Soldering made easy
The ERSA soldering primer
Soldering – a never-ending story

for more than 5,000 years

Man had scarcely learned how to use metals for his purposes when the desire to join them arose in him. Many of the pieces of jewelry, tools and weapons we know from the Bronze Age owe their usefulness and beauty the art of soldering.

Today, it is difficult to say who first discovered how to "glue" metals. One thing is certain - the goldsmiths of ancient Egypt knew how to join gold and silver already more than 5,000 years ago. Their colleagues in Troy were also master craftsmen long before the ancient Teutons could even dream of such handicraft. Soldering really "came of age" when tin was discovered as a joining metal. And that was already 4,000 years ago! From then on, soldering technology was on its way. It first spread around the Mediterranean. The Cretans showed it to the Etruscans, who then taught it to the Romans, Tunisians, Spaniards, followed by many others, including the less developed cultures of the time - the Swiss, Bohemians, Hungarians, Teutons and Scandinavians. The craft of soldering was, from culture to culture, from generation to generation, continuously improved and refined.

The ancient Romans already laid down and soldered 400 km of leaden water pipes, conjured up stoves and bathtubs from bronze sheets, and we should not miss to mention the ability of their armorers and goldsmiths. Aside from the aspect of craftsmanship in soldering, the understanding of the science of soldering has been much enlarged and refined over the centuries. Today, soft soldering in the electronic industry has developed into a full-fledged production technology, encompassing the fields of mechanics, chemistry, physics and metallurgy. An instrumental part to this development was played by Ernst Sachs, the founder of the company that was named after the initials of his name - ERSA. In 1921 he developed the first electrically operated soldering iron for the industry that was manufactured in series. Since that time, ERSA has committed itself, with great passion and extending its full power of innovation, to the further development and perfection of the soldering technology.

Today, the name ERSA stands for the most comprehensive product range in the soft soldering technology world-wide, with more than 90 years of industry experience and innovation, know-how and highest product quality.

Our soldering iron program starts with the smallest soldering tip, includes the classical soldering iron powered from the standard power net and special soldering tools, and ends with the 500 W hammer soldering iron. ERSA’s electronically temperature controlled soldering...
stations define the industry standard, as does the extensive range of rework and inspection, wave-, reflow- and selective soldering equipment. The ERSA stencil printer line complements the product range.

ERSA’s soldering tools are used in the hobby area, such as, for example, in model-making or Tiffany soldering, in the craft sector, in laboratories and in industrial electronic manufacturing.

New challenges for the soldering technology were raised by the ban on certain hazardous substances (RoHS) in 2006. Since 1. July 2006 electric and electronic equipment may not contain any lead, mercury, hexavalent chromium, PBB (Polybrominated biphenyls) or PBDE (Polybrominated diphenyl ethers).

This restriction entailed in many cases having to depart from the use of well-known soft solders based on tin and lead.

With the publication of this small primer, ERSA would like to facilitate your entry into the “World of Soldering”, and to raise your enthusiasm for a modern technology that has a long history.
To imagine today’s world without soft soldering is not possible. It is the means to fabricate safely functioning electrically conducting connections. Regardless of whether we talk about power technology, drive technology, telecommunications, automation or electronic controls – in all those fields soldered connections have a decisive share that everything functions in a way as has been foreseen and planned by the developers and visionaries of the products. Today soft soldering is such a common place occurrence, that no one wastes any further thought on it. We take our daily use of computers, mobile phones and play stations for granted, the modern comforts provided for by electronics found in modern automobiles is expected as a matter of course, and we fly – privately or on business – to the farthest spots in the world.

Consequential damage because of the failure of a solder joint in an iPod is relatively limited. It is a different matter altogether, though, if the electronics in an airplane full of vacationers, in a space shuttle, or in an implanted pacemaker fails. Such failures are immanently life threatening. But not to worry – for those applications the highest quality demands apply, rightfully!

Aside from soldering in consumer electronic products, there are numerous other applications such as, to name but a few, alternative power generation with wind turbines or solar parks, R&D departments, and in work performed by craftsmen such as electricians and plumbers. Let us not forget the many part-time and hobby users, for whom there are no limits curtailing their phantasies and artistic freedom when handling a soldering iron and solder.
In a soldering process two metal parts are joined by means of a molten metallic bonding agent (solder), whereby the melting point of the bonding agent is always lower than that of the metal parts to be joined. If the melting point is below 450 °C, then it is a soft soldering process, if it is above, it is called hard soldering or brazing. Welding, on the other hand, is the process where two metals will be heated up to their melting point, at which time they will, together with a filler material, form a pool of molten material causing coalescence. In soft soldering, the seams of the two materials to be joined will be filled with a tin alloy. But that the tin alloy will not simply adhere to the two foreign metals after cooling, it is necessary that it, to a certain extent, dissolves the surface of the material to be joined forming a mix of crystals – the diffusion zone. That is the task of the tin. The other components of the alloy are responsible for the liquefaction of the solder and the resulting mechanical strength. Therefore, a solder joint consists of the following layers:

1. Base metal
2. Diffusion zone
3. Solidified solder
4. Diffusion zone
5. Base metal

To achieve the highest mechanical strength, i.e. to assure the durability of the solder joint, the diffusion zone may not be too thick nor too thin. The ideal thickness for this zone is 0.5 µ. The formation of this zone depends on the temperature, the solder time and the alloy used. If the diffusion zone is too large, the solder joint will be brittle and porous, whereas the formation of a too small zone indicates that an insufficient or no mechanical connection at all has been formed.
Heat is required in order to melt the solder. This is the job of the soldering iron. Depending on the solder joint and on the solder alloy, temperatures in the range of 200 °C – 450 °C are required. In the field of electronics, the usual temperature is between 250 °C and 375 °C. In order to have the correct temperature available for any soldering purpose, the thermal output of the soldering iron as well as an efficient transfer of the available heat to the solder joint to be made is decisive. Either one selects a soldering iron that performs within the temperature range required for the purpose, or a decision is made to utilize a soldering station with temperature control. Only these latter instruments enable the user to work on different applications without loss of solder joint quality, because of the precise control of the preset temperature at the soldering iron tip. On soldering stations, the registration of the actual tip temperature should be highly precise, and the heating element should be powerful enough and have a reaction time fast enough to avoid over-temperature situations as well as cold solder joints.
The soldering tip is the “heart” of the soldering iron, and responsible for the heat transfer from the heating element via the solder to the solder joint. Depending on the soldering iron and the application, different types of tips are available. Prerequisites for good solder joints are the correct soldering iron tip shape, perfect heat transfer, a good condition of the tip and a reliable performance over time. In addition, the soldering tip has to convey also the necessary amount of sensitivity back to the operator.

The classical soldering tip is manufactured from copper. It has very good thermal conductivity and it is cost-effective. Unfortunately, copper oxidizes very strongly under the influence of heat, and it gives up copper molecules to the tin, until it is completely eroded. To maintain a tip in operational shape, it requires intensive care. It is for this reason that in the electronic industry, which is the largest field of application, only coated tips are being used today. ERSADUR tips have been conceived for continuous operation and for high-quality results. In a very special manufacturing process, developed and used exclusively by ERSA, ERSADUR tips are galvanically plated with an iron coating and protected against corrosion and oxidation by an additional chrome layer. And their perfect thermal conductivity protects the heating element from overheating and premature wear. ERSA offers a comprehensive range of soldering tips, for the diverse requirements. Properly cared for, a considerably lengthened service life can be achieved when utilizing ERSADUR tips:

- Soldering irons with long-life soldering tips should never be cleaned before putting them down, since the solder remaining on the tips inhibits oxidization of the solder trace.
- Long-life soldering tips should always remain wetted with solder, otherwise they become passive and will no longer accept solder. In this case, tips can be reactivated by the application of the lead- and halogen-free ERSA Tip Reactivator. All that is needed is to wipe the hot tip on the surface of the regeneration compound. Furthermore, the hot tips should regularly and before starting to solder be cleaned with a moistened viscose cleaning sponge or, alternatively, with the ERSA “dry sponge”, a sponge manufactured from special metal wool. For lead-free soldering, cleaning with dry sponges has been shown to be advantageous, since quenching of the soldering tip by the moist sponge is thereby avoided. Due to the higher operating temperatures for lead-free applications, this quenching could be detrimental for the service life of the tip.

ERSA Tip Reactivator. Comprehensive accessories available under www.ersa.com
What is needed for soldering?

The basics – the 5 essential factors

3. The Solder

for making the connection

Metallic bonding agents (solders), mostly in the shape of a wire or a bar, are available as diverse alloys.

Soft solders consist mostly of a mix of tin (Sn) and lead (Pb). Since the implementation of the RoHS guidelines on 01. July 2006, the use of solders containing lead is prohibited. Lead-free solders are usually alloys containing silver (Ag) and copper (Cu).

The material composition of the alloy determines the melting temperature and the physical properties of the connection. Factors for the choice of an alloy are: Process, specification of the product, field of application, cost of the alloy.

Prerequisites for good soldering results are:

- Suitable soldering iron
- Suitable fluxes
- Clean surfaces of where to solder
- Suitable solder alloy
- Sound soldering tip
- Correct soldering time

Fluxes are used so that solder and metal can bond properly. Fluxes condition the surfaces of the parts to be soldered; they remove the oxides as well as other flow-inhibiting contaminations and prevent the formation of new oxides during the soldering process. A difference is made between acidic (as used for plumbing tasks) and acid-free products (used in electrical and electronic applications). In electronic production, it is most common to use solder wire with one or more flux cores, whereas in the plumbing as well as in the radiator- and auto body work bar solder is the form of choice.

4. The Flux

for the ability to wet

The Flux

Examples for some common alloys

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Flux type</th>
<th>Melting point / range</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Sn60Pb40</td>
<td>EN 29454/1.1.2 (F-SW 26/DIN 8511)</td>
<td>183 °C - 190 °C</td>
</tr>
<tr>
<td>L-Sn60Pb38Cu2</td>
<td>EN 29454/1.1.2 (F-SW 26/DIN 8511)</td>
<td>183 °C - 190 °C</td>
</tr>
<tr>
<td>L-Sn63Pb37</td>
<td>EN 29454/1.1.3 (F-SW 32/DIN 8511), free of halogen</td>
<td>183 °C eutectic</td>
</tr>
<tr>
<td>L-Sn62Pb36Ag2</td>
<td>EN 29454/1.1.3 (F-SW 32/DIN 8511), free of halogen</td>
<td>178 °C - 190 °C</td>
</tr>
</tbody>
</table>

Alloy – lead-free / complying RoHS-WEEE

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Flux type</th>
<th>Melting point / range</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-Sn95,5Ag3,8Cu0,7</td>
<td>EN 29454/1.1.2 (F-SW 26/DIN 8511)</td>
<td>217 °C eutectic</td>
</tr>
<tr>
<td>L-Sn96,5Ag3,5</td>
<td>EN 29454/1.2.3 (F-SW 33/DIN 8511), free of halogen</td>
<td>221 °C eutectic</td>
</tr>
<tr>
<td>L-Sn99,3Cu0,7</td>
<td>EN 29454/1.2.3 (F-SW 33/DIN 8511), free of halogen</td>
<td>227 °C eutectic</td>
</tr>
</tbody>
</table>
It pays to be on the safe side - this also is true for soldering. The electrical safety of a soldering iron is recognized by the presence of the VDE and GS emblem. The use of these emblems is binding, and all such identified products have to be monitored for their compliance with the test regulations, and control tests have to be duly performed.

Health protection during soldering

- The breathing zone is in close proximity to the soldering process, and the solder is being added manually by hand. This holds the danger of contaminating both the air which is inhaled as well as the hands holding the solder wire and other items which may have been touched.

- Flux vapors can be damaging to the operators health, and they should be kept out of the breathing area. Suitable devices for this task are solder fume extractions, which exhaust the smoke and associated vapors from the workplace and remove particles and gases. Modern fume extractions can be programmed to operate only when the soldering process is taking place, thus saving energy.

- One should never eat, drink or smoke in rooms where soldering is performed. Containminations which remain on the hands can enter the human body through food or cigarette smoke.

- Hands should be washed thoroughly after soldering.
Preparation

The most important prerequisite for a good solder joint is absolute cleanliness. Conductor and component must be free of dirt, oil and oxides. They should be removed with solvents or flux.

ERSADUR soldering tips should, prior to soldering, be cleaned while hot with a moist sponge or with a metallic dry sponge. At no time should the tip be filed, as used to be done with copper tips, as this would damage the protective layer and render the tip unusable.

The soldering process

The soldering process has three phases: wetting, flowing, and bonding. For these, the working temperature is the most important criteria. It is always best to work at the lowest temperatures at which the three phases can progress smoothly. This naturally requires a certain amount of experience. A temperature controlled soldering station will definitely facilitate this work. After cleaning, place the tip on the joint to be soldered and allow the joint to be heated up. Then feed the flux-cored solder wire between the soldering tip and the joint and allow as much solder to flow as is required to wet the complete joint. Then first remove the solder wire and right after that the soldering tip, to avoid overheating the solder. Allow the solder to solidify, avoiding any vibrations or jarring during this time.

Best solder quality

because of the right preparation and correct soldering parameters
**Soldering duration**

With a correctly dimensioned soldering iron tip, the soldering process should be completed within 2 to maximum 5 seconds. When soldering electronic components with lead-free solders, experience shows that a longer soldering time is required. But even here requiring more than 5 seconds is not permissible, and it indicates that either the temperature setting is too low or the soldering iron is lacking the necessary power.

**Solder joint quality**

When the leads of the components mounted on the board are crimped, a good solder joint has been formed when the contour of the soldered lead is still recognizable. This will not be the case, if an excessive amount of solder has been used to form the joint. A further quality attribute is the wetting angle. This consideration is based on the fact that good wetting of the pad, discernible through a small wetting angle, has given rise to the formation of a diffusion zone (intermetallic zone). Wetting angles up to 25º identify a good joint, wetting angles up to 50º are still tolerable for the manual soldering process.

The appearance of the surface area of the solder joint is another attribute of quality. The surface should be smooth and shiny, without any porous areas visible. Grainy surfaces point towards either overheating of the solder or to an excessive soldering time. With lead-free solders, especially with silver loaded alloys, matt surfaces may be formed. The one absolutely sure indication of a sound and strong solder joint is the formation of the diffusion zone. In the diffusion zone, intermetallic compounds of copper and tin are formed, whose presence is the final proof of quality. Unfortunately, the only way to make this zone visible is through a destructive test (sectioning of the joint). It is noteworthy, that a too thick diffusion zone tends to cause the solder joint to be brittle, that is, it weakens the joint. The higher the soldering temperature and the longer the soldering duration, the thicker will be the diffusion zone. It is for this reason that the joint should be made at the lowest suitable temperature and in the shortest period of time. As soon as the last solder joint has been made, the soldering iron is placed securely into the holder. At this time, the tip should not be cleaned, because the remaining solder on the tip prevents oxidization.
To achieve good results in desoldering, it is essential to select the right equipment. One can choose from desoldering wicks (desoldering using the principle of capillary action), mechanical desoldering pumps (solder suckers) or electronically temperature controlled desoldering systems. For the latter technology, desoldering systems using contact heat or hot air are available.

Correctly desoldering made easy

Desoldering

In order to repair a defective solder joint, it is advisable to remove the old solder and to solder a new joint. When desoldering with a hand-held pump, the solder joint has to be brought up - using a soldering iron - to the melting temperature of the solder. After removing the tip from the joint, the solder pump is brought into position and activated. Using a heated desoldering tool, the hollow desoldering tip is placed on the joint to be repaired, making certain that there is good thermal contact. After the solder is molten, it is then sucked off. For desoldering as well, selecting the correct tip is equally important. For example, the clear width of the suction tip should correspond to the diameter of the through-hole (see drwg. above); being of marginally larger size (but no more than 0,3 mm) is still acceptable. Optimal desoldering results, while taking the greatest possible care of the PCB and the components, are being achieved with temperature controlled desoldering instruments (see also pages 24/25). Note that a distinction has to be made between the desoldering of leaded components and the desoldering of SMD components.

Sucking up the old, molten solder remnants with a mechanical solder sucker (desoldering pump)
SMD Soldering

The SMD technology (Surface Mount Device Technology) is currently the standard process in electronic manufacturing. In their size reduced and more and more integrated, components placed on the surface of PCB’s pose growing challenges on the soldering equipment. Individual solder joints, for example on resistors, are made with ERSDUR long-life soldering tips starting with a diameter of 0.2 mm. Fine pitch connections with a high pin-out, i.e. IC’s, are most efficiently soldered with ERSA PowerWell soldering tips.

ERSA PowerWell technology for soldering fine pitch components in seconds
Soldering Fine Pitch Components

At first glance, soldering fine pitch components manually appears to be a difficult undertaking. Yet, with the correct equipment at hand, it is much simplified:

Place an ERSA PowerWell i-Tip soldering tip (1) on the i-Tool and set the tip temperature to between 285 ºC and 360 ºC (depending on the alloy used – tin/lead or lead free).

Then place the component and tack it on two corners.

Add flux paste (see also page 30) to all pins on all 4 sides. Clean the front of the PowerWell tip, including the cove by swiping at the moist sponge or the ERSA dry sponge.

Fill the cove with solder by melting the solder wire, until a small dome is present (4). Take care not to add too much solder.

Place the i-Tool lightly on to the flat section of the pins (5), and pull the tip, without exerting pressure on to the pins, towards the rear (6).

Following this method, the individual joints are formed optimally and uniformly.
SMD Desoldering

To desolder or rework SMD components, suitable tools to remove the component from the board are required. When desoldering with a desoldering tweezers, it is extremely important to select the correct pair of desoldering tips. After having desoldered and removed the component, the residual solder has to be removed from the pad (with a suitable soldering tip and a no-clean solder wick), so that the new component can be placed and soldered. Particularly in lead free applications, the availability of an IR heater plate is a very useful addition.

More comprehensive instructions you will find in the process guide lines “SMD Desoldering” on our web site www.ersa.de. To solder and desolder BGA or other high pin-out SMD components, particularly those with solder joints hidden from direct view, we recommend the semi-automatic rework stations from ERSA (see page 31).

Solder melting and removing it with a solder wick

ERSA desoldering tweezers

Some examples of different desoldering tip shapes:

- to desolder and remove MELF’s
- to desolder and remove SOIC’s
- to desolder and remove QFP and PLCC components

IR rework heater plate IRHP 200: to assist in the soldering and desoldering process on multilayer boards or high mass components
Rework or Repair Soldering

The rework process demonstrated on the example of a BGA (Ball Grid Array)

The essential steps of reworking a BGA are as follows:

1. Desoldering the BGA

The board is heated from the bottom with a rework station, whereas the BGA body itself is being heated from the top. The real-time component temperature measured controls the defined temperature progression of the component, so that all solder joints melt at the same time. The vacuum suction cup is placed on the body of the BGA, and once all joints are in the molten stage, the BGA is lifted off.

2. Removal of the residual solder, cleaning

Solder remaining on the pads is removed with a soldering iron. The solder is coated with flux, then contacted with a flat soldering tip (for example, 0102ADLF40 or 0102ZDLF150) and removed without applying any force. The solder adhere to the larger surface area of the tip, thereby leveling off the solder still remaining on the connection pads. Any flux residue is cleaned off (for example using ERSA Flux-Remover).

3. Reballing – Reusing the BGA

Desoldered BGA’s can be refitted with new solder balls and reattached to the board. This process is referred to as reballing. The solder still found on the BGA will be removed with a soldering station. Lying on its back, the component is being coated with flux, and subsequently new solder balls are placed (with a stencil, for example). With the rework station, the balls are heated up to the melting point of the solder, so that they make firm contact with the component body. The BGA is now ready to be reattached.

4. Application of flux or alternatively solder paste

The component and the connection pads are now fluxed, or, as the case may be, solder paste is added through stencil printing. The type of technique applied is dependent on the application, the components and the skill level of the operator. For the commonly used PBGA’s the application of flux is mostly sufficient.
5. Placing the component

Once the surface area where the component is to be placed is adequately prepared, the component is placed. Since all the connection points of a BGA are underneath the component body, a component placement unit is required. Visual placement by hand promises success only by an operator with extensive experience and excellent skills. If the component is placed on solder paste deposits, great care has to be taken not to squash the solder depot, since doing so may lead to shorts after soldering.

6. Resoldering the BGA

Through a controlled heat up, the component will be brought to the melting temperature of the solder alloy used. The heating process will continue until all solder joints have melted and have remained in the melt for some seconds. With this process, durable and lasting solder joints are being formed.

After the resoldering process, the board is cooled down again in a similar fashion as had been done during the desoldering step. These process steps are essentially applicable for all surface mount components, with differences only depending on the type of connections (leaded, hidden, etc.). Each time, small deviations may be required.

Rework – Repair of high terminal count IC’s to successfully repair SMT assemblies, some points of caution need to be observed:

- Dimensions and properties of the assembly have an influence on its temperature requirement
- Board carriers and supports hold the assembly flat and prevent warpage
- A gentle and controlled heating process, continuously monitored, prevents damaging components or the board
- Accurate component placement is a prerequisite for a good soldering result
- Operators that are well trained will understand the process and ensure good results

Rework Process Steps

1. Remove BGA
2. Remove residual solder from the pads of the board
3. Reballing – adding new solder balls
4. Application of flux resp. solder paste
5. Placing the new or reballed component
6. Resolder the BGA on the prepared surfaces of the board
The miniature soldering iron **Minor S**, with 5 W power and a maximum temperature of 440 °C, is ideal for soldering intricate applications on micro IC’s and under a microscope. It can operate from a 6 V transformer or from a 6 V battery.

Aside from its application in electronic manufacturing, the Minor S is also used in the manufacture or repair of watches, in the photographic industry or in dental technology.

The **Multitip** soldering irons are especially short, light and easy-to-handle soldering irons with minimal distance between soldering tip and the front part of the grip. They are ideally suitable for working on intricate solder joints. Its internally heated soldering tip provides an enhanced degree of efficiency.

The Multitip is available in 15 and 25 W, which makes it suitable for small and medium soldering applications, as for example on distribution connectors or in the hobby shop.
Universal Soldering Iron

ERSA 30 S and ERSA Multi-Pro

The proven ERSA 30 S with 30 resp. 40 W power is very robust and durable. Its improved ergonomics is further enhanced by the practical and detachable rubber clip-on support. This universal soldering iron is suitable for most soldering applications in the trades and the hobby area.

The Multi-Pro with its heat resistant power supply cord is extremely flexible, as it has a multitude of different tips available. As such, it is suitable for almost all conventional soldering tasks.

Standard- and Hammer Soldering Irons

ERSA 50 S, 80 S and 150 S / ERSA 200, 300 and 550

The ERSA 50 S / 80 S or 150 S, supplied with the standard angled soldering tip, is ideal for applications where a large amount of heating capacity is required, as for example for copper conductors with cross-sections of between 2,5 mm and 6 mm.

The hammer series soldering irons ERSA 200, 300 and 550 are particularly suited for sheet metal tinning and installation work, as well as for soldering collectors and copper rails.

Hammer soldering irons have also proven their excellence in leveling applications during body work and for lead glass applications.
High Speed Soldering Iron

ERSA Multi-Sprint

The Ersa Multi-Sprint is an ergonomically designed and extremely light-weight, pistol type soldering iron with up to 150 W power which does not require a transformer. Its PTC heating element, in conjunction with the interior heated ERSADUR long-life soldering tip, ensures its exceptionally high efficiency. Because of its very short heat up time, it is ideally suited for making quick single soldering joints. The Multi-Sprint is powered only as long as its push button is depressed. Depending on the heat requirement of the solder joint to be made, additional energy can be supplied by periodically depressing the push button. The large variety of soldering tips available for the series 832 / 842 irons makes the tool very suitable for more than only the use in repair and service applications.

Power Soldering Iron

ERSA Multi-TC

The Multi-TC is a powerful, temperature controlled soldering iron. A temperature sensor, located directly beneath the internally heated soldering tip, registers the actual temperature found in the immediate vicinity of the soldering joint. The heating system with the PTC heater element reacts immediately upon a detected loss of heat, replenishing the lack of heat instantaneously thanks to its excellent performance. Because of its high thermal performance, and because of the large selection of soldering tips, the Multi-TC is highly suitable for all applications in the electronic industry as well as anywhere else where standard irons with 150 W power are in use.
ERSA Gas soldering irons are fueled with commercially available lighter gas and are fired up through the piezo ignition. Compared with electrical soldering irons, the Independent 75 has between 15 – 75 W, and the Independent 130 between 25 – 130 W performance. Both irons are available in the Basic-Set and Profi-Set versions.

Aside from handling the usual types of electronic components, the selection of tips available enables the unit to also handle SMD soldering, micro-welding, forming and cutting of synthetic materials and the processing of shrink sleeves.

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Digital Soldering Station

ERSA RDS 80 – high performance for low cost

The digital soldering station ERSA RDS 80 incorporates the proven and tested ERSA RESISTRONIC temperature control technology, now also with 80 W heat output. The ceramic PTC heater element (Positive Temperature Coefficient) assumes in this temperature control technology the function of the thermocouple, and allows, on account of its very high ramp-up capability of up to 190 W, to bring the unit very quickly to operating temperature.

The very high heater output and the extensive selection of soldering tips make the unit suitable for a broad range of applications. The heating system with the internally heated soldering tips delivers an excellent thermal performance.

The ergonomic handling, the functional housing design and the large digital multi-function display leave nothing to be desired. Aside from a freely selectable choice in temperature settings between 150 °C and 450 °C, three fixed temperatures or two fixed temperatures plus one stand-by temperatures can be programmed.

The tool also is equipped with a power bar graph display, a calibration- and a power-off function. Through a connector with an integrated 220 kΩ resistor, the potential equalization of the soldering tip with the work place can be established.

Multifunctional display

Potential equalization socket

RT 80: sleek soldering iron with a large selection of soldering tips
The youngest member of the i-CON product family, the i-CON nano, fulfills all the needs of today’s electronic manufacturing while requiring minimal space. It is conceived for continuous duty operation in the electronic manufacturing environment as well as for special applications in the laboratory- and R&D departments.

On a unit as it left the manufacturer, the simple operating concept of the i-CON nano allows the user to variably set the working temperatures as well as the stand-by time and a calibration value.

Further adjustments such as fixed temperatures, power level, interlock and shutdown functions are added through the use of the free-of-charge PC software and an optionally available Micro-SD card.

The concept of the i-CON nano ensures that each application is processed with the optimal parameters. The i-CON nano stands for the highest level of process safety and quality control at low investment and operating cost.

- Small footprint (145 x 80 mm) – save valuable working space
- Antistatic as per MIL-Spec/ESA
- Three fixed temperature settings or continuously adjustable temperature settings from 150 °C to 450 °C
- Three selectable power level
- Ultra-light and ergonomic i-Tool nano with max 80 W power
- Broad selection of low-cost exchangeable long-life soldering tips
- Automatic stand-by and sleep function for low energy consumption and longer tip life
- Password interlock for maximum process control
- Calibration function for a precise setting of the tip temperature
- Complete parameterization through PC software and Micro-SD card
**High-End Soldering and Desoldering Stations**

ERSA i-CON1 and i-CON2 / C for highest productivity and process safety

The stations of the i-CON product family are ERSA’s innovative solution for intelligent manual soldering. The need to be able to cope with higher working temperatures and with progressively smaller process windows when working with lead free solders, poses no problem whatsoever for the i-CON product family.

The i-CON is available as a single station as well as a combined station.

The single station i-CON1 is delivered together with the i-Tool soldering iron. The i-Tool is extremely small, ultra-light and ergonomically designed. It is powered by a 150 W micro heating element, which realizes short heat-up times (within 9 seconds up to 350 ºC!) and rapid heat make-up.

The calibration data of the i-Tool is stored on the PCB found in the grip of the soldering iron. With this - from the control unit independent – calibration concept, all i-Tools can be calibrated from a central location.

In contrast to the concept followed by the cartridge type soldering tips, only the tip itself is exchanged at the i-Tool. The cost intensive heater element remains.

The combi soldering station i-CON2 can be operated either with a second i-Tool or with the SMD desoldering tweezers Chip Tool resp. with the desoldering iron X-Tool.

**Soldering miniature and densely placed SMD components with the i-Tool and i-Tips, starting at 0,2 mm diameter.**

- Soldering iron i-Tool with 150 W Micro heater element technology
- Economically priced exchangeable long-life tips of the i-Tip Series
- User friendly “One-Touch” operation
- Three power levels – no overshoot
- Process window and alarms
- Interface to control peripheral equipment on the workplace, such as heater plate and solder fume extractor
- Stand-By control for tools, heater plate and solder fume extractor
- i-Tool calibration
- Tools for SMT and conventional soldering applications
- Automatic tool recognition
The Chip Tool facilitates safe and quick desoldering, from the smallest chips up to large PLCC’s. To remove the residual solder and to desolder leaded components – also on multilayer boards – the X-Tool desoldering iron is the right tool.

ERSA i-Tool: The ideal soldering iron – light (only 30 g), small (only 155 mm), minimal distance between tip and grip (only 45 mm) and extremely powerful.

User-friendly controls: quick programming and interlocking, very large multifunctional display with i-Op controls, its menu is available in 7 languages. Online Help is available.

The C-line of the i-CON Stations was developed, so that peripheral equipment could be controlled or to communicate with them. Via a serial interface, the i-CON1 C resp. the i-CON2 C controls the ERSA IR heater plates or the ERSA solder fume extractors.

Configuration

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The ERSA HR 100 A applies the ERSA Hybrid-Rework Technology for a safe desoldering and replacement of small SMD components. Its medium wavelength IR radiation, combined with a safe stream of hot air ensures optimal heat transfer to the component.

This hybrid tool offers a gentle and homogeneous warming of all sizes of components, from 0201 chips up to 20 x 20 mm SMD’s and larger. Exchangeable hybrid adapters target the thermal energy available (up to 200 W) on to the component, all the while protecting adjacent areas and not blowing away or moving close-by parts.

Its user-friendly handling permits even operators with little experience to safely and efficiently operate the HR 100. More experienced operators, on the other hand, can not only variably adjust the air flow as well as the heat output, but also record and run profiles. In the grip of the ergonomic hybrid tool, a positioning laser is integrated, whose laser point makes it possible to keep track of the component worked on through the complete process.

- Hybrid tool with 200 W heater element, positioning laser integrated in grip
- 3 exchangeable hybrid adapters (6 x 6 mm, 10 x 10 mm and 20 x 20 mm)
- Silent rework fan (below 40 dB)
- Integrated vacuum pump and vacuum pen; tool mount and K-type thermocouple jack; USB interface; LED display
- 2-channel temperature recording: TC & IRS; AccuTC and flexpoint thermocouple holder
- Tool mount with z-axis height adjustment
- x-y pcb holder (290 mm x 250 mm)
- 800 W IR heater plate with glass cover: 125 mm x 125 mm IR high performance heating element
- Rework profile and documentation software ERSA IRsoft
Clean Air Solder Fume Extractors

ERSA EA 55 i and EA 110 plus i – protecting the environment, health and resources

The ERSA EA 55 i is a compact yet powerful filtration unit to economically remove fumes generated during the soldering process from the workplace. The i-CON1-C as well as the i-CON2-C can be connected to the EA 55 i with an interface cable. The solder fume extractor has three filtration levels to remove noxious fumes which can be hazardous to the health of the operators.

With the solder fume extractor EA 110 plus i, ERSA offers the user a further compact and highly efficient fume extraction unit for either one or two workplaces. With an interface cable, one or two units i-CON1 C / i-CON2 C can be connected to the EA 110 plus i. Both models, the EA 55 i and the EA 110 plus i, are provided with a stand-by mode and operate only when the soldering units they are connected to are being used. They are exceedingly easy to install, can be very flexibly placed, and with their very low noise level they can be operated in virtually all environments, be it repair shops, development facilities or laboratories.

To accommodate different working conditions and applications, a variety of extraction arms and nozzle shapes are available, which can be easily and quickly exchanged.

ERSA i-Con C – an interface controls everything: preheat, soldering, fume extraction.

Activated carbon binds dangerous gas molecules

ERSA EA 55 i

ERSA EA 110 plus i

The clean air solder fume extraction unit EA 110 plus i can be connected to and controlled by one or two i-CON1 C / i-CON2 C through an interface cable, or through a manual stand-by switch.
Tiffany or Sheet Metal Soldering

Soldering beyond the field of electronics

**Tiffany soldering (Lead glass soldering)**

Soldering a Tiffany object involves, as a rule, three individual steps:
- Point soldering (tacking)
- Rough soldering
- Finishing soldering

Prior to the actual soldering process, copper foil is glued to the edges of the glass. In the subsequent step, the point soldering step, the glass parts are fixed resp. joined together. For this, a drop of tin added to the tip of the soldering iron is carefully placed on the area to be joined. Each tip contact at the joint should be no more than 1 second.

In the rough soldering step, the gaps between the glass parts are filled with solder. After application of the flux, the soldering iron tip and the solder wire are together pulled (note: they should never be pushed) along the seam. Only if this procedure is accurately followed, and if a sufficient amount of solder is applied, the desired, half-round and convex seams are achieved. The lack of visual quality of the seam at this stage is optimized during the finishing soldering step, in which the soldering tip is dragged slowly and at an even speed from the beginning of the seam until the end. The seam worked on should always lie flat on the bench.

**Plumbing and tinsmith work**

For the joining of sheet metal and metal pipes, the joints to be soldered must have metallic shining surfaces. This calls for a good prior cleaning. After this, the flux – either solder grease or solder fluid, a zinc chloride solution – should be applied, after which the area to be soldered is heated with the tip of the soldering iron. Once the solder area is sufficiently hot, solder is added and the solder gap is filled. After the cool down of the joint, the aggressive residues of the fluxes are to be removed, so to avoid the risk of future corrosion.

Guiding the soldering iron when soldering a broad seam

Guiding the soldering iron when soldering a narrow seam
ERSADUR Tiffany-Soldering Tips

Out of the especially comprehensive range of ERSADUR Type 832 soldering tips, the types VD, GDLF, LDLF and MDLF are particularly suited for Tiffany work. On account of their shapes and their large mass (excellent because of the ensuing heat retention capacity), seams between the glass parts can be easily and quickly be filled with solder. And the ERSADUR finish warrants a long life of the tips.

ERSADUR Tiffany Soldering Tips

The soldering iron Multi-TC is very light, robust and powerful. The ERSA-SENSOTRONIC-Control with the PT-1000-Temperature sensor mounted in the tip reacts immediately when heat is withdrawn.

The Multi-TC is provided with a 2,2 mm wide, chisel-shaped soldering tip. Together with the Tiffany soldering tips, the slim Multi-TC is superbly suited for the use in Tiffany work.

With its precise temperature control, the soldering station DIGITAL 2000 A completely eliminates the possibility to overheat any glass components or the copper foil, and the unit has tremendous power reserves, making it comparable and putting it on an equal level with unregulated soldering irons with 150 W.

The ERSA-SENSOTRONIC control with its interior heated soldering tip, where the temperature sensor is mounted directly below the tip, provides for precise temperature control called for and ensures uniform temperature levels at the soldering joint.

The long-life ceramic PTC heater element heats up the powerful soldering iron with up to 290 W of power in just 60 seconds.

The DIGITAL 200 A is provided with a 2,2 mm wide, chisel-shaped soldering tip. Particularly good results are achieved with the optionally available tip versions 832 VD, 832 GDLF, 832 CDLF and 832 MDLF, which are specifically offered for Tiffany applications.
ERSA tool holders or rubber clip-on supports, both intended to safely and ergonomically be able to put down the soldering iron during work stoppages or during the heating up period. ERSA viscose cleaning sponges for moist or special metal wool for dry cleaning of the hot soldering tip prior to the soldering process.

You will find additional accessories at your local ERSA distributor or under www.ersa.com. Or simply by ordering our catalog!
More than 5000 customers worldwide use ERSA’s patented IR-Rework technology. ERSA rework stations deploy the Dynamic IR-Heating Technology, programmable upper and lower heating zones as well as the accurate, user friendly and motorized Auto-Pick-and-Place feature. The system control, the process documentation- and visualization is handled by the ERSA Rework software IRSoft.

ERSA Know-How-Seminars
Expert knowledge for professional users comprehensively imparted

Today more than ever, cost effective production and highest quality in the electronic manufacturing industry is the basis for profitable competitiveness. A key ingredient for being competitive is a well-qualified staff, which is up-to-date on current technology and process. ERSA Know-How-Seminars are ideal for transmitting this knowledge to those of your staff members with process responsibility in electronic manufacturing. In these seminars, theoretical and practical knowledge is presented - in product neutral fashion - in workshops and presentations by reputed experts in their field. Further information you will find under the heading “Events” on www.ersa.de.
Technical data and further detailed information to our program of manual soldering tools you will find in our catalog „Soldering Tools“. This is available, as are the catalogs „Rework“ resp. „Inspection“, in printed form and in the PDF format on the internet at www.ersa.de.

Aside from the extensive selection of hand soldering tools, rework stations and inspection systems for non-destructive inspection, ERSA, as Europe’s largest manufacturer of soldering systems, also offers a complete range of selective soldering-, wave soldering- and reflow systems, as well as stencil printers for the industrial electronic manufacturing industry.

Additional information you can find in the relevant brochures and under www.ersa.de.