

EGES

Intelligent
Ultramelt®

INDUCTION MELTING FURNACES



Fast Economical Reliable

ABOUT EGES

EGES is one of the major Medium Frequency (MF) Induction Furnace manufacturers. EGES has been producing Induction Melting & Holding Furnaces since 1981 operating over 800 furnaces in 4 continents;

In 1981 EGES has started to produce 50 kW converters with 75 kg furnace capacity. Since then EGES has developed its technology and steadily increased its melting capacity. In the last three years EGES reached up to manufacture 20 MW converters with 45-ton furnace capacity. This benefits the medium and big size foundries that have been looking for the best technology at affordable cost.



EGES Mechanic Workshop

EGES scope of supply; MF Induction Melting and Holding Systems

- From 50 kg to 45 ton capacity melting furnaces for Ferrous and Non-Ferrous applications, with 50 kW to 20 MW Power Supplies
- Holding furnaces up to 45 ton
- Drop-Down Induction Furnaces for Non Ferrous metals with crucible up to 1-ton capacity

Frequency range of EGES systems are between 50hz - 20khz .

As well as classical MF Induction furnaces, EGES also supplies MELT & HOLD Systems, EXTENDED POWER Systems (power sharing systems) and "TRIPLE FURNACES" Systems in order to meet foundries' requirements for better productivity and for various applications with the most economical investment costs.

Modernization of Induction Furnaces

EGES replaces old fashioned Line Frequency Converters with New Generation MF converters. During modernization of MF system Line Frequency (50 Hz) furnace body and, if possible, furnace coils are being utilised. Existing cooling system and hydraulics are also integrated into the system.

With the modernization the customers can save up to 40% in their investment costs and increase molten metal capacity almost double depending on the application.

Non Ferrous Induction MF Melting Shops

EGES MF Induction systems can also be operated in Non-ferrous foundries as well as ferrous foundries.

Copper & Copper Alloys

Perfect alloying, Higher melting capacity, flexibility, Lower energy consumption, less exhaust gas, environmentally friendly system properties make MF EGES systems a perfect solution for Copper & Copper alloys Foundries.

Aluminium applications

Besides standard Aluminium foundries, EGES systems are also efficiently used for Aluminium recycling.

EGES has also got wide experiences for melting Gold, Zinc & Zinc Alloys.

MF Induction Heating Systems

As well as melting systems, EGES is also a leading MF Induction heating system producer within the range of 50kW - 20MW power and 50hz-20khz frequency range.



EGES Electric & Electronic Workshop

EGES manufactures different types of heating systems for different applications.

Billet Heating Systems, (Steel, Brass, Aluminium)

EGES MF Induction Billet heating systems are designed according to customer needs.

Continuous Steel sheet heating systems for Galvanization lines

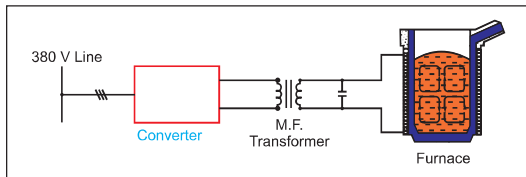
Galvanized coil production is made in continuous galvanic lines and with hot dipping method in some companies such as Assan, Demirsaç Galvanize etc. After surface cleaning and before the hot dripping unit EGES supplies special "MF Induction Continuous steel sheet heating system" for the steel sheets in various thickness and width.

Pipe heating systems

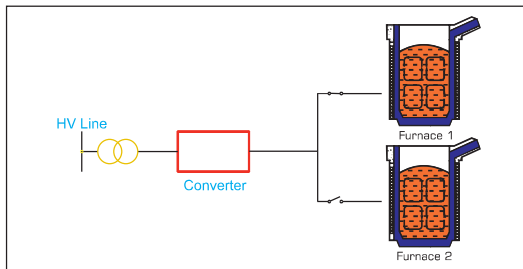
The Pipe heating system is used for the longitudinally and spirally welded pipes across a broad product range including general-purpose galvanised water pipes, boiler tubes, square and rectangular tubes, gas pipes precision tubes, water, oil and natural gas line pipes and pipes with protective coating and lining.



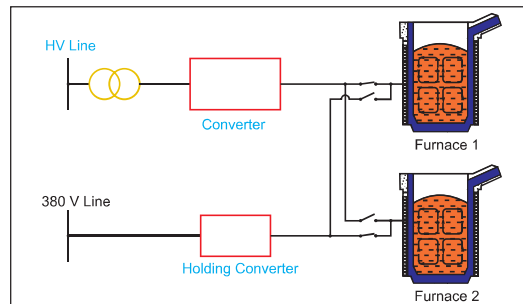
The Principle of Various Eges Melting Systems



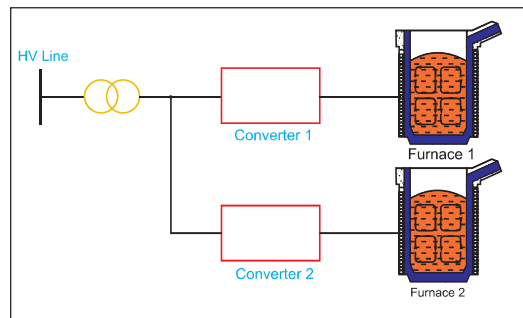
Less than 600 kW system's main circuit diagram



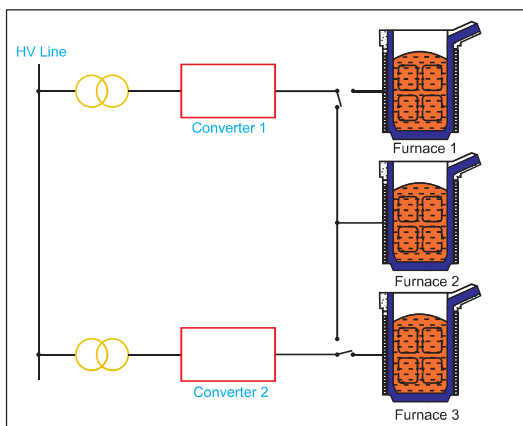
Ultramelt Standard Melting Circuit Diagram



Melt & Hold System Schematic Diagram



Extended Power System Schematic Diagram



Triple Furnace System Schematic Diagram

CONVERTER

Most advanced electronic components

At EGES R & D laboratories any idea that may help to improve the performance of already existing excellent technology is applied by the skilled EGES engineers who follow the new publications and search for the most recent electronics components. Our main concern is to reach today's advanced technological level and submit to our clients only the best of it.

Superior parallel resonance converter

In electrical circuits high current means higher failure probabilities and higher loss. Total current on a parallel resonance converter is much lower in comparison with serial resonance converter. The serial resonance current is approx. 5 times more than the parallel one. Therefore, in serial resonance when high powers are needed, it is necessary to work close to the limit current values of thyristor's. On the other hand, the spare parts cost for parallel resonance converters are much cheaper than the alternative one.

100% Safety margins in Power Semi-Conductors

EGES converters work on a principle of parallel resonance which means that even at the highest power level, the chosen thyristors work approximately half of the limit currents giving 100% safety margin to the thyristors. Because of this application, thyristors service life is extended twice as much due to low heat loss and lower operation temperature. The working temperature of thyristor's used in EGES converters are 80 - 95 °C which is 30 - 40 °C lower than the maximum operation temperature.

Thyristor Controlled Rectifier

EGES ULTRAMELT Furnace Rectifiers are not simple diode bridge type but fully thyristor controlled. This feature provides:

- Full output power at low input voltage.
- Power adjustment possibility at a very large range (5% - 100%)
- No damage caused by line voltage fluctuations
- Any failure on water cooled cables or metal penetration to coil do not cause harm to the converter.
- The current is limited during any failure or short circuit on the system which prevents bigger technical problems or repair expenses

Average power factor better than 0.95

The reactive energy used on EGES furnaces are low and the average power factor is higher than 0.95. Therefore, no additional precautions are needed.

No input power factor compensation is needed for EGES ULTRAMELT Furnaces

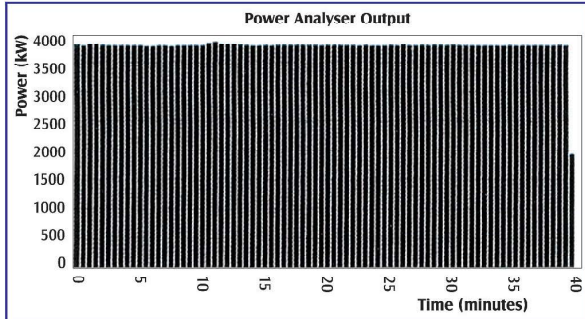
EGES continuously researches and implements new technology and is one of the several firms in the world that uses parallel resonance system without input power factor compensation.



2x5 MW Converter with 3x8 ton Furnaces Triple Power System

Reducing melting cost with constant power

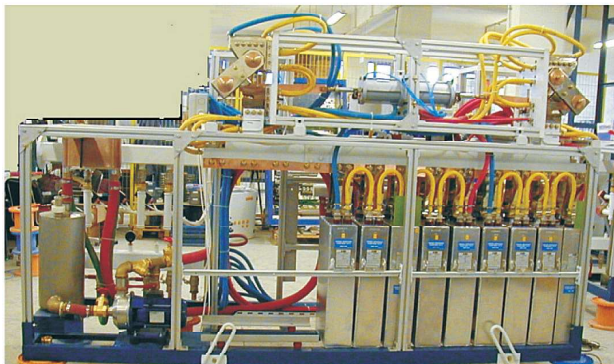
EGES ULTRAMELT Furnaces from the first moment of charging gives full constant power and reduces the melting time which increase efficiency in energy consumption. Constant power is provided automatically from the system without the interference of the operator.



Constant Power diagram of 3,5 MW Converter during melting period

Full power even at low input voltage

EGES ULTRAMELT Furnaces are designed to deliver full power even at - 20%, + 15% voltage variations that can be observed in some developing countries.



Capacitor bank

MF Capacitor Bank

MF capacitor unit together with water distribution is produced and placed under the platform ready to connect water cooling system.

Consist of;

- a) Capacitor frame
- b) Water cooled MF capacitors
- c) Set of cooling water monitoring fittings
- d) Pneumatic energy transfer switches

Additional precautions for energy efficiency over 350 kW converter

At high power converters, one of the main factors that decrease the efficiency of induction furnaces is the loss on the bus bars. In EGES ULTRAMELT furnaces, the capacitor bank over 350 kW converters, is placed under the platform near to furnaces which considerably increases the efficiency of the system.

Power adjustment with PLC control

During every start, converter runs with minimum power, and reaches to maximum automatically with soft increase. (soft-start)

When the converter is off, first, the power decreases softly then the system switches off. (soft-stop). This feature prevents voltage fluctuation and spikes on the main. Thus, the furnace can also be operated by means of suitable generators.

Direct connection to high voltage

Over 600 kW capacity EGES Converters can be directly connected to high voltage mains trough an isolated HV transformer. As per customer request, less than 600 kW capacity converters can also be directly connected to high voltage mains through an isolated HV transformer. In this case there will be no need for the second LV transformers. Less than 600 kW converters can directly be connected to 380V.

High electrical efficiency

EGES ULTRAMELT converters are designed to minimise electrical loss. Overall electrical efficiency is better than 95%.

Electronic earth leakage indicator with adjustable sensitivity

EGES ULTRAMELT furnaces are equipped with adjustable sensitivity earth leakage indicator to control continuously the leakage level in the system. Led bar type earth leakage display indicates to the operator the refractory lining quality as GOOD, FAIR or BAD with green, yellow, and red colors respectively. If metal penetrates through the furnace, the furnace stops automatically to avoid further damage and the leakage display turns red color.



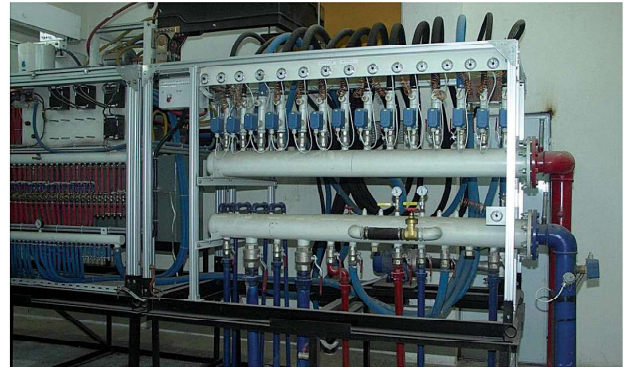
At the same time, the leakage system gives the operator an idea about the thickness and/or the quality of furnace lining. After the refractory material is rammed, the humidity of material may cause some leakage to earth. This error can be eliminated by adjusting the sensitivity of the indicator.

Complete control on water temperature and flow control of each channel in the coil

Cooling water temperature and flow in each channel of inductor and water cooling cable are controlled by continuously measured. Thus long working life and efficiency are provided in the system.

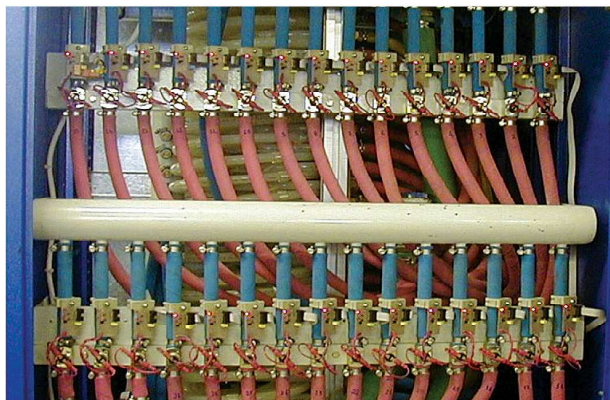
Complete control on water temperature and flow control of each channel

The main factor that determines the service life of a thyristor is the working temperature. In EGES ULTRAMELT converters, on each channel the water temperature and water flow of cooling system are constantly measured. This feature doesn't only increase the service life of the thyristors, but also, even though it occurs very rarely, gives chance to detect the blocked water channel.



Low maintenance cost due to modular electronic PCB design

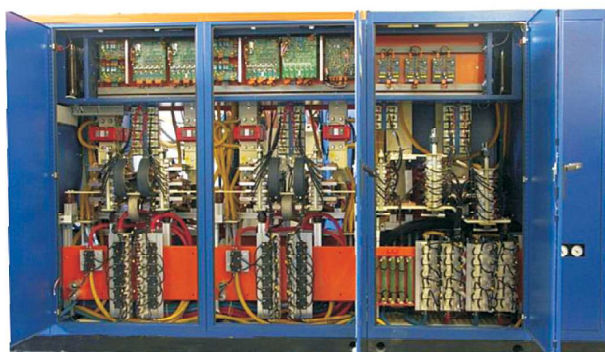
EGES ULTRAMELT converters have separate rectifier control, and inverter control PCB. There are also electronic PCB for earth leakage, water conductivity measurement and thyristor triggering. Having modular PCB design gives the user flexibility and easy maintenance work by changing only the defected board a simple operation which also gives the owner some economical benefits.



7,5 MW Converter cabinet

Specific atmospheric controlled isolated cabin for electronic control PCB's

EGES ULTRAMELT converters are produced to work efficiently at dusty, dirty and hot foundry conditions (IP54). Furthermore, in order to protect them from the negative environmental conditions and minimize the risk of failure, sensitive electronic control boards are placed in a second completely closed air cooled metal box.



7,5 MW Converter inside view

Furnaces

EGP S & T Type up to 45 ton Steel Construction Furnace

EGES R&D Department engineers have designed and successfully developed a new EGP S&T type up to 45 tons capacity steel construction coreless furnaces with yokes to be manufactured and presented to the potential customers services.

Choice of furnaces to meet customer's requirements:

Taking the valuable suggestions and opinions of the users into consideration, and with more than 48 years of experience, EGES has designed ULTRAMELT series furnaces. Coreless "Box Type furnace" which is more economical and heavy duty "Steel Construction furnace with Yokes" are the two different type furnaces manufactured by EGES to meet customer requirements.



5 MW Melt&Hold 8ton+14ton Furnace System

Advantages

- Gives the best result under heavy-duty working conditions.
- Has very low sound level
- Easy repair and maintenance if metal penetrates to the coil.
- Easy coil dismantle with modular concrete upper part.
- Using special "Lining Push-Out Device" worn out lining can easily be pushed-out within 10 minutes.



3MW 2x4ton Melt&Hold

High Efficiency, Rectangular Cross Sectioned Coil Conductor

It has been proven both theoretically and practically that the efficiency of the coil is maximum when its cross section is in rectangular shape. EGES does not use low efficiency circular or oval cross sectioned conductors on its furnaces. All coils are manufactured by using rectangular cross sectioned electrolytic copper with min. conductivity of 58 ohm mm² to minimize the coil loss.

Coil inner side is plastered with special pre-coat, which can stand up to 1800 °C. Special inflammable and heat resistant fiber glass material is used in order to fix coil windings.

In order to increase the efficiency and make the charging easier, the shape of the furnace is specially designed.

Early Warning System

Special sensor pins are welded on inner coil side with regular distances to detect the molten metal that penetrates to the coil. This feature considerably increases the liability of the system.

Back Tilting Furnace

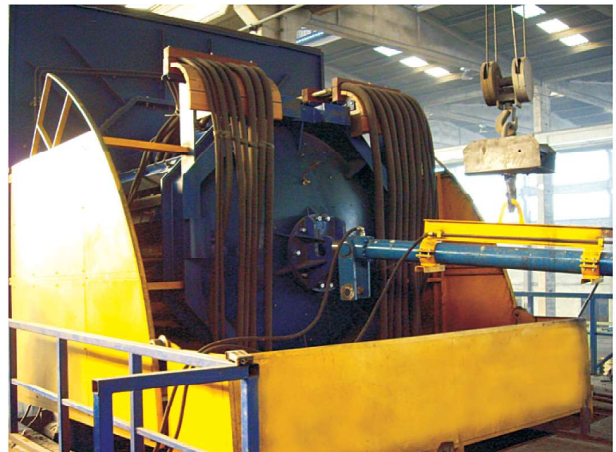
Especially from the large size of furnaces is quite difficult. To ease this operation, EGES manufactured "Back Tilting Furnaces" as per customer's request.



Principle of Back Tilting Diagram

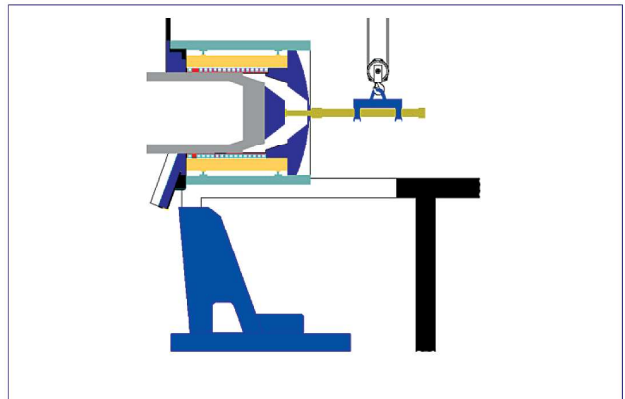


Push Out System



18 ton furnace Push Out & Side Guard accessories

To remove the worn-out lining material inside the furnace, push out device ease the work and decrease take out time.



Push Out Principle Diagram

Pneumatic Transfer Switch

Double furnace system has transfer switch changing its position by compressed air. This feature gives much easier operation and longer service life to the switch. Furthermore, operator can select furnace by using remote control on the hydraulic panel, and does not have to go near converter which is time loss.



Pneumatic Transfer Switch

COOLING SYSTEM

On EGES ULTRAMELT Furnaces, there are two separate Water Cooling Systems; which works in combination; converter and furnace cooling system.

Closed Circuit Converter Cooling System

The converter is cooled with closed circuit deionized water system. Keeping the value of conductivity of deionized water under $1 \mu\text{S}$ corrosion caused by ionisation is avoided. Also, in case of ionization resin is contaminated when the conductivity increases over $5 \mu\text{S}$, "Electronic Water Conductivity Measurement System" gives signal to warn the operator. If the deioniser is not changed within acceptable duration (approx. One week) after getting warning signal, the PLC locks the system to avoid further corrosion.

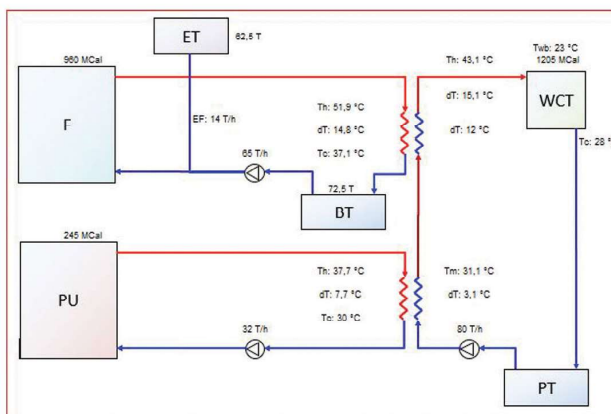
The converter is cooled by the furnace cooling water through a plate type water to water heat exchanger. Besides, for the countries where the humidity and environment temperature is very high, chiller type composed gas coolers are frequently used to reduce those values down to normal climatical conditions.



Heat exchanger & Pump station room

Open or Closed-Circuit Water Cooling Systems for the Furnaces

The coil can be cooled by one of the following systems according to the Customer's request.



Principle of Converter cooling diagram with deionized water

- Evaporative Type Cooling Tower "Open-Circuit"
- Air/water exchanger Fin-Fan/Radiator Type "Closed-Circuit"
- Baltimore type "Close-Circuit"
- Combination of Evaporative Type Cooling Tower and Plate Type water to water heat exchanger "Close-Circuit"

According to the climatic conditions of countries where the furnaces are to be installed, EGES offers various cooling systems that satisfies all customers.

During power failure, special cooling system design gives great confidence and comfort to the operator. Without auxiliary power supply or operator's intervention for furnace cooling are no more needed.

HYDRAULIC OPERATOR PANEL

Hydraulic operator panel use for furnace tilting and installed near the furnace. Also transfer switching and emergency stop are controlled by operator panel.



Converter Remote Control on Hydraulic Panel

All EGES furnaces are supplied with converter remote control panel which is assembled on hydraulic operator panel, controlling switch off and power adjustment functions. This remote control unit gives great convenience and comfort to the operator.

During power failures the molten metal inside the crucible can be poured out manually by hand or pressured air.

VIBRATOR CHARGER



Charging By Vibrator Charger

On request, EGES can also supply minimum 2.5 ton capacity electric motor driven vibrating charger with steel wheels moving on rails.

PLC

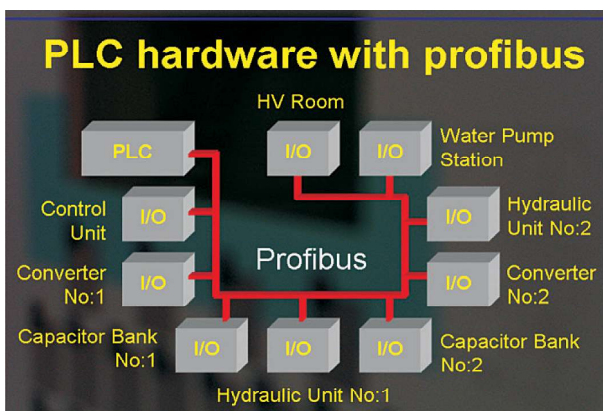
ULTRAMELT SYSTEM PLC PROGRAM SPECIFICATIONS

PLC (Programmable Logic Controller) system controls mainly the system work and balances needs of operator and the system. PLC systems also give flexibilities to our development idea. In order to give perfect complexity of the Melting System, EGES can add more functionality to the PLC program even after the system starts to work.

Worldwide known SIEMENS software and hardware

Well known SIEMENS or compatible software and hardware give upgrading possibility

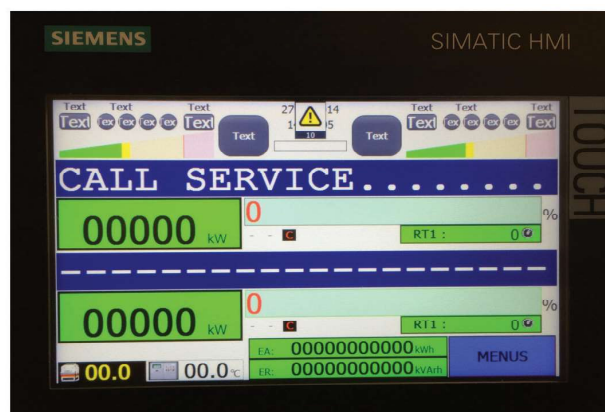
PLC program can be extended in order to meet the needs of the foundry.



PLC hardware with profibus

Easy operation of system

PLC provides operational instructions in your own language that makes it easier for the most inexperienced operators to use EGES ULTRAMELT Induction Furnaces.



SIEMENS Touch Screen PLC Display

Automatic Sintering Function

Using 4 different sintering curves give possibilities for using different lining materials including linings to melt copper or aluminum metals.

Automatic Heating Function (Cold start and dry) without temperature sensor

This program heats lining in control therefore extends lining life. Also if drying parameters are selected, it is possible to dry the lining in order to avoid wet condition of the lining.

4 different heating functions allow both cold start and dry function parameters.

Reduced Voltage Function

This function is automatically put into operation during sintering and when ambient temperature is rather cold.

Reduced Power Function

Reduced Power Function can manually be selected

Automatic Water Pump Shut-Off Function

Pump shut-off delay time can be adjusted. With this option, system cools down the lining of the furnace by running water pumps after end of melting with preset time then automatically stops all water pumps and cooling fans.

Automatic Soft Start and Soft Stop Function

This function starts the power from minimum level and increase up to latest saved value.

Other features

Protection of External and Primary pumps against dry operation.

Security for transfer switches position

Improper selection of transfer switch is avoided.

There are 40 various types of failure identification

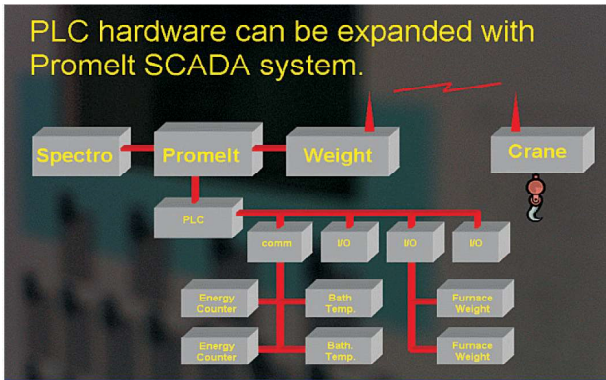
EGES Induction Melting Furnace System has 40 different fault types. Number of fault messages increases in order for adding 2nd furnace or 2nd converter to system.



PLC & Converter Remote Control Cabinet

SCADA SYSTEM

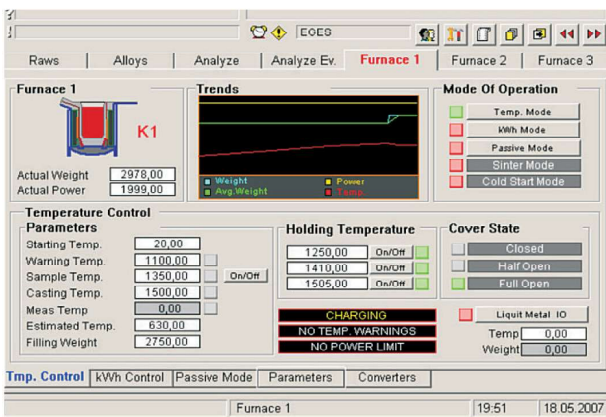
PLC hardware can be expanded with Promelt SCADA system.



SCADA and PLC hardware with profibus

PROMELT SCADA SYSTEM SPECIFICATIONS

Promelt SCADA program is used for effective and simple operation of EGES Induction Furnace System, where PLC system can not do some functions, such as charge analysis and Automatic Temperature Control.



Temperature Control Page

It displays and logs the PLC Fault Messages, Power meter data and Furnace Charging values.

Name	Fe	C	Si	Mn	Cr	P	S	Ni	Rec1	Total
1 Pig_Iron_A	92.000	4.000	2.000	0.000	0.000	0.000	0.000	0.000	100.000	100.000
2 Pig_Iron_B	94.000	4.000	1.000	0.000	0.000	0.000	0.000	0.000	100.000	100.000
3 Steel_Scrap	98.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	100.000	550.000
4 Fe-Mn(+)	0.000	7.000	0.000	35.000	0.000	58.000	0.000	0.000	100.000	30.000
5 Fe-Cr(+)	28.000	6.000	0.000	0.000	67.000	0.000	0.000	0.000	100.000	40.000
6 alloys01	40.000	50.000	10.000	0.000	0.000	0.000	0.000	0.000	50.000	0.000
7 -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8 -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9 -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10 -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11 -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	48.882	6.62	6.77	1.78	7.77	2.11	0.00	0.00	100.000	820.000
51 Pig_Iron_C	85.000	7.000	8.000	0.000	0.000	0.000	0.000	0.000	100.000	830.000
	-4.6820	6.48	7.63	-1.28	-3.27	-2.12	0.00	0.00	100.000	10.000

Analyse Page

All faults which exist in PLC are displayed. Time of existence, and repair acknowledged by the Operator for each fault is logged (Acknowledging of Promelt fault data must be done on Promelt display). Previous fault information can be read through the program.

Temperature Control Mode,

Temperature Control Mode estimates the molten metal temperature by means of weight of metal inside of furnace and given energy, it makes necessary corrections and indicates casting (pouring) temperatures through molten metal temperature measuring.

Energy Control Mode

Through Energy Control Mode, according to gross energy value to be given or as per energy consumed per ton of molten metal it calculates the actual given energy and after desired energy is supplied it turns to Holding Mode.

Analysis Reporting

Analysis reporting does formation of Analysis Values and comparison with spectrometer output.

Furnace Graphics pages

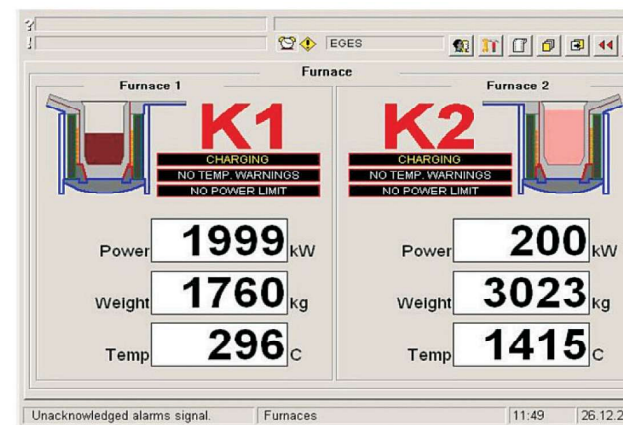
Through Furnace Graphics pages, the power supplied to furnace, weight of charged metal and calculated temperature can be followed.



Furnace Graphic Page

Simple Display Screen

There is also a screen which shows most of the data such as temperature, weight and power of furnace, in bigger letter or numbers.



Simple Display Page

ENVIRONMENT FRIENDLY

EGES Induction Furnaces give off minimum level of impurities to the atmosphere. Upon request, dust cleaning system filters can be installed at the end of the exhaust system.

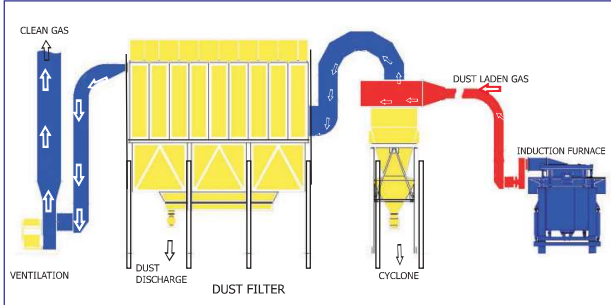


Diagram of Induction Furnace with Dedusting Filter System

SAFETY AND PROTECTION SYSTEM

With design of parallel resonance converter and from years of experience gained, EGES presents the safest induction furnaces.

Protection features are;

- 100% "Over Voltage protection" at mains
- Over Current protections
- Phase protection.
- Over voltage protection for thyristors and capacitors.
- On all principal water cooling branches, temperature and water flow are controlled.
- Earth Leakage detector.
- Early metal penetration warning system.
- Galvanic electrical isolation.
- Temperature control and water flow controls for each thyristor branch.
- All protection systems are directed and controlled by the PLC and all errors are logged.

EGES furnaces are produced in accordance with IEC regulations.

PIPE HEATING SYSTEM



60° Pipe Heating System

ACCESSORIES



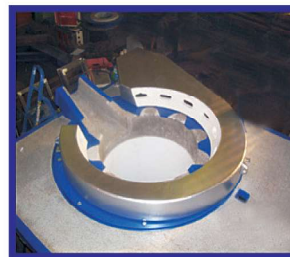
Furnace Weighing System



Side Guard System



Refractory Rammer



Exhaust Ring System



Air Cooler System



Furnace Charger System

THE MELTING RATES FOR RECOMMENDED COMBINATIONS

TYPE	FURNACE		CONVERTER		MELTING RATE (kg/h)		MELTING TIME (minute)	
	MODEL	CAPACITY (kg)	POWER (kW)	FREQUENCY (Hz.)	G.IRON AT 1450°C	STEEL AT 1600°C	G.IRON AT 1450°C	STEEL AT 1600°C
STEEL CONSTRUCTION FURNACES WITH YOKE	EGP 1000 SE	1000	600	1000	1137	1043	53	58
	EGP 1000 SE	1000	800	500	1580	1450	38	41
	EGP 1500 SE	1500	800	500	1580	1450	57	62
	EGP 1500 SE	1500	1000	500	2058	1888	44	48
	EGP 2000 SE	2000	1000	500	2058	1888	58	64
	EGP 2000 SE	2000	1250	500	2573	2360	47	51
	EGP 2000 SE	2000	1500	500	3088	2833	39	42
	EGP 2500 SE	2500	1250	500	2573	2360	58	64
	EGP 2500 SE	2500	1500	500	3088	2833	49	53
	EGP 3000 SE	3000	1750	500	3305	3062	54	59
	EGP 3000 SE	3000	2000	500	4117	3777	44	48
	EGP 3000 SE	3000	2500	500	5146	4721	35	38
	EGP 4000 SE	4000	2500	500	5146	4721	47	51
	EGP 4000 SE	4000	3000	500	6175	5665	39	42
	EGP 5000 S	5000	2500	500	5146	4721	58	64
	EGP 5000 S	5000	3000	250	6175	5665	49	53
	EGP 6000 S	6000	3000	250	6175	5665	58	64
	EGP 6000 S	6000	3500	250	7205	6610	50	54
	EGP 6000 S	6000	4000	250	8234	7554	44	48
	EGP 6000 S	6000	5000	250	10292	9442	35	38
	EGP 8000 S	8000	5000	250	10292	9442	47	51
	EGP 10 T	10000	6000	250	12351	11331	49	53
	EGP 10 T	10000	7500	250	14409	13219	42	45
	EGP 12 T	12000	6000	250	12351	11331	58	64
	EGP 12 T	12000	7500	250	14409	13219	50	54
	EGP 15 T	15000	7500	250	14409	13219	62	68
	EGP 15 T	15000	8000	250	16460	15100	55	60
	EGP 18 T	18000	10000	250	20575	18875	52	57
	EGP 18 T	18000	12000	250	24690	22650	44	48
	EGP 20 T	20000	12000	250	24690	22650	49	53
	EGP 25 T	25000	10000	250	20575	18875	73	79
	EGP 25 T	25000	12000	250	24690	22650	61	66
EGP 25 T	25000	14000	250	28805	26425	52	57	
EGP 25 T	25000	15000	250	30862	28312	49	53	
EGP 30 T	30000	15000	250	30862	28312	58	64	
EGP 30 T	30000	16000	250	32950	29745	55	62	
EGP 40 T	40000	18000	250	36950	33745	57	64	
EGP 40 T	40000	20000	250	38886	35128	62	68	
EGP 45 T	45000	20000	250	38886	35128	67	72	

Upon request; Other combinations and 50 Hz.-4000 Hz frequency systems can be produced

For other metals, multiply the melt rate for steel by the following coefficients :

Aluminium:1, Copper:1.6, Brass:1.9, Bronze:1.9, Gold:5, Silver:2.85

SERVICE

24 Hours / 365 days a year around service is available

EGES differences

EGES is one of the major Induction Furnace Producer to provide aftersales maintenance and service because of;

- EGES high technology design" means less failures,
- Special PLC system that locates the faults,
- Error logging memory which directs the technician to solve problems easily.
- Trained and experienced technicians and engineers.
- Suitable converter design for fast service.
- Telephone advice line for fast technical support
- Large stock of spare parts.

Fast,
Cost Effective,
High Quality,
Reliable,
Service On
365 days,
24 hours



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+90 543 543 3437

service@eges.com.tr



EGES since 1975

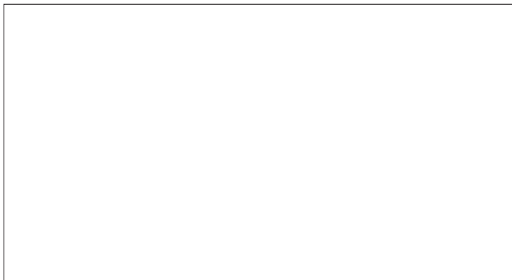


PREFERRED PARTNER FOR THE 21st CENTURY

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