

Innovative solutions for the railway industry

Encoders, sensors and cameras



Baumer

Passion for Sensors

Baumer experts understand your needs. Our broad portfolio of products and technologies offers the right solution for every application.



Pioneering, precision and quality.

The Baumer Group is one of the worldwide leading manufacturers of sensors, encoders, measuring instruments and components for automated image processing. Being a family-owned Group, we employ about 2700 people in 38 international subsidiaries and locations. With strong customer orientation, consistently high quality at international level and big innovative power we engineer tailored solutions for any industry and application.

This also applies to the railway industry – where we have been proving a reliable partner to our customers for many years. Our leading market position results from our innovative, broad portfolio and strong customer orientation. Our products particularly addressing the railway industry meet the demanding related industry standards as a prerequisite.

We stand for precision, partnership and pioneering spirit. Our products meet the related application requirements with utmost reliability and precision thanks to our particularly high quality standards applied to design and manufacture.



Learn more.

Downloadable data sheets and more information about our products are available at:

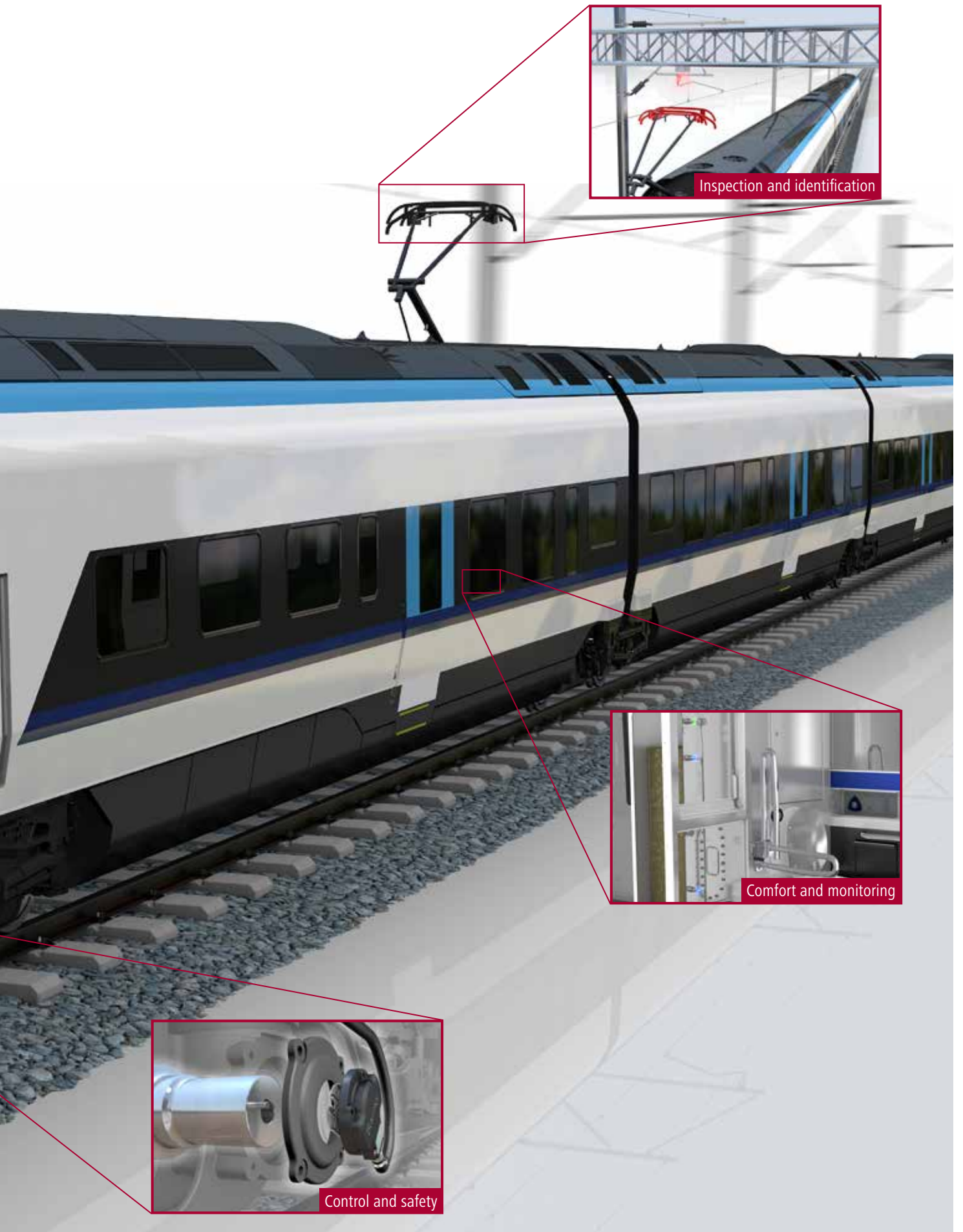
www.baumer.com/railway



Cutting edge sensor solutions.

From innovative axle encoders, precise pressure and level sensors to high-speed cameras: Baumer has more than 50 years of experience in designing sensors for the railway industry. We pride ourselves on being among industry leaders when it comes to innovative sensor solutions that bring true value to our customers.

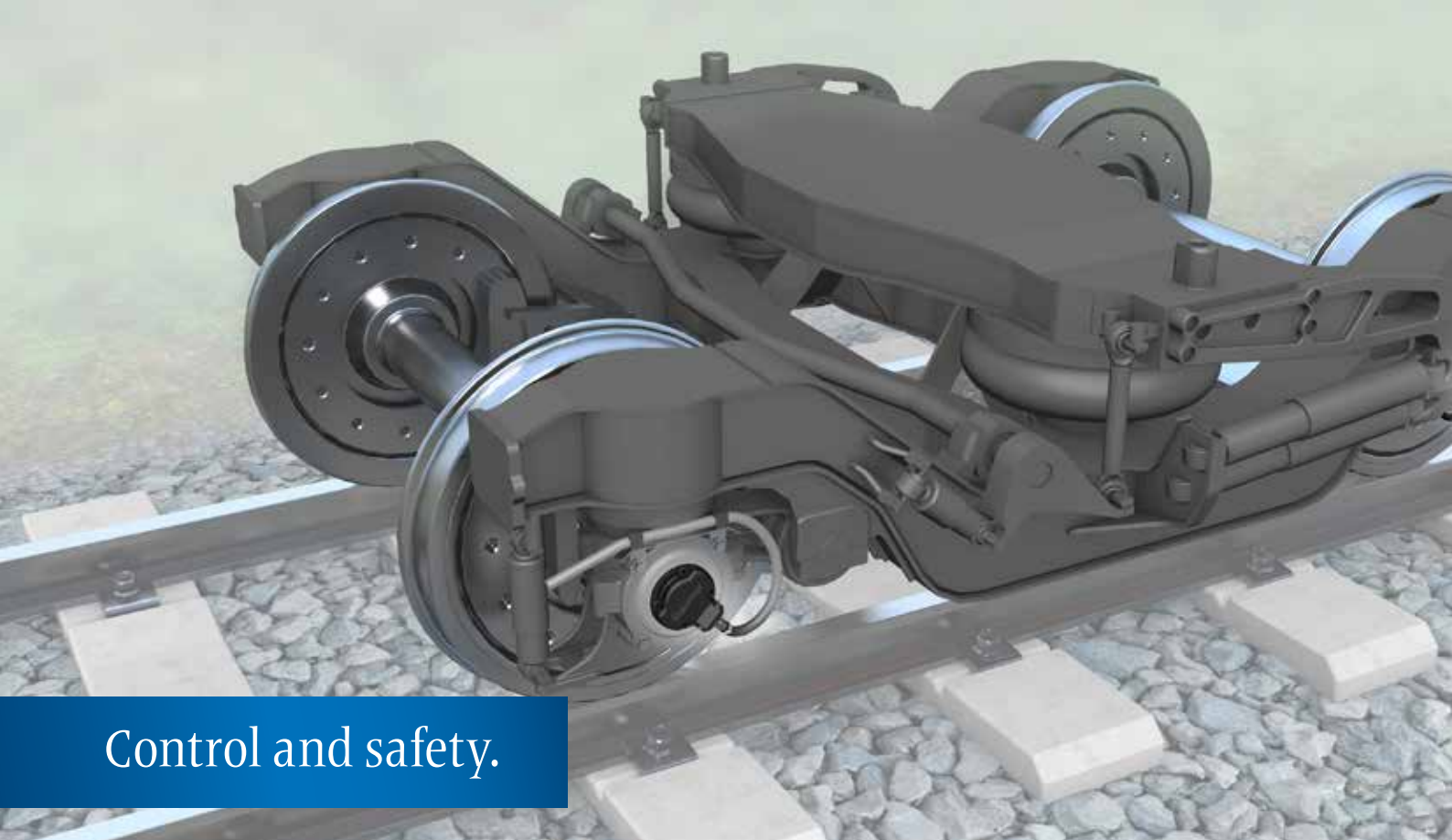




Inspection and identification

Comfort and monitoring

Control and safety



Control and safety.



Multi-channel axle encoder
BPIV2

- Fully integrated axle encoder allows easy mounting without any adjustments
- Exchangeable bearing package enables maintenance in the field, encoder is ready for use within minutes
- Optimal solution for vehicles with few available axle ends, e.g. locos
- Simple retrofitting without additional effort due to standard mechanical interfaces
- Optimum and custom-fit solutions due to the wide range of configuration options such as freely selectable number of pulses per encoder unit, various coupling types, cables and connectors



High performance bearingless axle encoder
BPIK

- Minimized life cycle costs and no mechanical wear due to bearingless design
- Simple mechanical attachment to existing axle box designs, as dimensioned like conventional pick-up Hall sensors
- Straight or side cable exit for optimum cable routing

Perfectly fitting solutions for axle speed measurement.

Baumer innovative axle encoder portfolio provides reliable and proven solutions for speed measurement and condition monitoring. The robust magnetic sensing technology offers superb signal quality and flexibility.

- Drastically simplified axle configuration for minimized cabling and faster installation
- Multi-unit design with up to four independent encoder units per axle encoder
- Each encoder unit is individually configurable to meet the specific requirements of any subsystem
- Incremental outputs for current and voltage can be freely combined in an axle encoder
- Dynamic and accurate speed measurement also at very low speeds due to high resolution
- Freely configurable number of pulses up to 1200 ppr, separately for each encoder unit
- Smart functions, such as direction of rotation, digital speed threshold, heartbeat signal
- Integrated temperature and acceleration sensors for sophisticated condition monitoring
- Conforms to EN 50128 / EN 50129 SIL2 and EN 45545 HL3



BPIV2 – Multi-unit axle encoder with field-exchangeable bearing package

- Standard interface for fast and safe assembly
- Up to 4 independent A90° B signals, galvanically isolated

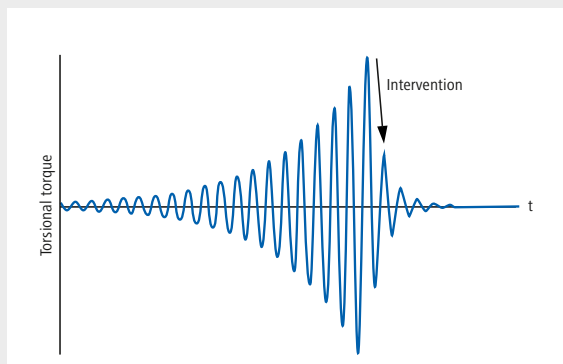


BPIK – High performance bearingless encoder

- Bearingless design for minimal wear and life cycle cost
- Up to 2 independent A90° B signals, galvanically isolated

Application highlight – torsional vibration detection

Reliable, accurate and fast torsional vibration detection is key to increase traction performance, wheel set lifetime and safety. BPIK signals enable torsional vibration detection with ultimate dynamics and precision, by unsurpassed signal quality and robustness, high resolution and zero backlash. This enables reduced wear, increased traction and improved passenger comfort.



Overview of applications

- Traction control
- Torsional vibration detection
- Wheel slide protection
- Train control
- Bogie and wheel condition monitoring
- Juridical recording
- Drive information system
- Hot box detection
- Bogie hunting and derailment detection





Comfort and monitoring.

Level detection.

The *CleverLevel*® family offers a broad variety of process connections to allow integration in several different ways: mounting into welding sleeves or into tubes to extend the length of the sensor according to the needed switch point for top mount into tanks etc. The rugged design is proven and successfully in operation globally.



CleverLevel®

- Frequency sweep technology
- Ignoring adhesion and incrustations
- High sensitivity over a wide temperature range
- Configurable to match application requirements
- Conforms to EN 50155 §12



Water and grey water management

CleverLevel® LBFS

- No vibrating nor moving parts, no regular cleaning or maintenance necessary
- Solid stainless steel housing, long-term durable and robust in harsh environment
- Low-invasive sensor tip, low risk of adherence
- Fast response time, accurate level sensing
- Compact level switch, respecting limited installation space

Overview of applications

- Sanding container
- Dry run protection (diesel pump)
- Expansion vessels in cooling circuits
- Level control in fluid reservoirs

Pressure control. Dedicated product families for several requirement classes.

Within 3 product families of pressure sensors, Baumer offers best matching performance-cost solutions.

- Tested for railway applications according to EN 50155:2007
- Vibration and shock resistant according to EN 61373:1999, 2010 (category 2)
- Accuracy classes from 0.1% ... 0.5% FS (maximum error of measurement)



PP20R

- Optimized for a broad range of applications
- 1 kV Insulation test
- Suitable for 24 V Class S1 supply
- Marking according to GS1 standard



EF6

- High EMC protection
- High accuracy over a wide temperature range (-40 °C ... +85 °C)
- Designed for harsh environments



PBMR

- Excellent accuracy and long-term stability up to $\leq 0.1\%$ FS
- Active temperature compensation throughout the entire operating temperature range
- Pressure measuring range -1 ... 40 bar

Overview of applications

Cooling systems for locomotives, railcars and special vehicles

PP20R / EF6 / PBMR

- Differential pressure measurement in Water-Glycol or Thermo-oil circuits for flow calculation
- Pressure control of coolant recirculating pumps
- Suitable for cooling towers or for cooling containers on the vehicle roof or underfloor

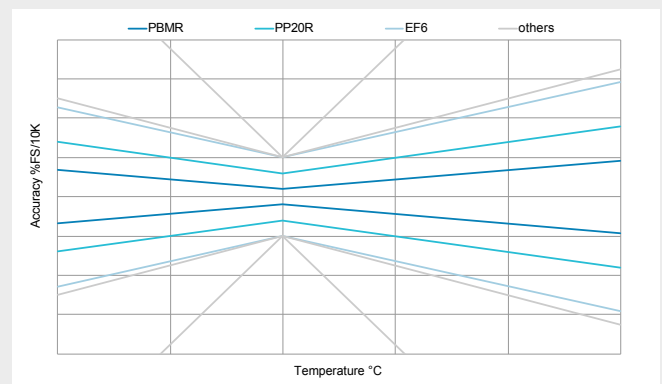
Testing / Measuring / Observation applications

PBMR

- Master pressure control
- Continuous level detection
- Control / observation applications (reference sensor for system critical applications)
- Cabin pressure control
- High accurate / temperature compensation guaranteeing highest process reliability
- Best in class repeatability

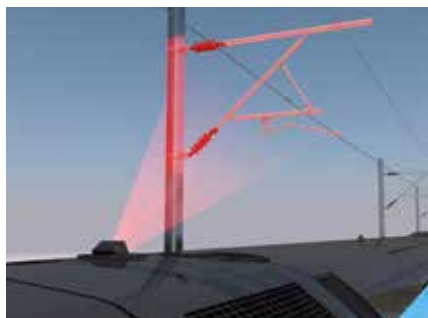
High accuracy over a wide temperature range

In many cases, a temperature-stable sensor with lower initial accuracy is to be preferred to a more unstable sensor with higher initial accuracy if the operating temperature deviates from the reference temperature (e.g. 20 °C).





Inspection and identification.



Catenary infrastructure inspection

LX cameras

- Precise inspection for geometry, breakage or deformation with high-resolution global shutter CMOS cameras with up to 48 megapixel resolution
- Image acquisition at high speed with short exposure times $< 10 \mu\text{s}$
- Fast image transfer up to 10 Gbit/s



Pantograph, wheel and brake inspection

LX 3D cameras

- Reliable detection of wear and tear with laser triangulation and resolutions up to 4K line width
- Stable image processing in outdoor use thanks to camera models with dynamic range of more than 70 dB
- Easy customization of laser triangulation algorithm using *VisualApplets*



Track, rail and catenary wire inspection

LX, LX 3D cameras

- Accurate capturing of rail profile and wear conditions with LX 3D cameras for laser triangulation
- Fast measurement of catenary wire height, residual thickness and stagger thanks to high frame rates and high resolution of the LX cameras

Cameras for catenary, track and train inspection systems.

High frame rates, exceptional image quality and ease of integration – that's what our industrial cameras stand for. Their robust, industrial design is the basis for long-term stability and precise image analysis in your application.

- Precise inspection with resolutions up to 48 megapixel
- Fast image acquisition with high sensitivity global shutter CMOS cameras and exposure times starting at 1 μ s
- Industrial design: e.g. models with IP 65 / 67 rating, extended operating temperature range from -40°C to 70°C or M12 connector
- Robust industrial housing tolerates vibrations of up to 10 g and shocks of up to 100 g
- Efficient solution with powerful camera features like JPEG compression, Burst Mode, Multi I/O, Multi ROI, Binning and HDR
- Quick and easy setup for Windows[®], Linux[®] and ARM[®]-based platforms



UIC wagon numbers and sign recognition
CX cameras

- High character recognition rate based on excellent image quality with Sony[®] Pregius[™] sensors
- Camera models for harsh environments with IP 65 / 67 protection
- Easy installation thanks to cable lengths up to 100 m and Gigabit Ethernet interface



High-resolution, fast and robust cameras (LX cameras)

- Up to 48 megapixel resolution and 216 fps
- Models with 10 GigE interface and IP 65 / 67 protection



Cameras with image processing (LX VisualApplets cameras)

- Up to 20 megapixel resolution and 56 fps
- Models e.g. for 3D laser triangulation, JPEG compression and HDR calculation



Cameras for harsh environments (CX.I cameras)

- Up to 12 megapixel resolution and 94 fps
- Extended operating temperature range from -40°C to 70°C



Fast and reliable cameras with cutting-edge CMOS sensors (CX cameras)

- Up to 20 megapixel resolution and 403 fps
- Compact 29 x 29 mm housing

Worldwide presence.

We strive to be close to our customers all around the world. We listen to them, and then after understanding their needs, we provide the best solution. Worldwide customer service for us starts with on-the-spot personal discussions and qualified consultation. Our application engineers speak your language and strive from the start, through an interactive problem analysis, to offer comprehensive and user-compatible solutions. The worldwide Baumer sales organizations guarantee a high level of readiness to deliver.



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Oman
Philippines
Qatar
Saudi Arabia
Singapore
South Korea
Taiwan
Thailand
UAE

Europe

Austria
Belgium
Bulgaria
Croatia
Czech Republic
Denmark
Finland
France
Germany
Greece
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For more information
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