

# GT120T

## INSTRUCTION MANUAL

It is of vital importance, before attempting to operate your engine, to read the general '**SAFETY INSTRUCTIONS AND WARNINGS**' in the following section and to strictly adhere to the advice contained therein.

Also, please study the entire contents of this instruction manual, so as to familiarize yourself with the controls and other features of the engine.

### SAFETY INSTRUCTIONS AND WARNINGS ABOUT YOUR O.S. ENGINE

Remember that your engine is not a "toy", but a highly efficient internal-combustion machine whose power is capable of harming you, or others, if it is misused or abused. As owner, you, alone, are responsible for the safe operation of your engine, so act with discretion and care at all times. If at some future date, your O.S. engine is acquired by another person, we would respectfully request that these instructions are also passed on to its new owner.

The advice which follows is grouped under two headings according to the degree of damage or danger which might arise through misuse or neglect.

### WARNING

These cover events which might involve serious (in extreme circumstances, even fatal) injury.

### NOTES

These cover the many other possibilities, generally less obvious sources of danger, but which, under certain circumstances, may also cause damage or injury.

### WARNING

Never touch, or allow any object to come into contact with the rotating propeller and do not crouch over the engine when it is running.

**Gasoline is poisonous.** Do not allow it come into contact with the eyes or mouth. Always store it in a clearly marked container in a cool and dark place and out of the reach of children. There is a possibility that it may damage your health.

**Gasoline is highly flammable.** Keep it away from an open flame, excessive heat, sources of sparks, or anything else which might cause it to ignite. Do not smoke or allow anyone else to smoke near to it.

### ABOUT THE ENGINE

- This engine is designed for experienced fliers. Beginners and newcomers should not use this engine.
- The ignitor and the carburetor are specially designed for the engine.
- The normal rotation direction of the engine is counterclockwise facing to the propeller.
- It offers broad power characteristics suitable for sport flight as well as acro flight.
- The specially designed ignition module "IG-10" is equipped with a micro computer and designed not to operate below 120 rpm.
- The positions of the throttle lever and the choke lever can be changed at desired angle by yourself.
- A silencer is not included in the box since we do not sell it. Purchase a suitable one in the market.

### STANDARD ACCESSORIES

- Spark Plug CM-6 (2pcs.)
- Throttle Lever (2pcs.)
- Ignition module Assembly (IG-10)
- Propeller Washer
- Cap Screw M5x50 (6pcs.)



Carry out the mixing of the gasoline and oil outdoors or in a well ventilated place away from any source of fire to prevent the possibility of a fire.



Refill the fuel tank only after the engine is well cooled down, or there is a danger of fire.



Model engines generates considerable heat. Do not touch any part of your engine until it has cooled. Contact with the muffler (silencer), cylinder head or exhaust header pipe, in particular, may result in a serious burn.



Observe the laws and regulations in each country and district concerning the usage, transportation and storage of gasoline. Ask details at fire station in each district.



Never operate your engine in an enclosed space. Model engines, like automobile engines, exhaust deadly carbon-monoxide. Run your engine only in an open area.



Do not operate the engine nor model alone, or there is a possibility of injury.

### NOTES

Any propeller requires utmost attention to handle. Be sure to follow the instruction manual supplied with a propeller.

This engine was designed for model aircraft. Do not attempt to use it for any other purpose.

Start the engine only after installing it in the model.

Do not start the engine before installing it in the model, or there is a possibility of injury.

Be sure to use an effective silencer (muffler). Frequent exposure to an open exhaust may eventually impair your hearing. Such noise is also likely to cause annoyance to others over a wide area.

Mount the engine in your model securely, following the manufacturers' recommendations.

For their safety, keep all onlookers (especially small children) well back (at least 10 meters) when preparing your model for flight.

When checking a spark plug with the power source on, do not hold the plug, plug cap, high tension cord, or you will get a shock.

Install a top-quality propeller of the diameter and pitch specified for the engine and aircraft.

Discard any propeller which has become split, cracked, nicked or otherwise rendered unsafe. Never attempt to repair such a propeller: destroy it. Do not modify a propeller in any way.

Install the propeller on the shaft so that the curved face of the blades faces forward – i.e. in the direction of flight. Firmly tighten the propeller washer and propeller installing screws using the correct size wrench. Always check the tightness of propeller installing screws and retighten them, if necessary, before starting the engine. Also, check the tightness of all the screws and nuts before restarting the engine.

Always check the throttle linkage. If it is disconnected, throttle action becomes uncontrollable, which may result in a serious accident.

Take care that loose clothing (ties, shirt sleeves, scarves, etc.) do not come into contact with the propeller. Do not carry loose objects (such as pencils, screwdrivers, etc.) in a shirt pocket from where they could fall through the propeller arc.

Use an electric starter for this engine. The wearing of safety glasses is also strongly recommended. If you try hand starting, be sure to use a chicken stick or heavy glove. Never attempt to start the engine with a bare hand.

Be sure to carry out adjustments of the high speed needle and slow speed needle after stopping the engine.

Do not start your engine in an area containing loose gravel or sand. The propeller may throw such material in your face and eyes and cause injury.

If you have to carry the model to the take-off point with the engine running, be especially cautious. Keep the propeller pointed away from you and walk well clear of spectators.

Switch off the ignition module to stop the engine or fully close the throttle valve via the transmitter to shut off the fuel supply. Otherwise there is a possibility of injury.

Immediately after the engine is stopped, the engine may start with a crank even when the igniter switch is off. Do not crank the engine, or there is a possibility of injury.

Be sure to install an externally operable switch for the ignition system battery to stop the engine if it is started unintentionally with the radio transmitter turned off or there is the possibility of injury.

Connect the throttle linkage so that the engine can be stopped via radio operation.

This engine does not require a muffler pressurized fuel system but be sure to provide an air vent.

For plumbing use TYGON® F-4040 (Yellow color) or strong nitrile rubber of more than 3mm ID and 6mm OD. Replace tubing periodically as it becomes hardened. Replace tubing inside the fuel tank every six months. We recommend code No.28382200 Fluoro rubber tube (3 x 5 x 500mm, optional) to use.

Use fuel line keepers of stainless wire, etc. at the end of the tubing to prevent it from coming off.

Be sure to install an in-line fuel filter code No.78300000 (optional) between the tank and carburetor to prevent foreign matter in the tank from entering the carburetor. Clean the filter periodically.

### IGNITION MODULE

#### Major specifications

- Consumption current is 500mA / 6V / 6,000rpm. Use a power source of more than 1000mAh capacity.
- The ignition module is set not to operate below 120rpm for safety.
- The voltage of power source is 6~11.1V (rated). (Ni-Cd, Ni-MH 5~9 cells, Li-Po, Li-Fe 2~3 cells)

### Installation

- Install the ignition module taking sufficient anti-vibration measures.

Install the ignition module at least 100mm away from the engine and in a place where there is airflow so that engine exhaust heat and radiation heat do not affect its operation.

Do not share the power source with receiver and use a separate power source.

Equip an ON/OFF switch between the ignition module and its power source and install it in a place where can be operated from outside the model.

Install the ignition module and its power source as far as possible away from the servos and receiver power source.

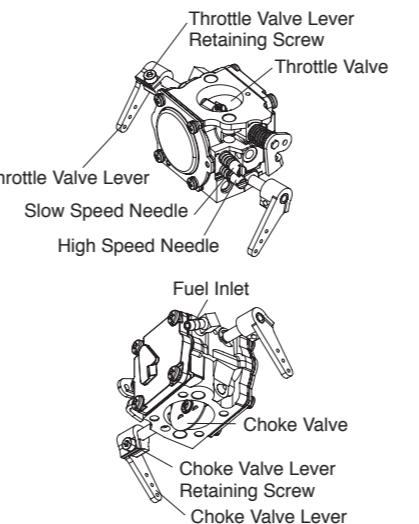
Connect the sensor leads of the igniter module to the sensor leads from the engine.

Connect the battery leads of the igniter module (red, black two parallel wires) to the power source.

Make sure the jackets of high tension cord does not touch the engine and cowl to avoid accidental short circuit.

Install the plug cap on the plug securely.

### CARBURETOR PARTS NAME



### INSTALLATION

Use a strong enough material for the mounting face of the model, such as birch ply firewall of more than 8mm thick.

Make sure the mounting face of the model is flat. If it is uneven, work on it to be flat. (When shims are added to change the thrust angle, work on it to be flat.)

The surface of the radial mount is precisely machined flat. Make sure the mounting face of the model is also flat.

Use 6mm steel hex socket head bolts to install the engine. (Do not use brass, soft steel nor aluminum screws, because they are not strong enough.) Also, use the Nord Lock Washers (optional extra) and other anti-loosening washers or apply locking agent.

Be sure that there is sufficient air intake and outlet area on the model for engine cooling to avoid overheating. (Pay careful attention to the cooling since a gasoline engine generates more heat than a glow engine.)

Secure at least a 30mm dia. area around the air intake of the carburetor so that the air intake will not be restricted. (Cut out the firewall big enough if necessary.)

### FUEL TANK & LINES

Use a tank designed for gasoline. (Tanks designed for glow fuel use a rubber cap which is deteriorated by gasoline.)

A 1,000cc tank will provide 12~13 minutes flight. (With full throttle, it will provide 7~8 minutes flight.)

Install a commercially available gasoline fuel filter between fuel tank and carburetor. (Clean the filter from time to time.)

### CARBURETOR LINKAGE

Before connecting the throttle linkage, make sure that the throttle valve lever does not interfere with the bulkhead or mount of the model when it is fully closed and opened.

In order to obtain suitable idling, connect the throttle linkage so that the throttle valve lever may be located at 4 to 5 degrees opened position from fully closed position when the throttle stick on the transmitter is fully pulled down, and the throttle valve may be fully closed when the throttle stick as well as the rim lever on the transmitter are fully pulled down or engine cut-off mixing is operated.

Connect the linkage so that the throttle valve is fully opened when the throttle stick on the transmitter is fully advanced. (Adjust the movement so that the pushrod does not bind when the throttle valve is fully closed and fully opened.)

Connect the linkage so that the servo arm and pushrod, and throttle valve lever make a right angle when the throttle stick on the transmitter is placed at mid position to avoid differential action.

### PROPELLER & SPINNER ATTACHMENT

- If the supplied retaining screws are too long due to a thinner prop hub or too short due to a thicker prop hub (cannot be screwed into the drive hub by more than 10mm), Use suitable length strong steel hex socket head cap screws.
- Install the propeller before the first flight of the day and remove it after the day's flight.
- Make a habit of always checking the tightness of propeller retaining screws making sure they are free of damage or rust before starting the engine. Replace the propeller periodically (every 50 flights) even if it looks as if nothing is wrong.

### Warning:

Make sure that the propeller is well balanced.

An unbalanced propeller and/or spinner can cause serious vibration which may weaken parts of the airframe or affect the safety of the radio-control system. Do not use any propeller which has become split, cracked or nicked even very slightly, or received strong impact even if no apparent damage is visible.

### MIXING OF OIL

- Use regular gasoline. (No need to use high octane gasoline.)
- Alcohol based glow fuel cannot be used in this engine. Not only will the engine not work properly but the internal carburetor plastic parts will be damaged.

Use high quality commercially available 2 stroke engine oil.

Follow the oil manufacturer's recommendations concerning the mixture ratio of gasoline and oil. If there is no recommendation, mix with a 25:1 ratio.

We have checked the following oil mixture ratio. KLOTZ ModelLube (50:1), AMSOIL SABER® professional Synthetic 2-Stroke Oil(100:1), RED LINE Two-Stroke Racing Oil (50:1). (This does not mean we guarantee the quality of these oils.)

Follow the instructions in the running-in section concerning the mixture for running-in.

### RUNNING-IN / STARTING

- Use a fuel with increased oil content and set the needle a little on the rich side. Too rich a needle setting may cause misfiring or erratic running due to fouling of the plug.

Use a 25:1 fuel/oil mixture if the particular brand of oil states 50:1 mix. Use a 20:1 fuel/oil mixture if the particular brand of oil states 25:1 mix. Set only the high speed needle 200 below maximum rpm. The low speed needle need not be richened.

No need to carry out running-in on a bench nor with the model fixed. Just fly the model with the above mentioned fuel and needle setting.

A total of 10 flights (8~10 liters fuel) are required.

Avoid prolonged full throttle running at initial stage, and gradually extend the full throttle running time.

**WARNING:** When ground running the engine, avoid dusty or sandy locations. If dust or grit is drawn into the engine, this can have a ruinous effect, drastically shortening engine life in a matter of minutes.

### CARBURETOR PARTS NAME

#### Precautions

- Do not disassemble the ignition module and plug cap. (The ignition module and high tension cord is irreparable. Replace it when necessary.)

- Be careful not to mount the ignition module so that it can be hit by water, gasoline or exhaust.
- Avoid using the engine when the external temperature is over 50°C.
- Do not move the rpm sensor as it is placed at its optimum position, otherwise the engine will not run properly.
- Do not pull on the high tension cord to remove the plug cap, or the inner wire will break. Be sure to hold the plug cap to remove it. Wear gloves not to damage your fingers while removing it.
- Do not connect nor disconnect the rpm sensor with the ignition module on, or there is a possibility it will fire and the engine start.
- Check the ignition module for spark when installing the plug cap on the plug and be careful about getting a shock. Make sure there is no flammable material or gasoline vapors near by that could ignite.
- Do not turn the propeller with the ignition module on, or there is a possibility the engine will start.

### PROPELLER

Use a wooden or a carbon fiber propeller.

Do not use a nylon propeller.

The choice of propeller depends on the design and weight of the aircraft and on the type of flying in which you will be engaged. Determine the best size and type after practical experimentation. As a starting point, refer to the props listed in the table shown below. Slightly larger, or even slightly smaller props than those shown in the table may be used, but remember that propeller noise will increase if blade tip velocity is raised due to high rpm or if a larger diameter/lower pitch prop is used. Be well aware propeller rotating arc is very large due to a large propeller used with this engine. Carry out the needle adjustments only after stopping the engine. Do not allow your face or hands to come close to the rotating prop.

Type	Size (DxP)
Running-in	26x12, 27x10
Acro/Scale	26x11-13,

## ■ Initial needle position

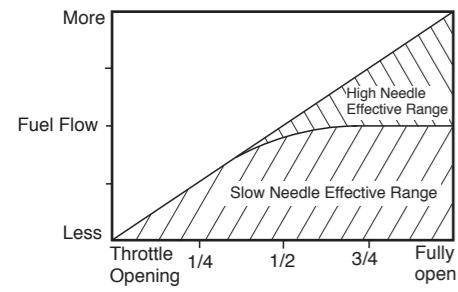
When starting the engine for the first time, set both the high speed needle 2 turns open and the slow speed needle 2 turns open from the fully closed position. With this position both high and slow speed mixtures will be rich. If the settings are upset, come back to this setting and adjust them according to procedure in the needle setting section.

## ■ Starting with a Chicken stick or gloved hand

1. Turn on the transmitter switch.
2. Turn on the receiver switch.
3. Close the choke valve fully (ON).
4. Pull down the throttle stick on the transmitter fully or to the 1/8 opened position (2 to 3 clicks).
5. Turn on the ignition switch.
6. Flip the propeller counterclockwise until the fuel reaches the carburetor and you hear explosion several times.
7. Open the choke valve fully (OFF).
8. Tell the helper and onlookers that you will start the engine now and have the helper hold the model securely.
9. Tell the helper and onlookers that you will start the engine now and have the helper hold the model securely.
- Flip the propeller counterclockwise with a Chicken stick. (Usually the engine starts with 5 to 6 flips.)

## ■ NEEDLE ADJUSTMENTS

The slow speed needle is effective through the high speed range, while the high speed needle is not effective in the low speed range. Both needles are effective in the mid speed range, while the slow speed needle is the most effective. (Refer to the diagram below.)



## ■ Carry out the needle settings as follows.

### Adjustment on the ground

1. Start the engine. Open the throttle valve slowly until fully open and run the engine for 10 seconds to warm the engine.
2. Set the throttle stick 2-3 clicks advanced from the bottom and measure rpm with a tachometer and write it down.
3. Close the slow speed needle approx. 30 degrees and measure rpm with a tachometer and write it down. (Be sure to adjust the slow needle only after stopping the engine.)
4. Repeat step 3 to locate the slow speed needle position where the maximum rpm is achieved. Open the slow speed needle from that position reducing 700 – 800 rpm. That is almost the right position of the slow speed needle..
5. Open the throttle valve fully and measure rpm with a tachometer and write it down.
6. Close the high needle approx. 30 degrees and measure rpm and write it down. (Be sure to adjust the high needle only after stopping the engine.)
7. Repeat step 6. to locate the high needle position where maximum rpm is achieved. Open it approx. 60 degrees from this position. This is the basic high needle position.
8. Set the throttle trim on the transmitter so that the idle rpm is approx. 1,800 (approx. 1,600rpm when idle down function is used).
9. Warm the engine for 10 seconds with the throttle fully open, then idle the engine for 5 seconds, then quickly open the throttle fully. Make sure the engine does not respond sluggishly to increase rpm nor hesitates before picking up speed or even ceases firing.

10. If the engine responds sluggishly to increase rpm, the mixture is too rich due to the slow speed needle being open too far. Close the slow speed needle approx. 15 degrees. Repeat this procedure until the engine accelerates smoothly. (Be sure to adjust the slow speed needle only after stopping the engine.)
11. If the engine hesitates before picking up speed or ceases firing, the mixture is too lean due to the slow speed needle being open too far. Open the needle approx. 15 degrees. Repeat this procedure until the engine accelerates smoothly. (Be sure to adjust the slow speed needle only after stopping the engine.)

## ■ Adjustment with flight

1. If the rpm drops or the exhaust sound weakens when vertically climbing from level flight with full throttle, the mixture is too lean. Land the model and open the high speed needle approx. 15 degrees. Repeat this procedure until the engine sound is smooth.
2. If, on the other hand, exhaust sound is irregular when vertically climbing from level flight, the mixture is too rich. Land the model and close the high speed needle approx. 15 degrees. Repeat this procedure until the sound in level flight is steady.
3. If the power drops gradually or exhaust sound weakens (overheating symptom), when performing torque roll and hovering, the mixture is too lean. Land the model and open the slow speed needle approx. 15 degrees. Repeat this procedure until power remains steady.
4. If the above symptom is not detected with prolonged torque roll and hovering but sluggish to increased rpm when the throttle is fully opened abruptly, the mixture is too rich. Land the model and close the slow speed needle approx. 15 degrees until sluggish rpm increase disappears.

### Note

Generally, a gasoline engine is sensitive to a lean mixture compared with a glow engine, and will stop without warning hesitation and stops with overheating. It is recommended that the engine be run with a slightly richer mixture.

## ■ FLIGHT & MAINTENANCE

### ■ Checking prior to flight

- When the engine is started, make sure the radio control system works normally (distance test).
- Engine does not run erratic with full throttle.

- Idling is stable.

- Responds positively to the throttle operation.

- Warm-up is finished.

Warm-up is required as with full size aircraft and car engines. Take off the model after warming the engine for approx. 10 seconds with full throttle.

### ■ Precautions in flight

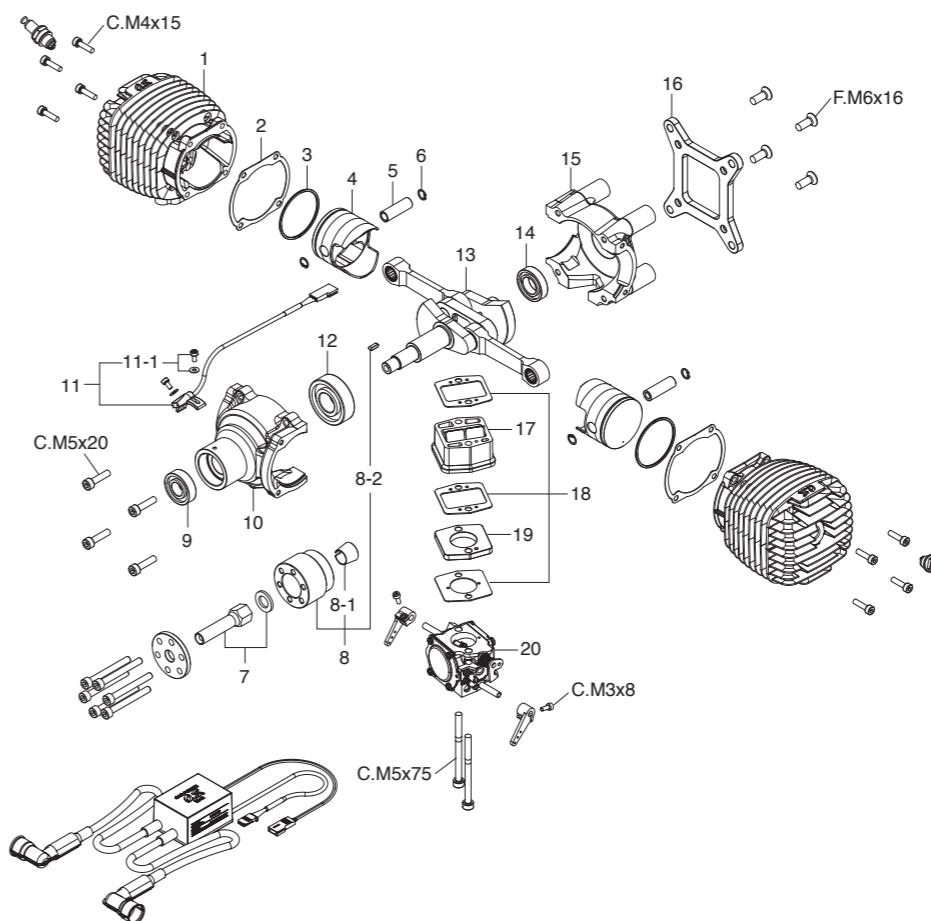
- A slight engine rpm increase and decrease delay is normal. Abrupt throttle operation will cause engine to quit. Move throttle smoothly.
- Due to the construction of the carburetor, 80~90% of maximum power develops with half throttle. If you feel uneasy with this, adjust with transmitter function (exponential and throttle curve, etc.) or differential of throttle linkage.

• Cooling is more vitally important to a gasoline engine than to a glow engine. If overheating symptoms (loss of power at full throttle or exhaust note at mid speed changes from cloudy one to clear one) are observed during flight, immediately stop flying and carry out the following countermeasures.

- 1) Enlarge the air intake cutout on the cowling.
  - 2) Enlarge the air outlet cutout on the cowling. (It is vitally important.)
  - 3) Partly cover the air intake cutout on the cowling where air does not hit direct the engine.
  - 4) Install an air guiding plate on the fuselage and cowling so that cooling air may be guided to the cylinder portion of the engine and muffler.
- O.S. GENUINE PARTS & ACCESSORIES**
- SPARK PLUG CM-6 (NGK) (7166900)
  - SPARK PLUG CM-6 (Rcexl) (71669010)
  - GASOLINE FUEL FILTER (S) (78300000)
  - LOCK WASHER M6 (10sets) (55500005)
  - SUPER FILTER (S) (72403051)
  - SUPER FILTER (L) (72403050)
  - NON-BUBBLE WEIGHT (S) (71531010)
  - GASOLINE FUEL TUBE YELLOW S (28382400)  
ID. 2.4mm x OD. 4.8mm Length 1m
  - GASOLINE FUEL TUBE YELLOW M (28382500)  
ID. 3.2mm x OD. 6.4mm Length 1m
  - FLUORORUBBER TUBE  
ID. 3mm x OD. 5mm Length 500mm (28382200)

## ■ ENGINE EXPLODED VIEW

\*Type of screw  
C...Cap Screw F...Flat Head Screw



## ■ ENGINE PARTS LIST

No.	Code No.	Description
1	28603100	Cylinder Block
2	28614000	Cylinder Gasket
3	28603401	Piston Ring
4	28603200	Piston
5	29760000	Piston Pin
6	29717000	Piston Retainer
7	28602100	Pilot Shaft
8	4AB08000	Drive Spacer
8-1	29708100	Taper Collet
8-2	29708200	Parallel Key
9	29730000	Ball Bearing (F)
10	4AB01000	Front Housing
11	74002A20	Rotation Sensor
11-1	74002321	Rotation Sensor Retaining Screw Set (2pcs.)
12	28631000	Ball Bearing (M)
13	4AB02000	Crankshaft Assembly
14	26730005	Ball Bearing (R)
15	4AB01800	Rear Housing
16	4AB28000	Radial Motor Mount
17	4AB18000	Reed Valve Assembly
18	4AB15000	Carburetor Gasket Set (3pcs./set)
19	4AB21000	Carburetor Spacer
20	4AB81000	Carburetor Complete (HS-324A)
4AB81410		Throttle Lever (No.8)
74002A10		Ignition Module (IG-10)
71669010		Spark Plug CM-6 (Rcexl)
79871550		Cap Screw M5x50 (10pcs./set)
4AB09000		Propeller Washer

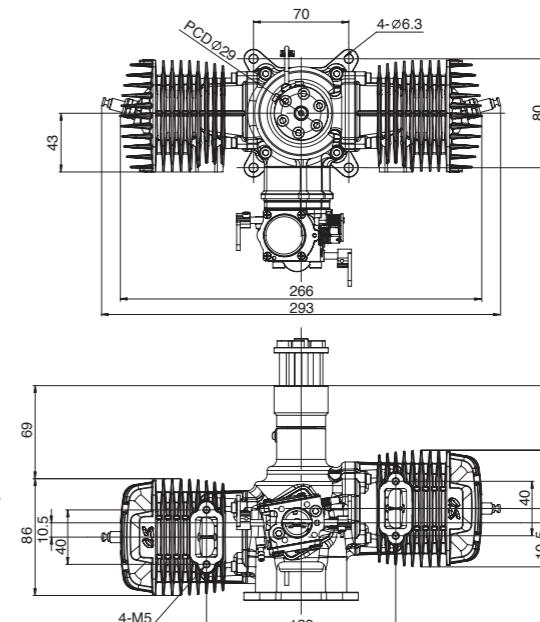
## CAP SCREW SETS / FLAT HEAD SCREW SET (10pcs./sets)

Code No.	Size	Pcs. used in an engine
79871110	M3x8	Throttle Valve Lever Retaining Screw (2pcs.)
79871415	M4x15	Cylinder Block Retaining Screw (8pcs.)
79871520	M5x20	Front Housing Retaining Screw (4pcs.)
79871575	M5x75	Carburetor & Reed valve Retaining Screw (2pcs.)
79875616	M6x16(F)	Radial Motor Mount Retaining Screw (4pcs.)

## ■ THREE VIEW DRAWING Dimensions (mm)

### SPECIFICATIONS

■ Displacement	59.9 cc x 2 / 3.66 cu.in. x 2
■ Bore	44.0 mm / 1.732 in.
■ Stroke	39.4 mm / 1.551 in.
■ Output	10.0 ps / 9.86 hp / 7,000 r.p.m.
■ Practical R.P.M.	1,600-8,000 r.p.m.
■ Weight	2,450 g / 86.42 oz. (Engine) 150 g / 5.29 oz. (Ignition module)



The specifications are subject to alteration for improvement without notice.

