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Study and Analysis of Voltage Dips in an Adjustable Speed Drives

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Abstract. Currently, voltage dips are the most common disturbance of power quality. The voltage dips are a great problem on industrial process controlled by Adjustable Speed Drives (ASD). This paper describes an experimental study for evaluating the behavior of ASD when voltage dips appear. The measured parameters are: input and output voltage, input and output current, motor speed and torque. Finally this paper presents a development of a tolerance curve of ASD in order to study.

Key words

ASD, voltage, current, torque, motor speed, dips, tolerance curve.

1. Introduction

A voltage dip is defined by standard IEEE 1159-1995 [1], as a voltage reduction between 0.9 to 0.1 p.u., in root-mean-square, with a duration between 8.33 milli second until 1 minute.

Figure 1. Phasor diagram voltage dip type A.

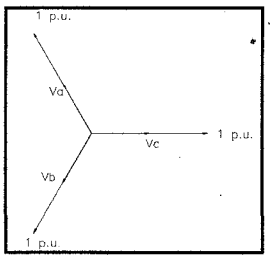
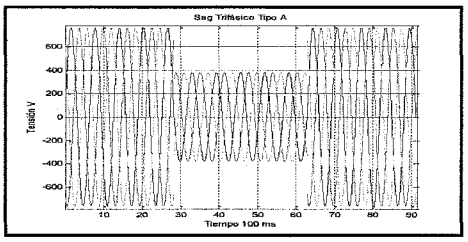


Figure 2. Waveform voltage dip type A.



One of the voltage dips that causes a greatest impact on industrial processes is the voltage dip type A. This voltage dip is a reduction in the three phases of an electric system. At the same time these voltages dip are a consequence of a three-phase fault in the power system [3].

The figure 1 shows of phasorial diagram of voltage dip type A, The figure 2 shows of a reduction in three phases in a waveform voltage.

Among the industrial process, the most vulnerable ones to voltage dips are the following:

- Food industry.
- Plastics industry.
- Beer industry.
- Paper industry.
- Ceramics industry.
- Petrochemical industry.
- Textil industry.
- Wooden industry.
- Metallugircal industry.
- Steel industry.

Table I. - Sensitive equipment to voltage dips [2].

Equipment	Vmin(%)	TMáx (ms)
Starter motor	50	40
PLC	50 – 90	8 - 20
Adjustable speed drives inverters	82	1.5
Adjustable speed drives rectifiers	50 - 80	2 - 3
Process Controllers	70	< 8
Computers	70	< 8
Continous current controllers	88	< 8
Contactors	50-60	20 - 30
Electromagnetic switches	50	10
Electromagnetic relays and starters	50 - 60	15 - 40
Sensitive load fed through ferroresonant transformer	50	500

2. Study methodology

The methodology development test has the following stages:

A. Development of flow chart for testing.