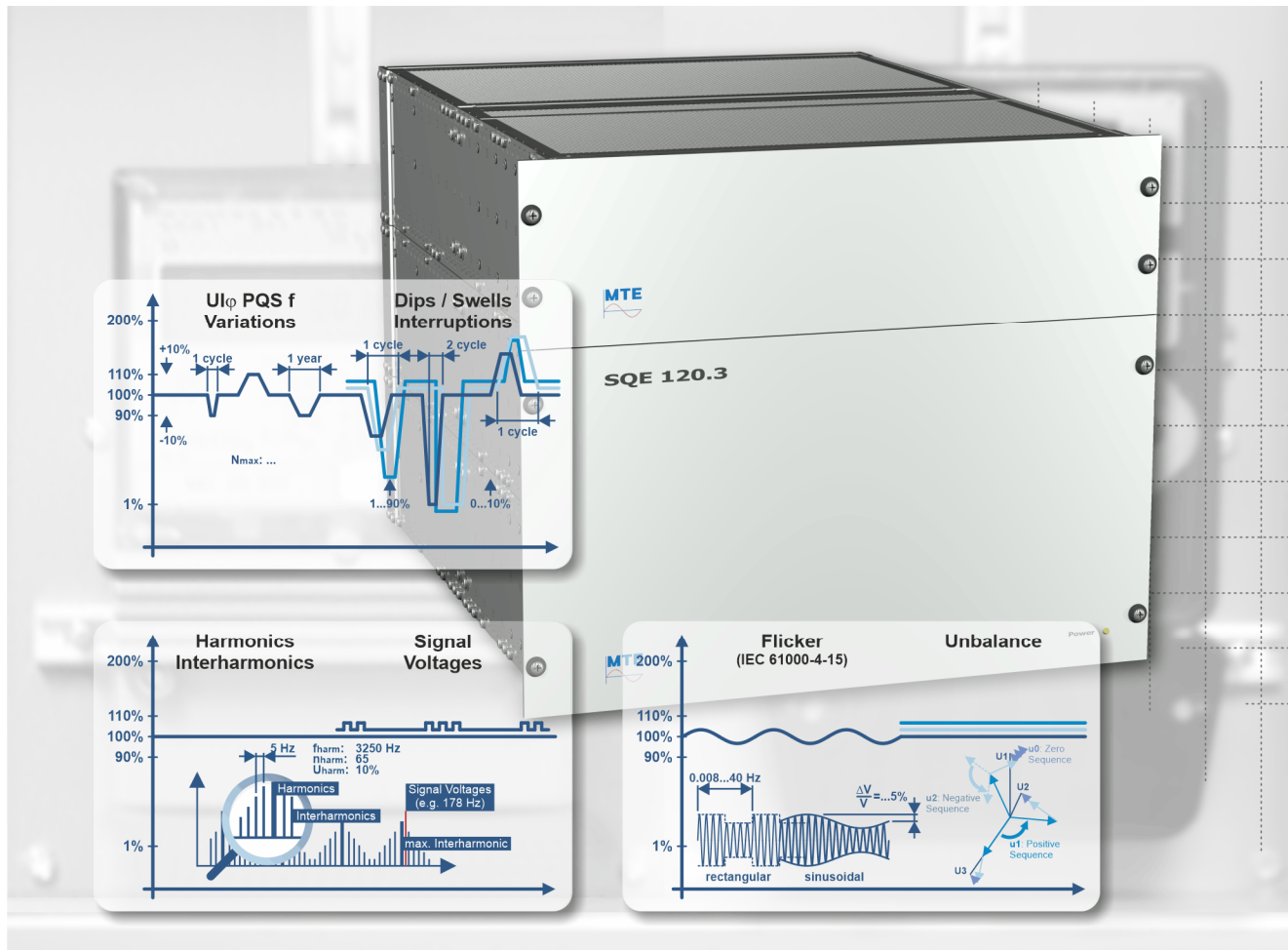


SQE 120.3

Three-phase power source with power quality signal generation

The SQE 120.3 is a further development of the SPE 120.3 with increased short term stability and integrated power quality test functions. The computer controlled power source can simulate any 2-, 3- or 4-wire system (IEC or ANSI) with symmetrical or asymmetrical conditions, combined with different types of power quality test signals.



The SQE 120.3 is especially appropriate for test laboratories to perform compliance, acceptance or type test of electricity meters and different types of power, energy and power quality measurement devices, following the existing (IEC 61000-4-30, EN 50160) and the new (IEC 62586-1,2) power quality standards.

3-Phase Power Source for Meter Test Systems

- Voltage U: 3 x 0 V ... 480 V (L-N) / 600 VA ($\leq 0.05\%$)
- Current I: 3 x 0 A ... 120 A / 600 VA ($\leq 0.05\%$)
- Phase angle φ : 3 x 0.00 ... 359.99° ($\leq 0.1^\circ$)
- Frequency f (fundamental): 40 ... 400 Hz (≤ 0.01 Hz) (45 ... 65 Hz synchronized to supply voltage)
- Stability (fulfils Chinese standard JJG 597-2005):
 - 1 h: U,I: $\leq 0.005\%$ (time base: 150s)
 - P: $\leq 0.01\%$ (time base: 150s)
 - 2 min: P: $\leq 0.015\%$ (time base: 1 - 1.5s)

Communication

The SQE 120.3 is controlled with a PC with the test system software CALegration via one of the interfaces:

- Ethernet (RJ45)
- USB 2.0 (Type B)

Generation of Power Quality Test Signals

- Phase synchronisation / control / regulation
 - Voltage variations
 - Dips/Swells/Interruptions
 - Flicker (IEC 61000-4-15)
- Interharmonics superposition
- Power Quality Signal Stream
- PQ Command Set
- GPS time synchronisation (Option)

Synchronisation Pulse Outputs / Inputs (Option)

Events (dips, swells, interruptions) may be precisely time stamped (start time, end time) for synchronisation.

- 3 Outputs (5 V / BNC):
 - Trigger Output (dip / swell)
 - Sample Ref Output (scanning / sampling)
 - Phase Ref Output (zero crossing)
- 3 Inputs (5 ... 24 V / BNC):
 - Trigger Inputs (dip / swell)
 - Delay: 0 ... 60s \pm 30 μ s

Technical Data SQE 120.3

GENERAL

| | |
|------------------------|--|
| Supply voltage | 3 x 88 / 152 VACmin ... 264 / 457 VACmax, 47 ... 63 Hz |
| Power consumption: | < 4.3 kW (PFC Power Factor Correction) |
| Power efficiency | > 85 % at full load |
| Housing: | 19"-plug-in unit, 9HU |
| Dimensions: | W 485 x H 400 x D 600 mm |
| Weight: | approx. 80 kg |
| Operation temperature: | -10 °C ... +50 °C |
| Storage temperature: | -20 °C ... +60 °C |
| Relative humidity: | ≤ 85% at Ta ≤ 21°C |
| | ≤ 95% at Ta ≤ 25°C, 30 days / year spread |

Safety CE

| | |
|-----------------------|-----------------------------|
| Isolation protection: | IEC 61010-1:2001 |
| Measurement Category: | 300 V CAT III, 600 V CAT II |
| Degree of protection: | IP-20 |

POWER SOURCE

Voltage

| Range (phase - neutral): | 0 V ... 480 V | | | | | | | | | | |
|---------------------------|---|-------------------|---|------------------|---------------------|------------------|---------------------|-----------------|---------------------|--------------|----------------------|
| Output power (per phase): | 600 VA | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Internal Range Un</th> <th>S [VA]¹ (Peak \hat{U} / \hat{I})</th> </tr> </thead> <tbody> <tr> <td>>300 V ... 480 V</td> <td>600 (746 V / 1.9 A)</td> </tr> <tr> <td>>150 V ... 300 V</td> <td>600 (467 V / 3.1 A)</td> </tr> <tr> <td>>75 V ... 150 V</td> <td>600 (233 V / 6.2 A)</td> </tr> <tr> <td>0 V ... 75 V</td> <td>600 (117 V / 12.4 A)</td> </tr> </tbody> </table> | Internal Range Un | S [VA] ¹ (Peak \hat{U} / \hat{I}) | >300 V ... 480 V | 600 (746 V / 1.9 A) | >150 V ... 300 V | 600 (467 V / 3.1 A) | >75 V ... 150 V | 600 (233 V / 6.2 A) | 0 V ... 75 V | 600 (117 V / 12.4 A) |
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| >75 V ... 150 V | 600 (233 V / 6.2 A) | | | | | | | | | | |
| 0 V ... 75 V | 600 (117 V / 12.4 A) | | | | | | | | | | |
| Resolution: | 0.01 % ¹ | | | | | | | | | | |
| Accuracy | ≤ 0.05 % (typical < 0.02 %) ¹ | | | | | | | | | | |
| Distortion factor: | ≤ 0.5 % (typical < 0.3 %) ² | | | | | | | | | | |
| Load regulation: | ≤ 0.01 % (from 0 % – 100 % load) | | | | | | | | | | |
| Power factor of the load: | 0.5 cap. – 1 – 0.2 ind. | | | | | | | | | | |

Current

| Range (phase - neutral): | 0 A ... 120 A | | | | | | | | | | | | | | |
|---------------------------|--|-------------------|---|-----------------|---------------------|----------------|----------------------|-----------------|-----------------------|-------------------|----------------------|-------------------|-----------------------|----------------|----------------------|
| Output power (per phase): | 600 VA | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Internal Range In</th> <th>S [VA]¹ (Peak \hat{I} / \hat{U})</th> </tr> </thead> <tbody> <tr> <td>>80 A ... 120 A</td> <td>600 (187 A / 7.8 V)</td> </tr> <tr> <td>>12 A ... 80 A</td> <td>600 (124 A / 11.7 V)</td> </tr> <tr> <td>>1.2 A ... 12 A</td> <td>480 (18.7 A / 62.2 V)</td> </tr> <tr> <td>>120 mA ... 1.2 A</td> <td>48 (1.87 A / 62.2 V)</td> </tr> <tr> <td>>12 mA ... 120 mA</td> <td>4.8 (187 mA / 62.2 V)</td> </tr> <tr> <td>0 mA ... 12 mA</td> <td>0.48 (18.7mA/62.2 V)</td> </tr> </tbody> </table> | Internal Range In | S [VA] ¹ (Peak \hat{I} / \hat{U}) | >80 A ... 120 A | 600 (187 A / 7.8 V) | >12 A ... 80 A | 600 (124 A / 11.7 V) | >1.2 A ... 12 A | 480 (18.7 A / 62.2 V) | >120 mA ... 1.2 A | 48 (1.87 A / 62.2 V) | >12 mA ... 120 mA | 4.8 (187 mA / 62.2 V) | 0 mA ... 12 mA | 0.48 (18.7mA/62.2 V) |
| Internal Range In | S [VA] ¹ (Peak \hat{I} / \hat{U}) | | | | | | | | | | | | | | |
| >80 A ... 120 A | 600 (187 A / 7.8 V) | | | | | | | | | | | | | | |
| >12 A ... 80 A | 600 (124 A / 11.7 V) | | | | | | | | | | | | | | |
| >1.2 A ... 12 A | 480 (18.7 A / 62.2 V) | | | | | | | | | | | | | | |
| >120 mA ... 1.2 A | 48 (1.87 A / 62.2 V) | | | | | | | | | | | | | | |
| >12 mA ... 120 mA | 4.8 (187 mA / 62.2 V) | | | | | | | | | | | | | | |
| 0 mA ... 12 mA | 0.48 (18.7mA/62.2 V) | | | | | | | | | | | | | | |
| Resolution: | 0.01 % ¹ | | | | | | | | | | | | | | |
| Accuracy | ≤ 0.05 % (typical < 0.02 %) ¹ | | | | | | | | | | | | | | |
| Distortion factor: | ≤ 0.5 % (typical < 0.3 %) ² | | | | | | | | | | | | | | |
| Load regulation: | ≤ 0.01 % (from 0 % – 100 % load) | | | | | | | | | | | | | | |
| Power factor of the load: | 1 – 0.1 ind. | | | | | | | | | | | | | | |

Phase angle

| | |
|-------------|----------------------------|
| Range: | 0.00 ° - 359.99 ° |
| Resolution: | 0.01 ° |
| Accuracy: | ≤ 0.1 ° (typical < 0.05 °) |

Frequency

| | |
|-------------|---|
| Fundamental | Mode NUM: 45 Hz ... 65 Hz (Option: 15 Hz ... 400 Hz) |
| | Mode LINE: 45 Hz ... 65 Hz synchronized to supply voltage |
| Resolution: | 0.01 Hz |
| Accuracy: | ≤ 0.01 Hz |
| Stability: | 0.001 Hz |

Stability

| | |
|-----------------|---|
| Duration 1 h: | U,I: ≤ 0.005 % (time base: 150s) P: ≤ 0.01% (time base: 150s) |
| Duration 2 min: | P: ≤ 0.015 % (time base: 1 - 1.5s) fulfils Chinese standard JJJ 597-2005 |

POWER QUALITY SIGNALS

Power Frequency

| Range | Accuracy | Time base / Interval |
|-------------------|----------|----------------------|
| 42.5 Hz ... 69 Hz | 0.01 Hz | 10 s |

Magnitude of Voltage, Current

| Range | Accuracy | Time base / Interval |
|---|---|--|
| U: 5 V ... 480 V ⁴ 10 % ... 200 % U _{din} ³ | U: 0.1 % of U _{din} ³ within 10 ... 150 % U _{din} | 10 cyc (50 Hz) / 200 ms 12 cyc (60 Hz) / 200 ms |
| I: 0 A ... 120 A ⁴ | I: 0.1 % ¹ | |

Harmonics / Interharmonics of Voltage, Current

| Range | Accuracy | Time base / Interval |
|--|---|--|
| Harmonics U, I⁴ | | |
| 1 Harmonic ⁶ | U Harmonics: ≥ 1 % Un: ± 5 % < 1 % Un: ± 0.05 % ¹ | 10 cyc (50 Hz) / 200 ms 12 cyc (60 Hz) / 200 ms |
| Hn | Range | |
| 2 ... 8 | max. 100 % | |
| 9 ... 30 | max. 40 % | |
| 31 ... 63 | max. 10 % | |
| 2 ... 8 Harmonics ⁶ Sum of all: max. 40 % | I Harmonics: ≥ 1 % In: ± 5 % < 1 % In: ± 0.05 % ¹ | |
| Interharmonics U, I⁴ | | |
| 1 Interharmonic ⁶ | U Interharmonics: ≥ 3 % Un: ± 5 % < 3 % Un: ± 0.15 % ¹ | 10 cyc (50 Hz) / 200 ms 12 cyc (60 Hz) / 200 ms |
| f [Hz] | Range | |
| 40 - 400 | max 100 % | |
| - 1'500 | max. 40 % | |
| - 3'000 | max. 10 % | |
| 2 ... 4 Interharmonics ⁶ Sum of all: max. 40 % | I Interharmonics: ≥ 3 % In: ± 5 % < 3 % In: ± 0.15 % ¹ | |

Flicker

| Range | Accuracy | Time base / Interval |
|--|---|----------------------|
| 0 Pst ... 10 Pst ⁴ Rectangular, sinusoidal: 0 ... 5 % ΔU/U, 0 ... 40 Hz | 5 % on test points acc. IEC 61000-4-15 | 10 min |

Unbalance of Voltage

| Range | Accuracy | Time base / Interval |
|---|--|--|
| 0 ... 5 % u0 0 ... 5 % u2 applies only on 3-phase systems | 0.15 % absolute within: 1 ... 5 % u0 1 ... 5 % u2 | 10 cyc (50 Hz) / 200 ms 12 cyc (60 Hz) / 200 ms |

Mains Signalling Voltage (Ripple Control Signal)

| Range | Accuracy | Time base / Interval |
|---------------------------------|--|-------------------------|
| Signalling Voltage ⁴ | Amplitude | 10 cyc (50 Hz) / 200 ms |
| f [Hz] | Amplitude | 12 cyc (60 Hz) / 200 ms |
| 40 - 400 | max 100 % | |
| - 1'500 | max. 40 % | |
| - 3'000 | max. 10 % | |
| | 3 .. 15 % of U _{din} ³ : ± 5 % | |
| | 1 .. 3 % of U _{din} : ± 0.15 % U _{din} | |

Dips and Swells of Voltage / Inrush Current

| Range | Accuracy | Time base / Interval |
|---|--|-----------------------------------|
| Amplitude Urms(1/2): 0.5 V ... 480 V ⁴ (1 % U _{din}) | Amplitude Urms(1/2): 0.2 % of U _{din} ³ | Urms(1/2), Irms(1/2) (sliding) |
| Amplitude Irms(1/2): max. 100 % of In ⁴ | Amplitude Irms(1/2): 0.5 % | |
| Duration U, I: 1 cyc – 10 min ^{4,5} | Duration U, I: 1 cyc | |

Interruptions of Voltage

| Range | Accuracy | Time base / Interval |
|--|-----------------|----------------------|
| Amplitude Urms(1/2): 0 V ... 24 V ⁴ (<1 % ... <10 % U _{din} ³) | | Urms(1/2) (sliding) |
| Duration: 1 cyc – 10 min ^{4,5} | Duration: 1 cyc | |

Notes

¹ related to the internal range (Un, In) final value (Full Scale, FS)

² at linear load, sinusoidal signals

³ declared input voltage U_{din}: 57.7, 63.5, 220, 230, 240 V (L-N)

⁴ individual per phase

⁵ variable start point of event in relation to zero crossing of fundamental: ±180° (Resolution: 1°)

⁶ for single frequency harmonics, interharmonics under steady-state conditions