

TC 250

Engine

The 250cc 2-stroke engine has for many years been the best combination of unsurpassed power within a lightweight construction. The simplicity and low maintenance cost of the 2-stroke motor has made it a favourite amongst motocross riders for generations. All the latest innovations feature on the latest generation TC 250 to maintain its best-in-class performance.

With more than 53 hp, and an overall weight of just 23.9 kg, the engine sets the benchmark in the competitive 250cc class. Many national championships now allow 250cc 2-strokes to race in the MX2 category which makes the TC 250 the perfect machine to compete against 4-strokes with.

The lightweight engine provides more torque than any 250cc 2-stroke on the market without losing its typical high-revving, lightweight 2-stroke character. The engine is designed to centralize rotating mass for optimal operation within the chassis which creates a light and agile handling feel.

A fuel injection system (Keihin EFI, Ø 39mm throttle body in combination with Vitesco EMS) and an electronic exhaust control allow for a more compact engine design. This technology also allows for a tailor-made power delivery in each gear and for every situation.

Draining noses for liquids and added service markers on the engine (▲) clearly show where to use washers, making maintenance and service incredibly easy. Additionally, the aluminium diecast water pump cover is shared among all 2-stroke engines, making it easy for dealers to supply spare parts in the rare case it's needed.

The engine alone makes it easier to go faster for everyone, from beginners through to seasoned professionals.

- Pinnacle of performance → over 53 hp, 23.9 kg
- No jetting changes required → 2 stroke EFI technology
- Mass-centralisation → significant benefits in handling and manoeuvrability
- Easy serviceability of engine internals → service markers and draining noses for liquids

Cylinder head

The cylinder head features an external water temperature sensor for a clear indication of the engine's running condition. A "front" indication makes it close to impossible to mount the cylinder head the wrong way, which not only helps mechanics but also riders servicing engines by themselves.

The combustion chamber inserts follow the same logic. Mixing up inserts from different models will be a matter of the past. All these details significantly improve the overall engine serviceability.

Motocross specific cylinder timing and porting results in a high compression ratio for the TC 250 and no compromise between the TC and TE range.

- "Front" indication on cylinder head → avoiding wrong installations

- Specific combustion chamber inserts → impossible to mix-up with inserts from other models
- Motocross specific cylinder timing and porting → pure motocross performance

Cylinder

The cylinder features a 66.4 mm bore. The highly innovative electronic exhaust control manages the opening of both the main exhaust and lateral exhaust ports via an actuator. On the TC 250, the lateral exhaust ports open before the main exhaust port opens to deliver controllable power.

The machined finish on the upper contour of the exhaust port ensures accurate port timing delivering unrivalled performance in every situation.

- Electronical exhaust control → tailormade, linear and predictable power delivery
- Machined exhaust port → outstanding performance and controllability

Crankshaft

The crankshaft is designed with weight reduction in mind to increase the liveliness and response of the engine. The perfect balance of rotating masses is achieved by balancing the weights of the crankshaft flywheel, the rotor, and the counter balancer shaft. With a perfect combination of these components, vibrations are kept to an absolute minimum. Engine internals are also positioned to ensure that the rotational mass created has very little effect on the handling of the motorcycle.

- Lightweight crankshaft → responsive engine character
- Combination of crankshaft, rotor, and counter balancer shaft → minimal vibration

Crankcases

The TC 250 engine is designed with mass centralization and weight minimization as a key theme. As a result, the lightweight engine casings are developed to house the shaft arrangements in the perfect position, centralising oscillating mass, and improving rideability. The casings are manufactured using a high-pressure die cast production process, resulting in thin wall thickness while retaining exceptional reliability.

The black powder coating provides additional durability to the engine cover while service and oil level markings improve the serviceability. Additionally, the engine is connected to the frame with symmetrical engine mounts (left and right side) resulting in an optimized flex characteristic.

- Light and compact crankcase, optimised mass-centralisation
- Symmetrical engine mounts
- Easy serviceability of engine internals with added service markers and draining noses for liquids

Counter balancer shaft

The TC 250 features a laterally mounted counter balancer shaft. This shaft significantly reduces vibrations resulting in a smoother and more comfortable ride with less rider fatigue.

- Counter balancer shaft → significantly reduced vibration

Electronic Fuel Injection (EFI)

The TC 250 features Electronic Fuel Injection. In cooperation with Keihin, a 39 mm throttle body was developed to fulfil the needs of the innovative, and state of the art 2-stroke injection system. The Electronic Control Unit (ECU) comes from Vitesco and works in harmony with the Keihin throttle body by always delivering the right amount of the fuel/air mixture. Therefore, the ECU continuously analyses water temperature, air temperature, ambient pressure, pressure within the crankcase, rpm, and throttle position to calculate the perfect fuel/air mixture for any riding situation.

Composite flaps on the outside of the reed valve case provide exceptional sealing of the intake tract. This design prevents excess fuel build-up in extreme up or downhill sections which can lead to overly rich engine settings. Industry leaders Boyesen Inc. supplies the carbon membranes for the reed valve.

A beneficial side effect of the Electronic Fuel Injection and the ECU is the implementation of the innovative electronic exhaust control.

With all of this innovation, the TC 250 features two engine maps. Map 1 is the standard, more mellow map for linear, predictable power, while Map 2 is the aggressive map for added throttle response and a more explosive power output. Either map can be selected via the 2-stroke Map Select Switch on the left side of the handlebar.

- EFI by Keihin (39mm throttle body) → optimal power delivery and performance in any condition (no more re-jetting)
- Updated reed valve case design → guarantees right fuel/air mixture even in the most extreme up or downhill sections

E-Start

The TC 250 comes with electric start as standard. A kickstart is not in place and cannot be retrofitted. The starter motor comes without any intermediate shaft, saving weight and allowing a compact engine design with perfect integration. A robust but also compact cover protects the starter motor from damage caused by roost or rocks. The 12,8V 2 Ah Lithium-Ion battery is placed under the rider's seat close to the centre of gravity. The engine can be started easily by pressing the combined start/stop switch on the right side of the handlebar. A high-quality stator and pickup from Mitsuba are built into the engine for outstanding reliability and an efficient power supply for the electronics.

- Electric start → less time lost if the engine is stalled and ease of use
- High-quality stator and pickup from Mitsuba → advanced reliability and efficient power supply for electronics

Gearbox

The TC 250 features a 5-speed gearbox manufactured exclusively by Pankl Racing Systems with motocross specific ratios. Additionally, precise and easy shifting is guaranteed thanks to the shift lever which prevents the build-up of dirt from blocking the lever tip in the toughest conditions thanks to its clever design.

- 5-speed gearbox → precise and easy shifting
- Gear lever → optimal leverage, smoother and precise shifting
- Friction optimized shifting mechanism → less lever force required

Clutch

The TC 250 features a Damped Diaphragm Steel (DDS) clutch. The exclusive characteristics of this system include a single diaphragm steel pressure plate instead of traditional coil springs. It integrates a damping system for better traction and durability. The clutch basket is a single-piece, CNC-machined steel component that allows the use of thin steel liners and contributes to the compact design of the engine.

- DDS clutch → light action with integrated damping system, increased traction, and reliability

CNC-machined steel clutch basket → consistent modulation and exceptional durability