130	HL4 180	112MS	4	84000	107700
1,2	21633	1,0	1240	HL4 180	112MS	4	84900	109300

## 5.1 HL GEARED MOTORS

## 4,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
196,4	189	2,3	7,38	HL1 010	112M	4	9400	10650
155,9	238	1,3	9,30	HL1 010	112M	4	10200	11500
155,9	238	2,6	9,30	HL1 020	112M	4	10200	11500
122,4	294	2,3	11,8	HL2 010	112M	4	10900	12300
97,5	368	2,0	14,9	HL2 010	112M	4	11700	13200
77,7	463	1,6	18,7	HL2 010	112M	4	12350	14100
62,5	575	1,4	23,2	HL2 010	112M	4	13600	15450
62,5	575	2,5	23,2	HL2 020	112M	4	13600	15450
54,2	663	2,7	26,7	HL2 030	112M	4	25700	29950
50,3	714	1,8	28,8	HL2 020	112M	4	14600	16500
50,3	714	2,9	28,8	HL2 030	112M	4	26200	30400
45,5	791	1,0	31,9	HL2 010	112M	4	15050	17950
45,5	791	2,0	31,9	HL2 020	112M	4	15050	17950
45,5	791	2,3	31,9	HL2 030	112M	4	27400	31750
43,7	823	2,2	33,2	HL2 030	112M	4	27750	32150
36,6	983	1,4	39,6	HL2 020	112M	4	15850	17950
36,6	983	2,1	39,6	HL2 030	112M	4	29350	33850
36,1	996	1,3	40,2	HL2 020	112M	4	15900	18000
31,7	1133	1,6	45,7	HL2 030	112M	4	30150	34950
29,0	1237	1,1	49,9	HL2 020	112M	4	16950	19250
28,3	1230	1,3	51,2	HL3 020	112M	4	17100	19450
28,3	1230	2,0	51,2	HL3 030	112M	4	31600	36650
25,2	1426	1,3	57,5	HL2 030	112M	4	33000	38350
25,2	1426	2,5	57,5	HL2 050	112M	4	33000	38350
22,6	1544	1,1	64,2	HL3 020	112M	4	17900	20300
22,6	1544	1,6	64,2	HL3 030	112M	4	33850	39250
22,6	1544	3,0	64,2	HL3 050	112M	4	33850	39250
20,8	1729	3,0	69,8	HL2 080	112M	4	49900	57600
19,8	1762	1,1	73,3	HL3 030	112M	4	35300	41000
19,8	1762	2,0	73,3	HL3 050	112M	4	35300	41000
18,0	1938	1,3	80,6	HL3 030	112M	4	36900	42800
18,0	1938	2,5	80,6	HL3 050	112M	4	36900	42800
15,8	2211	1,6	92,0	HL3 050	112M	4	37700	43700
14,5	2409	1,1	100	HL3 030	112M	4	39000	45300
14,5	2409	2,0	100	HL3 050	112M	4	39000	45300
12,8	2731	2,7	114	HL3 080	112M	4	57200	65950
12,7	2748	1,3	114	HL3 050	112M	4	40250	46650
11,8	2945	2,9	122	HL3 080	112M	4	58250	67200
11,6	2993	1,7	125	HL3 050	112M	4	41600	48300
10,5	3313	1,5	138	HL3 050	112M	4	43100	50050
10,2	3427	2,2	143	HL3 080	112M	4	62150	71850
9,6	3638	2,9	151	HL3 130	112M	4	67500	88800

## 5.1 HL GEARED MOTORS

## 4,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
9,4	3720	1,1	155	HL3 050	112M	4	45100	51700
8,6	4051	2,1	168	HL3 080	112M	4	62700	72500
8,5	4118	1,3	171	HL3 050	112M	4	45100	51700
7,5	4669	1,6	194	HL3 080	112M	4	62700	72500
7,0	5004	2,1	208	HL3 130	112M	4	67500	88800
6,9	5083	1,5	211	HL3 080	112M	4	62700	72500
6,7	5186	1,0	216	HL3 050	112M	4	45100	51700
6,5	5364	2,2	223	HL3 130	112M	4	67500	88800
6,3	5572	1,2	232	HL3 080	112M	4	62700	72500
6,0	5859	1,4	244	HL3 080	112M	4	62700	72500
6,0	5767	1,9	240	HL3 130	112M	4	67500	88800
6,0	5767	2,8	240	HL3 180	112M	4	69000	88800
5,4	6402	1,2	266	HL3 080	112M	4	62700	72500
5,1	6883	1,6	286	HL3 130	112M	4	67500	88800
5,1	6845	1,8	285	HL3 180	112M	4	69000	88800
5,0	6993	1,2	291	HL3 080	112M	4	62700	72500
4,7	7379	1,1	307	HL3 080	112M	4	63250	73050
4,4	7692	1,9	330	HL4 130	112M	4	68800	90500
4,4	7692	2,5	330	HL4 180	112M	4	70300	90500
4,3	8169	1,1	340	HL3 130	112M	4	69000	90700
4,3	8169	1,6	340	HL3 180	112M	4	70500	90700
4,1	8343	1,7	358	HL4 130	112M	4	70250	91500
3,5	9558	1,5	410	HL4 130	112M	4	70900	93500
3,5	9558	2,0	410	HL4 180	112M	4	72550	93500
3,2	10473	1,4	449	HL4 130	112M	4	71800	94500
3,2	10473	1,9	449	HL4 180	112M	4	73500	94500
2,8	11878	1,2	509	HL4 130	112M	4	73550	96500
2,8	11878	1,7	509	HL4 180	112M	4	75150	96500
2,6	13148	1,1	564	HL4 130	112M	4	74450	97600
2,6	13148	1,5	564	HL4 180	112M	4	76000	97600
2,3	14761	1,0	633	HL4 130	112M	4	75700	99600
2,2	15244	1,2	654	HL4 180	112M	4	77800	100200
2,1	16339	1,3	701	HL4 180	112M	4	78200	100700
1,8	18943	1,0	812	HL4 180	112M	4	80100	103100
1,6	20969	0,9	899	HL4 180	112M	4	81600	104800

## 5,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
273,8	186	2,6	5,37	HL1 010	132MS	4	8750	9900
199,1	256	1,7	7,38	HL1 010	132MS	4	9350	10600
199,1	256	2,9	7,38	HL1 020	132MS	4	9350	10600

## 5.1 HL GEARED MOTORS

## 5,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
158,1	322	0,9	9,30	HL1 010	132MS	4	10200	11500
158,1	322	1,9	9,30	HL1 020	132MS	4	10200	11500
158,1	322	2,2	9,30	HL1 030	132MS	4	19300	22350
124,1	398	1,7	11,8	HL2 010	132MS	4	10900	12300
124,1	398	2,9	11,8	HL2 020	132MS	4	10900	12300
98,9	500	1,4	14,9	HL2 010	132MS	4	11650	13200
98,9	500	2,6	14,9	HL2 020	132MS	4	11650	13200
78,8	627	1,2	18,7	HL2 010	132MS	4	12300	14050
78,8	627	2,2	18,7	HL2 020	132MS	4	12300	14050
69,0	716	2,4	21,3	HL2 030	132MS	4	24300	28100
63,4	780	1,0	23,2	HL2 010	132MS	4	13500	15350
63,4	780	1,8	23,2	HL2 020	132MS	4	13500	15350
63,4	780	2,6	23,2	HL2 030	132MS	4	24950	28950
55,0	899	1,9	26,7	HL2 030	132MS	4	25600	29850
51,0	969	1,3	28,8	HL2 020	132MS	4	14550	16450
51,0	969	2,1	28,8	HL2 030	132MS	4	26050	30300
46,1	1072	1,4	31,9	HL2 020	132MS	4	15000	16900
46,1	1072	1,7	31,9	HL2 030	132MS	4	27250	31600
46,1	1072	2,9	31,9	HL2 050	132MS	4	27250	31600
44,3	1117	1,6	33,2	HL2 030	132MS	4	27600	32000
37,1	1333	1,0	39,6	HL2 020	132MS	4	15850	17950
37,1	1333	1,6	39,6	HL2 030	132MS	4	29150	33650
37,1	1333	2,9	39,6	HL2 050	132MS	4	29150	33650
36,6	1351	0,9	40,2	HL2 020	132MS	4	15850	17950
32,2	1536	1,2	45,7	HL2 030	132MS	4	28900	34750
32,2	1536	2,3	45,7	HL2 050	132MS	4	28900	34750
28,7	1668	1,0	51,2	HL3 020	132MS	4	17000	19350
28,7	1668	1,5	51,2	HL3 030	132MS	4	31450	36350
28,7	1668	2,6	51,2	HL3 050	132MS	4	31450	36350
26,5	1862	2,7	55,4	HL2 080	132MS	4	45850	52850
25,5	1934	0,9	57,5	HL2 030	132MS	4	32950	38300
25,5	1934	1,8	57,5	HL2 050	132MS	4	32950	38300
22,9	2094	1,2	64,2	HL3 030	132MS	4	33700	39050
22,9	2094	2,2	64,2	HL3 050	132MS	4	33700	39050
21,1	2345	2,1	69,8	HL2 080	132MS	4	49650	57350
20,1	2389	1,5	73,3	HL3 050	132MS	4	35200	40950
18,2	2629	0,9	80,6	HL3 030	132MS	4	36700	42600
18,2	2629	1,8	80,6	HL3 050	132MS	4	36700	42600
17,6	2722	2,6	83,5	HL3 080	132MS	4	51450	59400
16,2	2951	2,4	90,5	HL3 080	132MS	4	52800	61000
16,0	2999	1,2	92,0	HL3 050	132MS	4	37650	43650
14,9	3214	2,6	98,6	HL3 080	132MS	4	54700	63200

## 5.1 HL GEARED MOTORS

## 5,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
14,7	3267	1,5	100	HL3 050	132MS	4	38800	45050
14,1	3390	2,9	104	HL3 130	132MS	4	60950	80200
13,2	3645	2,8	112	HL3 130	132MS	4	62050	81700
12,9	3727	1,0	114	HL3 050	132MS	4	40100	46550
12,9	3704	1,9	114	HL3 080	132MS	4	57150	65900
12,1	3970	2,5	122	HL3 130	132MS	4	63700	83850
12,0	3994	2,1	122	HL3 080	132MS	4	58000	66850
11,8	4060	1,2	125	HL3 050	132MS	4	41400	48000
10,7	4494	1,1	138	HL3 050	132MS	4	42650	49550
10,5	4576	2,2	140	HL3 130	132MS	4	66600	87600
10,3	4649	1,6	143	HL3 080	132MS	4	61900	71500
9,7	4934	2,1	151	HL3 130	132MS	4	67500	88800
9,1	5288	2,5	162	HL3 130	132MS	4	67500	88800
9,1	5288	2,9	162	HL3 180	132MS	4	69000	88800
8,7	5494	1,6	168	HL3 080	132MS	4	62700	72500
8,6	5585	0,9	171	HL3 050	132MS	4	45100	51700
8,4	5687	2,8	174	HL3 180	132MS	4	69000	88800
7,9	6095	2,2	187	HL3 130	132MS	4	67500	88800
7,6	6332	1,2	194	HL3 080	132MS	4	62700	72500
7,1	6787	1,6	208	HL3 130	132MS	4	67500	88800
7,1	6787	2,3	208	HL3 180	132MS	4	69000	88800
7,0	6895	1,1	211	HL3 080	132MS	4	62700	72500
6,6	7275	1,6	223	HL3 130	132MS	4	67500	88800
6,1	7822	1,4	240	HL3 130	132MS	4	67500	88800
6,1	7822	2,0	240	HL3 180	132MS	4	69000	88800
6,0	7946	1,0	244	HL3 080	132MS	4	62700	72500
5,5	8683	0,9	266	HL3 080	132MS	4	62700	72500
5,2	9284	1,3	285	HL3 180	132MS	4	69000	88800
5,1	9336	1,2	286	HL3 130	132MS	4	67500	88800
4,5	10432	1,4	330	HL4 130	132MS	4	68600	90300
4,5	10432	1,8	330	HL4 180	132MS	4	70050	90300
4,3	11080	1,1	340	HL3 180	132MS	4	70500	90700
4,1	11315	1,3	358	HL4 130	132MS	4	70250	91500
3,6	12964	1,1	410	HL4 130	132MS	4	70700	93100
3,6	12964	1,5	410	HL4 180	132MS	4	72300	93100
3,3	14205	1,0	449	HL4 130	132MS	4	71600	94200
3,3	14205	1,4	449	HL4 180	132MS	4	73100	94200
2,9	16110	1,2	509	HL4 180	132MS	4	74700	96200
2,6	17833	1,1	564	HL4 180	132MS	4	76000	97600
2,2	20675	0,9	654	HL4 180	132MS	4	77800	100200
2,1	22161	0,9	701	HL4 180	132MS	4	78200	100700

## 5.1 HL GEARED MOTORS

## 7,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
424,3	164	2,9	3,44	HL1 010	132M	4	7550	8550
338,0	206	2,5	4,32	HL1 010	132M	4	8050	9100
272,0	255	1,9	5,37	HL1 010	132M	4	8800	9950
197,7	351	1,2	7,38	HL1 010	132M	4	9400	10650
197,7	351	2,1	7,38	HL1 020	132M	4	9400	10650
157,0	443	1,4	9,30	HL1 020	132M	4	10200	11500
157,0	443	1,6	9,30	HL1 030	132M	4	19350	22400
123,3	547	1,2	11,8	HL2 010	132M	4	10900	12300
123,3	547	2,1	11,8	HL2 020	132M	4	10900	12300
123,3	547	2,9	11,8	HL2 030	132M	4	20650	23900
98,2	686	1,1	14,9	HL2 010	132M	4	11650	13200
98,2	686	1,9	14,9	HL2 020	132M	4	11650	13200
98,2	686	2,9	14,9	HL2 030	132M	4	22300	25850
78,2	861	1,6	18,7	HL2 020	132M	4	12350	14100
78,2	861	2,4	18,7	HL2 030	132M	4	23500	27300
68,6	983	1,8	21,3	HL2 030	132M	4	24350	28200
63,0	1070	1,4	23,2	HL2 020	132M	4	13550	15400
63,0	1070	1,9	23,2	HL2 030	132M	4	25000	29000
54,6	1234	1,4	26,7	HL2 030	132M	4	25650	29900
54,6	1234	2,8	26,7	HL2 050	132M	4	25650	29900
50,7	1330	1,0	28,8	HL2 020	132M	4	14550	16450
50,7	1330	1,5	28,8	HL2 030	132M	4	26100	30350
45,8	1472	1,0	31,9	HL2 020	132M	4	15000	16900
45,8	1472	1,2	31,9	HL2 030	132M	4	27350	31700
45,8	1472	2,1	31,9	HL2 050	132M	4	27350	31700
44,0	1533	1,2	33,2	HL2 030	132M	4	27700	32100
44,0	1533	2,2	33,2	HL2 050	132M	4	27700	32100
36,8	1830	1,1	39,6	HL2 030	132M	4	29300	33800
36,8	1830	2,1	39,6	HL2 050	132M	4	29300	33800
32,0	2109	1,7	45,7	HL2 050	132M	4	28950	34800
31,9	2113	2,9	45,8	HL2 080	132M	4	43300	50050
28,5	2290	1,1	51,2	HL3 030	132M	4	31550	36450
28,5	2290	1,9	51,2	HL3 050	132M	4	31550	36450
27,3	2396	2,9	53,5	HL3 080	132M	4	45450	52500
26,4	2556	2,0	55,4	HL2 080	132M	4	45900	52900
25,4	2656	1,3	57,5	HL2 050	132M	4	32950	38300
23,1	2829	2,9	63,2	HL3 080	132M	4	48250	55700
22,7	2875	1,6	64,2	HL3 050	132M	4	33800	39200
20,9	3219	1,6	69,8	HL2 080	132M	4	49800	57550
19,9	3280	1,1	73,3	HL3 050	132M	4	35350	41050
18,7	3494	2,8	78,0	HL3 130	132M	4	55900	73700
18,4	3551	2,4	79,3	HL3 080	132M	4	51050	59000

## 5.1 HL GEARED MOTORS

## 7,50 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
18,1	3609	1,3	80,6	HL3 050	132M	4	36800	42700
17,5	3738	1,9	83,5	HL3 080	132M	4	51550	59550
16,1	4051	1,8	90,5	HL3 080	132M	4	52900	61100
15,4	4248	2,8	94,9	HL3 130	132M	4	59300	78100
14,8	4413	1,9	98,6	HL3 080	132M	4	54950	63450
14,6	4485	1,1	100	HL3 050	132M	4	38900	45200
14,0	4654	2,1	104	HL3 130	132M	4	61100	80400
13,1	5005	2,0	112	HL3 130	132M	4	62200	81850
13,1	5005	3,0	112	HL3 180	132M	4	63650	81850
12,9	5086	1,4	114	HL3 080	132M	4	57150	65900
12,0	5451	1,9	122	HL3 130	132M	4	63850	84150
12,0	5451	2,8	122	HL3 180	132M	4	65400	84150
11,9	5484	1,5	122	HL3 080	132M	4	58150	67000
11,7	5574	0,9	125	HL3 050	132M	4	41500	48150
10,4	6283	1,6	140	HL3 130	132M	4	66800	87850
10,4	6283	2,5	140	HL3 180	132M	4	68150	87850
10,2	6383	1,2	143	HL3 080	132M	4	62150	71850
9,6	6774	1,5	151	HL3 130	132M	4	67500	88800
9,6	6774	2,3	151	HL3 180	132M	4	69000	88800
9,0	7261	1,8	162	HL3 130	132M	4	67500	88800
9,0	7261	2,1	162	HL3 180	132M	4	69000	88800
8,7	7543	1,1	168	HL3 080	132M	4	62700	72500
8,4	7808	2,0	174	HL3 180	132M	4	69000	88800
7,8	8369	1,6	187	HL3 130	132M	4	67500	88800
7,0	9318	1,1	208	HL3 130	132M	4	67500	88800
7,0	9318	1,7	208	HL3 180	132M	4	69000	88800
6,5	9988	1,2	223	HL3 130	132M	4	67500	88800
6,1	10740	1,0	240	HL3 130	132M	4	67500	88800
6,1	10740	1,5	240	HL3 180	132M	4	69000	88800
5,1	12746	1,0	285	HL3 180	132M	4	69000	88800
4,4	14323	1,0	330	HL4 130	132M	4	68800	90500
4,4	14323	1,3	330	HL4 180	132M	4	70300	90500
4,1	15536	0,9	358	HL4 130	132M	4	70250	91500
3,6	17799	1,1	410	HL4 180	132M	4	72300	93100
3,3	19503	1,0	449	HL4 180	132M	4	73100	94200
2,9	22119	0,9	509	HL4 180	132M	4	74700	96200

## 11,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
428,6	238	2,0	3,44	HL1 010	160MA	4	7500	8550
341,4	298	1,7	4,32	HL1 010	160MA	4	8000	9050

## 5.1 HL GEARED MOTORS

## 11,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
274,8	371	1,3	5,37	HL1 010	160MA	4	8750	9900
274,8	371	2,5	5,37	HL1 020	160MA	4	8750	9900
199,7	510	1,4	7,38	HL1 020	160MA	4	9350	10600
199,7	510	2,3	7,38	HL1 030	160MA	4	17850	20650
158,6	642	0,9	9,30	HL1 020	160MA	4	10200	11500
158,6	642	1,1	9,30	HL1 030	160MA	4	19300	22350
124,6	793	1,5	11,8	HL2 020	160MA	4	10900	12300
124,6	793	2,0	11,8	HL2 030	160MA	4	20600	23850
99,2	996	1,3	14,9	HL2 020	160MA	4	11600	13150
99,2	996	2,0	14,9	HL2 030	160MA	4	22250	25800
79,0	1250	1,1	18,7	HL2 020	160MA	4	12300	14050
79,0	1250	1,7	18,7	HL2 030	160MA	4	23450	27250
79,0	1250	2,9	18,7	HL2 050	160MA	4	23450	27250
69,3	1427	1,2	21,3	HL2 030	160MA	4	24250	28050
69,3	1427	2,3	21,3	HL2 050	160MA	4	24250	28050
63,6	1554	0,9	23,2	HL2 020	160MA	4	13500	15350
63,6	1554	1,3	23,2	HL2 030	160MA	4	24950	28950
63,6	1554	2,5	23,2	HL2 050	160MA	4	24950	28950
55,2	1791	1,0	26,7	HL2 030	160MA	4	25600	29850
55,2	1791	1,9	26,7	HL2 050	160MA	4	25600	29850
51,2	1931	1,1	28,8	HL2 030	160MA	4	26050	30300
51,2	1931	2,1	28,8	HL2 050	160MA	4	26050	30300
46,2	2138	1,4	31,9	HL2 050	160MA	4	27250	31600
44,7	2211	3,0	33,0	HL2 080	160MA	4	39200	45300
44,4	2226	1,5	33,2	HL2 050	160MA	4	27600	32000
38,4	2571	2,4	38,4	HL2 080	160MA	4	41250	47650
37,2	2656	1,4	39,6	HL2 050	160MA	4	29150	33650
32,3	3062	1,1	45,7	HL2 050	160MA	4	28900	34750
32,2	3068	2,0	45,8	HL2 080	160MA	4	43200	49900
32,1	3083	2,6	46,0	HL2 130	160MA	4	47750	62800
28,8	3325	1,3	51,2	HL3 050	160MA	4	31450	36350
27,6	3478	2,0	53,5	HL3 080	160MA	4	45300	52350
26,6	3711	1,3	55,4	HL2 080	160MA	4	45800	52800
25,6	3856	0,9	57,5	HL2 050	160MA	4	32950	38300
24,3	3953	2,7	60,8	HL3 130	160MA	4	51700	68100
23,3	4106	2,0	63,2	HL3 080	160MA	4	48100	55550
23,0	4174	1,1	64,2	HL3 050	160MA	4	33700	39050
21,1	4674	1,1	69,8	HL2 080	160MA	4	49650	57350
19,3	4962	2,3	76,3	HL3 130	160MA	4	55450	73000
19,3	4962	2,9	76,3	HL3 180	160MA	4	56650	73000
18,9	5073	1,9	78,0	HL3 130	160MA	4	55750	73450
18,9	5073	2,8	78,0	HL3 180	160MA	4	57000	73450



## 5.1 HL GEARED MOTORS

## 11,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
18,6	5155	1,6	79,3	HL3 080	160MA	4	51000	58900
17,7	5427	1,3	83,5	HL3 080	160MA	4	51350	59300
16,3	5882	1,2	90,5	HL3 080	160MA	4	52700	60900
15,5	6166	1,9	94,9	HL3 130	160MA	4	59200	77950
15,5	6166	2,5	94,9	HL3 180	160MA	4	61150	77950
15,1	6368	2,3	98,0	HL3 180	160MA	4	61300	78550
15,0	6406	1,3	98,6	HL3 080	160MA	4	54500	62950
14,2	6757	1,4	104	HL3 130	160MA	4	60800	80000
13,2	7266	1,4	112	HL3 130	160MA	4	62050	81700
13,2	7266	2,0	112	HL3 180	160MA	4	63500	81700
13,0	7384	1,0	114	HL3 080	160MA	4	57050	65800
12,1	7914	1,3	122	HL3 130	160MA	4	63700	83850
12,1	7914	1,9	122	HL3 180	160MA	4	65150	83850
12,0	7961	1,1	122	HL3 080	160MA	4	58000	66850
10,5	9121	1,1	140	HL3 130	160MA	4	66600	87600
10,5	9121	1,7	140	HL3 180	160MA	4	68000	87600
9,7	9834	1,0	151	HL3 130	160MA	4	67500	88800
9,7	9834	1,6	151	HL3 180	160MA	4	69000	88800
9,1	10541	1,2	162	HL3 130	160MA	4	67500	88800
9,1	10541	1,4	162	HL3 180	160MA	4	69000	88800
8,5	11335	1,4	174	HL3 180	160MA	4	69000	88800
7,9	12149	1,1	187	HL3 130	160MA	4	67500	88800
7,1	13528	1,2	208	HL3 180	160MA	4	69000	88800
6,1	15592	1,0	240	HL3 180	160MA	4	69000	88800

## 15,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
428,6	324	1,4	3,44	HL1 010	160LA	4	7500	8550
428,6	324	2,6	3,44	HL1 020	160LA	4	7500	8550
341,4	407	1,1	4,32	HL1 010	160LA	4	8000	9050
341,4	407	2,3	4,32	HL1 020	160LA	4	8000	9050
274,8	506	0,9	5,37	HL1 010	160LA	4	8750	9900
274,8	506	1,8	5,37	HL1 020	160LA	4	8750	9900
274,8	506	2,8	5,37	HL1 030	160LA	4	16150	18650
238,4	583	2,3	6,19	HL1 030	160LA	4	16900	19600
199,7	696	1,1	7,38	HL1 020	160LA	4	9350	10600
199,7	696	1,7	7,38	HL1 030	160LA	4	17850	20650
124,6	1082	1,1	11,8	HL2 020	160LA	4	10900	12300
124,6	1082	1,4	11,8	HL2 030	160LA	4	20600	23850
124,6	1082	2,6	11,8	HL2 050	160LA	4	20600	23850
99,2	1358	1,0	14,9	HL2 020	160LA	4	11600	13150

## 15,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Motor Size	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
99,2	1358	1,4	14,9	HL2 030	160LA	4	22250	25800
99,2	1358	2,5	14,9	HL2 050	160LA	4	22250	25800
79,0	1705	1,2	18,7	HL2 030	160LA	4	23450	27250
79,0	1705	2,2	18,7	HL2 050	160LA	4	23450	27250
69,3	1946	1,7	21,3	HL2 050	160LA	4	24250	28050
64,6	2085	2,8	22,8	HL2 080	160LA	4	35000	40450
63,6	2119	0,9	23,2	HL2 030	160LA	4	24950	28950
63,6	2119	1,8	23,2	HL2 050	160LA	4	24950	28950
56,1	2403	2,3	26,3	HL2 080	160LA	4	36750	42500
55,2	2442	1,4	26,7	HL2 050	160LA	4	25600	29850
51,5	2616	2,5	28,6	HL2 080	160LA	4	37550	43400
51,2	2633	1,5	28,8	HL2 050	160LA	4	26050	30300
46,2	2915	1,1	31,9	HL2 050	160LA	4	27250	31600
44,7	3015	2,2	33,0	HL2 080	160LA	4	38950	45100
44,4	3035	1,1	33,2	HL2 050	160LA	4	27600	32000
38,4	3505	1,8	38,4	HL2 080	160LA	4	41250	47650
38,0	3542	2,6	38,8	HL2 130	160LA	4	45300	59600
37,2	3622	1,1	39,6	HL2 050	160LA	4	29150	33650
32,2	4183	1,5	45,8	HL2 080	160LA	4	43200	49900
32,1	4204	1,9	46,0	HL2 130	160LA	4	47750	62800
32,1	4204	2,8	46,0	HL2 180	160LA	4	48800	62800
30,4	4294	2,4	48,4	HL3 130	160LA	4	48350	63550
30,4	4294	2,6	48,4	HL3 180	160LA	4	49350	63550
28,8	4534	1,0	51,2	HL3 050	160LA	4	31450	36350
27,6	4743	1,4	53,5	HL3 080	160LA	4	45300	52350
26,6	5061	1,0	55,4	HL2 080	160LA	4	45800	52800
24,3	5390	2,0	60,8	HL3 130	160LA	4	51700	68100
24,3	5390	2,5	60,8	HL3 180	160LA	4	52900	68100
23,3	5600	1,4	63,2	HL3 080	160LA	4	48100	55550
19,3	6767	1,7	76,3	HL3 130	160LA	4	55450	73000
19,3	6767	2,2	76,3	HL3 180	160LA	4	56650	73000
18,9	6917	1,4	78,0	HL3 130	160LA	4	55750	73450
18,9	6917	2,0	78,0	HL3 180	160LA	4	57000	73450
18,6	7030	1,2	79,3	HL3 080	160LA	4	51000	58900
17,7	7400	0,9	83,5	HL3 080	160LA	4	51350	59300
15,5	8409	1,4	94,9	HL3 130	160LA	4	59200	77950
15,5	8409	1,8	94,9	HL3 180	160LA	4	61150	77950
15,1	8684	1,7	98,0	HL3 180	160LA	4	61300	78550
15,0	8736	0,9	98,6	HL3 080	160LA	4	54500	62950
14,2	9214	1,1	104	HL3 130	160LA	4	60800	80000
13,2	9908	1,0	112	HL3 130	160LA	4	62050	81700
13,2	9908	1,5	112	HL3 180	160LA	4	63500	81700

## 5.1 HL GEARED MOTORS

## 15,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
12,1	10791	0,9	122	HL3 130	160LA		4	63700	83850
12,1	10791	1,4	122	HL3 180	160LA		4	65150	83850
10,5	12438	1,2	140	HL3 180	160LA		4	68000	87600
9,7	13410	1,2	151	HL3 180	160LA		4	69000	88800
9,1	14374	0,9	162	HL3 130	160LA		4	67500	88800
9,1	14374	1,1	162	HL3 180	160LA		4	69000	88800
8,5	15456	1,0	174	HL3 180	160LA		4	69000	88800

## 30,00 kW

$n_2$ [rpm]	$M_2$ [Nm]	$f_s$	$i$	Gear reducer	Size	Motor	Pole	$Fr_2$ CS [N]	$Fr_2$ SS [N]
196,7	1413	2,7	7,50	HL1 080	200L		4	25100	29000

## 5.2 IHL GEAR REDUCER - 1400 rpm

## IHL1 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
540	4,32	18,89	324,1	8130	9210	790
500	5,37	14,08	260,8	8900	10080	990
450	7,38	9,21	189,6	9520	10770	1360
320	9,30	5,20	150,5	10200	11510	1710

## IHL1 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
770	7,38	15,76	189,6	9520	10770	1360
630	9,30	10,24	150,5	10200	11510	1710

## IHL1 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
760	9,30	12,35	150,5	19500	22720	1710

## IHL2 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
710	11,8	9,34	118,2	11100	12550	2000
760	14,9	7,97	94,2	11800	13350	2400
790	18,7	6,60	75,0	12500	14250	2400
820	23,2	5,51	60,4	13750	15600	2400
650	28,8	3,51	48,6	14750	16650	2400
850	31,9	4,15	43,9	15100	17100	2400
670	39,6	2,63	35,3	16000	18200	2400
860	40,2	3,34	34,8	16050	18250	2400
690	49,9	2,15	28,0	17150	19500	2400
590	68,7	1,34	20,4	18400	20850	2400

## IHL2 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2190	18,7	18,28	75,0	23650	27500	3340
1820	21,3	13,32	65,8	24650	28500	3810
2100	23,2	14,11	60,4	25300	29400	4150
1820	26,7	10,61	52,4	25850	30100	4780
2140	28,8	11,57	48,6	26500	30700	5200
1890	31,9	9,23	43,9	27700	32100	5200
1850	33,2	8,68	42,1	28300	32600	5200
2170	39,6	8,53	35,3	29600	34000	5200
1890	45,7	6,45	30,6	31000	36000	5200
1920	57,5	5,20	24,3	33100	38450	5200

## IHL2 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5210	55,4	14,66	25,3	46750	53900	9900
5290	69,8	11,82	20,1	50400	58200	12470

## IHL2 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1220	11,8	16,05	118,2	11100	12550	2120
1380	14,9	14,46	94,2	11800	13350	2660
1450	18,7	12,11	75,0	12500	14250	3400
1510	23,2	10,14	60,4	13750	15600	3400
1320	28,8	7,14	48,6	14750	16650	3400
1610	31,9	7,86	43,9	15100	17100	3400
1400	39,6	5,50	35,3	16000	18200	3400
1340	40,2	5,20	34,8	16050	18250	3400
1430	49,9	4,46	28,0	17150	19500	3400
1180	68,7	2,68	20,4	18400	20850	3400

## IHL2 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
3230	31,9	15,78	43,9	27700	32100	5700
3590	33,2	16,84	42,1	28300	32600	5940
4010	39,6	15,76	35,3	29600	34000	7090
3630	45,7	12,38	30,6	31000	36000	8170
3640	57,5	9,86	24,3	33100	38450	8800

## IHL3 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
860	51,2	2,70	27,4	17150	19500	2400
860	64,2	2,15	21,8	18250	20600	2400
870	80,6	1,73	17,4	19800	22400	2400
750	87,4	1,38	16,0	20200	22800	2000
880	100	1,41	14,0	21200	24050	2400
880	110	1,29	12,8	21900	24750	2400
880	125	1,14	11,2	22650	25750	2400
880	138	1,03	10,2	23200	26300	2400
820	155	0,85	9,0	23650	27000	2400
900	174	0,83	8,1	23650	27000	2400
750	188	0,64	7,5	23650	27000	2000
940	216	0,70	6,5	23650	27000	2400
950	236	0,65	5,9	23650	27000	2400
950	297	0,51	4,7	23800	27150	2400
860	369	0,37	3,8	24650	28150	2400

## IHL3 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2600	51,2	8,16	27,4	32650	37900	5200
2610	64,2	6,53	21,8	34350	39850	5200
1930	73,3	4,23	19,1	35750	41600	5200
2620	80,6	5,22	17,4	37350	43300	5200
1950	92,0	3,41	15,2	38300	44400	5200
2630	100	4,22	14,0	39500	45800	5200
1960	114	2,75	12,2	40900	47400	5200
2650	125	3,42	11,2	42100	48900	5200
2650	138	3,09	10,2	43800	50800	5200
2260	155	2,35	9,0	45100	51700	5200
2700	171	2,53	8,2	45100	51700	5200
1970	197	1,60	7,1	45100	51700	5200
2760	216	2,06	6,5	45100	51700	5200
1970	249	1,27	5,6	45100	51700	5200
2300	293	1,26	4,8	45300	52000	5200
2000	309	1,04	4,5	45550	52400	5200
2390	369	1,04	3,8	46200	53650	5200
2030	425	0,77	3,3	47100	54650	5200

## IHL3 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1710	51,2	5,37	27,4	17150	19500	3400
1710	64,2	4,28	21,8	18250	20600	3400
1730	80,6	3,45	17,4	19800	22400	3400
1430	87,4	2,63	16,0	20200	22800	3400
1780	100	2,85	14,0	21200	24050	3400
1780	110	2,60	12,8	21900	24750	3400
1780	125	2,30	11,2	22650	25750	3400
1780	138	2,07	10,2	23200	26300	3400
1510	155	1,57	9,0	23650	27000	3400
1840	174	1,70	8,1	23650	27000	3400
1430	188	1,22	7,5	23650	27000	3400
1900	216	1,42	6,5	23650	27000	3400
1920	236	1,31	5,9	23650	27000	3400
1950	297	1,06	4,7	23800	27150	3400
1620	369	0,71	3,8	24650	28150	3400

## IHL3 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
4640	51,2	14,57	27,4	32650	37900	8800
4740	64,2	11,86	21,8	34350	39850	8800
3650	73,3	8,00	19,1	35750	41600	8800
4920	80,6	9,80	17,4	37350	43300	8800
3680	92,0	6,43	15,2	38300	44400	8800
5080	100	8,15	14,0	39500	45800	8800
3720	114	5,23	12,2	40900	47400	8800
5250	125	6,77	11,2	42100	48900	8800
5300	138	6,18	10,2	43800	50800	8800
4430	155	4,60	9,0	45100	51700	8800
5340	171	5,01	8,2	45100	51700	8800
3750	197	3,05	7,1	45100	51700	8800
5400	216	4,02	6,5	45100	51700	8800
3750	249	2,42	5,6	45100	51700	8800
4470	293	2,45	4,8	45300	52000	8800
3800	309	1,98	4,5	45550	52400	8800
4650	369	2,03	3,8	46200	53650	8800
3900	425	1,47	3,3	47100	54650	8800

## IHL3 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
8710	79,3	17,64	17,7	51350	59300	13750
7330	83,5	14,10	16,8	52250	60400	14480
7500	90,5	13,31	15,5	53450	61700	14900
8660	98,6	14,11	14,2	56200	64900	14900
7500	114	10,61	12,3	57550	66350	14900
8830	122	11,58	11,4	58850	67850	14900
7960	143	8,97	9,8	62700	72500	14900
8950	168	8,53	8,3	62700	72500	14900
7790	194	6,44	7,2	62700	72500	14900
8150	211	6,19	6,6	62700	72500	14900
6800	232	4,71	6,0	62700	72500	14900
8210	244	5,41	5,7	62700	72500	14900
8260	266	4,98	5,3	62700	72500	14900
8330	291	4,60	4,8	63100	72900	14900
8420	307	4,41	4,6	63450	73250	14900
6910	357	3,11	3,9	64800	74600	14900
5700	409	2,24	3,4	65450	75550	14900

## IHL3 180

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
16200	140	18,53	10,0	69000	88800	24340
16300	151	17,31	9,3	69000	88800	26240
15900	162	15,76	8,6	69000	88800	28130
16500	174	15,15	8,0	69000	88800	29000
16700	208	12,85	6,7	69000	88800	29000
16800	240	11,26	5,8	69000	88800	29000
13100	285	7,36	4,9	69200	89000	29000
13400	340	6,31	4,1	71000	91500	29000

## IHL3 130

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
10200	104	15,76	13,5	61750	81300	18030
10600	112	15,23	12,5	63000	82900	19390
10600	122	14,01	11,5	64650	85100	21000
10800	140	12,35	10,0	67500	88800	21000
10800	151	11,47	9,3	67500	88800	21000
13800	162	13,70	8,6	67500	88800	21000
14100	187	12,10	7,5	67500	88800	21000
11100	208	8,53	6,7	67500	88800	21000
12300	223	8,86	6,3	67500	88800	21000
11200	240	7,49	5,8	67500	88800	21000
11300	286	6,36	4,9	68100	89000	21000
8930	340	4,22	4,1	70250	91500	21000

## IHL4 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1000	348	0,48	4,0	24600	28100	2400
1020	433	0,39	3,2	25000	28500	2400
1040	474	0,36	3,0	25150	28600	2400
1070	538	0,33	2,6	25850	29300	2400
1070	668	0,27	2,1	26200	29650	2400
1110	740	0,25	1,9	27000	30150	2400
1130	811	0,23	1,7	27300	30900	2400
1160	919	0,21	1,5	27400	31000	2400
1170	1020	0,19	1,4	27450	31050	2400
1200	1160	0,17	1,2	27550	31200	2400
1220	1270	0,16	1,1	27600	31350	2400
1000	1440	0,12	1,0	27650	31550	2400
1250	1590	0,13	0,9	27700	31800	2400
1250	1740	0,12	0,8	27800	32000	2400
1000	2160	0,08	0,6	28700	32200	2400
1000	2720	0,06	0,5	29600	32500	2400

## IHL4 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2810	348	1,34	4,0	46000	53450	5200
2810	433	1,08	3,2	47200	54800	5200
2810	474	0,98	3,0	47850	55100	5200
2810	538	0,87	2,6	48600	56450	5200
2830	668	0,70	2,1	49750	57300	5200
2830	740	0,63	1,9	50500	58600	5200
2580	831	0,51	1,7	51400	59700	5200
2840	919	0,51	1,5	52150	60400	5200
2880	1020	0,47	1,4	53000	61650	5200
2710	1140	0,39	1,2	53600	62200	5200
2940	1270	0,38	1,1	54800	63500	5200
2800	1440	0,32	1,0	55300	64200	5200
2970	1590	0,31	0,9	55850	65600	5200
2560	1740	0,24	0,8	56400	67100	5200
2800	1980	0,23	0,7	56950	67750	5200
2560	2190	0,19	0,6	57500	68900	5200
2440	2280	0,18	0,6	57500	68900	5200
2440	2490	0,16	0,6	57500	68900	5200
2800	2720	0,17	0,5	58600	69800	5200

## IHL4 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1990	348	0,95	4,0	24600	28100	3400
2010	433	0,77	3,2	25000	28500	3400
2040	474	0,71	3,0	25150	28600	3400
2140	538	0,66	2,6	25850	29300	3400
2150	668	0,53	2,1	26200	29650	3400
2220	740	0,50	1,9	27000	30150	3400
2240	811	0,46	1,7	27300	30900	3400
2280	919	0,41	1,5	27400	31000	3400
2320	1020	0,38	1,4	27450	31050	3400
2370	1160	0,34	1,2	27550	31200	3400
2410	1270	0,32	1,1	27600	31350	3400
1830	1440	0,21	1,0	27650	31550	3400
2460	1590	0,26	0,9	27700	31800	3400
2460	1740	0,23	0,8	27800	32000	3400
1830	2160	0,14	0,6	28700	32200	3400
1830	2720	0,11	0,5	29600	32500	3400

## IHL4 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5480	348	2,61	4,0	46000	53450	8800
5490	433	2,10	3,2	47200	54800	8800
5490	474	1,92	3,0	47850	55100	8800
5500	538	1,69	2,6	48600	56450	8800
5530	668	1,37	2,1	49750	57300	8800
5540	740	1,24	1,9	50500	58600	8800
5090	831	1,01	1,7	51400	59700	8800
5610	919	1,01	1,5	52150	60400	8800
5640	1020	0,92	1,4	53000	61650	8800
5310	1140	0,77	1,2	53600	62200	8800
5760	1270	0,75	1,1	54800	63500	8800
5470	1440	0,63	1,0	55300	64200	8800
5800	1590	0,60	0,9	55850	65600	8800
5070	1740	0,48	0,8	56400	67100	8800
5470	1980	0,46	0,7	56950	67750	8800
5070	2190	0,38	0,6	57500	68900	8800
4610	2280	0,33	0,6	57500	68900	8800
4610	2490	0,31	0,6	57500	68900	8800
5470	2720	0,33	0,5	58600	69800	8800



## 5.2 IHL GEAR REDUCER - 1400 rpm

## IHL4 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
8060	395	3,38	3,5	65100	75150	14900
9850	467	3,50	3,0	66350	76550	14900
9850	529	3,08	2,6	68200	78700	14900
9860	586	2,79	2,4	69100	79750	14900
9320	658	2,35	2,1	69850	80500	14900
9900	728	2,25	1,9	70700	81750	14900
9320	825	1,87	1,7	72250	83400	14900
9400	905	1,72	1,5	73050	84350	14900
10000	1000	1,66	1,4	74600	86150	14900
9470	1140	1,38	1,2	75450	87100	14900
10300	1260	1,35	1,1	76400	88500	14900
9950	1430	1,15	1,0	77500	89400	14900
9700	1570	1,03	0,9	78000	90000	14900
9950	1800	0,92	0,8	78300	90300	14900
8630	2090	0,68	0,7	78700	90700	14900
9950	2270	0,73	0,6	79000	91100	14900
8630	2500	0,57	0,6	79000	91100	14900
8840	2710	0,54	0,5	79500	91600	14900

## IHL4 180

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
19500	330	9,80	4,2	70700	91100	29000
20200	410	8,15	3,4	72800	93900	29000
20500	449	7,55	3,1	73900	95100	29000
20800	509	6,77	2,7	75600	96800	29000
21000	564	6,18	2,5	76500	98300	29000
19500	654	4,94	2,1	78200	100700	29000
21200	701	5,01	2,0	79000	101600	29000
20100	812	4,09	1,7	80800	104000	29000
20400	899	3,75	1,6	81600	104800	29000
16000	980	2,70	1,4	83100	106500	29000
21200	1130	3,09	1,2	84900	109300	29000
21600	1240	2,89	1,1	85800	110800	29000
22000	1410	2,59	1,0	87100	112000	29000
22000	1560	2,34	0,9	88500	114400	29000
19100	1770	1,79	0,8	90300	116100	29000
22000	1940	1,88	0,7	91200	117800	29000
17000	2510	1,12	0,6	94400	122000	29000

## IHL4 130

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
14900	330	7,48	4,2	70150	91100	21000
14900	358	6,89	3,9	70350	92100	21000
14900	410	6,02	3,4	71100	93900	21000
14900	449	5,49	3,1	72100	95100	21000
14900	509	4,84	2,7	74000	96800	21000
14900	564	4,37	2,5	75150	98300	21000
15000	633	3,92	2,2	76000	100200	21000
15100	701	3,57	2,0	77100	101600	21000
13500	812	2,75	1,7	79000	104000	21000
13800	899	2,54	1,6	80000	104800	21000
15400	964	2,65	1,5	81000	105900	21000
14300	1130	2,09	1,2	83000	109300	21000
14600	1240	1,95	1,1	84200	110800	21000
14800	1410	1,75	1,0	85100	112000	21000
14800	1560	1,58	0,9	86500	114400	21000
14800	1770	1,39	0,8	88000	116100	21000
14800	1940	1,27	0,7	89100	117800	21000
11000	2510	0,73	0,6	92600	122000	21000

## IHL1 010

$Mn_2$ [Nm]	$i$	$Pn_1$ [kW]	$n_2$ [rpm]	$Fr_2$ CS [N]	$Fr_2$ SS [N]	$M_{2max}$ [Nm]
580	4,32	13,04	208,3	9280	10520	790
550	5,37	9,95	167,6	10160	11510	990
490	7,38	6,45	121,9	10870	12300	1360
350	9,30	3,66	96,8	11640	13140	1710

## IHL1 020

$Mn_2$ [Nm]	$i$	$Pn_1$ [kW]	$n_2$ [rpm]	$Fr_2$ CS [N]	$Fr_2$ SS [N]	$M_{2max}$ [Nm]
870	7,38	11,45	121,9	10870	12300	1360
670	9,30	7,00	96,8	11640	13140	1710

## IHL1 030

$Mn_2$ [Nm]	$i$	$Pn_1$ [kW]	$n_2$ [rpm]	$Fr_2$ CS [N]	$Fr_2$ SS [N]	$M_{2max}$ [Nm]
860	9,30	8,98	96,8	22380	25940	1710

## IHL2 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
730	11,8	6,17	76,0	12650	14350	2000
820	14,9	5,53	60,5	13750	15600	2400
840	18,7	4,51	48,2	14800	16700	2400
850	23,2	3,67	38,8	15700	17800	2400
680	28,8	2,36	31,2	16850	19000	2400
860	31,9	2,70	28,2	17150	19500	2400
710	39,6	1,79	22,7	17900	20300	2400
860	40,2	2,14	22,4	18200	20550	2400
740	49,9	1,48	18,0	19600	22250	2400
600	68,7	0,88	13,1	21700	24500	2400

## IHL2 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2430	18,7	13,04	48,2	26550	30750	3340
1850	21,3	8,70	42,3	28150	32550	3810
2300	23,2	9,93	38,8	28900	33400	4150
1880	26,7	7,05	33,7	29500	34350	4780
2180	28,8	7,58	31,2	30250	35050	5200
2050	31,9	6,44	28,2	31600	36650	5200
1910	33,2	5,76	27,1	32800	38150	5200
2200	39,6	5,56	22,7	33800	39200	5200
1930	45,7	4,23	19,7	35400	41100	5200
1950	57,5	3,39	15,6	37750	43750	5200

## IHL2 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5330	55,4	9,64	16,3	52700	60900	9900
5400	69,8	7,75	12,9	57150	65900	12470

## IHL2 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1330	11,8	11,25	76,0	12650	14350	2120
1510	14,9	10,17	60,5	13750	15600	2660
1580	18,7	8,48	48,2	14800	16700	3400
1620	23,2	7,00	38,8	15700	17800	3400
1420	28,8	4,94	31,2	16850	19000	3400
1710	31,9	5,37	28,2	17150	19500	3400
1450	39,6	3,66	22,7	17900	20300	3400
1470	40,2	3,67	22,4	18200	20550	3400
1470	49,9	2,95	18,0	19600	22250	3400
1200	68,7	1,75	13,1	21700	24500	3400

## IHL2 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
3650	31,9	11,46	28,2	31600	36650	5700
3640	33,2	10,98	27,1	32800	38150	5940
4380	39,6	11,07	22,7	33800	39200	7090
3650	45,7	8,00	19,7	35400	41100	8170
3680	57,5	6,41	15,6	37750	43750	8800

## 5.3 IHL GEAR REDUCER - 900 rpm

### IHL3 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
870	51,2	1,76	17,6	19600	22250	2400
880	64,2	1,42	14,0	21200	24050	2400
880	80,6	1,13	11,2	22650	25750	2400
750	87,4	0,89	10,3	23150	26250	2000
900	100	0,93	9,0	23650	27000	2400
900	110	0,85	8,2	23650	27000	2400
920	125	0,76	7,2	23650	27000	2400
940	138	0,70	6,5	23650	27000	2400
840	155	0,56	5,8	23650	27000	2400
950	174	0,57	5,2	23650	27000	2400
750	188	0,41	4,8	23750	27100	2000
1000	216	0,48	4,2	24200	27650	2400
1000	236	0,44	3,8	24650	28150	2400
1040	297	0,36	3,0	25150	28600	2400
880	369	0,25	2,4	25900	29350	2400

### IHL3 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2620	51,2	5,29	17,6	37300	43250	5200
2630	64,2	4,23	14,0	39500	45800	5200
1960	73,3	2,76	12,3	40800	47250	5200
2650	80,6	3,39	11,2	42100	48900	5200
1970	92,0	2,21	9,8	45100	51700	5200
2670	100	2,75	9,0	45100	51700	5200
1970	114	1,78	7,9	45100	51700	5200
2730	125	2,26	7,2	45100	51700	5200
2760	138	2,07	6,5	45100	51700	5200
2290	155	1,53	5,8	45100	51700	5200
2800	171	1,69	5,3	45100	51700	5200
2000	197	1,05	4,6	45450	52250	5200
2810	216	1,35	4,2	45800	53000	5200
2020	249	0,84	3,6	46900	54300	5200
2460	293	0,87	3,1	47350	54900	5200
2050	309	0,69	2,9	48250	55300	5200
2520	369	0,71	2,4	49000	56850	5200
2160	425	0,52	2,1	49750	57300	5200

### IHL3 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1730	51,2	3,49	17,6	19600	22250	3400
1780	64,2	2,86	14,0	21200	24050	3400
1780	80,6	2,28	11,2	22650	25750	3400
1430	87,4	1,69	10,3	23150	26250	3400
1830	100	1,89	9,0	23650	27000	3400
1840	110	1,73	8,2	23650	27000	3400
1880	125	1,56	7,2	23650	27000	3400
1900	138	1,42	6,5	23650	27000	3400
1580	155	1,05	5,8	23650	27000	3400
1950	174	1,16	5,2	23650	27000	3400
1430	188	0,79	4,8	23750	27100	3400
1990	216	0,95	4,2	24200	27650	3400
2000	236	0,88	3,8	24650	28150	3400
2030	297	0,71	3,0	25150	28600	3400
1650	369	0,46	2,4	25900	29350	3400

### IHL3 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
4920	51,2	9,93	17,6	37300	43250	8800
5080	64,2	8,17	14,0	39500	45800	8800
3720	73,3	5,24	12,3	40800	47250	8800
5250	80,6	6,72	11,2	42100	48900	8800
3750	92,0	4,21	9,8	45100	51700	8800
5320	100	5,48	9,0	45100	51700	8800
3750	114	3,39	7,9	45100	51700	8800
5370	125	4,45	7,2	45100	51700	8800
5400	138	4,05	6,5	45100	51700	8800
4460	155	2,98	5,8	45100	51700	8800
5470	171	3,30	5,3	45100	51700	8800
3800	197	1,99	4,6	45450	52250	8800
5480	216	2,62	4,2	45800	53000	8800
3880	249	1,61	3,6	46900	54300	8800
4820	293	1,70	3,1	47350	54900	8800
3940	309	1,32	2,9	48250	55300	8800
5000	369	1,40	2,4	49000	56850	8800
4100	425	1,00	2,1	49750	57300	8800

## IHL3 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
9440	79,3	12,29	11,3	59150	68200	14620
7860	83,5	9,72	10,8	60500	69850	14900
7630	90,5	8,71	9,9	62700	72500	14900
9510	98,6	9,96	9,1	62700	72500	14900
7750	114	7,04	7,9	62700	72500	14900
8990	122	7,58	7,3	62700	72500	14900
8170	143	5,92	6,3	62700	72500	14900
9070	168	5,56	5,3	62700	72500	14900
7960	194	4,23	4,6	63450	73250	14900
8490	211	4,15	4,3	64050	73850	14900
6800	232	3,03	3,9	64800	74600	14900
8730	244	3,70	3,7	64950	74900	14900
8830	266	3,42	3,4	65450	75550	14900
8530	291	3,03	3,1	66150	76300	14900
9010	307	3,03	2,9	66800	77350	14900
7370	357	2,13	2,5	68650	79200	14900
6050	409	1,53	2,2	69600	80250	14900

## IHL3 130

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
11000	112	10,12	8,1	67500	88800	19390
11000	122	9,33	7,4	67500	88800	21000
11100	140	8,15	6,4	67500	88800	21000
11200	151	7,61	5,9	67500	88800	21000
14700	162	9,35	5,5	67500	88800	21000
14900	187	8,23	4,8	68400	89400	21000
11600	208	5,76	4,3	69000	90700	21000
12300	223	5,69	4,0	70300	91800	21000
11900	240	5,11	3,8	70500	92400	21000
12300	286	4,42	3,1	72100	95100	21000
9530	340	2,90	2,6	74450	97600	21000

## IHL3 180

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
16700	140	12,27	6,4	69000	88800	24340
16800	151	11,45	5,9	69000	88800	26240
17400	162	11,07	5,5	69000	88800	28130
16900	174	10,00	5,2	69000	88800	29000
17400	208	8,63	4,3	70500	90700	29000
17800	240	7,66	3,8	72100	92400	29000
13900	285	5,05	3,2	73500	94500	29000
14300	340	4,35	2,6	76000	97600	29000

## IHL4 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1070	348	0,33	2,6	25850	29300	2400
1070	433	0,26	2,1	26200	29650	2400
1110	474	0,25	1,9	27000	30150	2400
1130	538	0,22	1,7	27300	30900	2400
1170	668	0,19	1,3	27500	31100	2400
1200	740	0,17	1,2	27550	31200	2400
1220	811	0,16	1,1	27600	31350	2400
1250	919	0,14	1,0	27650	31550	2400
1250	1020	0,13	0,9	27700	31800	2400
1250	1160	0,11	0,8	27800	32000	2400
1250	1270	0,11	0,7	28200	32100	2400
1000	1440	0,07	0,6	28700	32200	2400
1250	1590	0,08	0,6	28700	32200	2400
1250	1740	0,08	0,5	29600	32500	2400
1000	2160	0,05	0,4	31000	34000	2400
1000	2720	0,04	0,3	31000	34000	2400

## IHL4 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2810	348	0,86	2,6	48600	56450	5200
2830	433	0,70	2,1	49750	57300	5200
2830	474	0,64	1,9	50500	58600	5200
2840	538	0,56	1,7	51400	59700	5200
2880	668	0,46	1,3	53300	62000	5200
2910	740	0,42	1,2	53600	62200	5200
2760	831	0,35	1,1	54800	63500	5200
2970	919	0,34	1,0	55300	64200	5200
2970	1020	0,31	0,9	55850	65600	5200
2800	1140	0,26	0,8	56400	67100	5200
2970	1270	0,25	0,7	56950	67750	5200
2800	1440	0,21	0,6	57500	68900	5200
2970	1590	0,20	0,6	57500	68900	5200
2560	1740	0,16	0,5	58600	69800	5200
2800	1980	0,15	0,5	58600	69800	5200
2560	2190	0,12	0,4	61000	73100	5200
2440	2280	0,11	0,4	61000	73100	5200
2440	2490	0,10	0,4	61000	73100	5200
2800	2720	0,11	0,3	62500	74000	5200

## IHL4 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2140	348	0,65	2,6	25850	29300	3400
2150	433	0,53	2,1	26200	29650	3400
2220	474	0,50	1,9	27000	30150	3400
2240	538	0,44	1,7	27300	30900	3400
2330	668	0,37	1,3	27500	31100	3400
2370	740	0,34	1,2	27550	31200	3400
2410	811	0,32	1,1	27600	31350	3400
2460	919	0,28	1,0	27650	31550	3400
2460	1020	0,26	0,9	27700	31800	3400
2460	1160	0,23	0,8	27800	32000	3400
2460	1270	0,21	0,7	28200	32100	3400
1830	1440	0,14	0,6	28700	32200	3400
2460	1590	0,16	0,6	28700	32200	3400
2460	1740	0,15	0,5	29600	32500	3400
1830	2160	0,09	0,4	31000	34000	3400
1830	2720	0,07	0,3	31000	34000	3400

## IHL4 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5500	348	1,68	2,6	48600	56450	8800
5530	433	1,36	2,1	49750	57300	8800
5540	474	1,24	1,9	50500	58600	8800
5570	538	1,10	1,7	51400	59700	8800
5650	668	0,90	1,3	53300	62000	8800
5710	740	0,82	1,2	53600	62200	8800
5410	831	0,69	1,1	54800	63500	8800
5800	919	0,67	1,0	55300	64200	8800
5800	1020	0,61	0,9	55850	65600	8800
5470	1140	0,51	0,8	56400	67100	8800
5800	1270	0,49	0,7	56950	67750	8800
5470	1440	0,40	0,6	57500	68900	8800
5800	1590	0,39	0,6	57500	68900	8800
5070	1740	0,31	0,5	58600	69800	8800
5470	1980	0,29	0,5	58600	69800	8800
5070	2190	0,25	0,4	61000	73100	8800
4610	2280	0,22	0,4	61000	73100	8800
4610	2490	0,20	0,4	61000	73100	8800
5470	2720	0,21	0,3	62500	74000	8800

## 5.3 IHL GEAR REDUCER - 900 rpm

### IHL4 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
8140	395	2,19	2,3	69350	80000	14900
9900	467	2,26	1,9	70700	81750	14900
9920	529	2,00	1,7	72250	83400	14900
9970	586	1,81	1,5	73050	84350	14900
9440	658	1,53	1,4	74600	86150	14900
10200	728	1,49	1,2	75450	87100	14900
9830	825	1,27	1,1	76400	88500	14900
9700	905	1,14	1,0	77500	89400	14900
10400	1000	1,11	0,9	78000	90000	14900
9700	1140	0,91	0,8	78300	90300	14900
10400	1260	0,88	0,7	78700	90700	14900
9950	1430	0,74	0,6	79000	91100	14900
9700	1570	0,66	0,6	79000	91100	14900
9950	1800	0,59	0,5	79500	91600	14900
8630	2090	0,44	0,4	83200	96000	14900
9950	2270	0,47	0,4	83200	96000	14900
8630	2500	0,37	0,4	83200	96000	14900
8840	2710	0,35	0,3	86600	100000	14900

### IHL4 130

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
14900	330	4,81	2,7	74000	96800	21000
14900	358	4,43	2,5	75150	98300	21000
15000	410	3,89	2,2	76000	100200	21000
15100	449	3,58	2,0	77100	101600	21000
15200	509	3,18	1,8	78300	103100	21000
15300	564	2,89	1,6	80000	104800	21000
15400	633	2,59	1,4	81600	106500	21000
15500	701	2,36	1,3	82300	107700	21000
14700	812	1,92	1,1	84200	110800	21000
14800	899	1,76	1,0	85100	112000	21000
15700	964	1,73	0,9	86500	114400	21000
14800	1130	1,40	0,8	88000	116100	21000
14800	1240	1,28	0,7	89100	117800	21000
14800	1410	1,12	0,6	92600	122000	21000
14800	1560	1,01	0,6	92600	122000	21000
14800	1770	0,89	0,5	95000	125000	21000
14800	1940	0,82	0,5	95000	125000	21000
11000	2510	0,47	0,4	98500	129600	21000

### IHL4 180

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
20800	330	6,72	2,7	75600	96800	29000
21100	410	5,48	2,2	77800	100200	29000
21200	449	5,02	2,0	79000	101600	29000
21300	509	4,45	1,8	80100	103100	29000
21400	564	4,05	1,6	81600	104800	29000
20800	654	3,39	1,4	83100	106500	29000
21700	701	3,30	1,3	84000	107700	29000
21600	812	2,83	1,1	85800	110800	29000
22000	899	2,60	1,0	87100	112000	29000
17000	980	1,85	0,9	88500	114400	29000
22000	1130	2,07	0,8	90300	116100	29000
22000	1240	1,89	0,7	91200	117800	29000
22000	1410	1,66	0,6	94400	122000	29000
22000	1560	1,50	0,6	94400	122000	29000
19100	1770	1,15	0,5	97200	125000	29000
22000	1940	1,21	0,5	97200	125000	29000
17000	2510	0,72	0,4	100400	129600	29000

## 5.4 IHL GEAR REDUCER - 500 rpm

## IHL1 010

$Mn_2$ [Nm]	$i$	$Pn_1$ [kW]	$n_2$ [rpm]	$Fr_2$ CS [N]	$Fr_2$ SS [N]	$M_{2max}$ [Nm]
630	5,37	6,33	93,1	12120	13730	990
530	7,38	3,87	67,7	12970	14670	1360
370	9,30	2,15	53,8	13880	15670	1710

## IHL1 020

$Mn_2$ [Nm]	$i$	$Pn_1$ [kW]	$n_2$ [rpm]	$Fr_2$ CS [N]	$Fr_2$ SS [N]	$M_{2max}$ [Nm]
730	9,30	4,24	53,8	13880	15670	1710

## IHL1 030

$Mn_2$ [Nm]	$i$	$Pn_1$ [kW]	$n_2$ [rpm]	$Fr_2$ CS [N]	$Fr_2$ SS [N]	$M_{2max}$ [Nm]
860	9,30	4,99	53,8	25750	30000	1710



## 5.4 IHL GEAR REDUCER - 500 rpm

## IHL2 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
730	11,8	3,43	42,2	15100	17100	2000
860	14,9	3,22	33,6	16200	18400	2400
860	18,7	2,56	26,8	17250	19600	2400
860	23,2	2,06	21,6	18300	20650	2400
740	28,8	1,43	17,3	20100	22650	2400
870	31,9	1,52	15,7	20600	23250	2400
800	39,6	1,12	12,6	22000	24800	2400
880	40,2	1,22	12,4	22050	24850	2400
820	49,9	0,91	10,0	23650	27000	2400
600	68,7	0,49	7,3	23650	27000	2400

## IHL2 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1920	21,3	5,02	23,5	33600	38950	3810
2610	23,2	6,26	21,6	34500	40000	4150
1930	26,7	4,02	18,7	36250	42100	4780
2220	28,8	4,29	17,3	37400	43350	5200
2220	31,9	3,87	15,7	37700	43700	5200
1950	33,2	3,27	15,1	38400	44500	5200
2240	39,6	3,14	12,6	40300	46750	5200
1960	45,7	2,39	10,9	42200	49050	5200
1970	57,5	1,91	8,7	45100	51700	5200

## IHL2 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5500	55,4	5,53	9,0	62700	72500	9900
5500	69,8	4,39	7,2	62700	72500	12470

## IHL2 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1430	11,8	6,72	42,2	15100	17100	2120
1660	14,9	6,21	33,6	16200	18400	2660
1710	18,7	5,10	26,8	17250	19600	3400
1710	23,2	4,10	21,6	18300	20650	3400
1470	28,8	2,84	17,3	20100	22650	3400
1770	31,9	3,09	15,7	20600	23250	3400
1500	39,6	2,11	12,6	22000	24800	3400
1550	40,2	2,15	12,4	22050	24850	3400
1510	49,9	1,68	10,0	23650	27000	3400
1200	68,7	0,97	7,3	23650	27000	3400

## IHL2 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
3680	33,2	6,17	15,1	38400	44500	5940
4410	39,6	6,19	12,6	40300	46750	7090
3750	45,7	4,57	10,9	42200	49050	8170
3750	57,5	3,63	8,7	45100	51700	8800

## IHL3 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
880	51,2	0,99	9,8	23650	27000	2400
900	64,2	0,80	7,8	23650	27000	2400
940	80,6	0,67	6,2	23650	27000	2400
750	87,4	0,49	5,7	23650	27000	2000
950	100	0,54	5,0	23650	27000	2400
970	110	0,51	4,6	24100	27550	2400
1000	125	0,46	4,0	24600	28100	2400
1010	138	0,42	3,6	24800	28350	2400
870	155	0,32	3,2	25000	28500	2400
1050	174	0,35	2,9	25200	28800	2400
770	188	0,24	2,7	25600	29100	2000
1070	216	0,28	2,3	26000	29450	2400
1070	236	0,26	2,1	26200	29650	2400
1130	297	0,22	1,7	27300	30900	2400
960	369	0,15	1,4	27450	31050	2400

## IHL3 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2650	51,2	2,97	9,8	45100	51700	5200
2710	64,2	2,42	7,8	45100	51700	5200
1970	73,3	1,54	6,8	45100	51700	5200
2770	80,6	1,97	6,2	45100	51700	5200
1970	92,0	1,23	5,4	45100	51700	5200
2810	100	1,61	5,0	45100	51700	5200
2000	114	1,00	4,4	45650	52600	5200
2810	125	1,29	4,0	46000	53450	5200
2810	138	1,17	3,6	46900	54300	5200
2440	155	0,90	3,2	47200	54800	5200
2810	171	0,94	2,9	48250	55300	5200
2100	197	0,61	2,5	48900	56750	5200
2820	216	0,75	2,3	49250	57050	5200
2180	249	0,50	2,0	50100	57950	5200
2580	293	0,51	1,7	51400	59700	5200
2250	309	0,42	1,6	51800	60050	5200
2670	369	0,42	1,4	53000	61650	5200
2370	425	0,32	1,2	53600	62200	5200

## IHL3 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1780	51,2	2,00	9,8	23650	27000	3400
1850	64,2	1,65	7,8	23650	27000	3400
1910	80,6	1,36	6,2	23650	27000	3400
1430	87,4	0,94	5,7	23650	27000	3400
1950	100	1,12	5,0	23650	27000	3400
1970	110	1,03	4,6	24100	27550	3400
1990	125	0,92	4,0	24600	28100	3400
2010	138	0,84	3,6	24800	28350	3400
1650	155	0,61	3,2	25000	28500	3400
2050	174	0,68	2,9	25200	28800	3400
1430	188	0,44	2,7	25600	29100	3400
2140	216	0,57	2,3	26000	29450	3400
2150	236	0,52	2,1	26200	29650	3400
2240	297	0,43	1,7	27300	30900	3400
1750	369	0,27	1,4	27450	31050	3400

## IHL3 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5300	51,2	5,94	9,8	45100	51700	8800
5360	64,2	4,79	7,8	45100	51700	8800
3750	73,3	2,94	6,8	45100	51700	8800
5410	80,6	3,85	6,2	45100	51700	8800
3750	92,0	2,34	5,4	45100	51700	8800
5480	100	3,14	5,0	45100	51700	8800
3800	114	1,91	4,4	45650	52600	8800
5480	125	2,53	4,0	46000	53450	8800
5490	138	2,29	3,6	46900	54300	8800
4780	155	1,77	3,2	47200	54800	8800
5490	171	1,84	2,9	48250	55300	8800
4000	197	1,16	2,5	48900	56750	8800
5510	216	1,47	2,3	49250	57050	8800
4140	249	0,96	2,0	50100	57950	8800
5080	293	1,00	1,7	51400	59700	8800
4280	309	0,79	1,6	51800	60050	8800
5240	369	0,82	1,4	53000	61650	8800
4490	425	0,61	1,2	53600	62200	8800

## IHL3 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
9770	79,3	7,07	6,3	62700	72500	14620
7970	83,5	5,48	6,0	62700	72500	14900
7920	90,5	5,02	5,5	62700	72500	14900
9850	98,6	5,73	5,1	62700	72500	14900
7960	114	4,02	4,4	63850	73650	14900
9150	122	4,29	4,1	64400	74200	14900
8800	143	3,54	3,5	65100	75150	14900
9240	168	3,15	3,0	66350	76550	14900
8080	194	2,39	2,6	68200	78700	14900
9210	211	2,50	2,4	69100	79750	14900
6890	232	1,71	2,2	69600	80250	14900
9240	244	2,18	2,1	69850	80500	14900
9250	266	1,99	1,9	70700	81750	14900
8640	291	1,70	1,7	72250	83400	14900
9360	307	1,75	1,6	72650	83900	14900
7920	357	1,27	1,4	74600	86150	14900
6730	409	0,94	1,2	75450	87100	14900

## IHL3 130

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
11500	112	5,90	4,5	68600	90300	19390
11700	122	5,51	4,1	70250	91500	21000
12000	140	4,89	3,6	70700	93100	21000
12200	151	4,61	3,3	71600	94200	21000
14900	162	5,27	3,1	72100	95100	21000
14900	187	4,57	2,7	74000	96800	21000
12800	208	3,53	2,4	75400	98900	21000
12300	223	3,16	2,2	76000	100200	21000
13100	240	3,13	2,1	76500	100700	21000
13500	286	2,71	1,7	79000	104000	21000
10400	340	1,76	1,5	81000	105900	21000

## IHL3 180

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
17900	140	7,32	3,6	72300	93100	24340
18200	151	6,90	3,3	73100	94200	26240
17500	162	6,19	3,1	73900	95100	28130
18600	174	6,12	2,9	74700	96200	29000
19200	208	5,29	2,4	76700	98900	29000
19100	240	4,57	2,1	78200	100700	29000
15500	285	3,11	1,8	80100	103100	29000
15800	340	2,67	1,5	82100	105900	29000

## IHL4 010

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
1170	348	0,20	1,4	27450	31050	2400
1210	433	0,17	1,2	27550	31200	2400
1230	474	0,15	1,1	27600	31350	2400
1250	538	0,14	0,9	27700	31800	2400
1250	668	0,11	0,7	28200	32100	2400
1250	740	0,10	0,7	28200	32100	2400
1250	811	0,09	0,6	28700	32200	2400
1250	919	0,08	0,5	29600	32500	2400
1250	1020	0,07	0,5	29600	32500	2400
1250	1160	0,06	0,4	31000	34000	2400
1250	1270	0,06	0,4	31000	34000	2400
1000	1440	0,04	0,3	31000	34000	2400
1250	1590	0,05	0,3	31000	34000	2400
1250	1740	0,04	0,3	31000	34000	2400
1000	2160	0,03	0,2	31000	34000	2400
1000	2720	0,02	0,2	31000	34000	2400

## IHL4 030

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2860	348	0,49	1,4	53000	61650	5200
2930	433	0,40	1,2	53600	62200	5200
2960	474	0,37	1,1	54800	63500	5200
2970	538	0,33	0,9	55850	65600	5200
2970	668	0,26	0,7	56950	67750	5200
2970	740	0,24	0,7	56950	67750	5200
2800	831	0,20	0,6	57500	68900	5200
2970	919	0,19	0,5	58600	69800	5200
2970	1020	0,17	0,5	58600	69800	5200
2800	1140	0,14	0,4	61000	73100	5200
2970	1270	0,14	0,4	61000	73100	5200
2800	1440	0,12	0,3	62500	74000	5200
2970	1590	0,11	0,3	62500	74000	5200
2560	1740	0,09	0,3	62500	74000	5200
2800	1980	0,08	0,3	62500	74000	5200
2560	2190	0,07	0,2	64000	74000	5200
2440	2280	0,06	0,2	64000	74000	5200
2440	2490	0,06	0,2	64000	74000	5200
2800	2720	0,06	0,2	64000	74000	5200

## IHL4 020

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
2310	348	0,39	1,4	27450	31050	3400
2390	433	0,33	1,2	27550	31200	3400
2430	474	0,30	1,1	27600	31350	3400
2460	538	0,27	0,9	27700	31800	3400
2460	668	0,22	0,7	28200	32100	3400
2460	740	0,20	0,7	28200	32100	3400
2460	811	0,18	0,6	28700	32200	3400
2460	919	0,16	0,5	29600	32500	3400
2460	1020	0,14	0,5	29600	32500	3400
2460	1160	0,13	0,4	31000	34000	3400
2460	1270	0,12	0,4	31000	34000	3400
1830	1440	0,08	0,3	31000	34000	3400
2460	1590	0,09	0,3	31000	34000	3400
2460	1740	0,08	0,3	31000	34000	3400
1830	2160	0,05	0,2	31000	34000	3400
1830	2720	0,04	0,2	31000	34000	3400

## IHL4 050

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
5630	348	0,96	1,4	53000	61650	8800
5740	433	0,78	1,2	53600	62200	8800
5760	474	0,72	1,1	54800	63500	8800
5800	538	0,64	0,9	55850	65600	8800
5800	668	0,51	0,7	56950	67750	8800
5800	740	0,46	0,7	56950	67750	8800
5470	831	0,39	0,6	57500	68900	8800
5800	919	0,37	0,5	58600	69800	8800
5800	1020	0,34	0,5	58600	69800	8800
5470	1140	0,28	0,4	61000	73100	8800
5800	1270	0,27	0,4	61000	73100	8800
5470	1440	0,22	0,3	62500	74000	8800
5800	1590	0,22	0,3	62500	74000	8800
5070	1740	0,17	0,3	62500	74000	8800
5470	1980	0,16	0,3	62500	74000	8800
5070	2190	0,14	0,2	64000	74000	8800
4610	2280	0,12	0,2	64000	74000	8800
4610	2490	0,11	0,2	64000	74000	8800
5470	2720	0,12	0,2	64000	74000	8800

## 5.4 IHL GEAR REDUCER - 500 rpm

## IHL4 080

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
8430	395	1,26	1,3	75050	86650	14900
10300	467	1,31	1,1	76400	88500	14900
10400	529	1,16	0,9	78000	90000	14900
10400	586	1,05	0,9	78000	90000	14900
9700	658	0,87	0,8	78300	90300	14900
10400	728	0,85	0,7	78700	90700	14900
9950	825	0,71	0,6	79000	91100	14900
9700	905	0,63	0,6	79000	91100	14900
10400	1000	0,62	0,5	79500	91600	14900
9700	1140	0,50	0,4	83200	96000	14900
10400	1260	0,49	0,4	83200	96000	14900
9950	1430	0,41	0,3	86600	100000	14900
9700	1570	0,37	0,3	86600	100000	14900
9950	1800	0,33	0,3	86600	100000	14900
8630	2090	0,24	0,2	92400	106600	14900
9950	2270	0,26	0,2	92400	106600	14900
8630	2500	0,20	0,2	92400	106600	14900
8840	2710	0,19	0,2	92400	106600	14900

## IHL4 180

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
21500	330	3,85	1,5	82100	105900	29000
21700	410	3,14	1,2	84900	109300	29000
21700	449	2,86	1,1	85800	110800	29000
21700	509	2,52	1,0	87100	112000	29000
21700	564	2,28	0,9	88500	114400	29000
22000	654	1,99	0,8	90300	116100	29000
21700	701	1,84	0,7	91200	117800	29000
22000	812	1,60	0,6	94400	122000	29000
22000	899	1,45	0,6	94400	122000	29000
17000	980	1,03	0,5	97200	125000	29000
22000	1130	1,15	0,4	100400	129600	29000
22000	1240	1,05	0,4	100400	129600	29000
22000	1410	0,92	0,4	100400	129600	29000
22000	1560	0,83	0,3	105600	136000	29000
19100	1770	0,64	0,3	105600	136000	29000
22000	1940	0,67	0,3	105600	136000	29000
17000	2510	0,40	0,2	108800	140000	29000

## IHL4 130

Mn <sub>2</sub> [Nm]	i	Pn <sub>1</sub> [kW]	n <sub>2</sub> [rpm]	Fr <sub>2</sub> CS [N]	Fr <sub>2</sub> SS [N]	M <sub>2max</sub> [Nm]
15400	330	2,75	1,5	81000	105900	21000
15400	358	2,55	1,4	81600	106500	21000
15600	410	2,24	1,2	83000	109300	21000
15600	449	2,05	1,1	84200	110800	21000
15700	509	1,82	1,0	85100	112000	21000
15700	564	1,64	0,9	86500	114400	21000
15700	633	1,47	0,8	88000	116100	21000
15700	701	1,32	0,7	89100	117800	21000
14800	812	1,08	0,6	92600	122000	21000
14800	899	0,98	0,6	92600	122000	21000
15700	964	0,96	0,5	95000	125000	21000
14800	1130	0,78	0,4	98500	129600	21000
14800	1240	0,71	0,4	98500	129600	21000
14800	1410	0,62	0,4	98500	129600	21000
14800	1560	0,56	0,3	102700	136000	21000
14800	1770	0,50	0,3	102700	136000	21000
14800	1940	0,45	0,3	102700	136000	21000
11000	2510	0,26	0,2	106400	140000	21000

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