



**TERMS, DEFINITIONS, ABBREVIATIONS,  
SYMBOLS AND UNITS FOR ELECTROMAGNETIC  
RELAYS**

**ESCC Basic Specification No. 2133600**

|         |            |
|---------|------------|
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## 1 **SCOPE**

This specification forms part of ESCC Basic Specification No. 21300, Terms, Definitions, Abbreviations, Symbols and Units, and covers electromagnetic relays.

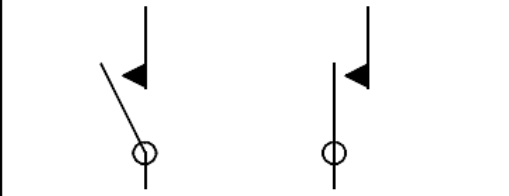
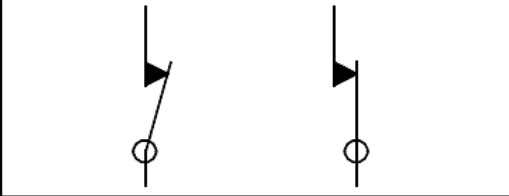
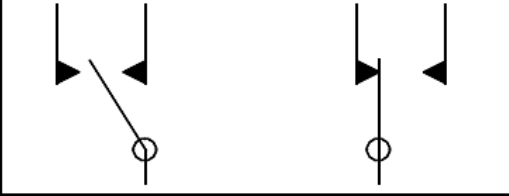
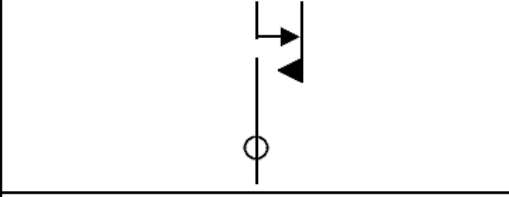
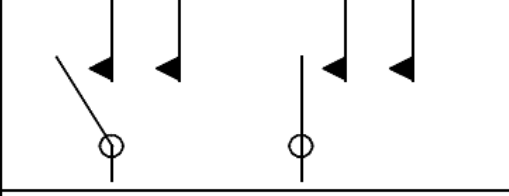
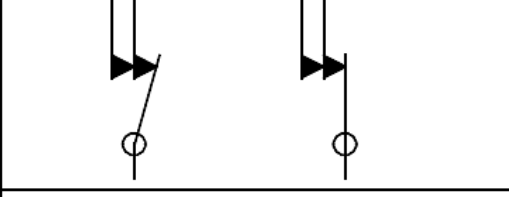
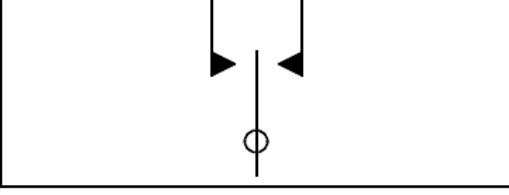
## 2 **TERMS, DEFINITIONS AND ABBREVIATIONS**

|   |  |
|---|--|
| Armature  | The moving magnetic member of an electromagnetic relay structure that converts electrical energy into mechanical work.   |
| Chatter, Contact (contact bounce)                   | The undesired vibration of mating contacts during which there may or may not be actual physical contact opening. If there is no actual opening, but only a change in resistance, it is referred to as dynamic resistance and appears as grass on the screen of an oscilloscope with adequate sensitivity and resolution. |
| Coil  | An assembly consisting of 1 or more magnet wire windings, usually wound over an insulated iron core on a bobbin or spool, or self-supporting, with terminals and any other required parts such as a sleeve or slug.  |
| Coil, Rated Voltage ( $V_C$ )                       |  |
| Coil Resistance ( $R_B$ )                           |  |
| – Latch ( $R_{BL}$ )                                |  |
| – Reset ( $R_{BR}$ )                                |  |
| Contacts  | The surfaces of current-carrying members at which electrical circuits are opened or closed.  |
| Contacts, Double Throw                              | A contact combination having 2 positions, such as in break-make, make-break, etc.  |
| Contacts, Dry Circuit                               | (a) Contacts that neither break nor make current.<br>(b) Erroneously used for low level contacts.  |
| Contacts, Low Level                                 | Contacts that control only the flow of relatively small currents in relatively low voltage circuits, i.e. a maximum closed circuit current of 10mA and a maximum open circuit voltage of 10mV, either AC or DC.  |
| Contacts, Normally Closed (N/C)<br>(Break contacts) | Contact pairs that are closed when the armature is in its non-operative position.  |
| Contacts, Normally Open (N/O)<br>(Make contacts)    | Contact pairs that are open when the armature is in its non-operative position.  |
| Contact Force                                       | The pressure exerted by a movable contact against a fixed contact when the contacts are closed.  |
| Contact Gap   | The distance between a pair of mating relay contacts when the contacts are open.   |
| Contact Load  | The electrical power demands encountered by a contact set in any particular application.   |

|   |   |
|---|---|
| Contact Miss  | Failure of a contact-mating pair to establish the intended circuit electrically. This may be a circuit resistance in excess of a specified maximum value.   |
| Contact Rating  | The maximum current for a given type of load (i.e. voltage frequency and nature of impedance) which the relay (contacts) will make, carry, break (unless otherwise specified) for its rated life.   |
| Contact Resistance ( $R_c$ )  | The electrical resistance of operated contacts as measured at their associated contact spring terminals.  |
| Contact Spring  | A current-carrying spring to which the contacts are fastened.   |
| Contact Spring Terminals  | Those portions of contact springs to which the current-carrying conductors are attached.  |
| Contact Transfer Time   | The interval between opening of the closed contacts and closing of the opened contacts of a contact combination.  |
| Core, Coil  | That portion of the magnetic structure of a relay around which the coil is usually wound.   |
| Crystal Can Relay   | A term used to identify a micro-miniature relay housed in a hermetically sealed enclosure that was originally used to enclose a frequency control type of quartz crystal.   |
| De-energisation   | The removal of power from a relay coil. Also commonly used to indicate a change in coil applied power adequate to produce drop-out.   |
| Double Pole Double Throw (2PDT)   | 2 sets of double-throw contacts. Double-throw contact sets have 3 contacts. The middle one is in contact with the second, but not with the third in 1 position of a relay, and reverses this connection in the other relay position. The basic double-throw contact combination is the make-break (form C). |
| Drop-out, Specified<br>Drop-out Voltage ( $U_d$ )<br>Drop-out Current ( $I_d$ ) | The specified maximum current or voltage at which a relay must restore to its unoperated position.  |
| Dry Circuit   | A mechanically closed circuit with no appreciable applied voltage.  |
| Electromagnetic Relay   | A relay whose operation depends upon the electromagnetic effects of current flowing in an energising winding.   |
| Energisation  | The application of power to a coil winding of a relay (coil energised - coil de-energised).   |
| Frame   | The main supporting portion of a relay which may include parts of the magnetic structure.   |
| Half Crystal Can Relay  | Relay housed in a half-size crystal can.  |
| Header  | The sub-assembly that supports and insulates the leads passing through the walls of a sealed relay.   |
| Housing (Can, Case)   | An enclosure or cover for 1 or more relays, with or without accessories, usually providing access to the terminals.   |

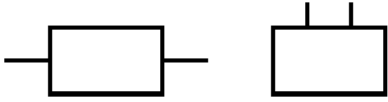
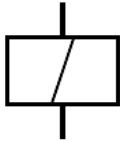
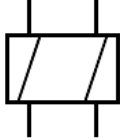
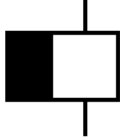
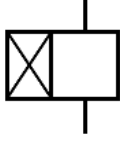
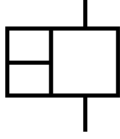
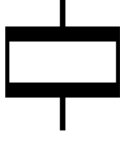
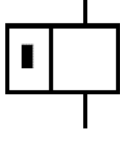
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| Insulation Resistance ( $I_R$ )<br>(of a device)   | Resistance of insulation measured (in $\Omega$ ) at a specified (of a device) DC voltage and under ambient conditions after the current becomes constant. The resistance to leakage current of an intended insulator.  |
| Intermediate Current   | The range of contact current at which there is insufficient energy under arcing conditions at the mating contact surfaces to ensure good contacting for the type of contact material, shape and forces employed.   |
| Latching Relay<br>Bi-stable relay<br>Polarised (magnetically latched relay)  | A relay that maintains its contact in the last position assumed without the need for maintaining coil energisation by means of remanent magnetism until reset electrically.  |
| Miss Test (Low Level Test)   | A test made to detect a contact miss.  |
| Pick-up, Specified <ul style="list-style-type: none"><li>– Pick-up Voltage (<math>U_C</math>)</li><li>– Pick-up Current (<math>I_C</math>)</li><li>– Latch Voltage (<math>U_L</math>)</li><li>– Reset Voltage (<math>U_R</math>)</li></ul> | Latch and reset for latching relays.<br>The current or voltage at, or below which, the armature is required to come into contact with the coil core or pole piece by assuming its fully operated position.   |
| Pole Piece   | The end of an electromagnet, sometimes separable from the main section, and usually shaped so as to distribute the magnetic field in a pattern best suited to the application.   |
| Rated Coil Current   | The steady state coil current on which a relay is intended to operate for the prescribed duty cycle.   |
| Rated Coil Voltage   | The coil voltage on which a relay is intended to operate for the prescribed duty cycle.  |
| Rated Contact Current ( $I_{CR}$ )   | The current which contacts are designed to handle during their rated life.   |
| Switch-over<br>(Change-over)   | A relay is switched over when it picks up or drops out.  |
| Time, Contact Bounce ( $R_{eb}$ )  | The time interval from initial actuation of a contact to the end of bounce brought about during pick-up or drop-out or from external causes.   |
| Time, Operate ( $T_E$ ) <ul style="list-style-type: none"><li>– Latch (<math>T_L</math>)</li><li>– Reset (<math>T_R</math>)</li></ul>  | Latch time, reset time for latching relays. The time interval from coil energisation to the functioning time of the last contact to function. Where not otherwise stated, the functioning time of the contact in question is taken at its initial functioning time (i.e. excluding contact bounce time). |
| Time, Release ( $T_D$ )  | The time interval from coil de-energisation to the functioning time of the last contact to function. Where not otherwise stated, the functioning time of the contact in question is taken at its initial functioning time (i.e. excluding contact bounce time).  |

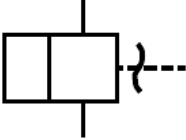
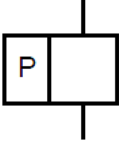
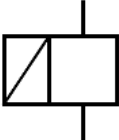
**3 SYMBOLS FOR MOST COMMONLY USED RELAY CONTACT COMBINATIONS**

| FORM | SYMBOL  | DESCRIPTION                                  |
|------|---|--|
| A    |    | Make contact or SPST N/O                     |
| B    |    | Break contact or SPST N/C                    |
| C    |   | Change over contact break before make SPDT   |
| D    |  | Make-before-break contact                    |
| F    |  | Contact with 2 makes making in succession    |
| G    |  | Contact with 2 breaks breaking in succession |
| K    |  | Two-way contact with neutral position        |



4 **SYMBOLS FOR RELAY COILS**

| SYMBOL  | DESCRIPTION  |
|---|--|
|    | <p>Relay coil</p>  |
|    | <p>Relay coil with 1 winding</p>                               |
|    | <p>Relay coil with 2 windings</p>                              |
|  | <p>Relay coil of a slow-releasing relay</p>                    |
|  | <p>Relay coil of a slow-operating relay</p>                    |
|  | <p>Relay coil of a high speed relay</p>                        |
|  | <p>Relay coil of a relay unaffected by alternating current</p> |
|  | <p>Relay coil of an <b>AC</b> relay</p>                        |

| SYMBOL  | DESCRIPTION  |
|---|--|
|  | <p>Relay coil of a mechanically resonant relay</p> |
|  | <p>Relay coil of a polarised relay</p>             |
|  | <p>Relay coil of a remanent relay</p>              |