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AN EFFECTIVE IMPLEMENTATION OF NOVEL FEATURES OF THREE-LEVEL CONVERTER

Y.Harikrishna[1], L.Uday Kiran [2], P.Purna Chandrarao [3]

[1]M.Tech Student, Dept of EEE, Chalapathi Institute of Technology, Guntur, A.P, India

[2]Assistant Professor, Dept of EEE, Chalapathi Institute of Technology, Guntur, A.P, India

[3] Head Dept of EEE, Chalapathi Institute of Technology, Guntur, A.P, India

ABSTRACT:

Research that was made on high power ac–dc converters of single-stage full-bridge on the other hand, was additionally challenging, and as a result, there were fewer works in earlier efforts. We put forward a novel integrated three-level ac–dc converter which integrates the process of boost power factor correction as well as three-level dc–dc converter. It functions with two autonomous controllers such as an input controller that carries out power factor correction and regulates dc bus as well as an output controller that control output voltage. The input controller will put off dc-bus voltage from turning extreme while allowing single-stage converter topology to be utilized. The outstanding trait of proposed converter is that it merges performance of two-stage converters by reduce of price of single-stage converters. The proposed converter has several important features such as; it contains reduced cost when compared to two-stage converters and shows improved performance when compared to a single-stage converter.

Keywords: Input controller, Output controller, Three-level ac–dc converter, Boost power factor correction.

1. INTRODUCTION:

There were several works regarding single-stage power factor correction converters mainly for forward converters. The earlier works that were made on single-stage ac–dc full-bridge converters contains several drawbacks. Some of them are current-fed converters by means of a boost inductor that is linked to input of full-bridge circuit [1]. While they attain a near-unity input power factor, they need an energy-storage capacitor across primary side dc bus, which outcomes in high voltage overshoots. Some of them are resonant converters that should be controlled by means of altering of switching-frequency control that makes it tricky to optimize their design since they should be operated on extensive range of switching frequency. Most of them are voltage-fed, pulse width modulation converters by means of huge energy storage capacitor that is associated across their primary side dc bus. In our work we present a novel single-stage ac–dc converter that does not include drawbacks of earlier projected single-stage as well as two-stage converters. Our work will introduce a novel integrated three-level ac–dc converter which integrates the process of boost power factor correction as well as three-level dc–dc converter. The proposed converter is made to function with two autonomous controllers such as an input controller that carry out power factor correction and regulate dc bus as well as an output controller that control output voltage. The input controller will prevent dc-bus voltage from turning extreme while allowing single-stage converter topology to be utilized [2][3]. A novel converter was introduced in our work explains its fundamental operating principles as well as its modes of process, and considers its characteristics. While proposed converter might seem costly, the actuality is that it might be cheaper than a traditional two-stage converter. The practicability of the novel converter is confirmed by means of results that are obtained from prototype converter.

2. METHODOLOGY:

Problems that are connected with single-stage converters; extreme dc-bus voltages because of lack of dedicated controller to control these voltages, reduced efficiency due to low dc-bus voltage exist in support of two-level single-stage converters. The methods of power factor correction are divided three categories such as Passive converters: These make use of passive

elements like inductors as well as capacitors to sort out low frequency input current harmonics and construct the input current much more sinusoidal. While these converters are simple and low-priced, they are also important and are therefore used in restricted number of applications. Two-stage converters includes ac–dc boost pre-regulator converter which shape input current as well as secluded dc–dc full-bridge converter that changes pre-regulator output to necessary dc voltage. These two-stage converters, on the other hand, necessitate two separate switch-mode converters, and as a consequence, can be expensive. On the other hand, they contain poor effectiveness when operating in light-load circumstances while there are two converter stages that are functioning each by its personal set of fixed losses while a minute amount of power is in fact transferred towards load. These constant losses are major under light-load operating circumstances. Single-stage converters will carry out power factor correction /ac–dc conversion as well as dc–dc conversion by a single full-bridge converter. Our work will present a novel single-stage ac–dc converter is made to function with two autonomous controllers such as an input controller that carry out power factor correction and regulate dc bus as well as an output controller that control output voltage. The input controller will prevent dc-bus voltage from turning extreme while allowing single-stage converter topology to be utilized. Output controller allows the converter to function by improved efficiency as well as with less output ripple since each section of converter is made to function in a most favourable manner [4]. A novel introduced in our work explains its fundamental operating principles as well as its modes of process, and considers its characteristics. The practicability of the novel converter is confirmed by means of results that are obtained from prototype converter. The proposed converter can function by means of an improved input power factor in support of universal input line applications than single-controller, as it does contain a dedicated controller in support of its input section that can carry out power factor correction. The exceptional trait of this converter is that it merges performance of two-stage converters by reduce of price of single-stage converters.

3. ADVANTAGES OF PROPOSED SYSTEM:

We present a new single-stage ac–dc converter that does not include drawbacks of earlier projected single-stage as well as two-stage converters. This converter has several important features. It contains reduced cost when compared to two-stage converters. While proposed converter might seem costly, the actuality is that it might be cheaper than a traditional two-stage converter. This is since replacing a switch as well as its related gate drive circuitry by four diodes will decrease cost significantly although component count seems to be improved and this is particularly true when diodes are well-ordered in mass numbers. It shows improved performance when compared to a single-stage converter. Novel single-stage ac–dc converter is made to function with two autonomous controllers such as an input controller that carry out power factor correction and regulate dc bus as well as an output controller that control output voltage. The proposed single-stage converter can function by means of an improved input power factor in support of universal input line applications than single-controller, as it does contain a dedicated controller in support of its input section that can carry out power factor correction. The input controller will prevent dc-bus voltage from turning extreme while allowing single-stage converter topology to be utilized. Presence of a second controller moreover allows the converter to function by improved efficiency as well as with less output ripple since each section of converter is made to function in a most favourable manner. There is improved design flexibility of the proposed system. While converter is a multilevel converter, it is managed by high dc-bus voltage, standard dc-bus voltage [5]. There are advantages to functioning by high dc-bus voltage or else by standard dc bus voltage. Although the projected converter has abovementioned advantages over usual two-stage converter, it will include lesser heavy-load effectiveness due to increased conduction losses. When determining of whether to make use of the proposed converter against a traditional two-stage converter, most important trade-off that has to be considered is lesser cost and enhanced light-load effectiveness against heavy-load effectiveness [6].

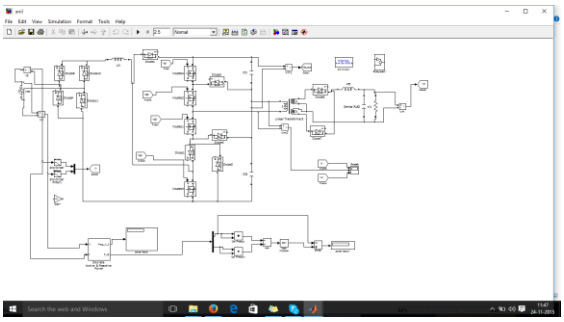

Fig 1: proposed circuit of three level converter

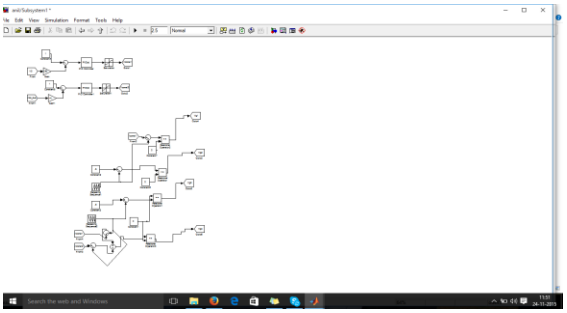

Fig 2: proposed controller for three level converter

Fig 3: in phase voltage currents and transformer voltage and load current and power factor of proposed converter

4. CONCLUSION:

We introduce a novel integrated three-level ac–dc converter in our work that integrates the process of boost power factor correction as well as three-level dc–dc converter. The projected converter functions by two autonomous controllers such as an input controller that carries out power factor correction and regulate dc bus as well as an output controller that control output voltage. The input controller will check dc-bus voltage from turning severe while allowing single-stage converter topology to be utilized. The special feature of our proposed converter is that it merges performance of two-stage converters by reduce of price of single-stage converters. Our proposed converter which is novel single-stage ac–dc converter does not include drawbacks of earlier projected single-stage as well as two-stage converters. Our work will explain its fundamental operating principles as well as characteristics of the proposed system. This converter has numerous significant features b means of contains reduced cost when compared to two-stage converters, shows improved performance when compared to a single-stage converter. Presence of second controller in addition allows converter to function by improved efficiency as well as with less output ripple since each section of converter is made to function in a most favourable manner.

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Y.Harikrishna graduated in B.Tech, EEE from Dr Samuel George Institute of Engineering and Technology, Markapur, Dist: Prakasam, Andhra Pradesh**.**

L.Uday Kiran (Assistant Professor)

Mobile No: 9293333329

Email Id: udaysriram@gmail.com

P.Purna Chandrarao,EEE HOD

Mobile No: 9866257105

Email Id: chandu.podila@gmail.com