

CheckSystem 2.1 S

Single-phase test system with class 0.05 reference standard and integrated single-phase current source up to 120 A



The CheckSystem 2.1 S portable test system consists of an integrated single-phase current source and a single-phase electronic reference standard of accuracy class 0.05. 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 S 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 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.
- Clamp-on CT 100A (active error compensated)

Technical Data CheckSystem 2.1 S (class 0.05)

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 ... 480 V
Synchronisation	10 V ... 480 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 certified

Isolation protection:	IEC 61010-1:2001
Measurement Category:	300V CAT III / 600V CAT II
Degree of protection:	IP-65 (housing closed) IP-30 (housing open)

CURRENT SOURCE

Current Range	1 mA ... 120 A		
Output power	60 VA		
	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 ... 80 A	60 VA / 0.75 V	
	80 A ... 120 A	60 VA / 0.5 V	
Resolution	0.1 % of end of internal range		
Accuracy	≤ 0.05 % of end of internal range		
Distortion Factor	≤ 0.8 %		
Stability	≤ 0.03 % (30 min.) ≤ 0.1 % (1 h)		
Load Regulation	≤ 0.01 % (from 0 % ... 100 % load)		
Power Factor of Load	1 – 0.1 ind.		
Bandwidth	30 Hz ... 1 kHz (-3 dB)		
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

REFERENCE STANDARD - Measurement Range

Measuring Quantity	Range	Input / Sensor
Voltage (phase - neutral)	10 V ... 480 V	U, N
Current	1 mA ... 12 A	12 A
	12 mA ... 120 A	120 A
	10 mA ... 100 A	Clamp-on CT 100A

REFERENCE STANDARD - Measurement Accuracy

Voltage / Current	≤ ± E [%] ^{1,2}	
Measuring Quantity	Range	Class 0.05
Voltage (U, N)	30 V ... 480 V	0.05
	10V ... 30 V	1.0
Current direct 12 A or 120 A	12 mA ... 120 A	0.05
	1 mA ... 12 mA	0.05
Current clamp-on CT 100A	100 mA ... 100 A	0.2
	10 mA ... 100 mA	1.0

Power / Energy		Voltage: 30 V... 480 V (L - N)	≤ ± E [%] ^{1,2,3}
Measuring Quantity / Input I	Range	Class 0.05	
Active (P), Apparent (S) Power / Energy			
Direct 12 A or 120 A	12 mA ... 120 A	0.05	
	1 mA ... 12 mA	0.05	
Clamp-on CT100A	100 mA ... 100 A	0.2	
	10 mA ... 100 mA	1.0	
Reactive (Q) Power / Energy			
Direct 12 A or 120 A	12 mA ... 120 A	0.1	
	1 mA ... 12 mA	0.1	
Clamp-on CT100A	100 mA ... 100 A	0.4	
	10 mA ... 100 mA	1.0	

Influence of external magnetic fields (45 Hz ... 66 Hz): ≤ 0.07 % / 0.5 mT³

Temperature coefficient (TC):	Range	≤ ± TC [%/°C] ³
	0° C ... +40°C	0.0025
	-10° C ... +50°C	0.0040

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

- x.x : Related to the measuring value
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 %)
- Fundamental frequency in the range 45 ... 66 Hz
- S: x.x, P, Q: x.x / PF (related to apparent power), 3- and 4-wire networks

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			
Meter constant:	C = 36'000'000 / (ln * Un)			
Active, Reactive, Apparent [imp/Wh(varh,VAh)]	The meter constant depends on the selected internal current (ln) and voltage (Un) ranges.			
	Internal current ranges ln [A]			
Direct 12A	0.004	0.012	0.04	0.12
	0.4	1.2	4	12
Direct 120A	0.004	0.012	0.04	0.12
	0.4	1.2	4	12
	26.6	80	120	
Clamp-on CT 100A	0.1	1	10	100
	Internal voltage ranges Un [V]			
U, N	60	120	240	480

Example: ln = 12A, Un = 240V
C = 36'000'000 / (12 * 240)
= 12'500 [imp/Wh]

Output frequency:	C' = C / 3'600 [imp/W(s,vars, Vas)] fo = C' * PΣ(QΣ, SΣ) f _{max} = 36'000'000 / (12 * 240 * 3'600) * 12 * 240 = 10'000 [imp/s]
-------------------	--