TESI®

INDUCTION HEATING EQUIPMENT

INDUCTION HEATING GENERATORS

IHG SERIES - CHG SERIES - SHG SERIES

INTRODUCTION

Induction heating is a complex technology, since several are the factors that can influence the process.

Induction heating, applied to pipeline construction, faces even more criticalities because of the extremely severe environmental conditions in which pipeline projects are usually carried out.

Tesi can count on a team of experts with long experience and deep knowledge of this technology. Our people and equipment are renowned among the most important international contractors and engineering companies for top quality service and performance.

We provide a series of Induction Heating Generators with different power ranges to match any kind of applications:

- Induction heating self powered generators (DIESEL):
  IHG series
- Induction heating electric motor generators (CONVERTERS):
  CHG series
- Induction heating STATIC generators (INVERTERS):
  SHG series

These generators are designed to comply different and proper requirements for Onshore, Offshore and Spoolbase projects. All the series have the common features described in the next pages, as well as high level of reliability required from pipeline contractors.

	Flame	Infrared Heaters	Induction Heating Uncontrolled	Induction Heating Digital Controlled
Heating Time	Long	Very long	Short	Short
Efficency	Low	Very low	Excellent	Excellent
Adjustable and Controlled Heat Cycle	No	Yes	No	Yes
Heating Uniformity*	Very Poor	Poor	Good	Excellent

***depending on the combination of generator and coil**

Induction Heating Generators

Default Features

Management Control Board & Software

The control board is electrically interfaced (connected) to any diesel engine, electric motor, alternator and is able to manage all the parameters related to induction heating cycle, and also monitor the whole system. As for induction heating electrical parameters the control system is able to read, monitor and tune the values in a closed loop PID control. It is also designed so that critical parameters (such as max voltage, current, temperatures, PF, I^2T etc) are always under control.
It is equipped with different communication ports, including CANBUS J1939, able to interface with ECU (engines control units) so that all engine parameters can be controlled (temp, pressure, speed, warnings and alarms) or adjusted (desired speed, for instance). Control boards can be easily upgraded through a dedicated USB port whenever a new firmware release is available. Through a USB port it is also possible to download logger data.
Hardware and software are constantly upgraded in order to make our machines always more reliable, powerful, easy to use and serviced. TESI's equipment really ***make the difference***.

Auto & Continuous PF adjustment

Power Factor (PF) of an AC electrical power system is, by definition, the ratio between real power and apparent power in the circuit. Systems with ***PF=1*** as all TESI generators are extremely efficient, since the full power of the system is transferred to the load (pipe). To have a system always with PF=1 there must be a continuous measurement and consequent continous adjustment of the capacitor banks and other parameters that influence the value.
Tesi Generator Management Control Board automatically and continuously monitor the real values of these parameters (True Root Mean Square - TRMS) and adjust them, to have always the PF=1 during any heat cycles or heat treatments.

Display & Start-Up procedure assistance

All series of Induction Heating Generators made by TESI are equipped with a certified low temperature display (-40°C). Through the display operators are driven step-by-step to use the machine properly. The display also shows relevant parameters during operation such as voltage, current, power, alternator temperature, PF, as well as warnings, suggestions and alarms. The Management Control Board allow to customize the generator according to the customer preference.
Options available are:

Autocrank Start-Up:

to automatically start the engine by a push button (no keys) with or without password. This option manages the entire start-up sequence, including any pre-heat if necessary.

Password Level:

to set up different level of passwords, also used in case of lease in order to stop the machine in case payments are not respected.

Data-Logger:

built-in recorder for the complete storage of the operational parameters (times, heating cycles datas, settings, alarms).
This information can be easily downloaded through the USB port and trasmitted to TESI technical support or uploaded to a third party Telemetry GSM or Satellite system.

Over Current Protection & Over Voltage Protection

All Tesi generators have a full protection of the sensible components (main alternators, connectors and cables).
Equipment failures and damages are largely due to operators negligence that do not respect the correct procedures causing unexpected openings of the induction circuit that generate extremely fast over voltage and overcurrent that can't be handled by conventional protection devices available on the market.

Tesi developed and integrated into ***all*** generators a protection system capable to continuously protects against ***over voltage***; machines are also provided with ***fast acting (50 ms) over current protection***. Tesi generators are the only available on the market to have this protection. Tesi generators are also equipped with a full protection against direct and indirect contacts.

Optional Features

Heat Treatment

Heat treatment module allows to heat a pipe according to a desired heating profile set on the generator by the operator. To do this, the generator is equipped with high accurate temperature probe and special software that continuosly control the generator output power and power factor.
Moreover, the heat treatment software is specifically designed to continuosly adjust the power factor for every pipe temperature, especially when the pipe reaches the Curie temperature, where the steel pipe magnetic relative permeability is around 1.

Wireless Remote Control

Max Distance: 150 mt
Working Temp: -20°C / +70°C
Battery n°2 NiMH
Battery Charger 11 ÷ 28 Vdc or 230 Vac

Radio remote controls feature the maximum safety level, CAT4 (EN 954-1), thanks to a product design widely based on the concepts of redundancy, monitoring and self-checking. Transmitter is available with 4 push buttons, and all feature a Start/Horn button, a mushroom head Stop button and removable "contactless" safety key for restricted operation as standard. Transmitter compact dimension and 25 mm diameter motion buttons enable easy use when wearing industrial gloves. It is equipped, as standard, with Start and Stop buttons, LED indicators and an Emergency mushroom-head button. On request additional operations can be controlled by remote.

TS Demag®

Designed, developed and tested by TESI, is an integrated system detecting and removing irregular residual magnetism by the use of the same coil performing welding pre-heat.
It is an ***automatic*** system based on a feedback-loop that measures the residual magnetism on pipe ends with a sensor and, in case the value is too high, automatically manage and control the demag process.
The entire operation require few minutes (max 5) and the effect lasts for few hours. Compared to other systems we are sure that TS Demag can remove any kind of residual magnetism (patch, radial, longitudinal) because of the special current based on harmonic of second level used, that are able to penetrate through the whole wall thickness.

Auxiliary Alternator

120/240 VAC – 50/60 Hz, 9 kW
AUX alternator is driven by the main engine and connected by heavy duty rubber belts. It can be used both during heating cycle or when the generator is in cruise-speed mode to power any kind of tools, light torches or multimedia devices.

Air Compressed System

N°1 cylinder, water cooled - Flow 12.8 CFM (0.36 m^3/min) @ 2400 rpm - 8 bar
10 GAL-standard

Air compressed systems are designed to provide dry, clean and pressurized air. Reliability and durability are enhanced by a cast-iron piston that is stronger than aluminum pistons. It can be used to power any kind of pneumatic tools, such as pneumatic drills and small sand-blasting machines or simply for cleaning.

Induction Heating Self Powered Generators (Diesel): IHG series

		IHG 120	IHG 150	IHG 180	IHG 350
Max Output Power	kW	120	150	180	350
Duty Cycle	50 % Max ON (6' ÷ 20') kW	120	150	180	350
	100% kW	100	120	150	280
Working temp	°C (°F)	-15°C / +45°C (+5°F 7 +113°F) -40°C on request			
Relative Humidity		85%			
Dry Weight	kg (lb)	2500 (5512)		3000	6000 (13228)
L x W x H	mm (in)	2440 x 1280 x 2020 (96" x 50" x 80")		3100 x 1500 x 2300 (122" x 59" x 91")	3370 x 1730 x 2470 (132" x 68" x 97")
Max Inclination	Deg (°)	35°			22°
Noise Power Level	dB (A)	LW=109 dB (A)			
Tank Capacity	L (US Gal)	170 ÷ 200 (45 ÷ 53)		200 ÷ 250 (53 ÷ 66)	500 (132)
Rated Voltage	V	165	215 / 240	480	265 / 490
Rated Current	A	725	560 / 625	313	680 / 715
Frequency	Hz	440-480	480 / 480	480	480 / 600
Alternator Insulation Class	H				
IP Protection	22				
Output Connectors	Power Lock / Leviton series 16 / Gifas 623120/613120				
Remote Control	Wired Remote Lg. 15 mt (cable for -40°C) / Wireless				

Engine Features

		IHG 120	IHG 150	IHG 180	IHG 350
Brand		CUMMINS FTP (IVECO)	CUMMINS FTP (IVECO)	DEUTZ	DEUTZ
Displacement	L (in3)	6,7 (409)		7,2 (439)	16 (976)
Cooling		Liquid			
Emission Compliance		US EPA Tier 3 EU Stage III A			US EPA Tier 2 EU Stage II
Power	kW (Hp)	142 ÷ 175 (190 ÷ 235)	194 (260)	234 (314)	400 (536)
Speed	RPM	2400 or 1800		1800	
Max Torque	Nm (lb-ft)	930 (686)	990 (730)	1300 (959)	2700 (1991)
Speed Control		ECU electronic			
Fuel Consumption (100% Load)	g/kWh (lb/hph)	223 (0.37) (Air) / 208 (0.34) (Liquid)	226 (0.37)	218 (0.36)	220 (0.36)

INDUCTION HEATING ELECTRIC MOTOR GENERATORS: CHG SERIES

		CHG 80	CHG 110	CHG 180	CHG 350
MAX OUTPUT POWER	kW	80	110	180	350
DUTY CYCLE	50 % Max ON (6' ÷ 20') kW	80	110	180	350
	100% kW	depending on model			
WORKING TEMP	°C (°F)	-15°C / +45°C (+5°F 7 +113°F) optional kit for -40°C shall be installed			
RELATIVE HUMIDITY	85%				
DRY WEIGHT	kg (lb)	1200 (2646)	1400 (3086)	2500 (5512)	6500 (14330)
L x W x H	mm (in)	1660 x 1260 x 1870 (65.4 x 49.6 x 73.6)	1620 x 1305 x 1526 (63.8 x 51.4 x 60)	2300 x 1680 x 1926 (90.6 x 66.1 x 75.8)	3500 x 1700 x 2100 (137.8 x 66.9 x 82.7)
MAX INCLINATION	DEG (°)	W=40° L= 5°			
NOISE POWER LEVEL	dB (A)	LW=90 dB (A)			
INPUT VOLTAGE	V	380/480 VAC @ 50/60 HZ			
RATED INPUT CURRENT	A	190 ÷ 112	240 ÷ 200	410 ÷ 325	755 ÷ 595
START-UP CURRENT	A	230 A for 40" 350 A for 8"	295 A for 40" 450 A for 8"	500 A for 50" 780 A for 12"	1100 A for 60" 1700 A for 15"
RATED VOLTAGE	Vac	135	160	265	490
RATED CURRENT	A	600	690	680	715
FREQUENCY	Hz	396 ÷ 475	396 ÷ 475	396 ÷ 475	480 ÷ 600
INSULATION CLASS	H				
IP PROTECTION	IP22				
OUTPUT CONNECTORS	Power Lock / Leviton series 16 / Gifas 623120/613120				
REMOTE CONTROL	Wired Remote Lg. 15 mt (cable for -40°C)				

Induction Heating Static Generators (Inverters): SHG series

		SHG 40	SHG 80	SHG 120	SHG 240	SHG 320
Input Voltage		380 Vac - 480 Vac 3 Phase - 50/60 Hz				
Input Current	A	70 ÷ 55	150 ÷ 120	203 ÷ 165	406 ÷ 325	539 ÷ 430
Input Power Factor		≥ 0.9				
Efficiency		≥ 95%				
Output Power	kW	40	80	120	240	320
	Duty	100%				
Frequency	kHz	7 (3 ÷ 9)		4.5 (3 ÷ 8)	3 (2.5 ÷ 6)	
Max Output Current	A	300	400	650	1050	1200
Max Output Voltage	V	800	1000	1050	1200	1300
Overload		110% - 1 min				
Operating Temperature	°C (°F)	-20°C / +40°C (-4°F / +104°F)				
Storage Temperature		-30°C / + 60°C (-22°F / + 140°F)				
Cooling Type		Air Cooled				
Enclosure Protection		IP20				
Output Connectors		Power Lock / Leviton series 16 / Gifas 623120/613120				
L x W x H	mm (in)	560 x 800 x 730 (22" x 30" x 27")		1100 x 1500 x 560 (43" x 59" x 22")		
Dry Weight	kg (lb)	150 (330)	200 (441)	320 (705)	560 (1235)	660 (1455)

A COMPANY OF TESI GROUP

info@tesigroup.com
www.tesigroup.com

TESI SPA
HEADQUARTER
Via Piave, 20/11 20080 - Vermezzo (MI) ITALY
Tel +39 02 9440501 - Fax +39 02 9449087

INDUCTION HEATING CENTRE
Via San Giuseppe 29 43039 - Salsomaggiore Terme (PR) ITALY

TESIGROUP LLC
10617 Jefferson Chemical Road
Conroe, TX 77301 USA
Tel +1 (936) 4415678 - Fax +1 (936) 7565566

DAEMAR HEATING TECHNOLOGY CO.ltd
Unit 501, Building 1 - Jia 12 Jiuxianqiao Road
Chaoyang District, Beijing CHINA
Tel +86 10 6438 0812 - Fax +86 10 6438 0612