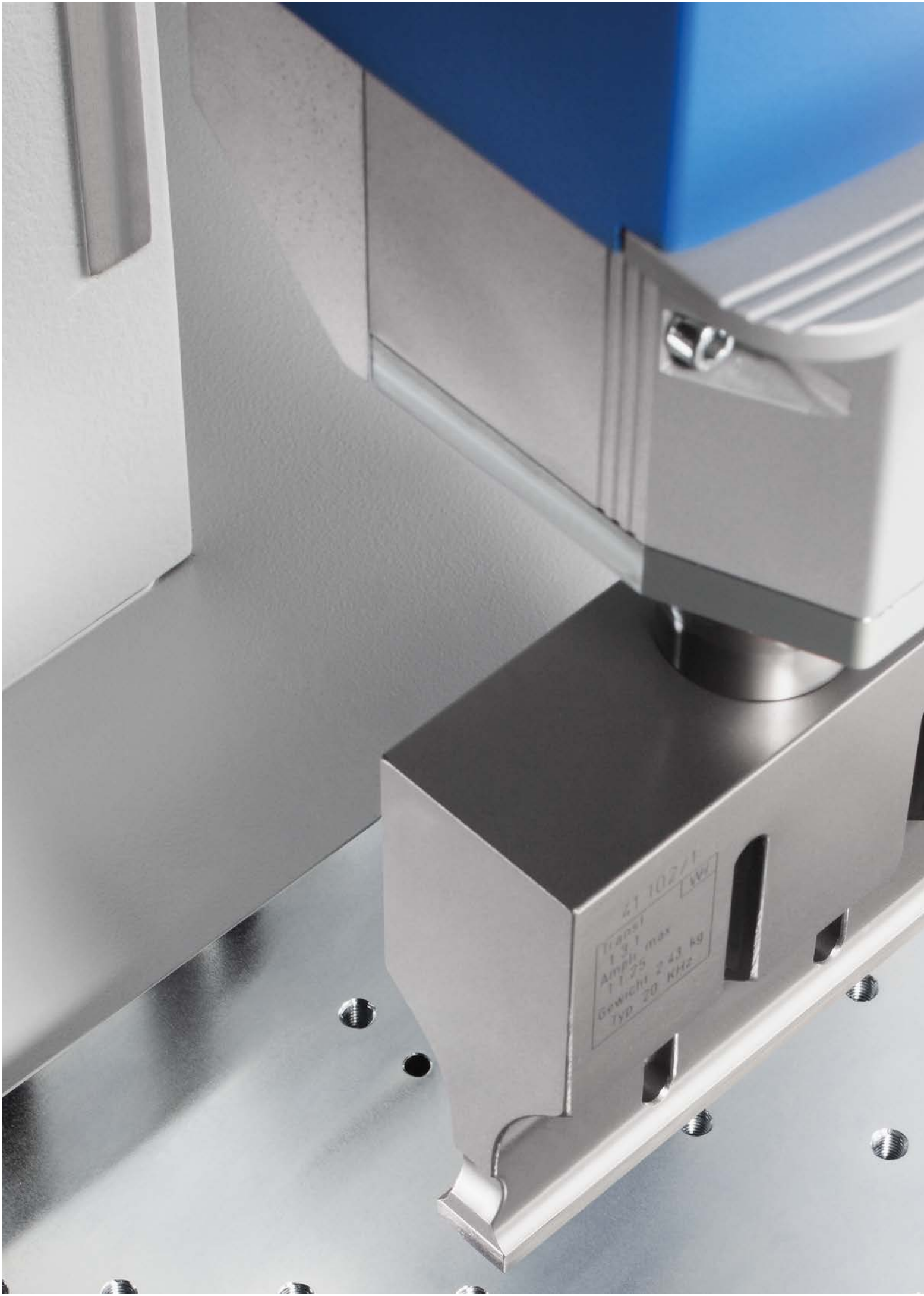
DIALOG

ULTRASONIC WELDING TECHNOLOGY

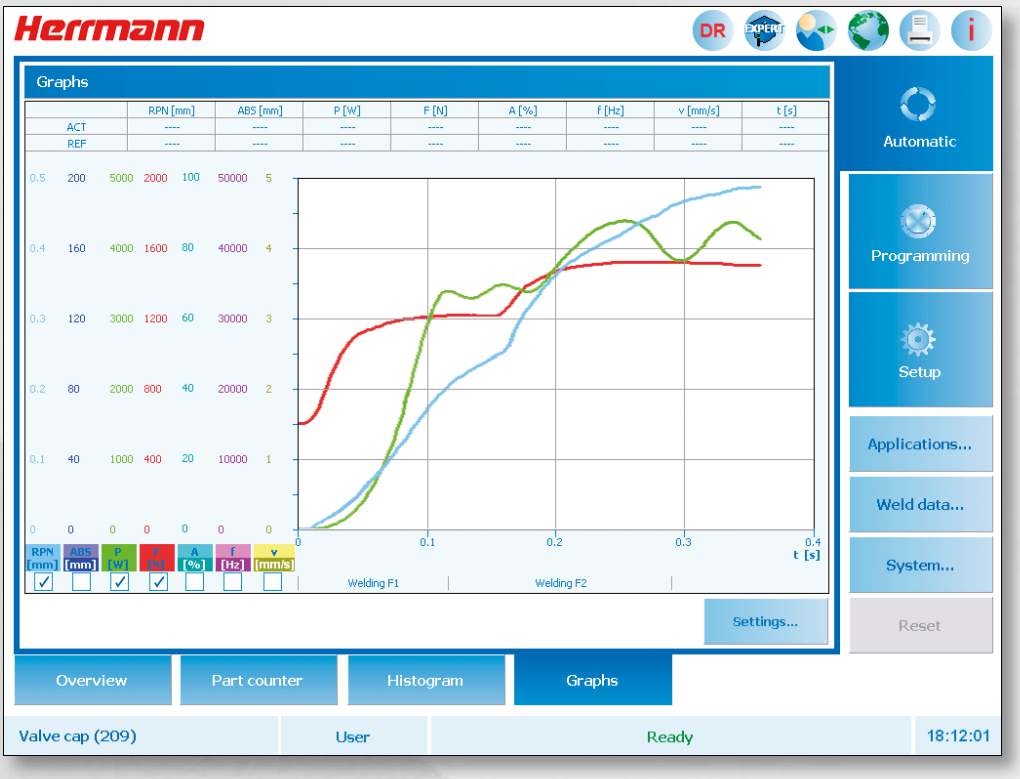



Herrmann Ultraschall


41 1024
Amplit. max
11,25
Gewicht 2,43 kg
TYP 20 kHz

The DIALOG series.
Groundbreaking technology from the beginning.

Precise. Versatile. Efficient. The DIALOG series demonstrates the entire innovative power of Herrmann Ultraschall. The main focus of this advanced product line is to address highly specific and diverse customer requirements: The DIALOG product line provides the right machines and weld systems for any kind of application in any industry. It provides solutions for complex applications while being easy to integrate and user-friendly. Thanks to intelligent power grading and a large number of variants and options, both in the machine area and in the software, the DIALOG product line can be configured specifically and individually for any weld application. With superior technology and ultimate efficiency, Herrmann Ultraschall sets the standards for ultrasonic welding technology worldwide.



Innovative process control: DIALOG software

Excellence.
In speed and precision.

Technology expertise means more than mere functionality. First and foremost, the revolutionary key technologies of the DIALOG series represent increased customer benefits. These include reduction of non-production time, ease of operation and maximum quality output. In addition to operational efficiency, the DIALOG product line also ensures energy efficiency and occupational safety.

Quality production and consistency

Achieving excellent weld quality is one thing. Continuously reproducing this quality and thus preventing rejects is another. The technology in the highly advanced DIALOG product line offers repeatable weld results for the most varied applications, worldwide. All machines are calibrated at the factory and undergo a 100 % functional check. Calibration of the machines is also possible at regular intervals during later operation. Above all, this means: reliable quality.

Efficiency with time savings

Production, change-over, and down time are the major factors affecting manufacturing efficiency. With the DIALOG product line, all three factors can be significantly and efficiently reduced. For example, the optional custom stroke selection reduces redundant non-production time, and the SoftTouch mode allows for a quick approach and gentle contact with the application. With the help of the quick-change system QCS, the aligned weld tools can be converted to a new application in less than a minute.

Flexibility

The advanced DIALOG product line provides all the benefits of a well-engineered series, and at the same time leaves Herrmann Ultraschall production as a unique item. All machines are configured in accordance with individual customer requirements and customized for their future purposes. They are equally suited for an extensive range of both parts and applications and can be converted for new applications at any time.

Ultimate production safety

The CE-compliant DIALOG product line provides safety at many different levels. The ActiveGuard system is based on a two-channel safety concept using a two-hand trigger. Systematic prevention of hazards and an electrically secured contact protection ensure maximum occupational safety when operating the machine. Safety also means protection from tampering. Special password protection, divided into four different levels, prevents tampering and ensures maximum process safety.

Sophisticated ergonomics

Modern industrial design, an intelligent user interface, a good feel of the control and functional elements, as well as a pleasant color concept, ensure comfortable and agreeable handling for the ultrasonic welding machine. The glare-free LED work space illumination facilitates the loading process and improves the insertion and assembly quality of applications.

Focus on the weld process.
In dialog with intelligent software.

The 4th generation weld process software is the ultimate proof of the innovative power of Herrmann Ultraschall. The name DIALOG G4 is a byword for superlative software for control and operation of the weld process, the machine equipment, and up to six customized auxiliary functions. The intelligent process control reduces the reject rate and thus increases efficiency.

Five general operating modes

Every weld application is unique in terms of its shape, material and requirement. To achieve optimum weld results, the DIALOG G4 control provides five different basic operating modes, which serve as switch-off criteria for the weld process. These can be individually monitored by means of permitted limits and thus form the foundation for reliable quality monitoring.

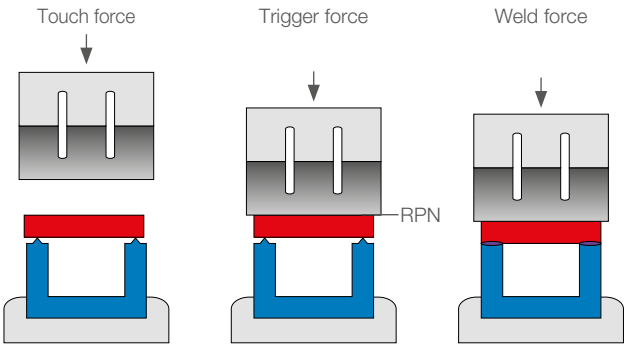
1. Time
The ultrasonic output ends after the defined ultrasonic output duration.

2. Distance ABS (absolute)
In this mode, ultrasonic is switched off as soon as the sonotrode has reached its absolute end position. This operating mode is used for achieving equal and repeatable application heights after the weld process.

3. Depth RPN (Reference Point Numeric)
The start point of the weld process is referenced to the point of tool contact on the component surface. From there, the weld process is active until a defined weld depth is achieved. This mode compensates for dimensional tolerances, which can for example occur due to different injection molds. The weld depth is always the same and the generated melt volume remains constant – this is vital for repeatable weld results.

4. Power
Is used as the switch-off criterion if the defined power limit is exceeded. This mode is used in spot welding, for example.

5. Energy
The ultrasonic output ends upon introduction of the required amount of energy. Consistent energy results in a consistent melt volume, which, in turn, ensures uniform weld strength.



In addition: the expert operating modes

6. ADEPT
This MultiSelect function terminates the weld process as soon as the first of the selected switch-off criteria is reached. It is possible to simultaneously activate up to five criteria (ADEPT = Absolute depth, Depth RPN, Energy, Power, Time). The system constantly monitors whether all parameters are within the permissible process window. This ensures the correct response for sensitive surfaces or functional components, guaranteeing excellent quality in complex weld tasks.

7. Sequential weld process
Using the “Sequential” operating mode, you can divide the classic weld process into several process steps. In this way, the operator can influence and modify different joining processes and monitoring criteria during the weld process, which overall only takes a few milliseconds. It is therefore possible to precisely control the joining sequences of critical materials or complex component designs to ensure a safe process.

Process visualization

For decades, transparency and visualization of the weld process have been a priority at Herrmann. Only in this way is it possible to understand, optimize, and monitor the ultrasonic joining process. Prevention of unnecessary rejects, reduction of standstill time, and high machine availability guarantee an efficient and economic manufacturing process.

- Graphical display of the time-related curves for all relevant process variables, such as power, joining distance, force, amplitude, and frequency. The curves document the characteristics of the performed weld process and can be compared with saved reference graphs for the purpose of quality assessment and parameter optimization
- Visualization of the joining velocity. Uniform joining velocity results in an optimum melt flow, which is a crucial factor and responsible for the overall strength of the weld
- Waterfall graphs for rapid assessment of process diversification
- Visualization of the overall weld process from contact of the sonotrode with the application to the end of the solidification phase
- PartView: illustration of the currently selected application for rapid component identification
- Customizable configuration of graph records
- Digital display of process variables simply by touching the graph
- Print-out of system and weld process parameters and graphs – ideal for assessment and documentation of the weld process

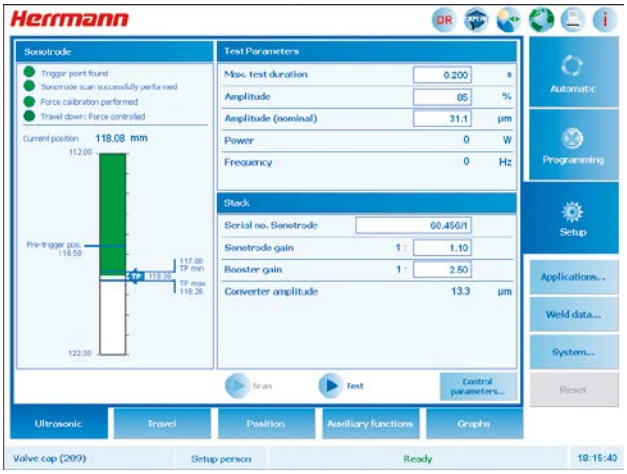
Visual process control.
Focus on the application.

Process-oriented user guidance with a touch screen provides an extremely user-friendly human machine interface allowing intuitive navigation. Task-oriented menu contents ensure excellent usability. Additionally, all process variables are continuously recorded and assessed using statistical methods to monitor process suitability.

Process-oriented user guidance

Properties and functions

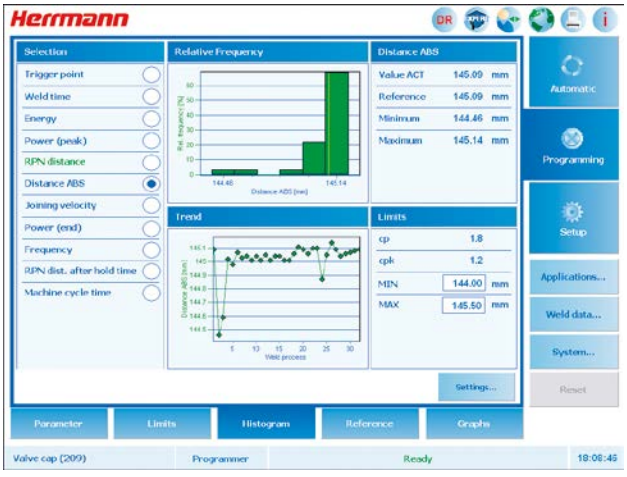
- Intuitive operation and process-oriented navigation
- Task-oriented menu structure
- Easy definition and input of weld process parameters and their permitted limits
- No programming skills required
- EasySelect mode for specific software use
- Consistent menu navigation is available in 14 of the most common user languages



Statistics and data archiving

Prevention of rejects is the main objective of process monitoring. Histograms are used to visualize the diversification of process variables and thus enabling rapid appraisal of the weld quality. Trend diagrams indicating the direction of development of a process allow for early intervention if required. Process suitability characteristics (cp, cpk) of all relevant weld variables ensure quantification of the stability of good parts production.

- Statistical quality display with trend indication
- Data memory for parameters of 1000 applications
- Data archive of the last 300 welds, incl. graph records
- Error history of the last 100 messages
- Part counter (daily, batch, and total part counter)
- Quality surveillance using tolerance range assessment for good / suspect statements with regard to the welded application
- Backup / restore functions provide data safety for all weld process parameters
- Continuous calculation of the process suitability characteristics cp and cpk using the defined process window (upper / lower limit) and the diversification of the weld variables



Process validation and traceability.
Additional software for maximum quality and safety.

Today, the requirements for high quality products, for example in medical engineering, have become increasingly diverse and complex: In addition to tightness, strength, and minimum generation of particles, process validation and traceability are important quality criteria. Useful additional software packages from Herrmann Ultraschall are valuable for process monitoring, quality assurance, and data acquisition.

Additional software packages

DataRecorder
The DataRecorder provides support in the field of data transmission and data management. It is used for process monitoring and for external statistical quality assessment.

- Recording and archiving of all weld process values and process parameters on an external PC using Microsoft Windows
- Connection of up to 16 devices (DataClient)
- Transmission of 130 different types of process reference data
- Direct transmission of the received data to other conventional software programs

FSC-Software
Process safety and traceability are frequent requirements. The FSC software package supports the DIALOG control technology in terms of compliance with strict criteria according to FDA 21CFR Part 11. FSC software is directly integrated into the DIALOG control weld process control system, making an additional PC unnecessary.

- User authentication by password and photo
- User management (user profiles) and control of user access rights
- Documentation of all activities in the audit trail

FDA software component (FSC)

Calibration – a Herrmann Ultraschall standard

All ultrasonic welding systems and machines are calibrated at the factory. This calibration process includes the verification and adjustment of:

- Sonotrode amplitude
- Trigger, weld, and hold forces
- Position measuring system
- Joining velocity

Therefore, ultrasonic welding machines of the same type can be identically programmed and operated. It is thus possible to implement production of the same applications on several machines using identical weld process parameters. Consistently maintaining high quality also involves keeping the production equipment in a reliable condition. On request, Herrmann Ultraschall service provides worldwide support for machine and system calibration. This includes maintenance of machines at regular intervals, replacement of defective components, the required new calibration, and comprehensive documentation including a calibration certificate.

17 % more output.
HMC servo-pneumatics.

The HMC (High Motion Control), patented by Herrmann Ultraschall, combines the benefits of pneumatics with the dynamics of an electrical drive. The HMC allows for force and position control with maximum repeatability and process-optimized processing velocity. No matter whether the weld force is small or large – it can always be repeated.

Freely programmable drive system

Position calculation is performed as a non-contact function by means of an incremental absolute distance measurement system with continuous referencing. In combination with the specially developed servo-pneumatic drive, this system provides a freely programmable drive system (SpeedControl) for the entire range of sonotrode travel.

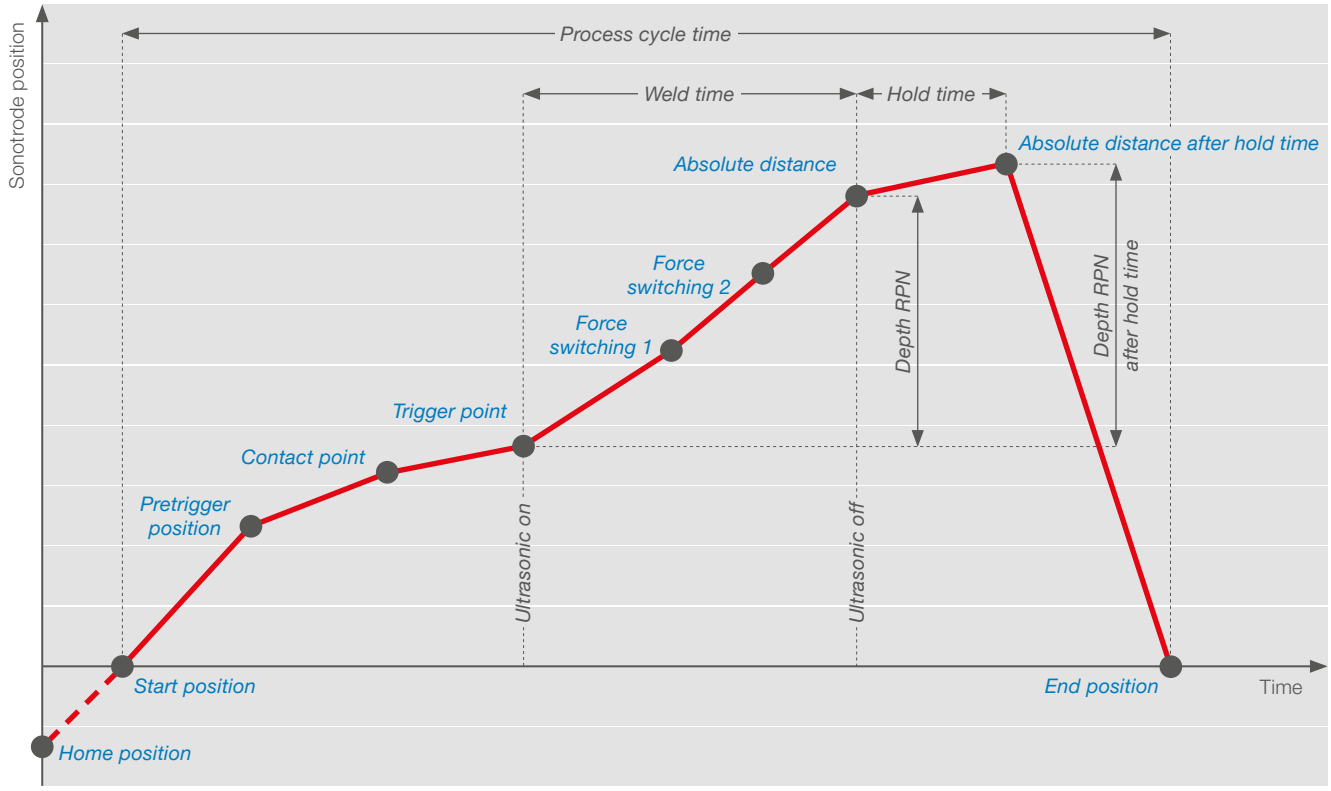
SoftTouch mode

Upon contact of the sonotrode with the component to be welded, SoftTouch mode prevents damage to sensitive joint geometries. Quick approach of the sonotrode to the application, along with gentle contact, allows for maximum stroke speed and movement while also protecting the application surface during contact with the sonotrode.

Free custom stroke selection

Servo-pneumatic control of the pneumatic drive cylinder allows for free custom stroke selection (freely programmable start and end position of the sonotrode). This minimizes stroke distances of the sonotrode, reduces unnecessary non-production times, and thus achieves short machine cycle times. The stroke can be individually adjusted for the required weld task and the size of the plastic part to be welded.

Process steps of the joining curve



Setup	Travel down	Touching	Trigger	Ultrasonic welding	Hold	Back	Process step
Position		SoftTouch	Force	Force	Force	Position	Control mode

Force profiling

By modifying the weld force during the weld process, the quality of the weld can be significantly improved in various applications. Therefore, it is possible to achieve uniform joining velocity for plastic materials, which results in a homogeneous melting behavior, in turn providing for higher joint strength. Extremely short control times of a few milliseconds form the basis for highly repeatable force profiles for required weld force modifications. This applies for both increases and decreases of weld forces. Only the fast control of the HMC servo-pneumatics enables the realization of the selective weld process.

DIALOG technology provides force profiling of up to three different weld forces. A separately adjustable hold force that is active during the solidification phase of the weld process results in an additional increase in joint strength.

Maximum effectiveness and energy efficiency. Ultrasonic generators from Herrmann Ultraschall.

ULTRAPLAST digital generator technology from Herrmann Ultraschall has been specifically designed for intermittent weld processes. Their excellent efficiency is based on an effectiveness factor of up to 93 %. The power output is performed in a repeatable and extremely precise way during the weld time of just a few milliseconds. A new chassis and cooling concept (Coolplate) guarantees steady operation and high reliability – even in extreme operating conditions.

DSP – digital signal processor

The DSP is both the intelligence and the memory of the generator. Supported by a microcontroller, it performs all measured data acquisiton, digital measured data processing and control technology. Due to digital technology, the ultrasonic generator is not affected by aging, temperature variations, or tolerances originating from electronic components used and therefore ensures high-quality weld results.

ResonanceScan – determining the sonotrode resonance characteristics

The digital ultrasonic generator identifies the resonance characteristics of the sonotrode during ResonanceScan and automatically adjusts to its oscillation properties. This reliably protects the sonotrode from unnecessary loads, and the entire vibrating system constantly operates at optimum operating conditions. This has a positive effect on service life, efficiency, and repeatability. Every new weld tool undergoes this scan process once. The obtained sonotrode parameters are saved in memories, which can be accessed upon tool change.

Green Ultrasonic – energy efficiency

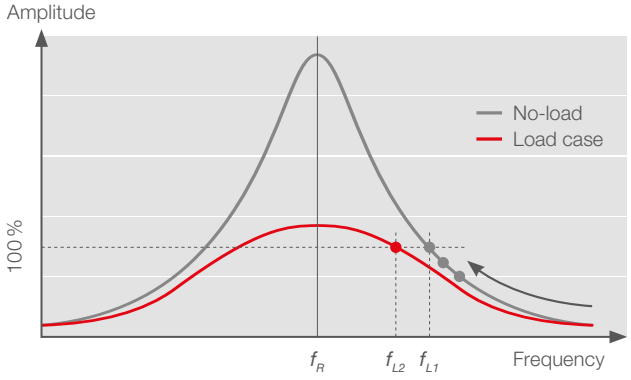
The active PFC (Power Factor Control) in the power supply of single-phase devices with output power of up to 2400 W makes the digital generators from Herrmann Ultraschall even more efficient and economic. The PFC minimizes power loss and coupling of interference into the supply mains.

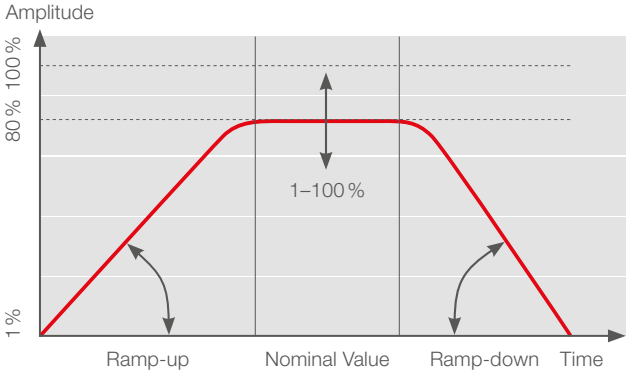
Weld amplitude – flexible and stable

The output amplitude can be fully programmed to operate from 1–100 % and precisely adjusted to the plastic material. The electronic control system with a scanning frequency in the megahertz range (1 µs) maintains the amplitude at a constant level for all operating conditions. The correct and constant amplitude guarantees the best possible weld process.

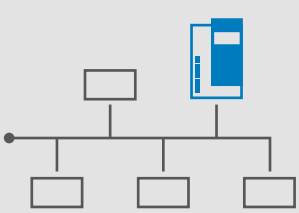
Programmable ramp-up and ramp-down time

Targeted ramp-up adjusted for the material and sonotrode geometry improves the quality of the weld result, particularly with short weld times. Gentle, controlled ramp-down of the sonotrodes increases their service life, particularly with large weld tools.





Interfaces for system integration



Communication between the ultrasonic welding system and the digital generator is performed using a comprehensive operation concept with the help of DIALOG G4 software on the 15" touch screen. Optional fieldbus modules of various different bus systems are available for integration in higher level networks. These allow for external memory selection of parameter sets for saved applications, fault and error diagnostics and can provide information on the status of the weld process. All communication interfaces are easily accessible at the front of the generator and provide a variety of utilization options upon system integration.

The customized welding machine. Produced in series.

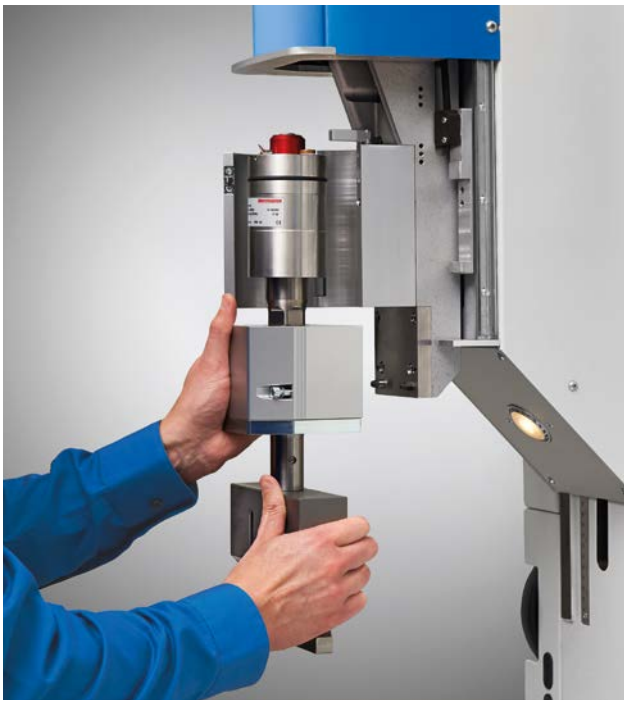
The objective of the Herrmann Ultraschall product strategy is precise identification of customer needs and strategic implementation in HiQ series machines. Often it is the small, customer-specific details that turn high-quality production goods into a premium product.

Equipment variants

- **Reduction of setup times with tool change system**
  The HiQ DIALOG can be fitted with an optional hinged tool change cover, which allows for quick and easy changing of the aligned ultrasonic stack with the quick-change system (QCS). In combination with a coded fixture and an indexed alignment module, this eliminates time-consuming weld tool setup and manual parameter selection upon an application change.

- **LowForce variant**
  For small part applications, extremely low weld forces are required. A particularly precise LowForce variant has been developed for this purpose. Special guiding and drive systems allow precise weld results with repeatable weld forces from as low a value as 10 N.

- **Ergonomic start signal trigger**
  All ergonomic requirements are met in every individual device – whether it is a robust start button, sensitive start trigger or non-contact start signal.



Technical data

HiQ DIALOG	20 kHz	35 kHz
Generator power [W]	2400 / 4800 / 6200	1200
Weld force min./max.* [N] *at 8 bar	30 / 2490	10 / 650
Stroke [mm]	150	100
Outside dimensions (W x H* x D) [mm] *at max. height adjustment	723 / 1533 / 707	723 / 1533 / 707
Throat depth to center of sonotrode [mm]	260	260
Height adjustment [mm]	430	430
Operating device	15“ touch screen color	15“ touch screen color
Operating modes	7	7
Application memories	1000	1000
Number of saved welds (weld data)	300 per Memory	300 per Memory
Control of auxiliary functions (optional)	max. 6	max. 6

Technical data depend on the selected machine variant

ULTRACELL sound insulation.
The ideal workplace.

ULTRACELL is an integrative sound insulation concept for the HiQ machine series that can be adapted to varying production requirements and offers individual customization. ULTRACELL offers maximum occupational safety, ultimate ergonomics, and the option of an automatic start for efficient component loading processes. The compact type and high degree of mobility enables universal application in manufacturing.

Sound insulation integration

For various 20 kHz applications in particular, suitable ear protection is recommended. Herrmann Ultraschall provides proper sound insulation, specifically designed for the HiQ product line.

Basic equipment

- Lifting door with safety contact strip for maximum user safety
- Rubber-cushioned foot support for comfortable foot position
- Work space illumination for precise parts handling and visual quality control
- Casters with arresting device – mobility at all times
- Equipment for transport by crane

ULTRACELL	Size 800	Size 1200
Footprint (W × D) [mm]	800 × 800	1200 × 800
Opening width [mm]	450	850
Opening stroke [mm]	450	450

Options and modifications

- ESD design
- Light curtain
- Attachment variants for control units
- Mounting feet, height adjustable
- RAL custom paint
- Supplemental workplace equipment options
- Customized foot space design
- Frame and casing adjustments

Accessories and customized options.
In proven series production quality.

A comprehensive modular system with a wide range of accessories and options is available for all machine types and weld systems – the best possible response to all customer requirements. In close collaboration with our customers, we develop and offer a product portfolio that meets market requirements – always on the cutting edge of technology.

Customized machine and system supplements

- Alignment modules and assembly systems
- Customized fixture design
- State-of-the-art sensor and camera technology
- Intelligent tool change management
- Function and signal elements
- Modules for quality assurance
- Auxiliary tools
- Functional assemblies, such as film indexer and cutting modules
- Integration of systems provided by customers
- Electrical adjustments and interfaces
- ULTRACARE spare parts packages

Fixture with carriage

Indexed alignment module

Automatic film indexer

Ergonomic workplace design and equipment

The HiQ machine workstation table is a robust workbench with two integrated tool cabinets and a solid sheet steel bench top. Customer-specified special paints are possible.

Equipment options

- Casters
- Leveling feet
- Foot support with adjustable tilt and height
- Toolshop with complete tool kit
- Additional shelves

Modularity for automation.
Ultrasonic welding systems for high endurance.

24/7 maximum cycle rate – a typical requirement for automated production, has been achieved by Herrmann Ultraschall countless times. Based on reliable systems and components, Herrmann Ultraschall develops machine types and weld systems for extreme conditions in automation, ranging from simple and safe integration of the ultrasonic system into an automated production system to smooth start-up, production support and technical user training.

HiQ MODULAR

An intelligent solution to integrate reliable technology from the series machinery range one-to-one into automated production systems without compromising on the usual ease of operation. Customized mounting of controls and control cabinets is performed according to customer requirements. Findings and parameters obtained from series machinery can be directly adopted for use in automation systems. The HiQ MODULAR concept can be supplemented with the appropriate accessories and options as desired.

- Similar to (series) production
- Modular
- Flexible
- Robust

VE SLIMLINE

Herrmann Ultraschall provides standard actuators in a large number of variants, which cover all the properties and equipment features of a reliable series production machine. The units are specially designed for permanent use in automated manufacturing and their compact structure speaks for itself. The Herrmann Ultraschall modular system provides a comprehensive integration package for mechanical and automation engineers, as well as a large number of accessories and options. Each complete system is a functional unit, facilitating integration and start-up.

- Compact, slim
- Combinable
- Versatile
- Reliable

High-tech for the highest demands.
Sonotrode development and manufacturing.

Ultrasonic welding is a high-tech field at the apex of electronics, physics, and mechanical engineering. For more than 50 years, Herrmann Ultraschall has not only been one of the pioneers of this sophisticated technology but also one of the world's leading companies in the sector. Using innovative processes and instruments, experienced professionals develop high-tech tools for high-tech machinery. For a perfect weld result in every respect.

FEM calculations for durable ultrasonic sonotrodes

Herrmann Ultraschall uses state-of-the-art FEM software for sonotrode development. This calculates and visualizes the vibrating behavior of the sonotrode and any material stresses that occur, and makes it possible to find the optimum geometry.

The result:
Maximum efficiency, even distribution of the weld amplitude, and a high degree of stability.

High-tech sonotrode manufacturing for maximum precision and reliability

The mostly complex three-dimensional sonotrode contours are converted to milling programs using CAD/CAM. Strict precision requirements for calculation algorithms guarantee perfectly fitting surfaces. Production is robot-assisted in 5-axis operating centers with state-of-the-art high-speed cutting tools.

The result:
The perfect counterpart for your component.

Perfecting the weld tool: The sonotrode measurement station

Every sonotrode has its own individual acoustic fingerprint. The amplitude distribution relevant for the weld quality is determined at the vibrating sonotrode, using state-of-the-art laser measurement technology. All corrections for sonotrode optimization are thoroughly documented. Finishing the weld surfaces with suitable surface coatings further extends the service life.

The result:
A perfect weld tool – customized for your components.

Continuous support from the beginning.
ULTRASONIC ENGINEERING.

The expert teams at Herrmann Ultraschall offer support during every phase of a project. This includes joint design discussion, component design, pre-production prototype welding in application laboratories, definition of weld process parameters for verification of the required component properties, training/instruction services, and after-sales services. Close cooperation with the customer and efficient product development is the primary focus.

Ultrasonic lab plastics

Application consulting
- Early support for component design
- Support and direction for designing the weld geometry
- Principle testing for feasibility

Application optimization
- Common trials and tests with the customer
- Determination and optimization of tooling profiles and process limits
- Verification of research results with the help of microscopy, tensile tests, sealing tests, burst tests, high-speed cameras, and microtome cuts
- Complete documentation of the feasibility test results

Training and seminars

- Beginner and expert seminars
- Hands-on user training
- Trainings on site or at our local facilities
- Customer-specific trainings

Technical project design

- Consistent implementation of customer requirements and test results in design concepts
- 3D supported collision analysis
- FEM-supported tool design
- Mechanical and electrical interface definition
- Consulting on integrating the weld process

Tech-Center on-site

- Customer-oriented support for feasibility analyses
- Ultrasonic laboratories are strategically located in the major markets worldwide
- Experienced and native-speaking application specialists

After-sales service

- Optional 24-hour service hotline
- On-site service in the respective languages through our Tech-Centers
- Preventative maintenance and servicing measures

FIRST CLASS TECHNOLOGY. WORLDWIDE. 24 LOCATIONS IN 18 COUNTRIES.

Global Headquarters
Herrmann Ultraschalltechnik GmbH & Co. KG
Descostraße 3–11 · 76307 Karlsbad, Germany
www.herrmannultraschall.com

North America Headquarters
Herrmann Ultrasonics, Inc.
1261 Hardt Circle · Bartlett, IL 60103, USA
www.herrmannultrasonics.com

China Headquarters
Herrmann Ultrasonics (Taicang) Co. Ltd.
Build 20-B, No. 111, North Dongting Road, Taicang,
Jiangsu Province, China · **www.herrmannultrasonic.cn**

Japan Headquarters
Herrmann Ultrasonic Japan Corporation
KOIL 503-1, 148-2 Kashiwanoha Campus, 178-4 Wakashiba,
Kashiwa City, Chiba 277-8519 · **www.herrmannultrasonic.co.jp**

Herrmann Ultraschall

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