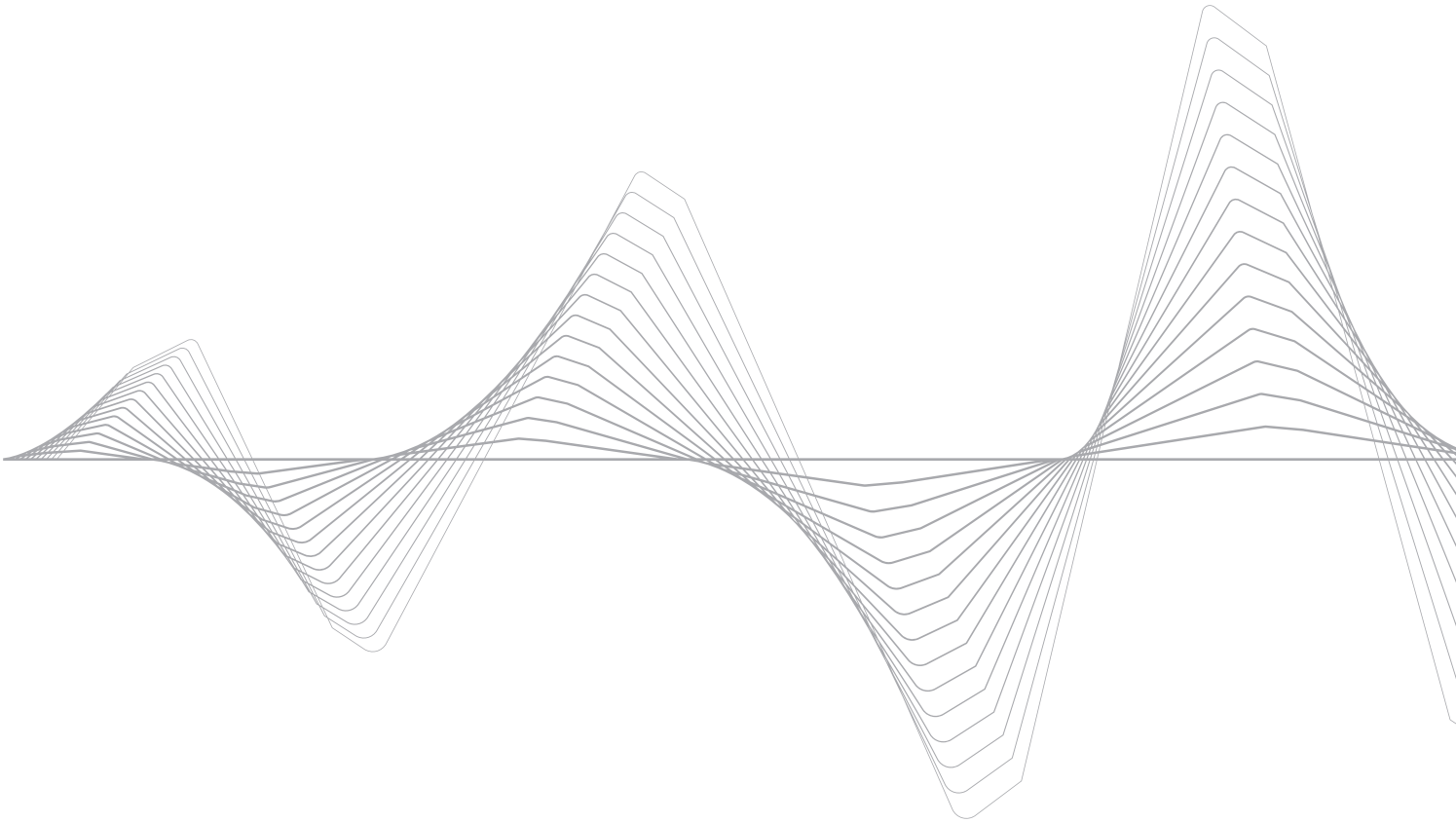
ROTAX®

OPERATOR'S MANUAL

125 DD2 MAX EVO



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GENERAL INFORMATION
BRP-ROTAX RECOMMENDS PRODUCTS
OF THE FOLLOWING COMPANIES:

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Chapter: INTRO
GENERAL INFORMATION

Preface

Before operating the engine, read the Operators Manual carefully.
If any passages of the Manual are not clearly understood or if you have questions, please contact an authorized Distribution or Service Center for ROTAX®-kart engines.

Engine performance may vary depending on, among other things, general conditions, ambient temperature and altitude.

Contents

This Operators Manual contains instructions about how to operate the ROTAX®-Engine Type 125 MAX DD2 evo.

Safety Messages

The types of safety messages, what they look like and how they are used in this guide are explained as follows: The safety alert symbol indicates a potential injury hazard.

Figure 1.1: Safety alert symbol

⚠ WARNING
Indicates a potential hazard, if not avoided, could result in serious injury or death.

⚠ CAUTION
Indicates a hazard situation which, if not avoided, could result in minor or moderate injury.

NOTICE
Indicates an instruction which, if not followed, could severely damage vehicle components or other property.

ENVIRONMENTAL NOTE
Environmental notes give you tips on environmental protection.

NOTE

Indicates supplementary information which may be needed to fully complete or understand an instruction.

✓ Denotes a checking operation

TIP This information gives you additional advice and tips

⚠ WARNING
This vehicle may exceed the performance of other vehicles you may have ridden. Take time to familiarize yourself with your new vehicle.

Chapter: 1
TECHNICAL DESCRIPTION

TOPICS IN THIS CHAPTER

DESIGN OF THE ROTAX ENGINE 125 MAX DD2 EVO

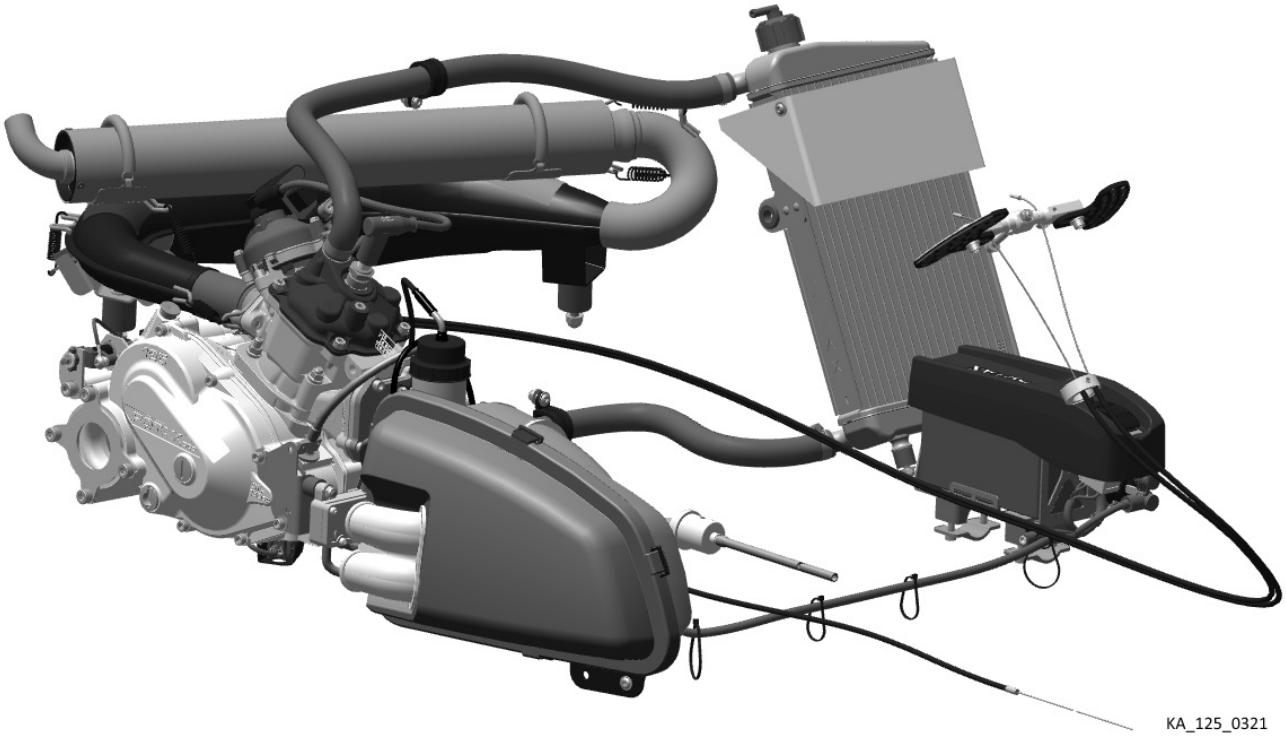

Figure 1.1

GENERAL

The Rotax 125 MAX DD2 evo engine is a single cylinder two stroke engine with reed valve controlled inlet and 125 cm^3 displacement. Mixture lubrication is achieved by adding oil to the gasoline in a specified mixing ratio.

The power transmission to the rear axle takes place via a manually shift able integrated 2-speed gearbox.

COOLING CIRCUIT

The coolant is pumped from the radiator to the water pump which is driven by the clutch shaft. The water pump conveys the coolant through cylinder and the cylinder head back to the radiator.

The cooling circuit is equipped with a thermostat (opening point 45 °C / 113 °F). It assures that the engine reaches its operating temperature quickly and keeps it at a relatively constant level.
The thermostat is integrated in the cylinder head cover.

BALANCE GEAR

The balance gear is mounted on the primary shaft and rotates counter-wise to the crankshaft to reduce engine vibration.

IGNITION UNIT

The control of the ignition system is exercised by the ECU (Engine Control Unit). To calculate the ignition timing, an engine speed sensor is needed, which is installed on the bottom of the engine housing. There is no manual adjustment of the ignition system necessary and/or possible.

If the power button is pressed once, the ignition is activated and the button lights up. To start the engine, it only needs to be pressed once again. To turn off the engine as well as the ignition, proceed in reverse order.

ELECTRIC STARTER

By pressing the "START" button, the circuit between the battery and the electric starter will be closed by a relay. The electric starter drives the starter gear on the crankshaft via an intermediate gear with free wheeling, until the engine starts to run. An automatic switch reset from "START" to "ON" is integrated.

ELECTRO PNEUMATICALLY EXHAUST TIMING CONTROL

The engine type 125 MAX DD2 evo is equipped with an electro-pneumatic exhaust control. The E-RAVE (Electronic ROTAX Adjustable Variable Exhaust) system is controlled by an electro-pneumatic valve via the ECU. The vacuum required is provided by the engine crankcase.

If the engine is running at idle speed or below the opening point of the E-RAVE system (between approximately 8000-9000 rpm) the exhaust valve is closed. With the engine running, it closes or opens the electro-pneumatic valve of the exhaust depending on the speed and, therefore it provides optimum performance characteristics.

INTAKE SILENCER

The intake silencer incorporates an air filter to clean the intake air. The intake silencer has been designed for optimum reduction of air intake noise level and represents a tuned system with the engine.

The air filter consists of several layers and has been optimized in the area of air passage and filter efficiency. If soiled or during engine maintenance work, clean the filter with biodegradable products.

EXHAUST SYSTEM

The exhaust system is designed as resonance system with an after-muffler and represents a tuned system with engine.

GEARBOX

The power transmission to the rear axle takes place via manually shiftable integrated 2-speed gearbox and not as usual, via a maintenance intensive chain drive. Changing the gear activates the gear shift fork as well as a shifting sleeve, which slides on the hollow shaft between the 1st and 2nd gear and then engages in the respective idle gear.

The gear is kept in position by an index pin, which keeps the gearshift fork in the selected position, 1st gear, neutral or 2nd gear.

To allow shifting into 2nd gear without lifting the foot from the gas pedal, the ignition is cut off for a moment when actuating the shifting paddle.

ELECTRONIC SHIFTING ASSISTANT (ESA)

To optimize the shifting from 1st to 2nd gear, the ignition is interrupted for a short time. This releases load from the gearset and, gear shifting is faster and less stressful for the gearset.

FUEL PUMP

The fuel pump functions due to the alternating negative pressure and overpressure in the crankcase and sucks fuel from the fuel tank into the carburetor via the fuel pump.
In the suction side of the fuel pump (between fuel tank and fuel pump) a fuel filter is installed to prevent contamination of the fuel pump and carburetor.

CARBURETOR

The carburetor (DELL'ORTO VHSB 34) is a slide type carburetor with float system. The standard main jet is suitable for almost all operating conditions. For extreme operating conditions, the main jet size must be adjusted to the actual conditions according to this manual.

CENTRIFUGAL CLUTCH

The engine is equipped with a centrifugal clutch operating in an oil bath. This clutch separates the engine from the gearbox at less than 2.500 rpm. Only at an engine speed of approx. 4.000 rpm. the centrifugal clutch is completely engaged.

OVERLOAD CLUTCH

The engine has a mechanical overload clutch, which is installed on the rear axle. It is to protect the crankshaft from hard shocks from the drive components which are not usual during normal operation (e.g. the blocking of the rear axle).

NOTES

Chapter: 2
OPERATING FLUIDS AND BATTERY

TOPICS IN THIS CHAPTER

See also table “important information (summary)” in Chapter 5.

COOLANT

Use only distilled water as engine coolant. If the kart is stored below the freezing temperature of water, make sure to drain the water from the cooling radiator and engine completely.

Step	Procedure
1	Open radiator cap and fill the system with coolant. Small radiator: approx. 0.52 liter / 0.137 gal for the complete cooling system Big radiator: approx. 0.7 liter / 0.185 gal for the complete cooling system
2	Close radiator cap.

NOTICE

Observe the storage conditions.
Storage below the freezing temperature of water could lead to a damage of the cooling system and the engine.

NOTICE

Exceeding the engine temperature could lead to serious engine failure.
The engine temperature should not exceed 85 °C / 185 °F.

BATTERY

See Fig. Pos. 1: Charging connector, TYPICAL.
The power for the ignition unit and electric starter is only supplied from the battery. With a fully charged battery of 12 V and 6.5 Ah, the engine can be started approximately one hundred times and operated over a period of approximately five hours. With the battery voltage decreasing to approximately 11 V the point will be reached when the battery voltage is too low to generate a spark for ignition.

NOTICE

The lifespan of the battery will be drastically reduced by exhausting the battery completely.
Fully re-charge the battery before and after any operation of the kart.

NOTE

It is recommended to always carry a charged spare battery. The installed battery should be replaced with a fully charged battery before it is completely exhausted.

NOTE

If the spark plug is removed, to check if the battery still generates a spark, consider the following: with the spark plug removed it is easier for the electric starter to crank the engine, which reduces current absorption of the electric starter, resulting in battery voltage adequate to generate a spark. If the spark plug is fitted again, it may happen that the engine does not start.

NOTE

To charge a battery, the delivered battery charging unit specified by ROTAX® should be utilized (battery charger part no. 265148). When using the lithium battery available as spare part, the battery charger Optimate Lithium (part no. 581325) is mandatory.

NOTE

To be able to use the battery charger in your home country, please contact your nearest authorized ROTAX® distributor or one of their ROTAX® Service Centers to receive an adapter plug or adapter cable, respectively.

NOTE

This battery charger will switch over automatically to maintenance charge as soon as the target voltage is reached. Therefore overcharging with the result of ruining the battery will be impossible.

NOTICE

Use of any other battery charger can impair the battery life or may ruin the battery.

BATTERY CHARGING UNIT

When charging the battery take note of the following:

Step	Procedure
1	Connect battery charger to the charging connector (pos. 1).

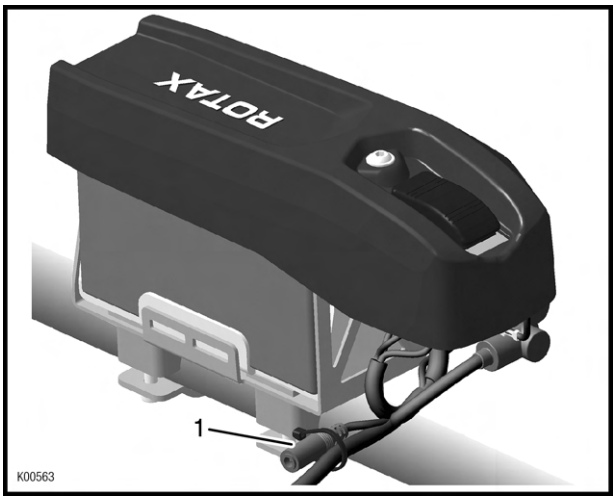

Figure 2.1: Pos. 1: Charging connector, TYPICAL

Step	Procedure
2	Connect the battery charging unit on 110-230V, 50 - 60Hz power supply. During the charging procedure, the charge indicating lamp will light up red.
3	At completion of the charging process, the control lamp will change to green, but the charging current will remain, thus warranting a fully charged battery.
4	The charging time amounts to approx. 12 hours.

NOTE

The battery charger may be connected to the battery for a longer period, as the battery takes just the current required to be fully charged.

NOTE

A non-extinguishing red control lamp, even after 24 hours of charging, indicates that the charging capacity of the battery is diminishing.

NOTE

A red/green blinking of the charging control lamp indicates transition from main charging to additional charging and does not signal a faulty battery charger.

Step	Procedure
5	Unplug power supply to battery charging unit.
6	Remove output wires of the battery charger from the battery.
7	The battery is ready again for use.

NOTICE

In addition to these directives, follow the advice of the battery charging unit manufacturer.

NOTE

When the battery is charged while not mounted on the kart, use the connector cable (part no. 266022). If needed, contact your authorized distributor or one of their ROTAX® Service Centers.

The charging condition of the battery can be estimated by using a commercially available measuring instrument.

FUEL

For engine operation, a mixture of unleaded gasoline of at least ROZ $_{min.}$ 95 / 91 (RON +MON) / 2 and **fully synthetic** two-stroke oil, mixed at ratio 1: 50 (2% oil) has to be used.

NOTICE

Carry out a correct running-in procedure.

See Chapter 4 section: Running-in procedure for the engine.

⚠ WARNING

Non-compliance can result in serious injuries or death!
When mixing fuel and fuelling do not smoke or allow open fire. Gasoline is highly flammable and explosive under certain conditions.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Never perform mixing and fuelling in closed rooms, handle fuel in well ventilated areas only.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Fuel the kart only when engine is not running and the combination switch is at OFF position.

⚠ WARNING

Risk of fire and explosion!
Make sure that fuel will not splash onto hot engine components or equipment. Always wipe off any fuel spillage from the vehicle.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Pay attention to the safety advice of the kart manufacturer.

NOTICE

Possible engine trouble!
Too much oil in the fuel mixture (more than 2%) could lead to engine trouble (e.g. coking of the exhaust valve, piston ring sticking).

NOTICE

Possible engine blow-up!
Insufficient amount of oil in the fuel mixture (less than 2%) could result in e.g. piston seizure.

NOTICE

Engine damage and damage to the intake system may occur.
Do not try any different sorts of fuel.

NOTICE

Before each fuelling, shake fuel container well to ensure adequate mixing of the gasoline with the oil.

NOTICE

Ensure that no contamination enters the fuel tank and the carburetor.

NOTICE

Unleaded fuel has a limited storage life.
Store only the quantity of fuel in a container which will be needed in the near future.

ENVIRONMENTAL NOTE

Don’t spill fuel. Absorb spilled fuel with appropriate drying agent and ensure ecological disposal.

NOTES

Chapter: 3
ENGINE CALIBRATION

TOPICS IN THIS CHAPTER

ENGINE CALIBRATION

RUN-IN PROCEDURE

⚠ WARNING

Non-compliance may result in serious injuries or death!
Running-in has to be done with a “long” gear ratio and a rich main jet (2 sizes bigger than the recommended main jet based on altitude and temperature.

NOTICE

For the first 10 liters of fuel use a mixing ratio of 1:33 (= 3% or 0.3 liter oil per 10 liters of fuel).

NOTE

BRP-Rotax recommends to use XPS Kart - Tec oil.

Step	Procedure
1	15 min. up to 10.000 rpm. 15 min. up to 12.000 rpm. 15 min. full load.
2	Reduce the main jet size step by step (e.g. 172 - 170 - 168 ...).

NOTE

Make sure that the coolant temperature reaches a minimum of 55 °C (130 °F).
At cold ambient temperature radiator needs to get partly covered by tape.

PERFORMANCE GRAPHS

In this diagram, the different performance characteristics of the MAX engines are shown. The vertical Y-axis shows the power in kilowatts (kW). The horizontal X-axis shows the rotational speed in revolutions per minute (rpm).

For more information, please check the performance data sheets on www.rotax-kart.com.

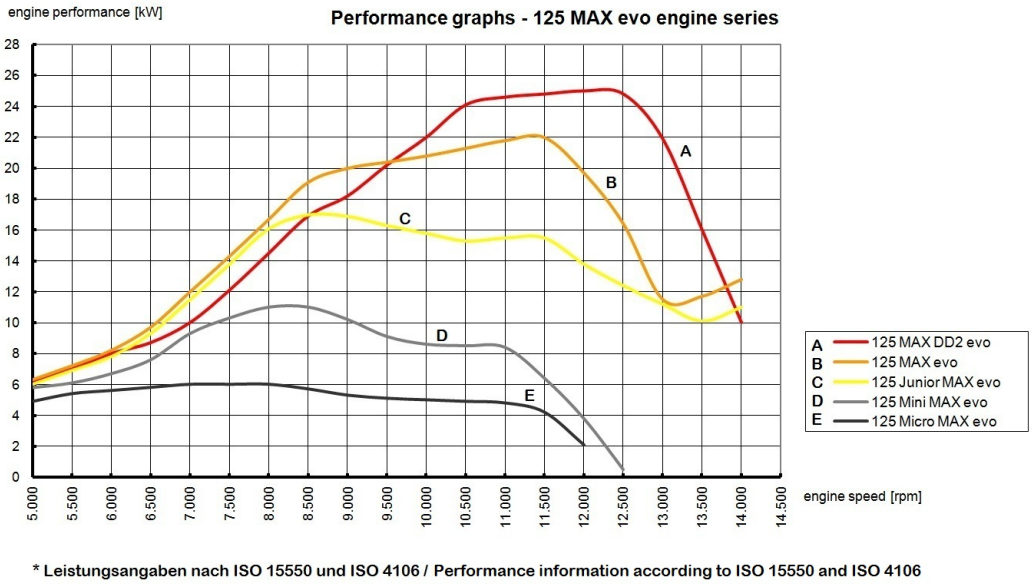

Figure 3.1: Performance graphs

CARBURETOR CALIBRATION

The standard carburetor calibration is for an ambient temperature of 25 °C / 77 °F and 400 m / 1310 ft above sea level. At operation with different temperatures and altitudes, the main jet of the carburetor has to be changed in accordance with Table 1, to optimize engine performance.

NOTE

For engine operation at an ambient temperature below 10 °C / 50 °F, make sure not to demand full power before the coolant temperature has reached 45 °C / 113 °F.

NOTE

The warranty by BRP-Rotax will no longer apply, if the carburetor calibration is carried out improperly and causes engine damage.

The following application for smartphones shows the individual setting of your ROTAX® 125 Max DD2 evo engine:

The ROTAX® Max Jetting Guide is an App for Android™ and iOS devices, designed to assist users with setting up the recommended main jet based on the ambient conditions and the type of engine. The perfect set-up can be calculated in two ways, either automatically - which requires a GPS signal and an internet connection, or manually - which requires certain knowledge about altitude and weather conditions.

AUTOMATIC-SET-UP

Step	Procedure
1	Click on the blue font "Update GPS weather data" button below the weather information. After a short time the app will automatically provide all the necessary information regarding weather and geographical position.

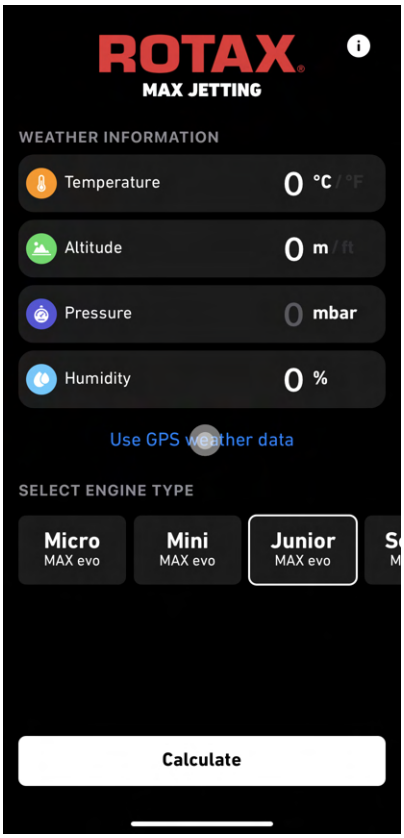

Figure 3.2

Step	Procedure
2	To select your engine type for the calculation click on one of the engine models, MICRO MAX is selected by default. You can swipe left and right to see all engine types available.

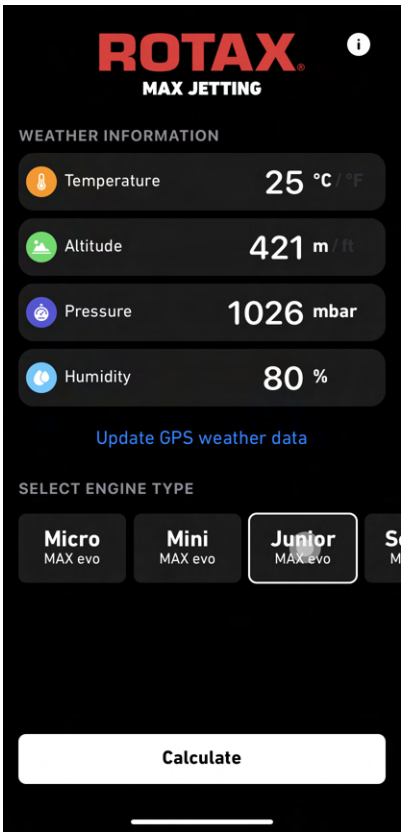

Figure 3.3

Step	Procedure
3	Having completed all fields of the weather data and having selected the engine type you can press the white "CALCULATE" button on the bottom of your screen to find out the suitable jet for your engine type and environment.

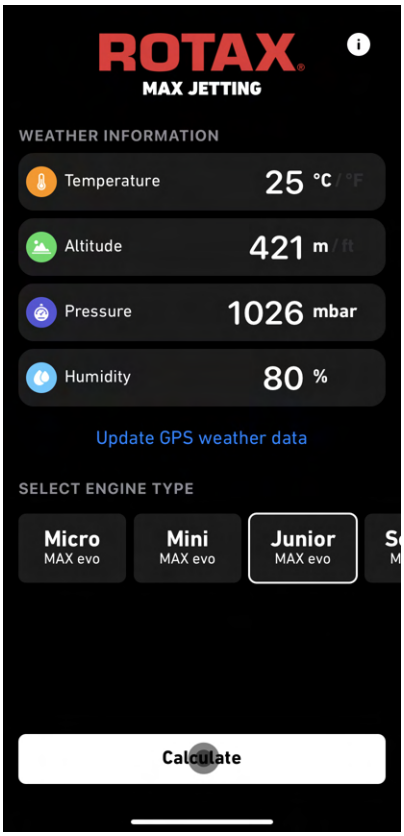

Figure 3.4

Step	Procedure
4	Now the recommended main jet value will be provided. In case a second calculation needs to be made, you can start over by simply pressing the button saying “RESET” next to the calculated value.

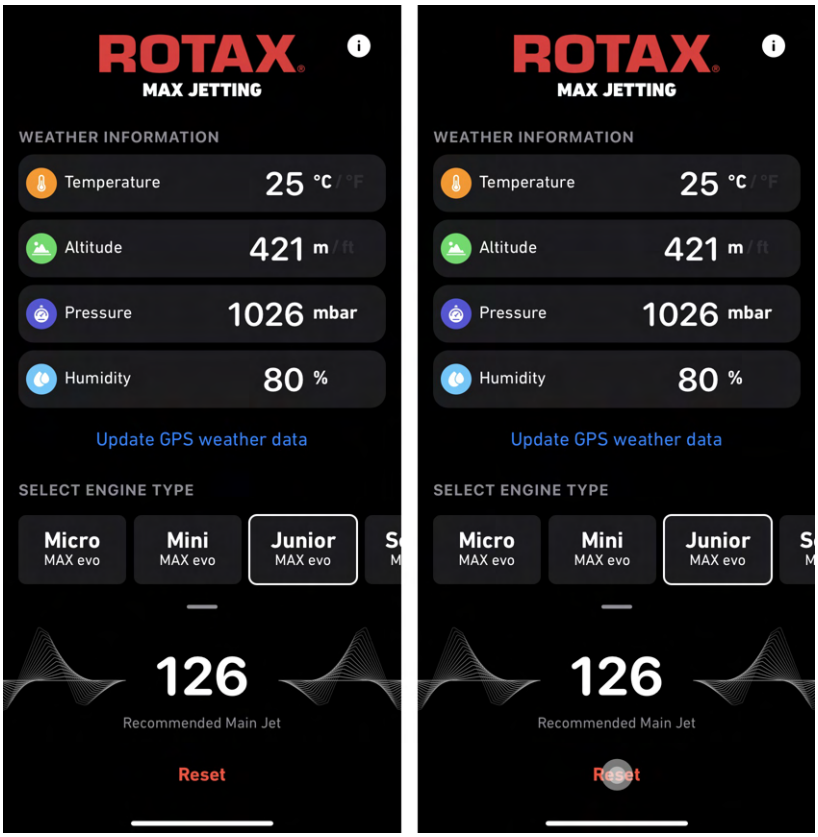

Figure 3.5

MANUAL SET-UP

Step	Procedure
1	In case no GPS signal or internet connection is available, the necessary data needs to be added manually, which of course requires knowledge about current weather conditions at the race track as well as the altitude. By clicking on the empty space next to “Temperature”, “Altitude”, “Atmos. Pressure” and “Humidity”, you are able to enter the required information. In terms of “Atmos. Pressure”, the atmospheric pressure at sea level has to be entered, usually the barometer shows the actual level.
2	As a second step, the engine type of the kart needs to be selected. Therefore, the button underneath the weather data needs to be clicked. The app will automatically show all potential Max evo engines, from which one can be selected by clicking on a certain engine type.

3	After all the necessary information has been provided and selected, you only need to click the circular red button saying “CALCULATE” at the bottom of the screen.
4	Now the recommended main jet value will be provided. In case a second calculation needs to be made, you can start over by simply pressing the button saying “RESET” next to the calculated value.

Additional Information

- In case values are being entered manually, the provided numbers will turn from white to red if they are considered to be unrealistic.
- Depending on their preference, users can decide if they would like to use the metric or the imperial system. You can change between Celsius and Fahrenheit by simply clicking on the small °C or °F next to the value for temperature. The same works with feet and meter, where you can just click on the small m or ft located next to the value for altitude in order to change between the systems.

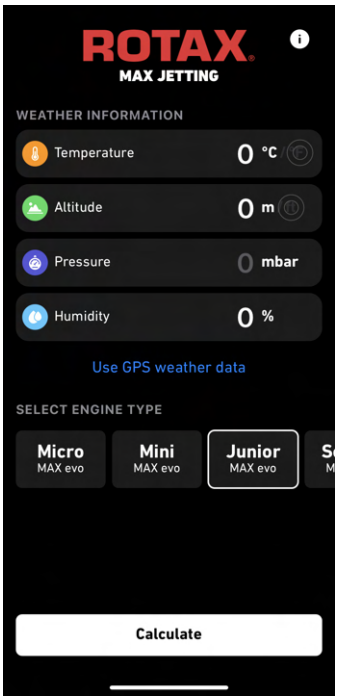

Figure 3.6

- In the top right corner, you can find a button called “INFO”. By clicking this button, additional information about the app as well as setting up the carburetor like float height, position of the jet needle or the air adjustment screw can be found. By clicking the small red X underneath the info button, you can return to the home screen.

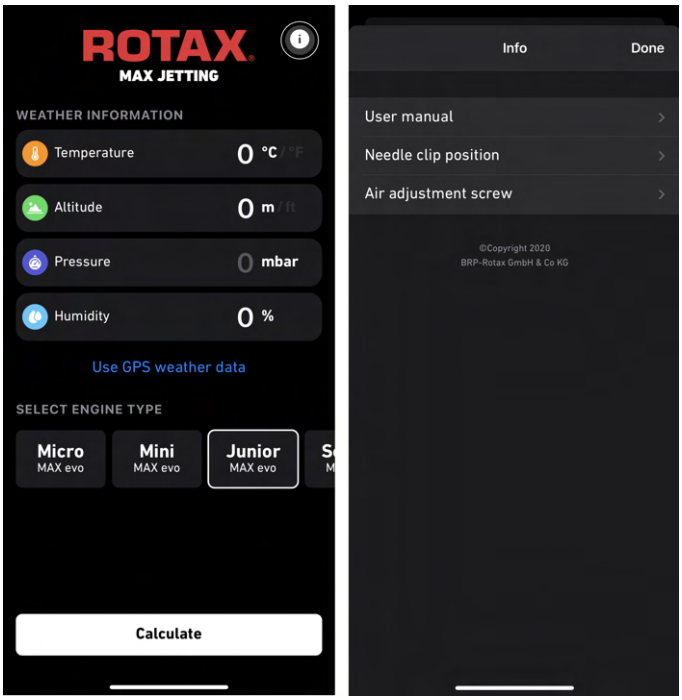
ROTAX
MAX JETTING
WEATHER INFORMATION
Temperature
0 °C °F
Altitude
0 m / ft
Pressure
0 mbar
Humidity
0 %
Use GPS weather data
SELECT ENGINE TYPE
Micro
MAX evo
Mini
MAX evo
Junior
MAX evo
Calculate
Info
Done
User manual
Needle clip position
Air adjustment screw
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Figure 3.7

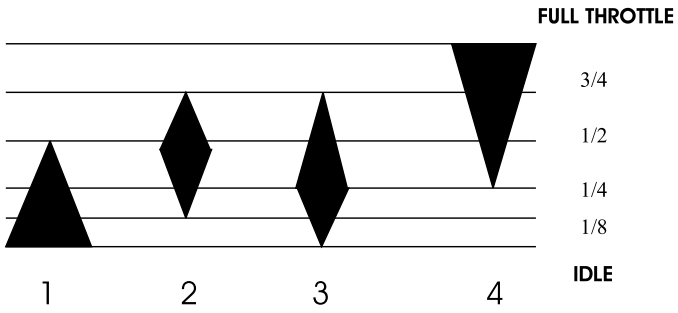
App Download

Please scan the following QR-code for your mobile device:

Figure 3.8: QR- code, Android device

Figure 3.9: QR- code, iOS device

For better understanding and as help for carburetor adjustment, the following figure describes the effect of the various adjustments, depending on the throttle position.



1 - AIR SCREW AND PILOT JET

2 - TYPE AND POSITION OF JET NEEDLE

3 - TYPE OF NEEDLE JET

4 - MAINJET

Figure 3.10: Various adjustments

CHANGE OF THE CARBURETOR MAIN JET

To change the carburetor main jet, proceed as follows:

Tools required:
• Open-end wrench 19 mm • Flathead screwdriver

NOTE

The carburetor must not be removed from the engine in order to change the jetting.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Handle fuel in well-ventilated areas only.

⚠ WARNING

Non-compliance can result in serious injuries or death!
When handling with fuel, do not smoke or allow open flames. Gasoline and gasoline vapor are highly flammable and explosive under certain conditions.

⚠ WARNING

Risk of fire and explosion!
Make sure that fuel will not splash onto hot engine components or equipment. Always wipe off any fuel spillage from the vehicle.

ENVIRONMENTAL NOTE

Don’t spill fuel. Absorb spilled fuel with appropriate drying agent and ensure ecological disposal.

Step	Procedure
1	Drain the fuel in the float chamber into a suitable clean tray by removing the plug screw (pos. 27) and gasket ring (pos. 26). **NOTE** *The fuel drained from the float chamber may be poured back into the fuel tank.*
2	Remove the main jet (pos. 15) and the main jet cup (pos. 14). **NOTE** *The size of the jet is imprinted on the face of the main jet.*

Step	Procedure
3	Select the appropriate size of main jet, refer to ROTAX® Max Jetting Guide.
4	Install the main jet cup (pos. 14) in position and fit the corresponding main jet (see ROTAX® Max Jetting Guide).
5	Fit and hand-tighten the plug screw (pos. 27) and gasket ring (pos. 26).

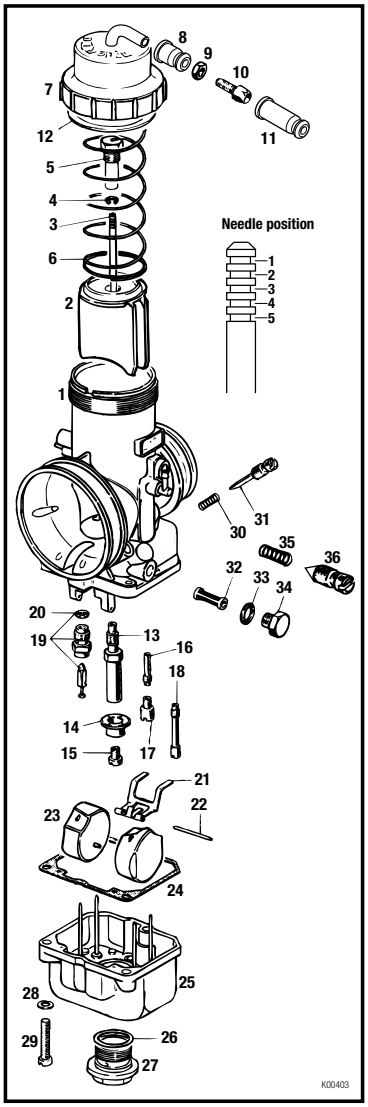


Figure 3.11: Components of carburetor

NOTE

In a disassembled carburetor, the position of the jet needle (pos. 3) can be changed. The standard position of the jet needle is 'position 2'. If the clip (pos. 4) is set in 'position 1' of the jet needle, the full mixture in part and full-load will become slightly leaner. If the clip (pos. 4) is set into 'position 5', the fuel mixture will become slightly richer in the part and full-load range.

NOTE

The fuel filter (pos. 32) is located below the fuel inlet on the carburetor, preventing contamination from entering the carburetor, which could impair operation of the carburetor.

Step	Procedure
6	Remove the hex. screw (pos. 34) and gasket ring (pos. 33).
7	Pull out the fuel filter (pos. 32) and clean the filter and fuel inlet.
8	Refit the fuel filter (pos. 32), the gasket ring (pos. 33) and hex. screw (pos. 34).

NOTE

When trying to start the engine it, will take a few seconds for the fuel pump to fill the float chamber and for the engine to start.

NOTE

With the adjustment screw (pos. 36), the idle speed of the engine can be adjusted. By turning in the adjustment screw (pos. 36) the idle speed increases and by turning out the screw (pos. 36) the idle speed will be reduced.

NOTE

With the adjustment screw (pos. 31), the fuel mixture formation can be adjusted. By turning in the adjustment screw (pos. 31), the air-fuel mixture will become richer at idling and by turning out the screw (pos. 31), the air-fuel mixture will become leaner at idling. The default setting of the adjustment screw are two full turns and one quarter of a turn (2 ¼) from inside to outside.

CHOOSE OF GEAR RATIO

In spite of its 2 gears, the 125 MAX DD2 evo engine offers a broad performance band. Therefore, the frequent changing of the primary gear ratio is not necessary.

NOTE

It is not possible to change the 1st and 2nd gear individually.

On most of the Kart circuits you will be well served with the standard gear ratio (35/62 which is equivalent to 12/90 for 1st gear and 14/79 for 2nd gear).
If due to the special shape of the circuit (e.g. extremely sharp corners or long straights), it is deemed necessary, the primary gear ratio can be changed both, a shorter or a longer ratio.
If the rpm. range from 9.200 to 12.200 rpm. is not sufficient because of a particular track shape (extremely long straight), the maximum engine speed of 13.600 rpm. should be aimed for.

NOTE

A basic requirement for the full use of the speed range between 12.200 to 13.600 rpm. is optimized carburetor jetting (see chapter 4.1. Carburetor calibration).

The acceleration potential between 9.200 and 12.200 rpm. is essentially higher than between 12.200 and 13.600 rpm. Therefore, it does not always make sense to use this rpm. range (high top speed on a straight) and to not take advantage of the acceleration potential of the lower rpm. range (out of sharp corners).
This is a suggestion. The optimum choice can only be found with the exact knowledge of the race track.
To approach and optimize the reduction gear ratio, the following charts should be helpful. The optimization procedure regarding the reduction gear ratio for a new race track is explained step by step by the following example:

Procedure
Start with the standard gear ratio (35/62, equivalent to 12/90 at 1st gear and 14/79 at 2nd gear).

Based on the following criteria, you must decide, whether a shorter or longer gear ratio is necessary.

Does the engine reach 12.500 rpm in 2nd gear at the end of the longest straight?

IF YES, proceed as follows

Procedure
Choose the next longer gear ratio (36/61 equivalent to 12/87 in 1st gear and 14/76 in 2nd gear).

IF NO, proceed as follows

Procedure
Choose the next shorter gear ratio (34/63 equivalent to 11/87 in 1st gear and 14/83 in 2nd gear).

.

If these gear ratios are still not sufficient, try the next shorter or next longer gear ratio.

NOTE

When using short gear ratios, it may happen that the response behavior of the engine in 1st gear is aggressive and the vehicle handling becomes difficult. For a good lap time, often a longer gear ratio is helpful to achieve reasonable performance behavior.

NOTE

To help with the choice of adequate gear ratios, the two charts below illustrate the traditional gear ratios and the top speeds in [kmh] that can be reached in the respective gear at an engine speed of 12.500 rpm.

Gear ratio 1 st gear				
Number of teeth of primary drive gear	**Number of teeth of secondary drive gear**	**Gear ratio**	**Traditional gear ratio (in sprocket size)**	**Theoretical max. speed (in km/h / mile/h) (at 12.500 rpm and wheel diameter 870 mm /34.25 in.)**
32	65	8.65	10 to 87	75 / 47
33	64	8.26	11 to 91	79 / 49
34	63	7.89	11 to 87	83 / 52
35	62	7.55	12 to 90	86 / 53
36	61	7.22	12 to 87	90 / 56
37	60	6.91	12 to 83	94 / 58
38	59	6.61	12 to 80	99 / 62

gear ratio of 1st gear (cannot be changed)	4.26

Gear ratio 2 nd gear				
Number of teeth of primary drive gear	**Number of teeth of secondary drive gear**	**Gear ratio**	**Traditional gear ratio (in sprocket size)**	**Theoretical max. speed (in km/h / mile/h) (at 12.500 rpm and wheel diameter 870 mm /34.25 in.)**
32	65	6.52	14 to 91	100 / 62
33	64	6.23	14 to 87	105 / 65
34	63	5.95	14 to 83	110 / 68

Gear ratio 2 nd gear				
Number of teeth of primary drive gear	**Number of teeth of secondary drive gear**	**Gear ratio**	**Traditional gear ratio (in sprocket size)**	**Theoretical max. speed (in km/h / mile/h) (at 12.500 rpm and wheel diameter 870 mm /34.25 in.)**
35	62	5.69	14 to 79	115 / 72
36	61	5.44	14 to 76	120 / 75
37	60	5.21	14 to 73	125 / 78
38	59	4.98	15 to 75	131 / 81

gear ratio of 2nd gear (cannot be changed)	3.21

NOTE

To facilitate the change of gear ratio, it is recommended to carry a clutch drum with a primary drive gear and the respective secondary gear for each gear ratio.

NOTE

*To allow easier matching of primary and secondary gears, please note that the sum of the last digits of the teeth number must always be 7 or 17 (3**5** / 6**2**).*

EXCHANGE OF GEAR REDUCTION RATIO

Tools required:
• Torque wrench • Allen key 5 mm • Allen key 6 mm

At first glance, the exchange of the gear ratio seems to be more complicated than you are used to. If, however, you follow the hints below, you will notice that the work involved is not much different.

Step	Procedure
1	Lift engine side of the kart and place the vehicle on a trolley.
2	Remove the right rear hub with wheel.
3	Unscrew 4 Allen screws M6x30 (pos. 1), 4 Allen screws M8x70 (pos. 2) and 2 Allen screws M6x40 (pos. 3). Remove the gear cover. **NOTE** *If the gear cover is difficult to remove, it can be levered off at the separating lugs.*

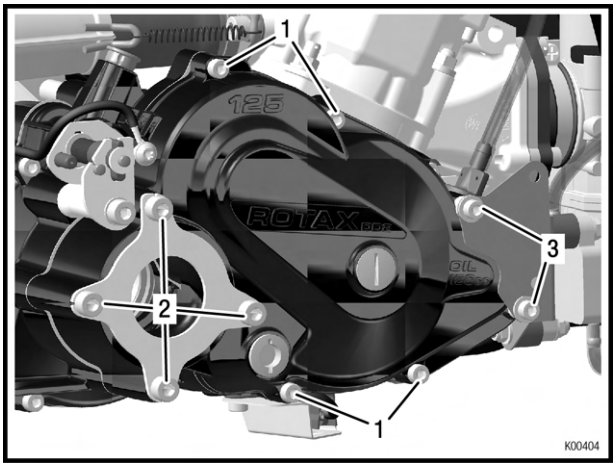


Figure 3.12: Gear cover

Step	Procedure
4	Remove the primary drive gear (pos. 4) and secondary gear (pos. 5) and fit the gear pair of your choice. **NOTE** *At re-assembly, proceed in reverse sequence. Tighten the screws to the following torque settings:* *M6: 10 Nm (88 lbf. in.) / M8: 22 Nm (195 lbf. in.)*

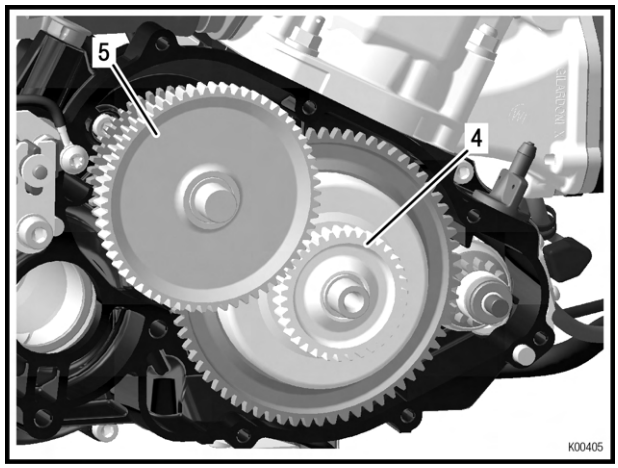


Figure 3.13: Gear ratio

OPERATION OF THE GEAR BOX

The ROTAX® 125 MAX DD2 evo is fitted with a 2-speed gearbox that is changed manually via a shifting device. The engine also has an electronic ignition cut-off which when changing from 1st to 2nd gear, interrupts the ignition, relieving the load from the gearbox and thereby makes gear shifting easier and faster.

NOTE

Gear shifting might not be possible when the engine is not running as it is not assured that the gear engages.

In principle, the gear shifting is very simple, only some points have to be observed:

Engagement of the 1st gear

NOTICE
It is prohibited, to rev the engine up in idle mode in order to change engage the 1st gear. This could lead to engine failure.

Shifting from 1st to 2nd gear

- In principle, this is possible at any engine speed (rpm.). The optimum timing for shifting is at about 12.200 1/min.
- Due to the electronic ignition cut-off, the gas pedal can stay fully activated during the shifting operation.

Shifting from 2nd to 1st gear

- Due to the high difference in rpm. between the two gears, it is not recommended to shift down at a speed of over 10.200 rpm.

ADJUSTMENT OF GEAR SHIFTING

The perfect functioning of gear shifting depends to a great extent on the correct adjustment of the gear shifting mechanism.

NOTE

When the engine is not running, it may not be possible to engage gears, depending on the position between shifting sleeve and idle gear of the first or second gear. In this case, turn the rear axle until you find a position allowing gears to engage.

Step	Procedure
1	Check, whether the shift paddle aligns with the steering wheel when in „NEUTRAL“. If this is not the case, correct the Bowden cable accordingly. **NOTE** *For adjustment of gear shifting, please follow the instruction of the chassis manufacturer.* **NOTE** *If the gearshift cables are excessively tensioned, the gears are hard to shift.*
2	The distance between shift contact and screw head at the gearshift shaft must be 1,0 – 1,5 mm / 0.04 – 0.06 in. The distance can be adjusted by turning the Allen screw (pos.1) in or out. See Fig. “Adjusted” **NOTE** *If the distance between shift contact and screw head is not correctly adjusted, the function of the ignition cut-off is not assured. This may cause gear shifting problems.* **NOTE** *If changing the gear becomes difficult after some operating hours, check , whether the retaining plate is bent, replace it with a new one or try to bend the support back into the correct position.*

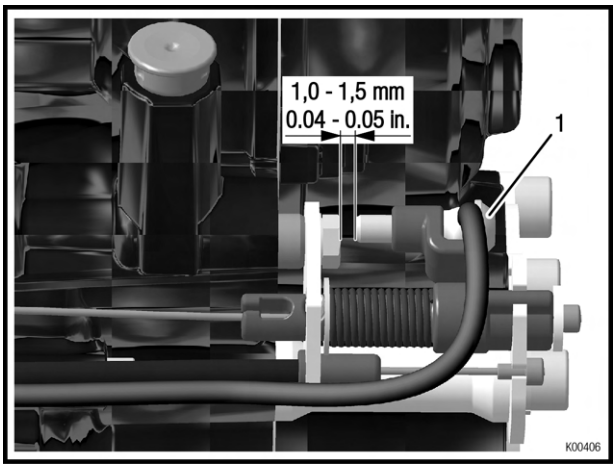


Figure 3.14: Adjusted

Chapter: 4
ENGINE OPERATION

TOPICS IN THIS CHAPTER

ENGINE OPERATING

ENGINE START

Before starting the engine, make sure you have completed all necessary tasks for running the engine:

- ✓ Fuel tank full.
- ✓ Battery charged and connected.
- ✓ Battery voltage over 12 V.
- ✓ Carburetor Bowden cable is moving freely and carburetor piston connected in idle position.
- ✓ For safety reasons, it's recommended to put the shifting device in **"Neutral"** (no gear engaged).

At engine start proceed as follows:

Step	Procedure
1	On a cold engine, pull the choke lever (pos. 1,) into a vertical position.

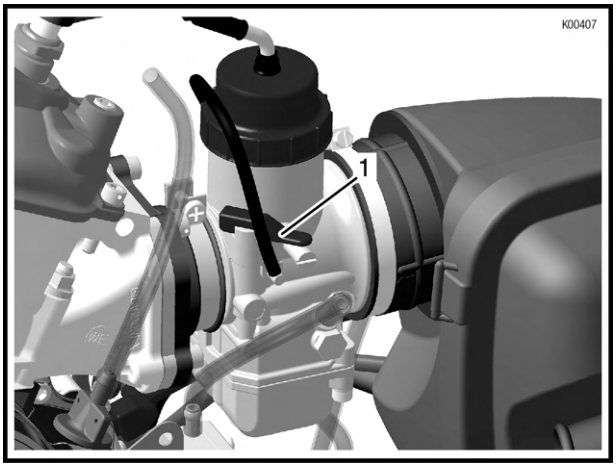


Figure 4.1: Choke lever

Step	Procedure
2	Press the power button once, the ignition system is activated (light turns on). Press the button again until the engine starts. See Fig. "Power button" **NOTE** *If the engine does not start, repeat the operation after a few seconds in the same manner.*

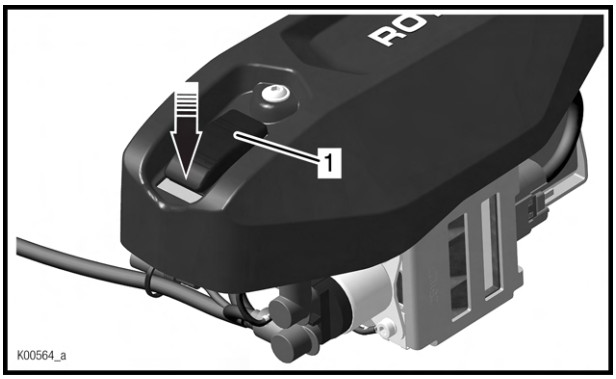


Figure 4.2: Power button

Step	Procedure
3	After engine start, take choke back until engine idles smoothly without choke.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Always wear protective clothing for kart operation (helmet, overall, gloves, shoes, neck and rib guards).

⚠ CAUTION

Non-compliance can result in serious injuries!
Do not touch the engine, the radiator or the exhaust system during and immediately after kart operation. Risk of burning!

⚠ WARNING

Non-compliance can result in serious injuries or death!
During kart operation, beware of any contact of body or clothing with moving parts of the kart (drive chain, rear axle and wheels)..

⚠ WARNING

Non-compliance can result in serious injuries or death!
Comply with the safety advice of the engine and kart manufacturer.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Inspect any part prone to wear (tyres, bearings etc.) before each kart event for good condition, in accordance with the directives of the kart manufacturer.

NOTICE

Non-compliance can result in engine damage!
Keep to running-in procedure as directed.

NOTICE

Non-compliance can result in serious injuries or death!
Operate engine only within the specified limits and intended purpose.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Only get in and out of the kart if engine is not running.

STOPPING THE ENGINE

See Fig. Power button

Step	Procedure
1	Press the power button and the engine will stop.

NOTE

If electric starter is activated, the ignition system will consume current. This can cause a deep discharge and damage to the battery.

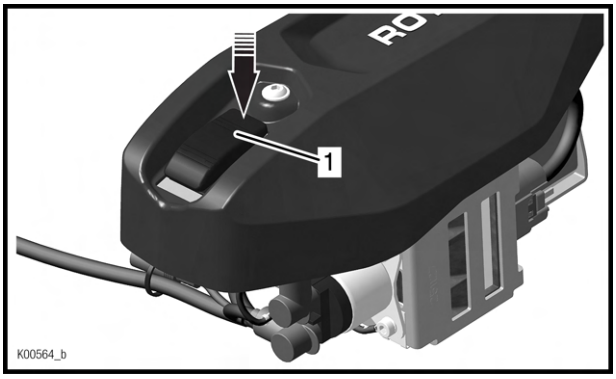


Figure 4.3: Power button

1 Power button

SETTING OF THE EXHAUST VALVE TIMING

Tools required:
• Allen key 4 mm or Socket wrench 8 mm

The opening time of the exhaust valve is set in the ECU and depends on the engine speed. However, the ECU allows two different modes of the exhaust valve opening. These can be selected by connecting an additional cable to the cylinder head cover.

NOTICE
The ground wire must be continuously connected. This is important for the general function of the engine.

Variant 1: Additional cable on battery ground

A:
See Ground wire
The additional cable is **NOT** attached to the ground wire. The control of the exhaust valve timing is activated at 9100 rpm.

NOTE

Isolate the additional cable with an electrical/insulating tape to the ground wire so that a possible contact with the engine ground does not affect the function.

B:
See Ground wire
The additional cable is attached to the ground wire. The control of the exhaust valve timing is activated at 8800 rpm.

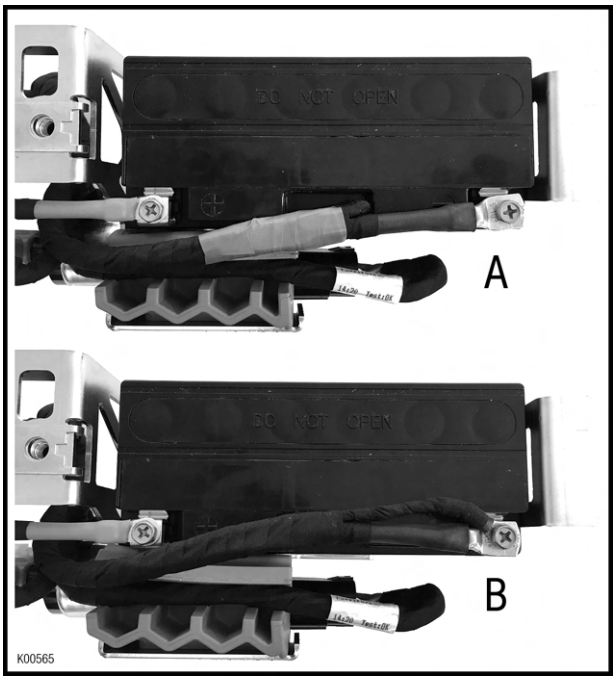


Figure 4.4: Ground wire

Variant 2: Additional cable on starter relay

A:
See Cable on starter relay.
The additional cable is **NOT** attached to the ground wire. The control of the exhaust valve timing is activated at 9100 rpm.

NOTE

Isolate the additional cable with an electrical/insulating tape to the ground wire so that a possible contact with the engine ground does not affect the function.

B:
See Cable on starter relay.
The additional cable is attached to the ground wire. The control of the exhaust valve timing is activated at 8800 rpm.

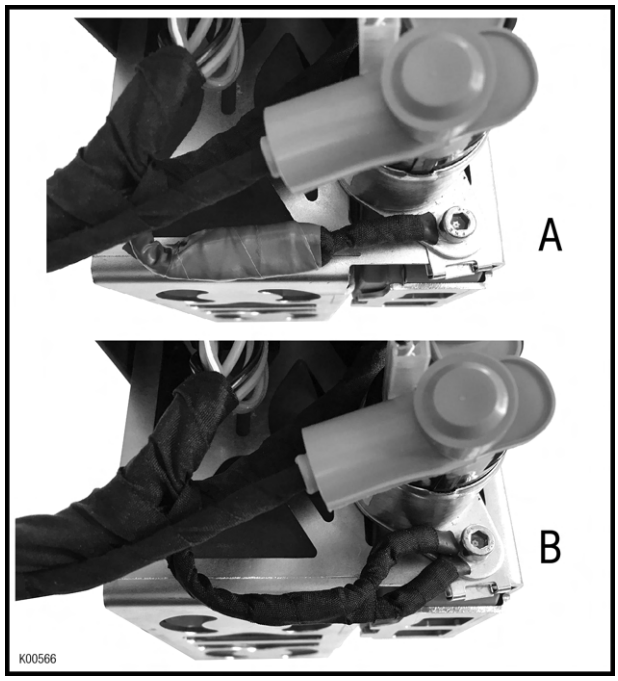


Figure 4.5: Cable on starter relay

NOTE

Either variant 1 or variant 2 has been installed in your engine.

MAINTENANCE SCHEDULE FOR ENGINE COMPONENTS

NOTICE

Non-compliance with the specified maintenance schedule could result in engine damage.

	FREQUENCY						NOTES
ENGINE	**Before every operation**	**After every operation**	**Every 2 hours of operation**	**Every 5 hours of operation**	**Every 10 hours of operation**	**Every 50 hours of operation**	
Check oil level in gearbox			**X**				
Exchange oil in gearbox							after first 5 hours of operation, then inspect the oil every 5 hours and change it if necessary
Clean exhaust valve and check if moving freely				**X**			
Check overflow bottle, empty if needed	**X**						
Tear-down inspection of engine (must be conducted by an authorized ROTAX® Service Center)						**X**	Inspect following components and replace if requested: piston, piston pin and piston pin bearing, conrod and conrod bearing, main bearings of crankshaft.
Clean airfilter, apply oil, replace in case of visible damage				**X**			after each rainy session, use air filter cleaner kit
Visually inspect connections between engine and carburetor and check fit and tightness of intake silencer	**X**						right after every collision
Visually inspect fuel filter regarding dirt, replace if needed	**X**						
Replace fuel filter						**X**	

	FREQUENCY						NOTES
ENGINE	**Before every operation**	**After every operation**	**Every 2 hours of operation**	**Every 5 hours of operation**	**Every 10 hours of operation**	**Every 50 hours of operation**	
Renew damping material in after muffler of exhaust system				**X**			
Check fit and tightness of exhaust	**X**						
Inspect for oil or water on the leakage bore at the crankcase	**X**						right after every collision
Verify a tight fit and non leakage of radiator hoses and clamps at engine and radiator	**X**						right after every collision
Replace spark plug						**X**	as requested
Dirt catching groove on secondary gear					**X**		
Overload clutch inspection	**X**						
RAVE			**X**				Clean hoses with compressed air.

OPERATING LIMITS

Operating the engine is only permitted under following conditions:
Recommended coolant temperature rang: 45 °C – 85 °C (113 °F – 185 °F).

NOTICE

Operating the engine at a too low temperature could result in piston seizure.
The engine is only allowed to be run at peak performance after reaching the specified operating temperature.

NOTE

If the engine does not reach the minimum specified operating temperature due to the low ambient temperature, then the cooling efficiency of the radiator must be reduced by partially covering the radiator with adhesive tape.

NOTICE

Non-compliance can result in engine damage!
The maximum operating temperature of the engine must not be exceeded. If the temperature is too high, it may result in piston seizure.

NOTE

Dirt must be cleared from the lamination of the radiator at regular intervals to achieve the best cooling performance.

Chapter: 5
PRESERVATION AND TRANSPORT

TOPICS IN THIS CHAPTER

PRESERVATION AND TRANSPORT

PRESERVATION OF ENGINE AND EQUIPMENT

For longer periods out of operation (winter time), make sure that the engine will be properly preserved.

Step	Procedure
1	Detach carburetor, drain fuel from carburetor and close carburetor openings to ensure that no dust or dirt can enter.
2	If the vehicle gets stored at temperatures below freezing, drain the entire cooling system and clean the cooling circuit with pressure air.

NOTICE
Not following this may lead to engine damage.

Step	Procedure
3	Close intake and exhaust port of engine with adhesive tape so that they are airtight.
4	Apply oil on exhaust system to prevent corrosion.
5	Remove battery from the fixture and charge periodically with the specified battery charger.

TRANSPORT OF THE KART

If the carburetor is still filled with fuel, the kart is only allowed to be transported in a horizontal position.
If the kart is to be transported in a vertical position, the fuel must be drained from the carburetor first.

NOTE

If the kart is in a vertical position at transport, the remaining fuel in the carburetor might flow into the crankcase with the result that the engine won't start at next try.

Step	Procedure
1	Remove drain screw on float chamber of carburetor and collect the fuel in a suitable container.
2	Clean drain screw and refit.

IMPORTANT INFORMATION (SUMMARY)

IMPORTANT INFORMATION	Liter	GAL.	SPECIFICATION	RECOMMENDED BRANDS
FUEL			Unleaded fuel of minimum octane level of 95 ROZ resp. 91 MOZ	
2–STROKE OIL			Fully synthetic	XPS Kart-Tec
OIL IN FUEL MIXING RATIO			During break-in: 1:33 (=3% oil) During normal use: 1:50 (=2% oil)	
COOLING SYSTEM	0.90	0.237	Pure water resp. antifreeze if kart is stored at temperatures below 0 °C/ 32 °F	
GEARBOX OIL	0.150	0.039	Engine oil SAE 15W-40	XPS Kart-Tec
SPARK PLUG			see IPC	NGK

NOTES

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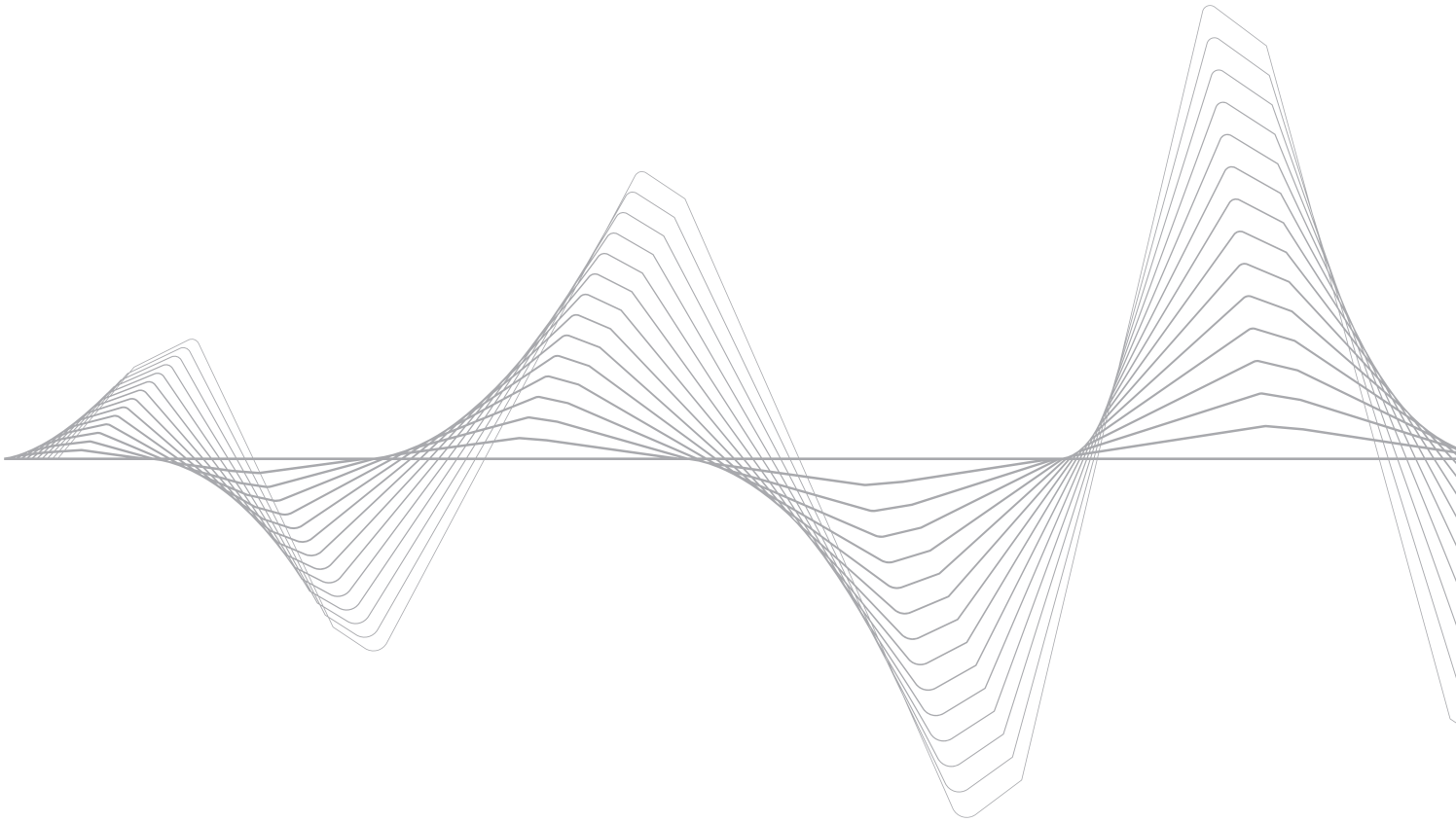

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