

# Operating instructions

## MVVS 116 IRS No: 3010



Version 1.7

**Before using the engine, please read these instructions carefully.**

Congratulations on choosing the gas engine MVVS 116cc. MVVS 116cc has been designed and manufactured for propeller-powered radio-controlled model planes. It is able to meet all of your expectations of an acrobatic racing engine.

### Technical specifications

Bore	42 mm	Maximum power output ** Silencer INT 58.01 +MVVS adaptor	14 HP / 6400 RpM 11 HP / 6000 RpM
Stroke	42 mm	Maximum torque ** Silencer INT 58.01 +MVVS adaptor	15 N/m / 6100 RpM 12.7 N/m / 5600 RpM
Weight of complete engine without ignition*	3100 g	Fuel	Unleaded 95-octane fuel
Weight of ignition unit	270 g	Lubrication	Oil with petrol in mixture 1:40
		RpM range	1000 – 7500 RpM

\* Some manufacturers state the weight of incomplete engines. The value in the table above stands for the weight of a complete engine, including the spark plug, carburetor, drive washer and prop screws.

\*\* Power output varies with the exhaust used. The value given in the table stands for the maximum available power output.

### Safety precautions

- 1) Never use the engine for any manned vehicles.
- 2) When operating model planes, always follow the rules and laws in effect in your country.
- 3) The manufacturer declines all responsibility for all damages arising from the operation of models and other appliances driven by MVVS 116cc engine.
- 4) Use always original spare parts.
- 5) Never tamper with the engine construction.
- 6) Before each flight check that all the propeller screws are tightened up and in good condition. If you use a spinner, check that it is tightened up, too. When mounting the spinner always follow the assembly instructions.
- 7) Periodically check that the engine is firmly fixed to the engine mounts. Never start a loose engine!
- 8) Always use a balanced propeller! Always replace the propeller when damaged!
- 9) Make sure that no part of your body intersects the plane of the spinning propeller.

- 10) Always wear close-fitting, well-fastened clothes when starting or operating the running engine. Never wear loosely hanging clothes (tie, scarf, etc.).
- 11) Never try to stop the engine by any part of your body.
- 12) Always stop the engine either by turning off the ignition switch or by completely closing the carburetor throttle valve.
- 13) Before starting the engine always make sure that the model is safely fixed in place and cannot start moving.
- 14) Fuel is combustible and therefore must be kept in an enclosed container at a safe distance from the engine when it is running.
- 15) When preparing fuel carefully follow the manufacturer's or dealer's instructions.
- 16) Small objects must be kept at a safe distance from the engine when it is running. Never throw any objects towards the spinning propeller.
- 17) Be careful in choosing the location where you wish to start the engine. Avoid dusty or sandy areas.
- 18) Start the engine in well-ventilated areas only. Never start the engine indoors.
- 19) When starting the engine make sure that bystanders, especially children, are at a safe distance of at least 10 m.
- 20) The engine power output makes it possible to fly big models. Mal-operation of such models may cause serious damage. Start using the MVVS 116cc in model planes only after you have mastered operating smaller models.

### Selecting a suitable propeller

It is usually the case that propellers of the same dimensions coming from different manufacturers are not the same. Oftentimes not even propellers of the same dimensions produced by a same manufacturer are not the same. The engine power is best utilized when the propeller dynamics curve and engine power curve (revolutions/power output) intersect in the area of the engine top power output. Unfortunately, no propeller manufacturer provides this information. Engine power output is also a variable quality. It depends above all on the silencer used and can considerably vary. The situation is further complicated by environmental parameters (temperature and atmospheric pressure in particular): low temperature and high pressure increase propellers' input requirements by 20% in comparison with input at hot weather.

**Suggested propeller dimensions:**

two-blade:	28x10-14, 30x10-12, 32x10
three blade:	28x10

These values are only approximate and may vary with the factors described in the previous section, as well as with the type of the exhaust system used.

The MVVS 116 is designed for the power maximum by 5800 – 6300 RpM (according the exhaust pipe used). If this maximum performance is needed, choose the suitable propeller so, the engine reach these speed on the ground (in fact slightly lower; depends on the unloading the propeller in air in accordance to reached speed while flying).

We do not recommend using propellers, which allow turning the engine on the ground more as 7000 RpM.

When fixing the propeller to the engine tighten the central nut and each screw several times over. Finally tighten the washer screws once again in sequence across each other.

### Fuel

Always use unleaded 95-octane petrol mixed in the proportion 40 volume units of petrol to 1 unit of Mobil Racing 2T oil. If necessary, **quality brand-name synthetic oil intended for racing two-stroke engines** can be used too.

For running the engine in, please use MVVS Racing 2T oil that comes with the engine. Mix it in the proportion 30:1.

Never use inexpensive oil developed for garden appliances or synthetic oils intended for the operation of methanol model engines. The manufacturer declines all responsibility for all engine damages arising from the use of low-quality fuel.

Store fuel in containers designed for this purpose. Do not use mixed fuel older than 90 days.

### Assembly

The engine is fastened to place by four holders built in the rear cover. The engine can be mounted directly to the firewall or an assembly kit can be used (special accessories). Use screws M6. If you decide to fasten the engine using flexible motor mounts, always choose parts with enough solidity and strength. Make sure to secure the screws against loosening and regularly check that they are tightened up and in good condition.

Since air is used to cool the engine, sufficient air circulation under the cowl must be ensured. Never forget about hot air outlet – which must be bigger than the intake one. Gas engines heat up to higher degree than methanol ones!

Do not forget that the engine needs oxygen from the air to be able to operate. Therefore ensure access of air to the engine intake as well. Caution: intake of warm air from beneath the cowl may cut the engine power output.

For fuel supply use the hose delivered only, this diameter ensure the sufficient fuel supply in each turn and minimize the flow resistance. Use of the smaller hose can cause engine turn off by the turning with high G-forces.

**Caution! When mounting the engine in the model use seals to protect all openings and prevent the pollution of the engine's inside with sawdust, residual abrasives etc. Make sure that the inside of the fuselage is clean and that all parts are tighten in place and cannot be sucked inside the engine.**

### Exhaust

Use only factory-made exhausts pipes designed for this type of engine. Preferably MVVS exhaust system, which also guarantees the announced power output. The manufacturer declines all responsibility for all engine damages arising from the use of improper exhaust systems.

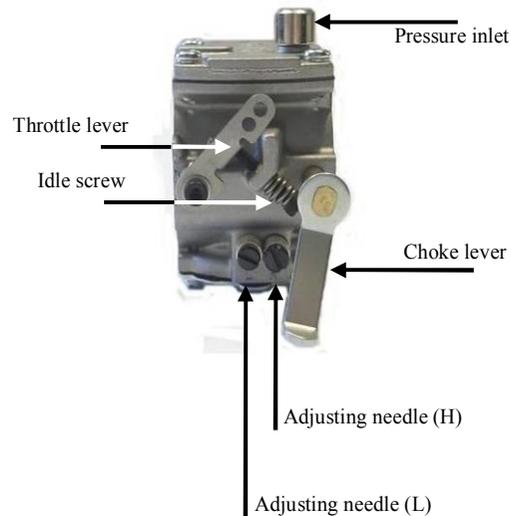
When mounting the exhaust follow the manufacturer's instructions. Make sure to secure sufficient cooling of the exhaust.

## Carburetor adjustment

Carburetor is adjusted before you buy it. It is not usually needed to change this setting (always apply if used recommended exhaust system and propeller).

**Caution! All settings make only if engine does not run. Injury may be caused by propeller.**

**Basic setting:** adjusting needle (L) for low revolutions range: 1 turn  
adjusting needle (H) for high revolutions range 50 min till 1 turn  
(the values are derived from the position of clock-hands, starting position: fully closed needle)



Caution! Never tighten the adjusting needles with too much strength. This may cause damage of the needles. If the needles are damaged this way it is no longer possible to adjust the carburetor and it is necessary to exchange it for a new one.

The new engine comes adjusted to the basic setting. This setting should be kept during the running in!

After the engine has been run in, adjust it following the instructions below:

- start the engine and warm it up
- let the engine run at idle speed for approx. 5 seconds

**If the engine starts to run backwards do not open the throttle - stop the engine immediately! Otherwise the engine could be damaged!**

### Step I

- Accelerate to 2/3 of the throttle range within approx. 1 sec (faster acceleration). Repeat three times – if the engine accelerates quickly and without a hiccup go to Step III. If acceleration is not smooth go on to Step II.

### Step II

- Faulty acceleration with hiccups and a tendency to cut out is usually attributable to a poor fuel mixture in the medium-revolutions range. Stop the engine and recheck the fuel feed (the hose-pipe must not be pinched or broken; if fitted, check also the fuel filter permeability). Restart the engine and test acceleration again. If problems persist adjust the carburetor. Open the adjusting needle L by 5 min and retest acceleration. If acceleration is smooth, open the needle by another 3-5 min - this should be done because the needle was previously set at a boundary value; if atmospheric conditions changed during flight, the problems might recur.

- If the engine continues to malaccelerate open the needle by 10 min if the engine's operation does not improve, stop it and check the basic setting. Set the adjusting needle L at 50 min and the adjusting needle H at 50 min. till 1 turn . Restart the engine and test acceleration. If the engine runs correctly go to Step III. If it continues to malaccelerate, open the needle by another 10 min. If it keeps malaccelerate, the defect is likely to lie elsewhere than in incorrect adjustment. In such a case, go to the section on problem solving.

### Step III

- If the engine accelerates correctly, according to the above test, set it at idle speed and accelerate to full speed. Repeat twice more. If the engine functions correctly, go to Step IV. If it cuts out, open the L needle by 5-10 min more.

- If the engine does not respond to acceleration fast enough keep closing the L needle until the engine starts to cut out in response to gas. At that point reopen the L nozzle by 5-10 min.

### Step IV

- If the engine reacts correctly set it at full speed. If revolutions do not drop, the engine has been adjusted successfully. If revolutions seem to drop, open the adjusting needle H by approx. 5-10 min.

**Caution!!! Never close the choke valve completely when the engine is operating!**

The choke valve is set to allow minimum air flow only when fully closed, which could cause damage to the intake reed valve.

**Starting and running a new engine in**

Before you first start the engine, screw the plug in and tighten it up. Follow the instructions on the box of the spark plug. Make sure that the plug socket is fitted in place and fastened down properly; pull the wire ring over the hexagon.

Fix the ignition sensor in proper position above the magnet with screws enclosed.

***Unless the spark plug is not inserted in plug socket, never turn the engine with ignition turned on. This could lead to ignition damage!***

1) Make sure that the ignition is switched off, the choke valve is closed and the throttle valve is about half opened. Then give the engine 3-4 turns, provided that carburetor is not overflowing. If it is overflowing, give the engine 1-2 turns only.

2) Switch the ignition on, open the choke valve, set the throttle at slightly higher idle speed and give the engine a few quickly turns. If even after the fourth turn, with the choke valve opened, you do not hear a suggestion of the engine starting, give the engine 2 turns following the instructions in paragraph 1 above. Then proceed according to instructions given in paragraph 2.

3) If the engine does not start even after another set of turns open the throttle to maximum and give the engine approx. 4 turns. Switch the ignition off and on again and restart the engine with throttle turned slightly down and the choke valve set open.

4) If the engine still would not start, unscrew the plug and check its contacts. Clean any possible petrol moisture ( i.e. an indication of engine overflow ) and screw it in again. Further starting should only be done with the throttle turned down. If the plug is dry then probably not enough fuel has been drawn into the carburetor. If that is the case, check the fuel feed and then return to the instructions given in paragraph 1.

***If the engine starts to run backwards do not open the throttle - stop the engine immediately! Otherwise the engine could be damaged!***

While the engine has been started, leave it run for approx. 5 min at a higher idle speed. Then run it in for approx. 20 min, while changing revolutions from idle to 1/2-3/4 of the range and shortly holding each position - gradually prolong the holding periods. After 10 minutes running, start opening the throttle at maximum for short periods of time. Stop the engine and let it cool down. Then restart it and check the adjustment. If everything is all right, you can first take off. During first few flights do not overload the engine and do not let it run at high revolutions for long periods of time (very important at hot weather). Use up all fuel that was produced as a mixture with the oil that is included in the package. From now on, fuel and oil should be mixed in the proportion 40:1.

- **DO NOT PROCESS THE RUNNING-IN AT IDLE SPEED!**
- **A COLD ENGINE SHOULD BE WARMED UP BY SHORT ACCELERATIONS (1-2 SEC)**

## Problem guide

### The engine would not start:

- check the battery voltage; use the good brand battery only
- check and or replace the spark plug if needed (check the spark by inserting the plug into the plug socket and turning the engine. The correct electrode spacing is 0,6 mm.)
- check the fuel supply
- turn the engine to check its mechanical condition
- check whether the carburetor needles are adjusted correctly
- take the carburetor off and visually examine the condition of the carbon-fiber reed valve
- unscrew the carburetor cover on the side of the pressure inlet, check the fuel screen possibly give the carburetor a blow with a current of air; when reassembling, make sure you arrange the membrane and gasket in a correct order
- recheck the pressure hose attached to the carburetor

### Replacing the reed valve:

- unscrew and remove the carburetor (mind the gasket)
- unscrew four M4 screws on the flange, remove the flange and take off the reed valve (mind the gasket)
- unscrew four M2 screws and remove the old valves, replace them with new ones, screw the screws back in and tighten them gently
- when reassembling, make sure you fix the gasket correctly

**Mechanical faults of the engine must always be committed to a professional service department!**

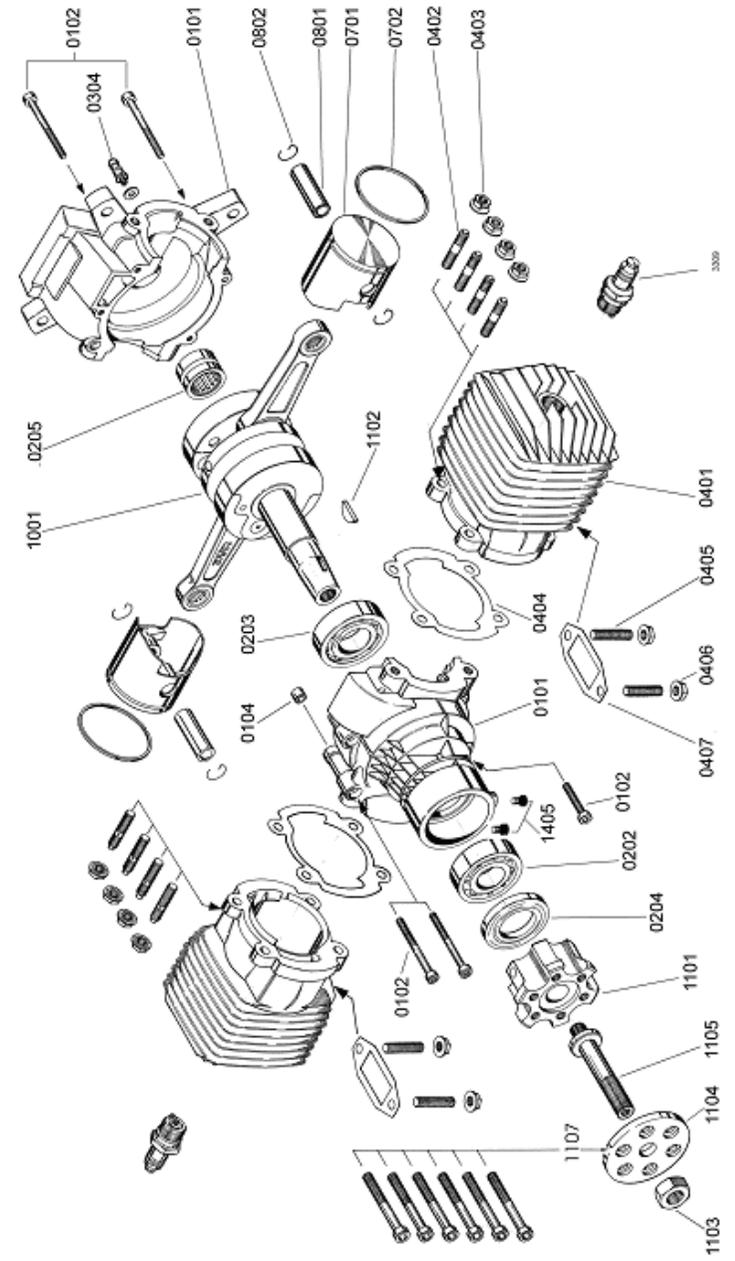
### Service information

After each 20 hours of running or 1 year change the spark plug.

After each 50 hours of operation time preventively check up the con-rod and the reed valve.

After 300 hours of operation time commit the engine to the professional warranty service department.

## Notes:



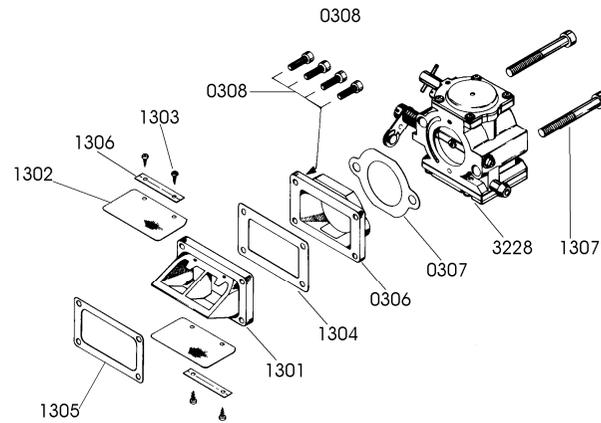
Spare parts list

## Warranty

The MVVS gas engines come with a three-year guarantee against defects in workmanship and materials. Only original buyers of the engines are eligible warranty claimants. The warranty cannot be transferred with a change in ownership.

### This guarantee does not cover:

- any normal wear that might occur
- damage arising from accidents
- damage arising from the use of an unbalanced or damaged propeller
- damage arising from the use of a too small or a too big propeller
- damage arising from the use of low-quality fuel
- damage arising from the use of other than original spare parts and accessories
- damage arising from sucking a foreign object into the engine
- damage arising from any improper use



Nr.	Description	Nr.	Description
0101	Crankcase	1102	Drive washer key
0102	Crankcase screws-set	1103	Propeller nut
0104	Spacer sleeve	1104	Propeller washer
0202	Front bearing	1105	Propeller screw
0203	Rear bearing	1107	Propeller screws - set
0204	Packing	0306	Carburetor flange
0205	Rear cover bearing	0307	Carb. flange gasket
0304	Pressure nipple	0308	Carb. flange screws - set
0305	Pressure nipple gasket	1301	Reed valve case
0401	Cylinder	1302	Reed valve
0402	Cylinder screws - set	1303	Reed valve screws
0403	Cylinder nut	1304	Reed valve gasket-upper
0404	Cylinder gasket	1305	Reed valve gasket-bottom
0405	Exhaust screws - set	1306	Reed valve strap
0406	Exhaust nut	1307	Carburetor screws
0407	Exhaust flange gasket	1300	= 1301 + 1302 + 1303 + 1305 +
0701	Piston	(set)	1306
0702	Piston ring		
0801	Piston pin	3314B	Electronic ignition unit ICU-B
0802	Piston pin retainer	3309	Spark plug
1001	Crankshaft	1405	Ignition sensor fixing screws
1101	Drive washer	3228	Carburetor

For further questions, please contact:

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### Certificate of Warranty

Date:	Serial number:	Dealer:
Buyer's name and address:		