LÖWENSTEIN medical MAGAZINE

May 2018 Issue

CARA

Facing the future.

MINISCREEN PREMIUM

Polygraphy at a new level.

JOYCECLINIC FF

No compromises.

HOSPITAL HOMECARE DIAGNOSTICS

MINISCREEN PREMIUM

Polygraphy at a new level.

Löwenstein Medical
Arzbacher Straße 80
D-56130 Bad Ems
Telephone: +49 26 03/96 00-0
Internet: www.hul.de

LÖWENSTEIN
medical

INTRODUCTION

Dear Patients, Customers, Employees and Friends,

It has been a while since we last published the Löwenstein Medical Magazine. In that time our group of companies has taken several steps to ready us for the future in medical technology, a business field facing challenges and upheavals brought by digitalization. Success will come only to those companies fully prepared to deal with those challenges.

One of the recent events that drew the public's attention was the name change of our main company Heinen + Löwenstein to Löwenstein Medical. We decided in favor of the change to create more transparency, particularly for international markets. The Löwenstein Group is wholly owned and operated by the Löwenstein family. Especially in foreign countries, family ownership is seen positively because many successful German high-tech companies remain in family hands and can make business decisions divorced from the risks and forces of capital markets.

In that same vein, the opening of our new production facilities for Löwenstein Medical Technology in Hamburg is seen as a clear commitment to Germany as a good location for business. We are convinced that medical products can be developed and produced with excellence in Germany. With the help of modern, automated and flexible production methods, we orient ourselves on the manufacturing costs in production regions such as Eastern Europe and China. By integrating development, purchasing, production and sales at our many different locations, we create a unique environment characterized by rapid responses to market feedback and the confidence to effect changes through innovations. We are helped, not least of all, by our employees' strong identification with our corporate goals, products and services.

The history of the Löwenstein Group is marked by the willingness to change and advanced development in our business fields Hospital, Homecare and Diagnostics. In this issue we report on traditional medical products such as masks, polygraph systems for sleep diagnostics, ventilators and intensive care ventilation monitoring. For the first time we present our software solutions, which today are equally important for medical technology companies. For example, we were one of the world's three companies to establish a telemedicine system for patient care and insurance invoicing in sleep apnea therapy in France, where the systems were launched in accordance with new legal requirements.

Finally, we welcome our newest group member, Dameca of Denmark, an established international company in anesthetics technology, and Salvia, which has long been involved in the development and production of intensive care ventilation and anesthesia. With this expansion, we strengthen our standing in this business field for the long term and gain entry to new markets for our hospital products. Our openness to integration and synergy is an essential aspect of our philosophy, which we put into practice every day. We are sure that Dameca and Salvia will follow a similarly successful path like Weinmann, which today, as Löwenstein Medical Technology, is a financially strong and innovative cornerstone of our Group.

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NEW NAME: AFTER 31 YEARS **HEINEN + LÖWENSTEIN** BECOMES **LÖWENSTEIN MEDICAL**

Many long-term customers and employees are still having trouble becoming accustomed to our new name, which has been in use since July 2017. All things considered, the change is not that big. Nevertheless, the reaction is understandable. Your trusted service provider (or your employer) is called "Heinen + Löwenstein" or our preferred short name "H+L" for many years and then suddenly it's not. Although the old name had come to be a well-known brand in Germany and internationally, the family decided at the end of 2016 to change the name and make it more modern.

The name "Heinen" had a long history which began in 1929 in Bonn and continued in Meckenheim from 1973. At that time the former managing director Dr. Felix Marx first came into contact with Reinhard Löwenstein, who was looking for self-employment opportunities after having served as managing director (and shareholder) of "Heyer" in Bad Ems. The company's focus was then on selling devices for the care of premature and newborn babies, including resuscitation units, incubators, pediatric ventilators and more. Heinen had 15 employees in 1986 when Marx sold half of his shares to the young and ambitious Löwenstein.

New building in Bad Ems, 2018

"Mr. Löwenstein told us at that time, 'We will increase turnover to six million marks this year and to ten million next year.' That was the start. He laid out rough plans. At that point he had already shown us that he was a visionary. Everything he said has come to pass," said Dietmar Stürken, today's sales manager in North Germany, who was on board back then.

A great deal has happened in the meantime. The company has grown continuously and has added new business fields. In the 2000s when the market for supplying patients with sleep apnea devices boomed, the company grew at an annual rate of about 20 percent.

Today more than 2,000 employees work every day for the well-being of our patients and the satisfaction of our customers. Most work in Germany, but more than 200 are abroad. "We pay attention to our increasing internationalization without neglecting the basis of our identity," said Dr. Ulrich Brandenburg about the name change. Dr. Brandenburg, marketing director at Löwenstein Medical, has been a part of the success story for more than 15 years.

Neonatology is still a field of activity and perhaps the most emotionally important for us because that is where it all began for "Heinen + Löwenstein" and many of our customers from then are today customers of "Löwenstein Medical". It's clear that the name but not the core of the company's identity has changed. That will remain so under the new name. Please allow us to smile a little when someone refers to us as "H+L" or "HuL".

One of the company's own buildings in Bad Ems, 1989

SMART THERAPY, THANKS TO THE KARLSRUHE DEVELOPMENT TEAM

Karlsruhe Development Team

The successful products of the Löwenstein Group are developed at several different locations, one of which is in Karlsruhe in the southwestern corner of Germany. The team of developers with more than 20 years of experience works in close cooperation with colleagues in Hamburg at Löwenstein Medical Technology (LMT) Devices for Sleep Therapy and Homecare Ventilation.

One of the core competencies of the Karlsruhe team is therapeutic algorithms. In collaboration with hospitals, we continuously optimize the algorithms with the help of sophisticated simulation technology. Our engineers test and re-test the reactions to defined breathing patterns and refine the algorithms. With the launch of nasal High-Flow Therapy (HFT) for our prisma VENT platform, we offer customers the world's broadest therapy spectrum in respiratory homecare treatment.

Telemedicine documentation on treatment quality with prisma CLOUD

Our software for therapy devices and LMT homecare products is developed in Karlsruhe. For remote management of therapy settings in a sleep lab or assessment of treatment progress in a doctor's practice, our ultra-modern PC software prismaTS supports professional users with decision making.

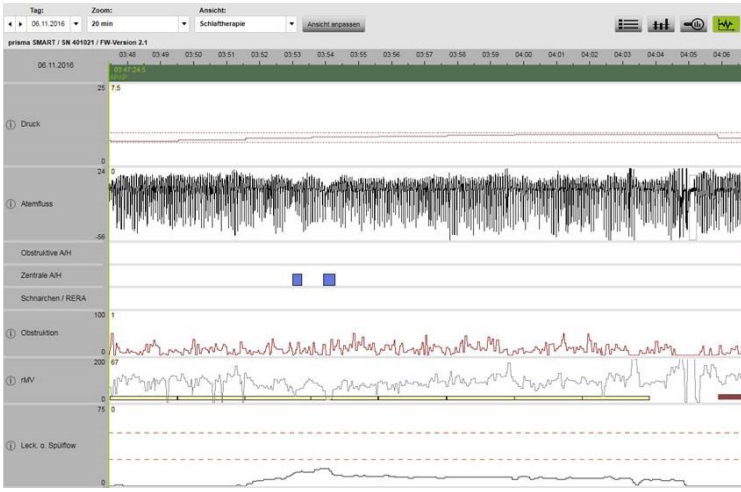
Depending on the severity of the patient's illness and the country's health care delivery processes, the trend is toward even closer therapy monitoring with data transmission via wireless modem and data analysis by a care provider on a secure Web platform. For that purpose we offer prisma CLOUD, which has already been put to use, mainly in France. Any difficulties with therapy can be recognized quickly and resolved by a discussion involving patient and care provider.

Behind all these products are the LMT developers, who not only have extensive expertise, but also knowledge of all the work done in development, including tests, clinical studies, development, project management, requirements management and system architecture. It's normal for a software house in an IT region to have a casual working atmosphere in which we can pursue the goal of rapid innovation without compromising on quality. Intuitive use via a modern touch screen is just one example of a measure of quality.

In the end the user sees the finished product that functions reliably, but not all the challenges that had to be met during development. That makes us all the more proud at every successful product launch and motivates us for the next job. Right now we are working on concepts for the products of the future such as device operation via smartphone apps. Or perhaps by calling out, "Alexa, set my go-to-sleep ramp to 20 minutes."

Beyond simplifying operation, digitalization technology offers ways to further optimize treatment by recognizing the patient's current, personal needs. It's important that the patient or a family member is informed of the goal, status and progress of therapy. Only then can device users handle problems without losing time to traveling and waiting, make informed decisions and know when they truly need professional support.

Breathe easily and sleep soundly – we're here to help you!



High-resolution presentation of therapy success with PC software prisma TS

Karlsruhe Team

NEW PRODUCTION AND LOGISTICS CENTER IN HAMBURG

In the wake of successful integration of the Weinmann homecare business and adoption of the name Löwenstein Medical Technology in June 2016 – a change that made the affiliation visible to outsiders – the Hamburg company continued on its course of change with a major investment in new construction.

Upon completion, the new Production and Logistics Center was dedicated at a ceremony in November 2017. Before the grand opening, the entire warehouse was moved in so that operations could resume in full at the new location after just a few days. It was a special moment for many at LMT. Thirteen years ago Production and Logistics relocated to Henstedt-Ulzburg and now the employees from the two sites have been reunited.

The new construction promises Löwenstein Medical Technology long-term cost reductions and higher efficiency in Operations. Shorter communication ways among the functional areas guarantee faster response times in series production start-ups or resolving quality problems, for example.

With the ultra-modern Production and Logistics Center, the Hamburg company is well prepared for the development and production of high-quality medical products from Germany now and in the future.


LIEBHERR
HKL MIETPARK


KONFEKTIONIERUNG II
KF
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OPENING OF OUR BRANCH IN KAMMERSTEIN

At the end of a nine-month construction project, another branch office in the familiar style of Löwenstein Medical opened its doors on 20 October 2017. The modern, functional and attractive design of the most recently built offices ensures high recognition value of the company's sites among customers, vendors and patients. The completion of the newest branch in Bavaria brings the total to seven similarly designed regional centers

Löwenstein Medical moved from the old location in Wendelstein to the new offices in Kammerstein, southwest of Nuremberg. The grand opening was celebrated right on time with customers and employees. After the official ceremony with brief speeches, employees and guests had a chance to mingle and chat.

The new building, which is conveniently located near A6, offers more than 850 square meters of space for modern, well-equipped workstations, warehouses and conference and meeting rooms. The almost 3,000 square-meter property also houses an oxygen tank to improve the regional supply options for our oxygen team. In light of the continuous growth in our business fields, newly constructed offices are designed to meet contemporary market requirements. They include customer and patient consulting on site and training facilities for our own employees and external customers. The branches also serve as supply points for the many sleep-respiratory centers located in the area.

The new branch is yet another important element in our strategy to provide care for patients living nearby who are treated at home. Our unwavering customer orientation along with steadily increasing proximity to customers are values that Löwenstein Medical lives every day. The countrywide infrastructure supporting our branch network in Germany will allow us to intensify our connections to local customers.

SALVIA MEDICAL UNDER THE SIGN OF THE LÖWENSTEIN GROUP – A SUCCESS STORY CONTINUES!

In the 1950s SALVIA medical started out as a specialist in measurement and control engineering for complex applications. Even then development focused on creating high-quality solutions for demanding tasks such as dialysis. When intensive care ventilation became established as a standard medical procedure, SALVIA medical faced the challenge of synchronizing the patient and machine. With its control technology expertise and the development of ideal ventilation solutions, the company had a new field which would soon demand the total capacity of the workforce.

Since then, intensive care ventilators for neonates, children and adults, anesthesia machines and respirators, IPPB and CPAP devices have set milestones in SALVIA's ambitious development. As an Original Equipment Manufacturer, SALVIA medical has developed and produced ventilators and respiratory therapy devices for the world's medical technology firms, including Hoyer (former owner of SALVIA), General Electric, Dameca, Air-Liquide.

The first project with Löwenstein Medical was kicked off in 2007. Over the years the cooperative efforts intensified with the expansion of international sales of intensive care ventilators. The two companies increased their trusting collaboration in other projects. Löwenstein Medical supported SALVIA, for example, in the development and marketing of new products and developed into a worldwide exclusive sales partner. Now the success story continues. SALVIA medical recently joined the Löwenstein Group and became a part of a successful, medium-size family business. We are pleased that the team from SALVIA medical can now bring its competence to the development of clinical systems for the entire group.

In the future Löwenstein Medical will offer its customers in Germany an extensive portfolio in intensive care ventilation. With the product palette from Hamilton Medical and products from SALVIA medical, customers will have the choice of the most modern ventilators in the world combined with outstanding service.

A NEW FAMILY MEMBER WITH A LONG HISTORY

Dameca and its 35 employees, who develop and manufacture anesthesia devices, joined the Löwenstein Group on 1 July 2017. An important element in the group-wide strategy, the Danish company boasts a long history, starting in 1948 with the "Kinoorgel", its first anesthesia machine. Since then the company has remained active in anesthesia and has sold more than 35,000 machines in more than 100 countries around the world. Some 45 years ago Reinhard Löwenstein, who was then working for Heyer, sold Dameca devices in Germany. Consequently, Mr. Löwenstein and Soren Schramm, the former owner and a grandson of Dameca's founder, had known each other for a long time before the acquisition. Part of Philips from 2011 to 2015, Dameca was sold off when Philips withdrew from the anesthesia business. The move opened up the chance for Löwenstein Medical to expand its know-how in the field of anesthesia and to gain access to new sales channels. With a small and flexible team, the Copenhagen site is expected to be another important part of the Group's internationalization strategy.

Dameca

Anaesthesia machine "Kinoorgel"

Dameca presented the new anesthesia machine AX500 at MEDICA in November 2017. The new development in the lower mid-range area features modern electronics and software architecture. Since the launch dozens of devices have been sold throughout the world. Dameca also continues to sell established products, including AX700, Siesta and the MRT-compatible device Whispa, which cover the entire range of anesthesia products.

Dameca and Löwenstein Medical want to develop jointly a new anesthesia platform, which will allow them to serve the complete field of anaesthetics. However, sales of both device lines remain separate and independent. The name "Dameca" is well-known in anesthesia around the world. It will open doors for Löwenstein Medical in the Scandinavian market. The market presence and sales, primarily in Denmark, Norway and Sweden, will be further enhanced.

New AX500

TWO PLUS TWO EQUALS MORE

Back in February 2016 we began pursuing the goal of capturing the hospitals of the world with JOYCEclinic FF. It was an ambitious goal, considering that it was the first time we had offered our own brand mask to this segment in which competitive products were already well established.

Nevertheless, our mask quickly won over the market with its good price/performance ratio. Convincing arguments include the mask's high-quality material, automatically adjusting forehead cushion, interchangeable elbows and an integrated quick-release cord. And it's all "Made in Germany", produced by a family-owned and operated company.

Relaunch JOYCEclinic FF

Without a doubt, JOYCEclinic FF has become a success story. In less than two years, the mask has made it to 22 countries!

Even though many masks have already been sold, there's always room for improvement. We actively sought constructive feedback from our customers, worked out some ideas with the development team and learned a lot in pan-European patient tests.

We are pleased to present the second version of JOYCEclinic FF. Reworked and improved in two important areas.

JOYCEclinic FF with endoscope adapter in use

THE MASK CUSHION

The length and width in the first version's sizes were not ideal. Because the mask cushions were a bit too small, they could not cover larger faces. Size S was hardly ever used. The new mask cushion is 8 mm longer and 4.5 mm wider. That doesn't sound like much, but it turns out to be a correction of more than a half size!

We did not stop at changing the length and width. The highly sensitive area around the bridge of the nose in particular had to be made softer to allow a more comfortable fit of the cushion. Thanks to customer feedback, we were able to make this part wider, softer and more supple. Now not only patients with longer faces can use our masks, but all users can benefit from a better fit and more comfort.

In addition to changes in the sizes, customers wanted the mask cushion to be more securely attached to the mask frame. Our development department took on the challenge. With a stronger silicone rib at the attachment point, the mask cushion stays in place even at high ventilation pressures, when the mask is removed over the patient's head or is handled less than gently.

JOYCEclinic FF

THE ELBOW

Given the high number of different ventilators and tube systems, we have to offer a variety of elbows suitable for each system. Customers appreciate having the choice from among interchangeable elbows (NV, Vented, NV + AAV, Endoscope Adapter). The endoscope adapter in particular, which allows bronchoscope examinations while the patient is ventilated, has won over many fans. That's good for us because only a few manufacturers offer such a range in their portfolios. Switching between elbows, however, was slightly difficult and had to be corrected.

Why is the elbow so tight and why wasn't it made easier to change?

In the early development phase when a hospital was using JOYCEclinic FF with different tube systems (e.g., double patient circuit), we saw that the mask and elbow were subject to too much leverage. If the patient moved just a little bit more, the elbow, complete with the tube system, could become detached from the mask. That should not happen under any circumstances, so we played it safe and increased the holding power.

As it turned out, the hold was a little too strong to allow an easy exchange of elbows. Consequently, we could not simply make the elbow easier to change and had to come up with another solution.

A small lever below the retaining ring delivered the desired results. The elbow is still turned in the same direction. Simply turn the elbow counterclockwise from 12 to 11 o'clock (or push the lever from 6 o'clock to 5). For safety reasons, we kept the strong holding power, but made the elbow easy to loosen and change with little effort.
We saved the best for last. That is, all other mask parts and benefits, the packaging, the name and the article number remain the same.

Since making these minor but important improvements, we look forward to 2018, confident that we can add another chapter to our success story!

*NV without AAV**

NV with AAV (Leckage 1)*

V with AAV (Leckage 2)*

Endoscope adapter

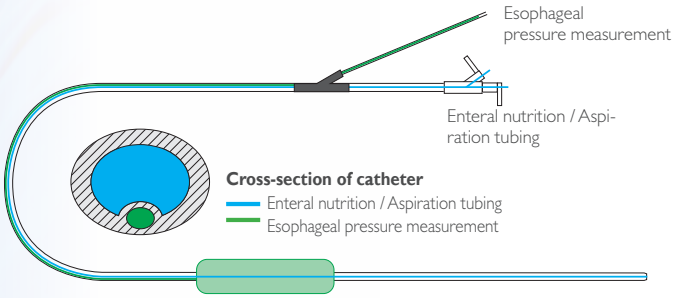
* *AAV = Anti-Asphyxia-Valve*

ESOPHAGEAL VENTILATION MONITORING – FROM RESEARCH INSTRUMENT TO STANDARD BEDSIDE METHOD

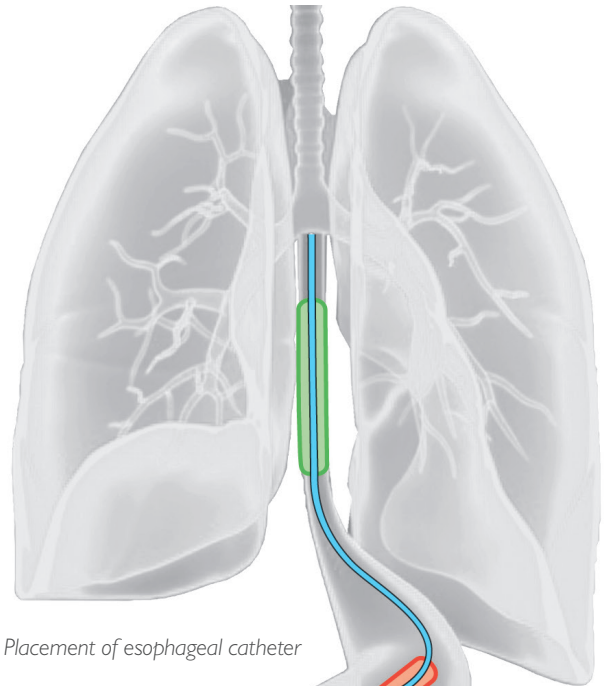
Guest article by Dr. Sven Pulletz, Osnabrück

Lung-protective ventilation reduces ventilation associated complications (Ventilator Associated Lung Injury and Ventilator-Induced Lung Injury), especially by decreasing the mechanical pressure and volume strain on the lungs.

Clinical findings in recent years show that lung-protective ventilation can be effected only with regular adjustment of the ventilator settings to the individual lung function. The adaptation of ventilation therapy based on esophageal pressure measurement is a simple, valid and minimally invasive method which requires only the placement of a modified feeding tube. The changes in esophageal pressure during a breathing cycle reflect the changes in pleural pressure. The transpulmonary pressure situation, or the difference between alveolar pressure and intrapleural pressure, shows the extent of mechanical stress on the alveoli. It is responsible for VALI. The inspiratory plateau pressure set on the ventilator plays a less important role. Studies show that, given the high variability in the ratio of the lungs' elasticity to the thorax, the inspiratory plateau pressure set on the ventilator results in highly varied transpulmonary pressure gradients. In patients with elevated pleural pressure, resulting from increased intra-abdominal pressure, for example, the same inspiratory pressure may be associated with lesser ventilator-associated lung injury than in patients with low pleural pressure. When an elevated intra-abdominal pressure is present (e.g., in cases of obesity, ileus, ascites), an inspiratory plateau pressure of more than 30 mbar can be tolerated if the inspiratory transpulmonary pressure is not accompanied by a potentially dangerous increase of more than 25 mbar.



Esophageal catheter with simultaneous administration of enteral tube



Placement of esophageal catheter

The end-expiratory transpulmonary pressure (TTP exp) can be adjusted by titration of the applied PEEP as airway pressure is related to the applied PEEP. The titration of the applied PEEP to TTP exp between 0 and 10 mbar (but always in the positive range) can reduce the cyclical alveolar collapse. In contrast to other methods for detection of individual PEEPs, this procedure also can be used during spontaneous breathing and weaning. In cases of weaning, an esophageal pressure measurement can provide valuable information (e.g., unveiling patient-ventilator asynchrony, monitoring of muscular effort, calculation of intrinsic PEEP under spontaneous breathing) and permit the weaning process to be optimized. During weaning and assisted spontaneous breathing in a critical situation, the patient's Work of Breathing can be determined with use of a PESO (esophageal) catheter and pressure support for the patient can be adjusted to the affected lung function. With the availability of modern intensive care ventilators and PESO monitors, this established method can now be used easily at the patient's bedside.

PESO monitor, an alternative to esophageal pressure measurement made via ventilator

About the author: Dr. Sven Pulletz is an anesthesiologist with authorization to provide training for special intensive care medicine. In his research work and as senior physician at the clinic for anesthesia and internal medicine in Osnabrück Hospital, his focus is on lung-protective intensive care ventilation.

PRESTIGIOUS DESIGN PRIZE FOR NEW VENTILATORS

At the "Night of the Designers", our newest representatives of the elisa product family celebrated not one but two successes. The iF DESIGN AWARD recognizes outstanding achievement in design. The value of the annual award goes far beyond the conferral of the international design trophies. Design is not just a question of appearance, but rather a global and multifunctional contribution to a state-of-the-art workplace in intensive care medicine. Especially in stressful situations, factors such as self-explanatory operation, coherent software architecture and thoughtful placement of components determine the success of treatment and the frequency of errors. In light of rapid progress in medical developments and chronic personnel shortages in hospitals, designers deal with a wide variety of questions in a product's developmental stage to which they need to find intelligent answers for clinical use.

In the end, design, quality and functionality have to be woven into a close symbiotic relationship.

Validation of all these aspects came in January 2018 when the iF Design team of 63 international experts examined our two newest intensive care ventilators and declared them superior to 6,402 exhibits. Elisa 300 and 500 exemplify not only the best ventilator performance, innovative ventilation and diverse usage options, but also new standards in operability, flexibility and individuality.

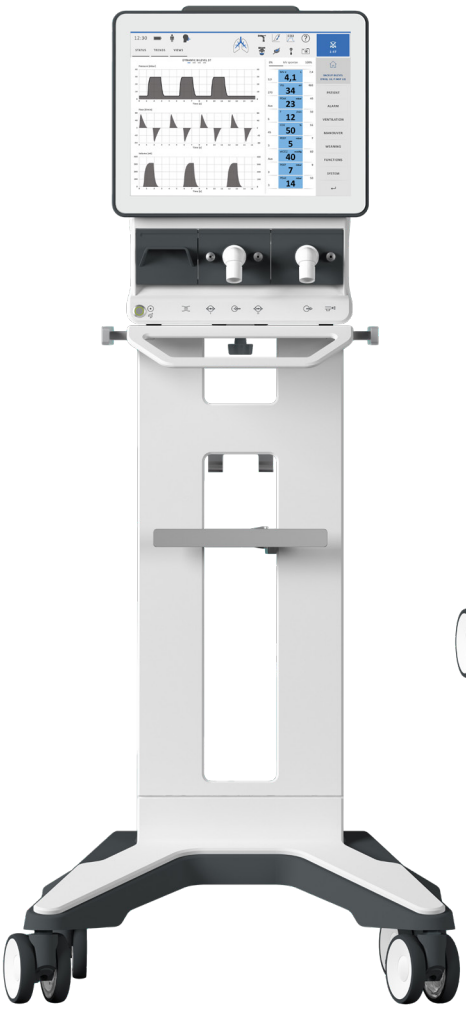
elisa 300 | elisa 500 | elisa 600 | elisa 800 | elisa 800 VIT

ELISA 300 AND 500 – NEW TURBINE-DRIVEN VENTILATORS SET NEW STANDARDS

With the official presentation of the newest members of the elisa family at MEDICA in November 2017, Löwenstein Medical made available two high-performance turbine devices which satisfy nearly the entire spectrum of clinical requirements. In close collaboration with our customers and ventilation experts from our worldwide network of reference hospitals, "ventilation was rethought" and implemented in state-of-the-art technology. Developers focused on a variety of challenges involving acute care of intensive care patients requiring ventilation, modern ventilation modes and maximum operating flexibility. For use in the intensive care unit, intermediate care department or weaning unit, the innovative Graphical User Interface can be adjusted to the specific needs of patients and users. The display can be reduced to the essentials or the availability of extensive diagnostic and therapeutic tools for lung protection, weaning, non-invasive ventilation or high-flow therapy can be configured and organized for individual work processes. The elisa product family also boasts the common denominator of simplicity and flexibility with the highest technological standards and practicable innovation.

Efficient, whisper-quiet turbines guarantee a total flow of up to 300 liters per minute and thus make possible high leakage compensation in mask ventilation and operation separate from a central gas supply. That eliminates the need for heavy compressed gas cylinders in mobile use. Battery-powered operation of up to four hours and special transport solutions make elisa 300 and elisa 500 eminently suitable for intra-hospital transfers and flexible use in everyday hospital routines. The rechargeable batteries can be replaced easily even during operation.

The new turbine-driven intensive care ventilators combine the virtues of the elisa family with the advantages of the latest turbine technology.



New elisa 500

New elisa 300

CARA – IN USE!

Our premium nasal mask CARA, which was launched in October 2017, has been an overwhelming success. No other mask has been sold so successfully in both national and international markets. Within just a few months, CARA has climbed to third place in our monthly statistics for best-selling masks.

The road to success was laid out in autumn 2015 when the mask team at Löwenstein Medical Technology kicked off a new development project with the working name "new mask generation". Very general. Bland. Intentionally vague – a mask was needed first. A new mask. All well and good, but what was the focus? What would the market need in two years? What would the competition have?

It was clear that JOYCE had served us well for more than 10 years, but the time had come for a new generation with a new focus and a new name. What should we focus on to make a successful mask? Many requirements were so obvious that we didn't even have to talk about them. A good fit without pressure points or leaks was essential in order to ensure good patient compliance.

Easier said than done – especially when the same mask should fit faces in Europe, Asia and the USA. Of course it also had to be easy for patients and mask fitters to use. As always, development began in the same way with the definition of core markets, market analysis, customer surveys and competitive analyses. The focus requirements gradually came to light. As an added extra, we might find out what makes our mask special.

BANK ON THE BEST

"New" does not necessarily mean that you have to give up what has already proven to work well. The ball-and-socket joint, which permits unlimited freedom of movement, is one of those things and an indispensable one at that. Still another requirement was for peace and quiet in the bedroom. A quiet exhalation system makes its contribution with a diffuse airflow that disturbs neither patient nor bedmate.

Okay, bank on the best. We can do that! To be sure, the new requirements also were a challenge. The new mask had to be small, lightweight and modern.

MODERN LIFESTYLE, NOT A MEDICAL PRODUCT

Appearance counts. It's true enough that we sleep through the night, but the look of medical products plays an increasingly important role anyway. There is no lack of masks, but one with a contemporary design is sure to meet with approval and stand out from the rest. For a man or a woman, in the West or Far East, modern lightness convinces everyone everywhere. That's exactly what our mask does.

The choice of colors for the headgear contributes greatly to the user's perception of the mask as new and different. Trendy tones like teal and grey lend the mask a modern touch.

The lightness comes from the use of just a few materials. The bridge on the forehead support of transparent plastic is very narrow, almost fragile and hardly noticeable at all. It cannot break, however, because it is made of the nearly indestructible plastic which we have been using in our masks for years.

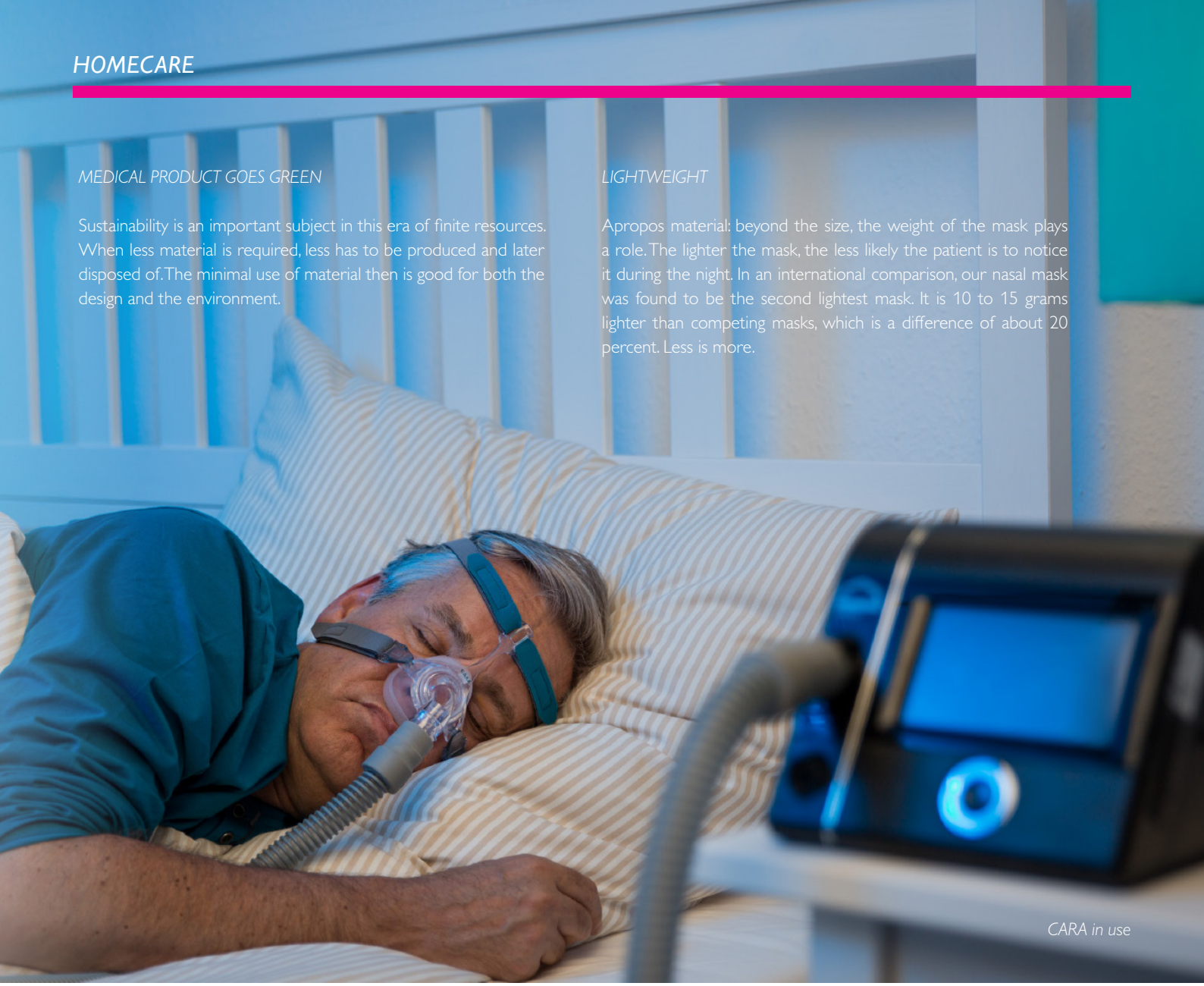
New CARA

MEDICAL PRODUCT GOES GREEN

Sustainability is an important subject in this era of finite resources. When less material is required, less has to be produced and later disposed of. The minimal use of material then is good for both the design and the environment.

LIGHTWEIGHT

Apropos material: beyond the size, the weight of the mask plays a role. The lighter the mask, the less likely the patient is to notice it during the night. In an international comparison, our nasal mask was found to be the second lightest mask. It is 10 to 15 grams lighter than competing masks, which is a difference of about 20 percent. Less is more.



CARA in use

STANDARD 100 BY OEKO-TEX

These days people react with greater sensitivity to foods, fabrics and other materials. Intolerances have become nearly "normal". To call consumers' attention to particularly gentle products, manufacturers often describe their lotions or soaps as "sensitive".

For the textile industry the independent Hohenstein Institute checks the individual components of textiles for hazardous substances. All components. Including yarns, fibers, printing, hook-and-loop closures. Simply everything.

Certification from Hohenstein Institute attests to the product's harmlessness to human health and confirms that no hazardous materials are used.

Ours is the first respiratory mask to receive this certification. Unmistakable quality "Made in Germany".

OEKO-TEX®
CONFIDENCE IN TEXTILES
STANDARD 100
17.0.19472 HOHENSTEIN HTTI
Tested for harmful substances.
www.oeko-tex.com/standard100

GIVE THE CHILD A NAME

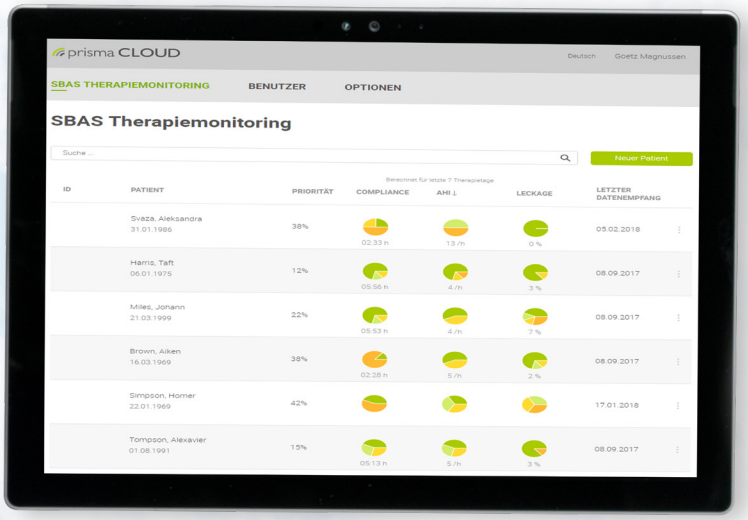
Our new mask satisfies all requirements of our core markets. What about the name? We can't just call it "new mask generation", which is too long and rather clumsy. It has to be short and appealing. Why not use a first name for a female again? CARA – short, memorable and congenial. We'll take it.

CARA really is memorable. It impresses users with its good fit in two different sizes, its lightness and quiet exhalation system with diffuse flow.

In just a few months CARA amassed a crowd of convinced fans. For many customers it is the mask of choice for new and experienced patients.

After two years of intense development work, the mask team could relax, lean back and enjoy the success. But as we know, after the project is before the project. The team has already begun working on the next mask. The working title, however, will remain a secret for now.

– 2018 – THE YEAR OF TELEMEDICINE



Telemedicine with prisma CLOUD

Digitalization is on everyone's lips as it penetrates more and more areas of daily life. Sometimes the effects are highly noticeable and other times nearly invisible. Long ago we became accustomed to communicating digitally, booking vacations online and sharing cars with others via apps. And what's going on in healthcare?

Digital communication with the doctor's practice? Sick leave via e-mail? Tele-consultations with a specialist? Although many projects investigating telemedicine support in health care have been initiated around the country, one has the feeling that digitalization here is not keeping pace with developments in other industries. Yet digitalization offers obvious advantages through widespread telemedicine support of patients, doctors and the industry. Such support helps to ensure the quality of care and treatment even under the continuously increasing cost pressure. Likewise, the necessary medical care processes can be simplified and optimized with the integration of digital services.

When we consider our sleep apnea patients and their therapy, for example, we realize that the majority of patients is cared for according to a clearly defined, standard process. The patient's partner or the patient himself notices that he sleeps poorly, feels tired during the day and snores. He goes to the family doctor, who makes the preliminary diagnosis of chronic obstructive sleep apnea, which is later confirmed by a specialist. A therapy device is prescribed, titrated in a sleep lab and taken home by the patient. As long as the device settings are correct and the device is always used, the patient remains symptom-free. At subsequent check-ups the therapy is adjusted to changing needs. Very often, however, no adjustments are required and the patient is pleased because he has no symptoms. Nevertheless, it is possible that the settings made in the sleep lab are not ideal or that conditions change temporarily or those changes persist. In these cases, closer monitoring by medical personnel is required in order to ensure patient compliance with therapy. Most importantly, the patient should feel that he is being quickly, professionally and adequately cared for; otherwise, there is a great risk that he will discontinue therapy. Sleep labs expressly advise patients to contact care providers as soon as problems with therapy occur. That's the point at which other problems arise. Patients do not always take the initiative in reporting trouble with therapy although they have good reason to do so. Others have concerns or questions about their therapy and take up the providers' time, leaving other issues unaddressed. In the end the available resources cannot be ideally utilized.

Our telemedicine-supported care processes can help everyone involved. The prisma CLOUD solution is a telemedicine platform that is connected directly via modem to our therapy devices. Every morning after therapy has ended the devices transmit encrypted data. On a Website to which the treating physician has access, the data are graphically displayed so that a fast and reliable assessment can be made. This makes it easy to identify critical and non-critical patients.

With the first version, which has been in use since early this year, the doctor can call up and analyze the Apnea-Hypopnea Index (AHI), device usage time and leakage for each patient. With quickly and easily accessible information the doctor can decide who needs medical advice or adjustments to therapy settings. The doctor can contact patients directly and concentrate on critical patients. The advantages are apparent. Doctors save time, which they can then invest in caring for other patients. The patient can rest assured that his doctor is always monitoring the therapy and will intervene as soon as problems occur. After all, the doctor bases treatment decisions on the latest information, which is made available automatically. Patients consequently develop more trust and confidence in their therapy. They have the feeling that they are not alone and benefit from the best care possible. On top of that, patients avoid having to spend additional time in the sleep lab while enjoying the same level of care.

So that our customers, patients and users can benefit from all the advantages of our platform in future, we plan to continue the roll out of prisma CLOUD this year and make it more widely available. We have already begun working with some sleep labs in Germany on projects aimed at integrating prisma CLOUD in their existing processes. Simultaneously we are working closely with several doctors to develop prisma CLOUD with greater customer orientation. We can and will learn more about our users' needs in order to develop the best product and satisfy the demands we make of ourselves.

At Löwenstein Medical Technology 2018 is the year of telemedicine. Several devices from the prisma series are now connected to prisma CLOUD and many more will be added during the year. We are sure that this new business field will further strengthen our market position and open up opportunities and advances in the future.

With prisma CLOUD we have created the basis for new digital products and services intended to support the doctor, patient and supplier. We are just starting out on this journey and are looking forward to entering the digital future with our customers!

prisma CLOUD

PRISMA VENT50 – HIGH-LEVEL VENTILATION THERAPY

We completed our ventilation portfolio this year with our new all-rounder prisma VENT50, featuring the same sleek, modern design as the successful prisma VENT30 and prisma VENT40, which were launched in 2016. The new ventilator is suitable for both non-invasive and invasive ventilation.

Compared to the previously launched prisma VENT devices, the prisma VENT50 offers a few advanced developments. In addition to ventilation with a leakage system, the ventilator can be used with a single patient circuit equipped with a patient valve. Other prisma VENT50 features and functions include a large pressure range up to 50 hPA, pressure and volume-controlled mouthpiece ventilation modes (MPVp and MPVv), and LIAM (Lung Insufflation Assist Maneuver) for cough support and secretion management.

The variety of new functions permits treatment of a broader spectrum of illnesses. The modern ventilator also has a complete alarm management system, an internal power pack, a rechargeable battery with up to 12-hour capacity and an integrated oxygen connection. Depending on the ventilator's equipment version, the innovative High-Flow Therapy can also be administered with prisma VENT50.

The previously described benefits of the prisma VENT30 and prisma VENT40 devices also apply to prisma VENT50.

Large, brilliant display

Easy operation

Simple settings

Compatibility

Quiet as a whisper operation

New prisma VENT50

MINISCREEN PREMIUM

Over the past several decades, staged diagnostics in sleep medicine has become well established in Germany. Löwenstein Medical was one of the first companies to satisfy customer needs with its own polygraph product line. Thirteen years ago the first MiniScreen 8 devices were sold on the German market. The success story began then with sales of several hundred polygraph devices sold per year.

CURRENT REQUIREMENTS

Today's requirements of polygraph systems go beyond purely diagnostic capabilities. It has become increasingly more important to monitor the sufficiency of the therapy device in use and the type of treatment given to the patient. In the past 15 years the treatment types have developed from CPAP and APAP to BiLevel and ASV.
More attention is being paid to automatic adaptation and patient comfort functions in the different types of therapy. In BiLevel treatment, for example, higher pressures are used than in CPAP and APAP. It should be noted that ventilators used outside the hospital (Non-Invasive Ventilation, NIV) work with quickly changing positive pressures.

Market factors require that all types of therapy be monitored with polygraphs, in some instances with mobile devices.

New MiniScreen premium

The gold standard for measuring the airflow and pressure with a polygraph is the use of a T-Adapter. Generally used during therapy, the part is inserted between the mask and breathing tube and connected to the polygraph device. Two physical procedures register the signals:

1. Nasal pressure measurement
2. Differential pressure measurement

NASAL PRESSURE MEASUREMENT

Nasal pressure measurement makes use of the fact that the patient's breathing causes pressure fluctuations in the air-conveying part of PAP treatment, breathing hose and mask. The pressure fluctuations are subject to the patient's breathing cycle (inspiration and expiration) and, under some circumstances, to the type of therapy. These types of therapy (BiLevel, ASV, PSV, aPCV, PCV) apply higher pressure during inspiration than expiration.

Depending on conditions during therapy, the airflow computation indicates weak points. Because the flow signal calculation is based on pressure fluctuation, in the case of a mandatory breath, respiratory flow may be indicated even though the patient has an apnea.

Furthermore, the pressure sensors are limited in their maximum pressure registration. When in such cases the peaks in the airflow curves are cut off, hypopnea and RERA can no longer be detected reliably under some circumstances.

DIFFERENTIAL PRESSURE MEASUREMENT

The differential pressure measurement ascertains the patient's actual respiratory volume flow. The special T-shaped adapter used for that purpose is equipped with two pressure measurement points; a defined cross-sectional constriction is integrated between them. This narrowing causes an increase in the speed of the flow and a decrease in static pressure (Bernoulli effect). The resulting differential pressure is a measure of the volume flow.

Differential pressure measurement has been integrated in the MiniScreen premium. The device offers high-quality signal recording not only in a routine examination, but also in ventilation monitoring for patients outside the hospital or for those treated with high and quickly changing pressures. The differential pressure measurement ensures that the patient's airflow is correctly registered even when mandatory ventilator breaths are administered.

As registration of the exact airflow curve is reliable at high pressures, precise event recognition is possible.

AUTONOMOUS AROUSAL RECOGNITION

Another helpful feature of the MiniScreen premium is the detection of autonomous arousals by means of the pulse wave amplitude. If sympathicotonia occurs as a result of an obstructive event, the patient reacts with a short-term increase in cardiac rate and a similarly brief stiffening of the vascular system. The related reduction of the pulse wave amplitude allows conclusions to be drawn about an autonomous arousal. Consequently, MiniScreen premium provides exact detection of hypopnea and RERA in the polygraphic area.

The robust, thoroughly proven quality made in Germany, very low subsequent costs, simple operation and best signal quality, including during PAP therapy with high pressures, make MiniScreen premium the perfect device for future polygraphic measurements.

NEW CARA

CARA

Facing the future.

Löwenstein Medical
Arzbacher Straße 80
D-56130 Bad Ems
Telephone: 0 26 03/96 00-0
Internet: www.hul.de

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bad ems
GERMANY

LÖWENSTEIN medical

igny
FRANCE

LÖWENSTEIN medical
france

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