

# SITI

SPA

SOCIETÀ ITALIANA TRASMISSIONI INDUSTRIALI



## HL - MHL



**INSTALLATION, OPERATION  
and MAINTENANCE MANUAL**

# 03.2005

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## CONTACTING OUR SERVICE DEPARTMENT

When contacting our customer service department always quote the data indicated on the gearbox's identification plate.

Our service department is located at:



SOCIETÀ ITALIANA TRASMISSIONI INDUSTRIALI



GEARBOXES  
MOTORIZED GEARBOXES  
SPEED VARIATORS  
ELECTRIC C.A./C.C. MOTORS  
COUPLINGS

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### HEADQUARTER

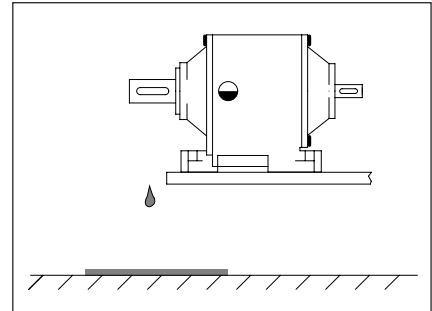
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## MAINTENANCE

### Routine checks

Periodically check the outer surfaces of the gearbox and the cooling air passages for cleanliness. Regularly make sure that no lubricant leaks through the seals, mounting flanges, mounting screws of the covers, caps etc..

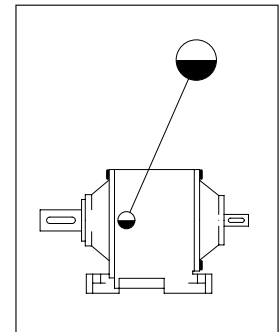


### Cleaning

Direct cleaning should usually be carried out using soft solvents in order not to damage the paintwork. Then clean inside immediately with the same oil used during actual operations. It is good practice to do this with hot oil, flushing out any coolant in the circuit. In this case be careful not to allow any foam to form - this happens due to the presence of impurities. When this operation has been completed, drain the oil while still hot. Both the oil characteristics and the regularity with which the oil reaches the pre-determined points are extremely important factors to ensure efficient lubrication.

### Checking the oil level

Regularly check that the oil level is correct when the gearbox has stopped and cooled down sufficiently. To do this, use the sight-glass provided. This should be kept clean and see-through at all times. When looking through the sight-glass, if it seems as though there are deposits in the oil, make sure that no foreign bodies such as dust, sand or water have got inside the gearbox housing. If the oil level has fallen below the minimum level, top up immediately. If the gearbox runs with insufficient lubricant, this could quickly cause extremely serious and irreparable damage. If the level of oil inside the gearbox is too low it affects the heat exchange process and the reduced cooling power and heat dissipation cause the internal operating temperature to increase, especially at the points where the sides of the teeth come into contact.



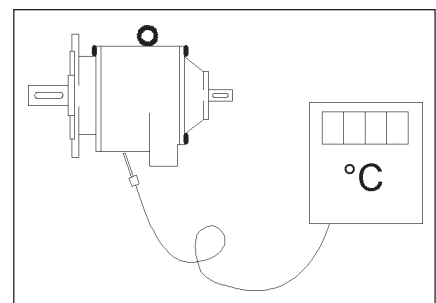
### Operating temperature

The operating temperature depends on a number of factors such as the type of power transmission, the type and quantity of lubricant, the characteristics and structure of the gearbox, the speed and power applied and the environment in which the gearbox is operating.

Generally, a rise in temperature of 15-20° compared to the outside temperature is acceptable.

### Measuring the operating temperature

Wherever possible, suitable instruments should be used to measure the external temperature of the gearbox housing. As, under optimum operating conditions, there is a rise in temperature of 15-20°C inside the gearbox compared to outside, the housing normally becomes too hot to touch. It is therefore wrong to assume that the gearbox is too hot just because it cannot be touched. In fact, it cannot be touched as soon as the temperature goes above 50°C. It is important to check that the operating temperature when the gearbox runs at normal speed, when the operating conditions remain the same, is more or less constant. This indicates that the gearbox is running in a trouble-free manner.



## Replacing the seals

The efficiency and service life of the ring seals largely depends on the operating temperature in the contact zone, any chemical reactions which may occur between the rubber compound and the lubricant and, finally, its wear condition.

The ring seals need to be replaced when:

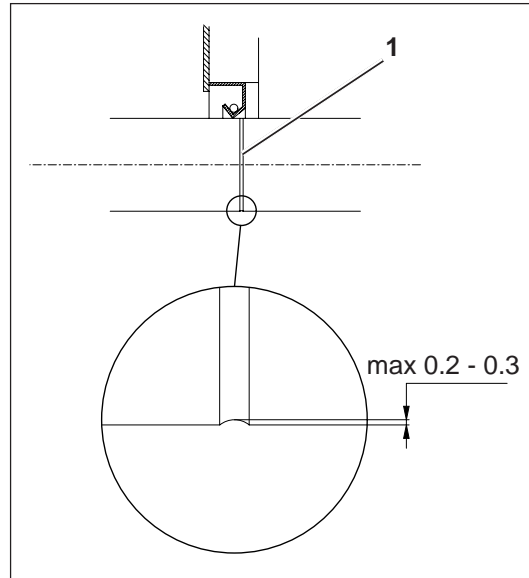
- the seal is no longer efficient and, as a result, oil is leaking out;
- the entire machine or system is overhauled.

Whenever a seal is no longer efficient, it must be replaced immediately to avoid any further leakage and prevent any other parts from being damaged.

When installing the new ring seal, follow the instructions below:

- take great care when handling the seal and make sure it is in good condition (do not leave it in stock for too long as this could cause premature wear especially if it is stored in a damp environment)
- always check that the seat where the seal is to be fitted is perfect i.e. without scoring, marks, nicks, dents or surface defects of any kind
- make sure the lip of the new seal is not fitted at exactly the same point **1** as the previous one
- if the area where the ring seal comes into contact with the shaft has worn down by more than 0.2-0.3 mm, do not, under any circumstances, install a new seal but contact our local service centre where the staff will see whether the shaft can still be used and identify the cause of the damage
- install the ring seal perpendicularly to the shaft, with the lip absolutely free and not curled under or pinched
- install the ring seal so that the lip faces the oil that must be kept in or the side from where the pressure is exerted
- for ring seals without a dust-tight lip, coat the outside of the lip with grease
- for ring seals provided with a dust-tight lip, fill the gap between the seal lip and the dust-tight lip with grease
- lubricate the seal seat on the shaft
- do not use sealants because, if they get on the seal lip or shaft surface they can cause rapid wear
- when installing the seal, press down as near as possible to the outside edge
- do not block the ring seal axially or apply too much load
- always use suitable tools to avoid damaging the seal lip with threads, grooves, sharp edges or keyways
- always cover the seal lip and the seat on the shaft when repainting the gearbox.

All the precautions mentioned above need to be taken in order to prevent the ring seal from becoming dry especially when the shaft first starts to rotate. If the seal becomes dry, the temperatures in the area where it comes into contact with the shaft would become too high and this would immediately damage the seal material causing the lip to harden and producing cracks and discolouring.



## Lubrication

### A- Gearboxes supplied with oil

Lubricating the gearboxes with synthetic oil ensures top performance, unlimited service life and minimum maintenance is required. In this case the only maintenance procedure to be performed is cleaning the outside of the gearbox housing with soft solvents so as not to ruin the paintwork.

#### a) running in the gearboxes

The running in time is about 300 hours. During this period we recommend gradually increasing the power up to a limit of 50-70% of the maximum power output (during the first hours of operation). At this stage the gearbox may reach higher temperatures than normal. The oil does not need to be changed after the running in period unless any dirt or particles of abrasive material are found which could affect the gearbox operations.

## B- Gearboxes supplied without oil

The gearboxes supplied by our company without oil are the one intended for heavy-duty use (from size 40 - included - upwards). In this case, the maintenance procedures to be performed are as follows:

### a) running in the gearboxes

The running in time is about 300-400 hours. During this period we recommend gradually increasing the power output up to a limit of 50-70% of the maximum power output (during the first hours of operation). At this stage the gearboxes may reach higher temperatures than normal. It is advisable to change the oil after the running in period.

### b) changing the oil

The time interval at which the oil should be changed depends on the operating conditions. These are outlined in the chart below:

Oil temperature	Duty	Time interval (hours)
<60°C	Continuous	5000
	Intermittent	8000
>60°C	Continuous	2500
	Intermittent	5000

The data indicated in this chart refers to mineral and synthetic lubricants. The latter can be used for long-term lubrication if used within a normal temperature range and as long as they are not ruined by dirt, air, etc. getting inside the gearbox.

HL 20 size gearboxes are supplied permanently lubricated with synthetic oil and therefore do not require maintenance.

Large gearboxes (from HL40 onwards), on the other hand, are supplied without oil and are therefore provided with filler, drain and level plugs.

It is therefore the user's responsibility to add the oil in the correct amount according to the mounting position.

Remember that the amounts indicated in the chart are for reference purposes only. The user should add oil until it reaches the level indicated on the sight-glass (once the gearbox has been installed in the correct position).

## Lubricant used for the HL20: Shell Tivella SC-320 (Lifetime lubrication)

Typical properties	
Volumetric mass	1.052 (kg/dmc)
Kinematic viscosity at 40°C	320 cST
Pour point	-42 °C
Viscosity index	242
Flash point (c.o.c.)	290 °C
FZG test exceeds stage	>12

### NOTE

This lubricant cannot be mixed with mineral oils and is incompatible with nitrocellulose paints and seals made of natural rubber. The larger gearboxes, on the other hand, are supplied without oil and are therefore provided with filler, drain and level plugs.

## Recommended lubricants for the HL40-HL70 gearboxes

### Synthetic oils (Lifetime lubrication)

Brand	Type of oil
IP	Telium Oil VSF
SHELL	Tivela Oil SC 320
KLÜBER	Syntheso D 220 EP
FINA	Giran S 320
ESSO	Glycolube Range 220

Ambient temperature -30°C +50°C

Operating temperature -40°C +130°C

Mineral or synthetic oils (requiring periodic lubrication)

Ambient Temp.		-10°C +50°C		-30°C +100°C	-40°C +120°C
Type of lubricant		Mineral oil		Synthetic oil	
Type of service		Normal	Heavy	Normal and heavy	
Brand	IP	Mellana Oil 220	Mellana Oil 320	Telesia Oil 150	
	ESSO	Spartan EP 220	Spartan EP 320	S220	
	AGIP	Blasia 220	Blasia 320	Blasia 460	
	MOBIL	Mobilgear 220	Mobilgear 320	Glycoil 30	
	SHELL	Omala EP 320	Omala EP 320	Tivela Oil WB	
	BP	Energol GR-XP 220	Energol GR-XP 320	Energol SG-XP 220	
	TEXACO	Meropa 220	Meropa 320	Rando Oil HD Cz68X	
	TOTAL	Carter EP 220	Carter EP 320		
	KLÜBER			Syntheso D 220	
				Syntheso HT 220	

Amount of lubricant (in litres)

Size	Mounting position								
	B3	B5	B6	B7	B8	V1	V3	V5	V6
20/2 (*)	0.4	0.4	0.5	0.5	0.5	0.7	0.6	0.7	0.6
25/2	0.4	0.4	0.7	0.8	0.6	1.1	1	1.1	1
30/2	0.7	0.6	1.2	1.3	1.1	2.2	2.1	2.2	2.1
40/2	1.3	1.2	2.2	2.3	2.1	3.8	3.6	3.7	3.5
50/2	2.9	2.7	4.6	4.8	4.5	7.8	7.5	7.8	7.5
60/2	5	4.7	7.5	8.4	7.2	12.8	12.1	13	12.3
70/2	7	6.5	11.4	12.4	10.8	19.5	18.6	20	19
25/3	0.5	0.5	0.8	0.9	0.7	1.2	1.1	1.2	1.1
30/3	0.8	0.7	1.3	1.4	1.2	2.3	2.2	2.3	2.2
40/3	1.5	1.4	2.4	2.5	2.3	4	3.8	3.9	3.7
50/3	3.1	2.9	4.8	5	4.7	8	7.7	8	7.7
60/3	5.4	5	7.8	8.7	7.5	13.2	12.5	13.3	12.5
70/3	7.5	7	11.9	12.9	11.3	20	19.1	20.5	19.5

(\*) Supplied pre-lubricated by SITI

## TROUBLE-SHOOTING

PROBLEM	POSSIBLE CAUSES	REMEDY
The motor does not start	<ul style="list-style-type: none"> <li>a) The motor's electrical wiring is faulty</li> <li>b) The motor is faulty</li> <li>c) Wrong size motor</li> </ul>	<ul style="list-style-type: none"> <li>a) Check the connections</li> <li>b) Replace the motor</li> <li>c) Replace the motor</li> </ul>
The motor and gearbox reach temperatures which are too high	<ul style="list-style-type: none"> <li>a) Mechanical overload</li> <li>b) Wrong size geared motor assembly</li> </ul>	<ul style="list-style-type: none"> <li>a) Check the mechanical parts driven by the geared motor assembly</li> <li>b) Replace the geared motor assembly</li> </ul>
The current absorbed and/or the temperature of the motor are too high	<ul style="list-style-type: none"> <li>a) Motor faulty</li> <li>b) Wrong size motor</li> </ul>	<ul style="list-style-type: none"> <li>a) Replace the motor</li> <li>b) Replace the motor</li> </ul>
The gearbox reaches a temperature which is too high	<ul style="list-style-type: none"> <li>a) Gearbox faulty</li> <li>b) Wrong size gearbox</li> <li>c) Wrong mounting position</li> <li>d) Not enough lubricant</li> </ul>	<ul style="list-style-type: none"> <li>a) Repair or replace the gearbox</li> <li>b) Replace the gearbox</li> <li>c) Check that the gearbox supplied is that ordered</li> <li>d) Add lubricant until the level indicated is reached</li> </ul>
Oil leaks from the shafts	<ul style="list-style-type: none"> <li>a) Ring seals worn down or defective</li> <li>b) Seal seat on the shaft worn</li> </ul>	<ul style="list-style-type: none"> <li>a) Replace the ring seals</li> <li>b) Replace the ring seals and install them in a very slightly different position or replace the shafts</li> </ul>
Oil leaks from the seals	<ul style="list-style-type: none"> <li>a) Flanges not tightened properly</li> <li>b) Seals defective</li> </ul>	<ul style="list-style-type: none"> <li>a) Tighten the flanges</li> <li>b) Replace the seals and check that the surfaces are properly machined</li> </ul>
A banging noise is coming from the gearbox	<ul style="list-style-type: none"> <li>a) Gear teeth defective</li> </ul>	<ul style="list-style-type: none"> <li>a) Contact our customer service department</li> </ul>
A whistling noise is coming from the gearbox	<ul style="list-style-type: none"> <li>a) Not enough lubricant</li> <li>b) Gears defective or worn down</li> <li>c) Bearings defective or not installed properly</li> </ul>	<ul style="list-style-type: none"> <li>a) Add lubricant until the level indicated is reached</li> <li>b) Contact our customer service department</li> <li>c) Contact our customer service department</li> </ul>



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**RIDUTTORI**

**MOTORIDUTTORI**

**VARIATORI CONTINUI**

**MOTORI ELETTRICI C.A./C.C.**

**GIUNTI ELASTICI**

GEARBOXES

GEARED MOTORS

SPEED VARIATORS

A.C./D.C. ELECTRIC MOTORS

FLEXIBLE COUPLINGS

**SEDE e STABILIMENTO**

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