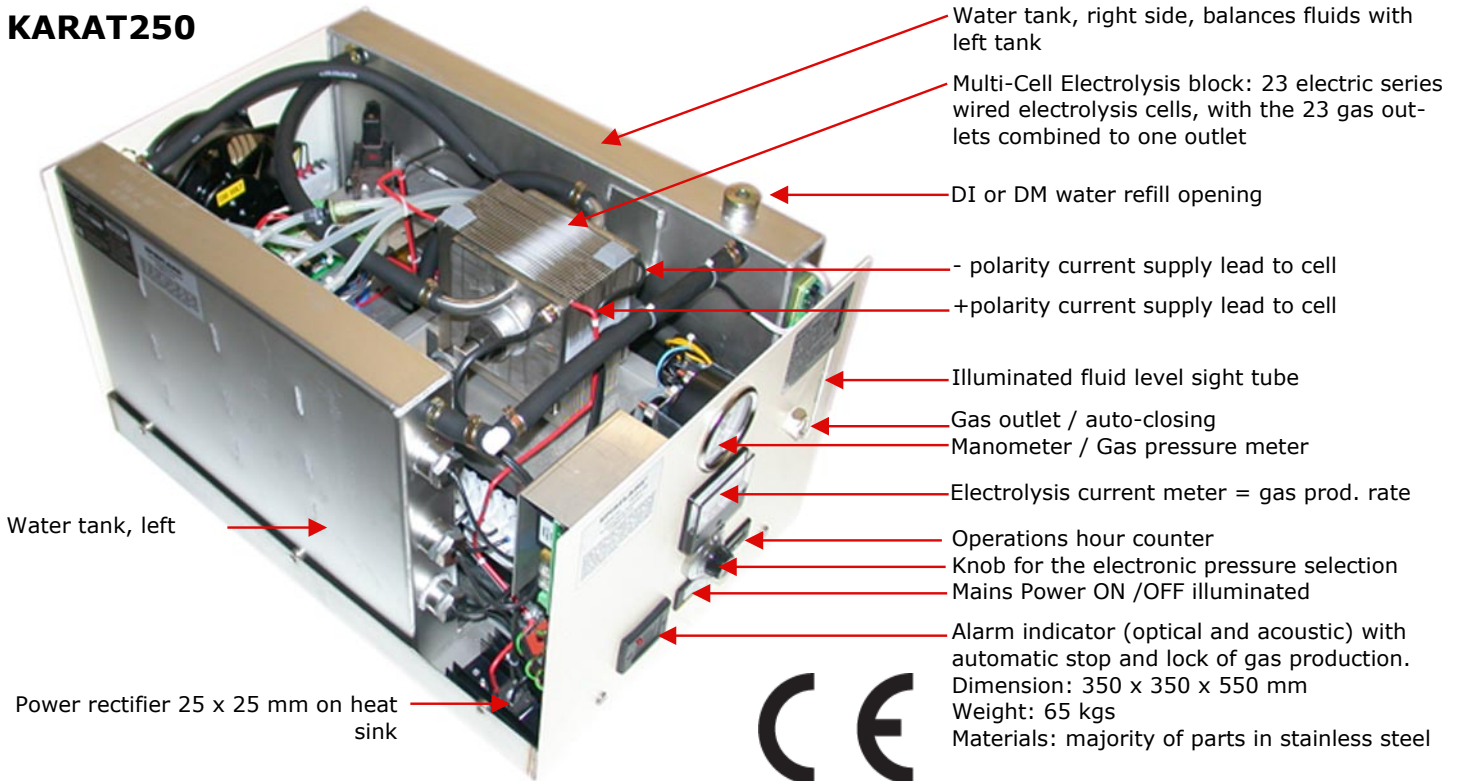


# The **KARAT250 SPIRFLAME**®

is a worldwide patented multi-cell flame generator producing Hydrogen and Oxygen in the absolute perfect 2:1 ratio by the electrolysis of water. Energy taken from any 230 vac outlet. The consumption depends on the gas production rate and reaches a max of approx 1000 Watt. The flame heating is electronically selected by user and is then automatically stabilized by the electronic control itself.

The **KARAT250**® is used with goldsmith and dental labs for platinum, gold, silver and other noble metal soldering tasks, be it very fine or large.

## KARAT250



### Visitors FQ's during the inhorgenta 2006:

#### What is the difference between a Spirflame® model Karat250 and other electrolyser based hydrogen generators?

The Spirflame® electrolysers are worldwide patented, true\* Multicells with twenty (and more) interconnected electrolyzing cells. Electrolysers known now for almost 40 years to the goldsmith or dental lab technician are **monocell** designs.

The Karat250 operates **22** active electrolysis cells and therefore to produce the same gas rate only needs **1/22** the current needed by a monocell.

What this means?

Please go to page -3-

#### What is the advantage of the Karat250?

The KARAT250 is an industrial, 100% permanent - full-gas rate duty, applicable self-fueling welding- and soldering flame generator for single- and multi-torch application.

#### Are there smaller models available?

Yes, this would be the model Karat100, not much less cost, mainly used for small to medium sized chain manufacturing or repair services.

"With eating comes the appetite ..." this comes often very true as user discover the usefulness and wants to solder larger pieces or melt small amounts of gold or platinum. Eventually at that point the heating power of the Karat100 will not suffice anymore. The purchase of a more powerful Karat250 is the consequence. This being the case "old" 100 can be chained gas wise with the new 250 and the result would be the power of a "350".

### **Why do Spirflame®s have separate Boosters?**

The Booster is a gas mixture modifying container passed by the pure spirflame® gas (2H+1O). The spirflame® gas saturates with vapors atomized from the booster fluid. This then causes a combustion nature change from the extreme hot pure 2H/1O flame to a positively softer, more material metallurgical friendly and reducing (oxides limiting) spirflame®. For example a flux can be added to the gas flow creating a green flux flame supporting solder flow on gold and silver. Do not use on Platinum.

The Karat250 can operate simultaneously multiple torches. One of the torch operators working with gold, the other for example with Platinum.

The platinum task may not use a modified flame, the gold or silver station needs a modified flame with a flux additive.

Therefore it seems and is logical to provide the possibility to work from one Spirflame® with multiple boosters and each one with its own fluid mixture. A booster installed in the base generator is complicated to regularly clean / maintain. The booster fluid is consumed and must be replenished regularly.

An external booster, easily accessible and removable is simple to maintain and handle. A booster installed in the gas generator looks good but in use it is immediately an ergonomic disaster and reason for not properly maintain the equipment.

### **The Spirflame® Karat250 must be installed at workstation?**

The Karat250 maybe placed up to 25 meter (or more) remote from operator. Important is to have the boosters near the operator stations.

There are installation where several Karat250's are "locked" into a cellar and gas is piped through fix installed stainless steel pipes (inner ø 8 mm, wall 1 mm) to various ateliers distributed over several building levels. Almost since 10 years a well known music instrument retailer with repair facilities operates such an installation in the midst of the old city part of Zurich in an restored historic building prohibited to store pressurized gas sources.

True "gas from plug in socket" is also now found at this companies other two locations. More tech details available on request.

### **What type of jobs can be done with a Karat®?**

Well in general everything needed for platinum, gold, silver - and other noble alloys thermal treatments, provided the metal or alloy masses do not exceed the thermal heat supply capacity at max gas rate. There is no limit towards finest applications, nozzles are available down to 50 micron and important these spirflame®s burn stable and dependable, which is most important for example for the eye catching creations in platinum and gold of goldsmith Mr. Giovanni Corvaja.

### **Can Tips (torch nozzles) clog?**

With Mono-cell systems tips may and will clog because of high humidity and electrolyte fluid aerosol content in the gas. An absolute chaos if this happens during a demanding solder task.

Such contaminated gases are not existent in the cold multicell electrolysis process. During the past Inhorgenta 06 jewelry exhibition Munich two Karat250 did operate permanently under full load between 09h00 to 18h00.

No trace of residues at the tips and continuously clean and stable flames. Hope you have seen this during your visit at our booth! This is industrial standard.

We would hear from our customers a few nasty things in case an assembly line would have to be stopped because of a clogged flame nozzle!

### **Multiple gas generators Karat250 can be chainganged?**

Yes, complete generator clusters can be arranged with up to 12 (or more) standard Karat250 units. These Karat250 will then organize load distribution automatically between themselves.

### **How many torches / stations can be fed from one Spirflame® Karat250?**

One to ten torch stations without interfering operators work. The maximal allowable gas consumption of all stations may obviously not pass over the maximal possible gas production rate. That would mean one very large flame or for example 20 small flames. The available gas is distributed on all torches.

### **Why are Spirflame® parts mostly made from high quality stainless steel?**

The Karat250 engineering base is now an almost 30 years success story of developing and supplying demanding industrial customers the world over. The best materials are just good enough.

### **What temperatures do spirflame®s reach?**

Atomized booster fluid chemicals reduce the flame combustion core temperature from an aggressive 3050 °C (only water in booster) in steps down to 2600 °C (methanol in Booster) and further down to around 1600 °C (acetone in Booster) for a very soft flame, for example for hollow items. Remember the advantage of multiple boosters!

### **How is flame size / heating power changed?**

Basically changing tip size does the major flame size change, additionally a fine flame tuning can be made at torch valve. The basic gas pressure is manually set at the Karat250. This selected pressure is than automatically stabilized by the internal electronic control circuits by increasing or decreasing the gas production rate to meet the total demand of all torch stations.

### **What is the smallest and largest flame size?**

This depends on tip size and can go from a 0,2 mm length to a 200+ mm long size with accordingly heating power, eg for melting applications.

## Why does the well known goldsmith Mr. Giovanni Corvaja since years prefer the Spiriflame® technology?

The very fine gold and platinum wire works done by Mr. Giovanni Corvaja do not only need a stable hand, but with small flames also a constant heat delivery. Various of his delicate works showed in museums the world over can only be crafted with such a dependable tool. More details on request.

## What type of service must be done?

Basically as a seasoned user said: "Pay the electricity bill, add water and booster fluid in time and as needed, clean out from time to time booster and flame arrester in torch", clearly neglecting our preventive maintenance guides for industrial usage, but we could not argue at all. His Spiriflame® did work with him for now almost 10+ years and as he retires, he wanted to hand back his unit to us to carefully retire it.

## Warranty?

Two years on materials and labour. In case of a failure we e-guide the customer through a sequence of questions & answers which usually after two cycles points to the problem. We have an exchange program in place. Special internal well padded plastic shipping boxes can be sent through UPS with a reconditioned (not new) Karat. At customer site Karat's are swapped and UPS leaves with package. Shipping papers everything is prepared from Spirig's side. Follow the instructions. Work with the Spiriflame®. Then you will get a fix cost repair proposal and a cost proposal to keep the swapped Karat. Saves freight costs! By the way, Spirig has a worldwide special discounted UPS freight agreement.

## \* What means MULTICELL?

### Basic physical law from Ohm:

Any student or apprentice for electricians learns already very early: "**Double** the current in a conductor and the heat losses will **quadruplicate**". These heat losses are the reason for the temperature increase.

Be it now a Mono-cell or a Multi-cell electrolyser, the electrolysis needs a dc current made through rectifying in a rectifier element an ac current originating from the secondary windings of a transformer connected to 230 (or other) vac supply.

The Mono-cell is basically an outer cylindrical vessel containing the needed electrolyte fluid into which from an insulated head plate another smaller diameter, bottom open, cylinder dips. The outer vessel now used as an electrode is connected to the + polarity of the dc source, the inner cylinder to the - polarity.

The mentioned electrolyte fluid is a caustic potash or sodium-hydroxide. It is not known as a too well electric conductor, actually it is compared to metals a very bad conductor.

The electrolysis current must pass from outer electrode **through** the electrolyte fluid to the inner electrode otherwise no water dissociation will take place.

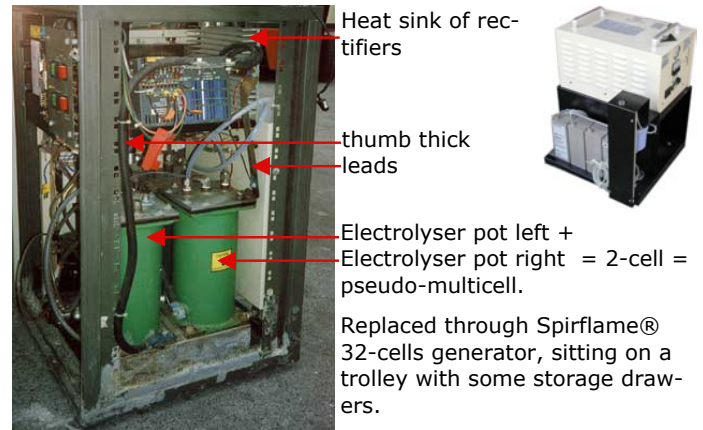
## Basic physical law from Faraday:

To produce a gas mixture of **100** liters a dc current of **165** Ampere must flow for **one** hour through **one**. This law is independent of the size and distance of the electrodes.

For example to produce a gas volume of 250 liter (Karat250 spec.) a dc current of 165 A x 2,5, also 412 Ampere must flow for one hour through the electrolysis bath.

Our apprentice remarks: "412 ampere, this needs wires thick like a thumb!"

He is correct and there will be needed rectifiers sized like larger coffee pots, and ac transformers sized almost like a beauty case.



The KARAT250 needs a full gas rate (=250 liter per hour) a maximal electrolysis current of 18 ampere.

A Mono-cell will need a dc current of 412 amp (vs. the 18). The 412 amp is 22,8 times higher than the 18 amp.

Therefore the electric current heat losses created in a mono-cell design will be  $22,8 \times 22,8 = 521x$  higher than the current losses in the Karat250 producing the same amount of gas.

Mono-cells are therefore often also termed as "water cookers" and similar not so nice expressions from disappointed users.

The law of Ohm and Faraday clearly differentiate the Spiriflame® technology from other electrolysers.

**The Spiriflame® technology is patented worldwide.**

**The Spiriflame® technology is not licensed.**