

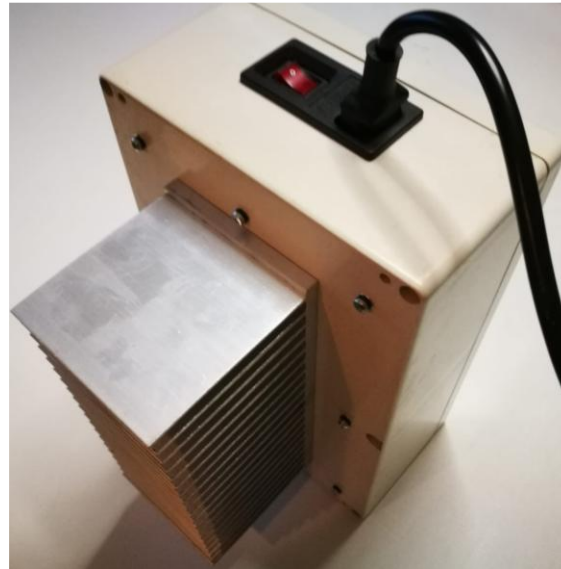
Proficiency Test of Current Harmonics Measurements PTC(HARM-CUR-50-2000-III)

Firenze, July 20, 2026

Rev. 0

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Travelling Sample for harmonic current generation



Detailed description is in clause 6. of the scheme of the proficiency test.

General information

- Number of participants: 5
- Start date: July 2025
- Stop date: July 2026
- Issues faced:
 - No specific issue, apart from a relatively low number of participants (the minimum required for running the PT)
- Scheme of the proficiency test PTC(HARM-CUR-50-2000-III):
<https://www.dinfo.unifi.it/vp-436-schemes-of-the-proficiency-tests.html>

Measurement procedure

- Harmonic current measurement is carried out according to §6.3 of EN 61000-3-2:2019.
- Set the test observation period $T_{\text{obs}} = 10 \text{ s}$ (or larger)
- After measurement check that the value of the harmonic of order 1 (at the 50 Hz fundamental frequency) is $256.00 \text{ mA} \pm 15.00 \text{ mA}$. If the measured value is outside the specified 241.00 mA to 271.00 mA interval, then immediately contact the Coordinator. The interlaboratory comparison is temporarily postponed until the cause of this out-of-tolerance measured value is clarified and appropriate corrective actions are undertaken.
- Supply voltage is 230 V (rms)

Harmonics to be measured

Table 1: Table to be used for recording the harmonic currents measurement results. Columns four and five shall be filled up by the Laboratory, the other columns (two, three, and six) will be filled up by the Coordinator.

1	2	3	4	5	6
Harmonic order	x^* mA	s^* mA	x mA	U_{lab} mA	ζ
5	-	-			-
9	-	-			-
13	-	-			-
17	-	-			-
21	-	-			-
25	-	-			-
29	-	-			-
33	-	-			-
37	-	-			-
39	-	-			-

Reference values

- Reference values are:
 - x^* reference value of the current harmonic at a given frequency
 - s^* standard deviation of the current harmonic at a given frequency
- x^* and s^* are obtained through the robust statistical analysis in terms of robust mean and robust standard deviation

Robust statistical analysis

$x_1, x_2, \dots, x_i, \dots, x_p$ } Raw data (p participants)

$x^* = \text{median of } x_i \quad (i = 1, 2, \dots, p)$

$s^* = 1,483 \text{ median of } |x_i - x^*| \quad (i = 1, 2, \dots, p)$

} Initial reference value

$\delta = 1,5s^*$

$x_i^* = \begin{cases} x^* - \delta, & \text{if } x_i < x^* - \delta \\ x^* + \delta, & \text{if } x_i > x^* + \delta \\ x_i, & \text{otherwise} \end{cases}$

} Transformed set of data

$x^* = \sum x_i^* / p$

$s^* = 1,134 \sqrt{\sum (x_i^* - x^*)^2 / (p - 1)}$

} New reference value
(iterative algorithm)



Performance statistic ζ

- Performance statistic ζ (clause 9.6 of ISO 13528:2022) that the Coordinator applies to the Participant providing the measurement result x_i with standard uncertainty u_{xi}

$$\zeta_i = \frac{x_i - X}{\sqrt{u_{xi}^2 + u_X^2}} \quad X = x^*, u_X = \frac{1,25 \cdot s^*}{\sqrt{p}}$$

$$\begin{cases} 2 < |\zeta_i| < 3 \Rightarrow \text{warning} \\ 3 < |\zeta_i| \Rightarrow \text{action} \end{cases}$$

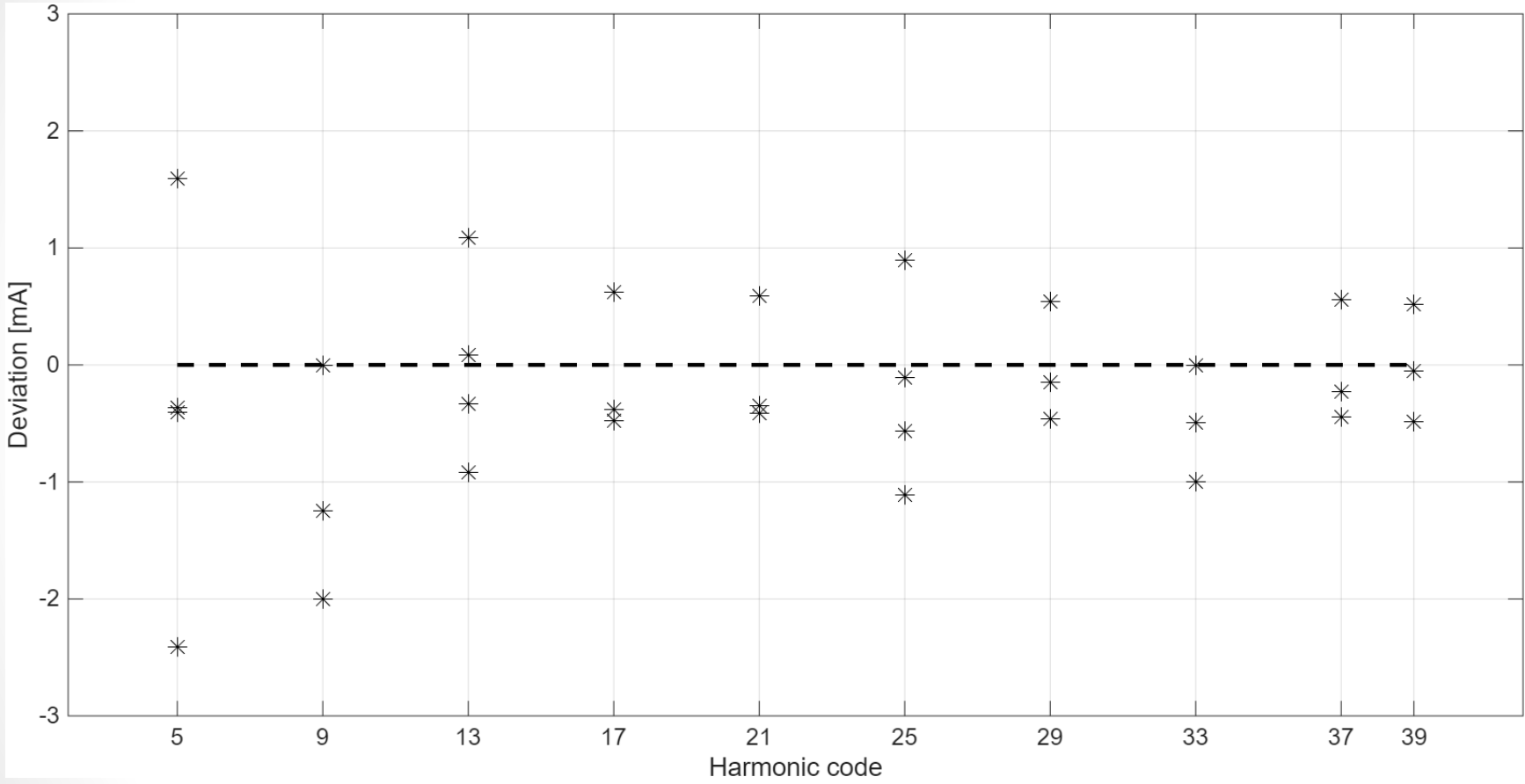
Results

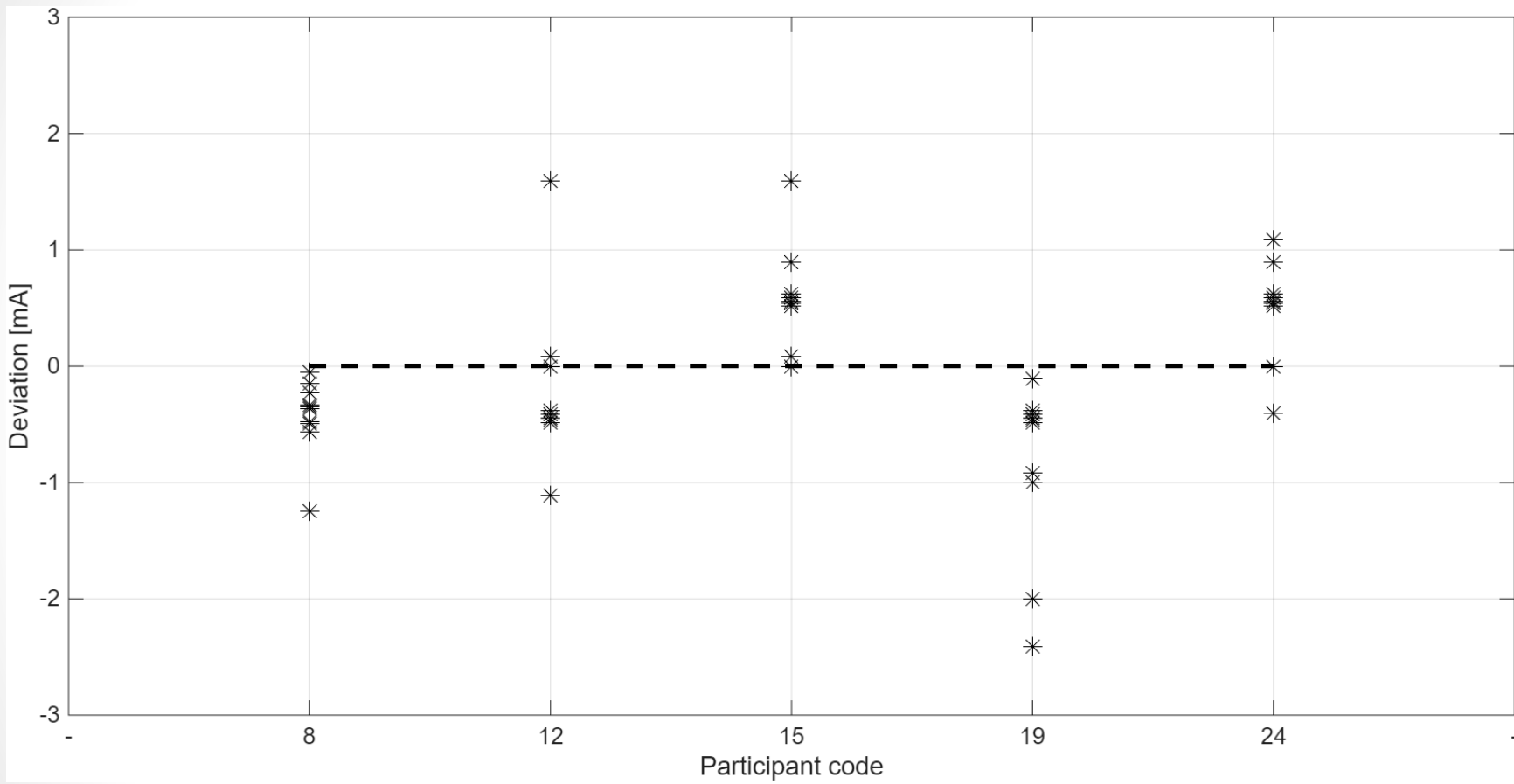
Harmonic code to frequency conversion

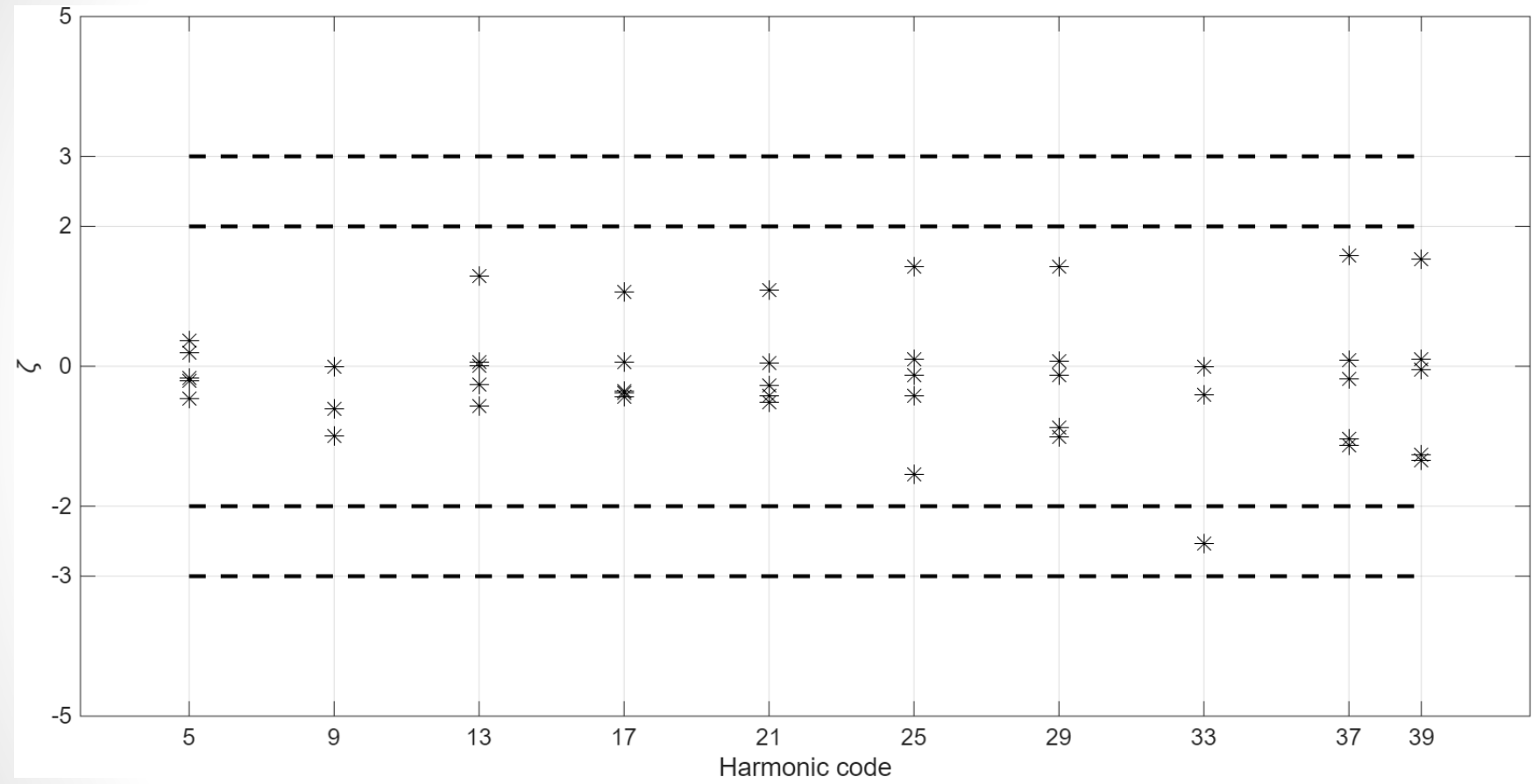
Harmonic code	Frequency Hz
5	250
9	450
13	650
17	850
21	1050
25	1250
29	1450
33	1650
37	1850
39	1950

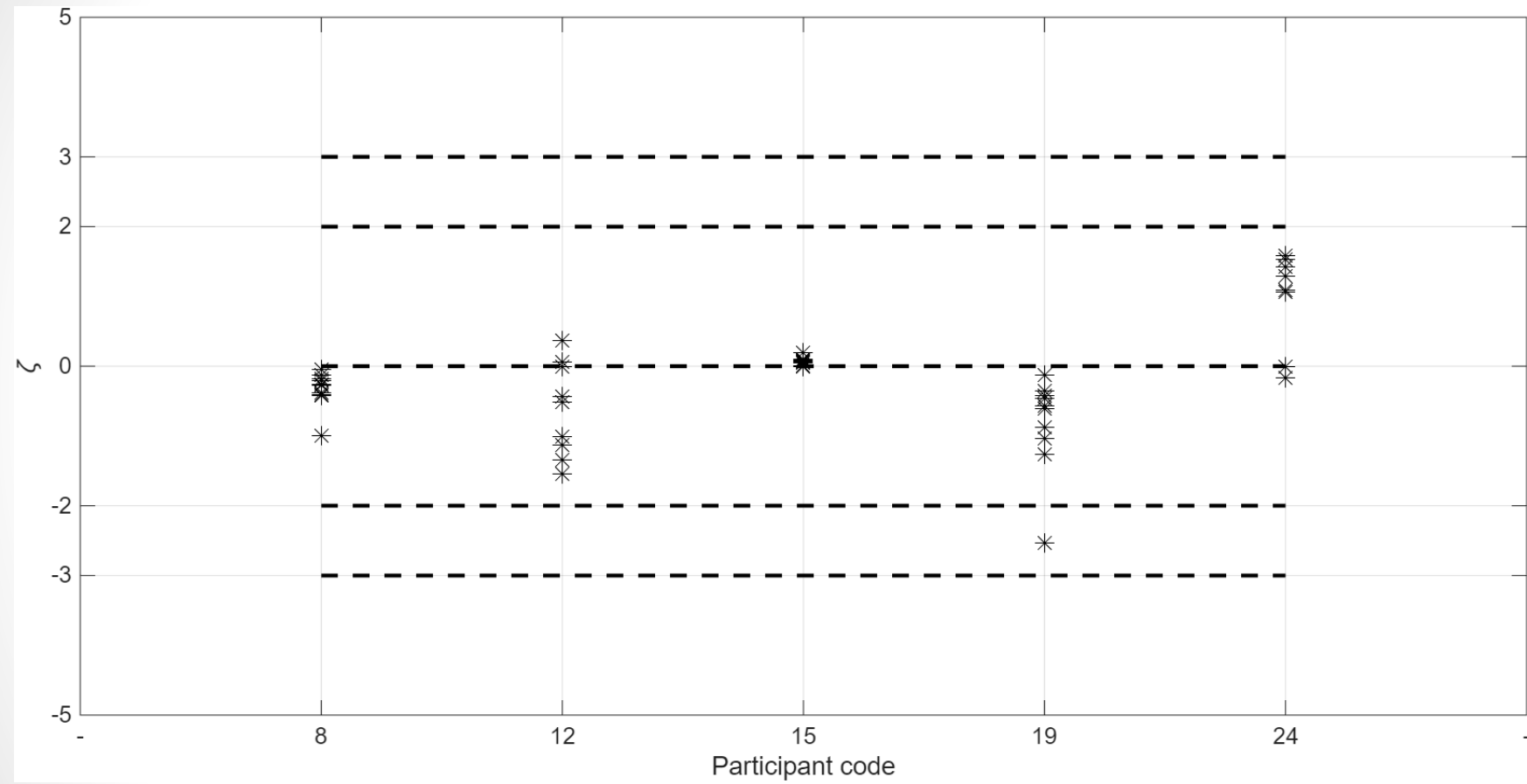
Interpretation of results

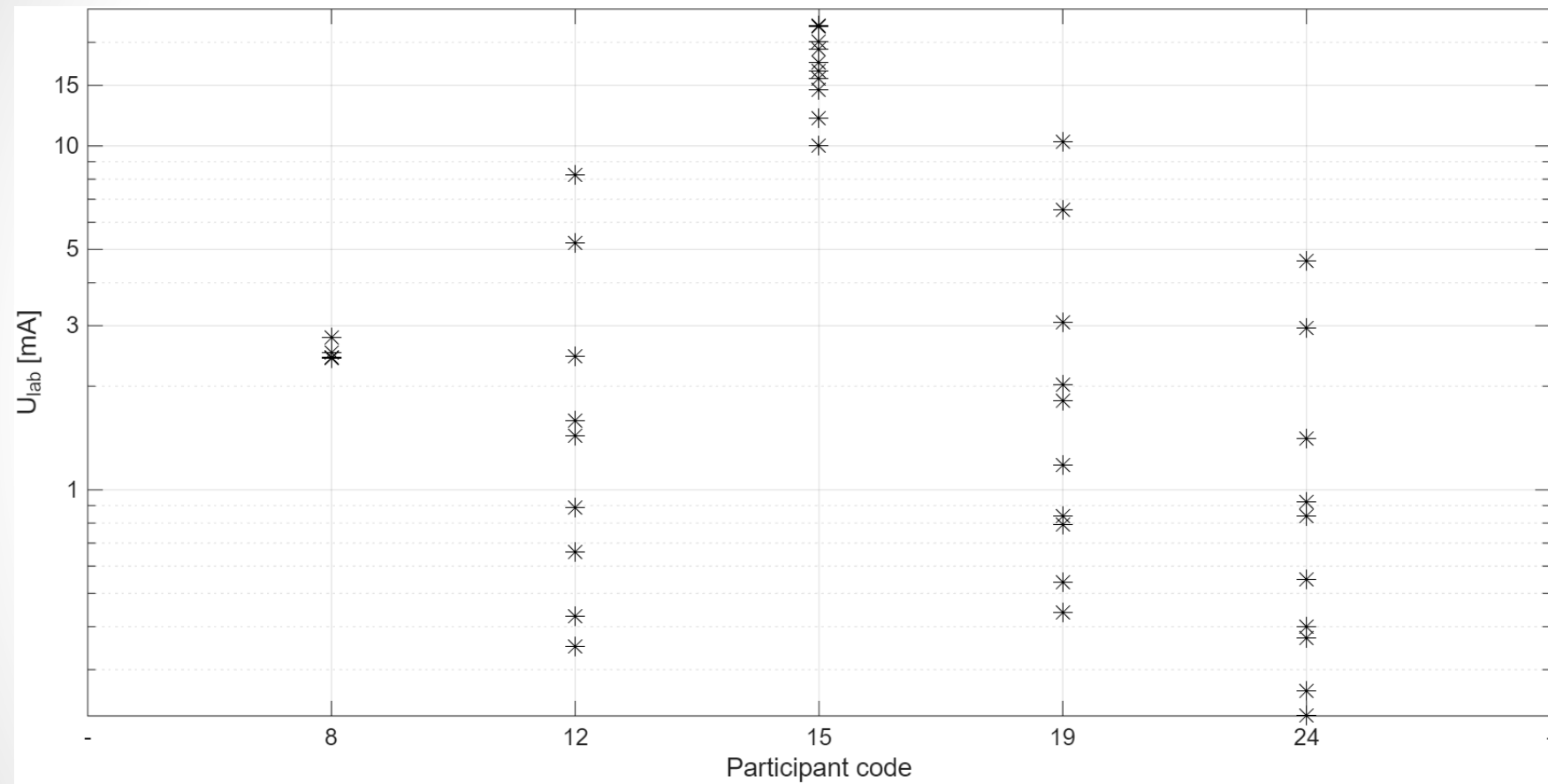
- Results are reported as:
 - Deviation between x_i , the measurement result of the i-th laboratory at a given frequency, and x^* reference value of the electric field at the same frequency
 - Performance statistic ζ_i of the i-th laboratory at a given frequency











Harmonic	Frequency	x^*	s^*
#	Hz	mA	mA
5	250	210.41	1.89
9	450	134.00	0.00
13	650	62.92	0.83
17	850	41.38	0.64
21	1050	37.41	0.61
25	1250	24.11	1.01
29	1450	17.46	0.58
33	1650	17.00	0.00
37	1850	11.44	0.59
39	1950	9.49	0.57

Remarks

- The measurement results provided by the 5 participants at the 10 measurement frequencies selected by the Coordinator are within -3 mA to $+2\text{ mA}$ from the reference values
- 50 measurement results were provided by the participants, and 1 warning signal was issued
- The robust standard deviation s^* is comprised between 0 mA and 1.9 mA