

Rail Industry - Residual Current Circuit Breaker Guidance Sheet

Overview

Blakley Electrics produces a range of Core Balance Earth Leakage Sensors that are widely used within our various ranges of standard and purpose made distribution and protection assemblies. The sensors are available in four models: the ELS with fixed sensitivity and VELS, VRCD and VELR all with adjustable sensitivity and time delay. The sensors work in conjunction with MCBs to BS EN 60898-1 or BS EN 60947-2 or MCCBs to BS EN 60947-2, fitted with either a shunt trip or under voltage release. These combinations provide protection in accordance with BS 4293. The combined Residual Current Circuit Breaker arrangement provides protection similar to that of an RCBO and is classified as an AC type device.

DC Immunity

Blakley Electrics Core Balance Earth Leakage Sensors are recognised by Network Rail (NR) and the Docklands Light Railway (DLR) as providing a high level of immunity to the stray dc currents that are often found in third rail dc electrified locations. The dc stray currents can saturate non-dc immune / standard RCDs and dramatically increase the current required to operate devices. For further information please see our dc Immune RCD Technical Data Sheet TDS13.

ELS Series

The ELS series sensor is a fixed sensitivity device with an integral CT.
Standard sensitivities 5, 10, 20, 30, 100, 300 or 500mA.
Standard Voltages: 110, 230 or 400V ac, 50 or 60Hz.

VELS Series

The VELS series sensor is a variable sensitivity and time delay device with an integral CT.
Sensitivities 100mA to 1A.
Time Delay: 0 to 1 second
Standard Voltages: 110, 230 or 400V ac, 50 or 60Hz.

VRCD Series

The VRCD series sensor is a variable sensitivity and time delay device with external matched CT.
Sensitivities 100mA to 2A.
Time Delay: 0 to 3.5 seconds
CT internal diameter: 45, 65, 100, 150 or 200mm
Standard Voltages: 110, 230 or 400V ac, 50 or 60Hz.

VELR Series

The VELR series sensor is a variable sensitivity and time delay device with external unmatched CT.
Sensitivities 30, 100, 300, 500mA or 1A (dependent on CT ID)
Time Delay: 0.02, 0.2 0.5, 1 or 5 seconds.
CT internal diameter: 35, 60, 80, 110, 160 or 210mm
Voltages: 110V, 230V and 400V ac, 50 or 60Hz (selected by terminals)



ELS

VELS



VRCD



VELR

Testing

The following ½, 1 and 5 times tests should be performed as part of the initial verification and periodic testing required by BS 7671:2008 Amendment 3:2015. For further information please refer to BS 7671:2008 Amendment 3, Guidance Note 3 'Inspection & Testing' section 2.6.19 'Operation and functional testing of RCDs'.

½ Times Test – All Blakley earth leakage assemblies should NOT operate/open when tested at 50% of the devices rated tripping current ($I_{\Delta n}$).

1 Times Test (Operational Test) – All Blakley Electrics earth leakage assemblies MUST operate when tested at 100% of the devices rated tripping current ($I_{\Delta n}$) within a time period of no greater than 200ms (with zero time delay selected).

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5 Times Test (Additional Protection, ELS and VELR series only) – Blakley Electrics earth leakage assemblies being used to provide Additional Protection in accordance with BS7671:2008 Amendment 3:2015 section 411.3.3. MUST not have a rated tripping current ($I_{\Delta n}$) exceeding 30mA and when tested at 5 times rated tripping current ($I_{\Delta n}$) they MUST operate within a time period of no greater than 40mS.

Time Delay Test – The time delay characteristic of Blakley Electrics variable earth leakage assemblies is in accordance with the requirements of BS4293. Assemblies with time delay MUST operate when tested at 100% of the devices rated tripping current ($I_{\Delta n}$) within a time period of not less than 50% of the set time delay and not greater than the set time delay + 200mS. In order to verify the time delay period an RCD test set with a 'selective' RCD test facility will be required. The maximum time period 'selective' RCD test sets can measure varies from model to model. For example, the Megger RCDT320 test set can measure up to 1 second, which should be sufficient in most cases. If there is a requirement to measure longer time periods, specialist equipment maybe required.

110V (Reduced Low Voltage) RLV Testing - In order to perform an RCD test on a 110V RLV circuit, a test set with a minimum operating voltage of 50V is required. In addition, it is preferable the test set is a 2 wire device, as many 3 wire test sets require the neutral and earth to be at the same potential: such instruments are unsuitable for operation on an RLV supply because the neutral is not distributed (N is replaced by L2). The Megger RCDT320 test set can be configured for 2 or 3 wire operation and in 2 wire mode is suitable for testing RCDs on 110V RLV systems. Other instruments with a similar specification may also be suitable.

ELE series RCD Testing Guidance

The ELE series of "dc Immune" RCD assemblies has been widely used by the Rail industry for many decades. The standard ELE assemblies are a basic unit that requires the installer to pass the load cables (Live & Neutral for single phase and L1, L2, L3 & Neutral for three phase devices) through the aperture of the earth leakage sensor before connecting to the MCB load terminals.

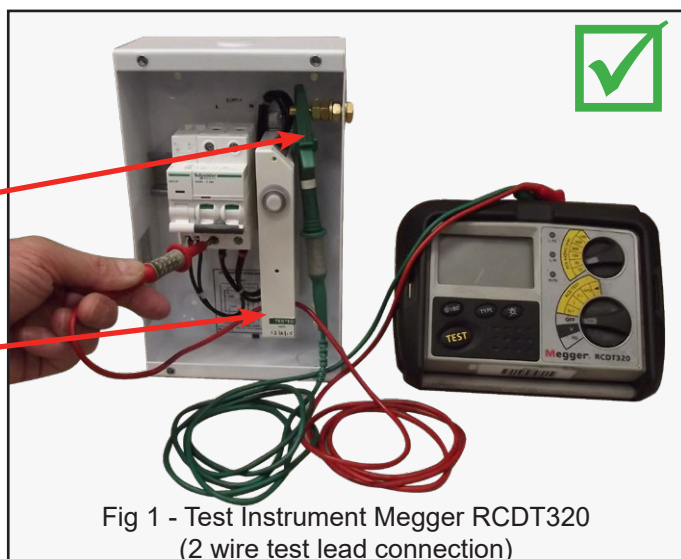
When connecting an RCD test set to ELE assemblies, the L1 test lead MUST pass through the aperture of the sensor before connecting to the L terminal at the bottom of the MCB. This will ensure that the test current generated by the RCD test set is correctly monitored by the sensor and the device will operate when a test is performed. Failure to pass the L1 test lead through the sensor aperture will prevent the sensor from monitoring the test current generated by the RCD test set and prevent the device from operating when a test is performed.

IMPORTANT NOTE: This only applies to ELE series devices, other assemblies may include circuitry pre-wired through the sensor aperture and should not be tested in this fashion.

CORRECT - RCD Test Lead Connection (ELE Series ONLY)

Connect LO test lead
to Main Earth Stud

L1 Test Lead MUST be passed
through Sensor Aperture



INCORRECT - RCD Test Lead Connection (ELE Series ONLY)

L1 Test Lead NOT passed
through Sensor Aperture

