

# **Pilot Operating Handbook**

## **Dynali H3 Sport 135 HP**



## **Ultralight Helicopter**

Dynali\_POH\_H3 Sport 135 HP/ Revision 3.0 – Issue date 01.02.2020

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## PILOT OPERATING HANDBOOK FOR DYNALI H3 SPORT 135 HP

Model : \_\_\_\_\_

Serial N° : \_\_\_\_\_

Registration : \_\_\_\_\_

Type Certificate N° : \_\_\_\_\_

Aircraft builder and  
type certificate holder : \_\_\_\_\_

Distribution Partner : \_\_\_\_\_

Owner : \_\_\_\_\_



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## **SECTION 1 - GENERAL**

### **1.1 INTRODUCTION**

This manual is designed as an operating guide for pilots, instructors, and owners/operators, providing information for the safe and efficient operation of this helicopter. It includes documentation required by the competent certification authority. This handbook is not however designed as a substitute for adequate and competent flight instruction.

Pilots of this aircraft must hold a proper license, including the class rating “helicopter”, corresponding to the aircraft’s model. A special endorsement may be required to fly with passengers. It is the pilot’s responsibility to be familiar with this handbook, the special characteristics of this helicopter, and all other information and legal requirements relevant for the operation in his country. The pilot is responsible for determining that the helicopter is in a safe condition for flight, and for operation of the aircraft with in compliance with the procedures and limitations set out in this manual.

It is the owner’s/operator’s responsibility to have this helicopter registered and insured, according to country-specific regulations. The aircraft owner/operator is also responsible for maintaining the helicopter in airworthy condition. Maintenance instructions are provided in SECTION 8 of this manual as well as in the Assembly Manual.

Note that depending on the kind of operation, type of maintenance activity or component involved, the competent authority may dictate qualified personnel and/or certified facilities.

### **1.2 CERTIFICATION**

The H3 Sport was designed, tested and certified according to the French design specifications for ultralight helicopters (Code HUL) including the latest amendment published on the date of this revision, it has also been designed and tested for conformity with the British Civil Airworthiness Requirements (BCAR) and CS-VLR, although these latter two certifications have not been solicited.

The certification document (Fiche d’identification) was issued by the French DGAC (Direction Générale de l’Aviation Civile).

## 1.3 PERFORMANCE DATA AND OPERATING PROCEDURES

The legal basis for operating a helicopter is provided by national laws and regulations. The helicopter must be operated in compliance with any technical specifications and limitations under which national approval may be conditional (e.g. Type Approval Data Sheet).

All documented performance data and operating procedures have been identified within the certification processes for this helicopter by means of ground tests, flight tests and detailed analysis.

## 1.4 DEFINITION OF TERMS

This manual uses “WARNING”, “CAUTION” and “NOTE” in bold capital letters to indicate especially critical and important instructions. Additionally, the color of the panel (red, yellow and grey shading) highlights the significance of the instruction.

Definitions for each term are given below.

### **WARNING !**

**A warning means that the neglect of the appropriate procedure or condition could result in personal injury or death.**

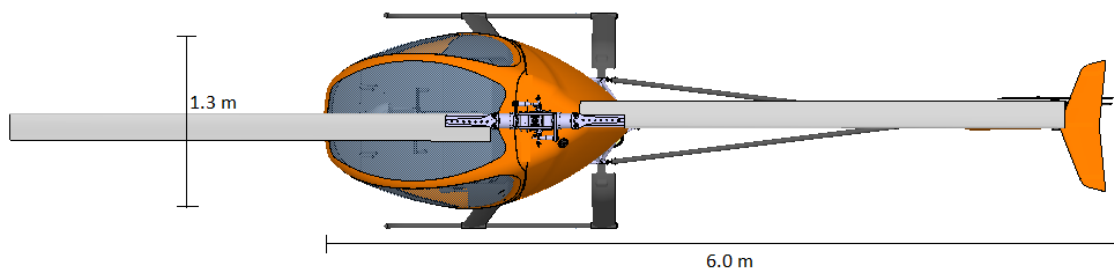
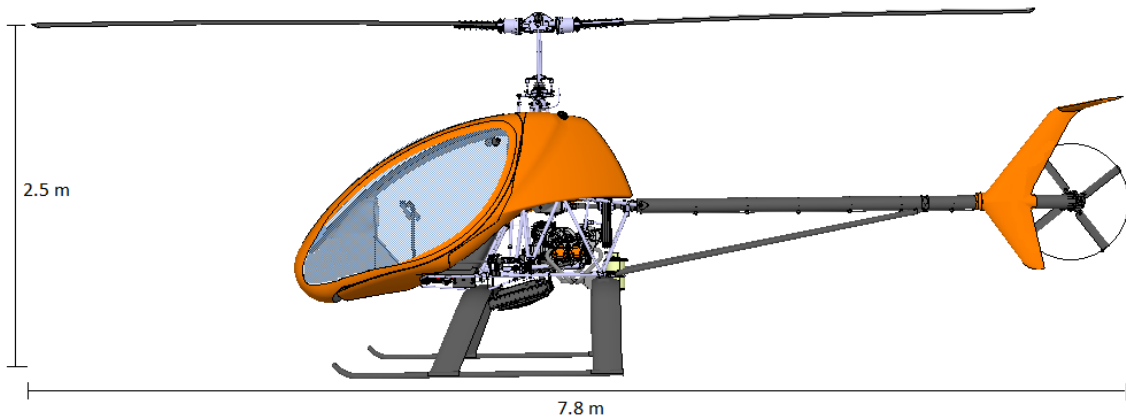
### **CAUTION**

**A caution means that the neglect of the appropriate procedure or condition could result in damage or destruction of equipment.**

### **NOTE**

**A note stresses the attention for a special circumstance, which is essential to emphasize.**

## 1.5 3-VIEW DRAWING OF THE H3 SPORT





## 1.6 DESCRIPTION

The Dynali H3 Sport is an ultralight two-seat helicopter in a side-by-side seating configuration. The main structure is a stainless steel or painted steel chassis which frames the engine, the cabin, the tail structure and all the main and rear transmission.

The main rotor mast is made from stainless steel and the main rotor blades are in extruded aluminum. The rotor head is controlled by push-pull rods through the swash plate.

The tail structure is composed of an aluminum boom, supported by two carbon tail struts. The tail rotor blades are formed in carbon and are controlled by push-pull cables. The cabin cell and the stabilizer are made from vacuum infused carbon fiber and the canopy is in Perspex.

## 1.7 TECHNICAL CHARACTERISTICS

### GENERAL

Fuselage length .....	<b>6.00 m</b>
Maximum Length (including main rotor).....	<b>7.80 m</b>
Height .....	<b>2.50 m</b>
Height on wheels .....	<b>2.60 m</b>
Interior cabin width.....	<b>1.30 m</b>
Width of undercarriage .....	<b>1.80 m</b>
Empty weight .....	<b>312.5 kg (standard configuration)</b>
MTOW (max.) .....	<b>500 kg</b>
Fuel tank capacity.....	<b>60 L</b>
Regular fuel .....	<b>Unleaded 98 or UL91</b>
Low level warning light.....	<b>15 L</b>
Instrument reading.....	<b>(1/2 = 34L) (1/4 = 22L) (0/4 = 15L)</b>

### MAIN ROTOR

2-blade pitch articulated, semi-rigid on teetering hinge

Diameter .....	<b>7.14 m</b>
Number of blades .....	<b>2</b>
Blade chord .....	<b>18 cm</b>
Blade twisting .....	<b>0°</b>
Blade weight .....	<b>12 kg</b>
Blade tip speed at 100% of nominal configuration .....	<b>690 km/h</b>

## TAIL ROTOR

4-blade, pitch articulated, rigid type without articulation

Diameter .....	<b>0.8 m</b>
Number of blades .....	<b>4</b>
Blade chord .....	<b>5.5 cm</b>
Blade twisting .....	<b>5°</b>
Blade weight .....	<b>120 g</b>
Blade tip speed at 100% of nominal configuration .....	<b>580 km/h</b>

## TRANSMISSION

*Main transmission and Main Transmission Gearbox (MTG)*

Main Transmission .....	<b>Pulleys &amp; Four V-belts</b>
Main transmission gearbox (MTG) .....	<b>90° conic spiral gearing</b>
Reduction ration MTG.....	<b>3.55 / 1</b>
Freewheel.....	<b>6.6 kN - 6 rollers</b>

*Rear transmission and Rear Transmission Gearbox (RTG)*

Rear transmission.....	<b>Shaft</b>
Rear transmission gearbox (RTG).....	<b>90° conic spiral gearing</b>
Reduction ratio RTG.....	<b>2 / 1</b>

*Reduction ratios*

Engine / main transmission shaft.....	<b>2.9 / 1</b>
Engine / engine gear .....	<b>2.4 / 1</b>
Engine / main rotor .....	<b>10.6 / 1</b>
Tail rotor / main rotor .....	<b>7.3 / 1</b>

## ROTAX ENGINE CONFIGURATIONS

- 4-cylinder, four-stroke spark-ignition engine with opposed cylinders
- Liquid cooled cylinder heads
- Air cooled cylinders
- Dry sump forced lubrication with separate oil tank
- Automatic valve adjustment by hydraulic tappet
- Mechanical and/or electrical fuel pump
- Electronic dual ignition
- Electric starter (12V 0.6 kW)
- Air intake system, exhaust system with muffler

Engine .....	<b>Rotax 912 ULS-I-BB</b>
Bore.....	<b>1 600 cm<sup>3</sup></b>
Specificity .....	<b>Injection M150 &amp; Big Bore</b>

## ENGINE COOLING AND LUBRICATION

### *Engine coolant*

Glycol diluted at 50%  
Quantity ..... **6 L maximum**

### *Engine oil*

Type..... **Synthetic oil with anti-friction additive for 4-stroke engine**  
Capacity..... **3.2 L**  
Recommended oils..... **Motorcycle 5W40**  
Consumption ..... **0.1 L/h maximum**

### *Oil MTG*

Type..... **Hypoid SAE 70 to 90 (SWEPCO 201)**  
Capacity..... **0.8 L**

### *Oil RTG*

Type ..... **Hypoid SAE 70 to 90 (SWEPCO 201)**  
Capacity..... **125 mL**

### *Oil in the free-wheel*

Type ..... **Anti-friction additive oil FUCHS RENOLIN MR30 VG100**  
Capacity..... **40 mL**

## **SECTION 2 - LIMITS IN USE**

### **2.1 GENERAL**

This section contains operating limitations, instrument markings and basic placards which are required for safe operation of the helicopter, including its engine, and standard equipment or systems.

#### **WARNING !**

**The operation of a helicopter demands professional pilot instruction and dedicated training on helicopters. Without valid license, the helicopter must not be operated.**

#### **WARNING !**

**During the entire flight, adequate rotor loading must be maintained. Do not perform any manœuvres resulting in the sensation of feeling lightness or near weightlessness.**

#### **WARNING !**

**Smoking on board is strictly prohibited.**

#### **CAUTION**

**This helicopter has been designed and tested for a safe design load at maximum gross weight. Flying at high speed in turbulent air, especially in combination with aggressive manœuvres or a steep turn, can easily create higher loads on the aircraft.**

#### **NOTE**

**This helicopter does not comply with the terms of the international authority for civil aviation (ICAO). There is no international common regulatory system for ultralight helicopters.**

**NOTE**

During the certification process, all required safe loads have been successfully demonstrated with an adequate safety margin. However hard landings or landing on uneven surfaces may result in excessive loads on certain components. Following such incident, extra attention should be given during the external pre-flight check.

## **2.2 ENVIRONMENTAL LIMITATIONS**

Minimum operating Outside Air T° for safe flight ..... -15 °C  
Maximum operating Outside Air T° for safe flight, .....+40 °C  
Maximum wind speed or gust intensity for safe flight ... 60 km/h  
Maximum demonstrated crosswind component..... 30 km/h (16kts)  
Maximum tailwind component for take-off and landing... 30 km/h (16kts)  
Maximum demonstrated operating altitude..... 10 000 ft  
Slope landing..... 8° longitudinal / 4° lateral

**WARNING !**

Do not consider flying in the likelihood of severe weather. Thunderstorms may develop rapidly with the risk of heavy precipitation or hail, severe turbulence with strong vertical air movements, and lightning strikes. If, despite proper flight planning, a thunderstorm should be encountered, consider a precautionary landing immediately.

**NOTE**

It is the responsibility of the pilot / operator to make the decision if flight operation is safe.



## 2.3 COLOUR CODE FOR INSTRUMENT MARKINGS

<b>Red</b>	Operating limits (needle should not enter red during operation)
<b>Yellow</b>	Precautionary or special operating procedure range
<b>Green</b>	Normal operating range



## 2.4 SPEED LIMITATIONS



Red zone ..... 0 km/h – 85 km/h  
 Green zone ..... 85 km/h - 130 km/h  
 Yellow zone ..... 130 km/h - 165 km/h  
 Red zone (VNE) ..... 165 km/h

### WARNING !

The VNE must never be exceeded.

### WARNING !

Depending on installed optional equipment, VNE may be lower !

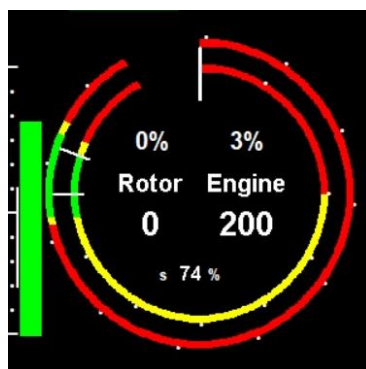
### WARNING !

Sudden or large forward input on the controls must be avoided at all means, even at airspeed within green arc. Do not exceed maximum speed when flying through turbulence, gusts or rough winds.

### CAUTION

Notice the first red zone located between 0 and 85 km/h that shows the recommended flight profile during take-off and landing. Thus, it is recommended to have a speed close to 85 km/h when flying between 0 and 150 m of altitude.

## 2.5 ROTOR AND ENGINE SPEED LIMITATION



### Engine RPM – Interior circle

Red circle.....	1000 RPM – 1500 RPM
Yellow circle.....	1500 RPM – 5300 RPM
<b>Green circle.....</b>	<b>5300 RPM – 5800 RPM</b>
Yellow circle.....	5800 RPM – 5900 RPM
Red circle (VNE) .....	5900 RPM – 6500 RPM

### Rotor RPM – Exterior circle

Red circle.....	0 RPM – 505 RPM
Yellow circle.....	505 RPM – 515 RPM
<b>Green circle.....</b>	<b>515 RPM – 565 RPM</b>
Yellow circle.....	565 RPM – 575 RPM
Red circle (VNE) .....	575 RPM – 600 RPM

### CAUTION

After engine start, the engine RPM will rise to between 2500 and 3000 RPM. Clutch should only be engaged with engine idling.

## 2.6 ENGINE AND TRANSMISSION LIMITATIONS

Engine limits as found in the Rotax manual or its appendices take priority over information provided in this manual for information purposes.

### **Battery voltage**

Minimum voltage .....	12 V
Low voltage caution range.....	12 – 12.5 V
<b>Normal range</b> .....	<b>12.5 - 14 V</b>
High voltage caution range .....	14 – 15.5 V
Maximum voltage .....	15.5 V

### **NOTE**

Some versions of the engine are equipped with two batteries. These are then identical and have the characteristics listed above

### **Cylinder Head Temperature (CHT°)**

Minimum CHT° .....	60 °C
Low CHT° caution range.....	60 - 75 °C
<b>Normal range</b> .....	<b>75 - 110 °C</b>
High CHT° caution range .....	110 - 115 °C
Maximum CHT° .....	115 °C

### **Engine Oil Temperature**

Minimum oil temperature .....	60 °C
Minimum oil temperature caution range .....	60 – 90 °C
<b>Normal range</b> .....	<b>90 - 115 °C</b>
Caution range .....	115 - 125 °C
Maximum .....	125 °C

### **Engine Oil Pressure**

Low oil pressure warning light .....	1 bar
Low oil pressure caution range .....	1 – 1.8 bar
<b>Normal range</b> .....	<b>1.8 – 5 bar</b>
High oil pressure caution range .....	5 – 7 bar
Maximum oil pressure.....	7 bar

### **Main Transmission Gearbox Oil Temperature**

<b>Normal range</b> .....	<b>60 - 110 °C</b>
Caution range .....	110 - 125 °C
Maximum .....	125 °C

## Fuel Type

Regular fuel.....EN 228 Super (min RON) 98 or UL91  
Occasional fuel .....AVGAS 100 LL

*N.B : Green fuels such as Ethanol are prohibited. AVGAS may be used. Caution, some fuels induce knock in the cylinders and can cause piston destruction instantly.*

ROTOR RPM	505	505-515	515-565	565-575	575
ENGINE RPM	1500	1500-5300	5300-5800	5800-5900	5900
VOLTS	12	12 - 12.5	12.5 - 14	14 - 15.5	15.5
CH T°	60	60 - 75	75 - 110	110 - 115	115
OIL T°	60	60 - 90	90 - 115	115 - 125	125
OIL PRESS.	1	1 - 1.8	1.8 - 5	5 - 7	7
MTG T°	0	20 - 40	40 - 110	110 - 125	125

## 2.7 WEIGHT LIMITS

Maximum take-off weight at sea level.....500 kg  
Standard empty weight .....312.5 kg  
Minimum total weight of solo pilot .....50 kg  
Maximum total weight of solo pilot (imperatively left hand seat) .....125 kg  
Maximum total weight in cockpit for safe operation .....200 kg  
Maximum weight in storage compartment .....10 kg

### NOTE

Minimum crew is one pilot ALWAYS on the left seat ! Harness in the RH seat must be fastened and tight if seat is not occupied.

In most countries, the law prohibits flights with dual controls except in training flights accompanied by a qualified instructor. Without an instructor, it is necessary to remove the cyclic stick on the passenger side.

### CAUTION

The flight controls must never be restricted by passenger or objects. Passengers must be briefed before the flight.

### WARNING !

Always keep 1 inHg (MAP) power margin in relation to atmospheric pressure !

**CAUTION**

The take-off weight is the total weight of the helicopter including empty weight, optional / additional equipment, occupants, fuel and luggage at take-off. The maximum value specified above must never be exceeded.

## 2.8 CENTER OF GRAVITY (C.G.) LIMITS

**CAUTION**

The balance envelope is conditioned by the correct adjustment of the flight controls, which allow for full travel. The original settings must not be modified.

Longitudinal balance is limited between the extreme aft balance and the extreme forward balance, corresponding to the limits tested in flight.

Between the forward and aft balance limits, all variations are authorised insofar as the maximum takeoff weight is not exceeded.

Datum point .....	<b>Rotor mast</b>
Extreme forward balance authorised (from the mast) .....	<b>+136mm</b>
Extreme aft balance authorised (from the mast) .....	<b>-136mm</b>

**WARNING !**

**SOLO PILOT ALWAYS ON THE LEFT SEAT !**

**SOLO PILOT ON THE RIGHT SEAT IS PROHIBITED !**

## 2.9 LOAD FACTOR LIMITS

Limit of safe operation positive load factor .....	<b>+2.5g</b>
Limit of negative load factor .....	<b>Negative load factor prohibited !</b>

**WARNING !**

**+2.5g can not be exceeded. Beyond that limit, dynamic stall can occur.**

**WARNING !**

**As with all 2-blade helicopters, negative load factors are strictly prohibited !!!**

## **2.10 AUTHORISED OPERATION**

Only daytime VFR flight is approved !

Night time VFR or IFR flight is prohibited !

Low-G manoeuvre is prohibited !

### **WARNING !**

**Any manoeuvre resulting in a low-G condition can result in a loss of control. Always maintain adequate load on the rotor and avoid aggressive forward control input performed from level flight or following a pull-up**

Aerobatic flight is prohibited !

### **NOTE**

**Manœuvres involving bank angles of more than 60° are considered to be aerobatic flight.**

Flight in icing conditions is prohibited !

### **NOTE**

**Icing may occur even at temperatures above freezing.**

Operation in severe turbulence is prohibited !

## **2.11 NOISE LEVEL**

As required by « L'arrêté du 24 février 2012 » concerning the noise level produced by the helicopter, the noise perceived at ground level when the aircraft has a total mass of 500 kg and a height of 150m is lower than 65 dB(A).

### **NOTE**

**In order to avoid noise levels higher than 65 dB at ground-level, a cruising flight has to be executed at minimum 493 ft above ground.**

## 2.12 STICKERS

### Cabin

In view of pilot and passenger (must be installed by the customer/distributor depending on the applicable regulation) :

**SOLO PILOT IN LEFT SEAT**

**V<sub>NE</sub> 165 KM/H**

**NIGHT VFR, IFR, LOW-G, ICING CONDITIONS,  
AEROBATIC FLIGHT PROHIBITED!**

*However, if the pilot on the right seat weighs up to maximum 20 kg more than the one on the left seat, the helicopter remains perfectly manoeuvrable.*

**NO SMOKING**

### Exterior

**NO STEP**

**NO PUSH**

**USE ONLY 5W10 OIL**

**FUEL SP98/UL91**



## 2.13 DASHBOARD AND CONTROLS



### 2.13.1 MARKINGS

#### MASTER KEY

Enables the activation of functions when turned on the ON position. Functions are disabled when the key is set on the OFF position for at least 5 seconds. This prevents from any involuntary action.

#### BATT

Both switches ON/OFF ensure the activation of the batteries: ECU (1) and rest of equipment (starter included) (2).



## **IGN**

Both switches ON/OFF enable the activation of both electronic engine ignitions.

## **ALARM BUZZER**

Is expressed with a light and a tone. It is activated under the following circumstances :

- If collective > 2 % and rotor < 520 RPM;
- If collective > 5 % ;  $T_{oil} < 50\text{ }^{\circ}\text{C}$  and engine ON ;
- If collective > 5 % ;  $P_{oil} < 2\text{ bar}$  and engine ON ;
- If try to start the engine while the first fuel pump is OFF.

## **GOV**

The indicator is orange if the governor is not active.

The indicator is flashing red if the governor is preactivated.

The indicator is blue if the governor is active.

## **CHIP Main (BTP) and Rear (BTA)**

Indicators are green if there is no chip in the transmission gearbox and red if some is detected.

## **FRAME Main and Engine**

The indicator is green if the frame pressure is > 2.5 bar.

The indicator is flashing red if the frame pressure < 2.5 bar.

## **FUEL**

The indicator is green if > 15 L remains in the fuel tank.

The indicator is yellow if < 15 L remains in the fuel tank.

## **OIL-P**

The indicator is green if the engine oil pressure is > 1 bar.

The indicator is red if the engine oil pressure is < 1 bar.

## **CLUTCH**

The indicator is red when the rotor is disengaged.

The indicator is flashing orange when the rotor is being engaged.

The indicator is green when the rotor is engaged.

## 2.13.2 KEYPAD

The buttons enable the activation and deactivation of functions. Their indicators show the function's status:

- Green : working ;
- Orange : consuming an excess of current;
- Red: faulty function.

### **START**

Press to start the engine (green light).

### **FUEL 2**

Show the functioning of the fuel pump 2.

### **REFUEL (optional)**

This function enable to pump fuel from an external tank to refuel the helicopter. It cannot be activated if the engine is running or the battery voltage is < 12 V.

#### **NOTE**

**The pump allows for refuel the tank up to 55 L (75 L if equipped with the optional 80 L fuel tank).**

**Once this threshold reached, it is possible to continue refuelling by pressing and maintaining the button.**

### **ROTOR ON**

Enables the engagement of the rotor. It is possible to do so by pressing the button if the following criteria are respected:

- Engine is running ;
- Oil pressure > 1 bar ;
- Oil temperature > 30 °C.

Indicator is green when the rotor is engaged and orange during button pressure.

---

## **ROTOR OFF**

Enables the disengagement of the rotor. It is possible to do so by pressing > 2 seconds on the button if the criteria are respected:

- Throttle < 5%;
- Rotor < 300 RPM;
- Engine < 3000 RPM;
- Collective < 10 %.

It is also possible to disengage while out of criteria by pressing > 5 seconds.

## **COOL DOWN**

The activation of fans is automatic. However, it is possible to do it manually when out of criteria.

This button enables the activation of radiators' fans by pressing it when the water temperature is > 70 °C and the engine is running. Fans stop by themselves when temperature gets < 70 °C.

It is possible to activate the fans by pressing and maintaining the button while the engine is not running.

## **RADIO TRT**

This button allows to switch on the radio when the engine is not running.

## **LANDING LIGHT (optional)**

Simply pressing the button enables to turn on the lights, a second pressure causes them to flash and a third pressure turns them off.

## **STROBE LIGHT (optional)**

Enables the activation/deactivation of the stroboscope and position lights. Press once to activate the lights and a second time to deactivate them.

## **CAB HEATER**

Enables the activation/deactivation of the cabin's heating by simple pressure.

## **VIBRATE FUNCTION**

Vibrating collective ( green if working) :

- Vibrate slowly if power at less than 2 inHg of maximum power;
- Vibrate rapidly if power at less than 1 inHg of the maximum power;
- Vibrate slowly and tone if collective > 5 % and  $T_{oil} < 50\text{ }^{\circ}\text{C}$ ;
- Vibrate slowly and tone if collective > 5 % and  $P_{oil} < 2\text{ bar}$ ;
- Vibrate slowly if collective > 2 % and engine < 520 RPM;
- Vibrate rapidly if rotor > 550 RPM.

### **2.13.3 CYCLIC CONTROL**



#### **TRIM (optional)**

Active if Master Key ON.

Joystick with four directions ( Up, Down, Left et Right).

#### **START**

Pressure > 1 sec to start ( do not press for longer than 15 seconds).

Pressure < 1 sec to cancel vocal alarms (until the next alarm) and the buzzer (for 5 seconds).



---

## **GOV**

Pressure > 1 sec to pre-activate/deactivate (if throttle between 20 and 60 %).

## **PAGE**

Press the button Up or Down to change the page on the EFIS.

## **FRQ**

Press Down to select a memory.

Press Up to change frequency.

PTT Push To Talk.



## **SECTION 3 - EMERGENCY PROCEDURES**

This chapter contains all the checklists and procedures to be executed in emergency situations.

Emergencies due to defects of the helicopter or its engine are extremely rare if the aircraft is checked thoroughly before each flight and continuously maintained. If there should occur a case of emergency, the guidelines of this chapter should be followed in order to manage the emergency. However, evaluation of the situation and remedial actions to deal with it remain the responsibility of the pilot.

Strict compliance with the engine manufacturer's maintenance schedules, operational procedures is essential. The helicopter must always be flown with the risk of engine failure in mind, and must not be flown over any large bodies of water where a forced landing cannot be safely executed.

### **3.1 ENGINE FAILURE – AUTOROTATION**

#### **WARNING !**

**A loss of power may be caused by a failure of engine or transmission.**

**A change in the noise level, a yawing movement or a loss of revolutions (RPM) may indicate an engine failure.**

**An unusual noise, shock, alert, vibrations or serious yawing may indicate a transmission failure.**

**In all events, lower the collective and perform precautionary landing.**

**EVERY PILOT MUST BE TRAINED FOR AUTOROTATION. ALWAYS PLAN YOUR ROUTE TO REMAIN WITHIN SAFE GLIDING DISTANCE TO AREAS WHERE A SAFE FORCED LANDING CAN BE PERFORMED.**

#### **Engine failure during take-off acceleration**

- Maintain directional control.
- Lower the collective.
- Control the yaw movement.
- Perform a sliding landing.

### **Engine failure at low altitude and low speed**

- Control the yaw movement.
- Above 5 ft, slightly lower collective.
- Use collective to cushion contact with the ground.
- If insufficient speed to make a quick stop make sliding landing.

### **Engine failure above 500 ft**

- Lower the collective completely and immediately initiate autorotation.
- Control the yaw movement.
- Maintain the speed around 70 to 100 km/h, with 100 % rotor RPM.
- Use collective to maintain rotor RPM.
- Select landing point facing into wind.
- Approaching the ground, act on the cyclic stick to flare and reduce rate of descent **WITHOUT RISING THE COLLECTIVE**.
- At around 10 ft, bring the machine to horizontal and raise the collective to halt the descent.
- Preferably land into the wind.

#### **NOTE**

**It is strongly recommended to practice emergency procedures regularly, with a qualified flight instructor.**

## **3.2 FORCED DITCHING**

- Autorotation procedure until contact with water.
- Lay the helicopter down on the left as soon as contact has been made with water in order to stop the rotation of the main rotor.
- Detach the safety belts and evacuate the cabin rapidly as soon as possible.



### 3.3 EMERGENCY EVACUATION

#### CAUTION

**In normal circumstances, occupants should never leave the helicopter while the rotors are turning. If abandoning the aircraft in an emergency, the pilot should turn off the engine and turn the master key OFF if this can be done without endangering the occupants.**

**If leaving the aircraft with the rotor turning, the occupants should follow a path in line with the nose of the helicopter, to minimise the risk of being injured by a rotor.**

Occupants should be briefed before flight on emergency evacuation procedures, including :

- Actions to be taken in the event of a forced landing
- Operation of the seat harness
- How to open the doors
- How to safely exit and move away from the aircraft

### 3.4 TAIL ROTOR OR TRANSMISSION FAILURE IN TRANSLATION

- Sudden yaw to the left cannot be controlled with the right pedal if the airspeed is below 100 km/h. Above 100 km/h, the vertical stabilisers remain efficient enough to maintain heading (with slight deviation however).
- Initiate autorotation immediately and then adjust power.
- Maintain 110 km/h so that the vertical stabilisers keep efficient and assist in keeping heading.
- Eventually, perform a sliding landing.

### 3.5 TAIL ROTOR OR TRANSMISSION FAILURE IN HOVER

- Sudden yaw to the left cannot be controlled with the right pedal.
- Keep machine horizontal and cushion impact.
- Cut the throttle immediately.

### **3.6 ENGINE FIRE/SMOKE ON GROUND**

- Both magnetos OFF and master switch OFF to shut-down engine and fuel pumps.
- Evacuate the aircraft.
- Extinguish the fire with an extinguisher, a fire hose, or a woollen blanket, sand or earth.

### **3.7 ENGINE FIRE/SMOKE IN FLIGHT**

- Open ventilation for fresh air.
- Initiate emergency descent under autorotation.
- Perform emergency call, if time and situation permits.
- Continue procedure as described in “Engine failure”
- Finish procedure as described in “Engine fire/smoke on ground”

### **3.8 LANDING INTO HIGH VEGETATION**

- Plan touch-down and flare with minimum ground speed and minimum rate of descent.
- Plan the contact with a positive pitch attitude (not horizontal)
- Shut down engine by switching magnetos OFF and master switch OFF.

### **3.9 LOSS OF VISIBILITY**

In case of canopy misting, open air vents and lateral sliding vents to ensure proper ventilation. If the situation cannot be corrected or occurs suddenly, such as after a bird strike or canopy icing, maintain safe altitude by visual reference to the sides, using the open sliding window, if necessary. Stabilize the aircraft and land at the nearest suitable place.

### **3.10 GOVERNOR FAILURE**

- Use the throttle to maintain rotor RPM manually and land using an average angle approach. The throttle control must be used to ensure full power and RPM.

#### **WARNING !**

**The pilots must be trained to control the throttle manually !**

## **3.11 ALARM AND WARNING LIGHTS**

### ***Low RPM rotor (white) + sound alarm***

- Lower the collective and manage the throttle to get the RPM back immediately.
- If close to a landing spot and if it is impossible to get the RPM back, land to the closest available spot.

### ***CHIP Main (Orange)***

The indicator is ON when chip is detected in de MTG.

- Land soon (no emergency procedure).

### ***CHIP Rear (Orange)***

The indicator is ON when chip is detected in de RTG.

- Land soon (no emergency procedure).

### ***FRAME Main (Red)***

The indicator is ON when there is a loss of pressure in the main frame.

- Land immediately.

### ***FRAME Engine (Red)***

The indicator is ON when there is a loss of pressure in the engine support.

- Land immediately.

### ***OIL-P (Red)***

The indicator is ON when there is a loss of engine oil pressure.

- Land immediately.

### ***Fuel (Yellow)***

The indicator is ON when there is 15 L, or less, of fuel remaining. This allows the engine to run for about 20 minutes at nominal power.

- Land soon (no emergency procedure).

---

## ***Fuel 2***

Operates if the fuel pump 1 has no power supply.

If orange :

- Land soon (no emergency procedure).

If red :

- Land immediately.

## ***Alarm Buzzer (Light + tone)***

If collective > 2 % and rotor < 520 RPM.

If collective > 5 % ;  $T_{oil} < 50\text{ }^{\circ}\text{C}$  and engine ON.

If collective > 5 % ;  $P_{oil} < 2\text{ bar}$  and engine ON.

If start with pump 1 under no power.

- Act to re-establish normal parameters.

## **SECTION 4 - NORMAL PROCEDURES**

This section contains check list items, instructions and procedures for the normal operation of the helicopter. However, these procedures do not replace the pilot's appreciation of any specific situation.

The pilot shall be familiar with the aircraft limitations detailed in SECTION 2 of this manual and shall have performed proper flight planning considering required legal aspects, as well as SECTION 5 and SECTION 6 of this manual. The use of check lists as provided in this Pilot Operating Handbook is mandatory for safe operation.

### **4.1 PRE-FLIGHT CHECKLIST**

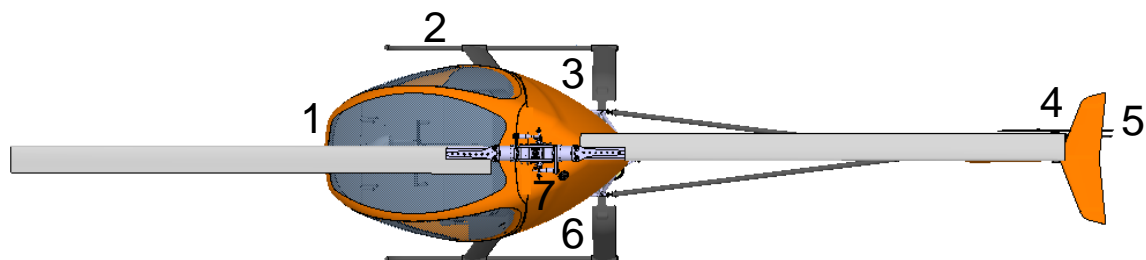
All daily or pre-flight check list items consist of visual checks and do not replace professional mechanical inspection and maintenance. The following check list applies for the all versions of the H3 Sport, with notations covering the engine variants.

Note that depending on optional equipment installed, it is recommended that owner/operators add any appropriate items to suit their specific configurations.

#### **4.1.1 BEFORE PRE-FLIGHT CHECK**

- Check that nothing can be sucked into the rotors (clothes, pollution,...).
- No human or animal presence closer than 20m.
- Check weather condition (wind speed and direction, no snow/ice).
- There should be no obstacles and sufficient clearance in departure zones.
- Check documentation is complete.

#### 4.1.2 COMPLETE PRE-FLIGHT CHECK OF THE HELICOPTER



##### **Station 1 (cabin)**

- Perform complete walk around, check and observe everything.
- Check that the pitot tube is oriented forward.
- Check the cabin strap is properly attached.
- Check the cleanliness of the windshield.
- Check the condition of the door hinges.
- Check the wool thread.
- Check that the blades are not strapped and not in the helicopter axis.

##### **Station 2 (skids and lateral cabin)**

- Check that the wheels are removed or locked on the undercarriage.
- Check that the horizontal pitch rod, under the chassis has sufficient clearance from the skids.
- Check for oil, coolant or fuel leaks on and below the engine and transmissions.
- Check the condition of the skids (no cracks, no excessive wear).

#### **NOTE**

Skids may have a slight bend in the centre section (see SECTION 7)

##### **Station 3 (engine, RH side)**

- The intake butterfly is properly attached.
- No trace of wear on the drive pulley (on engine).
- Check inner and outer condition of the drive belts and check that no foreign objects can obstruct them.
- Check the tension of the belts.

### **CAUTION**

**Drive belts must be tensioned to the recommended value. In case of doubt, see the maintenance manual for adjusting the tension of the belts.**

**If they are too loose, belt slipping may be noticed during flight.**

### **NOTE**

**After the first hours of use of the belts (following delivery or after maintenance replacement), the tension should be re-adjusted.**

- Check that the belt guides are parallel to the belts.
- Check the shaft bearing and the pressure screws.
- No deformation of the rubber coupling attachment (the main transmission shaft has not moved to the rear).
- Check the absence of leak on the freewheel.
- Check the tightening rings (pulley and shaft bearing).
- Check the water level in the water expansion tank.

#### **Station 4 (stabiliser)**

- Check the attachment of the tail tube.

#### **Station 5 (tail rotor)**

- Check for leaks and oil level in the Rear Transmission Gearbox.
- Check the Telatemp.
- Check appearance of tail rotor blades.
- Test the full pitch on rotor blades.
- Test the full travel of the rear rotor control cables.
- Check the six studs and their locking wire.
- Check the attachment of the cable bracket.
- Check the lubrication.

### **Station 6 (engine, LH side)**

- On the fuel tank, check the fuel level, filler cap closed, both taps open, filters clean, no trace of leak, bottom dry.
- Check that there are no leaks below the Main Transmission Gearbox.
- Check the Telatemp.
- Check the three control marks are aligned (on the base of the mast).
- Check that there are no cracks on the exhaust.
- On radiators and fans, check for grass or debris and check for leaks.
- Check all attachment collars for the radiators.
- Check receiving pulley for signs of wear and check there is no oil leak.
- Check the oil level in the oil tank (do not fill above 1/3 of the gauge).
- Check for fuel smell.

### **Station 7 (main rotor)**

- Remove the parking strap from rear facing rotor.
- Check the rotor blades along their full length (leading and trailing edge).
- Check the attachment of the blade tips.
- Check the upper and lower surface of blades.
- Check the absence of any damage.
- Check the cleanliness.

#### **NOTE**

**The cleanliness of the rotor blades may have important effect on the performance of the helicopter.**

- Check the free tilting of the rotor.
- Check the tilt stop nylon ring.
- Check the free movement of the pitch rods.
- Check all ball joints on the swash plate (greased, not bent).
- Check the condition of the bellows.
- Test the sliding movement of the swash plate.
- Check the condition of the sliding guide.
- Check the absence of cracks and the correct attachment of the drive collar on the mast.
- Check the absence of leaks at the blade roots (if any, clean).



## 4.2 STANDARD CHECKLIST FOR H3 SPORT

### 4.2.1 BEFORE ENGINE START CHECKLIST

HELICOPTER CONDITION..... AIRWORTHY  
 FUEL QUANTITY ..... \_\_\_\_\_ LTS / GAL  
 RANGE ..... CALCULATED  
 WEIGHT & BALANCE ..... CHECKED  
 DOCUMENTATION ..... PREPARED  
 CANOPY ..... CLOSED AND LATCHED  
 CABIN..... NO LOOSE OBJECTS  
 SEATBELTS..... FASTENED  
**ALL** FLIGHT CONTROLS ..... CHECK FULL TRAVEL  
 GENERAL SWITCH (IF INSTALLED) ..... OFF  
 LEFT HAND COLLECTIVE ..... FULL DOWN  
 CENTRAL COLLECTIVE..... IN CONTACT WITH LOWER STOP  
 MAXIMUM MANIFOLD PRESSURE ..... MAX \_\_\_\_\_ inHG  
 ALTIMETER ..... SET  
 INSTRUMENTS..... CHECKED  
**ALL** SWITCHES..... OFF  
 BREAKERS ..... PUSHED IN  
 THROTTLE..... IDLE  
 DUAL CONTROLS ..... ONLY IF INSTRUCTION FLIGHT

### 4.2.2 ENGINE START CHECKLIST

MASTER KEY ..... ON  
 BATTERY 1 ..... ON  
 BATTERY 2 ..... ON

#### NOTE

**It is important to transfer the oil remaining in the engine to the oil tank.**

**Therefore, first verify that the rotor is disengaged.**

**Then, open the oil tank and press on the start button ( maximum 15 seconds) until the oil pressure reaches > 3 bar and hearing a gurgling in the tank. The action can be retaken if needed.**

**Verify the oil level in the tank is correct (first third on the flat part of the gauge).**

**It is unnecessary to pour too much oil as this would be spilled as an excess.**

**NOTE**

**At this point, all the indicators should be green, except the CLUTCH and OIL-P that must be red and the GOV that must be yellow.**

**If it's not the case, refer to section about the indicators.**

IGNITION 1 ..... ON  
IGNITION 2 ..... ON  
START ..... PRESSURE ON THE BUTTON

**NOTE**

**The Start button has a delay of 1 second of pressure before activating.**

**The alarm activates itself if the fuel pump 1 is OFF.**

**After start, the OIL-P indicator becomes green in within 15 seconds.**

WAIT UNTIL  $T_{OIL} > 30\text{ }^{\circ}\text{C}$  WITH THE ENGINE IDLING

ROTOR ON ..... PRESS TO ENGAGE (LED IS ORANGE  
DURING PRESSURE)

**NOTE**

**The LED becomes green instantaneously if all conditions are fulfilled :**

- $T_{oil} > 30^{\circ}$  ;
- $P_{oil} > 3\text{ bar}$  .

WAIT UNTIL  $T_{OIL} > 50\text{ }^{\circ}\text{C}$ .

CHECK CORRECT OPERATION OF THE FREEWHEEL BY  
INCREASING RPM TO 100 % AND THEN REDUCING THROTTLE.

**NOTE**

**The engine and rotor RPMs should desynchronize on the EFIS, the freewheel must be smooth and noise free, the rotor decelerates at its own rhythm.**

CHECK IGNITION BY INCREASING ENGINE RPM TO 4500 RPM AND  
CUTTING IGNITION 1 (WITH IGNITION 2 ON) THEN IGNITION 2 (WITH  
IGNITION 1 ON).

**NOTE**

**Listen to the noise of the engine and its ignitions to make sure that these work correctly. The RPM drop must be less than 250 RPM.**

TO PREACTIVATE THE GOVERNOR (FLASHING RED LIGHT), INCREASE THROTTLE UP TO BETWEEN 20 % AND 60 %, AND THEN PRESS THE GOV BUTTON > 1 SECOND.

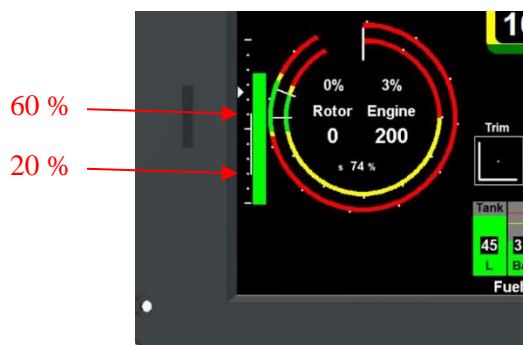
**NOTE**

**The position of the throttle is showed by a white arrow on the left part of the EFIS. The white stripe on the scale represents the 20 – 60 % zone. See illustration.**

TO ACTIVATE THE GOVERNOR (BLUE LED), MANUALLY BRING THE ENGINE RPM TO 100 %.

**NOTE**

**To deactivate the governor, it is also necessary to be between 20 % and 60 % of the throttle and press on the GOV button for > 1 second.**



#### 4.2.3 TAKE-OFF CHECKLIST

WARNING LIGHTS .....ALL GREEN  
 GOV (IF USED) .....BLUE  
 AVIONICS ..... ON  
 FUEL ..... CHECKED  
 RPM.....BOTH 100 %  
 HOVER.....CHECK POWER AND STABILITY DURING 30 SEC  
 VIBRATIONS & NOISE ..... NO ABNORMAL LEVEL  
 WIND DIRECTION ..... CHECKED  
 WEIGHT & BALANCE ..... CHECKED  
 CONTROLS..... NORMAL & FREE  
 CHT° ..... MIN 70°C – MAX 120°C  
 OIL T° ..... MIN 60°C – MAX 130°C  
 OIL PRESSURE .....MIN 1,5 BAR  
 INSTRUMENTS.....ALL GREEN

#### CAUTION

**Perform take-off into the wind and with least possible crosswind component.**

TRANSITION.....INCREASE SPEED & CONTROL TRAJECTORY  
 SPEED ..... MINIMUM 80 KM/H BEFORE CLIMB

#### WARNING !

**The so-called “dead man’s curve”, shown in the height-speed diagram should be constantly kept in mind. Both on takeoff and landing, the areas indicated in the diagram should be avoided.**

#### 4.2.4 LANDING CHECKLIST

WIND DIRECTION ..... CHECKED  
 WARNING LIGHTS ..... ALL OFF  
 INSTRUMENTS.....ALL GREEN  
 FUEL ..... CHECKED  
 AIRSPEED ..... 80 – 100 km/h  
 AFTER TOUCHDOWN..... COLLECTIVE FULL DOWN

#### NOTE

**Where possible, always opt for an upwind approach and check wind direction during your observation of planned landing zone.**

#### 4.2.5 ENGINE SHUTDOWN PROCEDURE

AFTER TOUCHDOWN..... COLLECTIVE FULL DOWN  
GOVERNOR.....OFF  
THROTTLE..... FULL IDLE  
CLUTCH..... **OFF AFTER 3 MIN (BELT T°)**  
LOW RPM WARNING .....OFF  
T° ..... COOL DOWN FOR 2 MIN  
AVIONICS .....OFF  
IGNITIONS .....BOTH OFF  
MASTER KEY .....OFF

#### CAUTION

**On shut down, do not brake the rotor by raising the collective.**

**When left free, the wind may cause the rotor to swing over to head height. The pilot should survey the aircraft's surroundings and hold the cyclic to prevent the rotor swinging over.**

#### WARNING !

**Mind the spinning rear rotor close to obstructions or persons. A fast turning rotor is almost invisible.**

**Do not vacate the helicopter until rotor is at a complete stop.**

**It is mandatory to keep controls neutral during rotor deceleration !**

#### CAUTION

**Having shut down the engine, observe the time that it takes for the rotor to stop. If rotor RPM fall off unusually quickly there may be a transmission problem.**



## **SECTION 5 - PERFORMANCES**

The following data were determined by flight testing and demonstrated with average piloting skills, with engine and aircraft in good condition, as well as clean main rotors

The parameters apply to standard conditions (15 °C at sea level and standard pressure) and a gross weight of 500 kg.

Note that a higher airfield elevation, increased temperature and/or low air pressure will have a negative effect on performance.

### **5.1 GENERAL**

#### **WARNING !**

**Always keep at least 1" inHG (MAP) in relation to atmospheric pressure.**

#### **NOTE**

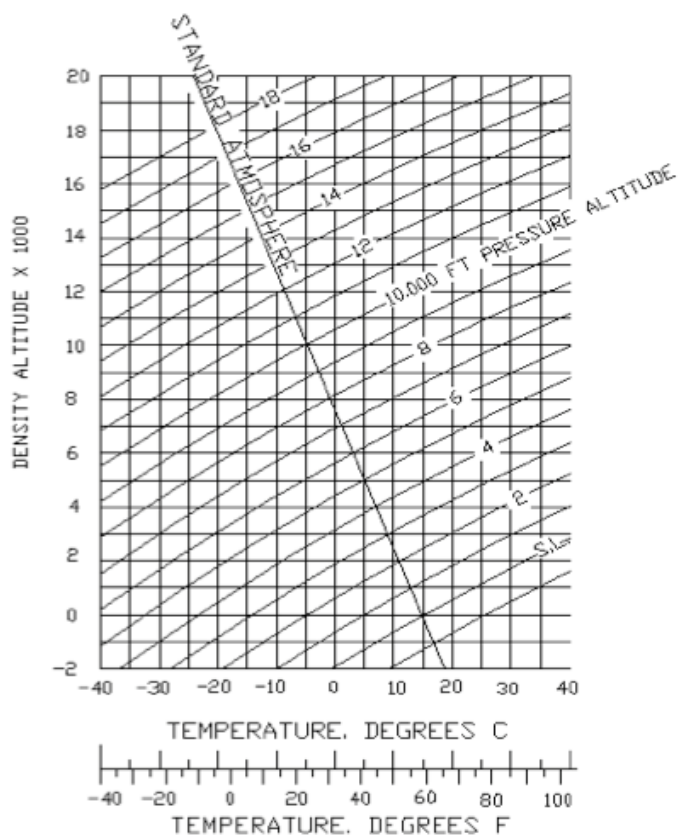
**Satisfactory engine cooling has been demonstrated at outside air temperatures up to 35 °C. If needed for hotter climates, an additional oil radiator can be installed.**

**The owner/operator must remain within the normal operating temperatures. Duration of hover flight is limited by the engine temperature.**

#### **NOTE**

**Information regarding performance indicated in this chapter was obtained under optimal flight conditions. Performance shown under other conditions may vary substantially from this.**

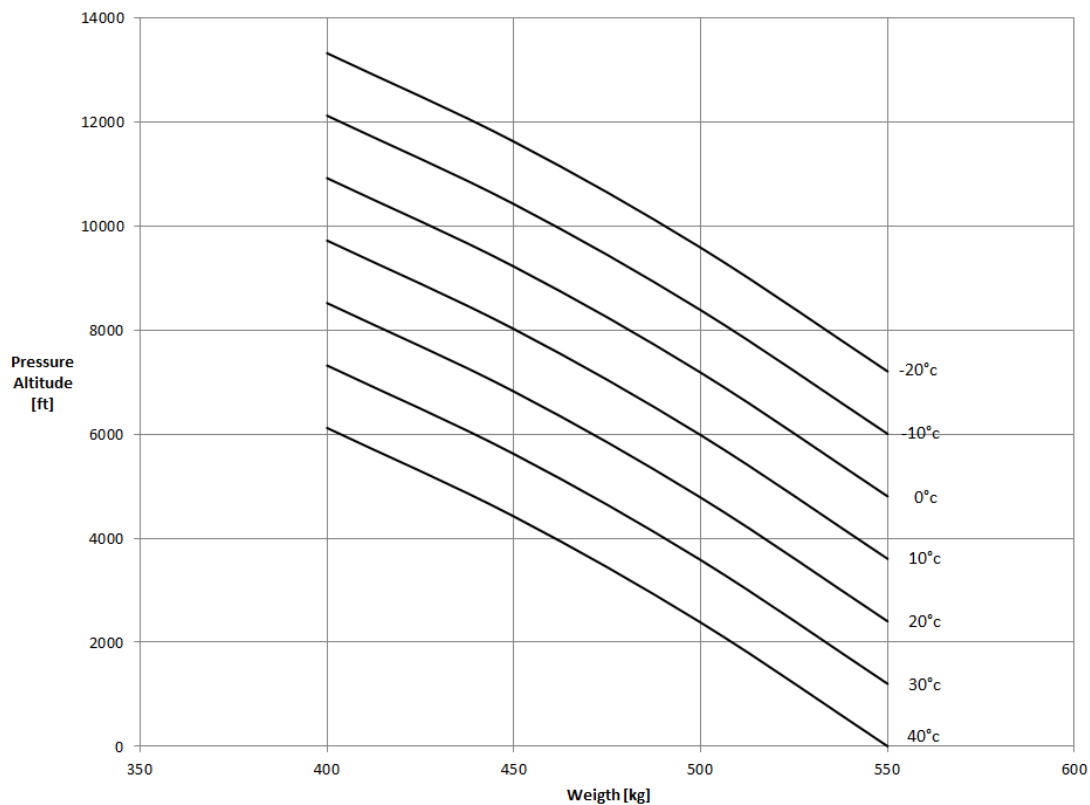
## 5.2 ALTITUDE DENSITY DIAGRAM





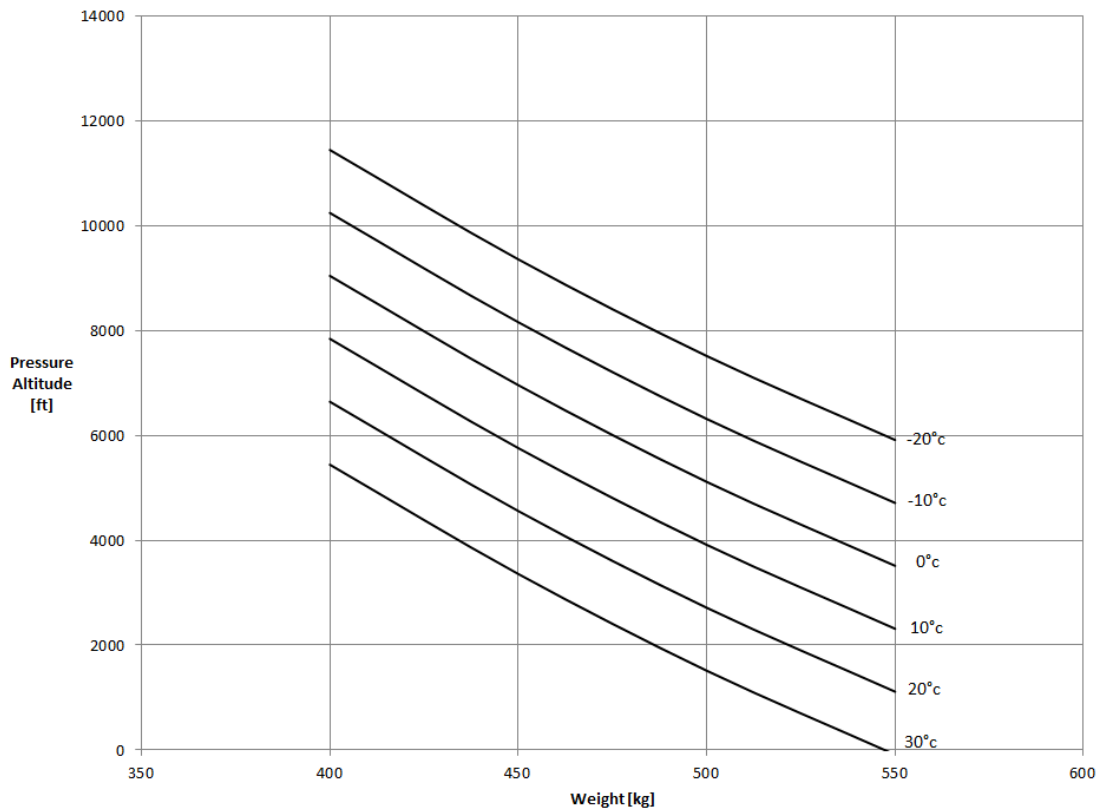
## 5.3 HOVER IN GROUND EFFECT

### Rotax 912ULS-I-BB



## 5.4 OUTSIDE GROUND EFFECT

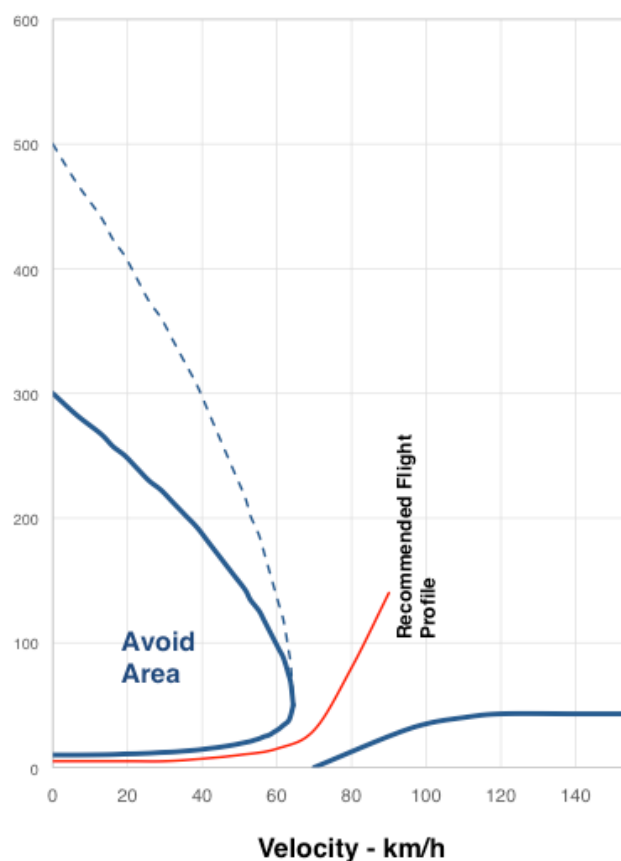
### Rotax 912ULS-I-BB



## 5.5 HEIGHT-SPEED DIAGRAM

This diagram indicates combinations of height and speed (avoid area in blue) where a safe landing may not be possible in case of an engine failure.

Take-offs and landings should always be conducted according to the recommended flight profile, provided as red line.



## **5.6 ENGINE PERFORMANCE**

Please refer to Rotax engine manual to find performance curves.

The maximum power is measured at 5 800 RPM with a MAP of 29,95 inHg.

As recommended, the upper limit in continuous use is set at 27,95 inHG of MAP or 2 inches lower than the atmospheric conditions, depending on which one is the lowest.

### ***Performances Rotax 912ULS-I-BB***

<b>Max. power (5 minutes)</b>	135 HP / 99 kW @ 5800 RPM
<b>Glide ratio</b>	3,1 @ 120 km/h
<b>Climb rate</b>	860 ft/min @ 70 km/h

## SECTION 6 - WEIGHT AND BALANCE

The helicopter must be operated within the weight and balance limits as specified in SECTION 2 of this manual. Loading situations outside these limits can result in restricted flight control and can ultimately lead to degraded safety.

### 6.1 EMPTY WEIGHT ET BALANCE

The empty weight of a Dynali H3 Sport helicopter includes :

- Basic flight equipment
- Engine oil, transmission gearbox oils
- Coolant liquid
- The quantity of unusable fuel

The empty weight and the empty C.G. must be measured for each Dynali H3 Sport helicopter, once assembly is completed. The empty weight may not in any case (except for options) exceed the standard reference empty weight as indicated in this manual.

Maximum take-off weight at sea level.....**500 kg**  
Standard empty weight.....**312.5 kg**

Datum ..... **Rotor mast**  
Forward balance limit in relation to datum ..... **136 mm**  
Aft balance limit in relation to datum ..... **-136mm**

Minimum total weight of solo pilot .....**50 kg**  
Maximum total weight of solo pilot (imperatively left hand seat) .....**125 kg**  
Maximum total weight in cockpit for safe operation .....**200 kg**  
Maximum weight in storage compartment .....**10 kg**

#### NOTE

**The owner/operator must refer to SECTION 2 of this manual to have complete information about the weight and balance limits.**

**Exceeding these limits may lead to an insufficient amplitude in the flight controls.**

## **6.2 PROCEDURE FOR WEIGHING THE HELICOPTER**

### **Preparation of the aircraft**

- Purge the fuel.
- Check oil levels.
- Place the blades in longitudinal position.
- Check that all equipment included in the basic configuration are correctly installed.
- Check the cleanliness of the aircraft and remove any foreign body.

### **Method to determine empty C.G. position and empty weight**

- Place a water level on the rotor mast or on the tail boom.
- Hang the helicopter from a hoist.
- **Note the empty weight \_\_\_\_\_ kg.**
- Place a tube under the skids, perpendicular to the helicopter.
- Lower the helicopter on the tube.
- Roll the helicopter on the tube until finding the equilibrium (tail tube at 0°).
- Measure the distance between the tube under the skids and the rotor mast.
- **Note the empty C.G. \_\_\_\_\_ kg.**

#### **NOTE**

**A positive distance means that the centre of gravity is located in front of the rotor mast.**

**A negative distance means that the centre of gravity is located at the rear of the rotor mast.**

## **6.3 CALCULATION OF WEIGHT AND BALANCE**

For each part of a helicopter there is an associated weight expressed in kilos and a moment in relation to the datum point (the rotor mast) expressed in kg\*m. This moment corresponds to the weight of the part multiplied by the distance from the centre of gravity of the part by reference to the datum.

Before each flight you should :

- Check that the position of the C.G. of the Dynali H3 Sport, as it will be on take-off, is within the fore and aft balance limits.
- Ensure that the take-off weight of the Dynali H3 Sport does not exceed the maximum authorised take-off weight.

These two conditions are met if the point defined by the take-off weight and the position of the C.G. are within the range of the longitudinal CG (see figure showing longitudinal balance range). If either of these conditions is not met, pilot/operator must cancel the flight.

The table below sums up the weights and distances from the datum and the moment associated with the various parts of the helicopter and its payload.

ITEM	WEIGHT (KG)	DISTANCE % DATUM (MM)	MOMENT (KG.MM)
Standard empty weight	312.5	-120	-37 500
Passenger	$W_{PAX}$	606	$W_{PAX} \times 606$
Useable fuel (0.7 kg/l)	$W_{FUEL}$	-170	$W_{FUEL} \times 170$

#### CAUTION

The empty weight of the helicopter must never exceed 312.5 kg.

#### CAUTION

The solo pilot must weigh at least 50 kg. Below this weight the rear balance limit is exceeded. Below this weight, ballast must be added to maintain an equivalent of 50 kg minimum on the passenger seat.

#### CAUTION

The maximum weight of the solo pilot is 125 kg.

#### WARNING !

**THE SOLO PILOT MUST IMPERATIVELY TAKE THE LEFT HAND SEAT !**







## 6.4 WEIGHT SHEET

INDIVIDUAL WEIGHT SHEET		DYNALI H3 SPORT 135 HP
DATE	N° AIRFRAME (S/N)	REGISTRATION
OWNER		
NAME		ADDRESS
PLACE OF WEIGHING		
METHOD OF WEIGHING		
EMPTY WEIGHT		kg
<b>POSITION EMPTY CG % DATUM*</b> at ..... mm in front of wheel axles = ..... mm rear of axis of rotor mast  <i>*Datum = axis of rotor mast</i>		mm
<b>NOTES</b> The empty CG measured at .....mm aft of the mast axis, i.e., forward of**, aligned with**, aft of** the standard CG of the H3 'Sport' (located at 136 mm behind the mast axis) * **delete where not applicable		



## 6.5 LATERAL BALANCE

The Dynali H3 Sport is equipped with dual controls. Apart from solo flights, for which the pilot must be in the left hand seat, the Dynali H3 Sport may be flown from the left or the right hand seat. In order to guarantee the easy piloting of the aircraft, the left hand side must always be heavier than the right hand side.

The condition for balancing the aircraft to compensate for the thrust of the tail rotor is 13 kg more on the left hand seat (\*\*) so that the rotor mast is vertical in hover. However the aircraft remains maneuverable well outside this level, although listing.

(\*\*) This explains the obligation for the solo pilot to take the left hand seat.

### WARNING !

**Minimum weight of solo pilot in left hand seat : 50 kg**

**Maximum weight of solo pilot without ballast in right hand seat : 125 kg**

**When flying with two people onboard, place the heavier person on left hand seat.**

### NOTE

**The maximum acceptable weight of 125 kg on the left hand seat corresponds to the limit of travel of the cyclic to maintain acceptable maneuverability. Above 125 kg in the left hand seat, additional ballast in the right hand seat must be added, corresponding to the weight of the pilot relative to 125 kg.**



## SECTION 7 - SYSTEMS

The purpose of this chapter is to introduce the pilot who has not assembled his Dynali H3 Sport to the various systems forming part of this helicopter.

Further information can be found in the assembly manual. We advise all pilots to read through this in order to better understand the design and mechanics of the Dynali H3 Sport.

### 7.1 AIRFRAME & UNDERCARRIAGE

The basic protective structure of the chassis is made from welded tubular steel tubes to provide maximum passive safety for the crew. The tubes are all connected to each other by TIG welding. The main tubes are all of a diameter 25 mm with a thickness of 2 mm, providing thus excellent resistance to fatigue. In addition (and as an easy optical check of airframe integrity), a pressure indicator is located at the aft of the airframe. As long as the green indicator can be seen, there is pressure in the airframe. If it disappears, it means that there is a loss of pressure which indicates a possible crack.



**Nominal pressure = 3 bar**



**Pressure lost**

Two light indicators located on the dashboard, FRAME Main and FRAME Engine, indicate a loss of pressure as well. They light up when the pressure in the main frame (FRAME Main) or the engine support (FRAME Engine) is lower than 2,5 bar.

The possible leak can come either from the valve, or, in the worst case, from a crack in the airframe. In any case of doubt, inflate pressure in the airframe and search for the origin of the leak.

The undercarriage is made of aluminum skids and carbon legs. It is a shock absorbing design with two legs designed for progressive deformation on each side (passive safety). The metal inserts located in the front of the skid tubes are necessary to avoid excessive vibration.

The tail boom of the Dynali H3 Sport is made of aluminium. It is supported by two carbon struts.

The cabin body is made from vacuum-infused carbon fibre but has no structural role.

## 7.2 ENGINE & ENGINE MOUNT

The engine mount is made from stainless steel. It is mounted on two silentblocs which damp the vibrations throughout the airframe and is **suspended on two rods which act as a clutch by lowering** (tensioning the belts) **or raising the engine** (releasing the belts). When tensioned, the system is automatically locked (rods are on the other side of the tensioner axis).

Different engines can be installed in the H3, all based on the 900 series of BRP ROTAX :

- The **Rotax 914UL 115HP with TURBO**, which provides for the maintenance of the full power range at any altitude. Although there is some added weight resulting from the addition of a turbo and associated equipment, this version promises to be popular for heavy pilots in hot and high environments.
- The **Rotax 912ULS-I-BB 135HP INJECTION BIG BORE**, supplies the most appropriate power to the helicopter thanks to the ECU electronically controlling the injection system linked to bigger cylinders. The improvements made on the basic engine are performed within Dynali Sprl. The benefits of this version are the high torque and a comfortable power margin, without increasing the aircraft's weight. Furthermore, the fuel consumption stays close to 20 L/h. Therefore, it is the solution with the best Power/Weight and Power/Fuel consumption ratio.

H3 Sport	115 HP	135 HP
Engine	Rotax 914UL	Rotax 912ULS-I-BB
Bore	1200 cm <sup>3</sup>	1600 cm <sup>3</sup>
Specificity	Turbo	Injection M150 & Big Bore
Cooling	Water, oil and air	

### NOTE

**The Rotax 900 series are among the best engines in the world. However, Rotax does not guarantee its engines when these are used in rotary wing aircraft.**

## **7.3 MAIN TRANSMISSION**

The drive pulley is bolted directly onto the engine shaft.

Four V-belts transfer the movement to the receiving (driven) pulley which houses one freewheel. The freewheel is oil lubricated and can bear a torque of 660 Nm. It drives the rotor while the engine is running and keeps it free of movement when the engine is stopped or idle (failure or landing).

The tension in the drive belts is provided by the two tensioning rods linked to the tensioner arm. An electric actuator moves the bell crank of the tensioner arm for tensioning the belts.

The clutch system of the H3 is commanded from the cockpit. It serves to connect or disconnect the engine to the transmission system. When disconnected, it allows the engine to start with the rotor stationary, ensuring the safety of those on the ground during warm-up. Once ready for take-off, the rotor is engaged by the pilot using a switch on the instrument panel.

The V-belts are slotted for better power transmission. Adequate tensioning is mandatory. The adequate tension can be easily checked before the flight with a spring dynamometer. The belts may not flap, this can cause premature wear of the freewheel. Correct belt tensioning = 15 kg for 1 cm deflection in the middle of the belt.



The transmission shaft transmits the movement forward to the main rotor via the main transmission gearbox and to the tail rotor via a rubber coupling joint and then to the rear transmission.

The long shaft which drives the tail rotor is supported by seven intermediate bearings in the tail tube.

## **7.4 MAIN TRANSMISSION GEARBOX (MTG)**

The main transmission gearbox transfers the rotating movement from the main transmission shaft to the main rotor mast. The MTG of the H3 is dimensioned to support 250 HP whereas in reality it only has to bear a maximum of 135 HP. The total weight of the assembled MTG is 15 kg.

The MTG contains conic gearing with spiral teeth providing a single stage of reduction. The gearings are fabricated from aviation quality steel which is thermally treated and lubricated in a mineral oil bath. The large upper bearing in the main transmission gearbox may leak a little. This is not a problem as all precautions have been taken : sponge clean and watch the oil level. No intervention is required as long as the lip of the bearing flange fills up clearly.

The MTG is equipped with a T° sensor and with a chip detector, wired to a warning light in the cockpit, which indicates the pilot of every metallic particle detected.

The conical spiral gearing of the main transmission gearbox is a part that wears out rapidly. The gearbox should be emptied every 50 h to filter the oil or renew it and also, the magnetic plug should be surveyed.

Every 250 h, the main transmission gearbox should be opened in order to inspect the conical gear and the bearings.

## **7.5 MAIN ROTOR**

The rotor mast is made of Cr-Mo steel and designed to bear a load of +22 g.

The blades are made of extruded high resistance aluminum. As a safety precaution, their service life is provisionally limited to 1000 h before complete inspection. They can be used in all-weather conditions except for hail or icing conditions. A mark is traced on the upper side of the blade to check for possible permanent elongation of the blades. They are held by stainless steel sheets and aluminum blade roots.

Four stop bearings with oblique contact allow for the blade root to oscillate to set the pitch. They are over-dimensioned and can support excess speed up to 600 RPM. These bearings oscillate very little and the bearing balls, over the long term can make traces in their seating, causing shimmy in the cyclic pitch control. They should be replaced as soon as the shimmy can be felt.

The ball joints of the blade rods have a little play ; they should be greased with traditional grease.

The seven bolts and the two blade screws are set in position on a template. Dismounting them may cause misalignment. When removing the blades, it is done by unscrewing the 2 x 4 M8 bolts, holding the blade supports.

## 7.6 TAIL ROTOR

The tail rotor is equipped with four blades in order to keep a small diameter which provides for a greater degree of safety. The blades have a N° relative to their manufacturing balancing. It is not possible to replace one single blade. Blades must all be replaced together.

The four blades (120 g each) are composed of carbon, held by blade roots which are not articulated. The blade roots are held in nylon bearings which rapidly develop play.

This play does not affect the performance as the nylon bearings are held by stop bearings with flat rollers. In operation, the centrifugal force maintains the roots firmly in place which press uniformly on the whole crown of the bearings.

Only the rollers of these bearings must be greased and all surplus grease is immediately evacuated by the 1 kg of centrifugal force. The rollers dry and sometime corrode rapidly but no intervention is required as long as the rudder pedals do not show stiffness. All that has to be done then is to dismantle, clean with gasoline and grease the corroded rollers without necessarily changing them.

The rear transmission gearbox (RTG) also has a pair of conic gears with spiral teeth and splash lubrication. The entry and exit shafts are of stainless steel. It does not present any problem of wear. A chip detector is also installed.

The left lateral bearing of the RTG, even if fitted with a sealing ring, may leak a little !

Regularly sponge the oil drop in the lip of this lateral bearing.

## 7.7 FLIGHT CONTROLS

Standard equipment includes dual controls. The cyclic on the passenger side can be folded away. The regulation only allows dual control during training flights with instructor.

All controls operate through control rods with ball joint endings. The flight controls of the Dynali H3 Sport operate in the same manner as those of most other helicopters. The cyclic and the collective control the pitch of each blade via the swash plate.

### WARNING !

**The controls are very sensitive, this being why we recommend frictions on the three controls. Fully unscrew and re-screw 6 threads the lateral frictions and 11 threads the pitch friction.**

Both collective are also of the classical type with a throttle twist grip. An electronic controller, called "governor", acts on the electronic butterfly in relation to the collective position.



The governor acts as a « cruise control » and allows the pilot to avoid having to constantly adjust the throttle to maintain engine and rotor RPM. The governor is a standard equipment on the H3 Sport (embedded in the M150 if this ECU is installed).

The governor operates on the pilot's throttle control and gathers its information from the probe of the rotor rev-counter.

The pedals act on the pitch of the tail rotor, via the two Teleflex cables.

The Teleflex cables do not take any load. A system of counter rotating gearings neutralises the effect of pressure on the pedals.

## **7.8 RADIATORS**

The coolant radiator of the H3 is a very important item for training schools. It is very large and allows for the H3 to be flown in hover flight for long periods without overheating, without the requirement for periodic circuits to cool the engine oil. Two oil radiators are positioned on top of the coolant radiator and provide the same high efficiency performance.

Four fans, equipped with thermo switches allow for the automatic independent regulation of coolant and oil temperatures at ideal levels.

## **7.9 STABILISER**

The Dynali H3 Sport is equipped with a T-shape stabilizer. It allows for improved stabilisation in pitch and roll movement.



## **7.10 FUEL CIRCUIT**

The engine is fed directly by 2 fuel pumps. For safety reasons, the second pump starts when the first one provides insufficient power or is faulty.

The fuel tank has a capacity of 60 L. An optional 80 L fuel tank can be installed on the aircraft. In both cases the tank is equipped with fuel level sensor. The information is displayed on the EFIS and a light indicator (FUEL) lights up on the instrument panel if the fuel level drops below 15 L.

For an optimal functioning, the fuel system includes four filters. The two first, the pre-filters, are located between the tank and the pumps. The two others, the main filters, are located after the fuel pumps.

The air vent of the fuel tank is provided by the breather line which also acts as an overflow spillage line. This former end at a lower level than the engine components to avoid any spillage on them.

## **7.11 CABIN**

This helicopter has a single large undivided glazed canopy, locked with two lateral latches on the left and right hand side. A gas strut in the front allows for the canopy to stay open during boarding.

The locking mechanism can be operated from the Inside and outside by moving a steel locking device. The door is properly locked when both latches are in upper position.

As an option, two adjustable fresh air vents on each side are provided for ventilation. The sliding window can be used as a photography opening and is large enough to pass a hand through.

Thanks to its 1,3 m wide cabin, the H3 is the most spacious ultralight helicopter on the market. It allows two large people to sit comfortably and easily in the cabin, with plenty of elbow room, giving a feeling of space, while providing a panoramic view.

Storage lockers are provided for personal effects and documents beneath the cabin seats.



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## **SECTION 8 - HANDLING & MAINTENANCE**

### **8.1 GENERAL**

This chapter describes the recommended procedures for the handling and the maintenance of the Dynali H3 Sport helicopter.

Any person designated by Dynali or its distributors is authorised to perform maintenance operations, under the supervision or authorisation of these structures..

We ask that each new owner/operator contacts us and remains in close contact with Dynali SPRL or his local authorised distributor in order to receive the latest service bulletins concerning the Dynali H3 Sport.

In the event of sale of his helicopter, the original owner/operator should inform the new owner/operator of the manuals that he requires and suggest that he contact Dynali SPRL or the authorised distributor.

Furthermore, the internet website [www.dynali.com](http://www.dynali.com) regularly shows new information made available to everybody.

Under the regulations, the responsibility for the maintenance of an ultralight helicopter lies exclusively with the **builder / owner / operator** of the helicopter. He must ensure that servicing is performed in compliance with the Maintenance Manual and the recommendations of Dynali SPRL.

All limits, procedures, safety practices, part life cycles and TBO life cycles shown in the present manual are considered as mandatory.

### **8.2 OBLIGATORY DOCUMENTS**

The following documents must be permanently left aboard the aircraft :

1. Airworthiness Certificate
2. Registration Certificate
3. Radio operation certificate (if a radio equipment is installed)
4. Insurance Certificate
5. Weight sheet
6. Checklists
7. Flight manual

### **8.3 MAINTENANCE LOGBOOK**

All maintenance work must be logged in the appropriate logbook which must contain, at the least, the following information :

- Date of performance of the work.
- Number of hours flight logged.
- Description of the work and remarks.
- Name of the technician.
- Supervisor signature.

#### **NOTE**

**Telephone contact with Dynali Helicopter Company is always possible, if any doubt subsists or if there is any doubt concerning the work.**

### **8.4 MAINTENANCE AND PROCEDURES**

Dynali SPRL requires that the maintenance inspections should be made :

- 1) Every 25h. The pilot may perform this after having followed a training course with an authorised distributor.
- 2) Every 50h. The pilot may perform this after having followed a training course with an authorised distributor.
- 3) Every 100h. This operation must be performed in an authorised maintenance center by a qualified technician.
- 4) Every 250h. This operation must be performed in an authorised maintenance center by a qualified technician.
- 5) Every 500h. This operation must be performed in an authorised maintenance center by a qualified technician.
- 6) Every 1000h. This operation must be performed in an authorised maintenance center by a qualified technician.
- 7) Every 2000h. This operation must be performed in an authorised maintenance center by a qualified technician.

Dynali SPRL recommends a full inspection of the machine every 12 months. This must be performed by an authorised maintenance center.

Furthermore as from the 50<sup>th</sup> hour, the operation to be undertaken is, in fact, a series of operations. For example, after 2000 hours, all the maintenance operations included in the 25h, 50h, 100h, 250h, 500h, 1000h and 2000h checks must be performed.



## 8.5 MAINTENANCE TRACKING

### H3 Sport 135 HP :

Registration	
Serial N°	
Delivery date	
Observations	

### Owner :

Name	
First name	
Address	
Telephone	

### Maintenance calendar :

Hours	Date	Place – Technical operation - Remarks	Technician	Visa
<b>25</b>				
<b>50</b>				
<b>75</b>				
<b>100</b>				
<b>125</b>				
<b>150</b>				
<b>175</b>				
<b>200</b>				
<b>225</b>				
<b>250</b>				
<b>275</b>				
<b>300</b>				
<b>325</b>				
<b>350</b>				
<b>375</b>				
<b>400</b>				
<b>425</b>				
<b>450</b>				
<b>etc.</b>				

## 8.6 SCHEDULED MAINTENANCE

### WARNING !

Those service life hours are estimated service life.

O = Inspection

X = Replacement

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>GENERAL SUPPLIES</b>								
000	<b>WATER, OIL &amp; FUEL HOSES</b>  500h or every 5 years (whatever comes first) : Replace all fuel hoses. Check the water and oil hoses and replace if necessary  Check carefully every 2 years.					O / X		

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>301 CHASSIS &amp; UNDERCARRIAGE</b>								
<b>301000</b>	<b>CHASSIS H3 (FRAME)</b>  50h : Inspect the four attachment plates on the main stop bearing housing (upper column of the chassis).  100h : Check there is no crack all along the length of the tubes of the chassis and check all the accessible welds without disassembling anything.  500h : Remove the cabin fairings for a complete check of the chassis.  2000h : End of service life of the chassis. Replace in a Dynali service center or directly with the manufacturer.		O	O		O		X
<b>301100</b>	<b>UNDERCARRIAGE</b>  25h : Check the width of the skids (1890mm). The horizontal joining tubes must not be bent by more than 17mm.  100h : Check the welds and the wear of the sole plates.	O		O				
<b>301330</b>	<b>STRUT ATTACHMENT BRACKET</b>  100h : Check absence of cracks and deformation.			O			X	



Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>302</b>	<b>ROTAX ENGINE &amp; ENGINE SUPPORT</b>							
<b>302000</b>	<b>ROTAX ENGINE 912ULS / 912ULS-I / 914UL</b>  NOTE : REFER TO ROTAX MANUAL FOR DETAILED MAINTENANCE PROCEDURES.  100h : Check absence of finings/chip in the reduction gear (inspect the magnetic cap on the reducer). Replace the spark plugs. Drain the oil and replace the oil filter. Drain the coolant (or every year). Clean the air filter(s).  250h : Measure cylinder compressions. Check the springs on the butterfly housing. Replace the air filter.  Check wear on the bearings of the reduction gear.  500h : Replace the bearings of the engine gearbox (ask Dynali for appropriate brand). Check piston taper, valve condition and running-in. Check the flatness of the cylinder heads and cylinders and rectify if necessary. Check the segments between spikes. Check the condition of the pushers.  NOTE : ROTAX Engines being not certified for radial loads on the reduction gear (all ultralight helicopters using pulleys and belts), this part must be carefully inspected as often as possible. The possibility of a failure of the reduction gear must be considered at all time.  1000h : Disassembly of the engine for complete check.  2000h : General overhaul / Replacement of the engine.			O / X				O / X
<b>302010</b>	<b>ENGINE SUPPORT SWINGING ARM</b>  100h : Check the welds and check absence of cracks.			O				
<b>202020</b>	<b>SILENTBLOC</b>  100h : Check for deformation of the rubber.  1000h : Replace the silentblocs (See detailed procedure in the assembly manual).			O			X	

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>303</b>	<b>MAIN TRANSMISSION GEARBOX (MTG)</b>	<b>O / X</b>					<b>X</b>	
	<p>250h : Inspection AND replacement of gears and bearings if there is visible wear on the MTG pinions. (See detailed procedure in the assembly manual).</p> <p><b>NOTE : This maintenance operation should be performed in a Dynali service center or by the manufacturer !</b></p> <p>2000h : Complete replacement of MTG in a Dynali service center or by the manufacturer.</p> <p>50h : Oil change and filling MTG with <b>SWEPCO 201 90W AIRCRAFT APPLICATION</b> (See detailed procedure in the assembly manual).</p> <p>NOTE : The upper horizontal bearing will eject some grease during the first hours of operation and will be later replaced by MTG oil which may sweat slightly.</p> <p><b>SPECIFIC MAINTENANCE DURING INITIAL RUNNING PERIOD OF THE MTG : See below.</b></p> <p>After the first 2h running period of the MTG : Drain and fill new oil SWEPCO 201.</p> <p>After the first 10h running period of the MTG : Drain and fill new oil SWEPCO 201.</p>		<b>X</b>					
<b>203410</b>	<p><b>CONICAL GEARING</b></p> <p>250h : Remove the MTG inner shaft and crown from the MTG to inspect the teeth and the needle support bearing 203450, the driving teeth and grease them.</p> <p>It is necessary to <b>adjust</b> the play of the inner shaft conical bearings in the entry casing and the state of wear of the teeth on the crown. Inspection AND <b>replacement of the pinions, bearings, rings and sealings if there is any visible wear</b> (See detailed procedure in the assembly manual).</p>				<b>O / X</b>			
<b>203340</b>	<b>MAST BASE SPACER</b>				<b>X</b>			
<b>217300</b>	<b>TELATEMP</b>					<b>X</b>		
<b>303SL</b>	<p><b>MAGNETIC CHIP DETECTOR (MTG)</b></p> <p>50h : Inspect and clean the chip detector during the oil drain (See detailed procedure in the assembly manual).</p>		<b>O</b>					
<b>303175</b>	<p><b>MAGNETIC CAP</b></p> <p>50h : Inspect and clean the cap of the inspection cover during the oil drain (See detailed procedure in the assembly manual).</p>		<b>O</b>					

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>304</b>	<b>MAIN TRANSMISSION</b>							
<b>304062</b>	<b>DRIVE PULLEY</b>  Change pulley and belts as soon as it is no longer possible to tighten the belts under good conditions (engine horizontal) (See detailed procedure in the assembly manual).	O			X			
<b>304450</b>	<b>BELT XPA 1000</b>  25h : Inspect the belts along all their length, inside and outside. Check belt tension (should be between 15kg and 25kg for 10mm indentation) and alignment of pulleys.  <b>CAUTION : The tension of new belts must often be readjusted during the first running hours. Then, the tension is adjusted when required.</b>  The service life of the belts is arbitrary, according the care with which they are treated.	O			X			
<b>304330</b>	<b>FREEWHEEL STIEBER NF35-V</b>  25h : Check operation in both directions, with the belts loosened. You should feel that the rollers engage firmly.  250h : Oil change, clean and grease (See detailed procedure in the assembly manual).  Replace the freewheel in a Dynali service center or by the manufacturer if it becomes noisy or shows signs of failure.	O			O			
<b>304315</b>	<b>OIL FUSCH RENOLIN MR 30 VG 100 (40ml)</b>  250h : Oil change of the freewheel (See detailed procedure in the assembly manual).				X			
<b>304102</b>	<b>RECEIVING PULLEY</b>  250h : Inspect the pulley grooves for wear.				O			
<b>304345</b>	<b>SEALING RING</b>				O			
<b>304AP</b>	<b>MAIN TRANSMISSION SHAFT ASSY</b>  250h : Remove the shaft for inspection. Take care, keep the TIGHTENING STOP RING 204380 (FORWARD !) well in its place ! (See detailed procedure in the assembly manual).  1000h : Replace the main transmission shaft assy (See detailed procedure in the assembly manual).				O		X	
<b>203560</b>	<b>O-RING (MTG ENTRY SHAFT)</b>				X			
<b>304310</b>	<b>BRASS RING</b>  50h : Push away the o-ring to check the state of the brass ring.		O		X			
<b>304320</b>	<b>O-RING (ON BRASS RING)</b>				X			

304360	<b>MAIN TRANSMISSION SHAFT</b>  25h : Test the absence of vertical play at the insertion point.  250h : Visual check of the grooves, clean and grease (See detailed procedure in the assembly manual).	O			O			
204420	<b>BEARING GYE35-KRR-B EN</b>  25h : Check the tightness and the check mark on the tightness pins. Check the attachment of the flanges.  50h : Grease through the greasing holes.	O	O		X			
304520	<b>SHAFT INSERT</b>  250h : Examine the play of the nylon shaft insert on the tensioner shaft. Clean and grease.				O			
304550	<b>UPPER ARTICULATION SCREW M8</b>  25h : Grease if necessary, re-tighten if necessary.	O						
304510	<b>TENSIONER SHAFT</b>  50h : Check for cracks and welds of attachment plates.		O				X	
304590	<b>DRIVE BELT GUIDE CLAMP</b>  25h : Check for cracks.	O						
304540	<b>TENSIONER ROD &amp; BALL JOINTS</b>	O					X	

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>305</b>	<b>ROTOR MAST</b>							
<b>305012</b>	<b>MAIN STOP BEARING HOUSING</b>							X
<b>305030</b>	<b>MAIN STOP BEARING 7208-B-2RS-TPV</b>  250h : Remove the mast to replace the bearing (See detailed procedure in the assembly manual).  NOTE : Lower sealing ring of the main stop bearing must be glued to outer ring (with Cyanolite) in order to avoid it to fall down along the mast.				X			
<b>205020</b>	<b>HOUSING SCREW</b>						X	
<b>305040</b>	<b>MAIN STOP BEARING HOUSING COVER</b>  25h : Check the wear that could be made by the cover on the mast.	O						
<b>305MR</b>	<b>ROTOR MAST ASSY</b>  100h : Grease and check the wear where the swashplate fits (See detailed procedure in the assembly manual).  250h : Remove the mast, check if there is any abrasion to the right of the bearing. Grease with CHAIN LUB. The mast must be held tight in the nylon spacer of the MTG (See detailed procedure in the assembly manual)  1000h : Replace the mast (See detailed procedure in the assembly manual).			O	O		X	
<b>205090</b>	<b>BEARING RING IR 30X35X30</b>				X			
<b>205080</b>	<b>ROTOR TILT STOP RING</b>  50h : Swing the rotor down and check the stop ring functions correctly. Check that the ball joints are free.		O					
<b>205060</b>	<b>MAST BASE DRIVING ROLLER</b>  1000h : Replace the rollers.						X	
<b>205050</b>	<b>MAST DRIVE BASE</b>  250h : Check wear on the grooves at the mast drive base and the hub of the MTG.  Grease the rollers if necessary.				O		X	
<b>305100</b>	<b>MAST STOP TUBE</b>  100h : Check the tightness of mast the stop tube as well as the COMPRESSION SLEEVE (205115) and the LOCKING NUT (205120).  1000h : Replace the mast stop tube.			O			X	

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>306</b>	<b>SWASH PLATE</b>							
<b>306010</b>	<b>SWASH PLATE SLIDING GUIDE</b> 25h : Check the attachment. Deformation is possible and must be checked (some play between axle and guide is acceptable). Replace if there is serious wear.	O						
<b>306040</b>	<b>DRIVE COLLAR WELDED</b> 50h : Check the absence of cracks 1000h : Replace the whole drive collar assembly (collar, bars, bearings, nozzles, forks, ball joints). To do this it is necessary to withdraw the mast (See detailed procedure in the assembly manual).		O				X	
<b>206030</b>	<b>SCISSOR BEARING 626 2RS</b> 50h : Check that there is no play in the bearings.		O				X	
<b>206055</b>	<b>INTER-BEARING SPACER</b>						X	
<b>306070</b>	<b>WELDED FORK M8</b> 100h : Check for signs of cracking.			O			X	
<b>BJR08</b>	<b>BALL JOINT Ø8</b> 50h : Check the state of each ball joint of the swashplate. Attention, do not grease the PTFE ball joints.		O			X		
<b>306180</b>	<b>STUD UPPER SWASH PLATE M10</b> 50h : Check the correct attachment of the lateral studs, de forward screw and the aft guide.		O				X	
<b>306185</b>	<b>STUD UPPER SWASH PLATE M8</b>		O				X	
<b>306300</b>	<b>CENTRAL BALL JOINT GEH 40 TXG3E 2RS</b> 500h : Replace the central ball joint. Extract the mast (See detailed procedure in the assembly manual).					X		
<b>306240</b>	<b>BEARING 61816 2RS</b>							X
<b>206295</b>	<b>LATERAL CONTROL STUD</b>					X		
	<b>FORWARD SCREW M8X90</b>					X		
<b>206296</b>	<b>LATERAL CONTROL STUD SOCKET</b>							X
<b>206294</b>	<b>FRICTION DAMPER</b>							X
<b>BJL10</b>	<b>BALL JOINT Ø10 LEFT THREAD (GAKL10)</b> 50h : Check for play and grease.		O			X		
<b>BJR10</b>	<b>BALL JOINT Ø10 (GAKR10)</b> 50h : Check for play and grease.		O			X		

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>307</b>	<b>MAIN ROTOR HEAD</b>							
<b>000</b>	<b>PAIR OF BLADES</b>  25h : Check adherence of the rotor tip plates.  100h : Check carefully the general appearance of the upper and lower surfaces of the rotor blades for cracking.  <b>100h : ADJUST TRACKING AND BALANCE OF THE ROTOR WITH A VIBREX. OTHER METHODS OR EQUIPMENT ARE INSUFFICIENTLY PRECISE.</b>  <b>VIBREX MAXIMUM VALUE : ... &lt; 0,07 IPS @ 2Ω</b>  This procedure must be performed in a maintenance center equipped with the appropriate material. A poor adjustment or the rotor can create important and dangerous vibrations for the helicopter. On the long term, this can lead to premature fatigue of the structure and of its mechanical components.  250h : Check for wear/corrosion at the connexion between blade sheath and blade. Replace in case of excessive corrosion.  1000h : Replace the aluminium blades. This operation must be performed in a Dynali service center or by the manufacturer.	O		O	O		X	
<b>307031</b>	<b>BLADE GRIP</b>						X	
<b>207AF</b>	<b>SPINDLE AXLE &amp; BLADE STOP BEARING</b>						X	
<b>307300</b>	<b>BLADE ROOT 2 SLOTS</b>						X	
	<b>OIL ATF + SLICK 50 PTFE 300CC</b>					X		
<b>207340</b>	<b>BLADE ROOT COVER</b>						X	
<b>207320</b>	<b>SEALING RING</b>  25h : Check for leaks.	O				X		
<b>307211</b>	<b>SPINDLE AXLE BEARING CENTERED</b>						X	
<b>307100</b>	<b>BLADE RETENTION STUD</b>						X	
<b>307470</b>	<b>ROTOR HEAD FLANGE</b>							X
<b>207500</b>	<b>BEARING NKXR 35Z</b>  25h : Swing over the rotor head and check for smooth operation and no binding.  50h : Grease.  250h : Replace the inner bearings and rings on the support bearings of the mast if the rings are marked by the needles of the bearings (See detailed procedure in assembly manual).	O	O		X			

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>308</b>	<b>CYCLIC CONTROL</b>							
308150	BELLCRANK MIXER ASSY						X	
208170	INTER BEARING SPACER						X	
208160	BEARING 6000 2RS						X	
BJR10	BALL JOINT Ø10 (TILT)		O			X		
208080	TRIPLE STIRRUP INTERMIXER 100h : Check for cracking on the stirrup as well as on the control rods.			O			X	
208100	LEFT PITCH BELLCRANK & BEARING						X	
208105	RIGHT PITCH BELLCRANK & BEARING						X	
308EL	FORWARD END ASSY 500h : Replace the assembled longitudinal end part (end part, bearings spacers).						X	
BJR08	BALL JOINT Ø8 50h : Check the condition and the lubrication of all ball joints on the controls and bearings of the balancer. Check all the ball joints, the nozzles and the attachment of the screws. 500h : Replace the three upper and lower ball joints. Replace the ball joint and the aluminium spacer.		O			X		



Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>309</b>	<b>COLLECTIVE &amp; CONTROL RODS, TRIMS &amp; FRICTIONS</b>							
209020	BEARING 61804 2RS							X
209025	BEARING 6001 2RS							X
209040	FRICTION SPACER 25h : Check that the throttle friction is free (without governor).	O						
309060	SCREW FOR COLLECTIVE STIFFENER 50h : Check for signs of cracking (engine support screw, stiffener, collar), sufficiently tight but not blocking, as well as the condition of the plastic rings.		O					
309180	LEFT COLLECTIVE LEVER M8							X
309190	CENTRAL COLLECTIVE LEVER (THROTTLE CONTROL)							X
309200	THROTTLE AXLE 250h : Check that the axle is not bended.				O			X
309340	LOWER PITCH ROD					X		
BJR10	BALL JOINT Ø10 (REAR)		O			X		
BJR08	BALL JOINT Ø8 (FRONT)		O			X		
309250	THROTTLE CONNECTING ROD		O					
BJR06	ROTULE Ø6		O					
309SDW	COLLECTIVE BUNGEE				X			
310SDW	THROTTLE TRIM SANDOW 25h : Check the condition of the bungee. It keeps the throttle in position (very important).	O			X			



Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>310</b>	<b>GOVERNOR</b>							
210360	<b>TOOTHED BELT</b>  50h : Check the tension of the belt. <b>Replace every 5 years</b> of if the belt harden.		<b>O</b>					

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>311</b>	<b>PEDAL SYSTEM</b>							
211010	<b>PEDAL BARS SUPPORT</b>  500h : Disassemble, clean, check the play and grease if necessary.					O		
311040	<b>FORWARD PEDAL BAR</b>					O		X
311050	<b>REAR PEDAL BAR</b>					O		X
3111XX	<b>PEDALS</b>  100h : Check the welds and clearance between pedals.  NOTE : The rudder pedals can progressively stiffen when the rotor blade bearings are too dry or the variator of the rear rotor is worn. It is of prime importance to check that there is no rubbing or blockage at any point on the length of the cables.			O				

Part N°		25h	50h	100h	250h	500h	1000h	2000h
312CRB 312TRB	<b>ROTAX 912ULS / 914UL ENGINE</b>							
310210	<b>THROTTLE CABLE / CHOKE (DOUBLE)</b> 50h : Check that the cables do not catch in their sleeves.		O			X		
310100	<b>THROTTLE CORRELATOR</b> 250h : Tighten the bolt on the correlator.				O			
210132	<b>SCREW CABLE TIGHTENER Ø2</b> 50h : Check the tightness of the cable clamp.		O					
310010	<b>CHOKE CABLE ATTACHMENT BRACKET</b>					O		
210009	<b>THROTTLE CABLE ATTACHMENT BRACKET ON MTG</b>					O		
	<b>CARBURETORS</b> 100h : Synchronise the carburetors. Check the rubber intake. Check for tears. Remove the carburetors to check the inside of the rubber intake. Check the carburetor cups and their attachment brackets. If installed, check the hoses of the carburetor heater. <b>Check the butterfly springs.</b>  1000h : Complete overhaul of the carburetors (membranes, needles, sealing rings, floats, clamps, rubber intake).			O			X	
	<b>MECHANICAL FUEL PUMP</b>					X		
	<b>FUEL HOSES</b>					X		
312TRB	<b>TURBO MAINTENANCE</b>							
	Check the tightening of the screws of the turbo	O						
	Grease the shaft of the wastegate (Loctite 8151)	O						

Part N°		25h	50h	100h	250h	500h	1000h	2000h
312INJ	<b>ROTAX 912ULS-I ENGINE</b>							
310133	<b>THROTTLE CABLE &amp; SLEEVE</b> 50h : Check that the cable do not catch in its sleeve.		O		X			
310100	<b>THROTTLE CORRELATOR</b> 250h : Tighten the bolt of the correlator.				O			
210132	<b>SCREW CABLE TIGHTENER Ø2</b> 50h : Check the tightness of the cable clamp.		O			X		
314CP	<b>BUTTERFLY BODY ASSY</b>				O			
314660	<b>INJECTOR</b>				O	X		
314685	<b>FUEL PRESSURE REGULATOR 3 BARS</b>					X		
314860	<b>ENGINE RPM SENSOR</b>					X		
314060	<b>FUEL PRESSURE SENSOR</b>							X
314800	<b>MAP / BAP SENSOR</b>					X		
314810	<b>COOLANT T° SENSOR</b>							X
314820	<b>AIR T° SENSOR</b>							X
314870	<b>LAMBDA SENSOR</b>					X		
314630	<b>TPS</b>						X	
214050	<b>ELECTRICAL FUEL PUMP</b> 50h : Test both fuel pumps 1000h : Invert both fuel pumps 2000h : Replace both fuel pumps (If only 1 pump installed, replace every 500h)		O				O	X
	<b>FUEL HOSES</b>					X		
314050	<b>FUEL FILTER</b>				X			
314617	<b>BUTTERFLY SPRING</b>			O	X			
314628	<b>AIR INTAKE HOSE</b>			O			X	

Part N°		25h	50h	100h	250h	500h	1000h	2000h
312CRB 312INJ 312TRB	<b>COOLANT &amp; OIL &amp; EXHAUST</b>							
312060	<b>OIL TANK ATTACHMENT CLAMP</b>						X	
212305	<b>COOLANT MAIN RADIATOR</b> 25h : Check that there are no leaks. 250h : Drain the coolant liquid (or every 5 years). 1000h : Replace the radiator.	O			X		X	
212304	<b>OIL NIPPLE ON MAIN RADIATOR</b> 25h : if leakage, replace the 2x2 o-rings.	O						
312315	<b>MAIN RADIATOR ATTACHMENT CLAMP</b>			O		X		
312020	<b>ADDITIONAL OIL RADIATOR</b>						X	
312401	<b>FAN SPAL VA08-AP10/C-23A 12V</b>						X	
312510	<b>BENDED WATER HOSE Ø36</b> Check every 2 years, replace every 5 years						X	
001300	<b>BREADED OIL METALLIC HOSE</b>						X	
312027	<b>OIL THERMOSWITCH (ON OIL RADIATOR)</b>					X		
312520	<b>COOLANT THERMOSWITCH</b> 250h : Replace the thermocontact, the brass washer and o-ring on the oil radiator.					X		
312700	<b>EXHAUST</b>		O					

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>313</b>	<b>DASHBOARD &amp; ELECTRICAL CIRCUIT</b>							
3132XX	INDICATING LIGHTS & LOW RPM						O	
213530	DOUBLE POLE SWITCH WITH SAFETY (IGN) 250h : Replace the ignition contacts as oxydation can cause intermittant failures.						X	
313526	DOUBLE POLE SWITCH (CLUTCH)						X	
213207	CONTACT KEY 40A						X	
213BK	BREAKERS						X	
21340A	RELAYS 40A (FANS)						X	
GNR	RIGID AND SOFT SLEEVES (MAP HOSE)						X	
313360	BATTERY 12V ALLIANT X4 NOTE : Indeterminate service life. Never allow for a battery to discharge under 12V for a long period. After a discharge, the battery will be out of use.				O / X			
313540	GENERAL FUSE						X	
213460	ROTOR RPM SENSOR						X	
313CND	CAPACITOR 22,000 MF						X	
313REG	ENGINE REGULATOR ROTAX (DUCATI) 500h : Check that the plastic part is not deformed. Check the grounding, disconnect and check the connectors and wires (corrosion, overheat).					O		
	CABLES & ELECTRICAL HARNESSSES 250h : Remove the instrument panel and check all wires, connexions, no trace of corrosion or overheating. Check the connexions of the batterie, main fuse, regulator, condensator.				O			X



Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>314</b>	<b>FUEL</b>							
314510	<b>COLLAR</b> 25h : Check absence of tearing. Check attachment of the trapeze <b>and tighten the strap.</b>	O						
314505	<b>FUEL TANK 60L (CARBON)</b>						X	
314550	<b>FUEL VALVE</b> 25h : Check all the fuel filters.	O					X	
314330	<b>LOW FUEL SENSOR</b> 250h : <b>Testing the light.</b> 1000h : <b>Remove for complete check.</b>				O		O	
314560	<b>FUEL LEVEL GAUGE</b>						X	





Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>315 TAIL STRUCTURE</b>								
315400	<b>TAIL BOOM</b>  25h : Attachment of tube to chassis. Check for signs of cracking along the full length.	O						X
315275	<b>MAIN TAIL COLLAR</b>	O						X
315200	<b>TAIL STRUT (CARBON)</b>  50h : Check for signs of splitting.		O				X	
BJR12	<b>BALL JOINT GAR-12</b>			O			X	



Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>316</b>	<b>REAR TRANSMISSION</b>							
216020	RUBBER COUPLING					O		X
316040	REAR TRANSMISSION SHAFT 250h : Extract the rear transmission shaft to check the support bearings.				O			X
216050	BEARING HOUSING 250h : Check that the bearings are well held by the M4 screws. The bearings can not turn in their housing.				O			
216060	BEARING 6002 2RS C3 100h : Through the orifices under the tube, check the flanges of the bearings and check that the conical sleeves do not detach.			O			X	
216065	CONICAL SLEEVE				O		X	

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>317</b>	<b>REAR TRANSMISSION GEARBOX (RTG)</b>		O	O	O		X	
	<p>50h : Inspect the teeth of the small pinion through the inspection glass. Check the air vent.</p> <p>100h : Check the play in the bearings and between the pinions. (See detailed procedure in the assembly manual).</p> <p>250h : Remove the window and check the gears.</p> <p>1000h : Factory overhaul (Replace shaft, pinions and bearings).</p>							
<b>203180</b>	<b>MAGNETIC CHIP DETECTOR RTG</b>		O					X
	50h : Clean the filings detector stopper.							
<b>303005</b>	<b>OIL SWEPCO 201 90W AIRCRAFT APPLICATION</b>		X					
	250h : Replace the oil.							
<b>217300</b>	<b>TELATEMP</b>					X		
	500h : Replace whenever necessary.							

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>318</b>	<b>TAIL ROTOR</b>	<b>O</b>						
218010	ROTATIVE VARIATOR 100h : Maximum wear depth = 0,5mm			O		X		
218030	PCM RING				X			
218020	BEARING 61806 2RS				O	X		
218040	STATIC VARIATOR 6 GROOVES 50h : Check the surface of the hub for signs of cracking.		O					X
318100	TAIL ROTOR HUB 4 BLADES			O				X
218190	STOP BEARING RING			O	X			
218220	STOP BEARING 51104 RECTIFIED 100h : Check the greasing of the bearings.  NOTE : The grease dries in a random manner. If movement becomes difficult, it is necessary to depose the bearings to clean them with gasoline and grease the balls.  NOTE : If the pedals become stiff, this may mean that the bearings are dry or dirty. The whole rear rotor must be deposed with its hub and the static variator.  NOTE : If the pedals are jerky in movement in flight or on the ground this may mean that the six guide lugs (218350) of the variator are worn. The width of the of the flat surface resulting from wear authorised is 2mm. Replace the studs as necessary.			O	X			
218200	MUSHROOM BUSHING			O	X			
318240	BLADE ROOT BARREL			O	X			
106	RIGID NYLON SLEEVE			O	X			
218250	TAIL ROTOR BLADE ROOT						X	
218320	TAIL ROTOR BLADE							X
218350	VARIATOR GUIDE STUD Ø6 250h : Replace the studs as soon as flat wear surfaces 2mm in width, or turn them by ¼ turn if possible			O	X			
000006	SAFETY WIRE				X			
218400	PUSH-PULL CABLE 250h : Disconnect to check for stiff points.				O			X
218410	PUSH-PULL CABLE FORK 250h : Check for use of the axles.				O			
218430	PUSH-PULL AND BEARING SUPPORT CUP 50h : Check tightness of screws.		O					

Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>319</b>	<b>STABILIZER</b>							
<b>319030</b>	<b>HORIZONTAL STABILIZER / SHARK TAIL</b>  50h : Check for signs of cracking in the stainless steel folded tabs and the attachment collars. Check the state of the tail supports.  NOTE : For helicopter fitted with the new Shark Tail, only check the attachments of the stabilizer as well as the absence of cracks in the carbon fiber.		O					
<b>319080</b>	<b>HORIZONTAL STABILIZER FORWARD COLLAR</b>		O			X		
<b>219085</b>	<b>HORIZONTAL STABILIZER REAR COLLAR</b>		O			X		
<b>219045</b>	<b>ROD END</b>	O						
<b>319055</b>	<b>TAIL ROTOR SURROUND</b>						X	
<b>319060</b>	<b>TAIL ROTOR SURROUND BRACKET</b>						X	
<b>319315</b>	<b>TAIL ROTOR SURROUND COLLAR</b>  25h : Check for signs of cracking.	O					X	



Part N°		25h	50h	100h	250h	500h	1000h	2000h
<b>320</b>	<b>CABIN</b>							
320420	CANOPY STRAP	O						
320450	LATCHES	O						
320800	SEATBELTS & ATTACHMENTS 100h : Check for wear of the strap at the passage through the plates.			O				
320810	SEATBELT LOCKING BRACKET 25h : Check for wear or deformation. The locking must remain firm. Check for signs of cracking of the attachments.			O				



## **SECTION 9 - SAFETY TIPS**

### **General**

This section provides miscellaneous suggestions and guidance to help the pilot operate the helicopter more safely.

It is essential to warn the owner/operator about several risks that are too often underestimated or neglected through force of habit and to provide with the experience acquired by the whole family of pilots of light helicopters.

On the first pages are listed all the warnings that all pilots must constantly bear in mind.

A helicopter is, by its nature, a capricious and unstable machine which is subject to both the laws of the air and of physics. Furthermore, its mechanical components comprise a total chain which is both complex and precise. A helicopter requires care and maintenance. Please study carefully the specific characteristics and the recommendations which follow.

### **Pilot airmanship**

- Keep both hands on the controls especially when close to the ground (it is prohibited to release the controls).
- Be attentive at all times and beware of overconfidence.
- Never fly if you are not feeling in perfect shape. In no case when you are influenced by alcohol, lack of sleep or stress.
- There is a high danger if there is an obligation to fly, to perform demonstration flights, or to fly from point A to point B.
- Do not perform risky or unusual manoeuvres.
- Do not perform low pass above friend's home.

### **Mental faculties**

Keep in mind that, in flight, we are not in our natural element. The analytical capacity is reduced by unconscious stress and this becomes more severe in the event of problems as we lose part of our faculties. We no longer notice factors which worsen the situation and we easily accumulate errors. Accidents are always the consequence of an accumulation of errors. In addition, our analytical capacity is reduced in flight.

### **Low-G avoidance**

Never push the control stick forward to descend or to terminate a pull-up (as you would in an airplane). This may produce a low-G (near weightless) condition which may result in a mast bumping occurrence, causing fatal damage to the rotor mast.



## Entering the vortex

In the event of descending too fast or moving forward with a tail wind, there is a danger of entering your own vortex and catching up with your own turbulence. The rotor operates in turbulent air and loses a large part of its lift. This phenomenon is present at all altitudes.

## Power management

Helicopters have relatively low reserve power in certain conditions such as transition phases, high altitude flight or air conditions (high temperature, turbulence,...).

Maximum loading of the rotor can be suddenly attained and a marked difference between the aircraft's characteristics in solo flight and heavy dual flight can be observed. With a heavy payload, limitations are more restricted and the power margin is reduced.

A piston engine has little inertia. With the slightest drop in engine speed the rotor will "freewheel". In icing conditions, for example, the engine may simply stop as compared with a fixed wing aircraft which will still be provided with thrust for a moment by its propeller. The governor system may hide the early stages of icing.

- Keep up your speed and never remain "hanging on your engine", it may fail.
- Never fly in a helicopter which is not adjusted for autorotation.
- To keep in training, descend as often as possible in autorotation, stopping short of the ground.
- Always watch your manifold pressure. This instrument will tell you the reserve power available. Before initiating any manoeuvre, check that you have at least 1" inHg MAP in reserve.
- Do not continue with a landing if the LOW RPM warning is alight.
- Check that the engine runs smoothly at idle.
- The throttle Sandow must be kept in good condition.

### **WARNING !**

**Manoeuvres close to ground and take-offs and landings should be performed with the governor set at 5800 RPM to provide more power.**

**If you have, in climb or on take-off, exceeded the available power, the rotor will lose RPM. The worst reaction is to further raise the collective, which will even further reduce the RPM. The correct reaction is to lower the collective and open the throttle to the limit. Then, allow the helicopter to lose a little more height while awaiting for the RPM to increase.**

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## **Lateral translation**

Excessive and longer lateral translation has to be avoided at all means. An engine failure during a lateral translation close to the ground may have fatal consequences.

## **Flying low on fuel is dangerous**

Never intentionally allow the fuel level to become critically low. A forced landing into unknown terrain always poses unnecessary and unpredictable risk with danger to material or life.

## **Do not push the envelope and remain easy on the controls**

Avoid abrupt control inputs or accelerated manoeuvres, particularly at high speed. These produce high fatigue loads in the dynamic components and could cause a premature and catastrophic failure of a critical component.

## **Strobe lights ON – for your own and other's safety**

Turn the strobe lights (if installed) ON before starting the engine and leave it on until the rotor stops turning. The strobe lights provide a warning to ground personnel. Leaving them on in flight is also advisable since the helicopter may be difficult for other aircraft to see.

## **Rotors can be extremely dangerous**

Never attempt to start the engine until the area around the rotor is completely clear of any persons or objects. Do not start the engine while standing beside the helicopter.

Be sure ground personnel or onlookers don't walk into the main rotor. Mind the spinning rotor when hovering close to obstructions or persons. It is advisable to maintain at least one rotor diameter distance from obstructions or persons when hovering with spinning rotor. A fast turning rotor is almost invisible, but may contain enough energy to kill a person.

Never let go of the control stick and make sure the rotor blades spin down in level/horizontal attitude until the rotor is at a complete stop. Wind or negligent behavior on the control stick may cause the blades to flap dangerously low and hit control stops, stabilizer, or people.

## **Power lines and cables are deadly**

Flying into wires, cables, and other objects is by far the number one cause of fatal accidents in rotary wing aircraft. Pilots must constantly be on the alert for this very real hazard.

- Watch for the towers ; you will not see the wires in time.
- Fly directly over the towers when crossing power lines.
- Constantly scan the higher terrain on either side of your flight path for towers
- Always maintain at least 500 feet AGL except during take-off and landing.

## **Loss of visibility can be fatal**

Flying a helicopter in obscured visibility due to fog, snow, low ceiling, or even a dark night can be fatal. Helicopters have less inherent stability and much faster roll and pitch rates than airplanes. Loss of the pilot's outside visual references, even for a moment, can result in disorientation, wrong control inputs, and an uncontrolled crash. This type of situation is likely to occur when a pilot attempts to fly through a partially obscured area and realizes too late that he is losing visibility. He loses control of the helicopter when he attempts a turn to regain visibility but is unable to complete the turn without visual references.

You must take corrective action before visibility is lost! Remember, a precautionary landing in a helicopter will always be safer than a flight with impaired or no visibility.

## **Carrying passengers**

Take the time to get familiar with your H3. Carrying a passenger increases the difficulty of managing the power. 30 hours of solo flight is recommended for beginners and 5 hours for experienced pilots before carrying a passenger.

## **Beware of any stiffening in the controls**

Cyclic plate, freezing or hardening of the grease on the mast. Rapid complete blockage can occur in these cases. In the pedals, the grease hardens in the stop bearings of the rear rotor blades. Never force the controls but fix the problem.

## **Overconfidence prevails in accidents**

A personal trait most often found in pilots having serious accidents is overconfidence.

High-time fixed-wing/gyroplane pilots converting to helicopters and private owners are particularly susceptible. Airplane pilots feel confident and relaxed in the air, but have not yet developed the control feel, coordination, and sensitivity demanded by a helicopter. Private owners must depend on self-discipline, which is sometimes forgotten. When flown properly and conservatively, helicopters are potentially the

safest aircraft built. But especially helicopters also allow little tolerance when flown to their limits. Helicopters must always be flown defensively.

### **Flying low over water is very hazardous**

Accidents repeatedly occur while maneuvering low over water. Many pilots do not realize their loss of depth perception when flying over water. Flying over calm glassy water is particularly dangerous, but even choppy water, with its constantly varying surface, interferes with normal depth perception and may cause a pilot to misjudge his height above the water.

**MAINTAIN SAFETY ALTITUDE AT ALL TIMES !**

### **Conversion pilots constitute high risk when flying helicopters**

There have been a number of fatal accidents involving experienced pilots who have many hours in airplanes or gyroplanes but with only limited experience flying helicopters.

The ingrained reactions and habits of an experienced airplane pilot can be deadly when flying a helicopter. The airplane pilot may fly the helicopter well when doing normal manoeuvres under ordinary conditions when there is time to think about the proper control response. But when required to react suddenly under unexpected circumstances, he may revert to his airplane reactions and commit a fatal error.

Under those conditions, his hands and feet move purely by reaction without conscious thought. Those reactions may well be based on his greater experience, i.e., the reactions developed flying airplanes.

For example, in an airplane his reaction to an engine failure would be to immediately and considerably go forward with the stick. In a helicopter, application of inadequate forward stick could result in a low-G situation or, if the engine failure occurred during initial climb, a reduction of rotor RPM combined with a high sink rate with the consequence of a hard landing or impact.

Airplane pilots may also underestimate pedal work. Especially in a helicopter, pedal control is most critical as it has the highest rate response with the smallest static and dynamic damping effect of all other controls. Being used to the high directional stability of an airplane, a conversion pilot may neglect proper pedal. Very much like gyroplanes, helicopters cannot be flown by control position or control force, but solely by resulting attitude. That means that the pilot together with his built-in senses and programmed reflexes represents a vital part in the active control feedback loop.

Gyroplane pilots, on the other hand, may underestimate the characteristics of helicopters and the necessity for proper training.

To develop safe helicopter reactions, conversion pilots must practice each procedure over and over again with a competent instructor until hands and feet will always make the right move without requiring conscious thought.

AND, ABOVE ALL, HE MUST NEVER ABRUPTLY PUSH THE CONTROL STICK FORWARD.

### **Beware of demonstration or initial training flights**

A disproportionate number of fatal and non-fatal accidents occur during demonstration or Initial training flights. The accidents occur because individuals other than the pilot are allowed to manipulate the controls without being properly prepared or indoctrinated.

If a student begins to lose control of the aircraft, an experienced flight instructor can easily regain control provided the student does not make any large or abrupt control movements. If, however, the student becomes momentarily confused and makes a sudden large control input in the wrong direction, even the most experienced instructor may not be able to recover control. Instructors are usually prepared to handle the situation where the student loses control and does nothing, but they are seldom prepared for the student who loses control and does the wrong thing.

Before allowing someone to touch the controls of the aircraft, they must be thoroughly briefed concerning the sensitivity of the controls in a helicopter. They must be firmly instructed to never make a large or sudden movement with the controls. And, the pilot-in-command must be prepared to instantly grip the controls should the student start to make a wrong move.

### **Manœuvering on the ground**

At the tail rotor, do not force the blades as doing so may mis-align them. Do not use force on the tail rotor surround. The manoeuvring wheels should only be used on hard and smooth ground. The machine should not be moved by pushing on the canopy or the horizontal stabiliser.

### **Parking**

Restrain/strap the rotor blades which flap in the wind. The shocks leave traces of impacts on the balls of the bearings.

### **Transporting the helicopter on a trailer**

Without main rotor blades or support the rearward blade. Possibly, on a short trip, let the blades hang and prevent flapping by using straps left fairly loose.

### **Flight in hard weather condition**

Heavy rain, dust, hail or snow may damage main rotor blades.

## Hovering above high-level grass

Do not take off in high level grass. There is a danger of fire. Do not perform hover flight above high level grass. The ground effect may be lost.

## Mechanical noise

All mechanical noises are propagated and amplified by the carbon fiber parts. The cabin wall acts as a resonating membrane. Carbon also grinds on the tubes of the frame. It is in the cabin that noise is amplified. Tough, an insulated carbon fiber reduces noise but causes additional weight.

The origin of the transmission noise is erroneous. **The sound seems to come from each of the elements that are listened.** The noise coming from the belts, at startup, is inevitable because ribbed belts are noisier than smooth ones, but they are more powerful. The pilot has to get used to the sounds of the helicopter but must remain constantly attentive to other noises he could hear.

In the engine reduction gear, the damping system of instant torque claw is very noisy. It is a noise like "bumping" or "scrap".

The rear rotor siren sound comes from the 4 blades but also the gear of the RTG that resonates in the rear propeller shaft, and the tail pipe.

At intermediate regimes, or when the rotors are not driven, the transmission belts are flapping, causing a mechanical noise flappement. That noise appears at deceleration.

A "tic-tic" or a "grunt" comes from the 15 drive wheels on the base of the mast. The mast is never perfectly aligned and the rollers operate a mini longitudinal displacement. This sound always accompanies a blade in the same position.

The "roar" in the tail pipe comes from the pinions of the RTG. When the tail rotor turns slowly, rear blades, one after the other, falls in its roots, causing a "knock".

The main rotor blades, when they are about to stop, can let a metallic noise like "dwing jump" be heard.

## Vibration level

Horizontal vibration	➤ Unproper rotor balancing
Vertical vibration	➤ Rotor tracking ➤ Worn tilt bearing
Shimmy (or vibration in the cyclic)	➤ A misaligned blade in his root ➤ Blade bearing deteriorated

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### **After a hard landing**

The chassis cannot be repaired if damaged. It must be replaced. The angle between main transmission shaft, main rotor mast and tail boom must be checked.

The skids must bend of maximum 17mm in the central section.

Check that the blade are not misaligned and that all the ball joint of the rotor head keep their movement free.

Check the free movement of the controls, in all directions.

**FLY SAFE.**



## SECTION 10 - WARRANTY CONDITIONS

1. The Dynali warranty covers the design of its helicopters as a whole as well as all parts designed by Dynali and manufactured by Dynali or sub-contracted by Dynali. Warranty conditions applying to the equipment, instruments and battery are those of the suppliers concerned. Where this is not the case the general warranty of Dynali applies, this being of 24 months from the date of delivery ex-works Dynali or 200 hours in operation, whichever of these events should occur first. Assembly of the helicopters is only covered by warranty when the helicopter has been assembled by Dynali SPRL.
2. Dynali SPRL guarantees all products against defective assembly, or manufacture as follows :
  - a. Products are guaranteed for a period of 24 months from date of delivery or 200 hours in operation, whichever event occurs first, in terms of both parts and labour.
  - b. Under the terms of the warranty, Dynali may choose to replace or repair any part found to be defective at no charge for the owner;
  - c. The warranty does not apply to parts subject to normal wear (drive belts, filters, spark plugs, oil, etc.).
  - d. The Dynali warranty only applies insofar as :
    - i. The products have been used according to the instructions in the current manuals in force at the time of the occurrence of the failure.
    - ii. The servicing of the products have been implemented in compliance with the instructions contained in the service manual supplied with the products at the time of delivery, as well as with any updates of service bulletins published by Dynali prior to the failure of the part.
    - iii. No modification has been made to the product by the buyer or any other person after delivery without the express written permission of Dynali SPRL;
    - iv. No repair has been implemented by the buyer or any third party without the express agreement of Dynali SPRL ;
    - v. Neither the maintenance nor the storage conditions of the products have been inappropriate;
    - vi. The user has not continued to use the products when a problem has been identified, thus provoking further damage or failure, (e.g. oil leak, overheating of the engine, noise from bearing, unusual vibration, etc.) ;
    - vii. Parts are assembled according to the rules of the art and used and used in the way intended.
    - viii. The helicopter is not flown in destructive conditions which may cause premature wear or damage (sand, salt, heavy rain, hail, dust),
    - ix. The helicopter has not been flown under extreme conditions, engine or rotor overspeed, hard landings, road or maritime transport under poor conditions, manoeuvres in flight generating excessive load factors ;
    - x. The logbook recording flight hours, unusual events, incidents, comments technical interventions, and regular servicing has been regularly kept up to date





according to the regulations. The owner of the helicopter should provide this logbook to Dynali in the event of any claim under warranty;

- xii. The product has not been modified by the addition of items not approved by the manufacturer, or caused repairs to be implemented by any non-qualified third parties.
- e. In order to make a valid claim under warranty, the buyer must :
  - i. Inform Dynali in writing in the shortest possible time of any defect, stating the nature of the defect and supply all related information to Dynali;
  - ii. Abstain from causing any repair or technical intervention by any other person or organization other than Dynali or a Dynali approved distributor,.
  - iii. Make available to Dynali or an authorised Dynali representative, at their registered address, the defective part, within 15 days of notification of the defect.
- 3. It is understood that some adjustments may be necessary during the first hours in flight following the entry to service. These adjustments are normal and are not covered by warranty. .
- 4. Service lives of parts are indicated but, subject to the loads applied during use, some parts may wear more rapidly than foreseen. If a part, subject to wear, is observed to wear more rapidly than the service life indicated, it will be replaced and invoiced at a price pro-rata of the expected lifetime (e.g. a part with an indicated service life of 200 hours, which is worn after 80 hours will be invoiced at a price representing 80/200<sup>ths</sup> of its standard sale price).
- 5. Technical evolution and improvements in products sold by Dynali SPRL are not covered by warranty for previously sold products.
- 6. If a defect cannot be remedied, or if the buyer cannot reasonably accept the remedies proposed by Dynali, the buyer may demand a voiding of the contract of sale or re-negotiation of the sale price.
- 7. Normal wear is not covered by the warranty.

