



CRYSTALYTE CO. LTD.

CE LVD REPORT

Prepared For :	CRYSTALYTE CO. LTD. BLK D 12/F WANG KWONG IND'L BLDG 45 HUNG TO ROAD KWUN TONG KOWLOON HONGKONG
Product Name:	CONTROLLER
Trade Name:	CRYSTALYTE
Model :	XCT96V50, XCT96V45, XCT72V90, XCT72V60, XCT72V50, XCT48V50, XCT48V25, XCT36V25, XCT24V20
Prepared By :	Shenzhen BST Technology Co., Ltd. Building No.23-24, Zhiheng Industrial Park, Guankouer Road, Nantou, Nanshan District, Shenzhen, Guangdong, China
Test Date:	Nov .13 .2013 - Nov .16 .2013
Date of Report :	Nov .16 .2013
Report No.:	BST13110177Y-1SR-2



LVD Report
EN 60947-1
Low-voltage switchgear and controlgear

Testing laboratory : Shenzhen BST Technology Co., Ltd.

Address : Building No.23-24, Zhiheng Industrial Park, Guankouer Road, Nantou, Nanshan District, Shenzhen, Guangdong, China

Testing location : Shenzhen BST Technology Co., Ltd.

Applicant : CRYSTALYTE CO. LTD.

Address : BLK D 12/F WANG KWONG IND'L BLDG 45 HUNG TO ROAD
KWUN TONG KOWLOON HONGKONG

Standard : EN 60947-1:2007+A1:2011

Test Result : Compliance with EN 60947-1:2007+A1:2011

Procedure deviation : N.A.

Non-standard test method : N.A.

Type of test object : CONTROLLER

Trademark : CRYSTALYTE

Model/type reference : XCT96V50, XCT96V45, XCT72V90, XCT72V60, XCT72V50,
XCT48V50, XCT48V25, XCT36V25, XCT24V20

Rating : See copy of marking plate

Manufacturer : CRYSTALYTE CO. LTD.

Address : BLK D 12/F WANG KWONG IND'L BLDG 45 HUNG TO ROAD
KWUN TONG KOWLOON HONGKONG

Particulars: test item vs. test requirements

Operating condition Continuous operation



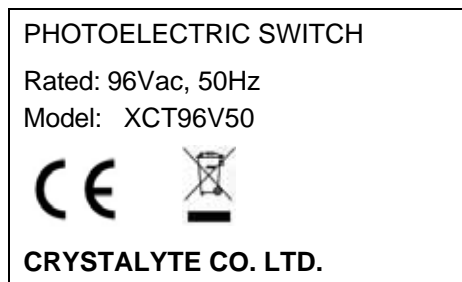
Possible test case verdicts :

test case does not apply to the test object	:	N(.A.)
test object does meet the requirement	:	P(ass)
test object does not meet the requirement	:	F(ail)

Artwork of Marking Label

(the marking is printed on the outside of the unit.)

<p>General remarks:</p> <p>"(see remark #)" refers to a remark appended to the report.</p> <p>"(see appended table)" refers to a table appended to the report.</p> <p>Throughout this report a comma is used as the decimal separator.</p> <p>The test results presented in this report relate only to the object tested.</p> <p>This report shall not be reproduced except in full without the written approval of the testing laboratory.</p>	<p>Attached with:</p> <p style="padding-left: 40px;">A. photo documentation</p> <p>General product information:</p> <p>The series products have the same circuit diagram, PCB layout and functionality. The differences are the model name, so, we select XCT96V50 to test.</p>
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EN 60947-1			
Clause	Requirement – Test	Result - Remark	Verdict
4	Characteristics		P
4.2	Type of equipment		P
	The product standard shall state the following, where applicable:		P
	kind of equipment: e.g. contactor, circuit-breaker, etc.		P
	number of poles;		P
	kind of current;		N
	interrupting medium;		P
	operating conditions (method of operation, method of control, etc.).		P
4.3	Rated and limiting values for the main circuit		P
4.3.1	Rated voltages		P
4.3.1.1	Rated operational voltage (Ue)	96V	P
	a) equipment for use on systems where a single fault to earth will not cause the full phase-to-phase voltage to appear across a pole;		P
	neutral earthed systems;		N
	unearthed and impedance earthed systems.		N
	b) equipment for use on systems where a single fault to earth will cause the full phase-to-phase voltage to appear across a pole (i.e. phase earthed systems).		P
4.3.1.2	Rated insulation voltage (Ui)		P
4.3.1.3	Rated impulse withstand voltage (Uimp)		P
4.3.2	Currents		P
4.3.2.1	Conventional free air thermal current (Ith)		N
4.3.2.2	Conventional enclosed thermal current (Ithe)		N
4.3.2.3	Rated operational current (Ie) or rated operational power		N
4.3.2.4	Rated uninterrupted current (Iu)		N
4.3.3	Rated frequency		P
4.3.4	Rated duties	50Hz	P
4.3.4.1	Eight-hour duty		N
4.3.4.2	Uninterrupted duty		P
4.3.4.3	Intermittent periodic duty or intermittent duty		N
	According to the number of operating cycles which they shall be capable of carrying out per hour, equipments are divided into the following classes:		N
	class 1: 1 operating cycle per hour;		N
	class 3: 3 operating cycles per hour;		N
	class 12: 12 operating cycles per hour;		N
	class 30: 30 operating cycles per hour;		N
	class 120: 120 operating cycles per hour;		N
	class 300: 300 operating cycles per hour;		N
	class 1 200: 1 200 operating cycles per hour;		N



EN 60947-1			
Clause	Requirement – Test	Result - Remark	Verdict
	class 3 000: 3 000 operating cycles per hour;		N
	class 120 000: 120 000 operating cycles per hour;		N
	class 300 000: 300 000 operating cycles per hour.		N
4.3.4.4	Temporary duty		N
4.3.4.5	Periodic duty		N
4.3.5	Normal load and overload characteristics		N
4.3.5.1	Ability to withstand motor switching overload currents		N
4.3.5.2	Rated making capacity		P
	The making conditions which shall be specified are:		P
	the applied voltage (see 2.5.32);		P
	the characteristics of the test circuit.		P
4.3.5.3	Rated breaking capacity		P
	The breaking conditions which shall be specified are:		P
	the characteristics of the test circuit;		P
	the power-frequency recovery voltage.		P
4.3.6	Short-circuit characteristics		N
4.3.6.1	Rated short-time withstand current (I _{cw})		N
4.3.6.2	Rated short-circuit making capacity (I _{cm})		N
4.3.6.3	Rated short-circuit breaking capacity (I _{cn})		N
4.3.6.4	Rated conditional short-circuit current		N
4.4	Utilization category		P
	The utilization category of an equipment defines the intended application and shall be specified in the relevant product standard; it is characterized by one or more of the following service conditions:		P
	current(s), expressed as multiple(s) of the rated operational current;		N
	voltage(s), expressed as multiple(s) of the rated operational voltage;		P
	power-factor or time-constant;		N
	short-circuit performance;		N
	selectivity;		N
	other service conditions, as applicable.		N
4.5	Control circuits		P
4.5.1	Electrical control circuits		P
	The characteristics of electrical control circuits are:		P
	kind of current;		N
	rated frequency if a.c.;		N
	rated control circuit voltage U _c (nature, and frequency if a.c.);		P



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Clause	Requirement – Test	Result - Remark	Verdict
	rated control supply voltage U_s (nature, and frequency if a.c.), where applicable.		N
4.5.2	Air-supply control circuits (pneumatic or electro-pneumatic)		N
	The characteristics of air-supply control circuits are:		N
	rated pressure and its limits;		N
	volumes of air, at atmospheric pressure, required for each closing and each opening operation.		N
4.6	Auxiliary circuits		P
4.7	Relays and releases		P
4.8	Co-ordination with short-circuit protective devices (SCPD)		N
4.9	Switching overvoltages		P
5	Product information		P
5.1	Nature of information		P
	The following information shall be given by the manufacturer, when required by the relevant product standard:		P
	manufacturer's name or trademark;	CRYSTALYTE CO. LTD.	P
	type designation or serial number;	See page 2	P
	number of the relevant product standard, if the manufacturer claims compliance.		P
	Characteristics:		P
	rated operational voltages (see 4.3.1.1 and note to 5.2);	96V	P
	utilization category and rated operational currents (or rated powers or rated uninterrupted currents), at the rated operational voltages of the equipment (see 4.3.1.1, 4.3.2.3, 4.3.2.4 and 4.4). In certain cases, this information may have to be completed by the value of the reference ambient air temperature at which the equipment has been calibrated;		P
	the value of the rated frequency/frequencies, e.g.: 50 Hz, 50 Hz/60 Hz, and/or the indication "d.c." or the symbol ;	50Hz	P
	rated duty, with the indication of the class of intermittent duty, if any (see 4.3.4);		N
	rated making and/or breaking capacities. These indications may be replaced, where applicable, by the indication of the utilization category;		P
	rated insulation voltage (see 4.3.1.2);		P
	rated impulse withstand voltage (see 4.3.1.3);		P
	switching overvoltage (see 4.9);		P



EN 60947-1			
Clause	Requirement – Test	Result - Remark	Verdict
	rated short-time withstand current together with its duration, where applicable (see 4.3.6.1);		N
	rated short-circuit making and/or breaking capacities, where applicable (see 4.3.6.2 and 4.3.6.3);		N
	rated conditional short-circuit current, where applicable (see 4.3.6.4);		N
	IP code, in case of enclosed equipment (see Annex C);		N
	pollution degree (see 6.1.3.2);		P
	type and maximum ratings of short-circuit protective device, where applicable;		P
	class of protection against electric shock (see IEC 61140), where applicable;		N
	rated control circuit voltage, kind of current and frequency;		P
	rated control supply voltage, kind of current and frequency, if different from those of the control coil;		N
	rated supply pressure of the air-pressure and limits of pressure variations (for air-pressure controlled equipment);		N
	suitability for isolation.		N
5.2	Marking		P
	a) on equipment for use on three-phase – four-wire systems, by both the value of phase-to-earth voltage and that of phase-to-phase voltage, e.g. 277/480 V;		P
	b) on equipment for use on three-phase – three-wire systems, by the value of phase-to-phase voltage, e.g. 480 V.		P
	The following information shall also be marked and visible after mounting:		P
	direction of movement of the actuator (see 7.1.5.2), if applicable;		P
	indication of the position of the actuator (see also 7.1.6.1 and 7.1.6.2);		P
	approval or certification mark, if applicable;		P
	for miniaturized equipment, symbol, colour code or letter code;		P
	terminal identification and marking (see 7.1.8.4);		P
	IP code and class of protection against electric shock, when applicable (marked preferably on the equipment as far as possible);		N



EN 60947-1			
Clause	Requirement – Test	Result - Remark	Verdict
	suitability for isolation, where applicable, with the isolation function symbol according to IEC 60617-7, reference 07-01-03, combined with the appropriate function symbol for the equipment, e.g.:		N
5.3	Instructions for installation, operation and maintenance		P
6	Normal service, mounting and transport conditions		P
6.1	Normal service conditions		P
6.1.1	Ambient air temperature		P
6.1.2	Altitude	<35	P
6.1.3	Atmospheric conditions	<2000m	P
6.1.3.1	Humidity		N
6.1.3.2	Pollution degree	No pollution or only dry, non-conductive pollution occurs.	P
6.1.4	Shock and vibration		P
6.2	Conditions during transport and storage		P
6.3	Mounting	the manufacturer's instructions.	P
7	Constructional and performance requirements		P
7.1	Constructional requirements		P
7.1.2	Materials	resistance to abnormal heat and fire.	P
7.1.2.1	General materials requirements		P
7.1.2.2	Glow wire testing	PCB	P
7.1.2.3	Test based on flammability category		P
7.1.3	Current-carrying parts and their connections		P
7.1.4	Clearances and creepage distances		P
7.1.5	Actuator		N
7.1.5.1	Insulation		N
	Moreover:		N
	if it is made of metal, it shall be capable of being satisfactorily connected to a protective conductor unless it is provided with additional reliable insulation;		N
	if it is made of or covered by insulating material, any internal metal part, which might become accessible in the event of insulation failure, shall also be insulated from live parts for the rated insulation voltage.		N
7.1.5.2	Direction of movement		N
7.1.6	Indication of the contact position		N
7.1.6.1	Indicating means		N
7.1.6.2	Indication by the actuator		N
7.1.7	Additional requirements for equipment suitable for isolation		P
7.1.7.1	Additional constructional requirements		P



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Clause	Requirement – Test	Result - Remark	Verdict
	the position of the actuator;		N
	a separate mechanical indicator;		N
	visibility of the moving contacts.		N
7.1.7.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers		N
7.1.7.3	Supplementary requirements for equipment provided with means for padlocking the open position		N
7.1.8	Terminals		P
7.1.8.1	Constructional requirements		P
7.1.8.2	Connecting capacity		P
7.1.8.3	Connection		P
7.1.8.4	Terminal identification and marking		P
7.1.9	Additional requirements for equipment provided with a neutral pole		N
7.1.10	Provisions for protective earthing		N
7.1.10.1	Constructional requirements		N
7.1.10.2	Protective earth terminal		N
7.1.10.3	Protective earth terminal marking and identification		N
7.1.11	Enclosures for equipment		N
7.1.11.1	Design		N
7.1.11.2	Insulation		N
7.1.13	Conduit pull-out, torque and bending with metallic conduits		P
7.2	Performance requirements		P
7.2.1	Operating conditions		P
7.2.1.1	General		P
7.2.1.2	Limits of operation of power operated equipment		N
7.2.1.3	Limits of operation of under-voltage relays and releases		P
	a) Operating voltage		P
	b) Operating time	0~3s	P
7.2.1.4	Limits of operation of shunt releases		N
7.2.1.5	Limits of operation of current operated relays and releases		N
7.2.2	Temperature-rise		P
7.2.2.1	Terminals		P
7.2.2.2	Accessible parts		P
7.2.2.3	Ambient air temperature		P
7.2.2.4	Main circuit		N
7.2.2.5	Control circuits		N
7.2.2.6	Windings of coils and electromagnets		P
7.2.2.7	Auxiliary circuits		N
7.2.2.8	Other parts		P



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Clause	Requirement – Test	Result - Remark	Verdict
7.2.3	Dielectric properties		P
	The dielectric properties are based on basic safety publications IEC 60664-1 and IEC 61140.		P
	a) The following requirements provide the means of achieving co-ordination of insulation of equipment with the conditions within the installation.		P
	b) The equipment shall be capable of withstanding:		P
	the rated impulse withstand voltage (see 4.3.1.3) in accordance with the overvoltage category given in Annex H;		P
	the impulse withstand voltage across the contact gaps of devices suitable for isolation as given in Table 14;		P
	the power-frequency withstand voltage.		P
	c) The requirements of this subclause shall be verified by the tests of 8.3.3.4.		P
7.2.3.1	Impulse withstand voltage		P
7.2.3.2	Power-frequency withstand voltage of the main, auxiliary and control circuits		P
7.2.3.3	Clearances		P
7.2.3.4	Creepage distances		P
	a) Dimensioning	Material Group I 600 < CTI	P
	b) Use of ribs		P
	c) Special applications		P
7.2.3.5	Solid insulation		P
7.2.3.6	Spacing between separate circuits		P
7.2.3.7	Requirements for equipment with protective separation		P
7.2.4	Ability to make, carry and break currents under no-load, normal load and overload conditions		N
7.2.4.1	Making and breaking capacities		P
7.2.4.2	Operational performance		P
7.2.4.3	Durability		P
7.2.4.3.1	Mechanical durability		P
7.2.4.3.2	Electrical durability		P
7.2.5	Ability to make, carry and break short-circuit currents		P
7.2.6	Switching overvoltages		P
7.2.7	Leakage currents of equipment suitable for isolation		P
7.3	Electromagnetic compatibility (EMC)		P
7.3.1	General		P



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Clause	Requirement – Test	Result - Remark	Verdict
	For products falling within the scope of this standard, two sets of environmental conditions are considered and are referred to as		P
	a) environment A;		P
	b) environment B.		P
7.3.2	Immunity		P
7.3.2.1	Equipment not incorporating electronic circuits		P
7.3.2.2	Equipment incorporating electronic circuits		P
7.3.3	Emission		P

8	Tests		P
8.1	Kinds of test		P
8.1.1	General		P
	Tests are as follows:		P
8.1.2	Type tests		P
8.1.3	Routine tests		P
8.1.4	Sampling tests		P
8.2	Compliance with constructional requirements		P
	The verification of compliance with the constructional requirements stated in 7.1 concerns, for example		P
	the materials;		P
	the equipment;		P
	the degrees of protection of enclosed equipment;		P
	the mechanical properties of terminals;		P
	the actuator;		P
	the position indicating device (see 2.3.18).		P
8.2.1	Materials		P
8.2.1.1	Test of resistance to abnormal heat and fire		P
8.2.1.1.1	Glow-wire test (on equipment)		P
8.2.1.1.2	Flammability, hot wire ignition and arc ignition tests (on materials)		P

8.2.2	Equipment		P
8.2.3	Enclosures for equipment		P
8.2.4	Mechanical properties of terminals		P
8.2.4.1	General conditions for tests	>90.5%	P
8.2.4.2	Tests of mechanical strength of terminals		P
8.2.4.3	Testing for damage to and accidental loosening of conductors (flexion test)		N
	The following tests shall be carried out using two new samples with		N
	a) the maximum number of conductors of the smallest cross-section connected to the terminal;		N



EN 60947-1			
Clause	Requirement – Test	Result - Remark	Verdict
	b) the maximum number of conductors of the largest cross-section connected to the terminal;		N
	c) the maximum number of conductors of the smallest and largest cross-sections connected to the terminal.		N

8.2.4.4	Pull-out test		N
8.2.4.4.1	Round copper conductors		N
8.2.4.4.2	Flat copper conductors		N
8.2.4.5	Test for insertability of unprepared round copper conductors having the maximum specified cross-section		N
8.2.4.5.1	Test procedure		N
8.2.4.5.2	Construction of gauges		N
8.2.4.6	Tests for insertability of flat conductors with rectangular cross-section		N
8.2.5	Verification of the effectiveness of indication of the main contact position of equipment suitable for isolation		P
8.2.5.1	Condition of equipment for the tests		P
8.2.5.2.1	Dependent and independent manual operation		P
8.2.5.2.2	Dependent power operation		N
8.2.5.2.3	Independent power operation		N
8.2.5.3	Condition of equipment during and after test		N
8.2.5.3.1	Dependent and independent manual operation		N
8.2.5.3.2	Dependent and independent power operation		N
8.2.7	Conduit pull-out test, torque test and bending test with metallic conduits		N
8.2.7.1	Pull-out test		N
8.2.7.2	Bending test		N
8.2.7.3	Torque test		N

8.3	Performance		P
8.3.1	Test sequences		P
8.3.2	General test conditions		P
8.3.2.1	General requirements		P
8.3.2.2	Test quantities		P
8.3.2.2.1	Values of test quantities		P
8.3.2.2.2	Tolerances on test quantities		P
8.3.2.2.3	Recovery voltage		P
	a) Power-frequency recovery voltage		P
	b) Transient recovery voltage		P
8.3.2.3	Evaluation of test results		P
8.3.2.4	Test reports		
8.3.3	Performance under no-load, normal load and overload conditions		P
8.3.3.1	Operation		P



EN 60947-1			
Clause	Requirement – Test	Result - Remark	Verdict
8.3.3.2	Operating limits		P
8.3.3.2.1	Power operated equipment		P
8.3.3.2.2	Relays and releases		P
8.3.3.3	Temperature-rise		P
8.3.3.3.1	Ambient air temperature		P
8.3.3.3.2	Measurement of the temperature of parts		N
8.3.3.3.3	Temperature-rise of a part		P
8.3.3.3.4	Temperature-rise of the main circuit		P
	i) For values of test current up to and including 400 A:		N
8.3.3.3.5	Temperature-rise of control circuits		P
8.3.3.3.6	Temperature-rise of coils of electromagnets		P
8.3.3.3.7	Temperature-rise of auxiliary circuits		P
8.3.3.4	Dielectric properties		P
8.3.3.4.1	Type tests		P
8.3.3.4.2	Routine tests		P
8.3.3.4.3	Sampling tests for verification of clearances		P
8.3.3.4.4	Tests for equipment with protective separation		P
8.3.3.5	Making and breaking capacities		P
8.3.3.5.2	Test circuit		P
8.3.3.5.3	Characteristics of transient recovery voltage		P
8.3.3.5.5	Test procedure for making and breaking capacities		P
8.3.3.5.6	Behaviour of the equipment during and after making and breaking capacity tests		P
8.3.3.6	Operational performance capability		P
8.3.3.7	Durability		P
8.3.3.7.1	Mechanical durability		P
8.3.3.7.2	Electrical durability		P
8.3.4	Performance under short-circuit conditions		N
8.3.4.1	General conditions for short-circuit tests		N
8.3.4.1.1	General requirements		N
8.3.4.1.2	Test circuit		N
	a) Figures 9, 10, 11 and 12 give the diagrams of the circuits to be used for the tests concerning		N
	b) The supply S feeds a circuit including resistors R1, reactors X and the equipment D under test.		N
	c) In each test circuit (Figures 9, 10, 11 and 12), the resistors and reactors are inserted between the supply source S and the equipment D under test. The positions of the closing device A and the current sensing devices (I1, I2, I3) may be different. The connections of the equipment under test to the test circuit shall be stated in the relevant product standard.		N



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Clause	Requirement – Test	Result - Remark	Verdict
	d) All parts of the equipment normally earthed in service, including the enclosure or the screens, shall be insulated from earth and connected to a point as indicated in Figures 9, 10, 11 or 12.		N
8.3.4.1.3	Power-factor of the test circuit		N
8.3.4.1.4	Time-constant of the test circuit		N
8.3.4.1.5	Calibration of the test circuit		N
8.3.4.1.6	Test procedure		N
8.3.4.1.7	Behaviour of the equipment during short-circuit making and breaking tests		N
8.3.4.1.8	Interpretation of records		N
8.3.4.1.9	Condition of the equipment after the tests		N
8.3.4.2	Short-circuit making and breaking capacities		N
8.3.4.3	Verification of the ability to carry the rated short-time withstand current		N
	For this test, over-current releases, if any, likely to operate during the test, shall be rendered inoperative.		N
	a) For a.c. The tests shall be made at the rated frequency of the equipment with a tolerance of $\pm 25\%$, and at the power-factor appropriate to the rated short-time withstand current in accordance with Table 16.		N
	b) For d.c. The current shall be applied for the specified time and its mean value determined from the record shall be at least equal to the specified value.		N
	c) Behaviour of the equipment during and after the test Behaviour of the equipment during the test shall be defined in the relevant product standard. After the test, it shall be possible to operate the equipment by its normal operating means.		N
8.3.4.4	Co-ordination with short-circuit protective devices and rated conditional short-circuit current		N
8.4	Tests for EMC		P
8.4.1	Immunity		P
8.4.1.1	Equipment not incorporating electronic circuits		P
8.4.1.2	Equipment incorporating electronic circuits		P
8.4.1.2.1	General		



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Clause	Requirement – Test	Result - Remark	Verdict
8.4.1.2.2	Electrostatic discharges		P
8.4.1.2.3	Radiated radio-frequency electromagnetic fields		N
8.4.1.2.4	Electrical fast transients/bursts (EFT/B)		P
8.4.1.2.5	Surges		P
8.4.1.2.6	Conducted disturbances induced by radio-frequency fields		P
8.4.1.2.7	Power frequency magnetic fields		P
8.4.1.2.8	Voltage dips and interruptions		P
8.4.2	Emission		P
8.4.2.1	Equipment not incorporating electronic circuits		P
8.4.2.2	Equipment incorporating electronic circuits		P



ANNEX A:

Photo-documentation



Photo 1 General Appearance of the EUT



Photo 2 General Appearance of the EUT



Photo 3 General Appearance of the EUT



Photo 4 General Appearance of the EUT



Photo 5 General Appearance of the EUT