

BMW i MOTORSPORT MEDIA GUIDE.

THE NEW BMW iFE.20 AND BMW i ANDRETTI MOTORSPORT.
SEASON 6, ABB FIA FORMULA E CHAMPIONSHIP.



Sheer
Driving Pleasure

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INTRODUCTION.

BMW i Andretti Motorsport is set to contest its second season as a works team in the ABB FIA Formula E Championship. In its maiden season, with a win, two pole positions and several podiums, the team showed that it's able to bring home top results in Formula E. For Season 6 of the world's first race series for fully-electric, single-seater cars the goal is to continue improving and be able to be among the front-runners battling for the top positions.

BMW i Andretti Motorsport races with two BMW iFE.20s, which, compared with their predecessors, have undergone development in line with Formula E regulations. The core of the BMW iFE.20 is the BMW i powertrain Racing eDrive02, which is a result of unprecedented close collaboration between production and motorsport engineers. The technology transfer between motorsport and production development is more intensive in the Formula E project than ever before in the history of the BMW Group.

Alexander Sims will once again take the cockpit of the #27 car. He will contest his second season for the team. Germany's Maximilian Günther

will make his debut for BMW i Andretti Motorsport in the #28 BMW iFE.20. He joins the team in his second season in Formula E.

BMW i and the ABB FIA Formula E Championship have been partners from day one. From Season 1, BMW has been involved as Official Vehicle Partner and believed in the concept. Since then, BMW i has not only provided the entire fleet of safety cars, but has also actively helped to shape the development of Formula E. Entering the series with BMW i Andretti Motorsport in Season 5 was the next logical step in this close partnership.

The calendar for Season 6 of the ABB FIA Formula E Championship includes 14 races in twelve locations. These include some of the most significant metropolises in the world, such as New York City, Mexico City, Seoul, Paris, Rome and London. With the BMW i Berlin E-Prix, BMW i's home event in the German capital is once again established on the race calendar once again. As in previous years, BMW i is the title sponsor of the event.

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FORMULA E: TECHLAB FOR THE BMW GROUP.

BMW i Motorsport's driving force is the development of innovative technologies in the field of electromobility, with relevance to series production. Formula E is the ideal platform for the future of mobility and a technology laboratory for the BMW Group regarding future generations of electrified and electric vehicles.

"Despite all the sporting ambition and aspirations on the racetrack, the technology transfer between racing and series production remains a central pillar of our involvement in Formula E," says BMW Group Motorsport Director Jens Marquardt. "Our objective for the works entry for Season 5 was to establish an efficient technology cycle between BMW i Motorsport and BMW i and we were very successful. BMW i engineers are already benefitting enormously from the technological insights we are getting from the extreme use case of Formula E as they develop future production model engines. We will continue this close collaboration this season, for the benefit of both parties."

The cycle in the collaboration between the motorsport and production departments looks like this: the same engineers who are developing production drives for BMW i models also worked on the drivetrain for the Formula E car, sometimes in the same production facilities. That's how the Formula E drive benefitted from the experience of production engineers during its development. Today already and also in the future, knowledge acquired in Formula E will flow directly into the development of future production drives. Motor racing makes it possible to test new materials, technologies and working methods under extreme conditions without having to take limiting factors into consideration.

There is already initial evidence that this cycle works. The current BMW i3 uses parts of the software that comes from the power electronics for the Formula E car's inverter.



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BMW iFE.20.

Like its predecessor, the BMW iFE.20 also has a uniform chassis as stipulated by Formula E regulations. However, there were also some areas in which BMW i Motorsport engineers were able to improve the car with the aid of insights gained from Season 5. This primarily relates to the rear structure, which was modified significantly thanks to innovative lightweight construction. The development of parts using generative design methods or 3D printing technology saved a considerable amount of weight compared with conventional development and production procedures, and gave engineers more room to manoeuvre in terms of the centre of gravity of the car and weight distribution.

For the first time, parts made of fibre-reinforced plastics, which were manufactured using fibres from sustainable raw materials, are being used in a race car competing on a works basis for BMW. In the BMW iFE.20, there are parts in the cooling circuit of the drive train, which are made of flax. The innovative gear concept from Season 5 has been retained, with the efficiency being increased further.

Further lessons from Season 5 don't relate to the car directly, rather to the software. Based on the previous year's insights, the further developed software helps the engineers to react faster and more specifically to the challenges of the distinctive Formula E race format. The updates are made use of both in the software used at the racetrack and in the driving simulator in Munich, which the drivers, team and engineers are making increasing use of to prepare specifically for the race events.

KEY SPECS OF THE GEN2 CAR.

- Length: 5,200mm
- Width: 1,800mm
- Height: 1,050mm
- Max. power: 250kW
- Race mode: 200kW
- Acceleration: 0–100 in 2.8 seconds
- Max. power regeneration: 250kW
- Minimum weight (incl. driver and battery): 900kg



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DESIGN OF THE BMW iFE.20.

From the exterior, the slightly modified design of the BMW iFE.20 is evident. It maintains some of the elements of its predecessor, including the blue and white corners which intersect in the style of the BMW logo. The view from above has also been accentuated which, considering the usually elevated seating position of spectators at Formula E races, plays a particularly important role. On top of this is the asymmetric layout, which provides maximum visibility at race speed.

The striking changes also include the non-reflective, matt black cockpit element, which has been extended to the whole driver environment. It puts even more focus on the driver and highlights his pivotal role in Formula E. The BMW logo pattern emphasised in its predecessor has been given a slightly more abstract interpretation for the BMW iFE.20. In return, there is greater accentuation of the progression of colour from blue to violet, the natural colours of electricity. Also, the BMW i Motorsport 'spirit marks' established during the course of last season are now also reflected in the design of the cars.

To make it easier to distinguish the two BMW iFE.20, Sims' #27 car is slightly more violet, while Günther's #28 BMW iFE.20 is slightly more blue.

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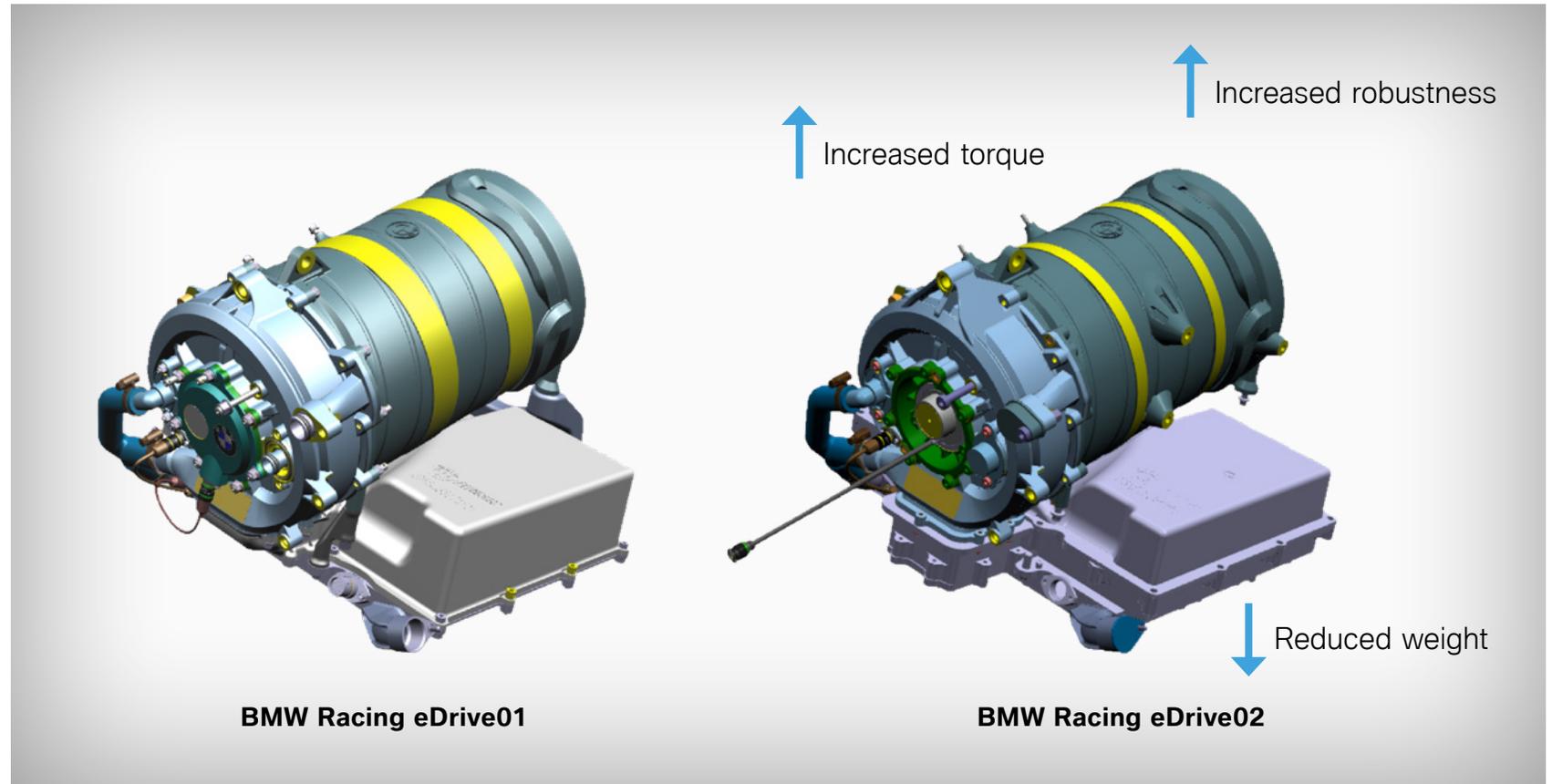
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BMW i DRIVETRAIN.

BMW expertise remains primarily in the core of the car, the enhanced drivetrain. The characteristic of the BMW Racing eDrive02 was revised based on the detailed information on the individual racetracks that the team gathered in its maiden season, and modified to suit the specific challenges of Formula E races. The changes affect the E-motor and the inverter. The main goal of the modifications is to improve the efficiency of the drivetrain. The same glycol used in production vehicles is now also used for its water circulation system. The cooling circuit for the BMW Racing eDrive02 was improved further from both the water and the air aspect, whereby the overall efficiency of the car increased further.

The E-motor attains a maximum efficiency of 98 percent and its power density is approximately 14kW/kg. Its maximum rotational speed is more than 30,000 rpm. The inverter works with a direct current of 900 volts and achieves a power density of approximately 45 kW/kg. In the BMW Racing eDrive02, a few improvements were made compared with the predecessor model from Season 5. The engineers managed to increase the torque and reduce the weight, while simultaneously increasing robustness.

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FACTS ON BMW RACING eDRIVE02.



KNOWLEDGE TRANSFER BETWEEN
PRODUCTION DEVELOPMENT AND MOTOR
RACING:

- Engineers transferred BMW i's knowledge and experience into a high-performance motorsport drive system.
- Development of the BMW Racing eDrive02 began in pre-development for series production drive systems, produced in the same prototype construction facilities as the next generations of BMW i series drives (Gen5).
- It is tested in the pre-production test facility.
- The drive systems for future generations of BMW i models and the drivetrain of the BMW iFE.20 are based on the same functional software modules.
- All findings from Formula E flow directly into production.

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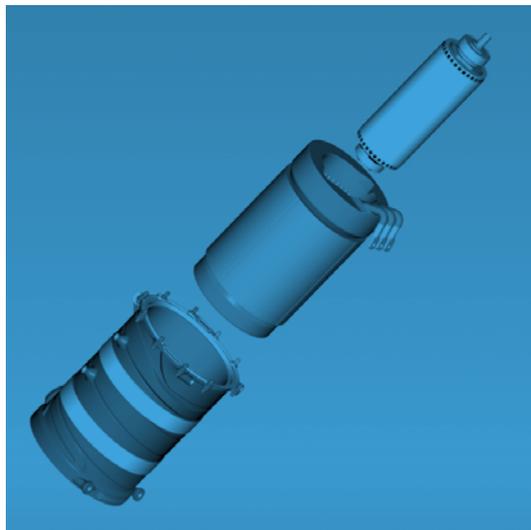
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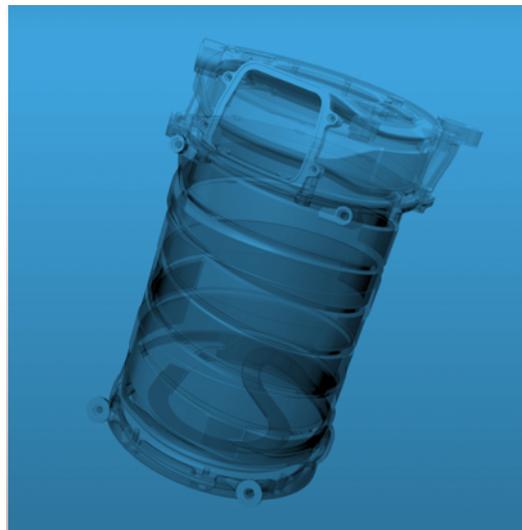
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FACTS...



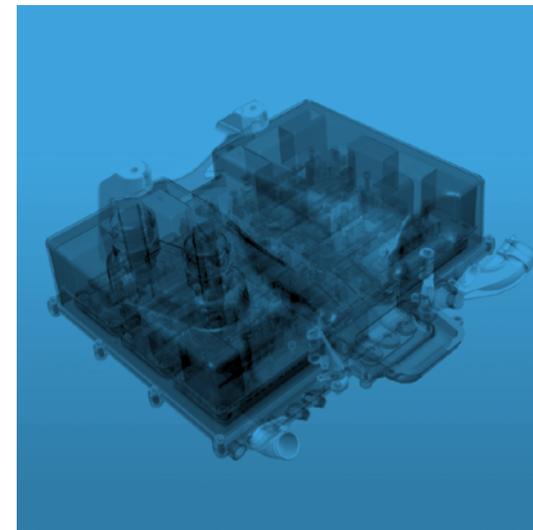
...ON THE ELECTRIC MOTOR.

- Maximum efficiency (e.g. highly effective cooling technologies and materials).
- Cutting-edge materials (carbon fibre, resins with high thermal conductivity, titanium, ceramic).
- Design for high motor speeds.
- High gravimetric energy density (kW/kg).
- Very compact construction (kW/l).



...ON THE COOLING SYSTEM.

- 360° cooling allows constant operation in longer races and higher temperatures.
- Minimal pressure loss thanks to CFD optimisation.
- Use of materials with high thermal conductivity (e.g. ceramic, casting compound).
- Objective: minimisation of losses for maximum efficiency.



... ON THE INVERTER.

- State-of-the-art SiC technology (MOSFETs with minimal switching and conduction losses).
- Latest materials (SiC, carbon-fibre housing).
- High gravimetric energy density.
- Maximum efficiency (e.g. latest SiC MOSFETs, effective cooling system, low-loss circuit layout).

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DRIVETRAIN COMPARISON: BMW i3 VS. BMW iFE.20.



Performance
+100%



Energy density
+300%



Weight
-50%



Torque density
+100%



Volume
-66%



Max. revs
+100%

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BMW i ANDRETTI MOTORSPORT.

BMW i Motorsport's expertise and decades of motor racing experience within Andretti Autosport come together in the BMW i Andretti Motorsport team. Andretti has been part of the Formula E field from day one and has a successful history in motor racing, particularly in North America, including three wins in the iconic Indy 500. BMW i Andretti Motorsport contests Formula E with a US licence, but has its team HQ in Banbury, England. The team places great emphasis on continuity. Around 90 percent of the members from Season 5 are still part of the team.



TEAM PRINCIPAL: ROGER GRIFFITHS.

Britain's Roger Griffiths has been a member of Andretti Autosport since 2014. He was initially active in all of the team's motor racing projects as Director of Motorsport Development. He then moved into a position of responsibility as co-team principal at Andretti Formula E. From Season 5, he has been team principal of BMW i Andretti Motorsport.

TEAM OWNER: MICHAEL ANDRETTI.

Andretti is one of the biggest names in international motor racing. Michael Andretti was one of the most successful members of this dynasty during his time as a racing driver. He was 1991 CART champion and won 42 races in the US Formula series – more than anyone else. He is now an equally successful businessman and team owner.

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#27 ALEXANDER SIMS.

Birthday	15 th March 1988
Place of birth	London (GBR)
Place of residence	Stratford-upon-Avon (GBR)
BMW driver since	2014
Biggest success	1 st place 24h Spa-Francorchamps 2016
First race	Kart race at Lydd Raceway in Southern England 1998
First win	In single seaters in 2008, racing in Formula Renault at Donington Park in the rain.
Hobbies	My family, DIY, gardening
Did you know...	...I live in the birthplace of William Shakespeare? I am also very interested in electromobility. I am chairman of the charity Zero Carbon World, which provides charging stations free of charge. I would also like to convert my old BMW 600 into an electric car.

CAREER.

2019	13 th place Formula E, 1 podium, 1 pole position
2018	2 nd place 24h Spa-Francorchamps
2017	2 nd place GTLM Class IMSA series 2 nd place 24h Nürburgring
2016	1 st place 24h Spa-Francorchamps
2015	3 rd place Formula 3 Macau Grand Prix 2 nd place British GT Championship
2014	3 rd place British GT Championship



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#28 MAXIMILIAN GÜNTHER.

Birthday	2 nd July 1997
Place of birth	Oberstdorf (GER)
Place of residence	Kempten (GER)
BMW driver since	2019
Biggest success	1 st place in the 2017 Formula 3 Grand Prix de Pau
First race	Kart race on the track in Bopfingen in 2007
First win	Kart race on the track in Bopfingen in 2007
Hobbies	Triathlon, golf, skating, cooking
Did you know...	...I am also really interested in aerodynamics away from the cockpit? I am an absolute perfectionist and leave nothing to chance. On top of that, I am also a real homebody and family man.

CAREER.

2019	17 th place Formula E
2018	14 th place FIA Formula 2, 1 win, 2 podiums
2017	1 st place Formula 3 Grand Prix de Pau 3 rd place FIA Formula 3 European Championship
2016	2 nd place FIA Formula 3 European Championship
2014	2 nd place ADAC Formula Masters
2013	2 nd place ADAC Formula Masters



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SEASON 6 OF THE ABB FIA FORMULA E CHAMPIONSHIP.

Formula E is the world's first racing series for fully-electric, single-seater cars. At the wheel are some of the best racing drivers in the world, who put on a display of thrilling racing at fascinating street circuits in some of the biggest cities in the world. Formula E takes racing to fans in city centres. In doing so, it also directly addresses the subject of electro-mobility in the form of an emotive and action-packed show set against magnificent backdrops.

Season 6 boasts 14 races in twelve metropolises on four continents. New to the race calendar are the races in the South Korean capital of Seoul, the Indonesian capital city Jakarta and the British capital city London. The season finale will be held there and comprise two races. The BMW i Berlin E-Prix, at which BMW i will once again act as title sponsor, remains established on the Formula E calendar.



R1 22nd November 2019 Diriyah, Saudi Arabia

R2 23rd November 2019 Diriyah, Saudi Arabia

R3 18th January 2020 Santiago, Chile

R4 15th February 2020 Mexico City, Mexico

R5 29th February 2020 Marrakesh, Morocco

R6 21st March 2020 Sanya, China

R7 4th April 2020 Rome, Italy

R8 18th April 2020 Paris, France

R9 3rd May 2020 Seoul, South Korea

R10 6th June 2020 Jakarta, Indonesia

R11 21st June 2020 Berlin, Germany

R12 11th July 2020 New York City, USA

R13 25th July 2020 London, United Kingdom

R14 26th July 2020 London, United Kingdom

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BMW i SAFETY CAR FLEET.

BMW i and the ABB FIA Formula E Championship have been partners from day one. When the series was launched in September 2014, BMW was already involved as Official Vehicle Partner and believed in the concept. Since then, BMW i has provided the entire fleet of safety cars.

Spearheading the fleet are two safety cars: the BMW i8 Roadster Safety Car (combined fuel consumption: 2.0 l/100 km; combined power consumption: 14.5 kWh/100 km; combined CO₂ emissions: 46 g/km), which has been specially modified for use at the racetrack,

and the BMW i8 Coupé Safety Car (combined fuel consumption: 1.8 l/100 km; combined power consumption: 14.0 kWh/100 km; combined CO₂ emissions: 42 g/km).

The BMW i fleet also includes the BMW i3s (combined fuel consumption: 0.0 l/100 km; combined energy consumption: 14.3 kWh; combined CO₂ emissions: 0 g/km) as 'Race Director Car' and the BMW 530e (combined fuel consumption: 2.2–2.1 l/100 km; combined energy consumption: 13.6–13.3 kWh/100 km; combined CO₂ emissions: 49–47 g/km)* in its role as 'Medical Car'.

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THE PARTNERS.

PRIMARY PARTNER.



“The Formula E Championship is the only race series that puts forward-looking technologies on the road - and in cities around the world that face complex mobility challenges. It serves as a competitive platform for evaluating and developing technologies and solutions for future vehicles,” says Swamy Kotagiri, CTO Magna.

As a mobility technology company, Magna is focused on delivering what’s needed today while creating technologies society doesn’t even know they need yet. With over 166,000 entrepreneurial minded employees and more than 60 years of experience, we are helping bring freedom to mobility. The freedom to go greener, safer, faster and without constraints.

For further information about Magna, visit www.magna.com.

FOUNDING MAIN PARTNER.

Julius Bär

Julius Baer is the leading Swiss private banking group. We focus on providing high-end services and in-depth advice to private clients around the world. Our relationships are built on partnership, continuity and mutual trust. Julius Baer is synonymous with best-in-class investment and wealth planning solutions based on the Julius Baer open product platform. We actively embrace change to remain at the leading edge of a genuine growth industry – as we have done for over 125 years. Therefore, we support projects and activities that have a visionary approach and share our values with regards to innovation, sustainability and forward-looking pioneering spirit.

For current partnerships and initiatives as well as for more information visit our website. www.juliusbaer.com/global/en/discover-julius-baer/sponsoring/

MAIN PARTNER.



Einhell is the leading manufacturer of cutting-edge tools for home and garden. By constantly developing our innovative battery platform, Power X-Change, we have become a pioneer in the field of battery-powered tools and garden equipment. We set standards in terms of the durability, performance and safety of our products. Our customers benefit from good value for money, top-class customer service, and wireless freedom during all do-it-yourself projects.

We are Main Partner of BMW i Motorsport in Formula E, ensuring we have our finger on the pulse when it comes to future technologies, which we can incorporate in our tools. Furthermore, we supply the BMW i Andretti Motorsport Team with our Power X-Change tools, offering its mechanics wireless freedom in the garage.

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OFFICIAL PARTNER.

harman/kardon
by HARMAN

With a legacy in audio reaching back more than 65 years, Harman Kardon is known and held in high regard for innovative premium audio solutions, blending beautiful design and aesthetics with refined audio for a captivating listening experience at home, on the go and in the car.

BMW and Harman Kardon share a long history of engineering and designing premium in-car user experiences at the forefront of industry innovation. Within the ABB FIA Formula E Championship sponsorship, Harman Kardon and BMW i bring together the thrill of racing and the thrill of sound, mixing audiophiles and speed aficionados, electrifying cars and electrifying music to showcase the power of alternative energy sources and electric vehicles.

Just like racing, music raises emotions and captivates your senses. Fast, fun, and forward-thinking, the Harman Kardon premium sound systems in the BMW i Series deliver inspiring sound for the mobility of the future.

OFFICIAL SUPPLIER.

PUMA


PUMA is one of the world's leading sports brands, designing, developing, selling and marketing footwear, apparel and accessories. For over 65 years, PUMA has been producing the most innovative products for the fastest athletes on the planet. PUMA offers performance and sport-inspired lifestyle products in categories such as football, running and training, golf, and motorsport. PUMA engages in exciting collaborations with renowned designers like STAPLE, STAMPD and TRAPSTAR to bring innovative and fast designs to the sports world. The PUMA Group owns the brands PUMA and COBRA Golf as well the subsidiary Dobotex. PUMA distributes its products in more than 120 countries, employs more than 13,000 people worldwide and is headquartered in Herzogenaurach/Germany.

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MEDIA CONTACT.



Matthias Schepke

Spokesperson BMW i Motorsport
Office: +49 (0)89 382 78416
Mobile: +49 (0)151 601 90450
E-mail: matthias.schepke@bmw.de

Ingo Lehbrink

Spokesperson BMW Group Motorsport
Phone: +49 (0)176 203 40224
E-mail: ingo.lehbrink@bmw.de

Benjamin Titz

Head of BMW Group Design,
Innovations & Motorsports
Communications
Office: +49 (0)89 382 22998
Mobile: +49 (0)179 7438088
E-mail: benjamin.titz@bmw.de

Media Website.

www.press.bmwgroup.com

BMW Motorsport on the web.



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