

FORMING THE FUTURE






FORGING HAMMERS



Linear hammer with ServoDirect Technology.

THE RIGHT SOLUTION FOR ALL COMPONENT SIZES. FORGING HAMMERS BY SCHULER.

Schuler forging. System solutions from Schuler offer customers worldwide a decisive advantage when it comes to quality, in all temperature ranges:

-  Systems for hot forging
-  Systems for warm forging
-  Systems for cold forging

Schuler forging hammers are used in hot forging.

We do everything we can to make your path to success easier. From hydraulic down stroking hammers with 16 kJ to pneumatic counterblow hammers with 1,400 kJ, from proven BÊCHÉ-Hammers up to the new linear hammer: We provide you with a comprehensive product range that allows you to produce any desired part efficiently. As a technology pioneer with a tradition of more than 100 years, we have once again advanced the industry with revolutionary linear hammers – and are transforming the world of forging from the ground up.

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ABOUT THE SCHULER GROUP – WWW.SCHULERGROUP.COM

Schuler is the world market leader in metal forming technology. The company supplies presses, automation solutions, dies, process know-how, and services for the entire metalworking industry and lightweight automotive design. Customers include automobile manufacturers and suppliers as well as companies from the forging, household appliances, packaging, energy, and electronics industries. Schuler is the leading supplier of minting presses and supplies system solutions for aerospace, rail transport, and large pipe manufacturing. Following the acquisition of toolmaker AWEBA and a majority stake in Chinese press manufacturing company Yadon, Schuler employs around 6,600 members of staff in 40 countries. The Austrian ANDRITZ Group holds a majority share in Schuler.



DOUBLE-ACTING HAMMERS.

Double-acting hammers can be used universally and are particularly well suited to small to medium-sized series. The BÊCHÉ hammer with hydraulic top pressure has solidified its position amongst the competition in the press industry as the universal forming machine. For small to mid-sized series, it is an economical alternative to presses.

Working capacity: 16 – 160 kJ



LINEAR HAMMERS.

Down stroking hammers were previously driven either hydraulically or pneumatically. Current requirements in modern forging can no longer be met by using these conventional technologies. Schuler's years of experience in presses driven by servo motors have now enabled the direct drive to also be successfully used in the hammer.

Working capacity: 16 – 160 kJ

FORGING PARTS





HYDRAULIC COUNTERBLOW HAMMERS.

BÊCHÉ counterblow hammers with hydraulic tup couplings are primarily used to manufacture large and oversized forgings. The high impact energy and forming force of the opposing ram hammers enables the precise forming of large forgings. Counterblow hammers with hydraulic drives are suitable for the medium-power range. A compressed air installation is not necessary for this application.

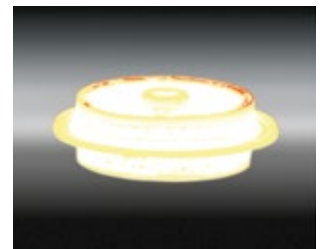
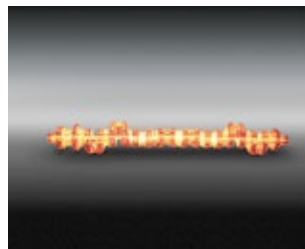
Working capacity: 160–400 kJ



PNEUMATIC COUNTERBLOW HAMMERS.

Pneumatic counterblow hammers with hydraulic tup coupling rely on the proven pneumatic drive, which enables extremely high forming energy. The stable stand design in connection with a massive guidance system guarantees high precision during forging operations. The robust design ensures a high level of availability.

Working capacity: 160–1,400 kJ



DOUBLE-ACTING HAMMERS. ECONOMIC AND FLEXIBLE FOR SMALL AND MID-SIZE LOTS.



KGH 4 down stroking hammer with proportional valve technology used in forging.

A high degree of forging precision is offered by the solid, single-piece U-frame design combined with exact guides with a large surface area. The hydraulic top pressure drive enables short strokes, a high blow sequence number and, due to the minimal pressure contact times, a reduced die load.

The special shape of the anvil construction made of high-strength cast steel guarantees a high degree of impact and low structure-borne sound radiation and thus also a low environmental load. The most advanced control systems enable the exact adjustment of the impact energy and impact sequence as well as precise die height correction.



Control block with proportional valve.

PROPORTIONAL VALVE TECHNOLOGY

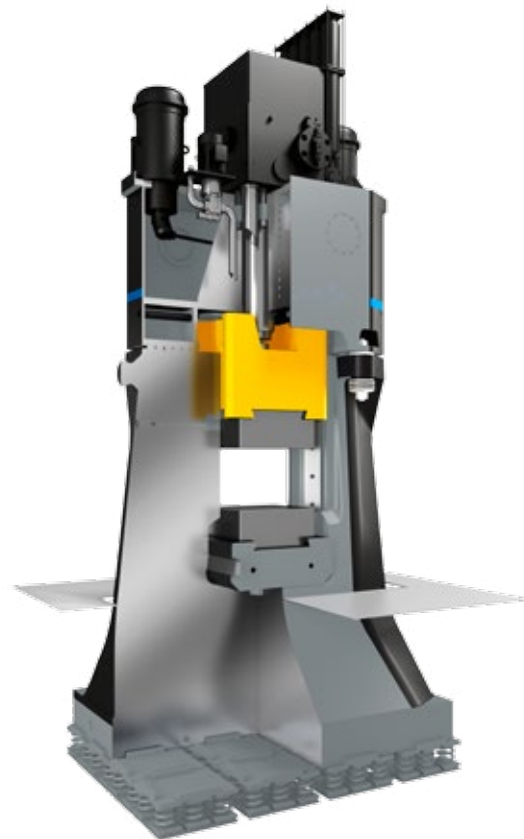
Employing modern proportional valves for impact control improves the drive of the hydraulically driven hammers. Down stroking hammers equipped with proportional valve technology have already proven to be advantageous in the following ways:

- Improved energy efficiency
- Improved automation
- Increased productivity
- High repeat accuracy (low energy fluctuations)
- Flexible stroke control enables optimal adaptation to forging processes and stroke reduction

- Low load on hydraulic components: Pressure peaks and cavitation are minimized by the ramp function of the valves
- Low maintenance costs through the simple readjustment of valves

The advantages:

- High impact sequence number
- Minimal pressure contact times
- Low operating costs
- Easy operation
- Guides with large surface area
- Universal use



MODEL OVERVIEW DOWN STROKING HAMMER

Model	KGH 1.6	KGH 2	KGH 2.5	KGH 3.15	KGH 4	KGH 5	KGH 6.3	KGH 8	KGH 10	KGH 12.5	KGH 16
Working capacity [kJ]	16	20	25	31.5	40	50	63	80	100	125	160
Impact frequency max. [min ⁻¹]	122	120	113	100	98	98	95	92	83	75	70
Tup stroke max. [mm]	635	665	685	755	790	775	805	835	885	1,160	1,190
Tup depth [mm]	470	510	550	595	640	695	750	830	890	1,020	1,050
Clearance guide width [mm]	520	570	608	664	717	766	831	890	960	1,060	1,150
Die height, total max.* [mm]	320	345	360	420	455	435	465	495	540	720	750
Total weight [t]	24	30	36	46	60	75	96	121	143	195	235

*] Without dovetails Subject to technical modifications.

LINEAR HAMMERS. ROBUST AND ENERGY-EFFICIENT.



A cylindrical linear motor is the heart of the linear drive patented by Schuler. This revolutionary technology has been successfully used in forging since 2014. The drive, designed for the field of forging, has proven to be a robust construction, which is not sensitive to dirt.

Maximum stroke accuracy thanks to linear drive. The linear hammer, developed and patented by Schuler, impresses as it offers the ultimate in stroke accuracy, which enables a never-before-seen level of precision, particularly for very sensitive forging processes. The non-contact linear drive is practically wear-free, extremely dynamic and offers the option of flexible stroke control. The machine therefore offers a maximum degree of adaptability to suit the requirements of the forging process.

The advantages offered by the direct drive:

- Maximum precision
- Optimum automation
- Press operations for bending, descaling and more are possible
- High energy efficiency
- No operating medium such as oil
- Wide base of information of process data

Cycle times fall, energy efficiency rises. The new drive technology from Schuler enables a maximum degree of adaptability to the increasingly specialized fields of application and processes inherent to forging. Thanks to the precise control, which provides repeat accuracy, forging can take place without the excess energy which would otherwise be needed.

This means that the reject rate is reduced considerably, even at a lower impact energy. Perfectly complemented by the non-contact, zero-maintenance linear drive, which directly converts electrical energy into the mechanical movement of the ram hammer, average energy savings of up to 25 percent can be achieved in comparison to hydraulic hammers.



Linear hammer with ServoDirect Technology.

SUSTAINABLE AND EFFICIENT FORMING

Less is more: If you want to optimize your profit, you need to reduce your energy consumption. This is why Schuler offers EcoForm, a range which places it well ahead of the competition: with innovative EcoForm products such as the linear hammer, hydraulic forging presses with EHF (Efficient Hydraulic Forming) or servo presses, you can work with exceptional energy efficiency. Not only can you conserve valuable resources, you can also significantly reduce your energy costs per component, thereby perfectly combining sustainability and profitability.



SUSTAINABLE
FORMING SOLUTIONS

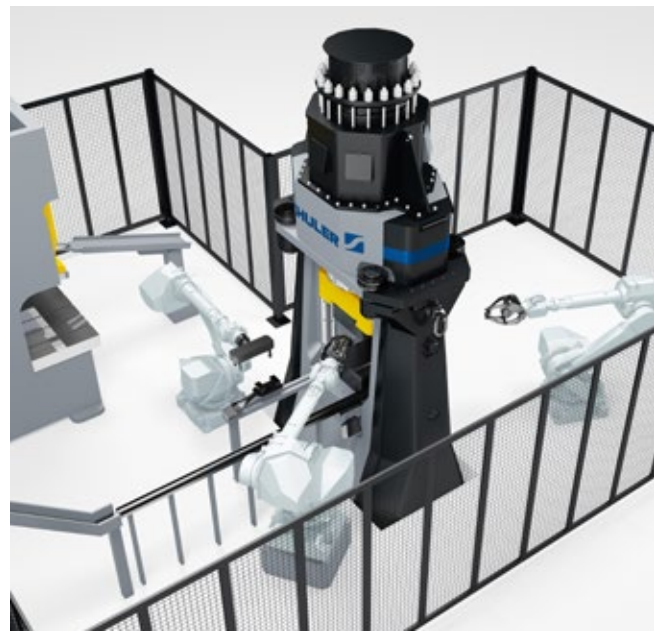
LINEAR HAMMERS. MAXIMUM ADAPTABILITY.



Maintenance-free drive head.

MAINTENANCE-FREE DRIVE.

As the forging hammer works with a non-contact, electrically driven linear motor, the standard hydraulic drive head is no longer required. As such, the dynamically highly loaded parts are reduced to a minimum, with the linear hammer being particularly low maintenance.



Optimum automation.

FLEXIBLE PROCESSES.

Process extension. The forging hammers can be quickly and easily adapted to the various tasks. This allows preform operations (descaling, bending) as well as setting blows and press operations (trimming, piercing) to be carried out.

Automated linear hammer. Thanks to the electrical drive concept, the linear hammer can be optimally integrated into automated systems. The exact path control and recording of the slide in automatic mode allows for process reliability and the operating speed to be increased.



- 1 Drive head with linear drive
- 2 Tup
- 3 Upper die
- 4 Anvil
- 5 Lower die
- 6 Anvil application

MODEL OVERVIEW FOR LINEAR HAMMER WITH SERVODIRECT TECHNOLOGY

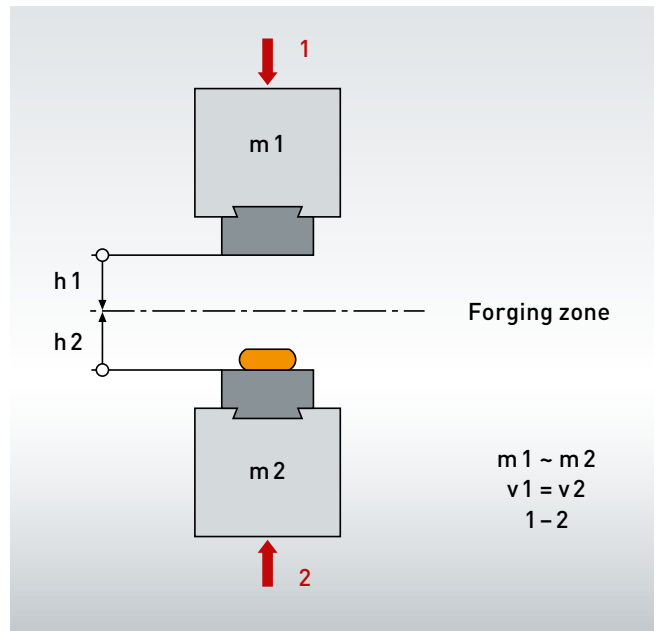
Type	KGE 1.6	KGE 2	KGE 2.5	KGE 3.15	KGE 4	KGE 5	KGE 6.3	KGE 8	KGE 10	KGE 12.5	KGE 16
Working capacity [kJ]	16	20	25	31.5	40	50	63	80	100	125	160
Impact frequency max. [min⁻¹]	135	130	125	110	108	106	104	95	90	90	80
Tup stroke max. [mm]	550	570	590	640	680	685	655	755	690	855	870
Tup depth [mm]	470	510	550	595	640	695	750	830	890	1,020	1,050
Clearance guide width [mm]	520	570	608	664	717	766	831	890	960	1,060	1,150
Die height, total max.* [mm]	320	345	360	420	455	435	465	495	540	650	750
Total weight [t]	22	28	34	44	57	72	96	121	143	195	235

*] Without dovetails Subject to technical modifications.

COUNTERBLOW HAMMERS. ECONOMIC MANUFACTURING OF LARGE FORGED PARTS.



DG 80 h counterblow hammer used in forging.



Functional principle of the Schuler counterblow hammer with equal tup masses and equal speeds.

As the first manufacturer of die forging hammers without anvils, BÉCHÉ brought the ORIGINAL COUNTERBLOW HAMMER to market in 1932. The principle involves two tups with the same approximate masses and speeds that move against one another. The use of modern drive technology enables the instantaneous reversal of the tups. This reduces the pressure contact time and thus increases the service life of the dies.

Larger installation space for tall dies. The special design allows for the installation of extremely large dies. The high tup stroke, which is the same for the lower and upper tups, enables the production of extremely tall forgings. The working capacity remains essentially the same for the various die heights.

Unique to this established design is the use of protruding dies, whereby the depth of the upper and lower tups is the same. Therefore, extremely long as well as protruding dies can be used, which is especially advantageous when manufacturing long forgings, like crankshafts, for example.

Optimal guidance accuracy. Because the guides are located so far outside, an extremely high guidance accuracy of the tups with simultaneous low guide load is achieved. The identical guide geometry of the upper and lower tups with X-arrangement achieves a uniform thermal expansion behavior. This system allows only the slightest guide play, the result of which is extremely high component accuracy.

Bear clutch. The upper and lower tups are connected to one another by way of a hydraulic coupling. After decades of experience, this low-maintenance tup coupling system is proven to be an extremely robust and low-maintenance system.

Minimization of foundation costs. Due to the equal tup masses, the disturbance forces in the ground are largely eliminated. Compared to anvil hammers and other systems with uneven tup masses, the cost of the foundation is reduced significantly since the actual impact forces with the counterblow hammer are virtually offset with the same masses. Therefore, the majority of counterblow hammers being used are grounded without vibration insulation.

Modern control with intuitive operation. Through the pre-selection of the working capacity, break times and spraying times between impacts, the modern, intuitive control enables individual adjustment for each forging. Process data acquisition and die data storage make exact reproducibility possible.

The impacts are triggered manually using three programmable foot switches or fully automatically with the forging program created in advance.



The die installation space with large tup depth and large clearance allows the use of oversized dies.

HYDRAULIC COUNTERBLOW HAMMERS. PRECISION WITH HIGH IMPACT ENERGY.



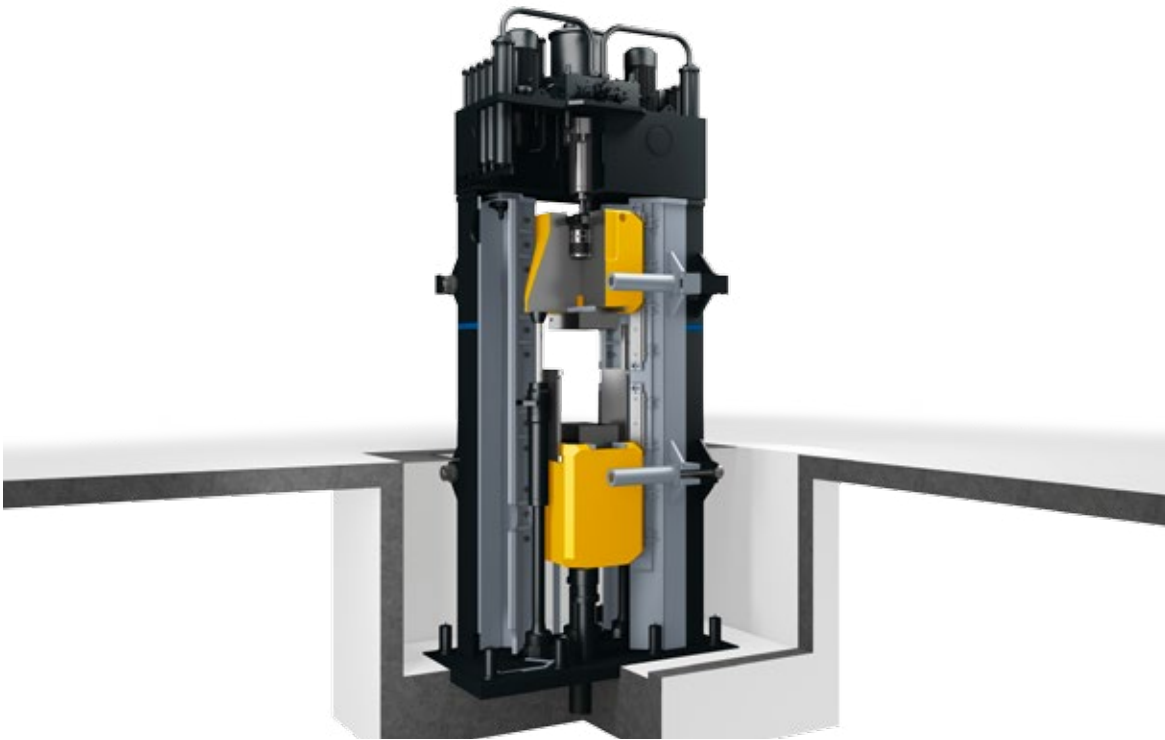
Drive head of a hydraulic counterblow hammer.

The drive, which has a compact block design in the hydraulic reservoir, is housed vibration-isolated on the stands. An exact oil temperature balance enables consistent energy dosing and simultaneously increases the service life of the oil.

The structural design of the HG counterblow hammer, with wide installation space and large tup strokes, allows especially long, tall and wide dies to be used. A low tup speed by comparison as well as the favorable design of the tups achieve high operational reliability. This results in the long service life and durability of the tups. Excellent accessibility, including to the hydraulic counterblow hammers, simplifies maintenance. Even changing a tup without having to disassemble the hammer frame is possible.

Counterblow hammers with hydraulic drive are used in the medium-power range.

Hydraulic counterblow hammers are characterized by exact energy dosing. The proportional valve control is also used for counterblow hammers. Like with the hydraulic top pressure hammer, the advantages of the proportional technology, such as high reproducibility and low pressure peaks in the hydraulic system, can be exploited with the drive of the HG counterblow hammer.



MODEL OVERVIEW HYDRAULIC COUNTERBLOW HAMMER

Model	HG 16	HG 20	HG 25	HG 31.5	HG 40
Working capacity [kJ]	160	200	250	315	400
Impact frequency max. [min ⁻¹]	50	50	50	45	45
Tup stroke max. [mm]	745	840	840	910	960
Tup depth [mm]	1,450	1,600	1,750	1,800	2,150
Clearance guide width [mm]	1,100	1,200	1,300	1,350	1,500
Die height, total max.* [mm]	630	710	710	800	900
Total weight [t]	133	161	203	255	322

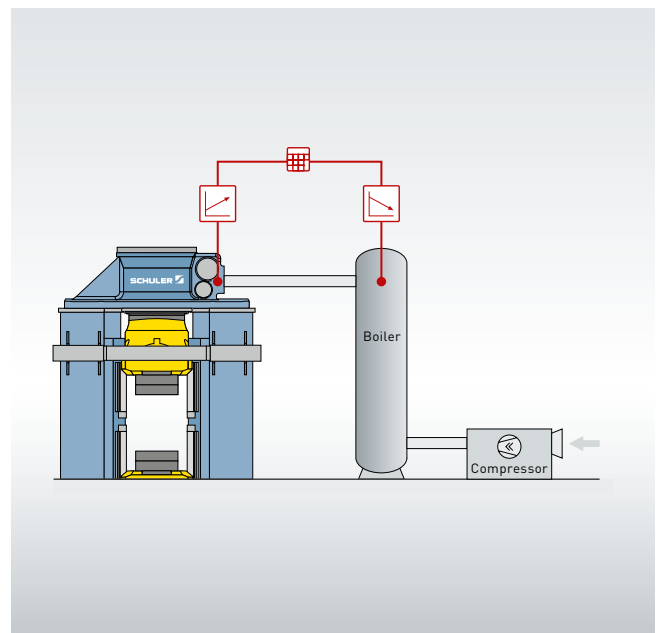
*) Without dovetails Subject to technical modifications.

PNEUMATIC COUNTERBLOW HAMMERS. THE GREATEST AMOUNT OF FORMING ENERGY FOR LARGE FORGED PARTS.



Counterblow hammer with 800 kJ working capacity.

Simple, robust compressed air drive. It is well known that hydraulic drives use less energy compared to compressed air drives. In practice, compressed air-powered counterblow hammers are known for their high level of availability thanks to a simple and robust drive that has a considerable impact on efficiency. With pneumatic counterblow hammers, the drive components are not located in the vibration range. The results are extremely low standstill and maintenance times and a high degree of utilization of the machine. It is this combined with the low energy costs that impact the overall economy of the system.



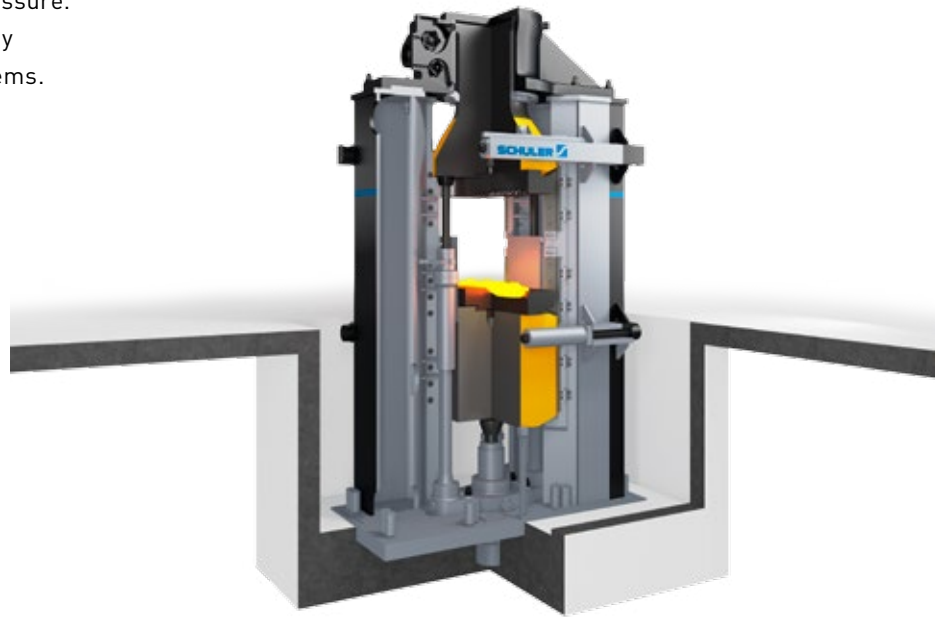
The compressed air sensor in the tank allows for the valves to have variable switching times.

Last but not least, energy-efficient compressor units and high operational reliability contribute to making pneumatic counterblow hammers still the preferred choice when it comes to counterblow hammers.

High impact frequency. The pneumatic drive enables a high number of consecutive impacts without the impact frequency slowing down. In practice, impact sequences of more than 100 impacts per forged part are achieved.

Improved energy dosing. Through the energy-efficient expansion of the drive medium during the impact stroke, the working capacity remains essentially the same for the various die heights.

When using compressed air compensation, the current pressure in the tank is measured immediately before the triggered forging blow. The switching time of the valve group is then calculated and the reproducibility is clearly improved as a result despite the falling boiler pressure. Through these measures, energy dosing accuracy is achieved that is comparable to hydraulic systems.



MODEL OVERVIEW PNEUMATIC COUNTERBLOW HAMMER

Model	DG 16	DG 20	DG 25	DG 31.5	DG 40	DG 50	DG 63	DG 80	DG 100	DG 125	DG 140
Working capacity [kJ]	160	200	250	315	400	500	630	800	1,000	1,250	1,400
Impact frequency max. [min ⁻¹]	50	45	45	40	40	36	36	32	28	25	25
Tup stroke max. [mm]	745	840	840	910	960	970	1,020	1,035	1,100	1,150	1,225
Tup depth [mm]	1,450	1,600	1,750	1,800	2,150	2,400	2,700	3,000	3,400	3,600	3,700
Clearance guide width [mm]	1,100	1,200	1,300	1,350	1,500	1,500	1,600	1,600	1,700	1,900	2,000
Die height, total max.* [mm]	630	710	710	800	900	900	900	1,000	1,100	1,100	1,200
Total weight [t]	120	145	180	210	285	355	433	650	850	1,050	1,200

*) Without dovetails Subject to technical modifications.

MODERN HAMMER CONTROL. SCHULER FORGE-CONTROL-SYSTEM (FCS).



Modern plant operating system with touchscreen.



The icon-based visualization is intuitive and simple.

The Schuler control represents the latest development in the area of controls for forging hammers. It was specially developed for work-dependent forging units and unites the most advanced functionality, high flexibility and maximum accuracy for controlling the required machine parameters.

The standard functions, depending on the unit and application, include a number of impact program defaults, energy and part thickness measurement, control circuits for energy and TDC position as well as documentation functions for die and production data.

The central control for partial or fully automatic forging cells includes the integration of all line components.



All relevant information is available at a glance during forging operations.



Central control for all line components.

THE ADVANTAGES

- Simple operation using the uniform, graphical touchscreen user interface.
- Control circuits which guarantee adherence to the process parameters
- Monitoring functions for parameters which impact quality, such as impact energy, part thickness and part temperature
- Exact dosing of the required impact energy
- Visualization of every customer language possible
- Access to machine documentation, circuit diagrams and fluid plans
- Remote maintenance and diagnostics
- External data backup interfaces for connecting to a customer network or ERP system (e.g. SAP)

AUTOMATION FROM SCHULER. ROBOT AUTOMATED HAMMER LINES.



Robot automated hammer line for optimal processes.

High-performance, thanks to robot automation. Forging hammers can be efficiently automated using the robots provided. The results: an increased level of output and consistent product quality, as well as increased safety and reliability throughout the entire production process. Depending on the parts geometry and operating speed requirements, two or three robots are used to automate the hammer.



Patented special pliers for use in automated hammer lines.

They are equipped with patented special pliers that allow the isolated uncoupling of the robot from the forging blows of the hammer.

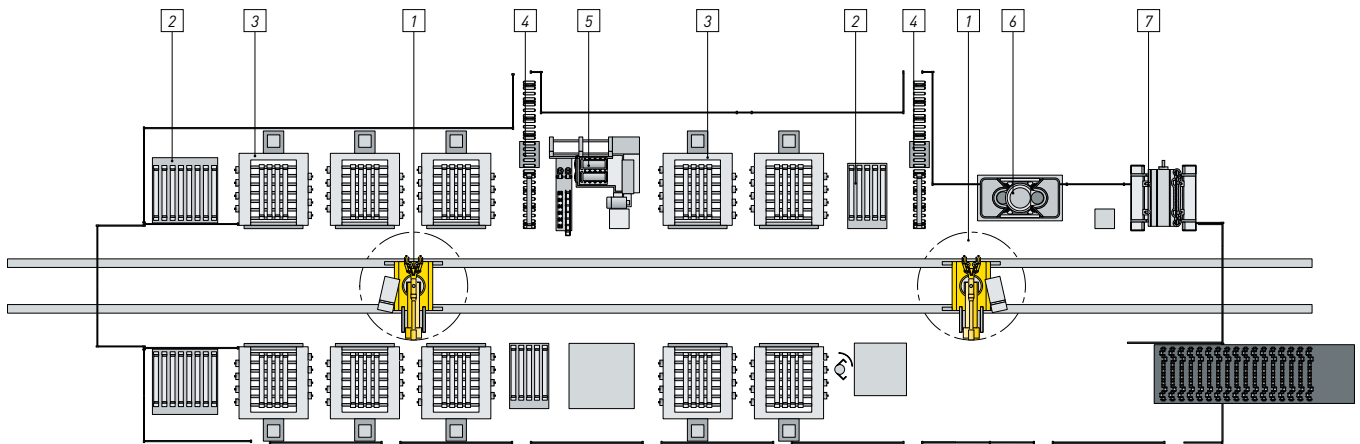
In this way, robot automation creates further potential to increase performance, cost effectiveness, and productivity – particularly in combination with the new hammer and linear drive.

SYSTEM SOLUTIONS FROM SCHULER. TURN-KEY SYSTEMS.

Tailor-made systems. As a supplier of customized system solutions, Schuler provides the complete press line as a turnkey system on request. Sophisticated system technology is the prerequisite for efficient production, which is reflected by the high degree of flexibility in the combination with the corresponding peripheral devices.

PARTIALLY AUTOMATED FORGING LINE WITH COUNTERBLOW HAMMER AND DEBURRING/SIZING PRESS

- | | |
|--------------------|------------------------------|
| 1 Manipulator | 5 Forging roller |
| 2 Storage location | 6 Counterblow hammer |
| 3 Furnace | 7 Deburring and sizing press |
| 4 Descaling | |



SCHULER SERVICE.

STATE-OF-THE-ART SERVICE FOR
MORE PERFORMANCE.

Schuler Service offers a tailored portfolio of services covering the entire life cycle of your equipment.



Schuler Service – Customer-oriented & efficient, worldwide.

Over 900 service employees worldwide provide expert support 24/7 in close cooperation with you – our partners. Our main priority is always to ensure the maximum productivity and safety of your production equipment in order to secure your company's continued success.

With over 175 years of experience and expertise, we can guarantee the best possible support for the operation of your machines – and not only those supplied by Schuler, but by all other manufacturers. Whatever the situation, Schuler Service has the right solution for your specific needs.

OUR SERVICES FOR YOU.

Technical Customer Support:

- Machine inspections
- Safety inspections
- Preventive maintenance
- Repair
- Repair welding
- Production support

Components and Accessories:

- Spare parts and spare part packages
- Maintenance kits
- Repair parts
- Replacement parts

Project Business:

- Modernization
- Retrofits
- Refurbishment
- Machine relocations

Special Services:

- Service contracts
- Hotline and remote service
- Training
- Tailored customer training
- Optimizing plant & processes
- Consulting

Used Machinery:

- Purchase and sale
- Evaluation

SCHULER SERVICE ONLINE



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www.schulergroup.com/service_en

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www.schulergroup.com/forging

Find out more. Simply scan the QR code with the camera of your smartphone or tablet.

Schuler Pressen GmbH

Schussenstraße 11

88250 Weingarten

Germany

Sales telephone +49 751 401-2214

Service telephone +49 751 401-2244

Fax +49 751 401-2694

forging@schulergroup.com

www.schulergroup.com/forging

