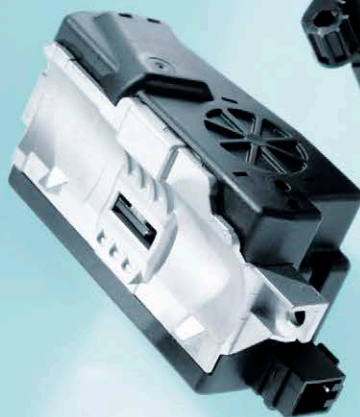




MARQUARDT INNOVATIONS

SYSTEMS FOR AUTOMOBILES



MARQUARDT



➤ WHEN DECADES OF EXPERIENCE DEVELOP THE FUTURE.

Batteries and subsystems for electro-mobility

- ➔ Battery management systems for 12V, 48V and high voltage applications
- ➔ Different cell types can be used
- ➔ Suitable for different bus-systems (CAN, LIN)
- ➔ Option of integration AUTOSAR standard software and customer software modules
- ➔ Functional safety up to ASIL D level

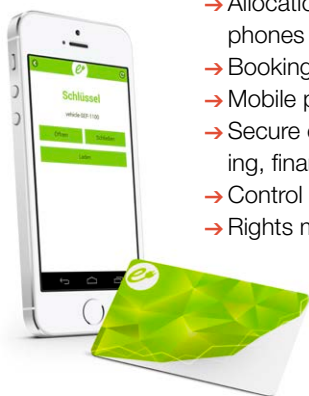


Touchpads

- ➔ Closed operating panel surface
- ➔ Tactile feedback
- ➔ Character and gesture recognition
- ➔ Intuitive operating capabilities
- ➔ Alternatively with touch-free activation

Drive authorization systems for rental cars, car sharing and fleet-applications

- ➔ Allocation of driving authorization to mobile phones
- ➔ Booking via computer or smart phone
- ➔ Mobile phone or smart card used as car key
- ➔ Secure communication on the level of banking, financial transactions
- ➔ Control of vehicle features and data
- ➔ Rights management through secure servers



Near field communication

- ➔ Contactless communication standard for easy coupling of smart phones, smart cards or similar devices (tap and go)
- ➔ NFC-Mobile phones or smart cards can be used as car key

Red green blue light engine

- ➔ Light engines with various light pipes possible for different areas in vehicles:
 - ➔ Seat trim, door sill plate, glove box
 - ➔ Over head, reading lamps
 - ➔ Trunk, rear lamps
 - ➔ Ambient light (mood)
- ➔ Each engine is a LIN node for controlling intensity, color and calibration of RGB LEDs



Capacitive control unit

- ➔ Paint and piano black finish technology
- ➔ Flexible capacitive solution
- ➔ Capacitive chrome capability





➤ WHEN INTELLIGENCE OPENS DOORS TO NEW POSSIBILITIES.

Keyless systems

- ➔ Customer orientated key fob designs
- ➔ Very highly integrated electronics with self-developed ASICs
- ➔ Long-term proven Marquardt 20 kHz PSK LF system with excellent disturbance immunity
- ➔ Innovative RF multi-channel technology to improve reliability
- ➔ Full integrated 3D transponder with 10 cm long range function
- ➔ 3-antenna-system for mid-size cars, 4 antennas for large SUVs
- ➔ Ideal for walk-away-lock, welcome-light, open on approach

Control devices, antennas, door handle sensors

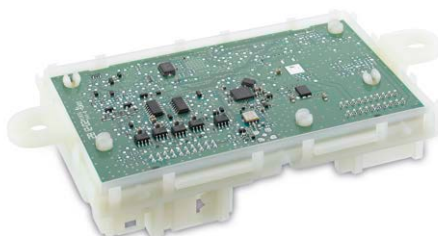
- ➔ Accurate performance
- ➔ Highly integrated features resulting in less installation space
- ➔ Suitable for different bus-systems (CAN, LIN, Flexray, MOST etc.)

Electronic steering column locks (ESCL)

- ➔ Anti-theft protection of highest quality
- ➔ Years of experience in supplying over 14 million electronic steering column locks
- ➔ More than 75 billion operating hours in the field
- ➔ Highest security standards according to ASIL D

Start-Stop-systems

- ➔ Solutions ranging from simple Start-Stop-switches to highly integrated systems
- ➔ Customer-specific operating concepts
- ➔ Individual surface piece designs
- ➔ Robust construction of highest precision
- ➔ Top-quality illumination



➤ OPERATING COMPONENTS



➤ BECAUSE RELIABLE CONTROL CONCEPTS CREATE AN ATMOSPHERE.



Central control panels

- Different control concepts: from a simple rotary handling to a multi-layered-operating device
- Optional Touch-feature, character recognition, gesture recognition



Middle console switches

- Simple, reliable concept
- Modular platform design
- Multiple design options
- Up to 7 functions (buttons)



Control panels

- High glossy A-surfaces
- Push-Buttons with functional display
- Symbol illumination



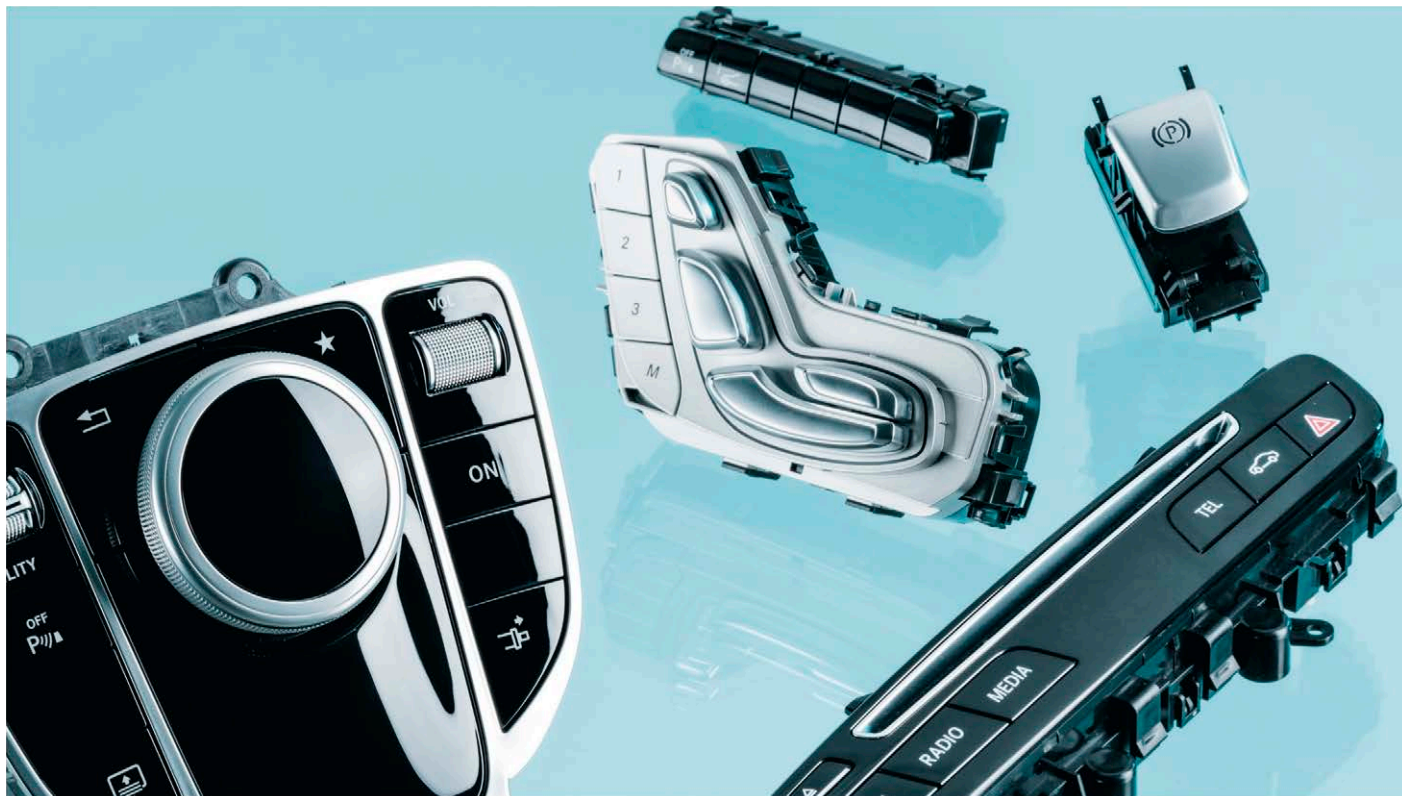
Hazard switches

- Available in various designs
- According to safety standards



Marquardt operating components can be customized:

- Value and haptics matching each vehicle
- From single switches to complex control panels
- Operating concepts: tilting, turning, pressing
- Electronic interfaces: LIN, CAN, discrete, radio communication
- Wide variety of surface designs: plastics, genuine metals, galvanised, wood, leather, foil, painted, closed integrated surfaces etc.
- Various illuminations, e.g. with fading-effect, multi-metals illumination etc.



➤ BECAUSE LATEST TECHNOLOGIES ALLOW TAILOR-MADE DESIGNS.

Multifunction switches

- ➔ Very flat building techniques, little design space required
- ➔ Different switch systems and tactile feeling solutions
- ➔ Sensor systems integrable
- ➔ High lifetime and robustness
- ➔ Dust and water protected



Rotary light switches

- ➔ Available with or without electronics
- ➔ Short and long travel switches
- ➔ Safety relevant component (ASIL D)



Electromechanical parking brakes

- ➔ Redundant switch
- ➔ With or without electronics available



Gear selection switch

- ➔ Motors and solenoids for active haptic
- ➔ Display technology
- ➔ Complex force curve possible



Seat control panel

- ➔ Sensor modules up to 4 directions with high life endurance
- ➔ With integrated memory function module





➤ WHERE INNOVATIVE PRODUCTS STAND FOR COMFORT, EFFICIENCY AND FUNCTIONAL SAFETY.

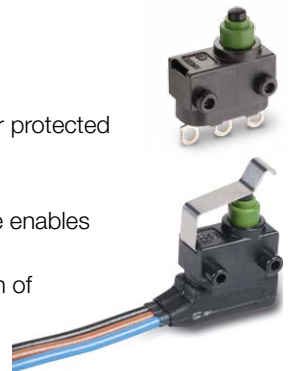
Micro-signal switches 1065 / 1075

- ➔ Large overtravel
- ➔ Redundant contact system for high switching reliability by double contacting
- ➔ Self-cleaning contact system due to wiping contacting
- ➔ Noiseless switching system
- ➔ Option 1: enter-zero version (basic type 1075) for detecting 3 switching positions
- ➔ Option 2: diagnostic switch (type 1060/1070)



Snap-action switch 1055

- ➔ Compact design with dust and water protected switching system (IP 67)
- ➔ Lamp load up to 30 W
- ➔ Specially designed pushbutton guide enables start-up angle of 40°
- ➔ Modular principle for a wide selection of connections, auxiliary actuators and fastening types



Modules

- ➔ Decades of experience in the development and production of electromechanical solutions
- ➔ Insertion of own developed snap and micro signal switches
- ➔ Electro component carriers

Panel switch 3230

- ➔ Rocker switch with customized caps
- ➔ Million times proven, friction snap-action contact system
- ➔ Powerful with 100 000 switching cycles electrically and mechanically for DC voltage applications
- ➔ Indicator lamp identical
- ➔ Dust and water protected
- ➔ With or without function illumination (LED)
- ➔ Block connection



Short-lift keys 3006

- ➔ Low height even with integrated LED
- ➔ SMD connection technique
- ➔ Pleasant actuating characteristic thanks to clearly tangible pressure point
- ➔ Extremely large actuator surface
- ➔ Six standard colors or without LED
- ➔ Two operating force variants
- ➔ Reflow lead-free solderable



BECAUSE CUTTING-EDGE TECHNOLOGY IS BASED ON KNOWLEDGE AND INGENUITY.

The Marquardt group was established in 1925 and has, in spite of becoming a Global Player, remained an independent family enterprise. With its two business areas – Automotive and Switches, Sensors & Controls – the Marquardt Group of companies is active all over the world in all the important markets and has offices at 14 locations with more than 8,000 employees.

According to our tradition, we have always seen ourselves as pioneers and drivers of innovation in the automotive, electrical engineering and electronics industry. Therefore, we pursue our development activities in a sustainable manner and invest around 10 percent

of annual sales in this forward-looking field. Our employees in the development department produce both customized and self-initiated solutions to meet customer requirements and wishes. We align our core competencies and technology portfolio accordingly.

Know-how, creativity and motivation are essential factors for the success of our products. About 520 engineers worldwide are currently working in our areas of development. 180 employees alone work in the software development department so as to provide the necessary artificial intelligence for every product. Due to the close collaboration with our customers we are able to introduce new technologies to the market as quickly as possible.

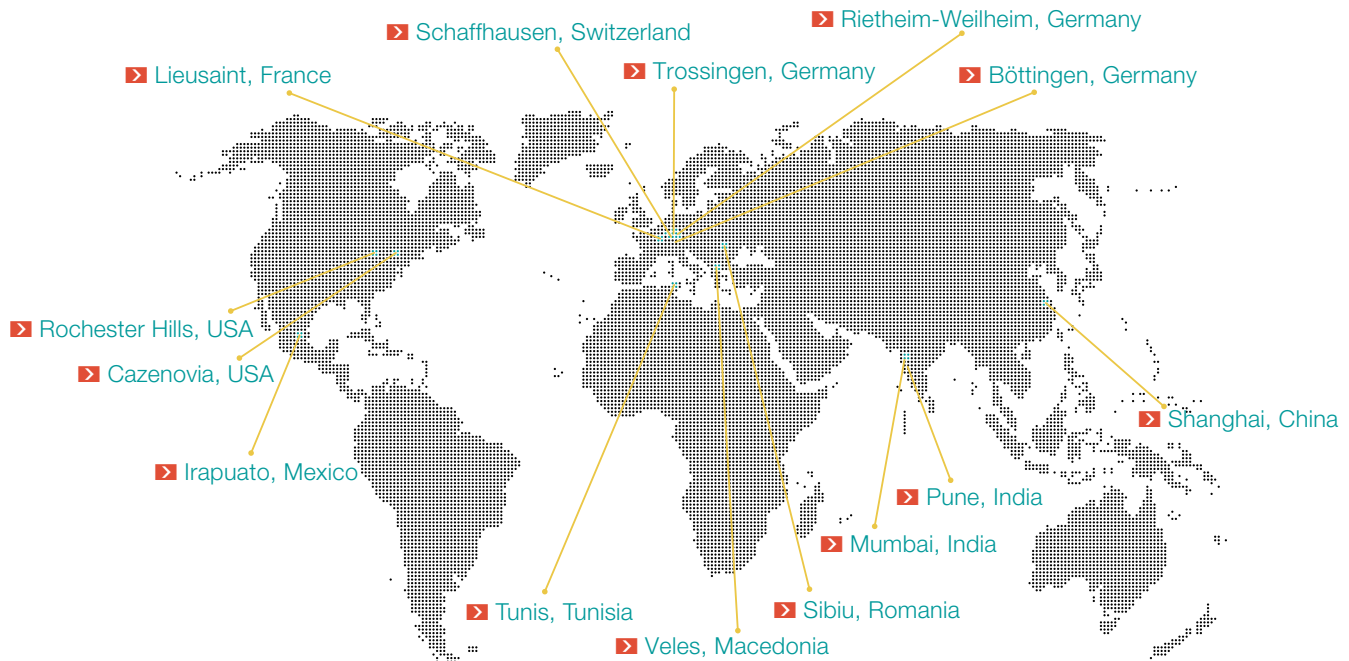
In 2013 alone, we registered a total of 60 new patents in order to expand competitive advantages in the coming years through industrial property rights. The automotive industry was the primary focus.

With the latest equipment, we are able to achieve our ambitious but always

realistic goals. A test field for testing and development-related qualifications, for instance, makes this possible. It allows us to perform nearly all of the tests required for the serial production without external help. Moreover, we have equipment for all necessary measurements and analyses at our disposal, ranging from optics simulation, luminance measurements, beam calculations, snap hook calculations, software-supported spring-calculations to rapid prototyping.

Development – owing to progress – accompanies Marquardt day after day, for 90 years. This experience helps us offer our customers the maximum benefit, which they pass on to their customers and thereby passing it on to you.

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