



## PTS 2.3 *genX*

Three-phase, fully automatic test system with a class 0.1 reference standard and integrated three-phase current source



The PTS 2.3 genX portable test system consists of an integrated three-phase current source unit and a three-phase electronic reference standard of accuracy class 0.1. Characteristic features of the PTS 2.3 genX are its wide measuring range, high accuracy and high tolerance to unwanted external influences.

The PTS 2.3 genX 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 with predefined load points without the need for an external PC
- Large 9" (800 x 480 pixels) TFT touch screen colour display with graphical user interface
- Data transfer and communication via USB (Type B), ETHERNET or WLAN
- Built in web server for remote display of graphical user interface and remote control of the unit
- Data storage on removable SD memory card
- Two USB (type A) connectors for connection of peripherals like mouse, keyboard

### Functions

- Independent generation of single- or three-phase current loading conditions for verification of meters using the incoming supply voltage
- 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)
- Ratio testing of Current Transformers (CT)

### Options

- Software CALegration
- UCT 120.3 set of 3 clamp-on CT's 120 A
- UCT 1000.3 set of 3 clamp-on CT's 1000 A
- UCT LEM.3 set of 3 flexible current probes FLEX 3000 (30/300/3000A)
- UCT AMP-LiteWire 3-phase adapter set for AmpLiteWire + primary high voltage current sensor AmpLiteWire 2000 A
- UCT VOLT-LiteWire 3-phase adapter set for VoltLiteWire + primary voltage sensor VoltLiteWire 40 kV

# Technical Data PTS 2.3 genX

## General

Auxiliary power supply:	Power may be taken from the auxiliary supply or the measuring circuit at: 88 VACmin ... 264 VACmax / 47 ... 63 Hz Protection: Switch off supply at > 276 VAC
Power consumption:	max. 400 VA
Housing:	Hard Plastic
Dimensions:	W 450 x D 297 x H 188 mm
Weight:	approx. 14.5 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 61010-1:2010
Measurement Category:	300V CAT III, 600V CAT II
Degree of protection:	IP-68 (housing closed) IP-40 (housing open)

## Current Source

<b>Current Range</b>	1 mA ... 120 A		
<b>Output power</b>	60 VA (per phase)		
	<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>	0.01 % of end of internal range		
<b>Accuracy</b>	≤ 0.1 % of end of internal range		
<b>Distortion Factor</b>	≤ 0.25 % on linear load		
<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 ... 3 kHz (-3 dB)		
<b>Phase Angle</b>	<b>Range</b>	<b>Accuracy</b>	<b>Resolution</b>
	-180° ... +180°	± 0.1°	0.01°
<b>Frequency</b>	<b>Range</b>	<b>Accuracy</b>	<b>Resolution</b>
Mode Sync (to input voltage)	40 Hz-70 Hz		
Mode Frequency	40 Hz-70 Hz	± 0.01 Hz	0.01 Hz
<b>Efficiency</b>	> 85 %		

## Reference Standard - Measurement Range

Measuring Quantity	Range	Input / Sensor
<b>Voltage (phase - neutral)</b>	5 V ... 500 V	U1, U2, U3
	10 mV ... 5 V	U1 (Burden)
<b>Current</b>	1 mA ... 12 A	12 A (I1, I2, I3)
	1 mA ... 120 A	120 A (I1, I2, I3)
	10 mA ... 120 A	UCT 120.3
	100 mA ... 1000 A	UCT 1000.3
	3 A ... 3000 A	FLEX 3000

## Reference Standard - Measurement Accuracy

Voltage / Current		≤ ± E [%] <sup>1 2 4</sup>
Measuring Quantity	Range	Cl. 0.1
<b>Voltage (U1, U2, U3, N)</b>	30 V ... 500 V	0.1
	5 V ... 30 V	0.2
<b>Current direct 12 A / 120 A</b>	10 mA ... 120 A	0.1
	1 mA ... 10 mA	0.1
<b>Current CT 120A UCT 120.3</b>	100 mA ... 120 A	0.2
	10 mA ... 100 mA	1.0
<b>Curr. CT 1000A UCT 1000.3</b>	10 A ... 1000 A	0.2
	1 A ... 10 A	1.0
<b>Current FLEX 3000 UCT LEM.3</b>	300 A ... 3000 A 30 A ... 300 A 3 A ... 30 A	0.1 + E <sub>M</sub>
<b>Burden Voltage (U1)</b>	500 mV ... 5 V	0.5
	10 mV ... 500 mV	0.5

Power / Energy		Voltage: 30 V ... 500 V (U - N)	≤ ± E [%] <sup>1 2 3</sup>
Measuring quantity / Input I	Range		Cl. 0.1
<b>Active (P), Apparent (S) and Reactive (Q) Power / Energy</b>			
Direct 12 A / 120 A (I1, I2, I3)	10 mA ... 120 A		0.1
	1 mA ... 10 mA		0.1
Current CT 120A UCT 120.3	100 mA ... 120 A		0.2
	10 mA ... 100 mA		1.0
Curr. CT 1000A UCT 1000.3	10 A ... 1000 A		0.2
	1 A ... 10 A		1.0

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

Temperature coefficient (TC):		≤ ± TC [%/°C] <sup>3</sup>
Range		Cl. 0.1
0° C ... +40° C		0.005
-10° C ... +50° C		0.008

Frequency / Phase Angle / Power Factor		≤ ± E
Measuring Quantity	Range	Cl. 0.1
<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

CT/PT Ratio		≤ ± E [%] <sup>1 2</sup>
<b>Ratio error E:</b> Sum of errors of inputs used for primary (IP, UP) and secondary (IS, US) measurements.		E <sub>P</sub> + E <sub>S</sub>

CT/PT Burden		≤ ± E [%] <sup>1 2</sup>
<b>Operating burden S<sub>n</sub>:</b> Sum of errors of inputs used for voltage (U) and current (I) measurement.		E <sub>U</sub> + E <sub>I</sub>

## Notes

- x.x: Related to the measuring value  
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E(M) = FS/M \* x.x (e.g. 0.1 at FS = 120 mA, E(20mA) = 120/20 \* 0.1 = 0.5 %)
- 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
- E<sub>M</sub>: Accuracy specified by manufacturer of clamp-on CT or sensor
- Typical values, determined on the basis of monthly calibrations and calculated by least square method

## Pulse Input / output

Input level:	4 ... 12 VDC (24 VDC)			
Input frequency:	max. 200 kHz			
Supply:	12 VDC (I < 60 mA)			
Output level:	5V			
Pulse length:	≥ 10µs			
<b>Meter constant:</b>	C = C <sub>0</sub> / (ln * Un)			
Active, Reactive, Apparent	C <sub>0</sub> = 60'000'000 [imp/Wh(varh, VAh)] The meter constant depends on the highest selected internal ranges ln, Un. The actual constant CPZ1 with unit [imp/Ws (vars, VAs)] is indicated on the display at frequency output.			
	Internal current ranges ln [A]			
Direct 12/120 A (I1, I2, I3)	0.004	0.012	0.04	0.12
	0.4	1.2	4	12
	40	80	120	
Current CT 120A UCT 120.3	0.12	1.2	12	120
Current CT 1000A UCT 1000.3	1	10	100	1000
FLEX 3000 UCT LEM.3	-	30	300	3000
	Internal voltage ranges Un [V]			
Burden U1	0.5	5		
Direct U1, U2, U3, N	250		500	
	Example: Un = 250 V, ln = 12 A C = 20'000 [imp/Wh(varh, VAh)]			
Output frequency:	CPZ1 = C / 3'600 [imp/Ws(vars, VAs)] f <sub>0</sub> = CPZ1 * PΣ(QΣ, SΣ) f <sub>max</sub> = CPZ1 * 3 * Un * ln = 5.55555 imp/Ws * 3 * 250V * 12A = 50'000 [imp/s] Factor 3 for 3-phase system			