

## **APRILIA RSV4 FACTORY**

**A revolutionary project and a unique history of victories on the racetrack have come together to create the RSV4. A supersport with absolutely exclusive racing technology, developed around the 4 narrow V cylinder engine developed from the technical know-how that has led Aprilia to victory on racetracks all over the world. Aprilia RSV4 hits the racetrack and the roads with one goal only: to win.**

**33 championships, 254 MotoGP World Championship wins and 8 Superbike victories : over the last two decades Aprilia has become a modern motorcycling legend.** The bikes from Noale have dominated tracks the world over thanks to the genial design, courage and extraordinary abilities of the technicians who pursued innovative solutions by experimenting, innovating and sometimes **revolutionising technical schemes that seemed to be unchangeable.** **Aprilia RSV4 FACTORY**, the bike that brings Aprilia back into the 2009 **Superbike World Championship**, is the product of this immense technical know-how. It is a highly technologically advanced motorcycle, **conceived for racing** and for this purpose **designed and developed by Aprilia together with the marque's Race Division**, the largest and most advanced of its kind in Europe and one of the most important in the world.

**Aprilia RSV4 FACTORY** is a **racing machine** that, in line with the Aprilia tradition, follows a **completely innovative approach in its design and construction.** Its **narrow V engine**, the use of **state-of-the-art electronics**, plus its **lightness** and **extreme compactness** are only a few of the features that make it unique in the world. Aprilia **RSV4 FACTORY** is designed and built with the same philosophy adopted by the **Aprilia race division.** This is why **RSV4 FACTORY is the most "complete" Superbike racing replica, ready for those who want to venture onto the track with a class leading motorcycle.**

The **engine** of the **RSV4 FACTORY** is the **most innovative and powerful Aprilia has ever built.** It is a **super compact 999.6 cc 65° V-four cylinder engine** designed for **maximum power (180 CV)**, where powerplant engineering comes together with the **finest materials** and the **most advanced electronic control solutions.** Aprilia's engine, in fact, uses a **Ride by Wire** multimap technology, a solution that opens up new frontiers for engine management, with practically infinite possibilities for further development.

Besides the triple map Ride by Wire system, a **sophisticated electronic injection system** with **two injectors** and **adjustable height ducts** are fitted.

**Aprilia RSV4 FACTORY** is an **absolute supersport motorcycle, the most complete bike available on the market for bike fans**, and its **chassis** confirms this: designed for the racetrack, it has adjustment features that are typical of racing motorcycles. The **adjustable geometry chassis** allows parameters such as **the position and inclination of the headstock**, the height of the **swingarm** pin and even that of the **engine** to be changed. The **construction technology** is also motorsports-derived: the **RSV4 FACTORY chassis** and **swingarm** are made of **aluminium** with variable section castings and pressings.

The **components** are the state-of-the-art in motorcycling technology: **Öhlins Racing fork, rear monoshock** and **steering damper, Brembo monobloc callipers, forged aluminium rims.**

**Aprilia RSV4 FACTORY is the new benchmark in the street legal superbike sector.** The unique characteristics of the bike are listed as follows:



- **Compact, innovative design**
  - **New - and unique - 65° V-four cylinder engine**
  - **Multi-adjustable perimetral aluminium alloy frame**
  - **Adjustable engine position relative within frame**
  - **Asymmetric aluminium swingarm**
  - **Öhlins Racing full adjustable fork and rear monoshock.**
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- **DESIGN: the quest for ultimate compactness**

**Creating the most compact, innovative and gorgeous supersport bike on the market:** a tough and intriguing challenge for Aprilia's style department! This is how **RSV4 Factory** was created, a motorcycle that sets new performance and riding standards while **opening new horizons in ultra-sports motorcycle design**. Just a few simple and distinctive styling elements highlight rather than conceal the specific technical features of the **Aprilia RSV4 Factory**. **Its frame and engine stand out as fundamental elements of the motorbike's design.**

In line with Aprilia traditions, the design of **RSV4 Factory** does not focus merely on looks but it **serves technology and performance**. Every detail has been conceived not just to be **unique and beautiful**, but also and above all to be **efficient**.

The needs of the optimised dynamic intake system feeding the V4 defined the **strong-charactered front**, with **extra-large air intakes** that not only develop considerable overpressure in the airbox (approx. 35 mb @ 280 km/h), but also completely separate the headlamps from the bottom of the fairing. This results in **an absolutely unique style**, never seen before on a sports motorcycle. The look of the **RSV4 Factory** is absolutely original, technological and definitely aggressive. **The triple headlamp** cites the original Aprilia maxi sportsbike, that RSV that set new standards for sports twins in 1998.

**Smaller, lower and narrower than any 4 cylinder bike before**, the RSV4 Factory's **extreme compactness** is its strength, together with an almost obsessive pursuit of perfect **ergonomics** (crucial for perfect riding control), which has always distinguished Aprilia's road and World Championship dominating motorcycles.

In depth aerodynamic studies **minimised surfaces** without compromising the bike's class-leading aerodynamics. **The spectacular, ultra-compact tail fairing** is one of the most distinctive features of this motorcycle. **The LED taillight merges stunningly into the tail**, offering excellent luminosity. Even **the rear** of the RSV4 Factory is absolutely **unmistakable**.

- **ENGINE: an exclusive 65° V4**

The pursuit of **maximum engine performance** in a supersport motorcycle must be accompanied by a **perfectly positioned engine in the frame**. Mass centralisation, swingarm length and optimum **weight distribution** are ingredients for achieving the most competitive bike, together with the pursuit of maximum power and perfect power delivery.

Aprilia engineers have known for years that a **narrow V engine layout** is the **ideal technical solution** for obtaining a **class-beating chassis architecture** that emphasises the **performance**

**of the engine.** It is no coincidence that the RSV 1000 twin, launched in 1998, is still universally acknowledged as the sports motorcycle with the best chassis ever. Even the **multiple race-winning RSA 250 GP motorcycles (5 world championship victories in the last three seasons)** produced by **Aprilia's race division** have a V engine. Aprilia was able to draw from its **extensive expertise gained in years of unrivalled supremacy in the Motorcycle World Championship**; hence, when the time for defining the new Superbike came, after evaluating all possible solutions, a **narrow V engine** was chosen. A **65° V-4 cylinder engine**, the only solution that could ensure **unparalleled performance**, enabling the outstanding chassis architecture that has defined all Aprilia racing motorcycles for the past twenty years.

Besides the exclusive configuration that makes the 65° V4 **unique around the world**, the technical advantages of the Aprilia four-cylinder engine can be summarised as follows:

- **Perfectly integrated into the frame**, with optimal mass centralisation and minimised inertia for benchmark agility.
- **Absolute slimness**, its overall width is comparable to that of a twin cylinder motorcycle, with huge benefits in terms of ergonomics and aerodynamics.
- The compactness of the engine makes a **very oversquare cylinder layout possible**, using large bores and subsequently **larger valves**, helping the engine breathe more freely and achieve **higher engine speeds** (14,000 usable rpm).

The engine was **entirely developed by Aprilia's Research and Development Division**, aiming at offering record performance and reliability in compliance with the strictest reliability and quality standards.

Aprilia's V4 design exploited the most powerful calculation programmes currently available on the market, **resulting in a highly optimised engine layout**. By slightly opening the angle of the V (with respect to a 60° V engine), the designers could make use of the larger space to **optimise the inlet ducts** and **maximise engine efficiency**. The RSV4 engine has **class-leading fluid dynamics attributes** that no narrow V engine can match.

**The unique timing system** makes **extremely compact heads possible** (measuring only 250 mm high at the rear), especially in the area beneath the frame spars, which are thus much narrower than would otherwise be possible. The **lateral timing chain** drives the intake camshaft only and follows an optimised path for improved timing precision and chain durability.

A **gear pair** at the centre of the cylinder bank transmits drive to the exhaust camshaft. This solution made it possible to obtain an **extremely compact head** in the exhaust area. **The V4 is even more compact than the V60 Magnesium twin** mounted on the RSV 1000 R.

**A countershaft** dampens vibrations even more than in a 90° V engine. **The crankcase is a monobloc configuration with integrated cylinder liners** for **maximum rigidity** and **consistent performance**.

### **Electronics of the Future**

Aprilia's RSV4 Factory engine features **full Ride by Wire technology**. There is no direct connection between throttle grip and the **throttle valves**, which are completely controlled by a latest generation Marelli control unit.

**Each bank has a dedicated servo unit actuating the two relevant throttle bodies only.** Hence the two banks, and subsequently the quantity of fuel injected, can be managed independently. While this solution has been tried and tested by Aprilia, it has never been applied before on such a powerful engine, thus **opening up practically infinite possibilities for power delivery control**.



This technology immediately benefits the rider who, thanks to the **triple mapping that can be controlled directly from the handlebar**, can change the engine delivery mode and thus the motorcycle's temperament at any time.

The fuel supply uses **two injectors per cylinder**: one injector is placed downstream of the throttle valve and a "shower" injector is placed in the airbox and starts working at high loads and revs. The technological excellence of the V4 engine is complemented by **electronically controlled variable length intake ducts**. At low revs and loads, **the long duct favours torque and smooth power delivery**. When top performance is required, the upper part of the intake duct raises, thus **shortening the duct** and leaving the engine free to **express its full power potential**. A **butterfly valve in the exhaust** further optimises power delivery.

The **transmission** was also designed according to the most advanced criteria. To underscore the **racing soul** of the V4 engine, **a cassette gearbox is used**, with a multiplate wet clutch disc equipped with a mechanical **slipper system** to optimise engine braking torque and ensure **stability under hard braking**.

Lastly, in order to minimise weight, Aprilia's new engine makes large use of **ultralight materials**; all valve covers and external housings are made from **magnesium**.

## THE V4 ENGINE in Short

**Engine capacity:** 999.6 cc

**Architecture:** 65° V4

**Power:** 180 HP (132.4 kW) at 12,500 rpm

**Crankcase:** monobloc with integrated cylinder liners

**Timing system:** 4 valves per cylinder (Titanium and Nymonic) operated directly by a camshaft driven by a mixed chain/gear system (lateral timing chain, central gear train)

**Fuel system:** Magneti Marelli electronic injection with 2 injectors per cylinder and integrated independent Ride by Wire system for each bank. Three mappings selectable from handlebar. Electronically controlled variable length intake ducts

**Antivibration countershaft**

**Maximum rpm:** 14,100 rpm

**Compression ratio:** 13:1

**Transmission:** 6-speed direct-control cassette gearbox

**Clutch:** multiplate wet clutch with mechanical slipper system

**Exhaust system:** 4 into 2 into 1 headers with oxygen sensor and single silencer with integrated catalytic converter and butterfly valve.

- **CHASSIS: Aprilia's entire racing know-how**

A unique engine like Aprilia V4 could be nothing but combined with an extraordinary chassis that stresses the uniqueness of this motorcycle. Years of races and victories at the top level melts into a **racing chassis** implemented by Aprilia's research and development department, with construction solutions and adjustments that only racing prototypes can boast.

**RSV4 Factory reaps the rewards of Aprilia's entire racing experience.**

Perfect **mass centralisation** was a must when the RSV4 Factory frame was being developed. Everything was designed in order to achieve the best possible result, starting from the **tank**

**position** (crucial for riding) with **most of the fuel under the saddle** in order to optimise motorcycle balance and eliminate any riding differences between full and empty tank. There is no doubt: **Aprilia RSV4 Factory is a true track-ready motorcycle, and a front/rear weight distribution of 52/48 confirms this.**

### Frame

In line with Aprilia race division traditions, the RSV4 structure uses castings and aluminium pressings that are welded to create a far more rigid frame than that of the RSV 1000 twin, which was already a benchmark. In particular, torsional and flexural rigidities were optimised in order to offer perfect feeling and control as well as the ability to handle high power outputs such as those of the Superbike version.

Notwithstanding the higher performance, the **RSV4 Factory frame** weighs almost the same as the RSV, at **only 10.1 kg**, a lightness matched only by racing frames. The **special construction technology** also allows both the **frame** and the **swingarm** to show the **natural and shining colour of the aluminium**, which makes the appearance of the RSV4 Factory very similar to that of a racing prototype.

Designed using the **knowledge acquired during GP racing**, the spectacular swingarm of the RSV4 Factory, like its frame, is made by **combining castings** (the internal part and the swingarm pin/wheel connection areas) with **aluminium bent sheet elements** (the external part) to form a **very rigid but super light box section** capable of minimising the moving masses, exalting the reactivity and sensibility of the motorcycle to the suspension adjustments. The **asymmetric conformation**, with an arch section on the right side and a reinforcing arch on the left, made it possible to implement an **exhaust system with optimised internal volumes** without penalising the rigidity of the swingarm. Here too, FEM modelling was used in the design process to **optimise cross sections and thicknesses**. The **swingarm of the RSV4 Factory weighs only 5,100 grams**, close to the absolute standard threshold for this technical element.

The desire to offer **the first four V cylinder "race ready" superbike in the world** led Aprilia to find **unique solutions** that will hardly be found on competitors' bikes even in the years to come. In order to boost chassis performance and make it match the rider's style and wishes, or features of the track, **Aprilia RSV4 Factory ensures a combination of adjustments that are pretty much infinite**. The **multi-adjustable suspensions**, taken for granted on a motorcycle of this level, are combined with **adjustments of the headstock position and rake** (through interchangeable bushings), **the rear end height, the swingarm pin height and - introducing a new capability exclusive to this bike - the engine position in the frame**. **Aprilia RSV4 Factory is the most highly adjustable production motorcycle in the world, just like a real race bike.**

### Suspension

**The Öhlins Racing upside-down** fork has 43-mm stanchions and is titanium nitride coated to minimise friction. The wheel travel is 120 mm. Like in race motorcycles, the fork allows precision adjustment for hydraulic compression and rebound damping and spring preload.

**The Öhlins Racing rear shock absorber** is equipped with a "Piggy Back" nitrogen canister and can be **adjusted for spring preload, compression and rebound damping and length**, thus allowing the height of the rear end of the bike to be changed to adjust the set-up to the different riding styles and tracks. The wheel travel is 130 mm.

The motorcycle is also equipped with an **Öhlins Racing adjustable** steering damper.

## Brakes

**The front system** is without a shadow of a doubt the best system available on the market. **Brembo monobloc radial callipers** are the state-of-the-art in racing braking systems thanks to their **power**, high **modulability** and **fatigue resistance**.

The **dual 320-mm diameter stainless steel floating discs** are completely new and were developed by Aprilia specifically for this motorcycle. A rotor with reduced height and asymmetric perforation were used, allowing the braking power to be improved and the front wheel to be lightened by approximately 500 grams. The floating retainer is fastened to the flange with 6 pins only in order to **minimise inertia and weight**.

The brake pump is the radial type to **improve lever feel and response accuracy**. The rear braking system is Brembo "Serie Oro" **with 220-mm diameter stainless steel disc and two-piston caliper, with racing-type pump and integrated tank**.

## Rims

The search for greater **lightness** led to implementation of **new forged aluminium rims**. The **original design** further **decreases the weight** (approximately 1 kg less than the RSV 1000 twin) which, together with the new brake discs, minimises unsprung mass and rotating mass inertia, benefiting motorcycle responsiveness.

## Components

A real Superbike is special not only as far as performance is concerned but also for the **care** it is built with. With regard to the RSV4 Factory, the **details** say it all: **no other "race ready" motorcycle has ever been built with such care**. The **attention paid to its construction** not only satisfies the desire for beauty (a motorbike built like RSV4 Factory is in any case gorgeous), but most of all aims at achieving the goal: to win. This is why every detail was thought out to **increase performance and functionality, reducing the weight and considerably increasing the product's quality and finish**.

**The following components are worth pointing out:**

- **Instrument panel:** the mixed type (digital-analogue), it receives all the information from the **CAN line** and becomes **an integral and crucial part of the self-diagnosis system** as it is fitted with memory. It is a real **onboard computer**, fitted with a dot matrix display inserted in a **minimal, extremely modern and compact design** that provides all the information relating to the use of the motorcycle, including: shift light, engaged gear indication, indication of the engine map being used and chronometer with time storing memory. Its functionality was improved to reach a level that is even better than that of the best products available on the market, **all use modes are controlled** from the left hand switchgear unit so the hands can always remain on the handlebar.

- **the front headlamp** uses **three elements** that call to mind of the first RSV 1000 twin, proving to be perfectly integrated, even from the structural point of view, with the top fairing and creating a very distinctive front. The parabolic mirror was designed with modern calculation systems that led to an excellent result: **maximum visibility** at night with reduced weight and size.

- **The electrical system** was designed in order to achieve maximum functionality, rationality and minimum weight: the result is an extremely clean and compact layout that makes maintenance operations easier and is preset for **use on the racetrack** as the parts dedicated to the headlamps can be easily removed. Even the **turn indicators** - with the **front indicators** incorporated in the rear view mirrors and the **rear indicators** in the license plate holder – can be **removed quickly** for **use on the track**, the real hunting ground of Aprilia RSV4 Factory.

- **ACCESSORIES**

A **complete range of accessories** is available for Aprilia RSV4 fans:

- Akrapovic racing exhaust system
- Öhlins TTX36 rear shock absorber
- adjustable footpegs
- racing half-handlebars
- fairing protection pads
- high top fairing
- fairing caps for rear mirrors
- rear stand pins
- license plate retainer cover
- motorcycle cover
- dedicated stand
- carbon heelrests
- tank cover with backpack
- tail fairing bag
- carbon exhaust system protection
- carbon fairing pullers.

Then there is a series of options - many of which designed and manufactured specifically for racetrack use. Complementing these options are a dedicated **suit** and **helmet**.



## APRILIA RSV4 FACTORY: Technical Specifications

<b>Engine type</b>	Aprilia longitudinal 65° V-4 cylinder, 4-stroke, liquid cooling system, double overhead camshafts (DOHC), four valves per cylinder
<b>Fuel</b>	Unleaded gasoline
<b>Bore and stroke</b>	78 x 52.3 mm
<b>Total engine capacity</b>	999.6 cc
<b>Compression ratio</b>	13:1
<b>Maximum power at crankshaft</b>	180 CV (132.4 kW) at 12,500 rpm
<b>Maximum torque at crankshaft</b>	115 Nm at 10,000 rpm
<b>Induction and fuel system</b>	Airbox with front dynamic air intakes. Variable length intake ducts controlled via ECU. 4 Weber-Marelli 48-mm throttle bodies with 8 injectors and latest generation Ride-by-Wire engine management. Choice of three different engine maps selectable by the rider with bike in motion Track Sport Road
<b>Ignition</b>	Magneti Marelli digital electronic ignition system integrated in engine control system, with one spark plug per cylinder and "stick-coil"-type coils
<b>Starter</b>	Electric
<b>Exhaust system</b>	4 into 2 into 1 layout, single oxygen sensor, lateral single silencer with engine control unit-controlled butterfly valve and integrated trivalent catalytic converter (Euro 3)
<b>Alternator</b>	Flywheel mounted 420W alternator with rare earth magnets
<b>Lubrication</b>	Wet sump lubrication system with oil radiator and two oil pumps (lubrication and cooling)
<b>Gearbox</b>	6-speed cassette type gearbox 1 <sup>st</sup> : 39/15 (2.6) 2 <sup>nd</sup> : 33/16 (2,063) 3 <sup>rd</sup> : 34/20 (1.7) 4 <sup>th</sup> : 32/22 (1,455) 5 <sup>th</sup> : 34/26 (1,308) 6 <sup>th</sup> : 33/27 (1,222)
<b>Clutch</b>	Multi-disc oil-bath, with mechanical slipper system
<b>Primary drive</b>	Straight cut gears and integrated flexible coupling, drive ratio: 73/44 (1,659)



<b>Secondary drive</b>	Chain: Drive ratio: 40/16 (2,5)
<b>Chassis</b>	Twin-spar adjustable aluminium frame, with castings and pressings. Envisaged adjustments: <ul style="list-style-type: none"><li>• headstock position and rake</li><li>• engine height</li><li>• swingarm pin height</li></ul> Öhlins adjustable steering dumper
<b>Front suspension</b>	Öhlins Racing upside-down fork, 43-mm stanchions (with Tin surface treatment). Low profile forged aluminium radial caliper mountings. Completely adjustable spring preload and hydraulic compression and rebound damping. Wheel travel: 120 mm
<b>Rear suspension</b>	Twin sided aluminium swingarm; mixed low thickness and sheet casting technology. Öhlins Racing monoshock with piggyback with completely adjustable: spring preload, wheelbase and hydraulic compression and rebound damping. APS progressive linkages. Wheel travel: 130 mm
<b>Brakes</b>	Front: Dual 320-mm diameter floating stainless steel disc with lightweight stainless steel rotor and aluminium flange with 6 pins. Brembo monobloc radial callipers with 4 34-mm opposite. Sintered pads. Radial pump and metal braided brake hose  Rear: 220-mm diameter disc; Brembo floating caliper with two 32-mm isolated pistons. Sintered pads. Pump with integrated tank and metal braided hose
<b>Rims</b>	Aprilia forged aluminium alloy rims, completely machined, 5 split spokes. Front: 3.5"X17" Rear: 6"X17"
<b>Tyres</b>	Radial tubeless. Front: 120/70 ZR 17 Rear: 190/55 ZR 17 (alternative: 190/50 ZR 17)
<b>Dimensions (default settings)</b>	Max. length: 2040 mm Max. width: 735 mm (at the handlebar) Max. height: 1120 mm Min. height from the ground: 130 mm Saddle height: 845 mm Centre to centre distance: 1420 mm Trail: 105 mm Steering angle: 24.5°
<b>Kerb weight</b>	179 kg *
<b>Tank</b>	17 litres (4-litre reserve included)

\*Dry weight, without battery and fluids.