



MCERTS 2007

A 'Plant Operator'
friendly QAL3 concept



ABB

Contents



EN14181 Summary

QAL 3 – Key Points

QAL 3 – without calibration gas bottles

QAL 3 – ‘according to the maintenance interval’

ABB’s QAL 3 Software Package



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ABB’s QAL 3 Software Package

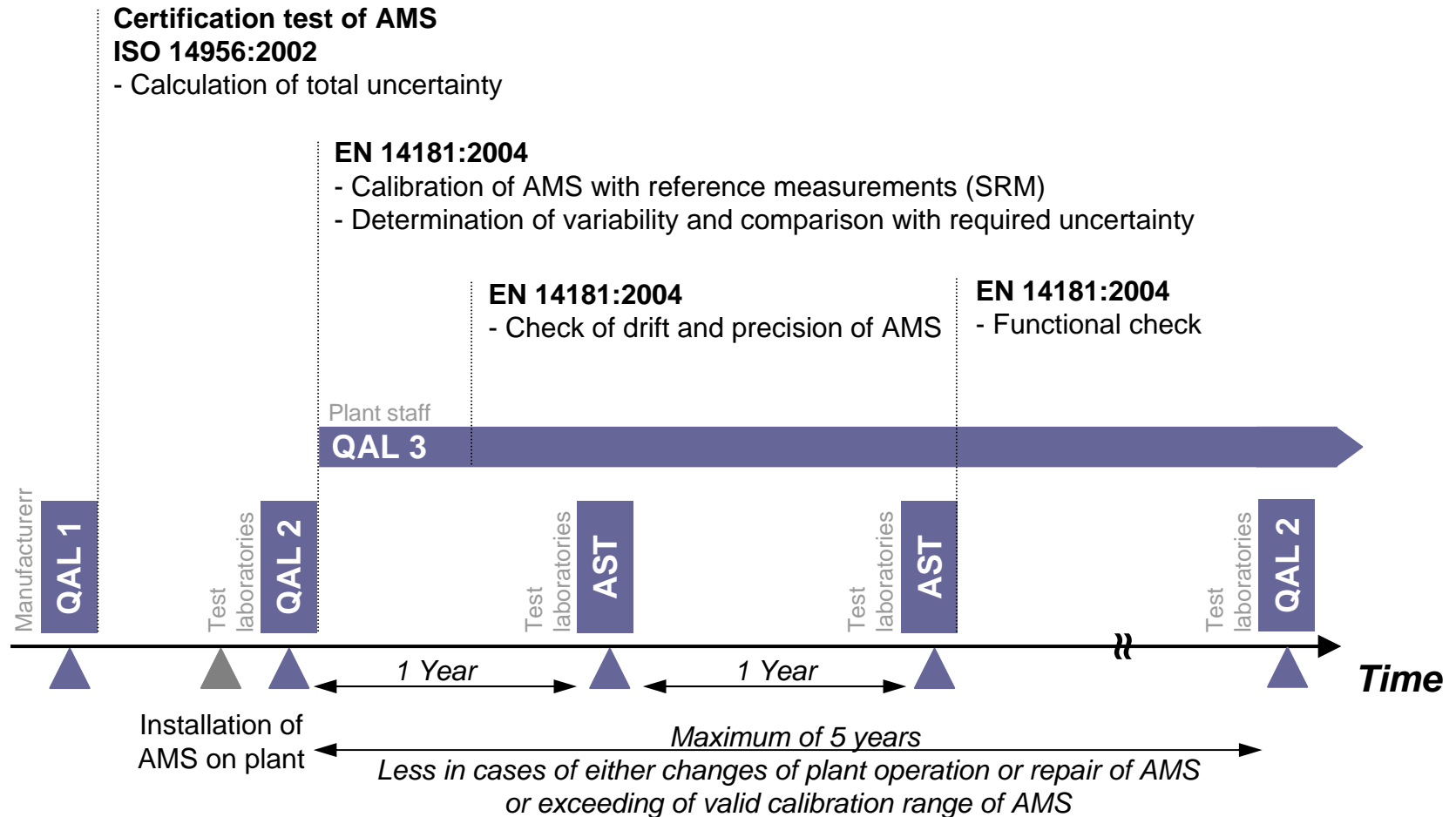


EN 14181 Quality Assurance of Automated Measuring Systems

Level	Application	Data
QAL1	<ul style="list-style-type: none">■ Suitability of equipment	<ul style="list-style-type: none">■ Performance evaluation, based on EN ISO 14956■ Uncertainty calculations
QAL2 Annual Surveillance Test AST	<ul style="list-style-type: none">■ Installation■ Calibration■ Functionality	<ul style="list-style-type: none">■ Reference tests■ Functionality checks■ Calibration function■ Variability test■ Uncertainty calculations
QAL3	<ul style="list-style-type: none">■ Precision■ Drift■ Performance	<ul style="list-style-type: none">■ Zero drift■ Span drift



QAL1...3 over time, with references



AST = Annual Surveillance Test
AMS = Automated Measuring System
SRM = Standard Reference Method



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QAL 3 – Key Points

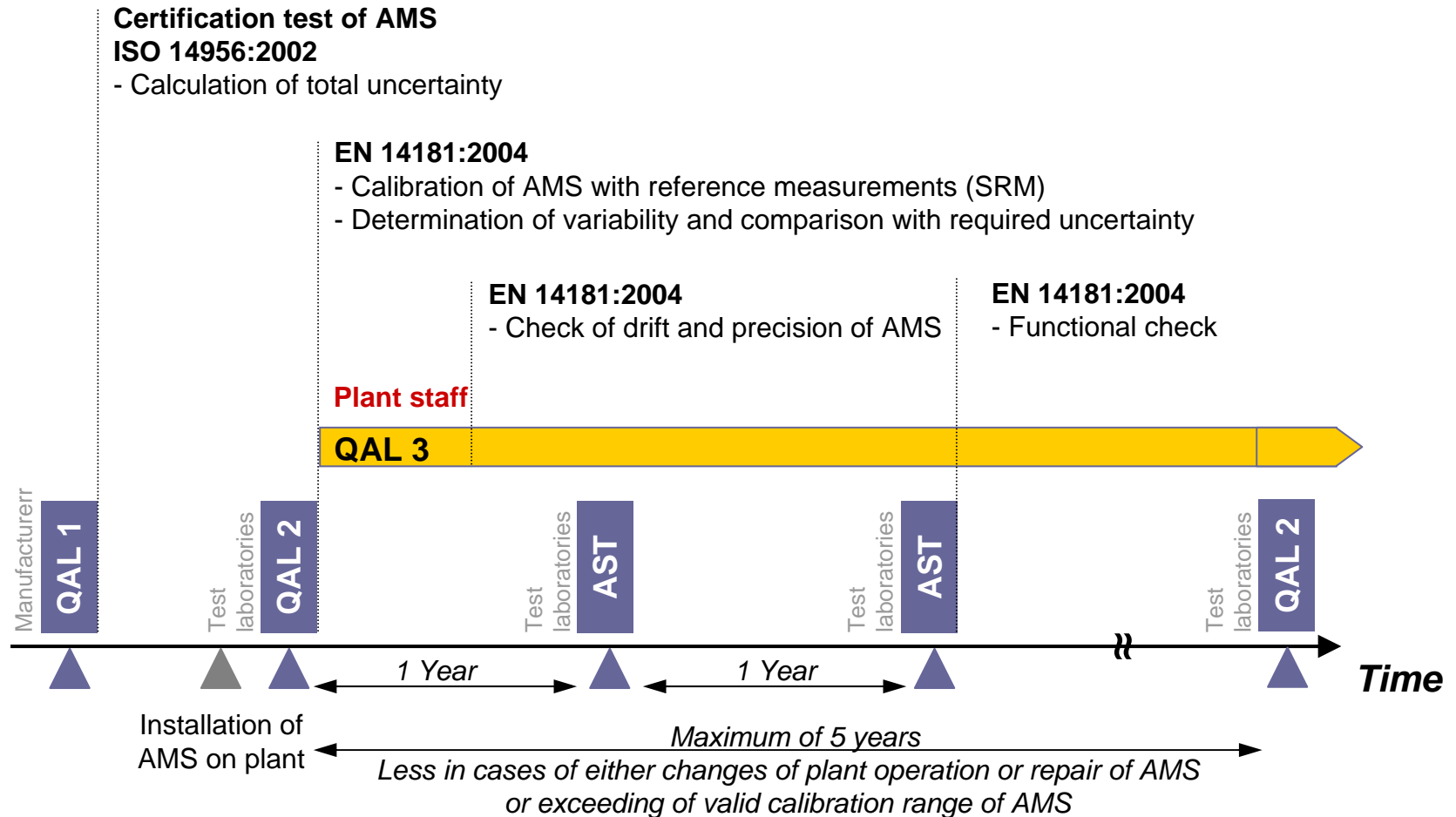
QAL 3 – without calibration gas bottles

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QAL1...3 over time, with references



AST = Annual Surveillance Test
AMS = Automated Measuring System
SRM = Standard Reference Method



QAL 3 - Plant Owners Responsibility

Plant owner must ensure that - until the next AST / QAL2, the AMS meets the measurement uncertainty requirement

- Tests are performed continuously, during ongoing operation
- **Scope**
 - Periodic zero and span checks
 - Measured values are incorporated in **CUSUM** or **SHEWHART** control charts
 - Control charts reveal if drift and precision are in control, i.e. within an admissible range derived from results of the “QAL1 report”



Comparison of CUSUM and Shewhart Control Charts

CUSUM ¹⁾ – Control Chart

- Determines **separately**
Drift and Precision
of the AMS
at the zero and
reference point
- Higher Flexibility

1) Cumulative sum chart

Shewhart ²⁾ – Control Chart

- Determines the **combined**
Drift and Precision
of the AMS
at the zero and
reference point
- Easier procedure

2) Named after Walter Shewhart



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QAL3 monitoring by ABB (CUSUM approach)

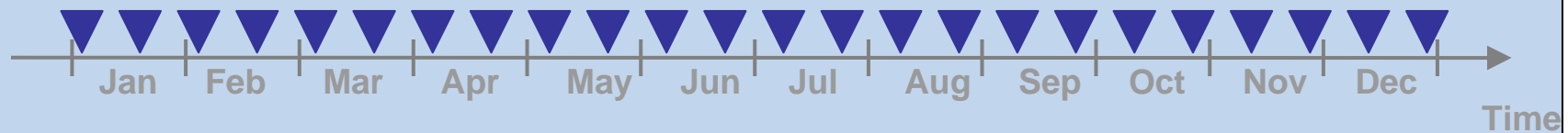
Every week (i.e. at least 52 times per year!) ...

1. ... **device adjustment** must take place ...

TARGET: No additional influence on availability as a result!!

Advance Optima and EasyLine

short adjustment times (e.g. < 10 min.) have no influence on availability,
=> small maintenance interval possible / advantageous

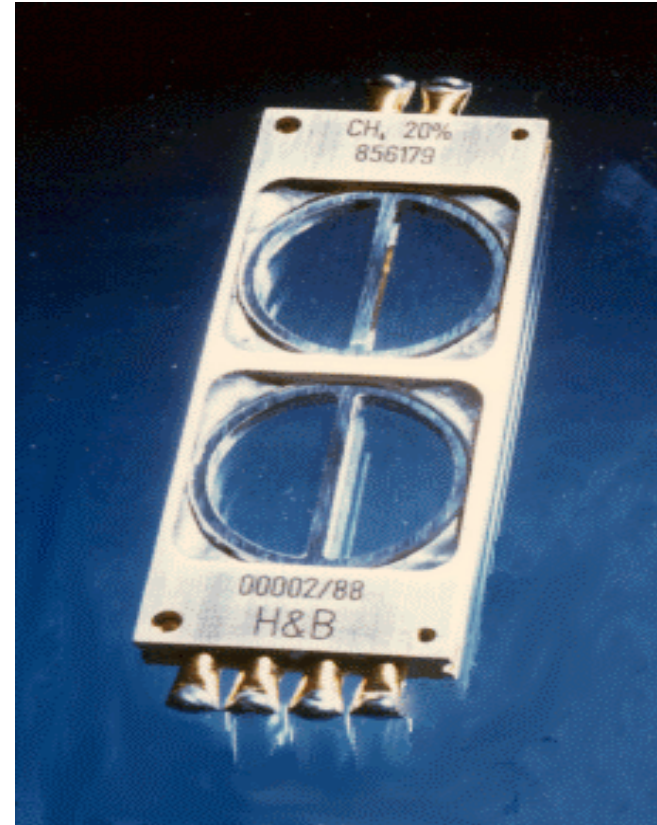


▼ = Adjustment and simultaneous QAL3 inspection

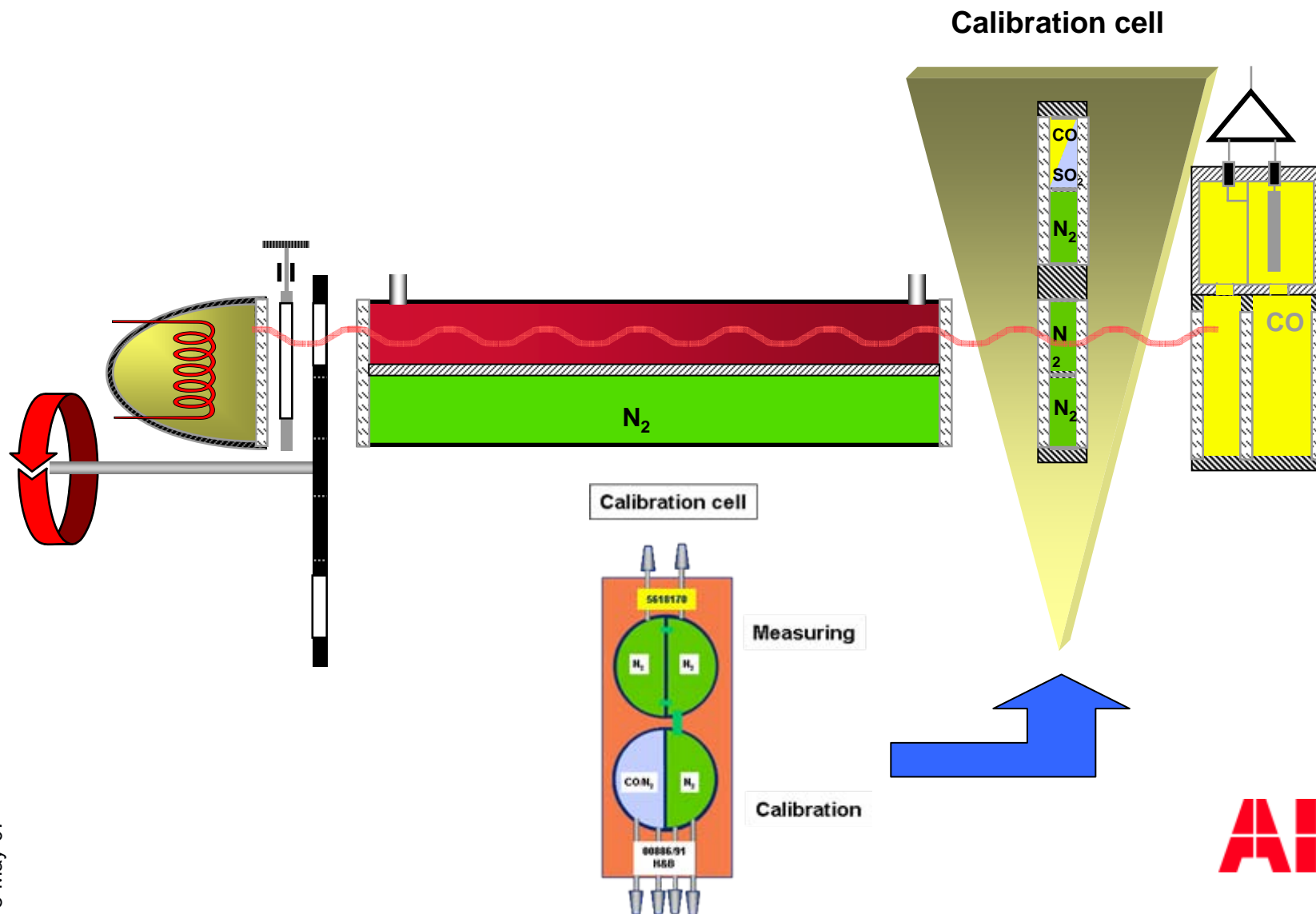


Validation/Calibration with Calibration Cells

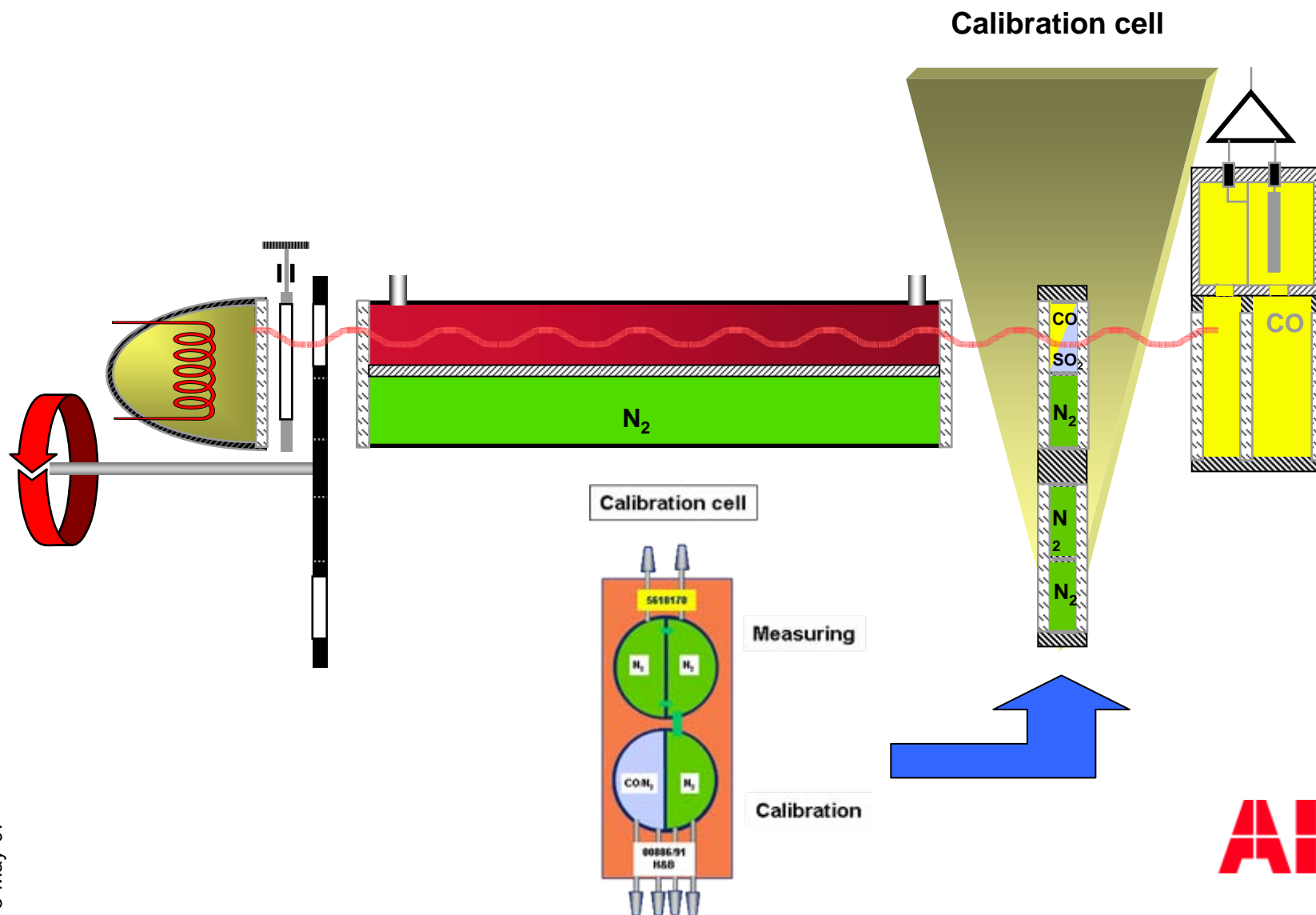
- Validation/Calibration with gas filled calibration cells
- Selective adjustment of the span point
- Zero point calibration with ambient air
- No need for expensive test gas bottles
- Reduced maintenance workload (no changing of gas bottles)
- Higher availability



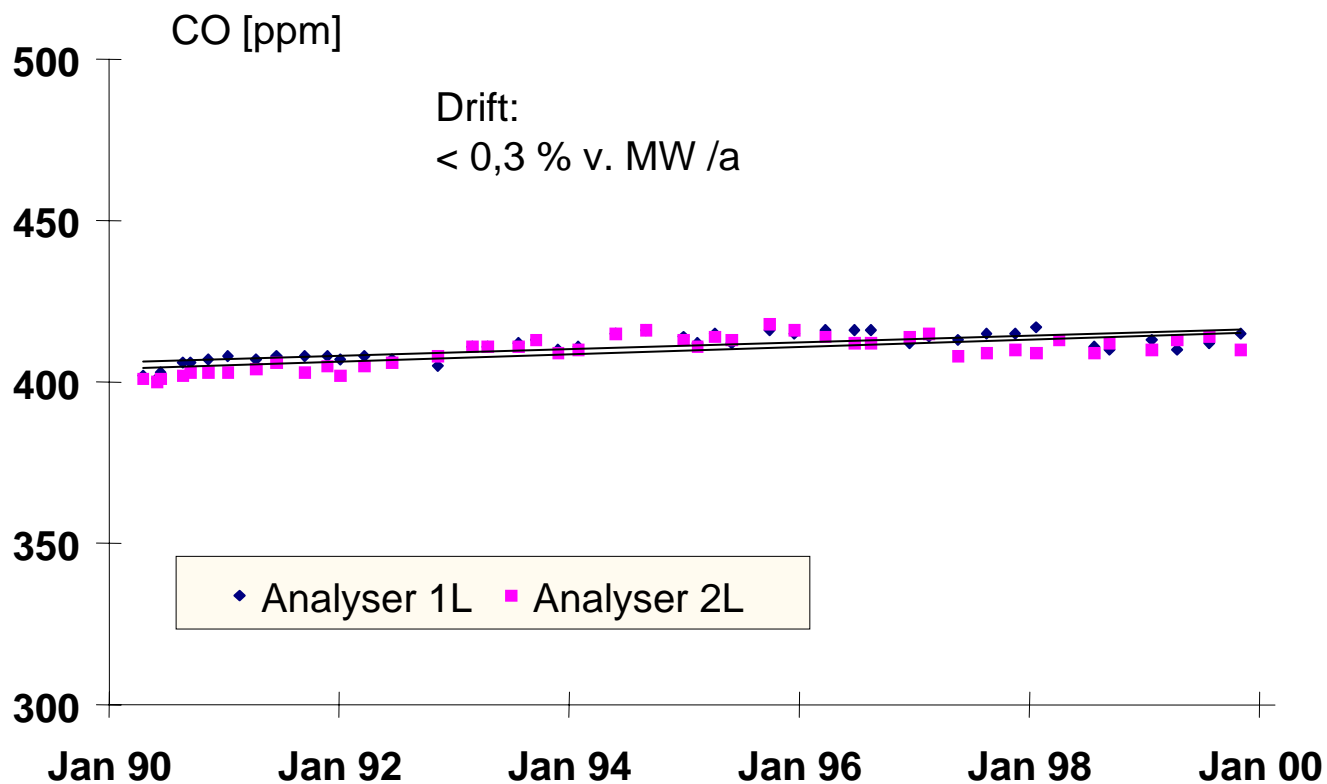
Validation/Calibration without test gas



Validation/Calibration without test gas



Longterm Stability of Calibration Cells



TÜV approved for QAL3 monitoring



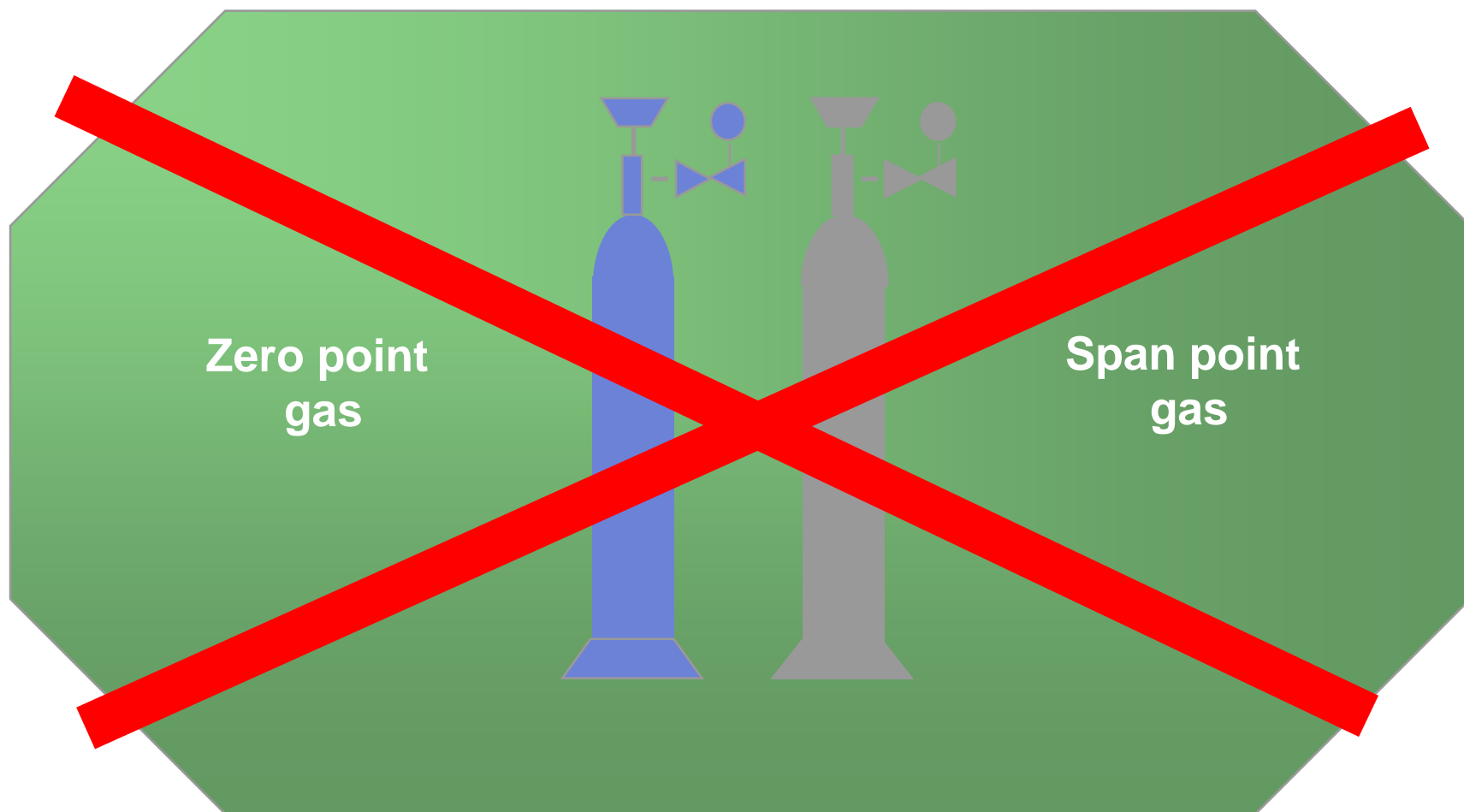
TUV SUD Industrie Service
Mehr Sicherheit.
Mehr Wert.

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No need for expensive test gases!



Contents



EN14181 Summary

QAL 3 – Key Points

QAL 3 – without calibration gas bottles

QAL 3 – ‘according to the maintenance interval’

ABB’s QAL 3 Software Package



QAL3 monitoring by ABB (Shewhart approach)

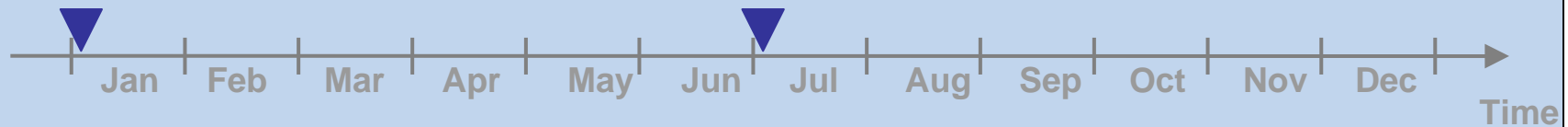
According to the maintenance interval ...

1. ... **device adjustment** must take place ...

TARGET: No additional influence on availability as a result!!

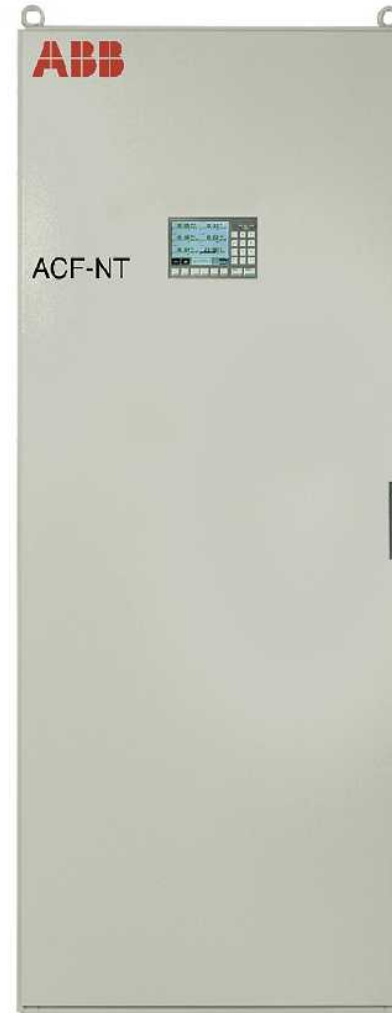
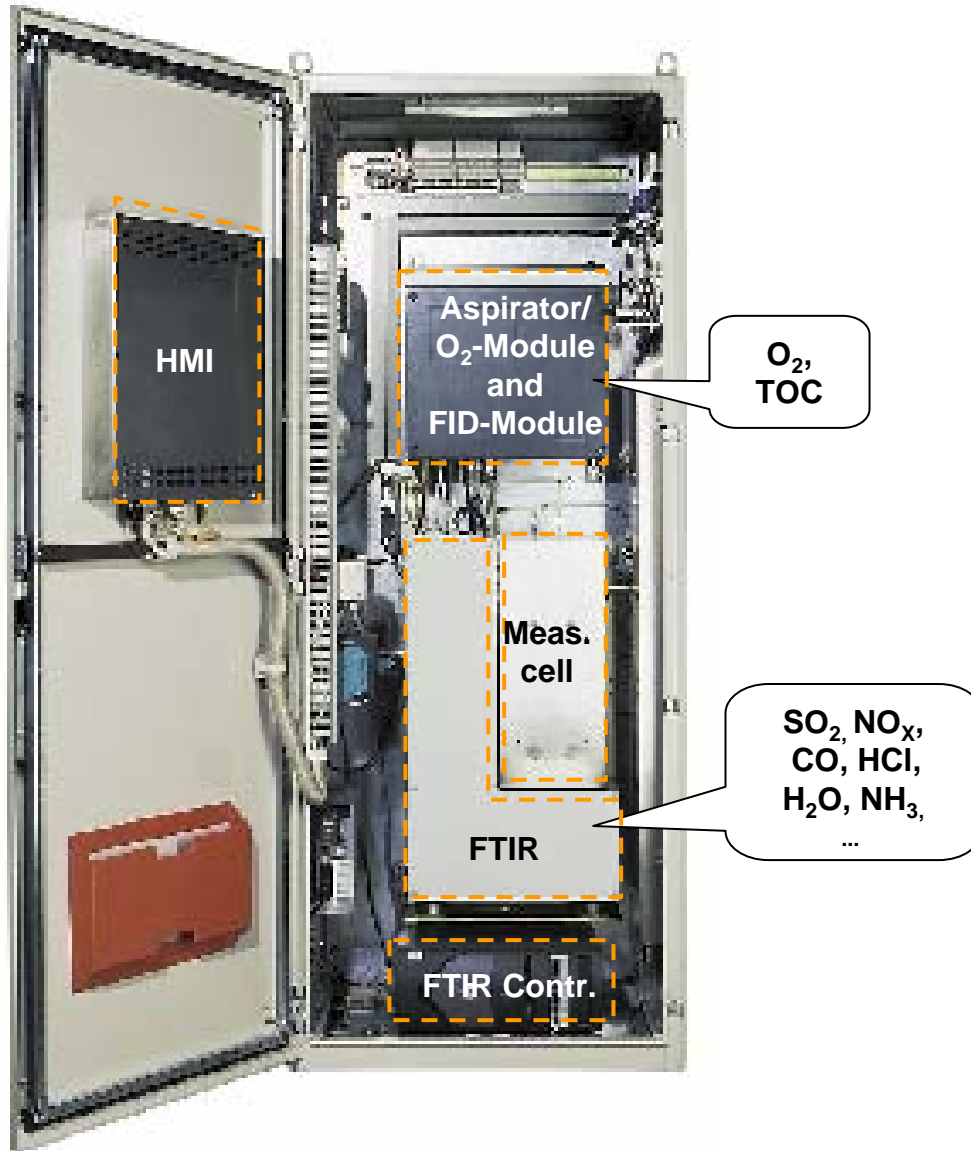
ACF-NT

long adjustment times (approx. 1 day) reduce availability
=> large maintenance intervals (6 months) essential

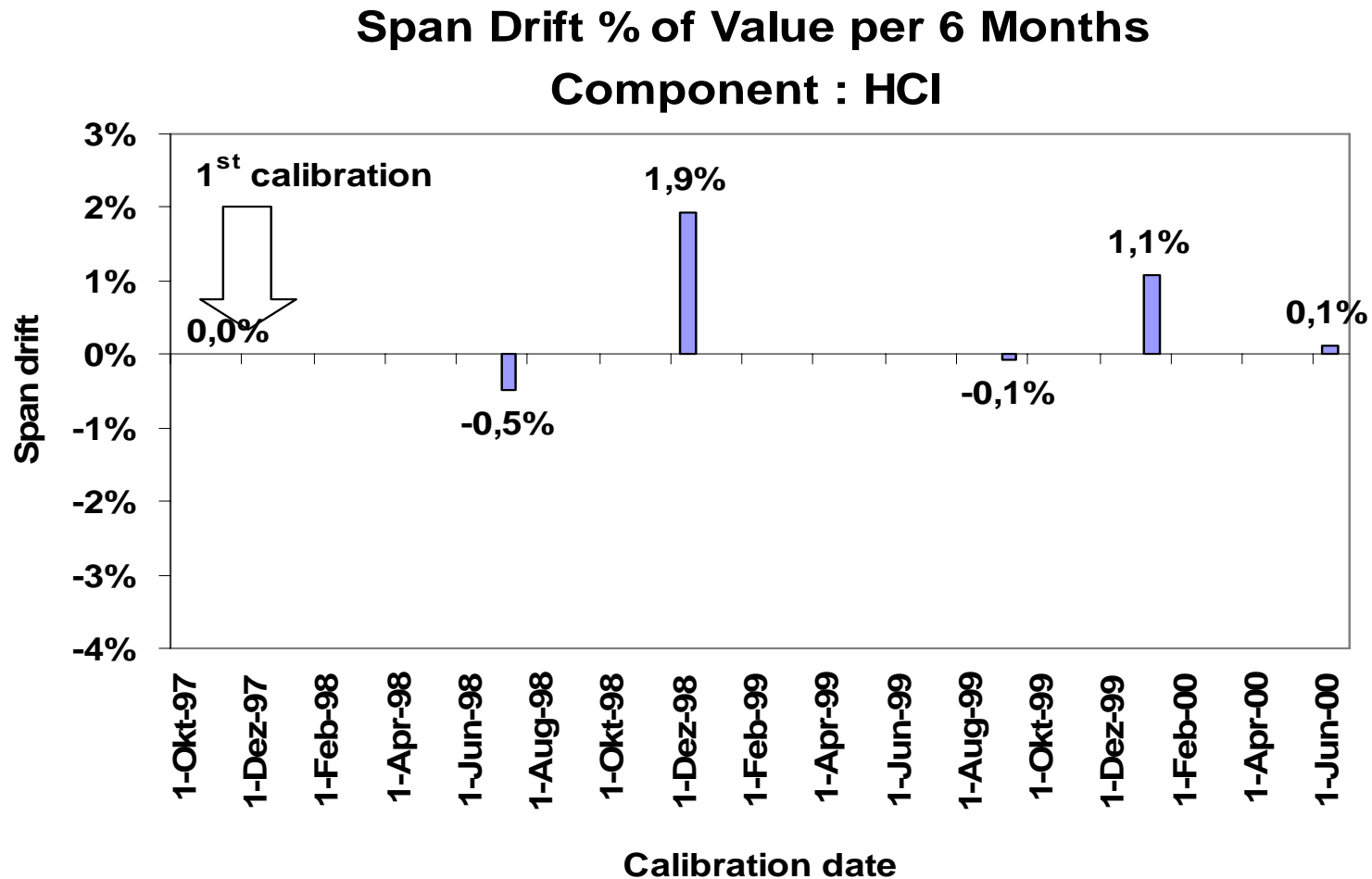


▼ = Adjustment and simultaneous QAL3 inspection

ACF-NT System



High Span Stability on HCl (Model ACF)



TÜV/MCerts approved



PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

Advance CEMAS FTIR – NT
Multigas Continuous Emission Monitor

manufactured by:

ABB Automation Products GmbH
Stierstadtstrasse 5
D-60488 Frankfurt-am-Main
Germany

has been assessed by Sira Certification Service
and for the conditions stated on this certificate complies with:

**MCERTS Performance Standards for Continuous Emission
Monitoring Systems Version 2, Revision 1, April 2003**

Certification Ranges :

SO ₂	-	0 to 75 mg/m ³
NO	-	0 to 200 mg/m ³
HCl	-	0 to 15 mg/m ³
H ₂ O	-	0 to 40 %Vol
CO	-	0 to 75 mg/m ³
O ₂	-	0 to 25%
NH ₃	-	0 to 15 mg/m ³

Laboratory tests have been carried out on this instrument for HF and the results have been included in the summary table on page 4. However it is not formally certified for HF as no field trials were carried out.

Certificate No: Sira MC030016/02
Initial Certification: 01 October 2003
This Certificate Issued: 20 July 2006
Renewal Date: 30 September 2008

Technical Director

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

12 Acorn Industrial Park, Crayford Road, Crayford
Dartford, Kent, UK, DA14 4AL
Tel: 01322 520500 Fax: 01322 520501

This certificate may only be reproduced in its entirety and without change

Page 1 of 6

... 6 month certified
maintenance
interval!



Contents



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ABB’s QAL 3 Software Package



ABB QAL3 Solution

Software Package QAL3

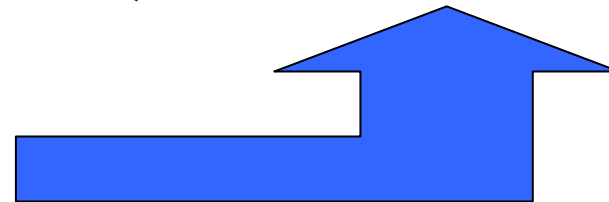
Quality control based on EN14181 – made easy



- Automated capture, checking and documentation of drift and precision at the zero and reference points
- Creation of Shewhart or CUSUM control charts
- Digital document archiving in database
- Applicable for all emission instruments regardless of manufacturer
- Supports Ethernet networks
- Fulfills the requirements of EN14181, QAL3

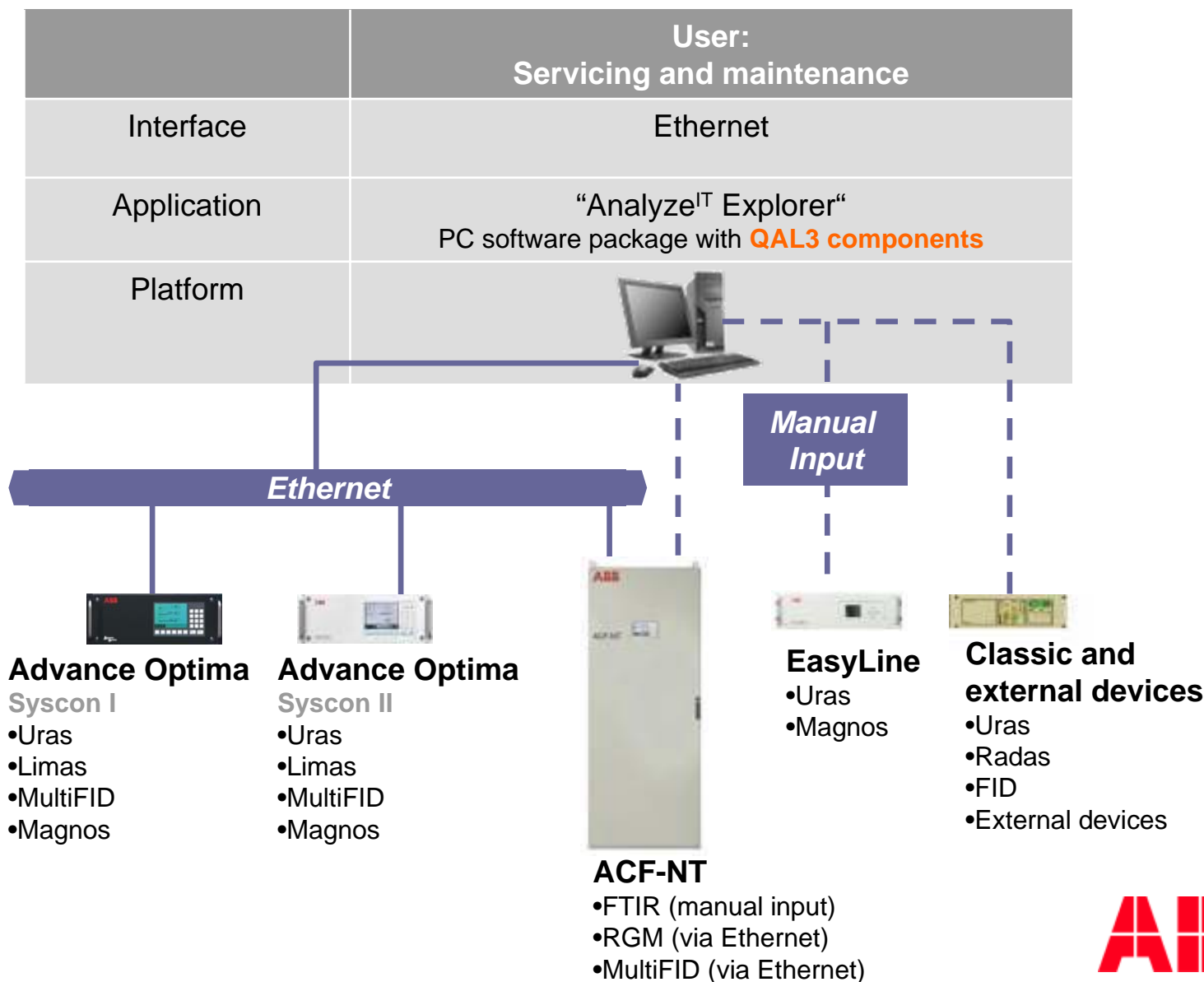
ABB

- Automated capture, checking and documentation of drift and precision at the zero and reference points
- Creation of Shewhart or CUSUM control charts
- Digital document archiving in database
- Applicable for all emission instruments regardless of manufacturer
- Supports ethernet networks
- Fulfills the requirements of EN14181, QAL3



ABB

QAL3 solution



QAL3 Design

ABB devices with Ethernet connection

■ The analyzer ...

... is adjusted at regular intervals (manually or automatically) in order to ensure that the control range is not exceeded (requirement concerning the definition of the maintenance interval). *In the process, the absolute drifts (cumulated drift values since basic adjustment) are ascertained in the device.*

■ The Analyze^{IT} Explorer software package ...

1. ... automatically records all absolute drifts with the date and time from the connected device so that all adjustments are documented
2. Then the QAL3 inspection takes place, ...
 1. ... the relative drifts (d_t) between two adjustments are recalculated via the collective absolute drifts.
 2. ... the control charts algorithm (CUSUM or Shewhart) is calculated with d_t and the device-specific S_{AMS} . In the event of an infringement of the control range, a warning signal is emitted.
 3. ... all relevant parameters are stored and can be printed out



QAL3 Design

ABB devices without Ethernet connection and external devices

- The **analyzer** ...

... is adjusted at regular intervals (manually or automatically) in order to ensure that the control range is not exceeded (requirement concerning the definition of the servicing interval).

- With the **Analyze^{IT} Explorer** software package...

... QAL3 inspection is performed manually. To this end, all data relevant to QAL3 can be entered (S_{AMS} , $C_{Reference}$, C_{Actual} , etc.)

1. the control charts algorithm (CUSUM or Shewart) is calculated using the values entered. In the event of an infringement of the control range, a warning signal is emitted.
2. all relevant parameters are stored and can be printed out



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Any Questions?





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Stands 44 & 45!!**