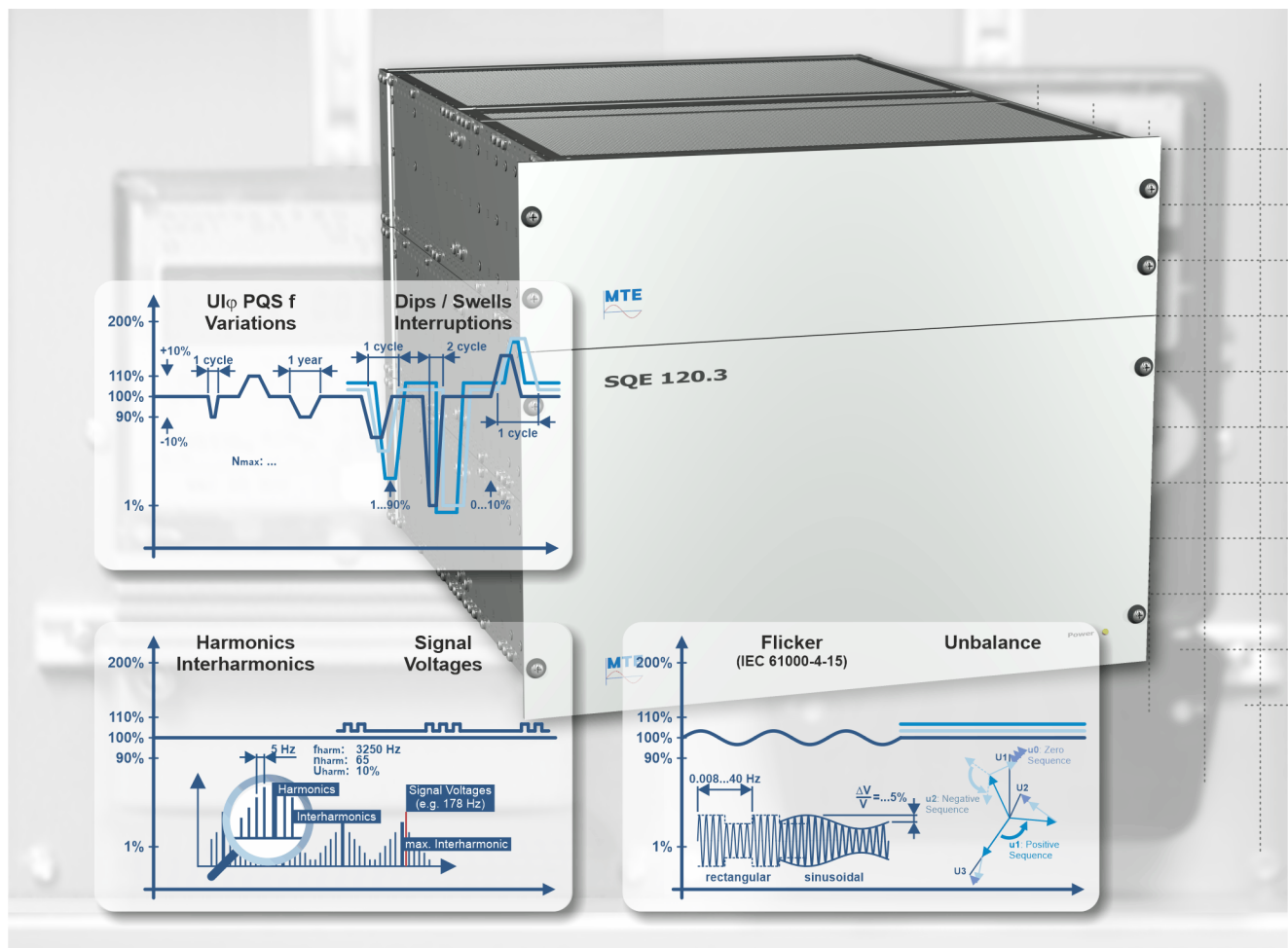


## SQE 120.3

### 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  $\phi$ : 3 x 0.00 ... 359.99° ( $\leq 0.1$  °)
- Frequency f (fundamental): 40 ... 400 Hz ( $\leq 0.01$  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  $\mu$ 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 Cc

|                       |                             |
|-----------------------|-----------------------------|
| 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><tr><th>Internal Range Un</th><th>S [VA]<sup>1</sup> (Peak Ũ / Î)</th></tr><tr><td>&gt;300 V ... 480 V</td><td>600 (746 V / 1.9 A)</td></tr><tr><td>&gt;150 V ... 300 V</td><td>600 (467 V / 3.1 A)</td></tr><tr><td>&gt;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></table> | Internal Range Un | S [VA] <sup>1</sup> (Peak Ũ / Î) | >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) |
| Internal Range Un         | S [VA] <sup>1</sup> (Peak Ũ / Î)                                                                                                                                                                                                                                                                                                                        |                   |                                  |                  |                     |                  |                     |                 |                     |              |                      |
| >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)                                                                                                                                                                                                                                                                                                                                    |                   |                                  |                  |                     |                  |                     |                 |                     |              |                      |
| Resolution:               | 0.01 % <sup>1</sup>                                                                                                                                                                                                                                                                                                                                     |                   |                                  |                  |                     |                  |                     |                 |                     |              |                      |
| Accuracy                  | ≤ 0.05 % (typical < 0.02 %) <sup>1</sup>                                                                                                                                                                                                                                                                                                                |                   |                                  |                  |                     |                  |                     |                 |                     |              |                      |
| Distortion factor:        | ≤ 0.5 % (typical < 0.3 %) <sup>2</sup>                                                                                                                                                                                                                                                                                                                  |                   |                                  |                  |                     |                  |                     |                 |                     |              |                      |
| 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><tr><th>Internal Range In</th><th>S [VA]<sup>1</sup> (Peak Î / Ũ)</th></tr><tr><td>&gt;80 A ... 120 A</td><td>600 (187 A / 7.8 V)</td></tr><tr><td>&gt;12 A ... 80 A</td><td>600 (124 A / 11.7 V)</td></tr><tr><td>&gt;1.2 A ... 12 A</td><td>480 (18.7 A / 62.2 V)</td></tr><tr><td>&gt;120 mA ... 1.2 A</td><td>48 (1.87 A / 62.2 V)</td></tr><tr><td>&gt;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></table> | Internal Range In | S [VA] <sup>1</sup> (Peak Î / Ũ) | >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] <sup>1</sup> (Peak Î / Ũ)                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                                  |                 |                     |                |                      |                 |                       |                   |                      |                   |                       |                |                      |
| >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 % <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                                  |                 |                     |                |                      |                 |                       |                   |                      |                   |                       |                |                      |
| Accuracy                  | ≤ 0.05 % (typical < 0.02 %) <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |                                  |                 |                     |                |                      |                 |                       |                   |                      |                   |                       |                |                      |
| Distortion factor:        | ≤ 0.5 % (typical < 0.3 %) <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |                                  |                 |                     |                |                      |                 |                       |                   |                      |                   |                       |                |                      |
| 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)<br>P: ≤ 0.01% (time base: 150s)           |
| Duration 2 min: | P: ≤ 0.015 % (time base: 1 - 1.5s)<br>fulfils Chinese standard JJG 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 <sup>4</sup><br>10 % ... 200 % U <sub>din</sub> <sup>3</sup> | U: 0.1 % of U <sub>din</sub> <sup>3</sup><br>within 10 ... 150 % U <sub>din</sub> | 10 cyc (50 Hz) / 200 ms<br>12 cyc (60 Hz) / 200 ms |
| I: 0 A ... 120 A <sup>4</sup>                                                 | I: 0.1 % <sup>1</sup>                                                             |                                                    |

### Harmonics / Interharmonics of Voltage, Current

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

### Flicker

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

### Unbalance of Voltage

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

### Mains Signalling Voltage (Ripple Control Signal)

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

### Dips and Swells of Voltage / Inrush Current

|                                                                                 |                                                                |                                   |
|---------------------------------------------------------------------------------|----------------------------------------------------------------|-----------------------------------|
| Range                                                                           | Accuracy                                                       | Time base / Interval              |
| Amplitude Urms(1/2):<br>0.5 V ... 480 V <sup>4</sup><br>(1 % U <sub>din</sub> ) | Amplitude Urms(1/2):<br>0.2 % of U <sub>din</sub> <sup>3</sup> | Urms(1/2), Irms(1/2)<br>(sliding) |
| Amplitude Irms(1/2):<br>max. 100 % of I <sub>n</sub> <sup>4</sup>               | Amplitude Irms(1/2):<br>0.5 %                                  |                                   |
| Duration U, I:<br>1 cyc – 10 min <sup>4,5</sup>                                 | Duration U, I: 1 cyc                                           |                                   |

### Interruptions of Voltage

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

#### Notes

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

<sup>2</sup> at linear load, sinusoidal signals

<sup>3</sup> declared input voltage U<sub>din</sub>: 57.7, 63.5, 220, 230, 240 V (L-N)

<sup>4</sup> individual per phase

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

<sup>6</sup> for single frequency harmonics, interharmonics under steady-state conditions