



## CheckSystem 2.1

Single-phase test system with class 0.2 reference standard and integrated single-phase current source up to 120 A



The CheckSystem 2.1 portable test system consists of an integrated single-phase current source and a single-phase electronic reference standard of accuracy class 0.2. Characteristic features of the CheckSystem 2.1 are its wide measuring range, high accuracy and high tolerance to unwanted external influences. The CheckSystem 2.1 allows the monitoring of meter installations as well as analysis of the local mains conditions.

### Advantages

- Easy verification of meters under precise load conditions, using the built-in, compact, current source
- Automatic operation using predefined load points without the need for an external PC
- Internal memory for storage of measurement results and customer data
- Display of vector diagram for analysis of the supply conditions
- User-friendly system for data input and operation of source and reference meter
- The system may be used either as a stand-alone reference standard meter, or together with the integrated power source

### Functions

- Independent generation of single-phase current loading conditions for verification of meters using the incoming supply voltage
- Active, reactive and apparent energy measurement with integrated error calculator and pulse output
- Vector diagram, harmonics spectrum and wave form display for analysis of the mains conditions
- Voltage measurement
- Current measurement directly or with UCT clamp-on CT
- Active, reactive and apparent power measurement
- Phase angle, power factor and frequency measurement

### Options

- Software CALSOFT for memory readout, online data logging, presentation and printout of results and customer data and for automatic test sequences.
- UCT120.1 clamp-on CT 120A (active error compensated)

# Technical Data CheckSystem 2.1 (class 0.2)

## General

Auxiliary supply:	Power may be taken from the auxiliary supply or the measuring circuit at: 88 VACmin ... 264 VACmax / 47 ... 63 Hz 125 VDCmin ... 372 VDCmax Protection: up to 440VACmax
Voltages Operation	10 V ... 300 V
Synchronisation	10 V ... 300 V
Power consumption:	max. 150 VA
Housing:	Hard Plastic
Dimensions:	W 273 x H 247 x D 178 mm
Weight:	approx. 5.6 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:	300V CAT III
Degree of protection:	IP-65 (housing closed) IP-30 (housing open)

## CURRENT SOURCE

<b>Current Range</b>	1 mA ... 120 A		
<b>Output power</b>	60 VA		
	<b>Internal Ranges</b>	<b>S<sub>max</sub> / U<sub>max</sub></b>	
	1 mA ... 12 mA	60 mVA / 5 V	
	12 mA ... 120 mA	600 mVA / 5 V	
	120 mA ... 1.2 A	6 VA / 5 V	
	1.2 A ... 12 A	60 VA / 5 V	
	12 A ... 80 A	60 VA / 0.75 V	
	80 A ... 120 A	60 VA / 0.5 V	
<b>Resolution</b>	0.1 % of end of internal range		
<b>Accuracy</b>	≤ 0.2 % of end of internal range		
<b>Distortion Factor</b>	≤ 0.8 %		
<b>Stability</b>	≤ 0.03 % (30 min.) ≤ 0.1 % (1 h)		
<b>Load Regulation</b>	≤ 0.01 % (from 0 % ... 100 % load)		
<b>Power Factor of Load</b>	1 – 0.1 ind.		
<b>Bandwidth</b>	30 Hz ... 1 kHz (-3 dB)		
<b>Phase Angle</b>	<b>Range</b>	<b>Accuracy</b>	<b>Resolution</b>
	-180° ... +180°	± 0.2°	0.1°
<b>Frequency</b>	<b>Range</b>	<b>Accuracy</b>	<b>Resolution</b>
Mode Line (synch. to input voltage)	40 Hz-70 Hz		
Mode NUM	40 Hz-70 Hz	± 0.01 Hz	0.01 Hz

## REFERENCE STANDARD - Measurement Range

Measuring Quantity	Range	Input / Sensor
<b>Voltage (phase - neutral)</b>	10 V ... 300 V	U, N
<b>Current</b>	1 mA ... 12 A	12 A
	1 mA ... 120 A	120 A
	10 mA ... 120 A	Clamp-on CT 120 A

## REFERENCE STANDARD - Measurement Accuracy

<b>Voltage / Current</b>	≤ ± E [%] <sup>1,2</sup>	
Measuring Quantity	Range	<b>Class 0.2</b>
<b>Voltage (U, N)</b>	46 V ... 300 V	0.2
	10V ... 46 V	1.0
<b>Current direct 12 A or 120 A</b>	12 mA ... 120 A	0.2
	1 mA ... 12 mA	0.2
<b>Current CT 120A UCT 120.1</b>	100 mA ... 120 A	0.2
	10 mA ... 100 mA	1.0

<b>Power / Energy</b>	Voltage: 46 V... 300 V (L - N)	≤ ± E [%] <sup>1,2,3</sup>
Measuring Quantity / Input I	Range	<b>Class 0.2</b>
<b>Active (P), Apparent (S) Power / Energy</b>		
Direct 12 A or 120 A	12 mA ... 120 A	0.2
	1 mA ... 12 mA	0.2
Current CT 120A UCT 120.1	100 mA ... 120 A	0.2
	10 mA ... 100 mA	1.0
<b>Reactive (Q) Power / Energy</b>		
Direct 12 A or 120 A	12 mA ... 120 A	0.4
	1 mA ... 12 mA	0.4
Current CT 120A UCT 120.1	100 mA ... 120 A	0.4
	10 mA ... 100 mA	1.0

Influence of external magnetic fields (45 Hz ... 66 Hz): ≤ 0.07 % / 0.5 mT<sup>3</sup>

Temperature coefficient (TC):

Range	≤ ± TC [%/°C] <sup>3</sup>
0° C ... +40°C	0.02
-10° C ... +50°C	0.05

<b>Frequency / Phase Angle / Power Factor</b>	≤ ± E	
Measuring Quantity	Range	
<b>Frequency (f)</b>	40 Hz ... 70 Hz	0.01 Hz
<b>Phase Angle (φ)</b>	0.00° ... 359.99°	0.1°
<b>Power Factor (PF)</b>	-1.000... +1.000	0.002

## Notes

- x.x : Related to the measuring value  
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E(M) = FS/M \* x.x (e.g. 0.2 at FS = 46 v, E(10V) = 46/10 \* 0.2 = 0.92 %)
- Fundamental frequency in the range 45 ... 66 Hz
- S: x.x, P, Q: x.x / PF (related to apparent power)

## Pulse Input / Output

REDEL 8-pole common input / output connector, suitable for scanning head SH 2003

Input level:	4 ... 12 VDC (24 VDC)					
Input frequency:	max. 200 kHz					
Input supply:	12 VDC (I < 60 mA)					
Output level:	5 V					
Pulse length:	≥ 10 μs					
<b>Meter constant:</b>	C = 120'000'000 / In					
Active, Reactive, Apparent [imp/kWh(kvarh,kVAh)]	The meter constant depends on the selected internal current range (In).					
	Internal current ranges In [A]					
Direct 12A	0.012	0.12	1.2	12		
Direct 120A	0.012	0.12	1.2	12	80	120
Current CT 120A UCT 120.1	0.12	1.2	12	120		
	Example: Clamp-on CT 120 A (In = 10 A) C = 120'000'000 / 10 = 12'000'000 [imp/kWh]					
Output frequency:	C' = C / 3'600'000 [imp/Ws(vars, Vas)] fo = C' * PΣ(QΣ, SΣ) f <sub>max</sub> = 120'000'000 / (10 * 3'600'000) * 10 * 300 = 10'000 [imp/s]					