



CH-3003 Bern-Wabern, 7. January 2011

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# Measurement Services

## Time and Frequency Laboratory

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Valid from: 01.01.2011

The time and frequency laboratory at METAS performs high accuracy calibrations of frequency standards and measuring instruments as well as clocks. Our measurement results are traceable to national standards and thus to internationally supported realizations of the SI units. Our main customers are the accredited laboratories of the Swiss Calibration Service (SCS). However, the services are also available directly to industry and commerce, if they are not routinely offered by a SCS laboratory. The scopes of the accredited laboratories are listed on the internet page of the Swiss Accreditation Service ([www.sas.ch](http://www.sas.ch)).

The services enumerated in this catalogue correspond to our standard measurement capabilities. Other services, with e.g. reduced measurement uncertainty or an extended measurement range, are possible and may be discussed directly with the responsible expert. In addition, our lab team with its considerable specialist knowledge is available for consultation and assisting in finding solutions to demanding metrological tasks in the time and frequency field.

### Measurement uncertainty

The measurement uncertainties are supplied for information only and can be evaluated only after the measurements being completed. They contain contributions originating from the measurement standard, from the calibration method, from the environmental conditions and from the device under test. The indicated uncertainty of measurement is stated as the combined standard uncertainty multiplied by a coverage factor  $k = 2$ . The measured value ( $y$ ) and the associated uncertainty ( $U$ ) represent the interval ( $y \pm U$ ) which contains the value of the measured quantity with a probability of approximately 95 %. The uncertainty is estimated following the guidelines of the ISO.

### Pricing

The listed calibration fees are guiding prices based on the Ordinance of 5 July 2006 on the Fees of the Federal Office of Metrology and take into account a fee for the use of the measurement equipment. The indicated prices apply for standard measurement services, with the reservation of price changes, VAT excluded, and comprise a certificate of calibration or a measurement report.

*The price indications apply for Swiss customers only.  
Foreign customers are kindly requested to ask for a quotation.*

## Contact Persons

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Frequency standards	Christian Schlunegger	+41 31 32 33 301
Frequency counters	Christian Schlunegger	+41 31 32 33 301
Time standards	Laurent-Guy Bernier	+41 31 32 34 645
Time interval counters	Laurent-Guy Bernier	+41 31 32 34 645

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# 1. Frequency standards

## 1.1. Standalone frequency standards (outside METAS)

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Quantity	Relative frequency offset $f < 1.3$ GHz	
Uncertainty	4E-11 Hz/Hz	
Procedure	Counter measurement	
Parameters	10 s < gate time < 100 s	
Extend of service	Measurement of the frequency offset for one gate time / frequency	
Price	fixed-price	CHF 1'850.00

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Extend of service	additional gate time / frequency	
Price	further pieces	CHF 200.00

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Quantity	Relative frequency offset $f = 1,5,10$ MHz	
Uncertainty	2E-12 Hz/Hz	
Procedure	Phase comparison	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1 V on 50 Ohm	
Extend of service	Measurement of the frequency offset	
Price	fixed-price	CHF 2'250.00

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## 1.2. Radiosync. Frequency standards (outside METAS)

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Quantity	Relative frequency offset $f < 1.3$ GHz	
Uncertainty	4E-11 Hz/Hz	
Procedure	Counter measurement	
Price	fixed-price	CHF 1'850.00

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Quantity	Relative frequency offset $f = 1,5,10$ MHz	
Uncertainty	2E-12 Hz/Hz	
Procedure	Phase comparison	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1 V on 50 Ohm	
Price	fixed-price	CHF 2'250.00

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# 2. Frequency counters

## 2.1. Standalone frequency standards (at METAS)

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Quantity	Relative frequency offset $f < 1.3$ GHz	
Uncertainty	4E-11 Hz/Hz	
Procedure	Counter measurement	
Parameters	10 s < gate time < 100 s	
Extend of service	Measurement for one gate time / frequency	
Price	fixed-price	CHF 1'650.00

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Extend of service	additional gate time / frequency	
Price		CHF 200.00

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Quantity	Relative frequency offset $f = 1,5,10$ MHz	
Uncertainty	2E-12 Hz/Hz	
Procedure	Phase comparison	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1 V on 50 Ohm	
Extend of service	Measurement of the frequency offset	
Price	fixed-price	CHF 2'050.00
Quantity	Relative frequency offset $f = 5,10$ MHz	
Uncertainty	1E-13 Hz/Hz	
Procedure	Phase comparison	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1 V on 50 Ohm	
Extend of service	Measurement of the frequency offset	
Price	fixed-price	CHF 2'750.00
Extend of service	Adjust frequency offset	
Price	on request	
Extend of service	Adjust frequency offset	
Price	actual costs	CHF 215.00

## 2.2. Frequency Counter (at METAS)

Quantity	Relative frequency offset $f < 1.3$ GHz	
Uncertainty	4E-11 Hz/Hz	
Procedure	Counter measurement	
Extend of service	Calibration of the frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 1'650.00
Quantity	Relative frequency offset $f = 1,5,10$ MHz	
Uncertainty	2E-12 Hz/Hz	
Procedure	Phase measurement	
Parameters	Signal: Sinus, Amp rms: 0.5 V - 1V on 50 Ohm	
Extend of service	Calibration of the frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 2'050.00
Quantity	Relative frequency offset $f = 5,10$ MHz	
Uncertainty	1E-13 Hz/Hz	
Procedure	Phase measurement	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1V à 50 Ohm	
Extend of service	Calibration of the frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 2'750.00

## 2.3. Frequency counter (outside METAS)

Quantity	Relative frequency offset $f < 1.3$ GHz	
Uncertainty	4E-11 Hz/Hz	
Procedure	Counter measurement	
Extend of service	Calibration of the frequency offset of the internal time base of the unit under test	
Price	fixed-price	CHF 1'850.00

Quantity	Relative frequency offset $f = 1, 5, 10$ MHz	
Uncertainty	$2E-12$ Hz/Hz	
Procedure	Phase comparison	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1 V on 50 Ohm	
Extend of service	Calibration of the frequency offset of the internal time base of the unit under test	
Price	fixed-price	CHF 2'250.00

## 3. Time standards

### 3.1. Atomic clocks (at METAS)

Quantity	Offset of the timescale	
Uncertainty	10 ns with respect to UTC-R, 100 ns with respect to UTC	
Procedure	Time difference measurement	
Extend of service	Calibration of the difference of the timescales DUT vs. UTC-R	
Price	fixed-price	CHF 400.00
Quantity	Offset of the timescale	
Uncertainty	50 ns vs. UTC	
Extend of service	Calibration of the difference of the timescales DUT vs. UTC	
Price	fixed-price	CHF 1'000.00
Extend of service	Adjust the difference of the timescales	
Price	on request	

## 4. Time interval counters

### 4.1. Time interval counter (at METAS)

Quantity	Relative frequency offset $f < 1.3$ GHz	
Uncertainty	$4 E-11$ Hz/Hz	
Procedure	Counter measurement	
Extend of service	Calibration of frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 1'650.00
Quantity	Relative frequency offset $f = 1, 5, 10$ MHz	
Uncertainty	$2E-12$ Hz/Hz	
Procedure	Phase measurement	
Parameters	Signal: Sine, Amp rms 0.5 V - 1 V on 50 ohm	
Extend of service	Calibration frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 2'050.00

Quantity	Relative frequency offset $f = 5, 10 \text{ MHz}$	
Uncertainty	1E-13 Hz/Hz	
Procedure	Phase measurement	
Parameters	Signal: Sine, Amp rms 0.5 V - 1 V on 50 ohm	
Extend of service	Calibration of frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 2'750.00

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## 4.2. Time interval counter (outside METAS)

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Quantity	Relative frequency offset $f < 1.3 \text{ GHz}$	
Uncertainty	4 E-11 Hz/Hz	
Procedure	Counter measurement	
Extend of service	Calibration of the frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 1'850.00

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Quantity	Relative frequency offset $f = 1, 5, 10 \text{ MHz}$	
Uncertainty	2E-12 Hz/Hz	
Procedure	Phase measurement	
Parameters	Signal: Sine, Amp rms: 0.5 V - 1 V on 50 ohm	
Extend of service	Calibration of the frequency offset of the internal time base of the DUT	
Price	fixed-price	CHF 2'250.00

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