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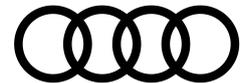
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Condensed Information

## **Four Rings, Four-Wheel Drive: 40 Years of quattro**

- **Technology and success story: around 10.5 million all-wheel drive Audis produced since 1980**
- **New quattro technology with electric torque vectoring in the Audi e-tron S and e-tron S Sportback prototypes**
- **Audi the world's first high-volume manufacturer of cars with three electric motors**

**“quattro” means “Audi,” and “Audi” often means “quattro”: The principle of four-wheel drive is a cornerstone of the brand and has been for 40 years. Since the original quattro made its debut at the Geneva Motor Show in 1980, Audi has produced around 10.5 million cars featuring quattro drive systems. Now, it is time for the next chapter in this particular success story: With the Prototypes of Audi e-tron S and Audi e-tron S Sportback, Audi will be unveiling electric torque vectoring.**

### **40 years of quattro: the track record and the model range**

The quattro has built up an impressive track record over 40 years. By the end of 2019, Audi had produced 10,448,406 cars with all-wheel drive, including 804,224 in 2019 alone. Almost 45% of all Audi models built in 2019 featured quattro drive systems, with most coming from the factories in Changchun in China and San José Chiapa in Mexico. Ingolstadt and Neckarsulm made 258,765 new cars with the famous all-wheel drive technology in 2019.

The quattro drive system is a cornerstone of the Audi brand. It is represented in every model series except the compact A1. All large and particularly powerful vehicle versions, as well as all S and RS models, transfer their horsepower to the road through four wheels.

### **quattro 2.0: electric torque vectoring**

Audi will be presenting the next stage of development of electric all-wheel drive. In the Audi e-tron S and e-tron S Sportback prototypes, the quattro system will be accompanied by electric torque vectoring. Electric torque vectoring – which involves distributing power between the wheels – takes mere milliseconds. It can also engage high torque, allowing the car to be driven as energetically into curves as a sports car. Audi is the first manufacturer in the premium segment to mass-produce the technology using three electric motors.

*\*\* The fuel consumption values of all models named and available on the German market can be found in the list provided at the end of this press information.*

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With the Audi e-tron\*\* and the Audi e-tron Sportback\*\*, Audi is entering the age of sustainable transportation. Electric motors drive the front and rear axles in both SUV models. The suspension and drive control units work closely together to regulate the ideal distribution of drive torque between them – permanently, fully variably and within fractions of a second. For reasons of efficiency, the electric SUVs use only the rear electric motor in most situations. If the driver requests more output than it can provide, the front unit will instantly be activated. This also happens predictively before slip occurs in icy conditions or during fast cornering, or if the car understeers or oversteers. The result is extremely precise handling that can be adjusted to a large extent via the suspension control systems, from supremely stable to sporty.

### **An all-star line-up: the versions of the mechanical quattro drive system**

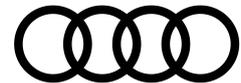
Audi's quattro technology is versatile and tailored precisely to suit the specific vehicle concept. One thing that all models do share is the way the system works in concert with [wheel-selective torque control](#) – a function of Electronic Stabilization Control (ESC) that refines handling at the limits of adhesion by gently applying the brakes at appropriate moments.

There are two technologies available for models with longitudinal front-mounted engines, depending on transmission. The quattro permanent all-wheel drive system, which cooperates with the [tiptronic torque-converter automatic transmission](#), centers on a purely mechanical self-locking center differential. During normal driving, it distributes slightly more torque to the rear, but if necessary, it will transfer up to 70% to the front axle or up to 85% to the rear. However, quattro with ultra technology – which can be found in Audi models with S tronic or with manual transmissions – uses a dual-clutch arrangement. This means that its control unit can switch whenever necessary from front-wheel drive to all-wheel drive in the blink of an eye – predictively in many cases. There are no differences in terms of traction and handling compared with permanent systems.

The compact Audi models with transverse engines use their own quattro drivetrain. At its core is a hydraulic multi-plate clutch that sits on the rear axle for better weight distribution. In many models, this is managed so dynamically that it can transfer some of the torque from the front axle to the rear as soon as the car starts to turn in to a corner. There is also a multi-plate clutch in the R8, a mid-engined high-performance sports car. In this case, it is mounted on the front axle. When necessary, it transfers the torque from the rear wheels to the front wheels.

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#### **40 years of quattro: the milestones**

When the Audi quattro first appeared at the Geneva Motor Show in 1980, it introduced a means of transmitting power that was entirely new for the passenger car sector – an all-wheel drive system that was lightweight, compact, efficient and tension-free. This made the quattro concept particularly suited to sporty cars and high-volume production right from the outset. The 147 kW (200 PS) original quattro remained part of the product range as a standard model until 1991 and underwent several technical revisions. In 1984, Audi added the exclusive Sport quattro with 225 kW (306 PS). In 1986, the manually locking center differential that had been fitted to the original quattro since its launch was replaced by the Torsen differential, which was able to distribute drive torque variably.

The brand continued to refine its quattro technology in subsequent years. The first Audi TDI with permanent all-wheel drive appeared in 1995. Then in 1999, the technology was applied to the A3 and TT model series and thus the compact segment. The next big step came in 2005 with the center differential with asymmetric, dynamic power distribution. In 2007, a viscous coupling appeared on the front axle on the Audi R8, followed a year later by the sport differential. quattro with ultra technology was added to the range in 2016.

#### **40 years of quattro: supremacy in motorsports**

Audi first entered the World Rally Championship in 1981 and dominated the event just one season later. The Audi team won the manufacturers' championship in 1982, and Finnish driver Hannu Mikkola secured the drivers' trophy in 1983. Audi took both titles in 1984, with Stig Blomqvist of Sweden becoming world champion. That year, Audi fielded its Sport quattro with a shorter wheelbase, followed in 1985 by the Sport quattro S1 producing 350 kW (476 PS). In 1987, Walter Röhrl drove a specially modified S1 to victory at the Pikes Peak hill climb in the USA – the perfect finishing touch to the exhilarating years of rallying.

Audi subsequently shifted to racing touring cars. In 1988, the manufacturer won both the drivers' and manufacturers' championships in the US Trans-Am at its first attempt with the Audi 200, before competing with considerable success in the IMSA GTO series the following year. In 1990/91, Audi entered its mighty V8 quattro in the Deutsche Tourenwagenmeisterschaft (DTM), winning two drivers' championships. The A4 quattro Supertouring entered seven national championships in 1996 – and won them all. Two years later, the European ruling bodies banned all-wheel drive almost completely from touring car races.

An Audi all-wheel drive race car – the Audi R18 e-tron quattro with a hybrid drive – once again took to the track in 2012. A V6-TDI drove the rear wheels, while a flywheel accumulator supplied [recuperated energy](#) to two electric motors on the front axle. The car used a temporary quattro drive system during acceleration. It boasted a formidable track record, with three overall victories at the 24 Hours of Le Mans and two drivers' and manufacturers' titles in the World Endurance Championship (WEC).

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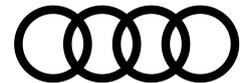


**40 years of quattro: *Vorsprung durch Technik***

quattro is an icon. The name represents safe driving and sportiness, technical expertise and competitive superiority – in short, *Vorsprung durch Technik*. The success of quattro models on the road and in racing has cemented this status, as has a series of legendary TV commercials and advertising campaigns. In 1986, professional rally driver Harald Demuth drove an Audi 100 CS quattro up the Kaipola ski jump in Finland. Circuit and rallycross champion Mattias Ekström (Sweden) performed a similar feat in 2019, using an Audi e-tron quattro with three electric motors to scale the steepest section of the [Streifski course at Kitzbühel](#), negotiating gradients of as much as 85%.

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Facts and Figures

## 40 Years of Audi quattro

### The track record

- Almost 10.5 million cars with quattro drive systems produced since 1980
- Total in 2019: 804,224 quattro models built worldwide, 258,765 of which in Germany
- quattro technology is standard in all high-performance Audis

### The mechanical quattro technologies

- A wide-ranging array of technologies: quattro permanent all-wheel drive, quattro with ultra technology for models with longitudinal front-mounted engines, plus sport differential for many top models
- quattro with multi-plate clutch for models with transverse engines and the R8 sports car

### Electric all-wheel drive

- Audi e-tron and e-tron Sportback feature two separately controlled electric motors
- Audi e-tron S and e-tron S Sportback prototypes have three electric motors, each with two electric motors on the rear axle, featuring electric torque vectoring

### The technical milestones

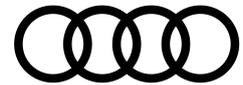
- 1980 to 1999: original quattro in 1980 and Sport quattro in 1984 with manually locking center differential; Torsen differential in 1986; TT and A3 with quattro drive systems in 1999
- 2000 to 2020: center differential with asymmetric, dynamic power distribution in 2005; Audi R8 with viscous coupling in 2007; sport differential in 2008; quattro with ultra technology in 2016

### quattro in motorsports

- 1980s: four titles in the World Rally Championship from 1982 to 1984; three victories in the Pikes Peak hill climb from 1985 to 1987; then major success in the Trans-Am and IMSA GTO series in the USA
- 1990s: drivers' championships in the DTM in 1990 and 1991; seven titles in the Super Touring category in a single season in 1996
- 2010s: three Le Mans victories and four WEC titles for the Audi R18 e-tron quattro

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40 Years of quattro – 40 Years of *Vorsprung durch Technik*

## **40 Years of quattro: the All-Conquering Technology from Audi**

A technology and success story from Audi is celebrating a major birthday, as the quattro drive system turns 40 years old. Since the original quattro first made its debut at the Geneva Motor Show in 1980, the principle of four-wheel drive has become one of the cornerstones of the brand. To date, Audi has produced almost 10.5 million cars with quattro drive systems. Now, it is time for the next chapter in this particular success story: The prototypes Audi e-tron S and e-tron S Sportback use electric torque vectoring.

### **The track record**

“quattro” means “Audi,” and “Audi” often means “quattro.” Now, 40 years after the original quattro first appeared, Audi has notched up some impressive figures: By the end of 2019, Audi had produced almost 10.5 million cars with all-wheel drive worldwide, including 804,224 last year alone. In 2019, around 45% of Audi customers chose models featuring quattro drive systems. The factories in Changchun, China, and San José Chiapa, Mexico, are leading the charge when it comes to the production of all-wheel-drive Audis. Altogether, 258,765 new Audis with quattro technology were built in Germany in 2019.

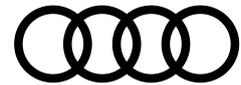
The quattro drive system has been one of the biggest cornerstones of the Audi brand for 40 years. It is represented in every model series except the compact A1\*\*. All larger models – the A8\*\*, the Q7\*\*, the Q8\*\*, the e-tron\*\* and the e-tron Sportback\*\*, the R8\*\* and all S and RS models transfer their horsepower to the road through four wheels as standard.

### **The mechanical quattro systems**

Throughout its model range, Audi offers a very wide variety of car concepts – and quattro technology is equally multifaceted. One thing that all versions do share is the way the system works in concert with [wheel-selective torque control](#) – a software function of Electronic Stabilization Control (ESC). During dynamic cornering, it applies the brakes very gently to the unloaded wheels on the inside of the curve before they have the chance to slip. This input makes the handling neutral, dynamic and stable.

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### **Two systems: quattro drive for longitudinal engines**

The Audi models with longitudinal front-mounted engines and [tiptronic automatic transmissions](#) employ the classic quattro drive system with a self-locking center differential, which operates by purely mechanical means and therefore without any delay whatsoever. It is configured as a planetary gear. This involves an internal gear encompassing a sun gear, with cylindrical planet gears, joined to the rotating housing, turning between them. In regular driving operation, 60% of the drive torque flows to the rear axle via the internal gear, which has a larger diameter, and its associated output shaft. The remaining 40% goes to the front axle via the smaller sun gear. This asymmetric, dynamic torque distribution results in sporty, rear-biased handling. If the wheels on one axis lose traction, the shape of the gearwheels and helical gearing in the differential produce axial forces. These forces act on friction discs to produce a locking effect that diverts the bulk of the drive torque to the wheels with the better traction. Up to 70% can be directed to the front wheels and up to 85% to the rear.

quattro with highly efficient ultra technology is designed for Audi models featuring a longitudinal front-mounted engine working with a manual transmission or the S tronic dual-clutch transmission. In the case of a moderate driving style, only the front wheels are driven for reasons of efficiency. The all-wheel drive system is ready to spring into action immediately when needed. In fact, it is usually activated predictively. During fast cornering, the control unit will detect that the front inside wheel is about to reach the limit of grip around half a second before it actually happens. There are no differences in terms of traction and handling compared with permanent quattro drive systems.

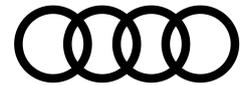
The concept with two clutches in the drivetrain gives quattro with ultra technology a key efficiency advantage over the competition. When the system changes to front-wheel drive, the front clutch – a multi-plate clutch at the transmission output – disconnects the propshaft. A decoupling clutch also opens in the rear differential. It shuts down the rotating components that cause the most drag losses here, such as the large crown wheel running in the oil bath.

### **Torque vectoring at the rear axle: the sport differential**

The sport differential is available for the particularly powerful and sporty Audi models with tiptronic. This improves handling, traction and stability by distributing drive torque ideally between the rear left and right wheels in all operating states. During turning or acceleration, torque vectoring literally presses the car into the curve without producing any understeer. At the same time, the system stabilizes the vehicle by shifting drive torque to the wheel on the inside of the curve whenever necessary.

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In addition to the functions covered by a conventional differential, the sport differential has a transmission stage and hydraulic multi-plate clutch fed by an oil pump. During fast cornering, the clutch engages for the outside wheel, which has better grip, thereby seamlessly directing the higher speed of the transmission stage to that wheel. The extra torque required is taken from the opposite wheel via the differential, which means that almost all the torque goes to the wheel on the outside of the curve.

### **Hydraulic multi-plate clutches: the quattro drive system for transverse engines and in the Audi R8**

The compact models with transverse engine configurations use a quattro drivetrain centered on an electronically controlled hydraulic multi-plate clutch. It is mounted at the end of the propshaft before the rear differential to optimize weight distribution. Inside it is a package of metal friction rings mounted in pairs one behind the other. One ring of each pair is permanently meshed with the clutch basket, which rotates with the propshaft. The other ring of each pair is connected to the short shaft leading to the rear differential.

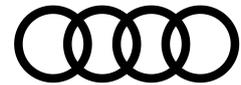
The all-wheel drive control unit constantly calculates the best torque distribution between the front and rear axles based on extensive data. When the requirements change, the electric axial piston pump builds up as much as 40 bar of hydraulic pressure within just a few milliseconds. It presses the friction plates together, which enables variable transmission of the drive torque from the front axle to the rear.

On the especially sporty models with transverse engine layouts, clutch management is designed to focus on dynamics, with more frequent and pronounced rearward torque distribution. In sport mode, or when ESC is disabled, management permits controlled drifts on road surfaces with low grip. When the car is driven with a more restrained style, the clutch can be disengaged entirely on some models to boost efficiency.

In second-generation versions of the R8 high-performance sports car (since 2015), Audi has fitted the electrohydraulic multi-plate clutch in a special drive layout. Behind the V10 mid-mounted engine is a compact seven-speed S tronic along with a locking differential to drive the rear wheels. One of its output shafts is linked to the propshaft that runs to the front-axle drive. The water-cooled multi-plate clutch, which distributes the necessary torque to the front wheels in any driving situation, is integrated within this. There is no fixed basic distribution; in extreme cases, up to 100% can be transmitted to the front or rear axle.

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## quattro 2.0: electric torque vectoring

With the Audi e-tron and the e-tron Sportback, the brand with the four rings is making strides into the sustainable future of transportation – and the future of the quattro drive system. The two electric motors on the front and rear axles enable electric all-wheel drive that ensures the best possible traction and sporty handling. The Audi e-tron\*\* uses electric all-wheel drive with the benefits of the conventional sport differential.

### **Audi e-tron\*\* and Audi e-tron Sportback\*\*:** electric all-wheel drive

Electric all-wheel drive regulates the ideal distribution of torque to both axles permanently and fully variably, combining the efficiency of a single-axle drive with the handling and traction of an all-wheel drive. When driven at a calm pace, the Audi e-tron\*\* and e-tron Sportback\*\* use only the rear electric motor for propulsion. If the driver demands more power than it can supply, the control units will activate the motor on the front axle. This happens predictively in many situations, even before slip occurs in icy conditions or during fast cornering, or if the car understeers or oversteers.

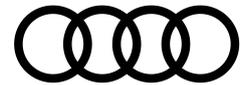
It takes just 30 milliseconds or so from the system detecting the situation to the drive torque from the electric motors kicking in. In combination with [wheel-selective torque control](#), electric all-wheel drive offers excellent traction, outstanding stability and plenty of fun whatever the weather. The driver can adjust the character of the handling via the suspension control systems, from supremely stable to sporty.

In the Audi e-tron S and e-tron S Sportback prototypes, Audi is presenting the latest generation of electric all-wheel drive. Each of the two exceptionally dynamic electric SUVs comes with three electric motors on board, allowing drivers to experience the benefits of the conventional sport differential on the rear axle. Each of the two rear electric motors actuates one rear wheel directly via its transmission. As with the axles, there is no mechanical link. The torque is distributed between the rear wheels – through a process named electric torque vectoring – in a matter of milliseconds, and it is possible to engage extremely high torque.

If the car turns into a curve quickly, the electric motor will direct extra torque to the rear wheel on the outside of the curve, while the brakes will be applied to the inside rear wheel accordingly. The difference can amount to as much as 220 Nm (*162.3 lb-ft*), which translates to around 2,100 Nm (*1548.9 lb-ft*) at the wheels as a result of the gear ratios. The latency, i.e. the time offset, is only around a quarter of that of a mechanical system, while the torque is higher in electric torque vectoring.

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The control units for electric all-wheel drive and the benefits of the conventional sport differential work closely together, which is what makes the high speed and precision of the control operations possible in the first place. Electronic Stabilization Control (ESC), the drive control unit (DCU), the electronic chassis platform (ECP) and the power electronics control units all have roles to play.

### **Always one step ahead of the competition: the technical milestones**

quattro technology can trace its roots back to the winter of 1976/77, when a team of Audi engineers conducted a series of test drives in the deep snow of Sweden. An Iltis traveled along for comparison purposes, and the all-terrain military vehicle with its high ground clearance outperformed the much more powerful front-wheel-drive prototypes. During this trip, it dawned on the engineers that Audi could realistically use an all-wheel drive system even on high-performance passenger cars – but it would have to be a completely new type that was lightweight, compact and efficient and could manage without a heavy transfer case or second propshaft.

The stroke of genius that made it all possible was the hollow shaft – a drilled-out, 263 millimeter (10.4 in) secondary shaft in the transmission that directed power in two directions. From its rear end, it drove the housing of the center differential, which was configured as a manually locking bevel-gear differential. In normal situations, it sent 50% of the power along the propshaft to the rear axle, which was equipped with a second locking differential. The other half of the torque was transferred to the front axle's differential along an output shaft rotating inside the secondary shaft. The quattro drive system was born.

### **Since 1980: quattro technologies for longitudinal engines**

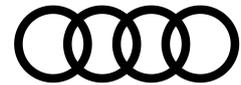
The new technology made its first appearance at the Geneva Motor Show in 1980, fitted to the Audi quattro, an angular coupé with a five-cylinder turbocharged engine delivering 147 kW (200 PS). Originally planned for only low-volume production, the original quattro ended up remaining part of the model line-up until 1991, having undergone numerous refinements along the way. In 1984, it was joined by the Audi Sport quattro with a shortened wheelbase. Producing 225 kW (306 PS), it was an exclusive high-performance sports car at the time.

With the new Audi 80 released in 1986, the brand introduced the second generation of its quattro technology, featuring the Torsen differential (Torsen: torque sensing), which was designed as a worm gear transmission. When a vehicle axle lost traction, friction would be created in the helical gears of the differential, allowing up to 75% of the torque to be diverted to the other axle.

The next big step for the models with longitudinal front-mounted engines came in 2005 with the Audi RS 4. The new planetary gearing allowed even higher locking values and distributed the

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forces in a 40:60 ratio in normal conditions. This third generation of the center differential has undergone further stages of development since then and still features in the range to this day.

### **1999 onward: new developments across all technical platforms**

Audi has continued to expand its range of quattro models over the course of 40 years. The decision was made back in the early 1980s to offer the quattro drive system across the board. The new models helped to pave the brand's way into the premium segment. The first TDI with permanent all-wheel drive appeared in 1995; four years later, the technology moved into the compact class. The A3 and the new TT featured the electronically controlled hydraulic multi-plate clutch.

The first generation of the Audi R8 high-performance sports car launched in 2007. Its quattro drive system was a very special development, with the transmission in the rear integrating a power take-off supplying an unregulated viscous coupling on the front axle via a propshaft. It could divert 15% to 30% of torque to the front wheels when conditions called for it. The sport differential for the powerful A and Q models came in 2008, making its debut in the Audi S4. Finally, the quattro system with the exceptionally efficient ultra technology became the most recent innovation to join the technology line-up when it arrived on the Audi A4 in 2016.

### **quattro in motorsports**

Audi entered the world of rallying as a works team in 1978, initially running front-wheel drive cars. Barely a year had passed since the original quattro was first unveiled in Geneva than the brand began to achieve enormous success in the World Rally Championship. Hannu Mikkola from Finland won the first six special trials in the snow at the 1981 Monte Carlo Rally. He had a lead of almost six minutes when victory slipped through his fingers due to a minor accident. He recorded his first victory at the next round in Sweden.

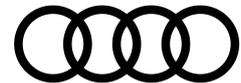
### **1982–1987: supremacy on gravel**

The following year, the quattro dominated the championship. Audi set a new benchmark with seven victories and easily won the manufacturers' championship. One year later, Mikkola took home the drivers' title. The 1984 season also started off with a bang – the newly recruited two-time world champion Walter Röhrl won the Monte Carlo Rally ahead of his teammates Stig Blomqvist (Sweden) and Mikkola. At the end of the season, Audi claimed both the manufacturers' title and the drivers' title with Blomqvist.

To make better use of the loose regulations of the Group B class of rallying, Audi developed the Sport quattro for the 1984 season. This had a shorter wheelbase that promised nimbler handling. It was followed in 1985 by the Sport quattro S1, which developed 350 kW (476 PS) and was elevated to legendary status due in part to its striking rear spoiler. In the middle ratio, the 1,090 kilogram (2,403.0 lb) S1 shot from 0 to 100 km/h (62.1 mph) in 3.1 seconds. In the

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last event of the season, the British RAC Rally, Röhl used a dual-clutch transmission that was actuated pneumatically – a precursor to today's S tronic.

When the exhilarating Group B years came to an end in 1986, Audi pulled out of the World Rally Championship – but not without one last bombshell. In July 1987, Röhl won the Pikes Peak hill climb in Colorado, USA, driving an extensively modified Sport quattro S1 adorned with some enormous wings. Röhl tackled the 19.99-kilometer (12.4 mi) course, very little of which was paved at the time, in a record time of 10 minutes and 47.85 seconds, hitting a top speed of 196 km/h (121.8 mph). “It was the very pinnacle of what can be done with a rally car”, he noted.

### **1988–1992: success in touring car racing**

The brand competed in the Trans-Am series in the USA with the Audi 200 in 1988, winning the manufacturers' and drivers' titles at the first attempt, the latter courtesy of US driver Hurley Haywood. Haywood and Hans-Joachim Stuck scored seven wins out of 15 races in the IMSA GTO series in 1989, when the regulations were a little more relaxed. The five-cylinder turbo in their Audi 90 quattro hit top form at around 530 kW (720 PS).

Audi switched to the Deutsche Tourenwagenmeisterschaft (DTM) touring car championship in 1990. Stuck won the drivers' title with the big and powerful V8 quattro that first year, followed by Frank Biela in 1991. By the time Audi withdrew from the series in 1992, it had won 18 out of 36 races. In 1996, the Audi A4 quattro Supertouring, with its two-liter, four-cylinder engine, entered seven national championships on three continents – and won them all. Two years later, the European rules largely banished all-wheel drive from touring car competition. The quattro's record up to that point read as follows: four titles in the World Rally Championship, three victories at Pikes Peak, a championship win in the Trans-Am, two DTM titles, eleven national touring car championships and a World Touring Car Cup.

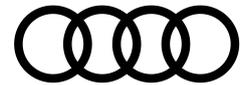
### **2012–2014: three overall victories at Le Mans**

It was not until 2012 that an Audi all-wheel-drive race car – the Audi R18 e-tron quattro with a hybrid drive system – once again took to the track. A V6 TDI drove the rear wheels, while a flywheel accumulator supplied [recuperated energy](#) to two electric motors on the front axle. When the situation called for maximum traction during acceleration, the race car was capable of throwing its temporary quattro drive system into the mix for a few crucial seconds.

With three consecutive overall victories at the 24 Hours of Le Mans and two drivers' and manufacturers' titles in the World Endurance Championship (WEC), Audi provided a convincing demonstration of the potential of the concept.

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## The enduring appeal of quattro

quattro is an icon. The name represents safe driving and sportiness, technical expertise and competitive superiority. The success of quattro models on the road and in racing has laid the foundation for this, while a series of legendary TV commercials has served only to underline it.

One unforgettable moment is the clip from 1986 filmed at the Kaipola ski jump in Finland, featuring the red Audi 100 CS quattro with professional rally driver Harald Demuth at the wheel scaling the 37.5-degree incline under its own power. Circuit and rallycross champion Mattias Ekström (Sweden) performed a similar feat in 2019. He tackled the steepest section of the [Streif ski course at Kitzbühel](#) in an Audi e-tron quattro with three electric motors, negotiating gradients of as much as 85%.

Audi has fueled the appeal of quattro again and again over 40 years with a succession of spectacular concept cars. The quattro Spyder presented at the 1991 International Motor Show (IAA) in Frankfurt am Main, Germany, was the brand's first thoroughbred sports car of the post-war era and its first car aluminum-bodied car. Just a few weeks later, Audi presented the Avus quattro at the Tokyo Motor Show. It was designed to feature a W12 engine producing 374 kW (509 PS) mounted longitudinally ahead of the rear axle, the manual transmission in the quattro drivetrain positioned between the front wheels.

The Audi TT quattro coupé and roadster concepts presented in fall 1995 indicated the way to series production. Three more concept cars marked the expansion of the model range in 2003. At the Detroit Motor Show in January, Audi presented its Pikes Peak quattro, the predecessor to the Q7. This was followed at the Geneva Motor Show by the Nuvolari quattro two-door coupé, which paved the way for the A5. Then, in September, the Audi Le Mans quattro was the star of the IAA in Frankfurt – and also the spitting image of what would later become the R8.

The Audi R8 e-tron concept, one of the stars of the IAA in 2009, was a high-performance sports car with electric-only drives at all four wheels. In 2010, the Audi quattro concept – a re-interpretation of the original quattro – appeared at the Paris Motor Show. From 2015 on, numerous concept cars heralded the future arrival of standard e-tron models with electric all-wheel drive: the Audi e-tron quattro concept (IAA 2015), the Audi e-tron Sportback concept (Shanghai 2017), the Audi e-tron GT concept (Los Angeles 2018) and the Audi Q4 e-tron concept (Geneva 2019).

– End –

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### **Fuel consumption of the models listed**

*(Fuel consumption, CO<sub>2</sub> emission figures, and efficiency classes given in ranges depend on the tires/wheels used as well as the selected equipment)*

#### **Audi e-tron**

Combined electric power consumption in kWh/100 km (62.1 mi): 24.3–21;

Combined CO<sub>2</sub> emissions in g/km: 0

#### **Audi e-tron Sportback**

Combined electric power consumption in kWh/100 km (62.1 mi): 23.9–20.6;

Combined CO<sub>2</sub> emissions in g/km: 0

#### **Audi A1**

Combined fuel consumption in l/100 km (62.1 mi): 6.0 – 4.7;

Combined CO<sub>2</sub> emissions in g/km: 137 - 107

#### **Audi A8**

Combined fuel consumption in l/100 km (62.1 mi): 11.4–5.7;

Combined CO<sub>2</sub> emissions in g/km (g/mi): 260–151

#### **Audi Q7**

Combined fuel consumption in l/100 km (62.1 mi): 9.1–6.6;

Combined CO<sub>2</sub> emissions in g/km: 208–174

#### **Audi Q8**

Combined fuel consumption in l/100 km (62.1 mi): 12.1–6.5;

Combined CO<sub>2</sub> emissions in g/km: 277–172

#### **Audi R8**

Combined fuel consumption in l/100 km (62.1 mi): 13.3–12.9;

Combined CO<sub>2</sub> emissions in g/km: 302–293

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The specified fuel consumption and emission data have been determined according to the measurement procedures prescribed by law. Since 1st September 2017, certain new vehicles are already being type-approved according to the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), a more realistic test procedure for measuring fuel consumption and CO<sub>2</sub> emissions. Starting on September 1st 2018, the New European Driving Cycle (NEDC) will be replaced by the WLTP in stages. Owing to the more realistic test conditions, the fuel consumption and CO<sub>2</sub> emissions measured according to the WLTP will, in many cases, be higher than those measured according to the NEDC. For further information on the differences between the WLTP and NEDC, please visit [www.audi.de/wltp](http://www.audi.de/wltp).

We are currently still required by law to state the NEDC figures. In the case of new vehicles which have been type-approved according to the WLTP, the NEDC figures are derived from the WLTP data. It is possible to specify the WLTP figures voluntarily in addition until such time as this is required by law. In cases where the NEDC figures are specified as value ranges, these do not refer to a particular individual vehicle and do not constitute part of the sales offering. They are intended exclusively as a means of comparison between different vehicle types. Additional equipment and accessories (e.g. add-on parts, different tyre formats, etc.) may change the relevant vehicle parameters, such as weight, rolling resistance and aerodynamics, and, in conjunction with weather and traffic conditions and individual driving style, may affect fuel consumption, electrical power consumption, CO<sub>2</sub> emissions and the performance figures for the vehicle.

Further information on official fuel consumption figures and the official specific CO<sub>2</sub> emissions of new passenger cars can be found in the "Guide on the fuel economy, CO<sub>2</sub> emissions and power consumption of new passenger car models", which is available free of charge at all sales dealerships and from DAT Deutsche Automobil Treuhand GmbH, Hellmuth-Hirth-Str. 1, D-73760 Ostfildern, Germany and at [www.dat.de](http://www.dat.de).

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The Audi Group, with its brands Audi, Ducati and Lamborghini, is one of the most successful manufacturers of automobiles and motorcycles in the premium segment. It is present in more than 100 markets worldwide and produces at 17 locations in 12 countries. 100 percent subsidiaries of AUDI AG include Audi Sport GmbH (Neckarsulm), Automobili Lamborghini S.p.A. (Sant'Agata Bolognese, Italy) and Ducati Motor Holding S.p.A. (Bologna, Italy).

In 2019, the Audi Group delivered to customers about 1.846 million automobiles of the Audi brand, 8,205 sports cars of the Lamborghini brand and 53,183 motorcycles of the Ducati brand. In the 2018 fiscal year, AUDI AG achieved total revenue of €59.2 billion and an operating profit before special items of €4.7 billion. At present, approximately 90,000 people work for the company all over the world, more than 60,000 of them in Germany. Audi focuses on sustainable products and technologies for the future of mobility.

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