

# 18-pulse Transformer Device for Flexible Connection of Asynchronous Power Systems

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**Abstract**—Transmission of active power between power systems with the same nominal frequencies, linked via phaserotating transformer is examined. The device is based on hexagonal scheme, and due to new proposal, provides symmetrical 18-phase output system of voltages, wherein the various phases of it are connected to different phases of threephase receiving system by means of semiconductor switching elements, composed in two groups to reduce a quantity of switching keys. For reducing oscillations of transmitted active power, caused by 20° step switching of the phase angle between the voltages of the connected systems PWM modulation method is used, thus providing a smoother angle switching. It was shown, that increasing the number of phases sufficiently reduces the level of harmonic distortion of currents and voltages on the buses of receiving power system, so at some conditions the requirements, imposed on higher harmonics content in high voltage electrical networks could be met without the use of additional filters.

**Keywords**—transformer phase-rotating device, semiconductor switching elements, controlled flexible connection at alternating current.

## REFERENCES

- [1]. Bosneaga V., Suslov V. Transformer Device for Flexible Connection of Asynchronous AC Power Systems Using Semiconducting Switching with PWM. Report presented at the 7th International Conference on Modern Power Systems 2017, Cluj-Napoca, Romania, 6-9 of June 2017. URL [www.et.utcluj.ro/mps](http://www.et.utcluj.ro/mps), last accessed at 28 of June 2017.
- [2]. A. G. H. Accioly, V. N. Lima, F. Bradaschia, F. A. S. Neves, M. C. Cavalcanti, A. Samuel Neto. Scalar pulse width modulation strategies for matrix converters. URL: <http://www.administradores.com.br/producaoacademica/> scalar-pulse-width-modulation-strategies-for-matrixconverters/841/, last accessed 3.03.2017
- [3]. GOST\_R\_54149-2010. [Requirements to quality of electrical energy in common power supplying systems]. Normi kachestva elektricheskoi energii v sistemah elektrosnabjenia obschego naznachenia. (In Russian)
- [4] IEEE Standard 519-2014. Compliances, Updates, Solutions and Case Studies. Confidential Property of Schneider Electric. Presented by: Dr John Cheng, CEng, CEM, CEA, CMVP URL: [https://www.google.md/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwirj7qPk\\_LUAhWoNpoKHc4wA8gQFggtMAI&url=http%3A%2F%2Fwww.schneiderelectric.com.tw%2Fdocuments%2FEvent%2F2016\\_electrical\\_engineering\\_seminar%2FIEEE\\_STD\\_519\\_1992vs2014.pdf&usq=AFQjCNFaAX7p3EsYAlZbMqWU9aAsZEH-dA](https://www.google.md/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0ahUKEwirj7qPk_LUAhWoNpoKHc4wA8gQFggtMAI&url=http%3A%2F%2Fwww.schneiderelectric.com.tw%2Fdocuments%2FEvent%2F2016_electrical_engineering_seminar%2FIEEE_STD_519_1992vs2014.pdf&usq=AFQjCNFaAX7p3EsYAlZbMqWU9aAsZEH-dA). Last accessed at July 5th 2017, (in Russian).
- [5]. Lantsov Vladimir, Eranosean Sarkis. [Power electronics]. Silovaiia elektronika, nr.1, year 2010. Elektronnaia komponentnaia baza silovih ustroistv. Chasti 2. URL: [http://www.power-e.ru/2010\\_1\\_6.php](http://www.power-e.ru/2010_1_6.php), last accessed 3.03.2017, (In Russian).