

## Hot-Wall Retort Furnaces up to 1100 °C



NR 75/06 with automatic gas injection and touch panel H 3700



NR 17/06 with gas supply system



Inside heating in models NRA .. /06

### NRA 17/06 - NRA 1000/11

These gas tight retort furnaces are equipped with direct or indirect heating depending on temperature. They are perfectly suited for various heat treatment processes requiring a defined protective or a reaction gas atmosphere. These compact models can also be laid out for heat treatment under vacuum up to 600 °C. The furnace chamber consists of a gas tight retort with water cooling around the door to protect the special sealing. Equipped with the corresponding safety technology, retort furnaces are also suitable for applications under reaction gases, such as hydrogen or, in combination with the IDB package, for inert debinding or for pyrolysis processes.

Different model versions are available depending on the temperature range required for the process:

#### Models NRA .. /06 with Tmax 650 °C

- Heating elements located inside the retort
- Temperature uniformity up to  $\Delta T$  6 K inside the work space from 100 °C - 600 °C see page 79
- Retort made of 1.4571
- Gas circulation fan in the back of the retort provides for optimal temperature uniformity

#### Models NRA .. /09 with Tmax 950 °C

- Outside heating with heating elements surrounding the retort as well as an additional door heater
- Temperature uniformity up to  $\Delta T$  6 K inside the work space from 200 °C - 900 °C see page 79
- Retort made of 1.4841
- Fan in the back of the retort provides for optimal temperature uniformity

#### Models NR .. /11 with Tmax 1100 °C

- Outside heating with heating elements surrounding the retort as well as an additional door heater
- Temperature uniformity up to  $\Delta T$  10 K inside the work space from 200 °C - 1050 °C see page 79
- Retort made of 1.4841



NRA 480/04S



NRA 50/09 H<sub>2</sub>

### Basic version

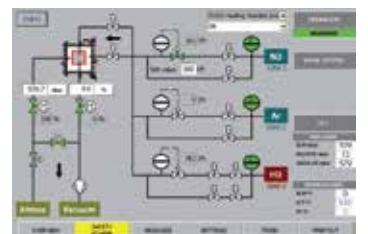
- Compact housing in frame design with removable stainless steel sheets
- Controls and gas supply integrated in the furnace housing
- Welded charging supports in the retort or air-baffle box in the furnace with air circulation
- Swivel door hinged on right side with open cooling water system
- Multi-zone control for 950 °C and 1100 °C version, separated by furnace chamber and door. Depending on furnace chamber additionally subdivided into one or several heating zones
- Temperature control as charge control with temperature measurement inside and outside the retort
- Gas supply system for one non-flammable protective or reaction gas with flow meter and solenoid valve, switchable via the control system
- Operation under vacuum up to 600 °C with optional single-stage rotary vane pump
- Port for vacuum pump for cold evacuation
- PLC controls with touch panel H 700 for data input (resp. P 300 for 650 °C-version) see page 70

### Additional equipment

- Upgrade for other nonflammable gases
- Automatic gas injection, including MFC flow controller for alternating volume flow, PLC controlled with touch panel H 3700
- Vacuum pump for evacuating of the retort up to 600 °C, attainable vacuum up to 10<sup>-5</sup> mbar subject to selected pump
- Cooling system for shortening process times
- Heat exchanger with closed-loop cooling water circuit for door cooling
- Measuring device for residual oxygen content



Vacuum pump for cold evacuation of the retort



Touchpanel H 3700 for automatic version



NR 200/11 H<sub>2</sub> for heat treatment under hydrogen



Bayonet quick-lock for the retort, also with electric drive as additional equipment



Parallel guided door to open the hot furnace as additional equipment



Bluing of drills in water steam atmosphere in a furnace of the NRA range



Charging of the NR 300/06 furnace with a pallet truck

### H<sub>2</sub> Version for Operation under Hydrogen

When hydrogen is used as a process gas, the furnace is additionally equipped with the required safety technology. Only certified and industry proven safety sensors are used. The furnace is controlled by a fail-safe PLC control system (S7- 300F/safety controller).

- H<sub>2</sub> supply at controlled overpressure of 50 mbar relative
- Certified safety concept
- PLC controls with graphic touch panel H 3700 for data input
- Redundant gas inlet valves for hydrogen
- Monitored pre-pressures of all process gases
- Bypass for safe flushing of furnace chamber with inert gas
- Torch for thermal afterburning of exhaust gases
- Emergency flood container for purging the furnace in case of failure

### IDB Version for Debinding under Non-flammable Protective Gases or for Pyrolysis Processes

The retort furnaces of the NR and NRA product line are perfectly suited for debinding under non-flammable protective gases or for pyrolysis processes. The IDB version of the furnaces implements a safety concept by controlled purging the furnace chamber with a protective gas. Exhaust gases are burned in an exhaust torch. Both the purging and the torch function are monitored to ensure a safe operation.

- Process control under monitored and controlled overpressure of 50 mbar relative
- Certified safety concept
- PLC controls with graphic touch panel H 1700 for data input
- Monitored gas pre-pressure of the process gas
- Bypass for safe flushing of furnace chamber with inert gas
- Torch for thermal afterburning of exhaust gases

Model	Tmax °C	Model	Tmax °C	Work space dimensions in mm			Useful volume in l	Electrical connection*
				w	d	h		
NRA 17/..	650 or 950	NR 17/11	1100	225	350	225	17	3-phase
NRA 25/..	650 or 950	NR 25/11	1100	225	500	225	25	3-phase
NRA 50/..	650 or 950	NR 50/11	1100	325	475	325	50	3-phase
NRA 75/..	650 or 950	NR 75/11	1100	325	700	325	75	3-phase
NRA 150/..	650 or 950	NR 150/11	1100	450	750	450	150	3-phase
NRA 200/..	650 or 950	NR 200/11	1100	450	1000	450	200	3-phase
NRA 300/..	650 or 950	NR 300/11	1100	570	900	570	300	3-phase
NRA 400/..	650 or 950	NR 400/11	1100	570	1250	570	400	3-phase
NRA 500/..	650 or 950	NR 500/11	1100	720	1000	720	500	3-phase
NRA 700/..	650 or 950	NR 700/11	1100	720	1350	720	700	3-phase
NRA 1000/..	650 or 950	NR 1000/11	1100	870	1350	870	1000	3-phase

\*Please see page 80 for more information about supply voltage





SRA 300/06 with charging basket

**SR(A) 17/.. - SR(A) 1500**

The retort furnaces SR and SRA (with gas circulation) are designed for operation with non-flammable or flammable protective or reaction gases. The furnace is loaded from above by crane or other lifting equipment provided by the customer. In this way, even large charge weights can be loaded into the furnace chamber.

Depending on the temperature range in which the furnace be used, the following models are available:

Models SR .../11 with Tmax 1100 °C

- Heating from all sides outside the retort
- Temperature uniformity up to  $\Delta T$  14 K according to DIN 17052-1 within the working chamber of 500 °C - 1100 °C see page 79
- Retort made of 1.4841
- Top down multi-zone control of the furnace heating

Models SRA .. /09 with Tmax 950 °C

Design like models SR.../11 with following differences:

- Atmosphere circulation with powerful fan in the furnace lid provides for temperature uniformity of up to  $\Delta T$  8 K according to DIN 17052-1 within the working chamber of 200 °C - 900 °C see page 79

Models SRA .. /06 with Tmax 600 °C

Design like models SRA.../09 with following differences:

- Heating inside the retort
- Temperature uniformity up to  $\Delta T$  14 K according to DIN 17052-1 within the working chamber of 100 °C - 600 °C see page 79
- Single-zone control
- Retort made of 1.4571

Standard Equipment (all models)

Design like standard equipment of models NR and NRA with following differences:

- Charging from above with crane or other lifting equipment from customer
- Hinged lid with opening to the side

Additional equipment, H<sub>2</sub> version or IDB version see models NR and NRA



SR 170/1000/11 with changeable retort and cooling station

Model	Tmax °C	Inner dimensions of alloy retort		Volume in l	Outer dimensions in mm			Electrical connection*	Weight in kg
		ø in mm	h in mm		W	D	H		
SR(A) 17/..	600, 950 1100	250	350	17	1300	1700	1800	3-phase	600
SR(A) 25/..		250	500	25	1300	1900	1800	3-phase	800
SR(A) 50/..		400	450	50	1400	2000	1800	3-phase	1300
SR(A) 100/..		400	800	100	1400	2000	2100	3-phase	1500
SR(A) 200/..		600	700	200	1600	2200	2200	3-phase	2100
SR(A) 300/..		600	1000	300	1600	2200	2500	3-phase	2400
SR(A) 500/..		800	1000	500	1800	2400	2700	3-phase	2800
SR(A) 600/..		800	1200	600	1800	2400	2900	3-phase	3000
SR(A) 800/..		1000	1000	800	2000	2600	2800	3-phase	3100
SR(A) 1000/..		1000	1300	1000	2000	2600	3100	3-phase	3300
SR(A) 1500/..		1200	1300	1500	2200	2800	3300	3-phase	3500

\*Depending on furnace design connected load might be higher

\*Please see page 80 for more information about supply voltage



SRA 200/09