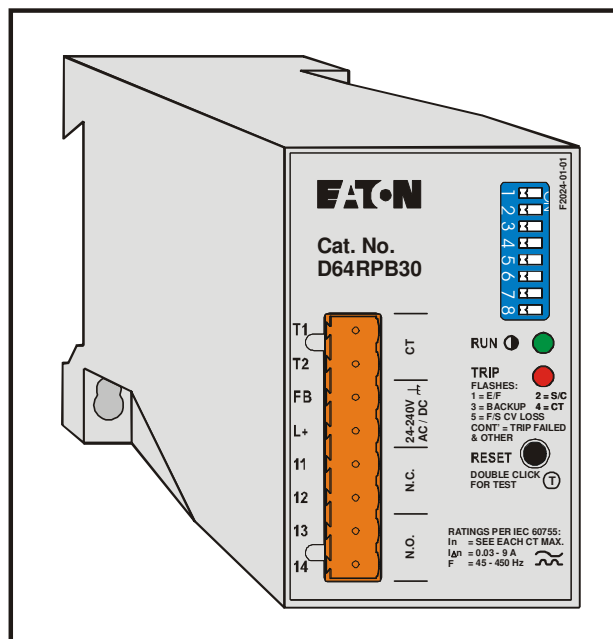


## Instructions for D64RPB30 Series C1 Ground Fault Relay



**Figure 1. D64RPB30 Ground Fault Relay**

### 1. FUNCTIONALITY

#### 1.1 Ground fault current sensing and fault reporting

The D64RPB30 is a microprocessor based ground fault relay for use on solidly grounded or resistance grounded systems.

The D64RPB30 employs an external 500:1 current transformer (CT) to measure ground fault current flowing to ground in electrical power distribution systems. The measured value is compared against two setpoints. The lower one, the Ground fault (G/F) setpoint, is settable from 30 mA to 9 A in 8 steps and has an associated delay settable from 20 ms to 10 s in 6 steps. The higher one, the Short Circuit (S/C) setpoint is fixed at 125 A. When the current exceeds the G/F setpoint for the set delay, but does not reach the S/C level, a 'G/F' is diagnosed and the unit trips by operating its internal relay. Should a fault occur causing a ground fault current exceeding the S/C setpoint, the D64RPB30 operates its relay without any delay diagnosing an 'S/C'.

Optionally, the user can select the operation of the relay to be Type 2 Coordinated with an upstream tripping device (fuse or breaker) to protect any local contactor contacts in the case of S/C faults. In this case the unit does not trip initially when the measured current exceeds the S/C setpoint, but waits for the upstream device to take care of current interruption and then trips. The latter trip flags the location of the fault to the user and also allows him to instantly re-close the upstream tripping device. Should the upstream device fail to perform, then automatic backup protection makes the D64RPB30 trip - as a last resort- 20 ms or 300 ms, selected by dipswitch, after the S/C occurred.

The relay contacts can be used in a trip or alarm circuit. Form "Z", normally open and normally closed contacts is provided.

The D64RPB30 is a Class A device as defined in the IEC 60755 standard; therefore it is designed for operation with sinusoidal AC and pulsating DC currents.

#### 1.2 External CT supervision

With any G/F protection scheme using an external CT, there is an inherent risk that ground faults will not be detected because of a bad or deteriorated connection to the CT. Both open circuits and shorts on the CT connection will prevent detection. Therefore, the conventional practice is to prove correct tripping regularly by means of current injection. This is an annoying procedure disrupting normal plant operation.

The D64RPB30 solves this problem by constantly supervising the connection to the external CT. Open circuits as well as shorts are detected and will cause a trip.

Please note that the D64RPB30 does not employ any DC injection to implement this feature. Even small DC currents sent through the secondary of a CT can bias its core enough to shift the trip point outside specification on sensitive settings.

For the CT supervision feature to work a 500:1 ratio Series A2 C311CT must be installed, as specified in section 5.

### 1.3 LED indicators

The unit has two LEDs. A green LED shows correct operation by slowly flashing (1 s on / 1 s off). When the unit is in a tripped condition, a red LED shows short 0.25 s flashes as a code indicating the cause of the trip:

- One 0.25 s flash every few seconds means Ground fault current exceeded the set G/F limit, but did not reach S/C levels. This trip is labeled 'G/F'.

- Two consecutive 0.25 s flashes every few seconds means Ground fault current exceeded the S/C level. This trip is labeled 'S/C'.

In case Type 2 Co-ordination is used, this code also means that the upstream device tripped correctly; after the current dropped to zero as a result of the upstream trip, the D64RPB30 activated its trip relay to isolate the faulty circuitry.

- Three consecutive 0.25 s flashes every few seconds can only occur when Type 2 Co-ordination is used. It means that Ground fault current exceeded the S/C level, but the upstream device failed to trip. The D64RPB30 then tripped as a last resort. This trip is labeled 'Backup'. The contactor should be replaced since its contacts may have been damaged due to the S/C current.
- Four consecutive 0.25 s flashes every few seconds means that the connection to the external CT is either open or shorted. Note that the trip is latched until reset; therefore intermittent failures will be captured, overcoming the impression that the unit tripped without cause.
- Continuous 0.25 s flashes indicate an extra 'trip failed' alarm state on top of one of the possible trips described above.

Following the operation of the trip relay, measured ground fault current remained at a high level. When the local or remote reset button is first pressed, the trip is not reset, but the 'trip failed' alarm state is. As a result the red LED will now show the original cause of the trip.

### 1.4 Reset / Test pushbutton

The built-in momentary pushbutton is used to verify the condition of the D64RPB30 if control voltage has been removed from the relay (see section 1.5) and to reset the internal relay and/or the red LED (depending on the exact Operating Mode, see section 1.6).

The reset will only be granted if the cause of the trip is cleared. Otherwise the relay will remain activated without resetting. If the cause of the trip is cleared but another fault exists, then pressing the reset button will reset the trip indication on the red LED. This permits the new trip code to be displayed. However, the relay will remain activated without resetting.

Double-clicking the local button invokes a test which switches an AC voltage onto the processor's CT sensor input. The voltage is scaled to simulate a Ground fault current of 1.5 times the G/F trip level setpoint. The unit will trip on G/F after the set delay (plus 0.4 s) and then switch off the AC voltage. Press the reset button again to reset the device. No external power supply is required.

### 1.5 Memory after loss of control voltage

When control voltage is removed from the D64RPB30, the condition of the relay will be memorized (for at least one week). Pressing the Reset pushbutton before restoring control voltage will light either the green LED or the red LED, green indicating no trip was registered and red indicating the opposite. The green LED will light continuously, whereas the red LED will give a sequence of short flashes as described in section 1.3 indicating the cause of trip. Please note that if the D64RPB30 is operated in one of the Failsafe modes (see section 1.6), and there was no trip when control voltage disappeared, the system will still activate its relay at the very moment of losing voltage. If this is what happened, the red LED will show five consecutive short flashes, meaning 'relay was merely activated because control voltage was lost while operating in Failsafe mode'.

## 1.6 Operating Modes

The D64RPB30 has four distinct Operating Modes. All modes have this in common:

- In the 'reset state' of the relay the normally open contact is open and the normally closed contact is closed.
- In the 'tripped state' of the relay the normally open contact is closed and the normally closed contact is open.

The different modes are:

1. Continuous Non-Failsafe operation  
After a trip the relay remains in the tripped state and the red LED remains active until the reset button is pressed. When control voltage is removed the relay goes to the reset state unconditionally.
2. Continuous Failsafe operation  
Same as mode 1, except when control voltage is removed the relay goes to the tripped state unconditionally.
3. Pulsed Non-Failsafe operation (for shunt controlled breakers, or alarm only purposes)  
When a trip occurs, the relay goes to the tripped state for 0.5 seconds, then resets. Regardless of the cause of trip, should measured current remain or go above the set G/F trip level, this pulse is repeated every 3 seconds. The red LED remains active until the reset button is pressed. This allows the user to verify which D64RPB30 tripped its associated breaker. If the reset button is not pressed (LED continues to show cause of trip), the functionality of the trip circuit is not compromised. That is, in case of a trip condition the relay will correctly issue a pulse, even if the red LED is active. When control voltage is removed the relay will not issue a pulse (but note that this will reset the red LED).
4. Pulsed Failsafe operation (for shunt controlled breakers, or alarm only purposes)  
Same as mode 3, except when control voltage is removed the relay will issue a 0.2-0.3 second pulse. This means that, when control voltage is restored after a trip due to loss of control voltage, the contact will remain open. This avoids the 500 ms delay in contact transfer that occurs when control power is restored on continuous failsafe operation (in 2 above).

If the D64RPB30 is to be used for alarm only purposes (rather than to interrupt ongoing processes), and the alarm has to have an auto-resetting operating mode, select one of the Pulsed modes. The pulses will be repeated as long as current is above the set G/F level. Note that a faulty connection of the external CT would only generate one pulse. Also, note that with Ground faults the red LED will always show the 'trip failed' alarm.

## 1.6 Tamper proof dipswitches

Eight dipswitches are used to program the D64RPB30. However, to discourage unauthorized manipulation, the preselected settings can only be changed by going through the procedure outlined below.

When an attempt is made to change the settings without going through this procedure, the green and red LEDs start to blink alternately until the switches are returned to their original positions. Should the switches be left in other than the preselected settings, the preselected settings, being stored in non-volatile memory, remain valid.

The proper procedure to change settings is as follows:

1. The dipswitches are placed in the new positions (ignoring the blinking LEDs).
2. Within 15 seconds after the last change was made (or control power was applied), the system is brought in test mode using the local pushbutton, causing the new settings to become active. Since the system will trip now, changing the settings cannot go by undetected. See section 1.4 for a description of how to invoke test mode.

Note that any trips must be reset before this procedure can be completed.

## 2. DIPSWITCH SETTINGS

**Table 1. Dipswitch Settings**

In this table 'R' denotes right and 'L' denotes left.

| Switch nos. | Parameter                                       | Set to                                                               | Meaning                                                                                                                                                                                                                                                                                   | Refer to section |
|-------------|-------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1 2 3       | Ground fault Trip Level                         | L L L<br>L L R<br>L R L<br>L R R<br>R L L<br>R L R<br>R R L<br>R R R | 30 mA<br>100 mA<br>500 mA<br>1 A<br>2 A<br>3 A<br>5 A<br>9 A                                                                                                                                                                                                                              | 1.1              |
| 4 5 6       | Ground fault Trip Delay and Type 2 Coordination | L L L<br>L L R<br>L R L<br>L R R<br>R L L<br>R L R<br>R R L<br>R R R | 20 ms without Type 2 Coordination<br>20 ms with Type 2 Coordination<br>300 ms without Type 2 Coordination<br>300 ms with Type 2 Coordination<br>1 s without Type 2 Coordination<br>2 s without Type 2 Coordination<br>5 s without Type 2 Coordination<br>10 s without Type 2 Coordination | 1.1              |
| 7 8         | Operating Mode                                  | L L<br>L R<br>R L<br>R R                                             | Continuous Non-Failsafe operation<br>Continuous Failsafe operation<br>Pulsed Non-Failsafe operation<br>Pulsed Failsafe operation                                                                                                                                                          | 1.5              |

## 3. CONTROL VOLTAGE

The D64RPB30 has a universal control voltage input, accepting nominal voltages between 24 and 240 V DC/AC 45-450 Hz with a -20% / +10% tolerance. The total range of accepted voltages is therefore 19.2 to 264 V DC/AC. Power consumption is 1.5 VA maximum with AC voltages and 0.5 Watts maximum with DC voltages.

Note that the built-in power supply circuit is non-isolated. This means that there is no electrical isolation between the control voltage input and the internal electronics. As a result these share a common ground reference. This reference is applied to the system through the FB<sup>1</sup> terminal which must be firmly connected to local frame or chassis ground with the shortest possible lead for safety and proper EMC behavior. Use a minimum 14 AWG stranded conductor. Control voltage is presented to the L+ terminal with respect to chassis ground. AC voltage sources connect their Neutral side to the chassis and

distribute their 'hot' L side through wiring to the L+ terminals. DC voltage sources connect their negative - side to the chassis and distribute their positive + side through wiring to the L+ terminals. For good EMC behavior it is important (as in any installation) to run all wiring close along the chassis or in metal ducts, avoiding excess lengths.

## 4. CONNECTIONS AND PRECAUTIONS

Refer to Figure 2 for typical field connections

Please consult the following checklist when applying the D64RPB30

1. If the D64RPB30 is used for alarming only purposes, or if the G/F Trip Delay is set to 1 second or higher, verify that the D64RPB30 cannot be subjected to conditions exceeding its Thermal Withstand Capability (see section 5: Technical Specification).

<sup>1</sup> IEC60445 defines FB as Functional equipotential bonding conductor. Frame bonding is the primary purpose of this terminal. This replaces N- designation.

2. Place the D64RPB30 in a clean dry enclosure. Locate the relay close to the isolating device (circuit breaker or contactor) that is protecting the circuit being monitored. Provide maximum clearance between the D64RPB30 and the external CT being used and any strong magnetic flux producing devices such as power transformers, autotransformers, control transformers, reactors, and high power conductors and other buswork.
3. Pass the power conductors of the circuit being monitored (including Neutral if any) through the external CT's opening.
4. All connections to the D64RPB30 are by means of screw clamp pull-apart terminals rated 10 A, 300 V. Terminals will accept 20-14 AWG solid or stranded conductors. Terminals for external connections are:  
**T1 and T2** for connecting an external CT  
**FB** for providing an absolute ground reference to the system (refer to section 3)  
**L+** for connecting control power's 'hot' or positive side  
**11 and 12** for access to the normally closed contact of the relay  
**13 and 14** for access to the normally open contact of the relay
5. In order to meet the Electromagnetic Compatibility (EMC) requirements a firm and short connection is required between terminal FB and the nearest chassis ground point. This distance should be kept to an absolute minimum. If the D64RPB30 is mounted on a 35 mm DIN rail a DIN rail mounted ground terminal block can be installed beside the unit to act as the chassis ground point. Use a minimum 14 AWG stranded conductor.
6. For good EMC behavior it is important (as in any installation) to run all wiring, especially if unshielded, close along the chassis or in metal ducts, avoiding excess lengths.
7. Connect AC or DC control power's 'hot' side to terminal L+. Control power's neutral or negative side must be connected to chassis ground (refer to section 3).
8. Integrate the relay contacts into the control circuit. Apply appropriate fusing to protect the contacts (13 A maximum).
9. Connect the two secondary terminals of the external CT to terminals T1 and T2 of the D64RPB30 using a minimum 14 AWG shielded twisted pair cable. Connect the shield to chassis ground by means of a clamp, close to the D64RPB30 (where the FB terminal is bonded to chassis ground as well). From the clamp to terminals T1 and T2 the wires can be left unshielded.  
**CAUTION:** Terminals T1 and T2 are NOT isolated. They are connected to the FB terminal internally via a 2.5 V DC voltage source, shunted with a 7 V transients suppressing zener diode. **DO NOT** connect the external transformer to ground at any other point. Doing so may damage the D64RPB30.  
**NOTE:** Use a 500:1 ratio Series A2 C311CT as specified in section 5, otherwise CT supervision will not work properly and the D64RPB30 will trip.
10. After the external CT is installed, test CT supervision during commissioning by shorting terminals T1 and T2 for two seconds. Be careful not to touch any other circuits. A 'CT' trip should occur. Remove the short and push the reset button to reset the 'CT' trip.

## 5. TECHNICAL SPECIFICATION

### Terminals

|                             |                                                                              |
|-----------------------------|------------------------------------------------------------------------------|
| Type                        | Pull-apart                                                                   |
| UL/CSA rating               | 300 V AC, 10 A                                                               |
| VDE rating                  | 250 V AC, 12 A, pollution degree 3, over-voltage category III                |
| Insulation stripping length | 7 mm (0.27 ")                                                                |
| Torque                      | 0.4 - 0.6 Nm (0.295 - 0.443 Ft. lb)                                          |
| Field wiring                | 0.5 - 2.5 mm <sup>2</sup> (VDE), 20 - 14 AWG (UL/CSA), Cu, solid or stranded |

### Control power

|                                                  |                                                                                                                        |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Voltage range                                    | Nominal: 24 – 240 V AC/DC, -20% / +10%<br>Total: 19.2 – 264 V AC/DC                                                    |
| Frequency range on AC                            | 45 – 450 Hz                                                                                                            |
| Power consumption                                | AC 1.5 VA max, DC 0.5 W                                                                                                |
| Isolation voltage                                | Not electrically isolated from electronics                                                                             |
| Loss of supply tolerance (no impaired operation) | 250 ms at 24 V ac<br>1 s at 120 V ac<br>4 s at 230 V ac<br>80 ms at 24 V dc<br>350 ms at 48 V dc<br>750 ms at 110 V dc |
| Power-up time                                    | 500 ms for G/F detection <sup>2</sup><br>100 ms for S/C detection                                                      |

### System power

|                                   |                                                                                                                                               |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Voltage range (using external CT) | Any, providing the power conductors passing through the CT are insulated for the system voltage and electrical clearance requirements are met |
| Current Range                     | Maximum continuous phase current specified for the C311CT connected to the relay                                                              |
| Frequency range                   | 45 – 450 Hz                                                                                                                                   |

### Memory after loss of control voltage

1 week minimum (until the memory is read by pressing the Reset button)

### Ground fault circuit

|                           |                                                               |
|---------------------------|---------------------------------------------------------------|
| G/F Trip Level (settable) | 0.03, 0.10, 0.50, 1, 2, 3, 5, 9 A                             |
| Accuracy of trip point    | -15% / +0% of Trip Level <sup>3</sup>                         |
| G/F Trip Delay (settable) | 0.02, 0.30, 1, 2, 5, 10 s <sup>4</sup>                        |
| Accuracy of trip delay    | -2 / +5 ms or $\pm 2.5\%$ of Trip Delay, whichever is greater |

<sup>2</sup> If a ground fault causing a current above the G/F Trip Level but below the S/C Trip Level is already present when power is applied, the system trips just as soon as possible, regardless of the G/F Trip Delay setting (rationale: the fault may have been present much longer than the delay set time and should be cleared without delay).

<sup>3</sup> The accuracy of the trip point refers to the value of the real world ground fault current (assuming a purely sinusoidal wave shape) that just causes a trip when slowly increased from zero.

<sup>4</sup> The ground fault detection mechanism has a 'thermal' behaviour for greatly reduced noise sensitivity: the quoted delays are valid for sinusoidal currents exceeding the setpoint by >10 times; for reduced current excursions the delay increases as follows:

|                           |           |
|---------------------------|-----------|
| current = 6 x setpoint:   | add 3 ms  |
| current = 4 x setpoint:   | add 8 ms  |
| current = 2 x setpoint:   | add 20 ms |
| current = 1.2 x setpoint: | add 60 ms |

For IEC 60755 'pulsating DC' currents, the delay increases by a further 50 ms maximum.

**Ground fault circuit (cont'd)**

|                                                                                                                          |                                                                                                                                                                                                                                                                                |                                         |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <u>Ground fault circuit (GFCI)</u>                                                                                       | <u>Current wave shape</u>                                                                                                                                                                                                                                                      | <u>External CT</u>                      |
| S/C Trip Level                                                                                                           | Sine                                                                                                                                                                                                                                                                           | 125 A ac                                |
|                                                                                                                          | IEC 60755 DC 0°                                                                                                                                                                                                                                                                | 110 A rms                               |
|                                                                                                                          | IEC 60755 DC 90°                                                                                                                                                                                                                                                               | 80 A rms                                |
|                                                                                                                          | IEC 60755 DC 135°                                                                                                                                                                                                                                                              | 60 A rms                                |
| Accuracy of S/C trip Point                                                                                               | ± (10% + 2A)                                                                                                                                                                                                                                                                   |                                         |
| S/C Trip Delay                                                                                                           | 5 ±2 ms                                                                                                                                                                                                                                                                        |                                         |
| Type 2 Co-ordination on S/C                                                                                              | Selectable on / off with 0.02 and 0.3 s G/F Trip Delay settings                                                                                                                                                                                                                |                                         |
| Thermal withstand capability (external CT)                                                                               | 300 A                                                                                                                                                                                                                                                                          | infinitely                              |
|                                                                                                                          | 500 A                                                                                                                                                                                                                                                                          | 2000 ms                                 |
|                                                                                                                          | 1000 A                                                                                                                                                                                                                                                                         | 500 ms                                  |
|                                                                                                                          | 2000 A                                                                                                                                                                                                                                                                         | 125 ms                                  |
|                                                                                                                          | 5000 A                                                                                                                                                                                                                                                                         | 20 ms                                   |
| Suitable external CT types – Must have internal electronics to provide short circuit/open circuit detection <sup>5</sup> | C311CT1-A2                                                                                                                                                                                                                                                                     | 46 mm (1.81") inner diameter            |
|                                                                                                                          | C311CT2-A2                                                                                                                                                                                                                                                                     | 90 mm (3.54") inner diameter            |
|                                                                                                                          | C311CT3-A2                                                                                                                                                                                                                                                                     | 150 x 170 mm (5.9 x 6.7") Split core    |
|                                                                                                                          | C311CT4-A2                                                                                                                                                                                                                                                                     | 100 x 350 mm (3.94 x 13.78") Split core |
|                                                                                                                          | C311CT5-A2                                                                                                                                                                                                                                                                     | 145 mm (5.70") inner diameter           |
|                                                                                                                          | C311CT6-A2                                                                                                                                                                                                                                                                     | 240 mm (9.45") inner diameter           |
|                                                                                                                          | C311CT7-A2                                                                                                                                                                                                                                                                     | 300 x 300 mm (11.8 x 11.8") Split core  |
|                                                                                                                          | C311CT8-A2                                                                                                                                                                                                                                                                     | 28 mm (1.1") inner diameter             |
|                                                                                                                          | C311CT9-A2                                                                                                                                                                                                                                                                     | 65 mm (2.56") inner diameter            |
|                                                                                                                          | C311CT28-A2                                                                                                                                                                                                                                                                    | 28 mm (1.1") inner diameter             |
| <u>External CT Supervision circuit</u>                                                                                   |                                                                                                                                                                                                                                                                                |                                         |
| CT loop resistance causing a fault (O/C)                                                                                 | > 1 kΩ                                                                                                                                                                                                                                                                         |                                         |
| CT shunt resistance causing a fault (S/C)                                                                                | < 50 Ω                                                                                                                                                                                                                                                                         |                                         |
| CT Fault Trip Delay                                                                                                      | 1.5 s                                                                                                                                                                                                                                                                          |                                         |
| <u>Relay contacts</u>                                                                                                    |                                                                                                                                                                                                                                                                                |                                         |
| Configuration                                                                                                            | Voltage free form "Z" (1 N.O. and 1 N.C contact, 4 terminals)                                                                                                                                                                                                                  |                                         |
| Maximum UL/CSA rating                                                                                                    | 5 A @ 125 and 250 V AC, general use<br>1/6 hp, 125 and 250 V AC<br>5 A @ 30 V DC, resistive<br><u>B300:</u><br>30 A, 3600 VA make, 3 A 360 VA break @ 120 V AC<br>15 A, 3600 VA make, 1.5 A 360 VA break @ 240 V AC                                                            |                                         |
| EN 60947 rating                                                                                                          | 5 A @ 250 V ac, utilization category AC-12<br>4 A @ 250 V ac, utilization category AC-13<br>3 A @ 250 V ac, utilization category AC-14<br>3 A @ 250 V ac, utilization category AC-15<br>5 A @ 30 V dc, utilization category DC-12<br>3 A @ 24 V dc, utilization category DC-13 |                                         |
| Isolation voltage                                                                                                        | 2 kV rms, 50 – 60 Hz, 1 minute                                                                                                                                                                                                                                                 |                                         |
| Breakdown voltage between open contacts                                                                                  | 1 kV rms                                                                                                                                                                                                                                                                       |                                         |
| Maximum fusing under EN 60947-5-1                                                                                        | 13 A                                                                                                                                                                                                                                                                           |                                         |

<sup>5</sup> Future production of all Eaton C311CT Series 500:1 ratio CTs will be supplied with internal electronics to provide short circuit/open circuit detection by the D64RPB30 relay. These are designated Series A2, as shown above. They will work with all D64R relays suitable for 500:1 ratio CTs.

**Environment**

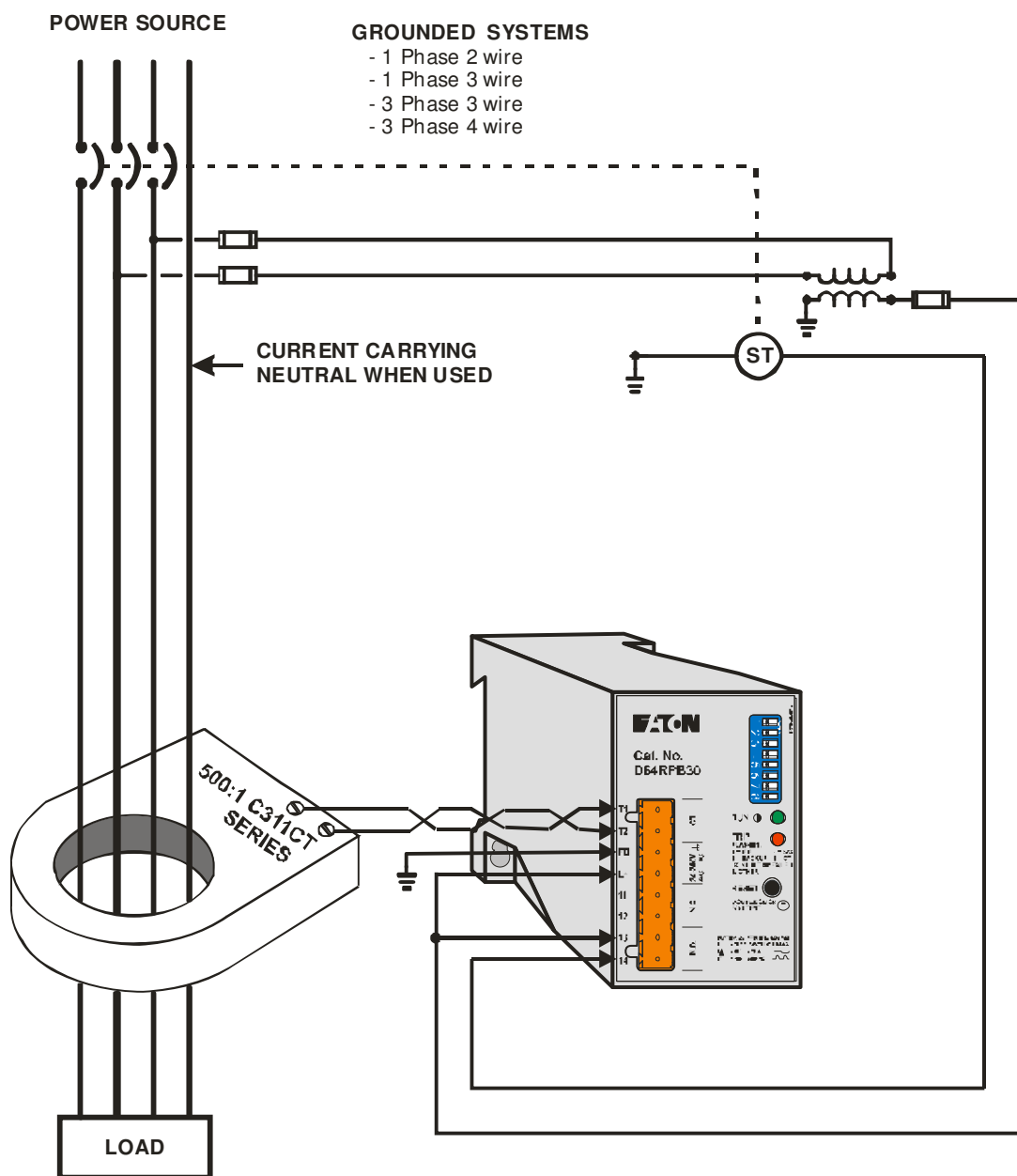
|                                       |                                             |
|---------------------------------------|---------------------------------------------|
| Operating temperature                 | -35 °C to +60 °C                            |
| Storage temperature                   | -40 °C to +80 °C                            |
| Humidity                              | 85% max (no condensation)                   |
| Ingress protection                    | IP20                                        |
| Shock resistance (no malfunction)     | 10 G                                        |
| Vibration resistance (no malfunction) | 10 G, 10 – 55 Hz at 1.5 mm double amplitude |

**Mechanical Properties**

|                                      |         |                      |
|--------------------------------------|---------|----------------------|
| Width                                | 45 mm   | 1.77"                |
| Height                               | 70 mm   | 2.76"                |
| Depth (not including terminal block) | 103 mm  | 4.03"                |
| Depth (including terminal block)     | 126 mm  | 4.95"                |
| DIN rail if DIN rail mounted         | 35 mm   |                      |
| Screws if screw mounted              | M4 x 20 | #8 x ¾" (2 required) |
| Weight (open)                        | 0.40 kg | 0.88 lbs.            |
| Weight (packaged)                    | 0.49 kg | 1.08 lbs.            |

**Applicable standards**

|               |                                                                                                                                                                                                                                                      |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 61000-6-3  | Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments (=lowest levels)<br>30-230 MHz 30 dBµV at 10 m distance<br>230-1000 MHz 37 dBµV at 10 m distance |
| EN 61000-6-2  | Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments (=highest levels)<br>80-1000 MHz with 80% AM modulation up to 10 V/m at 3 m distance from source                                   |
| EN 61000-4-2  | Electromagnetic compatibility (EMC) for industrial-process measurement and control equipment – Part 4-2: Electrostatic discharge (ESD) immunity                                                                                                      |
| EN 61000-4-3  | Electromagnetic compatibility (EMC) for industrial-process measurement and control equipment – Part 4-3: Radiated electromagnetic field immunity                                                                                                     |
| EN 61000-4-4  | Electromagnetic compatibility (EMC) for industrial-process measurement and control equipment – Part 4-4: Electrical fast transient/burst immunity                                                                                                    |
| EN 61000-4-5  | Electromagnetic compatibility (EMC) for industrial-process measurement and control equipment – Part 4-5: Surge immunity                                                                                                                              |
| EN 61000-4-6  | Electromagnetic compatibility (EMC) for industrial-process measurement and control equipment – Part 4-6: Conducted radio frequency field immunity                                                                                                    |
| EN 61000-4-11 | Electromagnetic compatibility (EMC) for industrial-process measurement and control equipment – Part 4-11: Voltage dips/drops/variations immunity                                                                                                     |
| EN 60947-5-1  | Low-voltage switchgear and control gear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices                                                                                                       |
| IEC 60755     | General requirements for Ground fault current operated protective devices                                                                                                                                                                            |
| UL            | UL 1053 Ground-Fault Sensing and Relaying Equipment, Class 1                                                                                                                                                                                         |
| CSA           | C22.2 No. 144-M91 Ground Fault Circuit Interrupters                                                                                                                                                                                                  |
| CE            | CE mark – Declaration of Conformity                                                                                                                                                                                                                  |



**FIGURE 2 - D64RPB30 TYPICAL FIELD CONNECTION WITH EXTERNAL 500:1 CURRENT TRANSFORMER AND PULSED TRIP-AUTO RESET**

## Dimensions

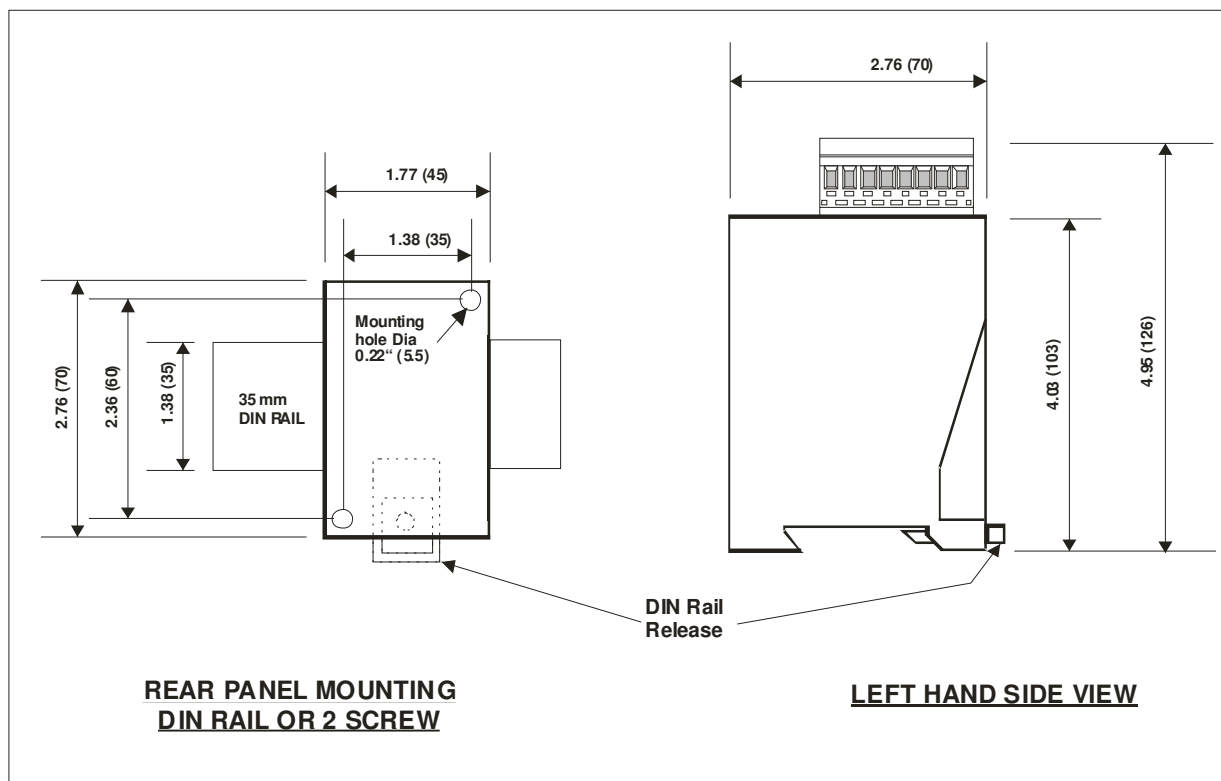


Figure 3. Dimensions Drawing – Approximate Dimensions in Inches (mm)

Table 2. Approximate Dimensions and shipping weights

| Dimensions in Inches (mm) |           |            | Shipping Weight<br>lbs. (kg) |
|---------------------------|-----------|------------|------------------------------|
| Width                     | Height    | Depth      |                              |
| 1.77 (45)                 | 2.76 (70) | 4.95 (126) | 1.08 (.49)                   |

Table 3. Output Contact States

| STATE OF OUTPUT RELAY CONTACTS UNDER VARIOUS OPERATING CONDITIONS<br>WITH DIPSWITCHES 7 & 8 IN SELECTED POSITIONS |                     |                                |                       |                             |                        |                                                               |                                                               |                                                               |                                                               |
|-------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------|-----------------------|-----------------------------|------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| OPERATING<br>CONDITIONS                                                                                           |                     | NON-FAILSAFE<br>7-Left, 8-Left |                       | FAILSAFE<br>7-Left, 8-Right |                        | PULSED NON-<br>FAILSAFE<br>7-Right, 8-Left                    |                                                               | PULSED FAILSAFE<br>7-Right, 8-Right                           |                                                               |
|                                                                                                                   |                     | 13 14<br>┌┐                    | 11 12<br>┌┐           | 13 14<br>┌┐                 | 11 12<br>┌┐            | 13 14<br>┌┐                                                   | 11 12<br>┌┐                                                   | 13 14<br>┌┐                                                   | 11 12<br>┌┐                                                   |
| 1.CONTROL POWER OFF                                                                                               |                     | ┌┐                             | ┌┐                    | ┌┐                          | ┌┐                     | ┌┐                                                            | ┌┐                                                            | 0.3s pulse<br>┌┐<br>then<br>┌┐                                | 0.3s pulse<br>┌┐<br>then<br>┌┐                                |
| 2.CONTROL POWER ON                                                                                                |                     | ┌┐                             | ┌┐                    | ┌┐<br>+ 500ms<br>= ┌┐       | ┌┐<br>+ 500ms<br>= ┌┐  | ┌┐                                                            | ┌┐                                                            | ┌┐                                                            | ┌┐                                                            |
| 3.CONTROL POWER ON,<br>FAULT CURRENT<br>ABOVE TRIP SETTING<br>& TRIP TIME                                         |                     | ┌┐                             | ┌┐                    | ┌┐                          | ┌┐                     | Cycles<br>┌┐<br>for 0.5s<br>every 3s                          | Cycles<br>┌┐<br>for 0.5s<br>every 3s                          | Cycles<br>┌┐<br>for 0.5s<br>every 3s                          | Cycles<br>┌┐<br>for 0.5s<br>every 3s                          |
| 4.CONTROL<br>POWER<br>ON,<br>FAULT<br>CLEARED                                                                     | NO RESET<br>REQUEST | ┌┐                             | ┌┐                    | ┌┐                          | ┌┐                     | ┌┐<br>Red TRIP<br>LED<br>flashing                             | ┌┐<br>Red TRIP<br>LED<br>flashing                             | ┌┐<br>Red TRIP<br>LED<br>flashing                             | ┌┐<br>Red TRIP<br>LED<br>flashing                             |
|                                                                                                                   | RESET<br>REQUEST    | ┌┐                             | ┌┐                    | ┌┐                          | ┌┐                     | Required<br>to reset<br>LED                                   | Required<br>to reset<br>LED                                   | Required<br>to reset<br>LED                                   | Required<br>to reset<br>LED                                   |
| 5.CONTROL POWER<br>OFF, FAULT STILL ON<br>SYSTEM                                                                  |                     | ┌┐                             | ┌┐                    | ┌┐                          | ┌┐                     | ┌┐                                                            | ┌┐                                                            | ┌┐                                                            | ┌┐                                                            |
| 6.CONTROL POWER<br>RESTORED, FAULT<br>STILL ON SYSTEM                                                             |                     | ┌┐<br>+ 500ms<br>= ┌┐          | ┌┐<br>+ 500ms<br>= ┌┐ | ┌┐                          | ┌┐                     | ┌┐<br>+ 500ms<br>Then<br>Cycles<br>┌┐<br>for 0.5s<br>every 3s | ┌┐<br>+ 500ms<br>Then<br>Cycles<br>┌┐<br>for 0.5s<br>every 3s | ┌┐<br>+ 500ms<br>Then<br>Cycles<br>┌┐<br>for 0.5s<br>every 3s | ┌┐<br>+ 500ms<br>Then<br>Cycles<br>┌┐<br>for 0.5s<br>every 3s |
| 7.CONTROL POWER<br>RESTORED, FAULT<br>CLEARED WHILE<br>CONTROL POWER OFF,<br>WITH OR WITHOUT<br>RESET             |                     | ┌┐                             | ┌┐                    | ┌┐<br>+ 500 ms<br>= ┌┐      | ┌┐<br>+ 500 ms<br>= ┌┐ | ┌┐                                                            | ┌┐                                                            | ┌┐                                                            | ┌┐                                                            |

**FORM 1 - TEST RECORD**

**GROUND FAULT TEST – D64RPB30**

Double clicking the RESET button on the front of the relay invokes a test which switches an AC voltage onto the processor's CT sensor input. The voltage is scaled to simulate a Ground fault current of 1.5 times the G/F trip level setpoint. The unit will trip on G/F after the set delay (plus 0.4 s) and then switch off the AC voltage.

**RESETTING THE D64RPB30 AFTER GROUND FAULT TRIP TEST**

If the D64RPB30 is in the Non-failsafe or Failsafe mode (manual reset), press the RESET button to reset the relay, the red TRIP LED will turn off, and the green RUN LED will flash.

If the D64RPB30 is in the Pulsed Non-Failsafe or Pulsed Failsafe operating mode, 0.5 seconds after the trip the output relay will reset automatically. However the red TRIP LED will continue to flash, registering the trip and the green RUN LED will remain off. Pressing the Reset button will cancel the register, the red TRIP LED will turn off and the Green RUN LED will flash.

No external power supply is required.

This form provides spaces to record the date the test was performed and the results. Those in charge of the building's electrical installation should retain the form in order to be available to the authority having jurisdiction.

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept | Oct. | Nov. | Dec. |
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