

Ox-Tox Check (%ZNS, %CNS)

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Diving
Tower Esslingen /
DE @
www.tauchturm.com
Sunday, 03.09.2017
Dive
Computer
Test @
pure oxygen

START →



Ox-Tox Check (%ZNS, %CNS)

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Air Pressure, Air Temperature,
Water Temperature: ca. 26 ° C



Ox-Tox Check (%ZNS, %CNS)



from left to right, *top row*:
Galileo 2 / G2, RATIO iX3M Deep, Cochran EMC-20H, NHeO3
Scubapro/UWATEC: TEC 2G, Aladin Sport Matrix

2nd row: Matrix (*4) as a depth reference

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After
ca.
104 min,
the END:

TEC 2G
(left)
&
MATRIX
(right)



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after ca. 104 min, the END:
iX3M Deep →



← Galileo 2 / G2

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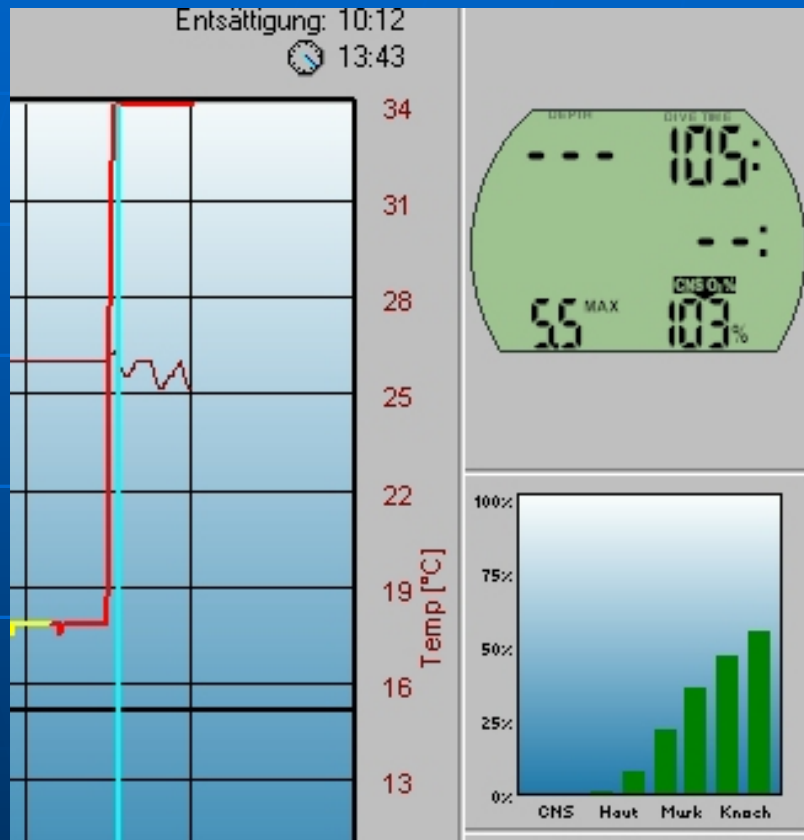
fO₂: 0,99 - 1.00, dive time: 105 min, Air Pressure:
ca. 978 +/- 2 mBar; geometrical depth: 5,4 (5,1 – 5,5);
Temp.: ca. 26 ° C (24 – 27) @ fresh water; results:

Dive Computer	measured Depth [m]	%CNS (%ZNS)	OTU	NOAA Limits [100%]
EMC-20 H	5,1	92 (+) 	21 % (ca. 179)	100 % = 850 OTU
iX3M Deep [#]	5,2	80 (+) 	187	135 min @ PO ₂ 1.45 <u>atm</u> 105 / 135 = 0,78
TEC 2 G	5,4	103 	n. a.	
Galileo 2/ G2	5,5	108 	199	
Matrix	5,5	103 	n. a.	
NHeO	5,3	--	--	
DIVE 3_01	5,5 (*, **)	88 (+) 	190	120 min @ PO ₂ 1.50 <u>atm</u> 105 / 120 = 0,875
(*) compensated for Water Temperature & Air Pressure	(**) pls. cf. chart with „Statistics“	(+) EAN 99; i.e.: fO ₂ = 0.99	[#] with APOS <u>4.0.26/013 from August 2017</u>	

Log Book:

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Aladin TEC 2 G with Scubapro SmartTRAK 2.0801:



Galileo 2 / G2 →

Statistics:

Frequency Analysis of Depth Readings [m] (#):

5,1 (1 *) 5,2 (1 *) 5,3 (2 *) 5,4 (1 *) 5,5 (5 *)

un-biased mean = $53,8 / 10 = 5,38$ m

**Standard Error of each reading (0,124)
and Standard Deviation (0,150) are close enough for a
(Gaussian) Normal Distribution, so:**

Depth in our pool = $5,38 \pm 0,15$

**i.e.: the next decimal place (5,3x) of the dive computer
depth reading is not valid!**

Statistics:

But this yields as well:
for greater diving depths > 11 m even the first decimal place
is as well not valid!

The CI (confidence interval)
with a ca. 90 % probability is for n=10:

$$1,83 * 0,15 / \text{SQRT}(10) = 0,086$$

i.e.: ca. 5,29 – 5,46

To put it the other way around;
there is only a ca. 10% probability,
that the real depth in the pool @ 03.09.17
was < 5,29 or > 5,46

Statistics:

What is sometimes possible as well
(another measurement):

i.e.: $5.5 - 5.0 = 0.5$

$\rightarrow 0.5/5.5$

ca. 9 % (sic !)

error



Mean = 5,36

Std.dev = +/- 0,2

Half-times of Compartments:



ca. 33' into the dive:
#1 is empty;
30' are 6 HT for cpt. #1



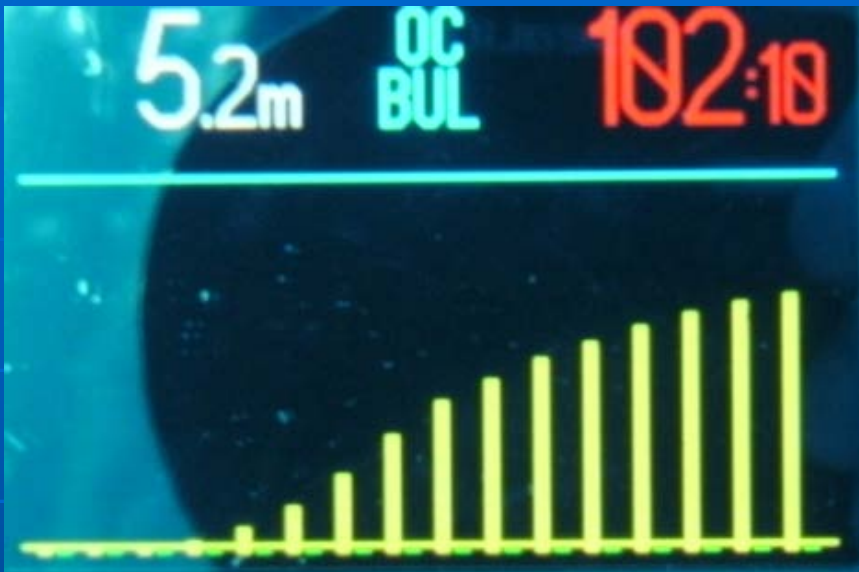
ca. 60' into the dive:
#1, #2 & #3 are empty
60' are approx. 6 HT for
cpt. #2 & 3



A compartment (cpt.) should be:

50 %	full/empty	after 1 HT
75 %		after 2 HT
87,5 %		after 3 HT
ca. 98 %		after 6 HT

Half-times of Compartments:



ca. 102': #1 → #4 are empty



ca. 104': #1 → #4 are empty



ca. 10' SI:


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Count Down during Surface Interval (SI): 



SI [hrs:min]	0:06	0:10	0:11	1:11	2:41	3:36	5:06	5:08
%ZNS, %CNS	107	104	103	65	32	21	11	10



%CNS reduction with exactly half-time of 90 min: 
but new NOAA standard says:
upps.... no good →
must be 120 min!
(pls. cf. next slide)

"There is no experimental basis on this!"

R.W. Bill Hamilton, 49th UHMS workshop, 2001, p. 70

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Change of O₂ half-time:

since 2013 in the NOAA Diving Manual, p. 4-27:



Table 4.7 ...

**„ ... it is based on a 120 minute half time,
consistent with traditional NOAA practices.“**

Source # [149] @

https://www.divetable.info/books/index_e.htm

**Dinsmore David A., Bozanic Jeffrey E. (2013)
NOAA Diving Manual, Diving for Science and Technology,
Fifth Edition, Best Publishing Company, Florida, ISBN
9781930536630**