



CheckSystem 2.1

Single-phase test system with class 0.2 reference standard and integrated single-phase current source



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
- Displays 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
- Voltage measurement
- Current measurement directly or with clip-on CT's
- Active, reactive and apparent power measurement
- Phase angle, power factor and frequency measurement

Uses

- On site meter measurements
- Verification of energy registration
- Verification of the circuit load conditions

Options

- Software CALSOFT for memory readout, online data logging, presentation and printout of results and customer data.
- 1 clamp-on CT 1000A (Measuring range: 10 mA ... 120 A, cable \varnothing : max. 52 mm)

Technical Data

General

Auxiliary supply:	Powered by the measuring circuit in the operating range: 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. 10 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 certified

Isolation protection:	IEC 61010-1:2002
Measurement Category:	300V CAT III
Degree of protection:	IP-54 (housing closed) IP-40 (housing open)

Current Source

Measuring Quantity	1 mA ... 120 A		
Current Range	1 mA ... 120 A		
Output power (at the final range value)	Internal Ranges	S _{max} / U _{max}	
	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 ... 120 A	60 VA / 0.5 V	
Resolution	1 mA ... 9.999 A	1 mA	
	10.00 A ... 99.90 A	10 mA	
	100.0 A ... 120.0 A	100 mA	
Accuracy	Better than 0.2 % *		
Distortion Factor	≤ 0.8 %		
Stability	Better than 0.03 % (30 min.) Better than 0.1 % (1 h)		
Load Regulation	≤ 0.01 % (from 0 % ... 100 %)		
Power Factor of Load	1 – 0.1 ind.		
Bandwidth	30 Hz ... 1 kHz	(-3 dB)	
Efficiency	≥ 75 %		
Phase Angle	Range	Accuracy	Resolution
	-180°/+180°	± 0.2°	0.1°
Frequency	Range	Accuracy	Resolution
Mode Line (synch. to input voltage)	40 Hz-70 Hz		
Mode NUM	40 Hz-70 Hz	± 0.01 Hz	0.01 Hz

Measurement Range

Measuring Quantity	Range	Input / Sensor
Voltage (phase - neutral)	10 V ... 300 V	U1, N
Current	1 mA ... 12 A 12 mA ... 120 A 10 mA ... 100 A 1 A ... 120 A	12 A 120 A Clamp-on CT 100A Clamp-on CT 1000A

Measurement Accuracy

Voltage / Current	≤ ± E [%] ^{1,2,4}	
Measuring Quantity	Range	Class 0.2
Voltage (L, N)	46 V ... 300 V 10V ... 46 V	0.2 1.0
Current direct 12 A or 120 A	12 mA ... 120 A 1 mA ... 12 mA	0.2 0.2
Current clamp-on CT 100A	100 mA ... 100 A 10 mA ... 100 mA	0.2 1.0
Current clamp-on CT 1000A	10 A ... 120 A 1 A ... 10 A	0.2 1.0

Power / Energy	Voltage: 46 V... 300 V (L - N)	≤ ± E [%] ^{1,2,3}
Measuring Quantity / Input I	Range	Class 0.2
Active (P), Apparent (S) Power / Energy		
Direct 12 A or 120 A	12 mA ... 120 A 1 mA ... 12 mA	0.2 0.2
Clamp-on CT100A	100 mA ... 100 A 10 mA ... 100 mA	0.2 1.0
Clamp-on CT1000A	10 A ... 120 A 1 A ... 10 A	0.2 1.0
Reactive (Q) Power / Energy		
Direct 12 A or 120 A	12 mA ... 120 A 1 mA ... 12 mA	0.2 0.2
Clamp-on CT100A	100 mA ... 100 A 10 mA ... 100 mA	0.4 1.0
Clamp-on CT1000A	10 A ... 120 A 1 A ... 10 A	0.4 1.0

Temperature coefficient (TC):	Range	≤ ± TC [%/°C] ³
	0 °C ... +40 °C	0.02
	-10 °C ... +50 °C	0.05

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

Notes

- ¹ x.x :Related to the measuring value
² x.x :Related to the measuring range final value (full scale, FS),
 $E(M) = FS/M * x.x$ (e.g. 0.2 at FS = 46 V, $E(10V) = 46/10 * 0.2 = 0.92\%$)
³ S: x.x, P,Q: x.x / PF (related to apparent power), 3- and 4-wire networks

Pulse Input / Output

LEMO 5-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				
Meter constant:	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	0.012	0.12	1.2	12	120
Clamp-on CT 100A	0.1	1	10	100	
Clamp-on CT 1000A	1.2	12	120		
	Example: Clamp-on CT 100A (In = 10 A) $C = 120'000'000 / 10$ $= 12'000'000$ [imp/kWh]				
Output frequency:	$C' = C / 3'600'000$ [imp/Ws(vars, Vas)] $f_o = C' * P\Sigma(Q\Sigma, S\Sigma)$ $f_{max} = 120'000'000 / (10 * 3'600'000) * 10 * 300 = 10'000$ [imp/s]				