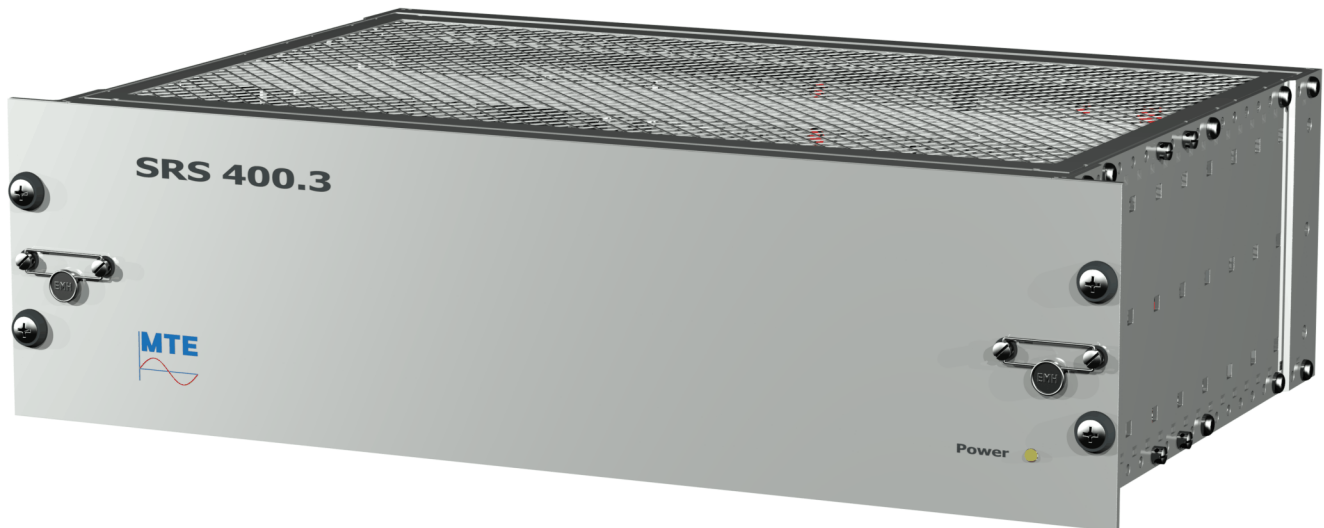# MTE Meter Test Equipment

SRS 400.3

Three-Phase Electronic System Reference Standard, Class 0.02

The SRS 400.3 three-phase electronic system reference standard has been especially developed for use with meter test systems.

The SRS 400.3 electronic system reference standard is a precision measurement unit for all AC values that are used in the measurement of energy. Its wide measurement range, high precision and excellent immunity to interference are the outstanding features of this instrument. It is the ideal measurement unit for verification of electricity meters in the test area.

This reference standard is operated completely via the RS 232C serial line interface.

Key features of the SRS 400.3

- Three-phase reference standard
- Precision measurement unit for AC values in the frequency range of 45 to 70 Hz
- Simultaneous availability of the measured values over the RS 232 C serial line interface
- Test of two, three and four-wire meters
- Integrated measurement connection mode switching

- Easy operation due to the use of processor technology
- Operation verification with error indication
- Integrated RS 232C serial line interface for data transmission and programmed operation using an external computer
- Current and voltage ranges:
  30 V to 520 V, 1 mA to 120 A

Other characteristics

Measurements are carried out in the four quadrants. They are valid for all AC operational modes, including the measurement of the power factor and the phase angle. Reactive power measurements may be made either in the natural or artificial connection mode. The measurement system uses the analogue/digital converter principle.

The operation and processing of the measured values is carried out using special operation commands from a personal computer. The internal, automatic, range selection may be switched off, and in this case the load point range is directly selected by the PC.

Technical Data SRS 400.3

Mains supply voltage:	88 ... 280 V, 45...66 Hz
Power consumption:	max. 20 VA
Housing:	19" plug-in unit, 3 HE
Dimensions:	W 483 x H 133 x D 342 mm
Weight:	approx. 6 kg
Influence of supply on the measuring results:	≤ 0.005% at 10% variation
Ambient temperature:	-10 °C ... +50 °C (Operating range) +10 °C ... +40 °C (Specified range)
Temp. Coefficient:	≤ 0.0025 % / °C +10°C ... +40°C ≤ 0.0050 % / °C -10°C ... +50°C
Frequency range of the measured quantities:	45 ... 70 Hz
Influence of external fields:	≤ 0.07 % / 0.5 mT
Time base:	1 (0.2 ... 9999) s

Current measurement (I)

Current range:	1 mA ... 12 A

Internal ranges:

1 mA	...	4 mA	$\alpha = 30000$
4 mA	...	12 mA	$\alpha = 10000$
12 mA	...	40 mA	$\alpha = 3000$
40 mA	...	120 mA	$\alpha = 1000$
120 mA	...	400 mA	$\alpha = 300$
400 mA	...	1.2 A	$\alpha = 100$
1.2 A	...	4.0 A	$\alpha = 30$
4.0 A	...	12.0 A	$\alpha = 10$

Display range:	1.0000 mA ... 12.0000 A
Measurement error:	$E \leq \pm 0.02$ % 4 mA ... 12 A of the measured value $E \leq \pm 0.02$ % 1 mA ... 4 mA of the measurement range final value
Current range:	10 mA ... 120 A

Internal ranges:

10 mA	...	40 mA	$\alpha = 3000$
40 mA	...	120 mA	$\alpha = 1000$
120 mA	...	400 mA	$\alpha = 300$
400 mA	...	1.2 A	$\alpha = 100$
1.2 A	...	4 A	$\alpha = 30$
4 A	...	12 A	$\alpha = 10$
12 A	...	40 A	$\alpha = 3$
40 A	...	120 A	$\alpha = 1$

Display range:	10.000 mA ... 120.000 A
Measurement error:	$E \leq \pm 0.02$ % 40 mA ... 120 A of the measured value $E \leq \pm 0.02$ % 10 mA ... 40 mA of the measurement range final value

Voltage measurement (U)

Voltage range:	30 V ... 520 V

Internal ranges:

30 V	...	65 V	$\beta = 8$
65 V	...	130 V	$\beta = 4$
130 V	...	260 V	$\beta = 2$
260 V	...	520 V	$\beta = 1$

Display range:	5.0000 ... 520.000 V
Measurement error:	$E \leq \pm 0.02$ % 30 V ... 520 V of the measured value

Power measurement (P, Q, S)

Power measurement per phase on range 30 ... 520 V. The accuracy of the power is related to apparent power

Measurement error (1 mA … 12 A):

Active, reactive, apparent power P, Q, S:	$E \leq \pm 0.02$ % 4 mA ... 12 A of the measured value
	$E \leq \pm 0.02$ % 1 mA ... 4 mA of the measurement range final value

Measurement error (10 mA … 120 A):

Active, reactive, apparent power P, Q, S:	$E \leq \pm 0.02$ % 40 mA ... 120 A of the measured value
	$E \leq \pm 0.02$ % 10 mA ... 40 mA of the measurement range final value
Display range:	6-digit for each measuring point

Energy measurement (W)

Connections and errors as under power measurement

Power factor (PF)

$$PF = \frac{P}{S} \qquad E \leq \pm 0.0002$$

Display range:	- 1.00000 ... + 1.00000

Phase angle display

Resolution:	0.01°
Accuracy:	$E < 0.01°$

Frequency inputs 1-3

Input level:	4 ... 12 V (24V)
Input frequency:	max. 200 kHz
Auxiliary voltage:	11 ... 13 V (I ≤ 60 mA)
Min. impulse length:	≥ 1 µs

Frequency output 1-3 (fo)

Output level:	5 V TTL short-circuit-proof
Range 12 A: 1 mA ... 12 A 120 A: 10 mA … 120 A	$\Sigma C_P = 1'125$ Imp./Wh

Output frequency:

$$f_o = \frac{\Sigma P \cdot \Sigma C_P \cdot \alpha \cdot \beta}{3600}$$

α, β The factors of the highest current and voltage range reached are to be substituted here.

Output frequency:	max. 58'500 Hz

Safety Requirements

- Isolation protection EN 61010-1
- $C\epsilon$
- Degree of Protection: IP-20
- Storage Temp.:   -20°C ... +55°C
- Relative humidity: ≤ 85% at Ta ≤ 21°C
- Relative humidity at 30 days/year: ≤ 95% at Ta ≤ 25°C