Technical article

Ersa multi-channel soldering and desoldering station i-CON VARIO 4

Board rework with high-end soldering stations – Quality and technology pay off

"If you need a machine and don't buy it, then you will ultimately find that you have paid for it and don't have it." HENRY FORD

Today, we can expand the quote from Henry Ford: "If you need a high quality machine and don't buy it, then you will ultimately find that you have paid for it and don't have it".

This statement is especially true for the manual rework of electronic assemblies. Demands on the precision and quality of the end products are continuously rising. Successful rework of electronic assemblies, with high-quality and long-life results, can only be achieved when the equipment used convinces with its quality and technology.

Using as an example a multi-channel soldering- and desoldering station, we will show which characteristics such a tool should possess for it to be successfully usable in daily operation.

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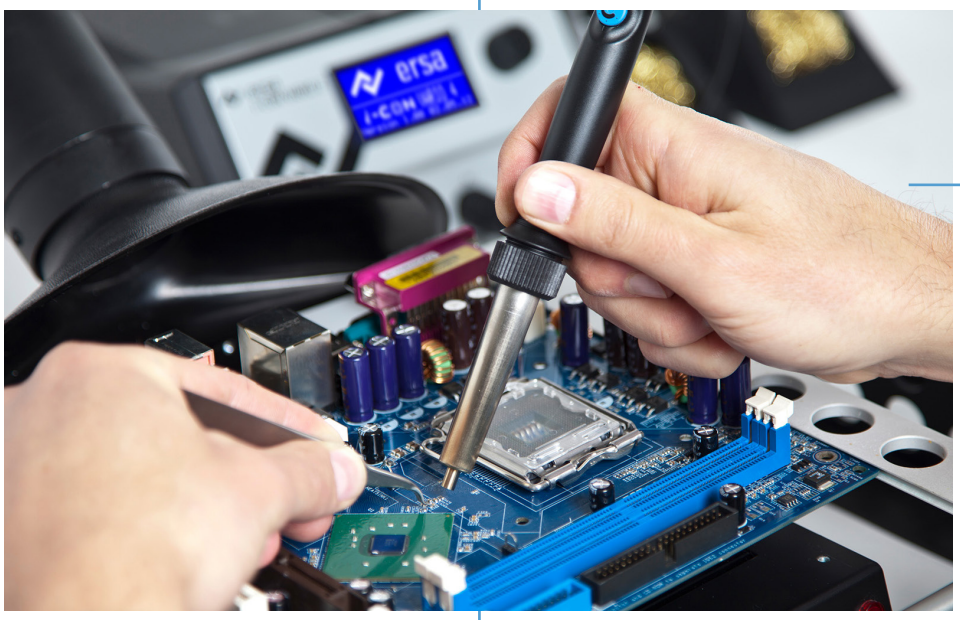


Ersa i-TOOL AIR S – hot air pencil 200 W for SMD rework

LONG-TERM DURABILITY

If the discussion centers on the issue of "long life" of a soldering iron, the first thought is always aimed at the life expectancy of a solder tip. But, already with this simple element, it pays off to consider the issues of quality: Cheap tips frequently offer, due to the lack of an ennobled surface, not the same useful life and performance as the original tips of renowned suppliers. Rework performed with worn tips is, in the final result, prone to fail and therefore constitutes a risk.

The durability of a soldering station and its soldering tools is a fundamental quality characteristic. As a consequence, suppliers of quality products utilize top-quality plastic materials and metals to ensure the ruggedness of the product during everyday use. Electrically conductive and impact-resistant polyamide-copolymers ensure ESD-enabled, durable housings and long-lasting hand pieces. Steel tubes for soldering irons and hot air pencils, made from upgraded alloys, have proven themselves during daily, continuous use over many years. The same can be claimed for the heat resistant and flexible supply lines and feeds for the soldering tools, which, together with a stable power supply, long-life heater elements and pumps, allow for a long useful life of the tools. If, on the other hand, low-cost plastics and inferior metal components are being used, broken station housings or unusable solder irons are a common sight, and to perform economical and reliable rework is simply not possible.

While in the classical solder iron, tips and the heating element are of primary importance, other functional elements are important in hot gas systems: high-quality diaphragm membrane pumps supplying the medium in hot gas systems have an audible advantage vis a vis loud and high revving piston pumps or turbines, as they operate very quietly. In addition, they can be controlled very precisely to deliver a constant volume of air or gas and they feature a long life expectancy.

Data check

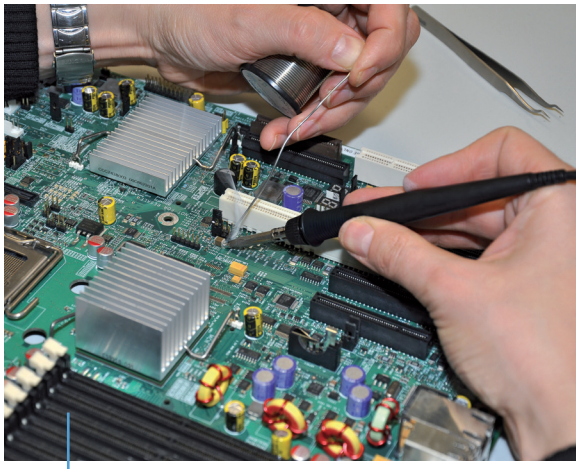
Quality tools for board repair

High-grade ESD materials for housings and hand pieces

Long-life solder tips and metal components used for the tools

Reliable electrical components such as robust and flexible feeds, stable power supply, long-life heating elements and pumps

Ersa X-TOOL VARIO – THT desoldering iron 150 W to desolder with solder sucking feature



Ersa i-TOOL – solder iron with 150 W for SMD and THT touch up

SIMPLE AND EASY TO OPERATE

High-quality solder stations prove their worth by being intuitive to operate. Cryptic displays and operating elements should be a thing of the past in the 21th Century. Nevertheless, most of the time only the manufacturers of premium products undergo the trouble to make the operation of a solder iron easy and transparent. This is of extreme importance, since the display is, for human operators, the information interface to the tool per se. To achieve optimal rework, all important information must be displayed in an easy readable fashion and be clearly understandable. Data such as the actual process temperature has to be displayed in large letters and be recognizable on the first glance; less relevant data can be pushed into the background. Displaying the information and the set points in clear text and in the language of the intended user will ensure that the user fully understands the parameters and the process.

The operational elements of the station and the tools, as well as the tools themselves, need to be ergonomically shaped and arranged. The user has to be able to quickly find his way to a safe operation. For example, a potentiometer in the grip of a hot air pencil eliminates the need to frequently move the hand to the station to adjust the air flow.

Data check

Simple and Safe Operation
High quality, back-lit display with easily readable clear text
Intuitive operation – simple and understandable elements
Ergonomic design of all functional elements

PERSUADING TECHNOLOGY

The most important quality feature of a working tool is its performance. How well can the rework task be performed with the soldering station?

For this, it is worthwhile to look at some technological aspects:
First of all is there the temperature control. The making of a reliable solder joint depends on the correct solder temperature. A solder joint formed with inadequate heat will lead to premature failure of the assembly, and overheating a solder joint during rework can damage it and again lead to board failure.

The precise measurement of the tip temperature is a prerequisite for being

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Convincing Technology

The station has to be **suitable for all types** of rework applications

True temperature control directly at the tip or in the hot gas ensures reproducible results

The soldering station should, as a standard feature, offer **stand-by and sleep modes,** as well as provide interfaces to **peripheral equipment**

For future sustainability, **firm-ware updates** should be possible

able to very closely control the process. Temperature draining off has to be compensated very quickly and efficiently through reheating by the heating element. Powerful and compact heating elements are therefore the principal components for professional soldering. This is true for the standard soldering iron as well as for the de-soldering tweezers – here it applies to both heated legs – or for high performance THT desoldering irons.

The same precision is called for by the hot air pencils. For reproducible soldering results, the exit temperature of the hot medium must be adjustable and held at a constant temperature. And an infinitely adjustable volume of air is needed, to be able to also handle the more delicate soldering tasks.

For this, digital measurement and digital control of the air temperature and air volume are a basic requisite. High-quality stations offer pumps which can be controlled by phase angle control, as well as accurate temperature measurement in the zero crossing of the heater current.

Modern multi-channel stations furthermore offer interfaces, with which additional peripheral tools such as preheating plates or a solder fume extraction unit can be driven. Communication with controls for process automation is also foreseen.

Ersa CHIP TOOL VARIO – SMD desoldering tweezer, 80 W, to desolder small SMD's

It has today been widely accepted in the electronic industry, that investing in premium and long-life manufacturing equipment does pay off. It is especially important in rework and touch-up that the right tools are easy to operate and safe to handle. So, when applied to successfully reworking electronic assemblies, Henry Ford's statement made more than 70 years ago holds true even today. ■

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