



**MAURON MUSY**

INNOVATIVE WATCH ENGINEERING

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Within the watch industry, the issue of water resistance has witnessed no significant breakthrough for 130 years. Invented in 1885, the O-type sealing ring – with all its inherent disadvantages including age-related deterioration, inconsistent efficiency and costly servicing – continues to equip even the most modern watches.

After three years of research and development, MAURON MUSY reveals its world-first nO-Ring® technology. A truly disruptive innovation, this patented system

relegates gaskets to the rank of historical curiosity. Based on the principle of mechanical sealing technology, this 100% Swiss Crafted device can legitimately be regarded as a “watch exterior complication”. No less than 36 components – including clamp braces and satellite compression springs – endow the case with perfect gasket-free water resistance. A solution whose brilliance lies in the unprecedented miniaturisation and adaptation of the device to watchmaking.

## ARMURE, THE ULTIMATE WATCH CONCEPTION

The robust and determined ARMURE model stems from functional analysis which makes users’ needs the core concern. Working within their independent laboratory, engineers Eric Mauron and Christophe Musy have entirely rethought the concept of water resistance. In this model, function creates design, since aesthetic and technical factors are inseparably entwined.

The unusual, extremely technical case conceals innovations never previously applied to the watch industry. The fruit of high-precision workmanship, it comprises 36 elements compared with only ten or so for traditional models. A degree of complexity that for the first time makes it possible to apply the principle of mechanical sealing technology to a watch.

Three years of research were required to develop the nO-Ring® technology, by which two clamp braces – the

caseband and bezel – tense the various case elements together via specially in-house-made satellite compression springs. Dedicated surface treatments ensure unfailing, gasket-free water resistance.

The ARMURE is equipped with Calibre 39, one of the best-performing self-winding movements on the market. Endowed with a 65-hour power reserve and beating at 4 Hz (28,800 vph), it features a modular construction enabling a wide range of variations including chronograph, GMT, moon phase and small seconds versions. 100% of its components are made in Switzerland.

Available in steel and titanium, ARMURE offers a broad choice of dials and finishing. Entirely produced and assembled in Switzerland, all models are delivered with two straps: one in leather and the other in rubber.

## WATER RESISTANCE, A LONGSTANDING BATTLE

Mechanical watchmaking faces a number of challenges. Frictional forces, thermal expansion, magnetism and gravity are just a few of the recurrent difficulties it encounters. Over the years, these obstacles have become an extremely powerful driving force for the industry. The majority of technical breakthroughs in recent years relate to improving watch performance.

The fields of investigation are many and varied, notably involving new materials (starting with silicon), high frequencies and flexible mechanisms. However different they may appear, these innovations have one thing in common: all stem from fields of application outside watchmaking, such as the aeronautical, automobile, medical, electronics or aerospace industries.

The quest for water resistance has been – and continues to be – one of the most essential watchmaking battles, even more so than the fight for accuracy. It is only once movements were sufficiently safeguarded from external aggressions that watchmakers were able to develop reliable horological complications. Watches could therefore not only be used in all circumstances, but also became sturdier and more durable. The cause-effect relationship between water resistance and modern watchmaking is so close that it has in fact modified the course of time.

Nonetheless, since the water-resistant pocket watch launched in 1885 and named “L’Imperméable” (“the waterproof model”), this field has undergone no significant evolution. The crown gasket equipping it – now known as an O-ring – was never challenged. Until now, no-one had sought to improve this technology other than by using various materials, notably including cork, elastomere, lead and shellac.

Nonetheless, O-ring seals have several flaws: they can be adversely affected by cosmetic products such as hairspray, and even if no specific agent damages the material, they age and dry up over time and must thus be regularly changed. Moreover, water-resistant watches are not truly waterproof, given that splashing such as that to which they are subjected by diving or showering is fatal to a weak case, even if the latter meets the benchmark international standard, ISO 22810. Finally, the deformation of gaskets due to underwater pressure is also problematic, since if they do not perfectly regain their initial shape and place, air can seep in and lead to condensation that can have devastating effects on the movement.

## NO-RING® TECHNOLOGY

Keenly aware of these imperfections, Eric Mauron and Christophe Musy worked for more than three years on a solution entirely unprecedented in the watch industry. Experienced engineers driven by the same thirst for innovation and discovery, they have combined three existing principles culminating in the patented nO-Ring® technology: mechanical sealing technology, the clamp

brace, and the satellite compression spring. A knock-on solution whose brilliance lies in miniaturising and adapting this device to watchmaking: a world first and a true paradigm shift in the field of containment, propelling the mechanical function of water resistance to the status of “watch exterior complication.”

## MECHANICAL SEALING TECHNOLOGY

Mechanical – or direct – sealing technology consists of securing two parts of a system together using strongly tightened bolts, without any gaskets. Used in mechanics for such sophisticated devices as dam turbines and nuclear reactors, this technology calls for serious knowledge of materials physics and fluid dynamics. It requires hardening and then straightening or grinding of the materials in contact so as to achieve exceptional

flatness and controlled roughness of the surface profile. Thus adapted to watchmaking, this approach entails standards governing the world of infinite smallness: in the case of MAURON MUSY, if the surfaces involved were the size of an Olympic swimming pool, their relief would correspond to tiny waves measuring a third of a millimetre high.

## CLAMP BRACE

Mechanical sealing technology must nonetheless be adapted: it is impossible to use clamping screws in watchmaking due to the risk that the latter might deform certain components. The two inventors have therefore developed extremely specific clamp braces: the sapphire crystal and caseback are held to the central circle

by a bezel consisting of two semi-circular parts; as well as a caseband composed of four articulated segments – with both elements acting on the springs. This clamping method is notably used in plastics manufacturing, since gaskets are not suited to the 300°C temperature required for plastic machining processes.

## SATELLITE COMPRESSION SPRING

Here too, the procedure has been entirely rethought. Classic clamp braces hold cone-shaped surfaces together, converting horizontal force into vertical action. Adopting such a method would however create strong pressures inside the case, leading to deformation of the components. In order to tense the various elements, Eric Mauron and Christophe Musy have developed a satellite compression spring. Representing the culmination of substantial development work, this domed ring is fitted on both the sapphire crystal and the transparent caseback.

The result is that the ensuing vertical pressure, amounting to as much as 390 Newton, ensures perfect water resistance for the entire device, without any gaskets or glue. If a water molecule were the size of a golf ball, it would have to travel 430km and face 3m-high hurdles in order to infiltrate the case. This patented nO-Ring® technology was entirely developed by the two brand founders.

## CROWN DEVICE

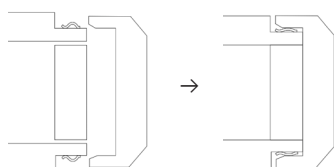
The concept is just as spectacular with regard to the water resistance of the crown: a shaft – generally called a winding stem – pivots inside a bearing screwed to the case. These two perfectly adjusted components with their nanometrically accurate fit ensure a gasket-free

seal. In comparison with the diameter of the Channel Tunnel, the space between the two would amount to a third of a millimetre, the thickness of a business card. The same principle is applied to the pushbuttons.

# NO-RING® BY MAURON MUSY MECHANICAL DIRECT-SEAL GASKET-FREE WATER-TIGHTNESS TECHNOLOGY

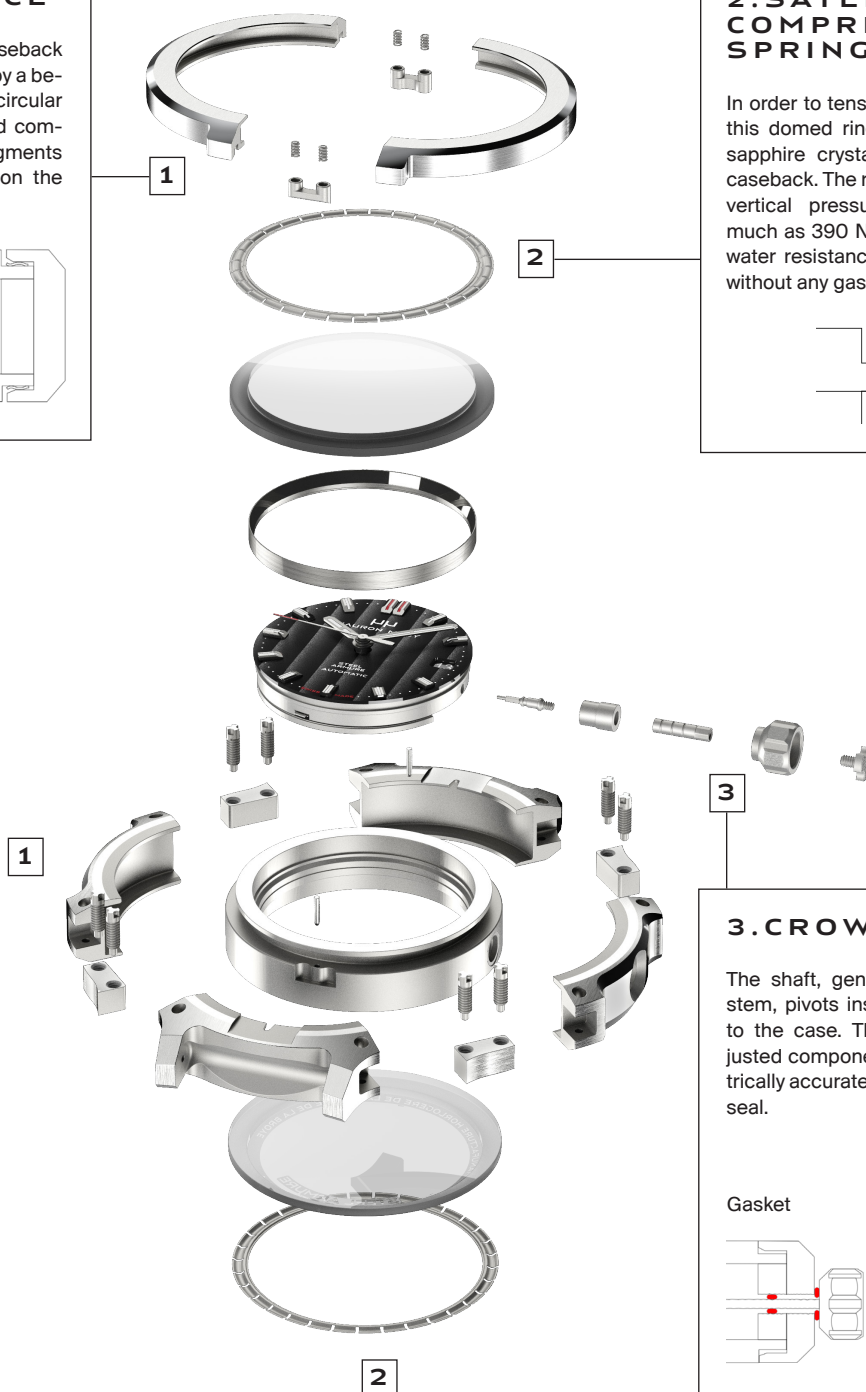
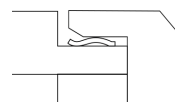
## 1. CLAMP BRACE

The sapphire crystal and caseback are held to the central circle by a bezel consisting of two semi-circular parts; as well as a caseband composed of four articulated segments with both elements acting on the springs.



## 2. SATELLITE COMPRESSION SPRING

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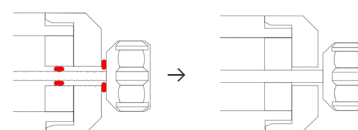


## 3. CROWN DEVICE

The shaft, generally called a winding stem, pivots inside a bearing screwed to the case. These two perfectly adjusted components with their nanometrically accurate fit ensure a gasket-free seal.

Gasket

Gasket-free





## NUMEROUS ADVANTAGES

Thus released from the generally used gaskets, the nO-Ring® ensures that the quality of the seal does not depend on the state of the materials involved. Lengthy and expensive recurrent after-sales maintenance service to guarantee a basic function is thus a thing of the past, as is the expense of systematically changing gaskets with each movement overhaul.

At MAURON MUSY, the operating instructions contain no warnings relating to potential precautions: owners can literally forget they are wearing a MAURON MUSY watch which is able to handle literally any situation. No need to check whether the crown is in place before jumping into the water; and no need to protect the

watch from sun on the beach so as to avoid gaskets dilating. Plus the case can be easily opened and closed for servicing.

Last but not least, nO-Ring® technology provides a masterful solution to one of the greatest challenges in the field of water resistance: the use of the crown and pushers under water. Whereas most diver's watches prohibit such handling, the dynamic shaft and bearing system, developed by the independent company, enables underwater operation of the chronograph function, for example. Even splashing – such as when showering or diving into a pool – which can prove fatal to traditional gaskets, is harmless to a MAURON MUSY watch.

## 100% SWISS CRAFTED MANIFESTO FOR AUTHENTIC SWISS WATCHMAKING

MAURON MUSY watches are not stamped with the inscription 'Swiss made', but instead proudly bear the 'Swiss Crafted' label certifying that 100% of the watch has been developed, manufactured and crafted in Switzerland.

From 1971 and until recently, the only criterion required to obtain the 'Swiss made' geographical appellation applied to the movement only: 50% of its value had to stem from Swiss expertise. Since 2017, a new federal law reinforces the definition of the label, since the entire watch – apart from its strap or bracelet – is now taken into consideration. The Swiss value requirement has also risen to 60%, while taking R&D expenses into consideration for the calculation.

As far as MAURON MUSY is concerned, something initially designed to be a guarantee of quality has come to betoken considerable hypocrisy. Not only does the phrasing of the law leave producers considerable room for manoeuvre, but controls are also virtually non-existent. This means that one and all are free to continue producing a substantial proportion of their components abroad (sometimes as much as 80% come from Asia) while continuing to carry the 'Swiss made' label.

This is a practice that MAURON MUSY refuses to adopt. All elements of its watches – movement, case and dial – are entirely developed, produced and assembled in Switzerland. No value-related considerations are taken into account, simply because the entire range of skills originate within the Swiss watch industry. With 'Swiss Crafted', MAURON MUSY is defending far more than a label, but indeed a full-fledged industrial code of ethics.

## FERTILE GROUND

MAURON MUSY is not burdened by the weight of years, quite the opposite. Born in 2013 in the Broye valley, at the heart of the Three Lakes region running along the foot of the Jura, the brand proudly proclaims its youth. It also proudly invokes its ancestry in the crucible of the Régis Mauron precision mechanics workshop founded in 1968 has played and continues to play the role of an incubator.

Initially a playground and then a watershed for converging passions, this place was to become Eric Mauron's work tool for producing watch exterior components when he joined his father in 1965. When he took over the family business eight years later, the young director gave free rein to his desire for innovation and new challenges. He set up a technical bureau and began developing high-precision machinery for watchmakers and stone polishers. The mechanical workshop was thus transformed into an R&D lab.

The encounter with Christophe Musy occurred during this period. Despite their almost 20-year age difference, their relationship soon became one of great mutual un-

derstanding. The experience of one, combined with the curiosity of the other, laid the groundwork for a creative dynamic that has maintained its momentum ever since. Mechanics and watchmaking thus became the topic of daily debate.

It was within this environment pervaded by a simultaneously studious and audacious atmosphere, that a collaborative endeavour began to take shape. The two men worked on developing a CNC gem-cutting machine and various other projects ensued. In 2013, the foundations of MAURON MUSY were laid and the workshop became an experimental facility.

It took long months of tests and trials to create the nO-Ring® technology. Like the 19th century pioneers of industrial watchmaking, the two researchers adjusted their machines, created others, forging their own path well off the traditional beaten track. The ARMURE collection, the first to featured the newly embedded technology, is destined to inspire others. The MAURON MUSY brand still shares the same address as the Régis Mauron precision workshop.

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