

TECHNICAL SPECIFICATION OF THE RICHARD MILLE TOURBILLON RM 009 FELIPE MASSA

This Richard Mille tourbillon wristwatch, developed in conjunction with the Formula 1 racing driver Felipe Massa and named after him, has been produced in a limited edition of 25 numbered watches. This experimental series represents the first time in the history of horology that a movement baseplate has been manufactured in Aluminum-Lithium and represents years of research and development. The watchcase is the world's first application of ALUSIC (Aluminum AS7G-Silicium-Carbide) in watchmaking. The objective of this experimental application of materials contained a dual challenge: the creation of the lightest mechanical watch ever made, and the realization of a tourbillon model able to endure vibrations, accelerations, decelerations and shocks in order to be a reliable companion for Felipe Massa during his tests, practice runs and Formula 1 races.

CALIBER RM 009 FM: Manual winding tourbillon with hours and minutes.

Dimensions: Length 45 mm x 37.80 mm (widest point) x 12.65 mm (thickest area)

RICHARD MILLE

MAIN FEATURES

(MANY OF WHICH ARE MAJOR TECHNICAL INNOVATIONS)

BOTTOM PLATE MADE OF ALUMINIUM-LITHIUM ALLOY

This alloy, normally only used in the aviation industry (most notably the new AIRBUS A 380), is made of lithium, aluminum, titanium, zirconium, chrome-silicium, zinc and manganese. Lithium within the alloy provides improved resistance and elastic modulus among other characteristics, but paradoxically it also reduces density. In fact, the density of this exceptional material is 2.6 while titanium is 4.9. Aluminum-Lithium was also selected from the aluminum alloys because of its high resistance to corrosion.



BRIDGES AND TOURBILLON CAGE IN TITANIUM AND ALUMINIUM/COPPER/MAGNESIUM

BRIDGES WITH SPLINED SCREWS IN GRADE 5 TITANIUM

TEETH OF BARREL AND THIRD WHEEL PINION WITH CORRECTED INVOLUTE PROFILE

The corrected profiles of the teeth allows a double pressure angle of 10° and 20°, thus effectively promoting smooth movement and compensating possible variations of engagement. This ensures excellent torque transmission and a distinct improvement in performance.



CALIBER RM 009 FM

OTHER CHARACTERISTICS

MOVEMENT DIMENSIONS: 30.20 x 28.60 mm

THICKNESS: 6.35 mm

DIAMETER OF THE TOURBILLON CAGE: 10.90 mm

DIAMETER OF THE BALANCE WHEEL: 10 mm

NUMBER OF JEWELS: 19

BALANCE WHEEL: GLUCYDUR, 2 arms.

MOMENT OF INERTIA: 10 mg/cm², lever angle 53°

FREQUENCY: 21,600 vph (3 Hz)

POWER RESERVE : 48 hours

BALANCE SPRING: ELINVAR by NIVAROX

SHOCK PROTECTION: KIF ELASTOR KE 160 B28

STONE SETTINGS: in titanium

BARREL SHAFT: in chronifer without nickel (DIN x 46 Cr 13 + S),

which has the following characteristics: non-oxidizable - antimagnetic - hardened.

FINISHING

MOVEMENT

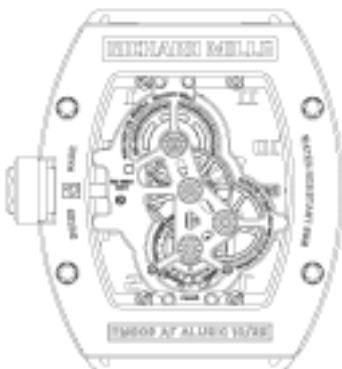
- Anglage and polishing by hand
- Locking sections hand polished
- Sapphire blasted milled sections
- Lapped and polished contact points
- Burnished pivots

STEEL PARTS

- Sapphire blasted surfaces
- Satin-finished surfaces
- Anglage and polishing by hand

GEAR WHEELS

- Concave chamfering with a diamond tool
- Circular finished faces
- Gilding (before cutting the teeth)
- Minimum manual correction to the wheels undertaken in order to preserve geometry and performance.



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CALIBER RM 009 FM

WATCHCASE

This was the subject of four years of research and development. This case is made of ALUSIC (AluminiumAS7G-Silicium-Carbon alloy), an exclusive material reserved solely for use in exceptional satellites, due to its enormous cost and its resistance to manufacturing processes. With a density of 2.95, its high wear resistance and superior level of rigidity combined with low weight allows the total watch (case and movement) to weigh less than 30 grams.

The design and execution of the watch demonstrate a complete conceptual approach to the movement, case and dial. As a result, everything has been constructed according to an extremely rigorous specification, in the manner of the data processing used in the design of Formula 1 racing cars where the chassis and the engine are developed in complete harmony. For example, a casing ring is no longer used and the movement is mounted on chassis mounting rubbers (ISO SW) fixed by 4 titanium screws. Features such as these are evidence of uncompromising workmanship.

Tripartite case with water resistance insured by three Nitril O-ring seals with titanium tube driven in and glued.

Assembly with spline screws (12) in grade 5 titanium and abrasion-resistant washers in copper-nickel-zinc alloy.

CROWN

In grade 5 micro-blasted titanium, with double seal O-ring and collar in Alcryl.

CRYSTAL

Bezel side: in sapphire (1800 Vickers) with anti-glare treatment (2 sides).

Thickness: 1,20 mm

Case-back: in sapphire with anti-glare treatment (2 sides)

Thickness : at the center 1 mm and outer edges 1.73 mm

DIAL

In sapphire (thickness: 0.40 mm) with anti-glare treatment, protected by 8 silicone braces inserted in the upper and lower grooves.

FLANGE (upper and lower)

In carbon fiber with index points filled with approved luminous material.