

Electric and digital

According to statistics from the German Federal Motor Transport Authority, published in January 2023, there are now over one million electric cars in Germany plus over 860,000 plug-in hybrids.

However, the development of registration figures shows fluctuations that are influenced by various factors such as the end of government-paid e-car premiums for commercially used vehicles. Overall though, the trend of e-car ownership is showing an upward trajectory.

This is to be welcomed, not least from an environmental point of view, because despite controversial discussions, the consensus is now that battery drives are the most efficient way of providing energy for

cars and that electric cars reduce their ecological backpack significantly faster than vehicles with internal combustion engines over a longer period of use.

A big problem, however, are the still very high vehicle prices, mainly determined by the expensive batteries. A solution to this problem is also emerging, but it is not likely to appeal to German manufacturers: The market entry of price-aggressive Chinese suppliers.

E-mobility needs networking and intelligent systems

In any case, one thing is obvious: networking and infotainment play a key role, especially for e-cars. This begins with charging planning

before the journey and continues when the car stops at the charging station. There, the app must inform the driver about the current charging progress, and on-board entertainment and productivity functions should bridge the waiting time.

With this background, together with our test partner umlaut, we have once again carried out a detailed comparison of the connectivity, e-mobility and infotainment functions of current electric cars. We have comprehensively reformed our test catalogue for this and adapted it even more closely to the requirements described. And for the first time, two Chinese vehicles are taking part in our full test.

Hannes Rügheimer

Electric cars are on the rise and represent the future in the plans of most car manufacturers. But with probably no other type of drive does everyday use depend as much on networking and intelligent on-board systems as with electric cars. And just as important as with any other car type, remains the operation of the complex technology. umlaut and connect have put all of this under the microscope.

IN OUR TEST

BMW iX	VERY GOOD
BYD ATTO 3	SUFFICIENT
GENESIS GV60	SATISFACTORY
MERCEDES-BENZ EQS SUV	VERY GOOD
NIO ET7	GOOD
PORSCHE TAYCAN	SATISFACTORY
TESLA MODEL Y	SATISFACTORY
VOLKSWAGEN ID.BUZZ	SATISFACTORY

BMW iX



The iX SUV is the current flagship among BMW's electric models. The electric vehicle underlines its independence not only with the, for some, overly prominent kidney at the front, but also in the interior. The climate control, for example, has been moved to the lower edge of the 14.9 inch infotainment display. This is complemented by a 12.3 inch instrument cluster. The brand-typical controller still resides on the centre console, although it is no longer officially called „iDrive“. This means that you can navigate through the menus either by turning and pushing the knob or via touchscreen.

The wide range of features can also be operated on the multifunctional steering wheel or via the AI-based voice recognition. The test vehicle also featured an informative head-up display and intuitive gesture control.

In terms of connectivity, the BMW iX leaves hardly anything to be desired; 5G is also included. However, if you want to use the Wi-Fi hotspot or streaming services, you have to subscribe to your own data volume.

Apple Carplay and Android Auto are supported both wired and wireless, although the wired version was a little problematic in our test.

But the on-board systems can read out the latest news or provide weather forecasts too. In the productivity category, however, the range of features remains limited.

With the „My BMW“ app, you can also operate a variety of vehicle functions remotely and check the status, only sharing the vehicle location is not possible. For mobile operating instructions on the smartphone, you have to install a separate app.

Navigating and charging are top-notch

The on-board navigation integrates necessary charging stops simply and clearly. However, it is not possible to exclude unwanted charging providers. When charging, the app provides reliable information about the current charging status.

Real-time traffic information is clearly displayed and integrated into the route planning; alternatives can

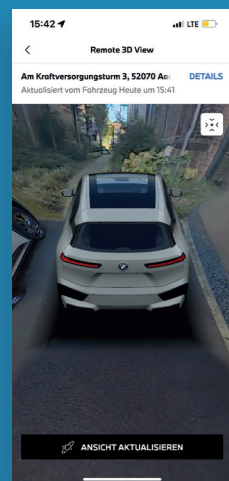
be selected manually. The on-board satnav also supports the search for parking spaces nicely.

In practice, however, assisted parking did not always work as expected – even though the associated 3D view is excellent. Lane assist and lane change also did not fully convince the umlaut test drivers.

All in all, the BMW came in a very good second place, not far behind the Mercedes. The Munich company has successfully transferred the virtues typical of the brand into the electric age.

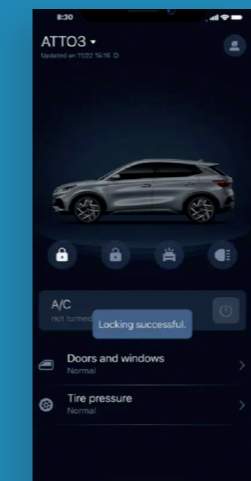
BMW iX XDRIVE 50	
Nominal performance	385 kW (523 PS)
max. torque	765 Nm
Maximum speed	200 km/h
Acceleration 0-100 km/h	4,6 s
Battery capacity (net)	108,8 kWh
max. charging power	22 kW AC/195 kW DC
Range (WLTP)	max. 633 km
Test car price	121 630 Euros
connect VERDICT	
VERY GOOD (873 Points)	

The electric flagship of the Bavarians comes with extensive infotainment and assistance features and thus convinces almost all round in our comparison.



Overview: The remote view, accessed via the app, shows what is going on around the vehicle.

The Chinese manufacturer offers affordable e-cars almost worldwide, also in Germany. In detail, however, there is still room for improvement in its systems.



Reduced: The BYD app primarily offers basic functions – special features are missing.

BYD Atto 3



The widespread explanation that the acronym BYD stands for „Build Your Dreams“ is controversial at least – presumably it is simply the abbreviation for the company name in Chinese, and the slogan comes from BYD's marketing. Anyway, the company is an expert in e-vehicle batteries and has already supplied Tesla with them. Now it wants to conquer the world with its own e-cars – in Germany flagship stores can already be found in Frankfurt and Cologne, complemented by a number of sales and service partners. However, none of them were able to provide us with a higher positioned model due to supply bottlenecks. So the choice fell on the Atto 3 compact SUV – the cheapest model in the BYD range and also in this test.

Its interior is a little playful for European tastes, but overall well equipped. A 5 inch instrument cluster and a 12.8 inch infotainment display dominate. Operation is controlled by touch, via the precisely responding multifunction steering wheel or a – still somewhat rudimentary –

voice recognition system. The latter shows a few imprecisions in its German localisation, for example when it reports that the destination will be reached at „5:10 p.m.“ instead of the „17:10“ common in Germany.

An LTE modem with SIM card slot provides internet access. A digital key and Wi-Fi hotspot are also offered, and the system even supports wired Carplay and Android Auto. For entertainment, there's DAB+, web radio, Bluetooth and Spotify streaming. However, the Atto 3 does not offer any info services on its own, and the productivity category in our rating also remains blank. Similarly, the BYD app only supports basic functions such as door locking and climate control – more advanced ones are non-existent.

Charging planning appears somewhat random

Navigation and charging planning show light and shade: The route guidance works well and is adapted to the traffic situation. Practical filter functions such as charging speed or

restaurants help when selecting charging stations. However, you can only search for locations along the route in the second step ... the system does not make its own suggestions for charging stops. In addition, the results of this search seem somewhat random.

The testers also see room for improvement in the assistance systems. The lane-keeping assistant steers rather erratically, the speed assistant does not react to traffic signs, and a parking assistant is missing. Although good approaches are undoubtedly present, BYD should still fine-tune the software and details.

BYD ATTO 3 COMFORT	
Nominal performance	150 kW (204 PS)
max. torque	310 Nm
Maximum speed	160 km/h
Acceleration 0-100 km/h	7,3 s
Battery capacity (net)	60,5 kWh
max. charging power	11 kW AC/88 kW DC
Range (WLTP)	max. 420 km
Test car price	44 625 Euros
connect VERDICT	
SUFFICIENT (623 Points)	

Genesis GV60



Genesis is the high-end brand of Hyundai, and in their range the GV60 was the first fully electric model. Technically, it is related to the Hyundai Ioniq 5 and Kia EV6 e-cars from the same group. But the GV60 has its own character – also in terms of infotainment and equipment. By the way, the illuminated glass ball on the centre console works as the mode selector for the automatic transmission.

In the cockpit, two 12.3 inch displays are mounted side by side – one as an instrument cluster, the other with touch control for infotainment. In addition, there is a handy controller including handwriting recognition as well as steering wheel control buttons. A head-up display is also on board and provides useful information.

The voice control works well in many areas, but showed some weaknesses with the climate control. In addition, the system claimed not to understand some of the commands even though the display showed their intentions correctly.

The productivity part of the Genesis system can be linked to a Google account. However, e-mail is not supported at all and SMS only to a limited extent. 5G and a Wi-Fi hotspot are not offered, Carplay and Android Auto are present, but only work wired.

The associated smartphone app offers many functions, for example, it can guide the driver to his car via augmented reality.

Good ideas with some weaknesses

The entertainment offerings are extensive, only music and video streaming are not offered as a factory feature. Instead, there are numerous personalisation options. A nice idea is that the car offers relaxation programmes while charging, however, it would be great if there were more choices than just nature sounds. In addition, the menu-only operation of the charging flap is a little cumbersome.

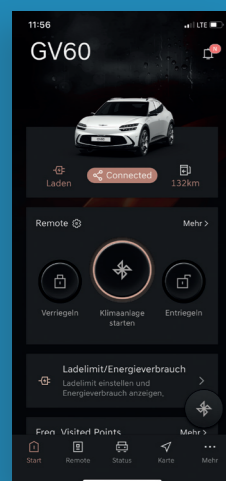
The navigation system was sometimes confusing in city traffic, but it

supports the search for charging points well and can also filter them by charging power or operator. On the other hand, the reason for a delay can only be determined with some difficulty in the real-time traffic information, and the search for a parking space could be easier.

The assistance systems also showed strengths and weaknesses: changing lanes after tapping the indicator and the parking assistant work well, but there is no automatic continuation in a traffic jam. At night, the camera-based exterior mirrors are hardly visible due to glare. Overall, the GV60 ranks in the midfield.

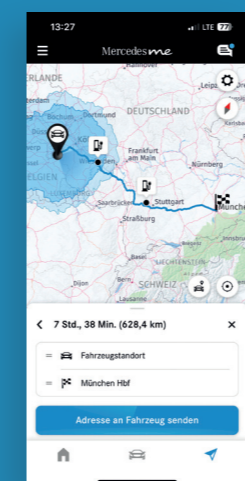
GENESIS GV60 SPORT PLUS AWD	
Nominal performance	360 kW (490 PS)
max. torque	700 Nm
Maximum speed	235 km/h
Acceleration 0-100 km/h	4,0 s
Battery capacity (net)	77,4 kWh
max. charging power	11 kW AC/240 kW DC
Range (WLTP)	max. 466 km
Test car price	83 150 Euros
connect VERDICT	
SATISFACTORY (727 Points)	

The sporty-luxurious Korean car has its own character, which also includes good ideas in infotainment and operation.



Everything in view: The Genesis app supports many functions and is easy to use overall.

The SUV variant of the electric top model from Mercedes competes in the test with maximum standard engine power and convinces with its MBUX.



Long-distance relationship: The "Mercedes me" app gives remote access to many vehicle functions.

Mercedes-Benz EQS SUV



In the SUV variant of the electric top model from Mercedes, the impressive "hyperscreen" is standard equipment: it combines the instrument cluster, central and passenger displays under a common glass cover so that they appear to be one continuous screen. Except for the instrument cluster, they can be operated by touch with haptic feedback. Eye tracking switches off the passenger display if the driver should turn her or his attention to its contents.

The infotainment operating system "MBUX" (Mercedes-Benz User Experience) provides an immense range of functions on the giant screen and is still comfortable and intuitive to operate. The two touch surfaces on the steering wheel can be used to control the functions displayed on the screens – on the left for the cockpit, on the right for the central display. This is logical and intuitive. In addition, there is the option of a comprehensive voice control, which responds to a steering wheel button press or "Hey, Mercedes". Gesture control is also included,

but was not entirely convincing in the test. The integrated 5G modem with eSIM provides internet connection – however, you only need to book your own data volume if you want to use the Wi-Fi hotspot or streaming services such as Tidal in the car.

In addition, smartphone integration via Apple Carplay or Android Auto offers further operating options – either wired or wireless in this latest MBUX generation. And from the outside, the "Mercedes me" app contributes a wide range of remotely controllable functions. However, separate apps are required for a digital logbook, access to the manufacturer's services and digital instructions.

Digital extras upon request

This also applies to the "Mercedes me Store", where you can buy or subscribe to additional software functions depending on the hardware installed and the equipment selected when ordering – from an in-car office to symbol projection

on the road through the LED headlights. There is reason for criticism only in details. For example, Teams calls are not supported.

The navigation is almost perfectly designed for electric driving and reliably leads to a suitable charging station. It's just a pity that you can't filter the offered charging providers. Augmented reality supports route guidance in the central display and even via the head-up display.

The overall package easily wins the test and the highest score we have awarded in this area so far. However, any other result would hardly have suited the 176,000 euro car.

MERCEDES-BENZ EQS 580 4MATIC SUV	
Nominal performance	300 kW (544 PS)
max. torque	858 Nm
Maximum speed	210 km/h
Acceleration 0-100 km/h	4,7 s
Battery capacity (net)	108,4 kWh
max. charging power	11 kW AC/200 kW DC
Range (WLTP)	max. 633 km
Test car price	176 489 Euros
connect VERDICT	
VERY GOOD (877 Points)	

Nio ET7



A year ago, we presented the Nio ET7 as part of an on-site review done in Shanghai. Since then, the Chinese e-car start-up has also gained a foothold in Germany and has already set up seven of its "Power Swap Stations" here. Within the framework of "Battery as a Service", they exchange an empty battery for a full one in about five minutes (see charging network test in connect 11/23). In the medium term, Nio promises to expand this offer to 50 such stations in Germany alone. However, the battery can also be charged in a conventional way, remaining in the vehicle.

All the more exciting is the question of how the production model offered in Germany performs in terms of connectivity and infotainment. Its cockpit with a 10.2 inch instrument cluster and a 12.8 inch infotainment screen is on a par with the other candidates in this comparison. The animated head of the voice assistant "Nomi" above the central display takes some getting used to, but is also somewhat like-

able. Nomi also provides visual feedback as to whether commands have been understood which works quite well in practice. However, the connectivity equipment only includes an LTE modem with eSIM. Nio does not offer Carplay or Android Auto, and our productivity category rating also shows almost only empty spaces.

For passenger entertainment, the ET7 offers DAB+, web radio, Bluetooth and audio streaming services such as Tidal or Spotify. There is also nicely visualised weather information. The Nio app is rather simple, but intuitive to use. It contains a useful charging station finder that can filter by provider and also supports functions such as door unlocking and remote climate control.

Semi-automatic charging planning

The route planning with electric charging stops is somewhat unconventional: If a destination that is too far away is entered, a red battery symbol first signals that charging is required on the way. However, the

charging stops are not suggested automatically; instead, the driver must manually select one of the stations displayed on the map. Here, the umlaut testers still see some potential for improvement.

The driver assistance systems are quite complete, only a traffic jam assistant is missing. Overall, they convey a safe feeling, which includes the smooth operation of the parking assistant. However, the lane-keeping assistant only works at higher speeds.

We were quite surprised that the Nio ranked right behind the top duo with the total grade "good". But overall this is well deserved.

NIO ET7	
Nominal performance	480 kW (408 PS)
max. torque	850 Nm
Maximum speed	200 km/h
Acceleration 0-100 km/h	3,8 s
Battery capacity (net)	100 kWh
max. charging power	11 kW AC/130 kW DC
Range (WLTP)	max. 580 km
Test car price	90 900 Euros
connect VERDICT	
GOOD	(773 Points)

Even as a fully electric sports car, a Porsche shows off its typical characteristics. This also effects its infotainment features.

Porsche Taycan



The all-electric Porsche is available in a total of three body variants: the particularly sporty basic model, the coupé-like Sport Turismo and the Cross Turismo designed as a sports station wagon. The latter was tested in the all-wheel-drive and performance-plus 4S version.

Where the Zuffenhausen company places its priorities is evident from the fact that the 16.9 inch instrument cluster display in the cockpit is significantly larger than the 10.9 inch infotainment touch-screen. In addition, there is an 8.4 inch display in the centre console that is touch-enabled and offers haptic feedback. It is used for climate control, address input which can be spelt out on the keyboard or handwritten, and all functions related to charging. A well-designed multifunctional steering wheel and voice recognition are available for operation. The driver assistance systems are controlled by a separate lever behind the steering wheel.

The personalisation via user profiles reaches far – each driver can not

only define seat and climate settings according to her or his own preferences, but also the start menu and the sorting of apps.

The Taycan does not yet support 5G, but otherwise all essential connectivity functions are on board. The entertainment department also has a lot to offer, including Spotify and Apple Music. Only video streaming is not supported by the Porsche. News reports are also read out loud. Carplay and Android Auto work reliably both wired and wirelessly. The calendar function and address book offer extensive options, for example for selecting the navigation destination. E-mails are received, but not text messages.

Long Routes take time to calculate

The Porsche Connect app not only controls various vehicle functions remotely, but also offers convenient route and charging planning. The navigation in the vehicle also supports the driver well, but the calculation of longer routes with charging

stops takes quite a long time, and it is not possible to filter charging providers. The search for free parking spaces via the navigation system works well overall.

The umlaut testers found minor limitations in the driver assistance systems. For example, the lane departure warning system does not actively steer, but only sounds a warning tone, and there is no automatic continuation in a traffic jam. The traffic sign recognition system, on the other hand, is good.

Like every Porsche, the Taycan is undoubtedly an outstanding driver's car, but it could still improve on our test criteria.

PORSCHE TAYCAN 4S CROSS TURISMO	
Nominal performance	360 kW (490 PS)
max. torque	650 Nm
Maximum speed	240 km/h
Acceleration 0-100 km/h	4,1 s
Battery capacity (net)	83,7 kWh
max. charging power	22 kW AC/270 kW DC
Range (WLTP)	max. 474 km
Test car price	163 678 Euros
connect VERDICT	
SATISFACTORY	(736 Points)

The Chinese e-car start-up comes with sporty aspirations and special features such as its "Power Swap". Despite minor shortcomings, it achieves third place.



Keep it simple: The Nio app is kept rather basic, but can be operated intuitively.



Charging chief: The Porsche Connect app also supports planning and monitoring charging stops.

Tesla Model Y



The opinionated Tesla boss Elon Musk thinks a press department and a test car pool are dispensable. So we had to make do with a rental car.

There are also a number of peculiarities in the vehicle itself. As in the somewhat smaller Model 3, the SUV-like Model Y does not have an instrument cluster. A head-up display is not even offered as an option. The current speed and other essential information is shown in the Tesla solely on the 15 inch central display. You can get used to this, but the fact that even important, safety-critical settings such as the windscreen wiper speed can only be found in submenus remains questionable.

The multifunctional steering wheel and voice control also function somewhat differently in detail than in other brands. But once you get used to them, they support you well.

In general, it is very clear that Tesla focuses primarily on software and sees the car itself almost only as a hardware platform for it, analogous to a smartphone, for example. However, this has a positive effect in

some cases, for example, through the extensive internet and Google integration, which also makes it easy to participate in Zoom meetings. During the journey and especially during charging breaks, Tuneln, Tidal, Spotify, Apple Music, Netflix, Disney Plus, Youtube and Twitch or even relaxation programmes such as "Campfire" or "Santa Claus" provide entertainment and recreation.

However, what is not considered important in California simply does not exist, for example, a logbook. Even e-mail is apparently too "old school" for the Musk company.

Tesla is also special when it comes to charging and driver assistance

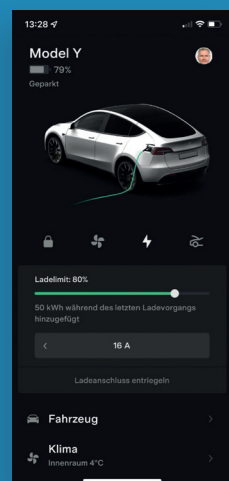
5G is on board in current vehicles, but the driver's smartphone plays a minor role at best – Carplay or Android Auto are missing. On the other hand, navigation and charging planning are very well solved, although the on-board system only takes Tesla's own Superchargers

into account when planning charging stops. However, you can even specify that you only want to charge at the secondary rate. Charging itself is controlled via the on-board display or the intuitive Tesla app

When it comes to driver assistance systems, Tesla relies on cameras and its software expertise instead of more advanced sensors such as radar or lidar. Basics such as distance control and lane departure warning work well this way. However, functions such as automatic parking or summoning will only be available in future software updates.

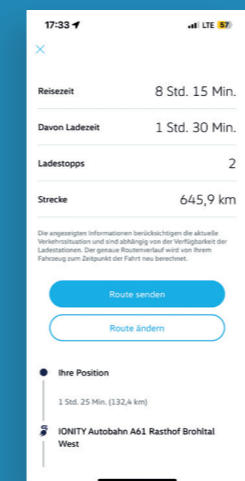
TESLA MODEL Y DUAL MOTOR (AWD) MAXIMUM RANGE	
Nominal performance	378 kW (514 PS)
max. torque	493 Nm
Maximum speed	217 km/h
Acceleration 0-100 km/h	5,0 s
Battery capacity (net)	79 kWh
max. charging power	11 kW AC/250 kW DC
Range (WLTP)	max. 533 km
Test car price	64 670 Euros
connect VERDICT	
SATISFACTORY (731 Points)	

The Californian e-car brand is as polarising as its CEO. We tested the infotainment and connectivity of a current Model Y.



Control authority: The Tesla app also keeps track of charging at all times.

Even those who no longer know the legendary Bully will immediately like the electric van based on it. In the test, however, it scores mixed marks.



Everything according to plan: The VW app proves very helpful when planning tours before departure.

Volkswagen ID.Buzz



When the question arose during the preparation phase of this test as to which Volkswagen ID model should be put under the microscope, the electric "Bully" successor ID.Buzz recommended by the manufacturer was perhaps not the closest choice – but quickly attracted a lot of fondness. Although the rear-wheel drive five-seater does not even try to keep up with the predominantly sporty test environment in terms of driving performance.

In the cockpit of the electric van, a 5.3 inch instrument cluster and a 12.0 inch infotainment screen provide information. Operation via sensor buttons on the multifunctional steering wheel and via the slider for climate and volume control, however, proved to be somewhat awkward. Some ID.Buzz drivers might prefer to use the voice control, which works well overall.

All in all, the connectivity department is well-equipped; only 5G and a digital key are not available in the ID.Buzz. The productivity category, on the other hand, is extremely thin

on the ground: there is an address book, but the VW does not offer any more features, including e-mail and text messaging.

In terms of entertainment sources, the essentials are offered. Only audio and video streaming are missing. The smartphone connection via Carplay or Android Auto worked well for both wired and wireless.

The VW app makes a good impression, although more sophisticated functions such as remote view or electronic logbook are missing. Good features are route planning including address transfer and planning of charging stops before the start of the journey.

Route guidance is good overall

The route planning in the vehicle is also convincing as it takes the necessary charging stops into account transparently and conveniently. However, it does not allow prioritisation of preferred charging providers. The route display on the central screen is clear and concise, but there

are no luxury features such as augmented reality available.

The driver assistance systems do a very good job overall. Autonomous braking and restarting in the city, the lane-keeping assistant on long-distance roads and automatic parking were noted by the testers as very convenient. Only the image quality and the view of the reversing camera show some room for improvement.

Overall, the ID.Buzz definitely has its strengths, but decisions by the manufacturer about prioritising functions and minor software flaws prevent a significantly better score.

VOLKSWAGEN ID.BUZZ PRO	
Nominal performance	150 kW (204 PS)
max. torque	310 Nm
Maximum speed	145 km/h
Acceleration 0-100 km/h	10,2 s
Battery capacity (net)	77 kWh
max. charging power	11 kW AC/170 kW DC
Range (WLTP)	max. 416 km
Test car price	71 013 Euros
connect VERDICT	
SATISFACTORY (687 Points)	

CAR CONNECT: ELECTRIC CARS COMPARED

Brand	Mercedes-Benz	BMW	Nio	Porsche	Tesla	Genesis	Volkswagen	BYD	
Model	EQS 580 4matic SUV	iX xDrive 50	ET7	Taycan 4S Cross Turismo	Model Y Dual Motor	GV60 Sport Plus AWD	ID.Buzz Pro	Atto 3 Comfort	
Infotainment system	MBUX	iDrive OS 8	Banyan 1.3.5	PCM	V 11.1	cclC 001.005.230517	Ready 2 Discover 0561	V1.4	
Basic price / Test car price (incl. equipment) at time of test (Euros)	147 922 / 176 489	107 900 / 121 630	69 900 / 90 900	114 222 / 163 678	54 990 / 64 670	73 100 / 83 150	64 581 / 71 013	44 625 / 44 625	
Smartphone App									
App: Name, version / available for iOS / for Android	Mercedes Me 1.37.0/+/+	My BMW 3.9.0/+/+	NIO 2.10.0/+/+	Porsche Connect 8.0.4/+/+	Tesla 4.26.2/+/+	GCS 1.0.3/+/+	Volkswagen 2.17.0/+/+	BYD 1.7.2/+/+	
Unlock, lock doors / Air cond. activate, deactivate / Air cond. timer	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Share Location / Route Sync. / First, Last Mile Nav / Priv. Car Sharing	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Remote Parking / Remote View / Vehicle Status Info / Maintenance Reminder	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Logbook / past charging / push notifications	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Navigation									
Navigation online / offline / POI Search online / offline	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Route planning: Suggestion of different routes / eco route / Select criteria	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Route guidance: 3D map / augmented reality	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Route guidance: Road names / direction arrow / lane info / exact lane pos.	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Parking space search: on street / car park / booking and billing	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Real-time traffic info / petrol station info / map updates OTA	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Productivity									
Infotainment system: address book / calendar / dig. Logbook	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
E-mail display / Text messages: Display / Read aloud / Send / Dictate	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Connectivity									
Car2X / Digital Key / Wi-Fi Hotspot / 5G / SIM card slot / eSIM	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Mobile data packs: initial term / costs / extension	n.n. / n.n. / n.n.	1 M. incl. / 9,95€/M. (3 GB) – 34,95 €/M. (50 GB) / per month	n.n. / n.n. / n.n.	3 years incl. / 299 €/year / per year	– / 9,99 €/M. / per month	n.n. / n.n. / n.n.	n.n. / n.n. / n.n.	2 years incl. / n.n. / n.n.	
USB ports: Number of USB-A / USB-C	– / 8	– / 4	1 / 2	– / 2	– / 2	– / 4	4 / 2	2 / 3	
Android Auto: wired/wireless, Apple Carplay: wired/wireless	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Remote Diagnostics / bCall (roadside assistance) / Offline Mode	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Voice control									
Virtual voice assistant / speaker localisation in the vehicle	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Voice input: classic / AI-based / Voice output: natural	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Infotainment									
DAB+ / web radio / Bluetooth / Equalizer / Music streaming / Video str.	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Internet browser / Weather information / News	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
App-Store / Third Party Apps	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
User profiles / customisable menu / data protection	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Displays and Digital Cockpit									
Instrument cluster: display size	12,3" (31,2 cm) ¹	12,3" (31,2 cm)	10,2" (25,9 cm)	16,9" (42,9 cm)	–	12,3" (31,2 cm)	5,3" (13,5 cm)	5,0" (12,7 cm)	
Infotainment screen: size / resolution / touch / haptic feedback	17,7" (44,9 cm) / 2400 x 900/+/+	14,9" (37,8 cm) / 200 ppi/+/+	12,8" (32,5 cm) / 1728 x 1888/+/+	10,9" (27,7 cm) / 1920 x 1080/+/+	15,0" (38,1 cm) / 1200 x 1920/+/+	12,3" (31,2 cm) / n.n./+/+	12,0" (30,5 cm) / n.n./+/+	12,8" (32,5 cm) / n.n./+/+	
Passenger screen: present / size / resolution	+ / 12,3" (31,2 cm) ¹ /n.n.	– / –	– / –	– / –	– / –	– / –	– / –	– / –	
Additional screens	2x Rear Seat 11,6" (29,5 cm)	–	Centre cons. Rear seats 6,6" (16,8 cm)	Centre console 8,4" (21,3 cm)	–	–	–	–	
Head-up display / gesture control / controller / pad (handwriting recog.)	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Multifct. steering wheel: Ctrl instrument cluster / volume / telephony	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Multifct. steering wheel: Operat. Driver Assist / Activ. Voice operat.	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Steering wheel heating / Electr. st. wheel adj. / inductive phone charging	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Driver assistance systems									
Cruise Control / Adaptive Cruise Control (ACC) / Intell. speed assist	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Traffic lt detection / traffic sign detect. / traffic jam assist / lane dept assist / active	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Lane Change Assist / Blind Spot Assist / Autonomous Emergency Braking	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Parking aid: acoustic / reversing cam. / all-round vision / park assist longitud. / transv.	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Adaptive high beam assistant / adaptive curve light	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
E Mobility									
Range management / charging station overview	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Charging Cooperations / Plug & Charge / Remote Charge control	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Sustainability, miscellaneous									
Vegan leather / recycled materials / reusable batteries	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Different driving modes / Eco driving mode / Concierge service	+/+	+/+	+/+	+/+	+/+	+/+	+/+	+/+	
Test results									
FEATURE SCORE	max. 300	very good (268)	very good (258)	satisfactory (208)	satisfactory (205)	satisfactory (200)	satisfactory (207)	satisfactory (195)	sufficient (164)
Smartphone App / Navigation / Productivity	30/39/10	27,9/37,0/10,0	27,9/32,8/6,3	15,0/24,6/1,3	17,2/32,8/5,0	19,3/24,6/6,3	17,1/30,8/6,3	10,7/24,6/1,3	10,7/24,6/0,0
Connectivity / Voice ctrl. / Infotainment. / Displ., Cockpit	34/30/34/28	31,7/24,0/26,7/23,1	27,2/24,0/26,7/23,1	11,3/24,0/24,3/19,8	22,7/18,0/24,3/16,5	20,4/18,0/26,7/13,2	15,9/18,0/21,9/19,8	27,2/24,0/19,4/14,8	20,4/30,0/14,6/13,2
Driver assistance / E Mobility / Sustainability, misc.	41/39/15	38,7/39,0/10,0	38,7/39,0/12,5	38,7/39,0/10,0	29,6/31,2/7,5	27,3/39,0/5,0	36,4/31,2/10,0	31,9/31,2/10,0	27,3/15,6/7,5
USER EXPERIENCE TASK-RELATED	max. 500	very good (446)	very good (452)	good (409)	good (407)	good (407)	good (404)	good (381)	satisfactory (337)
Smartphone App / Navigation / Productivity	46,9/78,1/15,6	39,7/70,9/14,6	41,7/72,2/14,0	38,1/68,3/0,0	38,1/60,3/13,7	44,8/61,4/14,9	39,7/54,7/10,8	34,1/58,8/0,0	32,8/41,4/0,0
Connectivity / Voice ctrl. / Infotainment. / Displ., Cockpit	62,5/46,9/78,1/46,9	52,8/40,4/71,5/41,3	48,7/42,2/73,1/44,4	52,5/38,7/65,9/37,5	54,9/36,1/68,1/43,8	56,3/29,7/67,6/28,1	55,1/31,9/66,5/45,0	55,6/33,6/59,4/32,1	53,8/36,1/60,9/37,5
Connectivity / Voice ctrl. / Infotainment. / Displ., Cockpit	46,9/62,5/15,6	40,7/59,5/14,5	41,2/61,3/13,5	39,2/54,5/14,4	32,8/48,2/11,3	34,5/57,1/12,5	34,6/55,5/10,1	39,6/56,3/11,8	25,5/39,6/9,5
USER EXPERIENCE OBJECT-RELATED	max. 200	good (163)	good (163)	good (156)	sufficient (124)	sufficient (124)	sufficient (116)	sufficient (111)	sufficient (122)
Usability App / System perception App	22,2 / 44,4	17,8/28,0	18,1/32,7	17,0/30,0	13,9/27,2	16,7/27,7	15,2/21,9	13,9/24,4	14,4/24,6
Usability HMI / System perception HMI (cehicle)	44,4 / 88,9	42,2/75,2	41,5/70,2	35,6/73,8	27,8/54,8	28,9/50,7	28,2/50,7	27,8/45,2	26,0/57,2
connect	VERDICT max. 1000	very good 877	very good 873	good 773	satisfactory 736	satisfactory 731	satisfactory 727	satisfactory 687	sufficient 623



Hannes Rügheimer
Author, connect

As has been the case in the past, the German premium manufacturers achieve the top positions in umlaut's assessment of connectivity, e-mobility support and infotainment. Mercedes and BMW are quite close to each other and with their top models both achieve the highest scores we have ever awarded in our car connectivity tests. Congratulations! The fact that both manufacturers provided us with their most expensive models with top equipment and very powerful engines explains to a certain extent their extremely high prices – it is certainly possible to start a little cheaper. But even around the 100,000 euro mark, the target group remains narrow. So managers in Stuttgart and Munich will perhaps breathe a sigh of relief that the third-placed Nio ET7 also costs a hefty 90,900 euros when you buy it with the 100-kWh battery. But the same battery can also be subscribed to for 289 euros per month, which lowers the basic price of the car to 69 900 euros. In addition, a cheaper 75 kWh battery is available as an alternative, and the Chinese newcomer also has cheaper models in its range.

The fact that the Porsche Taycan comes fourth with a grade of just „satisfactory“ is no less remarkable. After all, our connectivity and usability rating does not take the driving fun into account. And as part of the VW Group, Porsche may have to adopt some debatable feature and function decisions from Wolfsburg - which, incidentally, also prevent the likeable VW ID.Buzz from achieving a better rating.

Electric pioneer and polarising force Tesla, whose fans are convinced of their brand's far above average rating, meets some justifiable points of criticism. One can interpret the vehicle's peculiarities to some extent as "rethinking driving" and see a strategic strength in the manufacturer's pronounced focus on software, but some aspects are simply better solved by the established vehicle manufacturers.

The luxury Hyundai variant Genesis GV60 scores just four points behind its declared main opponent, Tesla. Since both providers are continuously fine-tuning their software, not only better test results may be in sight in the future, but also changes in the ranking are conceivable.

Finally, the BYD Atto 3 brings up the rear in our comparison, showing that some of the Chinese suppliers still need to learn a little more about what is expected in Western markets. But the example of Nio shows that this can happen faster than many believe.

