

Technical Data Sheet

Selective Soldering System

SEHO StartSelective



Reflow Soldering



Selective Soldering



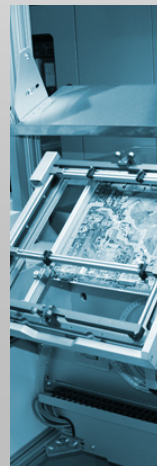
Wave Soldering



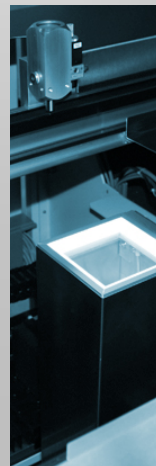
Special Machine Engineering



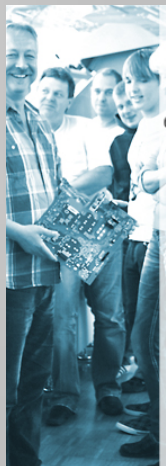
Handling Solutions



Automated Optical Inspection



Training & Know How



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Plug-and-Produce

The miniwave selective soldering system SEHO StartSelective was developed for soldering of through-hole components to printed circuit boards. The system is fully equipped to start production immediately: Simply connect, power on and produce!

The StartSelective is designed for stand-alone operation. It is thought through down to the last detail, from its compact design, ease of operation and many technical highlights. With a footprint of only 2.5 m², the StartSelective provides maximum quality and reproducibility of soldering results for assemblies up to 508 x 508 mm [20" x 20"] and an outstanding return of investment.

Loading and unloading of assemblies is done from a workplace which is installed at the front side of the machine, using a workpiece carrier that is slid manually into the system. All setup, retooling and maintenance are easily accessible on the right side of the machine through a large door.

This design allows users to integrate the StartSelective in any production island with minimum footprint requirements, or to place it as stand-alone system in the corner of the production floor.

All process-relevant components such as the micro drop jet fluxer, preheat system and maintenance-free electro-magnetic soldering unit have successfully been in use for years in other soldering systems from SEHO.

The individual process steps are performed successively for each one workpiece carrier in the process area. The entire production process is fully automated and continuously monitored.

Due to the comparatively high solder pot temperatures of approx. 280°C – 320°C that are required in a selective soldering process, it is necessary to operate in an inert atmosphere, typically using nitrogen. The nitrogen atmosphere guarantees highest soldering quality and minimum maintenance. To ensure this high quality and a stable process, nitrogen class 5.0 is required.

Specification of PCBs / Workpiece Carriers to be Processed

Handling of the printed circuit boards is made using carriers.

Specifications	mm / inch
external dimensions of carrier l x w	660 (incl. grip) x 560 / 25.98 x 22.05
PCB dimensions l x w, max.	508 x 508 / 20 x 20
maximum component height, top side	100 / 3.93
maximum component height, bottom side	30 / 1.18
weight of assemblies (without carrier), approx.	5 kg

For more details on board layout please see our „Design Guidelines for Selective Soldering“.

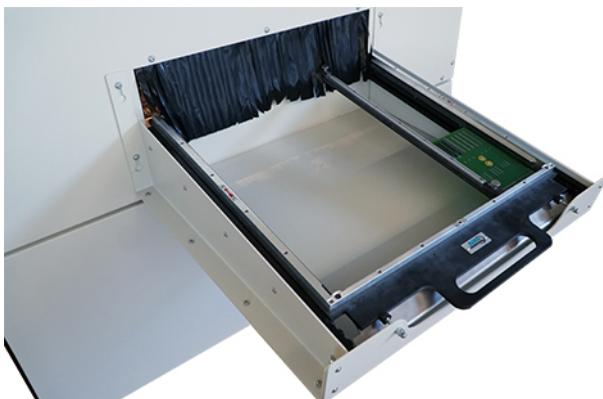
1 Basic Machine Equipment SEHO StartSelective

The basic machine is equipped with everything needed to start production immediately. The StartSelective is featured with a solid steel frame.

1.1 Holding Device for Workpiece Carrier / Workplace

The StartSelective provides an ergonomically designed workplace with a 7° slope that is installed at the front side of the machine. At the workplace, the carrier can comfortably be placed on a two-sided rail system. Of course, assembly of components can also be made here. The carrier is slid manually into the process area of the machine where an automated, internal holding device takes over the workpiece carrier. When the production process is finished, the workpiece carrier again is manually pulled back to the rail system and the printed circuit boards can be unloaded.

Holding Device for Workpiece Carrier / Workplace	
two-sided rail system for manual intake and outtake of workpiece carrier into the process area	
working height	900 mm +/- 50 mm 35.43" +/- 1.97"
supporting surface at the edges of the carrier	2 mm 0.08"
stop unit for exact positioning	standard



1.2 Universal Workpiece Carrier

Assembly of components can be done directly in the workpiece carrier.

workpiece carrier l x w = 660 x 560 mm [25.98" x 22.05"] for PCB dimensions up to l x w = 508 mm x 508 mm [20" x 20"]

Optionally, the workpiece carrier can be supplied with downholder set or additional transverse strips.

Of course, product-specific carriers are available on request. A lump-sum for engineering and design will be invoiced separately for product-specific carriers.

1.3 Axis System

The 3 axis system of the SEHO StartSelective ensures precise positioning and reliable repeatability.

The x axis is mounted in the upper machine area. This axis precisely positions in x direction the internal holding device for the workpiece carrier with the assemblies to be processed.

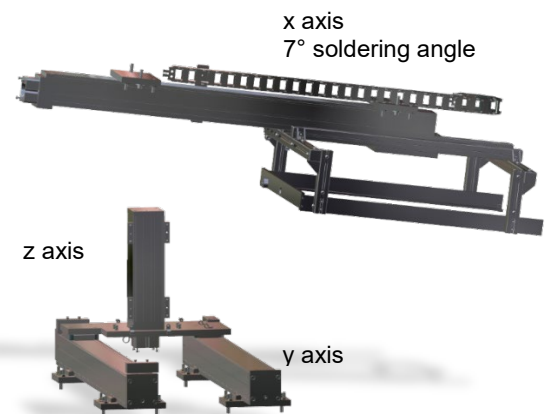
The x axis is installed in such a way that a 7° soldering angle is permanently achieved, resulting in a perfect peel off even in case of difficult geometries. Potential soldering defects such as solder bridges are thereby nearly completely excluded.

In addition, the IR top side heating is integrated in the internal holding device for the workpiece carrier at the x axis.

The y axis is installed in the bottom machine area and it ensures precise positioning of the micro drop jet fluxer and the soldering unit.

The electro-magnetic soldering unit is mounted on a z axis to position the solder nozzle precisely at each solder joint.

Axis System	
interpolating spindle axes	standard
drive unit for xy axes and z axis	AC servomotor
fixed soldering angle for x axis	7°
max. movement speed in x direction (positioning of carrier)	500 mm/s
max. movement speed in y and z direction (positioning of fluxer / soldering unit)	100 mm/s
repeatability	± 0.1 mm

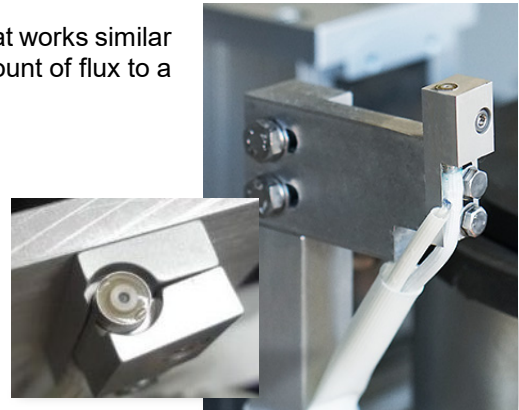


1.4 Micro Drop Jet Fluxer

The StartSelective is equipped with a micro drop jet fluxer that works similar to an ink jet system, ensuring deposition of a very small amount of flux to a geometrically limited area. All usual flux types can be used.

The nozzle head is equipped with one drop jet nozzle.

The micro drop jet fluxer is installed on the y axis that positions the fluxer precisely at the solder joints.



Fluxer Area	
principle	micro drop jet fluxer system
equipped with one nozzle head and one micro drop jet nozzle, spray width:	2 – 4 mm [0.078" – 0.157"]
level control of the flux container by means of a capacitive sensor	standard
flux container	1.0 l pressure tank – glass bottle
flux supply	nitrogen
flux types	alcohol-based and water-based fluxes with a solids content up to 5 %, optionally higher



1.5 Monitoring of the Drop Jet Fluxer Function

The micro drop jet fluxer spays through a highly precise laser light barrier to monitor the function and positioning accuracy of the fluxer.



1.6 Pulsar Bottom Side Preheating

The preheating supports the evaporation of the solvent, activates the solder joints and preheats the assemblies.

The preheat section of the StartSelective is equipped with pulsar heaters over the full area that feature a high energy density and quick reaction time.

After flux deposition, the internal workpiece carrier holding device at the x axis moves back to the preheat section and the preheating process is started automatically.



The system provides a total of six pulsar preheaters that are programmed and activated in groups of each two. Thereby, energy consumption of the machine is reduced to a minimum. Simultaneously, individual programming of each two heaters permits adjustment of a homogeneous temperature profile throughout the entire board even in case of very different thermal mass.

Preheat Area – Bottom Side Preheating	
heating elements	pulsar heaters
active heating area, l x w	508 x 508 mm 20" x 20"
power rating per heating element	1500 W
number of heating elements	6 each 2 emitters individually to be switched on or off
total power rating	9 kW
programming	pre-setting of heating power and heating time

1.7 IR Top Side Preheating with Temperature Control

The infrared preheating is integrated in the internal workpiece carrier holding device and installed at the x axis. It ensures permanent and controlled heat supply not only during the preheating process but also while flux is deposited and during the soldering process. Therefore, the top side preheating guarantees constant process conditions. The top side preheating features highest efficiency. Even in long soldering cycles, the assemblies are kept on a consistent temperature level, avoiding unintended cooling down of boards. This ensures homogeneous hole fill at all through-hole connections.

The temperature of the top side preheating is permanently controlled by means of a temperature sensor.

Preheat Area – Top Side Preheating	
heating elements	tubular heating element
length x width	508 x 508 mm 20" x 20"
total power rating	2.5 kW
control of heating power	temperature sensor



1.8 Soldering Unit # 5 with Electro-Magnetic Pump System



The StartSelective is equipped with an electro-magnetic soldering unit that is ideally suited for flexible and highly precise miniwave soldering processes.

This soldering unit features an extremely stable wave height, minimum maintenance requirements, basically no wear of parts as well as a very compact design.

The soldering process is performed in a 7° soldering angle, resulting in an ideal solder peel-off and effective reduction of potential soldering defects.

Thus, the system perfectly supports the use of not wetted solder nozzles. However, depending on the application it also can be equipped with wetted nozzles

The electro-magnetic soldering unit is installed on a y axis system that precisely positions the solder nozzle. Using a separate z axis, the perfect height for each solder joint is realized.

Electro-Magnetic Soldering Unit – Soldering Unit # 5		
field of application	miniwave soldering processes with quickly exchangeable solder nozzles	
leadfree capability	standard coated stainless steel pot	
solder pot volume	10 – 15 kg depending on alloy	
power rating	1000 W	
max. solder pot temperature	350°C	
nitrogen operation	standard	

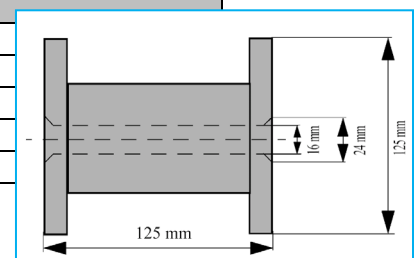
1.9 Solder Level Control

To ensure reproducible process conditions, the solder level in the pot is continuously monitored by means of a nitrogen by-pass measurement.

1.10 Automatic Wire Feeder

If the filling height in the solder pot should fall below the required level, solder wire will be refilled automatically.

Automatic Solder Wire Feeder	
dimensions of the wire coil (DIN 46399)	see drawing
weight	4 kg
diameter of solder wire	3 mm
alarm if feeder is empty	yes
drive system	electro-motoric



1.11 Wave Height Control with Measuring Needle

The height of the solder wave is automatically controlled to ensure constant process conditions.

This is realized with a contact measurement at the solder wave surface. With the obtained input signal, the solder wave height is regulated to the required value.



1.12 Nitrogen Gassing with Flow Quantity Measurement

The current nitrogen flow is permanently measured and monitored.



1.13 Control Unit and Touch HMI

The StartSelective is equipped with a Siemens PLC unit that offers an impressive performance. Combined with the touch HMI panel, the machine convinces with its ease of operation and high functionality.

Servomotors with multiturn absolute encoders make this control concept perfect. All components are ideally matched thus ensuring maximum efficiency.

Control Unit	
high precision control system	Simatic
easy and functional operation	Simatic HMI Comfort Panel
servomotors with multiturn absolute encoders	standard

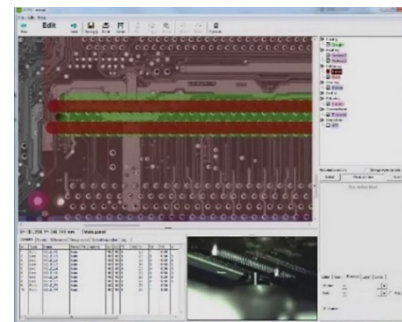
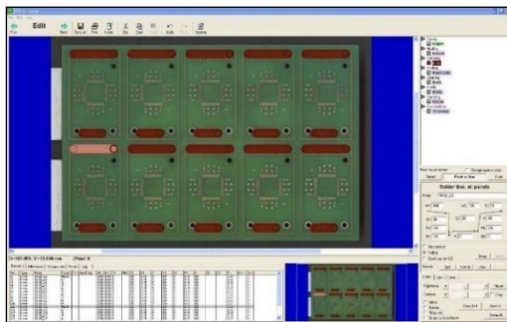


1.14 Offline Teaching Programm (OTP)

The StartSelective is designed for maximum efficiency. Programming is 100 % offline at any PC workplace so that the machine is always available for production. Using an USB stick or network connection, the soldering programs that have been edited offline can be transferred to the machine easily and quickly.

Visual intelligent programming: The offline teaching program from SEHO makes creation of soldering programs child's play. A comfortable wizzard leads the operator through the programming procedure. Basic data can be taken from any PCB picture (camera or scan), from gerber data or DXF files. Common picture distortions can be eliminated automatically by the program.

The software offers the possibility to globally store periodical process parameters, for use to particular solder points or soldering passages when developing new soldering programs.



1.15 Exhaust Control

The function of the exhaust is permanently monitored using a differential pressure switch.

1.16 Maintenance and Accessories Package

Everything needed for retooling of the soldering unit or for maintenance is also part of the basic machine equipment of the StartSelective:

- cleaning set for the soldering unit, 2 parts
- safety gloves
- tool to determine zero point of the process stations
- handle to take out the riser pipe
- gripping tongs for change of solder nozzles
- cleaning needle
- socket wrench for maintenance of soldering unit
- cleaning set for fluxer nozzles

1.17 Switch Cabinet and Electrical Components

Wiring of the machine according to European standard, excluded France:

230/400 V, 240/415 V

France: 240/400 V, 240/415 V, neutral wire connected.

Wiring of the machine according to US/CSA standard is optionally available.

2 Solder Nozzles

All nozzles have a standard height of 40 mm [1.57"].

Other nozzle heights and solder nozzles with different diameter or special geometry are available on request.

2.1 Miniwave Solder Nozzles – not wetted

Nozzles for Miniwave Soldering – not wetted (the inner diameter is decisive for the soldering area)			
solder nozzle, inner diameter:	3.0 mm	outer diameter:	4.0 mm
solder nozzle, inner diameter:	4.0 mm	outer diameter:	5.0 mm
solder nozzle, inner diameter:	5.0 mm	outer diameter:	6.0 mm
solder nozzle, inner diameter:	6.0 mm	outer diameter:	7.0 mm
solder nozzle, inner diameter:	7.0 mm	outer diameter:	8.0 mm
solder nozzle, inner diameter:	8.0 mm	outer diameter:	9.0 mm
solder nozzle, inner diameter:	9.0 mm	outer diameter:	10.0 mm
solder nozzle, inner diameter:	10.0 mm	outer diameter:	11.0 mm
solder nozzle, inner diameter:	12.0 mm	outer diameter:	13.0 mm



Due to the 7° soldering angle the StartSelective is ideally suited for the use of not wetted solder nozzles with the solder flow directed to one side.

This solder nozzle type features an exactly defined wetting width on the PCB that is limited to the nozzle dimensions. Moreover, not wetted solder nozzles permanently show a stable and reproducible solder flow. The nozzles are ideally suited for processing of lead-free solder alloys. They are nearly maintenance-free and featured with an unlimited lifetime.

2.2 Miniwave Solder Nozzles – wetted

Nozzles for Miniwave Soldering – wetted (the outer diameter is decisive for the soldering area)			
solder nozzle, outer diameter:	4.0 mm	inner diameter:	2.6 mm
solder nozzle, outer diameter:	5.0 mm	inner diameter:	2.6 mm
solder nozzle, outer diameter:	6.0 mm	inner diameter:	3.0 mm
solder nozzle, outer diameter:	8.0 mm	inner diameter:	4.0 mm
solder nozzle, outer diameter:	9.0 mm	inner diameter:	5.0 mm
solder nozzle, outer diameter:	10.0 mm	inner diameter:	6.0 mm
solder nozzle, outer diameter:	11.0 mm	inner diameter:	7.0 mm
solder nozzle, outer diameter:	12.0 mm	inner diameter:	8.0 mm
solder nozzle, outer diameter:	13.0 mm	inner diameter:	9.0 mm
solder nozzle, outer diameter:	14.0 mm	inner diameter:	10.0 mm
solder nozzle, outer diameter:	16.0 mm	inner diameter:	12.0 mm
solder nozzle, outer diameter:	18.0 mm	inner diameter:	14.0 mm
solder nozzle, outer diameter:	20.0 mm	inner diameter:	16.0 mm



In general, wetted solder nozzles require more regular maintenance and show a limited lifetime, particularly with lead-free solder alloys.

2.3 Accessories for Wetted Solder Nozzles

Cleaning set for wetted solder nozzles, consisting of 60 refresher sticks for manual activation of the solder nozzle surface, including holder, cleaning brushes and cleaning needles.

Gripping pliers for wetted solder nozzles, to support easy nozzle change.

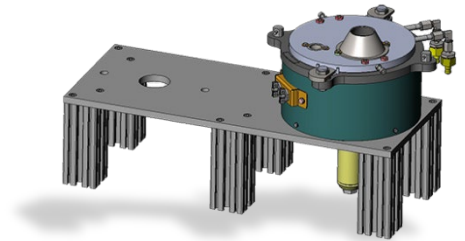
3 Options for the Soldering Area

3.1 Exchange Unit for Soldering Unit # 5

An additional solder pot that can be filled with a different alloy and which is quickly exchangeable. There is only one soldering unit installed in the machine.

The exchange unit comes with a simple base for safe storing.

For safety reasons, solder alloy has to cool down below 200°C before the solder pot is going to be exchanged. This option requires the "Retaining Tool for Soldering Unit Exchange".



3.2 Retaining Tool for Soldering Unit Exchange

Handles to lift out the soldering unit.

3.3 Maintenance Cart

This maintenance cart is the ideal assistance in terms of cleaning or retooling of soldering units.

Special design measurements that are adapted to the specific work flow, such as

- heat resistant working surfaces
- flexibly adjustable storage options for tools and the parts to be cleaned
- integrated bucket for oxides

facilitate maintenance work or retooling and ensure a clean working environment.

Moreover, the maintenance cart provides lockable drawers that can be used for tools, accessories and other parts which should be on hand.



4 Workpiece Carrier StartSelective

One workpiece carrier without downholders is included in the basic machine equipment of the StartSelective.

Additional workpiece carriers, accessories or product-specific carriers are optionally available.

4.1 Workpiece Carrier without Downholder Set

workpiece carrier	l x w = 660 x 560 mm		25.98" x 22.05" (length incl. grip)
PCB dimensions, max.:	l x w = 508 x 508 mm		20" x 20"

4.2 Additional Transverse Strip

To split the workpiece carrier into several smaller segments. This allows to use the entire workpiece carrier area and fill it completely when processing small PCBs.

4.3 Downholder Set for Workpiece Carrier

Downholder frame with transverse strips and set of downholders.

4.4 Additional Downholding Strip

To be used with downholder frame, to integrate additional downholders.

4.5 Product-Specific Workpiece Carrier

Designed for your specific products and to suit your individual production requirements. A lump-sum for engineering and design will be invoiced separately.

5 Consumables

The high-end flux and solder alloy that are included in SEHO's plug-and-produce starter package are ideally matched to the StartSelective. Therefore, the machine immediately can be used for production of high quality electronics.

Flux Stannol EF350, 1 liter

The halogen-free activated Co-Clean Flux EF350 guarantees outstanding wetting capability on different surfaces both with lead-free and solder alloys containing lead.

Solder Bar Stannol TSC305, triangular bars, 10 kg for initial filling

TSC305 (Sn96.5Ag3.0Cu0.5) is a lead-free, eutectic solder providing ideal wetting capabilities, with a melting range of 217°C and 222°C.

Solid Solder Wire Stannol TSC305, 3.0 mm, reel of 4 kg

Description as above.

Please note that the plug-and-produce starter package can only be ordered once from SEHO and only in combination with the StartSelective.

Subsequent demand for flux and solder alloy can directly be covered from Stannol GmbH & Co. KG and its worldwide sales partners. For further information please contact Stannol at www.stannol.de, Email: info@stannol.de or phone: +49-(0)2051-3120-312.

USA, Canada:

For further supplies please contact SEHO North America, Inc., Erlanger, KY, USA
Email: sehona@sehona.com, phone: +1 (859) 371-7346

Mexico, Argentina:

For further supplies please contact STE Latinoamerica, Zapopan, Jalisco, Mexico
Email: contacto@ste-latinoamerica.com

6 Services

6.1 US Voltage

Electrical wiring of the machine according to US standard with 3 x 208 V, 60 Hz, 3 phases.
This option includes UL certification and CSA approval of the system.

6.2 Design and Engineering of Product-Specific Carriers

Lump-sum for design and engineering of a workpiece carrier that is particularly tailored to your product.

6.3 Machine Capability Test

The machine capability test includes a comprehensive and detailed measurement report. Of course, all measurement devices that are used for the test are calibrated.

The following measurements are covered by the machine capability test:

- axis measurement
- solder pot temperature
- preheat temperature profiling
- optionally:
- measurements of flux amount

There is a choice of each 10 measurements, 30 measurements or 50 measurements.

6.4 Pre-Acceptance, Installation, Know How

Profit from our experience and from our know how!

We will be happy to perform a pre-acceptance test for your machine at our factory in Kreuzwertheim Germany.

We recommend to book a SEHO engineer or a trained engineer of the SEHO representative in your country for installation of the system in your production. In addition to the installation you will get an on-site briefing how to operate the machine.

Whether a practical training at SEHO, an individual on-site consulting service at your factory or a seminar of the SEHO Academy: We support you with intensive training of your employees to use your soldering system in an optimal way – to ensure best possible soldering results and work flow.

7 Technical Data SEHO StartSelective

dimensions (l x w x h) and weight	
StartSelective	2202 x 1350 x 1629 mm 475 kg 86.69" x 53.15" x 64.13" 475 kg
paint finish	
standard paint finish	RAL 9002
exhaust	
exhaust stack exhaust volume	1 x Ø 150 mm 5.9" 250 m³/h
nitrogen	
nitrogen connection nitrogen pressure nitrogen consumption nitrogen quality	R 1/4", to be supplied onsite min. 4 bar approx. 1.5 – 2.0 m³/h 5.0 recommended
voltages	
european standard US standard (optionally) power rating	230/400 V – 50 Hz – 3 phases + N + PE 3 x 208 V – 60 Hz – 3 phases approx. 13 kW

