PRELIMINARY CATALOGUE

TECHNICAL CATALOGUE

HPL SERIES

PLANETARY **GEARED**MOTORS

STANDARD **IEC**

MOTOVARIO®
HEART OF MOTION
a TECO Group company

PRELIMINARY
CATALOGUE

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1.1 COMPANY PROFILE

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^2 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

CATALOGUE

1.1 COMPANY PROFILE

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 experienced 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.

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1.2 PRODUCTS AND SOFTWARE MOTOVARIO

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.

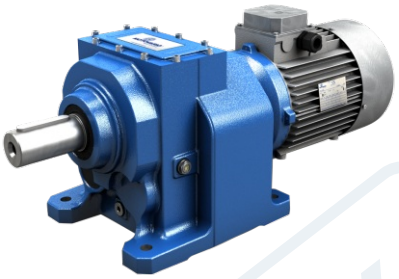
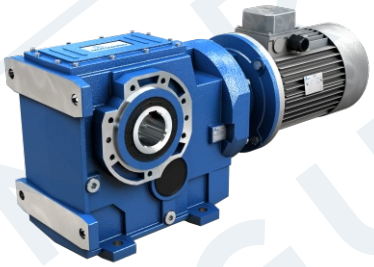
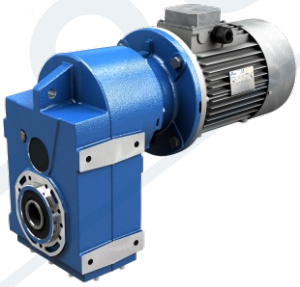
Range extension and ongoing evolution
The steady, significant growth of Motovario Group is achieved thanks to an ongoing search for new calculation and design tools, as well as to customer service. The new tools identified have led to innovation, improved product reliability as well as positive developments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

- Solidworks;
- Kissoft;
- 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.

1.2 PRODUCTS AND SOFTWARE MOTOVARIO

MOTOVARIO Products

HELICAL GEAR REDUCERS Cast iron or aluminum casing Output shaft up to 90 mm Mn_2 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_2 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 90 mm Mn_2 up to 10.250 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_2 up to 2.700 Nm Ratios up to 1083 Atex units	
PLANETARY GEARED UNITS Cast iron Output shaft up to 80 mm Mn_2 up to 10000 Nm Reduction stages 1, 2, 3, 4 Ratios up to 2700	

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1.2 PRODUCTS AND SOFTWARE MOTOVARIO

PARALLEL HELICAL AND BEVEL HELICAL GEAR REDUCERS FOR MIDDLE HEAVY INDUSTRY

Cast iron casing
Output shaft up to 180 mm
Mn_2 up to 110.000 Nm
Reduction stages 1, 2, 3, 4
Ratios up to 636
Atex units

MOTOVARIATORS AND MOTOVARIATOR-GEAR REDUCERS

Cast iron or aluminum casing
Ratios infinite
Mn_2 up to 5.000 Nm
Atex units

ELECTRIC MOTORS

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

DRIVES

DRIVON – motoinverter

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

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1.3 SYMBOLS AND FORMULAS

1.3.1 Symbols

Physical dimension	Symbol	Symbol units of measure	Input	Output
Power	P	[kW]	P_1	P_2
Requested power	Pr	[kW]	Pr_1	Pr_2
Nominal power	Pn	[kW]	Pn_1	Pn_2
Torque	M	[Nm]	M_1	M_2
Nominal torque	Mn	[Nm]		Mn_2
Requested torque	Mr	[Nm]	Mr_1	Mr_2
Speed	n	[rpm]	n_1	n_2
Force	F	[N]		
Radial load	Fr	[N]	Fr_1	Fr_2
Axial load	Fa	[N]	Fa_1	Fa_2
Reduction ratio	i			
Dynamic efficiency	η_d			
Service factor	f.s.			
Static	s			
Dynamic	d			
Calculated	c			
Maximum	max			
Minimum	min			
Moment of inertia	J	[kgm^2]	J_1	
Ambient temperature	T_{amb}	[°C]		
Dimension		[mm]		
Angular backlash	y	[arcmin]		

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1.3 SYMBOLS AND FORMULAS

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^2]
Angular acceleration	$\alpha = n / (9{,}55 * t)$ $\alpha = \omega / t$	[rad/s^2]
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	$F = m * g (\mu * \cos\beta + \text{sen}\beta)$	
m= mass [kg]; g= gravity acceleration [m/s^2]; μ= friction coefficent; β= angle of inclination		
Moment of inertia	$J = m * v^2 / \omega^2$	[kgm^2]
Torque	$M = F * d / 2$ $M = J * \omega / t$	[Nm]

MOTOR and GEARMOTOR		
Starting time	$ta = (Jext+Jm)*n_n/9{,}55+(M_{peak}-Mr)$	[s]
Braking time	$ts = (Jext+Jm)*n_n/9{,}55+(M_{peak}+Mr)$	[s]
Motor rotation angle during starting	$\varphi = n_n * ta / 19{,}1$	[rad]
Motor rotation angle during braking	$\varphi = n_n * ts / 19{,}1$	[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	$P1_{60Hz} = P1_{50Hz} * V_{60Hz}/V_{50Hz}$	[kW]
If input voltage at 60 Hz (V_{60Hz}) corresponds to winding voltage at 50 Hz (V_{50Hz}), power doesn't change $P1_{60Hz} = P1_{50Hz}$ If input voltage at 60 Hz (V_{60Hz}) is 20% higher than winding voltage at 50 Hz (V_{50Hz}), power increases by 20% $P1_{60Hz} = 1{,}2\ P1_{50Hz}$		
Torque at 60Hz	$M_{60hz} = M_{50Hz} * P1_{60Hz} / (1{,}2 * P1_{50Hz})$	[Nm]
Service factor at 60Hz	$f.s._{60Hz} = f.s._{50Hz} * 1{,}175 * P1_{50Hz} / P1_{60Hz}$	-

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1.4 PRODUCT SELECTION

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. **$Pr1=(Mr_2*n_2)/(9550*\eta_d)$.** 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 **n1. $i=n_1/n_2$**
3. Calculate the torque **Mc_2** for selecting the gear reducer through the torque required by the application **Mr_2** and the service factor s.f.: **$Mc_2=Mr_2*(f_s)$**
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: **$Mn_2 \geq Mc_2$**

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**

$M_{2\ max}$ [Nm]									
HPL 010		HPL 020		HPL 030		HPL 050		HPL 080	
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

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.

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1.5 SERVICE FACTOR

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 Pn1 by installed power P1. 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
Even	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
Even	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

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1.5 SERVICE FACTOR

Table APPLICATION CLASSIFICATION

Application	Type of load
CONVEYORS (for heavy, not uniform loads)	
Scraper	Moderate
Belt	Moderate
Bucket	Moderate
Elevators (Redler)	Moderate
Roller	Moderate
For furnaces	Moderate
Reciprocating	Heavy
Oscillating	Heavy
Screw	Heavy

Application	Type of load
PUMPS	
Centrifugal	Moderate
Rotary (gear and screw) (for heavy, not uniform loads 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
MILLS	
Rotary ball	Heavy
Hammer	Heavy
Rolling	Heavy
Cement	Moderate

Application	Type of load
COMPRESSORS	
Centrifugal	Uniform
Sliding-vane positive-displacement	Moderate
Reciprocating multiple-cylinder	Moderate
Reciprocating single-cylinder	Heavy

Application	Type of load
BATCHERS	
Rotary	Moderate
Reciprocating, vibrating	Moderate

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

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

Application	Type of load
FOOD INDUSTRY	
Mixers	Moderate
Kneading machines	Moderate
Sugar beet cutters	Moderate
Meat grinders	Moderate

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

Application	Type of load
STIRRERS	
Variable-density	Moderate
Variable-density with suspended solids	Moderate

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1.5 SERVICE FACTOR

Table APPLICATION CLASSIFICATION

Application	Type of load
MACHINE TOOLS	
Punching presses	Heavy
Cutting	Heavy
Planers	Heavy
Main drives	Moderate
Auxiliary drives (feeders, workpieces, conveyor)	Uniform
Bending machines	Moderate

Application	Type of load
FANS (regular, balanced speed)	
Centrifugal	Uniform
Lightweight, small-diameter	Uniform
Cooling towers	Moderate
Large-diameter turbo fans (mining)	Moderate

Application	Type of load
CRANES AND STACKER CRANES	
Arm rotation	Uniform
Sideshifter	Moderate
Basket drive control	Heavy

Application	Type of load
CRUSHERS	
Ore	Moderate
Stone	Moderate

Application	Type of load
PACKAGING MACHINES	Uniform

Application	Type of load
WOOD WORKING	
Debarkers	Heavy

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

Application	Type of load
METAL-WORKING	
Drawbenches	Heavy
Forging presses	Heavy
Cutting machines	Heavy
Rolling mills	Heavy

Application	Type of load
MIXERS	
Steady-density	Uniform
Variable-density	Moderate
For concrete	Moderate

Application	Type of load
ELEVATORS	
Hoists	Moderate
Lifts, ski lifts (cableways)	Heavy

Application	Type of load
WASHING MACHINES AND PUMPS	Moderate

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

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1.6 INSTALLATION

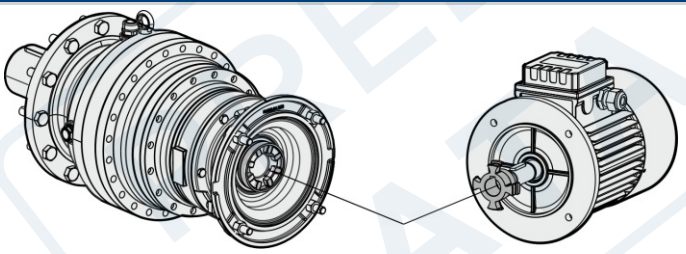
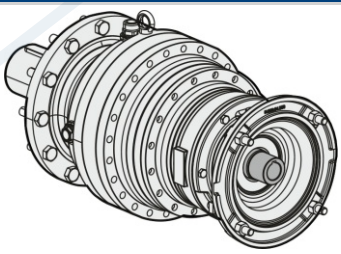
1.6.1 Installation

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°C or > +50°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.

Flexible joint	PAM Sleeve
	

2.1 DESIGN FEATURES

MOTOVARIO products are supplied with the following surface treatment characteristics:

External worm wheel 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.

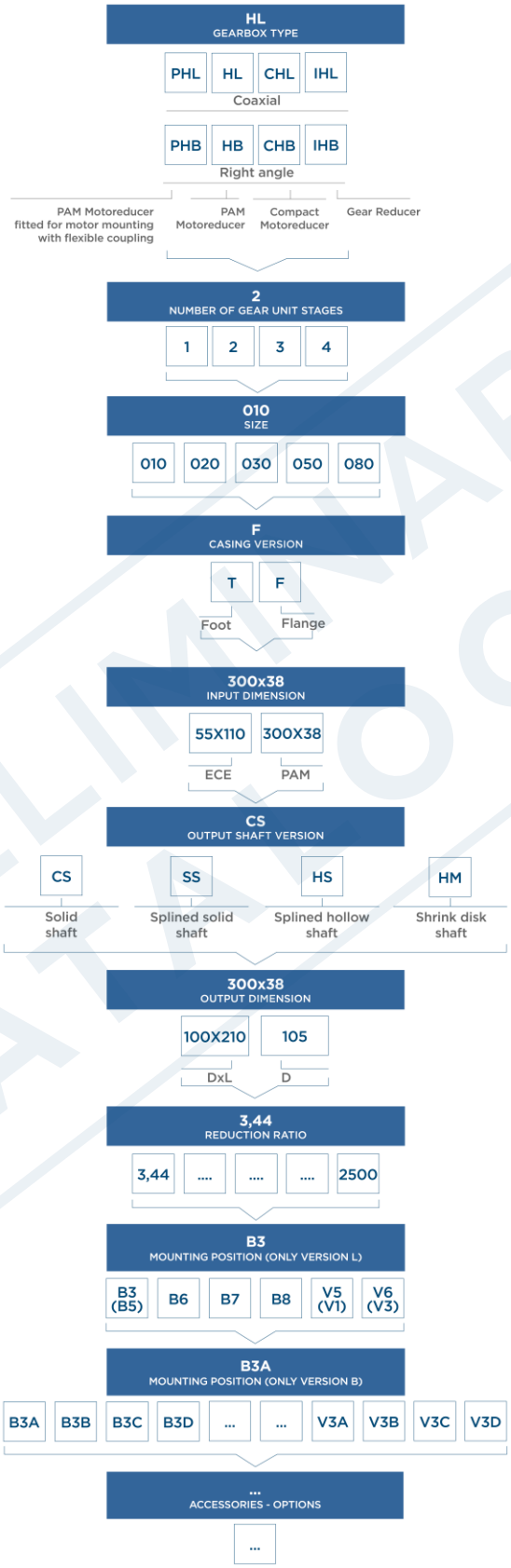
Dynamic η:
- The efficiency is the ratio between the output power P2 and the power absorbed by the gear reducer P $_1$: $\eta = P_2/P_1$.

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

PRELIMINARY CATALOGUE

2.2 TYPOLOGY

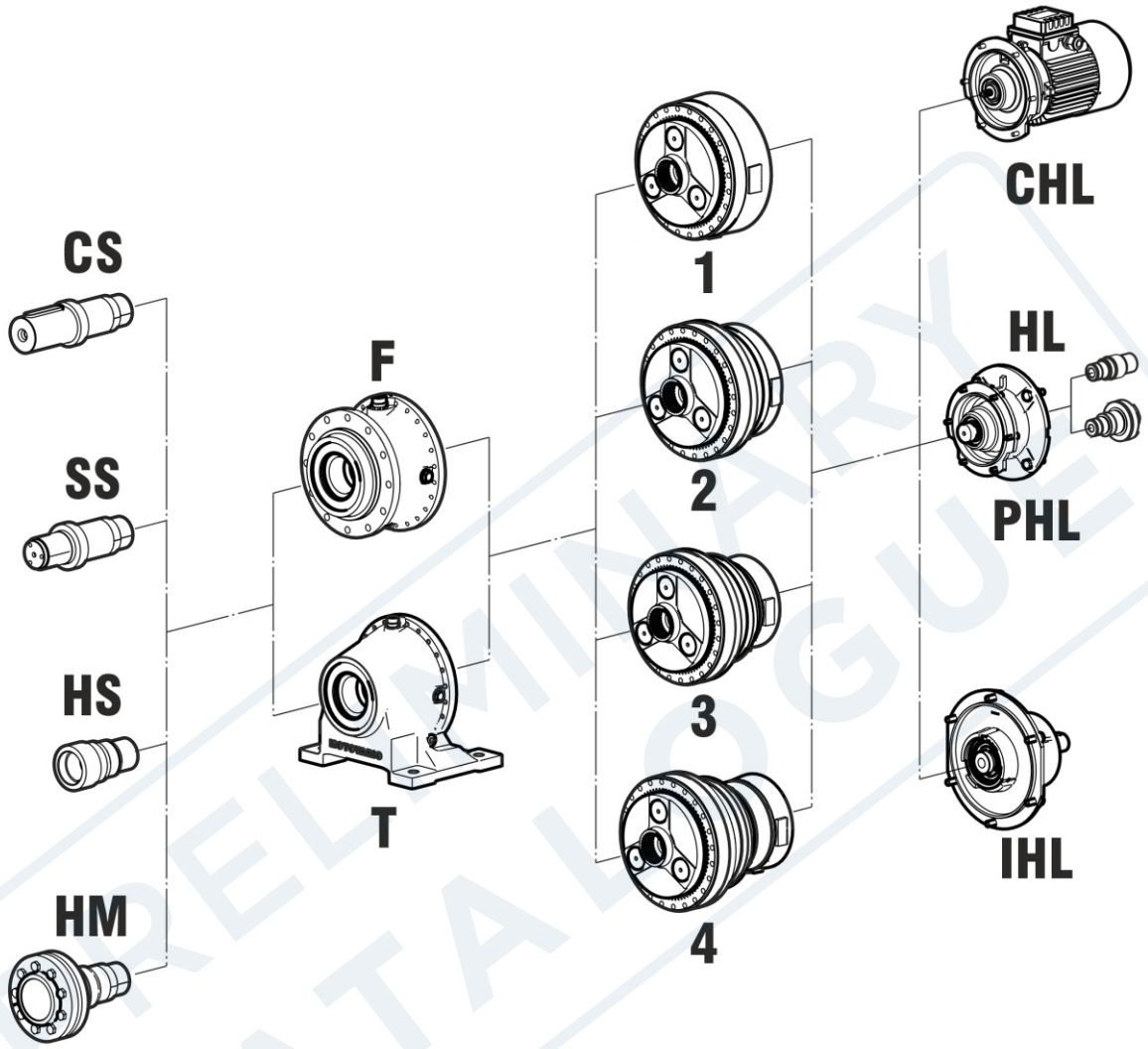
2.2.1 Designation



PRELIMINARY CATALOGUE

2.2 TYPOLOGY

2.2.2 Versions



CS	Solid shaft
SS	Splined solid shaft
HS	Splined hollow shaft
HM	Shrink disk shaft

F	Flange
T	Foot

1	Number of gear unit stages
2	
3	
4	

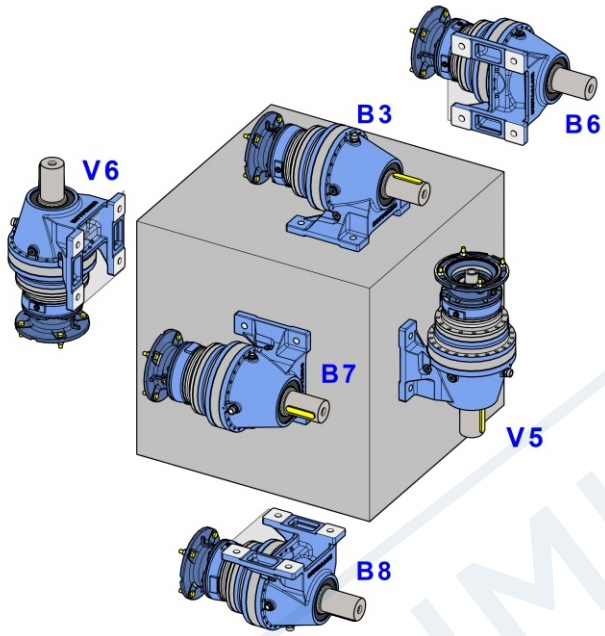
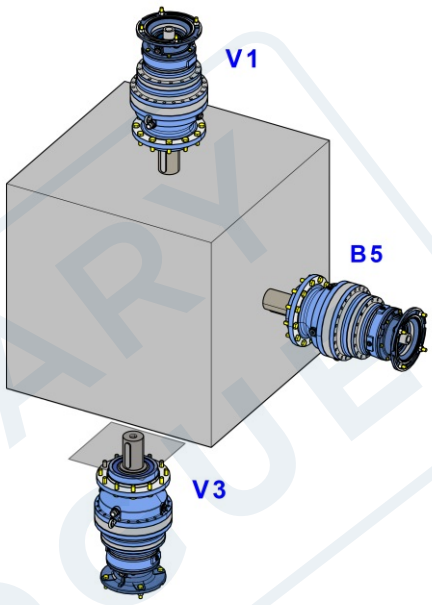
CHL	Compact electric motor version
HL	Fitted for motor coupling version (PAM)
PHL	Fitted for motor mounting with flexible coupling
IHL	Input shaft version

PRELIMINARY CATALOGUE

2.3 MOUNTING POSITIONS

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.

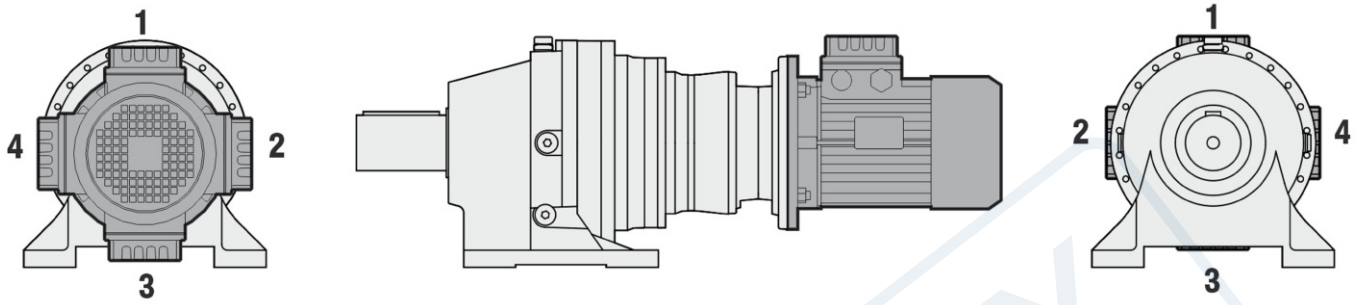
HL....T	HL....F
	

PRELIMINARY CATALOGUE

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.



PRELIMINARY CATALOGUE

2.4 THERMAL POWER

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 <= 1500 rpm
- environment temperature T_{amb}=25°C
- sea level altitude
- air speed around the gear reducer >=1m/s
- absence of external radial and/or axial loads

n_1 = 1500rpm							
	Pth [kW]		Pth [kW]		Pth [kW]		Pth [kW]
HPL 1-010	7,5	HPL 2-010	6,5	HPL 3-010	5,5	HPL 4-010	4
HPL 1-020	8	HPL 2-020	7	HPL 3-020	6	HPL 4-020	5
HPL 1-030	12	HPL 2-030	8	HPL 3-030	7	HPL 4-030	6
HPL 1-050	14	HPL 2-050	9	HPL 3-050	8	HPL 4-050	7
HPL 1-080	18	HPL 2-080	14	HPL 3-080	10	HPL 4-080	9

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).

PRELIMINARY CATALOGUE

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 < Pth * f_ta * f_tc * f_tn * f_tv, where:

- **P_1**= installed power [kW]
- **Pth** = 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 n1 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:

	n1 [rpm]							
ftn	500	700	900	1150	1400	1750	2250	2800
B3/B5 - B8 - B6 - B7	1,73	1,41	1,3	1,16	1	0,81	0,65	0,5
V5/V1 - V6/V3	1,3	1,16	1	0,81	0,65	0,5	0,4	0,25

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

		% Duty per hour of operation				
	Fc	100	80	70	40	20
Ambient temperature °C	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 n1 correction factor

	n1 [rpm]							
ftn	500	700	900	1150	1400	1750	2250	2800
B3/B5 B6 - B7 B8	1,73	1,41	1,3	1,16	1	0,81	0,65	0,5
V5/V1 V6/V3	1,3	1,16	1	0,81	0,65	0,5	0,4	0,25

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.

PRELIMINARY CATALOGUE

2.5 CRITICAL APPLICATIONS

2.5.1 Critical applications

	HPL				
	010	020	030	050	080
n1 < 1800 rpm	✔	✔	✔	✔	✔
1800 rpm < n1 < 3000 rpm	B	B	B	B	B
n1 > 3000 rpm	A	A	A	A	A

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

PRELIMINARY CATALOGUE

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				
	100	112	132	160
3,44			B5-B11	B5
4,32			B5-B11	B5
5,37			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 2-010						
i	080	090	100	112	132	160
11,8			B5-B11	B5-B11	B5-B11	B5
14,9			B5-B11	B5-B11	B5-B11	B5
18,7			B5-B11	B5-B11	B5-B11	B5
23,2			B5-B11	B5-B11	B5-B11	B5
28,8		B5-B11	B5-B11	B5-B11	B5-B11	
31,9		B5-B11	B5-B11	B5-B11	B5-B11	
39,6	B5-B11	B5-B11	B5-B11	B5-B11		
40,2		B5-B11	B5-B11	B5-B11	B5-B11	
49,9	B5-B11	B5-B11	B5-B11	B5-B11		
68,7	B5-B11	B5-B11				

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

CHL - HL - PHL - CHB - HB - PHB 4-010		
	071	080
348	B5-B11	B5-B11
433	B5-B11	B5-B11
474	B5-B11	
538	B5-B11	
668	B5-B11	
740	B5-B11	
811	B5-B11	
919	B5-B11	
1018	B5-B11	

PRELIMINARY CATALOGUE

2.6 MOTOR FLANGE AVAILABILITY

HL 020

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

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

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

CHL - HL - PHL - CHB - HB - PHB 4-020			
	071	080	090
348	B5-B11	B5-B11	B5-B11
433	B5-B11	B5-B11	B5-B11
474	B5-B11	B5-B11	
538	B5-B11	B5-B11	
668	B5-B11	B5-B11	
740	B5-B11	B5-B11	
811	B5-B11	B5-B11	
919	B5-B11	B5-B11	
1018	B5-B11	B5-B11	
1158	B5-B11		
1265	B5-B11		
1439	B5-B11		
1593	B5-B11		
1740	B5-B11		

PRELIMINARY CATALOGUE

2.6 MOTOR FLANGE AVAILABILITY

HL 030

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

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

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
64,2				B5-B11	B5-B11	B5-B11	B5
73,3			B5-B11	B5-B11	B5-B11	B5-B11	
80,6				B5-B11	B5-B11	B5-B11	
92,0			B5-B11	B5-B11	B5-B11	B5-B11	
100			B5-B11	B5-B11	B5-B11	B5-B11	
114			B5-B11	B5-B11	B5-B11	B5-B11	
125			B5-B11	B5-B11	B5-B11	B5-B11	
138			B5-B11	B5-B11	B5-B11	B5-B11	
155		B5-B11	B5-B11	B5-B11	B5-B11		
171		B5-B11	B5-B11	B5-B11	B5-B11		
197		B5-B11	B5-B11	B5-B11			
216		B5-B11	B5-B11	B5-B11	B5-B11		
249		B5-B11	B5-B11				
293		B5-B11	B5-B11				
309	B5-B11	B5-B11	B5-B11				
369	B5-B11	B5-B11	B5-B11				
425	B5-B11	B5-B11	B5-B11				

CHL - HL - PHL - CHB - HB - PHB 4-030			
	071	080	090
348		B5-B11	B5-B11
433	B5-B11	B5-B11	B5-B11
474	B5-B11	B5-B11	B5-B11
538	B5-B11	B5-B11	B5-B11
668	B5-B11	B5-B11	
740	B5-B11	B5-B11	
831	B5-B11	B5-B11	
919	B5-B11	B5-B11	
1018	B5-B11	B5-B11	
1143	B5-B11		
1265	B5-B11	B5-B11	
1439	B5-B11		
1593	B5-B11		
1740	B5-B11		
1979	B5-B11		
2191	B5-B11		

PRELIMINARY CATALOGUE

2.6 MOTOR FLANGE AVAILABILITY

HL 050

CHL - HL - PHL - CHB - HB - PHB 1-050	
	160
4,32	
5,37	
6,19	
7,38	B5

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

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

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

PRELIMINARY CATALOGUE

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			
	112	132	160
12,4			
14,6			
18,4			B5
22,8			B5
26,3			B5
28,6			B5
33,0			B5
38,4		B5-B11	B5
45,8		B5-B11	B5
55,4		B5-B11	B5
69,8	B5-B11	B5-B11	B5

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

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

PRELIMINARY CATALOGUE

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

1 - Ball Bearing

2 - Roller bearings

/ - Not available

PRELIMINARY CATALOGUE

2.8 RADIAL LOAD

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 maximum admissible axial loads are 1/5 of the value of the given radial load when they are applied in combination with the radial load. The tables relating to the output shafts give the maximum admissible value. This value must never be exceeded since it relates to the strength of the case. Particular conditions of radial load higher than the limits of the catalogue may occur. In this case, call our Technical Sevice 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: **Fre=(2000*M*fz)/D≤Fr1 or Fr2**

- **Fre** [N] Resulting radial load
- **M** [Nm] Torque on the shaft
- **D** [mm] Diameter of the transmission member mounted on the shaft
- **Fr1**-**Fr2** [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

PRELIMINARY CATALOGUE

2.9 LUBRICATION

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. For placement in Position V6 and V3, with the vertical slow shaft going upwards, it is necessary to ensure lubrication via a suitably-sized oil expansion tank (see the DEVICES chapter).
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
ENI	BLASIA SX	BLASIA
SHELL	OMALA S4 GXV	OMALA S2 GX
KLUBER	Klubersynth GEM 4-...N	Kluberoil GEM 1-...N
MOBIL	SHC GEAR	MOBILGEAR XMP
CASTROL	ALPHASYN T	ALPHA SP
BP	ENERSYN EPX	ENERGOL GR-XP
TOTAL	CARTER SH	CARTER EP
ESSO	SPARTAN S-EP	SPARTAN EP

*** Recommended**

2.9 LUBRICATION

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

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

2.9.3 Special lubricants

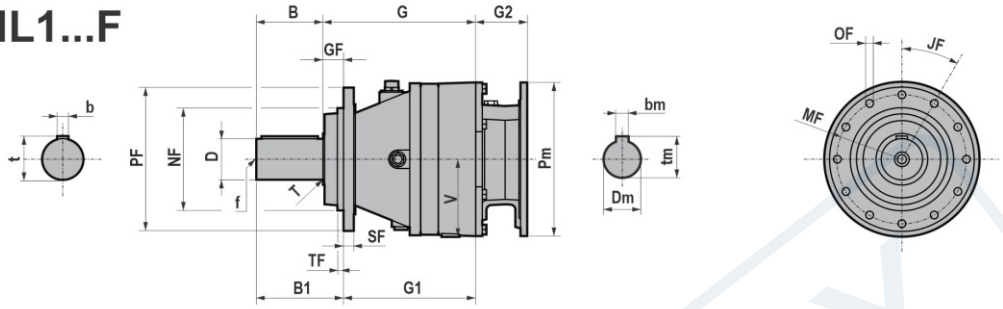
If 'special' lubricant is required please contact MOTOVARIO TECHNICAL SERVICE.

PRELIMINARY CATALOGUE

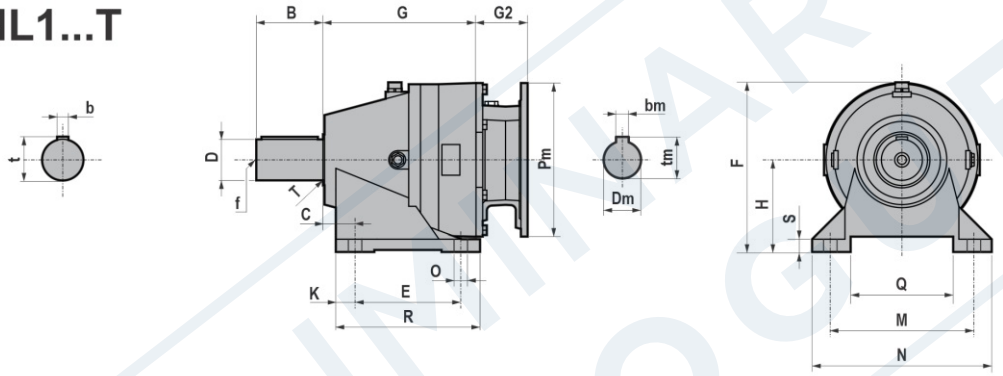
3.1 REDUCERS/GEARED MOTORS

3.1.1 HL..1

HL1...F



HL1...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	177	180,5	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	191	194,5	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	229	216	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	249	236	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	294,5	257,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	152

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

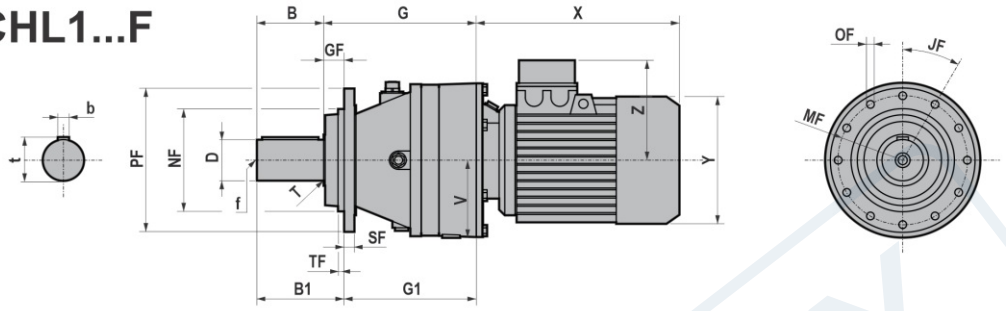
		G2			
IEC	**Pm x Dm**	**HL/PHL 1 010/020**	**HL/PHL 1 030**	**HL/PHL 1 050**	**HL/PHL 1 080**
71	160x14	/	/	/	/
80	200x19	/	/	/	/
90	200x24	/	/	/	/
100-112	250x28	85	/	/	/
132	300x38	110	110	/	/
160	350x42	157,5	157,5	157,5	/
180	350x48	/	/	/	/
200	400x55	/	/	/	185
225	450x60	/	/	/	/

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

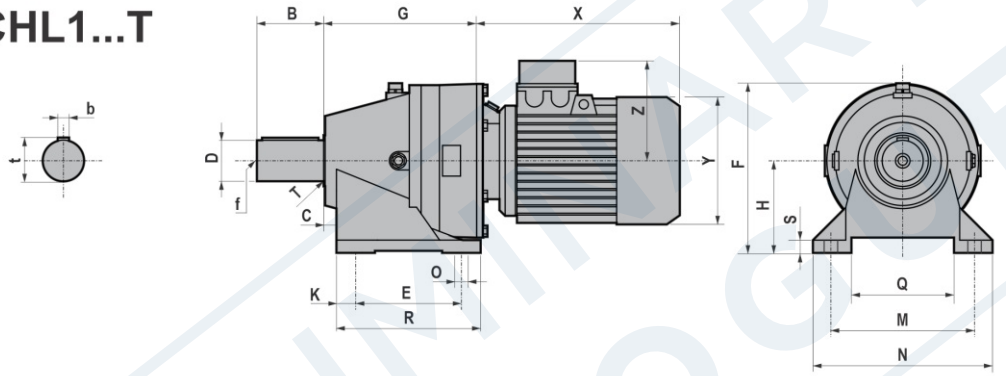
PRELIMINARY CATALOGUE

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	177	180,5	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	191	194,5	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	229	216	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	249	236	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	294,5	257,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	152

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

T (IE1 - IE2 - IE3)									
		71	80	090S	090L	100	112	132S	132M/L
010/ .../050	**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

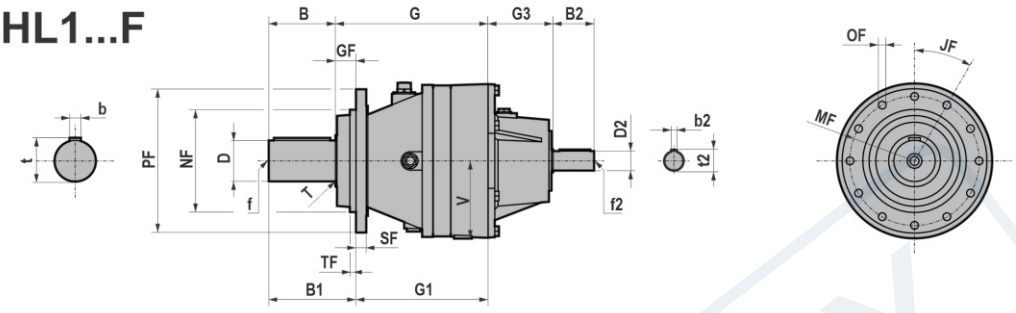
TB (IE1 - IE2 - IE3)									
		71	80	090S	090L	100	112	132S	132M/L
010/ .../050	**X**	286.5	321	353	378	417	453	505	547
	***X**		344	386	411		477		
	Y	139	158	173	173	191	211	249	249
	Z	129	137	157	157	168	183	230	230

*X TP80B4,TP90S4, TP90L4, TP90S6, TP112M4, TP112M6

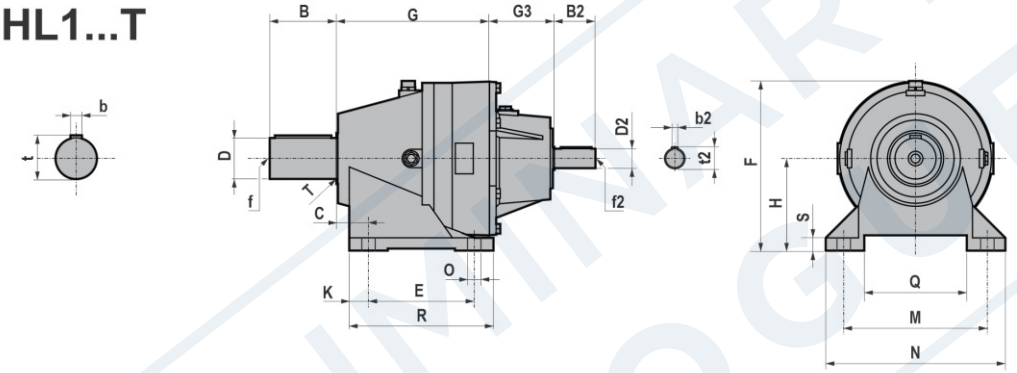
PRELIMINARY CATALOGUE

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
010	50	h6	82	14	53,5	M16	88	177	180,5	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	191	194,5	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	229	216	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	249	236	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126

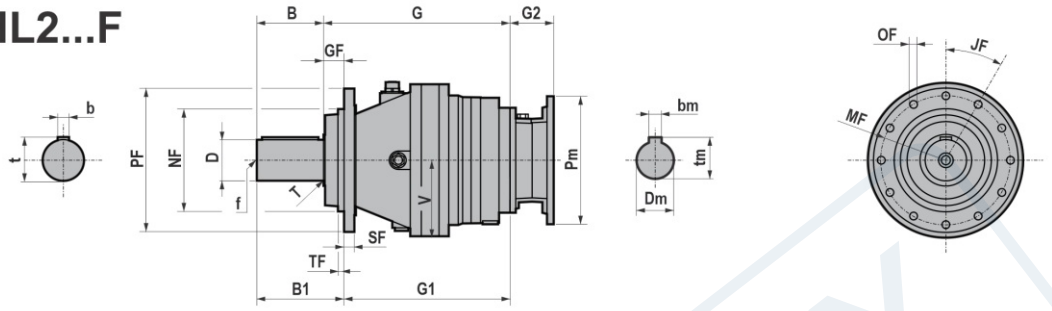
	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13

	G3	D2	B2	b2	t2	f2
010/.../050	113	28 j6	60	8	31	M10

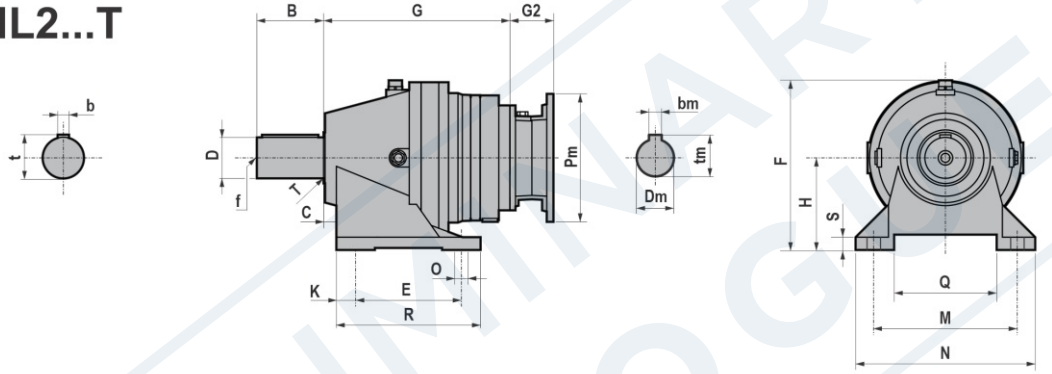
3.1 REDUCERS/GEARED MOTORS

3.1.4 HL..2

HL2...F



HL2...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	235,5	232	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	249,5	246	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	279	256	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	313	300	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	319,5	356,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

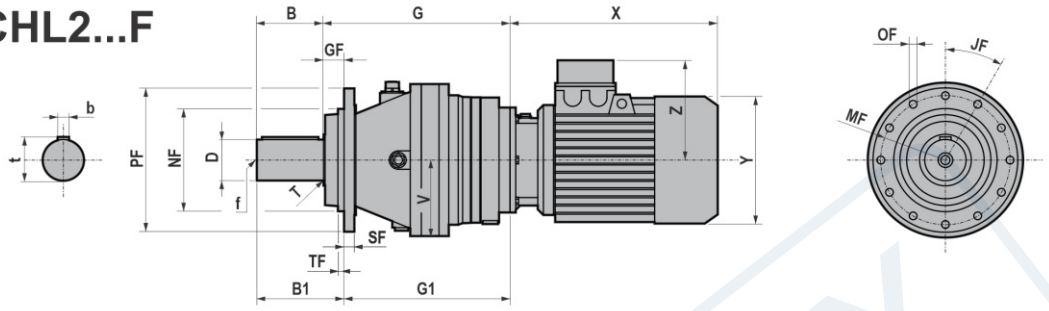
		G2			
IEC	**Pm x Dm**	**HL/PHL 2 010**	**HL/PHL 2 020**	**HL/PHL 2 030**	**HL/PHL 2 050/080**
71	160x14	/	/	/	/
80	200x19	70	70	/	/
90	200x24	70	70	70	/
100-112	250x28	85	85	85	85
132	300x38	110	110	110	110
160	350x42	/	157,5	157,5	157,5
180	350x48	/	/	/	/
200	400x55	/	/	/	/
225	450x60	/	/	/	/

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

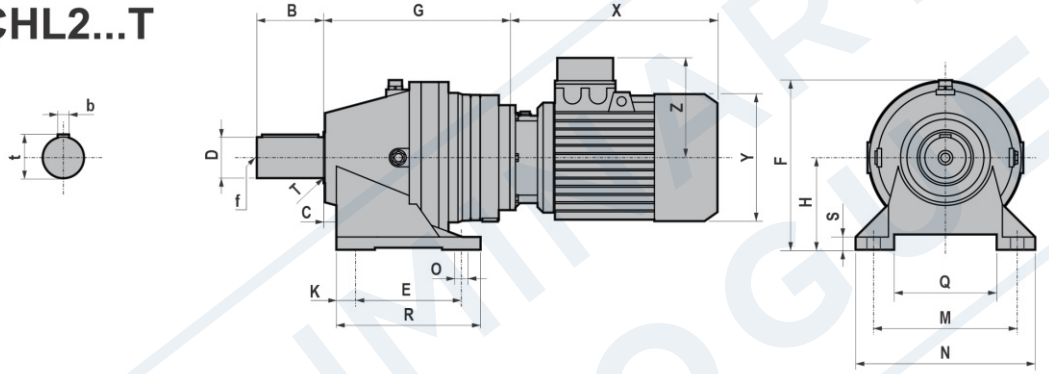
PRELIMINARY CATALOGUE

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
010	50	h6	82	14	53,5	M16	88	235,5	232	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	249,5	246	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	279	256	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	313	300	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	319,5	356,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

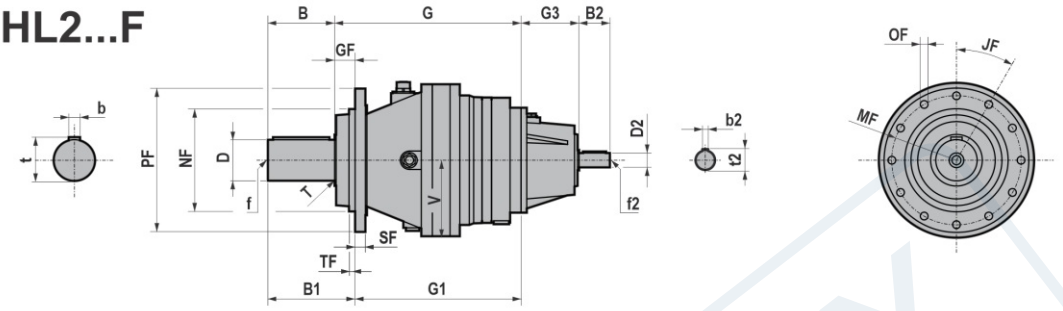
T (IE1 - IE2 - IE3)									
		71	80	090S	090L	100	112	132S	132M/L
010/ .../180	X	221	248	276	301	335	356	405	443
	*X		271	309	334		380		
	Y	139	158	173	173	191	211	249	249
	Z	112	122	130	130	139	154	194	194

TB (IE1 - IE2 - IE3)									
		71	80	090S	090L	100	112	132S	132M/L
010/ .../180	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

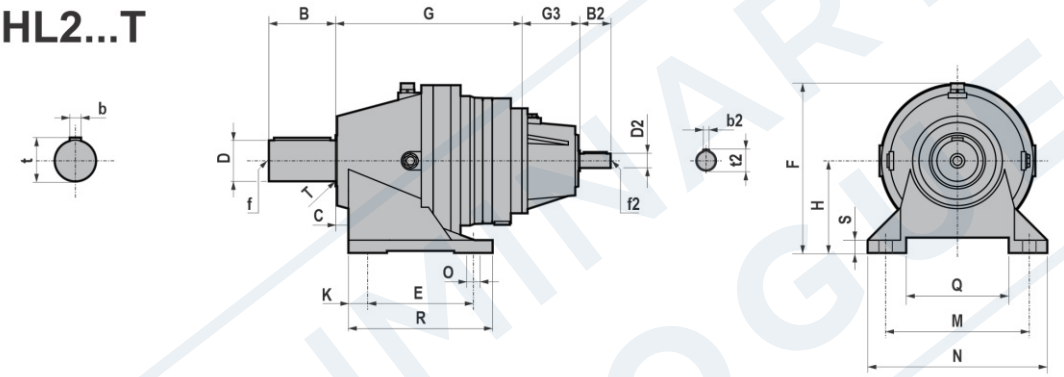
*X TP80B4,TP90S4, TP90L4, TP90S6, TP112M4, TP112M6

3.1.6 IHL..2

IHL2...F



IHL2...T



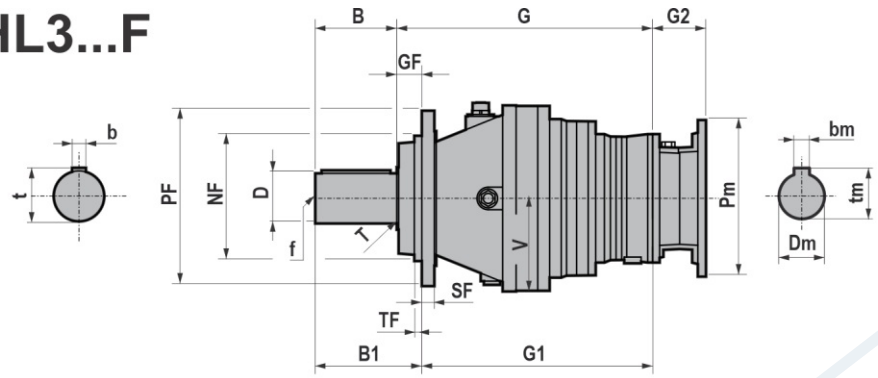
	D		B	b	t	f	B1	G	G1	C	E	F	H	K	M	N	O		Q	R	S	T	V
010	50	h6	82	14	53,5	M16	88	235,5	232	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	249,5	246	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	279	256	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	313	300	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	319,5	356,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

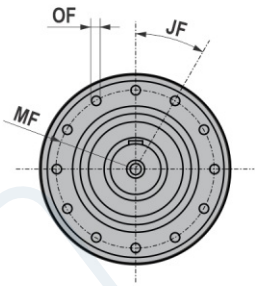
	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

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

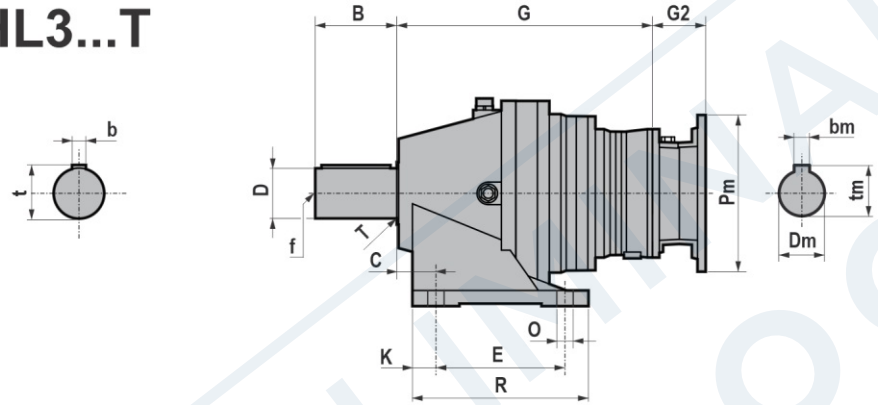
3.1.7 HL..3

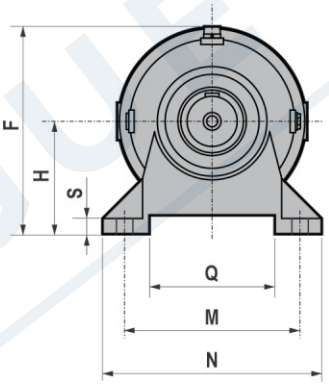
HL3...F





HL3...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	290,5	287	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	304,5	301	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	334	321	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	368	335	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	369,5	406,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

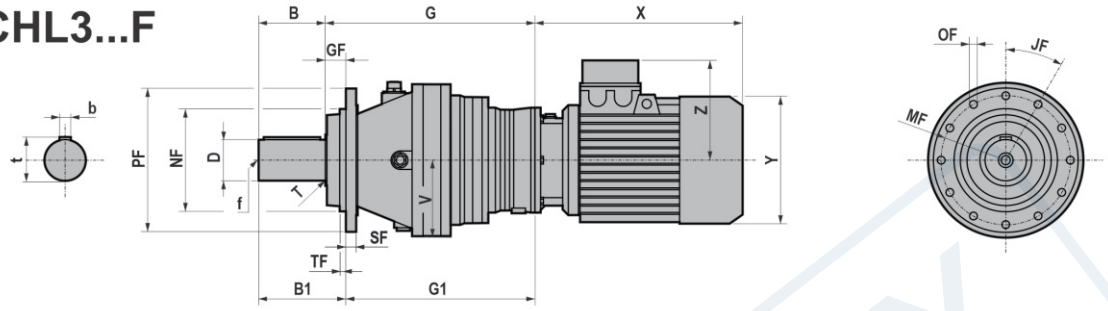
		G2		
IEC	**Pm x Dm**	**HL/PHL 3 010**	**HL/PHL 3 020/030**	**HL/PHL 3 050/080**
71	160x14	49	49	/
80	200x19	70	70	70
90	200x24	70	70	70
100-112	250x28	/	85	85
132	300x38	/	/	110
160	350x42	/	/	157,5
180	350x48	/	/	/

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

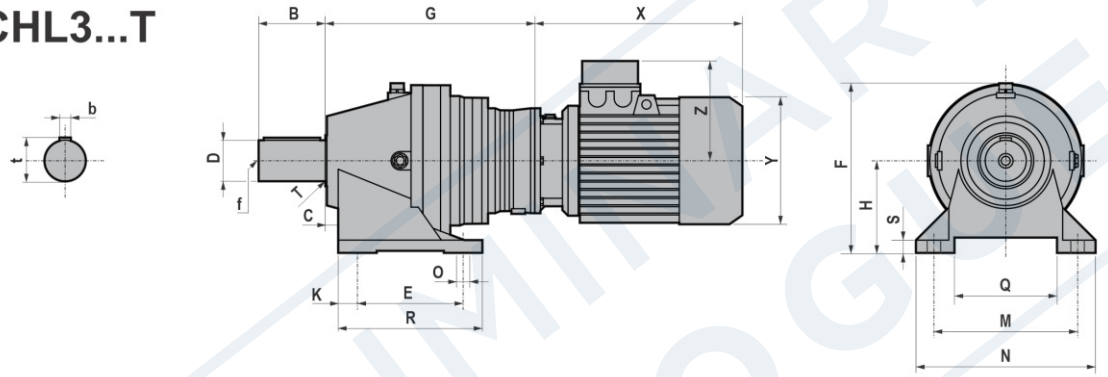
PRELIMINARY CATALOGUE

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	290,5	287	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	304,5	301	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	334	321	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	368	335	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	369,5	406,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

T (IE1 - IE2 - IE3)									
		71	80	090S	090L	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

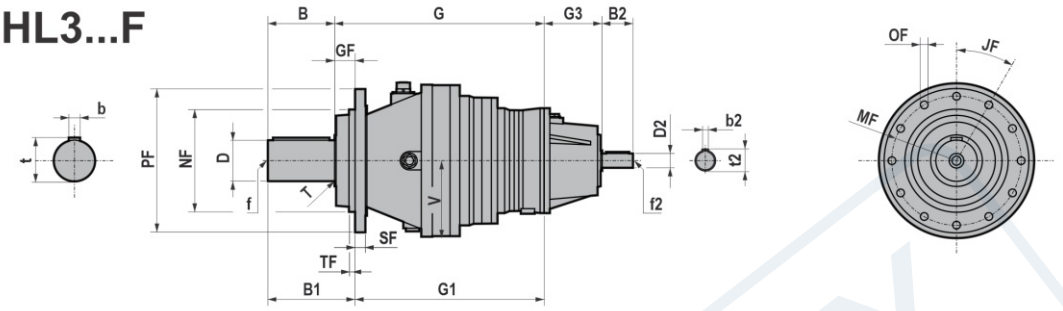
TB (IE1 - IE2 - IE3)									
		71	80	090S	090L	100	112	132S	132M/L
010/ .../080	X	286.5	321	353	378	417	453	505	547
	*X		344	386	411		477		
	Y	139	158	173	173	191	211	249	249
	Z	129	137	157	157	168	183	230	230

*X TP80B4,TP90S4, TP90L4, TP90S6, TP112M4, TP112M6

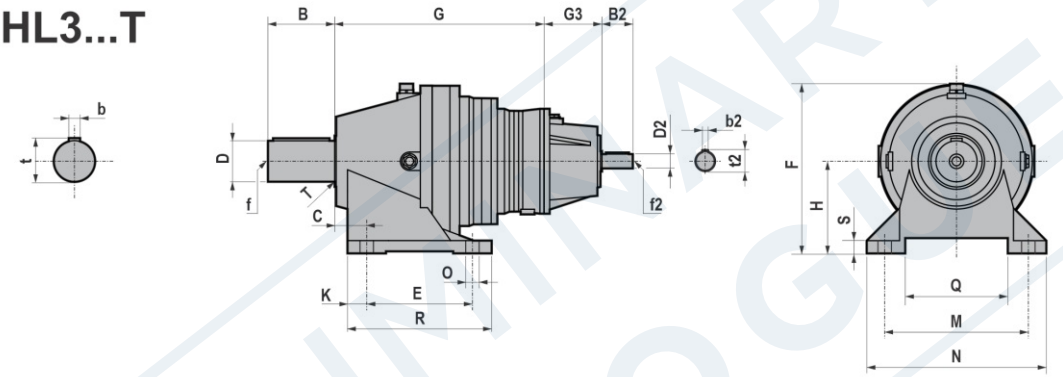
PRELIMINARY CATALOGUE

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
010	50	h6	82	14	53,5	M16	88	290,5	287	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	304,5	301	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	334	321	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	368	335	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	369,5	406,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

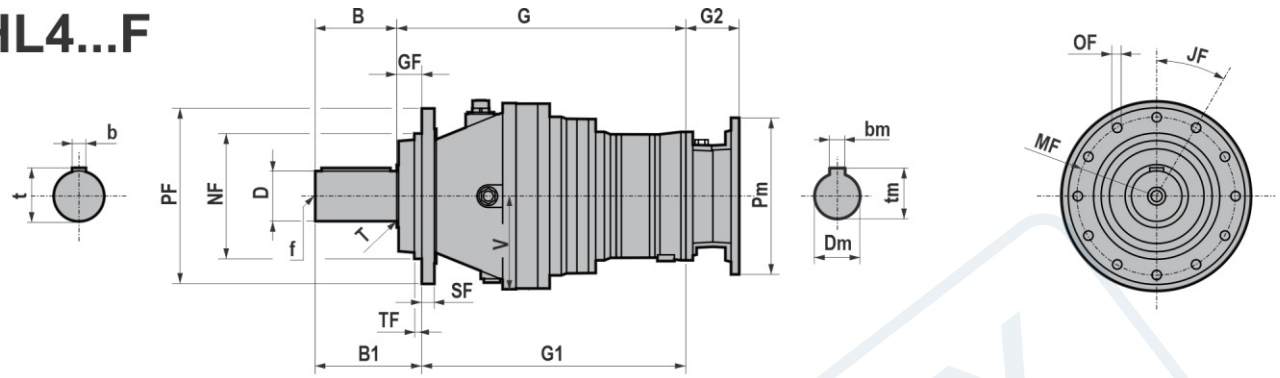
	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

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

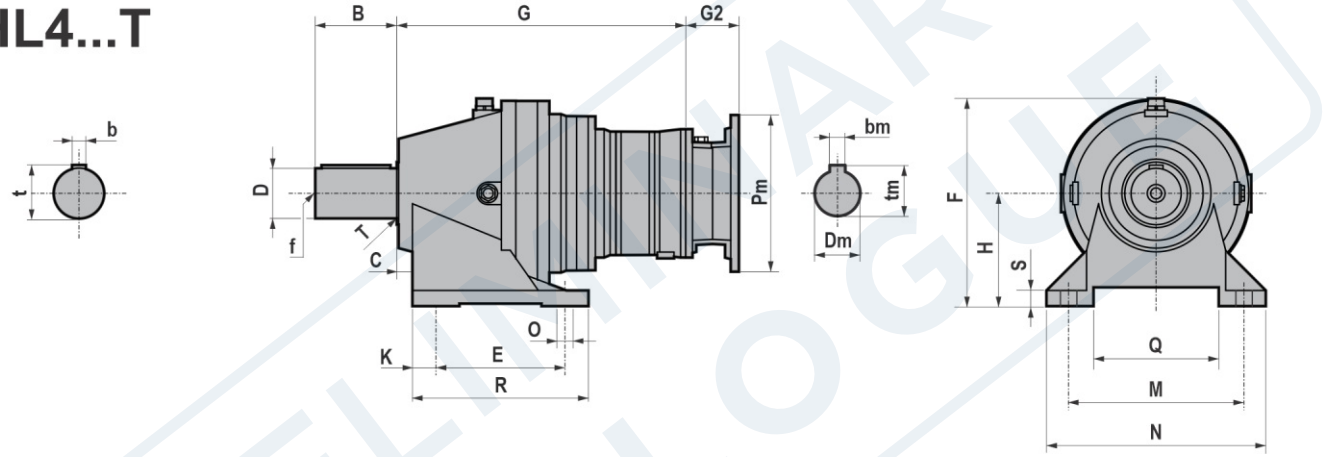
3.1 REDUCERS/GEARED MOTORS

3.1.10 HL..4

HL4...F



HL4...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	345,5	342	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	359,5	356	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	389	376	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	423	410	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	461,5	424,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

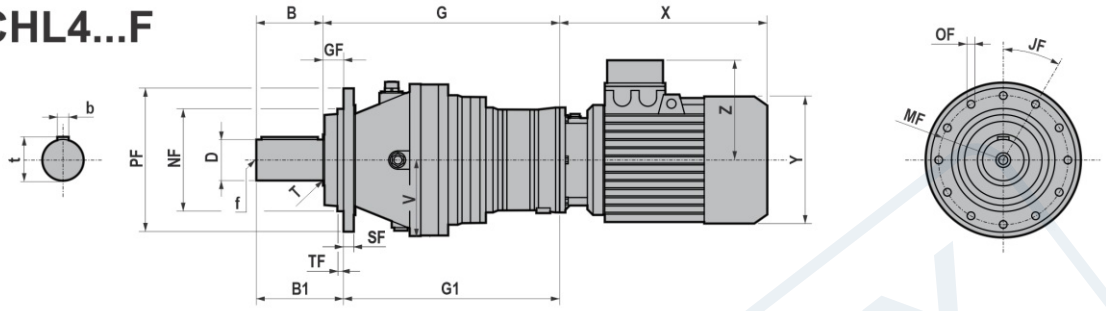
		G2		
IEC	**Pm x Dm**	**HL/PHL 4 020/030**	**HL/PHL 4 050**	**HL/PHL 4 080**
71	160x14	49	49	49
80	200x19	70	70	70
90	200x24	/	70	70
100-112	250x28	/	/	85
132	300x38	/	/	/
160	350x42	/	/	/

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

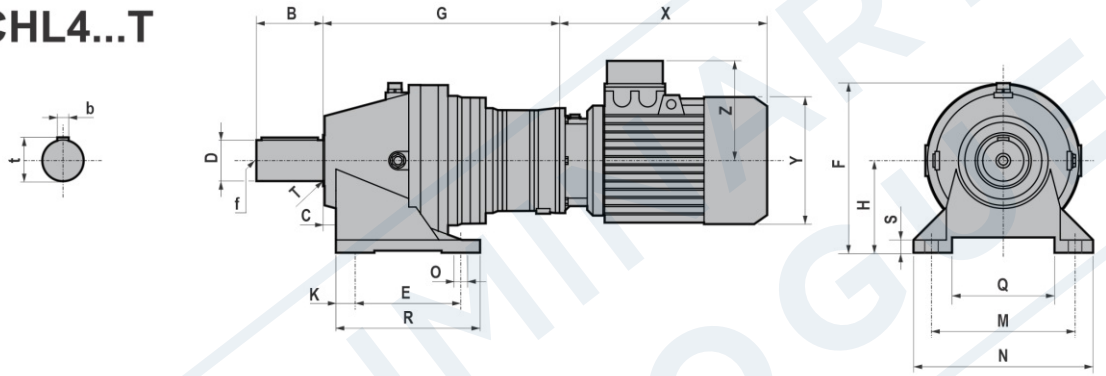
PRELIMINARY CATALOGUE

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
010	50	h6	82	14	53,5	M16	88	345,5	342	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	359,5	356	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	389	376	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	423	410	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	461,5	424,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

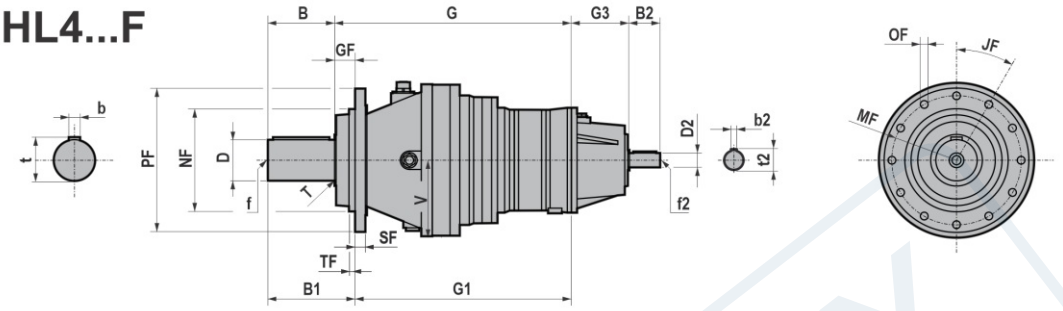
T (IE1 - IE2 - IE3)									
		71	80	090S	090L	100	112	132S	132M/L
010/ .../080	X	221	248	276	301	335	356	405	443
	*X		271	309	334		380		
	Y	139	158	173	173	191	211	249	249
	Z	112	122	130	130	139	154	194	194

TB (IE1 - IE2 - IE3)									
		71	80	090S	090L	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

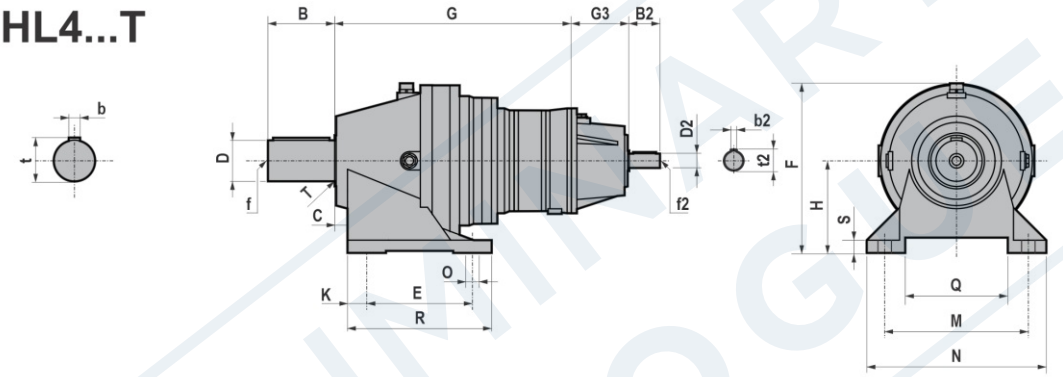
*X TP80B4,TP90S4, TP90L4, TP90S6, TP112M4, TP112M6

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
010	50	h6	82	14	53,5	M16	88	345,5	342	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
020	50	h6	82	14	53,5	M16	88	359,5	356	24	138	233	132	21	216	260	17	n°4	148,5	180	16	1,5	105
030	60	h6	105	18	64	M20	120	389	376	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
050	60	h6	105	18	64	M20	120	423	410	39	169	284	160	33	254	310	18	n°4	176	235	20	2	126
080	80	h6	130	22	85	M20	170	461,5	424,5	65	201	329	180	40	279	350	22	n°4	185,4	281	25	2	149

	PF	MF	NF f7	GF	JF	OF		SF	TF
010 020	185	165	110	6	45°	10,5	n°8	12	5
030 050	222	195	150	15	36°	12,5	n°10	20	13
080	280	250	200	40	30°	15	n°12	20	12

	G3	D2	B2	b2	t2	f2
010/.../080	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

IEC ~[kg]								
* HL/PHL	71	80	90	100-112	132	160	180	200
1-010	/	/	/	32	35	41	/	/
1-020	/	/	/	34	37	43	/	/
1-030	/	/	/	56	59	65	/	/
1-050	/	/	/	/	/	70	/	/
1-080	/	/	/	/	/	/	/	122
2-010	/	38	38	40	43	/	/	/
2-020	/	40	40	42	46	52	/	/
2-030	/	/	61	63	67	73	/	/
2-050	/	/	/	71	74	80	/	/
2-080	/	/	/	110	113	119	/	/
3-010	44	46	46	/	/	/	/	/
3-020	47	48	48	50	/	/	/	/
3-030	68	69	69	71	/	/	/	/
3-050	/	77	77	79	82	89	/	/
3-080	/	117	117	119	123	129	/	/
4-010	/	/	/	/	/	/	/	/
4-020	55	56	/	/	/	/	/	/
4-030	76	77	/	/	/	/	/	/
4-050	84	85	85	/	/	/	/	/
4-080	124	125	125	127	/	/	/	/

	~[kg]
IHL	
1-010	35
1-020	37
1-030	59
1-050	/
1-080	/
2-010	43
2-020	45
2-030	66
2-050	74
2-080	113
3-010	51
3-020	53
3-030	74
3-050	82
3-080	122
4-010	/
4-020	59
4-030	61
4-050	82
4-080	90

PRELIMINARY CATALOGUE

3.2 WEIGHTS

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

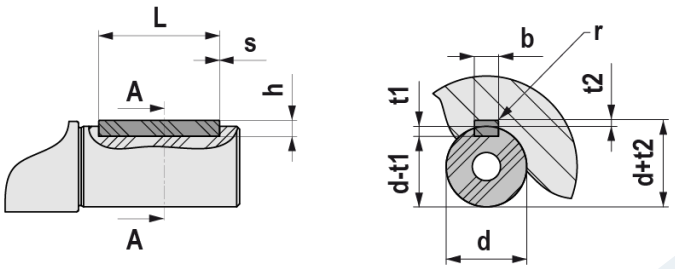
	TP ~[kg]						
CHL	80	090S	090L	100	112	132S	132M
1-010	/	/	/	48	59	85	88
1-020	/	/	/	51	62	88	91
1-030	/	/	/	/	83	109	112
1-050	/	/	/	/	/	/	/
1-080	/	/	/	/	/	/	/
2-010	45	50	52	56	67	93	96
2-020	48	52	54	59	70	96	99
2-030	/	73	75	80	91	117	120
2-050	/	/	/	88	99	125	128
2-080	/	/	/	/	137	163	166
3-010	54	58	60	/	/	/	/
3-020	56	61	63	67	78	/	/
3-030	77	82	84	88	99	/	/
3-050	85	89	91	96	107	133	136
3-080	125	130	132	136	147	173	176
4-010	/	/	/	/	/	/	/
4-020	64	/	/	/	/	/	/
4-030	85	/	/	/	/	/	/
4-050	93	97	99	/	/	/	/
4-080	133	138	140	144	/	/	/

	TBH ~[kg]	
CHL	71	80
1-010	/	/
1-020	/	/
1-030	/	/
1-050	/	/
1-080	/	/
2-010	/	44
2-020	/	47
2-030	/	/
2-050	/	/
2-080	/	/
3-010	51	52
3-020	53,3	55
3-030	74	76
3-050	/	84
3-080	/	124
4-010	/	/
4-020	61	63
4-030	82	84
4-050	90	92
4-080	130	132

	TBP ~[kg]						
CHL	80	090S	090L	100	112	132S	132M
1-010	/	/	/	55	69	99	102
1-020	/	/	/	58	72	102	105
1-030	/	/	/	/	93	123	126
1-050	/	/	/	/	/	/	/
1-080	/	/	/	/	/	/	/
2-010	49	53	58	63	77	107	110
2-020	51	56	60	66	80	110	113
2-030	/	77	81	87	101	131	134
2-050	/	/	/	95	109	139	142
2-080	/	/	/	/	147	177	180
3-010	57	62	66	/	/	/	/
3-020	60	64	68	74	88	/	/
3-030	81	85	89	95	109	/	/
3-050	88	93	97	103	117	147	150
3-080	129	133	137	143	157	187	190
4-010	/	/	/	/	/	/	/
4-020	68	/	/	/	/	/	/
4-030	89	/	/	/	/	/	/
4-050	96	101	105	/	/	/	/
4-080	137	141	145	151	/	/	/

PRELIMINARY CATALOGUE

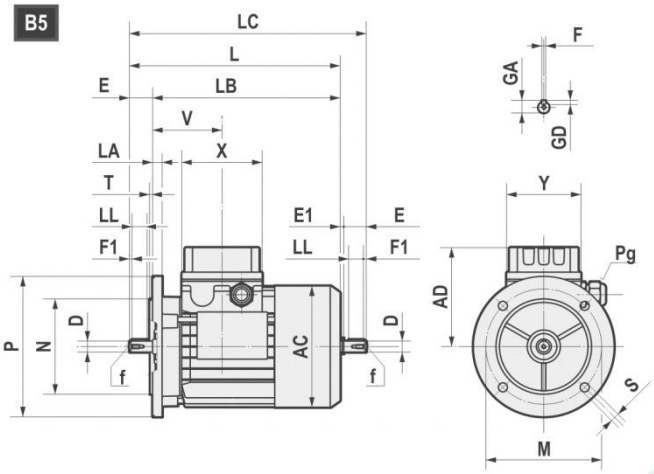
3.3 SHAFT END

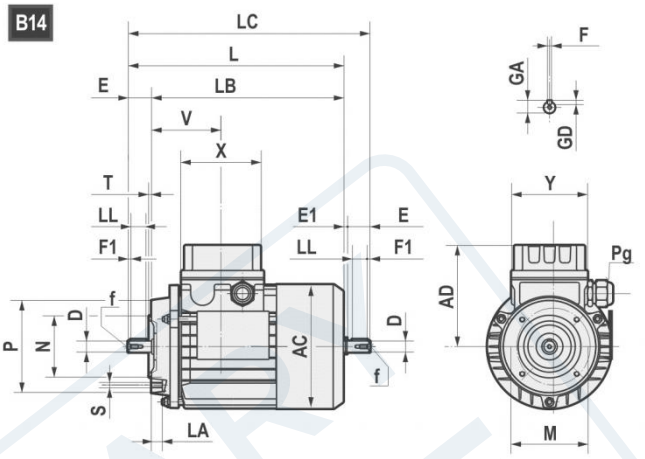


UNI 6604 - DIN 6885													
d			b x h			Tol. b / h	L		s min / max	b	t1	t2	Tol. t1 / t2	r max
	6	8	2	×	2	h9 / h9	6	20	0,16 0,25	2	1,2	1	0,1 0	0,08 0,16
>	8	10	3	×	3		6	36		3	1,8	1,4		
>	10	12	4	×	4		8	45		4	2,5	1,8		
>	12	17	5	×	5		10	56	0,25 0,4	5	3	2,3		0,16 0,25
>	17	22	6	×	6		14	70		6	3	2,8	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

PRELIMINARY CATALOGUE

3.4.1 Electric motors





	AC	AD	L	LB	LC	X	Y	V	D	E	E1	f	F1	GA	F	GD
63	121	104	211	188	235,5	80	74	69	11 j6	23	1,5	M4x10	2,5	12,5	4	4
71	139	112	238,5	208,5	271	80	74	74,5	14 j6	30	2,5	M5x12.5	3	16	5	5
80	158	122	272,5 *296	232,5 *256	314 *337	80	74	78	19 j6	40	1,5	M6x16	5	21,5	6	6
90S	173	146	298 *331	248 *281	349,5 *381	98	98	89,5	24 j6	50	1,5	M8x19	5	27	8	7
90L	173	146	323 *356	273 *306	374,5 *408	98	98	89,5	24 j6	50	1,5	M8x19	5	27	8	7
100	191	155	368	308	431,5	98	98	97,5	28 j6	60	3,5	M10x22	7,5	31	8	7
112	211	170	382,5 *408	322,5 *348	447 *472	98	98	100	28 j6	60	3,5	M10x22	7,5	31	8	7
132S	249	195	452	372	536,5	118	118	115,5	38 k6	80	4	M12x28	10	41	10	8
132L	249	195	490	410	574,5	118	118	115,5	38 k6	80	4	M12x28	10	41	10	8
160S	249	195	520	410	/	118	118	115,5	42k6	100	/	M16x36	10	45	12	8

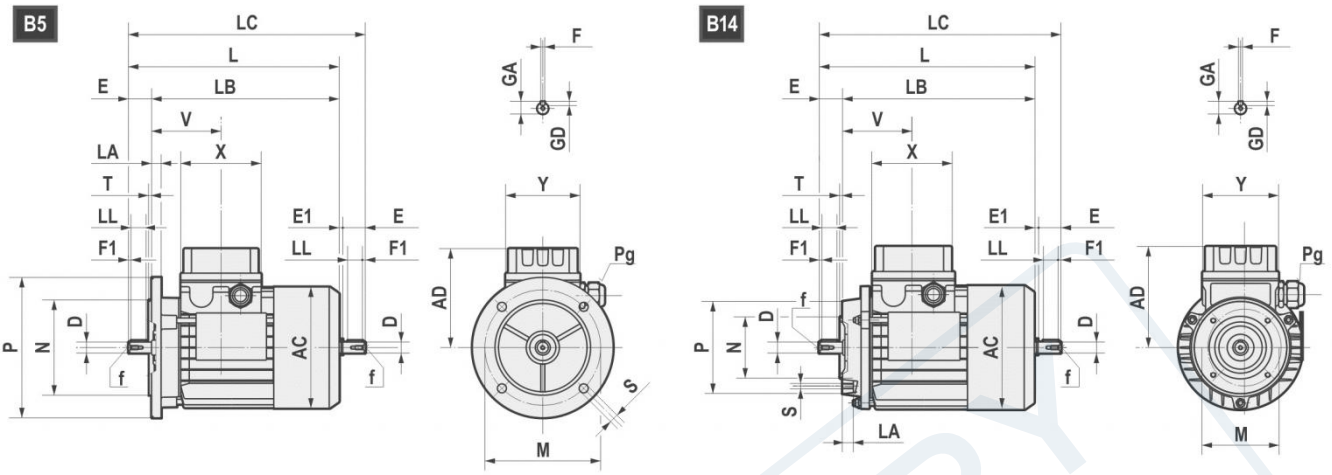
*TP80B4,TP90S4, TP90L4, TP90S6, TP112M4, TP112M6

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

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

PRELIMINARY CATALOGUE

3.4 ELECTRIC MOTORS



		AC	AD	L	LB	X	D	E	f	GA	F	GD	LL	Pg	
160M	2-4-6	314	251	600	490	158	42	110	M16	45	12	8	90	2-M40x1,5	1-M16x1,5
160L	2-4-6	314	251	645	535	158	42	110	M16	45	12	8	90	2-M40x1,5	1-M16x1,5
180M	2-4	355	267	680	570	158	48	110	M16	51,5	14	9	100	2-M40x1,5	1-M16x1,5
180L	4-6	355	267	720	610	158	48	110	M16	51,5	14	9	100	2-M40x1,5	1-M16x1,5
200L	2-4-6	397	300	785	675	187	55	110	M20	59	16	10	100	2-M50x1,5	1-M16x1,5
225S	4	446	325	820	680	187	60	140	M20	64	18	11	125	2-M50x1,5	1-M16x1,5
225M	2	446	325	815	705	187	55	110	M20	59	16	10	100	2-M50x1,5	1-M16x1,5
225M	4-6	446	325	845	705	187	60	140	M20	64	18	11	125	2-M50x1,5	1-M16x1,5
250M	2-4-6	485	360	910	770	238	60	140	M20	64	18	11	125	2-M63x1,5	1-M16x1,5
250M	2-4-6	485	360	910	770	238	65	140	M20	69	18	11	125	2-M63x1,5	1-M16x1,5
280S	2-4-6	547	390	970	830	238	65	140	M20	69	18	11	125	2-M63x1,5	1-M16x1,5
280S	2-4-6	547	390	970	830	238	75	140	M20	79,5	20	12	125	2-M63x1,5	1-M16x1,5
280M	2-4-6	547	390	1025	885	238	65	140	M20	69	18	11	125	2-M63x1,5	1-M16x1,5
280M	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
160	300	250	350	13	19	5
180	300	250	350	15	19	5
200	350	300	400	17	19	5
225	400	350	450	20	19	5
250	500	450	550	22	19	5
280	500	450	550	22	19	5

PRELIMINARY CATALOGUE

3.4.2 Standard high efficiency (TS), high (TH) 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.

Table of Motovario commercial availability

	EFFICIENCY LEVEL		
NOMINAL POWER [kW]	**IE1**	**IE2**	**IE3**
Pn < 0,12	TS-TBS	-	-
0,12 ≤ Pn < 0,75	-	TH-TBH	TP-TBP (**)
Pn ≥ 0,75	-	-	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.

3.4.3 Nominal power - [kW]

	63A			63B		63C	63D	71A		71B		71C
P.	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

	80A		80B		90S	90L	100LR	100LA	100L	112MR	112MS	112M
P.	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

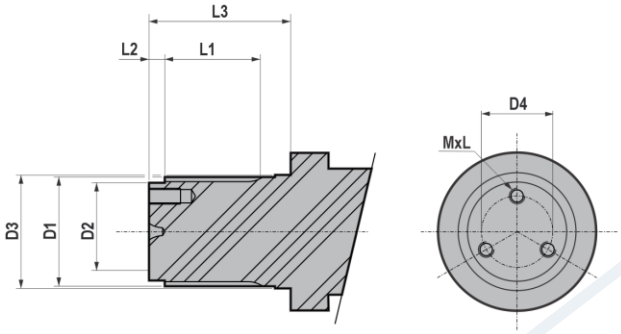
	132S	132MS	132MA	132MB	132M
P.	TP	TP	TP	TP	TP
2	5,5	-	-	-	7,5
4	-	5,5	-	-	7,5
6	3	-	4	5,5	-

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

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

PRELIMINARY CATALOGUE

4.1 LOW SPEED SHAFTS



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

PRELIMINARY CATALOGUE

5.1 HL GEAR REDUCER - 1400 rpm

HL 1 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
470	3,44	20,6	407
490	4,32	17,1	324
470	5,37	13,2	261
410	7,38	8,39	190
320	9,30	5,20	151

HL 1 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
840	3,44	36,9	407
880	4,32	30,8	324
930	5,37	26,2	261
750	7,38	15,4	190
630	9,30	10,2	151

HL 1 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1380	3,44	60,6	407
1430	4,32	50,0	324
1490	5,37	41,9	261
1400	6,19	34,2	226
1220	7,38	25,0	190
750	9,30	12,2	151

HL 1 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2370	3,44	104	407
2450	4,32	85,7	324
2560	5,37	72,1	261
2650	6,19	64,7	226
2270	7,38	46,5	190

HL 1 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
3760	3,60	158	389
3890	4,25	138	329
4060	5,33	115	263
4200	6,20	102	226
4090	7,50	82,4	187

PRELIMINARY CATALOGUE

5.1 HL GEAR REDUCER - 1400 rpm

HL 2 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
650	11,8	8,55	118
720	14,9	7,55	94,2
750	18,7	6,26	75,0
800	23,2	5,37	60,4
650	28,8	3,51	48,6
840	31,9	4,10	43,9
650	39,6	2,55	35,3
840	40,2	3,26	34,8
650	49,9	2,03	28,0
600	68,7	1,36	20,4

HL 2 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1050	11,8	13,8	118
1280	14,9	13,4	94,2
1360	18,7	11,4	75,0
1490	23,2	10,0	60,4
1300	28,8	7,03	48,6
1580	31,9	7,72	43,9
1300	39,6	5,11	35,3
1340	40,2	5,20	34,8
1300	49,9	4,06	28,0
1150	68,7	2,61	20,4

HL 2 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1640	11,8	21,6	118
1920	14,9	20,1	94,2
2020	18,7	16,9	75,0
1820	21,3	13,3	65,8
2100	23,2	14,1	60,4
1820	26,7	10,6	52,4
2000	28,8	10,8	48,6
1740	31,9	8,50	43,9
1820	33,2	8,54	42,1
2150	39,6	8,45	35,3
1820	45,7	6,21	30,6
1820	57,5	4,93	24,3

HL 2 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2930	11,8	38,6	118
3520	14,9	36,9	94,2
3650	18,7	30,5	75,0
3250	21,3	23,8	65,8
3940	23,2	26,5	60,4
3530	26,7	20,6	52,4
3830	28,8	20,7	48,6
3200	31,9	15,6	43,9
3560	33,2	16,7	42,1
4000	39,6	15,7	35,3
3560	45,7	12,1	30,6
3540	57,5	9,59	24,3

HL 2 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
4820	12,4	60,6	113
5690	14,6	60,6	95,7
5890	18,4	50,0	76,3
6140	22,8	41,9	61,4
6370	26,3	37,7	53,2
6700	28,6	36,5	48,9
6870	33,0	32,4	42,4
6270	38,4	25,5	36,5
6270	45,8	21,3	30,6
4750	55,4	13,4	25,3
4800	69,8	10,7	20,1

PRELIMINARY CATALOGUE

5.1 HL GEAR REDUCER - 1400 rpm

HL 3 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
850	51,2	2,67	27,4
850	64,2	2,13	21,8
850	80,6	1,69	17,4
720	87,4	1,32	16,0
860	100	1,38	14,0
860	110	1,26	12,8
860	125	1,11	11,2
860	138	1,00	10,2
820	155	0,851	9,05
880	174	0,814	8,07
750	188	0,642	7,46
910	216	0,678	6,49
910	236	0,621	5,94
910	297	0,493	4,72
850	369	0,370	3,80

HL 3 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1630	51,2	5,12	27,4
1650	64,2	4,13	21,8
1670	80,6	3,33	17,4
1200	87,4	2,20	16,0
1700	100	2,73	14,0
1740	110	2,55	12,8
1750	125	2,26	11,2
1750	138	2,04	10,2
1500	155	1,56	9,05
1800	174	1,67	8,07
1250	188	1,07	7,46
1820	216	1,36	6,49
1820	236	1,24	5,94
1850	297	1,00	4,72
1600	369	0,697	3,80

HL 3 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2250	51,2	7,07	27,4
2510	64,2	6,28	21,8
1920	73,3	4,21	19,1
2560	80,6	5,10	17,4
1950	92,0	3,41	15,2
2580	100	4,14	14,0
1950	114	2,74	12,2
2600	125	3,35	11,2
2650	138	3,09	10,2
2250	155	2,34	9,05
2700	171	2,53	8,17
1970	197	1,60	7,09
2720	216	2,03	6,49
1970	249	1,27	5,63
2300	293	1,26	4,78
1970	309	1,02	4,53
2350	369	1,02	3,80
2000	425	0,756	3,29

HL 3 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
4100	51,2	12,9	27,4
4750	64,2	11,9	21,8
3650	73,3	8,00	19,1
4900	80,6	9,76	17,4
3650	92,0	6,37	15,2
5030	100	8,06	14,0
3650	114	5,13	12,2
5050	125	6,52	11,2
5180	138	6,04	10,2
4450	155	4,62	9,05
5200	171	4,88	8,17
3650	197	2,97	7,09
5000	216	3,72	6,49
3750	249	2,42	5,63
4500	293	2,47	4,78
3750	309	1,95	4,53
4500	369	1,96	3,80
3800	425	1,44	3,29

PRELIMINARY CATALOGUE

5.1 HL GEAR REDUCER - 1400 rpm

HL 3 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
7000	53,5	21,0	26,2
7700	63,2	19,6	22,2
8350	79,3	16,9	17,7
6890	83,5	13,3	16,8
7410	90,5	13,2	15,5
8900	98,6	14,5	14,2
7410	114	10,5	12,3
7790	122	10,2	11,4
7900	143	8,90	9,82
7900	168	7,53	8,31
7500	194	6,20	7,21
8110	211	6,16	6,62
6520	232	4,52	6,04
8180	244	5,39	5,74
7300	266	4,40	5,26
7300	291	4,03	4,81
7300	307	3,82	4,56
6300	357	2,84	3,92
5670	409	2,23	3,42

PRELIMINARY CATALOGUE

5.1 HL GEAR REDUCER - 1400 rpm

HL 4 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1000	348	0,475	4,02
1010	433	0,386	3,23
1020	474	0,356	2,95
1060	538	0,326	2,60
1070	668	0,265	2,09
1110	740	0,248	1,89
1130	811	0,231	1,73
1160	919	0,209	1,52
1170	1020	0,190	1,38
1200	1160	0,172	1,21
1220	1260	0,160	1,11
880	1440	0,101	0,973
1250	1590	0,130	0,879
1250	1740	0,119	0,805
860	2160	0,0659	0,648
1000	2720	0,0608	0,514

HL 4 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1980	348	0,941	4,02
2000	433	0,765	3,23
2040	474	0,712	2,95
2110	538	0,650	2,60
2150	668	0,533	2,09
2220	740	0,497	1,89
2240	811	0,458	1,73
2290	919	0,412	1,52
2320	1020	0,378	1,38
2370	1160	0,339	1,21
2400	1260	0,314	1,11
1700	1440	0,196	0,973
2400	1590	0,250	0,879
2000	1740	0,190	0,805
1720	2160	0,132	0,648
1720	2720	0,105	0,514

HL 4 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2790	348	1,33	4,02
2810	433	1,08	3,23
2810	474	0,981	2,95
2810	538	0,865	2,60
2810	668	0,696	2,09
2830	740	0,633	1,89
2450	831	0,488	1,69
2830	919	0,510	1,52
2880	1020	0,469	1,38
2500	1140	0,362	1,23
2970	1260	0,389	1,11
2550	1440	0,293	0,973
2970	1590	0,309	0,879
2750	1740	0,262	0,805
2800	1980	0,234	0,707
2750	2190	0,208	0,639
2200	2280	0,160	0,614
2200	2490	0,146	0,562
2700	2720	0,164	0,514

HL 4 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
5400	348	2,57	4,02
5490	433	2,10	3,23
5490	474	1,92	2,95
5500	538	1,69	2,60
5500	668	1,36	2,09
5520	740	1,24	1,89
4800	831	0,957	1,69
5520	919	0,994	1,52
5570	1020	0,906	1,38
4850	1140	0,703	1,23
5750	1260	0,753	1,11
5100	1440	0,587	0,973
5800	1590	0,603	0,879
4700	1740	0,447	0,805
5400	1980	0,452	0,707
4500	2190	0,340	0,639
4000	2280	0,290	0,614
4000	2490	0,266	0,562
4500	2720	0,274	0,514

PRELIMINARY CATALOGUE

5.1 HL GEAR REDUCER - 1400 rpm

HL 4 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
7100	395	2,98	3,54
9850	467	3,50	3,00
9850	529	3,08	2,65
9850	586	2,78	2,39
9500	658	2,39	2,13
9850	728	2,24	1,92
8350	825	1,68	1,70
9550	905	1,75	1,55
9700	1000	1,60	1,40
9600	1140	1,40	1,23
9850	1260	1,29	1,11
8900	1430	1,03	0,979
10100	1570	1,07	0,893
8900	1800	0,819	0,778
7000	2090	0,554	0,669
8800	2270	0,643	0,618
7000	2500	0,464	0,561
8500	2700	0,520	0,518

PRELIMINARY CATALOGUE

5.2 HL GEAR REDUCER - 900 rpm

HL 1 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
530	3,44	15,0	262
560	4,32	12,6	208
530	5,37	9,59	168
460	7,38	6,05	122
340	9,30	3,55	96,8

HL 1 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
900	3,44	25,4	262
990	4,32	22,3	208
1050	5,37	19,0	168
850	7,38	11,2	122
710	9,30	7,42	96,8

HL 1 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1560	3,44	44,0	262
1620	4,32	36,4	208
1680	5,37	30,4	168
1580	6,19	24,8	145
1380	7,38	18,2	122
850	9,30	8,88	96,8

HL 1 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2680	3,44	75,7	262
2770	4,32	62,3	208
2890	5,37	52,3	168
3000	6,19	47,1	145
2560	7,38	33,7	122

HL 1 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
4250	3,60	115	250
4390	4,25	100	212
4580	5,33	83,4	169
4750	6,20	74,4	145
4270	7,50	55,3	120

PRELIMINARY CATALOGUE

5.2 HL GEAR REDUCER - 900 rpm

HL 2 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
690	11,8	5,84	76,0
790	14,9	5,32	60,5
820	18,7	4,40	48,2
840	23,2	3,63	38,8
650	28,8	2,26	31,2
850	31,9	2,67	28,2
650	39,6	1,64	22,7
850	40,2	2,12	22,4
650	49,9	1,30	18,0
600	68,7	0,875	13,1

HL 2 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1140	11,8	9,64	76,0
1440	14,9	9,70	60,5
1530	18,7	8,21	48,2
1600	23,2	6,91	38,8
1350	28,8	4,69	31,2
1620	31,9	5,09	28,2
1350	39,6	3,41	22,7
1510	40,2	3,76	22,4
1350	49,9	2,71	18,0
1200	68,7	1,75	13,1

HL 2 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1700	11,8	14,4	76,0
1980	14,9	13,3	60,5
2280	18,7	12,2	48,2
1850	21,3	8,70	42,3
2210	23,2	9,55	38,8
1850	26,7	6,93	33,7
2100	28,8	7,30	31,2
1900	31,9	5,97	28,2
1850	33,2	5,58	27,1
2220	39,6	5,61	22,7
1850	45,7	4,06	19,7
1850	57,5	3,22	15,6

HL 2 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
3040	11,8	25,7	76,0
3590	14,9	24,2	60,5
4120	18,7	22,1	48,2
3560	21,3	16,7	42,3
4290	23,2	18,5	38,8
3600	26,7	13,5	33,7
4200	28,8	14,6	31,2
3600	31,9	11,3	28,2
3600	33,2	10,9	27,1
4240	39,6	10,7	22,7
3600	45,7	7,89	19,7
3600	57,5	6,27	15,6

HL 2 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
5410	12,4	43,7	72,6
6390	14,6	43,8	61,5
6650	18,4	36,3	49,0
6840	22,8	30,0	39,4
6780	26,3	25,8	34,2
7040	28,6	24,6	31,4
7150	33,0	21,7	27,3
6480	38,4	16,9	23,5
6480	45,8	14,2	19,7
5000	55,4	9,04	16,3
5100	69,8	7,32	12,9

PRELIMINARY CATALOGUE

5.2 HL GEAR REDUCER - 900 rpm

HL 3 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
860	51,2	1,74	17,6
860	64,2	1,38	14,0
860	80,6	1,10	11,2
750	87,4	0,886	10,3
900	100	0,928	8,98
900	110	0,847	8,20
900	125	0,746	7,23
900	138	0,674	6,53
870	155	0,581	5,82
950	174	0,565	5,19
750	188	0,413	4,80
990	216	0,474	4,17
990	236	0,434	3,82
990	297	0,345	3,03
900	369	0,252	2,44

HL 3 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1670	51,2	3,37	17,6
1690	64,2	2,72	14,0
1710	80,6	2,19	11,2
1240	87,4	1,46	10,3
1740	100	1,79	8,98
1780	110	1,67	8,20
1810	125	1,50	7,23
1810	138	1,36	6,53
1550	155	1,03	5,82
1890	174	1,12	5,19
1290	188	0,710	4,80
1910	216	0,914	4,17
1910	236	0,837	3,82
1940	297	0,675	3,03
1650	369	0,462	2,44

HL 3 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2310	51,2	4,66	17,6
2570	64,2	4,13	14,0
1950	73,3	2,75	12,3
2640	80,6	3,38	11,2
1980	92,0	2,22	9,78
2660	100	2,74	8,98
1980	114	1,79	7,87
2680	125	2,22	7,23
2700	138	2,02	6,53
2280	155	1,52	5,82
2720	171	1,64	5,26
2000	197	1,05	4,56
2750	216	1,32	4,17
2000	249	0,831	3,62
2400	293	0,847	3,07
2030	309	0,679	2,91
2400	369	0,672	2,44
2100	425	0,510	2,12

HL 3 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
4290	51,2	8,66	17,6
4980	64,2	8,01	14,0
3700	73,3	5,21	12,3
5200	80,6	6,66	11,2
3700	92,0	4,15	9,78
5310	100	5,47	8,98
3700	114	3,34	7,87
5310	125	4,40	7,23
5310	138	3,98	6,53
4570	155	3,05	5,82
5320	171	3,21	5,26
3700	197	1,94	4,56
5170	216	2,48	4,17
3800	249	1,58	3,62
4670	293	1,65	3,07
3900	309	1,30	2,91
4690	369	1,31	2,44
4000	425	0,972	2,12

PRELIMINARY CATALOGUE

5.2 HL GEAR REDUCER - 900 rpm

HL 3 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
7300	53,5	14,1	16,8
8540	63,2	14,0	14,2
9090	79,3	11,8	11,3
7310	83,5	9,04	10,8
8000	90,5	9,13	9,95
9610	98,6	10,1	9,13
8000	114	7,27	7,92
8050	122	6,79	7,35
8120	143	5,88	6,31
8120	168	4,98	5,34
8000	194	4,25	4,63
8330	211	4,07	4,26
6650	232	2,96	3,88
8550	244	3,62	3,69
7540	266	2,92	3,38
7540	291	2,68	3,09
7540	307	2,54	2,93
6460	357	1,87	2,52
5910	409	1,49	2,20

PRELIMINARY CATALOGUE

5.2 HL GEAR REDUCER - 900 rpm

HL 4 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1070	348	0,327	2,58
1100	433	0,271	2,08
1110	474	0,249	1,90
1130	538	0,224	1,67
1150	668	0,183	1,35
1200	740	0,173	1,22
1220	811	0,160	1,11
1250	919	0,145	0,979
1250	1020	0,131	0,884
1250	1160	0,115	0,777
1250	1260	0,105	0,712
940	1440	0,0695	0,625
1250	1590	0,0836	0,565
1250	1740	0,0765	0,517
900	2160	0,0443	0,416
1000	2720	0,0391	0,331

HL 4 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2120	348	0,648	2,58
2140	433	0,526	2,08
2180	474	0,489	1,90
2250	538	0,445	1,67
2290	668	0,365	1,35
2360	740	0,340	1,22
2390	811	0,314	1,11
2440	919	0,283	0,979
2460	1020	0,257	0,884
2460	1160	0,226	0,777
2460	1260	0,207	0,712
1720	1440	0,127	0,625
2460	1590	0,164	0,565
2000	1740	0,122	0,517
1720	2160	0,0847	0,416
1720	2720	0,0673	0,331

HL 4 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2810	348	0,859	2,58
2830	433	0,696	2,08
2840	474	0,638	1,90
2870	538	0,568	1,67
2870	668	0,457	1,35
2870	740	0,413	1,22
2600	831	0,333	1,08
2870	919	0,332	0,979
2920	1020	0,305	0,884
2650	1140	0,247	0,788
2970	1260	0,250	0,712
2700	1440	0,200	0,625
2970	1590	0,199	0,565
2800	1740	0,171	0,517
2850	1980	0,153	0,455
2800	2190	0,136	0,411
2250	2280	0,105	0,395
2250	2490	0,0961	0,361
2750	2720	0,108	0,331

HL 4 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
5440	348	1,66	2,58
5530	433	1,36	2,08
5530	474	1,24	1,90
5610	538	1,11	1,67
5610	668	0,894	1,35
5610	740	0,807	1,22
5050	831	0,647	1,08
5610	919	0,650	0,979
5610	1020	0,587	0,884
5100	1140	0,475	0,788
5800	1260	0,488	0,712
5350	1440	0,396	0,625
5800	1590	0,388	0,565
4900	1740	0,300	0,517
5600	1980	0,301	0,455
4700	2190	0,228	0,411
4200	2280	0,196	0,395
4200	2490	0,179	0,361
4600	2720	0,180	0,331

PRELIMINARY CATALOGUE

5.2 HL GEAR REDUCER - 900 rpm

HL 4 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
7400	395	1,99	2,28
9910	467	2,26	1,93
9910	529	1,99	1,70
9930	586	1,80	1,54
9650	658	1,56	1,37
9950	728	1,46	1,24
8700	825	1,12	1,09
9720	905	1,14	0,995
9900	1000	1,05	0,899
9740	1140	0,910	0,790
10100	1260	0,853	0,714
9050	1430	0,674	0,630
10100	1570	0,686	0,574
9050	1800	0,535	0,500
7100	2090	0,361	0,430
8900	2270	0,418	0,397
7100	2500	0,303	0,360
8500	2700	0,335	0,333

PRELIMINARY CATALOGUE

5.3 HL GEAR REDUCER - 500 rpm

HL 1 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
600	3,44	9,41	145
690	4,32	8,62	116
630	5,37	6,33	93,1
530	7,38	3,87	67,7
370	9,30	2,15	53,8

HL 1 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1000	3,44	15,7	145
1220	4,32	15,2	116
1250	5,37	12,6	93,1
1050	7,38	7,68	67,7
730	9,30	4,24	53,8

HL 1 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1640	3,44	25,7	145
1960	4,32	24,5	116
2000	5,37	20,1	93,1
1820	6,19	15,9	80,8
1530	7,38	11,2	67,7
860	9,30	4,99	53,8

HL 1 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2830	3,44	44,4	145
3410	4,32	42,6	116
3490	5,37	35,1	93,1
3430	6,19	29,9	80,8
2810	7,38	20,5	67,7

HL 1 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
5230	3,60	78,4	139
5410	4,25	68,7	118
5640	5,33	57,1	93,8
5770	6,20	50,2	80,6
4620	7,50	33,3	66,7

PRELIMINARY CATALOGUE

5.3 HL GEAR REDUCER - 500 rpm

HL 2 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
690	11,8	3,24	42,2
840	14,9	3,14	33,6
850	18,7	2,53	26,8
850	23,2	2,04	21,6
670	28,8	1,29	17,3
860	31,9	1,50	15,7
670	39,6	0,940	12,6
860	40,2	1,19	12,4
670	49,9	0,747	10,0
600	68,7	0,486	7,28

HL 2 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1200	11,8	5,64	42,2
1620	14,9	6,06	33,6
1630	18,7	4,86	26,8
1660	23,2	3,98	21,6
1450	28,8	2,80	17,3
1680	31,9	2,93	15,7
1450	39,6	2,04	12,6
1550	40,2	2,15	12,4
1500	49,9	1,67	10,0
1200	68,7	0,972	7,28

HL 2 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1770	11,8	8,32	42,2
2350	14,9	8,80	33,6
2460	18,7	7,34	26,8
2000	21,3	5,23	23,5
2460	23,2	5,90	21,6
2000	26,7	4,16	18,7
2200	28,8	4,25	17,3
2230	31,9	3,89	15,7
2000	33,2	3,35	15,1
2290	39,6	3,21	12,6
2000	45,7	2,44	10,9
2000	57,5	1,93	8,69

HL 2 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
3140	11,8	14,8	42,2
4100	14,9	15,3	33,6
4580	18,7	13,7	26,8
3870	21,3	10,1	23,5
4680	23,2	11,2	21,6
3870	26,7	8,06	18,7
4360	28,8	8,42	17,3
4400	31,9	7,68	15,7
3900	33,2	6,53	15,1
4380	39,6	6,15	12,6
3900	45,7	4,75	10,9
3900	57,5	3,77	8,69

HL 2 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
5700	12,4	25,6	40,4
6730	14,6	25,6	34,2
7760	18,4	23,5	27,2
7820	22,8	19,1	21,9
7190	26,3	15,2	19,0
7530	28,6	14,6	17,5
7640	33,0	12,9	15,2
6490	38,4	9,41	13,0
6500	45,8	7,90	10,9
5400	55,4	5,43	9,03
5500	69,8	4,39	7,17

PRELIMINARY CATALOGUE

5.3 HL GEAR REDUCER - 500 rpm

HL 3 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
870	51,2	0,976	9,77
900	64,2	0,804	7,79
930	80,6	0,662	6,20
770	87,4	0,505	5,72
960	100	0,550	4,99
970	110	0,507	4,55
990	125	0,456	4,02
1010	138	0,420	3,63
900	155	0,334	3,23
1050	174	0,347	2,88
770	188	0,235	2,66
1090	216	0,290	2,32
1090	236	0,265	2,12
1090	297	0,211	1,69
930	369	0,145	1,36

HL 3 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1740	51,2	1,95	9,77
1780	64,2	1,59	7,79
1830	80,6	1,30	6,20
1290	87,4	0,846	5,72
1910	100	1,09	4,99
1950	110	1,02	4,55
1980	125	0,912	4,02
2010	138	0,837	3,63
1650	155	0,612	3,23
2090	174	0,691	2,88
1340	188	0,410	2,66
2100	216	0,559	2,32
2100	236	0,511	2,12
2120	297	0,410	1,69
1750	369	0,272	1,36

HL 3 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2510	51,2	2,81	9,77
2700	64,2	2,41	7,79
2100	73,3	1,64	6,82
2750	80,6	1,96	6,20
2100	92,0	1,31	5,44
2790	100	1,60	4,99
2100	114	1,05	4,37
2800	125	1,29	4,02
2800	138	1,17	3,63
2380	155	0,883	3,23
2820	171	0,945	2,92
2100	197	0,610	2,53
2820	216	0,750	2,32
2150	249	0,496	2,01
2450	293	0,480	1,71
2200	309	0,409	1,62
2450	369	0,381	1,36
2200	425	0,297	1,18

HL 3 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
4490	51,2	5,04	9,77
5360	64,2	4,79	7,79
3950	73,3	3,09	6,82
5410	80,6	3,85	6,20
3950	92,0	2,46	5,44
5480	100	3,14	4,99
3950	114	1,98	4,37
5480	125	2,53	4,02
5480	138	2,28	3,63
4670	155	1,73	3,23
5480	171	1,84	2,92
3950	197	1,15	2,53
5370	216	1,43	2,32
4000	249	0,923	2,01
4790	293	0,939	1,71
4100	309	0,761	1,62
4900	369	0,762	1,36
4150	425	0,560	1,18

PRELIMINARY CATALOGUE

5.3 HL GEAR REDUCER - 500 rpm

HL 3 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
7510	53,5	8,05	9,34
9400	63,2	8,54	7,91
9750	79,3	7,05	6,30
7650	83,5	5,26	5,99
8450	90,5	5,36	5,53
9850	98,6	5,73	5,07
8500	114	4,29	4,40
8910	122	4,17	4,08
8500	143	3,42	3,51
9030	168	3,07	2,97
8550	194	2,53	2,57
8700	211	2,36	2,36
7700	232	1,91	2,16
8730	244	2,06	2,05
8420	266	1,81	1,88
8420	291	1,66	1,72
8420	307	1,57	1,63
7300	357	1,17	1,40
6650	409	0,933	1,22

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5.3 HL GEAR REDUCER - 500 rpm

HL 4 010

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
1170	348	0,199	1,44
1190	433	0,163	1,16
1230	474	0,153	1,05
1250	538	0,137	0,930
1250	668	0,111	0,748
1250	740	0,0999	0,676
1250	811	0,0912	0,617
1250	919	0,0804	0,544
1250	1020	0,0726	0,491
1250	1160	0,0639	0,432
1250	1260	0,0585	0,395
1100	1440	0,0452	0,347
1250	1590	0,0464	0,314
1250	1740	0,0425	0,287
1000	2160	0,0274	0,231
1000	2720	0,0217	0,184

HL 4 020

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2310	348	0,392	1,44
2350	433	0,321	1,16
2420	474	0,302	1,05
2460	538	0,271	0,930
2460	668	0,218	0,748
2460	740	0,197	0,676
2460	811	0,179	0,617
2460	919	0,158	0,544
2460	1020	0,143	0,491
2460	1160	0,126	0,432
2460	1260	0,115	0,395
1900	1440	0,0781	0,347
2460	1590	0,0913	0,314
2000	1740	0,0680	0,287
1720	2160	0,0471	0,231
1720	2720	0,0374	0,184

HL 4 030

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
2900	348	0,492	1,44
2950	433	0,403	1,16
2970	474	0,370	1,05
2970	538	0,327	0,930
2970	668	0,263	0,748
2970	740	0,237	0,676
2700	831	0,192	0,602
2970	919	0,191	0,544
2970	1020	0,173	0,491
2700	1140	0,140	0,438
2970	1260	0,139	0,395
2750	1440	0,113	0,347
2970	1590	0,110	0,314
2800	1740	0,0952	0,287
2850	1980	0,0852	0,253
2800	2190	0,0756	0,228
2250	2280	0,0583	0,219
2250	2490	0,0534	0,201
2750	2720	0,0597	0,184

HL 4 050

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
5630	348	0,956	1,44
5760	433	0,787	1,16
5760	474	0,718	1,05
5800	538	0,638	0,930
5800	668	0,513	0,748
5800	740	0,464	0,676
5200	831	0,370	0,602
5800	919	0,373	0,544
5800	1020	0,337	0,491
5250	1140	0,272	0,438
5800	1260	0,271	0,395
5450	1440	0,224	0,347
5800	1590	0,215	0,314
5000	1740	0,170	0,287
5600	1980	0,167	0,253
4000	2190	0,108	0,228
4200	2280	0,109	0,219
4200	2490	0,0997	0,201
4600	2720	0,0999	0,184

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5.3 HL GEAR REDUCER - 500 rpm

HL 4 080

Mn_2 [Nm]	i	Pn_1 [kW]	n2 [rpm]
7850	395	1,17	1,27
10300	467	1,31	1,07
10300	529	1,15	0,945
10300	586	1,04	0,854
9800	658	0,881	0,760
10300	728	0,837	0,687
9150	825	0,656	0,606
9850	905	0,644	0,553
10100	1000	0,597	0,499
9870	1140	0,512	0,439
10100	1260	0,474	0,397
9600	1430	0,397	0,350
10100	1570	0,381	0,319
9600	1800	0,316	0,278
7150	2090	0,202	0,239
8950	2270	0,234	0,221
7150	2500	0,169	0,200
8500	2700	0,186	0,185

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6.1 SALES CONDITIONS

ATTENTION!

The revised data and information, shown in this technical catalogue, replaces the data of the previous editions. Old data is now obsolete. All technical data, dimensions, weights in this catalogue are subject to changes without warning. Illustrations are not binding. You can find the above mentioned data and information on our site www.motovario.com; please periodically consult the technical documentation on the web site to be always updated about possible modifications of performances and characteristics of the product.

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