

MAFS

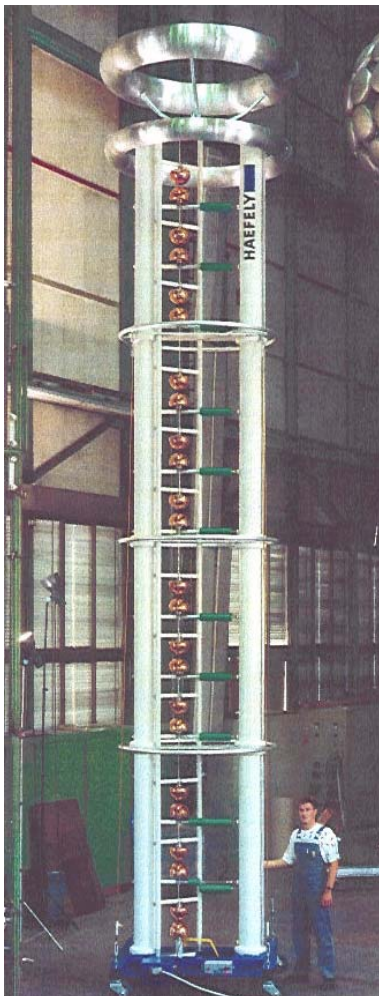
Multiple Chopping Gap

■ **The multiple chopping gap** is a originally patented Haefely development and is used to chop lightning impulses (on the front and on the tail) as well as switching impulses up to the highest voltages.

The multiple chopping gap serves simultaneously as a load capacitor for the impulse generator and allows excellent reproducibility of the chopping time and does not distort the wave shape until the chopping point.

With a additional secondary unit the MAFS is also usable for some applications as a voltage divider.

Rod gaps and sphere gaps (above 1000 kV) draw a substantial pre-discharge current prior to the voltage break-down, causing a voltage drop. This affects the comparison tests when testing power transformers.



Multiple chopping gap MAFS 2400

The sphere distance is automatically adjusted by the controls GC 223, GC 257.

In the automatic mode, their distance is set automatically in function of the charging voltage. The gap distance is displayed on these controls. The chopping is initiated by the first stage, having a triggering plug.

A manual control box GSC 219 is available to adjust the gap distance standalone or with non-Haefely control systems.

Design

For indoor operation and mobile design.

The HV units are made of stacked capacitors with inserted damping resistances. This active part is built in reinforced fibre-glass cylinders.

Our active part technology is derived from our decade-long experience. The copper spheres have tungsten sintered inserts to reduce the burn-off. Their distance is set by a precise drive. The upper semi-sphere is attached to a movable frame which makes it possible to adjust simultaneously all partial spark gaps.

The multiple chopping gaps are equipped with toroid electrodes. The electrodes are made of brushed aluminium. The electrode type is determined by the rated voltage. Fibre-glass struts are required when more than 2400 kV units are used.

The H base frame of welded steel profiles is equipped with four swivel castors.



Multiple chopping gap MAFS in front of an SGDA

Technical Data

Type	Rated impulse voltage LI 1.2 / 50 μ s	Rated impulse voltage SI 250 / 2500 μ s	Capacitance approx.	Int. damping resistance approx.	Min. clearance to walls and ceiling LI and SI neg.	Top electrode type
MAFS 600	600 kV	600 kV	2400 pF	30 Ω	1.2 m	A
MAFS 1200	1200 kV	1000 kV	1200 pF	60 Ω	2.4 m	B
MAFS 1800	1800 kV	1300 kV	800 pF	90 Ω	3.6 m	B
MAFS 2400	2400 kV	1600 kV	600 pF	120 Ω	4.8 m	D
MAFS 3000	3000 kV	1700 kV	480 pF	150 Ω	6.0 m	D
MAFS 3600	3600 kV	1800 kV	400 pF	180 Ω	7.2 m	E

at standard conditions according to IEC 60060-1 (1989) and altitudes lower than 1000 m.

Trigger range

for time-to-chop scattering:	< \pm 150ns	General	
for unchanged gap spacing, negative polarity	approx. 20 %	Relative humidity	<90% non-condensing
for unchanged gap spacing, positive polarity	approx. 10 %	Operating temperature	- 5 ... + 45 $^{\circ}$ C
with variable gap setting, both polarities	30 % to 100 %U _n	Storage temperature	- 20 ... + 50 $^{\circ}$ C
with short circuiting of stages and variable gap	20 kV to U _n	Height above sea level	<1000 m

Dimensions & Weight

Type	Number of high voltage units	Height approx.	Base frame approx.	Weight, net approx.	Weight, gross approx.	Shipping volume approx.
MAFS 600	1	2.5 m	1.5 m x 1.5 m	400 kg	700 kg	3.5 m ³
MAFS 1200	2	4.5 m	1.5 m x 1.5 m	600 kg	1000 kg	5.0 m ³
MAFS 1800	3	6.4 m	1.5 m x 1.5 m	800 kg	1400 kg	7.0 m ³
MAFS 2400	4	8.3 m	1.5 m x 1.5 m	1000 kg	1700 kg	8.5 m ³
MAFS 3000	5	10.3 m	1.5 m x 1.5 m	1200 kg	2000 kg	10.5 m ³
MAFS 3600	6	12.2 m	1.5 m x 1.5 m	1400 kg	2300 kg	12.0 m ³

Top Electrode

Type	Shape	Dimensions D x d approx.	Add. height approx.	Pre-discharge threshold approx.
A	Single toroid	1.5 m x 0.04 m	---	300 kV SI
B	Single toroid	1.8 m x 0.2 m	---	600 kV SI
D	Double toroid	1.9 m x 0.3 m and 1.8 m x 0.2 m	0.8 m	1600 kV SI
E	Double toroid	2.2 m x 0.6 m and 1.9 m x 0.3 m	1.2 m	1900 kV SI

Scope of Supply

Multiple chopping gap with one short circuit bar per 600 kV stage, Top electrode & Base frame
Multi-core control cable, between the connection box and the chopping gap, length max. 10 m
2 Test reports and 2 Instructions manuals

Accessories & Options

Secondary Unit (for Imp. Voltage measurement)

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