The History of Dräger

Johann Heinrich Dräger (1847–1917)

Dr. Bernhard Dräger (1870–1928)

Dr. Heinrich Dräger (1898–1986)

Contents

Dr. Christian Dräger (*1934)

Theo Dräger (*1938)

Stefan Dräger (*1963)

Technology for Life for over 120 years

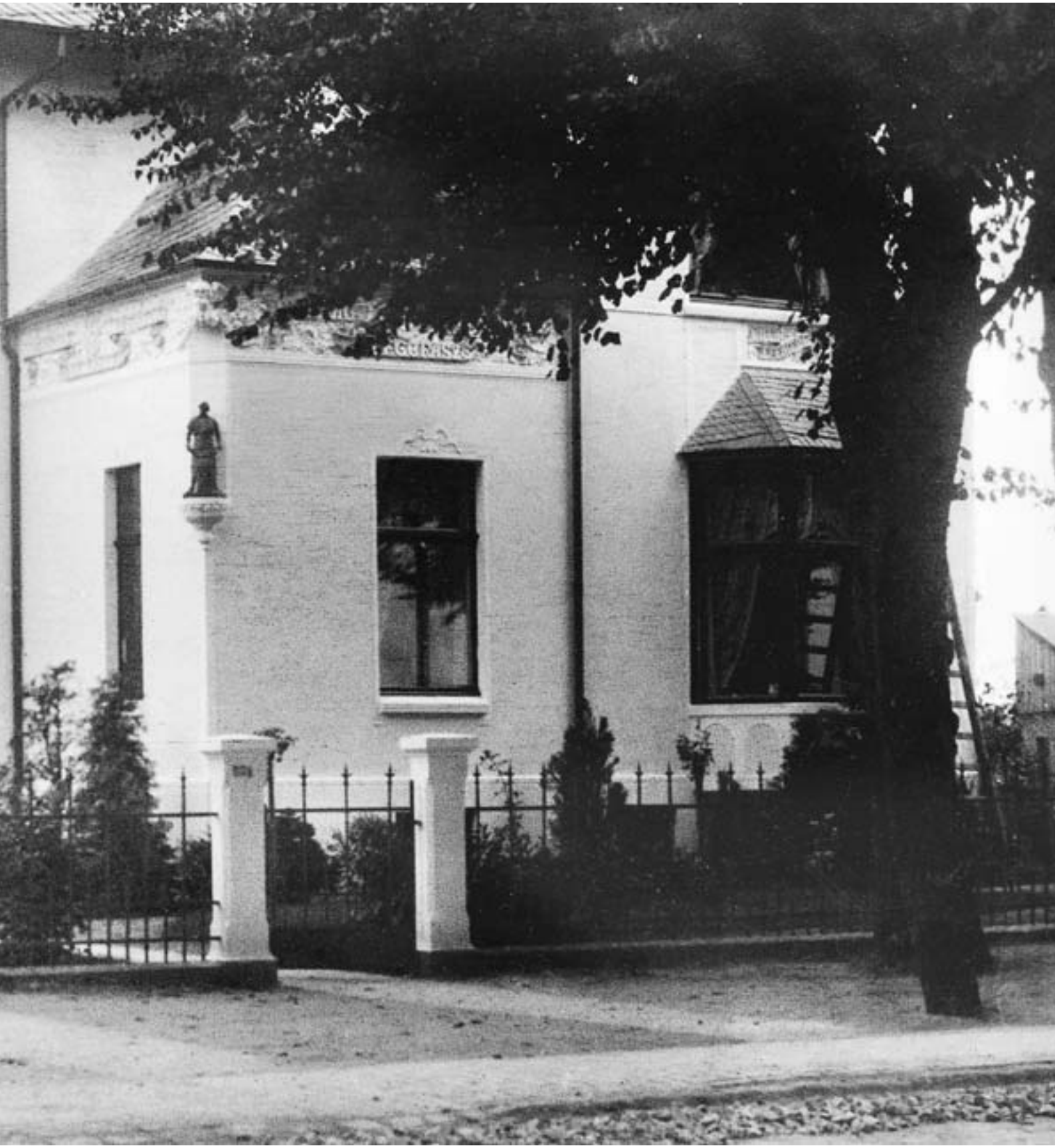
Dräger is technology for life. Every day we take on the responsibility and put all our passion, know-how and experience into making life better: With outstanding, pioneering technology which is 100 percent driven by life. We do it for all the people around the world who entrust their lives to our technology, for the environment and for our common future.

The key to the continued success of the Company, based in Lübeck, Germany, is its clear focus on the promising growth industries of medical and safety technology, its early expansion to international markets, and above all, the trust it has built and maintains with customers, employees, shareholders, and the general public.

The Company has always been managed by entrepreneurial members of the Dräger family, who have responsibly met new challenges while never losing sight of the vision: Johann Heinrich Dräger, Dr. Bernhard Dräger, Dr. Heinrich Dräger, Dr. Christian Dräger, Theo Dräger, and now Stefan Dräger. Healthy growth has consistently remained the main objective of the family business and shapes decisions within the Company even now.

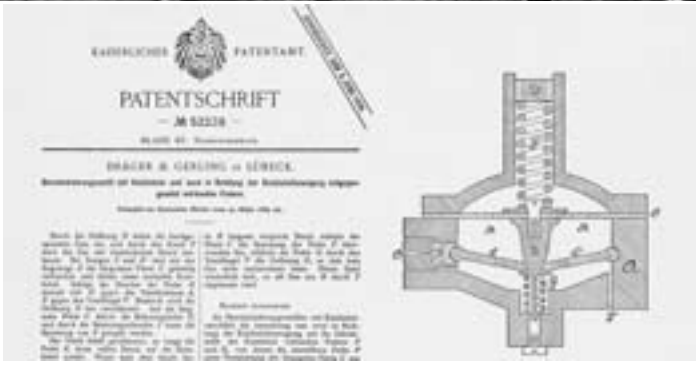
Founded in 1889 by Johann Heinrich Dräger, the family business has been headed in the fifth generation by CEO Stefan Dräger since 2005. Like his predecessors, he is firmly committed to the Company's four fundamental values: close customer relationships, continuous innovation, high quality, and competence on the part of each and every employee. These are the Company's strengths and characterize the Dräger brand to this day.

The Early Years: From Inventor's Workshop to Medical and Safety Technology Specialist



Around 1900 The "Old Factory" on Moislinger Allee, Lübeck.

1891 The postman delivers the patent for the Lubeca valve to Johann Heinrich Dräger.



1889 The patent specification: the Lubeca valve establishes the Company's technological leadership in gas pressure regulation.

1889

Founding of the workshop and shop "Dräger & Gerling"

Lubeca reducing valve for the reduction of carbon dioxide pressure

Bernhard Dräger joins the Company as a designer

1890

1891

Competitor valves – further development of the basic technology

Heinrich Dräger becomes sole proprietor

1892

Launch of manometer production

1893

The original beer vending machine proves a hit on the market

1894

Rise in sales and move to two-shift production

1889
The first patent

When the 42-year-old businessman Johann Heinrich Dräger founds "Dräger und Gerling" with a business partner in Lübeck on January 1, 1889, he can already look back on what for his time is an exemplary career. After the premature death of his father, a watchmaker, he is raised by his mother in modest circumstances in a village on the Elbe, where he attends the local school. The Industrial Revolution and period of promoterism, however, hold opportunities of which the talented and ambitious mechanic does not fail to take advantage. Starting with minor repairs, he eventually carves out a niche for himself in Lübeck society as a businessman dealing in all types of machines, which earns him the name "self, the made man" in his lodge. Yet his career is merely a portent of things to come in the Dräger success story.

The business of the newly founded company is the sale of equipment and innovations, such as beer tap systems that use compressed carbon dioxide. Though it has been possible since the second half of the 19th century to fill steel tanks with high-pressure gas, the problem of removing the gas in a controlled and safe manner at low pressure remains. Even the equipment sold by Dräger barely lives up to its task: the flow of gas, and therefore of beer, is uncontrollable and uneven; the valves are often faulty and require repair. Dissatisfied with the available technology, Mr. Dräger and his son Bernhard, who has just qualified as a mechanic, begin searching for a solution. The result, the Lubeca valve, is far superior to its predecessors.

For the first time, it is possible to precisely control the removal of carbon dioxide from a high-pressure tank, even though the Lubeca valve is very light: Dräger's product weighs just two kilograms, while competitors' are considerably heavier. This first patent changes the fledgling company's business.

Heinrich Dräger, a mechanic at heart, makes the risky decision not to sell his invention, but rather to produce and sell it himself. And rightly so – the trading company consequently flourishes to become an industrial enterprise.

1899
Oxygen is the future

Oxygen – this is the topic of the future that provides the founder's son, Bernhard Dräger, with what is still the Company's mission today: Technology for Life. He recognizes the potential of an imminent market, one that at the turn of the century has only just begun to emerge thanks to technical innovations such as the use of compressed oxygen for medicine and safety. Bernhard Dräger discovers that the principle of pressure reduction has applications as a basic technology that can be used in a variety of products, from soldering and welding equipment to ventilation and respiratory apparatus. He becomes the top inventor in his father's business, putting his knowledge from his studies of chemistry and physics directly to use at the growing company, which under his lead initiates extensive research and development at the end of the nineties. The first results of specific product development are launched on the market in 1899: the oxygen/hydrogen machine, a reduction valve for proportioning oxygen and hydrogen, and the finimeter, a high-pressure manometer used to view the exact fill level in oxygen tanks – crucial for all those whose life depends on oxygen from a tank.

1895	1896	1897	1898	1899
Realization of an industrial standard for connection thread	Autogenous welding and cutting torch	Establishment of the "Hülfe" company hardship fund	Heinrich Dräger is born (July 2, 1898)	Finimeter and oxygen/hydrogen machine
Basic research on oxygen proportioning		Construction of the Dräger factory on Moislinger Allee in Lübeck		Pressure suction jet oxygen injector
				Collaboration with Dr. Otto Roth (surgeon)

1902
The taming of anesthesia

Professor Otto Roth presents one of the world's first anesthesia machines with continuous oxygen feed to the German Congress of Surgeons in Berlin. Until now, the imprecise proportioning of gases in anesthesia has resulted in dreaded side effects: patients are susceptible during operations to insufficient oxygen, respiratory arrest, and circulatory failure. The Roth-Dräger anesthesia machine is the first to successfully and reliably enable a controlled mix of oxygen and anesthetics, such as ether and chloroform, thus making it possible to tame the anesthesia process. A milestone in the history of medical operations and an important financial success for the Company: in the ten years that follow, 1,500 Roth-Dräger anesthesia machines are sold throughout the world, establishing Drägerwerk's international reputation as a medical technology pioneer. Another important result for the Company is the success of its close interdisciplinary collaboration with medical practitioners – a path it will continue to pursue.

1906
The Courrières mining disaster

On March 10, a massive explosion convulses a coal mine near the French town of Courrières. Around 1,600 men are working underground at the time. There is an immediate call for aid; German mine rescue teams are among those that rush to help their fellow miners in France, an act of solidarity that causes quite a stir in these nationalistic times. But rescue comes too late for most of the miners: over 1,000 die in an inferno of flames, poisonous gases, collapsed mine walls, and floods. Yet, day after day, men continue to be saved by the French rescue teams, who are equipped with Dräger breathing apparatus. Two years earlier, in 1904, Bernhard Dräger had conducted a series of tests that corrected insufficient data on the respiratory requirements of humans. The tests resulted in the first serviceable breathing apparatus, which was then enhanced in close cooperation with mine rescuers. Bernhard Dräger himself travels to Courrières to experience at first hand the working conditions of the rescue

‹‹ **1904** Breathing apparatus development begins with physiological studies.

‹ **1906** Mine rescue worker with breathing apparatus at the scene of the accident in Courrières, France.

1900	1901	1902	1903	1904
Oxygen supply apparatus for high-altitude flights	Oxyhydrogen lamp	Roth-Dräger anesthesia apparatus	First safety welding torch	1904/09 breathing apparatus for miners (draegermen)
Technology transfer: systematic development of new areas for application		Portable oxygen inhalation device	Simulation system for dives to 200 meters	Launch of profit-sharing arrangement
		Establishment of Drägerwerk, Heinr. & Bernh. Dräger		Physiological studies for respiratory protection

^ **1902** Otto Roth (third from left) with the Roth-Dräger anesthesia apparatus.

teams underground. The new possibilities offered by Dräger equipment, which proves to be spectacularly effective in numerous mining disasters in Europe and the US, give the Company such a technological edge in the field that US mine rescue workers become known as "draegermen."

1909

Survival through serial production

The Pulmotor respirator becomes a top seller for the fledgling company – only two years after it was designed by Johann Heinrich Dräger and developed together with his son Bernhard. This major success is attributable to new technological advances: the easily transportable Pulmotor is the first device capable of resuscitating individuals who have lost consciousness from lack of oxygen, improving the chances of survival for accident victims who earlier often could not be saved. Dräger itself describes reports of resuscitation using the Pulmotor as "fantastic." The Pulmotor marks the Company's first great commercial success, over the life cycle of which Drägerwerk will implement the effective, technologically sophisticated use of oxygen as a basic therapy in various areas of medical and safety technology.

1905	1906	1907	1908	1909
Carbon dioxide sensor	Braun-Dräger positive pressure machine	Pulmotor	Dräger-Wiss acetylene welding torch	High-altitude oxygen breathing apparatus for balloon flights
Air purification system for submarines	Hydrogen cutting torch	Soda-lime cartridge for purifying breathing air	Dräger burnout protection	
		Diving rebreather for submarine crews		
		Establishment of Draeger Oxygen Apparatus Co., New York, US		

Turbulent Times: Between Innovation Challenges and Political Constraints

1910 Workers at an iron ore mine of the United States Steel Corporation.

"To be a draegerman is to look death in the eye at a mine disaster and rescue lives from fire, explosions, floods and cave-ins" (author Clara Dennis in "The Quest for the Soul of Nova Scotia," about a visit to the draegermen in Stellarton, Nova Scotia, Canada).

1913 A pilot is treated using a Pulmotor.

1913 Underwater simulation system for testing the world's first hoseless diving apparatus.

1917 Female workers on the breathing apparatus production line.

1910	1911	1912	1913	1914
Roth-Dräger mixed anesthesia apparatus	Roth-Dräger-Krönig positive pressure mixed anesthesia apparatus	Bernhard Dräger becomes sole proprietor	Dräger Tübben self-rescuer	Export quota of 40% (Canada and US)
Oxygen injector apparatus Model 1910/11	Systematic dives	Dräger combined anesthesia machine	World altitude record for airplanes (6,120 m) set with Dräger high-altitude breathing apparatus	Establishment of Company unemployment insurance plan
Hoseless diving apparatus			Opening of new factory building	Start of WWI

1911

The sinking of the German Empire's U3 submarine

On January 17, the U3 sinks in Kiel harbor. One of its ballast tanks is accidentally flooded, and 30 submariners are trapped in the vessel. Thanks to air purification technology developed by Dräger since 1905, the crew is able to survive until a floating crane half lifts the sunken vessel out of the water. 27 sailors manage to escape to safety through a torpedo barrel; only the officers trapped in the tower fail to survive the accident. Crew safety on the early generations of submarines is an obvious new field of activity for Drägerwerk. It is Dräger's 1907 soda-lime cartridge, which can be used to bind large quantities of expelled carbon dioxide, that saves the lives of the sailors onboard the U3.

1913

A factory with a "beneficial working environment"

When Bernhard Dräger opens the doors to his modern, high-rise factory made of reinforced concrete, he sees a building that embodies his relationship with his employees: surrounded by greens, the building features spacious, sunlit rooms, wide corridors and staircases, modern elevators, a telephone network, and generous sanitary facilities. These progressive working conditions are complemented by the social security measures offered to employees and their families from the outset: as early as 1897, Johann Heinrich Dräger founds the "Hülfe" company hardship fund, and in 1910, a company for the financing of employee homes; in 1914, Bernhard Dräger establishes company unemployment insurance.

1914

40 percent exports

In the last year of peace, exports – especially to the US – account for 40 percent of production. Continuous innovation and product improvement cement the position of Dräger products on international markets: between 1909 and 1912 alone, Dräger registers 46 German and 35 international patents. A subsidiary, Dräger Oxygen Apparatus Co., is established in New York as early as 1907. This international base makes the outbreak of the First World War a particularly drastic event for Drägerwerk: many of its international sales markets are lost, to be replaced by the demands of war-time production.

1916

Gas warfare on the Western Front

After graduating early from secondary school, Heinrich Dräger, Bernhard Dräger's oldest son, is drafted into the Empire's army and serves in a field artillery regiment on the Western Front. Thanks to his Dräger respiratory protection, the young soldier survives several gas attacks. In 1915, Drägerwerk begins developing respiratory protection apparatus at the request of the Prussian War Ministry. Over the course of the war, a total of 4.6 million of these respiratory protection devices are manufactured. Enormous demand for military and civilian use triggers a growth spurt: headcount grows from 300 to 2,000; new buildings are constructed; production, previously characterized by manual structures, is upscaled to mass production. The war quickly transforms the Company into a competitive industrial operation, while the war's end precipitates the collapse of production. High losses, mass layoffs, and plant closures follow.

1915	1916	1917	1918	1919
Mass production of breathing masks	Start of gas warfare on the Western Front New factory building, new administrative headquarters	Johann Heinrich Dräger dies (May 29, 1917)	Workforce increases to more than 2,000 November Revolution in Germany and end of war	Circuit system and absorber cartridge Existential crisis due to demobilization

^ **1924** Sales to new export markets: breathing apparatus prior to shipment to the USSR.

1923

Times of crisis

Inflation and economic crisis force the Company to close its plant and lay off all its workers. After the end of the war, the market for Dräger products shrinks; the Company is forced to turn to the manufacture of alternative products such as linen, clothing, and curtains. In the meantime, numerous competitors copy the products developed in Lübeck. Bernhard Dräger counters the loss of international patents, which hit the Company hard, with strong product innovation. This strategy helps the Company regain a foothold in its old markets in the early twenties. Closure in 1923 is another setback, but sales stabilize in 1924. But it will be 1928 before the Company recovers sufficiently to achieve a headcount of 300.

1924

Draegerogen: life-saving air for every miner

The BG 1924 respiratory device for miners is a miniature revolution. Before, it was a major problem to optimally proportion oxygen volumes both constantly and appropriately to the individual lung with portable respiratory equipment. The new technology solves this problem and quickly becomes the standard. Another milestone is the development of the Draegerogen – a light, easy-to-use breathing apparatus that does not require an oxygen tank and is therefore ideal for miners

1920	1921	1922	1923	1924
Spearheading of the introduction of DIN standard for connections			First central gas supply system	First rebreathing anesthesia apparatus for acetylene BG 1924 closed-circuit breathing apparatus for mining Cylinderless Draegerogen escape apparatus

1923 Economic crisis: workers picket at the factory gates.

1924 An advertising poster for the BG 1924 breathing apparatus.

fleeing to safety. The main component of this apparatus is a potassium superoxide cartridge that releases oxygen for up to one hour upon contact with breath – another example of technology that is still used for mining safety today.

1926

Closed-circuit system: new standards in the operating room

Laughing gas, superior to chloroform, begins to enjoy widespread use in operating rooms around the world. However, it is very expensive, helping to make the closed-circuit system introduced by Dräger in 1926 very popular. Technology based on the principle of rebreathing is already in use in mining, allowing miners to inhale oxygen they have already exhaled and thus continue working. This principle is now applied to anesthesia, and Model A becomes the first closed-circuit anesthesia machine to be mass produced. A new kind of carbon dioxide absorber purifies the exhaled air, which is then fed back into the machine; controlled positive pressure respiration is also possible.
A milestone in the history of anesthesia, Model A already has all the features we expect of modern-day anesthesia machines.

1928

Customer retention in the age of transatlantic steamers

Bernhard Dräger passes away in 1928. His son Heinrich, who has a doctorate in agricultural economics, takes over at the helm of the Company. That same year, he travels for three months through the US and Canada to familiarize himself with these key markets. He visits the Company's traditional customers, such as hospitals, mines, and large fire departments, and gets to know Drägerwerk's representatives. In the thirties, he travels extensively in the US, the Soviet Union, and other countries. The cultivation of international customers and their domestic markets becomes another success factor for Drägerwerk. Heinrich Dräger emphatically steers the Company toward the global market – up to 50 percent of its products are exported. This strategy proves extremely foresightful during the Great Depression: as domestic demand plummets, foreign sales limit the extent of losses.

1925	1926	1927	1928	1929
Carbon dioxide/air inhalation unit	Model A anesthesia apparatus	Chemical generation of oxygen	Bernhard Dräger dies (January 12, 1928)	Dräger light metal cylinders for respiratory protection
Closed-circuit apparatus for rescue divers	Temporary closure; two-thirds of workforce dismissed	Basis for gas detection systems	Revenue growth: another 300 employees	Dr. Heinrich Dräger takes over as head of the Company
	Establishment of chemistry department	Dr. Heinrich Dräger joins the Company		

1931

The conquest of the stratosphere

The Swiss explorer and physicist Auguste Piccard ascends to the previously uncharted height of 15,781 meters in a balloon basket made of light metal alloy. Breathing is not possible at this altitude. This dangerous experiment is made possible in part by Dräger technology – a newly developed air purification system and liquid oxygen breathing apparatus accompany the researcher on his expeditions. His flight marks the beginning of a new era in exploration: previously unobtainable depths at sea and in space suddenly become more accessible. The basis for these steps into the unknown is the rapid development of respiratory technology, in which Drägerwerk plays a major role. Dräger produces the first high-altitude breathing apparatus for balloon flights in 1912, and in 1914, the same technology helps to set an early world altitude record for planes. Later, the technology will be further refined for use in military planes during the Second World War.

1932 The diving rebreather – standard life-saving equipment for submarine crews.

1932

Morgenrot – an underwater drama

A German submarine sinks. There are ten men onboard, but only eight diving rebreathers they can use to leave the submerged submarine. The dramatic storyline of the UFA film "Morgenrot" (1932) illustrates the significance for submarine fleet crews of the respiratory technology perfected by Dräger that very year: in the event of a disaster, it was their only chance of survival. Drägerwerk developed its first submarine rebreather as early as 1907, and Bernhard and Johann Heinrich Dräger introduced the first portable diving apparatus in 1912. It was an important innovation, though at first glance there was little to distinguish it from conventional helmet diving equipment. The main difference: the equipment no longer included back weights or the air hose that previously connected the diver to a supply vessel. These were replaced by two oxygen tanks and an absorber. For the first time, divers could move freely under water for up to 40 minutes. In 1939, based on the diving rebreather, the diving and film pioneer Hans Hass will start developing the direct predecessor of modern-day diving apparatus together with Dräger engineers.

1937

The "people's gas mask" – more arms orders than ever before

On June 5, Hermann Göring, the Third Reich officer responsible for the Four-Year Plan, announces the introduction of a "people's gas mask." The mask costs five reichsmark, and people are taught how to use and look after them with courses and brochures. Fortunately, the people's gas mask never sees use in a real emergency situation. As of 1933/34, the Reichswehr Ministry places more and more orders with Dräger for a military rescuer based on the tried-and-tested mine self-rescuer. These orders pose a problem for Heinrich Dräger: a new plant is needed only for the production of the military rescuer. After the experiences of the First World War, however, he is wary of establishing surplus

1930	1931	1932	1933	1934
Collaboration with Professor Auguste Piccard (high altitude and deep sea researcher)	Liquid oxygen converter for stratospheric flights	Oxygen system for parachutists	Model 160 breathing apparatus for miners	Expansion to Group in "first Four-Year Plan"
	Establishment of money and banking study group by Dr. Heinrich Dräger – Keynesian lobby	Dräger counter-lung escape unit for submarine crews	Carbon monoxide detection instrument	Dr. Tiegel-Dräger ether vapor anesthesia machine
	Dr. Heinrich Dräger becomes sole proprietor		Financial support for employee living quarters	Dräger light gas cylinders

^ **1931** Auguste Piccard sets off on his record-breaking flight into the stratosphere.

capacity. Back then, concentrating on the production of nothing but arms led to large profits, but it also almost ended in bankruptcy for the Company. Also, the government's autarchic policy and the looming war pose a threat to the position of the export-oriented business on the global market – a position it has just managed to win back. At the same time, too much restraint means sacrificing the domestic market to competitors. Drägerwerk therefore endeavors to strike a balance between military and civil production – successfully: despite exploding military sales, civil production still accounts for 47 percent of total sales, even as arms efforts reached their height in 1939. That same year, however, the development of civil products is stopped. As a result, the Company lags behind the international competition in terms of technology after the war.

1935	1936	1937	1938	1939
MÜ type positive pressure mixed anesthesia apparatus	Dr. Heinrich Dräger aids persons persecuted by the Third Reich	Dräger tubes for mobile gas detection High-altitude breathing apparatus for military aircraft Start of production of "people's gas mask"	Hardship fund for illness, death, and other emergencies	Start of WWII Expansion of production of respiratory protection devices Number of employees exceeds 5,000

1943 High altitude breathing apparatus for military aircraft.

1941

Forced labor at Dräger, too

The employment of forced laborers is a dark chapter in Germany's industrial history. It was systematically organized by the National Socialist government to replace industrial workers sent to the front and thus sustain war production. In 1944, around a quarter of all workers employed in industry in Germany were forced labor. At Drägerwerk, 1,200 of 7,000 employees are forced laborers; they are civilians, mostly from occupied countries in the east - the Soviet Union, Poland, and Yugoslavia. The 50 prisoners of war are the minority. Heinrich Dräger turns down the offer to employ concentration camp prisoners when it is made to him by the Reich's Armament Ministry in 1944. At the same time, he shields Jewish company employees, such as the philosopher Hans Blumenberg, from the grasp of National Socialist authorities. He is one of the few in the industry to take this stance, and in doing so, incurs the strong disapproval of the Ministry. Only after heavy pressure from the war office does he allow a field camp of the Neuengamme concentration camp, with 500 work prisoners, to be set up at the Company's Hamburg-Wandsbek operation. As at all field camps of this kind, the prisoners are under the control of SS teams. Drägerwerk has little influence on their treatment. With Company support, the technical manager of the plant nonetheless continues to do his best to protect eastern European workers from SS harassment, and as a result, suffers reprisals himself. Shortly before the end of the war, Dräger manages to delay the closure of the camp to protect the prisoners from deportation.

1940	1941	1942	1943	1944
Break in civil development work due to military production	Cost-effective Model 10 compressed air breathing apparatus for short-term use	Interruption of production following air attack	Standard oxygen system for military planes	22 production plants with some 7,000 employees Conflict over employment of concentration camp prisoners

1947 The prototype of the iron lung.

1942 Female forced laborers on the particle filter mask production line at the Wandsbek factory.

At the end of the eighties, Drägerwerk is one of the first companies to resurrect and address the issue of forced labor; it also contributes to the German foundation for forced labor compensation.

1947

The battle against polio

A major global epidemic of polio breaks out in the wake of the war. Many patients need constant help breathing for long periods of time – but conventional respiratory equipment is not designed for long-term use. The iron lung is one of the first technologies to be developed for civil use in Lübeck after the war, and significantly increases the survival rate of patients with respiratory paralysis due to polio. Following capitulation in May 1945, the British army takes control of Drägerwerk. The production of respiratory protection devices for miners and welding torches for the reconstruction of the railroad network recommence the same month; a year later, the Company introduces the first new laughing gas anesthesia machine, Model D. The war nonetheless has a devastating impact on the Company – employee numbers fall to 900, and due to the loss of important patents, the Company is unable to close the gap between itself and foreign competitors.

1945	1946	1947	1948	1949
Plant closure and mass redundancies	Recommencement of breathing apparatus production for miners Model D O_2-NO_2 anesthesia apparatus	Iron lung prototype (polio therapy)	Formation of a general works council	New start following currency reform Integrated multi-gas anesthesia technology


DRÄ

New Beginnings:
Transformation to a Modern Technology Group

1958 Dräger's stand at a Hanover trade fair.

^ **1952** New and easier anesthesia: the Romulus anesthesia machine.

‹ **1955** The design department.

1952

Comfort that protects life

Dräger introduces the Romulus anesthesia machine, designed entirely with the needs of the user in mind. After the Second World War, hospital working methods are radically overhauled, not only in terms of constant improvements to machine functionality: the role of ergonomics also becomes increasingly important. After all, the operating room is a workplace, and the better organized the workplace, the more effective the work carried out there. Romulus has brand new features for the anesthetist: the machine is fitted with a blood pressure gauge and the new Dräger anesthesia monitor to simplify the measurement of pulse and respiratory frequency. Beneath the gas proportioning valves, there is a cabinet with drawers and a desk or shelf for anesthetists – a simple solution, but one that makes their work considerably easier. The entire setup is ultra-modern and typical of the work of Dräger engineers, with every apsect closely linked to the realities of the operating room. In the years to come, Dräger produces a number of anesthesia machines, tailor-made to a variety of requirements. It also produces a twin of the innovative machine for the US market, which is subject to different standards: Remus proves a remarkable market success – no mean feat for a German industrial product so soon after the war.

1950	1951	1952	1953	1954
Model G multi-gas rebreathing anesthesia apparatus	Oxygen tent (oxygen inhalation therapy)	Romulus universal anesthesia apparatus	PA 34 and DA 58 compressed air breathing apparatus	
	Incubator 1300 (first incubator for newborns)	Poliomat long-term ventilator	Alcotest tubes for road traffic controls	
	PA 30 respiratory protection device		Establishment of Company retirement fund “Dräger Sozialkasse”	

1953

The mastery of Mount Everest

On the day of Queen Elizabeth II's coronation, the British newspaper "The Times" reports a sensation: the world's highest mountain has been conquered. The race to reach the summit is also technological in nature: 8,844 meters above sea level, the air is thin – there's no getting around the transport of oxygen. When Edmund Hillary and Tenzing Norgay reach the summit of Mount Everest on May 29, 1953, Dräger technology is there, too. The reliable oxygen tanks the climbers take with them and the oxygen tanks left behind at a mountain camp by a Swiss mountaineering team the year before are crucial to both climbers' success. Equipped with an adapter, to which Dräger contributed its expertise, Edmund Hillary and Sherpa Tenzing are able to reach the summit thanks to air from the extra Dräger tanks.

1953

Breath tests

Any driver who has done a breath test is familiar with the Alcotest tube, a device still used throughout the world today, though in a more advanced form. With this device, Dräger makes it possible to measure alcohol levels in breath, and for the first time, police can immediately test for alcohol to confirm or negate their suspicions without having to carry out a blood test. The advancement of this technology aims to prevent drivers getting behind the wheel while under the influence: alcohol interlocks allow the engine to be started only after the driver has breathed into the device and shown an alcohol level below the specified limit. Scandinavian countries in particular encourage the use of this device. And they use Dräger technology. The Dräger Interlock XT is fitted with state-of-the-art sensor technology and successfully establishes itself throughout the world.

^ **1953** Edmund Hillary and Tenzing Norgay on Mount Everest.

1955

Mobile pressure chambers

Delphin II compressed air breathing apparatus for recreational and rescue divers

1956

Fabius anesthesia machine

Collaboration with Jacques Cousteau

1957

1958

Halothane anesthesia technology

Quality assurance: introduction of group production

1959

Pressure controlled ventilation: Assistor 640

1963 A miner on a rescue mission with the BG 174 breathing apparatus.

1960

Systems technology for compressed gas

As of the early sixties, tanks with medical gases no longer have to be carried back and forth in modern hospitals. Supplies to hospital wards and operating rooms are controlled by centralized systems – developed and installed by Dräger. These systems incorporate not only laughing gas and oxygen transmission networks and compressed air and vacuum equipment; they also include ventilation systems for sterile operating rooms. Starting in the seventies, Dräger will supply high-performance filters for bacteria and viruses. By constructing and selling central gas supply systems, Dräger makes an important contribution to the development of the modern, efficient hospital. Its experience in the field of medicine will be put to good use in the early seventies to develop systems for integrated compressed gas supply for laboratories. These systems allow the required technical gases to be extracted in exact doses via systems integrated in the laboratory bench and connected to tank control centers.

1969

A lab under the sea

A James Bond villain could emerge any second: the Helgoland underwater lab is an orange, 14-meter steel giant and the first of its kind to allow a week-long stay underwater, even in frigid seas. A milestone in underwater research, its purpose is to collect biological and geological seabed data off the coast of Helgoland, in Lübeck Bay, and in the North Atlantic off the coast of the United States through 1981.The data is fundamental to offshore technology. Back in 1913, Dräger already made possible the testing of deep-sea equipment at depths of up to 200 meters with the first diving simulator. In the eighties, Dräger will again raise the bar by constructing two state-of-the-art submarine simulation systems: with seven pressure chambers, GUSI provides a variety of possibilities for testing large technical equipment and new

1960	1961	1962	1963	1964
Central gas provision systems for hospitals	Dr. Heinrich Dräger takes seat on Supervisory Board	Dräger-Schreiber Plan for statutory capital formation	BG 174 breathing apparatus	6000/6500 incubator for newborns with air monitoring
Octavian anesthesia apparatus with Vapor halothane vaporizer	Dr. Christian Dräger becomes personally liable partner		Sulla anesthesia apparatus	
	Maintenance of air supply system for F 104 Starfighter			

1969 The launch of the Helgoland underwater laboratory.

1969 Progress at hospitals – gas provision is centralized.

welding processes. It allows crews to carry out underwater work at depths of up to 600 meters, and enables large equipment to be tested in wet chambers at depths up to 1,000 meters. But Titan pushes the limits even further. This deep-sea diving simulation system for biomedical research enables manned dives down to 1,000 meters and the study of animals at depths reaching 1,500 meters for the observation of medical and physiological effects on life under the sea.

1969

Compressed air – the future of respiratory protection

The introduction of 300-bar technology for compressed air respiratory equipment once again puts Dräger at the forefront. Until now, to be equipped with the legally prescribed minimum supply of 1,600 liters of air, firemen have had to carry two heavy tanks to callouts. A single tank containing the same amount of compressed air would be lighter, but the directive specifying the maximum length of the tank dictates the space available – and it's not enough. Maximum filling pressure, previously 200 bar, therefore has to be increased. When the German federal states' ministries for internal affairs announce their intent to equip all voluntary firemen with self-contained breathing apparatus, Dräger pushes for the introduction of 300-bar filling pressure, thus setting new standards for directives, regulations, and ordinances. The six-liter tank with 300-bar filling pressure replaces the old four-liter tank, and rapidly becomes the norm for compressed air respiratory equipment throughout Europe.

1965	1966	1967	1968	1969
Plastic high-pressure gas cylinders	HFB 320-Jet oxygen system	Halothan-Cato mobile (field) anesthesia apparatus	Establishment of North American Draeger Inc. 300-bar technology for compressed air breathing apparatus Dawn of electronic measurement, control, and regulating technologies Theo Dräger joins the Company	SMS 1 mixed gas rebreather

1974

European Council recommends gas detector tubes

In March 1974, the European Council approves a resolution making air quality tests at the workplace mandatory, and recommends to governments that they ensure that gas detection tubes comply with certain quality standards. This follows the use of gauges a year earlier by the US National Institute for Occupational Safety and Health to test the quality of Dräger gas detection technology. It is found to be very good, and US occupational safety inspectors begin using it to make official measurements. The UK follows suit three years later, recognizing the gas detection method using Dräger tubes as its official detection procedure. The scope of application is continually expanded. Detecting poisonous carbon monoxide was the task of the first Dräger tube back in 1937. Its use became quickly widespread, especially in the mining industry. At the start of the seventies, there were already over one hundred tubes for diverse purposes. Dräger tubes can be used to test carbon dioxide levels in elevators and fermenting cellars, to determine the degree of decay in raw fish, and to prevent acute and chronic carbon monoxide poisoning in cars and trucks. The display sensitivity of the tubes is also constantly enhanced. The aim is to implement the technology in those areas where accurate information on gas concentration is needed: for environmental protection, improved technologies, greater process efficiency, and enhanced safety. And the challenges keep growing to this day.

1974

A foundation for sharing ideas internationally

For over half a century, the Company has lived and breathed the spirit of Heinrich Dräger – a spirit characterized not only by entrepreneurial flair, but also by a deep sense of social responsibility. With his keen interest in economic and social policy, Heinrich Dräger is not afraid to broach contemporary problems, and his approaches are often well ahead of their time. He calls himself the

^ **1979** A milestone in Company history: the first shareholders' meeting.

"a voice in the wilderness," and in establishing the Dräger Foundation in 1974, he provides a basis for the fruitful continuation of his ideas. For him, this includes taking on one of the most crucial challenges of the 20th century: the population explosion in many developing countries and the global environmental threat for which industrialized countries bear the brunt of responsibility. The Foundation's cultural actvities are as local as its social and economic activities are international, centering on Lübeck, the Company's home town and site of its official business registration. There, Dräger aids in the maintenance of cultural and historical heritage, supports the Thomas Mann Society and Buddenbrooks house, promotes extensive archaeological digs in the old town, and much more.

1978

Secure air rescue

At the end of the sixties, air rescue by helicopter was still considered unnecessary, expensive, and excessive, in spite of the fact that ground rescue services were also practically nonexistent. However, as the number of traffic fatalities climbed to an all-time high of nearly 20,000 in 1970, the idea of an air rescue network began to catch on. Indispensable onboard a rescue helicopter: a transportable emergency respirator to keep patients alive on the

^ **1975** Routine measurements of refinery seals with Dräger gas detector tubes.

‹ **1978** Rapid response at accident scenes with Dräger respiratory equipment.

way to the clinic. In 1978, Dräger again sets new standards with the first respirator in the Oxylog family. It considerably improves the chances of resuscitating patients – key parameters, such as breathing frequency and breathing volume, can be continuously adjusted; the effectiveness of the ventilation process can be monitored directly on the machine. Respiration therapy can therefore be performed aboard the rescue helicopter before patients arrive at the clinic. Nowadays, the standard in air rescue is the Oxylog 3000. In addition to its easy handling and user friendliness, it displays breathing patterns and features control options with capabilities similar to those of the large machines used in intensive-care wards.

1979

The dual principle of capital and family

Drägerwerk AG goes public by issuing preferred shares. From now on, it is both a family business and a stock corporation. And the separation is clear. The capital stock is divided into two parts – half common shares, half preferred shares. The common shares are held by the family and are the only shares with voting rights. The preferred shares, with a higher dividend, are offered on the capital markets. Half of the company is therefore owned by shareholders and half by the family. The success of this dual model is primarily thanks to its transparency – on both sides. The majority shareholder status of the family is clearly defined. The well-being of the company comes first; in other words, long-term success, responsibility, decision-making, and capital are all under the guardianship of one office. Stefan Dräger has been the CEO of the Company since 2005. In 2010, Dräger issues common shares carrying voting rights for the first time as part of a capital increase.

1975	1976	1977	1978	1979
Modular production launched			UV1 intensive care ventilator	The Company goes public with the issue of preferred shares
PA 80 compressed air breathing apparatus becomes international standard			Oxylog emergency ventilator	
Panorama Nova full-face mask				

1983

Ulf Merbold's first space mission

It is the first mission not only for the German astronaut Ulf Merbold, but also for a module that enables scientific research and experiments in the special conditions prevailing in space: the "Spacelab." In this laboratory, the main focus is on material and medical research. Dräger technology is onboard, too, and continues to be used for subsequent operations such as the D1 mission carried out two years later under German leadership. Dräger develops a special system of micron and carbon filters, which creates pure air conditions for researching various bacteriological and chemical processes in the test environment Biorack. And in 1992, the Airbus A 340 takes to the air equipped with Dräger oxygen supply apparatus. Drägerwerk will boast an aerospace technology sector into the 21st century.

1983

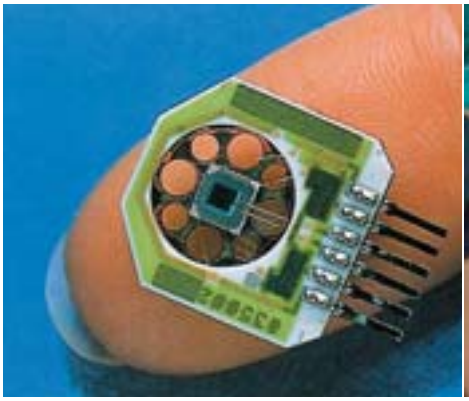
Clean rooms for a better future

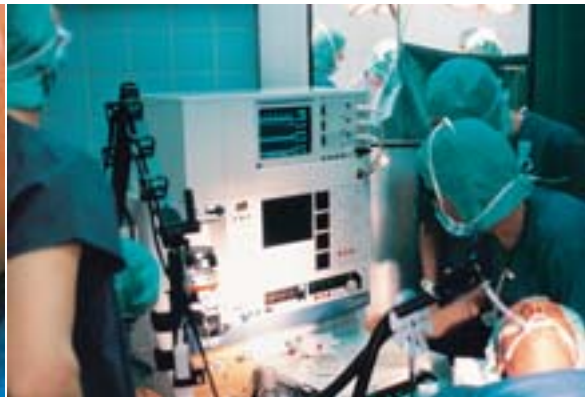
This future is digital: sales of products with electronic sensors rocket at the start of the eighties. Mechanical/pneumatic technology is increasingly replaced by electronics. In 1975, Dräger had set up a new central electronics department, where early basic research bore fruit: the new technology caught on well, particularly in the field of gas detection, with sensors that detect more gases than ever before and thus produce data that can be fed quickly through microprocessors. In 1983, all police patrol cars in North Rhine-Westphalia are fitted with electronic Alcotest devices. New generations of machines also arise in the field of medical technology: for the first time, the computer-aided long-term ventilator EV-A enables machine ventilation to be adjusted to patients' natural breathing patterns. So much growth needs space: in 1983, the third construction phase of the new sensor and measuring instrument production facility is completed. State-of-the-art clean rooms are used to manufacture chips and sensors. It is an investment in top international quality standards: in 1993, for reasons of reliability and quality, NASA will select Dräger oxygen sensors to monitor breathable air onboard its space shuttle – a true vote of confidence.

1988

World premiere for Cicero

At the end of May, the World Anesthesia Congress is held in Washington, DC. One highlight is the presentation of Cicero, the first integrated anesthesia workstation. Cicero is a product of the digital revolution and radically changes the working environment in the operating rooms of the time: all functions, such as gas





‹‹ **1981** Electronics replace mechanical-pneumatic technology: a sensor chip.

‹ **1988** Cicero, the first integrated anesthesia station.

1980	1981	1982	1983	1984
Commencement of electronization and miniaturization	First Malenter Symposium (theme: population policy)	EV-A electronic ventilator	Launch of corporate identity	CCBS system deep-sea diving apparatus
Basic research into new materials		Permox oxygen inhalation machine	Restructuring of sales divisions	Dr. Christian Dräger becomes Chairman of the Executive Board
Stationary detection technology			Issue of participation rights for capital increase	

^ **1985** Journey into space with the Spacelab: the ultra-clean gas filter system for Mission D1.

proportioning and ventilation, are electronically controlled with modern data management, clearly displayed on monitors, and regulated with ergonomic user guidance. The workstation takes care of the mechanical control and regulation work, freeing anesthetists to concentrate on patients. For the development of a genuinely practice-oriented working environment, doctors in Europe, Asia, and the United States are surveyed about their experiences. For Dräger, along with technical innovation, customer proximity is a cornerstone of product development. It is an effective strategy: Dräger will become the world leader in the field of anesthesia in 1996 and continue to launch new, progressive products on the market. In 2002, Zeus will break the mold once again. This revolutionary concept shifts the focus from individual parameters and functions to the process as a whole – from anesthesia and patient monitoring through documentation – for an anesthesia system fully integrated in the IT network of the modern hospital.

1985	1986	1987	1988	1989
Ultra-clean gas filter system for Biorack on Mission D1 Spacelab	Dr. Heinrich Dräger dies (June 28, 1986)	Incubator 8000 Oxyboks K self-rescuer for miners Type 720 PF chemical protection suit Evita long-term ventilator	Cicero integrated anesthetic workstation	New factory building at Revalstrasse plant The Babylog 8000 ventilator for infants and premature babies

Globalization:
Realignment as a Global Technology Leader

1995 Dräger employees at the Singapore branch.

^ On the road to the 21st century: the Revalstrasse plant.

1997

Dräger on its way to becoming a global player

Heinrich Dräger recognized the need for strong international presence already during the reconstruction period after the Second World War. Back then, the concept of globalization did not exist. He founded the Company's first foreign subsidiary in São Paulo, Brazil, in 1950. His sons, Dr. Christian Dräger and Theo Dräger, would maintain and intensify this commitment over the second half of the 20th century. By the time the baton is handed over to the family's fifth generation, Drägerwerk AG has seven different production locations on four continents and 100 sales companies worldwide. The Company is realigned with one

1990	1991	1992	1993	1994
Self-mixing principle in diving apparatus	Newtsuit pressure diving suit	PAC II warning instrument	Recognition as "most family-friendly large concern"	Chemical oxygen generators for Boeing B777
Airbus A330/340 emergency oxygen system		PA 94 compressed air breathing apparatus		
Eurofighter pilot air supply system		Futura respiratory protection mask		
		Stefan Dräger joins the Company		

1998 Sensors, transmitters and measuring heads for clean air.

1998 Gas detection equipment is installed in the new Reichstag.

clear goal in mind: from the organization that has grown to develop, produce, and sell all of its products, the medical and safety divisions emerge, each focused on its respective core competencies in medical and safety technology. Peripheral activities, such as Dräger Aerospace GmbH and the service areas, are outsourced in subsequent years.

1998

Ideas for the future of retirement

The Dräger Foundation invites guests, including Germany's President Roman Herzog, to take part in a symposium: how can retirement funding be stabilized in times of dwindling contributions? National and international experts are looking for answers. Dräger has a tradition of taking care of its employees – both in theory and in practice. As early as 1904, Johann Heinrich Dräger introduced a profit-sharing arrangement in the form of sales- and performance-based bonuses. His grandson Heinrich Dräger, who spoke in favor of individual retirement plans in various publications on economic theory, created the Company's first capital formation plan in 1957. Following this tradition, the Company continued to study issues relating to the future of retirement funding and to pursue innovative paths. By way of a scaled allowance scheme, introduced in 1983, Dräger offered employees the opportunity to become shareholders. In 2005, a new plan takes effect at Dräger that provides employees with a flexible approach to shaping their retirements. Various basic retirement financing levels provide for individual investments by employees and thus for the possibility of coupling retirement savings with the Company's success.

1999

Clean air in the new Reichstag

Not a breath of air makes it into the plenary hall of the newly opened Reichstag building without first being tested by Dräger gas detection technology. There is not a toxic or explosive gas or vapor that has a chance of penetrating the heart of the parliament or the party or meeting rooms. State-of-the-art Dräger sensors control parliament members' every breath of air – even the smallest traces of poisonous gases must be identified quickly, clearly, and reliably, and false alarms must be avoided whenever possible. This charge encompasses all aspects of ion mobility spectroscopy. Dräger's stationary gas detection systems guarantee safe working environments around the world – whether for semiconductor factories, power stations, or oil platforms. And no matter where in the world, the support service for major complexes must be ready to spring into action 24 hours a day – a requirement that Dräger meets with its global network of six specialized customer centers.

1995	1996	1997	1998	1999
First all-encompassing PDMS (patient data management system)	Emergency oxygen systems for complete Airbus fleet	Theo Dräger becomes Executive Board Chairman	Draegerman PSS 100/500 compressed air breathing apparatus	Chemical oxygen generators for complete Boeing fleet
Receipt of "European Prize for Social Innovation"	Julian anesthesia machine	Dr. Christian Dräger becomes Vice Chairman of the Supervisory Board	Evidential Alcotest 7110	Receipt of "German Logistics Award"
			microPac and MiniWarn portable gas detection instruments	
			Recognition as "environmentally friendly firm"	

^ **2006** Modern architecture promotes communication and transparency.

2001

New York, September 11

The Twin Towers of the World Trade Center are on fire. Fire fighters and rescue teams are immediately deployed on an unprecedented scale even before it becomes clear that this is a terrorist attack. The rescuers entering the burning towers have to protect themselves. They need respiratory protection devices and filters, masks, gas detection units, and thermal imaging cameras. Dräger's response is the Emergency Response Program, a concept that defines an exact procedure for rescue missions. A catastrophe of this magnitude is a true test for the program. Available equipment is immediately checked, a task force of Dräger employees put together, and special transportation arranged. Everything is in place within half a day. In the United States, "draegermen" have been synonymous with perfectly equipped rescue workers for over a hundred years. In the nineties, this name was fittingly bestowed on the latest generation of closed-circuit breathing apparatus, the Drägerman PSS BG4. The advanced respiratory technology of the BG4 allows rescue workers to do their job for up to four hours. It is an advantage that can save the lives of both victims and rescue workers in the event of major catastrophes such as 9/11.

2004

Acquisition of US incubator specialist

With the acquisition of the US incubator specialist Air-Shields, a leading provider of neonatology with a 65-year tradition, Dräger increases its presence in the United States, the largest

2000	2001	2002	2003	2004	2005
Participation in the World's Fair Expo 2000: "the anesthesia workstation of the future"	Caleo incubator	Pac Ex 2 gas warning instrument	Stock market listing on German TecDAX index	Acquisition of US incubator specialist Air-Shields	Stefan Dräger becomes Chairman of the Executive Board
	Savina mobile ventilation system	Systems contract for Airbus A380	Sale of Dräger Aerospace	Alcotest 6510	Theo Dräger becomes Deputy Chairman of the Supervisory Board
	Telemetry	Integrated anesthesia workstation Zeus	Stefan Dräger becomes a member of the Executive Board		

2008 Dräger DrugTest 5000 detects drug misuse from saliva samples.

2009 Polaris is the first Dräger operating light with LED technology.

homogeneous market for premature and newborn incubators. The objective is comprehensive therapeutic solutions combined with patient monitoring and ventilation for newborns.

2006

Dräger builds for the future in Lübeck

In August 2006, Stefan Dräger, the fifth-generation CEO, lays the foundation stone for the new head office of the medical division in Lübeck. In the age of globalization, this investment underlines the importance of Lübeck for the Company as it remains loyal to its tradition. With improved transparency, flexibility, and communication, the architecture and infrastructure of the new building support the Company's transformation to a globally networked and knowledge-based organization.

2007

Forward-looking manufacturing technology

Dräger has increased its investments in manufacturing technology of the future. Safety division is building an automated carbon production system. The activated carbon it will produce is used to absorb gaseous contaminants in breathing filters. The new production plant is a reflection of Dräger's development into a cutting-edge company that is closely attuned to market requirements.

2008

Quickly and effectively recognizing drug abuse

With the Dräger DrugTest 5000, Dräger is launching a device for the first time that can tell you within a matter of minutes whether a person takes drugs and which ones. The new system is capable of identifying six different substance classes. The test can be simply, hygienically and discretely administered as it is based on the analysis of saliva samples. This modern system can be used in traffic checks by the police and just as easily in emergency rooms or during drug rehab.

2010

Dräger opens up to the capital market

Dräger carried out a capital increase and raised the number of ordinary shares by 3,810,000 to 10,160,000. For the first time, Dräger introduced shares to the market that had until now only been held by the family. The capital increase provides new opportunities for Dräger to finance itself on the capital market without giving up its long-term orientation as a listed family company. It will generate around EUR 100 million net proceeds for Dräger. They will be used to reduce debt and promote growth. After completion of the capital increase, the Dräger family now holds a total of 71.3 percent of ordinary shares with voting rights. Dräger is releasing all common shares for trading on the stock market.

2006	2007	2008	2009	2010
Laying of the foundation stone for the new medical division headquarters in Lübeck	Change of legal form to Drägerwerk AG & Co. KGaA	Introduction of the Dräger DrugTest 5000	First Dräger surgical lighting using LED technology: Polaris	Capital increase by issuing ordinary shares with voting rights
	Supply of fire fighting and rescue trains to the Swiss Bundesbahn	Evita Infinity V500 ventilator	Founding of a European work council	Innovation drive: Ten new products for fire fighters at the "Interschutz"
		Signing of the "Charta of Diversity"	Anesthesia system Zeus Infinity Empowered	

Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck
www.draeger.com

Corporate Communications
Tel +49 451 882–2185
Fax +49 451 882–3944
info@draeger.com

90 70 231