ELD V2 – EARTH LEAKAGE PROTECTION RELAY

User Manual

Part Number: 121581

Revision: 9 – March 2014

Designed and manufactured in Australia by Ampcontrol Electronics Pty Ltd

WARNING! 	**This safety alert symbol identifies important safety messages in this manual and indicates a potential risk of injury or even death to personnel. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.**

CAUTION! 	**This safety alert symbol identifies important information to be read in order to ensure the correct sequence of work and to avoid damage or even destruction of the equipment, and reduce any potential risk of injury or death to personnel.**

	**Supplementary information not directly affecting safety or damage to equipment. Carefully read the message that follows, and inform other relevant personnel.**

	**Information concerning possible impact on the environment and actions required for prevention and proper response.**

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Before You Begin

We would like to take a moment to thank you for purchasing the Ampcontrol ELD V2 Earth Leakage Relay.

WARNING! 	**To become completely familiar with this equipment and to ensure correct operation, we strongly recommend that you take the time to read and thoroughly understand this user manual.**

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1 SAFETY AND OTHER WARNINGS

For safety reasons, the ELD V2 relay must be installed, operated and serviced only by competent personnel. Read and understand this instruction manual completely before installing, operating or servicing this equipment. Failure to install or operate this instrument in accordance with the instructions contained in this manual may create hazardous operating conditions.

1.1 Safe Use of Equipment

The equipment supplied has been manufactured according to the state of the art, and designed to ensure a safe operation. The equipment may only be used within the design parameters.

The instructions within this manual must be observed as an aid towards achieving maximum safety during operation.

The owner/user is responsible for observing the following instructions:

1.1.1 Changes to Equipment

Changes in the design and modifications to the equipment are not permitted. Unauthorised changes made to the hardware or operating firmware will void the manufacturer's warranty, and may compromise the integrity of the system into which it is installed and other connected equipment.

1.1.2 Equipment Knowledge

Experience with, or understanding of, this equipment is essential for the safe installation and removal of the equipment. Therefore, in case of a question on how to safely proceed, contact Ampcontrol immediately.

1.1.3 Manual Handling

Precautions have been taken to ensure all equipment is safe to handle and free from sharp edges. However care should always be taken when handling enclosures and gloves should be worn.

1.1.4 Installation

Correct operation and safety depend on the ELD V2 relay and associated equipment being installed correctly. Mechanical and or electrical installation and maintenance of plant and equipment must only be carried out by appropriately qualified personnel and must be tested thoroughly prior to operation.

1.1.5 Operation

As safety depends on the ELD V2 relay functioning correctly it is highly recommended that all safety functions of the relay be periodically tested to ensure correct operation.

2 RECEIVING AND STORAGE

2.1 Receiving

All possible precautions are taken to protect the equipment against damage or losses during shipment, however before accepting delivery, check all items against the packing list or bill of lading. If there are shortages or evidence of physical damage, notify Ampcontrol immediately.

Notify Ampcontrol within 7 days (maximum) in case of shortages or discrepancies, according to the packing list. This action will help ensure a speedy resolution to any perceived problems. Keep a record of all claims and correspondence. Photographs are recommended.

Where practicable do not remove protective covers prior to installation unless there are indications of damage. Boxes opened for inspection and inventory should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, especially if the wrappings are to be discarded.

2.2 Inspection

Equipment that is found to be damaged or has been modified away from its published specification must not be used. Please contact Ampcontrol if the equipment is suspected to be different than that ordered or if it does not match the published specifications.

2.3 Storage after Delivery

When the equipment is not to be installed immediately, proper storage is important to ensure protection of equipment and validity of warranty.

All equipment should be stored indoors, preferably on shelves and protected from the elements.

2.4 Unpacking of Equipment

The method of packing used will depend on the size and quantity of the equipment. The following cautions should be interpreted as appropriate.

CAUTION! 	**Take care when unpacking crates as the contents may have shifted during transport.**

 *ENVIRONMENTAL ALERT*	**The disposal of packaging materials, replaced parts, or components must comply with environmental restrictions without polluting the soil, air or water.** **Ensure that any timber and cardboard used as packaging is disposed of in a safe and environmentally responsible manner.** **Where possible, dispose of all waste products i.e. oils, metals, plastic and rubber products by using an approved recycling service centre.**

3 INSTALLATION

3.1 General Warnings

These instructions have been designed to assist users of the ELD V2 relay with installation.

Before the ELD V2 relay can be installed, there are a number of things that need to be considered and understood to prevent incorrect or unsafe operation of the relay or the system into which it is installed.

Along with relevant competence, and an understanding of the target application, the following points should be considered:

3.1.1 Ensure that the information provided in this user manual is fully understood.

It is extremely important that the limitations and functionality of the ELD V2 relay are understood to prevent incorrect installation and use from creating a potentially dangerous risk. If in doubt as to the nature of the limitations or their implication, consult a competent authority such as a supervisor or Ampcontrol technical representative.

3.1.2 Ensure that the application into which the relay is being installed has been properly defined, designed and approved.

Any system intended to mitigate the risk of injury needs to be properly designed and implemented. Such a system must be the result of structured risk analysis with the outcomes used to define the system requirements. These requirements, in turn, will guide the choice of instrumentation, logic solvers and actuators needed to implement the system. Understanding the needs of the system will ensure proper selection of equipment.

3.1.3 Ensure that the ELD V2 relay will properly perform the required functions within the system design.

It is important to understand how the relay is intended to interact with other equipment within a system. For safe and reliable use, it is crucial that neither the ELD V2's logical operation nor its signalling be compromised by incompatibilities with connected equipment.

3.1.4 Modifications of any form to the relay are prohibited.

The ELD V2 relay as supplied has been designed and manufactured to comply with the requirements of protection standards. If modifications of any form are made to the relay, the equipment may no longer be fit for use. If any modifications or damage to the relay is evident, do not use the equipment and contact Ampcontrol for advice.

3.2 Mandatory Installation Practices

The following information must be adhered to when installing the ELD V2 relay. Failure to adhere to this information may give rise to unsafe operation.

Using the relay in a manner that exceeds its electrical, functional or physical specifications, or in a way that is contrary to its operating restrictions, may create risks to personnel and/or equipment resulting in injury or death.

- The ELD V2 relay must be powered within the specified voltage range.
- The installation of the relay must be carried out by suitably trained and qualified personnel.
- Identification labels fixed to the relay must not be damaged, removed or covered before, during or after installation.
- The installation is to be in accordance with the relevant installation Standards/Codes of Practice.

- Modifications must not be made to any part of the relay. As supplied, the unit is built to, and complies with the relevant standards. Modifications to its construction will render the unit non-compliant.
- Complete and accurate records of the installation must be kept as part of the site installation.

4 OVERVIEW OF EARTH LEAKAGE PROTECTION

Earthing of electrical equipment, associated machinery and structures is a seemingly simple practice and is covered adequately by the various applicable sections of Australian Standards AS3000 or AS3007.

However, in the mining industry earthing is somewhat more complex than normal domestic or commercial applications and requires other factors to be taken into consideration, particularly where trailing and/or reeling cables supply mobile electrical equipment. The protection systems are designed to provide touch and step potentials of 50V or less when all the systems are used collectively.

It should be clearly understood that unless all four types of protection is incorporated in any design, then personal protection (touch and step potentials of 50V or less) will need to be assessed by a competent person or authority.

The protection systems that cover coal, shale mines and metalliferous mining are detailed in AS/NZS 2081:2011.

The above standard does not stand-alone and has been developed in coordination with other standards being:

- AS1740 – Underground mining substations.
- AS1802, AS1300 - Reticulation, trailing and reeling cables.
- AS1299, AS1300 - Plugs, adaptors, couplers and receptacles.
- AS/NZS 4871 – Electrical Equipment For Mines And Quarries
- Internationally accepted voltage/time effects on the human body based on IEC479.
- Instructions for installation in accordance with accepted State and Federal Regulations.
- Equipment maintained in accordance with industry standards.

4.1 Overview of Protection Problems

Unless properly controlled the occurrence of an earth fault can be hazardous because it may cause:

- Frame to earth voltages dangerous to personnel.
- Electric arcing, which may initiate an explosion or fire when arcing occurs in an underground mining operation.

CAUTION!	**The main purpose of earth fault protection is to safeguard personnel and electrical apparatus. However it is found that relays designed to operate on fault limited systems are not suitable for direct personal protection, i.e. users of portable drills, grinders etc, which require trip levels of 20-30mA, with instantaneous operation. (Refer AS/NZS 3190).**

The most common apparatus faults in mining applications are cable faults. Cables are most susceptible to damage and are the major source of dangerous electrical incidents. This applies particularly to the flexible trailing cables supplying power to mobile mining machines.

Cable construction is such as to provide every phase conductor with an individual conductor screen so that crushing would cause a low single phase to earth fault current. The protective device, such as an Ampcontrol ELD earth leakage relay, would then isolate the cable and contain the sparking within the cable before a heavy short circuit current due to a phase to phase fault occurs.

Earth fault protection has been applied with considerable success in limiting faults and providing quick disconnection of electrical apparatus from the supply in the event of earth fault situations.

A definite time operating characteristic is provided with adjustable trip sensitivity and time delay. Time delay between protective units is introduced to allow the unit close to the fault to isolate the faulty circuit without causing the healthy part of the system to be de-energised.

4.2 Earth Leakage Systems

Desirable though it may be, it is impractical to provide automatic protection against electrocution as a result of direct contact with a live conductor, particularly where the electrical reticulation is exposed to a humid or damp atmosphere.

The table below (taken from IEC Standards) indicates the current values affecting human beings.

Current mA	***Symptom***
1 or less	Causes no sensation - not felt
1 to 8	Sensation of shock, not painful, individual can let go at will, as muscular control is not lost
8 to 15	Painful shock, individual can let go at will, as muscular control is not lost
15 to 20	Painful shock, muscular control of adjacent muscles lost, cannot let go
20 to 50	Painful, severe muscular contractions, breathing difficult
50 to 100 (possible) 100 to 200 (certain)	Ventricular fibrillation (a heart condition that may result in death)
200 and over	Severe burns, severe muscular contractions; so severe that chest muscles clamp the heart and stop it for the duration of the shock (this prevents ventricular fibrillation).

It can be seen from the previous table that the passage of a current of as low as 15mA through the human body can cause loss of muscular control to the extent of preventing the recipient from disengaging from the live conductor. Whereas a current in excess of 50mA is sufficient to produce a critical heart condition from which there is little or no chance of recovery.

It follows that as an effective safeguard against electrocution resulting from direct contact with a live conductor, it would be necessary to introduce earth leakage protection designed to operate with a fault current below 15mA, which in the majority of cases, would be impractical.

The automatic protection of circuits is not intended to take the place of sound installation practice and the regular maintenance and testing of electrical apparatus.

Care must be taken in the selection and installation of all electrical equipment with due regard to its required duty and the conditions under which it may be called upon to operate.

Where automatic earth leakage protection has been installed it is essential that its operation be tested often, and to facilitate this, a means for testing is incorporated in all approved earth leakage relays.

4.3 Methods of Earth Leakage Protection

Earth Leakage Protection Relays for use in mining applications have to be designed and tested to AS/NZS 2081:2011 for use on fault limited systems.

There are two methods of protection used, Core Balance and Series Neutral earth leakage protection systems. A relay installed in Core Balance applications performs the primary protection in an installation, protecting the outlet supplying power to a machine. In this application the time delay is set at instantaneous. Series Neutral earth leakage provides backup protection for the installation and can have a time delay up to a maximum of 500mS.

4.3.1 Core Balance Protection

With this method all three phases of the cable are passed symmetrically through the toroid. If there is no earth fault present, the vector sum of the currents in a three-phase supply is zero. If current from any phase flows to earth the toroid flux becomes unbalanced. The toroid produces an output, which trips the relay.

A test current is injected through the window of the toroid to test the operation of the relay.

4.3.2 Series Neutral Protection

With this method the neutral is passed through the toroid. An earth fault on any of the phase conductors causes an earth current which returns, through the toroid, to the star point of the transformer.

A test circuit can connect a test resistor between a phase and earth or inject a current through the toroid as previously described. The test resistor to earth method is recommended with this type of protection as this test also proves the neutral to earth connection.

4.4 Earth Leakage Toroids

Toroids (current transformers) are not ideal devices and if correct procedures are not followed during installation, nuisance tripping can result. If, for example, we consider a single-phase earth leakage system where active and neutral pass through a toroid then at all times currents in the two wires are equal and opposite so that the net current through the toroid is zero. An ideal current transformer would have all of the flux from each wire contained in the core and so would accurately add the opposing fluxes to get a net result of zero. A real current transformer has “leakage fluxes”. This means that a very small proportion of the total flux from each cable is not contained in the core but in the space outside it and as a result it may link some turns but not others, depending on the positioning of the cables. The effect of this is that a small output may be obtained from the toroid where none would arise if the device were ideal.

The size of the error may vary from toroids of the same type because of slight differences in the core and the symmetry of the winding. Problems caused in this way increase as the toroid size increases, as currents increase and symmetry decreases. Nuisance tripping tends to occur when the total current rises, such as when a large motor is started. The following guidelines would help to avoid such problems.

4.4.1 Toroid Selection

i. Select the smallest internal diameter toroid, which will allow the cables to fit through. Avoid very large toroids (200mm) or toroids with square apertures.
ii. Only use approved toroids specified by Ampcontrol as these have been designed to minimise the problem.

4.4.2 Toroid Installation Guidelines

i. Keep cables as close to the centre of the toroid as possible. Do not tie them to one side of the toroid. Remember to aim for symmetry.
ii. Do not bring the cables back past the toroid within one diameter of the toroid. Trying to cram cables into a small space reduces symmetry and may lead to problems which are difficult to solve.
iii. Avoid placing the toroid near any device which produces magnetic fields. This includes busbars, transformers or other cables. Try to maintain several toroid diameters clearance.
iv. Many small cables tend to be worse than three larger ones. Try to position the toroid in the circuit with this in mind.
v. Toroids used for core balance earth leakage protection cannot have busbars passed through the toroid.
vi. To prevent possible nuisance tripping it is suggested that the conductor screen of the earth leakage toroid should be earthed at the relay end only. If both ends are earthed the possibility

exists for the shield to become an earth loop, having finite resistance and injecting noise into the toroid leads.

vii. To reduce the possibility of noise pickup, install twisted pair cable between the ELD relay and the toroid.

CAUTION! 	**The ELD relay includes a circuit for continually testing the toroid connection. The resistance of the wiring between the relay and toroid must be kept below 1ohm. If this is not done then a "CT" fault will be detected and the relay will trip.**

5 COMMISSIONING AND CALIBRATION

Prior to being put into service, the electrical protection system must be correctly commissioned. This manual does not cover system commissioning; the full scope of commissioning tests should be determined during the risk assessment or FMEA covering the design of the electrical protection system.

The following test can provide guidance on checking the correct operation of the ELD during commissioning. This is not intended to provide an exhaustive commissioning checklist, but should be considered to be a minimum set of tests.

5.1 Earth Leakage Test

A test current is injected through the window of the toroid to test the operation of the relay. See section 6.3.2 for instruction on resetting the ELD relay following a fault or a test.

6 ELD V2 OPERATION AND TESTING

The Ampcontrol ELD V2 Earth Leakage Relay is electronic in design and is based on microprocessor technology. The 'Healthy' LED flashes to indicate correct operation of the microprocessor. The relay uses a toroid to measure earth fault current. A definite time operating characteristic is provided with adjustable trip sensitivity and time delay. When a fault occurs and the trip level and time delay is exceeded the relay's trip function is activated, which operates the trip contacts connected in the system control circuit. The 'Trip' LED is on when a trip occurs. The trip condition is latched in non-volatile memory and requires operation of the reset input to clear the trip condition. An internal reset is also provided on the fascia of the relay. The 'Relay' LED is on to indicate the relay is energised.

A ten-segment LED bar graph indicates the percentage of leakage level being detected. This reading can be remotely monitored/displayed using the 4-20mA output of the relay. When the relay measures currents with frequencies much greater than 50Hz, the bar graph LED fast flashes (5Hz) instead of being steady. Should the high frequency current persist until the time delay is exceeded the relay will trip and the 'Har.Trip' LED (Harmonic Trip) will be illuminated.

The ELD V2 Earth Leakage Relay is housed in a stainless steel case and can be either 'DIN Rail' or 'Panel' mounted through a 69 x 39mm cut out. When panel mounted the front of the ELD relay is designed to provide IP56 ingress protection. There is provision to prevent unauthorised adjustment of the trip settings by sealing the post (in front of the knurled nut) with a lead seal, thus inhibiting the unauthorised removal of the front fascia cover.

An internal switch mode power supply allows the ELD to operate from 32VAC to 110VAC or 20VDC to 185VDC.

The ELD V2 Relay has been designed and tested for use on fault-limited systems. To ensure maximum protection the earth leakage system should be used in conjunction with the other protection systems covered by AS/NZS 2081. The collective systems are designed to limit touch and step potentials.

The relay is also suitable for industry where equipment or system earth leakage protection is required. The relay is not suitable for personal protection, which requires trip levels of 20-30mA, with instantaneous operation. (Refer AS/NZS 3190).

The ELD relay continually monitors the toroid and if the connection is lost the relay will trip and flash the 'CT Fault' LED.

CAUTION! 	**The ELD relay includes a circuit for continually testing the toroid connection. The resistance of the wiring between the relay and toroid must be kept below 1Ω. If this is not done then a CT fault will be detected and the relay will trip.**

6.1 Methods of Earth Leakage Protection

The ELD V2 Relay is suitable for the two methods of protection used. They are the Core Balance and Series Neutral earth leakage protection systems. (See Section 4.3, Methods of Earth Leakage Protection, for details).

6.2 Mechanical Arrangement

6.2.1 Enclosure

The ELD is housed in a plastic and stainless steel enclosure and is rated as IP20. The ELD enclosure is designed to be either DIN rail or Panel mounted. The dimensions are shown in Figure 1 below:

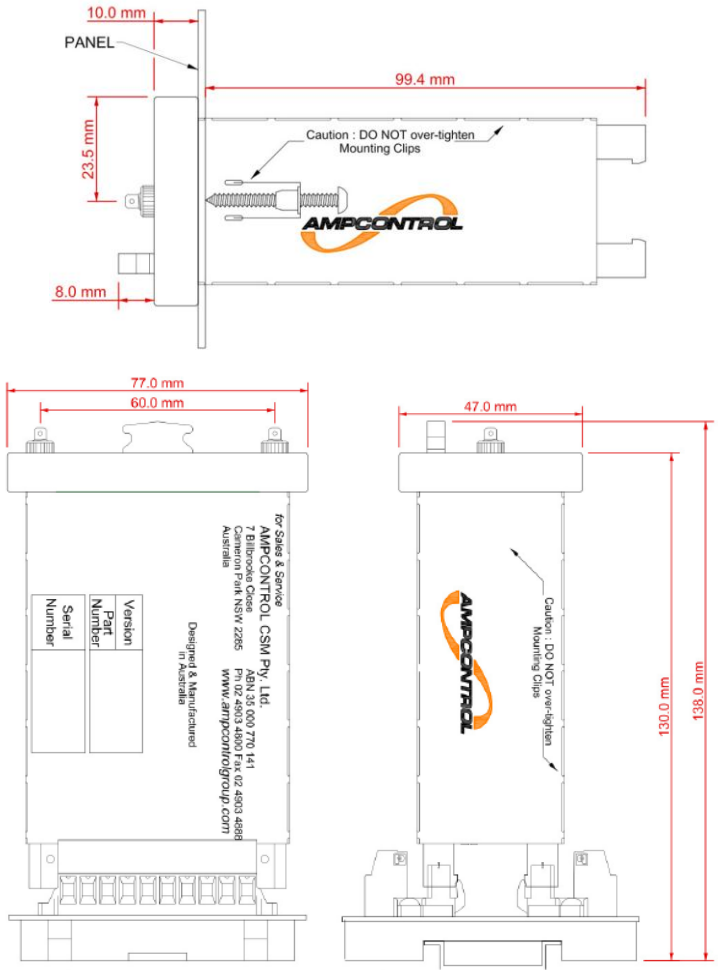


Figure 1: ELD enclosure dimensions – Panel mounted (top) and DIN rail mounted (bottom) options

6.2.2 Front Panel

The front fascia of the ELD V2 relay consists of a two switches for selection of the Trip Level and Delay Time, five (5) indication LEDs for diagnostics support and a ten-segment LED bar graph to display the level of Earth Leakage current being measured. Figure 2 shows the front fascia of the relay.

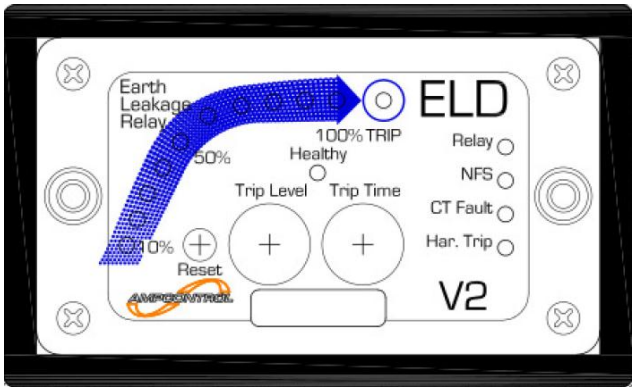


Figure 2: ELD V2 Front Fascia

6.3 Electrical Connections

Once the ELD relay has been mounted in a suitable location, it is necessary to wire it correctly.

Figure 3 shows a typical wiring diagram for the application of the ELD relay.

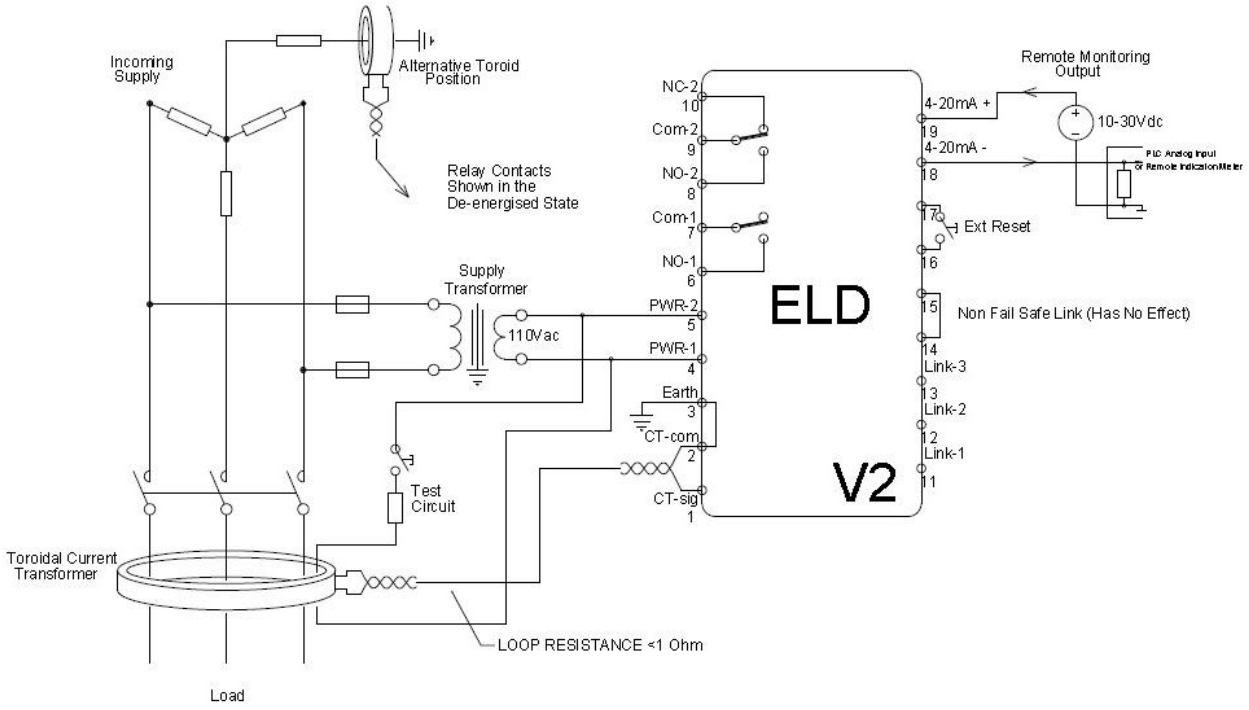


Figure 3: ELD Typical Electrical Application

6.3.1 Supply

The ELD V2 relay is able to operate across both AC and DC voltages ranges. The supply voltage can be 32-110VAC +/- 20% at 50Hz, or 20-185VDC.

6.3.2 Reset

To reset the relay: press the button located on the fascia of the relay, or provide an external normally open contact (it is recommended that a twisted pair be used between the N/O contact and the reset input). The reset button is also used to access the memory of the processor to view the maximum level of leakage since the previous trip. A section of the bar graph will slow flash (2Hz) indicating the peak level while the reset button is held closed, and will continue to flash for 1 second after the reset button is released.

6.3.3 Toroids

The ELD V2 Relay is designed for use with Ampcontrol EL500S series Toroids. They are available with window sizes 25, 60, & 112mm. These allow trip settings from 100mA to 2500mA.

7 OPERATION SUMMARY

7.1 Rotary Switches Configuration

7.1.1 Trip Level selection

The trip level can be selected via one of the rotary switches at the front of the unit. The trip level represents the threshold of current measured by the earth leakage toroid, above which a trip condition occurs. Trip level settings can be selected from 100 to 2500mA.

7.1.2 Time Delay selection

The time delay can be selected via one of the rotary switches at the front of the unit. The trip time represents the delay after which a trip condition has occurred when the ELD relay will de-energise. The settings for the time delay are <50 to 500ms.

7.2 Indication LEDs

7.2.1 Healthy LED

LED state	*Indication*
Off	Power Off; microprocessor not operating correctly
Flashing	Microprocessor is correctly operating
On	N/A

7.2.2 Trip LED

LED state	*Indication*
Off	Relay is healthy
Flashing	N/A
On	Relay has tripped due to a fault condition

7.2.3 Relay LED

LED state	*Indication*
Off	Relay is not energised
Flashing	N/A
On	Relay is energised

7.2.4 Har. Trip LED

LED state	*Indication*
Off	High frequency currents not being measured.
Flashing	N/A
On	High frequency current measured for a period exceeding the time delay.

7.2.5 CT Fault LED

LED state	*Indication*
Off	Earth Leakage toroid connection healthy
Flashing	Connection lost to the Earth Leakage toroid
On	N/A

7.3 Mode of Operation

To comply with AS/NZS 2081:2011 the relay can only be operated in the fail-safe mode. This is the default mode, where the relay drops out on fault or loss of power. Power to the relay is from the line side of the isolating device or from an independent supply.

8 SERVICE, MAINTENANCE & DISPOSAL

8.1 Equipment Service

The ELD V2 relay requires no internal servicing during its normal operating life. A number of external system based checks should however be completed on a regular basis. These 'routine inspections' must be carried out by suitably trained people with knowledge of the relay and the systems into which it is fitted. Routine inspections may take the form of either visual-only checks, or visual and 'hands-on' checks.

8.1.1 Visual Only Inspections

A basic visual inspection focuses on looking at the installation for signs of physical damage, water or dust ingress and the condition of cables and labels. This type of inspection may involve opening cabinets to gain access to the ELD V2 relay and other equipment. This level of inspection may also include cleaning display windows that have become obscured by dirt.

Observations would typically be:

- Check that equipment enclosures, cable trays, conduits, etc. are in good order with no physical damage.
- Check that sealed wall boxes are free from water and dust ingress internally. Door seals are in good condition.
- Check that connected cables are free from cuts, abrasions and obvious signs of damage. Cable restraints are in good order and correctly fitted.
- Check that labels on equipment, wall boxes and cables are present and in good condition (especially certification labels).
- Check that no modifications have been carried out to installed equipment.

8.1.2 Hands-On (Detailed) Inspections

A more detailed inspection would include all of the elements of a visual inspection, plus some checks that cover the integrity of connections, fixtures and fittings.

In addition to basic visual observations, more detailed integrity checks would involve:

- Verify that equipment housings, wall boxes and other mechanical fixtures are secured in place. This includes terminal box lids, tightness of cable glands, integrity of wall-box mountings, security of equipment fixing to walls/DIN rails etc.
- Verify all electrical connections are secure with no loose screw terminals or DIN rail terminals not fitted to rails etc.

8.2 Equipment Maintenance

WARNING! 	**The ELD V2 relay has no user-serviceable parts. All repairs must be carried out by Ampcontrol only. If a fault develops, return the relay to Ampcontrol for repair. It is essential that no attempt be made to repair the relay as any attempt to dismantle or repair the relay can seriously compromise the safety of the unit.**

8.3 Disposal

	**The electronic equipment discussed in this manual must not be treated as general waste. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment and human health which could otherwise be caused by incorrect waste handling of this product.**

9 SPECIFICATIONS

Supply Voltage	
Voltage	32-110VAC +/- 20%, 50Hz 20-185VDC
Power Consumption	< 3W

Relay Contacts	
Contacts	1 x NO / 1 x CO
Ratings	1.6A, 400VA
Relay to Toroid	< 1Ω

	**The above table relates to the latest version of the ELDV2 relay, designed and tested to AS/NZS 2081:2011, Section 6. While the relay itself has not changed, the relay output limits are different to previous versions of the relay to ensure compliance with the 2011 version of the standard.**

4-20mA Output	
4-20mA Output	The 'Loop Powered' current represents the leakage current as a % of the trip level. 4mA => 0% leakage, 20mA => 120% leakage (100% = 17.33mA)
Max. Loop Resistance	[Vs-10] x 50, where Vs must be greater than 10VDC and less than 30VDC
Accuracy	+/- 2% of full scale

Mechanical	
Dimensions	77x47x116mm
IP Rating	IP56 (when panel mounted)

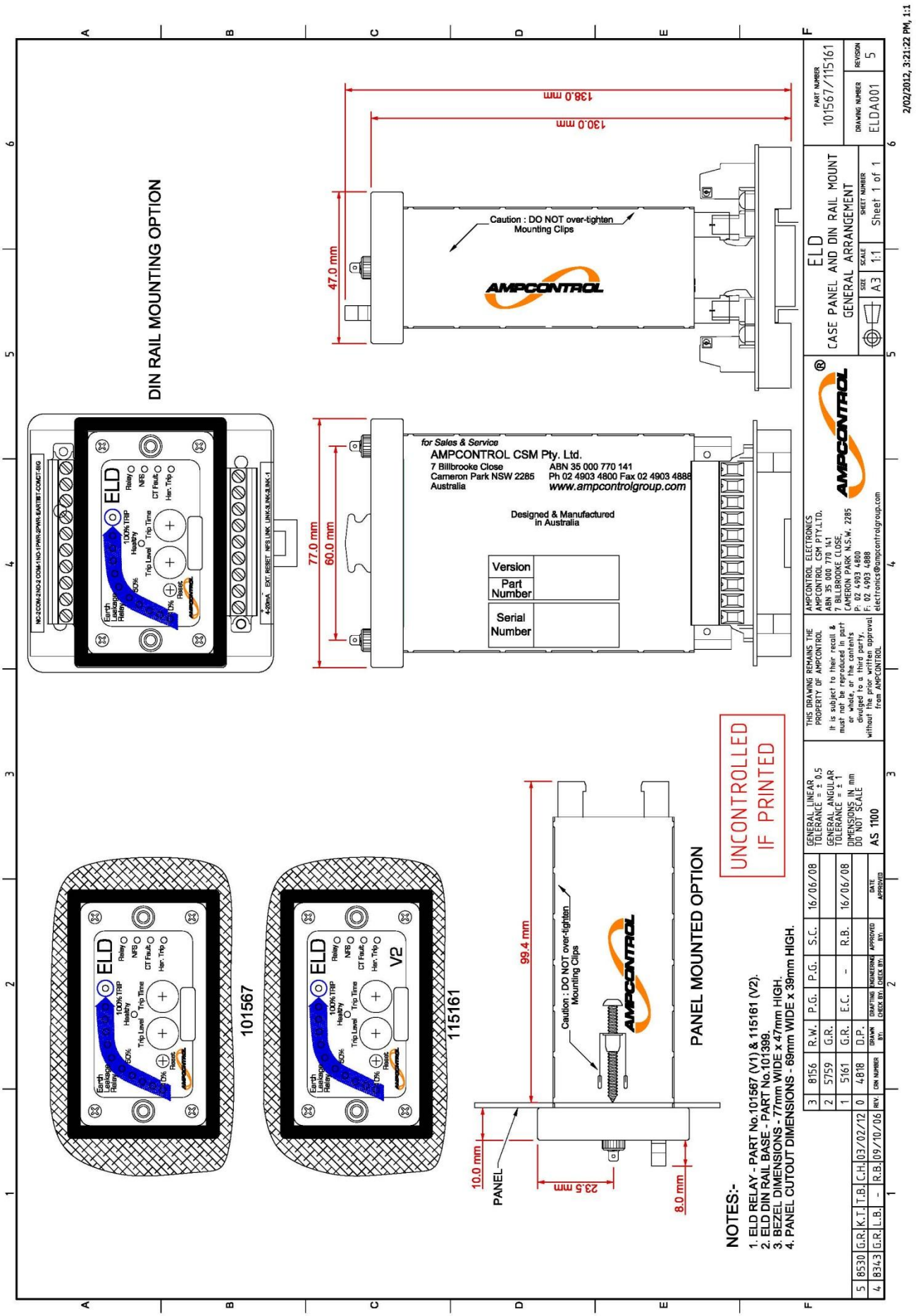
Trip and Time Delay Settings		
Switch Position	*Trip Level mA*	*Time Delay mS*
0	100	<50
1	150	100
2	200	150
3	250	200
4	300	250
5	350	300
6	400	350
7	450	400
8	500	450
9	750	500
A	1000	500
B	1250	500
C	1500	500
D	1750	500
E	2000	500
F	2500	500

WARNING! 	**The above table relates to Version 2 of the ELD relay, designed and tested to AS/NZS 2081:2011, Section 6. Positions 9 to F differ to previous relay versions to ensure compliance to the latest standard. Verify you have the correct relay by checking that 'V2' is printed on the fascia before selecting positions 9-F from this table.**

10 EQUIPMENT LIST

Part Number	Description
115161	ELD V2 Earth Leakage Relay
101399	ELD DIN Rail Mounting Kit
120255	ELD-ELC/F Adapter Kit
115437	Toroid – 25mm ID
101658	Toroid – 60mm ID
101656	Toroid – 112mm ID

APPENDIX A - DRAWINGS


DIN RAIL MOUNTING OPTION
ELD
CASE PANEL AND DIN RAIL MOUNT
GENERAL ARRANGEMENT
PART NUMBER 101567/115161
DRAWING NUMBER ELDA001
REVISION 5
SIZE A3
SCALE 1:1
SHEET NUMBER Sheet 1 of 1
2/02/2012, 3:21:22 PM, 1:1
138.0 mm
130.0 mm
47.0 mm
Caution : DO NOT over-tighten Mounting Clips
77.0 mm
60.0 mm
for Sales & Service
AMPCONTROL CSM Pty. Ltd.
7 Billbrooke Close
Carneron Park NSW 2285
Australia
ABN 35 000 770 141
Ph 02 4903 4800 Fax 02 4903 4888
www.ampcontrolgroup.com
Designed & Manufactured in Australia
Version
Part Number
Serial Number
101567
115161
PANEL MOUNTED OPTION
99.4 mm
Caution : DO NOT over-tighten Mounting Clips
10.0 mm
PANEL
23.5 mm
8.0 mm
UNCONTROLLED IF PRINTED
NOTES:-
1. ELD RELAY - PART No.101567 (V1) & 115161 (V2).
2. ELD DIN RAIL BASE - PART No.101399.
3. BEZEL DIMENSIONS - 77mm WIDE x 47mm HIGH.
4. PANEL CUTOUT DIMENSIONS - 69mm WIDE x 39mm HIGH.
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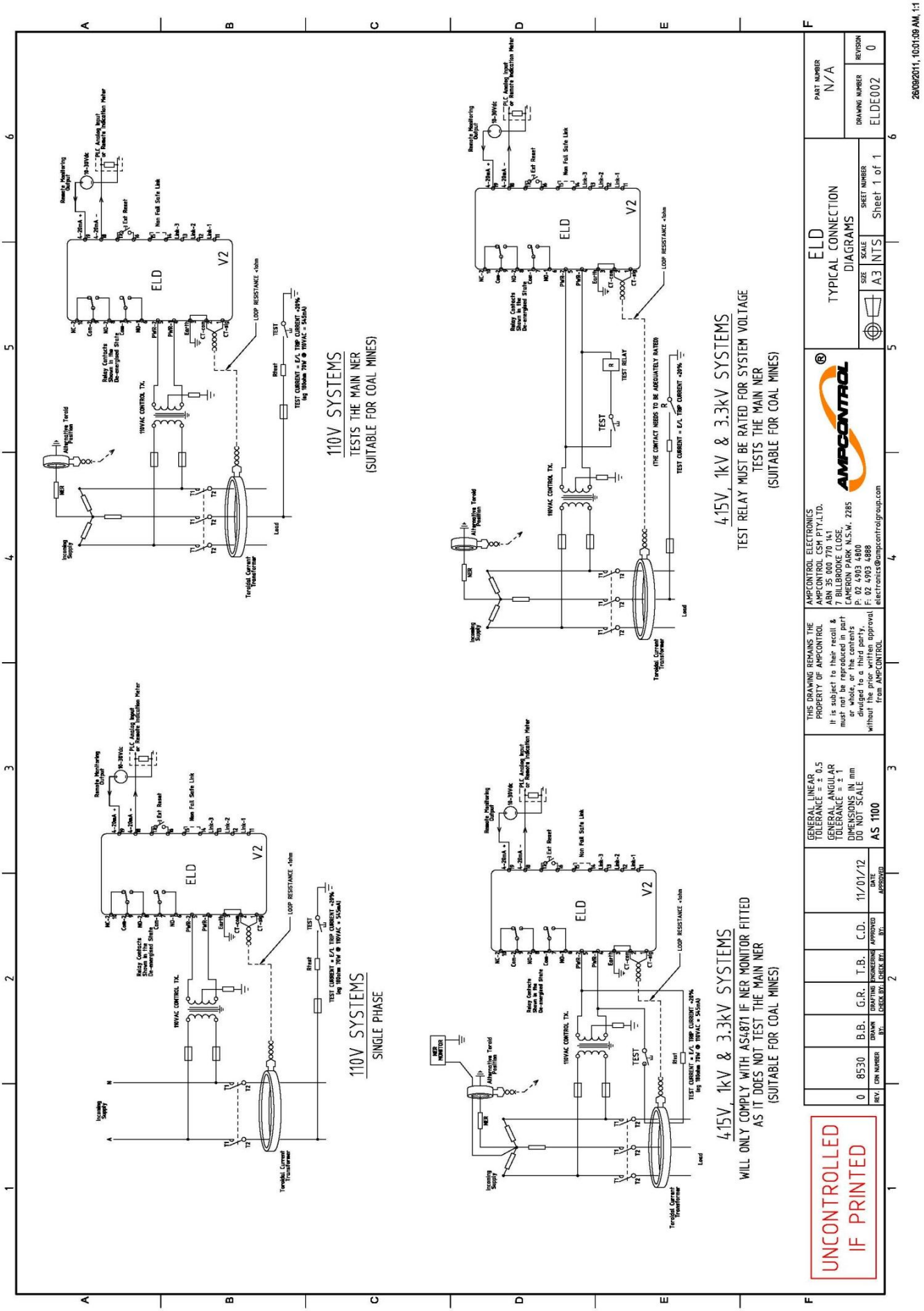
AMPCONTROL ELECTRONICS
AMPCONTROL CSM PTY.LTD.
ABN 35 000 770 141
7 BILLBROOKE CLOSE,
CAMERON PARK N.S.W. 2285
P. 02 4903 4800
F. 02 4903 4888
electronics@ampcontrolgroup.com
GENERAL LINEAR TOLERANCE = ± 0.5
GENERAL ANGULAR TOLERANCE = ± 1
DIMENSIONS IN mm
DO NOT SCALE
AS 1100
3 8156 R.W. P.G. P.G. S.C. 16/06/08
2 5759 G.R.
1 5161 G.R. E.C. - R.B. 16/06/08
5 8530 G.R. K.T. T.B. C.H. 03/02/12 0 4818 D.P.
4 8343 G.R. L.B. - R.B. 09/10/06
DRAWN BY: DRAFTING CHECK BY: ENGINEERING CHECK BY: APPROVED BY: DATE APPROVED
CON NUMBER REV


110V SYSTEMS
TESTS THE MAIN NER
(SUITABLE FOR COAL MINES)
415V, 1kV & 3.3kV SYSTEMS
TEST RELAY MUST BE RATED FOR SYSTEM VOLTAGE
TESTS THE MAIN NER
(SUITABLE FOR COAL MINES)
110V SYSTEMS
SINGLE PHASE
415V, 1kV & 3.3kV SYSTEMS
WILL ONLY COMPLY WITH AS4871 IF NER MONITOR FITTED
AS IT DOES NOT TEST THE MAIN NER
(SUITABLE FOR COAL MINES)
ELD
TYPICAL CONNECTION DIAGRAMS
AMPCONTROL ELECTRONICS
AMPCONTROL CSM PTY.LTD.
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GENERAL LINEAR TOLERANCE = ± 0.5
GENERAL ANGULAR TOLERANCE = ± 1
DIMENSIONS IN mm
DO NOT SCALE
AS 1100
SIZE A3
SCALE NTS
SHEET NUMBER Sheet 1 of 1
PART NUMBER N/A
DRAWING NUMBER ELDE002
REVISION 0
26/09/2011, 10:01:09 AM, 1:1
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