airpointer®
Calibration and Internal Span modules

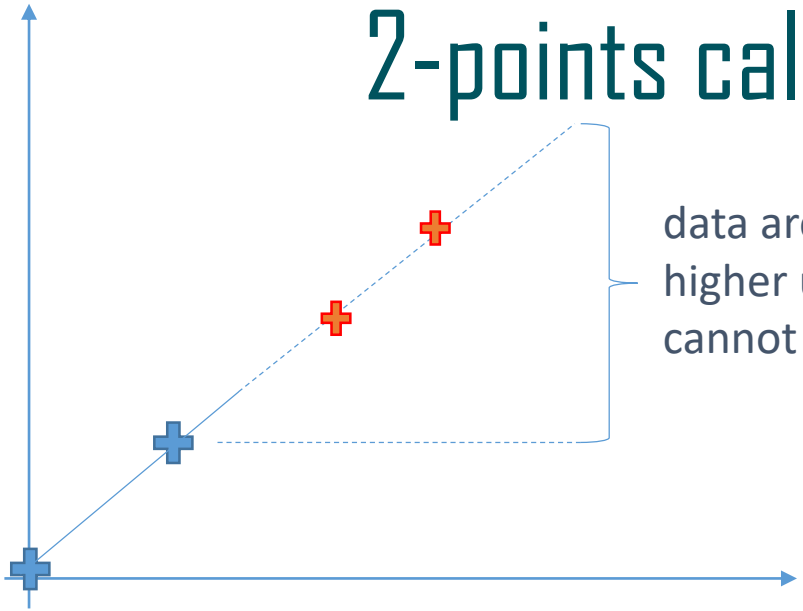
Calibration

O_3 using an external ozon generator
(O_3 generated by oxidation of O_2 by UV light)

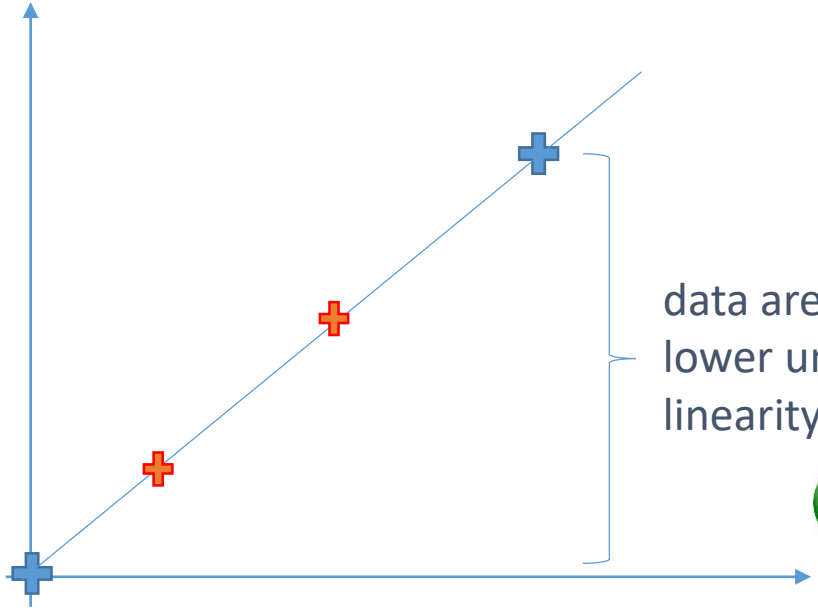
SO_2, CO, and NO using external cylinders

NO_2 using Gas Phase Titration (GPT)
(NO_2 generated using NO from a cylinder and O_3 from a generator)

2-points calibration



data are extrapolated:
higher uncertainty, linearity cannot be checked



data are interpolated:
lower uncertainty, possible to check linearity with intermediate points

2-points calibration: zero and span

Zero = lower point = 0% Full Scale (FS)
Span = upper point = 80% FS

Span (NO, NO_2, NO_x) = 400 ppb
Span (O_3) = 400 ppb
Span (NO_2) = 400 ppb
Span (CO) = 10 ppm
Span (B, T, E, X) = 15 ppb

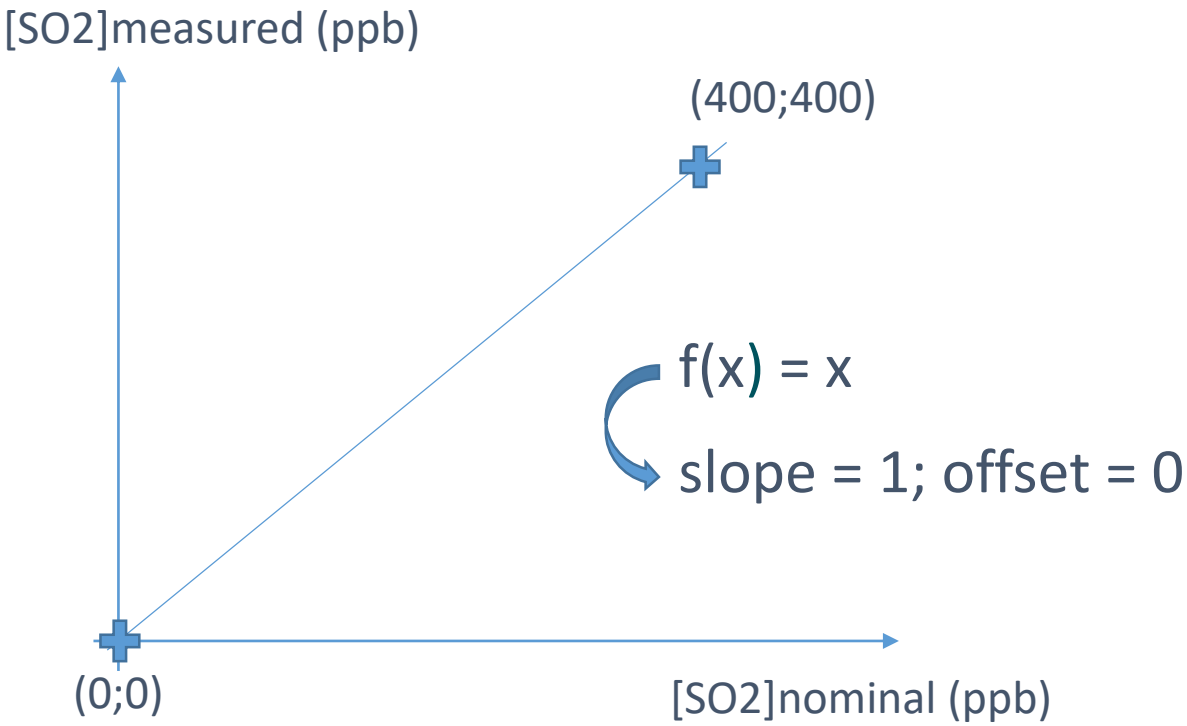
2-points calibration: zero and span

$$f(x) = a*x + b$$

slope

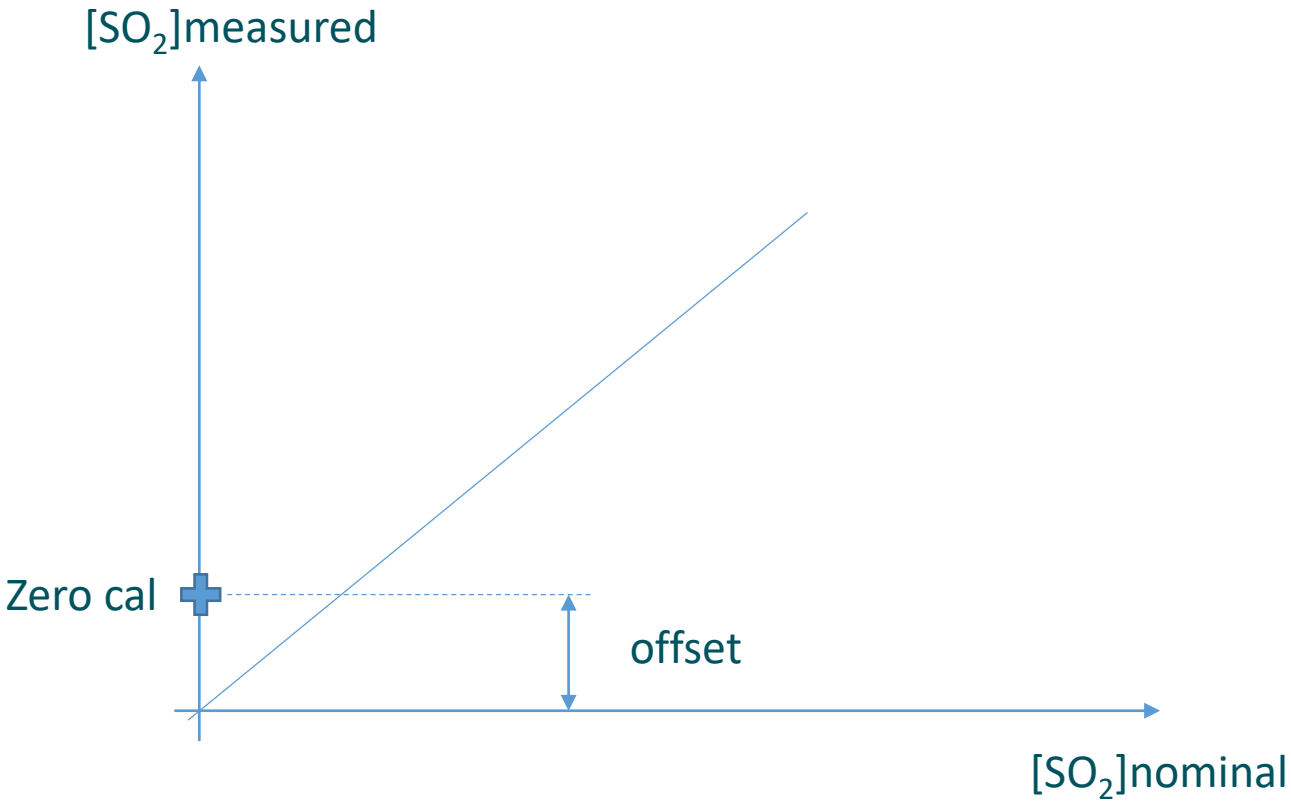
intercept
(or offset)

In a perfect world:



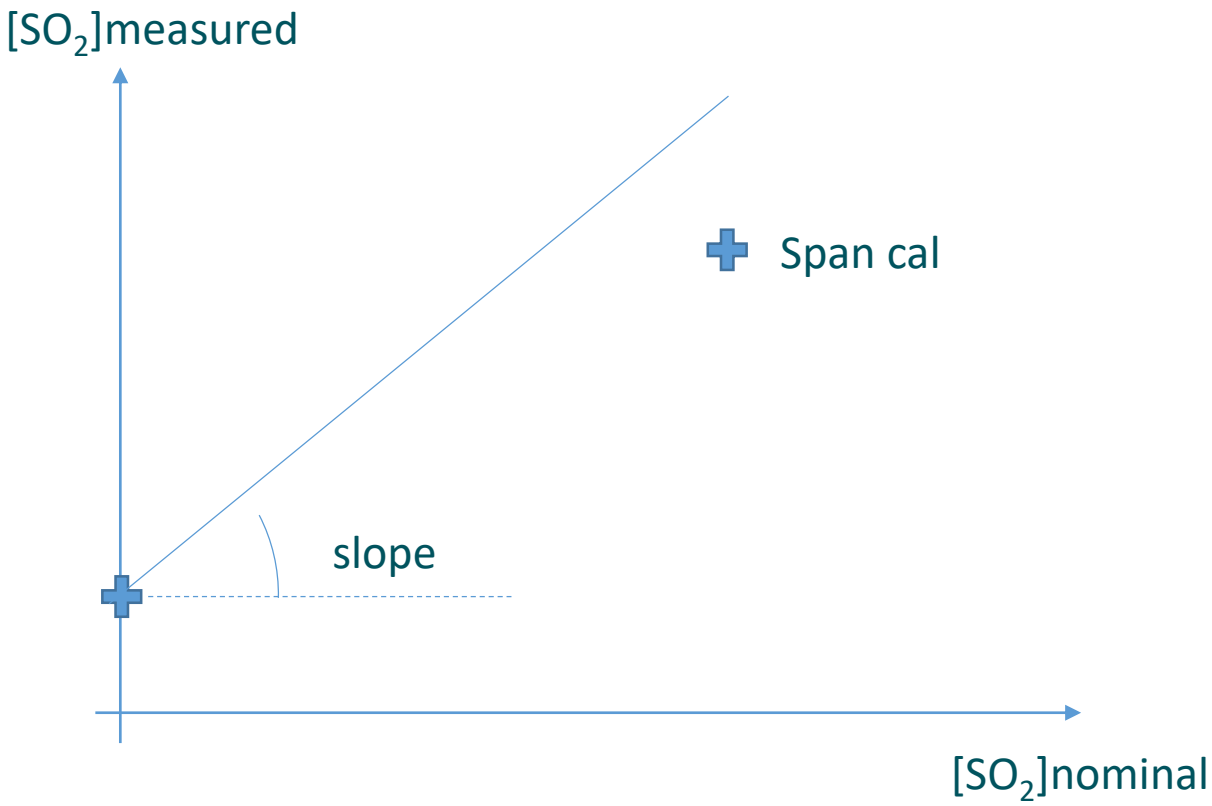
2-points calibration: zero and span

In reality:



2-points calibration: zero and span

In reality:



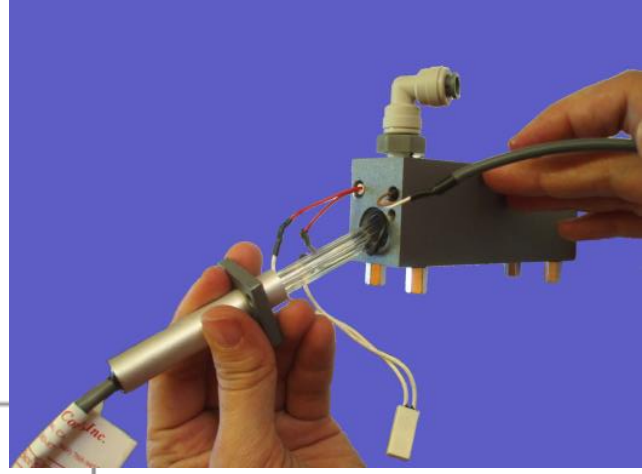
Span Check

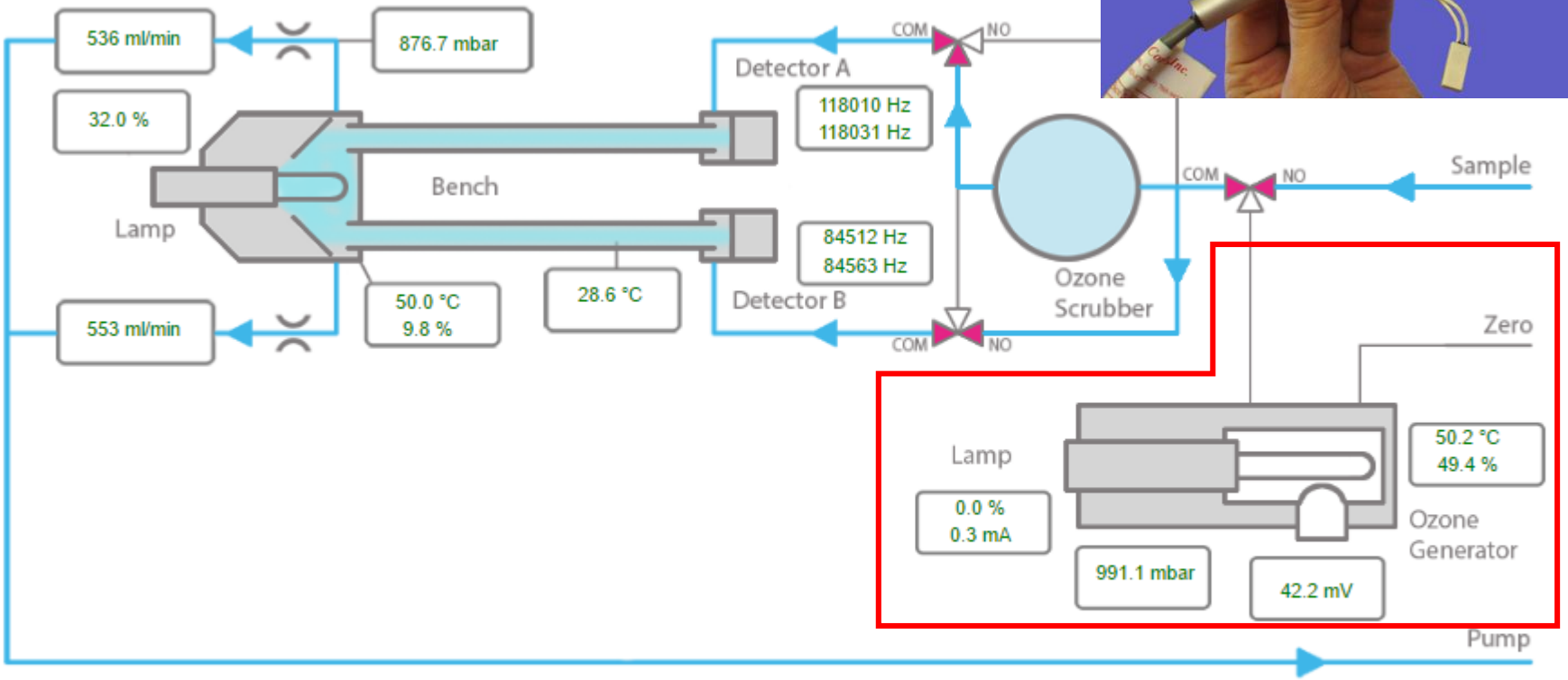
O_3 using an external ozon generator
(O_3 generated by oxidation of O_2 by UV light)

CO using an internal cylinder

SO_2 and NO_2 using permeation tubes
Permeation rate: ng/min @50°C
→ Concentration STRONGLY dependant on flows and T°

Span check O_3

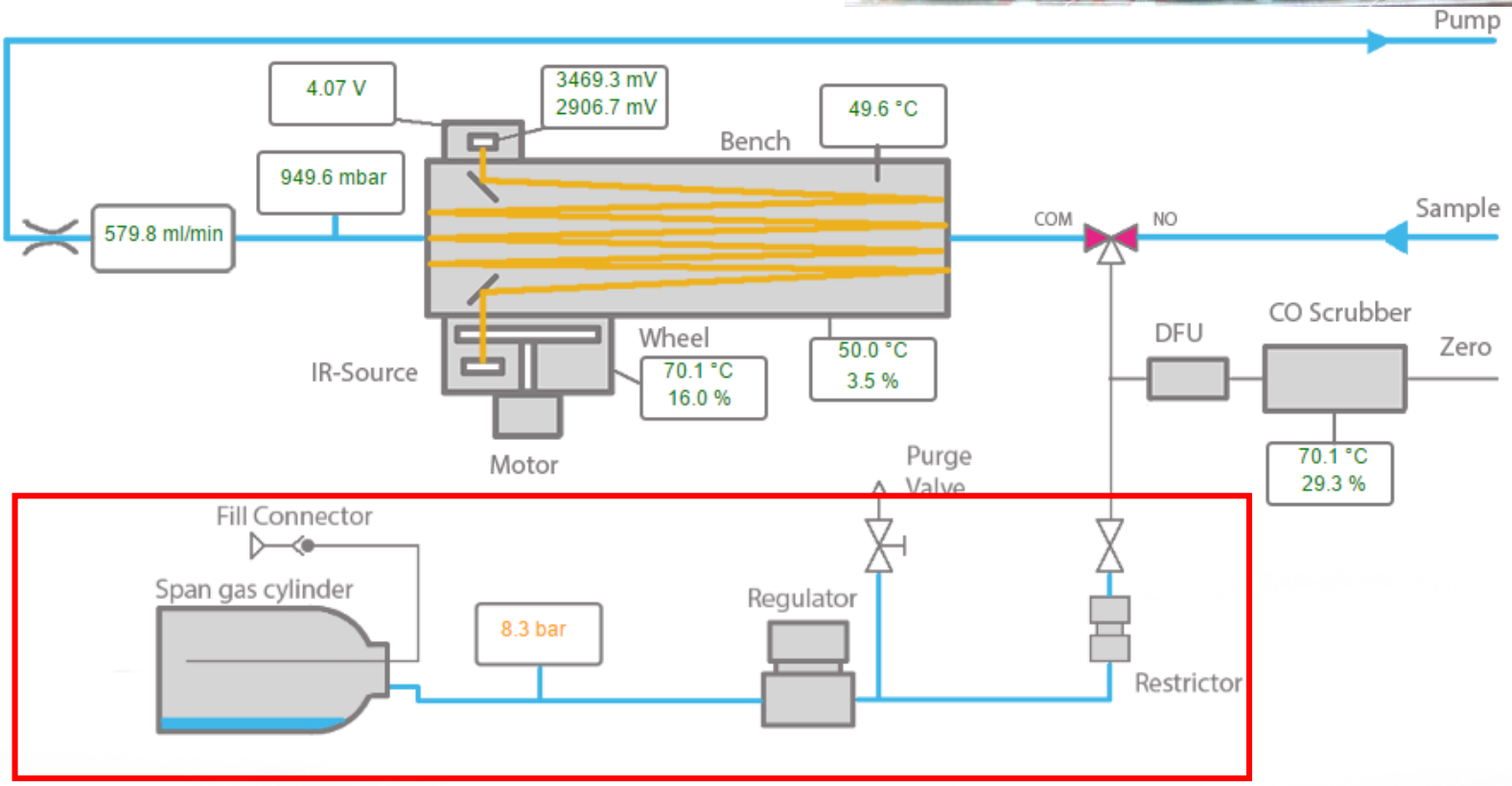




O3 49.9 ppb

Note: '-9999' is displayed for a missing value.

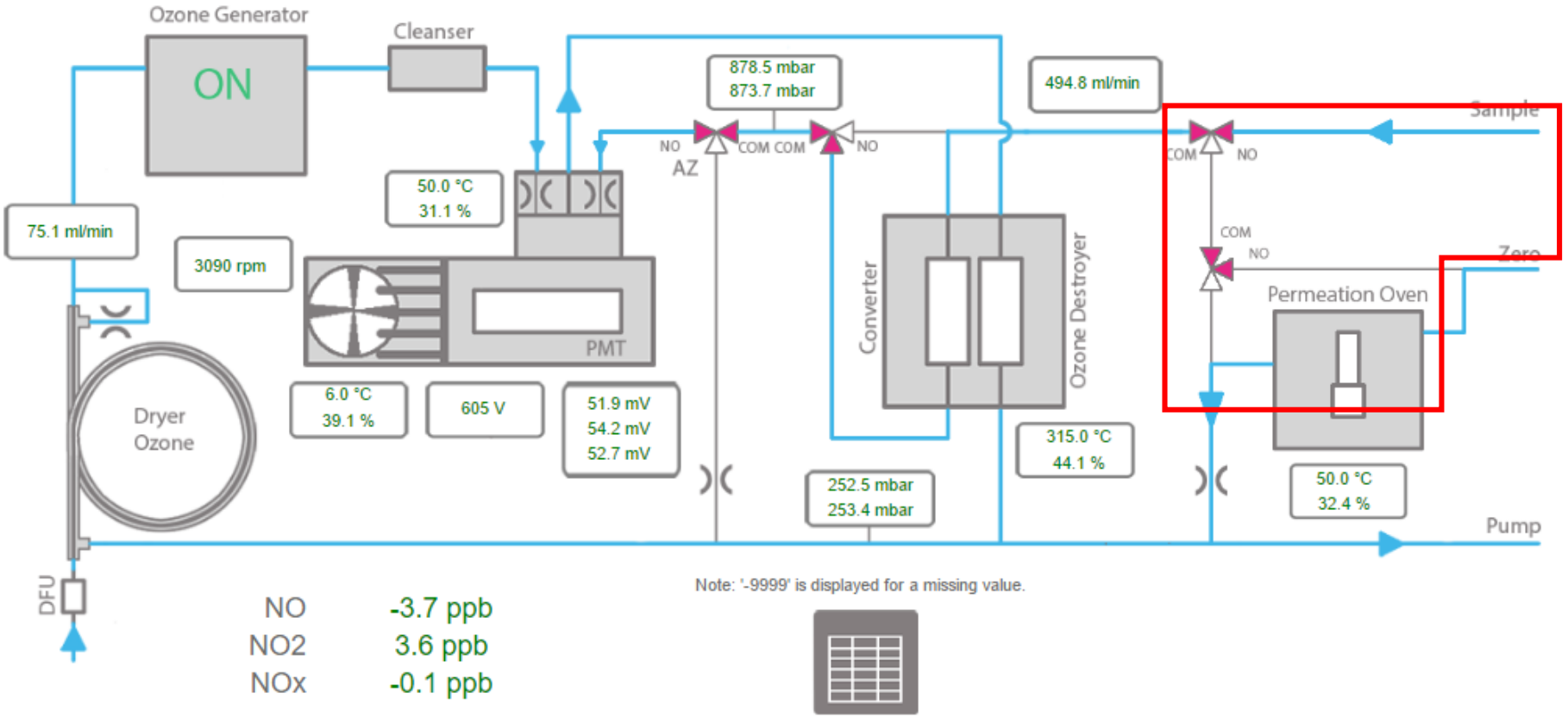
Span check CO



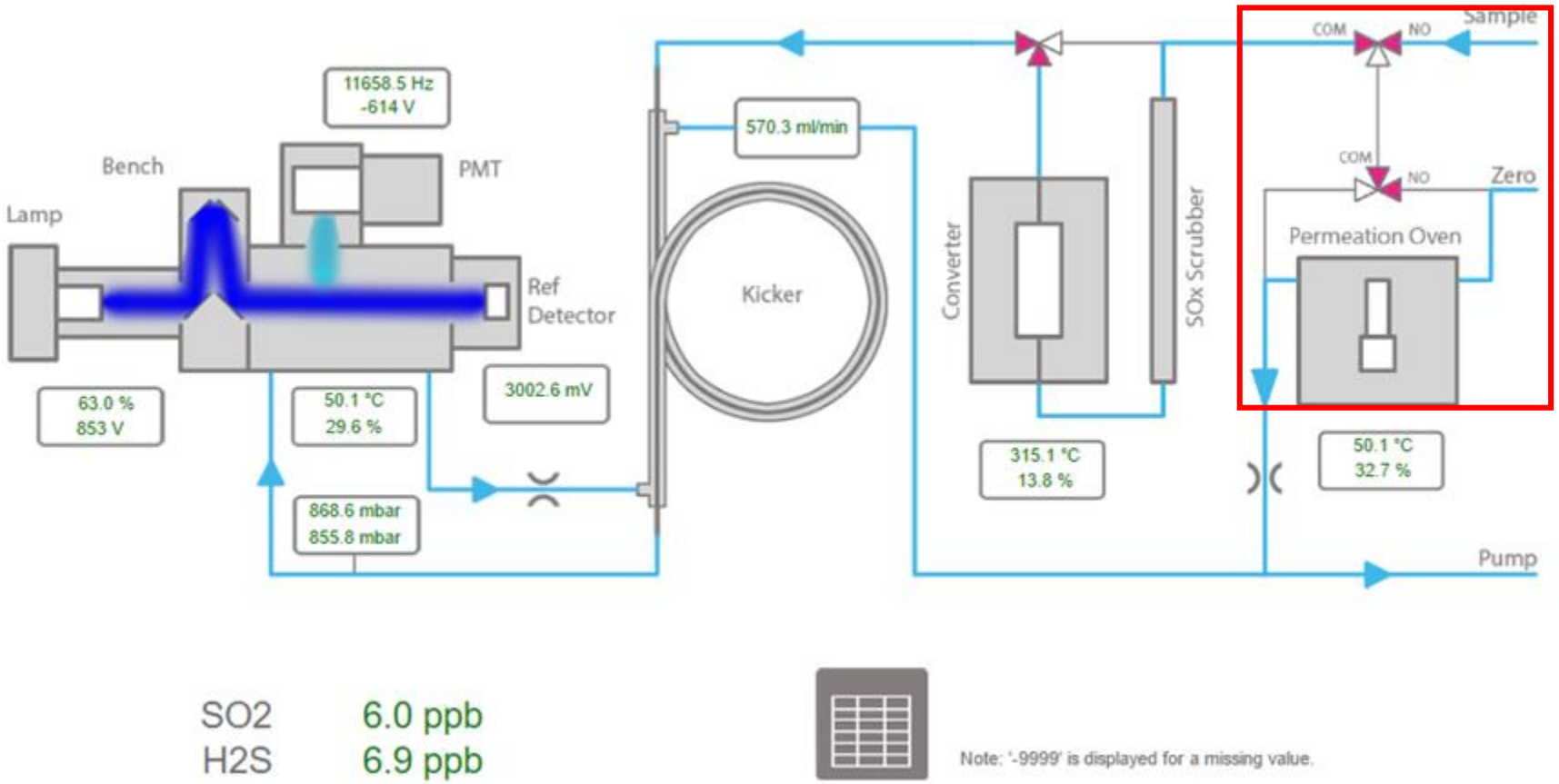
CO 1.306 ppm

Note: '-9999' is displayed for a missing value.

Span check NOx



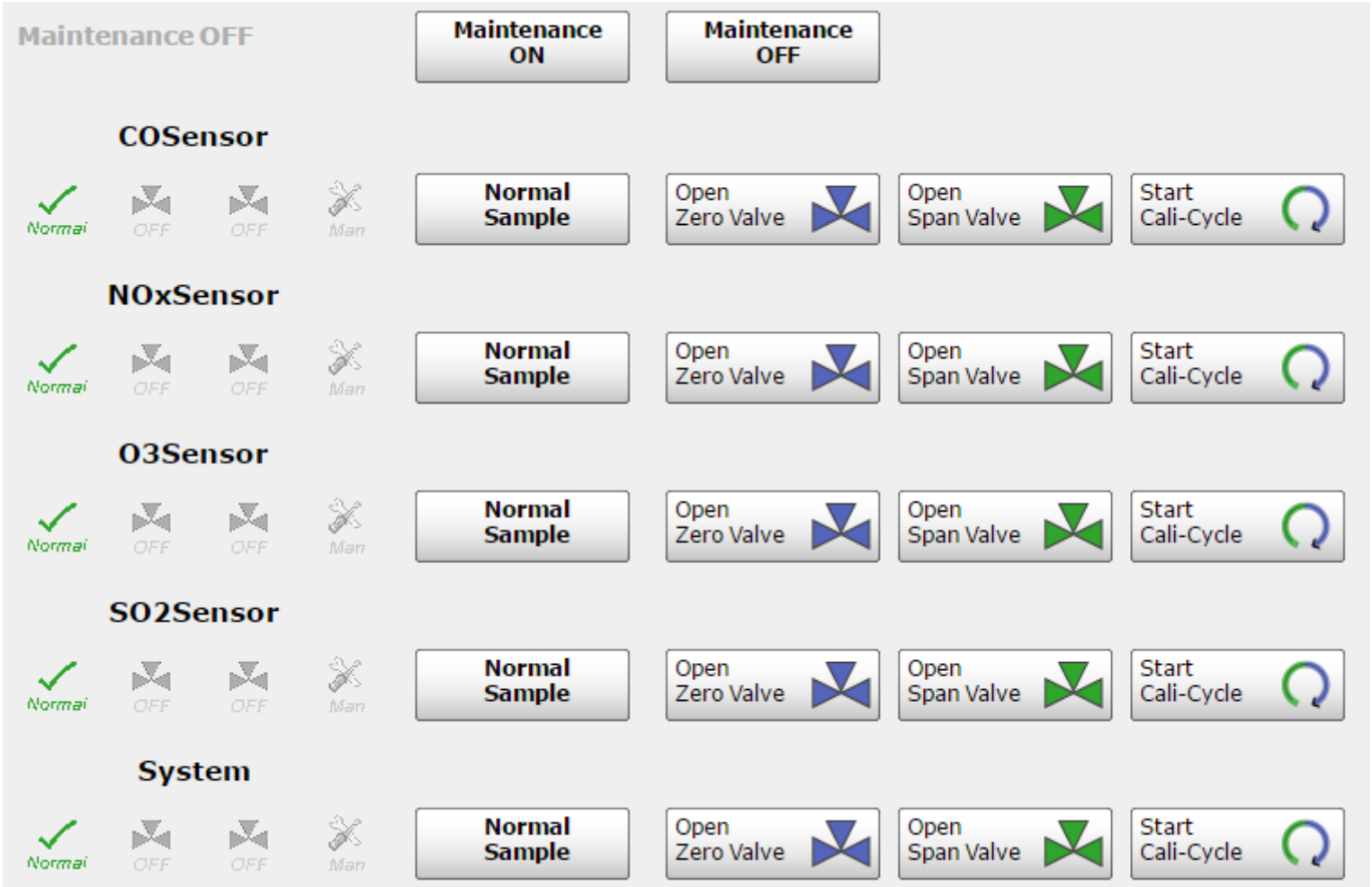
Span check SO_2



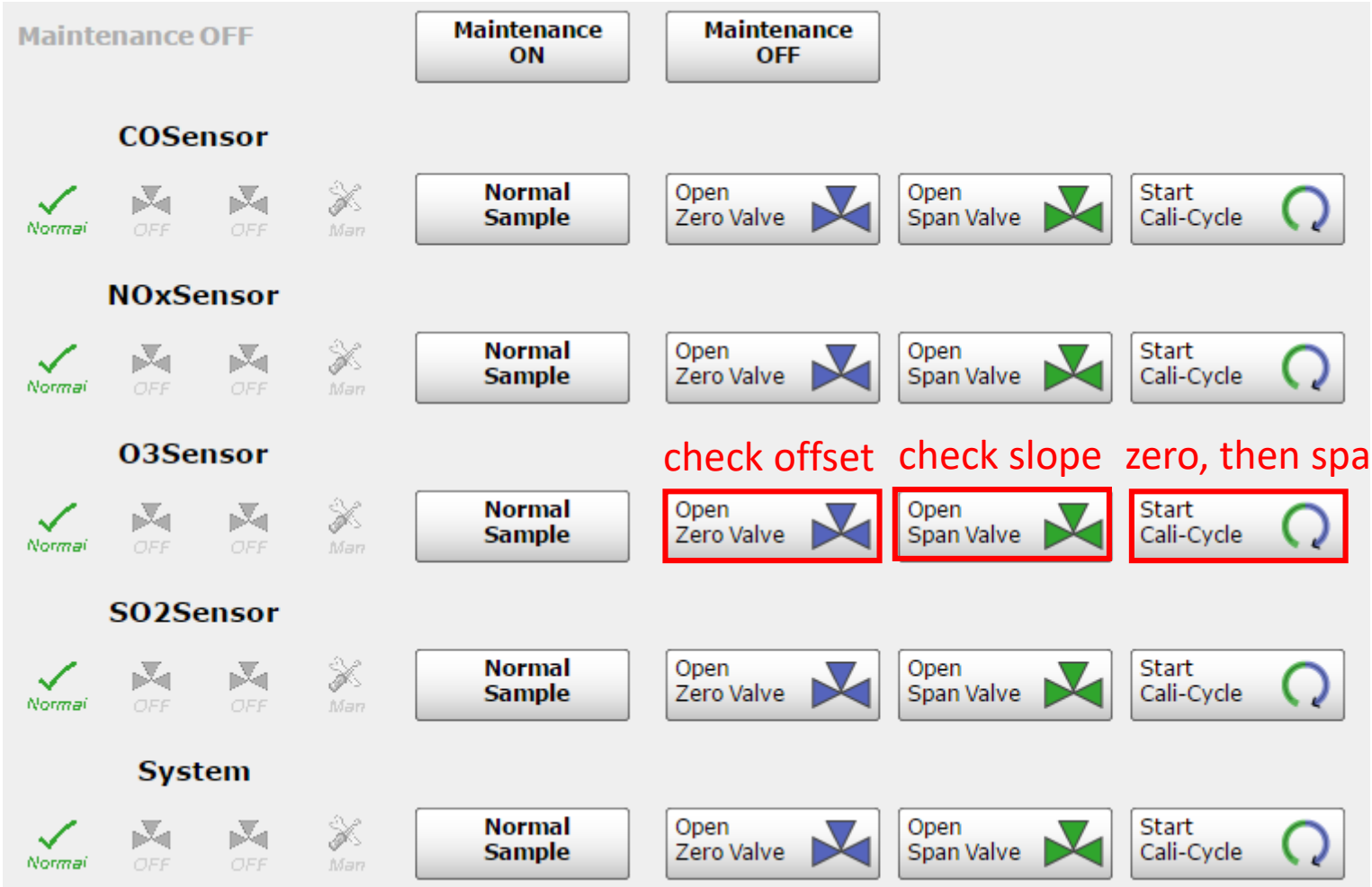
SO2	6.0 ppb
H2S	6.9 ppb

Note: '-9999' is displayed for a missing value.

Manual span check



Manual span check



Automatic span check

In setup/configuration/O3 sensor:

Calibration Factors		
O3Offset [ppb] Calibration factor offset	-0.446171	[-20 ≤ value ≤ 20]
O3Slope Calibration factor slope	1.143170	[0.5 ≤ value ≤ 3]
Save ...		Save ...
Calibration Setup		
O3Sensor_ISM [on/off] Internal span module built in	On / Off	
O3_autocorrect4span [on/off] correct following measuring results according to the last span	On / Off	
O3_autocorrect4zero [on/off] correct following measuring results according to the last zero	On / Off	
O3_wrong_cal_to_status [on/off] status fail on calibration values enabled	On / Off	
Save ...		Save ...
Calibration Timing		
CaliIntervalO3 [hours] 0 disables automatic calibration check	0	[0 ≤ value ≤ 744]
CaliNextAutoStartO3 [datetime] next calibration cycle starts at:	2015 - Feb - 3 08 : 30	= 2015-02-03 08:30:00
ZeroDurationO3 [sec] duration of active zero valve	720	[1 ≤ value ≤ 3600]
ZeroPurgeInO3 [sec] purge in time with zero air, data are not sampled	600	[1 ≤ value ≤ 3600]
SpanDurationO3 [sec] duration time of active span valve	720	[0 ≤ value ≤ 3600]
SpanPurgeInO3 [sec] purge in time with span gas, data are not sampled	600	[1 ≤ value ≤ 3600]
DurationPurgeOutO3 [sec] purge in time with sample, data are not sampled to averages	180	[1 ≤ value ≤ 3600]

Automatic span check

Calibration Factors		
O3Offset [ppb] Calibration factor offset	-0.446171	[-20 ≤ value ≤ 20]
O3Slope Calibration factor slope	1.143170	[0.5 ≤ value ≤ 3]
Save ...		Save ...
Calibration Setup		
O3Sensor_ISM [on/off] Internal span module built in	On Off	
O3_autocorrect4span [on/off] correct following measuring results according to the last span	On Off	
O3_autocorrect4zero [on/off] correct following measuring results according to the last zero	On Off	
O3_wrong_cal_to_status [on/off] status fail on calibration values enabled	On Off	
Save ...		Save ...
Calibration Timing	720-600 = 120“ averaged value	
CaliIntervalO3 [hours] 0 disables automatic calibration check	0	[0 ≤ value ≤ 744]
CaliNextAutoStartO3 [datetime] next calibration cycle starts at:	2015 - Feb - 3 08 : 30 = 2015-02-03 08:30:00	
ZeroDurationO3 [sec] duration of active zero valve	720	[1 ≤ value ≤ 3600]
ZeroPurgeInO3 [sec] purge in time with zero air, data are not sampled	600	[1 ≤ value ≤ 3600]
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SpanPurgeInO3 [sec] purge in time with span gas, data are not sampled	600	[1 ≤ value ≤ 3600]
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Automatic span check

Calibration Factors		
O3Offset [ppb] Calibration factor offset	-0.446171	[-20 ≤ value ≤ 20]
O3Slope Calibration factor slope	1.143170	[0.5 ≤ value ≤ 3]
Save ...		Save ...
Calibration Setup		
O3Sensor_ISM [on/off] Internal span module built in	On Off	
O3_autocorrect4span [on/off] correct following measuring results according to the last span	On Off	
O3_autocorrect4zero [on/off] correct following measuring results according to the last zero	On Off	
O3_wrong_cal_to_status [on/off] status fail on calibration values enabled	On Off	
Save ...		Save ...
Calibration Timing	720 + 720 + 180 = 1620“ = 27´ total cycle time	
CaliIntervalO3 [hours] 0 disables automatic calibration check	0	[0 ≤ value ≤ 744]
CaliNextAutoStartO3 [datetime] next calibration cycle starts at:	2015 - Feb - 3 08 : 30 = 2015-02-03 08:30:00	
ZeroDurationO3 [sec] duration of active zero valve	720	[1 ≤ value ≤ 3600]
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Maintenance

O_3 generator lamp lifetime: ~3-4 years

2L internal CO cylinder refill: ~every 6 weeks

Lifetime of a permeation tube: ~ 2 years

Thank you for your attention!