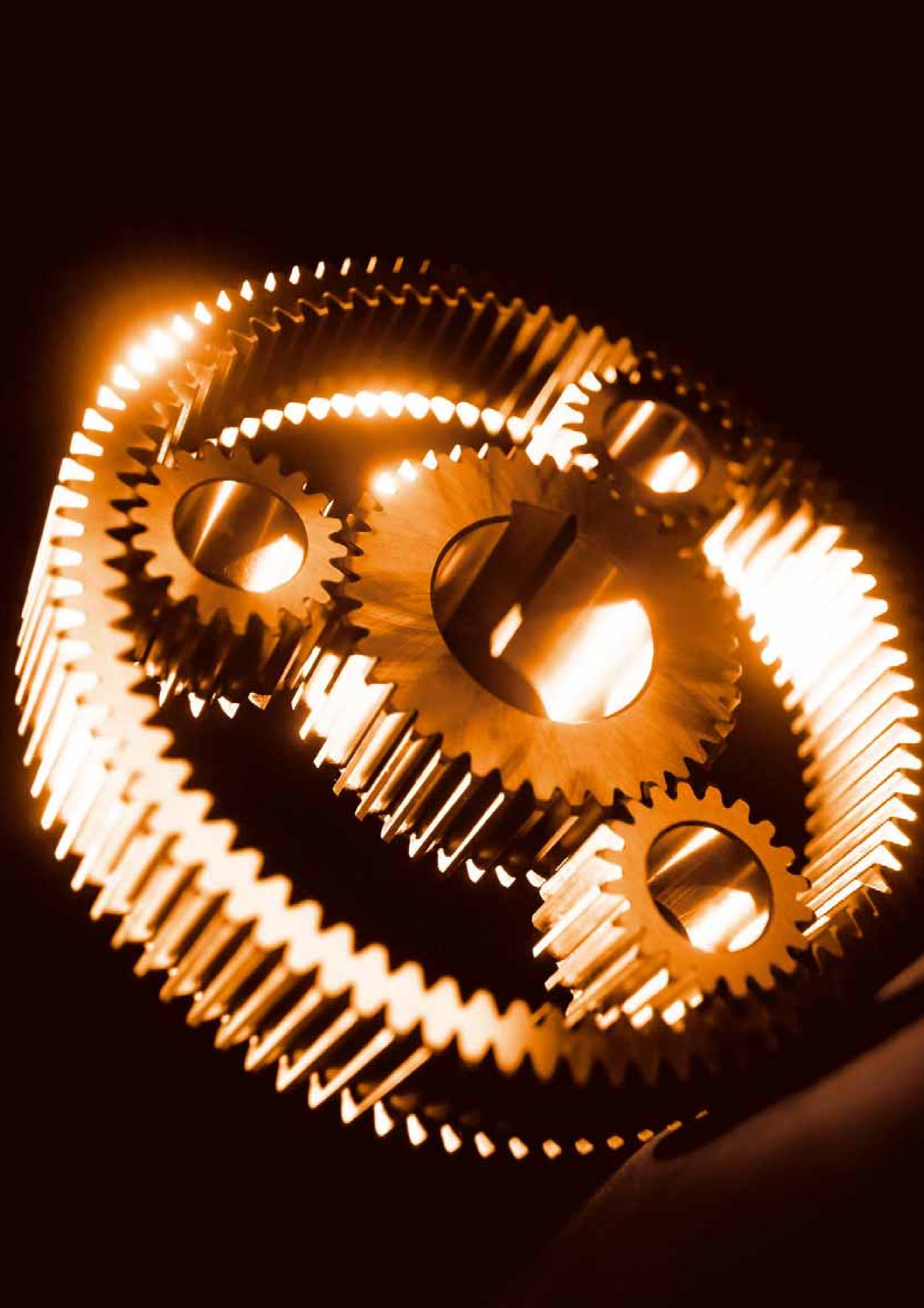
The purpose of a speed modulation gearbox is the possibility to increase or decrease the revolution speed by means of a temporary additional rotation. Said operation is effected manually, with motors or motor reducers, through a worm screw having an high reduction ratio. The angular speed adjustment can also be performed when the machine is running, by overlapping the effects of the different handlings and thus reducing the expensive non-working periods. The operation principle of UNIMEC's speed modulation gearboxes is the same as the planetary gearboxes, the only difference being the external ring gear, is not connected to the body, but is contrasted by an adjustment worm screw. Rotating this device, and as a consequence rotating the planetary system too, it is possible to modify the transmission output revolution speed. Machines made of various working stations, with conveyor belts and feeding lines (typical of the paper, packaging and press sectors, etc.) find their ideal solution in the speed modulation gears, in order to synchronize the various delivery phases.

Mechanical speed modulation gearboxes

Speed modulation gearboxes can also be used as non-stop speed modulators. It is therefore possible, in case for example of coiling lines, to modify the speed of one or more stations in order to obtain constant pulls. Other typical applications for speed modulation gearboxes are the press machines, the sheet working machines, the paper and packaging machines, where the control for waste reduction and for the machines setting requires high handling precisions.

3 versions, 5 models and 85 construction forms, mean a wide range of application for a designer. In addition to standard models, UNIMEC is able to provide special custom designed speed modulation gearboxes suited to the requirements of specific machines.



256 F

One stage speed modulation gearboxes.

257 DF

Two stages speed modulation gearboxes.

258 RC/F

Speed modulation gearboxes with hollow shaft transmission.

259 RS/F

Speed modulation gearboxes with protruding shaft transmission.

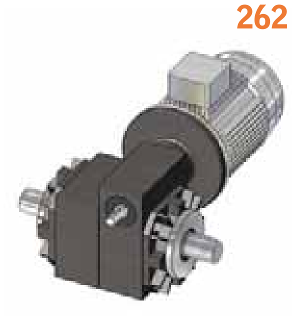
260 RIS/F

Speed modulation gearboxes with inverter transmission.

262 MF

One stage speed modulation gearboxes with motor on the adjustment worm screw.

262 MDF



Two stages speed modulation gearboxes with motor on the adjustment worm screw.

262 RC/MF

Speed modulation gearboxes with hollow shaft transmission and motor on the adjustment worm screw.

Application samples are online at www.unimec.eu - section Applications

RS/MF

262

Speed modulation gearboxes with protruding shaft transmission and motor on the adjustment worm screw.

RIS/MF

262

Speed modulation gearboxes with inverter transmission and motor on the adjustment worm screw.

MRF

263

One stage speed modulation gearboxes with motor reducer on the adjustment worm screw.

MRDF

263

Two stages speed modulation gearboxes with motor reducer on the adjustment worm screw.

RC/MRF

263

Speed modulation gearboxes with hollow shaft transmission and motor reducer on the adjustment worm screw.

RS/MRF

263

Speed modulation gearboxes with protruding shaft transmission and motor reducer on the adjustment worm screw.

RIS/MRF

263

Speed modulation gearboxes with inverter transmission and motor reducer on the adjustment worm screw.

Reinforced version -P

The 6 planets reinforced models have the suffix **-P**.

Casings

The speed modulation gearboxes casings are supplied with completely machine finished outer faces and varnished inner parts. They are made of grew cast iron EN-GJL-250 (according to the UNI EN 1561:1998 requirements).

Gears

The speed modulation gearboxes gears are made of different materials: the sun gear and planets of the planetary gear are made of alloy steel 17NiCrMo 6-4 (according to the UNI EN 10084:2000 requirements), while the ring gear is made of aluminium bronze CuAl10Fe2-C (according to the UNI EN 1982:2000 requirement), having high mechanical characteristics. The sun gear and planets have straight teeth and a reduction ratio of 1/3, while the ring gear has inner straight teeth and outer helicoidal teeth in order to couple with the adjustment worm screw, which is made of alloy steel 16NiCr4 (according to the UNI EN 10084:2000 requirements).
The planetary gears undergo thermal treatments like case-hardening and carburizing and then they are ground. The screw undergoes case-hardening and carburizing treatments before being thoroughly ground on both the threads and the tangs. In case the speed modulation gearbox couples with a bevel gearbox, the Gleason® conical bevel gear set toothing, made of steel 17NiCrMo 6-4 (according to the UNI EN 20084:2000 requirements) is case-hardened, carburized and run-in in pairs. The planes and holes undergo a grinding process.

Mechanical speed modulation gear boxes

Shafts

The speed modulation gearboxes shafts are made of carbon steel C45 (according to the UNI EN 10083-2:1998 requirements); the hollow shafts on the contrary are made of steel 16NiCr4 (according to the UNI EN 10084:2000 requirements), and they undergo case-hardening, carburizing and grinding treatments for their inner diameters. All shafts are induction ground and case-hardened in the contact area with the bearings and retaining rings.

Bearings and market materials

Top-quality bearings and market materials are used for the whole line.

GLOSSARY

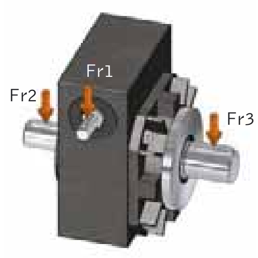
A = maximum input angular speed [rpm]
B = frequency of the loading cycle [Hz]
C_p = specific heat of lubricant [J/Kg•°C]
F_{r1} = radial force on the adjustment shaft [daN]
F_{r2} = radial force on the slow shaft [daN]
F_{r3} = radial force on the fast shaft [daN]
F_{r4} = radial force on the transmission shaft [daN]
F_{a1} = axial force on the adjustment shaft [daN]
F_{a2} = axial force on the slow shaft [daN]
F_{a3} = axial force on the fast shaft [daN]
F_{a4} = axial force on the transmission shaft [daN]
f_a = ambient factor
f_d = duration factor
f_g = usage factor
i_c = reduction ratio between the worm screw and the worm wheel, meant as a fraction (es.1/2)
i_t = reduction ratio between the fast shaft and the slow shaft, meant as a fraction (es.1/2)
J = total inertia [kgm^2]
J_f = speed modulation gearbox inertia [kgm^2]
J_v = inertia downstream of the speed modulation gearbox [kgm^2]
M_{tL} = torque on the slow shaft [daNm]
M_{tv} = torque on the fast shaft [daNm]
n_1 = fast shaft
n_2 = slow shaft
n_3 = adjustment shaft
P_d = power dissipated in the form of heat [kW]
P_i = input power to the single speed modulation gearbox [kW]
P_L = power on the slow shaft [kW]
P_J = inertia power [kW]
P_u = output power to the single speed modulation gearbox [kW]
P_v = power on the fast shaft [kW]
Pe = equivalent power [kW]
PTC = adjustment factor on thermal power
Q = lubricant flow-rate [litre/min]
rpm = rounds per minute
t_a = ambient temperature [°C]
t_f = speed modulation gearbox surface temperature [°C]
η = speed modulation gearbox running efficiency
θ_L = slow shaft rotation angle [°]
θ_v = fast shaft rotation angle [°]
θ_c = adjustment shaft rotation angle [°]
ω_L = slow shaft angular speed [rpm]
ω_v = fast shaft angular speed [rpm]
ω_c = adjustment shaft angular speed [rpm]
α_L = angular acceleration of the slow shaft [rad/s^2]

Unless otherwise specified all tables show linear measurements expressed in [mm].
All the reduction ratios are expressed in the form of a fraction, unless otherwise specified.

LOAD ANALYSIS AND COMPOSITION

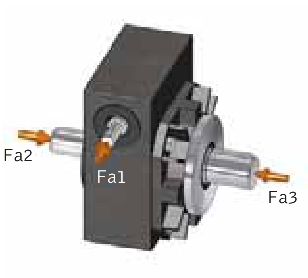
The aim of a speed modulation gearbox is to transmit power through the shafts handling and to adjust their angular speed; for this reason the gears, the shafts and the bearings have been designed to transmit powers and torques as shown in the power tables. Nevertheless there can also be other forces which have to be considered during the dimensioning phase.
Such loads are generated by the devices connected to the speed modulation gearbox and they can be caused by belt drives, sudden accelerations and decelerations of the flywheels, structure misalignments, vibrations, shocks, pendular cycles etc. There can be two types of loads acting on the shafts: radial and axial loads, as referred to the shaft axis itself. The tables below show the maximum values for each type of forces according to the model and the size. In case of heavy loads, the table values must be divided by 1,5, while in case of shock load they should be divided by 2.
In case real load approach to the table values (modified) it is advisable to contact the technical office.

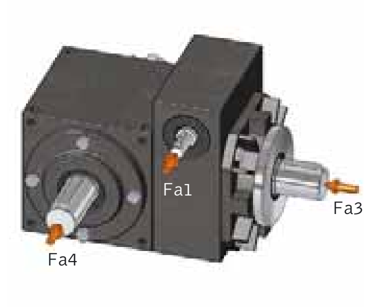
RADIAL LOADS



Size		**32**	**42**	**55**
Rotation speed of the fast shaft ω_V [rpm]				
Fr1 [daN]	50	27	75	100
	3000	13	28	65
Fr2 [daN]	50	140	190	230
	3000	65	75	180
Fr3 [daN]	50	180	230	380
	3000	80	90	260
Fr4 [daN]	50	300	600	1000
	3000	180	250	700

AXIAL LOADS





Size		32	42	55
Rotation speed of the fast shaft ω_v[rpm]				
Fa1 [daN]	50	20	34	45
	3000	5	13	16
Fa2 [daN]	50	60	150	250
	3000	25	58	100
Fa3 [daN]	50	110	210	350
	3000	45	90	160
Fa4 [daN]	50	120	260	400
	3000	50	110	180

BACKLASHES

The gears connection presents a natural and necessary backlash which is transmitted to the shafts. The gears backlash tends to increase according to the wear ratio of the components, that is why after various running cycles we can logically expect a higher value than taken before the start-up. It should be reminded that, due to the axial components of the transmission forces, the backlash measured under load can be different than the value taken when the speed modulation gearbox is unloaded.

RUNNING EFFICIENCY

The speed modulation gearboxes running efficiency mostly depends on the type of model used:

F model	90 - 93%
DF model	85 - 90%
RC/F-RS/F model	80 - 85%
RIS/F model	78 - 83%

HANDLING

Handling of speed modulation gearboxes can be manual or motorized. Handling of the worm screw can be manual or motorized, and in this last case a direct connection to the motor or motor reducer can be possible. The power tables determine the motoring power and the torque on the slow shaft, for each single speed modulation gearbox, in case of unique service factors, according to the model, size, ratio and rotation speeds.

The output speed adjustment

The core of the speed modulation gearbox operation is the adjustment of the output speed and the rotation angles by means the worm screw handling which is a variable that can be calculated as follows:

Having defined the parameters:
ω_V = fast shaft rotation speed [rpm]
ω_L = slow shaft rotation speed [rpm]
ω_c = worm screw rotation speed [rpm]
i_c = reduction ratio between the worm screw and the worm wheel, expressed as a fraction
i_c = 1/80 for sizes 32
i_c = 1/86 for sizes 42
i_c = 1/90 for sizes 55
i_t = total ratio of the transmission (expressed as a fraction) = ω_L/ω_V

the following relations result:

$$\omega_L = \omega_V \bullet i_t \pm \frac{2}{3} \bullet i_c \bullet \omega_c$$

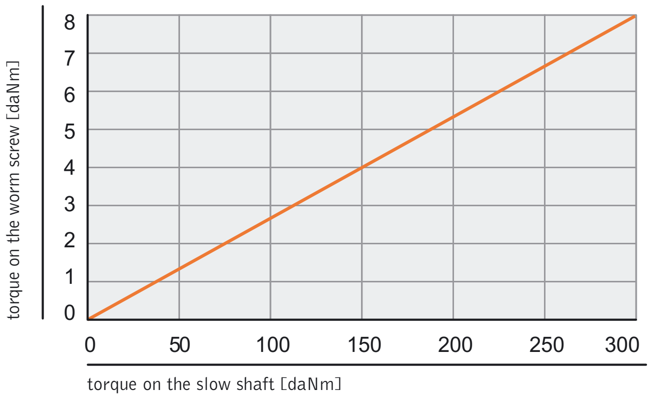
$$\pm\omega_c = (\omega_V \bullet i_t - \omega_L) \bullet \frac{3}{2} \bullet i_c$$

If we wanted to consider the adjustment in terms of grades instead of angular speeds, we should use the following formulas, where θ_L, θ_V and θ_c are the angular variations of the slow shaft, the fast shaft and the adjustment worm screw. Those variables can be expressed in radiant, grades or rounds and fractions of rounds.

$$\theta_L = \theta_V \bullet i_t \pm \frac{2}{3} \bullet i_c \bullet \theta_c$$

$$\pm\theta_c = (\theta_V \bullet i_t - \theta_L) \bullet \frac{3}{2} \bullet i_c$$

The ± sign indicates that the adjustment can be done by increasing or decreasing the number of rounds (or the rotation angles). The following graphs will show the wave of the torque to be applied to the adjustment worm screw as a function of the torque on the slow shaft.
Obviously, the function referred to the torque on the fast shaft can be obtained multiplying the torque value on the slow shaft by the reduction ratio of the speed reduction gearbox i_t.



Rotation directions

The rotation directions depend on the mounting scheme. According to the chosen model, as a function of the required rotation direction, it's possible to choose the mounting scheme which best meets desired requirements.
We remind that, <u>even if one only rotation direction of a shaft is changed from clockwise into anti-clockwise (and vice-versa), any other rotation of the speed modulation gearbox shafts direction must be reversed.</u>

Non-stop operation

A non-stop operation occurs when the speed modulation gear is subjected to time constant torque and angular speed. After a transition period the revolutions become stationary, together with the surface temperature of the speed modulation gearbox and the ambient thermal exchange. It is important to check for wear phenomena and thermal power.

Intermittent operation

An intermittent operation occurs when high grade accelerations and deceleration overlap to a revolution speed and torque (even at 0 value), make it necessary to verify the ability to counteract the system inertia. A revision of the speed modulation gearbox and the input power is therefore necessary. It is important to check bending and fatigue strength parameters.

LUBRICATION

The lubrication of the inner transmission devices (gears and bearings) is made using a mineral oil with extreme pressure additive: TOTAL CARTER EP 220. For a proper operation it is advisable to steady check for lubricant leakage. For all sizes a filling plug, a drain plug and an oil lever indicator are foreseen. The technical specifications and the application field for the lubricant inside the speed modulation gear boxes are listed below.

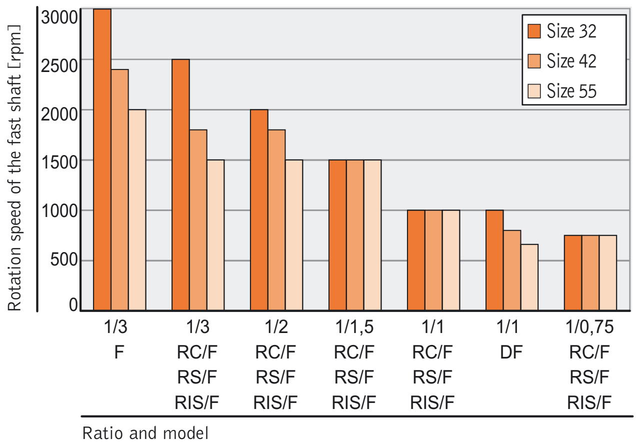
Lubricant	Application field	Operating temperature [°C]*	Technical specifications
Total Carter EP 220	standard	0 : +200	AGMA 9005: D24
(not compatible with polyglicol oils)			DIN 51517-3: CLP
			NF ISO 6743-6: CKD
Total Azolla ZS 68	High speeds**	-10 : +200	AFNOR NF E 48-603 HM
			DIN 51524-2: HLP
			ISO 6743-4: HM
Total Dacnis SH 100	High temperatures	-30 : +250	NF ISO 6743: DAJ
Total Nevastane SL 220	Food industry	-30 : +230	NSF-USDA: H1

* for operation temperatures between 80°C and 150°C Viton® seals should be used; for temperatures higher than 150°C and lower then -20°C it is advisable to contact our technical office.
** for input revolutions higher than 1500 rpm we suggest using Viton® seals in order to better counteract the local temperature increases due to the strong sliding on the retaining ring.

The quantity of lubricant contained in speed modulation gearboxes is shown in the following table.

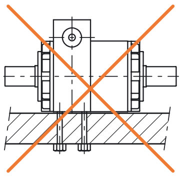
Size		32	42	55
F Model	Inner lubricant quantity [litres]	0,3	1,2	1,2
DF Model	Inner lubricant quantity [litres]	0,6	1,6	2,4
RC/F-RS/F-RIS/F Model	Inner lubricant quantity [litres]	0,7	2,1	2,7

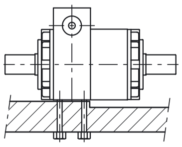
The inner devices of the speed modulation gearboxes can be lubricated in two ways: by means of splash or forced lubrication. Splash lubrication does not require external interventions: when the fast shaft revolutions are lower than indicate in the graph below, its operation ensures that lubricant reaches all the components requiring lubrication. For fast shaft revolution being higher than the indicated values it may happen that the gears peripheral speed be such as to create centrifugal forces able to overcome the lubricant adhesivity. Therefore, in order to ensure a proper lubrication, a lubricant feeding under pressure is necessary (5 bar suggested) by means of a suitable oil cooling circuit. **In case of forced lubrication it will be necessary to precise the mounting position and localization of the holes to be provided for the connection to the lubrication circuit.**



For revolutions reaching the border values indicated in the above graph it is advisable to contact our technical office in order to evaluate the modus operandi.
For very low revolutions of the fast shaft (lower than 50 rpm) the phenomena which normally generate splash could not be triggered off in a correct way. We suggest contacting our technical office in order to evaluate the most suitable solution to the problem.
In case of vertical axis mounting, the upper bearings and gears could not be properly lubricated. **It is therefore necessary to indicate such situation in case of order**, so that suitable grease holes can be foreseen. **If no indication about lubrication is given at the ordering phase, it is understood that the application conditions fall within the conditions of an horizontal mounting with splash lubrication.**

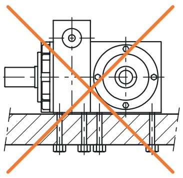
INSTALLATION AND MAINTENANCE





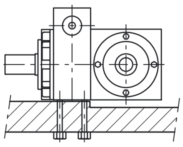
Installation

When positioning the speed modulation gears and connecting them to the machines , the greatest of care is necessary in the alignment of the axes. In case of an imprecise alignment, the bearing would overloaded, would be anomalous overheated, and they would be subjected to a greater wear with a consequent lifetime reduction and a noise increase. The modulation gears should be mounted so that movements and vibrations are avoided, and they should be properly fixed by means of bolts. We suggest effecting a proper cleaning and lubrication of the contact surfaces before assembling the connecting members, in order that any seizure or oxidizing problems be avoided. The assembly or disassembly must be carried out using tie rods and extractors through the threaded bore at the end of the shaft. For tight fittings, a shrink assembly is recommended, heating the members to be shrunk on to 80-100°C. For DF, RC/F, RS/F, RIS/F versions a simultaneous mounting of the two casings is to be avoided. It should be given previous notice in case of a vertical mounting in order that a proper lubrication be foreseen.



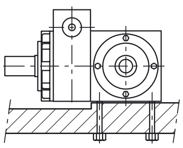
Preparing for service

All speed modulation gears are supplied filled with long lasting lubricant which ensures a perfect operation of the unit according to the power values indicated in the catalogue. The only exception is represented by the ones having an "add oil" label. The lubricant filling up to the right level is an installer's responsibility and it must be carried out when the gears are not in motion. An excessive filling should be avoided in order that any overheating, noise, power loss and lubricant leakage occur.



Start-up

All the units undergo a brief testing before being delivered to the client. However, several hours of running at full load are necessary before the modulation gear reaches its full running efficiency. In case of need, the modulation gear can be immediately set to work at full load; but, circumstances permitting, it is nonetheless advisable to subject it to a gradually increasing load to reach maximum load after 20 - 30 hours of running. It is also vital to take the precautions necessary to avoid overloading in the first stages of running. The temperatures reached by the speed modulation gearbox in these initial phases will be higher than the ones produced after the complete running -in of the same



Routine maintenance

The speed modulation gearboxes must be periodically inspected, depending on the level of use and work conditions. Lubricant leakage should be checked for, and in case the oil level should be restored and the seals replaced. The lubricant control must be effected when the speed modulation gear is not working. The oil should be changed at intervals which will vary according to the working conditions; generally, in normal conditions and at the normal operation temperatures, it should be possible to obtain a minimum lubricant lifetime of 10.000 hours.

Storage

The speed modulation gearboxes must be protected from deposits of dust and foreign matter during storage. Particular attention must be paid to saline or corrosive atmospheres. We also recommend to:

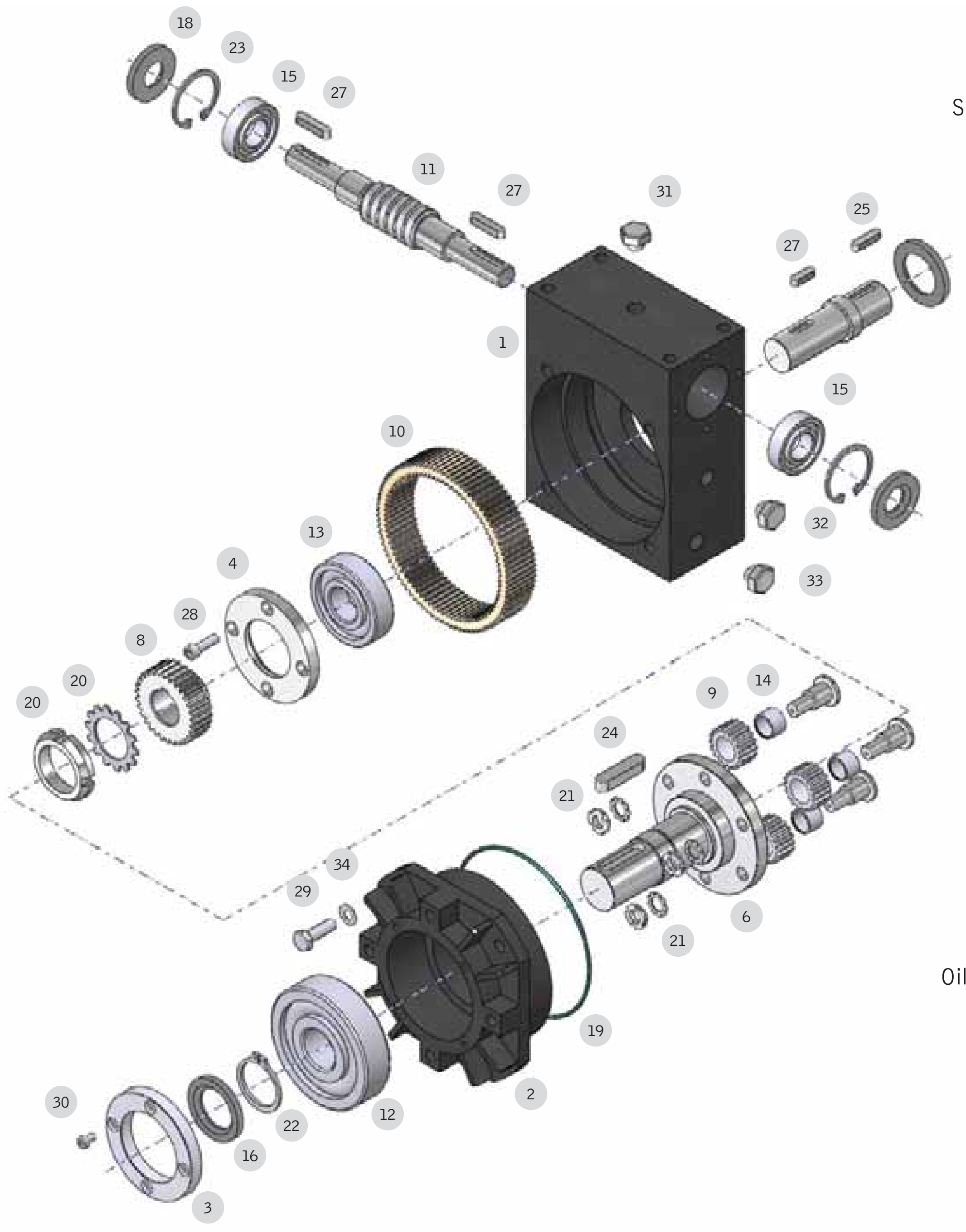
- Periodically rotate the shafts to ensure proper lubrication of inner parts and avoid that the seals dry up, therefore causing lubricant leakage.
- For speed modulation gearboxes without lubricant completely fill-in the unit with rustproof oil. When servicing for use, completely empty the oil and refill with the recommended oil to the correct level.
- Protect the shafts with suitable products.

Warranty

The warranty is valid only when the instructions contained in our manual are carefully folowed.

ORDERING CODES

F	32	P	1	1/3
model	size	reinforced version	construction model	ratio

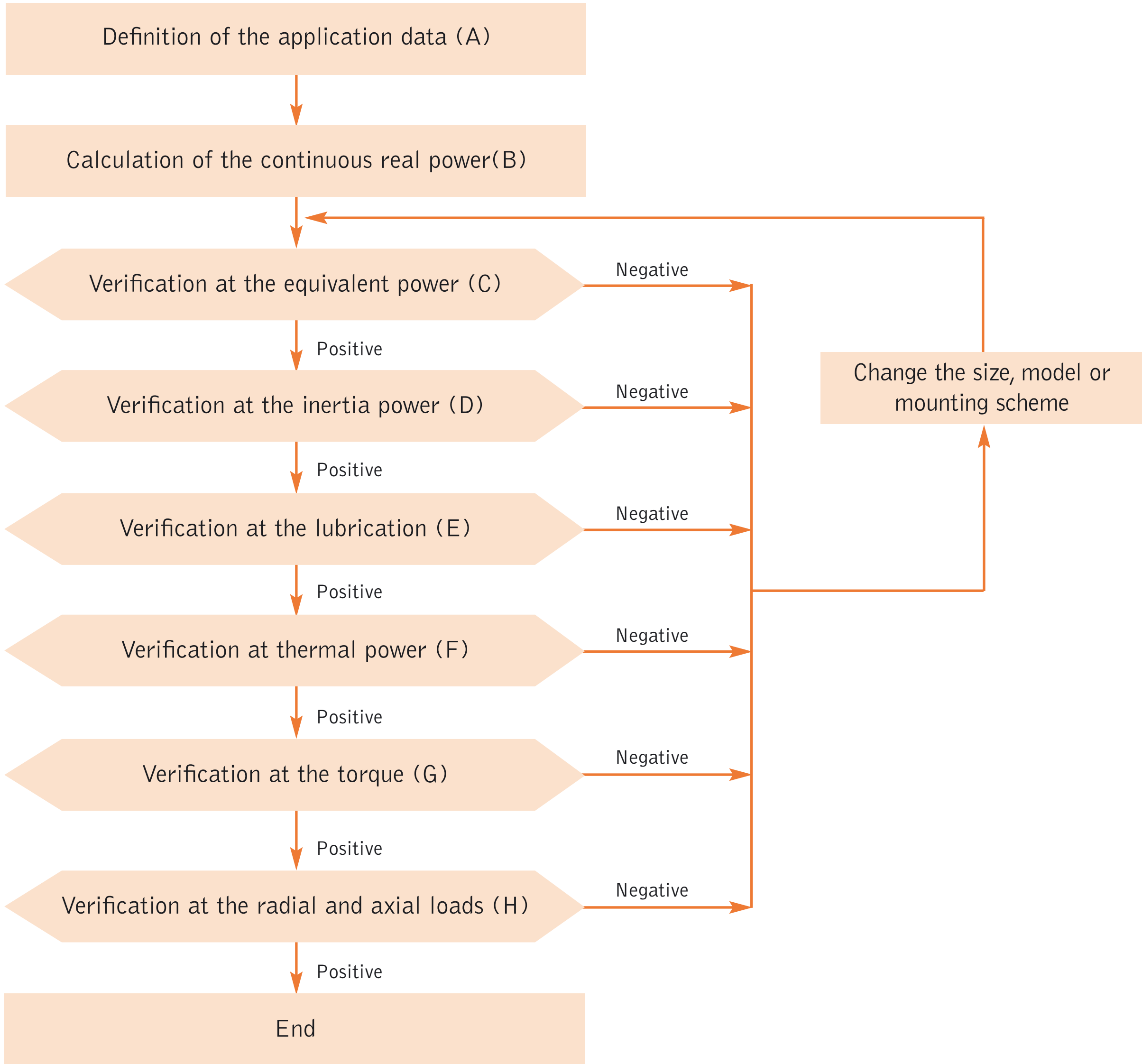


F MODEL

Casing	1
Slow shaft cover	2
Small cover	3
Cover	4
Fast shaft	5
Slow shaft	6
Shaft	7
Sun gear	8
Planets	9
Worm wheel	10
Worm screw	11
Bearing	12
Bearing	13
Bearing	14
Bearing	15
Seal	16
Seal	17
Seal	18
Seal	19
Stop ring	20
Stop ring	21
Snap ring	22
Snap ring	23
Key	24
Key	25
Key	26
Key	27
Bolt	28
Bolt	29
Bolt	30
Filling cap	31
Oil level indicator	32
Drain cap	33
Washer	34

DIMENSIONING OF THE SPEED MODULATION GEARBOX

For a correct dimensioning of speed modulation gearbox it is necessary to observe the following steps:



A – THE APPLICATION DATA

For a right dimensioning of the speed modulation gearboxes it is necessary to identify the application data: POWER, TORQUE, and REVOLUTION SPEED = a P power [kW] is defined as the product between the torque M_t [daNm] and the revolution speed ω [rpm]. The input power (P_i) is equal to the sum of the output speed (P_u) and the power dissipated into heat (P_d). The ratio of output power and input power is called running efficiency η of the transmission. The slow shaft revolution speed ω_L is equal to the fast shaft revolution ω_V multiplied by the reduction ratio i (meant as a fraction). Some useful formulas that link the above variables are shown below.

$$P_v = \frac{M_{tv} \bullet \omega_v}{955} \qquad P_L = \frac{M_{tL} \bullet \omega_L}{955} \qquad \omega_L = \omega_v \bullet i \qquad P_i = P_u + P_d = \frac{P_u}{\eta}$$

AMBIENT VARIABLES = these values identify the environment and the operating conditions of the speed modulation gearbox. Among them: temperature, oxidizing and corrosive factors, working and non-working periods, vibrations, maintenance and cleaning, insertion frequency, expected lifetime etc.

MOUNTING SCHEMES = there are several ways of transferring movement by means of speed modulation gear boxes. A clear idea on the mounting scheme allows to correctly identify the power flow of the same.

B – THE REAL CONTINUOUS POWER

The first step for the dimensioning of a speed modulation gear box is to calculate the real continuous power. By means of the formulas indicated at point A the user must calculate the input power P_i according to the scheme parameters. Two calculation criteria can be adopted: using the average parameters calculated on a significant period or adopting the maximum parameters. It is obvious that the second method (the worst case) is much more protective with respect to the average one and it should be used in case you need certainty and reliability.

C – THE POWER TABLES AND THE EQUIVALENT POWER

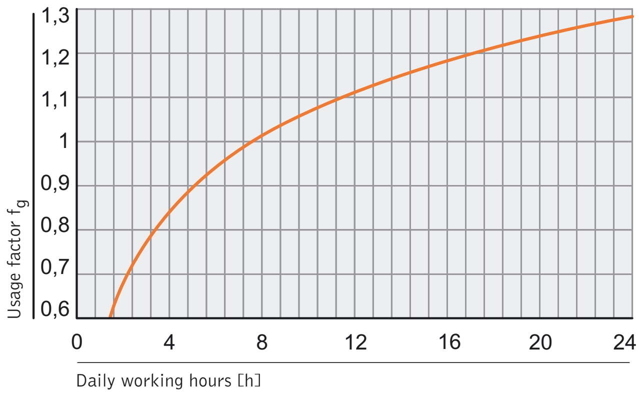
All the values listed in the catalogue refer to a use in standard conditions, that is with a 20°C temperature and under a regular running, without shocks for 8 daily working hours. The use under those conditions provides a lifetime of 10.000 hours. For different application conditions the equivalent power P_e should be calculated: it is the power which would be applied in standard conditions in order to have the same thermal exchange and wear effects, which the real load achieves in the real conditions of use. It is therefore advisable to calculate the equivalent load according to the following formula:

$$P_e = P_i \bullet f_g \bullet f_a \bullet f_d$$

It should be remarked that **the equivalent power is not the power requested by the speed modulation gearbox:** it is and indicator which helps in choosing the most suitable size in order to have higher reliability requisites. The power requested by the application is the input power P_i.

The usage factor f_g

The graph below can be used to calculate the usage factor f_g according to the working hours on a daily basis.



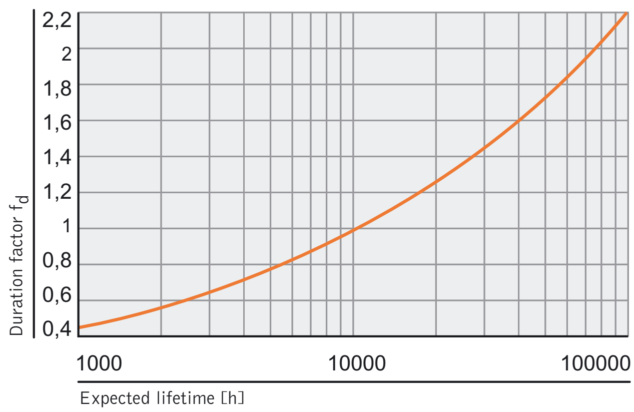
The ambient factor f_a

By means of the following table it is possible to calculate the f_a factor according to the operation conditions.

Type of load	daily running hours [h]	3	8	24
Light shocks, few insertions, regular movements		0,8	1	1,2
Medium shocks, frequent insertions, regular movements		1	1,2	1,5
High shocks, many insertions, irregular movements		1,2	1,8	2,4

The duration factor f_d

The duration factor f_d is obtained according to the theoretical expected lifetime (expressed in hours).

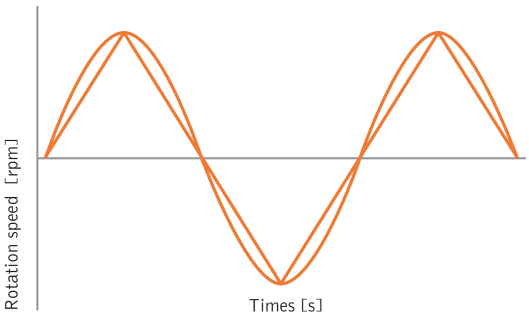


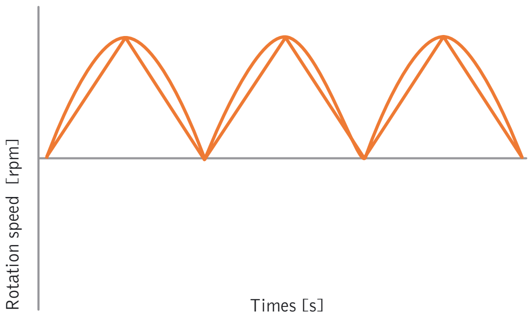
With the equivalent power value P_e and according to the angular speeds and the reduction ratio, it is possible to chose on the descriptive tables the size presenting an input power higher that the calculated one.
At the same time it is possible to check, through the graph on page 239 the torque necessary on the adjustment worm screw.

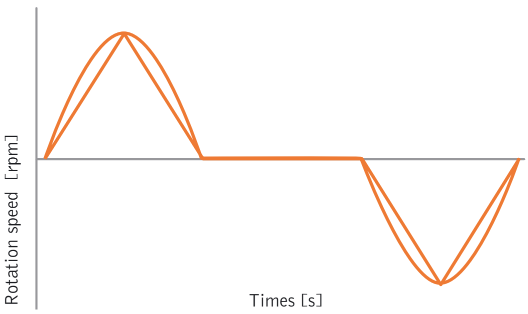
D – THE INERTIA POWER

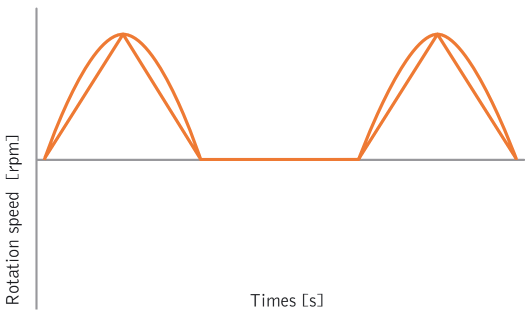
In case of important accelerations and decelerations it is necessary to calculate the inertia power P_J. It is the power necessary to counteract the inertia forces and torques opposed by the system in case of speed changes. First of all it is necessary that the designer calculates the system inertia downstream of the speed modulation gear box J_V reducing them first to the slow shaft and then to the fast one. After that the speed modulation gear box inertia J_f must be added, which can be taken from the table below, so that the total inertia J will be obtained. We remind that the inertia moments are expressed in [kg•m²].

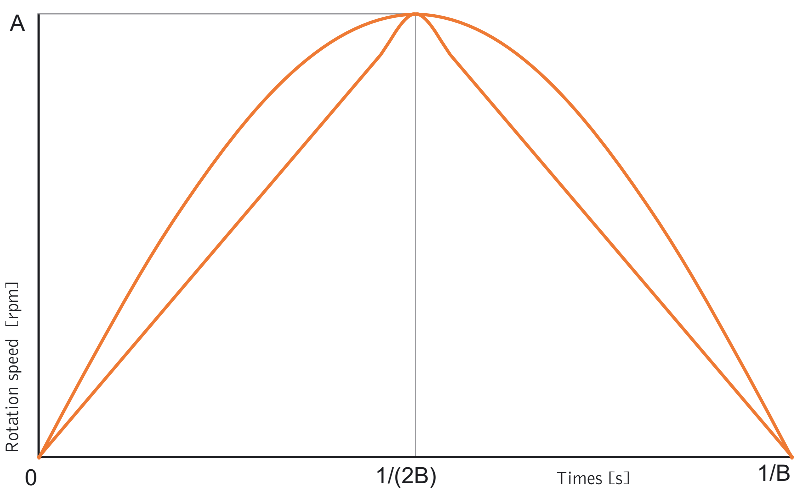
Size			**32**	**42**	**55**
Model	**Ratio**				
F	1/3	[kg•m²]	0,002570	0,010683	0,020641
DF	1/1	[kg•m²]	0,005140	0,021366	0,041282
RC/F	1/3	[kg•m²]	0,005010	0,021046	0,044702
RC/F	1/2	[kg•m²]	0,004565	0,018803	0,040974
RC/F	1/1,5	[kg•m²]	0,004558	0,018395	0,039553
RC/F	1/1	[kg•m²]	0,004973	0,018999	0,041566
RC/F	1/0,75	[kg•m²]	0,005722	0,020571	0,045857
RS/F	1/3	[kg•m²]	0,005163	0,021854	0,046895
RS/F	1/2	[kg•m²]	0,004718	0,019611	0,043168
RS/F	1/1,5	[kg•m²]	0,004710	0,019203	0,041745
RS/F	1/1	[kg•m²]	0,005126	0,019800	0,044662
RS/F	1/0,75	[kg•m²]	0,005882	0,021387	0,048049











Given ω_V the fast revolution speed and α_V the angular speed of the fast shaft, the inertia torque which is necessary to counteract is equal to $J \cdot \omega_V$ and the respective inertia power P_j is equal to $J \cdot \omega_V \cdot \alpha_V$. In case the time curve of the fast shaft speed ω_V can be traced back to one of the four schemes above, linear or sinusoidal, where A is the maximum speed in [rpm] and B is the cycle frequency in [Hz], the calculation of the inertia power in [kW] can be simplified, by taking A and B parameters and by calculating:

$$P_J = \frac{2 \cdot J \cdot A^2 \cdot B}{91188}$$

The power P_j must be added to the equivalent power P_e and a verification of the correctness of the size chosen on the descriptive tables must be carried out. If not correct it will be necessary to change the size and effect new verifications. Even the torque applied on the adjustment shaft must be recalculated on the basis of the new equivalent power.

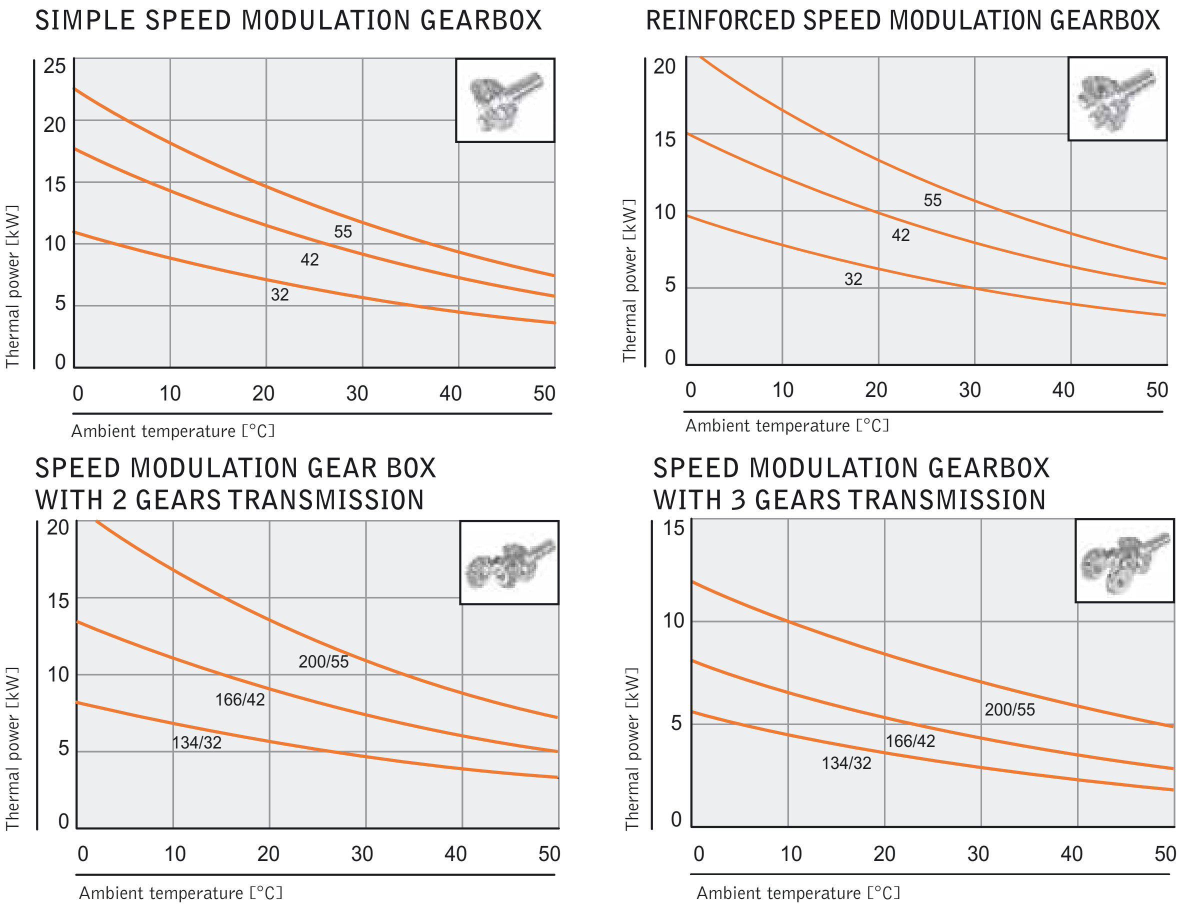
E - LUBRICATION

After a first dimensioning according to the power, it is advisable to check whether the only splash lubrication is enough or if a forced lubrication system is necessary. In should be therefore checked, by means of the graph illustrated in the "lubrication" paragraph, whether the average speed of the fast shaft is above or below the border value. In case of speed reaching the border value it will be necessary to contact our technical office. If it is possible to carry out the mounting even in a status of forced lubrication it is advisable to calculate the requested lubricant flow-rate Q [l/min.], being known the input power P_i [kW], the running efficiency η, the lubricant specific heat C_p [J/(kg•°C)], the ambient temperature t_a and the maximum temperature which can be reached by the speed modulation gearbox t_f [°C].

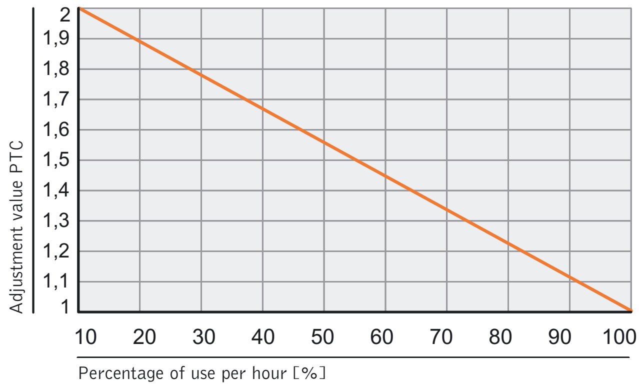
$$Q = \frac{67000 \cdot (1-\eta) \cdot P_i}{c_p \cdot (t_f - t_a)}$$

F – THE THERMAL POWER

When on the descriptive tables the input power values fall into the coloured area, this means that it is necessary to check the thermal power. This dimension, a function of the speed modulation gearbox size and of the ambient temperature, indicates the input power establishing a thermal balance with the ambient at the speed modulation gear surface temperature of 90°C. The following graphs show the waves of the thermal power in case of simple and reinforced speed modulation gearboxes with two or three gears transmission.



In case there are non-working times in the speed modulation gearbox operation, the thermal power can be increased of a factor PTC obtainable from the graph below, where the abscissa is the use percentage as referred to the hour.

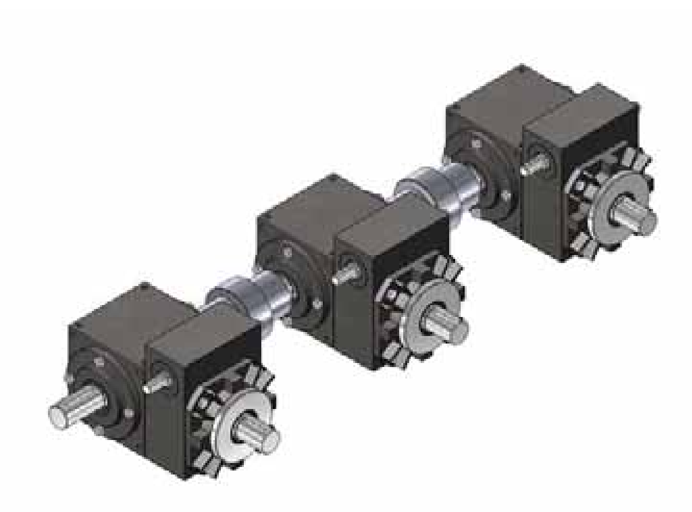


In case the thermal power is lower that the requested power P_i, it will be necessary to change the speed modulation gearbox size or to pass to forced lubrication. For the capacity calculation see paragraph E.

G - THE TORQUE

When one or more speed modulation gearboxes with transmission (RS, RC and RIS models) are mounted in series, it is necessary to check that the torque referred to the common axis does not exceed the value shown in the table below.

Size		134/32	166/42	200/55
RC/F - RIS/F Model	[daNm]	22	52	111
RS/F Model	[daNm]	52	146	266



H- RADIAL AND AXIAL LOADS

The last step is to verify the speed modulation gearbox strength to radial and axial loads. The border values of said loads are shown on pages 236-237. If the result of such verification is not positive, it will be necessary to change the size.

F Model

Ratio 1/3							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
3000	1000	12,7	10,9	29,6	25,4	43,7	37,5
2000	666	9,20	11,7	21,3	27,4	31,3	40,4
1500	500	7,30	12,6	17,1	29,4	25,2	43,3
1000	333	5,50	14,2	12,9	33,3	19,0	49,1
700	233	4,00	14,7	9,30	34,3	13,7	50,6
500	166	3,10	15,9	7,20	37,2	10,6	54,9
300	100	2,10	17,6	4,90	41,1	7,10	60,7
100	33	0,90	21,0	1,90	49,0	2,80	72,2
50	16	0,50	23,1	1,00	53,9	1,50	79,4

DF Model

Ratio 1/1							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
1000	1000	5,50	4,76	12,9	11,1	19,0	16,3
700	700	4,00	4,90	9,30	11,4	13,7	16,8
500	500	3,10	5,33	7,20	12,4	10,6	18,3
400	400	2,60	5,60	6,10	13,0	9,00	19,2
300	300	2,10	5,89	4,80	13,7	7,10	20,2
200	200	1,50	6,30	3,40	14,7	5,00	21,6
100	100	0,90	7,00	1,90	16,3	2,80	24,0
50	50	0,50	7,71	1,00	17,9	1,50	26,4
30	30	0,30	8,13	0,70	18,9	1,00	27,9

In case the speed modulation gearbox is used as multiplier, in order to obtain the output torque value (as referred to the fast shaft) it is necessary to multiply the value on the table by the reduction ratio (meant as a fraction).

RC/F-RS/F-RIS/F Model

Ratio 1/3								
Size		32		42		55		
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	
3000	1000	12,7	10,9	29,6	25,4	43,7	37,5	
2000	666	9,20	11,7	21,3	27,4	31,3	40,4	
1500	500	7,30	12,6	17,1	29,4	25,2	43,3	
1000	333	5,50	14,2	12,9	33,3	19,0	49,1	
700	233	4,00	14,7	9,30	34,3	13,7	50,6	
500	166	3,10	15,9	7,20	37,2	10,6	54,9	
300	100	2,10	17,6	4,90	41,1	7,10	60,7	
100	33	0,90	21,0	1,90	49,0	2,80	72,2	
50	16	0,50	23,1	1,00	53,9	1,50	79,4	

Ratio 1/1,5							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
1500	1000	9,20	7,12	22,1	17,0	42,4	32,8
1000	666	7,10	8,25	17,0	19,7	32,5	37,7
700	466	5,40	8,96	12,8	21,2	24,2	40,1
500	333	4,00	9,29	9,60	22,3	18,5	42,9
400	266	3,30	9,60	8,10	23,5	16,2	47,1
300	200	2,60	10,0	6,40	24,7	12,8	49,5
200	133	2,00	11,9	4,70	27,3	9,10	52,9
100	66	1,20	14,0	2,80	32,8	5,30	62,1
50	33	0,70	16,4	1,60	37,5	3,00	70,3

RC/F-RS/F Model

Ratio 1/2

Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
2000	1000	12,7	10,9	29,6	25,4	43,7	37,5
1500	750	10,2	11,7	23,9	27,4	35,2	40,4
1000	500	7,30	12,6	17,1	29,4	25,2	43,3
700	350	5,60	13,8	13,1	32,3	19,4	47,6
500	250	4,20	14,7	9,90	34,3	14,7	50,5
300	150	2,80	16,1	6,50	37,7	9,70	55,6
100	50	1,10	19,5	2,60	45,5	3,90	67,1
50	25	0,60	21,4	1,40	50,0	2,10	73,6
30	15	0,40	22,7	0,90	52,9	1,30	78,0

Ratio 1/1

Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
1000	1000	6,00	4,64	15,7	12,1	31,3	24,0
700	700	4,40	4,86	12,6	13,9	22,8	25,2
500	500	3,60	5,57	9,40	14,5	18,7	28,9
400	400	3,00	5,81	7,90	15,2	15,6	30,1
300	300	2,50	6,45	6,40	16,5	12,6	32,4
200	200	1,80	6,96	4,60	17,8	9,10	35,2
100	100	1,10	8,51	2,70	20,8	5,30	40,9
50	50	0,60	9,28	1,60	24,7	3,10	47,9
30	30	0,40	10,3	1,10	28,3	2,00	51,5

Ratio 1/0,75

Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
750	1000	4,10	3,52	8,00	6,88	20,7	17,8
600	800	3,90	4,19	7,70	8,27	19,2	20,6
500	666	3,50	4,51	6,70	8,65	17,4	22,4
400	533	3,00	4,84	5,80	9,35	15,5	25,0
300	400	2,40	5,16	4,70	10,1	12,7	27,3
200	266	1,80	5,81	3,50	11,3	9,50	30,7
100	133	1,10	7,11	2,10	13,5	5,70	36,8
50	66	0,70	9,12	1,30	16,9	3,50	45,6
30	40	0,50	10,7	0,90	19,3	2,40	51,6

FP Model

Ratio 1/3							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
3000	1000	22,8	17,6	53,2	41,1	78,6	60,7
2000	666	16,5	19,1	38,3	44,4	56,3	65,3
1500	500	13,1	20,2	30,7	47,4	45,3	70,0
1000	333	9,90	22,9	23,2	53,8	34,2	79,3
700	233	7,20	23,8	16,7	55,4	24,6	81,6
500	166	5,58	25,9	12,9	60,0	19,0	88,4
300	100	3,70	29,2	8,80	68,1	12,7	98,1
100	33	1,60	37,9	3,40	80,1	5,00	118
50	16	0,90	43,4	1,80	86,8	2,70	130

DF/P Model

Ratio 1/1							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
1000	1000	9,90	7,65	23,2	17,9	34,2	26,4
700	700	7,20	7,95	16,7	18,4	24,6	27,1
500	500	5,60	8,62	12,9	19,9	19,0	29,3
400	400	4,70	9,04	19,9	21,0	16,2	31,3
300	300	3,80	9,73	8,60	22,2	12,7	32,7
200	200	2,70	10,4	6,10	23,6	9,00	34,7
100	100	1,60	12,5	3,40	26,4	5,00	38,9
50	50	0,90	13,9	1,80	27,8	2,70	41,7
30	30	0,50	15,0	1,30	32,4	1,80	46,3

RC/FP-RS/FP-RIS/FP Model

Ratio 1/3							
Size		**32**		**42**		**55**	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
3000	1000	22,8	16,5	53,2	38,5	78,6	56,9
2000	666	16,5	17,9	38,3	41,6	56,3	61,2
1500	500	13,1	18,9	30,7	44,5	45,3	65,6
1000	333	9,90	21,5	23,2	50,5	34,2	74,4
700	233	7,20	22,4	16,7	51,9	24,6	76,5
500	166	5,50	24,0	12,9	56,3	19,0	82,9
300	100	3,70	26,8	8,80	63,8	12,7	92,0
100	33	1,60	35,1	3,40	74,6	5,00	109
50	16	0,90	40,7	1,80	81,5	2,70	122

Ratio 1/1,5							
Size		**32**		**42**		**55**	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
1500	1000	11,2	8,12	26,4	19,1	53,1	38,4
1000	666	8,60	9,40	20,3	22,1	40,6	44,2
700	466	6,80	10,5	14,7	22,8	31,0	48,2
500	333	5,10	11,1	11,9	25,9	24,1	52,4
400	266	4,40	11,9	10,0	27,2	20,0	54,5
300	200	3,40	12,5	7,90	28,7	15,7	57,2
200	133	2,70	14,8	5,80	31,7	11,2	61,2
100	66	1,60	17,5	3,50	38,1	6,50	71,8
50	33	1,00	21,9	2,20	48,3	4,60	101

RC/FP-RS/FP Model

Ratio 1/2							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
2000	1000	16,5	11,9	46,7	33,8	78,6	56,9
1500	750	14,7	14,2	43,0	41,5	63,3	61,1
1000	500	10,0	14,5	28,4	41,1	45,3	65,6
700	350	7,60	15,7	21,8	45,1	34,9	72,2
500	250	6,10	17,6	17,3	50,1	26,4	76,5
300	150	4,20	20,3	11,7	56,5	17,4	84,1
100	50	1,90	27,5	4,60	66,7	7,00	101
50	25	1,00	29,0	2,50	72,5	3,70	107
30	15	0,70	33,8	1,60	77,3	2,30	111

Ratio 1/1							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
1000	1000	6,00	4,35	15,7	11,3	31,1	22,5
700	700	4,40	4,55	12,6	13,0	22,8	23,6
500	500	3,60	5,22	9,40	13,6	18,7	27,1
400	400	3,00	5,43	7,90	14,3	15,6	28,2
300	300	2,50	6,04	6,40	15,4	12,6	30,4
200	200	1,80	6,52	4,60	16,6	9,10	32,9
100	100	1,10	7,97	2,70	19,5	5,30	38,4
50	50	0,60	8,70	1,60	23,2	3,10	44,9
30	30	0,40	9,66	1,10	26,5	2,00	48,3

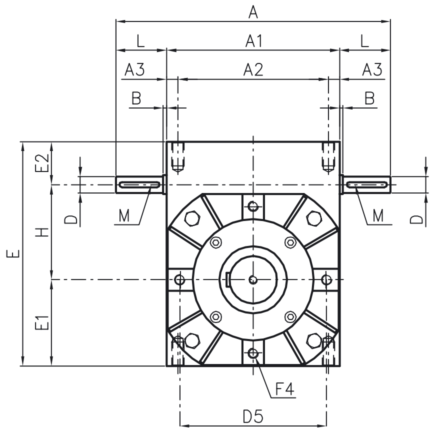
Ratio 1/0,75							
Size		32		42		55	
Fast shaft rotation speed ω_V [rpm]	Slow shaft rotation speed ω_L [rpm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]	P_i [kW]	M_{tL} [daNm]
750	1000	4,10	2,97	8,00	5,80	20,7	15,0
600	800	3,90	3,53	7,70	6,97	19,2	17,4
500	666	3,50	3,81	6,70	7,29	17,4	18,9
400	533	3,00	4,08	5,80	7,88	15,5	21,0
300	400	2,40	4,35	4,70	8,51	12,7	23,0
200	266	1,80	4,90	3,50	9,53	9,50	25,8
100	133	1,10	5,99	2,10	11,4	5,70	31,0
50	66	0,70	7,68	1,30	14,2	3,50	38,4
30	40	0,50	9,06	0,90	16,3	2,40	43,5

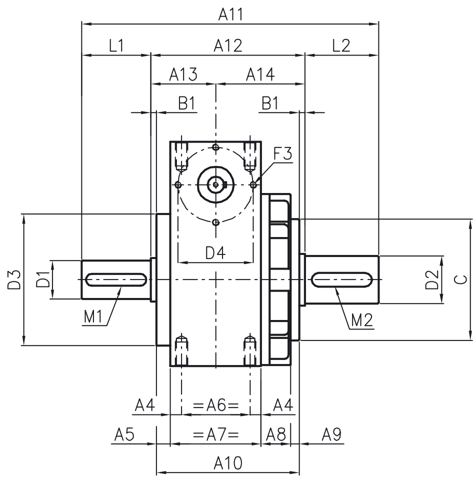
Basic constructive forms

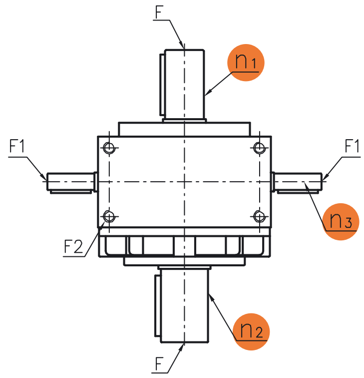
model 1

model 2

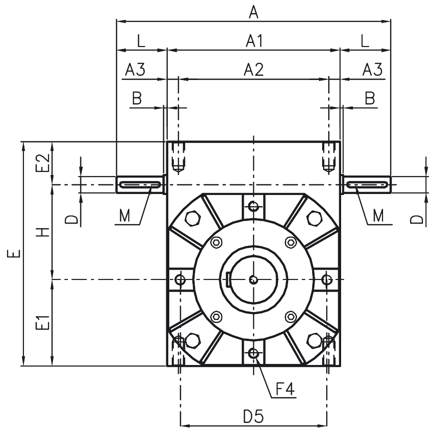
model 3

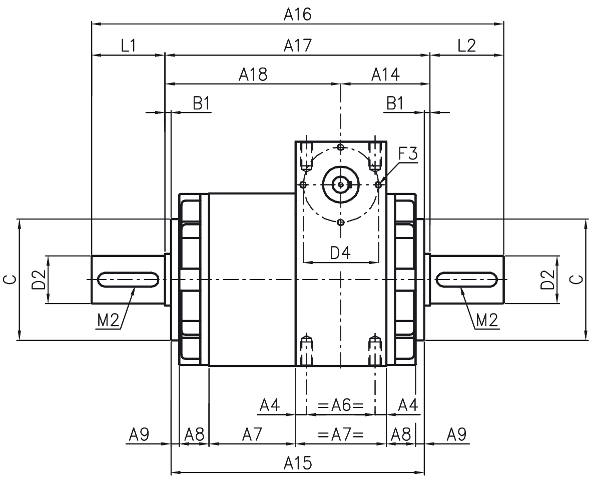


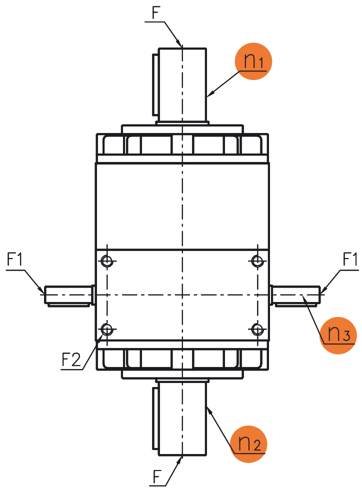




F Model			
Size	**32**	**42**	**55**
A	198	234	318
A1	134	166	200
A2	116	144	174
A3	9	11	13
A4	10	11	13
A5	10	18	16
A6	50	58	79
A7	70	80	105
A8	27	30	34
A9	10	10	10
A10	117	138	165
A11	206	262	334
A12	121	142	169
A13	47	60	70,5
A14	74	82	98,5
B	2	4	4
B1	2	2	2
C Ø	99	116	140
D Ø h7	14	19	19
D1 Ø h7	25	35	45
D2 Ø h7	32	42	55
D3 Ø g6	90	125	152
D4 Ø	60	68	87
D5 Ø	116	140	170
E	172	213	260
E1	67	83	100
E2	35	40	50
F	M8x16	M10x20	M10x20
F1	M5x10	M6x12	M6x12
F2	M10x18	M12x24	M14x28
F3	M5x10	M6x12	M8x15
F4	M8x18	M10x20	M12x24
H	70	90	110
L	32	34	59
L1	40	60	80
L2	45	60	85
M	5x5x25	6x6x25	6x6x50
M1	8x7x35	10x8x50	14x9x70
M2	10x8x40	12x8x50	16x10x70







Basic constructive forms

model 4

model 5

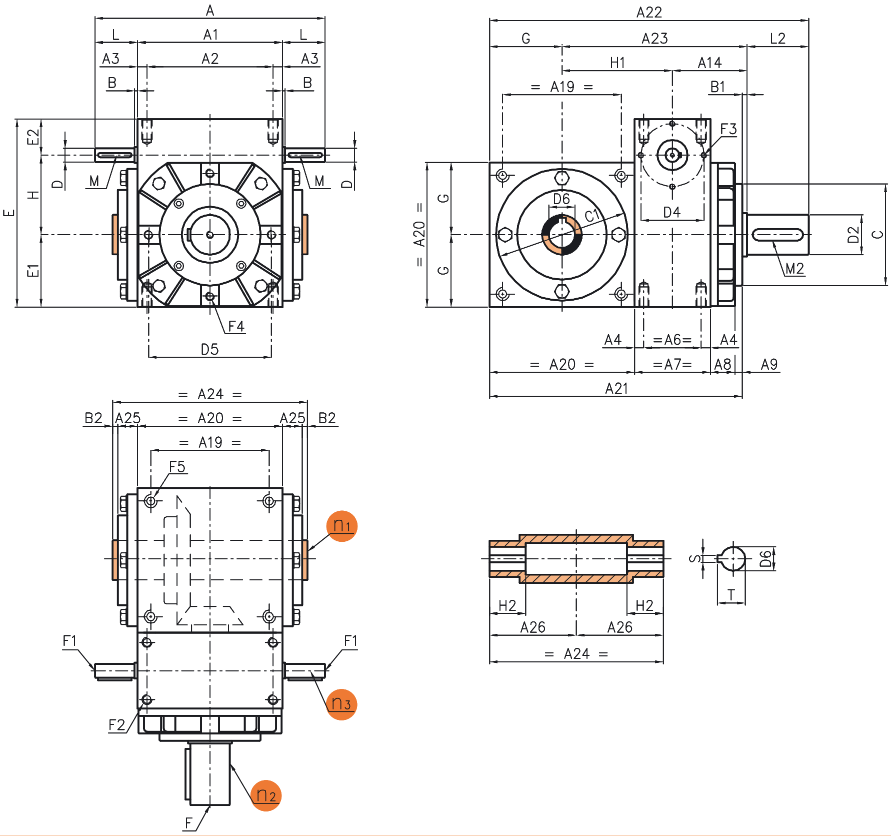
model 6

DF Model			
Size	**32**	**42**	**55**
A	198	234	318
A1	134	166	200
A2	116	144	174
A3	9	11	13
A4	10	11	13
A5	10	18	16
A6	50	58	79
A7	70	80	105
A8	27	30	34
A9	10	10	10
A14	74	82	98,5
A15	214	240	298
A16	308	364	472
A17	218	244	302
A18	144	162	203,5
B	2	4	4
B1	2	2	2
C Ø	99	116	140
D Ø h7	14	19	19
D2 Ø h7	32	42	55
D4 Ø	60	68	87
D5 Ø	116	140	170
E	172	213	260
E1	67	83	100
E2	35	40	50
F	M8x16	M10x20	M10x20
F1	M5x10	M6x12	M6x12
F2	M10x18	M12x24	M14x28
F3	M5x10	M6x12	M8x15
F4	M8x18	M10x20	M12x24
H	70	90	110
L	32	34	59
L2	45	60	85
M	5x5x25	6x6x25	6x6x50
M2	10x8x40	12x8x50	16x10x70

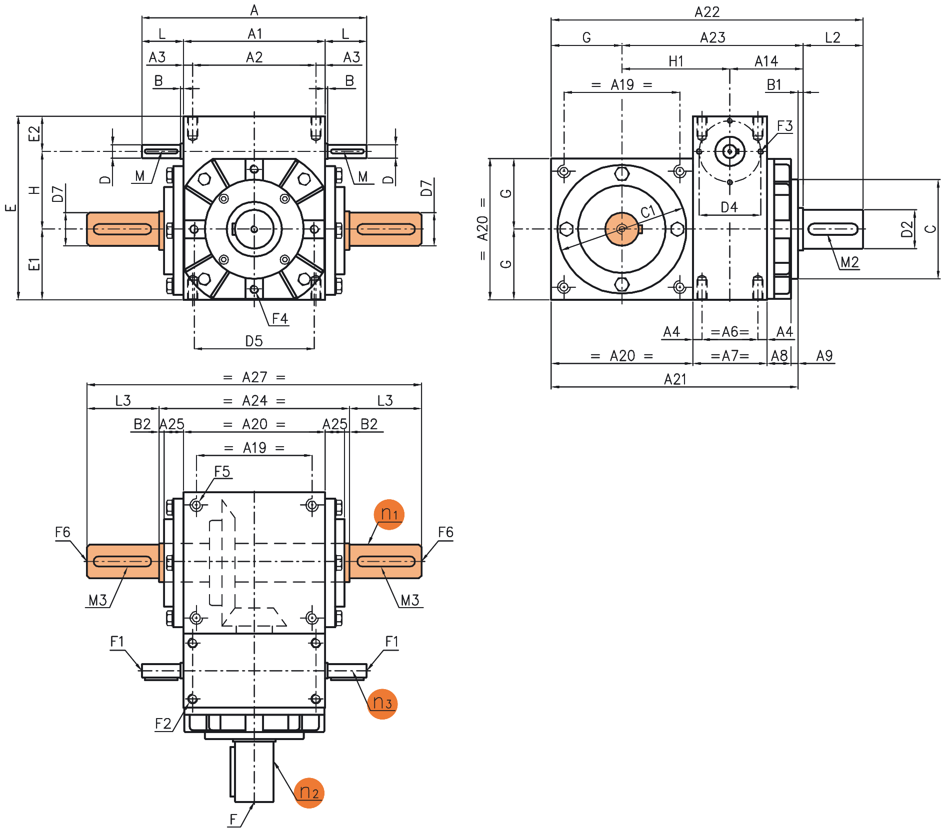
Basic constructive forms

model 7

model 8



RC/F Model			
Size	**32**	**42**	**55**
A	198	234	318
A1	134	166	200
A2	116	144	174
A3	9	11	13
A4	10	11	13
A6	50	58	79
A7	70	80	105
A8	27	30	34
A9	10	10	10
A14	74	82	98,5
A19	114	144	174
A20	134	166	200
A21	241	286	349
A22	288	348	436
A23	176	205	251
A24	174	212	250
A25	18	21	23
A26	87	106	125
B	2	4	4
B1	2	2	2
B2	2	2	2
C Ø	99	116	140
C1 Ø f7	122	156	185
D Ø h7	14	19	19
D2 Ø h7	32	42	55
D4 Ø	60	68	87
D5 Ø	116	140	170
D6 Ø	24	32	42
E	172	213	260
E1	67	83	100
E2	35	40	50
F	M8x16	M10x20	M10x20
F1	M5x10	M6x12	M6x12
F2	M10x18	M12x24	M14x28
F3	M5x10	M6x12	M8x15
F4	M8x18	M10x20	M12x24
F5	M10x25	M12x30	M14x35
G	67	83	100
H	70	90	110
H1	102	123	152,5
H2	35	45	50
L	32	34	59
L2	45	60	85
M	5x5x25	6x6x25	6x6x50
M2	10x8x40	12x8x50	16x10x70
S	8	10	12
T	27,3	35,3	45,3



Basic constructive forms

model 9

model 10

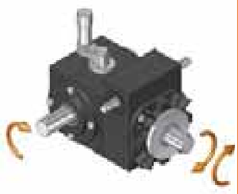
RS/F Model

Size	32	42	55
A	198	234	318
A1	134	166	200
A2	116	144	174
A3	9	11	13
A4	10	11	13
A6	50	58	79
A7	70	80	105
A8	27	30	34
A9	10	10	10
A14	74	82	98,5
A19	114	144	174
A20	134	166	200
A21	241	286	349
A22	288	348	436
A23	176	205	251
A24	174	212	250
A25	18	21	23
A27	304	392	470
B	2	4	4
B1	2	2	2
B2	2	2	2
C Ø	99	116	140
C1 Ø f7	122	156	185
D Ø h7	14	19	19
D2 Ø h7	32	42	55
D4 Ø	60	68	87
D5 Ø	116	140	170
D7 Ø h7	32	45	55
E	172	213	260
E1	67	83	100
E2	35	40	50
F	M8x16	M10x20	M10x20
F1	M5x10	M6x12	M6x12
F2	M10x18	M12x24	M14x28
F3	M5x10	M6x12	M8x15
F4	M8x18	M10x20	M12x24
F5	M10x25	M12x30	M14x35
F6	M8x20	M10x25	M10x25
G	67	83	100
H	70	90	110
H1	102	123	152,5
L	32	34	59
L2	45	60	85
L3	65	90	110
M	5x5x25	6x6x25	6x6x50
M2	10x8x40	12x8x50	16x10x70
M3	10x8x55	14x9x80	16x10x100

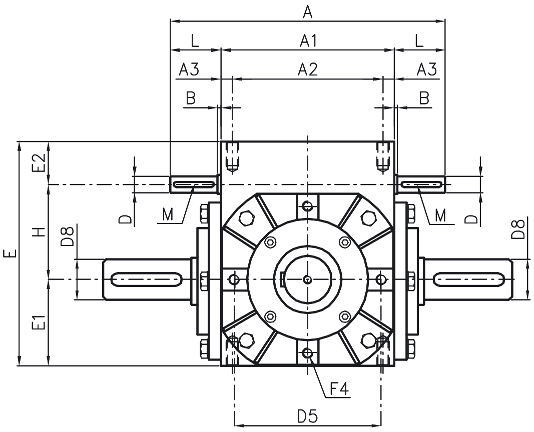
Basic constructive forms

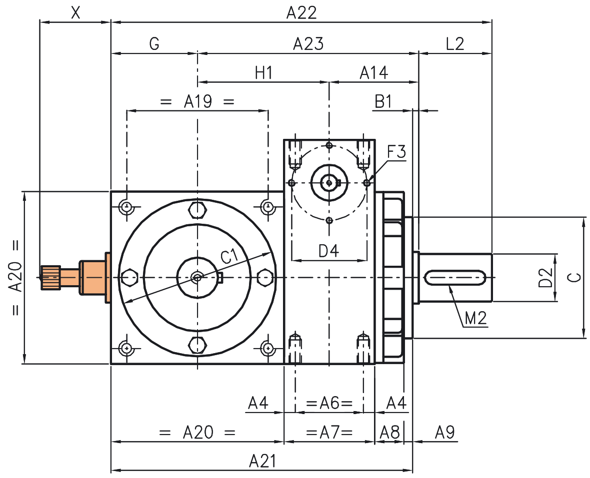
model 11

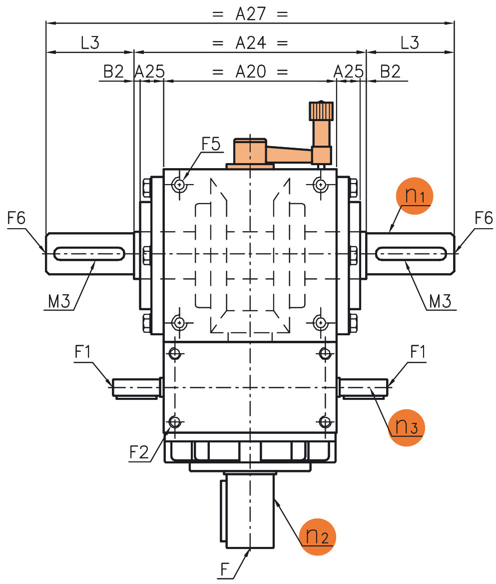
model 12

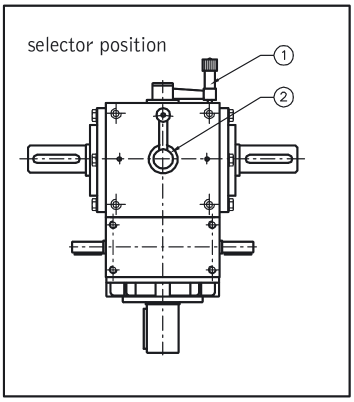


model 13



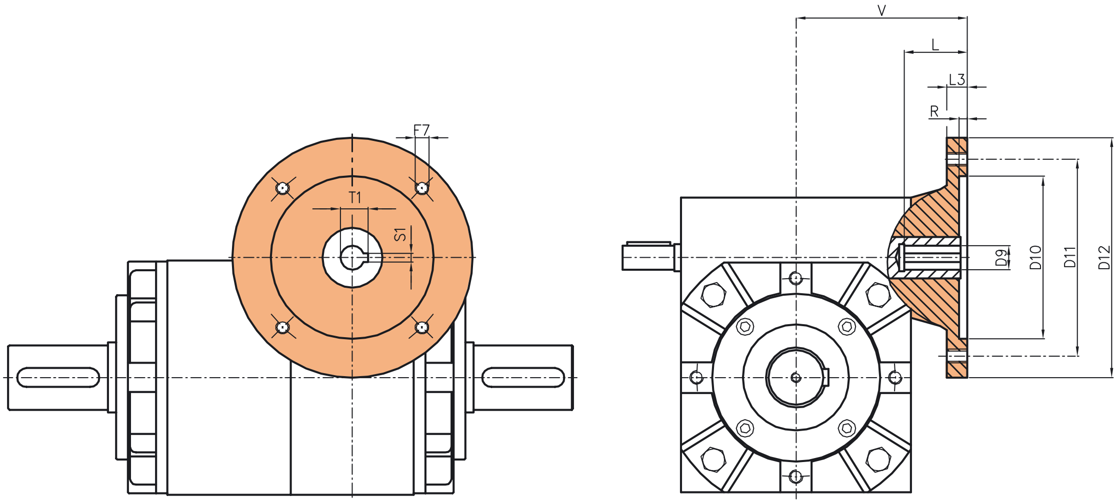






RIS/F Model			
Size	32	42	55
A	198	234	318
A1	134	166	200
A2	116	144	174
A3	9	11	13
A4	10	11	13
A6	50	58	79
A7	70	80	105
A8	27	30	34
A9	10	10	10
A14	74	82	98,5
A19	114	144	174
A20	134	166	200
A21	241	286	349
A22	288	348	436
A23	176	205	251
A24	174	212	250
A25	18	21	23
A27	264	325	420
B	2	4	4
B1	2	2	2
B2	2	2	2
C Ø	99	116	140
C1 Ø f7	122	156	185
D Ø h7	14	19	19
D2 Ø h7	32	42	55
D4 Ø	60	68	87
D5 Ø	116	140	170
D8 Ø h7	32	42	55
E	172	213	260
E1	67	83	100
E2	35	40	50
F	M8x16	M10x20	M10x20
F1	M5x10	M6x12	M6x12
F2	M10x18	M12x24	M14x28
F3	M5x10	M6x12	M8x15
F4	M8x18	M10x20	M12x24
F5	M10x25	M12x30	M14x35
F6	M8x20	M10x25	M10x25
G	67	83	100
H	70	90	110
H1	102	123	152,5
L	32	34	59
L2	45	60	85
L3	45	60	85
M	5x5x25	6x6x25	6x6x50
M2	10x8x40	12x8x50	16x10x70
M3	10x8x40	12x8x50	16x10x70
X	84	84	84

M Model

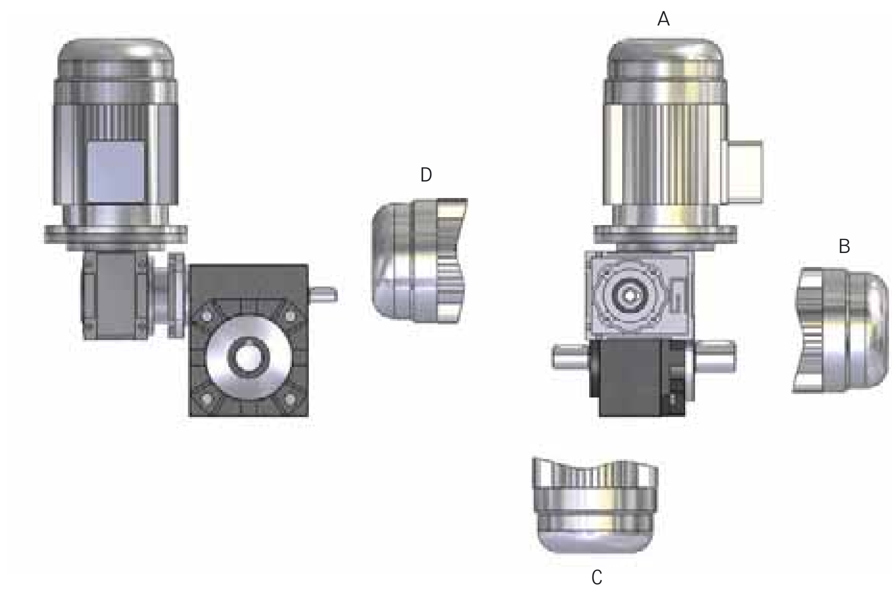


M Models

Size	IEC Flange	D9 H7	D10 H7	D11	D12	F7	L	R	S	T	V
32	56 B5	9	80	100	120	M6	20	4	3	10,4	97
	63 B5	11	95	115	140	M8	23	4	4	12,8	97
	71 B5	14	110	130	160	M8	30	4	5	16,3	97
	71 B14	14	70	85	105	7	30	4	5	16,3	97
42	63 B5	11	95	115	140	M8	23	4	4	12,8	116
	71 B5	14	110	130	160	M8	30	4	5	16,3	116
	80 B5	19	130	165	200	M10	40	4	6	21,8	116
	80 B14	19	80	100	120	7	40	4	6	21,8	116
55	71 B5	14	110	130	160	M8	30	5	5	16,3	140
	80 B5	19	130	165	200	M10	40	5	6	21,8	140
	80 B14	19	80	100	120	7	40	5	6	21,8	140
	90 B5	24	130	165	200	M10	50	5	8	27,3	140
	90 B14	24	95	115	140	9	50	5	8	27,3	140

MR Model

Special dimensions according to the motor reducer specifications.

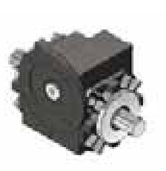


for not quoted dimensions see the schemes on pages 256-261.

Motorized speed modulation gearboxes


14


15


16


17


18


19


20


21


22


23


24


25


26


27

Application samples are online at www.unimec.eu - section Applications

Speed modulation gearboxes with motor reducers


28


29


30


31

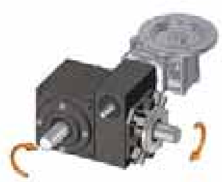

32


33


34


35


36


37


38


39


40


41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

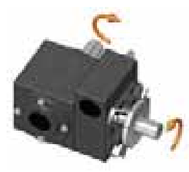
61


62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

NIPLOY treatment

For applications in oxidizing environments, it is possible to protect some bevel gearbox components which do not undergo any sliding, by means of a chemical nickel treatment, the so-called Niploy. It creates a non permanent surface coating on casings and covers.

NORMS

ATEX directive (94/9/CE)

The 94/9/CE directive is better known as the "ATEX directive". All UNIMEC's products may be classified as "components" according to the definition quoted in art.1 par.3 c), and therefore they do not require an ATEX mark.
A conformity declaration in accordance to what stated in art.8 par.3 can be supplied upon end user's request, subject to the filling up of a questionnaire with the indication of the working parameters.

Machinery directive (98/37/CE)

The 98/37/CE directive is better known as the "Machinery directive". UNIMEC's components are included in the products categories which do not need to affix the CE mark, as they are "intended to be incorporated or assembled with other machinery" (art.4 par.2). Upon end user's request a manufacturer declaration can be supplied in accordance to what is foreseen at Annex II, point B. The new machine directory (06/42/CE) will be acknowledged by 29/12/2009. UNIMEC guarantees that every new duty in mechanical transmission will be followed by such date.

ROHS directive (02/95/CE)

The 02/95/CE directive is better known as the "ROHS directive". All UNIMEC's suppliers of electromechanical equipments have issued a conformity certification to the above norms for their products. A copy of said certificates can be supplied upon final user's request.

REACH directive (06/121/CE)

The 06/121/CE is better known as "REACH" directive and applies as the rule CE 1907/2006. UNIMEC products present only inside lubricants as "substances", so being disciplined by art. 7 of above mentioned rule. By art. 7 par. 1 b) UNIMEC declares that its products are not subjected to any declaration or registration because the substances in them are not "to be lost in normal and reasonable previewed usage conditions"; in facts lubricant losses are typical of malfunctions or heavy anomalies. By art. 33 of the rule CE 1907/2006, UNIMEC declares that inside its products there aren't substances identified by art. 57 in percentage to be dangerous.

UNI EN ISO 9001:2000 norm

UNIMEC has always considered the company's quality system management as a very important subject. That is why, since the year 1996, UNIMEC is able to show its UNI EN ISO 9001 certification, at the beginning in accordance to the 1994 norms and now meeting the requirements of the version published in the year 2000. 13 years of company's quality, certified by UKAS, the world's most accredited certification body, take shape into an organization which is efficient at each stage of the working process. In date 31/10/2008 the new version of this norm was published. UNIMEC will evaluate every news reported in this revision.

UKAS QUALITY MANAGEMENT

Painting

Our products are all painted in color RAL 5015 blue. An oven-dry system enables the products to have a perfect adhesivity. Different colors as well as epoxidic paints are available.