

SHOCK PROOF WIRING SYSTEM

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Abstract - Safety is the state of being "safe" the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage, error, accidents, harm or any other event which could be considered non-desirable. Safety can also be defined to be the control of recognized hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or from exposure to something that causes health or economic losses. It can include protection of people. Electrical safety, it is also very serious and important because there are no chances of saving life if getting shock to human from any of electrical instrument or directly from electricity. From above discussion of electrical safety we developed the logic regarding isolation of circuit and elimination of earthing along with its maintenance in this our project. System must be protected; there should no cut or any kind of damage in wire which is used in our domestic wiring system. But from this instant forget all this things of safety about electricity. When you are using this instrument called Shockproof Wiring kit, then it will convert general wiring system in to shockproof wiring system.

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1.2 Necessity

Now the question arises that what is meant by shockproof wiring system? In general wiring system, if any part of your body is coming in contact with live part of the system- what happen, suddenly we get shock and it totally depends on luck that we will be safe or not. In shockproof wiring system there are only two things, which will happen- If we come in contact with any one wire (phase or neutral) of that system, we will not get any type of shock even if many ampere current will flow from that wire. Another thing is that if both two terminals become in contact with each other then it is a short circuit condition and total system will shut down and cut off from distribution system supply.

Keywords: Isolation Transformer, Fuse, CFL.

1. INTRODUCTION

1.1 General

Safety is the state of being "safe" the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage, error, accidents, harm or any other event which could be considered non-desirable. Safety can also be defined to be the control of recognized hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or from exposure to something that causes health or economic losses. It can include protection of people. Electrical safety, it is also very serious and important because there are no chances of saving life if getting shock to human from any of electrical instrument or directly from electricity. From above discussion of electrical safety we developed the logic regarding isolation of circuit and

2. LITERATURE REVIEW

2.1 New Concept

Let us see, what the main reason behind getting shock is. "In generating station the neutral point of alternator is earthed. Then in substation, neutral point of power transformer is also earthed and forward as neutral point in three phases four wire system. In our home we get 230V, 50Hz power supply is one part of this system. Hence the earth and neutral is having near about equal in potential. The earth is also a good conductor of electricity. So, if our body comes in contact with phase or live terminal of electricity, one path of flowing current is completed from generating station earth through our body and we get severe shock." There is no chance of getting shock by isolating this circuit. This is the main theme of our project that how we disconnect this circuit.

2.2 Magic Device

When we studied this system, we found some interesting things:
 □ Earthing is isolated, thus there is no chance to get shock.
 □ Transformer is only one device in electric world of which input and output both are electrical. Hence for isolating the earthing, transformer is very best device. We found that earthing of distribution transformer is extremely necessary and we cannot isolate it. But, when we get 230V 50Hz power supply from Distribution Company to our home. At this point, we connect one single-phase transformer in which secondary is not earthed. It will isolate earthing and we get safe power supply at secondary side from shock point of view. The main characteristic of this transformer is that it's input & output having same voltage level as we get 230V power supply from distribution system the output is also 230 V. This device converts general electric system into shockproof wiring system.

3. METHODOLOGY

3.1 Transformer

A transformer is a device with two or more stationary electrical circuits that are conductively disjointed but magnetically coupled by common time-varying magnetic field. Transformer is basically passive device for transforming voltages & current. One of the winding, generally termed as secondary winding, transforms energy through the principle of mutual induction and delivers power to the load. The voltage level at the primary & secondary windings is usually different and correspondingly decrease or increase in current accompanies any increase or decrease of the secondary voltage.

3.1 Working Principle of Transformer

A transformer is a static piece of apparatus used for transferring power from one circuit to another without change in frequency. It can raise or lower the voltage with corresponding decreases or increases in current in its simplest form, a transformer consist of two conducting coils having a mutual inductance. The primary winding receives electric power, and the secondary is the one, which delivers it. The coils are wound on a laminated core of magnetic material.

3.2 Isolation transformer



Fig 3.2 230V isolation transformer

An isolation transformer is a transformer used to transfer electrical power from a source of alternating current (AC) power to some equipment or device while isolating the powered device from the power source, usually for safety. Isolation transformers provide galvanic isolation and are used to protect against electric shock, to suppress electrical noise in sensitive devices, or to transfer power between two circuits which must not be connected together.

Suitably designed isolation transformers block interference caused by ground loops. Isolation transformers with electrostatic shields are used for power supplies for sensitive equipment such as computers or laboratory instruments. Broadly speaking any true transformer, whether used to transfer signals or power, is isolating, as the primary and secondary are not connected by conductors but only by induction. However, only transformers whose primary purpose is to isolate circuits (opposed to the more common transformer function of voltage conversion), are routinely described as isolation transformers. Given this function, a transformer sold for isolation is often built with special insulation between primary and secondary, and is tested, specified, and marked to withstand a high voltage between windings, typically in the 1000 to 5000 volt range.

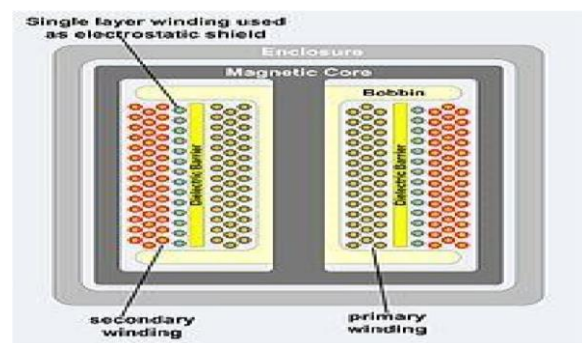


Fig 3.3 Internal Construction Isolation Transformer

The purpose of an isolation transformer usually has symmetrical windings meant to decouple two circuits. In other words, an isolation transformer helps an AC signal or power to be taken from any one device and fed into another without electrically connecting the two circuits. Isolation transformers can also be used to block transmission of DC signals from one circuit to the other. Isolation transformers with electrostatic shields are used for power supplies for sensitive equipment such as computer equipment's, electronic devices and laboratory instruments.

3.3 Neutral Earthing

Concept of neutral earthing: - It is essential to ground (that is to connect to earth) neutral at every part of electric power system. The components of electric power system are generators, transformers, transmission lines different circuits, load including rotating machine appliances etc. and it is necessary to ground neutral of each parts.

Definitions: -

Earthing – connecting to the earth or ground

1. Neutral earthing or system earthing – intentional connection of neutral point to ground is called system earthing or neutral earthing.

2. Equipment earthing – it is quite different from neutral earthing Equipment earthing means connecting to earth the non-current carrying parts to earth. The non-current carrying part means body of induction motors, synchronous machines switchgear structures, transformer core and tank, sheath of cable, body of portable equipment etc.

Importance of Neutral Earthing

Following are the importance of neutral earthing.

- The power system voltage during earth fault depends upon neutral earthing.
- Earth fault protection of power system is based on neutral earthing.
- Neutral earthing provides protection against arching ground.
- Neutral earthing give protection against unbalanced load, unbalanced voltage.

Types of Earthing-

There are following types of neutral earthing are present.

- Ungrounded or isolated neutral system.
- Solid grounding or effected grounding.
- Resistance earthing.
- Reactance earthing.

Ungrounded system: - The neutral of the power system is not connected to earth. This system is no more in use.

Solid earthing: - The neutral of power system is directly connected to earth without any impedance connected between neutral and ground.

Resistance earthing: - In this earthing system resistance is connected between neutral and ground.

Reactance earthing: - The neutral is connected to earth through a reactance to limit earth fault current.

Comparison between neutral earthing and equipment earthing:-

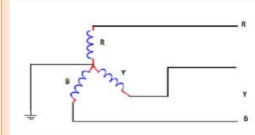
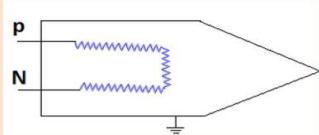
SR. NO	NEUTRAL EARTHING	EQUIPMENT EARTHING
1.		
2.	It is source or system earthing.	It is equipment earthing.
3.	It is provided for eliminating arching ground.	It is provided for protection of human being from electrocution.
4.	It is increase stability of system.	It has nothing to do with system stability.
5.	It is connecting neutral of system to earth.	In this equipment earthing, non-current carrying parts are connected to earth.
6.	This earthing provides suitable means for earth fault protection system.	It does not provide any means for protection system against earth fault.

Table 1 Comparison of Neutral Earthing and Equipment Earthing

4. ELECTRIC SHOCKS

An electric shock can occur upon contact of a human or animal body with any source of voltage high enough to cause sufficient current flow through the muscles or nerves. The minimum detectable current in humans is thought to be about 1 mA. The current may cause tissue damage or heart fibrillation if it is sufficiently high. Ninety-nine percent of what you do in your job as a Fire Control man, you will do around electricity. Since that makes you extremely susceptible to electric shock, it's very important for you to know the basics of electric shock, how to avoid being shocked, and how to treat victims of electric shock. The following section discusses those factors. This section discusses the severity, avoidance, and victims of electric shock.

Basics of Electric Shock

The following factors determine the severity of the effect electric shock has on your body:

- The amount of body resistance you have to the current flow.
- The path the current takes through your body.
- The length of time the current flows through your body.

Severity of shocks:

Table shows the effects of varying amounts of electric shock on a normal person.

Current	Effect on Human Body
1 to 8 mA	Perceptible, does not cause any pain.
8 to 15 mA	Painful shock, without loss of muscular control.
15 to 20 mA	Painful shock, muscular control of adjacent muscle lost.
20 to 50 mA	Severe muscular contraction, breathing becomes difficult.
50 to 100 mA	It may result in Fibrillation, may result in instant death.

Table 2 Severity of Shock

Now, we see that reason behind getting shock to human being is as below-

“In generating station the neutral point of alternator is earthed. Then in substation neutral point of power transformer is also earthed. Lastly the star point of distribution transformer is also earthed and foreword as neutral point in three phases four wire system. In our home we get 230V, 50Hz power supply is one part of this system. Hence the earth and neutral is having near about equal in potential. The earth also a good conductor of electricity so if our body is coming in contact with phase or live terminal of electricity, one path of flowing current is completed from generating station to earth through our body and we get severe shock.” But it is important to tell that “Improper earthing of your home” & “isolating the earthing from your home” are totally different concepts. If we do not provide earthing to your home then there is 100% chance to get shock. But when we isolate the earthing, we disconnect the circuit coming from power station to our home & going back to power station through earthing. If we disconnect this circuit then current coming from power station through phase is not going back to generating station through

earthing & our body. Hence the chances of getting shock is 100% nil.

How We Isolate Earthing

We know that the transformer is only one device whose input & output is same.

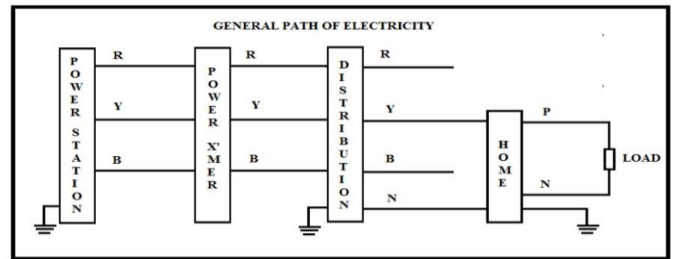


Fig 4.1 General path of electricity

It takes electricity and gives electricity without changing frequency. Hence if we connect a single-phase transformer to the incoming supply our home then it has capacity to disconnect the earthing continuity from power station to home. Because it is necessary to give earthing separately to the secondary side of transformer even if primary side of transformer has earthing. I.e. it has capacity to isolate the earthing circuit. That is our aim, to isolate earthing circuit & produce safe electrical path for human being.

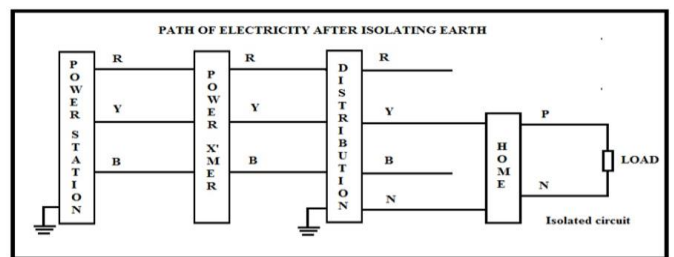


Fig 4.2 Isolated path of Electricity

5. Circuit Diagram

The above power system diagram is illustrated as follows in our project circuit

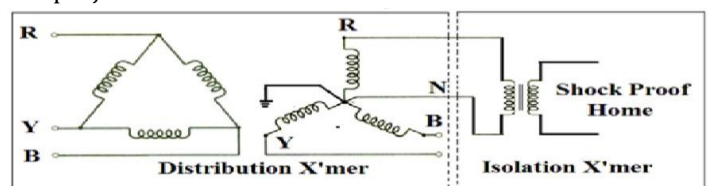


Fig 4.3 Project Working Model

6. FUTURE SCOPES

By implementing capacitor in parallel it can be used as power factor improving device as well as it can be implemented for 3 phase by using 3 single phase units. The ideal and redundant any devices or equipment in the home can be shut down automatically by using GSM based or Microcontroller based system this can improve power quality as well as remove the losses which ultimately increases the efficiency of system and hence billing can be reduced.

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CONCLUSION

Shock is very dangerous thing which happen in life of human being. So, we have just tried to decrease its dangerousness that provides safety to human being. This project is a magic device for those who are careless about electricity.

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