

# The new BMW S 1000 RR. Table of contents.



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# 1. Overall concept. Short version.



**“Our fascinating brief was to take the predecessor model – which has been a dominating force in all disciplines for 10 years – and significantly improve on its performance. This we translated into straightforward targets: one second faster on the track, more than 10 kg lighter and easier to control. These targets were taken as the basis for every decision. The result is a fascinating new motorcycle that exceeds the targets we set ourselves and will once again set the benchmark.”** Claudio De Martino, Vehicle Technology Team Leader.

## **The new BMW S 1000 RR – even lighter, faster and easier to control.**

The new BMW S 1000 RR sees its world premiere at the EICMA 2018. With a completely newly developed engine and suspension, engine output increased by 6 kW (8 hp) to 152 kW (207 hp) (in the USA: 151 kW (205 hp)) and a weight reduction of 208 kg to 197 kg (193.5 kg with M Package), the supersports bike originally launched in 2009 now goes into its third completely new generation. In addition to enhanced performance, other focus points were to make the new RR at least one second faster than its predecessor, create a more user-friendly design and ensure it offered maximum controllability and rideability. Whether in everyday use, on winding country roads or for high-performance race track riding – the new RR leaves nothing to be desired. In particular because BMW Motorrad has moved the assistance systems such as traction and wheelie control, ABS and Hill Start Control to a whole new level; the same applies to the LED lighting system and large TFT screen.

**Newly developed engine with BMW ShiftCam Technology for further enhanced power in the lower and medium engine speed range and increased top-end power.**

With its newly developed 4-cylinder in-line engine, now 4 kg lighter than before, the new RR achieves an entirely new level of performance. For this purpose, not only was the geometry of the intake and exhaust ports further optimised, the motorcycle now also comes with BMW ShiftCam Technology – an entirely new technology for BMW motorcycles which varies the valve timings and valve strokes on the intake side. A revised intake passage and a new exhaust system that is 1.3 kg lighter likewise contribute to increased overall performance. Ridability and sprint capability benefit from a substantially increased torque across a wide engine speed range.

**Completely new suspension with further developed suspension geometry for even greater ride precision and further improved handling.**

On the suspension side, too, the BMW Motorrad developers have left no stone unturned. With the aim of achieving a significant weight reduction, the engine in the new RR now has more of a load-bearing function than was previously the case. The requirement in designing the new main frame, in addition to improving ergonomics, was to have the force applied directly to the engine structure via the shortest possible paths. A significant increase in riding dynamics was achieved in the new RR based on the combination of the new riding geometry, optimised wheel load distribution and a substantial weight optimisation. The new Full Floater Pro kinematics in the rear wheel suspension also contributes significantly to the perceptible increase in suspension performance. All in all, riders of the new RR will benefit from further improved handling, increased traction and even more transparent feedback in all riding states up to the threshold range. In short: the new RR noticeably raises the bar on the suspension side while at the same time offering improved user-friendliness and controllability. The next generation of the electronic suspension DDC is available for the new RR as an optional equipment item. Specially developed for the RR, Dynamic Damping Control (DDC) requires no compromises in terms of suspension set-up. This is made possible among other things by new valve and control technology. What is more, a shim package is available for selective adaptation when required for ambitious race track riding.

**Four riding modes as standard and three more as part of the “Pro Modes” option for optimum adaptation.**

For ideal adaptation to varied conditions of use, the new RR is fitted with the four modes “Rain”, “Road”, “Dynamic” and “Race” as standard. For those who wish to delve deeper into the world of race tracks and motor racing, the “Pro Modes” option offers an additional three riding modes (Race Pro 1-3) that are freely programmable. These enable individual adaptation of the most diverse control functions such as Dynamic Traction Control DTC, ABS and wheelie detection as well as the throttle curve (torque adjustment) and Engine Brake to suit the rider’s own skill level and riding style. Other features that come with the “Pro Modes” option are Launch Control for perfect race starts and the configurable Pit Lane Limiter for exact adherence to speeds in the pit lane. Ultra-fast shifting up and down without the clutch is enabled by HP Shift Assistant Pro, which comes as a standard feature.

**New 6-axis sensor cluster for an unprecedented level of control quality. Dynamic Traction Control DTC and DTC Wheelie Function. ABS Pro for increased safety when braking in banking position.**

The new RR is fitted with ABS Pro and Dynamic Traction Control DTC as standard. In addition to traction control, DTC also includes the DTC Wheelie Function as standard – available as an ex works option and now individually adjustable for the first time. All control systems have been readjusted for regulation quality and characteristics. While the part integral BMW Motorrad ABS systems already provide a very high degree of performance and safety when braking in a straight line, ABS Pro now takes this a step further to offer increased safety when braking in banking position as well.

**Multifunctional instrument panel with 6.5-inch TFT screen for excellent readability and maximum range of information.**

The instrument panel of the new RR has also been completely newly developed and is now designed even more consistently for use in supersports racing. In addition to a maximum range of information, the BMW Motorrad developers paid particular attention to ensuring that the 6.5-inch TFT screen provides excellent readability – even in difficult light conditions. The aim was to offer the rider individually tailored screen displays for different uses. The Pure Ride screen shows all the information required for regular road use while the three Core screens are designed for use on the race track, with the rev counter displayed in analog form (Core 1 and 2) or else as a bar chart (Core 3), for example.

### **Even more dynamic design with optimised ergonomics and attractive colour schemes.**

The new layout of the main frame – as a Flex Frame – has made it possible to create a much leaner fuel tank and seating area trim sections for further improved support and knee grip. What is more, optimised contact surfaces and a newly defined ergonomic triangle between the handlebar ends, seat surface and footrests makes for optimum ergonomics. Meanwhile, completely newly developed body features ensure the new RR is instantly recognisable as a new model. This is supported by the dynamic design featuring a colour scheme with two individual characters: Racing Red and Motorsport paint finish.

### **The highlights of the new BMW S 1000 RR:**

- 4 kg lighter, newly developed 4-cylinder in-line engine with BMW ShiftCam Technology for variation of valve timings and valve strokes on the intake side.
- Increased output and torque: 152 kW (207 hp) (in the USA: 151 kW (205 hp)) at 13 500 rpm and 113 Nm at 11 000 rpm.
- At least 100 Nm of torque from 5 500 to 14 500 rpm.
- Effort-saving, linear torque curve: further improved rideability and controllability due to increased torque in the lower and medium engine speed range.
- Newly developed suspension featuring Flex Frame, with the engine taking on more of a load-bearing function.
- Significantly improved ergonomics due to Flex Frame.
- Refined suspension geometry for further improved handling, increased traction and crystal-clear feedback in the threshold range.

- Further developed electronic damping adaptation Dynamic Damping Control DDC with new valve generation as an optional equipment item.
- New rear wheel suspension weighing 300 g less than before with Full Floater Pro kinematics.
- Weight reduction of 11 – 14.5 kg to 197 kg when fully fuelled (DIN unladen) and 193.5 kg with M Package.
- New exhaust system weighing some 1.3 kg less, with front silencer.
- New 6-axis sensor cluster.
- Further developed Dynamic Traction Control DTC as standard
- DTC Wheelie Function as standard.
- Adjustable (+/- shift) DTC Wheelie Function as an optional equipment item.
- Engine brake function, adjustable.
- ABS Pro for increased safety when braking, also in banking position, as standard.
- New riding modes “Rain”, “Road”, “Dynamic” and “Race” as standard and “Pro Modes” option with three additional configurable modes “Race Pro 1-3” for optimum individual adaptation to conditions.
- Launch Control for perfect starts comes with "Pro Modes" option.
- Pit Lane Limiter for precise pit lane speeds also included with the "Pro Modes" option.
- Shift Assistant Pro for fast up and down shifting without clutch, standard.
- Shift pattern can easily be reversed.

Electronic cruise control as an ex works option.

- New instrument panel with 6.5-inch screen offering excellent readability and featuring a Pure Ride screen as well as three Core screens.

- LED light units all round.
- Turn indicators with new “Comfort Indicator” function.
- Completely newly designed body elements for even more dynamic styling and optimum aerodynamics.
- Two colour schemes for the market launch: Racing Red and Motorsport paint finish.
- Extended range of special accessories and ex-work options.



## 2. Drive.



**“The redesign of the RR engine confronted us with a considerable challenge in a number of different ways. An even higher peak output combined with increased torque in the lower and medium engine speed range – these are apparently incompatible opposites. With BMW ShiftCam Technology we managed a quantum leap.”** Jörg Vogt, Project Manager Drive



**4 kg lighter, completely new 4-cylinder engine that sets a new benchmark in terms of performance, torque and ridability.**

The new RR is fitted with a completely newly developed water-cooled 4-cylinder in-line engine. Its peak output is now 152 kW (207 hp) (in the USA: 151 kW (205 hp)) at 13 500 rpm (in the USA: 13 000 rpm) and therefore 6 kW (8 hp) (in the USA 4 kW (6 hp)) more than the predecessor model.

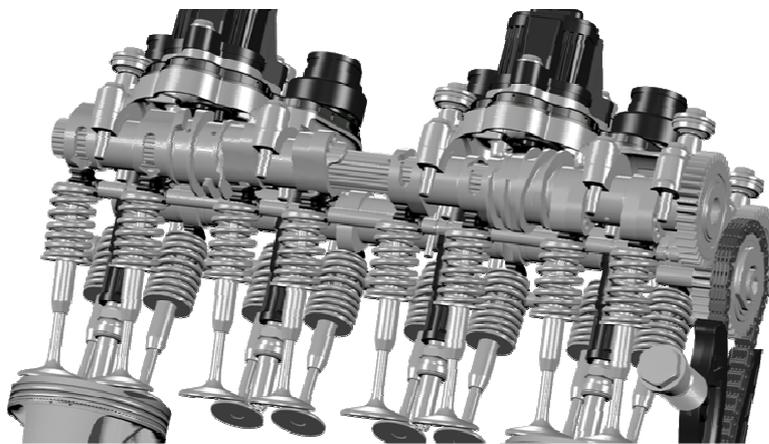
The maximum torque of 113 Nm is reached at 11 000 rpm. In spite of a substantial increase in peak output, the usable engine speed range of the new RR is now significantly broader and more fulsome. The maximum engine speed is 14 600 rpm.

**BMW ShiftCam Technology with variation of valve timing and valve stroke for increased torque and peak output.**

The main goal in developing the new RR was to further increase the already excellent performance figures of the predecessor model. In conjunction with further optimised torque delivery, it was also possible to combine ridability – in the sense of a more effort-saving riding style – and thus also controllability of the RR in order to achieve an outstanding level of overall performance.

Whether on the race track or for sporty riding on country roads: the new engine of the RR leaves nothing to be desired.

For this purpose, not only has the geometry of the cylinder head's intake and exhaust ports been further optimised: BMW ShiftCam Technology has also been introduced – a completely new technology for BMW Motorrad which is used to vary the valve timing and valve stroke on the intake side. The system comprises a triple-section intake shift camshaft which has two cams per activated valve, mounted on a shift segment: one partial-load cam and one full-load cam, each exhibiting optimised cam geometry. The shift speed of BMW ShiftCam is 9 000 rpm.

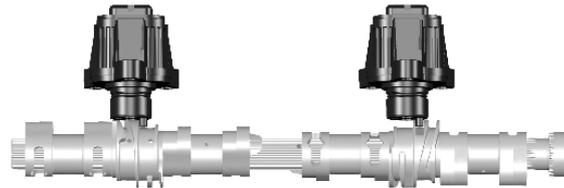


The intake valves are activated via axial shift of the shift cam segment in just 10 ms by either the partial-load or the full-load cam, depending on engine speed. The axial shift of the shift cam segment – and therefore the use of the partial-load or full-load cam – is effected by means of a two shifting gates on the shift cam segment and two electromechanical actuators. Variation of valve timing and valve stroke is achieved due to the differing configuration of the cam geometry. While the full-load cam provides maximum valve stroke, the partial-load cam delivers reduced valve stroke.

### **The benefits of BMW ShiftCam Technology:**

- Increased torque and pulling power in the lower and medium speed range while also increasing peak output.
- Optimum design of partial-load cam geometry for the lower to medium load and engine speed range. The new RR engine now offers the same high level of torque in the lower and medium engine speed range as that of the existing S 1000 R engine. This eliminates the sharp rise in torque of the existing RR engine, which resulted in an increased wheelie tendency.

- Reduction of load change loss in the partial load range.
- Reduction of exhaust emissions and optimised sound.
- Reduction of fuel consumption by approx. 4 % as compared to the predecessor model.



**Noticeable increase in rideability in everyday use and high performance on the race track due to significantly improved mid-range power.**

In practice, BMW ShiftCam Technology in the new RR makes for a substantially further increased torque level as compared to the predecessor model. In addition to the considerable boost in peak output from the previous figure of 146 kW (199 hp) to the current level of 152 kW (207 hp), it is the perceptible increase in torque and therefore pulling power that is particularly positive. Torque of more than 100 Nm is now available from 5 500 to 14 500 rpm, i.e. across an extremely broad engine speed range of 9 000 rotations per minute.

This allows the new RR to strike an even more perfect balance between fast, sporty runs on country roads and high-performance laps on the race track. To conclude: the new RR engine offers a significant additional power boost over the entire engine speed range as compared to a predecessor that was itself far from feeble, as well as allowing an even more supreme riding style over country road terrain.

**Much lighter and more compact basic engine with well-established 4-valve technology, the world's first ever hollow-bored titanium intake valves and speed-resistant rocker arms.**

For each combustion chamber there are four valves made of light titanium. As a world first in serial production, the shafts of the intake valves are also hollow-bored, which is reflected in a weight reduction of 10%. As before, the valves are activated via light, speed-resistant and DLC-coated rocker arms – though these are now designed to be 25 % lighter than those in the predecessor

model (weight reduced from 8 g to 11 g). This has allowed the maximum engine speed to be increased from 14 200 rpm to 14 600 rpm.

As before, the cylinder barrels are integrated in the upper half of the engine housing and they smoothly polish-honed in order to achieve reduced friction. In the same way as in the predecessor model, the upper half of the housing also holds the light and compact 6-speed transmission, which now features further enhanced shift precision. Shift Assistant Pro comes as standard, and it was possible to reduce the operational force required for the self-reinforcing anti-hopping clutch by 20 N to 65 N as compared to the predecessor model.

By comparison with the very light basic engine of the predecessor model, the power unit in the new RR has been designed to be much lighter still as well as more compact. In addition to the newly designed engine housing, this is due to additional weight reductions in other engine components. For example, the camshafts are now powered directly from the crankshaft – the previous idler gear is no longer necessary. The intermediate gear for halving the engine speed is now located directly inside the cylinder head. What is more, the oil and water pump are combined to form a compact module. This gives the new engine an even tidier look. In the new design, it was also possible to reduce the tubing for the water and oil cooling circuit to a minimum, as well as achieving a high level of impact resilience. In order to reduce overall width by more than 12 mm as compared to the predecessor model, there is now only one gearwheel on the crankshaft, since the intermediate gear of the starter motor engages directly with the clutch gear or primary gear. The starter motor has been integrated on the top of the housing behind the cylinders. The crankshaft position is now detected via the alternator. In order to reduce the overall height of the engine, the length of the heat-treated steel rods was also reduced by 4 mm to 99 mm. At the same time the rods weigh 10 % less than in the predecessor model.

In spite of the fact that BMW ShiftCam Technology itself has a weight of approx. 1.0 kg, the 4-cylinder engine in fact weighs in at a total of 4 kg less than the engine in the predecessor model as a result of these extensive measures. What is more, it is positioned 7.5 mm to the left within the frame. Meanwhile the track of the secondary chain has been shifted 5 mm to the left.

As before, oil is supplied in the form of wet sump lubrication, though the oil sump base has been lowered significantly in the interests of much enhanced operational safety on the race track. In order to achieve a lighter and more compact design, the clutch is now activated from the right-hand side of the engine.

### **Newly calculated intake system for optimum power delivery.**

The intake system has been selectively optimised in order to achieve not just a significant boost in peak output but also increased torque in the lower and medium engine speed range – which is especially important in terms of riding dynamics on country roads. The new RR likewise has a so-called full-e electromotive throttle actuator, or “electronic throttle grip”. The effect when riding is a pleasant reduction in the force required to operate the throttle grip, as well as perfect controllability of the engine.

As before, the new RR engine is also fitted with variable intake lengths. Here, the length of the intake funnels is varied between levels on a map-controlled basis by means of an electric motor positioned on the intake silencer. The shorter intake passages are opened from an engine speed of 11 700 rpm since these are more favourable in terms of achieving maximum output. The diameter and length of the intake tubes was newly harmonised for use in the new RR, and the intake silencer was reconfigured, as was the air intake. As a result – in conjunction with the newly designed intake ports and BMW ShiftCam Technology – filling and gas exchange are now more effective.

### **A completely new exhaust system, approx. 1.3 kg lighter, with front silencer and short, compact rear silencer for pleasant noise characteristics.**

The overriding goal of further enhancing the new RR in terms of output and torque while at the same time further reducing vehicle weight was likewise pursued by the BMW developers in creating the new exhaust system.

The latter was also completely newly designed: made of stainless steel like the predecessor model, it features two three-way catalytic converters. This results in optimised load changes, further increased torque in the medium engine speed range and also a boost in output. In addition to improved performance figures, the new exhaust system also reduces the weight of the vehicle by approx. 1.3 kg, not least due to the reduction of sheet thickness to 0.5 – 0.8 mm.

### **Riding modes “Rain”, “Road”, “Dynamic” and “Race” and the latest generation of Dynamic Traction Control DTC as well as DTC Wheelie Function with 6-axis sensor cluster.**

In the new RR, a distinction is drawn between two sets of riding modes: one for country roads and one for the race track. The new RR is fitted as standard with the four modes “Rain”, “Road”, “Dynamic” and “Race”, while the option “Pro Modes” offers “Race Pro 1”, “Race Pro 2” and “Race Pro 3” in addition. Another standard feature is the latest generation of Dynamic Traction Control

DTC with 6-axis sensor cluster, banking sensor and fine-tuning for increased safety and performance when accelerating.

The DTC has four fixed basic settings for each of the modes “Rain”, “Road”, “Dynamic” and “Race” as standard, as well as the DTC Wheelie Function. The “Race Pro” modes also offer a fine-tuning function (+/- shift). What is more, the “Pro Modes” option offers an adjustable DTC Wheelie Function for the first time. This uses front wheel lift detection to suppress or limit wheelies with the aim of achieving maximum acceleration.

**Two adjustable throttle curves for optimum response. Engine Brake as part of the “Pro Modes” option.**

The new RR has two throttle curves even in its standard trim: these are linked to the modes “Rain”, “Road”, “Dynamic” and “Race”:

- Rain: gentle throttle response, drive torque reduced in the lower gears.
- Road: optimum throttle response, drive torque reduced in the lower gears.
- Dynamic: optimum throttle response, drive torque reduced in the lower gears.
- Race: optimum throttle response, maximum torque in all gears.
- Race Pro 1-3: can be configured. In Race Pro it is additionally possible to select Setting 3. Gas response is gentle, drive torque is at maximum in all gears.

As another element of the “Pro Modes” option, Engine Brake also offers a three-stage adjustment of engine drag torque during coasting.

**Hill Start Control as standard and Hill Start Control Pro as part of the “Pro Modes” option for convenient hill starts.**

Even in its standard trim the new RR offers the function Hill Start Control to facilitate starting on gradients. The option Hill Start Control Pro goes beyond the comfort system Hill Start Control by providing the additional function Auto HSC. The settings menu allows this additional function to be individualised in such a way that the parking brake is automatically activated on a gradient (greater than +/- 5 %) when the hand or foot brake lever has been activated, shortly after the motorcycle comes to a standstill.

**Shift Assistant Pro for shifting up and down without using the clutch. Easily reversible gearshift pattern for race track use.**

Shift Assistant Pro allows upshifting without activating the clutch, thereby enabling perfect acceleration virtually without torque interrupt. It also allows downshifting without clutch or throttle valve activation within the relevant load and engine speed ranges. This means that very fast shifts are possible, while clutch activation is reduced to a minimum. For use on the race track, the conventional shift pattern (first gear at the bottom) can easily be reversed in a few straightforward steps (first gear at the top).

Launch Control for perfect race starts.

The new RR also offers the rider Launch Control for active support on race starts. Activation is during standstill with the engine idling by pressing the start button for more than three seconds. The relevant information is displayed on the screen in the instrument. From the technical point of view, Launch Control also limits engine torque so that the maximum transferable drive torque is available at the rear wheel when setting off in first gear. When the rider shifts into second gear, the engine torque is corrected in line with the change in ratio so that the maximum transferable drive torque continues to be available at the rear wheel during this phase.

Pit Lane Limiter for precise speed control in the pit lane.

The Pit Lane Limiter enables the RR rider to limit speed when passing through the pit lane, regardless of mode.

### 3. Suspension.



**“The main aim in terms of the new RR suspension was to develop further enhanced riding dynamics as well as achieving a significantly reduced weight as compared to the predecessor model. We were able to meet this target by means of the new main frame: the engine is now much more closely integrated as a load-bearing element, and there are a whole range of optimised details.”** Marcus Mund, Project Engineer Suspension.



The new development of the legendary RR is not just reflected in new drive technology geared towards top-level performance. In fact the new model's outstanding riding dynamics derive to a significant extent from the completely newly engineered suspension. Here, it is the optimum interplay between the frame design and the engine as a load-bearing element that has a key role to play. This interplay was the main focus in developing the new RR based on a holistic approach.

**New, much lighter Flex Frame with the engine more closely integrated in the frame as a load-bearing element.**

The centrepiece of the suspension in the new RR is still an aluminium bridge frame, though the layout of this has been drastically altered as compared to the predecessor model. The main frame is still configured as a welded structure made of four chill cast elements with the engine integrated at a 32-degree forward tilt as before, but now with a much more extended function as a load-bearing element.

With the aim of achieving a substantial weight reduction, the two top frame tubes, the steering head section and the engine mounts are now designed in such a way that the load-bearing function of the engine in the new RR is further expanded.

It is due to the fact that a greater proportion of the engine is integrated in the suspension structure that the weight of the frame is reduced by some 1.3 kg. What is more, the requirement in designing the new main frame was to have the force applied directly to the engine structure via the shortest possible paths. Made of circular aluminium tubes, the delicate rear frame of the new RR is now even lighter.

The entire composite structure of the main frame, rear frame and swinging arm was also newly calculated to achieve an optimum combination of stiffness and flexibility – hence the name Flex Frame. The new frame offers further benefits due to its very narrow design. In the area relevant to achieving good knee grip, it reduces the width of the motorcycle by 13 mm to 30 mm. As a result, it was possible to make the new RR only approx. 20 mm wider than a V4 Concept in this area. The rider now benefits from a much reduced spread of the upper thighs, which makes for a more relaxed ride posture. Other ergonomic benefits derive from the newly developed handlebars, now configured as a single section with the fork bridge. The handlebars have been optimised in terms of sweep and offset. It is possible to mount conventional stub handlebars for racing use. Other changes in the area of the seat and rear section likewise provide the rider with optimised ergonomics, in particular greater freedom of movement when riding in sporty style.

### **New suspension geometry for further improved handling, ride precision, traction and feedback.**

In developing the suspension of the new RR, the primary goals were to further increase agility, feedback and ride precision and to enhance the mechanical grip of the rear wheel. As a result, the steering head angle has now been set 0.4° steeper at 66.9°, with the offset of the fork bridges adjusted as necessary. The castor is reduced to 93.9 mm (previously 96.5 mm). At the same time, the wheelbase was extended by 9 mm to 1 441 mm. The length of the new single-section rear wheel swinging arm with underslung sections is 606.6 mm.

The new suspension geometry also results in clearer, improved feedback both at the front and from the rear wheel control. The new RR also offers optimised handling qualities as well as being more precise and directionally accurate to ride.

**Optimised wheel load distribution and completely newly developed Full Floater Pro kinematics in rear wheel control. New single-section underslung rear-wheel swinging arm.**

The extensive weight reduction measures are reflected in an unladen, fully fuelled weight of just 197 kg. This not only means the new RR is 11 kg lighter than its predecessor. It also results in a weight distribution that favours optimised wheel loads. As compared to the predecessor model it was possible to increase the front wheel load from 52.3 to 53.8 %.

With the aim of further honing suspension qualities, changes were also made to the rear wheel control and the design of the kinematics for central spring strut control. The latter now has an enlarged stroke and has been shifted much further away from the swinging arm rotational axis, which is adjustable across an offset range of +2 to -2 mm. The underslung swinging arm itself was also completely newly designed and is now a single-section chill cast part. It also weighs about 300 g less than in the predecessor model.



The aim of this overall redesign was to position the central spring strut as far away as possible from the engine, thereby suppressing undesired heating as a result of engine heat discharge. This results in a more stable temperature response, thereby ensuring more consistent damping forces – especially during high-performance use on the race track. In combination with a swinging arm derived from motor racing and the latter's optimised force transmission, this provides significant benefits for the rear tyre: the positive effects here are increased grip and reduced impact on the tyre itself. In addition to a substantial improvement in lap time of about one second as compared to the predecessor model, improvement in total time over a racing distance was another clearly stipulated objective.

As before, the central spring strut is fitted with an adjustable spring rest, damping rebound and compression stage. The rebound and compression stage can still be adjusted by means of the very user-friendly ten-click scaling. This means the spring strut offers perfect set-up options to meet the most

diverse requirements such as short impacts or extended bumps. The total spring travel at the rear axle is 117 mm (previously 120 mm).

The spring strut transmission ratio has been altered from 1.9 to 1.6:1, with the diameter of the main piston on the shock absorber enlarged to 46 mm. These two measures create a larger hydraulic volume flow and much lower operating pressures. In addition, the spring strut is friction-optimised (anodised) and has a wet-running piston rod guide with a separator piston mounted by means of Teflon tape. All this has a positive effective comfort and performance, because response is improved and force build-up in the spring strut is fast, precise and free of leakage impact.

### **Front wheel control via new, fully adjustable upside-down telescopic fork with a slide tube diameter of 45 mm.**

In the area of front wheel control, the new RR likewise meets its aspirations in terms of riding dynamics. This is taken care of by an upside-down fork with a slide tube diameter of 45 mm (previously 46 mm) and a high degree of brake stability, as well as a stable response and transparent feedback.

The upside-down fork is fitted with so-called closed-cartridge inserts, i.e. separate hydraulic piston-cylinder systems, and is fitted with adjustment options for the spring rest as well as the damping rebound and compression stage. Here again, a sensitive response, a broad adjustment range and very high damping reserves ensure maximum riding dynamics and individual set-up options – for race track use as well. The total spring travel is 120 mm. All in all, the front wheel control of the RR is some 300 g lighter than before.

### **Dynamic Damping Control DDC – new generation of the electronic damper control system as an option.**

The new RR can also be fitted with the electronically regulated suspension system Dynamic Damping Control DDC – though now in a completely new generation. For this purpose, the spring strut and fork were fitted with new, motorcycle-specific valves and were newly engineered.

The damping of the new-generation DDC is generated via conventional shim-fitted pistons. Maximum damping can be reduced as needed, however. The DDC valve is located in the piston bypass and is capable of optimum damping force build-up in real time (adjustment time ~10 ms) – without any loss in terms of feedback.

The DDC damper piston is fitted with a conventional mechanical shim package. The oil stream flows parallel to this through the conventionally shimmed piston (Ø 46 mm) and an electrically adjustable bypass. If the

current-fed valve is closed, the oil flows through the conventional piston only. This has the benefit of generating maximum damping. The electronically controlled valve runs according to the relevant characteristic curve, depending on mode and speed. Current feed is adapted within 10 ms to generate the relevant damping. Damping for country road use is essentially geared towards comfort and stability. The DDC Shim Package is equivalent to the classic mechanically structured and fitted valve. This has the advantage that suspension specialists can adapt the suspension to the rider's needs.



The DDC damping valves in the predecessor model were connected in series. The volume flow passed through the conventional and electrically adjustable damping section. Conventional damping was the lowest level of damping available. The electrical DDC valve increased damping. However, this resulted in the familiar drawback that the compromise between comfort and high damping tended to cause underdamping and pumping of the suspension.

To summarise: the mechanical valve of the new DDC can be applied to maximum damping. The advantage for race track use is perfect damping. The soft "damping curve" can be used when riding on country roads. The necessary adjustments take effect within approx. 10 ms.

The basic DDC settings are linked to the "Rain", "Road", "Dynamic" and "Race" modes. In "Rain" and "Road" mode, the DDC set-up focus is on full, pleasant damping which can be described as sporty and comfortable. The area of application for the "Road" DDC damping characteristic is preferably country roads with an asphalt surface ranging from poor to good.

By contrast, "Dynamic" mode is geared towards good quality country roads. The DDC damping characteristic "Road dyn." is available for this purpose.

In "Race" mode, basic damping for race track use is further increased and works with the characteristic "Track".

In the "Race Pro" modes, the individually adjustable DDC damping characteristic "Race" provides optimum support for use on the track, with an

even fuller and tighter damping setting. Here, the spring-damper elements give the rider optimum, crystal-clear feedback on the riding situation at all times.

In addition, the suspension set-up can be individualised in all modes. In the same way as with mechanical adjustment, the customer can make the suspension softer or stiffer simply by clicking in the configuration menu.

**Light cast wheels, ABS Pro in optimised set-up and DBC Dynamic Brake Control for maximum performance and safety when braking.**

The new 17-inch light alloy wheels of the RR were also created with the overriding objective of achieving maximum weight reduction. All in all they weigh in at just under 1.6 kg less than the existing wheels. The reduced rotational masses result in both improved acceleration and brake response as well as optimised handling qualities. In addition to the aluminium cast wheels, the range of optional equipment also offers even lighter M forged wheels and M carbon fibre wheels.

Like its predecessor, the new RR has a brake system that is supremely effective on the race track. At the front there are two radially mounted 4-piston fixed calipers in conjunction with 320 mm steel brake discs which are 4.5 mm thick. In total the front brake discs weigh some 0.5 kg less, thereby also contributing significantly to weight reduction. At the rear, deceleration is taken care of by a single-piston floating caliper with a 220 mm steel brake disc. The ABS Pro in the new RR, now a standard feature, has been further developed and refined as well as being newly configured for the individual modes.

While the existing BMW Motorrad ABS systems already provided a very high degree of safety when braking in a straight line, ABS Pro now takes this a step further to offer increased safety when braking on bends as well. Even when braking fast in banking position, ABS Pro is able to prevent the wheels from blocking, thereby reducing the risk of falling when banking – even in the event of panic braking. In the “Race Pro” modes, the ABS function can be set to five different levels, with the ABS Pro function linked accordingly.

As a component of the “Pro Modes” option, DBC Dynamic Brake Control provides the rider with additional support on braking manoeuvres. DBC increases safety when braking, even in difficult situations, by avoiding unintentional accelerator activation. As soon as the sensor cluster supplies a certain deceleration value during braking, any simultaneous desire to accelerate on the part of the rider is detected as

implausible and throttle valve opening is suppressed. This keeps the motorcycle stable and shortens the braking distance.

## 4. Electrical system and electronics.



**“The new 6.5-inch TFT screen offers a level quality in terms of display and information that is unrivalled in this segment. Readability and operation is unprecedented, and the range of accessible information leaves nothing to be desired.”** Anton Dötterböck, Project Engineer Electrical System

**New instrument cluster in the form of a large, perfectly readable 6.5-inch TFT screen with an unrivalled range of information and readability.**

The instrument cluster of the new RR has a total of four screens (Pure Ride with the main details and three Core screens) and riders can choose what is displayed to suit their needs. The instrument cluster was developed for the new RR on existing platforms and is designed consistently for use in supersports motorcycling. The range of information, quality of display and not least the user-friendliness of the new instrument cluster are unmatched in the supersports segment at the present time.



In addition to an expanded range of functions and information, the BMW Motorrad developers attached particular importance to excellent readability of the 6.5-inch TFT screen. For optimum visibility even in difficult light conditions, the screen was therefore designed to be large for good readability. It is linked to the Multi Controller on the left-hand handlebar panel and can be operated quickly, safely and conveniently from here.

The new TFT screen offers individually tailored displays for differing purposes. The Pure Ride screen has all the information required for regular riding on the road, for instance, while the three Core screens are designed for use on the race track and provide the relevant range of information for this purpose. In

addition, the rev counter is displayed here in both analog form (Core 1 and 2) and in the form of a bar chart (Core 3).

Alongside the digital display of speed, revolutions per minute, selected mode, settings for ABS Pro, DTC and DDC and the menus, it is also possible to access the following wide range of information on the screen (depending on the options fitted), for example:

- Current banking position, left/right.
- Maximum banking position achieved, left/right.
- Current deceleration in  $m/s^2$ .
- Maximum deceleration achieved in  $m/s^2$ .
- Engine speed reduction by DTC.
- Speed warning ("SPEED" appears when a previously defined speed is exceeded).
- Average speed.
- Average fuel consumption.
- Trip 1 and 2.
- Remaining range.
- Total kilometres.
- Fuel tank fill level.

For riders using the new RR on the race track, the new instrument cluster offers additional and highly interesting data which can be accessed in a variety of screen display formats:

- Lap time and lap distance.
- Lap-specific speeds (min, max, average).
- Active mode per lap.
- DTC adjustment value per lap.
- Banking angle, left/right.
- Maximum banking positions, left/right per lap.
- Maximum DTC torque reduction per lap.
- Maximum deceleration per lap.
- Number of shifts per lap.
- Average throttle grip position per lap.
- Total laps, total riding time and total distance.
- Best ever lap.

and much more besides.

**New, even more high-performance LED light units all round. Turn indicators with new “Comfort Indicator” function.**

All light units on the new RR feature the very latest LED technology. They include the bright main headlamp, the parking light, the front turn indicators, the rear light unit and the instrument cluster with its indicator lamps.

The new LED headlamp not only gives the RR a highly dynamic look, it also lights up the road even more effectively than before. The integrated parking lights reinforce the motorcycle's distinctive appearance: their level of light intensity was selected so they do not have to be homologated as daytime running light.



The front turn indicators are no longer mounted in the trim but integrated in the rear mirror instead. The new and in particular higher positioning of the turn indicators means the RR is now even more visible to other road users. By the same token, it takes no time at all to get the RR ready for track use. The “Comfort Indicator” function is a new feature. Here, the turn indicator automatically goes into neutral position so the rider can't forget it.

The light units at the rear of the RR have also been completely newly developed. The number plate carrier, turn indicators and number plate lights are all designed to form a single unit. What is more, the brake light and tail light have now been integrated in the turn indicators, too. The C-shaped rear light signature means the RR is instantly recognisable as a BMW even in its night-time appearance. The extremely compact grouping makes it easy to get the RR ready for track use in a few simple steps.

## 5. Design and colour concept.



**“Motorcycle design is a very specialised discipline – it combines body design, ergonomics, aerodynamics and technological development. The work is integrative: we use design to give function a form so as to shape and showcase technology. Our aim is to achieve instant recognition of the motorcycle model through its design.”** Matthias Kottmann, Designer RR.



### **Supersports design styling by BMW Motorrad.**

Since the market launch of the RR in 2009 and based on its ongoing development over subsequent years, the RR has redefined the term “supersports” and has been able to establish itself as the ultimate benchmark in the 1000 cc supersports bike segment on a lasting basis.

Newly developed from scratch, the new RR now moves into its third generation from the point of view of design styling, too. The engine and suspension have undergone comprehensive new development in order to remain the benchmark in the superbike sector. With its extremely compact layout, it is uncompromisingly designed for the race track: after all, every detail counts when beating the clock is what counts most. What is different here is that for the first time, the design team was deeply involved in the development process from the outset: this is why the perfect harmony between form and function in the new RR is so impressive.

The design of the new RR makes an unmistakable statement: it is the ultimate BMW Motorrad superbike. Light, fast, uncompromising. Even at first sight it is clearly distinct from its predecessors. The proportions are compactly concentrated between the wheels as never before.

The motorcycle's striking surfaces are tightly and powerfully moulded, their three dimensional configuration expressing maximum emotional power. All technical elements – engine, frame, fork, swinging arm, brake system, wheels, exhaust and lighting system –are consistently designed for maximum dynamic performance. They ensure optimum performance in every situation.

**Completely new body elements with a unique, highly dynamic design and optimised aerodynamics.**

The front view of the new RR forms an extremely narrow and streamlined silhouette. In combination with a low-level front section, this gives the new RR a light, athletic appearance. In the latest edition, BMW Motorrad has subjected the distinctive split face of the predecessor models to significant further development, shaping technical requirements to form a striking new BMW front graphic.

The clarity of the design with the generous surface configuration not only makes for a modern, high-end overall impression, it also ensures optimum air flow around the motorcycle, thereby further improving aerodynamics. The air intake duct sits between the painted surface in a dynamic T shape with black matt finish. For the first time, the split face is no longer asymmetrical – this was the case previously due to the differing geometry of the light functions. As a result, the new RR appears even more athletic and focussed.

The integrated front light design also gives the new RR the look of a racing machine – while at the same time meeting all legal requirements. The use of LED technology without reflectors makes it possible to combine low and high beam in one compact element, which is what accounts for the symmetry of the lights. Framed by the iconic parking light in a dynamically interpreted U shape, the light signature of the new RR makes it instantly recognisable from the front as a BMW – like the kidney grille on a BMW automobile.

The athletically low front and the short, slim rear exhibit highly dynamic proportions which are shorter and more compact than ever before due to the fact that the rear light functions have been shifted into the number plate carrier. With very short overhangs, the vehicle body sits virtually entirely between the wheels, creating the sportiest RR silhouette to date.

The characteristic subdivision of the side view into the upper section in body finish and the dark technology area at the bottom (“technology-body split”) means the RR is unmistakably recognisable as a supersports bike by BMW Motorrad from this perspective. At the same time, the characteristic DNA line provides a dynamic forward orientation, giving the RR a striking impression of lightness when viewed from the side.

The powerful surface styling gives the dynamic side design the impression of visual unity. A dynamic flow is traced across the body of the motorcycle by the surfaces, with the BMW logo as the start and finish point of the side surface workmanship. The dynamic here is mainly created by the tension between the surfaces. Surface styling itself is a feature that has been developed further from the previous model series. Dynamically striking and aerodynamic, sleek and effectively designed. The revision of the oil cooler and exhaust system has made it possible to create a very slim base that rounds off the motorcycle's compact proportions to the road.

The extremely lean rear silhouette gives the new RR an exceptional lightness, giving it a nimble, agile look in the same way as the front section. The aspiration to achieve absolute integration of form and function even extends to underneath the seat. The short rear frame is designed as a light aluminium tube frame. Here the high-end design especially comes into its own in an accentuation colour, depending on the equipment version. Sculptured down to the last detail, the grips for the passenger are integrated at the bottom side of the rear section. What is more, all elements and transitions are perfectly harmonised for top-level performance – this can be especially clearly seen on the spring strut mount of the frame, for example, with its fascinating technical look.

Finally, the new RR is lean and athletic when viewed from above, too. A dynamic line flows from the fuel tank to the rear. Here the striking design of the fuel tank lends particular emphasis to the motorcycle's length and sporty flair.

This is supported by the dynamic design featuring a colour scheme with two individual characters: Racing Red and BMW M.

In the latest generation, the RR likewise provides a dynamic further development of this sporty colour scheme. The fulsome Racing Red adorns the fuel tank trim and the upper trim section, while the lower half of the motorcycle is finished in contrasting black.





In the Motorsport colour scheme, the new RR appears in the BMW Motorsport colours (Racing Blue, Lightwhite, Racing Red), which emphasises its racing genes.

## 6. Equipment program.



### **Optional equipment and optional accessories.**

An extensive program of optional equipment and optional accessories is available for customisation of the new BMW S 1000 RR. Options are supplied ex works and are integrated in the production process. Optional accessories are installed by the BMW Motorrad dealer or else by customers themselves. These are also features which can be retrofitted.

Options are supplied directly ex works and are integrated in the production process. Optional accessories are installed by the BMW Motorrad dealer or by customers themselves. These are also features which can be retrofitted.

### **Options.**

- **M Package:** Pro Mode, Motorsport paint finish, M carbon fibre wheels, M light weight battery, M sport seat, M chassis kit with rear ride height adjustment and swingarm pivot.
- **Dynamic Package:** Next generation Dynamic Damping Control DDC, heated grips, cruise control.
- **Race Package:** Pro Mode, M forged wheel, M light weight battery, M chassis kit with rear ride height adjustment and swingarm pivot.

- Alarm system.
- Passenger seat cover.
- RDC tyre pressure control
- E-Call

### **Optional accessories.**

#### **Original BMW Motorrad Accessories.**

#### **M Performance Parts.**

- M axle protectors
- HP Carbon intake silencer cover.
- M Carbon rear wheel
- M Carbon front wheel
- M Carbon chain guard
- M Carbon wheel cover, rear
- M Carbon wheel cover, rear

- M Carbon pinion cover
- M Carbon fuel tank trims
- M Carbon side trip element, top
- M data logger
- M rider footrests
- M rider footrest system
- M seat
- M seat, high
- M seat, low
- M passenger footrests
- M handbrake lever, foldable
- M remote adjustment for brake
- M handbrake lever protector
- M chain tensioner
- M clutch lever, foldable
- M clutch lever protector
- M light weight battery
- M lift stand mount
- M engine protector
- M oil filler neck
- M cover kit
- M fork clamp for stub handlebars
- M forged wheel, rear
- M forged wheel, front

#### **Storage program.**

- Folding rucksack
- Rear bag, 20 l
- Tank bag, 1.5 l
- Saddle bags, 21 l
- Pouch for smartphone
- Tank rucksack, 10 l.
- Bag for passenger seat, 10 l.

#### **Ergonomics and comfort.**

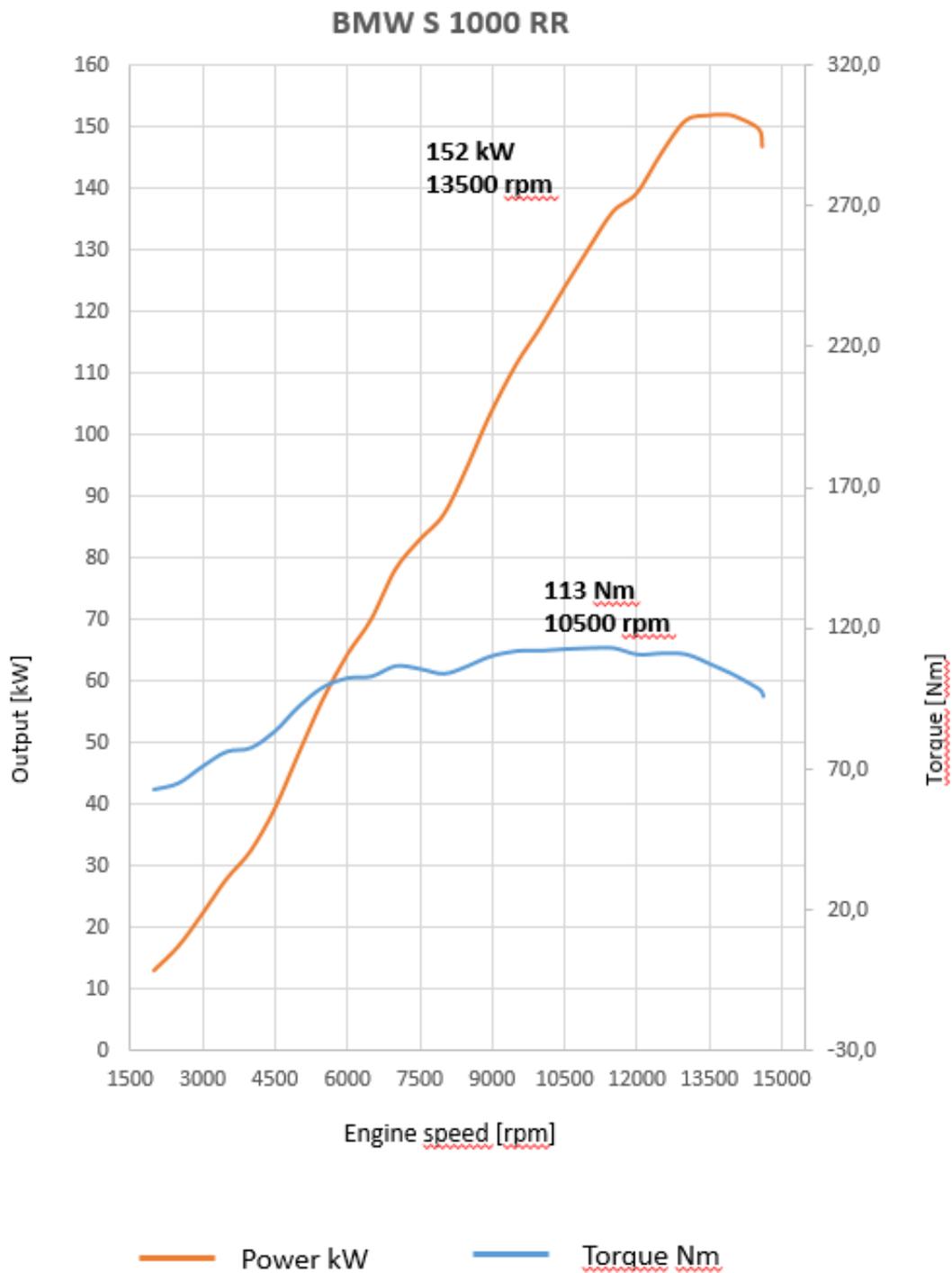
- Retrofit set – Pro Modes
- Retrofit set – heated grips
- Activation code for Shift Assistant Pro
- Passenger seat

- Windshield, tinted
- Windshield, high
- Windshield, high, tinted.

**Safety.**

- Brake disc lock with alarm system
- Retrofit set – alarm system
- Protective foil for 6.5-inch TFT screen
- First aid set, large
- First aid set, small
- Retrofit set – cruise control
- Radiator guard
- Retrofit set – RDC tyre pressure control

## 7. Engine output and torque.



## 8. Technical specifications.

<b>BMW S 1000 RR</b>		
<b>Engine</b>		
Capacity	cc	999
Bore/stroke	mm	80/49.7
Output	kW/hp	152/207
at engine speed	rpm	13 500
Torque	Nm	113
at engine speed	rpm	10 500
Type	Water-cooled in-line 4-cylinder engine	
Compression/fuel	13.3:1 / <b>premium</b> (super plus) unleaded petrol, octane number 95-98 (RON) (knock control; rated output with 98 RON)	
Valve/accelerator actuation	DOHC (double overhead camshaft) Valve activation via individual rocker arms and variable intake camshaft control system BMW ShiftCam	
Valves per cylinder	4	
Ø intake/outlet	mm	33.5/27.2
Throttle valve diameter	mm	48
Engine control	BMS-O	
Emission control	Closed-loop three-way catalytic converter	
<b>Electrical system</b>		
Alternator	W	450
Battery	V/Ah	12 / 8, maintenance-free
Headlamp	W	LED low beam twin headlamp in free-form technology LED high beam free-form surface/modular design
Starter	kW	(0.8)
<b>Power transmission – gearbox</b>		
Clutch	Self-reinforcing multi-plate anti-hopping wet clutch, mechanically activated	
Gearbox	Constant mesh 6-speed gearbox	
Primary ratio	(1.652)	
Transmission ratios	I	(2.647)
	II	2.091
	III.	1.727
	IV.	1.500
	V	(1.360)
	VI.	1.261
Rear wheel drive	Chain	
Secondary ratio	(2.647)	
<b>Suspension</b>		
Frame construction type	Aluminium composite bridge frame, self-supporting engine	
Front wheel control	Upside-down telescopic fork, slide tube diameter 45 mm, spring preload, compression and rebound stage adjustable, DDC option: damping electronically adjustable	
Rear wheel control	Aluminium underslung double-sided swinging arm with central spring strut, spring preload, adjustable compression and rebound stage, DDC option: damping electronically adjustable	
Spring travel, front/rear	mm	120/117
Wheel castor	mm	93.9
Wheelbase	mm	1 441
Steering head angle	°	66.9

**BMW S 1000 RR**

Brakes	Front	Twin disc brake, floating, Ø 320 mm, radial 4-piston fixed calipers
	Rear	Single-disc brake, Ø 220 mm, single-piston floating caliper
ABS		BMW Motorrad ABS Pro (part integral, disengageable)
Traction control		BMW Motorrad DTC
Wheels		Standard: Die-cast aluminium wheels Forged aluminium wheels as part of Race Package option Carbon fibre wheels as part of M Package option
	Front	3.50 x 17"
	Rear	6.00 x 17"
Tyres	Front	120/70 ZR17
	Rear	190/55 ZR17

**Dimensions and weights**

Total length	mm	2 073
Total width with mirrors	mm	846
Seat height	mm	824
DIN unladen weight, road ready, fully fuelled	kg	Standard: 197 with Race Package option 195.4, with M Package option 193.5
Permitted total weight	kg	407
Fuel tank capacity	l	16.5

**Performance figures**

Fuel consumption (WMTC)	l/100 km	6.4	
CO2	g/km	149	
Acceleration	0-100 km/h	s	3.1
Top speed	km/h	200	