TAGHeuer
SWISS AVANT-GARDE SINCE 1860

REINVENTING THE MECHANICAL REGULATOR
THE TAG HEUER MIKROGIRDER

Simpler, faster and more efficient than science dreamed possible, impervious to gravity and dramatically reducing isochronous error, potentially easier to manufacture and able to precisely measure time to a phenomenal 5/10,000th of a second today, and probably even more precisely tomorrow…
TAG Heuer challenges three centuries of hairspring/balance wheel mechanical regulation conventions to create a totally new mechanical regulator. The legendary Swiss brand is now unveiling a 5/10,000th of a second chronograph beating at 1,000 Hz or 7,200,000 beats per hour!

In 2010, TAG Heuer presented the **Grand Carrera Pendulum Concept**, the world's first-ever mechanical regulator to replace a conventional hairspring with magnets. Following TAG Heuer's Calibre 360 Chronograph (2005), which beats at 50Hz and measures and displays to the 1/100th of a second, the 6Hz Pendulum Concept, which is still under development, confirmed TAG Heuer's position as the unrivalled pioneer of high frequencies.

In 2011, TAG Heuer launched the **MIKROTIMER FLYING 1000**, the world's first 500hz mechanical chronograph. A revolutionary mechanical chronograph regulator without any balance wheel system and equipped with two escapements, the Mikrotimer's beats **3.6 million times per hour**, making it 125 times faster than a standard Swiss chronograph. Its central chronograph hand completes a full rotation 10 times per second. Now being successfully commercialized, the Mikrotimer was voted the 2011 Swiss Sports Watch of the Year at the Geneva Watchmaking Grand Prix. The victory marked the 7th time in 10 years that TAG Heuer was singled out by the Geneva jury for its engineering and design prowess.

Now comes the pioneering **MIKROGIRDER**, the Swiss legend's greatest achievement in watchmaking engineering to date, a game-changing technology which promises to completely revolutionize the very heart of the watch — the regulator. More than the Pendulum or the Mikrotimer, the MIKROGIRDER represents a total departure from the conventional, 3-centuries-old Christiaan Huygens system, which today still reigns over the mechanical watch industry.

THE RACE TO NOW: TAG HEUER'S RELENTLESS QUEST FOR PRECISION

For more than 150 years, TAG Heuer has been committed to one major goal and mission: providing consumers with the most precise mechanical timepieces possible.

In the world of Swiss watchmaking, accuracy is certified by the Contrôle Officiel Suisse des Chronomètres (COSC). The resulting certification, however, only covers watch functionality (HMS – Hours-Minutes-Seconds), not chronograph functionality.

To ensure ultimate chronograph quality and precision, TAG Heuer is developing a reference protocol that will soon establish the highest possible quality standard. In order to succeed, TAG Heuer needs access to the most accurate timepieces for measurement — at least 10 times more precise than any chronograph currently sold to consumers. This is one of the key reasons why, in the 21st century, TAG Heuer's R&D has been so single-mindedly focused on pushing further and higher the limits of high frequencies… from 4 Hz to 1,000 HZ in just 7 years!

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TAG HEUER: A TRADITION OF CHALLENGING CONVENTIONS

The regulation of a conventional mechanical watch is performed by a balance wheel and a spiral-shaped torsion hairspring, a system invented by Christiaan Huygens in 1675. Over the centuries, every aspect of this regulating system has been modified, improved, optimized and enhanced, yet as each new improvement remains based on Huygens' original concept, it remains a compromise, never an ideal. The Huygens system, although very reliable and aesthetic, has its limits: accuracy, sensitivity to gravity and thermal expansion, and the virtual impossibility of ever reaching a frequency higher than 500 Hz.

To solve these 'limits' and take Swiss watchmaking to a new unsurpassed level of excellence, TAG Heuer's award-winning team of engineers and watch masters made a radical decision: to forget the hairspring and the balance wheel and, starting from a blank page using mechanistic theory, entirely reinvent mechanical watch regulation — just as Christian Huygens did so successfully more than 3 centuries before.

THE TAG HEUER MIKROGIRDER: THE FIRST STEP TO ULTIMATE ACCURACY

Conceived, developed and manufactured in-house in the company's R&D lab in La Chaux-de-Fonds, Switzerland, the **MIKROGIRDER** is the fastest mechanical regulator ever crafted and tested. Overturning three centuries of watchmaking convention in the way mechanical energy is generated, stored and regulated, the MIKROGIRDER opens a promising new era in watchmaking, with potentially powerful and energy-sparing new movements precise to ever-smaller fractions of time.

Accurate to an unprecedented 5/10,000 of a second, the MIKROGIRDER is a completely new regulator system — **a coupling beam/girder and excitatory beam/girder system working with a linear oscillator** (versus a spiral shape in a classical hairspring) that vibrates isochronously at a very small angle, as opposed to a traditional watch, which vibrates at an angle of up to 320 degrees.

The advantages are numerous. In a classic spiral hairspring system, the effect of gravity due to mass is a dominant issue. With the MIKROGIRDER, the problem no longer even exists. There is no loss of amplitude and the movement's frequency can be modulated on a very large spectrum of frequency without overburdening the power supply. **The result is a significant increase in precision (division of time) and performance (frequency accuracy and stability).** The MIKROGIRDER energy performance will enable TAG Heuer chronographs to attain ultra-high frequencies never before dreamed possible. **Ten patents** are pending on this breakthrough.

ULTRA-HIGH FREQUENCY ON AN UNPRECEDENTED SCALE

The statistics are nothing short of astounding: 1,000 Hz = 1/2000th = 5/10,000th of a second = 7,200,000 beats per hour. In comparison, a regular watch functions at 4hz, or only 28,800 beats per hour. **The MIKROGIRDER is 250 times faster!**

The MIKROGIRDER's dual frequency system ensures precision and chronometry through 2 independent chains. As there is no possibility of interference between "normal speed" and "high speed", there is better precision and accuracy. The power reserve is improved, too, and wear and tear dramatically reduced, as "high speed" is "on demand" instead of being always engaged. Finally, the dual frequency system offers the ultimate in readability. **Finally, for ultimate readability, the smallest fractions of time — 1/1,000th and 5/10,000 of a second — are displayed on a central hand that completes a full revolution around the dial a mind-boggling 20 times per second. And like the Mikrotimer Flying 1000, a special counter at 3 o'clock and a 5/10,000-of-a-second scale on the dial's edge let you read this incredible measurement quickly and effortlessly.**

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MORE THAN EVER, TAG HEUER MASTERS TIME TO THE SMALLEST FRACTION AND EMBODIES "TECHNOLOGY & DESIGN"

A breakthrough providing an astonishing new level of high-frequency performance — without sacrificing precision or efficiency — the TAG HEUER MIKROGIRDER represents in and of itself an enormous technological leap forward. The potential benefits to future chronograph design and function might be huge, and TAG Heuer, once again, leads the way.

True to its "Technology and Design" DNA, TAG Heuer has embedded this mechanical engineering masterpiece in a new stunning asymmetric chronograph case design. Though the placement of the crown at 12 o'clock is inspired by the 1/100th of a second Heuer stopwatches of the 1920s, the overall design is decisively avant-garde. The unconventional shape and wide opening makes for easier reading, while the dial design allows one to see the beam/girder regulator system "at work". A new Concept masterpiece from TAG Heuer, it could very well become a commercial piece like most of its Concept predecessors of the last 10 years, including the Monaco V4, the Calibre 360, the Monaco 24, the Mikrograph 100, and, since the end of 2011, the Mikrotimer Flying 1000.

HISTORY

TAG HEUER: THE UNDISPUTED MASTER OF EVERY FRACTION OF TIME

Accurately measuring time is of course the main objective of all watch manufacture. Even more difficult, however, is precisely dividing time into the smallest possible fractions by means of a chronograph function. This is the watchmaker's greatest challenge.

From the beginning, TAG Heuer has pushed back the limits of accuracy, making it today the only watch brand to master 1/10th, 1/100th, and 1/1,000th, of a second precision on an automatic chronograph movement. Founded in 1860, the Swiss legend has dominated high-frequency timing and chronographs since 1916, the year Charles-August Heuer introduced the 1/100th Mikrograph stopwatch. In the 21st century, TAG Heuer has focused on bringing these same levels of precision to the even more complicated problem of mechanical chronograph timing. In 2005, TAG Heuer introduced the Calibre 360, the first-ever wrist mechanical chronograph measuring and displaying 1/100th of a second. In January 2011, TAG Heuer unveiled the Heuer CARRERA MIKROGRAPH 1/100th Second Chronograph, the first-ever wrist mechanical chronograph with a flying central hand rotating once per second to display 100ths of a second in an effortlessly easy-to-read and precise way. Then, at BaselWorld in March 2011, TAG Heuer revealed the TAG Heuer Mikrotimer Flying 1000, the world's fastest mechanical chronograph, measuring and displaying an incredible 1/1,000th of a second.

What follows is a fuller list of TAG Heuer's unprecedented run of patented world firsts:

- *The **MIKROGRAPH** (1916), the first-ever 1/100th of a second mechanical stopwatch. Introduced by Charles-August Heuer, the Mikrograph 1/50th and 1/100th, two patented stopwatches beating respectively at 18,000 and 36,000 beats per hour, revolutionized sport timekeeping and led TAG Heuer to become the Official Timekeeper of the Olympic Games as early as 1920.*
- *The **MICROTIMER** (1966), the first ever 1/1,000th miniaturized timekeeping system. Launched by Jack Heuer, the Microtimer 1/1,000th became the norm in contemporary timekeeping and opened the gate to Formula 1 and Scuderia Ferrari for TAG Heuer.*
- *The **MICROTIMER** (2002), the first Swiss digital wrist chronograph accurate to the **1/1,000th of a second**. Winner of the Best Design Award at the 2002 Geneva Watchmaking Grand Prix, the Swiss watch industry's most important award competition.*
- *For the **INDY 500 RACE** (starting in 2004), the first timing system accurate to the **1/10,000th of a second.** On November 4, 2006, TAG Heuer set a new world record when it precisely clocked an astonishing 2/10,000ths of a second difference between first-place Mattias Ekström of Sweden and second-place Heikki Kovalainen of Finland in the semi-final of The Race of Champions in Paris. This astounding level of accuracy — the two drivers were averaging 120 km/h, which means they were separated by only 6.6 centimeters at the finish line — is unprecedented in the history of sports timekeeping.*
- *The **TAG HEUER CALIBRE 360** (2005), the first modular mechanical wrist chronograph measuring and displaying 1/100th of a second thanks to an oscillator beating at **360,000 beats/hour**. Commercialization started at the end of 2005 with the "Vanquish" limited edition, which was followed in 2006 by the Carrera Calibre 360, winner in the Sports Watch category at the Geneva Watchmaking Grand Prix in 2006*
- *The **TAG HEUER GRAND CARRERA CALIBRE 36 CALIPER** (2008), the first-ever integrated mechanical wrist chronograph measuring and displaying 1/10th of a second, thanks to an oscillator beating at 36,000 beats per hour coupled with a rotating caliper scale. It won the Sports Watch of the Year Award at the Geneva Watchmaking Grand Prix 2008, the same year it was commercialized.*
- *The **TAG HEUER PENDULUM** (2010), the first mechanical watch regulated by a **6Hz magnetic field**. For the first time, a mechanical movement beats at high speed without a hairspring by means of a magnetic field. Super resistant, reliable and efficient, yet operating at a high-frequency equivalent to **43,200 beats per hour**, the 2010 Pendulum was more than just a watchmaking marvel; it represented a complete revolution in mechanical microsystems. It was the first mechanical device ever built based on an "energy-conserving" model as opposed to the conventional "energy-dissipating" model that has monopolized watchmaking since 1675.*

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- *THE **HEUER CARRERA MIKROGRAPH 1/100TH SECOND CHRONOGRAPH** (January 2011), the first integrated column wheel mechanical 1/100th of a second wrist chronograph with flying central hand display. This game-changing innovation combined two assortments beating at **28,800 and 360,000 beats/hour respectively**. It offered unrivalled precision and chronometry thanks to the independence of its "normal speed" and "high speed" watchmaking chains. This masterpiece redefines modern chronographs in terms of precision and readability.*
- *The **TAG HEUER MIKROTIMER FLYING 1000** (March 2011), the world's first 500hz mechanical chronograph. Equipped with two escapements and with no clutch or balance wheel system, the Mikrotimer's beats **3.6 million times per hour**, making it 125 times faster than a standard Swiss chronograph. Its central chronograph hand completes a full rotation 10-times per second. Now being successfully commercialized, the Mikrotimer was voted the 2011 Swiss Sports Watch of the Year at the Geneva Watchmaking Grand Prix.*

TAG Heuer celebrates "150 years of Motor Racing" in 2011. Founded in Saint-Imier in 1860 by Edouard Heuer, TAG Heuer has set many major milestones of high-end watchmaking, especially in the field of chronographs and ultimate precision. Today, one of the largest and most desired brands in the luxury watch industry, the Swiss legend draws upon its active engagement in the world of sports to create the most accurate timing instruments and watches in the world. TAG Heuer is the first watchmaker to master luxury chronographs with an unsurpassed precision of 1/10th, 1/100th, 1/1,000th and 1/10,000 of a second. From the Olympic Games in the 1920s to its role as official timekeeper for Formula One in the 90s and the legendary Indy 500 race today, TAG Heuer, in a constant quest for innovation, excellence, performance and prestige, continues to aim ever higher. This is reflected in its partnerships with F1 team Vodafone McLaren Mercedes and its World Champions Lewis Hamilton and Jenson Button, Audi Sport in the Le Mans 24 Hours endurance race, and the Automobile Club de Monaco with the prestigious Monaco Grand Prix. Now actively engaged in the Monaco Grand Prix, the Le Mans 24 and the Indy 500, TAG Heuer is ''Mastering Speed'' on motorsport's 3 most iconic racetracks. In 2011, the brand signed on as Official Watch and Timing Partner of the Fédération Internationale de Motocyclisme (FIM), and as Official Watch and Eyewear onboard Oracle Racing's bid to defend its title in the world's oldest sporting event — the America's Cup yachting competition.More than ever, the brand epitomizes prestige and performance through active partnerships with Hollywood icon Leonardo DiCaprio, Bollywood star Shah Rukh Khan, LPGA star Suzann Pettersen and WTA tennis champion Maria Sharapova. TAG Heuer is a privileged member of the Fondation de la Haute Horlogerie (FHH), the most exclusive club in the Swiss watchmaking industry. TAG Heuer has been recognized for its responsible watchmaking practices by the Responsible Jewellery Council, which awarded the brand with full RJC Member Certification in 2011.The newest additions to the TAG Heuer legacy are: the Calibre 1887, an in-house, Swiss manufactured, integrated column-wheel chronograph movement that pays tribute to the original Heuer oscillating pinion of 1887, one of the brand's first patents and a major benchmark in modern watchmaking; The TAG HEUER CARRERA 1887 CHRONOGRAPH, named the 2010 Swiss Watch of the Year in the Grand Prix de l'Horlogerie de Genève's prestigious "La Petite Aiguille" ("Small Hand") category; and the Heuer Carrera Mikrograph 1/100th Second Chronograph, the first ever column wheel integrated mechanical chronograph with 1/100th of a second display by a central hand, which pays tribute to the legendary Heuer Mikrograph stopwatch of 1916. At BaselWorld 2011, TAG Heuer unveiled the TAG Heuer Mikrotimer Flying 1000, the only mechanical chronograph to measure and display the 1/1,000th of a second. The technological marvel was named the "2011 Swiss Watch of the Year" in the Grand Prix de l'Horlogerie de Genève's prestigious "Sport" category, and the SIAR (Latin America's most prestigious watchmaking award) "Best Concept of the Year".

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