

SANTON RAIL GUIDE





WE AIM HIGH, WE WANT
TO BE THE BEST!

WE SERVE OUR CUSTOMERS
WITH THE BEST POSSIBLE
PRODUCTS AND SERVICE.
WE THEREFORE MAKE A CLEAR
PROMISE TO OUR CLIENTS.

BY BEING INNOVATIVE AND
HAVING A CUSTOMER DRIVEN
STRATEGY, WE WILL SUPPLY
YOU WITH A SUPERIOR SWITCH
SOLUTION. NO MATTER THE
CHALLENGE YOU ARE FACING,
WE BELIEVE THAT OUR 'OUT
OF THE BOX INNOVATIVE
CULTURE' IS A BENCHMARK
IN OUR MARKET AND DRIVES
US TO ALWAYS DEVELOP,
MANUFACTURE AND MAINTAIN
THE BEST PRODUCT THAT
YOU CAN GET!

Our expertise, we know switchgear for almost 100 years!

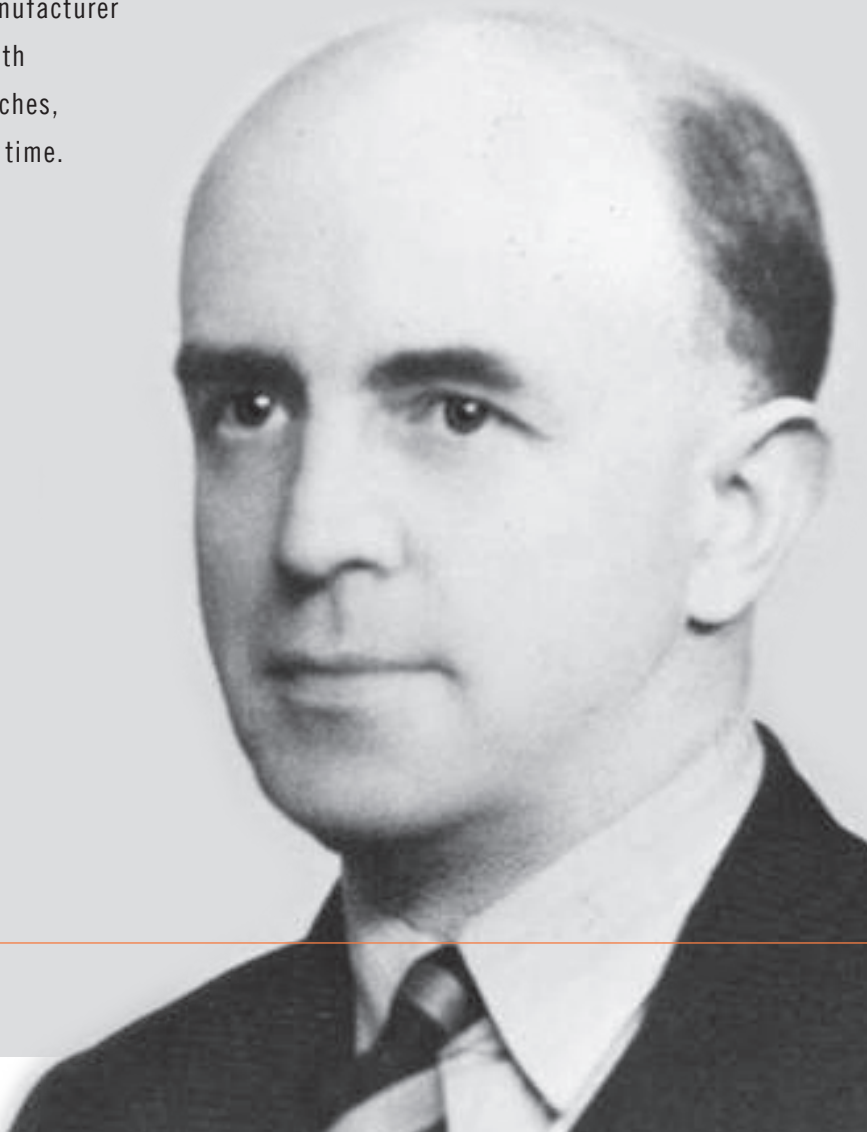
In the early 20's Santon was founded by the gentlemen Mr. Sanders and Mr. Fulton in the United Kingdom. Although Santon manufactured water heaters originally, in the late 20's the company developed a rotary switch for switching of DC currents needed to disconnect the high power DC heating elements.

In the 50's a joint venture with De Hoop Groenpol, located in Rotterdam, was started to manufacture the famous Santon P-type rotary switch in the Netherlands. As this joint venture was a big success the decision was made to take over Santon Ltd in the 70's. Up to 2004 Santon was part of the GTI group and had its office in Rotterdam.

Since 2005 Santon has grown to a global switch manufacturer and serves all major OEM's throughout the World. With production capabilities of more than 10 Million switches, we guarantee that we always supply your product in time.

Harold Curtice Sander

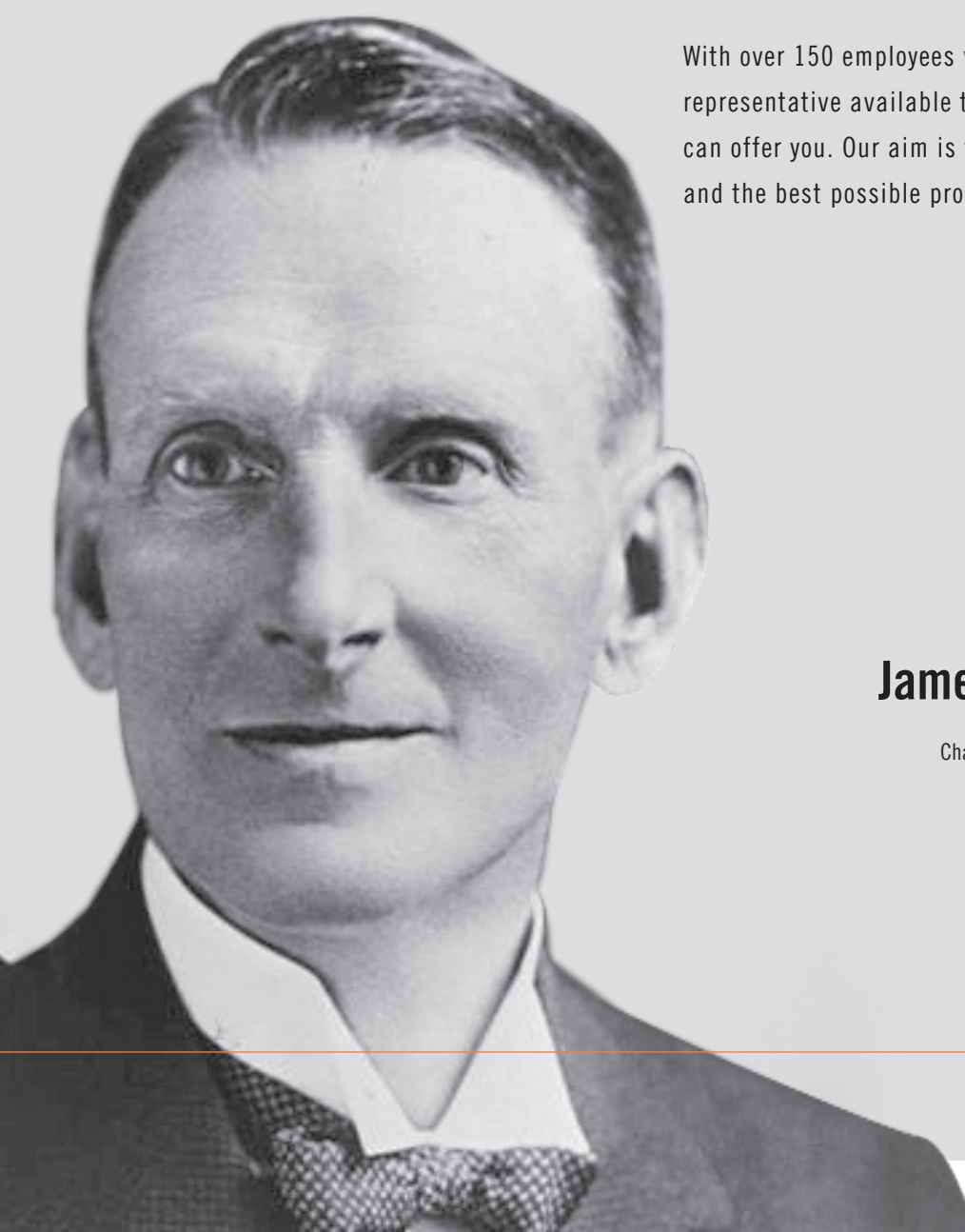
Founder
Chairman and Joint Manager
1930 - 1942



Santon is specialized in the engineering, manufacturing, assembling and overhauling electrical switch gear solutions. Our range of products starts at switches, but continues with master controllers, direction controllers, cab desk panels, door control panels, battery isolation switches, earth switches, and electrical control box assemblies like HVAC controllers. This is only a brief overview of our value added capabilities that Santon can support you with.

Besides designing and manufacturing new solutions for our customers, we also offer a wide range of repair, service and overhaul programs. We maintain, brand independent, master controllers, DC switches/contactors, panel assemblies and many more applications.

With over 150 employees worldwide, there is always a Santon representative available to explain how we work and what we can offer you. Our aim is to serve you with an excellent service and the best possible product that is available.



James Fraser Fulton

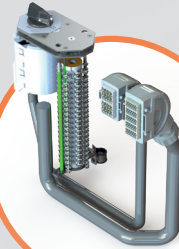
Founder

Chairman and Managing Director

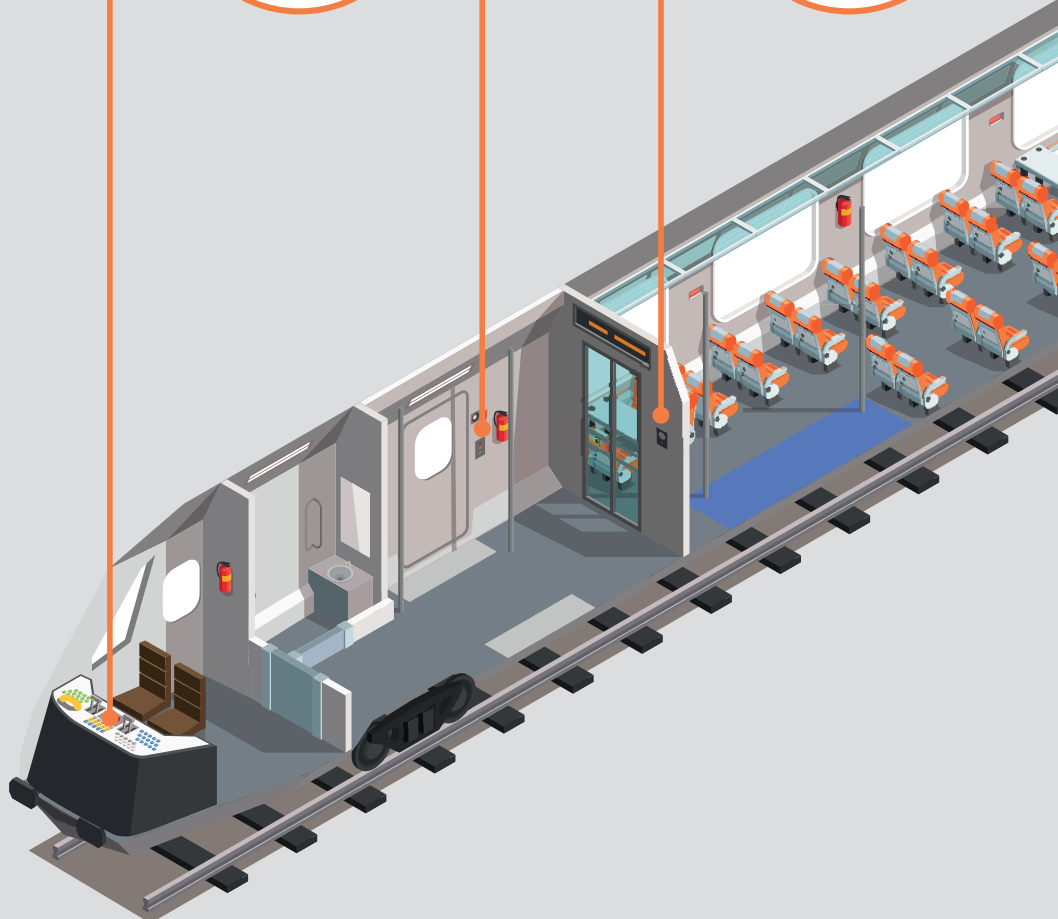
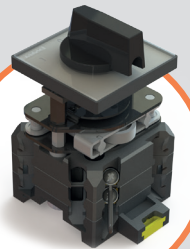
1921 - 1930

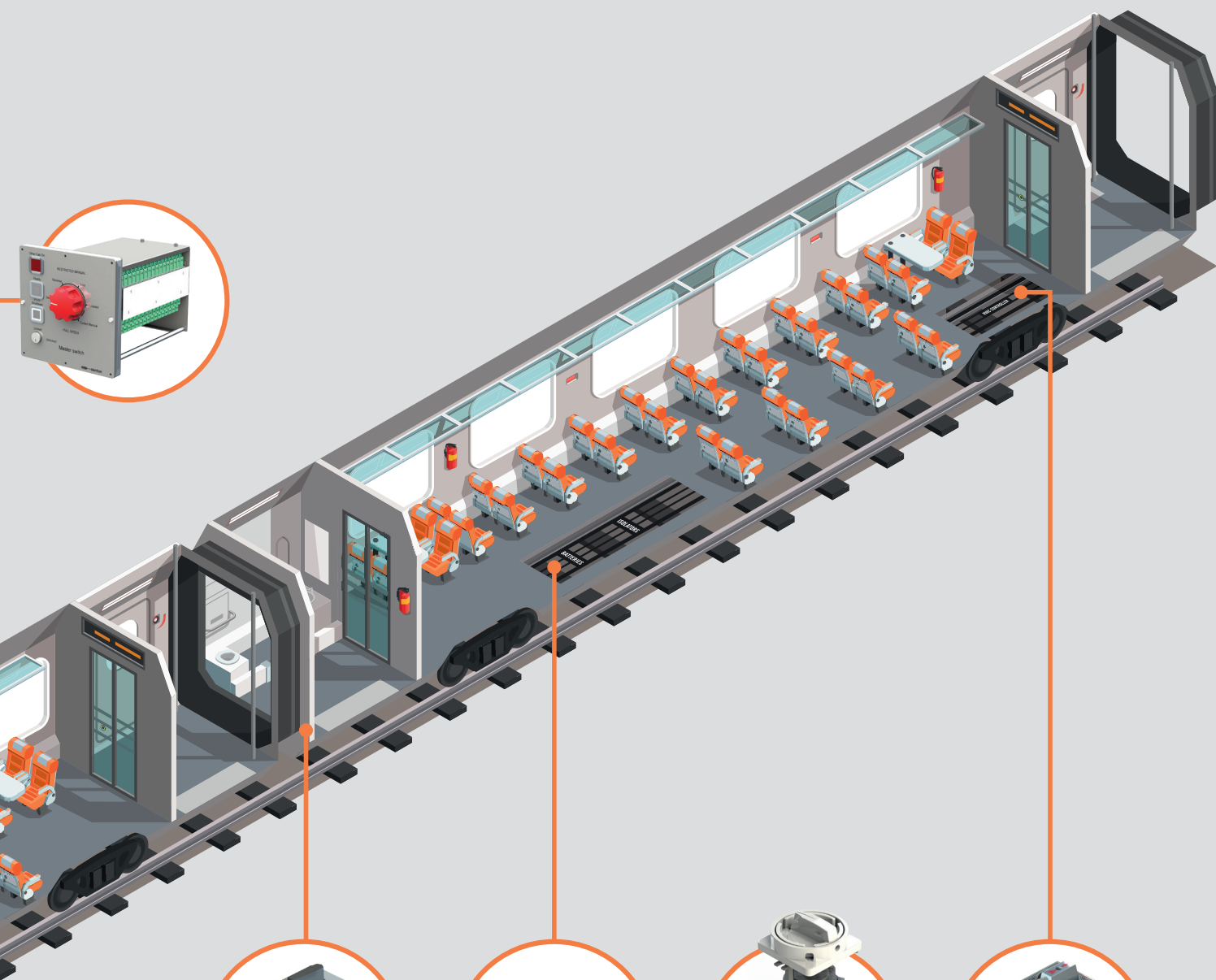
FIND SANTON IN YOUR TRAIN

DRIVER DESK



DOOR CONTROLLERS

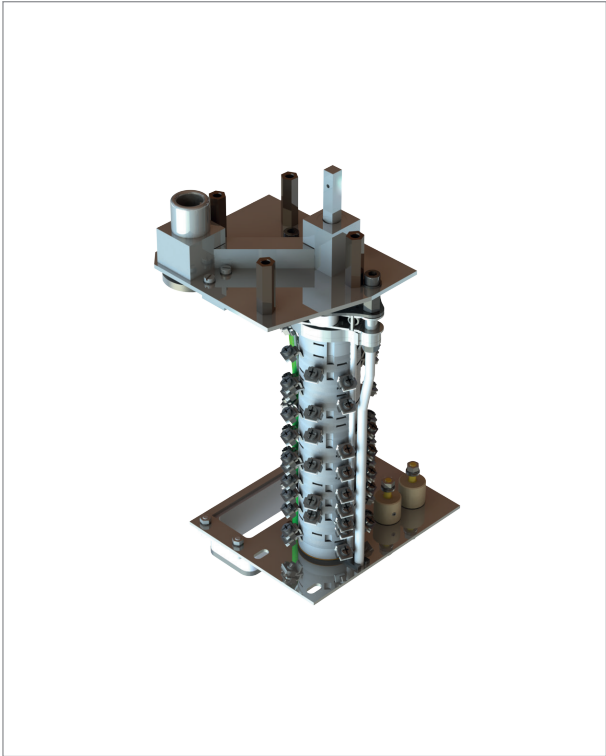




(UN)COUPLER
DRUM SWITCHES

UNDER CAR
EQUIPMENT &
ENGINEERED
ASSEMBLIES

BATTERY SOLUTIONS



BRAND INDEPENDENT

REPAIR, SERVICE AND OVERHAUL

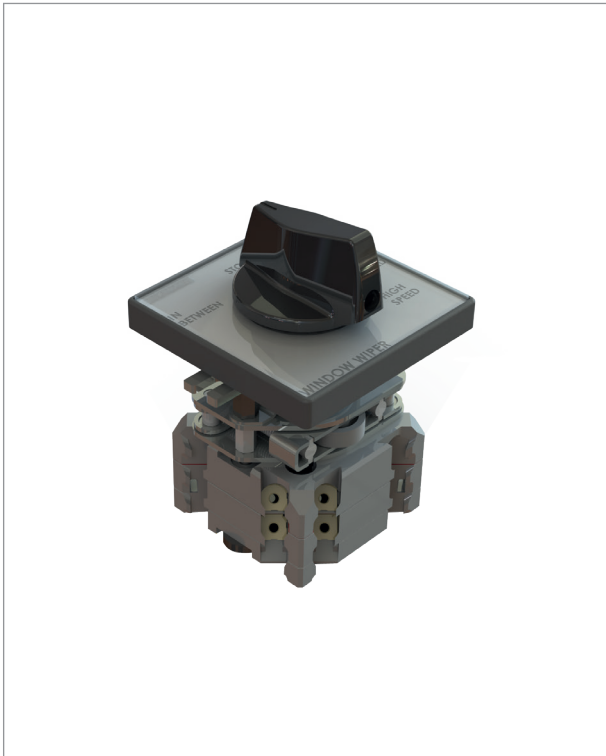
Santon offers repairs, maintenance and overhaul for our own designed and manufactured products, but also offers a repair, service and overhaul program for products that are not manufactured by Santon. Santon has repaired, re-designed and upgraded many different components where the original manufacturer cannot offer the service level that Santon is able to provide. Our engineers are very experienced in analysing a product, re-engineering the product, analysing obsolescence risks, and improving the TCO for the customer.

The products that we maintain:

- Master controllers
- Direction controllers
- Control panels
- High power DC contactors and breakers
- Un-coupler switches
- Electrical control assemblies
- And many other applications

Santon offer three types of programs, which are fully transparent and easy to understand. Each program is balanced between predictive and reactive maintenance. With the programs we make sure that you get the service that you need, matching with the lifetime of your assets.

1. Repair of a product after a failure: The unit is checked and the damaged part is repaired. The product is returned with an in- and outgoing inspection report and advice when to service the unit.
2. Service of a product (and repair if needed): The unit is checked and all parts that have been worn out are replaced. The product is returned with an in- and outgoing inspection report and advice when to overhaul the unit. All replaced parts are sent back to the customer to make the process fully transparent.
3. Overhaul of the product: The unit is analysed and checked for weaknesses. We listen to the Operators and look at repair/incident report history. Our engineers upgrade the unit accordingly to make sure it's built to the most modern standards. Part of the project is to fully type test the unit, perform a risk analysis, provide it a maintenance/lifecycle cost analysis, new maintenance document and drawing sets. All this is documented fully with an in- and outgoing inspection report to make sure you have the best quality information available!



XP-TYPE CONTROL SWITCH

Since the early 20's Santon is the number one manufacturer of rotary switches. With almost 100 years of knowledge and expertise, and designing more than sixty thousand different switches, we used this knowledge to develop the world's first switch, specifically designed for rail applications. Although the switch has been on the market for only a short period of time, many large car manufacturers and system integrators have selected the Santon XP-type switch as their standard switch for critical systems.

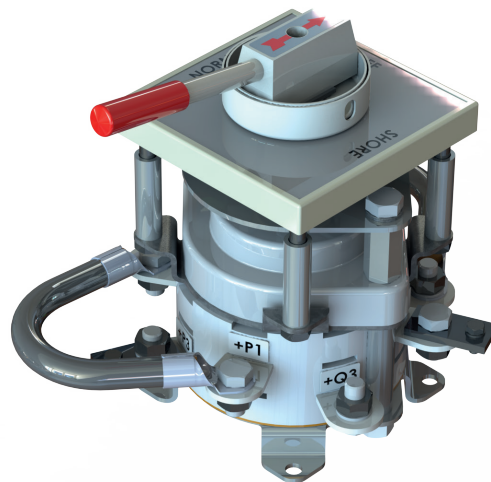
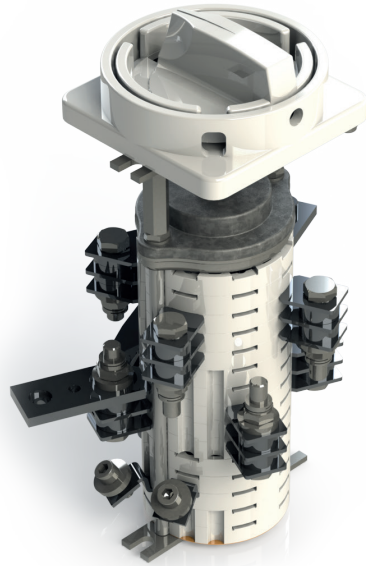
The Santon XP-type switch is designed to be used in safety critical systems that need to perform for many years without a failure. The Santon XP-type switch can be used for many applications such as key switches, un-couplers, direction switches, master door controls, shunt controls, wiper control switches, driver desk mount critical selector switches and many more. There is no limit in decks or configurations we can offer; we will design the best possible solution for you!

Today's standards ask manufacturers to be more innovative. The XP-type switch is tested and approved for all kinds of rail specific standards. All XP designs are:

- EN45545-R26-HL3 tested and approved
- IEC61373 tested and approved
- IEC60068 tested and approved
- And many more certificates are available.

The Santon XP-type is tested with a multiple rating to allow the same switch to be used for many applications. The switch is tested and approved according to the IEC61947-1-3 standard:

- 150V – 1,5A – DC14
 - 110V – 4A – DC14
 - 48V – 10A – DC14
 - 230V – 10A – AC13
-



BATTERY ISOLATION SWITCHES

Santon offers a wide range of battery isolation switches that can be used to switch off battery loads or can isolate/bypass batteries during maintenance. The Santon battery isolation switches are used on many Trains and are well known in the market. All our battery isolation switches are designed to switch high power DC on-load currents.

Santon always offer EN45545-R26-HL3 and IEC61373 tested and approved products. In specific cases we can offer products with an extreme low or high temperature. 96 hour salt testing is also part of the scope of our products. Santon offers two types of battery isolation switches:

1. Battery isolation switches starting at 40A up to 250A.

- Nominal voltage up to 1500V DC
- Isolation voltage of 6kV.
- Up to 8 poles
- ON-OFF or Change-over/bypass switch diagram
- Short circuit resistance up to 7,65kA
- Unlimited options like lockable knobs.

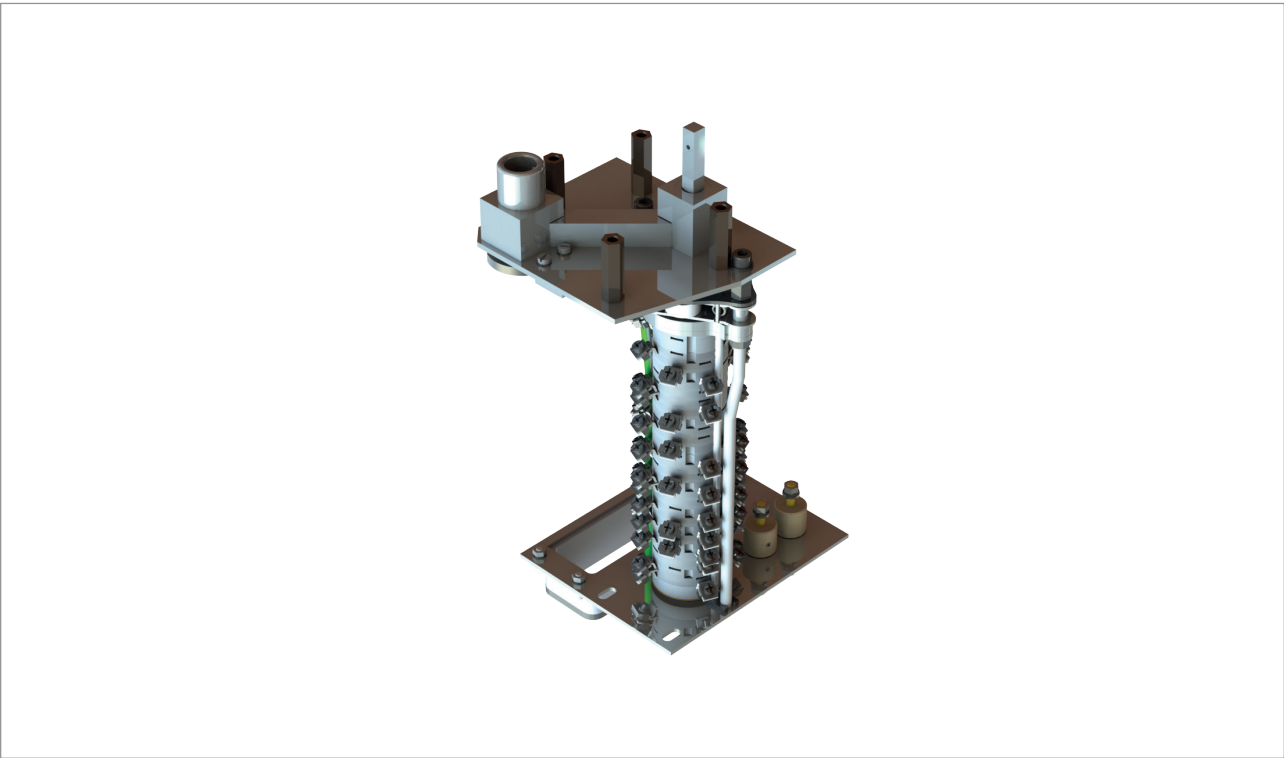
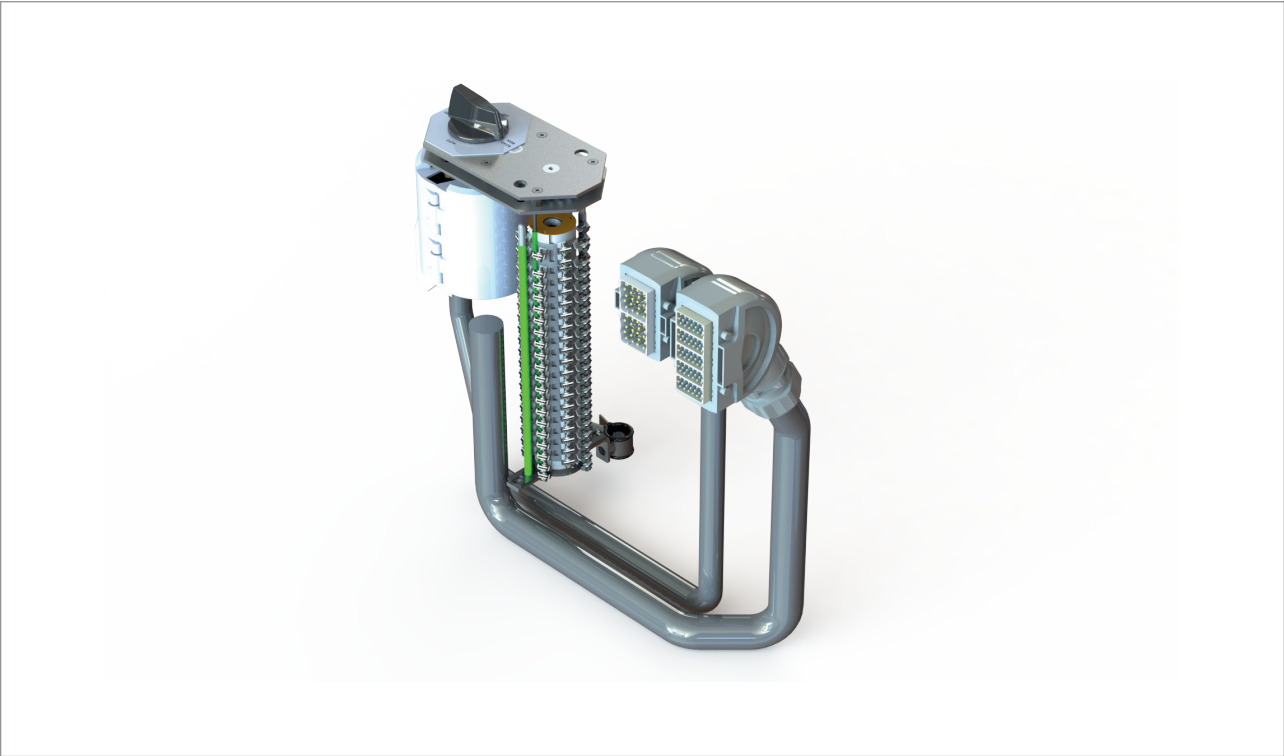
2. Battery isolation switches starting at 250A up to 1500A.

- Nominal voltage of 1000V DC
- Isolation voltage of 6kV.
- Up to 4 poles
- ON-OFF or Change-over/bypass switch diagram
- Short circuit resistance up to 65kA
- Unlimited options like lockable knobs.

Santon offers loose switches for OEM's, but also switches in IP67 enclosures. Santon enclosed products are used worldwide and are known for their extreme reliability. With our own test facility we can test undercar equipment to replicate the working conditions of your assets. This ensures that the product we designed for you will meet all your expectations.







P-TYPE

Every train vehicle is controlled by signals that can never fail, as critical train control management systems are relying on those components.

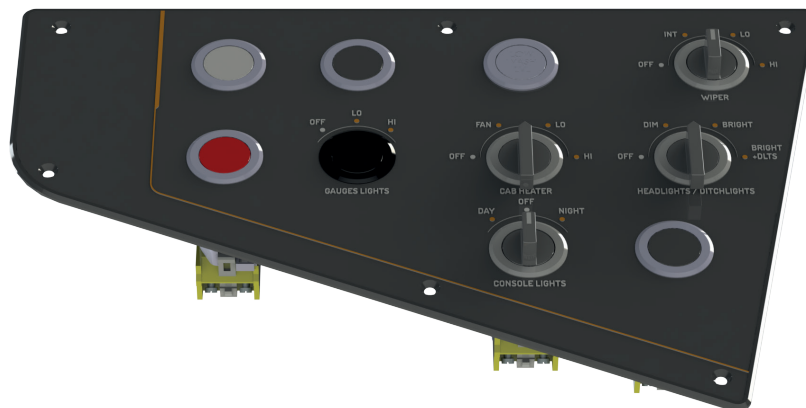
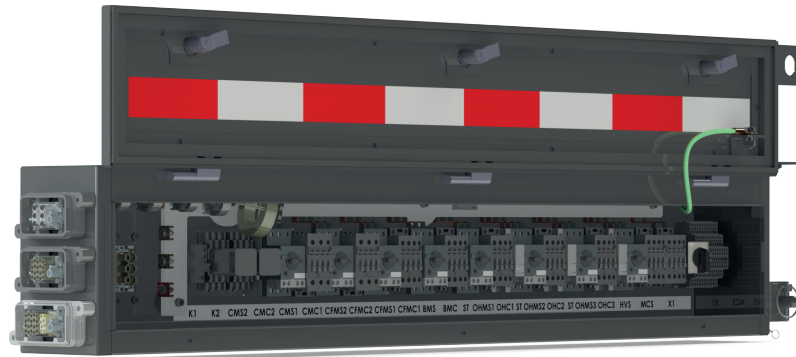
Santon has developed in the last decades a very strong name in critical control applications with our P-type switch. Trains on every continent of the world are equipped with master key switches, master door control switches, direction switches and many other applications. The Santon P-type switches can be used many times a day and withstand major wear and tear, or misuse by the operator.

Our P-type switch control solutions are designed for longevity. Before the first system is shipped, we fully test the requested life cycle to minimise the maintenance costs. Our switch solutions can switch more than 300,000 electrical cycles, which in most cases is a 30 year lifetime with no maintenance. The average contact resistance is 0.7mOhm at the start, more important after 300,000 cycles the contact resistance is still below 0,8mOhm.

Although the P-type with its self-cleaning contacts is designed for control signals, the product can still switch high DC loads:

- Nominal voltage of 137,5V or 250V DC
- Isolation voltage of 4kV
- Amperage up to 16A
- Available up to 100 poles
- Options like double column solutions, motor driven controls, lock able knobs and many more.

We have supplied more than 5,000,000 switches globally and therefore we can claim to be the very best in control solutions. Let's us help you and be amazed with the capabilities of our solutions.



ENGINEERED

AND BESPOKE ASSEMBLIES

Santon has a strong engineering team that is capable of developing bespoke designs for many applications. Our engineers are experts in the field of power distribution, control panels, door control panels, customer interface panels, and many more applications. Since 2015 we have the capability to offer complete driver desks, including all mechanical interfaces.

Santon focuses on lean management making our solutions very well engineered, easy to assemble, and easy to maintain. This supports the car owner to reduce its maintenance costs and down time of the asset.

Our automated test equipment supports you with unlimited data like mechanical and electrical functions, contact resistance, isolation testing, water tightness, and more tests can be added on request. All data is sent with the product, but it is also digitally available on request.

With production sites all over the world, we are able to offer you local content and support you locally!



* Shown switches are only available via EAO

LOOSE SWITCHES

F O R P R O D U C T I N T E G R A T I O N

A wide range of standard switches, optimized for the rail industry, are available at Santon. Driver desk selector switches, and many other applications, can be found in many projects. All our products are EN45545-R26-HL3 tested and approved.

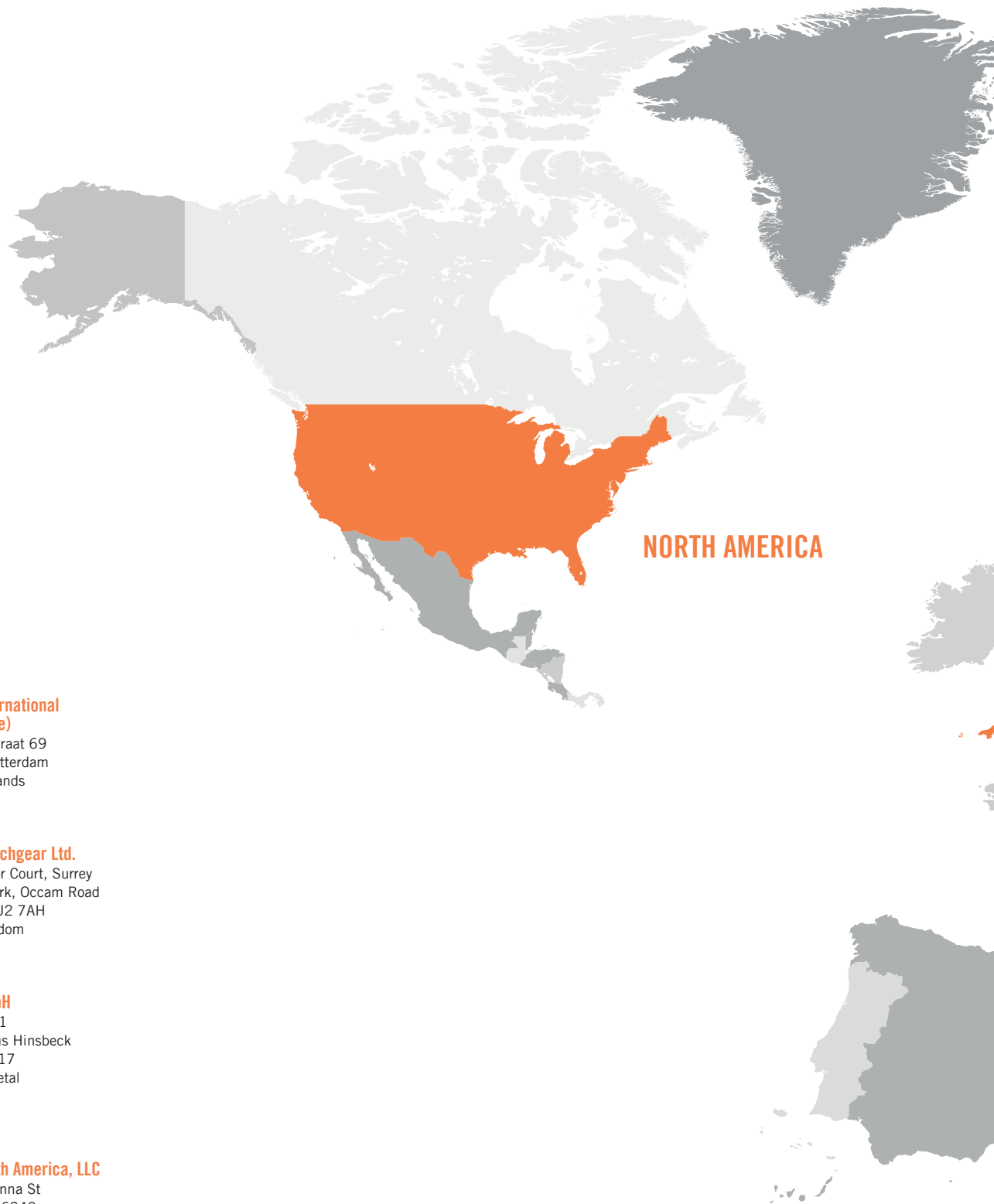
Robust options are specifically designed to meet the arduous operating standards demanded in the modern rail environment. With these options Santon is able to configure more than 50,000 unique switches.

Our switches are supplied with a black knob as standard, but the products on request are also available via selected partners to combine with industry standard knobs, key cylinders for extra safety, or any other requirement.

Our standard switches have the following features:

- Up to 20A
- Mechanical lifetime of +1 million cycles
- IP65 sealing
- Backlighting knobs
- Single hole mounting with different diameters
- All kind of contact configurations are possible

The list of features and possibilities is endless. We are more than happy to explain to you every detail of our product line up.



**Santon International
(Head-Office)**

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Santon Switchgear Ltd.

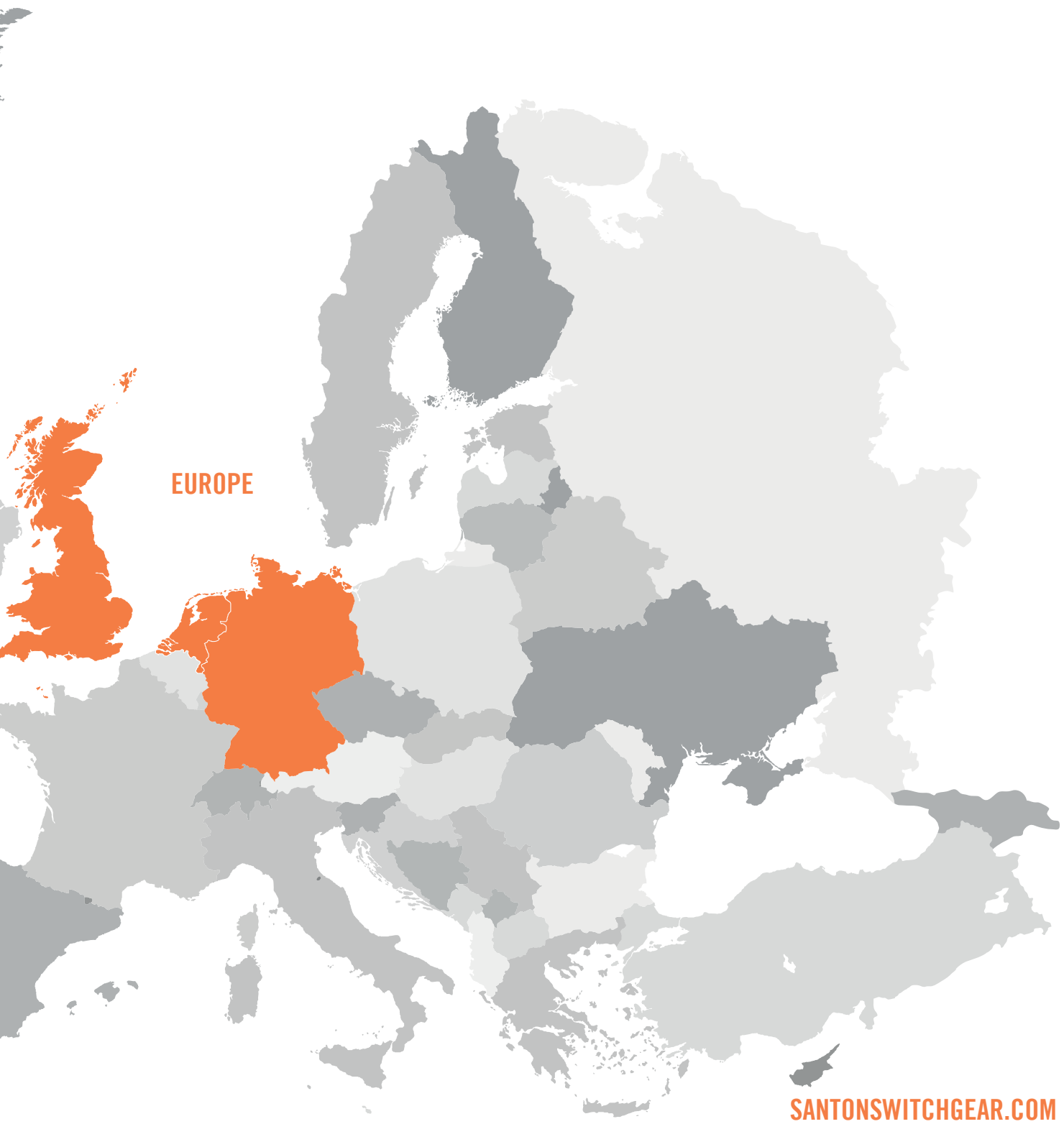
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