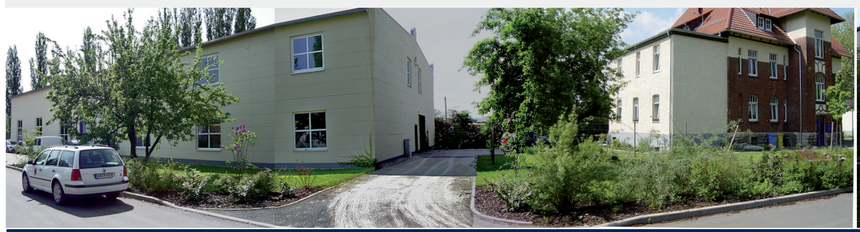
Furnace atmospheres and temperatures	Graphite
Air / O_2	400
hydrous	400
N_2	1800
Ar	2500
H_2	1600
Vacuum	1800
MFC	X
Vacuum (Oil-sealed or dry compressing vacuum pumps)	X
High vacuum (Oil diffusion pumps and if necessary high vacuum slide valve)	X
Burnable gases (Waste gas purification is needed)	X
Fast cooling (Fast cooling with side channel blower)	X
Fail safe PLC	X
Charging rack (Customized solutions)	X
Cooling module	X
Process visualization	X

- VACUUM FURNACES:
  - Integrated Sintering and Debinding
  - Graphit
  - Molybden
- CAF
- RETORT FURNACES
- HOOD TYPE FURNACES
- ROTARY TUBE FURNACES
- BELT FURNACES
- SPECIAL TECHNOLOGY

- SINTERING
- SINTERING AND DEBINDING
- MIM / CIM
- DEBINDING AND PYROLYSIS
- HEAT TREATMENT
- BRAZING
- MELTING AND INFILTRATION
- DRYING; CALCINATION
- POWDER METALLURGIE
- FOAMING
- LABORATORY

MUT ADVANCED HEATING GmbH designs and manufactures customized thermal processing equipment and systems since 1994 for industries, such as: glass and ceramic, metal processing, powder metallurgy, carbon and chemical processing industries.
We design systems for state of the art processes, such as: sintering, debinding, joining techniques, heat treatment of aggressive substances as well as for high-pressure and hot gas treatment.

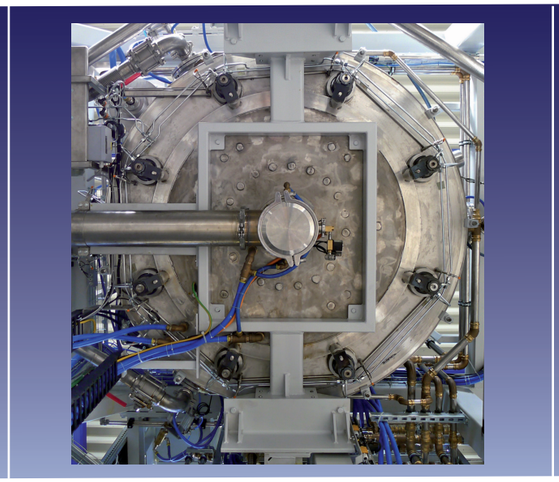
With in-house competence in mechanical design, process and safety techniques, electrical design and software development we are a skilled and reliable partner to our customers.
MUT is distinguished in its industry by a high level of vertical integration.

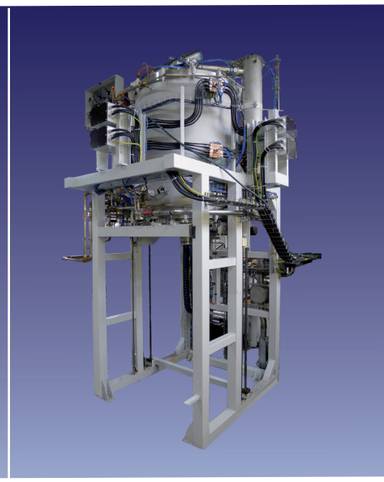


MUT ADVANCED HEATING GmbH · Fritz-Winkler-Straße 1-2 · D-07749 Jena
Telefon: 49.3641.56560 · Fax : 49.3641.565611 · www.mut-jena.de · info@mut-jena.de

MUT ADVANCED HEATING

Thermal Processing Equipment for the manufacture of high quality components





GO Graphite Furnaces

Graphite furnaces for manufacturing products in the field of:

- sintering of hard metals
- powder metallurgy
- PIM, MIM & CIM, 3D-Print
- sintering of high-performance ceramics
- technical ceramics
- non-oxide ceramics
- shape forming of glass
- fine chemicals
- carbon chemistry
- heat treatment

EFRE EUROPA FÜR THÜRINGEN
EUROPÄISCHER FONDS FÜR REGIONALE ENTWICKLUNG
Erstellungsdatum: 06.04.2018
EUROPÄISCHE UNION
MADE IN GERMANY

MUT ADVANCED HEATING

MUT's GO furnace series is on the market since 1996. The furnace concept has been reworked continuously and induced design reviews.
A lot of experiences from the last years have been incorporated.

The special design features of the GO series are:

- Vacuum-tight, double-walled water cooled vessel made from stainless steel special designed to high tightness
- Multi-layered insulation built with graphite and carbon soft felt for different application temperatures
- Removable heating interior with multi-zone heater assembly; support cage carries insulation
- Different heating systems possible, heaters made from tubes or meander heaters made from plate material
- Usage of low voltage heating elements (electrical supply by high current transformers)
- Different vacuum pump units available
- Gas supply with different inlet gases adapted to the process (optional for burning gases)
- Directed gas guide to prevent impurities by degassing
- Mass Flow Controller for gas flow adjustment via the heat treatment program (optional)
- partial pressure operation; controlled pressure with constant gas flow
- Easy up-scaling to encrease usable furnace space without risk of process
- Multiple system solutions for charging the products
- Safe disposal of exhaust gases by thermal post combustion (optional)
- Short cycle time by fast cooling unit (optional)
- Control system SIEMENS S7 including possibility of remote access

GO furnace series have some benefit to the user:

- High temperatures with advantageous cost-performance ratio
- Good temperature distribution due to multi-zone heater assembly
- Robust furnace construction for production and industrial application
- Energy savings by reduced specific energy input
- Partial pressure opreation with hydrogen and other burnable gases
- gas atmosphere change under hot condition
- Quick gas exchange rates or fast cooling unit to reduce cycle time
- Useable space adaptations to individual conditions possible
- Different furnace sizes available with modular add-on devices
- Different modular charging systems which are selected for specific operating conditions, thus minimizing the logistics effort

Following types are available:

model	usable heating chamber dimensions [mm]	usable furnace volume [dm³]	dimensions of furnace [mm] W xD x H	dimensions of switch cabinet [mm] W x Dx H	heating power 1,800°C-version [kW]	electrical supply [A] 3~
			vertical version			
GO 400/800	Ø400 x H800	101	1280/2080/3340	1200 x 400 x 2100	100	200
GO 580/1000	Ø580 x H1000	264	1490/2240/3850	1600 x 400 x 2100	180	315
GO 800/1200	Ø800 x H1200	603	1650/2360/4360	2000 x 400 x 2100	300	500
GO 980/1300	Ø980 x H1300	981	2150/2720/4720	2400 x 500 x 2100	400	630
GO 1100/1500	Ø1100 x H1500	1425	2350/3060/5650	3000 x 500 x 2100	500	800
			horizontal version			
GO 330/330/500	B330 x H330 x T500	54	1250/1200/1800	1600 x 400 x 2100	90	160
GO 480/480/900	B480 x H480 x T900	207	1900/3800/2300	2000 x 400 x 2100	210	315
GO 580/580/1250	B580 x H580 x T1250	421	2300/4600/2400	2000 x 500 x 2100	350	630
GO 700/700/1300	B700 x H700 x T1300	637	2500/5200/2550	2400 x 500 x 2100	450	800
			other dimensions on request			

Please configure your furnace according to your application:

The clearly arranged configurator shows all available possibilities. Our application specialists will help you to choose the optimal facilities that are necessary for the manufacturing process of your product.

■	Basic configuration
●	Options
▲	Accessory

Configurator for graphite furnaces	
Features	**GO**
Sturdy steel frame supports furnace equipment	■
Dopple-walled water cooled vessel made from stainless steel with several cooling water circuits	■
Cooling water supply with separate adjustable and monitored circuits	■
Gas inlet for one inert gas (1x purge gas valve und 1x process gas valve); process gas valve with rotameter	■
Heating chamber, consisting of heating elements and insulation	■
Removable heating interior; support frame carries radiation sheet insulation construction	■
Transformers, sensors and actors hard-wired completely	■
Temperature measurement via pyrometer	■
Furnace versions: up to 1,800 °C, 2,000 °C, 2,300 °C and 2,500 °C	●
vertikal versions	-
Inside bottom heating element and top heating element	■
Charging flange equipped with electric driven elevator (bottom loader)	■
Particularly good temperature homogeneity in the plane	■
Inside top heating element	●
upper top flange (service flange)	●
horizontal versions	-
Charging door with hinge-joint for manual opening (front loader)	■
Inside door heating element and rear wall heating element	■
movable charging door	●
Both-sided flange at the vessel (charging door / service flange)	●
Charging by carriage system	●
all versions	-
Separate switch box including switch, control and power electronic components	■
Control system SIEMENS S7 including possibility of remote access	■
Operation via SIEMENS touch panel with graphic visualisation	■
Vacuum operation up to 5×10^{-1} mbar (clean, cold, dry, and empty furnace)	■
Fine vacuum unit to 5×10^{-2} mbar with roots pump (clean, cold, dry, and empty furnace)	●
Hydraulic locking system	●
Dust filter	●
Cold trap	●
Partial pressure operation	●
Operation with flammable process gases (Atex version)	●
Operation with powdery materials	●
High vacuum unit to 5×10^{-5} mbar with oil diffusion pump (clean, cold, dry, and empty furnace)	●
Mass Flow Controller (MFC) for gas flow adjustment via the heat treatment program	●
Fast cooling with side channel blower	●
Thermocouples for measuring the charge temperature or heater temperature (up to 1,800 °C)	●
Torch, thermal post-combustion	●
Design for corrosive media	●
Control system SIEMENS S7 in fail-proof version	●
SIEMENS process visualization, data recording & program library	●
Cooling module (closed-loop furnace-cycle with heat exchanger and pump station)	▲
Charging rack (Consulting, design and manufacturing)	▲
Loading cart and charging place	▲