

Generators for Inductive Heating

eldec
Member of the EMAG Group



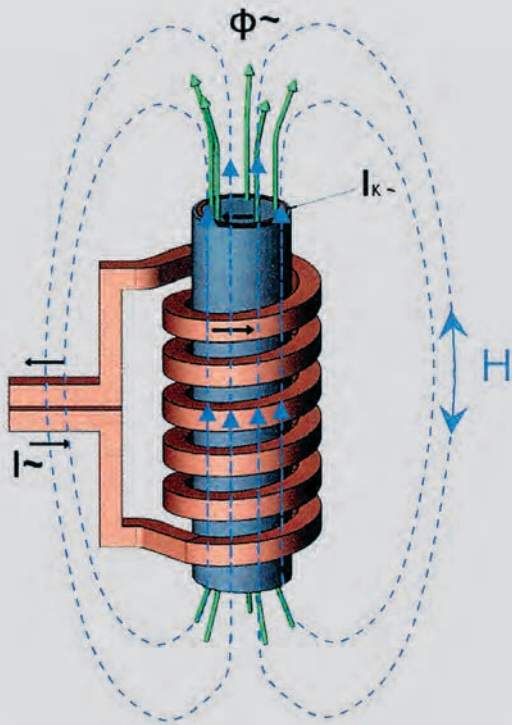


The Fascination of Induction Heating

An electromagnetic field used for a specific purpose, with its frequency, rating and field characteristics adjusted to the zone of a workpiece requiring heating- this is the basic idea behind industrial induction heating. It is a fascinating subject in terms of its technical implementation and effect. The main components of an inductive heating system are the inductor and the energy source. This energy source, also known as the generator, supplies an alternating current with the perfect frequency and rating for the specific requirement on the basis of an electrical resonant

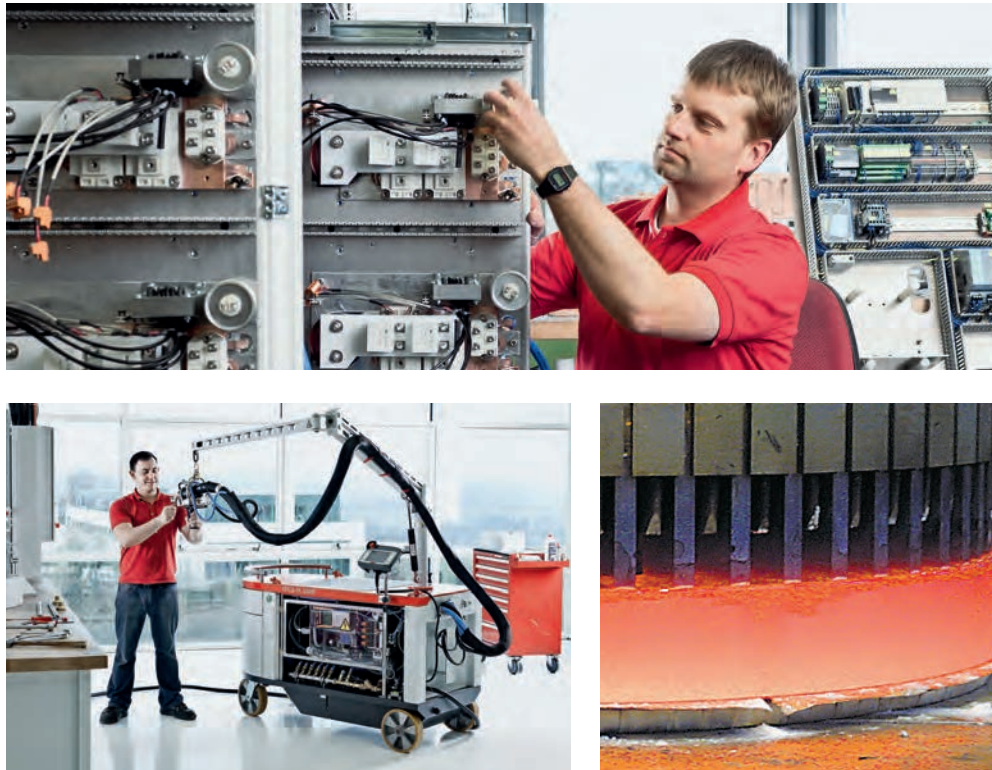
oscillation circuit consisting of capacitors (capacitance) and an inductor (inductance). The shape of the inductor is customized as much as possible to the appropriate zone for the workpiece requiring heating. Due to the alternating current produced by the generator, an electromagnetic field forms around the inductor. This field is aimed at an electrically conductive workpiece which it quickly heats up. This targeted and brief input of energy ensures that the workpiece experiences minimal warping while also guaranteeing high energy efficiency.

The high reproducibility of the energy input and the consistently high workpiece quality is another benefit compared to other heating methods. The main process parameters can be documented during the process for each workpiece if necessary.



$$U_{ind} = -w_2 \frac{d\Phi}{dt} = -w_2 \cdot \mu_0 \cdot A \cdot \frac{dH}{dt}$$





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eldec – All from a Single Source

“Turnkey” is an essential keyword for modern mechanical engineering: Production equipment must be precise and turnkey. All the central components should originally be from a single source – and that is exactly what eldec offers for the complex field of induction heating.

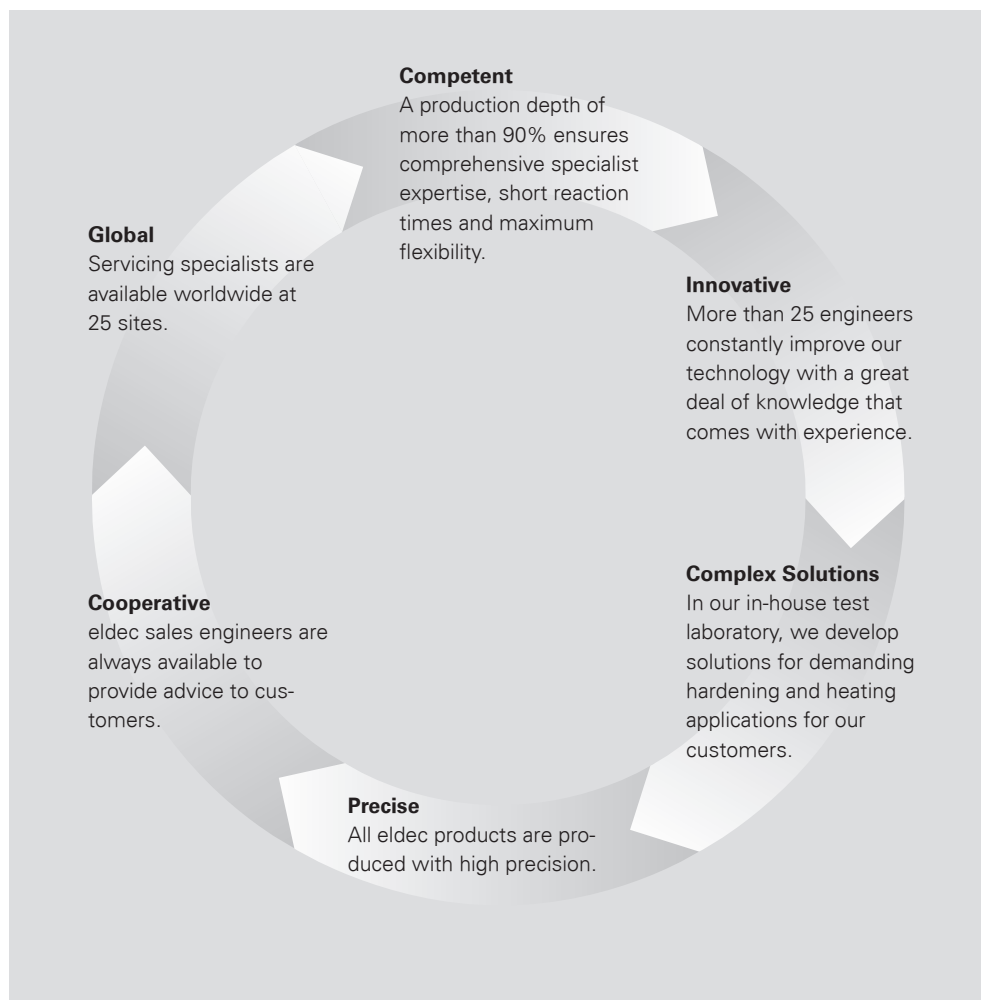
Not only do we have enormous production depth which guarantees high quality solutions down to the last detail, we also have our own process team to develop complex heating processes for our customers.

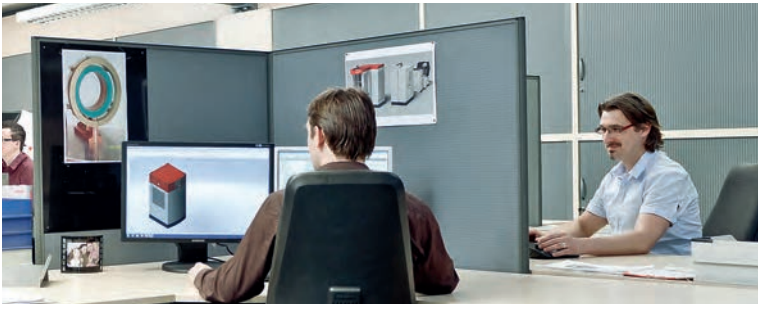
We have been involved with induction technology for decades – everything started with the design of inductors. Today our experts develop complete heating and hardening systems for a very wide range of industrial applications, but our generators and inductors are at the heart of them all. They form the basis for every induction system. A great deal of experience is used in their development, while their assembly is very similar to that of a high-quality manufacturing process.

Over the last few years, we have established a global EMAG eldec sales and service network manned by specialists. Sales representatives are located all over the world, which allows us to

guarantee excellent local customer support.

Ultimately, we are striving to achieve the same objective with every one of our products: high-quality, sustainable and efficient technology. In order to ensure our success, we use our experience, entrepreneurial tradition and innovative ideas to achieve our goals. How can we help you improve your production process?





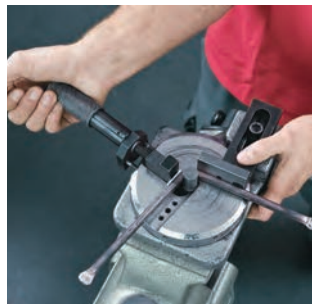
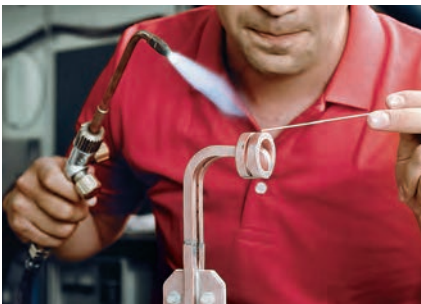
Innovation: The company's development department guarantees the same high technical standard for all eldec product lines. The expertise acquired over many years is used in our new developments and enables us to create complex solutions to any heating task.



Competence: At our site in Dornstetten, Germany, we have 10 development engineers and 15 fitters and technicians working very closely together to ensure high quality for every product.



Quality Control: Series of tests in our in-house test laboratory provide the basis for reliable production standards. Individual series of measurements with expertly set parameters accompany the production processes.



Precision: Our manual production ensures maximum precision in inductor production. Solid craftsmanship is guaranteed for perfectly functional inductors, tailored to the design of your workpiece.



Expert Advice: Technical advice from eldec sales engineers, customized to customers' needs, allows us to find the best solution for every manufacturing task.



The Global Service Network: enables us to provide intensive, fast customer support all over the world. Our specialists are spread out across the globe allowing for quick travel times to all of our customers. On the back of our brochure, you will find the addresses of our sales and service partners. Or contact our staff in Dornstetten and we'll put you in touch with your nearest contact.

eldec Generators and MICOs: Powerful, Precise, Energy-Efficient

eldec generators are the basis for reliable induction heating. Sophisticated rectifiers, sturdy IGBT inverter modules and high-efficiency resonant oscillation circuit components combined with the microprocessor controlled high-speed eldec control and regulating architecture form a product which

is second to none on the market in terms of adjustment range, efficiency, energy dosing and reliability. Thousands of these generators have been built and are consistently being improved. eldec can provide you the perfect product for any application: The PICO, PRODUCT LINE and CUSTOM LINE product lines are com-

prised of medium- and high-frequency generators from 1.5 to 1,500 kW while DF and SDF® generators range from 50 to 3,000 kW.

eldec Generators

PICO by eldec Generator



Compact, red, strong:
Just heat. Low-cost energy sources with a single output and very simple intuitive control MF and HF 5 – 150 KW.

eldec ECO LINE Generators for HF and MF



The mid-range:
Energy sources with single or multiple outputs to act as a stand-alone solution or for integration in complete systems. MF and HF 5 – 150 kW.

eldec CUSTOM LINE Generators for HF, MF, DF, LF and SDF®



Everything is possible:
Bespoke energy sources with single or multiple outputs and a wide range of power and frequency combinations. LF, MF, HF, DF, SDF® 20 – 3,000 kW.



eldec MICO

All in one:
Mobile energy sources with integrated active cooler and intuitive touchscreen control (MF and HF 20 – 70 kW).



MICO-S



MICO-M



MICO-L



The eldec Generator Portfolio

The sophisticated induction technology used in eldec generators makes it possible to supply energy extremely efficiently for all types of heating systems and induction hardening machines. These generators form the basis for solid production chains.

- Device protection by robust IGBT transistor technology: Short-circuit and open-circuit proof. Even accidental workpiece contact does not damage the generator.
- High efficiency of over 90% in all power classes.
- Flexible energy transfer: eldec generators are available with hose packages of up to 15 m in length.
- Automatic adjustment to the resonance frequency and inductor dimensions.
- Precision energy dosing ($\pm 2\%$) for high reproducibility and therefore excellent process capability (SPC).
- High power density due to the improved design of all components.
- Large frequency, power and adjustment ranges.
- Maintenance-free.
- Inverter in modular design.
- Easy operation and handling.
- Integration in higher-level manufacturing systems using various interfaces (analog and bus).
- Extensive range of multiple-power outputs: Switchable multiple outputs 2A, 3A, 4A, 5A, 6A (power available on an either/or basis for each output). Parallel multiple outputs: Twin, quad, triple all the way to eight-way multiple outputs (power available in parallel and on an individually controllable basis). Symmetrical multiple outputs (power available in parallel, not individually controllable).
- All power details on the basis of 100% duty cycle. Short-term power increase to order.
- eQC provides a range of functions and possibilities for quality monitoring.



PICO by eldec – Compact Medium-Frequency and High-Frequency Generators

Just heat! Low-cost energy sources with a single output and very simple intuitive control. The PICO series is complete with three sizes and a variety of power classes. PICO-S, PICO-M and PICO-L are our low-cost devices with uncompromising eldec quality due to the high level of component standardization. Developed,

built and tested by eldec. eldec PICO generators are available as medium-frequency and high-frequency energy sources from 5 to 150 kW for the inductive heating of a wide range of workpieces and materials. PICO generators are extremely compact and feature maximum power density as well as very simple handling.

Thanks to the new, intuitive user interface, "plug & play" is now a reality. Equipped with the familiar user friendly functions, it is a simple but extremely power-dense generator.

MFG / HFG power 5 – 150 kW



MF power: 5 – 150 kW

HF power: 5 – 75 kW

MF frequency ranges:

8 – 20 kHz or 16 – 40 kHz

HF frequency ranges:

100 – 250 kHz or 160 – 400 kHz

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator	
	V	A	l/min	W x H x D mm	kg
PICO-S 5 MF	3 x 400	10	8	450 x 280 x 510	50
PICO-S 10 MF	3 x 400	20	8	450 x 280 x 510	50
PICO-S 15 MF	3 x 400	32	8	450 x 280 x 510	50
PICO-S 20 MF	3 x 400	35	10	450 x 280 x 510	50
PICO-S 30 MF	3 x 400	63	12	450 x 280 x 510	60
PICO-S 5 HF	3 x 400	10	8	450 x 280 x 510	50
PICO-S 10 HF	3 x 400	20	8	450 x 280 x 510	50
PICO-S 15 HF	3 x 400	32	8	450 x 280 x 510	50
PICO-M 50 MF	3 x 400	100	27	550 x 560 x 510	120
PICO-M 75 MF	3 x 400	160	32	550 x 560 x 510	120
PICO-M 25 HF	3 x 400	50	11	550 x 560 x 510	110
PICO-M 35 HF	3 x 400	63	12	550 x 560 x 510	110
PICO-L 100 MF	3 x 400	200	37	550 x 910 x 800	170
PICO-L 150 MF	3 x 400	315	50	550 x 910 x 800	200
PICO-L 50 HF	3 x 400	100	27	550 x 910 x 800	160
PICO-L 75 HF	3 x 400	160	32	550 x 910 x 800	180

Equipment:

Operating modes: permanent, jog, timer
Control types: output, electricity, temperature (pyrometer)
8 different timers, each with a max. running time of 600 s
Intuitive operation using sealed keypad and display
Also for PICO-M and L: two-channel emergency stop

Options:

Control using foot pedal and external interface available
eldec brazing gun can be used
Profibus / Profinet interface on request
Options package for PICO-M and L: crane-compatible
Housing with IP54 enclosure and chassis

eldec ECO LINE MF Generators

The mid-range: energy sources with single or multiple outputs. Designed to act as either a stand-alone solution or for integration in complete systems. The ECO LINE series devices are available as MF units with a permanent power of 5 – 150 kW and up to 225 kW with short-term power increase. The ECO LINE is available

with a wide range of options and output versions. For example, each rating class is also available in 2A form (two outputs, heating sequentially), x2 form (two outputs heat simultaneously and independently of each other) and :2 form (heat simultaneously and symmetrically). With its compact design and wide range of control

features (optional Profibus / Profinet interface), ECO LINE is ideal for integrating into complete systems. The newly designed control panel enables you to control the generator intuitively.

MFG power 5 – 15 kW



eldec ECO LINE MF Generators

The mid-range: energy sources with single or multiple outputs designed to act as a stand-alone solution or for integration in complete systems.

MF power: 5 – 150 kW

MF frequency ranges: 10 – 25 kHz
(other frequencies to order)

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial transformer dimensions
	V	A	l/min	W x H x D mm	kg	ø x L mm
MFG 5	3 x 400	10	8	553 x 320 x 600	40	56 x 120-250
MFG 10	3 x 400	32	8	553 x 320 x 600	40	56 x 120-250
MFG 15	3 x 400	35	8	553 x 320 x 600	45	56 x 120-250

MFG power 20 – 150 kW

Type / Rating	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial transformer dimensions
	V	A	l/min	W x H x D mm	kg	ø x L mm
MFG 20	3 x 400	35	10	553 x 600 x 800	80	80 x 160-330
MFG 30	3 x 400	63	12	553 x 600 x 800	80	80 x 160-330
MFG 50	3 x 400	100	27	553 x 790 x 800	90	80 x 160-330
MFG 75	3 x 400	160	32	553 x 790 x 800	100	80 x 200-330
MFG 100	3 x 400	200	37	553 x 970 x 800	135	120 x 260-380
MFG 150	3 x 400	315	50	553 x 1,150 x 800	180	120 x 260-380

eldec ECO LINE HF Generators

The mid-range: energy sources with single or multiple outputs designed to act as a stand-alone solution or for integration in complete systems. The ECO LINE series devices are available as HF units with a permanent power of 5 – 75 kW. The ECO LINE is available with a wide range of options and output versions. For example, each

rating class is also available in 2A form (two outputs, heating sequentially), x2 form (two outputs heat simultaneously and independently of each other) and :2 form (heat simultaneously and symmetrically). With its compact design and wide range of control features (optional Profibus / Profinet interface), the ECO LINE is ideal for

integrating into complete systems. The newly designed control panel enables you to control the generator intuitively.

HFG power 5 – 15 kW



eldec ECO LINE HF Generators

The mid-range: energy sources with single or multiple outputs designed to act as a stand-alone solution or for integration in complete systems.

HF power: 5 – 75 kW

HF frequency ranges: 140 – 350 kHz
(other frequencies to order)

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial transformer dimensions
	V	A	l/min	W x H x D mm	kg	ø x L mm
HFG 5	3 x 400	10	5	553 x 320 x 600	40	45 x 120-250
HFG 10	3 x 400	20	6	553 x 320 x 600	40	45 x 120-250
HFG 15	3 x 400	32	8	553 x 320 x 600	45	45 x 120-250

HFG power 20 – 75 kW

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial transformer dimensions
	V	A	l/min	W x H x D mm	kg	ø x L mm
HFG 20	3 x 400	35	10	553 x 600 x 800	90	70 x 160-330
HFG 30	3 x 400	63	12	553 x 790 x 800	90	160 x 160-330
HFG 50	3 x 400	100	27	553 x 1,150 x 800	130	295 x 230 x 410
HFG 75	3 x 400	160	32	553 x 1,150 x 800	150	295 x 230 x 410



eldec Coolant Systems

eldec generators are generally watercooled as a result of their high power density. We can supply all our generators and systems with suitable passive or active coolant systems to order.

ECO LINE options for MFG

Mains voltage 200 V, 380 V, 400 V, 480 V, 560 V
 Hose package up to 15 m in length
 Profibus, Profinet interface for control
 by serial-parallel switch
 Frequency 16 – 40 kHz
 Frequency switchover 8 – 20/16 – 40 kHz
 Rapid change device (coax / cable box)
 Ground fault monitor
 Energy control
 Temperature control with pyrometer
 Temperature recorder
 Cable box with heating cable for shrink applications
 Foot switch / pedal
 Brazing gun
 Current and voltage display
 Coolant systems on request

ECO LINE options for HFG

Mains voltage 200 V, 380 V, 400 V, 480 V, 560 V
 Hose package up to 15 m in length
 Profibus, Profinet interface
 Coax winding switchover
 Ground fault monitor
 Energy control
 Temperature control with pyrometer
 Temperature recorder
 Foot switch / Pedal
 Brazing gun
 Current and voltage display
 Coolant systems to order



Control unit:

Display size: 7.5"
 Memory: 32 MB
 Universal connections to other systems:
 1 Ethernet interface and 2 serial interfaces
 2 USBs
 1 SD card slot

Enclosure: IP65 – washable
 Flat display with no recesses
 Simple, intuitive control
 Clear menu guide
 Direct selection of generator operating modes
 Large display area
 Only required controls are displayed



eldec CUSTOM LINE MF/HF/LF Generators

Bespoke energy sources with single or multiple outputs and a wide range of power and frequency combinations. LF, MF, HF, DF, SDF® 20 – 3,000 kW.

MF power: 200 – 1,500 kW

MF frequency ranges: 8 – 40 kHz

HF power: 100 – 1,500 kW

HF frequency ranges: 80 – 400 kHz

LF power: 50 – 500 kW

LF frequency ranges: 2 – 5 kHz

MFG control cabinet housing, power 200 – 1,500 kW

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial / Output transformer dim.
	V	A	l/min	W x H x D mm	kg	W x H x D mm
MFG 200	3 x 400	400	70	1,000 x 2,100 x 600	310	160 x 400 or
MFG 250	3 x 400	500	75	1,000 x 2,100 x 600	320	2 x 120 x 380
MFG 300	3 x 400	630	80	1,400 x 1,980 x 600	450	370 x 400 x 500
MFG 400	3 x 400	800	100	1,400 x 1,980 x 600	550	370 x 400 x 500
MFG 500	3 x 400	1,000	120	2,000 x 2,000 x 1,200	700	370 x 400 x 500
MFG 600	3 x 400	1,200	140	2,000 x 2,000 x 1,200	750	370 x 400 x 500
MFG 700	3 x 400	1,400	160	2,000 x 2,000 x 1,200	800	370 x 400 x 500
MFG 800	3 x 400	1,500	200	2,000 x 2,000 x 1,200	820	370 x 400 x 500
MFG 1000	3 x 400	2,000	250	2,000 x 2,000 x 1,200	950	370 x 400 x 500
MFG 1500	3 x 400	3,000	350	2,000 x 2,000 x 1,200	1,100	370 x 400 x 500

HFG control cabinet housing, power 100 – 1,500 kW

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial / Output transformer dim.
	V	A	l/min	W x H x D mm	kg	W x H x D mm
HFG 100	3 x 400	300	60	1,000 x 2,100 x 600	250	295 x 230 x 410
HFG 150	3 x 400	300	65	1,000 x 2,100 x 600	300	386 x 510 x 500
HFG 200	3 x 400	400	70	1,000 x 2,100 x 600	310	550 x 400 x 550
HFG 250	3 x 400	500	75	1,000 x 2,100 x 600	320	On request
HFG 300	3 x 400	630	80	1,400 x 1,980 x 600	450	On request
HFG 400	3 x 400	800	100	1,400 x 1,980 x 600	550	On request
HFG 500	3 x 400	1,000	120	1,400 x 1,980 x 600	700	On request
HFG 600	3 x 400	1,200	140	2,000 x 2,000 x 1,200	800	On request
HFG 700	3 x 400	1,400	160	2,000 x 2,000 x 1,200	820	On request
HFG 800	3 x 400	1,400	200	2,000 x 2,000 x 1,200	950	On request
HFG 1000	3 x 400	2,000	250	2,000 x 2,000 x 1,200	1,100	On request
HFG 1500	3 x 400	3,000	350	2,000 x 2,000 x 1,200	1,200	On request



eldec Coolant Systems

eldec generators are generally watercooled as a result of their high power density. We can supply all our generators and systems with suitable passive or active coolant systems to order.

CUSTOM LINE options for MFG

Mains voltage 200 V, 380 V, 400 V, 480 V, 560 V
 Hose package up to 15 m in length
 Profibus interface
 Serial-Parallel switch
 Frequency 16 – 40 kHz
 Frequency switchover 8 – 20/16 – 40 kHz
 Rapid change device (coax / cable box)
 Ground fault monitor
 Energy control
 Temperature control with pyrometer
 Temperature recorder
 Cable box with heating cable for shrink applications
 Foot switch / Pedal
 Brazing gun
 Current and voltage display

Coolant systems on request

CUSTOM LINE options for HFG

Mains voltage 200 V, 380 V, 400 V, 480 V, 560 V
 Hose package up to 15 m in length
 Profibus interface
 Coax winding switchover
 Ground fault monitor
 Energy control
 Temperature control with pyrometer
 Temperature recorder
 Foot switch / Pedal
 Brazing gun
 Current and voltage display

Coolant systems to order
 eQC + multiple outputs



eldec DF Generators: Two Frequencies in One Generator

eldec is well-known for its SDF® technology. Patented dual-frequency generators can be operated simultaneously or separately with both medium and high frequency. Although SDF® generators are suitable for users looking for a generator with an adjustable frequency, but who do not want

to operate it with simultaneous frequency, they are often too expensive. We can now supply DF generators (dual-frequency generators) for these applications: adjustable dual-frequency generators with the product and service quality you expect from eldec.

DFG power 50/50 – 70/200 kW



eldec CUSTOM LINE DF Generator for MF/HF

DF generators are available with various output rating combinations of the medium frequency and high frequency range.

MF/HF power: 50/50 – 70/200 kW

MF frequency ranges: 8 – 20 kHz, 10 – 25 kHz, 16 – 40 kHz

HF frequency ranges: 140 – 350 kHz oder 160 – 400 kHz

DFG MF / HF Sample combinations	Power connection + 10 % 50/60 Hz		Required cooling wa- ter without inductor	Generator dimensions		Output transformer
	V	A		W x H x D mm	kg	
DFG 50 / 50	3 x 400	96.2	30	1,000 + 400 x 2,100 x 600	90	Dimensions de- pendent on heating process
DFG 120 / 50	3 x 400	222	50	1,000 + 400 x 2,100 x 600	90	
DFG 150 / 75	3 x 400	227	60	1,000 + 400 x 2,100 x 600	130	
DFG 70 / 200	3 x 400	385	90	2,000 x 2,100 x 600	150	

DFG options and range of functions

Control types: output, electricity, temperature
Control using foot pedal and external interface available
Profibus
Recipe management
Temperature record

The following output rating combinations can be selected as required:

MF versions:
50, 70, 100, 130, 150, 200, 250 kW

HF versions:
30, 50, 75, 100, 150, 200 kW



eldec SDF®

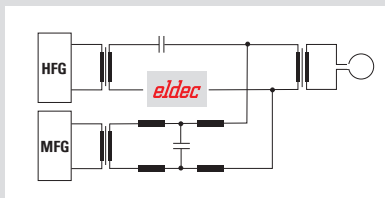
Simultaneous Dual Frequency Generators

eldec SDF® generators mean that, in addition to the conventional use of HF or MF energy, it is now also possible to apply two different frequencies (HF and MF) simultaneously to an inductor. For this purpose, SDF® generators have one HF and one MF converter equipped with a common power output including HF oscillation

being superimposed on the basic medium-frequency oscillation.

eldec SDF® generators are primarily used in complete hardening systems. Please request our separate brochure for more information.

SDF® power 50 – 3,000 kW



eldec SDF®: Patented circuit topology

eldec SDF® (simultaneous dual frequency) generators – our energy sources with maximum power density designed with simultaneous dual frequency technology for inductive hardening.

10 kHz to 25 kHz and 150 kHz to 350 kHz.

Unique and patented worldwide – simultaneous heating with medium and high frequency.

Flexible use as pure MF or HF energy source is possible.

Particularly beneficial for the contour-true edge layer hardening of complex surface geometries.

Device protection by robust IGBT transistor technology: short-circuit and open circuit proof. Even accidental workpiece contact does not damage the generator.

High efficiency of over 90% in all power classes.

Microprocessor-controlled, high-speed eldec control print and PLC allow the control cycle to be in single digit milliseconds.

Precision energy dosing for high reproducibility and therefore excellent process capability (SPC).

Maximum energy density => short process times.

Combination of pulse width modulation and pulse package control.



eldec CUSTOM LINE SDF® Generators

eldec SDF® (simultaneous dual frequency) generators feature a high power density in simultaneous dual frequency technology.

Power: 50 – 3,000 kW

Frequency: 10 kHz to 25 kHz and 150 kHz to 350 kHz

eldec SDF® generators are held in an electrical cabinet

SDF® power 50 – 3,000 kW

Type / Rated capacity	Power connection + 10 % 50/60 Hz		Required cooling water without inductor	Dimensions / Weight Generator		Coaxial/Output transformer dim.
	V	A		W x H x D mm	kg	
SDF® 50	3 x 400	100	80	1,000 x 2,100 x 600	280	125 x 480
SDF® 75	3 x 400	250	100	1,000 x 2,100 x 600	300	370 x 350 x 500
SDF® 100	3 x 400	200	100	1,000 x 2,100 x 600	320	370 x 350 x 500
SDF® 150	3 x 400	300	150	1,000 x 2,100 x 600	350	370 x 350 x 500
SDF® 200	3 x 400	400	160	1,100 x 1,980 x 600	500	370 x 350 x 500
SDF® 300	3 x 400	600	180	1,100 x 1,980 x 600	700	370 x 350 x 500
SDF® 450	3 x 400	1,000	200	2,000 x 2,000 x 1,200	800	350 x 350 x 650
SDF® 800	3 x 400	1,600	250	2,000 x 2,000 x 1,200	1,200	350 x 350 x 650
SDF® 1000	3 x 400	2,000	350	2,000 x 2,000 x 1,200	1,500	350 x 350 x 650
SDF® 3000	3 x 400	6,000	500	6,000 x 2,000 x 1,200	3,000	350 x 350 x 650

SDF® options

Profibus interface
 Profinet
 Ground fault monitor
 Energy control
 Temperature control with pyrometer
 Current and voltage display
 Coolant systems to order



eldec SDF® generators are multifunctional, but are primarily integrated in complete hardening systems. Please request our separate brochure for more information.

SDF® generator controller

RFID (radio frequency identification) unit for inductor:
Process monitoring is very important for induction hardening. For this reason, EMAG eldec induction GmbH has developed an RFID interface between the inductor and machine. The geometry and properties of the inductors used are important parameters which must be monitored during hardening processes. An RFID (radio frequency identification) system essentially includes a read-write unit and a writeable chip. The read-write unit is included in the inductor support while the chip is fitted in the inductor foot. Various data such as the number of heating cycles, equipment code, possible positioning instructions for the machine, flow values, information about repairs/modifications made, etc. can be saved. The interaction

between the RFID system and the hardening machine therefore ensures the clear identification of the correct tool for the component and complete documentation of the properties and history of the inductor.

SDF® coolant system



eldec Coolant Systems

eldec generators are generally watercooled as a result of their high power density. We can supply all our generators and systems with suitable passive or active coolant systems to order.



eldec MICO: Energy Source and Coolant System in One

Small and compact, stationary or mobile. The newly designed and built inductive heating system integrates the frequency converter and coolant system in a single housing, making the device suitable for a wide range of uses. This means maximum flexibility for your heating task. These machines make inductive brazing, tempering, cutting-edge hardening and coating/de-coating practical and straightforward.

In S, M or L – the MICO series is available in various power ratings (from 15 kW to 70 kW) and sizes and can be used in either stationary or mobile form.

MICO can be configured with rollers, crane hooks or forklift openings as well as with various work surfaces and with a wide range of tools, inductors, brazing guns or heating cables and other auxiliary equipment, retractable arms with parallelogram kinematics, short or long arms and with special balancers.

The MICO modular kit consists of the energy container (generator and coolant system), the stationary or mobile base plate and fixtures for tool handling together with the corresponding tools.



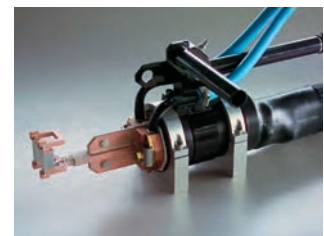
Operated using touchscreen



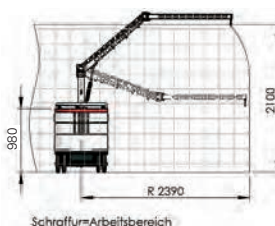
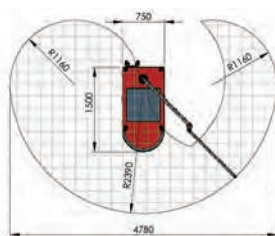
Cable box with heating cable



Practical storage of tools, etc.



Inductor with coax transformer, brazing copper connections



Schraffur=Arbeitsbereich
Working range using the example of the MICO-M, arm with parallelogram kinematics



Ergonomic Handling



MICO-S



MICO-M



MICO-L

eldec MICO

Energy container with generator, active coolant system, PLC system controller, 4 m hose package with coaxial transformer. Stationary base plate (with forklift openings), 4 crane hooks.

eldec MICO-S, MICO-M, MICO-L

Type	MF power	HF power	Dimensions, weight		Operation
	kW	kW	W x H x D mm	kg	
MICO-S	20	15	800 x 2,150 x 945	390	Intuitive user interface with integrated touchscreen, Emergency Stop button
MICO-S	25		800 x 2,150 x 945	390	
MICO-S	30		800 x 2,150 x 945	390	
MICO-S			800 x 2,150 x 945	390	
MICO-M	18	15	750 x 980 x 1,500	480	Intuitive user interface with integrated touchscreen, Emergency Stop button
MICO-M	25		750 x 980 x 1,500	480	
MICO-M	30		750 x 980 x 1,500	480	
MICO-M			750 x 980 x 1,500	480	
MICO-L	18	15	750 x 1,900 x 1,500	625	Intuitive user interface with integrated touchscreen, Emergency Stop button
MICO-L	30	35	750 x 1,900 x 1,500	625	
MICO-L	50		750 x 1,900 x 1,500	625	
MICO-L	50/80		750 x 1,900 x 1,500	625	
MICO-L	70		750 x 1,900 x 1,500	625	

Options for MICO-S, MICO-M, MICO-L

Energy transfer and tool handling

- Coax cable up to 15 m in length (MF)
- Arm with parallelogram kinematics (MICO-M only)
- Arm with balancer

Tools

- Inductors
- Brazing gun
- Heating cable / Cable box (for shrink and joining applications)

Others

- Double output and twin generators available to order
- Pyrometer to record the temperature
- Pedal / Foot switch
- Workpiece fixtures on MICO-M work surface available to order

Induction Heating for a Wide Range of Industries, Customer Requirements and Applications

eldec solutions are effective and efficient – particularly when it comes to energy consumption. They are so advanced in this area, that the company received a green dot for energy efficiency.

There are very few added value chains that can survive now without this technology. And every day more applications are available for eldec technology,

all over the world. eldec induction heating is used in a wide range of industries for various applications. We supply equipment ranging from single generators with the appropriate tools to complete systems for stationary or mobile brazing, shrinking, expanding, joining, melting, tempering, pre- and post-heating, decoating and surface hardening to our customers in the

electric machinery industry, aviation and aerospace, mechanical and plant engineering and in the automotive industry and its supply sector.

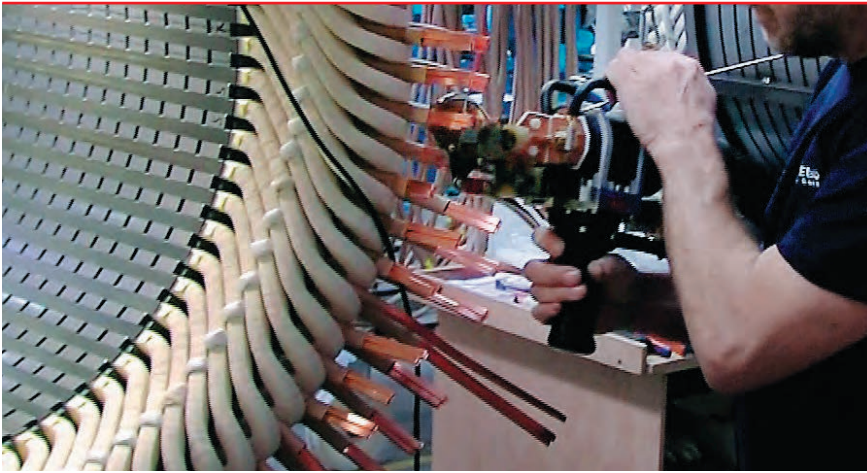


The main uses of eldec induction heating technology:

- Electric machinery production
- Automotive industry
- Mechanical and plant engineering
- Toolmaking
- Aviation and aerospace
- Other special applications

Leading companies rely on eldec technology:





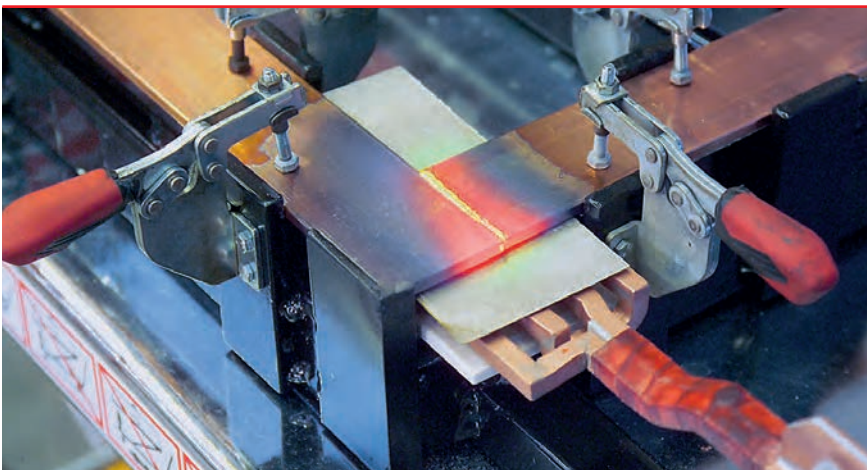
Brazing gun in use

Application example for brazing:
Brazing flat copper wires used in electric motor production

Brazing flat copper wires for electric motors is complicated. The joint must be of high quality and any insulation that has already been fitted should not be damaged. Using a mobile eldec MICO-M 30 MF fitted with an arm and balancer where the brazing gun with an inductor is mounted, flat copper wires can be brazed inductively on a time-controlled basis, which means that the process can be reproduced precisely and that the neighboring insulation does not get burnt.



Solution – eldec MICO-M 30 MF with arm



Butt joint for a transformer winding made of copper sections

Application example for brazing:
Brazing copper sections used in transformer production

Copper sections used to build transformers are butt-brazed in this application using an eldec MICO-L 50 MF and auxiliary equipment for holding the workpiece. The inductive brazing process is controlled by time. This guarantees the consistently high quality of the brazed joint.



Solution – eldec MICO-L 50 MF



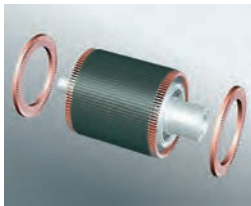
Application example for brazing:

Brazing flat short-circuiting rings used in electric motor production

Short-circuit rings for manufacturing electric motors (in this case for a train drive system) are brazed here using an eldec MFG 150 medium-frequency generator with field-controlled ring inductor and temperature control on a brazing bench which can be adjusted for various motor sizes.



Short-circuit ring at 780°C



Complete rotor with short-circuit rings



Short-circuit ring brazing inductor



Solution – eldec MFG 150 generator with brazing bench

Application example for pre-heating:

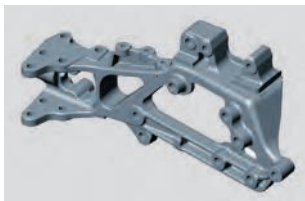
Preheating for welding truck axle mounts

With an MFG 15 DA, an inductor customized for the task and a temperature control system, the component is heated to 450°C to prevent cracking during the subsequent welding process.

The DA function means that two inductors, each of which is connected to the generator by a separate hose package, can be used in sequence using an internal circuit.

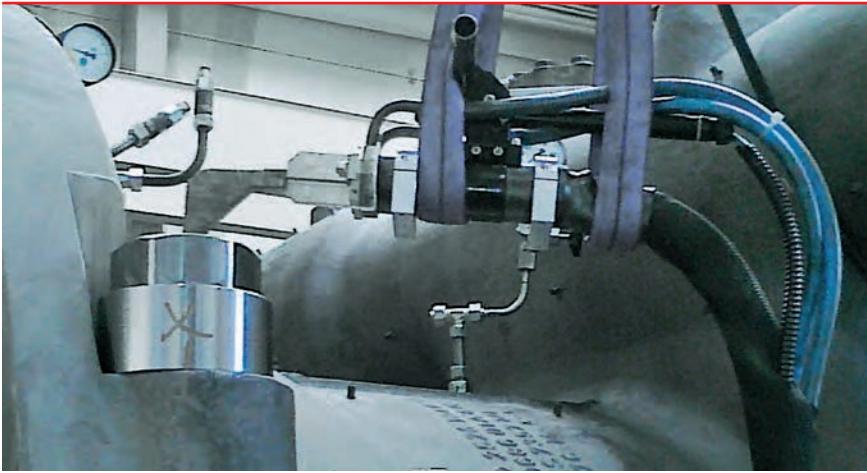


Component with adjusted inductor and pyrometer measurement spot to control the temperature



Solution – eldec MFG 15 DA generator



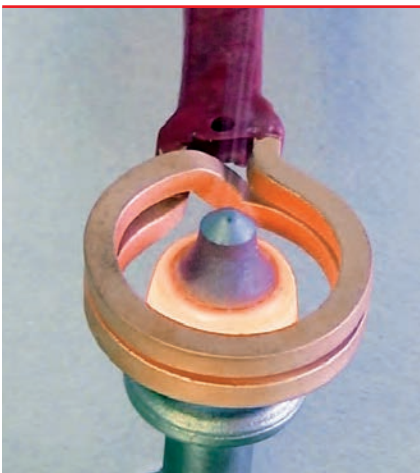


Application example for expansion:
Heating expansion screws

Expansion or casing joint bolts are used to produce high-strength connections for housings in turbines, to secure wind turbine hubs and for many other applications in large-scale system engineering. Using a central borehole in the screw, insert a slim inductor the length of a screw, the screw is then heated and expands. It is tightened while it is hot and then shrinks as it cools. This produces a secure screw connection.



Solution – PICO-S 15 MF or PICO-S 20 MF
 or MICO-M 18 MF



Brazing a carbide metal pin at 780°C

Application example for brazing:
Braze-fitting carbide metal pins

These components are used in the construction of roads and mining as cutter heads. Carbide metal pins are brazed to the end of the head to extend their service life. The brazing process is carried out inductively for quantity, quality and efficiency reasons. Often with a higher level of automation than shown here.



Solution – PICO-S 15 MF

Application example for brazing:

Braze-fitting carbide metal blades

In this example, carbide metal blades are inductively brazed to a rotating tool. The solution shown here with no automation can also be automated for the production of large volumes.



Braze-fitting carbide metal blades



Solution – PICO-S 15 MF



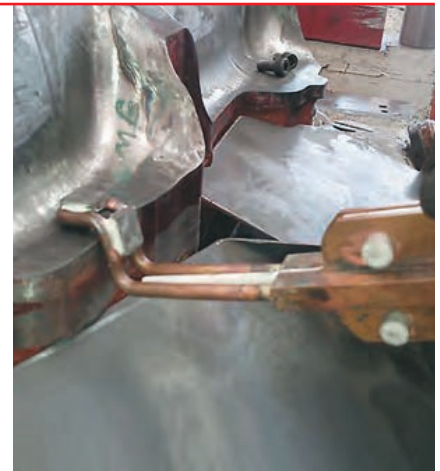
Application example for cutting-edge hardening:

Surface hardening of cutting edges

The edges of punching and forming tools, essentially for body construction, are subject to high levels of wear. To minimize this, the cut edges are inductively hardened using an eldec MICO-M 18 MF.



Typical forming tool



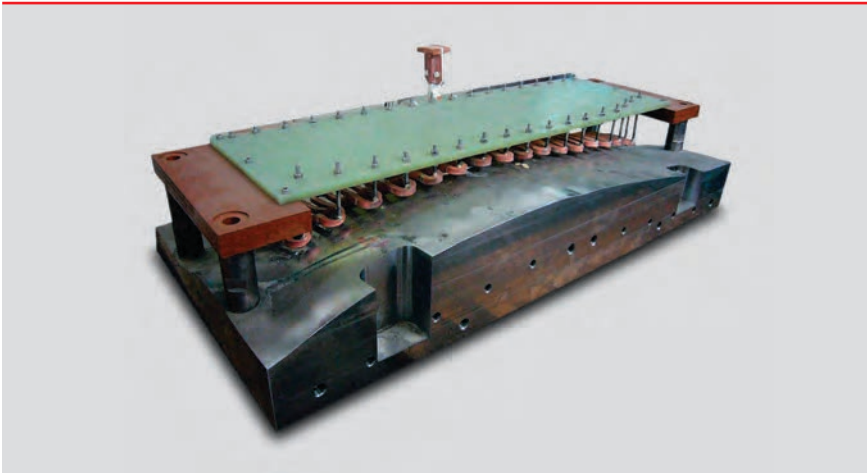
Adjusted inductor design



Adjusted inductor design

Solution – eldec MICO-M 18 MF
and PICO-S 20 MF



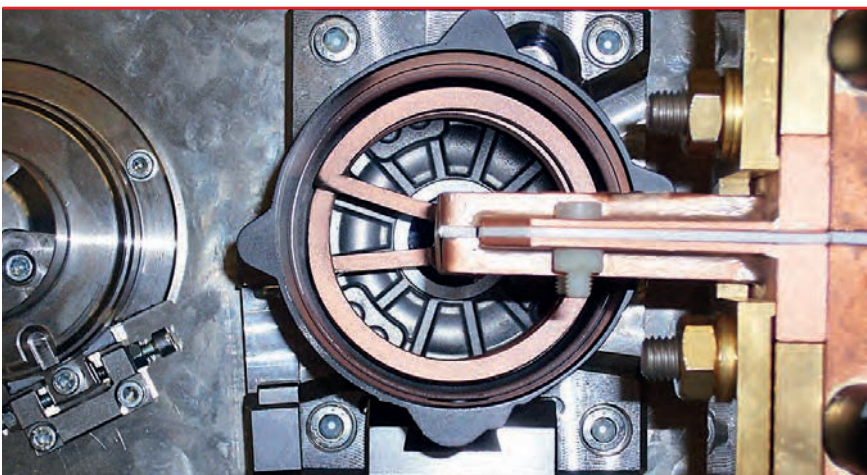


Application example for heating:
Heating plastic injection molds

The tool is partly inductively heated to improve the surface quality of plastic injection molds. In some cases, the workpiece can only be manufactured by using targeted heating and thus improving the flow properties of the plastic. The inductors are either integrated in the tool or heat the mold side of the tool.



Solution – eldec MFG 100 generator



Inductor immersed in the stator housing

Application example for joining:
Heating an electric motor housing

This example shows fitting an electric motor in an aluminium housing. The housing is heated to 180°C and expands; the motor is inserted in the housing and the connection then becomes secure as it cools.

The TWIN function means that two inductors which are each connected to the generator by a separate hose package can be used simultaneously and can be controlled independently of each other.



Solution – eldec MFG 25 TWIN generator

Application example for shrinking: **Shrink-fitting rotor caps**

An application from large turbine construction and repair. The so-called cap is attached or removed from the rotor. The weight of the cap is 1.7 t with an external diameter of 1,600 mm (63 in) and a length of 800 mm (31 in). It has to be expanded by 4-5 mm (0.2 in) with a target temperature of 350°C. The heating time is approx. 1 hour.



Winding and connecting the heating cables

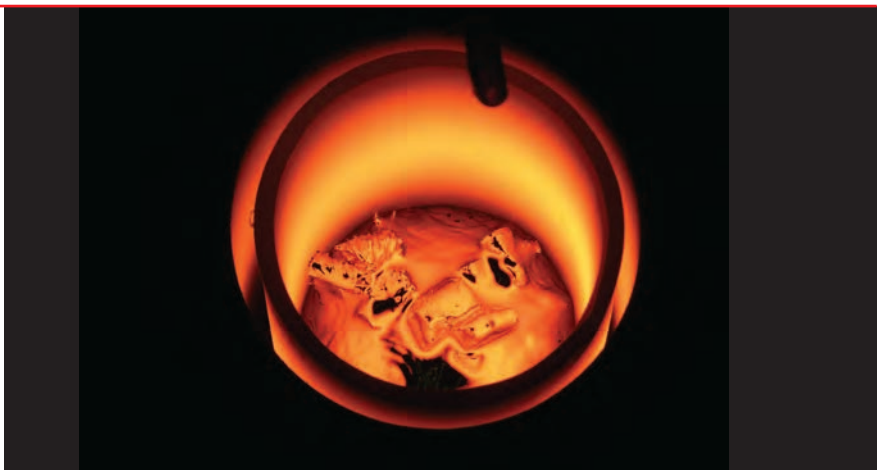


Solution – eldec MFG 150 generator
with cable box and heating cable



Application example for melting: **Melting copper**

The picture shows a melting process in a carbon crucible in which copper cubes are liquified at a temperature of approx. 1,200°C. The heating takes place under a shielding gas (argon) using a 50 kW medium-frequency generator.



Molten copper in a carbon crucible



Solution – eldec MFG 50 generator



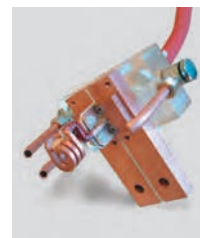
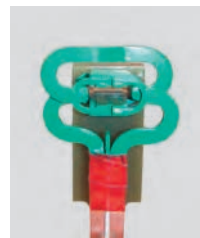
eldec inductors: Customized Products

eldec was founded in 1982 as Schwenk Induktorbau GmbH. Inductor design and production are still among our core skills, and form the framework for all our solutions. The tool for every induction heating system is an inductor whose frequency, material and power density are customized to the area of the workpiece that needs to be heated. This process allows for precision in both target and duration.

The design and construction of the inductor depend mainly on the geometry of the workpiece section to be heated.

eldec inductors are designed using the latest 3D CAD software, manufactured on CNC machine tools and built by skilled craftsmen at eldec in Germany and the U.S.A.

The result: Thousands of effective and efficient inductors that work precisely and reliably for our customers.





Process development

Innovative products require innovative processes. We can help you create these processes! Our wide range of application expertise, deep understanding of complete production process chains and well-founded metallurgical knowledge combined with extensive testing and analysis capacities provide the basis for finding the perfect solution.



Technology advice

We will find the perfect solution for your work. Our skilled staff will provide support from the very beginning – with sound technology advice. Our staff are experts in their fields, and are often sought after to speak at technology conferences and congresses – they even exchange views with the scientific world on a regular basis.



After-sales service

From our eldec sites, or jointly with our global sales and service partners, we ensure that everything runs smoothly with your eldec machine – and that you can use the full capacity of your system for many years to come. Full spare parts availability and a competent service team result in reliable work and a fast response.



Rental equipment available

You have received a major order – and you need to start production quickly. Your current system is not available or you may simply need a trial device quickly. We're here to help, and have equipment available for rent to help you complete the job.

Commissioning / Acceptance procedures

If required, systems with specifications and process technology can undergo an advance acceptance procedure with our customers before delivery at the eldec sites in Dornstetten (D) or Auburn Hills (U.S.A.).

eldec services: Comprehensive Service

The best product in the world is no good without great service to match. That is why we believe that a perfect solution must also include outstanding comprehensive service which we can provide worldwide thanks to our service network.

Our services extend from technology advice and extensive training to reliable after-sales service.



Operator training

Our training program allows for extensive training for the operators of your eldec systems. Individually or in small groups, the operators are taught the best practices for your eldec machine to ensure top quality.

Technology and metallurgy training

Our engineers will provide you with the knowledge you need to effectively make any decisions that may arise. In our metallurgy courses, we teach the basics, as well as advanced knowledge for specialists. After all – regardless of whether you are hardening or brazing – the material determines the process.

Maintenance training

The service life of any machine is extended by maintenance and care. We provide maintenance training to help you maintain your production. Your maintenance personnel learn everything they need to know about preventive maintenance, to ensure that your manufacturing system always runs smoothly.

Basic training in induction technology

In this course, we'll teach you basic and advanced information on induction heating. We answer your questions about induction and its physical principles, so that you'll know everything you need to know.



Inductor design and inductor production training

At the heart of every eldec system is an inductor. Therefore, we also provide special training courses for inductor production and design. This course is split into sections: theoretical and practical. The students in this course initially learn the basics of theory before they complete practical exercises to determine how to build a suitable inductor with the right frequency, material and power density.

Innovative Specialists for your Heating Task

Developing and manufacturing the best technology for industrial induction heating for customers – and supplying this throughout the world. That's what we do. The best technology and service is customized for the task at hand and provides our customers with maximum benefits every day, around the clock. It's important to us to achieve this with high quality, cost-effective and durable systems.

The eldec product range has continued to develop steadily over the course of years from the actual tool of inductive heating, the inductor, to energy sources and complete heating systems as well as a whole host of services.

Our customers are in the electric machinery industry, aviation and aerospace, mechanical and plant engineering and in the automotive and its supply industry.

This brochure describes eldec energy sources on the basis of single and dual frequency resonant oscillation circuits for inductive heating and complete heating systems for mobile or stationary brazing, shrinking, expanding, joining, melting, tempering, pre- and post-heating, decoating and surface hardening.

eldec MIND series hardening systems are described in a separate brochure.



The eldec company story: A global player for over 35 years



1982 Founded by Wolfgang Schwenk, graduate engineer, in Dornstetten, Black Forest. eldec developed and manufactured inductors.

1993 The product range grows: eldec develops and supplies the first HF and MF generators with IGBT semi-conductor transistors.

1998 eldec Induction U.S.A. is founded. This location sells the full range of eldec products, assembles generators and supplies the entire range of services in the American markets.

2000 Delivery of the first SDF® generators. A patented technology which is primarily used for the contour-true inductive surface hardening of gear wheels.

2004 eldec achieves a turnover of 11 million euros at two sites.

2006 Production of a unique test hardening system with a 3,000 kW SDF® generator.

2007 eldec achieves a global turnover of approx. 12 million euros with a workforce of 90.

2008 Launch of the MIND series of hardening machines.

2009 eldec opens a sales and service office in China. Launch of the MICO product range. Delivery of the first eldec exciter coil brazing system.

2010 Launch of the MIND-S product range.

2011 Launch of the MIND-M product range. Expansion of production and assembly space in the U.S.A., new-build at the Dornstetten site with an additional 2,000 m² of production and assembly space. eldec achieves a global turnover of approx. 19 mil. euros with a workforce of 135.

2012 Launch of the MICO-S. The MICO product family is complete. eldec achieves a global turnover of approx. 21 million euros.

2013 eldec becomes part of the EMAG Group.

2014 eldec launches the low-cost PICO generator range and the DFG generator series.

2015 eldec launches the VLC series of hardening machines on the basis of the EMAG machine platform.

2016 Launch of MIND-M plus product range.

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