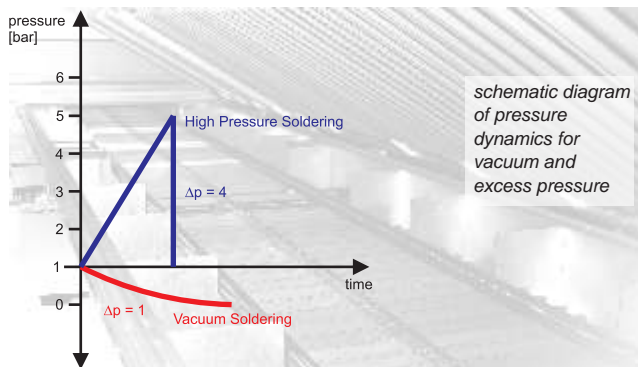


Void-Free Soldering Technology

MAXIREFLOW HP

- Up to 99 % void-free solder connections.
- High pressure module allows gas convection to be used for energy transfer.
- Pressure module, integrated in the peak area, makes for minimum space requirements.
- Hyper pneumatic process can be activated and deactivated programmable via software.
- Minimum cycle times.
- Robust and reliable conveyor system.
- High parallelism of conveyor rails ensures maximum process safety.
- Powerful energy transfer.
- Effective, multi-stage cooling area.



Whether for power electronics, electronic aviation systems, medical equipment or electronic systems for the automotive industry: voids in solder joints are representing one of the main problems.

Enclosed voids can cause a displacement of electrical and thermal paths and a local concentration of power and heat. In addition, gas voids are anxious to form spheres in the solder gap which could be a cause for tilting of chip components and a wedge-shaped solder gap. This is tightening the problem of patchy distribution of current or heat and is causing stress and cracks.

The amount of voids can be influenced by different measures such as a good wettability of metallization, solder pastes with special adopted solvents and an adequate preheating profile. However, to achieve virtually void-free solder joints, to date a special vacuum process step during soldering is demanded. But this vacuum process is associated with some essential disadvantages.

Besides of the technical expenses for vacuum pumps and additional locks, the vacuum process excludes the use of gas convection for heating and cooling. In addition, printed circuit board materials and also some components are tending to excessive outgassing in vacuum, and particularly some electrolyte capacitors cannot tolerate the vacuum process because of the hermetically enclosed liquids.

The same principles as used in vacuum soldering technology are applicable also for a higher pressure level. If the void in the solder joint develops in an excess pressure, the normal atmosphere pressure could be sufficient for escaping of enclosed gas. Essential for this effect is the pressure difference between the void and the surroundings.

SEHO goes this innovative and new way with the MaxiReflow HP that ideally combines convection heat and a special hyper pneumatic module, thus ensuring virtually void-free solder connections.

Perfect Temperature Management for Perfect Soldering Results

Each heating zone of MaxiReflow HP - also the zones integrated in the hyper pneumatic chamber - are provided with tangential fans that ensure an absolutely homogeneous heat distribution with their large volume of ventilated process gas.

The special shape of the nozzles and the optimized gas leading principle FDS (Flow Dynamic System) make for an ideal, highly efficient heat transfer to the printed circuit boards and thus enable the most effective and component-sensitive heating of the product, with set temperatures on a low level.

With a total of six top and bottom heating zones in front of the hyper pneumatic chamber and two top and bottom heating zones in the overpressure area, the system presents itself very effective also in terms of temperature management.

This enables a very precise and flexible reaction to all material and process related conditions - for perfect soldering results.

Also the temperature controlled cooling area that consists of two separately adjustable zones, is equipped with the established tangential blower concept. Over a distance of 900 mm (35.4 inch) cooling gradients can be affected systematically to cool down assemblies stress-free.

The Conveyor System: Reliable and Flexible

The MaxiReflow HP is provided with a robust chain conveyor system that makes for a reliable and flexible process.

The system is designed in such a way that it is not susceptible to soiling thus reducing machine downtimes because of maintenance requirements to an absolute minimum. Features such as an automatic chain oiler additionally help to disburden your maintenance personnel and ensure reliable function of the conveyor system for years. This not only saves time but also money in your production.

If required, MaxiReflow HP can be equipped with a center support to avoid bending of assemblies which are sensitive to heat.

The center support is featured with a specially small contact area to exclude any thermal affect to the desired temperature profile.

Separately controllable conveyor segments are installed in the preheat area, the pressure chamber and in the cooling area. This allows individual optimization of processes to maximize throughput.

heating zone and conveyor system
perfect soldering results - stable process



The Hyper Pneumatic Chamber: Effective and Safe

The technological highlight of the MaxiReflow HP is its innovative pressure chamber which enables gas convection to be used for heating of assemblies. This allows the application of conventional components and the realization of usual temperature distribution and profiles.

Provided with an active convection area of 600 mm (23.6 inch), arranged in two zones, and quartz heating elements that are installed in the bottom area of the machine, this new concept ensures absolutely reproducible, virtually void-free solder joints.

The hyper pneumatic chamber has a total volume of 240 liter and is designed for an excess pressure of max. 4.2 bar which provides high flexibility for a wide range of applications. Pressure buildup is controlled with a electromagnetic valve and is using nitrogen.

During soldering the process is designed in such a way that the solder alloy has been molten before entering the hyper pneumatic chamber.

In the first heating zone of the pressure chamber the liquid solder is exposed to an excess pressure (max. 4 bar). Simultaneously the combination of convection and quartz heating ensures stable and reproducible temperature conditions. After a short time period the excess pressure is released instantaneously which results in bringing the voids leaving the solder depot.

The clocked conveyor system transports the assembly to the second convection zone of the hyper pneumatic chamber and an excess pressure is build up again. The nominal temperature in this zone is already set to a value below the solder alloy's solidus which allows the solder to solidify in an excess pressure environment.

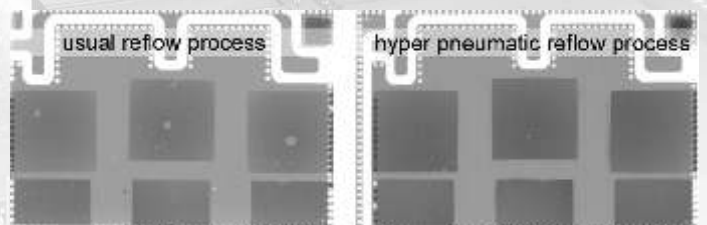
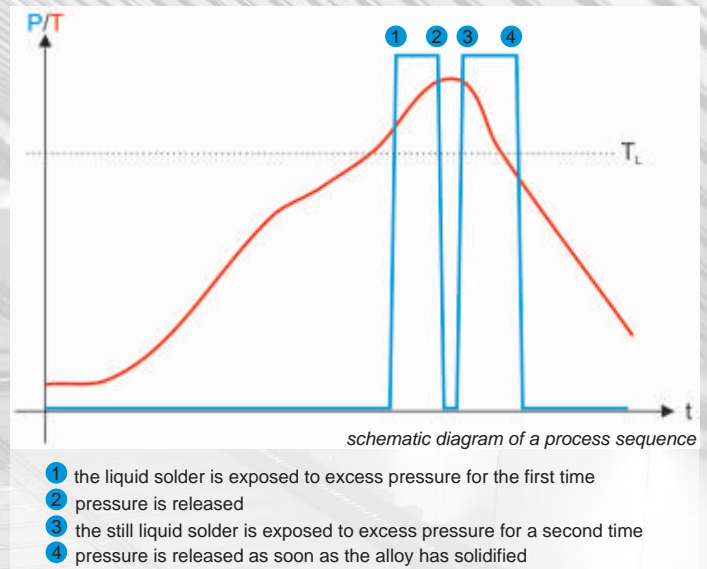
This innovative concept makes potentially still existing voids finally vanishing from the solder connections. Immediately after the solder's solidification the excess pressure is released and the assembly delivered to the cooling zone.

When processing uncritical assemblies, the MaxiReflow HP, of course, can also be operated without activating the hyper pneumatic chamber. The printed circuit boards in this case go through a conventional reflow soldering process - without a bulky intermediate module. Another advantage of MaxiReflow HP.

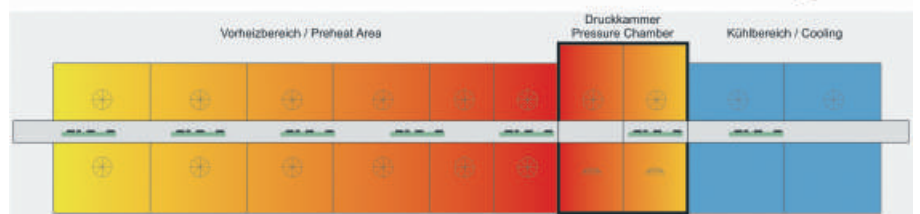
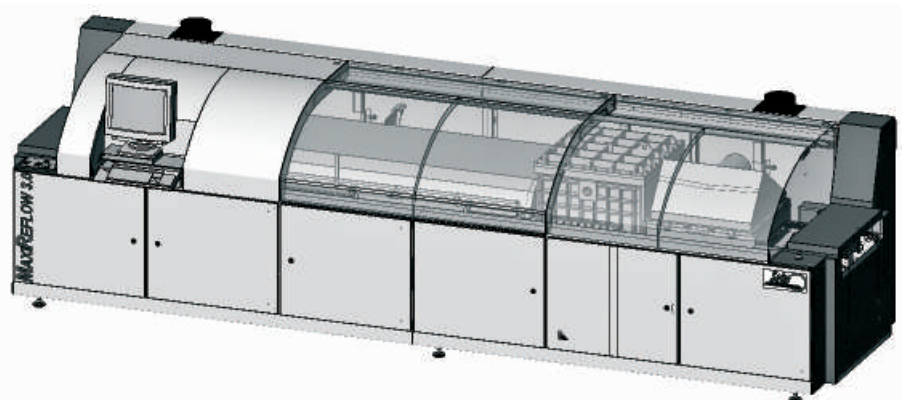
The Control Unit: Perfect Control - Easy Handling

The MaxiReflow HP is equipped with an up-to-date and modular designed control unit.

The software is easy to use and provided with a comprehensive management data tool for documentation and analyzing purposes.

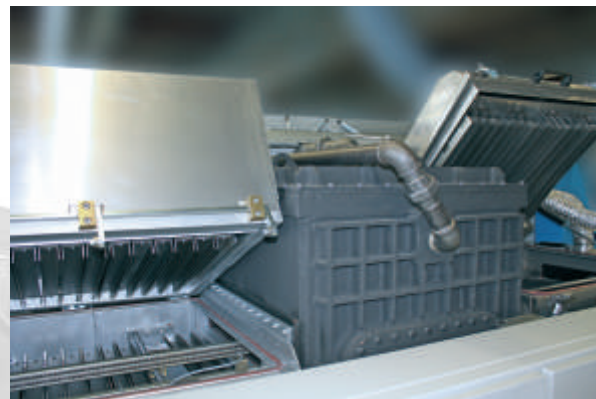


left: soldering result without hyper pneumatic technology - in many cases a significant void remains in the solder joint
right: soldering result with hyper pneumatic technology - virtually void-free



Technical Features and Options

| | |
|--|-----------------------|
| process gas | N ₂ or air |
| max. PCB length | 250 mm (9.85") |
| time for heating up | approx. 30 min. |
| Preheat and Cooling Area | |
| number of preheat zones top and bottom | 6 |
| total length of preheat area | 2400 mm (94.48") |
| number of adjustable cooling zones | 2 |
| total length of cooling area | 900 mm (35.43") |
| Hyper Pneumatic Chamber | |
| number of heating zones (convection top / quartz bottom) | 2 |
| active convection area | 600 mm (23.62") |
| max. excess pressure | 4.2 bar |
| volume | 240 liter |
| buildup and release of pressure | electromagnetic v. |
| Conveyor System | |
| pin-chain conveyor | ○ |
| max. working width | 400 (500) mm |
| conveyor speed adjustable between | 0.2 - 2.5 m/min. |
| number of conveyor segments | 3 |
| conveyor segments in preheat and cooling area coupled | ● |
| conveyor segment in the pressure chamber, clocked | ● |
| Flux Management | |
| multi-stage flux management with process gas cleaning | ● |
| Nitrogen Technology | |
| equipped for nitrogen operation | ● |
| oxygen analyzer | ○ |
| oxygen analyzer with nitrogen saving control | ○ |
| recommended nitrogen quality | 5.0 |
| pressure of nitrogen supply | 6 - 8 bar |
| Control Unit | |
| micro processor control with operation via PC | ● |
| management data system according to ISO 9000 | ● |
| clock timer and interval functions | ● |
| interfaces for inline integration (SMEGA, Siemens etc.) | ○ |
| closed loop control for all relevant functions | ● |
| Machine Dimensions | |
| length | 5610 mm |
| width | 1500 mm |
| height, depends on inlet height approx. | 1500 mm |



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Test us! Preparations for Soldering Tests

A reflow tracker (Datapaq or ECD Mole) can be used for recording of thermal profiles, however, because of structural reasons the unit has to go through the reflow system next to the assembly. In this case the printed circuit board size is limited to l x w = 250 x 300 ... 350 mm (this only applies for temperature profiling). If possible, we should receive a corresponding test board, prepared with thermo couples, prior to your visit so that we can manufacture a suitable carrier (loading gage).

For the soldering tests with focus on voiding, the assembled but not soldered boards should not be exposed to long transportation routes. If required the printed circuit boards can be printed with solder paste using the production equipment of one of our customers who is close to our factory (please bring along appropriate stencil and solder paste). Placement of components will be made manually.

Your challenge is our motivation. We look forward to seeing you at SEHO!

Further options upon request.

● Standard

○ Option