

# The new BMW F 800 R. Contents.



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# 1. Overall concept and vehicle properties.



BMW most recently struck out on a new path in the segment of medium category motorcycles with the F 800 series launched in 2006. In addition to the sporty F 800 S, the first model variation to be presented, and the F 800 ST with its touring capabilities, the fourth BMW Motorrad engine series was supplemented in 2007 with the F 800 GS and the F 650 GS – two dynamic enduro models in the very best BMW GS tradition.

With the new F 800 R, BMW now takes the logical step of expanding the F 800 model series further by presenting at the EICMA 2008 – the Milan motorcycle show - a sporty roadster in the segment of medium category naked bikes designed for a high level of riding dynamics and maximum riding fun. Alongside the two roadsters R 1200 R and K 1300 R, this is now the third BMW roadster to see its world premiere in the BMW Urban world of experience: the new F 800 R, the dynamic BMW naked bike for the medium category.

The engine of the F 800 R is the parallel twin with 4-valve technology and a capacity of 798 cc, already familiar from the F 800 S.

While the highly distinctive in-line 2-cylinder engine of the previous models was especially impressive due its pulling power, spontaneous response and low level of fuel consumption, the new model now reflects a further optimisation of engine and throttle response thanks to a new throttle valve kinematic system.

The rated output of the engine is 64 kW/87 bhp at approx. 8,000 rpm and produces a torque of 86 Nm at approx. 6,000 rpm. The mass compensation of the parallel twin is implemented by a system which is still unique in serial production motorcycle construction in which an additional swivel rod compensates the first-order and second-order mass forces, ensuring that the 2-cylinder engine runs with an unusually low level of vibration which is especially pleasant for the rider.

Closely based on the big BMW roadster K 1300 R in its design, the distinctively sporty F 800 R with its orientation towards a high level of riding dynamics delivers just what its dynamic exterior promises. From standing, the F 800 R possesses considerable sprinting power. What is more, shorter gear ratios

in fourth to sixth gear ensure improved continuity; in conjunction with the excellent pulling power of the two-cylinder this makes for a highly agile and sporty performance.

Important contributions to the outstanding dynamics of the new F 800 R are also made by the low dry weight of approx. 177 kg or approx. 199 kg fully fuelled and the chassis with double-sided rear-wheel swing-arm which is especially adapted to the requirements of a sporty naked bike. In accordance with the style and purpose of a sporty naked bike, the new F 800 R also has a secondary drive with O-ring chain.

In line with the demands of a dynamic roadster, the chassis is designed for excellent handling, agility and steering precision, and therefore maximum riding fun on winding country roads, though without compromises in terms of directional stability at high speeds, for example when riding on the motorway.

The streetbike freestyle world champion Christian Pfeiffer provides a foretaste of just how playfully the rider can handle the F 800 R. For over two years now he has ridden a version of the F 800 S exclusively tailored to his needs at international competitions and shows: the similarity of this bike to the current F 800 R is by no means coincidental. In future, the motorcycle acrobat will be able to demonstrate his skills on a machine based on the new F 800 R.

But the new F 800 R boasts more than just sporting talent: in the very best tradition of BMW it also possesses classic virtues such as outstanding seating comfort for rider and pillion passenger as well as an exemplary level of safety. For example, the F 800 R is optionally fitted with an ABS whose newly developed pressure sensor provides an even finer regulation of the system and therefore even greater safety – especially in connection with sporty riding.

What is more, the extensive BMW Motorrad accessory program meets all customer demands in terms of individual fittings.

#### **An overview of the main features of the new F 800 R:**

- Compact, sporty naked bike with high level of riding dynamics and agility for maximum riding fun.
- Liquid-cooled parallel twin with 798 cc, 4-valve technology, dohc valve drive via cam followers and a unique mass compensation mechanism.
- Top output 64 kW/87 bhp at approx. 8,000 rpm, maximum torque 86 Nm at approx. 6,000 rpm.

- Enormous pulling power for maximum riding fun on country roads.
- Intake manifold fuel injection with electronic engine management BMS-KP, oxygen sensor, closed-loop 3-way catalytic converter and secondary air system for low fuel consumption and purified exhaust emissions.
- New throttle valve kinematics for even more sensitive throttle response and improved engine response, especially in the lower speed range.
- Six-speed transmission with shorter ratio of the three upper gears for increased riding fun and performance.
- Secondary drive via O-ring chain.
- Torsionally stiff aluminium frame with new double-sided swing-arm.
- Generously sized telescopic fork with 43 millimetres stanchion diameter.
- Very agile handling with very high degree of steering precision.
- Dry weight/road-ready weight: approx. 177/199 kg.
- Fuel tank positioned under seat for optimum centre of gravity.
- High-performance Brembo brake system with optimised ABS and newly adjusted pressure sensor system.
- Wide range of accessories.

## 2. Engine.



### **Powerful parallel-twin for characteristic roadster dynamic performance.**

The new F 800 R is fitted with the 2-cylinder in-line engine with cylinders tilted forward by 30 degrees: the engine is largely familiar from the F 800 S. With its full torque curve and spontaneous response at all engine speeds, it offers an excellent basis for use in a roadster designed for a high level of riding dynamics.

In the segment of medium category naked bikes, the 2-cylinder offers a number of technical highlights. As reflected in the engine designation parallel twin, the crankshaft has a crank offset angle of zero degrees. This means that the engine, installed transversely to the direction of travel, operates with an even firing sequence in which a combustion cycle is initiated at every rotation of the crankshaft. This results in an intentional similarity in sound to the flat twin "boxer" engines, which also operate at a firing angle of 360 degrees. In particular, the even firing sequence supports a balanced gas exchange cycle with high torque efficiency and a harmonious curve, thus fulfilling the basic requirements for a dynamic engine in a sporty naked bike.

### **Unique mass compensation for maximum running smoothness.**

The first and second-order mass forces which are unavoidable in 2-cylinder engines are neutralised by a unique compensation mechanism which is familiar from the existing models of the F 800 series. Instead of using the conventional method of so-called compensation or counterbalance shafts, compensation of oscillating mass forces is effected by means of a system of pivots which is linked centrally to the crankshaft with a specifically defined arrangement of counterbalance masses: a tappet on the crankshaft offset from the crank pins by 180 degrees carries a so-called compensation rod. This rod is hinged on a balance arm which is virtually horizontal. The kinematics of the system is designed so that the compensation rod moves up and down in the opposite direction to the two engine rods. Due to the fact that it runs via a relatively long arm, the rod head moves virtually in a straight line. The distribution of masses at the rod head and arm has been selected so that the mass forces resulting from the swivel movement counterbalance the oscillating mass forces of the crank drive (piston and rod elements) in every position. This almost entirely eliminates the first and second-order mass forces and makes for a very low level of vibration when the engine is running. Another great advantage of this elegant construction is its low noise level, since the typical engine noises of cogs and chains do not apply here.

### **Oil circulation with semi-dry sump lubrication.**

The oil circulation also has a number of special technical features which go beyond what is standard in this category of motorcycle. In order to minimise splash losses, the F 800 engine series has a semi-dry sump lubrication system. Any oil escaping from the main bearings of the crank drive runs into the sealed off shaft of the compensation system. An oil pump extracts the lubricant from here and distributes it to the oil jets in the gearbox. Oil escaping from the gearbox via gaps in the crankcase is collected together with the oil escaping from the cylinder head via the chain shaft in the remaining space of the crankshaft casing around the rod shaft. This space is thus used as an integrated oil tank. A second pump feeds all bearings from this reservoir.

### **High-tech cylinder head as in the current K 1300 models.**

Two overhead camshafts rotate in the engine of the F 800 R, driven by a chain drive and activating four valves per cylinder via cam followers. As a light, low-friction and high-rev-suitable cam follower construction, the entire valve drive is extremely low-wear in spite of the large valve stroke, making for generous maintenance intervals.

### **Injection with new throttle valve kinematics.**

Other characteristic BMW features are demonstrated by the fuel-mixture preparation which is carried out by an intake manifold fuel injection system with BMS-KP engine management and two 46-millimetre throttle valves. Here the engine management system controls the injection quantity not by means of the duration of injection but via the pressure provided by the fuel pump depending on the required level of power. The fuel system works without a return system and only transports the quantity which the engine actually needs. This power-saving quantity control means that fuel pressure can be adjusted across a wide range to achieve optimum carburetion. This unique principle is patented. In order to measure the quantity of fuel injected, not only are the familiar parameters such as load, engine speed and temperature used but also the residual oxygen content of the exhaust emissions. The relevant information is provided by an oxygen sensor positioned behind the junction of the manifold pipes: this is indispensable for effective conversion of exhaust emissions by the separate 3-way catalytic converter which is installed as standard in the F 800 R.

For the first time, a new throttle valve kinematic system is used in the F 800 R which ensures an even more sensitive throttle response and improved engine response. It was especially important to developers to make sure that the accelerator maintained a gentle, finely tuned response, especially in the lower

speed range. Great importance was also attached to an accommodating load-change response while retaining a spontaneous and agile engine response.

The air required for carburetion reaches the intake silence by means of an intake snorkel positioned ideally in the cool air stream. As in all models of the F 800 series, this favourable positioning above the engine and the large volume for enhanced torque is possible due to the shift of the fuel tank under the seat.

### **New exhaust system in dynamic design with separate catalytic converter.**

A new exhaust system with a separate catalytic converter has been developed for the F 800 R. This is no longer integrated in the silencer as in the F 800 S. As a result the silencer of the F 800 R, made entirely of high-quality steel and with a matt surface, is considerably shorter and contributes to the sporty, dynamic look of the new BMW medium category roadster. The engine management system has been adapted to the new circumstances.

A secondary air system enriches the exhaust gas with fresh air so that pollutant emissions are reduced to a minimum after treatment in the closed-loop catalytic converter.

### **High-revving and high-torque.**

As with the F 800 S, not only the state-of-the-art fuel injection system of the new F 800 R contributes to the bike's highly agile power delivery but also the low centrifugal mass. Even in the lower engine speed range, the not especially short-stroke 4-valve engine with its bore-stroke ratio of 82.0 to 75.6 millimetres quickly gains engine speed and delivers 90 per cent of its maximum torque at 5,000 rpm. Between 5,000 and 8,000 rpm the engine demonstrates impressive power delivery to the accompaniment of a unique sound. The rated performance figures of the 798 cc twin – 64 kW/87 bhp at approx. 8,000 rpm and 86 Nm at approx. 6,000 rpm – provide a high level of performance potential for the F 800 R, especially when riding on country roads.

### **Optimised gear spacing for increased riding fun.**

While the gear ratios for gears one to three are identical to those of the F 800 S, gears four to six have been adapted to more common use on winding country roads with a shorter ratio so as to increase riding fun, agility and riding dynamics.

In this way, the parallel twin of the F 800 R combines impressive pulling power with dynamic spring capacity. At the same it demonstrates that sporty performance by no means comes at the price of a high level of fuel consumption. When riding the bike on country roads, a fuel consumption rate of well below

5 litres of premium fuel to 100 kilometres is feasible, allowing for an impressive range of 300 kilometres or more with the 16-litre fuel tank.

BMW Motorrad also offers an ex-works power-limited version at no extra charge with 25 kW/34 bhp at approx. 7,000 rpm and 55 Nm at approx. 3,500 rpm, for motorcycle novices who hold a restricted licence, for example. The power reduction is implemented by means of an altered throttle valve system which limits the opening angle of the throttle valves.

**Sporty secondary drive with O-ring chain.**

In order to do justice to its sporty, dynamic orientation, the new F 800 R has been fitted with an O-ring chain for its secondary drive. This has proven its low maintenance and reliability and is in keeping with the especially dynamic appearance of a naked bike in this segment.



### 3. Chassis.



#### **Engine and chassis in perfect harmony.**

In the F 800 R as in all models of the F 800 series, the compact design of the engine and chassis provides the ideal basis for exemplary riding properties which set benchmarks in terms of agility and directional stability. The extremely torsionally stiff aluminium frame, familiar from the F 800 S and made of welded extruded sections and die-cast mould parts, ensures a virtually straight-line connection between the steering head and swing arm pivot point. In order to optimise weight and space, the engine is integrated in the chassis as a load-bearing element and its casing with reinforcement in the rear section also performs the function of a bearing for the new double-sided swing-arm in light alloy cast with a total of four needle roller bearings. The engine block is bolted to the frame immediately above the swing-arm bearing. The frame rear section in steel tubing is largely the same as that of the F 800 S and is connected to the main frame by means of four bolt connections.

#### **New double-sided swing-arm in sporty design.**

The new F 800 R is fitted with a double-sided swing-arm. Unlike single-sided swing-arms it is a highly filigree construction in light alloy cast, giving an especially agile and sporty look and highlighting the very dynamic overall character of the new F 800 R, especially at the rear.

For the front wheel suspension in the F 800 R, a telescopic fork is used with 43 millimetres of stanchion diameter and generous covering of the immersion tube and stanchion. The solid suspension system benefits not only directional stability but also steering response. Agile banking changes in the new F 800 R are carried out with a high degree of steering precision and a very direct sense of the front wheel – a guarantee of maximum riding fun on winding country roads. The spring-damper settings are adjusted for increased riding dynamics and the 125 millimetres of spring clearance ensure both outstanding comfort as well as solid road-holding. A steering damper is fitted as standard.

A new upper fork bridge forged out of light alloy, with steering stem clamps which are also forged, supports broad, butted light alloy handlebars. The fork stabilizer is also new, ensuring additional torsional rigidity and further increasing ride stability and steering precision.

Balanced weight distribution and a favourable total weight equally contribute to the excellent riding dynamics of the F 800 R. Road-ready and fully fuelled it weighs only approx. 199 kg – its unladen weight is approx. 177 kg.

The rear strut has adjustable rebound stage damping and an easily accessible handwheel for adjusting the spring pre-tension. Its spring-strut settings have been adjusted for use in the new F 800 R. A socket wrench enlarges the contact surface of the handwheel so the rider can quickly and easily adapt the spring pre-tension to different load conditions. Directly pivoted to the double-sided swing arm, the strut also provides 125 millimetres of travel.

### **Sporty wheel design.**

The F 800 R features the wheel design "Speed" of the F 800 S. In these light alloy die-cast wheels, the valve is mounted on the side, which makes checking the tyre pressure very convenient. The front wheel size is 3.5 x 17" with a 120/70 ZR 17 tyre, while the rear wheel is 5.5 x 17", allowing a size 180/55 ZR 17 tyre to be mounted.

### **Uncompromising Brembo brake system.**

With 320-millimetre steel brake discs and Brembo 4-piston fixed brake calipers for the front wheel, the F 800 R is fitted with a brake system which one would generally expect of a large-volume naked bike. The brake calipers work with sintered metal pads and the main brake cylinder has an adjustable lever as well as a separate storage container. At the rear there is a single-piston floating caliper on a 265 millimetre steel disc. High-quality steel-reinforced brake lines, been re-laid to meet the special requirements of the F 800 R, ensure a stable pressure point which can be clearly felt.

### **Optimised ABS with new pressure sensor.**

The new F 800 R can be optionally fitted with ABS. This BMW Motorrad ABS is distinguished not only by its compact construction and low weight but has also been further optimised for use in the F 800 R with a new pressure sensor. In keeping with the sporty function of the F 800 R, the re-adjusted pressure sensor system allows even more finely tuned regulation of the ABS, for example when going over bumps.

What is more, BMW Motorrad ABS provides integrated diagnosis functions. For example, wheel rotation sensors automatically monitor their distance from the sensor wheel, thus enhancing the bike's excellent safety level.

## 4. Electrical system and electronics.



### **Electrical system with CAN bus technology.**

The electrical system of the new F 800 R works with the progressive CAN bus system familiar from the existing models of the F 800 series. The Single Wire System (SWS) offers numerous advantages: it reduces the amount of wiring, allows all control units to be networked with each other and thus simplifies the provision of extensive diagnoses. What is more, safety fuses are no longer required because the system automatically deactivates the affected component in case of malfunction.

Since the introduction of CAN bus technology, an electronic vehicle immobilisation function has been a standard feature of most BMW motorcycles, and this also applies to the new F 800 R. The electrical plug connections are waterproof and thus insusceptible to faults. A powerful battery with a capacity of 14 Ah and a powerful alternator with an output of 400 watts provide the power supply.

### **Instrument panel in new design.**

The cockpit with its analogue instruments informs the rider at a glance. For the F 800 R the dials have been redrawn and adapted to the dynamic appearance of the F 800 R in terms of design. As a special equipment option, BMW offers an on-board computer which also provides a stopwatch function among other features.

The asymmetrical dual headlamps with the technology familiar from the F 800 GS give the new F 800 R a sporty, aggressive face and intentionally echo the design of the big roadster model K 1300 R. Two H7 headlamps ensure that the rider can see and be seen.

### **New electrical switch units.**

As in the new K 1300 models, the F 800 R features switches and controls of an entirely new generation. The new switch units use MID technology (Moulded Interconnect Devices; lasered conductors instead of individual wiring) and are thus much smaller and more compact while also offering a wider range of functions, clear design and optimum reachability.

The functions of the left and right direction indicators, previously separate, are now combined in a single function on the left-hand side of the handlebars.

Activation of the hazard warning lights is now taken care of via a separate switch integrated at the top of the left-hand handlebar panel. The functions for low beam, high beam and headlamp flasher have been combined in a single switch which can be conveniently operated using the left index finger.

The activation switch for the optional grip heating has been moved upwards for easier operability and the selected heating level can be seen in the instrument panel display. The functions for starter and kill switch have been practically combined in a single rocker switch. This prevents the starter from being activated when the ignition is interrupted if the kill switch is activated by mistake, potentially resulting in battery discharge.

The new technical design allows twice as many functions to be provided with the same number of switches as before. This is an important factor in the incorporation of additional features in the future.

## 5. Body and design.



### **Sporty, dynamic roadster design.**

With the F 800 R, BMW Motorrad has realised a design concept which deliberately highlights the connection with the large sporty 4-cylinder roadster K 1300 R.

Due to the light effect of the rear section and the compact combination of headlamps and instruments, the F 800 R appears short and compact, further emphasising the sporty look of this dynamic naked bike.

BMW Motorrad has also paid special attention to quality details in the immediate field of vision of the rider. For example, not only have the faces of the instrument panel been redrawn but also the upper fork bridge with steering stem clamps, milled covering caps and butted handlebars are finished in especially high-quality style.

As compared to the F 800 S, the seat height has been slightly lowered: this will especially benefit re-starters, infrequent motorcyclists and beginners who will find the bike easier to handle as a result. An additional option for the reduction of seat height is a lower seat from the BMW Motorrad equipment program.

Additional design parts for further individualisation of the F 800 R for example the Sport windshield, radiator trim panels, a pillion passenger cover and an engine spoiler are to be found in the extensive BMW Motorrad equipment program.

## 6. Equipment program.



### **Special equipment features and special accessories.**

BMW fulfils individualisation wishes not only with special equipment features fitted at the Berlin plant but also by means of retrofitted accessories which can be fitted by a local dealer or by customers themselves. The special equipment features and special accessories have been specially adapted to the new F 800 R so that the buyer acquires high-quality, perfectly fitting products which are in keeping with the character of the machine itself.

### **Special equipment features.**

- BMW Motorrad ABS.
- Heated grips.
- Lower rider seat (775 mm seat height).
- Higher rider seat (825 mm seat height).
- Anti-theft warning system.
- Tyre pressure control.
- On-board computer.
- Power reduction to 25 kW/34 bhp.
- LED direction indicators.
- Sport windshield (in body colour).
- Socket.
- Main stand.

### **Special accessories.**

- Heated grips.
- Luggage bridge.
- Mounting kit for pannier holder.
- Sports pannier with variable volume.
- Topcase, small.
- Inner bag, Topcase.
- Back pad, Topcase.
- Tank rucksack.
- Tank bag.
- Main stand (with mounting kit).
- Service tools.
- Lower rider seat (775 mm seat height).
- Higher rider seat (825 mm seat height).
- LED direction indicators.
- White direction indicators.
- Helmet cord safeguard.
- BMW Motorrad ZUMO including holder.
- Pillion passenger seat cover.
- Engine spoiler.
- Radiator trim panel, black grained, and radiator trim panel, aluminium.

- Sport windshield (three colours: Alpine White non-metallic, Fire Orange non-metallic, White Aluminium metallic matt).
- Sports silencer by Akrapović®.
- Power reduction to 25 kW/34 bhp.
- Anti-theft warning system.
- Engine protection bracket.
- Socket.



## **7. The paint finishes of the F 800 R.**



BMW Motorrad offers the F 800 R in three attractive paint finishes. The two-colour finish Alpine White non-metallic with Black silk gloss reflects the spirit of the times. Fire Orange non-metallic has a provocative, sport effect while White Aluminium metallic matt comes over as technical and modern.

The frame, swing-arm and engine of the F 800 R are finished in black in all three colour versions. Together with the light alloy wheels, also finished in black, this makes for a particularly dynamic look which reflects the sporty ambitions of the F 800 R. The orange-coloured spring adds an interesting touch of colour.

The interplay between the coloured and black surfaces highlights the newly designed body features and the powerful character of the new F 800 R, especially the sections which are typical of a roadster such as the muscular front section and the slim, sporty rear.

The optional accessory parts such as the pillion passenger seat cover in body colour and the Sport windshield harmonise perfectly with the relevant paint finish.

## 8. Specifications.

### F 800 R.



#### Engine

Type	Water-cooled 2-cylinder 4-stroke engine, four valves per cylinder
Bore x stroke	82 mm x 75.6 mm
Capacity	798 cm <sup>3</sup>
Rated output	64 kW (87 bhp) at 8,000 rpm (output reduction to 25 kW (34 bhp) possible at 6,000 rpm)
Max. torque	86 Nm at 6,000 rpm (output reduction: 58 Nm at 3,250 rpm)
Compression ratio	12.0 : 1
Fuel mixture preparation/engine management	Electronic injection, digital engine electronics (BMS-KP)
Valve/gas control	DOHC (double overhead camshaft)
Intake valve (diameter in mm)	32
Outlet valve (diameter in mm)	27.5
Throttle valve diameter	46
Exhaust gas purification	Closed-loop 3-way catalytic converter, exhaust gas norm EU 3
Acceleration 1–100 km/h	3,9 s

#### Performance figures/fuel consumption

Maximum speed	over 200 km/h
Fuel consumption over 100 km at constant 90 km/h	3.6 l
Fuel consumption over 100 km at constant 120 km/h	4.8 l
Fuel type	Premium unleaded, minimum octane number 95 (RON)

#### Electrical system

Alternator	AC generator 400 W
Battery	12 V/14 Ah, maintenance-free
Headlamps	55 W (high/low beam), 5 W parking light, 21/5 W (brake/rear light)
Starter	0.9 kW

#### Power transmission

Clutch	Multi-plate clutch in oil bath, mechanically operated
Gearbox	Claw-type 6-speed gearbox integrated in engine casing
Secondary drive	Endless O-ring chain with jolt damping in the rear wheel hub
Primary transmission	1,943
Gear transmission ratios I	2,462
II	1,750
III	1,381
IV	1,227
V	1,130
VI	1,042
rear wheel gear ratio	1 : 2.35

#### **Chassis/brakes**

Frame	Bridge frame made aluminium, load-supporting engine
Front wheel suspension/spring elements	Telescopic fork, Ø 43 mm
Rear wheel suspension/spring elements	Cast aluminium double-sided swing arm, central suspension strut, spring pre-tension by means of hand wheel, hydraulically adjustable at continuously variable levels, rebound stage adjustable
Spring travel front/rear	125 mm/125 mm
Wheelbase	1,520 mm
Castor	91 mm
Steering head angle	65°
Wheels	Cast aluminium wheels
Rim dimensions, front	3.50 x 17"
Rim dimensions, rear	5.50 x 17"
Tyres, front	120/70 ZR 17
Tyres, rear	180/55 ZR 17
Brake, front	Dual disc brake, floating brake discs, diameter 320 mm, 4-piston fixed caliper
Brake, rear	Single disc brake, diameter 265 mm, single piston floating caliper
ABS	Optional equipment feature: BMW Motorrad ABS

#### **Measurements/weight**

Seat height	800 mm (low seat: 775 mm, height seat: 825 mm)
Inside leg length	1,770 mm (low seat: 1,720 mm, high seat: 1,820 mm)
Unladen weight, road-ready, fully fuelled	199 kg
Dry weight	177kg
Permitted gross vehicle weight	405 kg
Payload (with standard fittings)	206 kg
Usable fuel tank volume	16 l
incl. reserve	approx. 4.0 l
Length	2,145 mm
Height (not incl. mirrors)	1,160 mm
Width (incl. mirrors)	905 mm

## 9. Engine Output and Torque. F 800 R.

