

# PROPELLER V 231 MANUAL

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LIST OF REVISIONS

The owner of the manual enters the date, when he performed the change required by the revision. Enter bulletin number only for revisions issued as a bulletin.

NUMBER OF REVISION	NUMBER OF BULLETIN	NEW PAGES EDIT/DATE	SECTION NUMBER AFFECTED BY REVISION	REVISION PERFORMED DATE/SIGNATURE
	1001			
	1002			
	1003			
	1004			
	1005			
	1006			
	1007			
	1008			
	1009			
	1010			
	1011			
	1012			
	1013			
	1014			
	1015			

1016  
1017  
1018  
1019



## LIST OF VALID PAGES

SECTION	PAGE	DATE
Introduction	i	29. 1. 1993
	ii	29. 1. 1993
	iii	29. 1. 1993
	iv	29. 1. 1993
	v	29. 1. 1993
Description of the propeller and technical data	1-1	29. 1. 1993
	1-2	29. 1. 1993
	1-3	29. 1. 1993
	1-4	29. 1. 1993
	1-5	29. 1. 1993
Mounting of the propeller	2-1	29. 1. 1993
	2-2	29. 1. 1993
	2-3	29. 1. 1993
Operation, maintenance and repairs	3-1	29. 1. 1993
	3-2	29. 1. 1993
List of spare parts	4-1	29. 1. 1993
	4-2	29. 1. 1993
	4-3	29. 1. 1993
	4-4	29. 1. 1993

**LIST OF VALID PAGES AND LIST OF MODIFICATIONS**

The producer will send modified pages, including pages of the List of Modifications, and the List of Valid Pages complemented by new data.

The owner or the person in charge of the manual is obliged to replace old pages by new ones, complement the date of processing and sign themselves in the corresponding column.

**WARRANTY**

The producer provides a one-year or a hundred-hour warranty for propeller.

The service time of the propeller is not limited. It depends on its condition, the atmosphere, and the kind of operation.

A multiple repair of its lacquered surface and the exchange of the leading edges are expected.



**TABLE of CONTENTS**

Section 1. DESCRIPTION OF THE PROPELLER  
AND TECHNICAL DATA.....1-1

Section 2. MOUNTING OF THE PROPELLER.....2-1

Section 3. OPERATION, MAINTENANCE AND  
REPAIRS.....3-1

Section 4. LIST OF SPARE PARTS.....4-1



SECTION 1

DESCRIPTION OF THE PROPELLER  
AND  
TECHNICAL DATA

1/ Description of the Propeller.....	1-2
2/ Technical Data.....	1-2
3/ Performance Curves.....	1-3
4/ Operating conditions.....	1-6

## 1. DESCRIPTION OF THE PROPELLER

The V 231 propeller is designed for general aviation with very little demands on operation and maintenance. It consists of the airscrew body and hub. The airscrew structure is made of wood. The boss and two firm blades make a whole. The propeller is made of glued plywood machined into the required shape of blades with increased twisting to minimize waste. The surface of the propeller is protected with a layer of lacquer.

The airscrew hub is designed to mount the propeller on the engine. It consists of:  
– a metallic flange boss with corresponding metallic parts;  
– a propeller cover of composition structure. (See picture 4)

Although the V 231 propeller has been designed for M 332 and M 337 engines, its structure and way of mounting is designed to suit any engine of the same performance and speed. For this reason, propellers made to special orders can be delivered adjusted to the flange of the engine in harmony with SAE 2. In this case by agreement with the producer of the engine, it is necessary to take steps towards the approval of the use of the engine with such a propeller in air operation by supervisory authorities.

## 2. TECHNICAL DATA

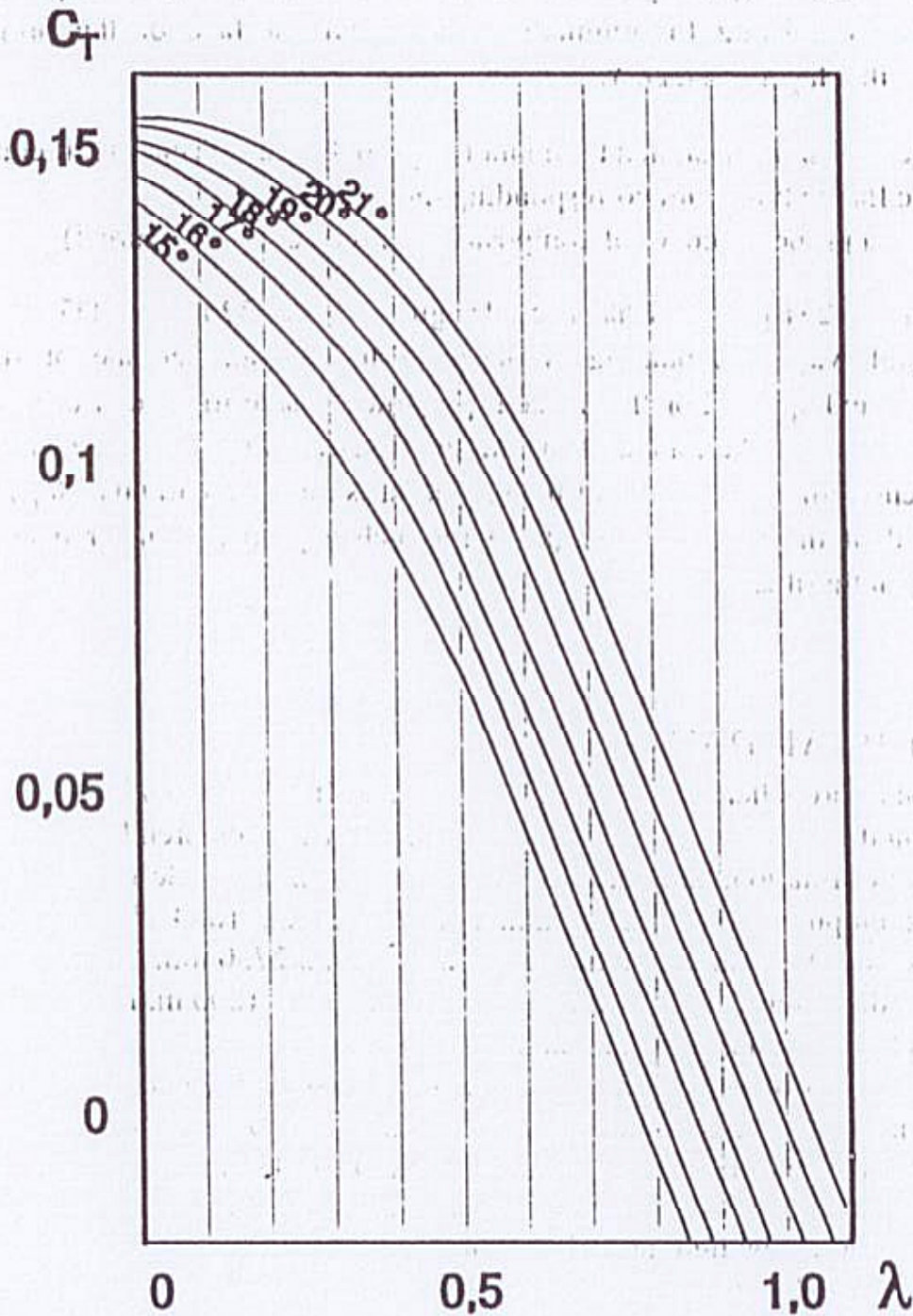
Type of propeller.....	fixed airscrew
Method of work.....	tractor airscrew
Sense of rotation.....	left
Max. output.....	160 kW
Max. speed.....	2750 min <sup>-1</sup>
Max. diameter.....	1800 mm
Number of blades.....	2
Material for blades.....	glued plywood
Profile.....	VZLÚ V 4
Moment of inertia.....	0,075 kgm.sec <sup>-2</sup>
Weight: propeller.....	6,6 kg
airscrew hub including flange.....	5,2 kg
total weight.....	11,8 kg



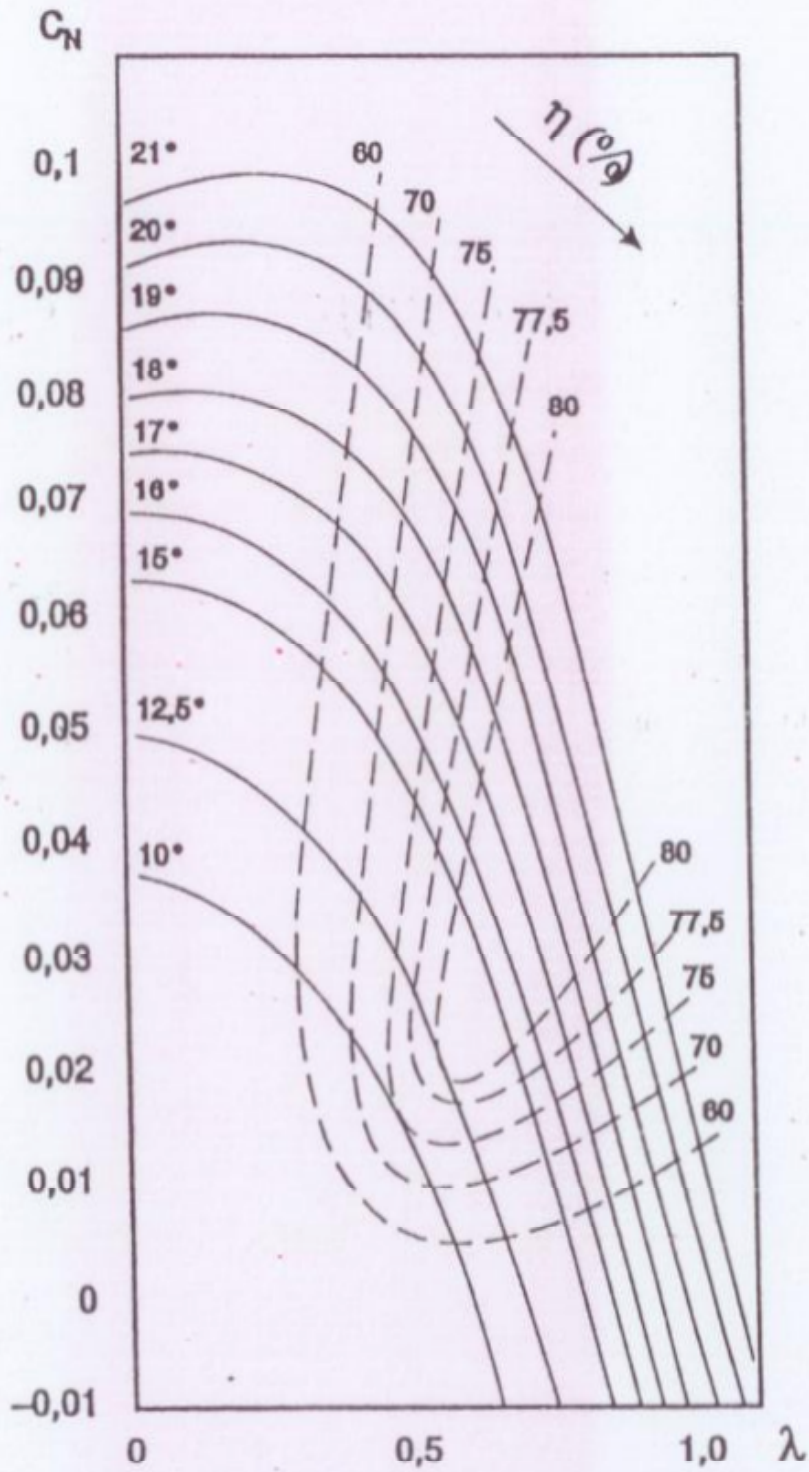
# DESCRIPTION OF THE PROPELLER AND TECHNICAL DATA

## 3. PERFORMANCE CURVES

Performance curves were illustrated for ISA conditions  
( $t = 15^{\circ}\text{C}$ ,  $p = 101\,325,2\text{ Pa}$ )

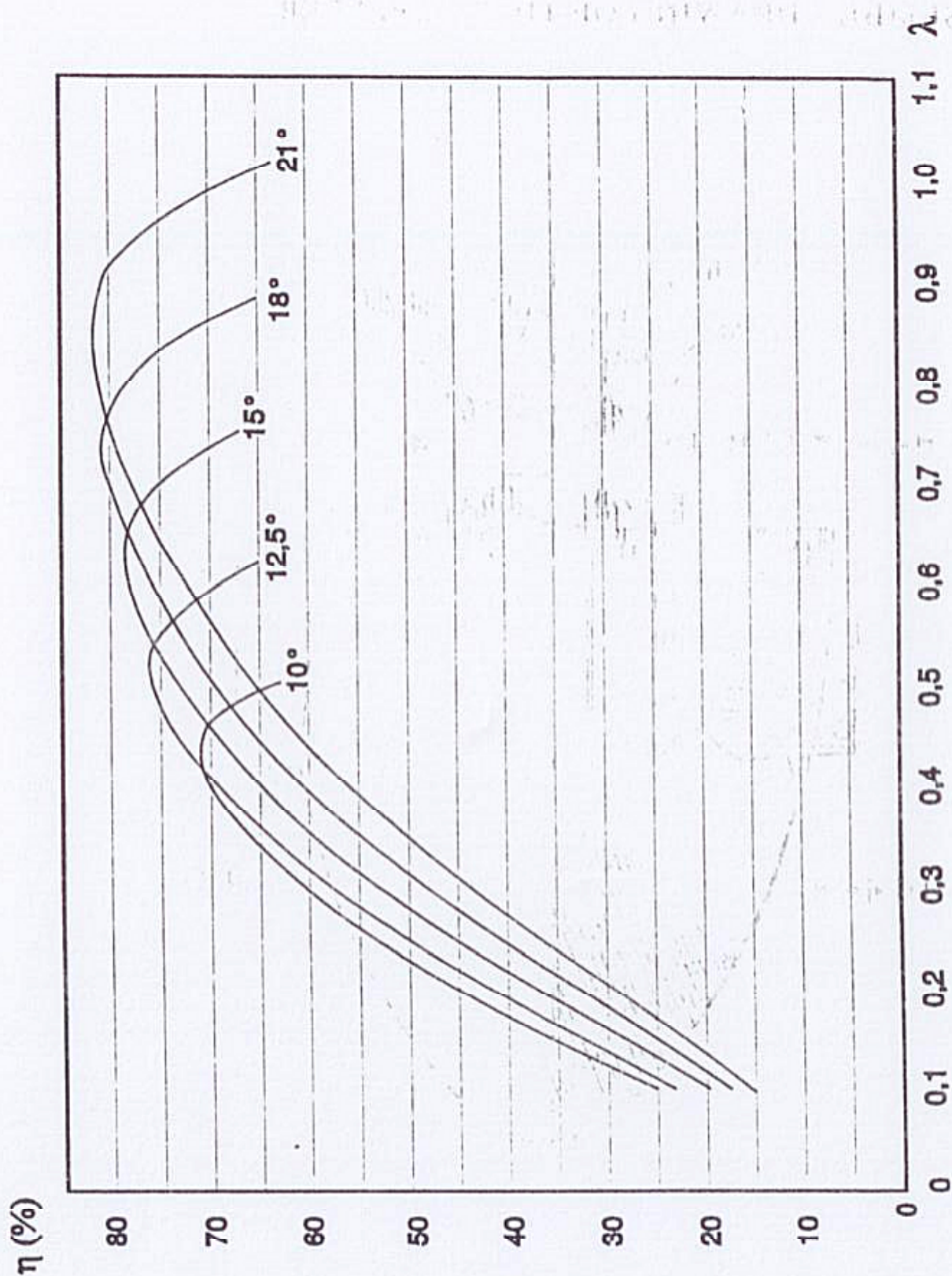








# DESCRIPTION OF THE PROPELLER AND TECHNICAL DATA



#### 4. OPERATING CONDITIONS

The propeller shall work under the following conditions:

- a/ range of atmospheric temperature..... $-25+45^{\circ}\text{C}$  ( $-13^{\circ}\text{F}+113^{\circ}\text{F}$ )
- b/ relative humidity of air..... $20+100\%$
- c/ operating altitude..... $0+6000$  m ( $0+19\ 700$  ft.)
- d/ max. operating multiple in the engine centre of gravity..... $n_x=\pm 1.5$  g  
 $n_y=+8$  g  
 $-6$  g  
 $n_z=\pm 2$  g

a/ max. values of result vector of angular speed:

- in turns at max. RPM.....  $|\omega_y+\omega_z|_{\max}=3$
- in autorotation turns at max. RPM to 120 km/h (65 mph).....  $|\omega_y+\omega_z|_{\max}=3$
- in autorotation turns at max. RPM to 180 km/h (97 mph).....  $|\omega_y+\omega_z|_{\max}=2$

The propeller shall resist the atmospheric temperature  $-40+60^{\circ}\text{C}$  ( $-40+140^{\circ}\text{F}$ ) without any damage.

Operation under icing conditions is not permitted.



SECTION 2

MOUNTING OF THE PROPELLER

1/ Mounting of the Propeller.....	2-2
2/ Mounting Tools.....	2-3

## 1. MOUNTING OF THE PROPELLER

Completeness and intactness of surfaces shall be checked after unpacking.

No special tools are needed. Standard workshop equipment is sufficient. Mounting of propeller must be done by an authorized aircraft mechanic. Mounting must be recorded in the propeller log book.

### INSTRUCTIONS FOR INSTALLATION:

Location marks of all rotary parts are directed towards the identification plate on the propeller body.

The tightening moment of the propeller flange nut mounted on the crankshaft, No. of drawing V 506-0001 :  $M_k = 294 \pm 343$  Nm.

#### Tightening moments – main M 10 nuts:

The nuts should be tightened slightly and alternately, and simultaneously with continuous centring of the propeller. After the definite location of the propeller on the boss, the nuts shall again be alternately tightened up by  $M_k = 25^{+2}/_{-3}$  Nm. Plus and minus tolerances of the tightening moment shall be utilized for the exact centring of the propeller. The difference between the mutual axial location of the ends of individual blades must not exceed 1 mm (measured from a firm wall with the horizontal location of the propeller after rotating the propeller through an angle 180°).

*Note:* Screws M10 No. of drawing V 231-1104 can also be mounted in reversed order, i.e. with the screw head towards the engine. In this case it is necessary to position the screws into the guide pins before the flange V 231-2200 is mounted on the crankshaft.

The tightening moment for M8 screws for the fastening of the rear plate of the propeller cover is  $15 \pm 2$  Nm.



## 2. MOUNTING TOOLS

Standard tools are necessary for the mounting of the propeller:

- nut wrench 17
- nut wrench 19
- screwdriver width 10

If V 231 propeller is mounted on M 332 and M 337 engines, special mounting tools can be ordered with respect to the mounting of the V 231-2200 engine flange. (See a list enclosed)

### SPECIAL ASSEMBLY TOOLS

ORDER	NUMBER	MARK	NAME	MARGINAL
1	1	V231-0873	Remover	
2	1	V231-0874	Fixing nut wrench	
3	1	V231-0875	Propeller flange wrench	
4	1	8001.14	Screwdriver	
5	1	630.7	Nut wrench 17	
6	1	630.7	Nut wrench 19	
7	1	TMK 200 R	Torque wrench 20-200 Nm	
8	1	OMK 500	Torque wrench 100-500 Nm	





SECTION 3

**OPERATION, MAINTENANCE  
AND REPAIRS**

1/ Operation, Maintenance and Repairs ..... 3-2



## 1. OPERATION, MAINTENANCE AND REPAIRS

After the first 10 hours of operation, it is necessary to retighten all screws. Further checks of screws should be made after one hundred hours of operation.

*Note* This procedure relates also to the propeller flange nut that must be checked regularly and tightened up by the tightening moment of  $M_k = 294+394 \text{ Nm}$  in prescribed intervals after the first 10 hours of operation and then after every 100 hour of operation. For this reason, it is necessary to dismantle the whole propeller.

The surface of the blades should be checked daily. Abrasions on the surface of the propeller should immediately be repaired by means of lacquer to prevent moistening of the core, and thus unbalance and vibration of the driving unit during operation.

Major repairs on the surface of the propeller and the exchange of the leading edges of the propeller can exclusively be carried out at repair shops.

Damage caused in collisions with solid bodies, if not longer than 250 mm (10 inch) from the end of the blade, could also be carried out at repair shops only.

The service time of the propeller is not limited. It depends on its condition, the atmosphere, and the kind of operation.

A multiple repair of its lacquered surface and the exchange of the leading edges are expected.



**SECTION 4**

**LIST OF SPARE PARTS**

**1/ Orders of Spare Parts.....4-2**

**2/ List of Spare Parts.....4-3**

**3/ Assembly Drawing of the Propeller.....4-4**

## ORDERS OF SPARE PARTS

The list of spare parts serves as a reference for customers to order spare parts and to get acquainted with the structure and mounting of the propeller.

The orders of spare parts should be sent either to the producer, whose address is presented on the front page of the propeller manual, or the distributors approved by the producer. Standard parts can also be obtained from other sources, provided the producer guarantees that the parts comply with the standard. Using other parts results in the forfeiture of the guarantee.

When ordering the parts, the customer must at least refer to their indication (column 3 of the list of parts, page 4-3) and quote the number of pieces.

In case the customer fails to quote the necessary data, the supplier will not be able to meet the customers' demands in time.



## 2. LIST OF SPARE PARTS

ORDER	NUMBER	MARK	NAME	MARGINAL
1	1	231-1300	Propeller body	
2	1	V231-1102	Gib	
3	12	10,5 ČSN 02 1702.14	Washer	
4	6	V231-1104	Screw M10x139	
5	1	V231-1101	Eccentric flange	
6	1	26x2 ČSN 02 9281.1	Packing ring	
7	1	V231-1200A	Propeller cover front part	
8	16	AM6x20 ČSN 02 1155.55	Screw	
9	6	M10 ČSN 02 1412.54	Slotted nut	
10	6	2,5x22 ČSN 02 1781.04	Split pin	
11	1	V506-0002	Nut lock	
12	1	V506-0001	Propeller flange nut	
13	1	V410-2103	Fixing nut washer	
14	1	90 ČSN 02 2925	Snap ring	
15	1	62x90x13 ČSN 02 9401.2	Gulero	
16	1	Sh 4016	Pressure bearing cap	
17	1	V231-2200	Flange	
18	1	V231-1103	Carrier pin	
19	6	M8x12 ČSN 02 1103.55	Screw	
20	6	8,4 ČSN 02 1702.15	Washer	
21	1	V231-1200B	Propeller cover back part	
22	1	Šc 4008 A, B, C	Gasket of pressure bearing cap	

3. ASSEMBLY DRAWING OF THE PROPELLER

