Markenrich Corporation
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THE RT250A
TOP OF THE LINE

If you're concerned about relay quality and performance, you know how vital relevant test data is to the quality control loop. Product quality depends on the prompt response to a problem identified by test data. Whether you manufacture relays or are an end-user, quality is of prime importance to the reliability of your product.

Bring SPC into your manufacturing process with the RT250A. Add one to your existing IEEE bus-controlled test system for complete and proper relay testing. The RT250A is a dedicated relay test engine. It's fast and it knows how to test everything from miniature reed switches to 400 ampere aircraft contactors. The RT250A...from Markenrich, the company with the longest performance record of low-cost, top performance benchtop relay test equipment.

All tests are in compliance with Military Standards 28776, 39016 and 83536 as well as European CECC standards. Virtually all commercial test requirements are met, too.

TEST DESCRIPTIONS

COIL RESISTANCE

DC coil resistance is measured by applying the rated coil voltage and measuring the resultant coil current. This test is normally performed first in sequence to avoid effects of heating caused by operating the relay.

CONTACT VOLTAGE DROP

Low power contacts may be measured by using the internal programmable current source. This is considered the normal method of testing contact resistance. High power contacts may be subject to higher currents by the use of an external IEEE-488 bus controlled power supply. The external supply is controlled by the MARTS software, applying current to the RUT contacts after they have settled. All contact switching is "cold". The maximum rating of the external supply is 10 amperes with a 28 volt compliance.

PULL-IN VOLTAGE AND CURRENT

Relays are tested according to one of two methods detailed below. Actual values for pull-in voltage and current are obtained by increasing the coil drive until all relay contacts actuate.

LINEAR RAMP METHOD

Coil drive is applied in a steadily increasing manner until contacts transfer according to their form. Start and end voltage and current levels may be defined as well as the nominal or saturate drive level. Ramp speed may also be programmed. As a safety feature, the maximum applied voltage or current cannot exceed the programmed nominal value.

STEP METHOD

Coil drive is applied in a stepwise manner, checking for contact operation at each stage. Up to three different drive values may be programmed. This method of testing is a very fast way to check minimum operate coil drive levels.

DROP-OUT VOLTAGE AND CURRENT

The same methods and criteria described for pull-in voltage and current also apply to drop-out voltage and current.

CONTACT TIMING

The contact timing test group consists of the following tests:

a) Operate and release time
b) Contact make bounce
c) Contact break bounce
d) Contact stabilization time
e) Contact sequencing
f) Transfer time

CONTACT MAKE BOUNCE

Contact make bounce is measured on normally open and normally closed contact sets. Bounce is determined by contact level changes of greater than 90 percent of the open circuit voltage. Contact level fluctuations of less than one microsecond in duration are ignored. Contact load is programmable.

OPERATE AND RELEASE TIME

The operate and release times of all contacts are measured concurrently and do not include bounce. Contact load is programmable.

CONTACT BREAK BOUNCE

Contact break bounce is measured on release of normally open contact sets. This test is otherwise identical to the contact make bounce test.

CONTACT STABILIZATION TIME

This test is actually a dynamic contact resistance test. The measurement is the time required for contact resistance to stabilize below a pre-defined threshold (usually 100 milliohms). Timing starts when contact resistance falls below a programmable level and stops when the final limit is reached. Contact load is programmable.

SEQUENCING

Contact sequencing refers to form C (break-before-make) and form D (make-before-break) operation of contact sets. These definitions may apply on one or more poles of a multipole relay.

TRANSFER TIME

Contact transfer time is the time required for the common contact to switch between its normally closed and its normally open positions. This is not the same as operate time and in fact excludes this measurement.

DIELECTRIC WITHSTANDING

This test, also known as "Hipot", is performed in close accordance with MIL-STD-202. All internal nodes or mutually exclusive contact points are subject to this test.

INSULATION RESISTANCE

This test is performed at a programmable D.C. voltage by measuring the leakage and converting it to resistance. In a manner similar to Hipot, all nodes are independently measured.

SYSTEM OPERATION

Operation of the RT250A is accomplished through an external controller. The RT250A is, by itself, a collection of integrated electronics designed to test, measure and record the various electrical parameters of relays. A controller is necessary to issue the appropriate commands to the RT250A to accomplish its assigned task.

CONTROLLER CHARACTERISTICS

The controller interface is the IEEE-488 bus standard commonly used in instrumentation systems. The controller itself may be any device capable of translating operator commands into the communications protocol used by the RT250A. A common implementation will consist of a desktop personal computer with the appropriate IEEE-488 bus interface.

The IBM-PC and compatible clones are logical choices for a controller for the RT250A. Markenrich offers software for these systems, enabling the user to implement complex test plans without having to write complex programs. This software is called the Markenrich Test Software, or MARTS. It is intended for both manufacturers and users of all types of relays and greatly facilitates data gathering needs. Markenrich also sells complete turnkey systems including test fixtures.

ELECTRICAL & MECHANICAL

Electrical	120/230 VAC, 65 W 50/60 Hz
Interface	IEEE-488 between RT250A and controller. Connector is Amphenol 57-10240 or equivalent. RUT connector is ITT/Canon DL1-156R or equivalent. Test heads are available.
Temperature	Operating: 40ª -90ªF (4ª-32ªC) Storage: -20ª-130ªF (-7 ª-54ªC)
Rel Humidity	0-50% without condensation
Dimensions	7 x 17 x 14 in. (17.78 x 43.18 x 35.56 cm)
Weight	30 lbs (13.60 kg.)

Test MNENMONIC	Test DESCRIPTION
ACR	Coil Resistance, Coil A
BBC	Contact break bounce
BCR	Coil resistance, Coil B
BDOV	FET/Bipolar drive drop-out voltage
BPII	FET/Bipolar drive pull-in current
BPIV	FET/Biploar pull-in voltage
COT	Common Open Time
CTR	Contact resistance
CVD	Contact voltage drop
DTT	Drop-out transfer time
EMF	Coil back EMF
FORM	Relay contact form check
NUTS	Mil-Std Compliant neutral screen
HP1	Mil-Std compliant hipot
FURB	Contact furbish cycle
OB	Operate bounce
OCST	Operate contact Stabilization
OT	Operate time
OTD	Operate time delay
PTT	Pull-in transfer time
RB	Release bounce
RCST	Release contact stabilization
RDOI	Ramp drop-out current
RDOV	Ramp drop-out voltage
RHDV	Ramp hold voltage
RPII	Ramp pull-in current
RPIV	Ramp pull-in voltage
RT	Release time
RTD	Release time delay
SDOI	Step drop-out current
SDOV	Step drop-out voltage
SOCK	Socket check
SPII	Step pull-in current
SPIV	Step pull-in voltage

Test CONDITION	Test DESCRIPTION
COILI1	Coil voltage 1
COILI2	Coil voltage 2
COILI3	Coil voltage 3
COILIV1	Coil current 1
COILV2	Coil current 2
COILV3	Coil current 3
CODE	Contact configuration code
CRANGE	CDV/CTR meas. range
CRATE	Coil voltage ramp rate
COND1	IR test voltage
FLAG2	Program test flags
FLAGS	Program test flags
HIPV1	Hipot test voltage 1
HIPV2	Hipot test voltage 2
HIPV3	Hipot test voltage 3
HRATE	Hipot voltage ramp rate
ICOND	Contact load current
IRANGE	Coil current meas. range
LEVEL	Contact load voltage range
TIC	Test time watchdog
TSOAK	Coil soak/delay time
VCOND	Contact load voltage
VRANGE	Coil voltage meas. range

Specifications Summary

Group A Tests

TEST	RANGE	RESOLUTION	ACCURACY
Pull-In/Drop-Out	0 to 80 vdc	0.02 V	±(1% + 0.02 V)
	0 to 270 vrms	0.1 vrms	±(1% + 0.1 vrms)
Pull-In/Drop-Out Current	0 to 409.5 mA	0.1 mA	±(1%+0.1 mA)
	0 to 40.95 mA	0.01 mA	±(1%+0.01 mA)
Operate Time	0 to 163.83 mS	0.01 mS	±0.01 mS
Release Time	0 to 163.83 mS	0.01 mS	±0.01 mS
Contact Voltage Drop	0 to 4.095 mV	0.001 mV	±(1% + 0.001 mV)
	0 to 40.95 mV	0.01 mV	±(1% + 0.01 mV)
	0 to 409.5 mV	0.1 mV	±(1% + 0.1 mV)
Coil Resistance	0 to 409.5 ohm	0.1ohm	±1%
	0 to 32767 ohm	1 ohm	±1%
Contact Bounce	0 to 163.83 mS	0.01 mS	±0.01 mS
Contact Bridging	Pass/Fail	----	----
Insulation Leakage	0 to 4.095 µA	1 na	±(2% + 1na)+Stray
Dielectric Withstanding	0 to 4.095 mA	1 µA	±(2% + 1µA)
Drive Transistor/FET	0 to 4.095 mA	1 µA	±(1% + 1µA)
	0 to 4.095 mA	1 mV	±(1% + 0.01V)
Coil Transient	0 to 40.95 mA	0.01 V	±(1% + 0.01V)
	0 to 409.5 mA	0.1 V	±(1% + 0.1V)

COIL POWER SUPPLY

OPERATING MODE	RANGE	RESOLUTION	ACCURACY
Voltage Forcing	0 to 80 V	0.1 V	±(1% = .1 V)
Current Forcing	0 to 409.5 mA	0.1 mA	±(1% = .1 mA)
	0 to 270 vrms	0.1vrms	±(1% = .1 V)

CONTACT LOAD SUPPLY (All Tests)

LOAD CURRENT	OPEN CIRCUIT VOLTAGE
0-100mA	0-6V/ 28V

CONTACT LOAD SUPPLY (CVD only)

LOAD CURRENT	OPEN CIRCUIT VOLTAGE
Internal 0-100mA	0-6V/ 28V
External 0 - 10A	0-28V

DC HIGH VOLTAGE SUPPLY

RANGE	RESOLUTION	TOLERANCE
0-750VDC	1 VDC	1%+1V

AC HIGH VOLTAGE SUPPLY

RANGE	RESOLUTION	TOLERANCE
0 to 1500 vrms	1 V	5%