S40A
Protection Relay Test Set

PONOVO POWER CO., LTD.
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S40A Protection Relay Test Set

S40A is a type of 3-phase protection relay test set, with 3×40A, 3×300V, and a local control system. It is a portable and economic secondary injection tester, and easy to use. This 3-phase protection relay testing set can apply to the testing not only on operating value and operating time of AC/DC relays, but also on complex voltage blocking directional over-current, zero sequence over-current, low-frequency load shedding and other protection functions of low voltage line micro-processor based protection and whole group transmission of high voltage line micro-processor based protection, and on starting value, quick-break value, harmonic blocking value and manual synchronization of micro-processor based transformer differential protection.

S40A is an ideal secondary injection tester for all power utilities, power plants, relay manufactures, panel manufactures, research institutes, universities, testing companies, etc.

Product Features

- Free adjustment of amplitude, phase angle and frequency
- Additional 200mA ac current source
- Auxiliary DC power supply (24V, 110V, 220V)
- 4 binary inputs, 1 binary output
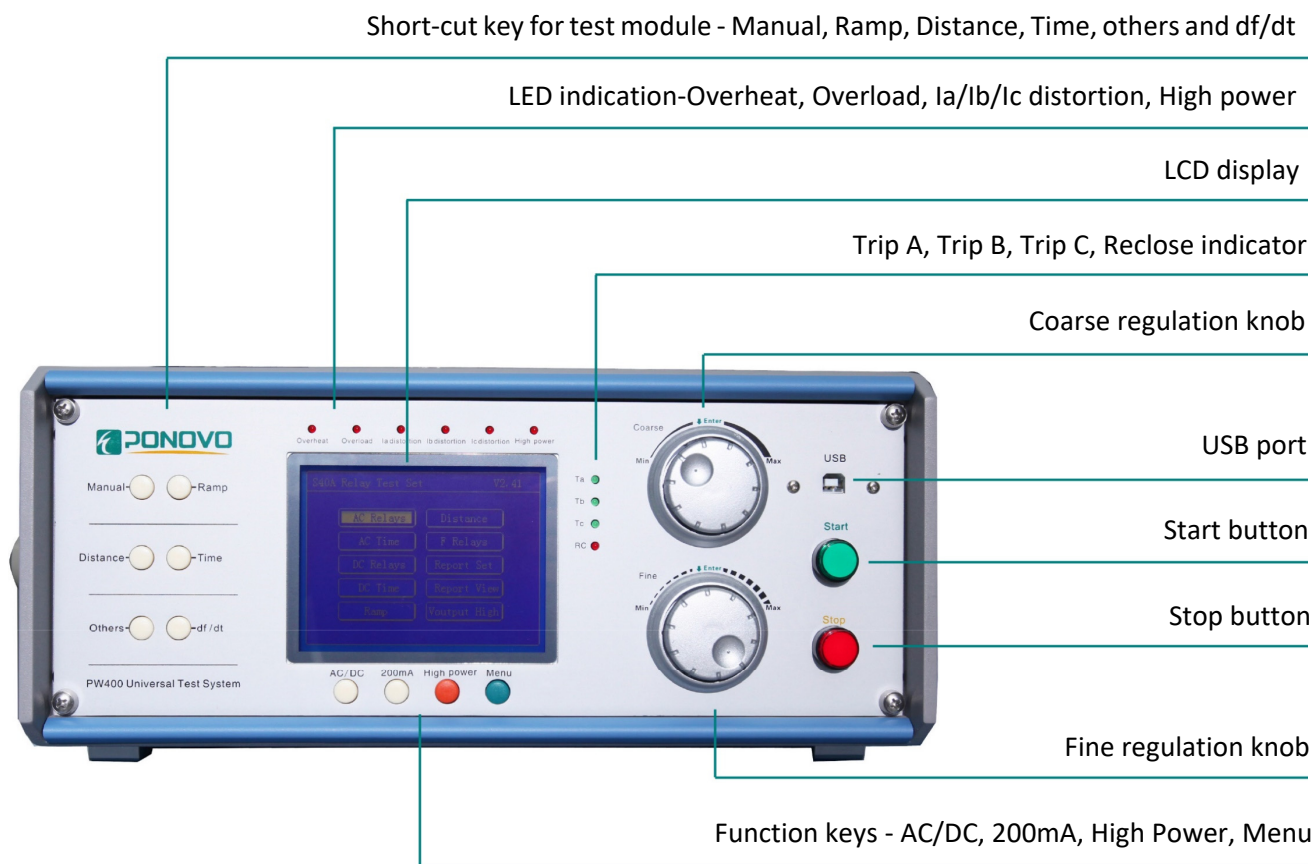- Locally with color LCD
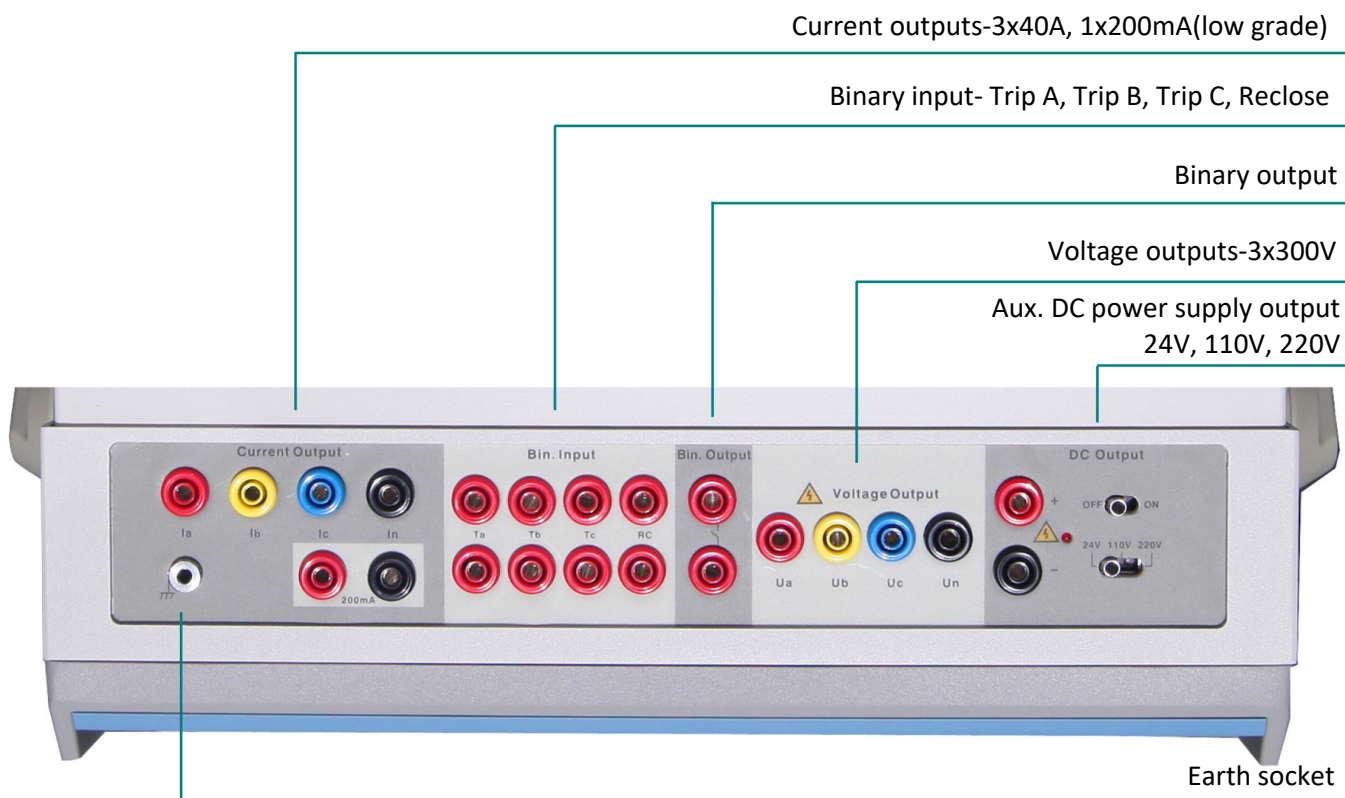
Test functions according to IEEE relay code

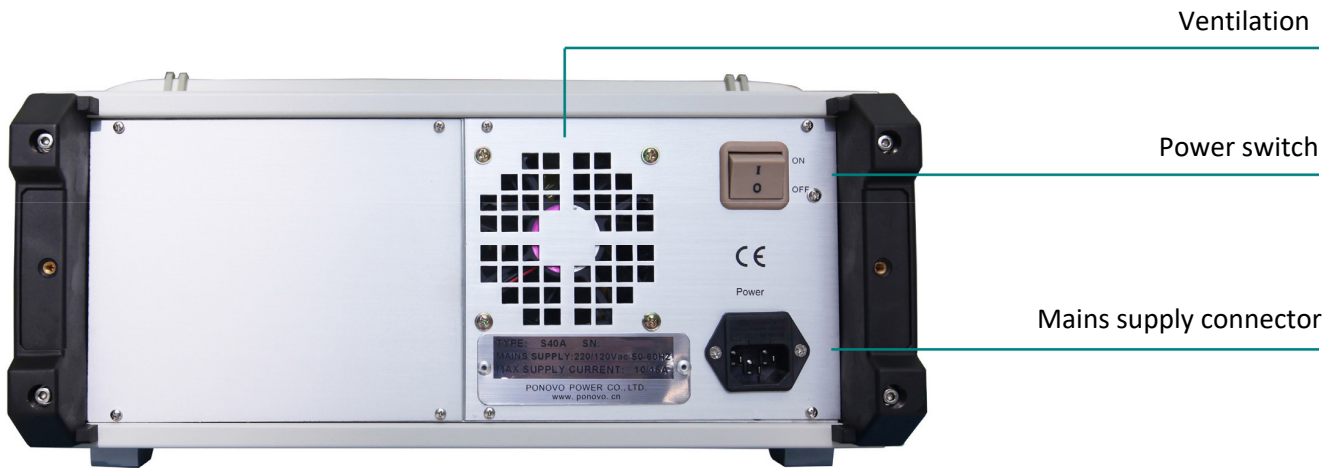| IEEE. NO.	DEVICE	IEEE. NO.	DEVICE
2	Time Delay Starting or Closing Relay	58	Rectification failure relay
21	Distance Relay	59/59N	Overvoltage Relay
24	Volts per Hertz Relay	60	Voltage or Current Balance Relay
25	Synchronizing or Synchronism-Check Device	61	Density switch or sensor
27/27N	Undervoltage Relay	62	Time-Delay Stopping or Opening Relay
30	Annunciator Relay	64	Ground Detector Relay
32	Directional Power Relay	67/67N	AC Directional Overcurrent Relay
36	Polarity or Polarizing Voltage Devices	74	Alarm Relay
37	Undercurrent or Underpower Relay	76	DC Overcurrent Relay
40	Field (over/under excitation) Relay	78	Phase-Angle Measuring Relay
46	Reverse phase or Phase-Balance Current Relay	79	AC-Reclosing Relay
47	Phase-sequence or phase-balance voltage relay	81/81U/O/R	Frequency Relay
50/50N	Instantaneous Overcurrent Relay	86	Lock-out relay
51/51N	AC Time Overcurrent Relay	87	Differential Protective Relay
52	AC Circuit Breaker	91	Voltage Directional Relay
53	Field Excitation Relay	92	Voltage and Power Directional Relay
55	Power Factor Relay	94	Trip Relay
56	Field Application Relay		

S40A Panels

- **Front Panel**

Short-cut key for test module - Manual, Ramp, Distance, Time, others and df/dt

LED indication-Overheat, Overload, Ia/Ib/Ic distortion, High power

LCD display

Trip A, Trip B, Trip C, Reclose indicator

Coarse regulation knob

USB port

Start button

Stop button

Fine regulation knob

Function keys - AC/DC, 200mA, High Power, Menu

- **Top Panel**

Current outputs-3x40A, 1x200mA(low grade)

Binary input- Trip A, Trip B, Trip C, Reclose

Binary output

Voltage outputs-3x300V

Aux. DC power supply output
24V, 110V, 220V

Earth socket

- **Rear Panel**

Ventilation

Power switch

Mains supply connector
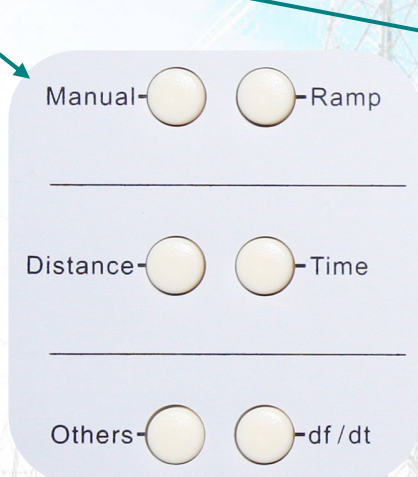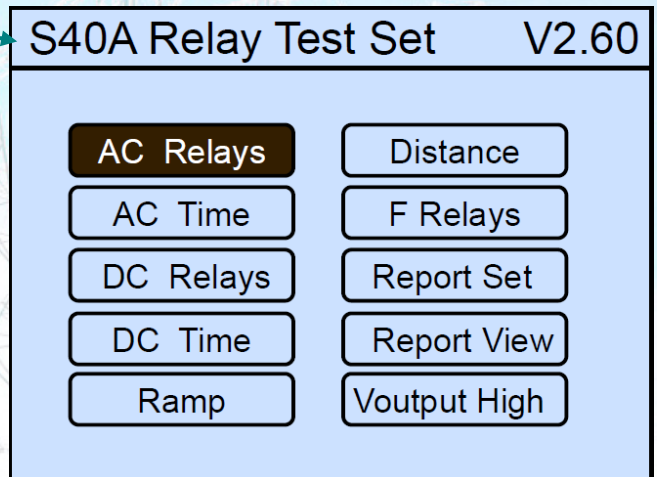
S40A Local Relay Test Set Software

S40A is a type of relay tester controlled by SCM. Colored LCD with local control system makes S40A portable, and easy to use. There are **Manual (AC Relays** and **DC Relays)** test modules**, Ramp** test module**, Distance** module**, Time (AC Time** and **DC Time)** test modules**, df/dt**(**Frequency relays**) module, which can test pick-up value and operating time of AC/DC relays, voltage blocking directional overcurrent, zero sequence overcurrent, frequency function etc. **Report Set** and **View**, can save, set, view and export report to PC through USB port. **Voltage Output Low or High** switches output range 100V or 300V.

Manual — Ramp

Distance — Time

Others — df/dt

Shortcut keys

S40A Relay Test Set   V2.60

AC Relays	Distance
AC Time	F Relays
DC Relays	Report Set
DC Time	Report View
Ramp	Voutput High

Main interface

➤ Manual test modules (AC Relays and DC Relays)

❖ Can output 3 AC voltages and 3 AC current or 3 DC voltages and 1 DC current
❖ Can manually control amplitude, phase and frequency of AC values and amplitude of DC values by step size
❖ Current range can be 3 phase AC 0-40A, DC 0-10A or 1 phase AC/DC 0-200mA

AC Relays		50.00Hz		DC Relays			
Ua	63.51ᵥ	0.0˚	Pick-up 1.04ₐ	Ua	100.00ᵥ		Pick-up
Ub	63.51ᵥ	-120.0˚	Drop-off 0.98ₐ	Ub	100.00ᵥ		Drop-off
Uc	63.51ᵥ	120.0˚	Factor 0.945	Uc	100.00ᵥ		
Ia	0.98ₐ	30.0˚		Ia	3.50ₐ		Factor
Ib	0.00ₐ	-150.0˚					
Ic	0.00ₐ	90.0˚					
			Others key For save				
Uabc		Iabc					

➤ Ramp module

❖ Can output 1 voltage Ua, with DC/AC, or 3 AC currents or 1 DC current
❖ Implement the automatic change of amplitude of AC, DC value by step size
❖ Automatically record pickup value, Dropoff value and calculate the factor of Dropoff/Pickup

Ramp		DC		Ramp		50.00Hz	
AC/DC	DC	Pick-up		AC/DC	AC	Pick-up 4.60ₐ	
Quantity	Ua			Quantity	Iabc	Drop-off 4.40ₐ	
		Drop-off				Factor 0.957	
From	90.00ᵥ			From	4.00ₐ		
to	110.00ᵥ	Factor		to	5.00ₐ		
Step Size	1.00ᵥ			Step Size	0.10ₐ		
Time	0.50ₛ			Time	0.10ₛ		
						Others key for save	
				Iabc		4.40ₐ	

➤ Distance module

❖ Can make the test of setting value check and recloser time of distance relay
❖ Provide three modes of zero-sequence compensating coefficient, KL, Kr and Kx, Z0/Z1.
❖ Can set transient fault and permanent fault
❖ Fault type includes A-E, B-E, C-E, A-B, B-C, C-A, A-B-C short-circuit
❖ Direction includes forward direction and reverse direction

Distance		
Nature	Transient	Trip Time1
Fault Type	A-E	
Directional	Forward	Reclose Time
Multiple	0.95	
|Z|	10.00Ω	
Phi	90.0°	Trip Time2
Current	5.00ᴀ	
Mode	KL	
Magnitude	0.67	
Angle	0.0°	
Fault Time	5.00ꜱ	

Distance		
Nature	Permanent	Trip Time1
Fault Type	B-E	0.512ꜱ
Directional	Forward	Reclose Time
Multiple	0.95	1.009ꜱ
|Z|	3.00Ω	Trip Time2
Phi	90.0°	0.115ꜱ
Current	5.00ᴀ	
Mode	Kr/Kx	
Magnitude	0.67	Others key
Angle	0.67	for save
Fault Time	5.00ꜱ	

➤ Time test modules (AC Time and DC Time)

❖ Provide two states
❖ When it enters into the second state, then starts timing
❖ When it get the binary input Ta, Tb, Tc, then get the test of AC and DC relay operating time

DC Time			
1nd	Ua	220.00ᴠ	Trip Time
	Ia	0.00ᴀ	
2nd	Ua	220.00ᴠ	
	Ia	9.00ᴀ	

AC Time			50.00Hz
1nd	Ua 57.74ᴠ	0.0°	Trip Time
	Ub 57.74ᴠ	-120.0°	1.026
	Uc 57.74ᴠ	120.0°	
	Ia 0.00ᴀ	-30.0°	
	Ib 0.00ᴀ	-150.0°	
	Ic 0.00ᴀ	90.0°	
2nd	Ua 30.00ᴠ	0.0°	
	Ub 57.74ᴠ	-120.0°	
	Uc 57.74ᴠ	120.0°	
	Ia 5.00ᴀ	-60.0°	
	Ib 0.00ᴀ	-150.0°	Others key
	Ic 0.00ᴀ	90.0°	For save

➤ df/dt test module (Frequency relays)

❖ Can make the fixed-point test for operating frequency, delay time, df/dt value, voltage blocking value and current blocking value of frequency relay

F Relays			50.00Hz
Ua	57.74ᴠ	0.0°	Fend
Ub	57.74ᴠ	-120.0°	45.00Hz
Uc	57.74ᴠ	120.0°	df/dt
			2.00Hz/s
Ia	0.00ᴀ	-30.0°	Setting
Ib	0.00ᴀ	-150.0°	48.00Hz
Ic	0.00ᴀ	90.0°	

F Relays			50.00Hz
Ua	57.74ᴠ	0.0°	Fend
Ub	57.74ᴠ	-120.0°	48.99Hz
Uc	57.74ᴠ	120.0°	df/dt
			1.00Hz/s
Ia	1.20ᴀ	-30.0°	Setting
Ib	1.20ᴀ	-150.0°	49.00Hz
Ic	1.20ᴀ	90.0°	
Trip time	2.054s		Others key for save

➢ Report Save and View

❖ After finishing the testing, there is Others key for save on the lower right of LCD.
❖ Press it to save reports in local
❖ Max 21 reports can be saved locally
❖ Report view is results and names of the selected test items will be displayed on the lower of LCD.
❖ There is the USB port to connect with PC to import report from the test set and review.

```
Report Name Set

————Tip————

Press AC/DC to move cursor
Press 200mA to save report name

Report name
TESTREPORT
```

OC Ramp	Empty	Empty
Empty	Empty	Empty
Empty	Empty	Empty
Empty	Empty	Empty
Empty	Empty	Empty
Empty	Empty	Empty
Empty	Empty	Empty

```
Ramp
  2.100A      2.000A      0.952
AC/DC-Delete      200mA-Delete all
```

➢ Voltage Output High/Low

❖ Voltage Output Low means max voltage output 100V, Voltage Output High means max voltage output 300V

```
S40A Relay Test Set        V2.60

   AC  Relays        Distance
   AC  Time          F Relays
   DC  Relays        Report Set
   DC  Time          Report View
   Ramp              Voutput Low
```

```
S40A Relay Test Set        V2.60

   AC  Relays        Distance
   AC  Time          F Relays
   DC  Relays        Report Set
   DC  Time          Report View
   Ramp              Voutput High
```

S40A
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Specifications

Voltage generators

Setting range

3-phase ac(L-N)	3×0~300V
1-phase ac(L-L)	1×0~600V
dc (L-N)	3×0~300V

Power

3-phase ac(L-N)	3×85VA at 300V
1-phase ac(L-L)	1×170VA at 600V (two generators in series)
dc (L-N)	3×100W at ±300 V
Accuracy	<0.16% rd.+0.04% rg. guar. <0.08% rd.+0.02% rg. typ.
Ranges	300V
Resolution	10mV
Distortion	0.1%

Current generators

Setting range

3-phase ac(L-N)	3×0~40A
1-phase ac(L-N)	1×0~120A
dc (L-N)	1×0~10A
Resolution	10mA

Low grade

1-phase ac(L-N)	1×0~200mA, 2.5VA at 200mA
dc (L-N)	1×0~200mA, 3.5W at 200mA
Resolution	0.1mA

Power

3-phase ac(L-N)	3×65VA at 5A, 3×400VA at 40A
dc (L-N)	90W at 10A
Accuracy	<0.16% rd.+0.04% rg. guar. <0.08% rd.+0.02% rg. typ.
Harmonics	2nd
Distortion	0.1%

General

Frequency

Range	DC 40 to 100Hz
Accuracy	0.002%
Resolution	0.01Hz

Phase

Angle range	0°~+360°
Accuracy	0.2°
Resolution	0.1°

Auxiliary dc supply

Voltage range	24V, 110V, 220V
Power	110W at 220V, 55W at 110V, 12W at 24V

Binary inputs

Number	4
Input characteristics	0~250Vdc or potential free
Max. measuring time	999999.999 s
Accuracy	1ms±0.1%
Resolution	1ms

Binary output, relay

Number	1
Type	Potential free relay contacts, software controlled
Break capacity ac	Vmax: 300Vac /Imax: 1A /Pmax: 125VA
Break capacity dc	Vmax: 300Vdc /Imax:1A /Pmax: 60W

Power supply

Nominal input voltage	110~240Vac
Permissible input voltage	90~260Vac
Nominal frequency	50/60Hz
Permissible frequency	45~65Hz

Environmental conditions

Operation temperature	0~+50°C
Storage temperature	-25~+70°C
Relative humidity	5~95% non-condensing
EMC(Emission)	IEC 61000-3-2/3
EMC(Immunity)	IEC61000-4-2/3/4/5/6/11
Safety	IEC 61010-1

Others

PC connection	USB
Ground Socket(earth)	4mm banana socket
Weight	18kg
Dimensions (WxHxD)	360mm×157mm×367mm

Specifications are subject to modification without notice

Professional Solution Provider For The Power World

*Since 2001, **Ponovo Power** has been focusing on providing professional solutions to over 5000 clients in the fields of intelligent testing and power quality control in China and aboard*

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