Ersa MULTI WAVE
Selective soldering with highest throughput

Please also adhere to our separate catalogue – **Ersa Selective Soldering Systems – In a class of its own!**

kurtz ersa

Cost savings due to technical highlights:

- Short cycle times due to simultaneous soldering process
- Process time is independent from the number of solder joints
- Superior quality
- Highest energy efficiency
- Maximum machine availability
- Outstanding serviceability
- Highest throughputs
- Superb process reliability
- Efficient programming
- Ready for traceability

Selective soldering within 2 seconds
No problem at all with the multi wave

Selective soldering processes ensure economic success, if they are precisely adapted to applications. A key factor in this context is productivity, namely, the throughput of assembly units achieved through soldering systems. In many fields of manufacturing, modern selective soldering systems are increasingly replacing conventional wave soldering systems. However, in high-volume manufacturing, in order to achieve the same throughput in selective soldering as in wave soldering systems, simultaneous selective soldering processes are required. These processes are characterised by the fact that they simultaneously solder all the selective soldering joints of an electronic assembly unit in a cycle.

In practice, this is implemented by multi wave soldering technology. The core of soldering units consists of product-specific soldering tools with individually built solder nozzles, which simultaneously and accurately convey the solder to the solder joints of the wired components. Thanks to this technology, soldering times of 2 - 3 seconds per assembly unit can be achieved, regardless of the number of components to be soldered.

Selective soldering systems based on multi wave technology guarantee a stable and repeatable selective soldering process with short cycle times for the user. The extensive equipment features of soldering systems allow economic processes and guarantee a high level of quality.

Careful handling of process materials results in low operating costs. High availability of soldering systems can be achieved by drastically reducing potential downtime for maintenance, programming and retrofitting. Extensive monitoring of parameters, which are relevant for the process, ensures high quality of the soldered assembly units.

Moreover, continuous process monitoring and safeguarding provide safety for the user. This enables systems to be operated without an operator.

At the same time, it provides a basis for the traceability of manufactured assembly units and connection to traceability systems. A high FPY is implicit under these conditions.

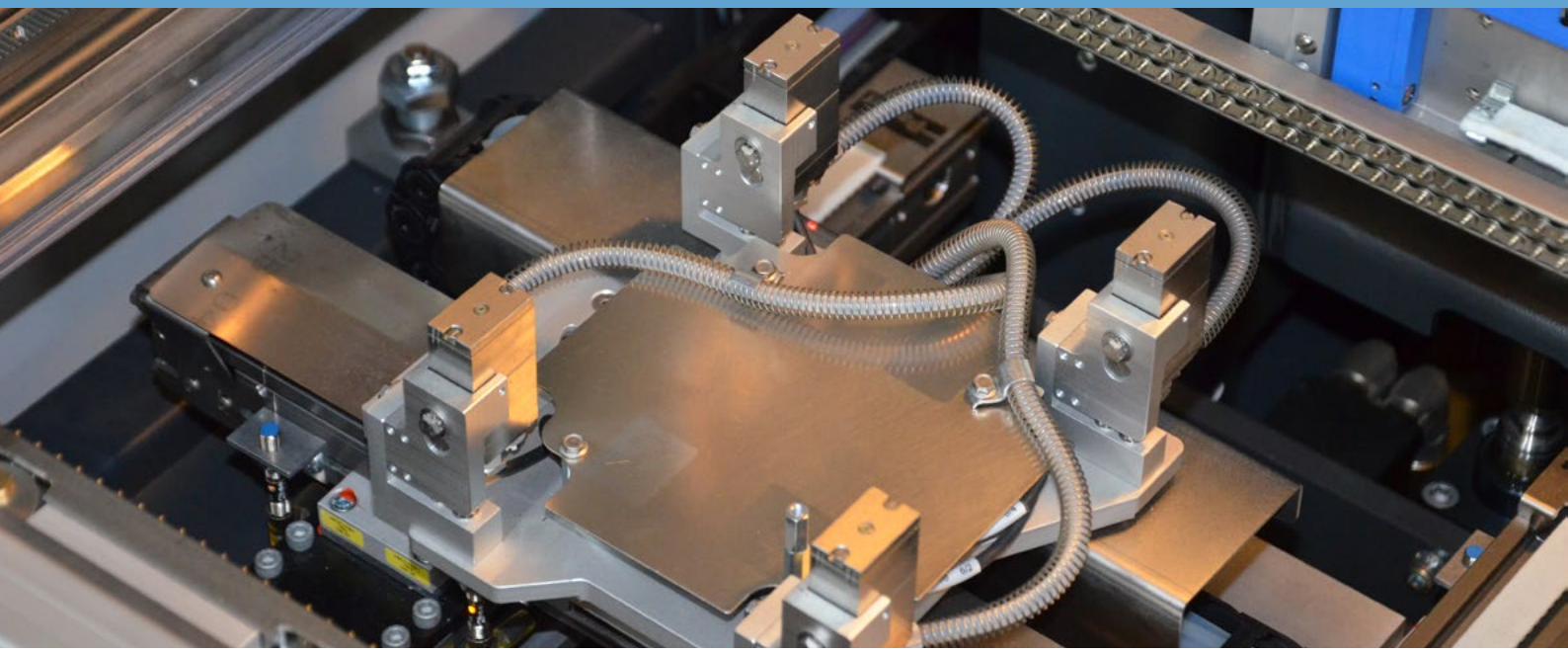
Due to its wide model range, multi wave technology is particularly interesting for SMEs, as well as for globally active companies, for which throughput and quality play a crucial role during manufacturing.

Investing in a flexible and expandable selective soldering system, in the age of SMT dominated electronics manufacturing, is a trend-setting decision. In fact, we cannot foresee whether a wide range of wired components will be replaced by SMDs in the near future. Wave soldering will thus remain a part of modern electronics manufacturing in the form of selective soldering technology for many years.

Ersa VERSAFLOW selective soldering system

Fluxing with highest precision

Superior process safety and best positioning accuracy also at highest throughputs



Flux module with four multi-drop heads; superior process safety through flux volume metering

The flux system of a multi wave soldering machine must live up to many high requirements simultaneously. High quality flux processes require not only precision but also speed and a high level of reliability.

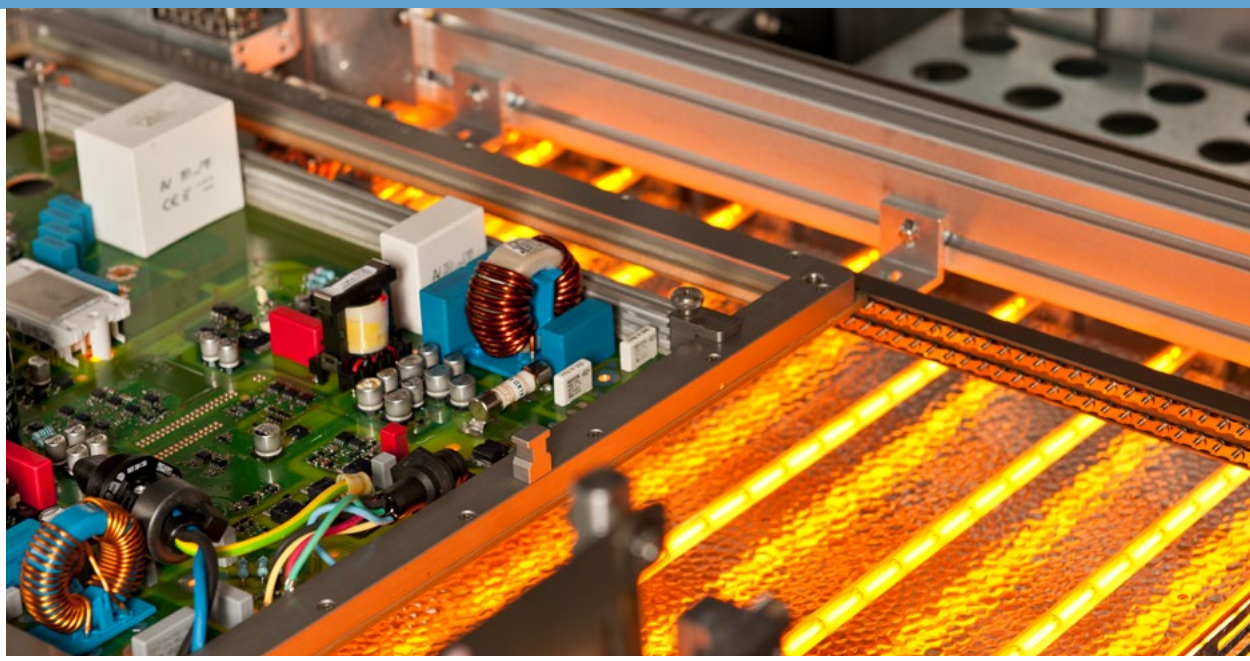
The sections of the PCB that are not wetted by the selective soldering waves may also not be supplied with flux material. In order to ensure this, today, modern micro-drop flux heads are used, which originate from industrial ink-jet technology and have been developed specifically to meet the special requirements of flux processes. The flux material is not sprayed here but it is rather specifically applied in single small droplets on the PCB surface. To this end, the flux heads are mounted on an X-Y axis system, which is precisely operated via CNC under the fixed assembly unit in the conveyor system. In order to ensure short cycle times in this sequential process, on the one hand, dynamic servo drives are used, whereas, on the other hand, flux systems in VERSAFLOW and ECOCELL can also be fitted with up to 4 spray heads. Thanks to an innovative feature, the high-performance control system of the machine allows exact wetting of large surfaces. Without time-consuming stops of the fluxer axis, the flux heads can be moved continuously and be precisely activated on the programmed positions.

Flux material application can be monitored continuously during automatic operation of soldering systems. Laser light barriers detect both the applied amount of flux material and target coordinates. If parameters differ from set values by a variable tolerance, the process is stopped and a corresponding operating signal is emitted for the operator.

Supported by Ersa CAD ASSISTANT, the fluxer can easily be programmed offline, while the machine continues to produce. This ensures optimal machine availability and time-efficient programming of different flux programmes.

Perfect preheating

Reproducible and economic – the ideal combination of bottom and top-side heating



Perfect preheating concept incorporating a dynamic bottom-side and top-side heating

Thanks to multi wave soldering processes, extremely short cycle times can be achieved. However, this requires a steady improvement in temperature performance, particularly in lead-free soldering processes.

Correct activation of flux materials for optimal wetting of the solder joints is essential to ensure good capillarity and, consequently, rising of the solder. If assembly units feature a high heat capacity, when using SnCu and SnAgCu solders, the heat balance of the solder joints strongly depends on the temperature and, therefore, on efficient pre-heating.

In order to take into account these various challenges, the Ersa selective soldering machines VERSAFLOW and ECOCELL are equipped with up to three preheater modules.

The heating cassettes, located below the conveyor system of the assembly units, are generally fitted with quartz rays. Its smart control system enables the operator to set different temperature gradients over several time intervals.

The temperature profile can be optimally aligned with its application and adapted to the individual process goals of customers.

The hybrid convection-heating modules above the conveyor system of the assembly units also support uniform heating of assembly units.

The heating modules are generally designed to provide full-surface heating of the maximum processable assembly unit size. However, in order to increase energy efficiency, the heating surface can be adjusted and controlled by a programme for the processing of small assembly units.

If, however, the flexibility of a short cycle time is not a priority, the heaters can be divided into two sections so that twice as many assembly units can be heated simultaneously.

Perfect soldering results every second due to an optimal nozzle geometry

Close-up of a solder nozzle plate with demanding nozzle geometries

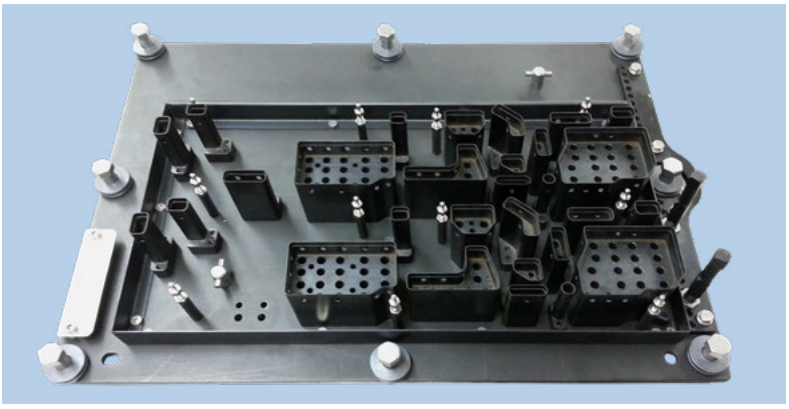
The core of a multi wave solder pot consists of a product-specific soldering tool: the nozzle plate.

This consists of a huge base-plate, on which the solder nozzles are arranged so that their size and position correlate with the solder joints on the board assembly.

In order to achieve consistent high quality soldering results, among other things, the inner structure of each nozzle is optimised during the design stage.

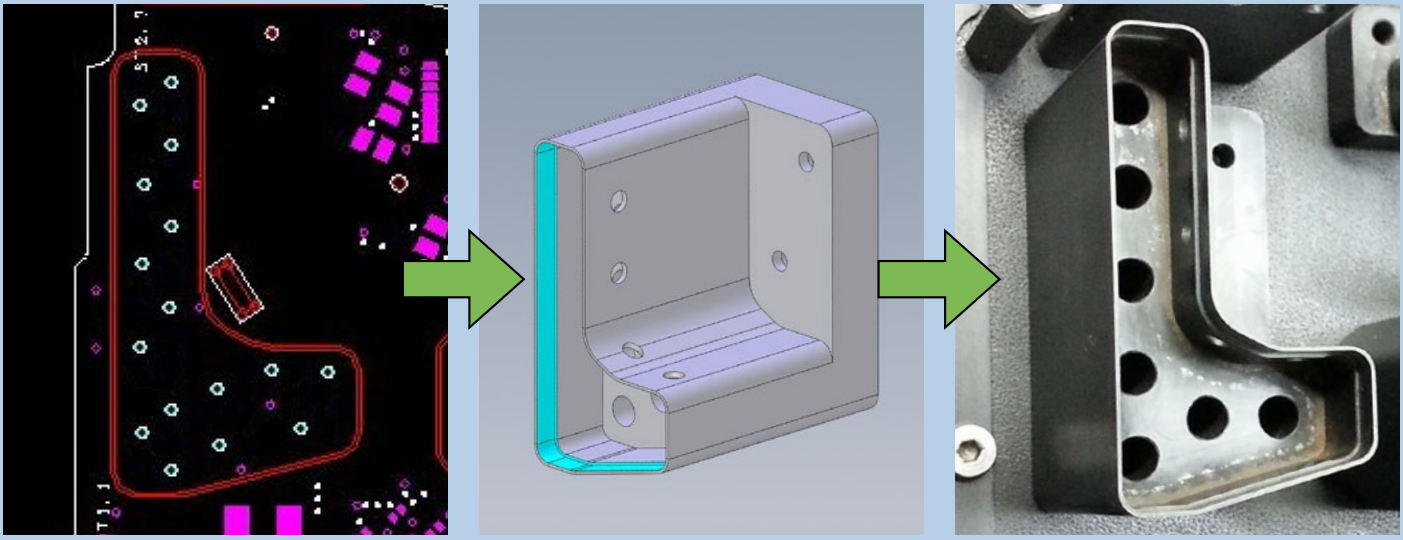
With regard to nozzle plate design, Ersa can rely on a longstanding experience and highly specialized application engineers. Customers gladly make use of this know-how so that, during PCB layout implementation, all parameters can be taken into account for an optimal process window.

The longstanding experience in the structural design of solder nozzles and the correct choice of materials and of a suitable protective layer against the attack of lead-free solders, guarantee stable soldering results, a high system availability and a high quality of the solder joints.



Solder nozzle plate "ready to solder"

“Safety First” – Individual solder nozzle design and process approval



Design steps for the development of a solder nozzle

Solder nozzle plates and product-specific component hold-downs are designed individually for each customer with a 3D-CAD system. No matter, if standard nozzle designs or customized nozzle layouts are required, the body of the solder nozzle is milled from a whole piece. After all nozzles have been manufactured, they are mounted on the solid base plate. Additional support pins are placed to prevent the PCB from bending during the soldering process.

Ersa also offers its customers the possibility of customized component hold-downs that are, as the solder nozzle plates, individually laid out for a specific board assembly. Every component hold down is designed, manufactured and mounted on the component hold-down plate to fit the geometry of the electronic components on the board assembly.

The Ersa component hold-down system in multiwave soldering systems is mounted directly in the free space over the board assembly, which is not used by handling systems or grippers. The great advantage of the integrated component hold-down is that the system is not required on each work piece carrier; instead it is mounted only once. This reduces the cost as well as the mounting time!

After changing the production to another board assembly it is essential to make sure that the correct solder nozzle plate and the correct hold-down are installed. Therefore Ersa customers have the possibility to encode the solder nozzle plates and the component hold-down with a transponder, connected to the tool by a thin steal rope, which is inserted into a reading device when the machine is setup. Before starting a new soldering process a plausibility check is performed. Only if the read codes of the nozzle plate and the component hold-down match with the product to be manufactured, the process approval is granted. The coding is monitored during the whole production process.

Individual component hold-down

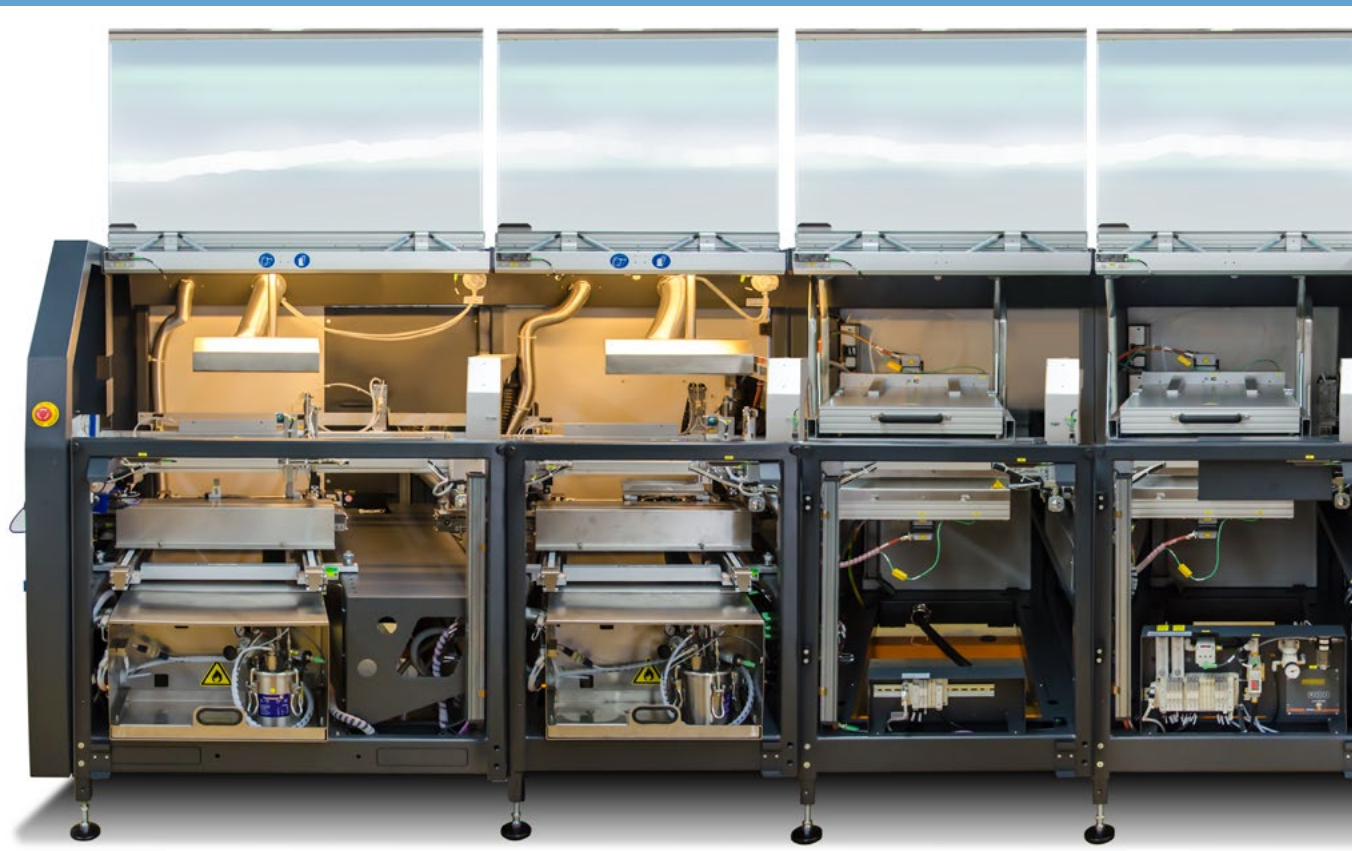
Transponder chip

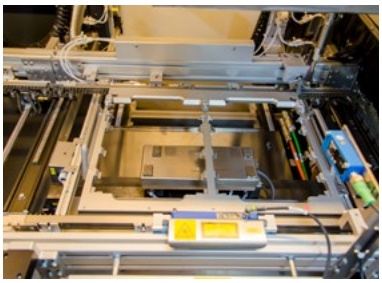
Code reader for transponder chips

Single component hold-down

VERSAFLOW Multiwave XL

Processing of large assemblies, high Throughput, high Quality





Flux system with 4 spray heads

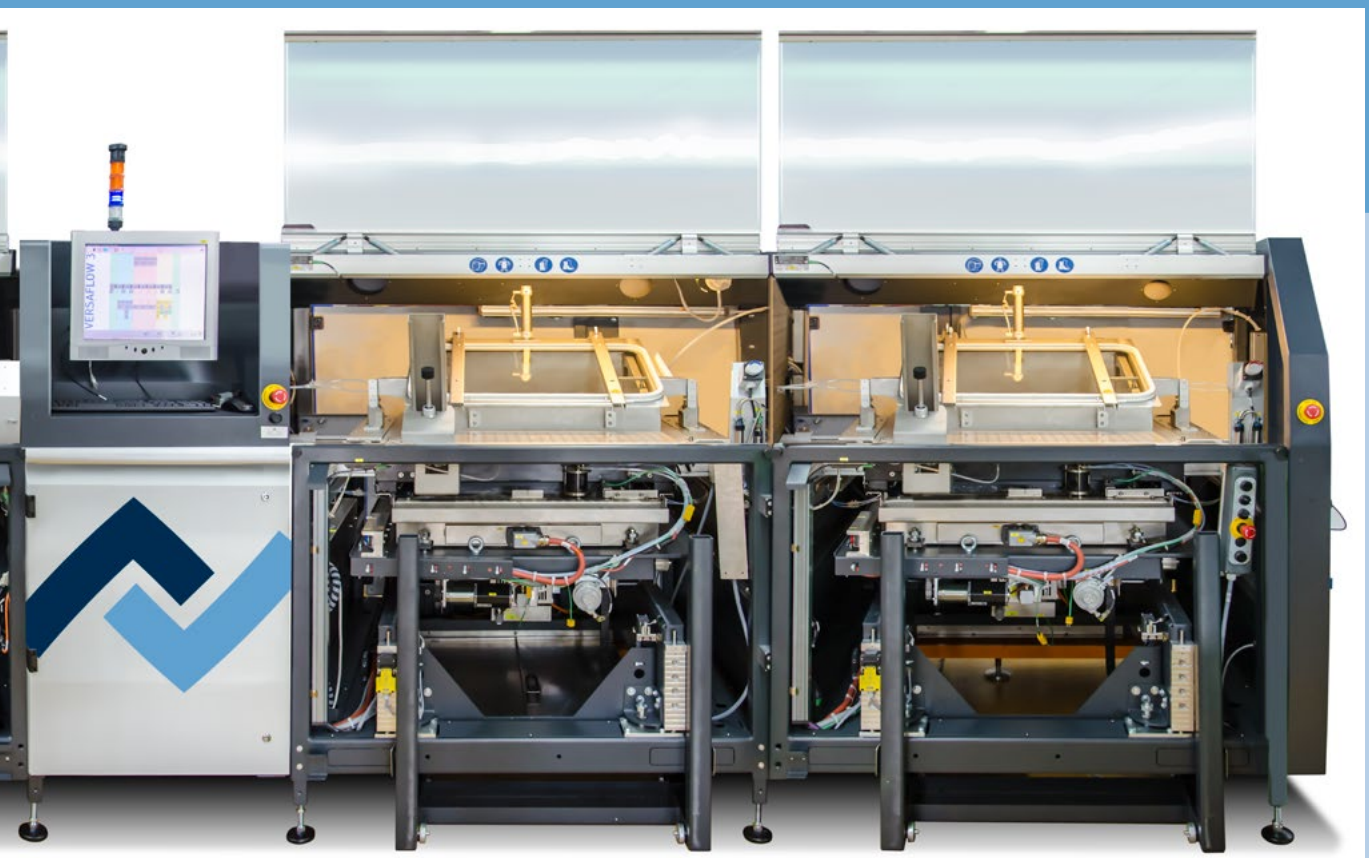
Today it has become state of the art to substitute classic wave soldering by selective soldering systems. This corresponds with the demand to manufacture large board assemblies in the same cycle time as in standard wave soldering processes.

The VERSAFLOW Multiwave XL fulfils these demands and is the first system which can manufacture large board assemblies in high volume production.

The modules of the Multiwave XL are based on approved Ersa technologies and meet the highest quality demands that are posed on production facilities and final products by electronic manufacturers all around the globe.

The Multiwave XL is equipped with two flux, four preheating an two soldering modules. The maximum size for assemblies is 16 x 20 inch (406 x 508 mm). This configuration allows the Multiwave XL to manufacture simultaneously up to eight large-sized assemblies.

Each flux module is placed on its own axle system, which can be equipped with up to four spray heads. The flexible design of the motion-sequence allows a fast application of the flux onto large board assemblies as well as the simultaneous application of flux on sinlge units arranged in panels.



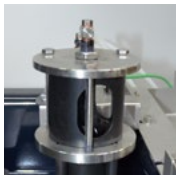
The preheating modules are equipped with fast reacting quartz emitters, which quickly and uniformly heat up the board assemblies to the required temperature. The first three preheating modules are arranged before the first soldering module. One more preheating module is placed between the first and the second soldering module.

Each module can be separately adjusted in stages, which allows product-specific temperature profiles and increases the reproducibility. Each preheating module can also be equipped with an optional upper-side convection heater.

Multiwave soldering units operate in a stable inert gas atmosphere. The entire soldering section is enclosed in a tunnel flooded with protective gas. Additionally a product-specific component hold-down can be integrated directly over the soldering module, corresponding to the customized solder nozzle plate. The longstanding experience in the structural design of nozzle plates guarantee homogeneous solder wave heights even when solder nozzles are arranged over the entire surface of the nozzle plate.

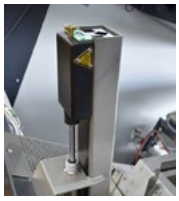
The great advantage of multiwave soldering systems is their calibratability. A special calibration tool allows the precise adjustment of the solder nozzle plate and the component hold-down in correspondence with the board assembly in the conveyor system. If the soldering modules of several soldering systems are calibrated like this in X, Y and Z direction, a product change within different production lines is possible without setting up the other soldering system to the new assembly.

The solder wave height and solder level monitoring as well as the solder bar supply are among the standard options for the Multiwave XL. The transport of the board assembly is performed directly by a pin-and-chain conveyor system or within product-specific solder frames.



Solder wave height measurement

Electromagnetic solder pump



Solder bar feeder

Maximum machine availability
due to „on the fly“ setup option

Ersa ECOCELL with 2 preheating modules and 2 „on the fly“ multi wave pots in combination with Ersa FIFO TOWER C

The latest generation of Ersa multi wave solder pots is maintenance-free, since its electromagnetic solder pumps have no moving parts. The performance of the pump can be adjusted stepless and the aggregate is suitable for all common lead-free solders.

„On the fly“ setup option with two soldering modules

The solder nozzle plate an den component holder system are equipped with quick fasteners in order to reduce the downtime during a tool change to a minimum. In matters of high volume production the mounting of solder modules is a further challenge.

The „on the fly“ setup option developed by Ersa allows machine availability to be further optimized. In this way, thanks to the setup, the availability of the system is not compromised, and a second solder unit can be installed. This allows Close-up of a solder nozzle plate with demanding nozzle geometries multiwave application on single wave unit the setting-up and installation of the soldering module that is not in use during current operation. In this way, it is possible to switch between the two products without downtime.

Solder module in maintenance and setup position

ERSASOFT
Operating – Documenting – Controlling

All Ersa selective soldering systems are operated with ERSASOFT, the dedicated PC-software. This machine visualization software offers numerous functions, which allow for an error-free operation of the system by the operator.

During the design of the user interface, great care was taken to make data entry a comfortable task. To achieve this, the icons of the touch screen were given adequate size. Identified by colour and uniformly structured, the dialogues provided offer quick orientation. Through clear distinction of the entry masks from the dialogues for the basic equipment configuration, it is virtually not possible for the system operator to lose the general overview. The clearly structured build of the software is intuitive to grasp, and the operation of the system is therefore easy to learn. Faulty operation of the system is prevented through the assignment of competency based and multi-level user rights.

All selective systems manufactured by Ersa are operated with ERSASOFT. But only that data which pertains to the configuration of the actual system is being shown on the display. For someone who has worked already with an Ersa reflow or wave soldering system, the analogue structure of the software is very quickly recognized. In view of this, it becomes apparent that, in this case, the training needs of the future operator of an Ersa selective soldering system is kept at a bare minimum.

Standard features of the ERSASOFT software is a process recorder, which continuously records the actual values of all aggregates that are important for the solder process, as well as the solder protocol, that stores all the process data that is important for traceability. Also incorporated is an extensive alarm management file. All messages received from the system are stored with a time stamp and signed-in user identification. All the data is available in the XML format, and can therefore easily be worked on in higher systems.

Special mention is made of the fact that all ERSASOFT software within one system generation is completely downward compatible. That means, that a customer can be certain, that any innovative software function that will be developed after he has taken delivery of his unit can be added to his system.

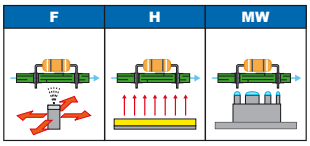
Software-Highlights:

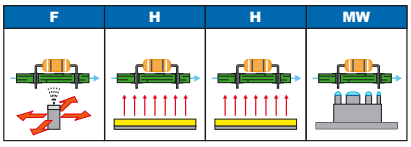
- **Traceability data acquisition pursuant to ZVEI Standard (included)**
- **Solder protocol, Process recorder, alarm management (included)**
- **Comfortable touch screenoperation**
- **Easy and intuitively to operate**
- **Downwards compatibility**
- **Linking to management execution program (MES) possible**

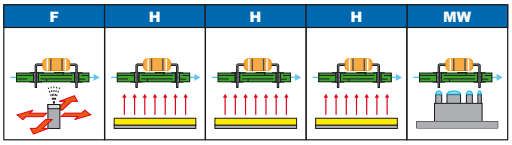
ERSASOFT stands for easy operation and optimized equipment availability

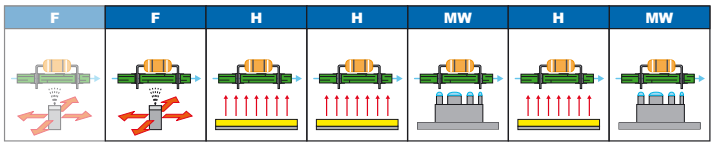
Ersa VERSAFLOW with multi wave solder module

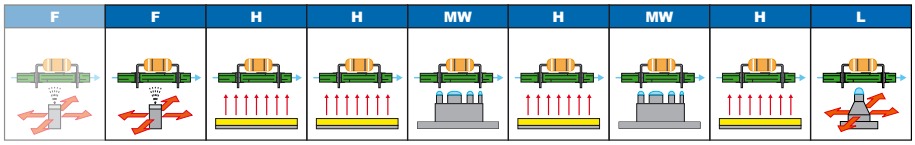
The selective soldering technology of the market leader in a highly flexible and future-proof modular design. – It always fits!

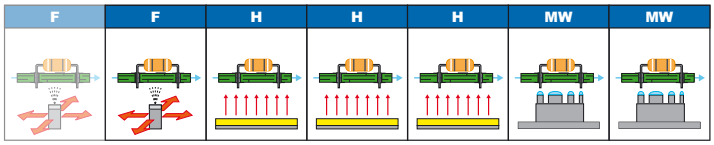


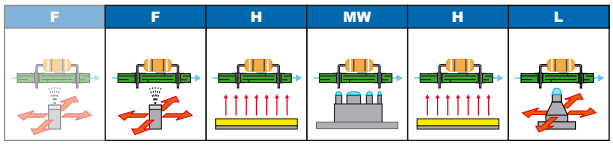












Below combinations of the arrangement of different modules show only some of the possibilities of the extremely flexible Ersa modular system concept.

Fluxer module

flux spray unit	750 mm

Preheat module

lower preheat	750 mm

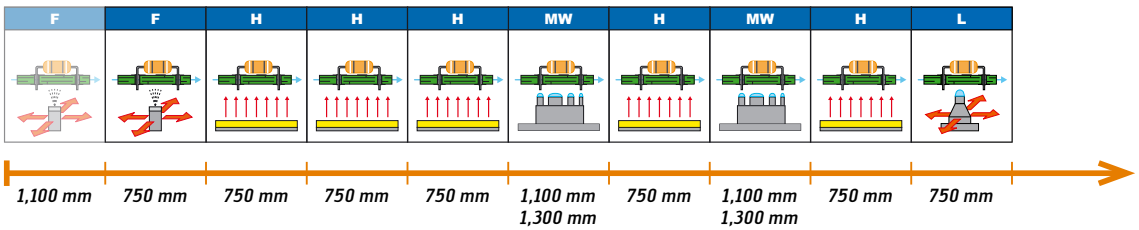
Solder module

single wave unit	750 mm

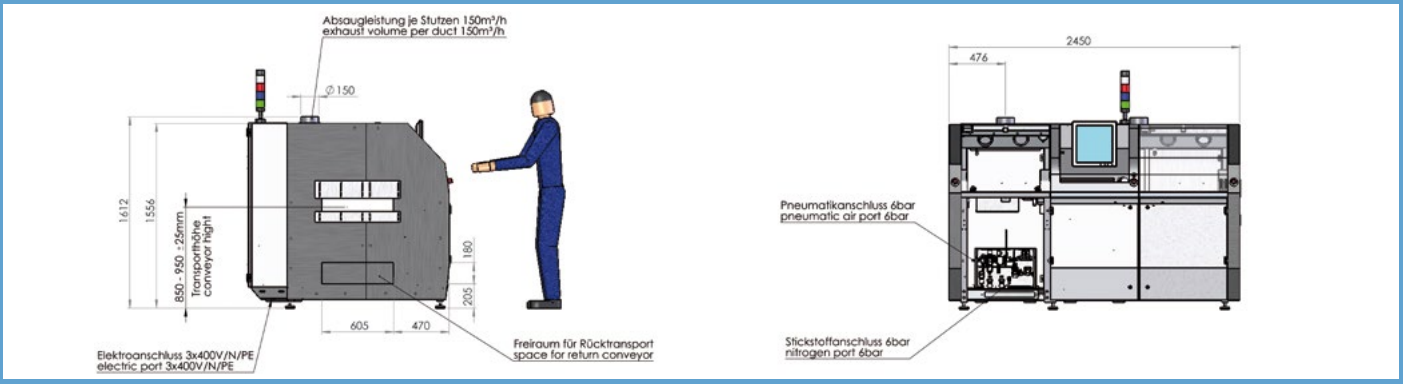
Multi wave solder module

mechanical pump	1,100 mm
electromagnetical pump	1,100 mm
electromagnetical pump XL	1,300 mm

Maximum configuration



Technical data: VERSAFLOW 3/45



Type of multiwave module	mechanical	electromagnetical	electromagnetical XL
Max. solder dimension:	370 x 425 mm [14.5 x 16,7"]	356 x 356 mm [14 x 14"]	360 x 460 mm [14.2 x 18.1"]
Max. PCB/carrier dimension:	380 x 508 mm [15 x 20"]	406 x 508 mm [16 x 20"]	406 x 508 mm [16 x 20"]
Solder filling:	(lead-free) approx. 450 kg [992 Lbs]	(lead-free) approx. 230 kg [507 Lbs]	(lead-free) approx. 410 kg [904 Lbs]
Free space top/bottom:	+100/-40 mm [4/1.5"]	+80/-25 mm [+3.1/-1"]	+80/-25 mm [+3.1/-1"]
Solder level monitoring:	yes	yes	yes
Wave height monitoring:	no	yes	yes
Solder pot for product specific nozzle plates:	yes	yes	yes
Retraction feature for maintenance purposes:	yes	yes	yes

Dimensions (basic machine)	
Width:	1,730 mm [101.5"]
Height:	1,620 mm [63.8"]
Weight:	from 1,650 kg [3,637.62 lbs]

Conveyor system	
Type:	segmented pin & chain/roller conveyor for PCB transport without solder frame
Conveyor angle:	0° fixed
PCB width: (single track)	63.5 - 406 mm [2.5" - 16"]
PCB length:	127 – 508 mm [5 – 20"]
Clearance from PCB edge:	3 mm [0.1"]
Conveyor height from floor:	850/950 mm ±25 mm [33.5/37.4" ±1"]
Conveyor speed:	0,2 – 10 m/min [7.9 – 393.7"/m]
Mast-/PCB weight:	max. 5 kg [11 lb]

Flux module	
Type:	high-precision spray flux system
Positioning system:	2 axis (X/Y), servomotor driven
Flux storage tank:	2 l
Positioning speed:	2 – 400 mm/sec [0.1 – 15.7"/sec]
Fluxer speed:	2 – 400 mm/sec [0.1 – 0.8"/sec] depending on the application
Positioning accuracy:	±0.25 mm [±0.01"]
Spray width:	2 – 8 mm (130/270 µm inner nozzle) [0.1" – 0.3"]

Preheat module (basic machine)	
Type:	bottom side heating with short wave length IR heaters
Power:	max. 12 kW
Temperature range:	0 – 200 °C [0 – 392 °F]

Solder module – mechanical pump	
Type:	solder pot enameled
Nozzle plate:	product-specific
Clearance from PCB edge:	3 mm [0.1"]
Solder temperature:	max. 320 °C [608 °F]
Max. solder dimension:	370 x 425 mm [14.5 x 16,7"]
Max. PCB/carrier dimension:	380 x 508 mm [15 x 20"]
Solder filling:	(lead-free) appr. 450 kg [992 Lbs]
Free space top/bottom:	+100/-40 mm [4/1.5"]

Solder module – electromagnetical pump	
Type:	solder pot enameled
Nozzle plate:	product-specific
Clearance from PCB edge:	3 mm [0.1"]
Solder temperature:	max. 320 °C [608 °F]
Max. solder dimension:	356 x 356 mm [14 x 14"]
Max. PCB/carrier dimension:	406 x 508 mm [16 x 20"]
Solder filling:	(lead-free) approx. 230 kg [507 Lbs]
Free space top/bottom:	+80/-25 mm [+3.1/-1"]

Solder module – electromagnetical pump XL	
Type:	solder pot enameled
Nozzle plate:	product-specific
Clearance from PCB edge:	3 mm [0.1"]
Solder temperature:	max. 320 °C [608 °F]
Max. solder dimension:	360 x 460 mm [14.2 x 18.1"]
Max. PCB/carrier dimension:	406 x 508 mm [16 x 20"]
Solder filling:	(lead-free) appr. 410 kg [904 Lbs]
Free space top/bottom:	+80/-25 mm [+3.1/-1"]

Nitrogen technology	
Nitrogen supply:	to be supplied locally
Nitrogen injection:	N_2-cover over the solder bath
Required pressure:	6 bar [87 PSI]
N_2-consumption:	approx. 12 – 18 m³/h [15 – 23.5 yd³/h] per solder pot
Required particle cleanliness:	5.0 on average

Pneumatic system	
Compressed air supply:	to be supplied locally
Required pressure:	6 bar [87 PSI]
Consumption:	< 5 m³/h [6.5 yd³/h]

Control (basic machine)
PC-control system: operation system Windows 7
Process visualization
Input of all process parameters
7 day time clock
Machine status control
Password function
Production-, process- & traceability data recording

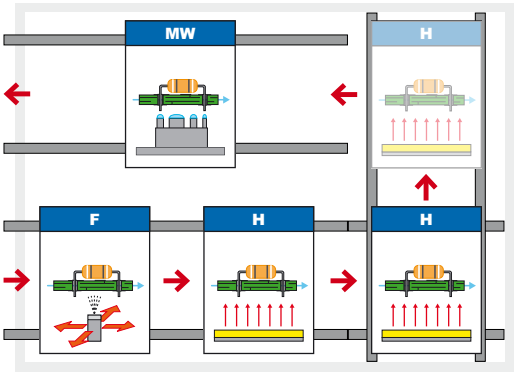
Electrical data	
Power:	5-wire system, 3 x 230/400 V, N, PE
Power tolerance range:	+6 %, -10 %
Frequency:	50/60 Hz
Power consumption:	max. 44 kW (basic machine)
Amperage:	max. 125 A (basic machine)

Exhaust rating (basic machine)	
Exhaust vol.: approx. 450 m³/h [588.58yd³/h], adjustable	
Exhaust stack:	2 stacks, 150 mm [5.9"] o.d. each

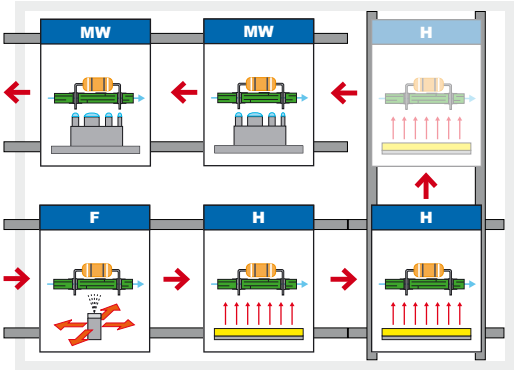
Ersa ECOCELL with multiwave module

Modern electronics production in U-layout: Selective soldering with highest throughput and highest uptimes

Ersa FIFO-TOWER



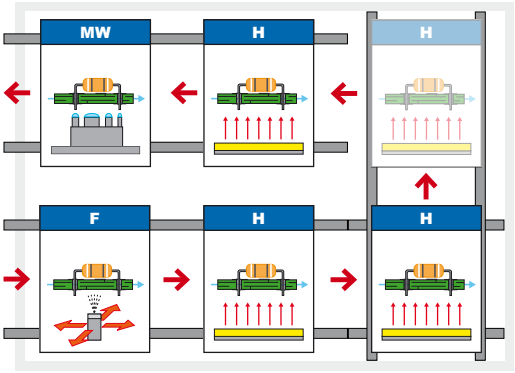
Ersa FIFO-TOWER



Due to the “on the fly” option of the ECOCELL, machine availability can optimally be used: This feature allows the operator to set up and prepare the second solder module while the first one is in operation, thus realizing a product change without machine downtime.

An alternative is the use of two solder pots to switch to a second solder alloy without any delays.

Ersa FIFO-TOWER



Fluxer module
flux spray unit

Preheat module
lower preheat

Multiwave solder module

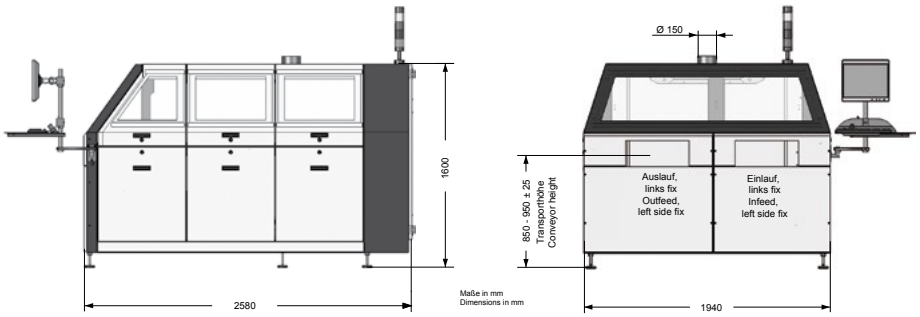
Technical data: ECOCELL

Dimensions (basic machine)	
Length:	2,580 mm [102"]
Width:	1,940 mm [76"]
Height:	1,600 mm [63"]
Weight:	approx. 1,100 kg [2,425 lbs]
Paint	RAL 7035/7016

Conveyor system	
Type:	pin-and-chain conveyor for PCB transport
Conveyor angle:	0° fix
PCB width (Single Track):	63.5 – 356 mm [2.5 – 14"]
PCB length:	127 – 356 mm [5 – 14"]
PCB top-side clearance: (basic machine)	75 mm [3"] (measured from PCB bottom side, except PCB edges 5 mm [0.2"])
PCB bottom-side clearance:	max. 25 mm [1"] (subject to soldering joint position)
Clearance from PCB edge:	3 mm [0.12"]
Conveyor height from floor:	850/950 mm, ±25 mm [33"/37", ±1"]
Conveyor speed:	2 – 10 m/min [7 – 33' min]
Pallet/PCB weight:	max. 5 kg [11 lb]

Flux module	
Type:	precision spray fluxer
Positioning system:	2 axes (X/Y), servomotor driven
Flux tank:	2 l
Positioning speed:	2 – 400 mm/s [0.04 – 16"/s]
Positioning accuracy:	±0.25 mm [±0.01"]
Spray width:	2 – 8 mm [0.08 – 0.3"] (130 µm/270 µm nozzle)

Preheat module (option)	
Dynamic bottom-side infrared emitters:	max. 10.4 kW
Temperature range:	0 – 200 °C [0 – 392 °F]



Solder module - electro magnetical pump	
Type:	solder pot enameled
Nozzle plate:	product-specific
Clearance from PCB edge:	3 mm
Solder temperature:	max. 320 °C [608 °F]
Max. solder dimension:	356 x 356 mm [14 x 14"]
Max. PCB/carrier dimension:	406 x 508 mm [16 x 20"]
Solder filling:	(lead-free) approx. 230 kg [507 Lbs]
Free space top/bottom:	+75/-25 mm [+3/-1"]

Nitrogen technology	
Nitrogen supply:	to be supplied locally
Nitrogen injection:	N_2-cover over the solder bath
Required pressure:	3 bar [43.5 PSI]
Nitrogen consumption:	approx. 18-20 m³/h (636-706 ft³/h) per solder pot
Particle cleanliness:	5.0

Pneumatic system	
Compressed air supply:	to be supplied locally
Required pressure:	6 bar [87 PSI]
Consumption:	< 5 m³/h [< 177 ft³/h]

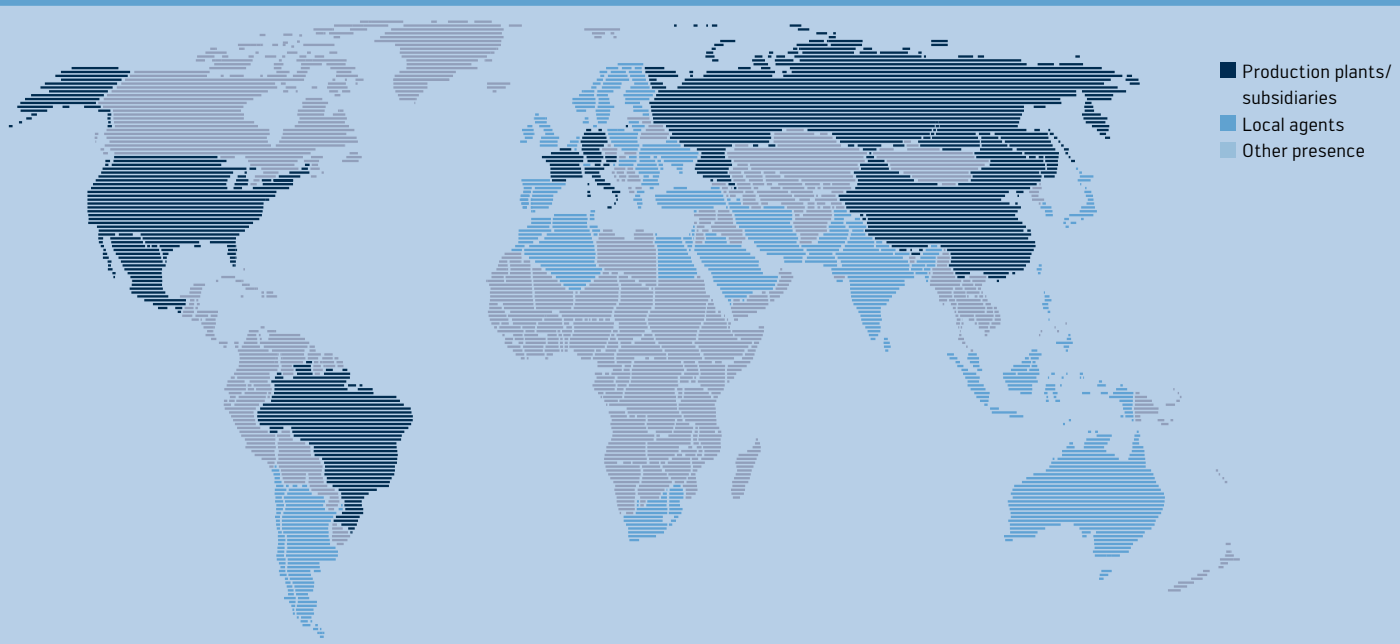
Control
PC-control system: operation system Windows 7
Process visualization
Input of all process parameters
7 day time clock
Machine status control
Password function
Production-, process- and traceability data recording

Electrical data	
Power:	5-wire system, 3 x 230/400 V, N, PE
Power tolerance range:	+6 %, -10 %
Frequency:	50/60 Hz
Power consumption:	40 kW (basic machine)
Amperage:	63 A (basic machine)

Machine exhaust (basic machine)	
Exhaust stack:	1 pc., OD 150 mm [6"]
Exhaust volume:	350 m³/h [458 yd³/h] adjustable

Ambient conditions/noise level	
Ambient temperature:	15 – 35 °C [59 – 95 °F]
Permanent noise level:	< 60 dB (A)

Electronics Production Equipment
Presence in 135 countries



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