

HAG-HF

Fully Automatic
Fusion Machine



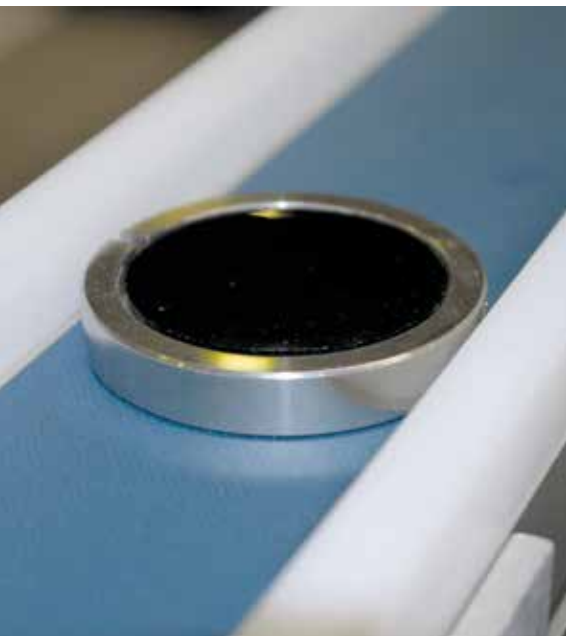
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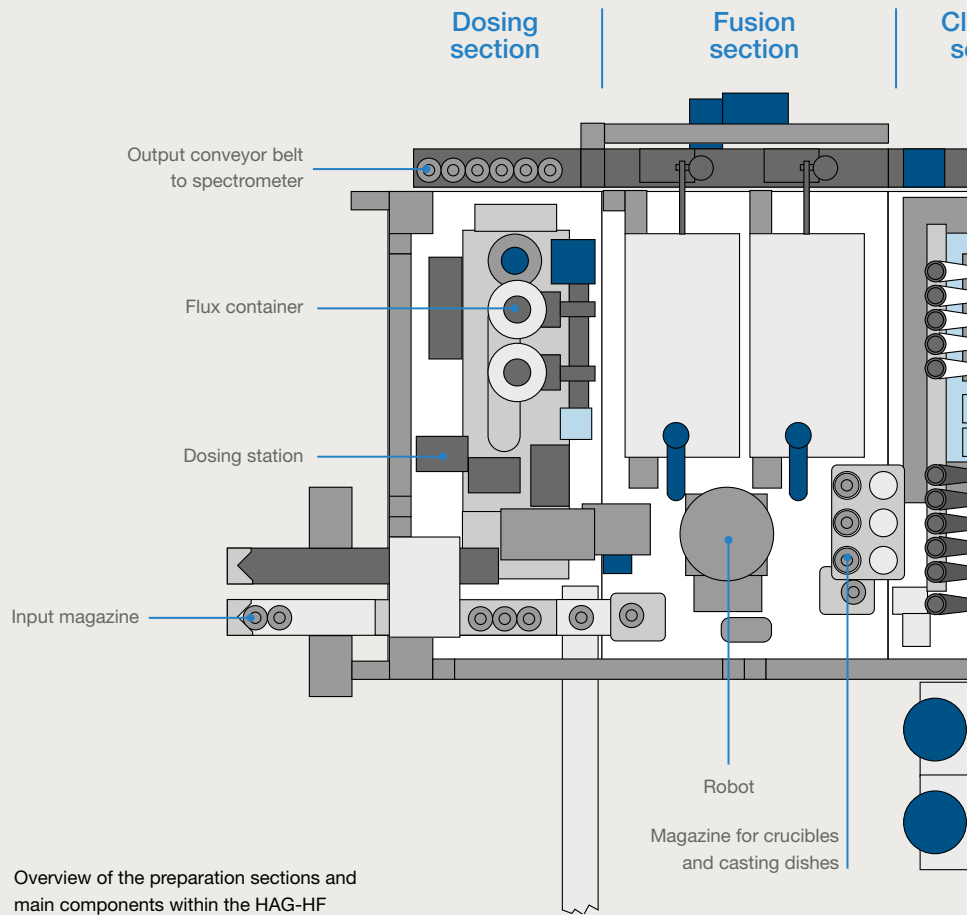


Preparation of oxidic sample material for XRF

At a glance

- The HAG-HF fully automatically prepares samples for spectroscopic analysis. The HAG-HF covers the following preparation steps: Dosing – Fusion – Quality control – Cleaning.
- The inductive fusion system is suitable for cement, iron ore, slag, fly-ash, geological samples, bauxite and other oxidic material.
- All modules are integrated within one compact machine base. The robot and linear conveyor systems handle and transport the samples within the HAG-HF.
- The system is fully automatic and monitors itself during operations.
- The HAG-HF improves reproducibility and increases precision. Sample preparation times are significantly reduced.
- According to the system configuration up to two samples can be prepared simultaneously.





Easy integration in automated systems

The HAG-HF can be used as a stand-alone machine or flexibly integrated into various laboratory automations. As an example, the sample material is sent into the laboratory by airtube. The sample material is unpacked from the airtube capsule, pulverized, dosed into cups and transported to the HAG-HF. Furthermore, the HAG-HF can be connected with a TGA-Unit for LOI determination.

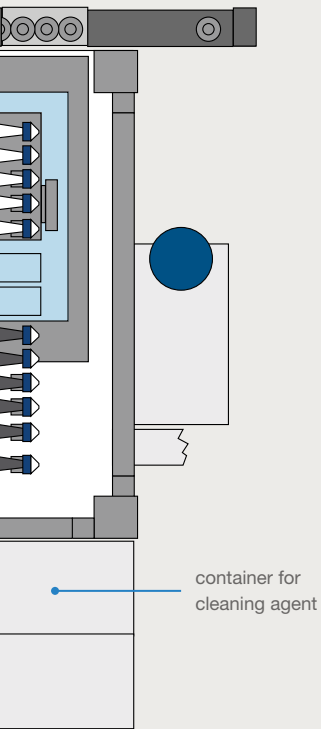
For different types of sample material, different preparation and cleaning programs can be defined. Furthermore, various groups of sample material can be assigned to specific sets of crucibles and casting dishes to avoid contamination and reduce the sample processing time.



Input conveyor for sample material



cleaning
section



Dosing of sample material into the Pt crucible

Dosing

A high-precision balance is used for dosing of sample material, flux and oxidizing

agent into the crucible. Different dosing modi can be defined to control the weighing procedure for different sample types. As an option, hygroscopic material can be protected from moisture absorption.

Solutions of wetting agent (like, e.g., lithium bromide) can be added using a high-precision peristaltic pump.

Previously in a muffle oven oxidized samples can be transferred into the Pt-crucibles. Typically a larger batch of sample material blended with flux and oxidizer are pre-treated in ceramic crucibles. This method helps saving preparation time and protects the Pt-crucibles. Afterwards, flux and when required, wetting agent can be added (Modus 4, dosing options).



HAG-HF connected with conveyor belt to TGA (right) and spectrometer (left)

Modus 1	Flux 100 %	+	Sample		+	WA*			
Modus 2	Flux X %	+	Sample	+	Flux 100 - X %	+	WA		
Modus 3	Flux X %	+	Sample	+	Oxidizing agent	+	Flux 100 - X %	+	WA
Modus 4	Oxidized sample + Flux X %		+	Flux 100 - X %		+	WA		

Dosing options of the HAG-HF

* Wetting agent



Fusion

The HAG-HF uses modern high-frequency generators. The steplessly variable temperature (ranging from 385°C to 1,300°C) is continuously controlled using infrared pyrometers. This allows a reliable temperature control during all fusion steps. Moreover, permanent temperature monitoring permits direct oxidizing of certain materials within the Pt-crucible.

By default, each fusion procedure is defined by four program steps. The program steps include following parameters: length of time, temperature, oscillating and tilting of the crucible during the melting process.

The crucibles are oscillated in a circular movement to improve homogenization of the melt. Additionally, the crucible can be tilt by 45°. The molten material is poured into a preheated casting dish. Afterwards it cools down by the ambient temperature. After solidifying, the casting dish is further cooled down by blowing with compressed air.

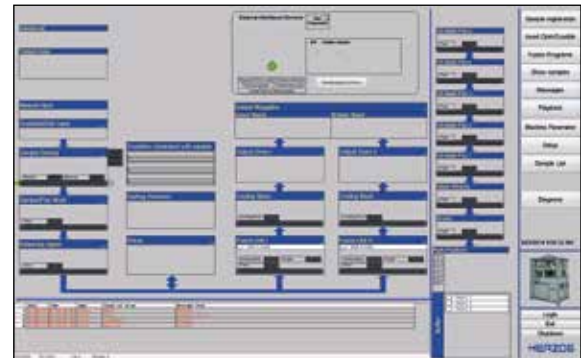
Following fused beads standard diameter can be produced: 29 mm, 32 mm, and 34 mm.

Transport to the XRF spectrometer

The HAG-HF transfers only intact beads to the transport system. A sensor detects crystallized or broken beads and ensures that they are discarded. To prevent contamination of the analysis surface during transport, the beads are not transferred directly to the transport system. With the side to be analyzed facing downward, they are placed on the edges of a holding ring. This ensures that only perfect beads make it to the analysis equipment.

Cleaning

After the fusion process, crucibles and casting dishes are automatically cleaned using a heated ultrasonic bath system (option). The cleaning fluid in the bath is automatically renewed at freely selectable intervals. The cleaned crucibles and casting dishes are rinsed by distilled water and blown dry with hot air. After the cleaning process the weight is measured to guarantee perfect cleanness (option).



Screenshot of the software control program

Technical data HAG-HF

Model: HAG-HF

- Colour: silver anodized/ white/ blue

Dimensions L X W X H

Overall dimensions of machine:	1,400 x 960 x 1,992 mm
Machine floor area:	1,060 x 1,500 mm

Weight

Machine:	850 kg
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Precision scale

Weighing range:	120 g
Precision:	0.1 mg

Power supply and consumption

Voltage:	3x 400 V, 50 Hz
Neutral conductor:	Not required
Po consumption:	10 kVA
Fusion temperature:	385 – 1,300°C

Compressed air supply and consumption

Pressure setting:	6 bar
Consumption:	Approx. 400 NL per sample

Water supply and consumption

Min. drinking water quality	Min 2 bar, max. 10 bar
Consumption:	Approx. 0.5 l per sample

Disposal connections

Waste water:	DN 25 mm
Waste air connection:	DN 125 mm
Required exhaust rate:	7m ³ /min
Static pressure:	370 Pa

Electrical switchgear cabinet

PLC system:	SIMATIC S7
Control voltage:	24V DC
Ingress Protection:	IP 44
Insulation class:	B

Sample insertion and discharge

- Manual, in a special cup in a defined start position
- Discharge via vacuum suction device to a defined position with the analysis surface facing downwards

Optionen

- 2nd fusion unit
- 2nd dosing device
- Ultrasound cleaning device
- Crucible and casting dish magazine
- Cooling device for cooling fluid
- Scale for prepared fused beads
- Temperature monitoring for casting dishes
- Linear magazine for 36 fused heads



The design of the machine complies with the applicable accident prevention and VDE (German association of electronic engineers) regulations. We reserve the right to make technical changes.

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