

PTS 3.3 C

Three-phase, fully automatic test system with class 0.05 reference standard and integrated three-phase current and voltage source



The PTS 3.3 C portable test system consists of an integrated three-phase current and voltage source and a three-phase electronic reference standard of accuracy class 0.05%. Characteristic features of the PTS 3.3 C are its wide measuring range, high accuracy and high tolerance to unwanted external influences.

The PTS 3.3 C 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 and voltage source
- Automatic operation with predefined load points without the need for an external PC
- Exchangeable Compact Flash (CF) memory card for measurement results and customer data
- Display of vector diagram and phase sequence for analysis of the supply conditions
- User-friendly system for data input and operation of combined 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 or three-phase loading conditions for verification of meters
- Active, reactive and apparent energy measurement for three phase, 3 or 4-wire, systems with integrated error calculator and pulse output
- Vector diagram, harmonics spectrum, wave form and rotary field display for analysis of the mains conditions
- Burden measurement of Current Transformer (CT) and Potential Transformer (PT)

Application

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

Options

- Software CALSOFT
- Error compensated clip-on CT's up to 100 A



Vector
diagram

Harmonics
analyses

Error
measurement

Burden
measurement

Harmonics
menu

Power source
setup menu

Adjustment
with regulators

Portable Reference Standard

Portable Power Source

Result
menu

Energy type
test step

Sequence
setup menu

Print
preview

Customer
address

Other checks
input

Storage and printout
of results together with
administrative data set (ADS)

Automatic Test Run

Technical Data PTS 3.3 C

General

Auxiliary voltage:	88 VAC _{min} ... 264 VAC _{max} , 47 ... 63 Hz
Power consumption:	400 VA _{max}
Housing:	Metal, rubber protectors
Dimensions:	W 465 x D 245 x H 365 mm
Weight:	approx. 18 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

Isolation protection:	IEC 61010-1:2001
Measurement Category:	300 V CAT III, 600 V CAT II
Degree of protection:	IP-20

Voltage Source

Range (phase - neutral):	30 V ... 480 V
Output power (per phase):	30 VA
Internal ranges (S _{max} / I _{max}):	300 V ... 480 (600) V (30 VA / 0.05 A) 150 V ... 300 V (30 VA / 0.10 A) 75 V ... 150 V (30 VA / 0.20 A) 30 V ... 75 V (30 VA / 0.40 A)
Distortion factor:	< 0.8 %
Resolution:	0.1 V
Accuracy:	0.3 % (45 Hz ... 100 Hz)
Stability:	0.03 % (30 min) / 0.1 % (1 h)
Bandwidth:	30 ... 2'000 Hz (3 dB)

Current Source

Range (per phase):	1 mA ... 120 A
Output power (per phase):	60 VA
Internal ranges (S _{max} / U _{max}):	10 A ... 120 A (60 VA / 0.5 V) 1 A ... 10 A (25 VA / 2.5 V) 1 mA ... 1 A (10 VA / 10 V)
Distortion factor:	< 0.8 %
Resolution:	min. 1 mA
Accuracy:	0.5 % (45 Hz ... 100 Hz)
Stability:	0.03 % (30 min) / 0.1 % (1 h)
Bandwidth:	30 ... 1'000 Hz (3 dB)
Phase angle:	-180.0 ° ... +180.0 °
Resolution:	0.1 ° (45 ... 100 Hz) / 1 ° (>100 Hz)
Frequency:	45 Hz ... 400 Hz
Resolution:	0.1 Hz (45 ... 100 Hz) / 1 Hz (>100 Hz)

Reference Standard - Measurement Range

Measuring Quantity	Range	Input / Sensor
Voltage (phase - neutral)	20 mV ... 480 V	L1, L2, L3, N U1, U2, U3, N
Current	1 mA ... 12 A	1A/10A (I1, I2, I3)
	10 mA ... 120 A	120A (I1, I2, I3)
	20 mA ... 100 A	Clamp-on CT 100A

Reference Standard - Measurement Accuracy

Voltage / Current		≤ ± E [%] ^{1 2}
Measuring Quantity	Range	Class 0.05
Voltage	30 V ... 480 V	0.05
	5 V ... 30 V	0.05
Current direct 1A/10A, 120A	40 mA ... 120 A	0.05
	1 mA ... 40 mA	0.05
Current clamp-on CT 100A	500 mA ... 100 A	0.2
	20 mA ... 500 mA	1.0
Burden Voltage(L1,L2,L3,N)	400 mV ... 5 V	0.5
	20 mV ... 400 mV	0.5

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

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 1A/10A or 120A	40 mA ... 120 A		0.05
	1 mA ... 40 mA		0.05
Clamp-on CT100A	500 mA ... 100 A		0.2
	20 mA ... 500 mA		1.0
Reactive (Q) Power / Energy			
Direct 1A/10A or 120A	40 mA ... 120 A		0.05
	1 mA ... 40 mA		0.05
Clamp-on CT 100A	500 mA ... 100 A		0.4
	20 mA ... 500 mA		1.0

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

Temperature coefficient (TC):

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

CT Burden		≤ ± E [%] ^{1 2 4}
I - Input / Range	U (L1, L2, L3, N)	
Direct 1A/10A		
40 mA ... 12 A	400 mV ... 5 V	0.55
	20 mV ... 400 mV	0.05 + 0.5
Clamp-on CT 100A		
500 mA ... 100 A	400 mV ... 5 V	0.7
	20 mV ... 400 mV	0.2 + 0.5

PT Burden		≤ ± E [%] ^{1 2 4}
I - Input / Range	U (L1, L2, L3, N)	
Direct 1A/10A		
40 mA ... 12 A	30 V ... 480 V	0.1
	30 V ... 480 V	0.05 + 0.05
Clamp-on CT 100A		
20 mA ... 500 mA	30 V ... 480 V	1.05

Notes

- ¹ 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. 0.05, FS =40 mA: E(10mA) = 40/10*0.05=0.2 %)
² Fundamental frequency in the range 45 ... 66 Hz
³ S: x.x; P,Q: x.x / PF (related to apparent power), 3- and 4-wire networks
⁴ E[%]: Accuracy of operating burden Sn [VA]

Pulse Input

Input level:	4 ... 12 VDC (24 VDC)
Input frequency:	max. 200 kHz
Input supply:	12 VDC (I < 60 mA)

Pulse Output

Output level:	5V
Pulse length:	≥ 1μs

Meter constant

Active, Reactive, Apparent [imp/Wh(varh,VAh)]	C = 72'000'000 / (In * Un) [... / Wh] The meter constant depends on the highest selected internal ranges of In, Un.
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Internal current ranges In [A]				
Direct 1A/10A	0.004	0.012	0.04	0.12
	0.4	1.2	4	12
Direct 120A	0.04	0.12	0.4	1.2
	4	12	40	120
Clamp-on CT 100A	0.8	4	20	100
Internal voltage ranges Un [V]				
L1,L2,L3,N / U1,U2,U3,N	60	120	240	480

Example: In = 12A, Un = 240V
C = 72'000'000 / (12 * 240) = 25'000
C' = C / 3'600 [imp/Ws(vars, VAs)]
fo = C' * PΣ(QΣ, SΣ)
f_{max} = 72'000'000 / (12 * 240 * 3'600) *
3 * 12 * 240 = 60'000 [imp/s]

Output frequency: