

PONOVO POWER CO., LTD

2F, 4Cell, Tower C, In.Do Mansion

No.48A Zhichun Road, Haidian District

Beijing, China (Post Code 100098)

Office	TEL. +86 (10) 82755151 ext. 8887				
	FAX +86 (10) 82755257				
E-Mail	E-Mail Info@ponovo.com.cn				
Website	www.ponovo.com.cn				

PCT200 SERIES

CT/PT TEST SYSTEM USER MANUAL

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This manual represents the technical status for the moment of publishing. The product information, description and specifications mentioned in the manual do not have any contact binding force and PONOVO POWER CO., LTD remains the right to make modifications to the technical specifications and configurations without prior notice. PONOVO POWER PONOVO explicitly exonerates itself from all liability for mistakes in this manual

Notes:

In order to prevent static electricity, the PCT and test CT must be connected to ground safely before test.



Avoid electric shock accident when the output voltage is above 36V.



Short circuit is prohibited at output side while testing.



Connect wires in accordance with instructions.



External voltages and currents are prohibited to apply on the tester's output.



Avoid the equipment being wet by rain.

Contact manufacturer timely and do not repair it when device works abnormally.



Special Tips:

- CT/PT testing system (called PCT) is applied in the electromagnetic current transformer (CT) and electromagnetic voltage transformer (PT) of power system. It completes the following test items:
- CT load impedance
- CT secondary coil resistance (Rct)
- CT excitation characteristic
- CT ratio
- CT polarity
- PT ratio and polarity
- PT excitation characteristic

.

PCT is only used in the above fields and the wiring connection/ operations should be executed in the guide of the user manual. Any other usage is invalid. The users must operate PCT in the proper way. Otherwise, improper operation might cause damage. The manufacturer will not take any responsibility for such damages. The users assume all responsibilities and risks.

- 2. The power supply must be accordance with the requirements described in user manual.
- 3. Users can't maintain the PCT without manufacturer's authorization. Otherwise the warranty period is invalid.
- 4. Users can't disassemble the PCT without manufacturer's authorization. Otherwise the warranty period is invalid.

- 5. It is prohibited to maintain reform, extend or change the system or any other accessories.
- 6. Only original accessories are accepted in test and detection process.
- It is not allowed to connect or disconnect the test object in the operation process. The high voltage caused by energy, storing in external inductance, might damage the human, PCT and test object.
- 8. Make sure that the terminals of the test objects are not charging to exit the program.
- Please make wiring connection in the guide of user manual while making CT test. If the wiring is wrong, the high voltage might damage the CT or PCT.
- 10. Please make wiring connection in the guide of user manual while making PT ratio and polarity test. If the users connect the PCT output with the secondary side of PT, thousands of volts high voltage might be generated in the primary side and damage the PT or PCT.
- 11. Please make wiring connection in the guide of user manual while making PT excitation test. The PCT output must be connected with the secondary side of PT. If it is connected with the primary side of PT, it might damage the PT or PCT.
- 12. The data and parameters in the nameplate are only for reference. PONOVO explicitly exonerates itself from all liability for mistakes in this manual.

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1. General Description

1.1 Functions

		PCT200Li	PCT200i	PCT200Ai	PCT200Mi	
	CT type	Р	P, TP, M	P, TP, M(0.2S)	P, M(0.2S)	
	Ratio, polarity	٠	•	•	•	
	Coarse ratio	•	•	•	/	
	Guess ratio	•	•	•	/	
	Turn-ratio and error	/	•	•	•	
	Ratio error and phase	▲ (1000())			•	
	displacement	◆ (100%)	•	•	•	
	Rct	•	•	•	•	
	Burden	•	•	•	•	
ст	Excitation characteristic	•	•	•	/	
СТ	CT demagnetization	•	•	•	•	
	Knee point (V-I)	•	•	•	/	
	Remanence flux (Kr)	/	•	•	/	
	Secondary time constant				1	
	(Ts)		•	•	1	
	Unsaturated inductance				/	
	(Lu)	•	•	•	7	
	Saturated inductance (Ls)	/	•	•	/	
	Safety factor (FS)	/	•	•	•	
	Accuracy limit factor (ALF)	•	•	•	/	
	Composite error (ɛc)	/	•	•	/	

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	Eal	/	•	•	/
	Transient area factor (Ktd)	/	•	•	/
	Rated symmetrical			♦	/
	short-circuit current ratio	/	•		
	(Kssc)				
	Peak instantaneous error	1		♦	/
	٤	1	•		
	Guess nameplate	•	•	♦	Assessment
	Report tools	•	•	♦	•
	Ratio	•	•	♦	/
PT	Polarity	•	•	♦	/
	Excitation characteristic	/	•	•	/

Notes: The symbol " \blacklozenge " indicates it has the function.

The symbol "/" indicates there it doesn't have the function.

1.2 Technical Specifications

	Items	PCT200Li	PCT200i	PCT200Ai	PCT200Mi						
Output voltage range		0-120V									
Output range	current		0-5Arms (15A peak)								
Output	power		0.001-	500VArms (1500VA peak)							
	Ratio test range	5000:1, 5000:5	35000:-45000:5	35000:-45000:5	35000:-45000:5						
T type CT	Ratio test accuracy Max. knee	1-5000 0.10%Typ. 0.20% Gur	1-2,000 0.05%Typ. 0.10%Gur 2,000-5,000,0.08%T yp.0.15%Gur 5,000-30,0000, 0.10%Typ. 0.20%Gur	1-2,000 0.02%Typ. 0.05%Gur 2,000-5,000,0.03%Typ0. 10% Gur 5,000-30,0000, 0.05%Typ. 0.20%Gur	1-2,000 0.02%Typ. 0.05%Gur 2,000-5,000.03%Typ.0.1 0%Gur 5,000-30,000, 0.05%Typ. 0.20%Gur						
	point voltage	5,000V	45,000V	45,000V	/						
	Burden test accuracy	±0.1%±1m Ω	±0.05%±1mΩ Typ. ±0	.1%±1mΩ Gur.							
	Winding resistance test accuracy	±0.1%±1m Ω	±0.05%±1mΩ Typ. ±0.1%±1mΩ Gur.								
M type	Ratio error		±0.10%Typ.±0.20% Gur	±0.05%Typ. ±0.10%Gur	±0.02%Typ. ±0.05%Gur						
СТ	Phase displaceme		5min Typ. 10min Gur.	1min Typ. 3min Gur. 0.01min	1min Typ. 2min Gur. 0.01min						

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	nt	0.1min									
Main a	upply	110-2	110-240Vac/50-60Hz(Nominal)								
Main s	ирріу	90-260Vac/45-65Hz (Permissible)									
Operat	ion		-10℃~50℃								
temper	rature										
Relativ	e humidity	≤9	00%, non-condensing								
Dimens	sions	470	x200x245mm (WxHxL)								
Weight	t		11kg								
LCD di	isplay	8.4 inch, color display									
Operat	ing system		Windows								

1.3 Features

- Apply the newest principle of multi point DC method and meet the standards of IEC 44-6 and GB 16847.
- Measure ratio differential and angle differential accurately. The max ratio differential error is ±0.1%, max angle differential error ±3min and the ratio measurement range is 1~35,000.
- Calibration certificate approved by Wuhan High Voltage Institute. The report includes: angle differential, ratio differential test and stability test.
- 8.4 inch LCD with colorful graphical interface for HMI.
- The whole integration structure, anti-vibration and anti-electromagnetic interference combination chassis.
- Built-in computer for operation. All test items are completed automatically.
- Light weight and small dimension due to small voltage and power output.
- Built-in linear amplifier for quick response and high accurate. The max output AC voltage is 120V and max output current is 5Arms (15A peak value).
- The voltage measurement method is used to test CT.
- The highest test knee point voltage of CT is about 45,000V. And the excitation characteristic test speed is fast. These features surpass that of traditional analyzer.
- Apply to various types of CT (including TP type) excitation, ratio, polarity, secondary winding resistance, load, ratio differential and angle differential etc steady-state or transient characteristic test.
- Automatically test knee point voltage/ current, 5%/ 10% error curve, ALF, FS, Ts, and Kr etc CT parameters.
- Users can select ten groups of excitation data to save.
- It lists the ratio error and phase error table and changes the report data in condition the rated current 1%-300% be set.
- The PCT automatically memories test items, report items, and report setting items.
- The report can be converted into EXCEL format in PC. More than thousands of reports are saved in it for checking and printing.
- Users can export the test results by U disk as well as upgrade.
- The report tool software is convenient for report saving, converting and analyzing which is for

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data contrast, judgment and assessment.

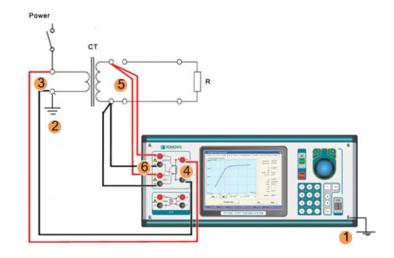
- User-defined test according to the defined standards.
- PT test items: ratio, polarity and volt-ampere characteristic.

1.4 Operation Preparation

Preparation:

CT secondary side load loop disconnection and secondary winding off-grounded CT primary side disconnects with busbar

Order of connection:



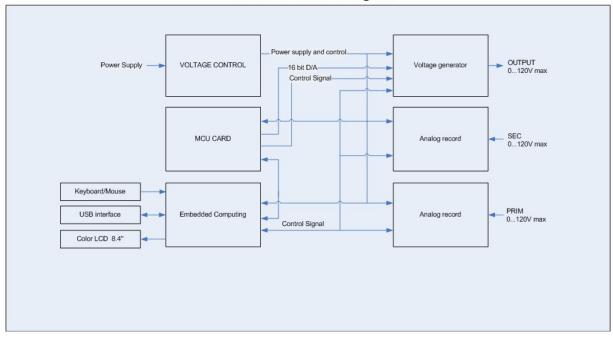
- 1. The chassis of PCT is grounded.
- 2. One end of CT primary side grounded (P2)

Note: There is a grounding switch in one side of primary. No matter the grounding switch is in P1

or P2, only one end is supposed to ground.

- 3. The test lead connects with P1, P2 of CT.
- 4. The other end of the lead connects with P1, P2 of PCT200i.
- 5. One secondary side connects with one group of CT's S1 and S2
- 6. The other Secondary side connects with S1, S2 of PCT200i.
- 7. Power on

1.5 Block Diagram



Serial PCT200i Diagram

2. Panel Description



- 1) Connecting CT secondary side
- 2) Secondary side voltage test while testing CT/PT (PT Excitation only)
- 3) Primary side voltage test while testing CT
- 4) Connecting PT primary side
- 5) Secondary side voltage test while testing PT
- 6) Run lamp: output indicator--flashing while outputting
- 7) Rotary encoder: selecting menu and setting specifications
- 8) Run and stop buttons
- 9) Keyboard
- 10) USB interface
- 11) LCD display



3. Operation Instruction

3.1 Select Test Functions

Choosing main menu button at any interface to enter, then rotating rotary encoder to change the cursor position and select specified testing button. The selected operation is displayed in the below.

🦸 PCT200i 👽							
CT Settings	CT Excita.	CT Ratio	CT Rct/Polarity.	Demagnet/Burden	CT Auto T	est PT Test	Report
⊤ CT Pola	rity	Run		CT Rct (1A) 25°C 75°C 0 • • ○ Ru		Stop	(Ω) (Ω) (Ω)
CT Dem	agnet.			Burden Z:		(Ω)	
	Run	Ş	Stop	Ru	n	Stop	•)
ок						11:38	2012-6-12

3.2 Set Test Parameters

Set variable parameters by pushing keyboard and pressing mouse.

3.3 Control Output

The run and stop buttons on the panel or the start test and stop test functions can control the output. While output, the operation indicator will flash.

3.4 Save Test Report

After testing, select the report menu and enter into report save interface. The report name is put in by keyboard and the content is selected by mouse selection. The report is saved automatically in the CT report file. The report can be copied and converted into EXCEL format in PC by U disk.

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€ PCT200i v4.0.5			
CT Settings CT Excita. CT R	atio CT Rct/Polarity/Demagnet./Burden	CT Auto Test PT Test	Report
CT Save Report			
Report Name:			
Contents:			
🔽 V-A Data	i⊽ Polarity	report tools	
🔽 Ratio Data	⊽ Rct		
i⊄ Burden	I⊄ Coarse Ratio I⊄ Select None	Save	
PT Save Report			
		Save	
ок		11:39	2012-6-12

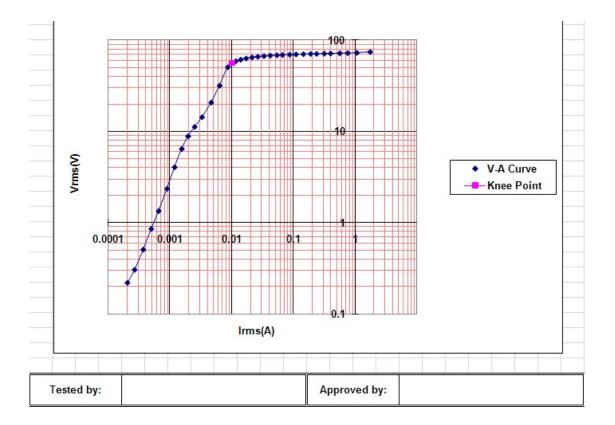
There are two ways to view test reports locally.

One is to view the test results in **Report tools**. The other way is to view in EXCEL format in PC.

The following is sample test report, A4.

			PC	T200	i Repor	t				
Repo	ort:	Nort	h Klang Strai	ts SS	C	T SN:	-		0	
CT Type: Class 0.5				1	Date:		2010	-3-10 0:00		
				Sett	tings					
CT Ty	pe:		Р		Free	uency :			50HZ	
Power F		-	0.8			Current ((A):		1200	
Secondary C	urrent (A):		1			Burden(V/			15	
CT Tempera	ature (C°):		25		W	inding:		15	1 152	
Stand	ard:		60044-1			ALF:			5P	
Composit	e Error:		5P							
				Res	sults					
Excit	ation									
Knee Po	int(V):		56.49							
Knee Po	int(A):		0.01009							
Ts			1.1651							
Kr	•		0.5694							
Lu			16.6							
Ls			0.36							
Composit	e Error:									
Rated	ated Ratio:									
Rat			1200:0.9999							
Ratio Err	ror (%):		-0.014							
hase Displac			3.345							
Turn Ratio	Error(%):		-0.301							
Turn R	atio:		1196.392							
Bure	den									
Burder	n(Ω):		0							4
Pol	arity				I			1		
	arity :		Positi	ve						
RCT 1.883										
Rct(75C°): 2.246										
q.			LILI							
				Ra	tio (lpr	%)				
VA	COSΦ	1%	5%	20%	100%	120%				
15	0.8				-0.01385					
	010			_	3101000			1		

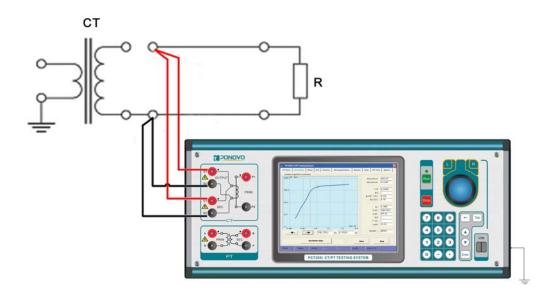
			Pł	nas	se l	Displa	ceme	nt(min)	(lpn%	6)		
V	A	COSΦ	1%	59		20%	100%		0%	<u></u>	-,		
1	5	0.8					3.3451						
			Irms			Vrms	Irms		V	ms	Irm	ne l	Vrms
	Standard		1.7125			.1968 V	0.0532			332 V	0.003		14.3357
			1.0474 /	-		7246 V	0.0415 A		67.8283 V		0.002	1	11.2026
Characteristic			0.7407			.2054 V	0.0328		66.	97 V	0.001	9 A	8.8421 V
teri			0.5512 /	1	71	.8511 V	0.026	A	1.2003	603 V	0.001	5 A	6.4353 V
Lac			0.392 A		71	.4819 V	0.021	A	64.7	667 V	0.001	2 A	4.0507 V
-Pa			0.311 A		71	2662 V /	0.0169	Α	63.1	49 V /	0.000	9 A	2.3488 V
		60044-1	0.2326 /	1	70	.9244 🖌	0.0138	Α	61.2	065 🖌	0.000	6 A	1.34 V
Excitation		00	0.1864 /	1	70	.6861 V	0.0115	Α	58.8	584 V	0.000	5 A	0.8541 V
Cit		9	0.1426 /	1	70	2865 V	0.0098	Α	55.6	582 V	0.000	4 A	0.5055 V
Ê			0.1082 /	1	69	.8885 V	0.0085	Α	50.5	515 V	0.000	3 A	0.304 V
			0.0854 4	1	69	.4875 V	0.0063	Α	/31.7	101 V	0.000	2 A 🔻	0.2187 V
			0.0654 4	1	68	.9856 V	0.0046	A	20.7	487 V			
	Jser D												



4. Burden Test

4.1 Wiring Connection

Connecting the instrument transformer according to the below direction, while doing secondary load impedance test.



Wiring direction: The transformer's output end S1 and testing end S1 are connected with one side of secondary load the CT.

The transformer's output end S2 and testing end S2 are connected with the other side of secondary load of the CT.

4.2 Test Operation

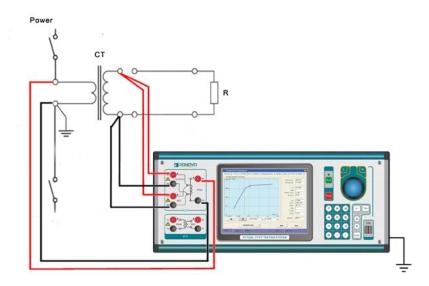
Entering the main menu and selecting the **Rct/polarity/demagnification/load impedance test** unit, CT secondary burden measuring can be done. After entering this unit and moving the mouse in the load impedance testing zone, the test software button is automatically available. The load impedance test can be finished pressing start button. The test result will be shown in the data fill bank, after testing, it stops automatically and the cursor is off.

€ PCT200i ¥4.0.5					×
CT Settings CT Excita. CT Ratio	CT Rct/Polarity/Demagn	net./Burden	CT Auto Test	PT Test	Report
CT Polarity		CT Rct (1A) 25°C 75°C 0 € °C Run			(Ω) (Ω) (Ω)
CT Demagnet.	В	Surden			
		z:		(Ω) (VA)	
Run	Stop	Rui	1	Stop	
ок			11:4	0	2012-6-12

5. CT Test

5.1 Wiring Connection

While doing the CT secondary coil resistance, polarity, excitation, demagnetization and ratio test, the instrument transformer tester should be connected according to the below diagram.



Wiring direction: The transformer's output S1 and testing side S1 are connected with one side of CT secondary.

The transformer's output S2 and testing side S2 are connected with the other side of CT secondary.

The transformer's primary test side P1 is connected with one side of CT primary.

The transformer's primary test side P2 is connected with the other side of the CT primary.



The comparison between four-cable and two-cable testing:

The transformer secondary tap is connected by claps and the following four-cable connection is applied.



Four-cable connection

Two-cable connection

Otherwise, the chuck resistance might affect measuring result and the CT tester might list the incorrect measuring result.

Four-cable connection: CT output terminal and input terminal are connected with tested objects by different claps.

Every testing cable needs a clap.---CORRECT

Two-cable connection: Single testing cable is applied in CT output terminal and input terminal. But the testing cable is connected with the transformer by a public clap.

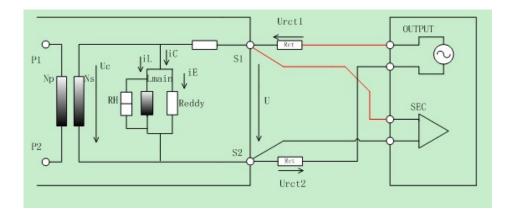
Two testing cables use a public clap.---INCORRECT

Physics background:

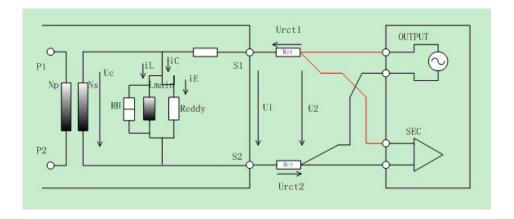
While two-cable is applied, if there is contact resistance in the CT clap, there will be big measuring error between the differential error and other parameters. Because the contact resistance might have change when the clap connect or disconnect with CT, the measuring result can't be repeated.

The max. contact resistance of two claps will be 0.5 and the max. overload would be 12.5VA. For this, the lower the CT coil resistance, the bigger the contact resistance's effect. When testing a 5ACT, such contact resistance might cause a completely wrong result. But if a higher resistance such as 10Ω , the error can be igored. So the four-cable conection is absolutely applied in 5ACT

testing. Showing as the following diagram:



Four-cable connection: The testing will not be affected by voltage drop, the CT testing result is correct.



Two-cable connection: The measuring voltage includes the voltage drop that clap contact resistance generates, then the CT measuring result might be incorrect.

5.2 Test Operation

5.2.1 Settings

Select CT parameter setting menu after entering into main menu. The CT nameplate parameters can be set by mouse or keyboard. The testing result will be correct on condition that the settings are right.

The related parameter settings are based on the selected CT type. All the parameters can be selected in the drop-down menu or by mouse.

P type CT parameter setting:

€ PCT200i ₩4.0	0.5					X
CT Settings	CT Excita.	CT Ratio	CT Rct/Polarity/	Demagnet./Burden	CT Auto Test PT	Test Report
Report Inform	nation					
He	ad:					
s	SN:			Type:		Clear
Time Reset	2012	2-6-12	11:42:39	Winding: 1	s: 1 s: 2	Result
Settings						
CT Type:	P	•	lpn(A):	600 •	VA:	15 🔹
Standard:	60044-1	•	Isn(A):	5 🔹	Extention(%):	120 💌
f:	50Hz	•	ες:	5P 🔹	T-meas(°C):	25
cosφ:	0.8	-	ALF:	20 🔹	Seq:	C-0 -
Ktd:		_	<ssc: 3="" th="" ▼<=""><th>Seq time test(</th><th>tal' 40</th><th>ť 100</th></ssc:>	Seq time test(tal' 40	ť 100
Ts(ms):	:]	Τp	o(ms): 20 🗾	t" 100	tal" 40	tfr 300
ОК					11:42	2012-6-12

TPY type CT parameter setting:

CT Settings Excita. Ratio Rct/Polarity/Demagnet/Burden Auto Test PT Test Report Report Information Head:	PCT200i								
Head: SN: Type: Clear Time Reset: Winding: 1 S: 1 S: 2 Settings PITP/M: TPY Ipn(A): 600 VA: 15 Standard: 60044-6 Isn(A): 1 Extention(%): 120 f: 50HZ cc: 5P T-meas(C): 25 cosqo: 0.8 ALF: 20 Seq time test(ms) Ktd: Kssc: 3 Seq time test(ms) tar r	CT Settings	Excita. R	atio Rct/Po	larity/Demag	gnet./Burde	en Auto	Test PT	Test Rep	oort
SN: Type: Clear Time Reset: Winding: 1 S: 1 S: 2 Settings PITP/M: TPY Ipn(A): 600 VA: 15 • Standard: 600044.6 Isn(A): 1 × Extention(%): 120 • f: 50HZ ec: 5P T-meas(C): 25 cosop: 0.8 ALF: 20 Seq time test(ms) Ktd: Kssc: 3 Seq time test(ms) tar r									
Time Reset: Winding: 1 S: 1 S: 2 Result Settings P/TP/M: TPY Ipn(A): 600 ✓ VA: 15 ✓ Standard: 60044.6 Isn(A): 1 ✓ Extention(%): 120 ✓ f: 50HZ cc: 5P ✓ T-meas(C): 25 cosq: 0.8 ALF: 20 ✓ Seq: C-O ✓ Ktd: ✓ Kssc: 3 ✓ Seq time test(ms) tar t T	н	ead:							
Time Reset: Winding: 1 S: 1 S: 2 Settings P/TP/M: TPY Ipn(A): 600 VA: 15 • Standard: 600044.6 Isn(A): 1 VA: 15 • f: 50HZ ec: 5P T-meas(C): 25 cosq: 0.8 ALF: 20 Seq time test(ms) Ktd: Kssc: 3 Seq time test(ms) tar r		SN:			Тур	ə: 🗌			
P/TP/M: TPY Ipn(A): 600 VA: 15 • Standard: 60044.6 Isn(A): 1 • Extention(%): 120 • f: 50HZ cc: 5P * T-meas(C): 25 cosq: 0.8 • ALF: 20 Y Seq: CO • Ktd: * Kssc: 3 Y Seq time test(ms) tar t	Time Res	et:			Winding	j: 1	s: 1	s: 2	Result
P/TP/M: TPY Ipn(A): 600 VA: 15 • Standard: 60044.6 Isn(A): 1 • Extention(%): 120 • f: 50HZ cc: 5P • T-meas(C): 25 cosqo: 0.8 • ALF: 20 • Seq: CO • Ktd: Kssc: 3 Seq time test(ms) tar t	Settinas								
Standard: 60044.6 • Isn(A): 1 • Extention(%): 120 • f: 50HZ • sc: 5P • T-meas(C): 25 cosp: 0.8 • ALF: 20 • Seq: CO • Ktd: • Kssc: 3 • Seq time test(ms) tar r	-	750	_		000			r	45
f: 50HZ cc: 5P T-meas(C): 25 cosp: 0.8 ALF: 20 Seq: CO Ktd: X Kssc: 3 Seq time test(ms)	P/TP/M:	IPY	<u> </u>	lpn	(A): 600	•		VA:	15 -
cosp: 0.8 ALF: 20 Seq: CO Ktd: Kssc: 3 Seq time test(ms)	Standard:	60044-6	•	Isn	(A): 1	•	Exter	ntion(%):	120 -
cosφ: 0.8 ✓ ALF: 20 ✓ Seq: C-O ✓ Ktd: ▼ Kssc: 3 ✓ Seq time test(ms) tar t <td>f:</td> <td>50HZ</td> <td>•</td> <td></td> <td>εc: 5P</td> <td>-</td> <td>T-n</td> <td>neas(C):</td> <td>25</td>	f:	50HZ	•		εc: 5P	-	T-n	neas(C):	25
Ktd: Kssc: 3 Seq time test(ms)	cosφ:	0.8	-	۵	LE· 20	-			
Ktd: V Kssc: 3 V tar r								004. 1	
Ts(ms): ▼ Tp(ms): 40 ▼ t" tal" tfr	Kt	d: 💽 💌	Ks	sc: 3 💌] Seq t	ime test(i			r 🗌
	Ts(ms	;): 🗾 🗖	Tp(n	ns): 40 💌] ť		tal"		tfr 🗌
CAPS NUM INS SCR. 13:19 2010-11-1	10								

M type CT parameter setting:

€ PCT200i v4	. 0. 5				
CT Settings	CT Excita. CT	Ratio CT Rct/Polarity/	Demagnet./Burden	CT Auto Test PT	Test Report
Report Info	rmation				
F	lead:				
	SN:		Type:		Clear
Time Res	et: 2012-6-	12 11:42:39	Winding: 1	s : 1 s : 2	Result
Settings					
CT Type:	M	lpn(A):	600 -	VA:	15 🔽
Standard:	60044-6 -	lsn(A):	5 -	Extention(%):	120 -
f:	50Hz -	Class:	0.2 -	T-meas(°C):	25
cosφ:	0.8 •	FS:	5 •	Seq:	C-0 🔽
Kt	d:	Kssc: 3 🔽	Seq time test(n	ns) tal' 40	ť 100
Ts(ms	3):	Tp(ms): 20 🔽	t" 100	tal" 40	tfr 300
ок				11:43	2012-6-12

5.2.2 Rct Measuring

CT secondary winding resistance test can be done after selecting the **Rct/Polarity/Demagnet/ Burden** measuring unit. Entering the Rct measuring unit, the secondary winding Rct can run automatically after pressing the run button. The measuring result 25° C means the resistance at current temperature and the 75° C means the resistance at 75° C. After testing, it stops automatically and the lamp is off.

f PCT200i 🛛 4.0.5			
CT Settings CT Excita. CT Ratio	CT Rct/Polarity/Demagnet /Burden	CT Auto Test	PT Test Report
CT Polarity	CT Rct (1A) 25°C 75°C 0 -		(Ω) (Ω) (Ω) Stop
CT Demagnet.	Burden		
	Z: [(Ω) (VA)
Run	Stop	in	Stop
ок		11:4	40 2012-6-12

5.2.3 Demagnetization

CT demagnetization can be done after selecting the **Rct/Polarity/Demagnet/ Burden** unit. The process will automatically run when entering the unit and pushing the run button. After the process, it will automatically stop and the lamp is off.

€ PCT200i v4.0.5		
CT Settings CT Excita. CT Ratio	CT Rct/Polarity/Demagnet /Burden	CT Auto Test PT Test Report
CT Polarity		Ω)
CT Demagnet.	Burden	
	Z:	(Ω) (VA)
Run	Stop F	Run Stop
ок		11:40 2012-6-12

5.2.4 Polarity Test

CT polarity check can be done after selecting the **Rct/Polarity/Demagnet/ Burden** unit. The polarity test is automatically finished while pushing the run button. It stops automatically and the lamp is off. The test method is negative polar.

🕻 PCT200i 👽	. 0. 5							
CT Settings	CT Excita.	CT Ratio	CT Rct/Polari	ity/Demagnet./	Burden	CT Auto	Test PT Test	Report
∼CT Pola		tun]	CTF	Rct (1A) 25°C 75°C ▼°C Ru		Stop	(Ω) (Ω)] (Ω)
CT Dem	agnet.			Bur	den			
					z:		(Ω)	
							(V/	4)
	Run	\$	Stop		Ru	n	Stop	
ок							11:40	2012-6-12

5.2.5 Excitation Test

				Demagne	ciburden		PT Test Report
-A Curvel	(logarithmi) ms	c coordina		****		Result	/-kn(V): 39.75 I-kn(A): 0.11482
0.0							εc≤ FS≤ 14.49
.0						F	5*(Ω): 0.211 Rct(Ω): 0.177 Eal(ν):
.1	/						Kr: 0.7771 Ts(s): 2.9189 Lu(H): 2.02
.01	/						Ktd: ε^(%): Ls(H): 0.04
.001	0.001	0.01	0.1	1.0			
<-Cursor	Cursor-	0.15	M 0.00245	~	Add to report (0)	St	andard: 60044-1
V-A Data	a					Run	Stop

CT excitation test can be done after selecting the Excita. unit.

The test will automatically run while entering the **Excita.** unit. It stops automatically after test and the lamp is off.

The test result displays in curve, and the voltage and current are shown at knee point.

Red cross will be shown at the knee point.

Press Cursor left, Cursor right or put in figures related to the value to observe.

Press excitation button, the excitation curve can be changed into data table pressing V-A data to check every voltage, current, magnetic flux and inductance.

-A Da				olarity/Demagn		uto Test PT Test Repo
	Urms(V)	Irms(A)	lpeak(A)	Remanence	L(H)	V-kn(V): 47.78
1	68.472	2.78174	8.71762	0.15486	0.03536	I-kn(A): 0.11578
2	67.930	2.15382	6.54196	0.15459	0.04674	
3	67.317	1.66745	4.90551	0.15427	0.06177	εε≤ 0.06146
4	66.647	1.29740	3.69061	0.15391	0.08129	FS≤
5	65.898	1.01314	2.75533	0.15352	0.10766	Rct75°(Ω): 0.216
6	65.053	0.80147	2.06569	0.15298	0.14176	Rct(Q): 0.181
7	64.067	0.64141	1.55620	0.15222	0.18532	Eal(v):
8	62.824	0.51731	1.16801	0.15123	0.24213	Kr: 0.7786
9	60.927	0.40276	0.87406	0.15057	0.31379	Ts(s): 5.3488
10	58.800	0.31419	0.65471	0.14901	0.40429	Lu(H): 2.01
11	56.299	0.24392	0.49109	0.14668	0.51606	Ktd:
12	53.469	0.18795	0.36757	0.14364	0.65482	ε*(%):
13	50.428	0.14450	0.27584	0.13993	0.82296	Ls(H): 0.05
14	47.295	0.11129	0.20707	0.13514	1.02818	E.G.(1).
					-	Standard: 60044-1
V-A (Curve				Ru	n Stop

5.2.6 Ratio Test

CT ratio test can be made in Ratio test. CT ratio, differential, angle difference, composite error and turns ratio error can be automatically tested.

When the test is completed, it stops automatically and the lamp is off.

Rated Parame	eter					
Ratio:	Ratio(%):	Phase(r	nin): N:		%):	Guess Ratio:
Ratio Error %	(at Ipn%)					
VA	cosPhi	1%	5%	20%	100%	120%
15.00	0.8					
3.75	1.0					2
hase Displac	cement (min) (a	at Ipn%)				
VA	cosPhi	1%	5%	20%	100%	120%
15.00	0.8					
3.75	1.0					

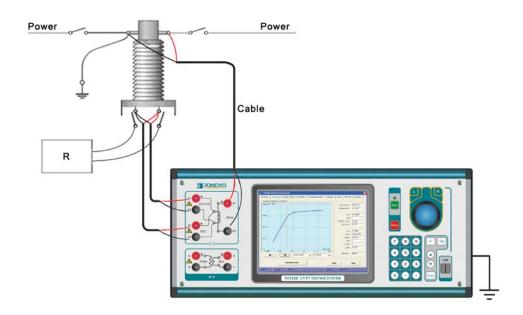
5.2.7 Auto Test

CT excitation, polarity, ratio, secondary side winding resistance and demagnetization tests all can be done after selecting auto test unit and pushing run button. When it is finished, the test automatically stops and the lamp is off. Ratio, excitation knee voltage, polarity, secondary side resistance test result can be checked in this unit. Excitation test result should be checked in excitation unit.

€ PCT200i v4.0.5	S
CT Settings CT Excita. CT Ra	ntio CT Rct/Polarity/Demagnet./Burden CT Auto Test PT Test Report
CT Test Task	CT Parameter
⊏ Rct	SN: CT Type:
Polarity	Winding: 1 S: 1 S: 2 f: 50Hz
⊢ Ratio	lpn(A): 600 lsn(A): 5 VA: 15
Demagnet.	CT Result
☐ Excitation	Rct(Ω): V-kn(V):
	Polarity: I-kn(A):
🗖 Select All	Ratio: Coarse Ratio: Fipr/Isn
Coarse Ratio	Run Stop
ок	11:45 2012-6-12

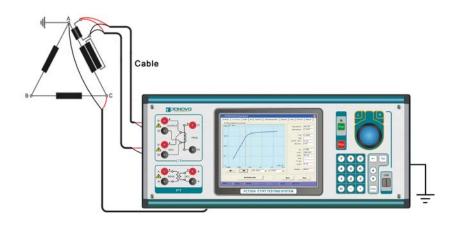
5.3 Application Examples

5.3.1 Transmission line CT Test



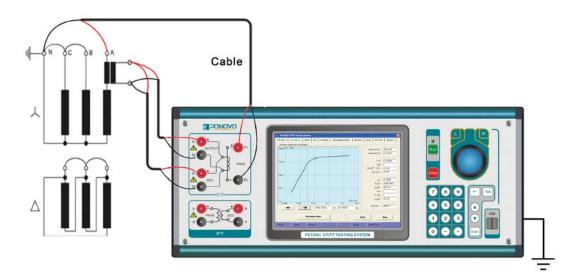
5.3.2 CT Test in Y Voltage Transformer

In order to reduce interference, other windings of the CT voltage transformer should be short circuit.



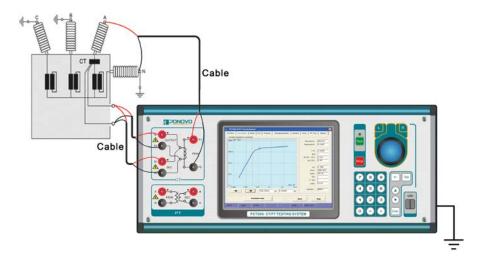
5.3.3 CT Test in the Star Connection Voltage Transformer

In order to reduce interference, other voltage transformer's windings should be short circuit.



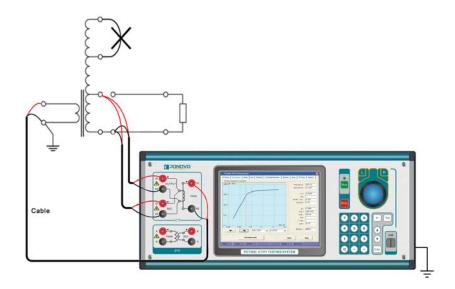
5.3.4 Bushing CT Test

In order to reduce interference, other windings of the CT voltage transformer should be short circuit.



5.3.5 Test CT with Tapping

All the windings in the same shank are all switched on while testing CT with tapping.

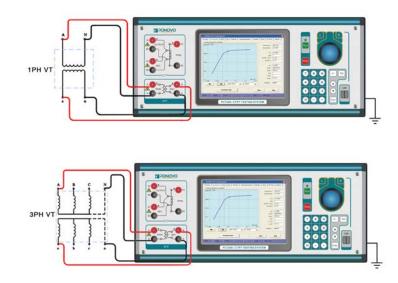


6. PT test

6.1 Wiring Connection

6.1.1 Polarity and Ratio Test

Connect instrument transformer tester as illustrated in below when doing PT polarity, ratio test.



 Wiring directions: The output "A" of transformer is connected with one side of PT primary. The output "N" of transformer is connected with one side of PT primary. The secondary testing end "a" of transformer is connected with one side of PT secondary. The secondary testing end "n" of transformer is connected with

the other end of PT secondary.

Note: The wiring for primary and secondary cannot be wrong, otherwise, it may give thousands of voltage.

6.1.2 Excitation Test

Connect transformer tester as illustrated in below when doing PT excitation test.



Single-phase voltage transformer



Three-phase voltage transformer

Wiring directions: The output S1 of transformer is connected with one side of PT secondary.

The output S1 of transformer is connected with the other side of PT secondary.

PT primary end is connected with a reliable ground, and other windings are open circuit.

Notes: Keep off the instrument, in case that thousands of voltage may occur while doing excitation test.

6.2 Test Operation

6.2.1 Settings

Set parameters according to PT nameplate.

🗲 PCT200i 🕫.0.5	E Contraction of the second
CT Settings CT Excita. CT Ratio CT Rct/Polarity/Demag	net./Burden CT Auto Test PT Test Report
Report Information	
Head:	
Time Reset: 2012-6-12 11:38:07 SN:	Туре:
V-A Curve	Parameter
	Upn(kV): 35 Primary: A-N -
	Usn: 57.74V - Secondary: a-n -
	f: 60Hz 💌 Winding: 1
	Pol. Ratio test
	Ratio:
	Error(%): Run
	Pol.:
Excitation test	
V-A Curve Run	Stop
ок	11:46 2012-6-12

6.2.2 Polarity and Ratio Test

The PT polarity, ratio test can be automatically finished after selecting polarity ratio and pushing run button. It stops automatically and the lamp is off.

<mark>PCT2001 v4.0.5</mark> CT Settings CT Excita. C	「Ratio CT Rct/Pe	olarity/Demagr	et./Burden CT A	uuto Test PT Tes	t Report
Report Information					_
Head: abc					
Time Reset: 11/4/201	0 6:04:51 PM	SN: 23	туре	9: 220kv	
V-A Curve(logarithmic of 10000-0/0 1000.0 100.0	coordinate)			35 Primar Secondary Winding	f. a-n 💌
1.0 0001 0.001 0.00	01 11	(A) 10 I	Ratio: 215 Pol.:	5.621KV :110V Negative	Run
Excitation test V-A Curve	Run			Stop	
OK CAPS N	IUM INS	SCRL	7:03 PM	11/4/2010	

45

6.2.3 Excitation Test

Enter into PT test unit, and then choose excitation test.

Every voltage and current value can be checked in the excitation curve.

€ PCT2001 v4.0.5			(Dundan) or	Auto Toot DT	Teet Percet		
CT Settings CT Excita. CT Ratio CT Rct/Polarity/Demagnet//Burden CT Auto Test PT Test Report Report Information Head: abc Time Reset: 11/4/2010 6:04:51 PM SN; 234 Type: 220ky							
V-A Curve(logarithmic coor 10000 0 100000 10000 10000 10000 10000	rdinate)		Usn: 110 f: 50H Pol. Ratio tes	V V Secon	nary: A-N v dary: a-n v ding: 1 Run		
V-A Curve	Run	SCRL	7:03 PM	Stop			

Press Save button to save the testing report after finished the test.

Appendix: Glossary

CT: current transformer

PT: Voltage transformer

P/TP/M: the type of CT.

P: protection current transformer class P

M: measurement current transformer

PR: protection current transformer class PR

PX: protection current transformer class PX

TPY: protection current transformer class TPY

TPX: protection current transformer class TPX

TPZ: protection current transformer class TPZ

TPS: protection current transformer class TPS

Standard: including 60044-1(IEC60044-1), 60044-6(IEC60044-6), ANSI30, ANSI45

f :frequency

cosφ:

Ipn: rated primary current

Isn: rated secondary current

εc: composite error

ALF: accuracy limit factor

Class: accuracy class

FS: instrument security factor

VA: power

T-meas: temperature of measurement

Seq: sequence

Ktd: transient dimensioning factor

Ts: secondary loop time constant

Kssc: rated symmetrical short-circuit current factor

Tp(ms): specified primary time constant

Seq time test (ms)

tal: permissible time to accuracy limit t": the duration of second current flow t': the duration of first current flow tal': Specified accuracy being maintained in tal' tal" Specified accuracy being maintained in tal" tfr: dead time(during auto-reclosing) V-kn: The voltage of knee point I-kn: The current of knee point Rct: secondary winding resistance Eal: rated equivalent limiting secondary e .m.f Kr: remanence factor Lu: Unsaturated inductance Ls: Saturated inductance Ktd: transient dimensioning factor ε[^]: peak instantaneous(total) error Upn: rated primary voltage Usn: rated secondary voltage