Circutor

REPORT EN 50160

CIRCUTOR QNA600 - Serial Number: 22343534530003

Record start date: 28/04/2025 00:00:00 (UTC+02)
Record end date: 04/05/2025 23:59:59 (UTC+02)

Circuit type: 3PH4W
Nominal Voltage: 230V (Low Voltage)
Nominal Frequency: 50 Hz

05 May 2025

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0. SUMMARY OF RESULTS

- Time Interval: 28/04/2025 00:00:00 (UTC+02) - 04/05/2025 23:59:59 (UTC+02)
- Device: CIRCUTOR QNA600
- Serial Number: 22343534530003
- Firmware: 1.11.0
- Measure Firmware: v1.2.28

Power Quality Parameter	EN 50160 Compliance	Remarks
Power Frequency	FAIL	Coverage: 99.9%
L-N Supply Voltage Variations	PASS	Coverage: 100.0%
L-L Supply Voltage Variations	PASS	Coverage: 100.0%
PLT Flicker Severity	FAIL	Coverage: 7.5%
Supply Voltage Unbalance	PASS	Coverage: 100.0%
L1-N Voltage Harmonics	PASS	Coverage: 100.0%
L1-N THD	PASS	Coverage: 100.0%
L2-N Voltage Harmonics	PASS	Coverage: 100.0%
L2-N THD	PASS	Coverage: 100.0%
L3-N Voltage Harmonics	PASS	Coverage: 100.0%
L3-N THD	PASS	Coverage: 100.0%
Mains Signalling Voltage	PASS	Coverage: 100.0%
Dips	-	Quantity: 3
Swells	-	Quantity: 0
Interruptions	-	Quantity: 9

1. POWER FREQUENCY

- Nominal Frequency: 50 Hz
- Parameter definition: Mean value of the fundamental frequency measured over 10 seconds.
- Limitation: For networks coupled by synchronous connections to an interconnected system.
  According to EN50160, frequency analysis period should be 1 year.

Requirement	Requested (% time)	Measured (% time)	Result
49.50Hz - 50.50Hz	99.5%	99.9%	PASS
47.00Hz - 52.00Hz	100.0%	99.9%	FAIL

Frequency Temporal Extract
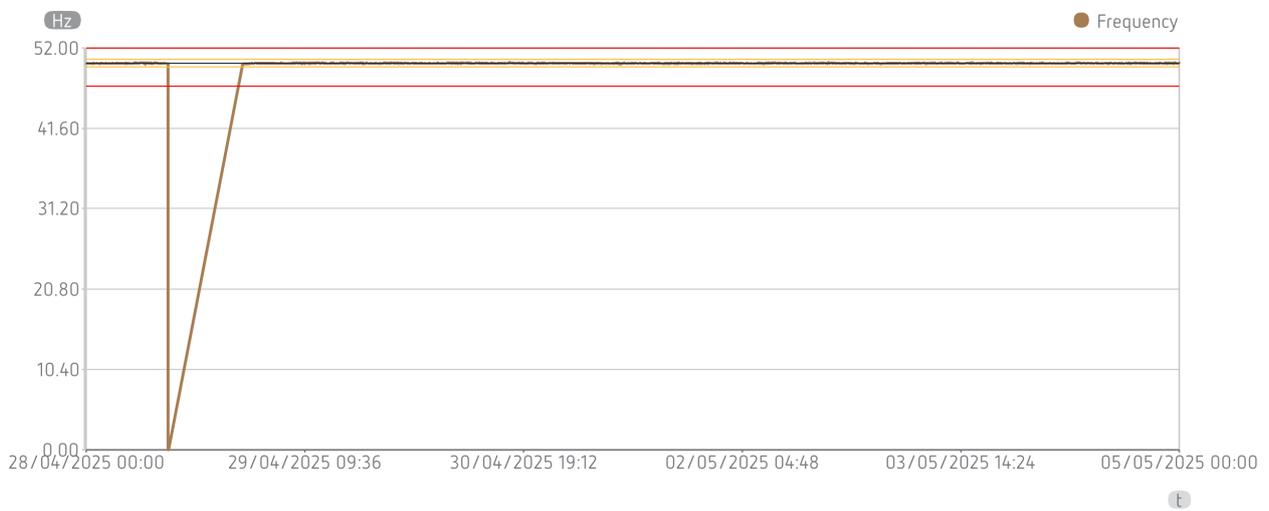
Frequency Normal Distribution

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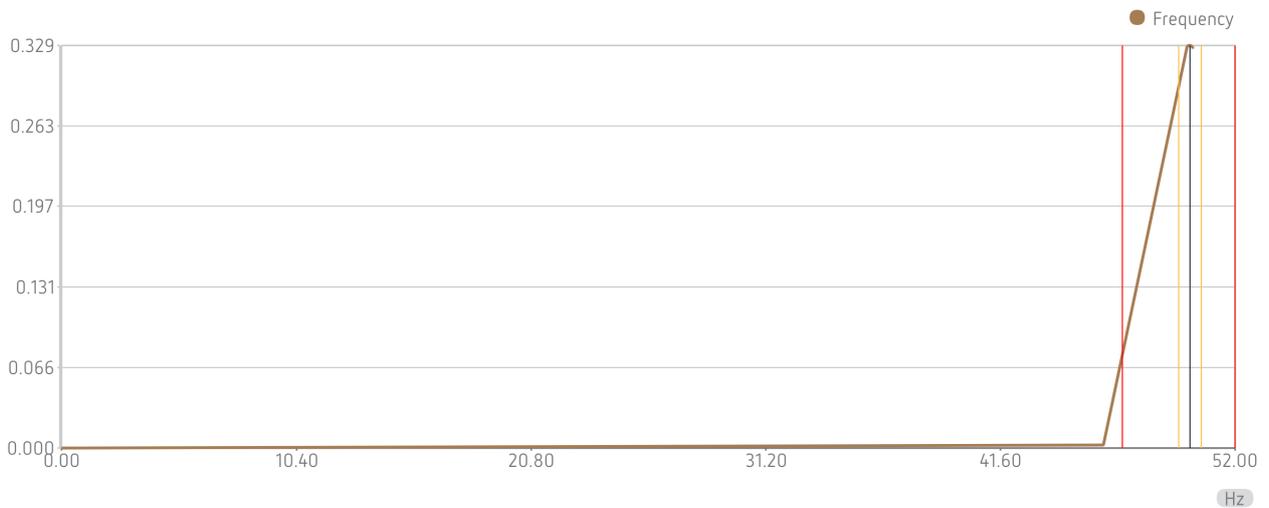
2. SUPPLY VOLTAGE VARIATIONS

2.1. L–N Voltage Variations

- Nominal Voltage: 230V
- Parameter definition: Supply voltage RMS values averaged over 10 min.
- Limitation: For networks coupled by synchronous connections to an interconnected system.
                          Interruption intervals excluded.
                          According to EN50160, voltage variations analysis period should be 1 week.

Requirement	Requested (% values)	L1 Voltage (% values)	L2 Voltage (% values)	L3 Voltage (% values)	Result
207V - 253V	95.0%	100.0%	100.0%	100.0%	PASS
195V - 253V	100.0%	100.0%	100.0%	100.0%	PASS

Voltage Variations Temporal Extract
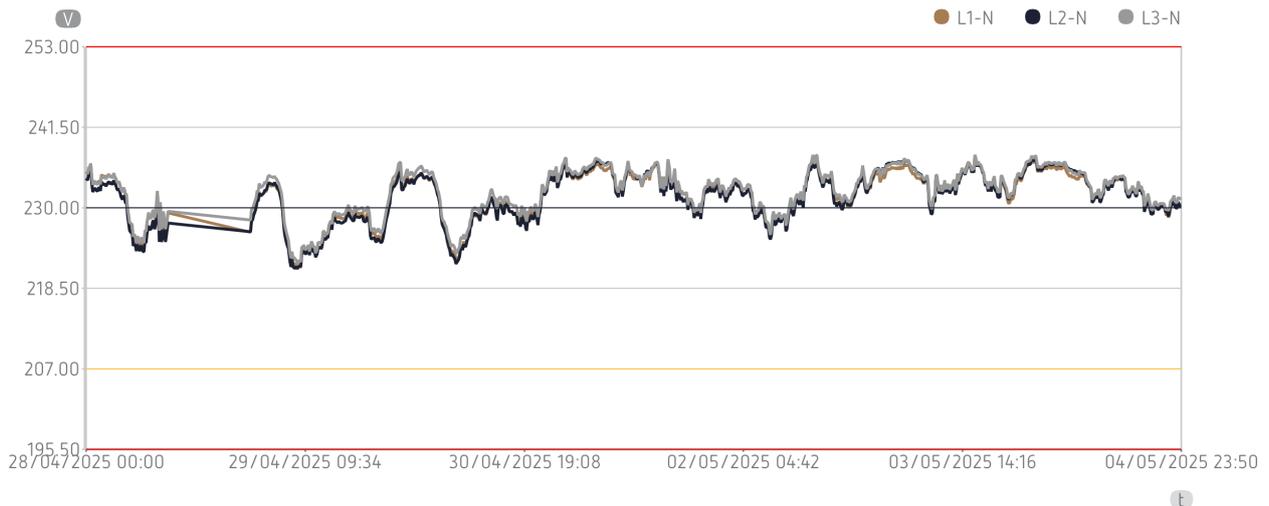
Voltage Variations Normal Distribution
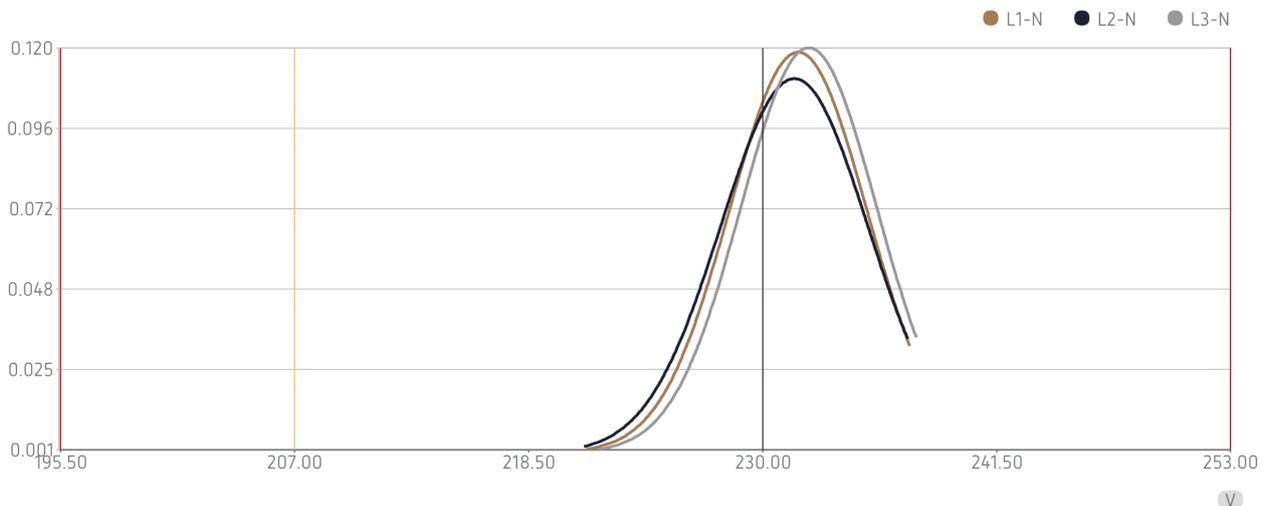
2.2. L-L Voltage Variations

- Nominal Voltage: 398V
- Parameter definition: Supply voltage RMS values averaged over 10 min.
- Limitation: For networks coupled by synchronous connections to an interconnected system.
                          Interruption intervals excluded.
                          According to EN50160, voltage variations analysis period should be 1 week.

Requirement	Requested (% values)	L12 Voltage (% values)	L23 Voltage (% values)	L31 Voltage (% values)	Result
358V – 438V	95.0%	100.0%	100.0%	100.0%	PASS
338V – 438V	100.0%	100.0%	100.0%	100.0%	PASS

Voltage Variations Temporal Extract

Voltage Variations Normal Distribution

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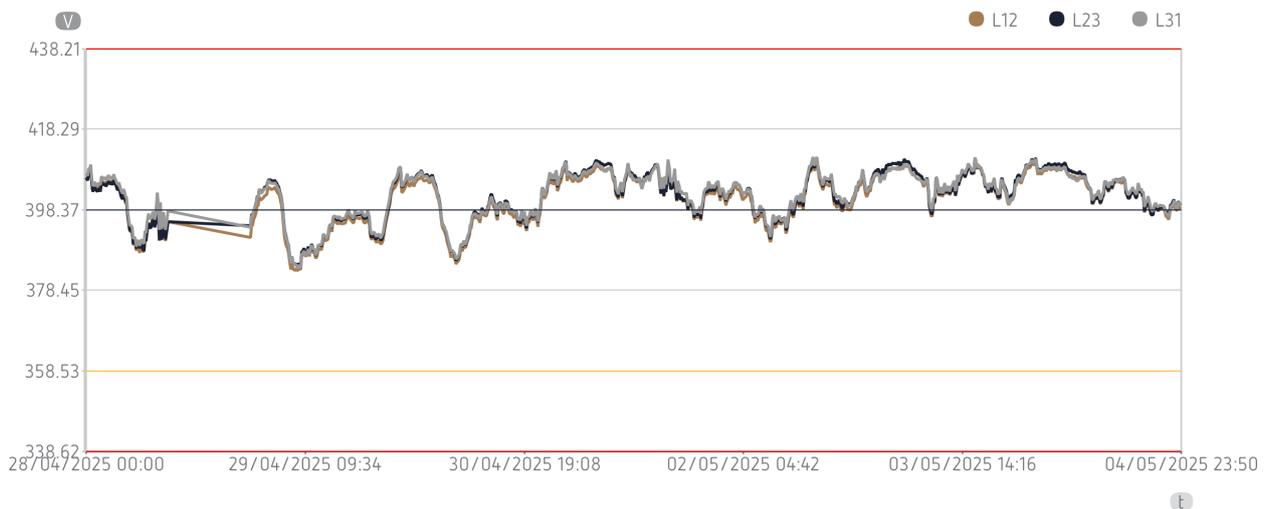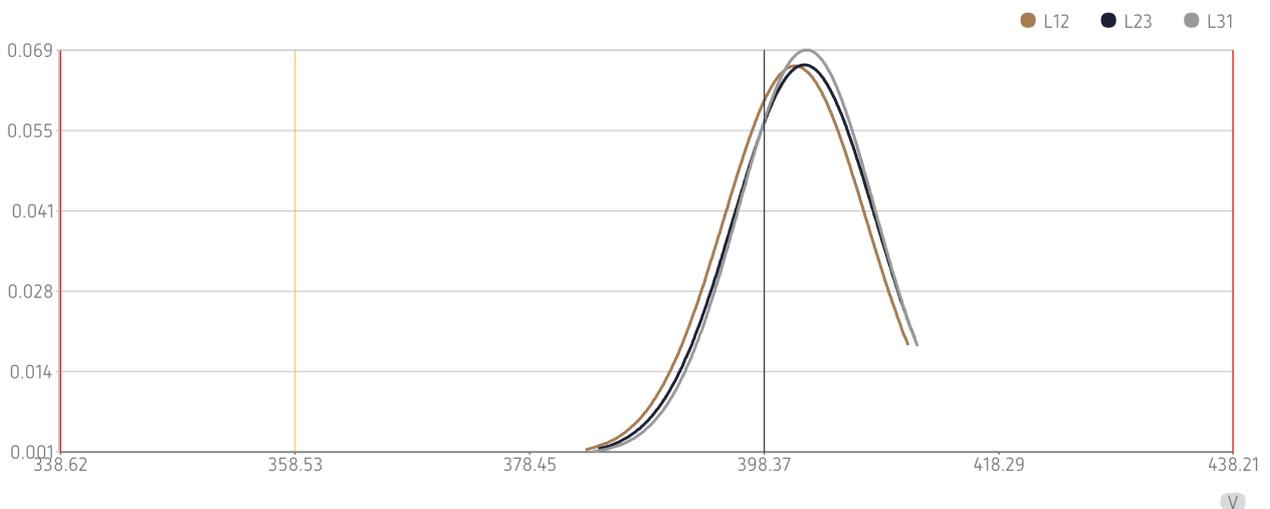
3. FLICKER SEVERITY

- Parameter definition: Long term flicker severity Plt due to voltage fluctuations (2h intervals).

- Limitation: According to EN50160, flicker analysis period should be 1 week.

Requirement	Requested (% time)	L1 Plt (% time)	L2 Plt (% time)	L3 Plt (% time)	Result
Plt <= 1	95.0%	7.5%	7.5%	7.5%	FAIL

Plt Flicker Temporal Extract

Plt Flicker Normal Distribution
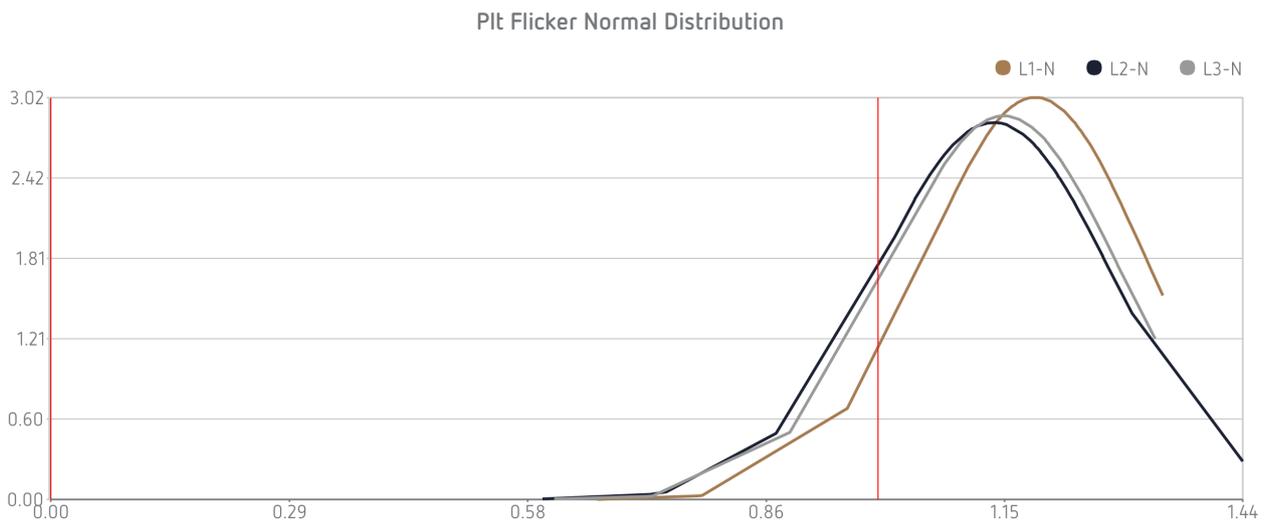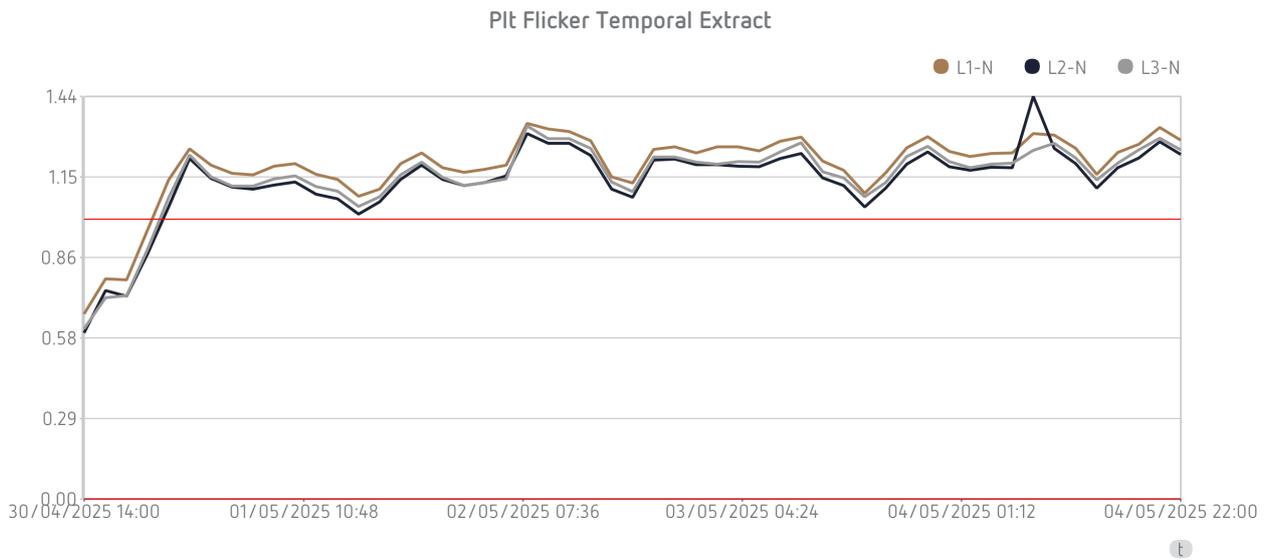
4. SUPPLY VOLTAGE UNBALANCE

- Parameter definition: RMS values of the negative sequence U_2 relative to the positive sequence U_1, averaged over 10 min.

- Limitation: According to EN50160, voltage unbalance analysis period should be 1 week.

Requirement	Requested (% values)	Measured (% values)	Result
0% – 2% (u_2)	95.0%	100.0%	PASS

Voltage Unbalance Temporal Extract
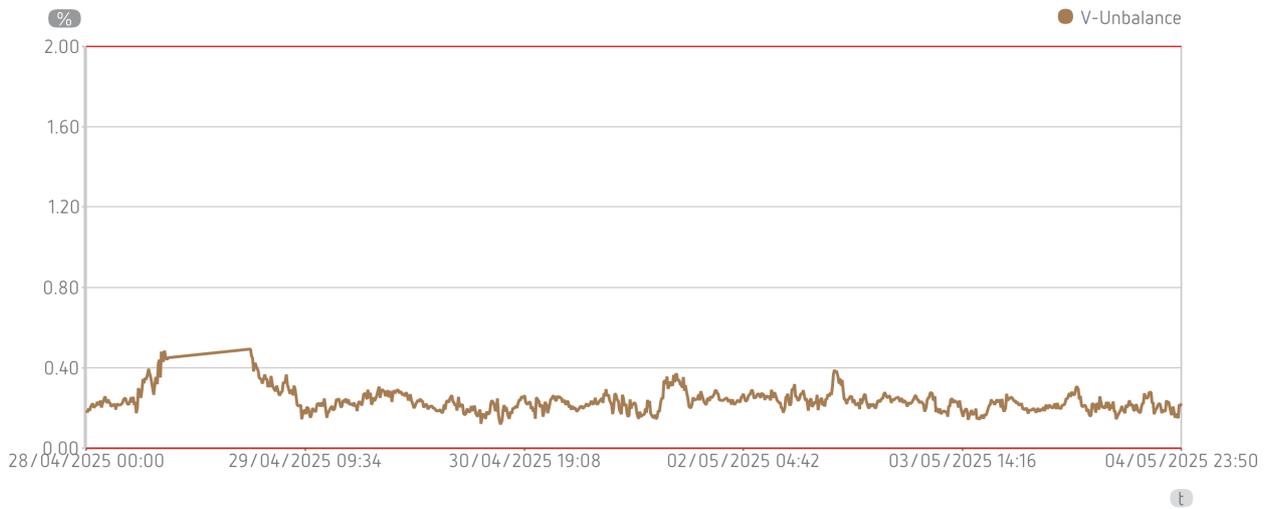
Voltage Unbalance Normal Distribution

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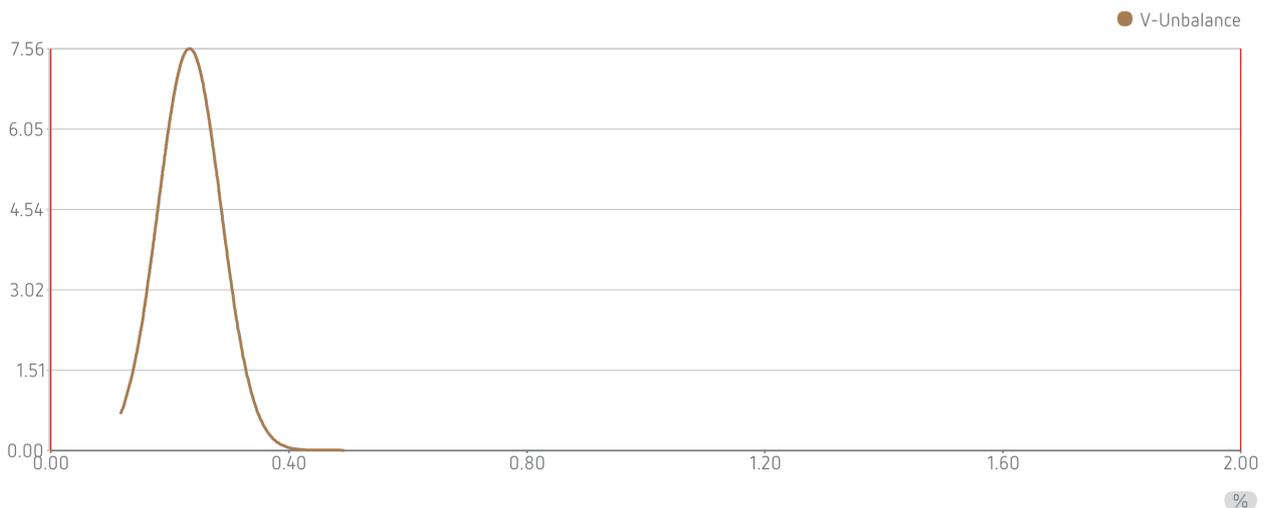
5. VOLTAGE HARMONICS AND THD

5.1. L1-N Voltage Harmonics and THD

- Parameter definition: Harmonic voltage RMS values averaged over 10 min.

- Limitation: According to EN50160, harmonics analysis period should be 1 week.

Even Harmonics

Order h	Requirement (%Uf)	Requested (% values)	Measured (% values)	Result
H_2	0% - 2.00%	95.0%	100.0%	PASS
H_4	0% - 1.00%	95.0%	100.0%	PASS
H_6	0% - 0.50%	95.0%	100.0%	PASS
H_8	0% - 0.50%	95.0%	100.0%	PASS
H_{10}	0% - 0.50%	95.0%	100.0%	PASS
H_{12}	0% - 0.50%	95.0%	100.0%	PASS
H_{14}	0% - 0.50%	95.0%	100.0%	PASS
H_{16}	0% - 0.50%	95.0%	100.0%	PASS
H_{18}	0% - 0.50%	95.0%	100.0%	PASS
H_{20}	0% - 0.50%	95.0%	100.0%	PASS
H_{22}	0% - 0.50%	95.0%	100.0%	PASS
H_{24}	0% - 0.50%	95.0%	100.0%	PASS

Odd Harmonics

Order h	Requirement (%Uf)	Requested (% values)	Measured (% values)	Result
H_3	0% - 5.00%	95.0%	100.0%	PASS
H_5	0% - 6.00%	95.0%	100.0%	PASS
H_7	0% - 5.00%	95.0%	100.0%	PASS
H_9	0% - 1.50%	95.0%	100.0%	PASS
H_{11}	0% - 3.50%	95.0%	100.0%	PASS
H_{13}	0% - 3.00%	95.0%	100.0%	PASS
H_{15}	0% - 1.00%	95.0%	100.0%	PASS
H_{17}	0% - 2.00%	95.0%	100.0%	PASS
H_{19}	0% - 1.50%	95.0%	100.0%	PASS
H_{21}	0% - 0.75%	95.0%	100.0%	PASS
H_{23}	0% - 1.50%	95.0%	100.0%	PASS
H_{25}	0% - 1.50%	95.0%	100.0%	PASS

THD

Requirement	Requested (% values)	Measured (% values)	Result
<= 8.00%	100.0%	100.0%	PASS

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5.2. L2-N Voltage Harmonics and THD

- Parameter definition: Harmonic voltage RMS values averaged over 10 min.
- Limitation: According to EN50160, harmonics analysis period should be 1 week.

Even Harmonics

Order h	Requirement (%Uf)	Requested (% values)	Measured (% values)	Result
H_2	0% - 2.00%	95.0%	100.0%	PASS
H_4	0% - 1.00%	95.0%	100.0%	PASS
H_6	0% - 0.50%	95.0%	100.0%	PASS
H_8	0% - 0.50%	95.0%	100.0%	PASS
H_{10}	0% - 0.50%	95.0%	100.0%	PASS
H_{12}	0% - 0.50%	95.0%	100.0%	PASS
H_{14}	0% - 0.50%	95.0%	100.0%	PASS
H_{16}	0% - 0.50%	95.0%	100.0%	PASS
H_{18}	0% - 0.50%	95.0%	100.0%	PASS
H_{20}	0% - 0.50%	95.0%	100.0%	PASS
H_{22}	0% - 0.50%	95.0%	100.0%	PASS
H_{24}	0% - 0.50%	95.0%	100.0%	PASS

Odd Harmonics

Order h	Requirement (%Uf)	Requested (% values)	Measured (% values)	Result
H_3	0% - 5.00%	95.0%	100.0%	PASS
H_5	0% - 6.00%	95.0%	100.0%	PASS
H_7	0% - 5.00%	95.0%	100.0%	PASS
H_9	0% - 1.50%	95.0%	100.0%	PASS
H_{11}	0% - 3.50%	95.0%	100.0%	PASS
H_{13}	0% - 3.00%	95.0%	100.0%	PASS
H_{15}	0% - 1.00%	95.0%	100.0%	PASS
H_{17}	0% - 2.00%	95.0%	100.0%	PASS
H_{19}	0% - 1.50%	95.0%	100.0%	PASS
H_{21}	0% - 0.75%	95.0%	100.0%	PASS
H_{23}	0% - 1.50%	95.0%	100.0%	PASS
H_{25}	0% - 1.50%	95.0%	100.0%	PASS

THD

| Requirement	Requested (% values)	Measured (% values)	Result
<= 8.00%	100.0%	100.0%	PASS

5.3. L3-N Voltage Harmonics and THD

- Parameter definition: Harmonic voltage RMS values averaged over 10 min.

- Limitation: According to EN50160, harmonics analysis period should be 1 week.

	Even Harmonics					Odd Harmonics			
Order h	Requirement (%Uf)	Requested (% values)	Measured (% values)	Result	Order h	Requirement (%Uf)	Requested (% values)	Measured (% values)	Result
H_2	0% - 2.00%	95.0%	100.0%	PASS	H_3	0% - 5.00%	95.0%	100.0%	PASS
H_4	0% - 1.00%	95.0%	100.0%	PASS	H_5	0% - 6.00%	95.0%	100.0%	PASS
H_6	0% - 0.50%	95.0%	100.0%	PASS	H_7	0% - 5.00%	95.0%	100.0%	PASS
H_8	0% - 0.50%	95.0%	100.0%	PASS	H_9	0% - 1.50%	95.0%	100.0%	PASS
H_{10}	0% - 0.50%	95.0%	100.0%	PASS	H_{11}	0% - 3.50%	95.0%	100.0%	PASS
H_{12}	0% - 0.50%	95.0%	100.0%	PASS	H_{13}	0% - 3.00%	95.0%	100.0%	PASS
H_{14}	0% - 0.50%	95.0%	100.0%	PASS	H_{15}	0% - 1.00%	95.0%	100.0%	PASS
H_{16}	0% - 0.50%	95.0%	100.0%	PASS	H_{17}	0% - 2.00%	95.0%	100.0%	PASS
H_{18}	0% - 0.50%	95.0%	100.0%	PASS	H_{19}	0% - 1.50%	95.0%	100.0%	PASS
H_{20}	0% - 0.50%	95.0%	100.0%	PASS	H_{21}	0% - 0.75%	95.0%	100.0%	PASS
H_{22}	0% - 0.50%	95.0%	100.0%	PASS	H_{23}	0% - 1.50%	95.0%	100.0%	PASS
H_{24}	0% - 0.50%	95.0%	100.0%	PASS	H_{25}	0% - 1.50%	95.0%	100.0%	PASS

THD			
Requirement	Requested (% values)	Measured (% values)	Result
<= 8.00%	100.0%	100.0%	PASS

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THD Temporal Extract

%

8.00	
6.40	
4.80	
3.20	
1.60	
0.00	

28/04/2025 00:00   29/04/2025 09:34   30/04/2025 19:08   02/05/2025 04:42   03/05/2025 14:16   04/05/2025 23:50

t

THD Normal Distribution

● L1-N ● L2-N ● L3-N

0.857	
0.691	
0.524	
0.357	
0.190	
0.024	

0.00   1.60   3.20   4.80   6.40   8.00

%

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6. MAINS SIGNALLING VOLTAGE

- Nominal Voltage: 230V

- Signalling Frequency: 1060.0 Hz

- Parameter definition: Data signals voltage RMS values averaged over 3s.

Requirement	Requested (% time)	L1 Signalling (% time)	L2 Signalling (% time)	L3 Signalling (% time)	Result
0V - 11V	99.0%	100.0%	100.0%	100.0%	PASS

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7. VOLTAGE EVENTS

7.1. Dips

- Nominal Voltage: 230V
- Parameter definition: On Polyphase systems, a Dip begins when the Urms voltage of one or more channels falls below the Dip threshold (90% Vnom) and ends when the Urms voltage of all measured channels is equal to, or above, the Dip threshold plus the hysteresis voltage (2% Vnom).
Each Dip is characterized by the min Urms value reached (u: Residual Voltage, in % Vnom) and its duration.
- Limitation: According to EN 50160, Polyphase evaluation should be used to identify Dips

- L1-N Dips

Residual Voltage (u: % Vnom)	Occurrences					
	10ms <= t <= 0.2s	0.2s < t <= 0.5s	0.5s < t <= 1s	1s < t <= 5s	5s < t <= 60s	60s < t
80 <= u < 90	1	0	0	0	0	0
70 <= u < 80	0	1	1	0	0	0
40 <= u < 70	0	0	0	0	0	0
5 <= u < 40	0	0	0	0	0	0
u < 5	0	0	0	0	0	0

(DEVICE IMMUNITY REQUIRED: Beyond Class 3)

Details				
Phases	Date	Time	Residual Voltage	Duration
L1-N	28/04/2025	12:33:20.076	73.73 %	594 ms
L1-N	28/04/2025	12:33:21.149	77.66 %	286 ms
L1-N	29/04/2025	01:03:05.656	88.51 %	70 ms

- L2-N Dips

Residual Voltage (u: % Vnom)	Occurrences					
	10ms <= t <= 0.2s	0.2s < t <= 0.5s	0.5s < t <= 1s	1s < t <= 5s	5s < t <= 60s	60s < t
80 <= u < 90	0	0	0	0	0	0
70 <= u < 80	0	1	1	0	0	0

Residual Voltage					
40 <= u < 70	0	0	0	0	0
5 <= u < 40	0	0	0	0	0
u < 5	0	0	0	0	0

(DEVICE IMMUNITY REQUIRED: Beyond Class 3)

		Details		
Phases	Date	Time	Residual Voltage	Duration
L2-N	28/04/2025	12:33:20.083	73.79 %	584 ms
L2-N	28/04/2025	12:33:21.156	77.96 %	276 ms

- L3-N Dips

Residual Voltage (u: % Vnom)	Occurrences					
	10ms <= t <= 0.2s	0.2s < t <= 0.5s	0.5s < t <= 1s	1s < t <= 5s	5s < t <= 60s	60s < t
80 <= u < 90	0	0	0	0	0	0
70 <= u < 80	0	1	1	0	0	0
40 <= u < 70	0	0	0	0	0	0
5 <= u < 40	0	0	0	0	0	0
u < 5	0	0	0	0	0	0

(DEVICE IMMUNITY REQUIRED: Beyond Class 3)

		Details		
Phases	Date	Time	Residual Voltage	Duration
L3-N	28/04/2025	12:33:20.090	74.56 %	574 ms
L3-N	28/04/2025	12:33:21.159	78.83 %	269 ms

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7.2. Swells

- Nominal Voltage: 230V

- Parameter definition: On Polyphase systems, a Swell begins when the Urms voltage of one or more channels rises above the Swell threshold (110% Vnom) and ends when the Urms voltage of all measured channels is equal to, or below, the Swell threshold minus the hysteresis voltage (2% Vnom).
Each Swell is characterized by the max Urms value reached (u: Swell Voltage, in % Vnom) and its duration.

- Limitation: According to EN 50160, Polyphase evaluation should be used to identify Swells

- L1-N Swells

NO SWELLS HAVE OCCURRED ON SELECTED DATES.

- L2-N Swells

NO SWELLS HAVE OCCURRED ON SELECTED DATES.

- L3-N Swells

NO SWELLS HAVE OCCURRED ON SELECTED DATES.

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7.3. Interruptions

- Nominal Voltage: 230V
- Parameter definition: On Polyphase systems, an Interruption takes place when the Urms voltage falls below 5% Vnom on all channels. Otherwise, it's considered to be a Dip.
An interruption is characterized by its duration.
- Limitation: According to EN 50160, Polyphase evaluation should be used to identify Interruptions
According to EN 50160, Interrupt threshold should be 5% of the Nominal Voltage.

Phases	Date	Time	Duration	Type
L2-N	28/04/2025	12:33:23.995	311 ms	Short
L1-N	28/04/2025	12:33:23.998	301 ms	Short
L3-N	28/04/2025	12:33:24.002	301 ms	Short
L2-N	28/04/2025	12:33:24.451	134 ms	Short
L3-N	28/04/2025	12:33:24.459	122 ms	Short
L1-N	28/04/2025	12:33:24.477	111 ms	Short
	28/04/2025	12:33:25.270	41303176 ms	Long
	28/04/2025	12:33:25.274	41303176 ms	Long
	28/04/2025	12:33:25.277	41303172 ms	Long

7.4. ITIC Curve

Dips, Swells and Interruptions
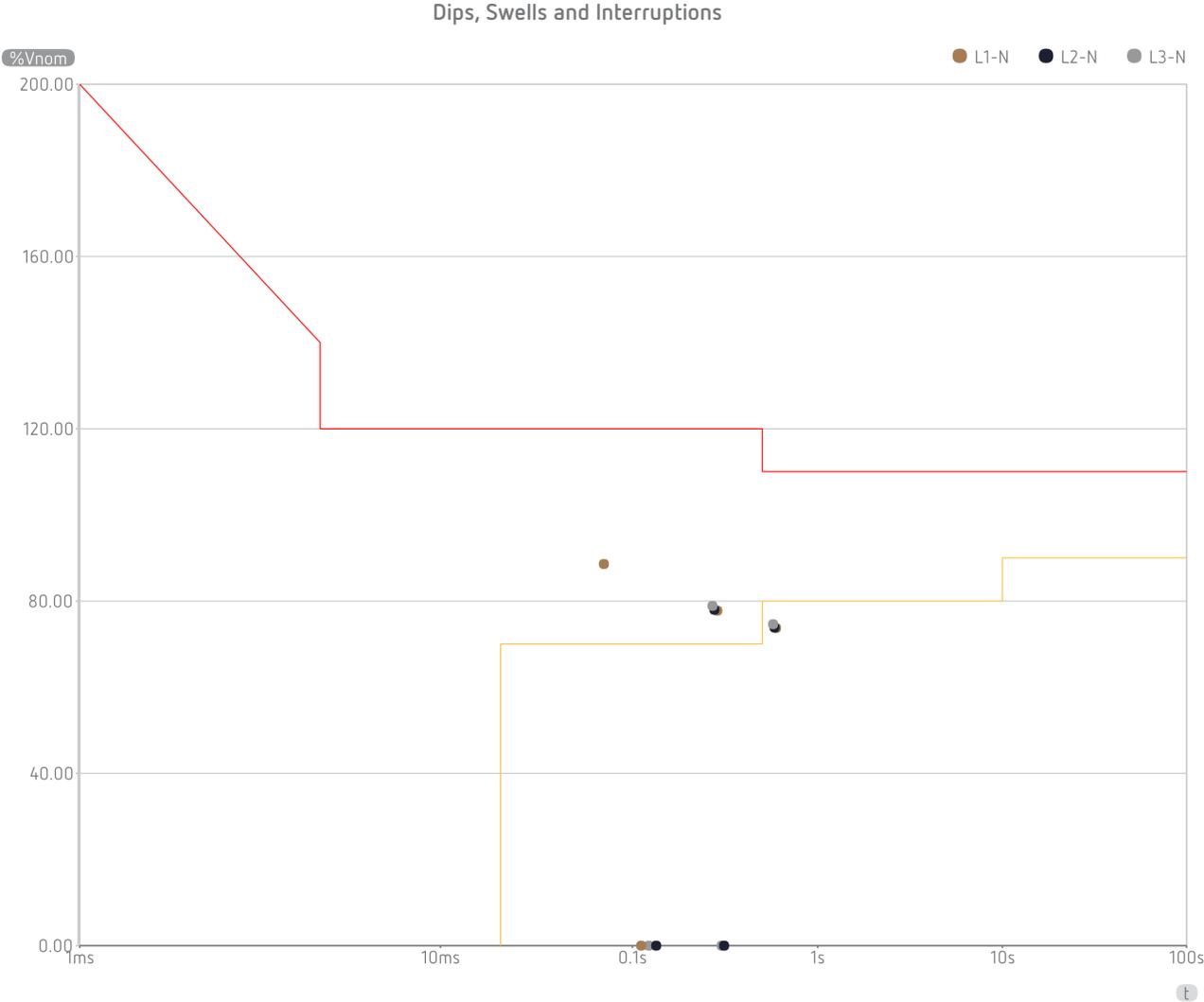
3 QUALITY EVENTs ARE NOT SHOWN IN THE ITIC CURVE BECAUSE THEY ARE OUT OF SCOPE OF IT (DURATION > 100s) .