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(56) Documents Cited

GB 2292224 A GB 2257797 A GB 2066484 A

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UR3104

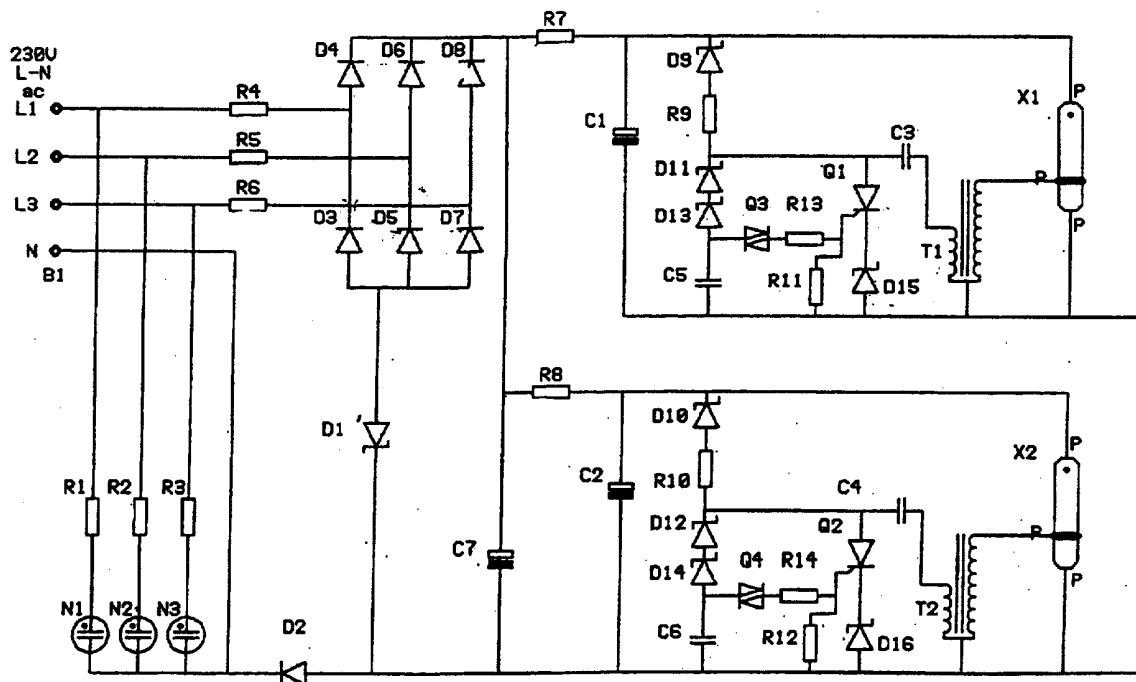
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On-line: WPI, CLAIMS, INSPEC, JAPIO

(54) Mains warning flashing unit

(57) To indicate that voltage supply is present from single phase and neutral, 2 phase, 3 phase, 3 phase and neutral, 220V.D.C. or 460V.D.C., circuitry detects supply voltage on inputs L1-L3, N. The Xenon tubes are fired through asynchronous circuitry comprising of Zener diodes, Deac, Thyristors and step up transformer. The flash rate is approximately one per second. Neon indicators N1-N3 are provided at each live input so that in the event of a Xenon tube failure, an indication of supply voltage is still provided.

FIG.1

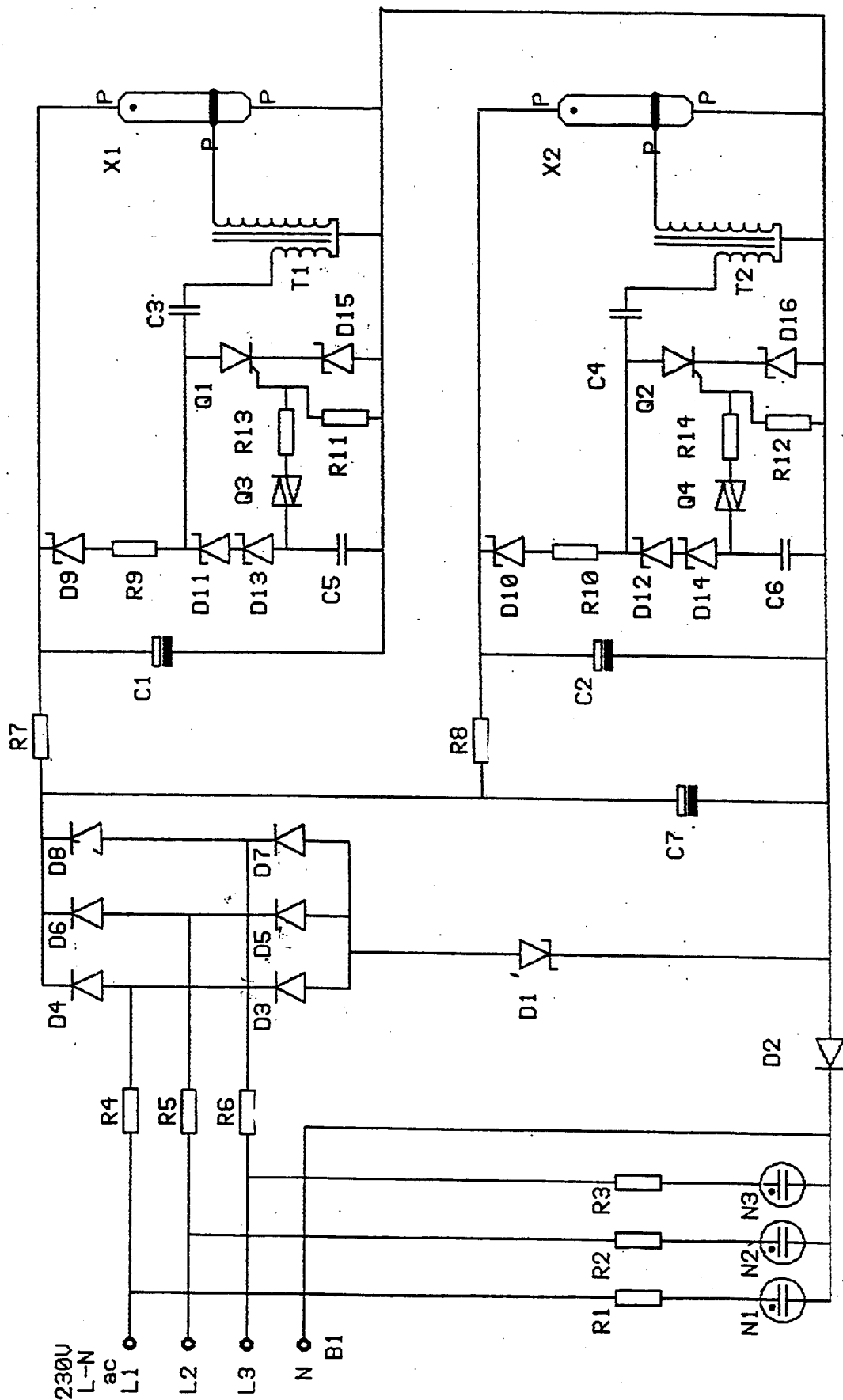


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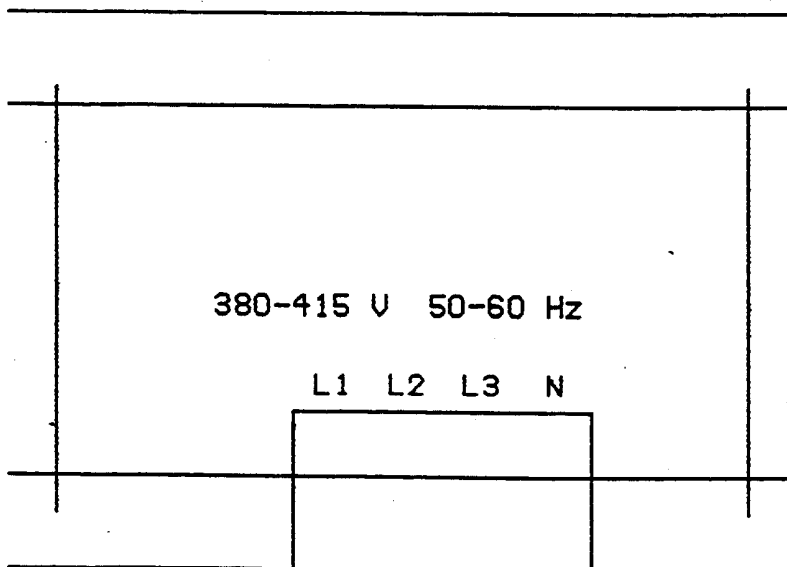
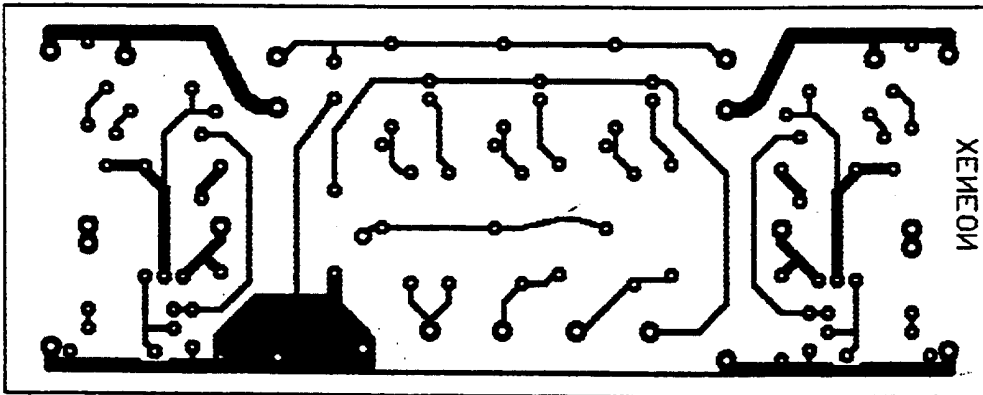
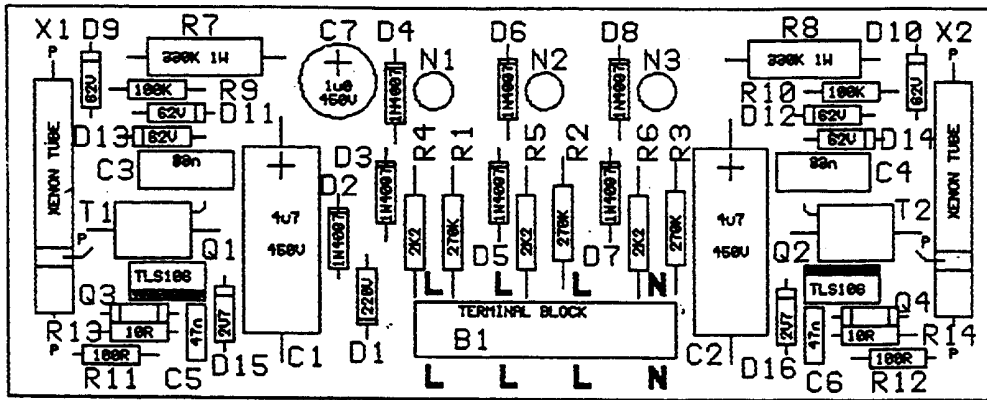
REM LIVE

FIG.1

Circuit
Diagram



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The invention relates to a mains warning device for medium voltage A.C. and D.C.

The warning device is designed to operate from A.C. single phase, Live Neutral or 3 phases or 2 phases Live - Live or 220volt D.C. using Live Neutral or 440volt D.C. using Live Live. Whenever any of these voltages are present the device flashes at a determinated rate. It also duplicates as a phase failure device.

The advantage of this one unit is that it can be used on a multiple range of voltages and has a second signalling element such as a neon as backup for the first signalling element which are preferably Xenon tube. Because of the intense flash people are alerted that voltage is present and warns them of the danger.

The device can be fed directly from the mains isolator or via a limit switch. If the mains isolator is switched on the unit flashes at a determinated rate warning personnel of the danger. If one phase of the three phase is missing the flash rate changes thereby indicating phase failure which is also shown by the respective phase neon not being illuminated.

Two independent Xenon tube flashing circuits are fed from a supply of either :-

- (a) Single Phase and Neutral
- (b) Two Phase
- (c) Three Phases
- (d) Three Phases and Neutral
- (e) 220V.D.C. or 460V.D.C.

via firing circuitry with one side flashing at a slightly different frequency than the other. The Xenon tubes are backed up by neons on each phase and illuminate if the phase is present.

The circuits are asynchronous and each flash is of 0.14 Joules energy and is repeated approximately every 1.5 seconds. Since the circuits are asynchronous the flashes appear to be random.

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To allow the unit to be used on a multiple of input voltages the circuitry at the front end has been designed to produce a steady D.C. voltage on C7. The dual firing circuits are then independent of input voltage and both sides function independently thereby increasing the safety aspect as it is unlikely that both circuits will fail simultaneously.

FIG 1.

Input Voltage is fed to the rectifier bridge D3-D8 via fuseable resistors R4 R5 R6.

With Voltage L-N

Half Wave rectification, current flows from one of L. Terminals via one resistor (R4-R6) through one Diode (D4, D6 or D8) to charge C7. It also then feeds firing circuits via R7 and R8. The return path via D2 to N. The respective phase neon also illuminates.

With Voltage 3 Phase L.L.L.

Voltage fed via R4, R5, R6 on to 3 phase rectifier bridge D3-D8 producing approximately 580 V.D.C. This is applied via 220v Zener diode D1 to C7 giving approximately 360 V.D.C. on C7 which then feeds R7 and R8 etc.

Current flows (e.g. for 1/16th of cycle)
L1-R4 D4 - (C7 R7 R8) - D1-D5-R5-L2.

The respective phase neons are illuminated.

With Voltage L.L.

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Same as above L.L.L. but with only 2 phases producing approximately 370V on C7 which feeds R7 R8 etc.

Current flow (e.g. for 1/2 cycle).
L1-R4-D4-(C7 R7 R8) - D1-D5 R5 L2
Respective phase neons illuminated.

With Voltage L.L.L.N.

Same as L.L.L. but since the voltage on the anode of D1 will be more negative D2 blocks any neutral current.

Similarly for L-L-N operation
Respective phase neons illuminated.

With 220V.D.C.

Use terminals L-N which feeds through resistor and diode bridge as per previously described.

With 460V.D.C.

Use terminals L1 L2 which feeds through resistor to diode bridge as previously described.

Firing Circuitry

After R7 and R8 the voltage is fed to the two independent firing circuits
Zener chain D9-D13 (D10-D14) charges capacitors C5 and C3 (C6 C4) Voltage fed to diac Q3 (Q4) is approximately 186 volts which drop to 30V which feeds the gate of thyristor Q1 (Q2) R13 is just a limiting resistor.

Commutation is ensured using a reverse biased gate. The current through R9 (R10) can be higher than the holding current of Q1 (Q2) under some

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circumstances causing Q1 (Q2) to latch on. A lower holding current is achieved by D15 (D16) ensuring that reverse bias is applied to the gate via R11 (R12) whenever there is current flowing in Q1 (Q2).

When thyristor is fired C3 (C4) is discharged via transformer T1 (T2) producing ignition for Xenon tube.

CLAIMS

- 1) A warning device to indicate that an item of electrical equipment is live by means of at least one first signalling (warning) element, wherein each first signalling element comprises a gas-filled tube and electrical circuitry for the firing of the gas filled tube. It is also characterised in that a respective second signalling element is associated with each phase of the electrical supply, the device to be used as a backup in case of failure of the first element.
- 2) A device according to claim 1 with dual asynchronous flashing.
- 3) A device according to claim 1-2 where commutation is ensured using a reversed bias gate.
- 4) A device according to claims 1-3 wherein the gas-filled tube is ignited by means of a step-up transformer.
- 5) A device according to claims 1-4 wherein the gas-filled tube is operated by circuitry comprising a Zener diodes and a thyristor.
- 6) A device according to any of claims 1-5 wherein the gas-filled tube is a Xenon tube.
- 7) A device according to any of claims 1-6 wherein each second signalling element is a neon indicator.
- 8) A device according to any of claims 1-7 wherein the unit is adapted to work on multi mode A.C.-D.C. converter operation.

9) A device according to any of claims 1-8 which is adapted to operate on single phase - Live - Neutral with flash rate of one every 1.5 seconds.

10) A device according to any of claims 1-9 which is adapted to operate on 3 Phase and Neutral with a flash rate of one every 1.5 seconds.

11) A device according to any of claims 1-10 which is adapted to operate on 220v - 460v D.C. with a flash rate of one every 1.5 seconds.

12) A device according to any of the claims 1-11 which is adapted to operate from a wide range of voltages with a flash rate of one every 1.5 seconds.

13) A device according to claims 1-12 wherein the electrical energy circuitry comprises of RC network.

14) A device according to any of the claims 1-13 wherein the frequency of flashing is determined by RC network.

15) A warning device as herein described and is shown in the drawing.

Amendments to the claims have been filed as follows

CLAIMS

- 1) A warning device to indicate that an item of electrical equipment is live by means of at least one first signalling warning element, wherein each first signalling element comprises a gas-filled tube and electrical circuitry for the firing of the gas-filled tube when connected to an AC or DC supply, it is also characterised in that a respective second signalling element is associated with each phase of the electrical supply to be used as a back up in case of failure of the first element.
- 2) A device according to claim 1 where two first signalling elements are provided with dual asynchronous flashing.
- 3) A device according to claims 1-2 where commutation of the two first signalling elements is ensured by using a respective reverse bias gate to switch each element, each gate being in series with a diode such that on conduction a voltage is produced across the diode to apply a reverse bias to the gate thereby reducing the holding current of the gate.
- 4) A device according to claims 1-3 wherein the gas-filled tube is ignited by means of a step-up transformer.

5) A device according to claims 1-4 wherein the gas-filled tube is operated by circuitry comprising a Zener diodes and a thyristor.

6) A device according to any of claims 1-5 wherein the gas-filled tube is a Xenon tube.

7) A device according to any of claims 1-6 wherein each second signalling element is a neon indicator.

8) A device according to any of claims 1-7 which is adapted to operate on single phase - Live - Neutral with flash rate of one every 1.5 seconds.

9) A device according to any of claims 1-8 which is adapted to operate on 3 Phase and Neutral with a flash rate of one every 1.5 seconds.

10) A device according to any of claims 1-9 which is adapted to operate on 220v - 460v D.C. with a flash rate of one every 1.5 seconds.

11) A device according to any of the claims 1-10 which is adapted to operate from a wide range of voltages with a flash rate of one every 1.5 seconds.

12) A device according to claims 1-11 wherein the electrical energy circuitry comprises of RC network.

13) A device according to any of the claims 1-12 wherein the frequency of flashing is determined by RC network.

14) A warning device as herein described and is shown in the drawing.



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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Other: On-line: WPI, CLAIMS, INSPEC, JAPIO

Documents considered to be relevant:

| Category | Identity of document and relevant passage | Relevant to claims |
|----------|---|--------------------|
| Y | GB2292224 A (Taylor) | 1-2, 4-7, 13-14 |
| Y | GB2257797 A (Bennison) | 1-2, 4-7, 13-14 |
| X | GB2066484 A (IPA) | 1 |

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