5M serves in thousands of foundries and steel plants in 4 continent and 35 countries

5M Elektromekanik, having so long and deep rooted history about induction melting system, is an international establishment founded in 2002. 5M, whose head office and the place of production placed in Istanbul, serves with broad sales and service network (see map) in a wide area all over the world. Products and services for induction melting systems with related sector and field

- Foundry Plants from 1kg up to 30ton/hour and more.
- Special Melting systems for Steel, Cast-Iron, Ductile Iron, Grey Iron, Copper, Brass, Aluminum and other ferrous and non-ferrous alloys.
- Turnkey Steel Plants
- Hot Rolling Mill
- Continuous Casting Machine
- Mini melting systems for laboratories and precious metals
- Induction heating systems
- Moveable crucible melting systems for non-ferrous metals
- Double frequency or variable frequencies Induction Melting Systems

Our Successful experiences and capacity on induction melting systems to meet your needs makes us valuable supplier and service center for you. We carry out your projects with mutually cooperation and trust as per your demand.

5M World References
- TURKIYE
- BRAZIL
- BULGARIA
- COLOMBIA
- EGYPT
- IRAN
- GREECE
- LIBYA
- MALAYSIA
- SOUTH KOREA
- SYRIA
- THAILAND
- UKRAINE
- INDONESIA
- SERBIA
- AZERBAIJAN
- IRAQ
- KAZAKHSTAN
- K.S.A.
- MACEDONIA
- MEXICO
- NORWAY
- POLAND
- ROMANIA
- RUSSIA
- SPAIN
- SWEDEN
- SUDAN
- JORDAN
- DENMARK
- TURKMENISTAN
- GAMBIA
- NAKHCHIVAN
- MALI
10000kg induction furnace at the time of operation – South Korea

2x2000kW ve 3x3000KG steel melting system at the time of operation – Egypt
Network protections and high-speed input fuses for maximum system protection
- High-speed protective fuses on the transformer output for system protection
- High-speed semi-conductor protection class fuses on the converter input
- Thermic magnetic switch against current overload
- Standard Input Over Current Protection Circuits
- Standard Input Over Voltage Protection Circuits

Easier to use through next generation operator panels and Reporting System
Specially designed for easier to use of operator, distinctly visible under foundry conditions, bright, digital and analog displays, operator panel and keypad. All necessary displays on panel such as temperature, pressure, kilowatt meter, earth leakage, volt meter, frequency...
- Getting Status reports easily by record keeping facility on internal memory integrated PLC and SCADA systems.
- If required daily, weekly or monthly period reports can be printed out.
- SMS status and warning messages transmission.

Capacitor Bank and Transfer Switch
Long life power capacitors through professional capacitor protection measures;
- Long life with installation of earthen full insulation
- Analog temperature sensor on each capacitor
- Pressure sensor on each capacitor
- Total capacitor pressure data
- Total capacitor temperature data
- Easy assembly and maintenance

A class, water cooled energy cables
- Made from high purity copper conductor, stranded, multicore energy cable
- Free water transition, internal cooling water channel
- Mounting and maintenance facility with easy demountable connections
- High insulation class ≥5000VAC
- A class carbon free insulating hose
- Excellent sealing under high pressure with double or triple stainless steel clamps connecters on both terminal points

Primary Or Secondary Insulation Solutions

Easy service and maintenance
SOLUTIONS
SUPERIOR TECHNOLOGY

- **Single Control Board managing Overall System**
  Single Digital Control Board, improved by current and new technologies, has a design providing high safety and efficiency conditions.
  - All adjustments are loaded beforehand and necessary adjustments can be done through computer if required.
  - No need for special setup in future or during commissioning.

- **High efficiency coil conductor**
  5M always uses rectangular, high-purity copper coil conductor.

- **Early Warning Detecting System**
  - Controls the level of Earth Leakage
  - Gives idea about lining getting thinner
  - Adjustable sensitivities
  - System can stop automatically by PLC when liquid metal approaches the coil.
  - Approach of metal to coil is prevented with thickness of lining and coil surface continuously controlled by electromagnetic control system.

- **Full safety for all systems;** Operation temperature of all components on system, especially thyristor and capacitors is not more than max. 60°C. Thus, defects caused by high temperature are prevented and total system quality is increased.

- **International standard spare parts;**
  - Electronic components can be supplied by readily available global producers
  - Manufacturers, brands and product codes of all power electronic components are international standard.
  - 5M products do not include hidden brands and international codes data of power electronic components such as power thyristors, capacitors, resistors etc.

- **Closed Circuit Water Cooling System**
  - Closed circuit deionized pure water cools converter, capacitors, thyristors, busbars, reactors etc.
  - There is a pressure and sensitive temperature control on all lines.
  - PLC warns operator in case of a problem in the cooling system and provides necessary treatment facility.
  - Demineralized water conductivity control constantly and warning operator.
High Safety and Efficiency with Enhanced Parallel Resonance Technology

- Excellent Driver Technology
- High Safety and Efficiency

5M PMT® 5700kW Melt&Hold Power Converter
Single power panel for Melt&Melt or dual power output; Melt&Hold/Process

- High efficiency at full power
- High cos Ø ≥ %98
- Bath temperature control with optic sensor
- Industrial energy analysis process
- Provides single or double furnaces to work with double frequency
- Remote troubleshooting and program update with modem

Melting solutions for special alloys

- Brass melting

50kW 25KG IGBT controlled manual tilting melting furnace at the time of casting—Gebze

5M PMI 225kW 350kg+750kg special movable furnace
ADVANTAGES OF MODULAR DESIGN IGBT TECHNOLOGIES

- Compensation-free in every operating condition, so there is no installation and maintenance costs of compensation.
- Upgradable converter power with parallel module technology
- Simple replaceable power modules in case of trouble and service requirement.
- 5M parallel module IGBT technology provides opportunity to continue at low power with other modules as faulty module easily unmounts in case of trouble in one of modules.

- Excellent coil protection system
- Operation in local languages
- Short message (SMS) warning system
- Probeless automatic sintering
- Automatic crucible preheating
- Energy monitoring and consumption reporting via remote connection
CORELESS INDUCTION MELTING FURNACES

- High-alloy antimagnetic aluminum casting side plates condensing magnetic area inside of furnace
- High heat gain by hydraulic controlled lid covering furnace intake full well and high durability fixed refractory put in lid
- Fixed Gas Ring vacuuming smoke through furnace intake
- Easy reach and treatment with removable rear/front cover
- Supported by steel construction stands
- Installation and commissioning in a short time
- Space saving with compact design
- Hydraulic safety with mechanical lock
- Hydraulic controlled furnace lid
- Fixed exhaust ring for environmental conditions
- Easy to service and maintenance

5M BOX construction furnace manufacturing plant

5M Box construction furnace
Hydraulic furnace cover
Fixed exhaust ring

Crucible melting furnaces for non-ferrous melting applications

1000kg Box Construction Furnace at the time of casting

Box Type Melting Furnace
Capacity ranges from 10KG – 3000KG

15T furnace manufacturing
N MELTING FURNACES

5M design coreless induction melting furnace with all accessories safety back and side barriers back tilting, capture hood and easy lining removal system

Steel Construction Furnaces
Capacity ranges from 500KG – 30.000KG

- High efficiency special design
- Long life quality equipment and labor
- Excellent insulation and safety by special materials
- Suitable design for safe and fast charging-discharging
- Special 5M design magnetic yokes preventing induction current diverging
- Maximum efficiency under hard working conditions
- Easy to service and maintenance with demountable top cassette
- Minimum sound level under heavy working environment
- Long life coil via water cooled magnetic yokes winding coil
- High durability lining with extra water cooled turns completing bottom and top turns.
- Anti heat loss design for molten metal
- Hydraulic system secured by mechanical lock

Special furnace design

1500kW 2x3000kg melting furnace at the time of casting – Norway
5M IGBT Controlled Mini Melting Systems

From 1 kg to 30 kg IGBT controlled melting systems suitable working laboratory conditions together with valuable and specific metal casting processes.

- Directly input voltage “380V or 440V”
- Small place with Compact design
- Tilting system with reductor
- Cooling with city water without any specific water installation.

5M IGBT Controlled Heating System

- Tunnel Heating Systems
- Pipe and joint heating
- Special heating systems for forging plants
- Variable and double frequency heating solutions
- Special heating projects for process
- Special heating solutions for copper, bronze, iron, steel, stainless steel and special alloys
- 1, 2, 3 or 4 headed heating solutions with variable frequencies and at the same time from single power unit
MODERN OPERATION SYSTEMS
EASY USE, CONTROL AND REMOTE

SCADA CONTROL SYSTEM
- Graphic interface program
- Furnace power
- Metal weight
- Heat tracking system
- Calculation of energy
- Easy energy control mode.
- Instant, daily, weekly and monthly energy reports
- Heat control script;
- Calculation of consumptive power and metal weight,
- Instantaneous heat profile, casting heat target,
calculation of time and casting heat according to molten metal
- Presentation of all warning and fault messages,
- Explanation of solutions or alternative methods,
- Saving of event records and reporting events.

PLC CONTROL SYSTEM
- Modern technologies
- Instant status information of system.
- Probeless auto sintering program for fast and slow sintering process
- Automatic error logging memory
- Display error messages audible
- Remote monitoring by internal modem troubleshooting
- Easy way to operating by HMI touch screen
- Operation in local languages and different character sets. Cyrillic, Chinese, Arabic, Korean etc.
- SMS through on GSM ; Short message warning system can send SMS to person in charge, Easy way to control and operation
- Crucible heating program

Operation Desk

Block diagram of Scada control system

Control Cabins

PLC Information Screens
THE BEST MELT

Steel, Stainless Steel, Cast-Iron, Ductile Iron, Grey Iron, Copper, Brass, Aluminum Ferrous and Non-Ferrous Alloys.

Single Melting Systems up to 10.000kW
- Modern Design
- Easy to use
- Low cost
- Standard operator panel
- New generation power electronic components

With its compact design takes a small place. With organized and systematic structure not only construction installation but also operation and maintenance costs are very economical.

Melt&Hold Melting Systems up to 15.000kW
- Improved for foundries whose target is to have high capacity casting. It takes less place and more economic than other systems. The difference from other standard melting systems is to have capability to choose required power and holding capacity.
- While a furnace is working with full power, the other is either working with full power or just holding
- Its usage is very simple. With only a single touch one of the furnaces enters the melting mode and the other enters waiting or holding hot mode.
- There is a twin power unit technology in single converter panel having independent operation ability.
- When melting converter breaks down, holding converter supports.
- During a power cut holding converter holds molten metal in furnace hot with a suitable generator.
- In case of a problem at one of the lines, with the opportunity of joining by two different energy lines, the other system continues its operation.
- Foundation & civil work costs and operation & maintenance charges are so economic with its methodical and organized structure

Double Frequency Melting Technology for Special Melting Process
Capability to work with one furnace at 2 different frequencies, and by feeding just from single power converter capability to work with 2 or more melting furnace at different frequencies and power. Classified different from other melting Systems and designed for user’s requirements. Improved specially by 5M RD Engineers for preparation of different characteristic alloys.

- Sample Configuration 1: during melting process of existing one melting furnace, operator can choose one from 2 different melting frequencies within few seconds in any time and apply to material inside furnace. Frequency can be changed over and over again.
- Sample Configuration 2: Designed for operation at different frequencies or power for 2 or 3 furnace melting Furnaces. For instance while furnace-1 is working at 1000Hz, Furnace-2 can continue to work at 3000Hz.
**ADVANTAGES OF MODULAR DESIGN IGBT TECHNOLOGIES**

- Compensation-free in every operating condition, so there is no installation and maintenance costs of compensation.
- Upgradable converter power with parallel module technology
- Simple replaceable power modules in case of trouble and service requirement.
- 5M parallel module IGBT technology provides opportunity to continue at low power with other modules as faulty module easily unmounts in case of trouble in one of modules.
- Operation with %30 higher capacity by comparison with normal systems
- New generation electronic drivers with DSP processors
- New generation components of power electronic
- Quality below legal limit, proper and safe energy consumption

**IGBT Single Melting Systems up to 5.000kW**

- Compensation-free in every operating condition, so there is no installation and maintenance costs of compensation.
- Upgradable converter power with parallel module technology
- Simple replaceable power modules in case of trouble and service requirement.
- 5M parallel module IGBT technology provides opportunity to continue at low power with other modules as faulty module easily unmounts in case of trouble in one of modules.

**IGBT Controlled Power Sharing Melting Systems up to 5.000kW**

It provides melting on both furnaces at the same time or while one furnace works at full power, the other furnace works with process power to proceed on molten metal inside, by sharing power between 0% and 100% ranges on high efficiency with independent power outlets working with single operating system

- Economic energy feeding at the same time from single or dual energy line with dual working opportunity.
- High safety IGBT power modules by independent full controlled input redressers
- %100 More production possibility with just increase in transformer power via independent redressers integrated to modules suitable increase in capacity for future projects.
- Easy use by user friendly operating system and touch screen PLC interface
- While one furnace works at full power, other one works at holding power at the same time to prevent holding losses.

**IGBT Melt&Hold Melting Systems up to 6.000kW**

- Improved for foundries whose target is to have high capacity casting. It takes less place and more economic than other systems. The difference from other standard melting systems is to have capability to choose required power and holding capacity.
- While a furnace is working with full power, the other is either working with full power or just holding
- Its usage is very simple. With only a single touch one of the furnaces enters the melting mode and the other enters waiting or holding hot mode.
- There is a twin power unit technology in single converter panel independent operation ability.
- During a power cut holding converter holds molten metal in furnace hot with a suitable generator.

In case of a problem at one of the lines, thanks to the opportunity of joining by two different energy lines, the other system continues its operation.
STEEL PLANTS

40MW – 4x25TON  400,000 ton/year Mini Steel Plants

- Turn-Key Steel Plant Solutions
- Continuous induction melting systems
- Continuous casting machine (CCM)
- Hot rolling mills
- Steel melting and applications
- Ladle refining furnace (LRF)
- Ingot melting solutions

5MW 2x8T Steel melting furnace during operation-Iraq

Continuous casting machine

Billet production with horizontal permanent molds

Running foundry in operation with sand moulding line

5M Melting furnace during casting to ingot moulds
5M Induction Furnaces present useful design for environmental protection by keeping venting specks at minimum level with active dust and smoke collecting system.
For other materials, multiply melt rate for steel by the following values: Aluminum: 1.0 – Copper: 1.6 – Silver: 2.85 – Gold: 5.0

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<th>1000-3000Hz</th>
<th>500-3000Hz</th>
<th>200-600Hz</th>
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<tr>
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<td>POWER (kW)</td>
<td>CONVERTER</td>
<td>FURNACE CAPACITY (kg)</td>
<td>STEEL @1650°C (kg/h)</td>
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