AutoMate Prague TECHNICAL SOLUTION

Schneider Electric

Title: Sol075 - ATS01 Impact of Start time and Initial voltage setting on motor current

Solution Number: Distribution: All Revision: 1.1

Author: Jozef Gaal

Date: 23.12.2009

1. Description:

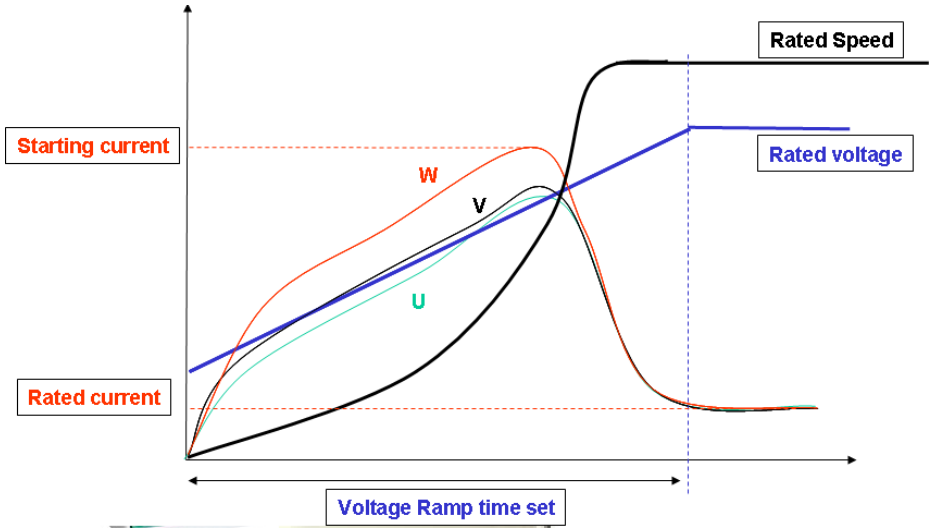
How motor current behaves when the Start time and Initial voltage setting changes.

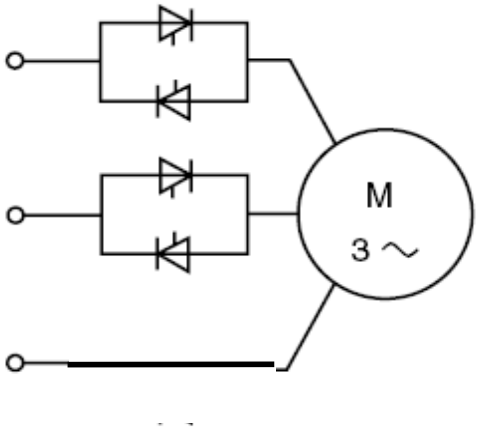
2. Introduction:

Basic principals and characteristic of 2 phase voltage controlled softstarters are known. Motor voltage is controlled in two phases which results in reduction of the starting current and consequently on total starting inrush current as well as initial torque reduction.

The document describes reaction of motor current on mutual changes of starting time and initial voltage.

2.1 Theoretical output characteristics diagram and Principal internal wiring diagram

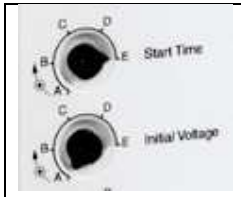




2.2 Hardware

Softstart unit: ATS01N206QN softstart unit 6A, 380 …415V 50/60Hz
Scope meter: FLUKE 196C 100 MHz; Current probe 80i-100s AC/DC
Motor: 1LA7083-4AA10Z 750W 3,3/1,9A 230/400V 50Hz

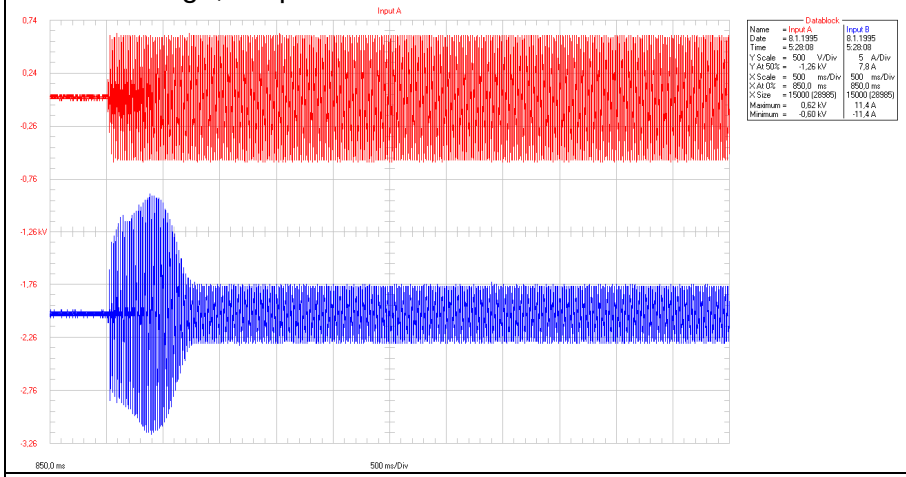
2.3 Studied combinations

	Start Time	A	E	A	E
	Initial Voltage	A	A	E	E
	Combination	**1**	**2**	**3**	**4**

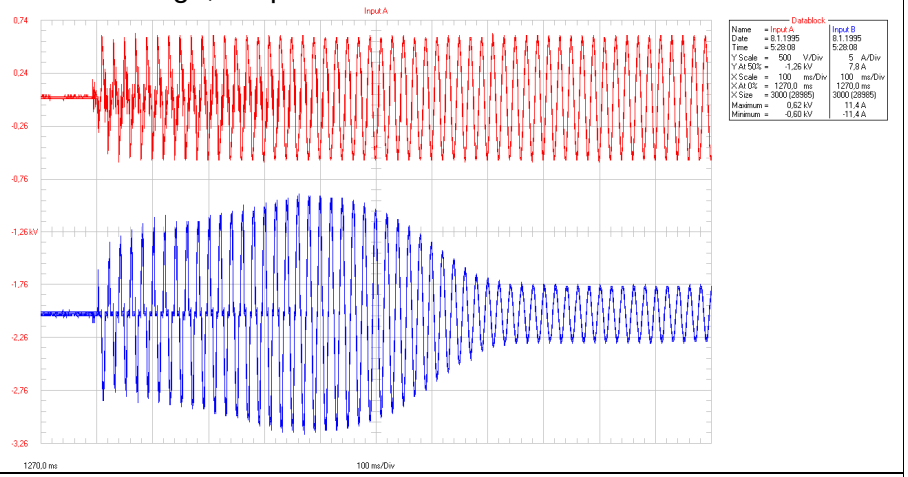
3. Measured combinations

3.1 *Combination 1, Start time A, Initial Voltage A*

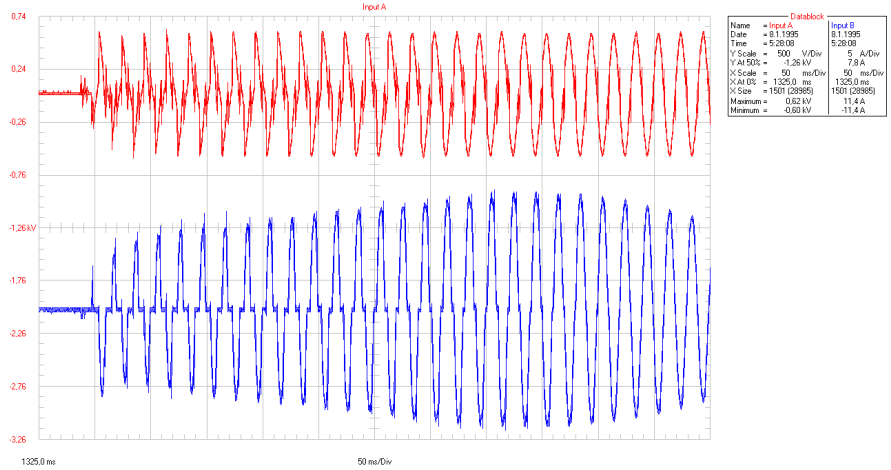
U1-U3 Voltage, U1 phase Current:



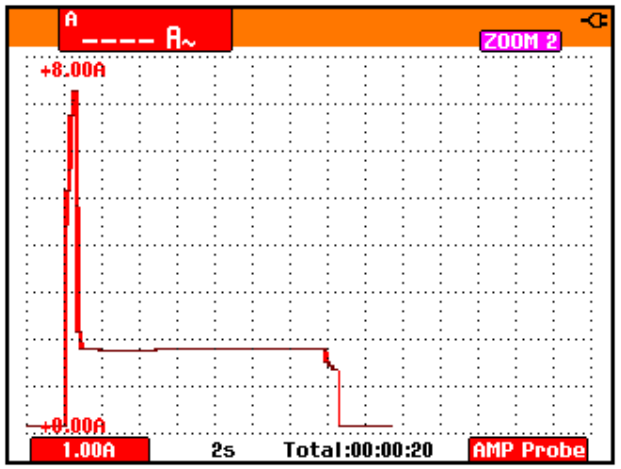
U1-U3 Voltage, U1 phase Current:



U1-U3 Voltage, U1 phase Current:

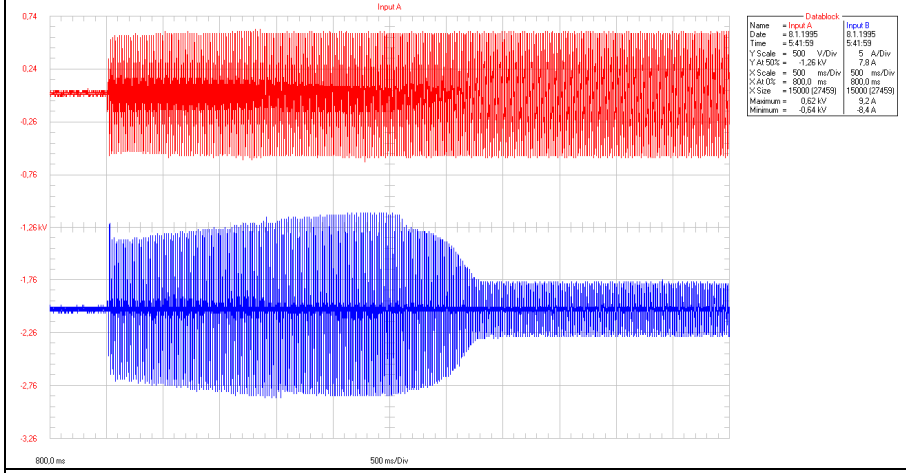


U1 phase Current Effective value for overall starting time:

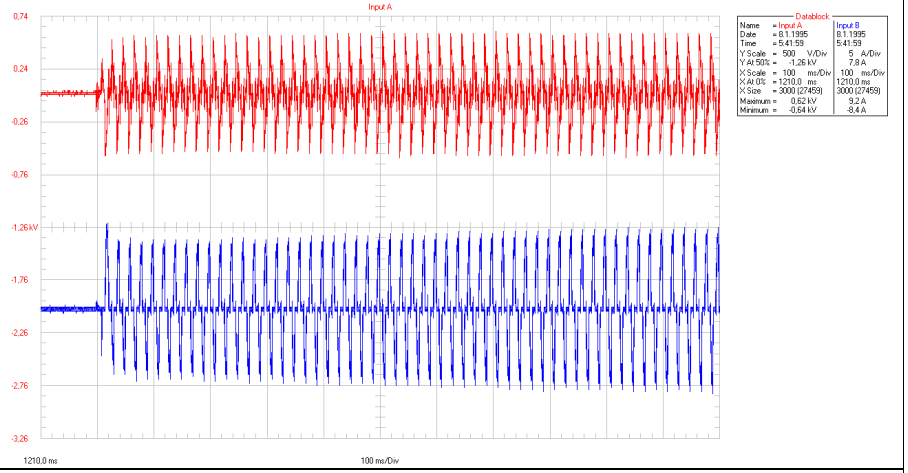


3.2 Combination 2, Start time E, Initial Voltage A

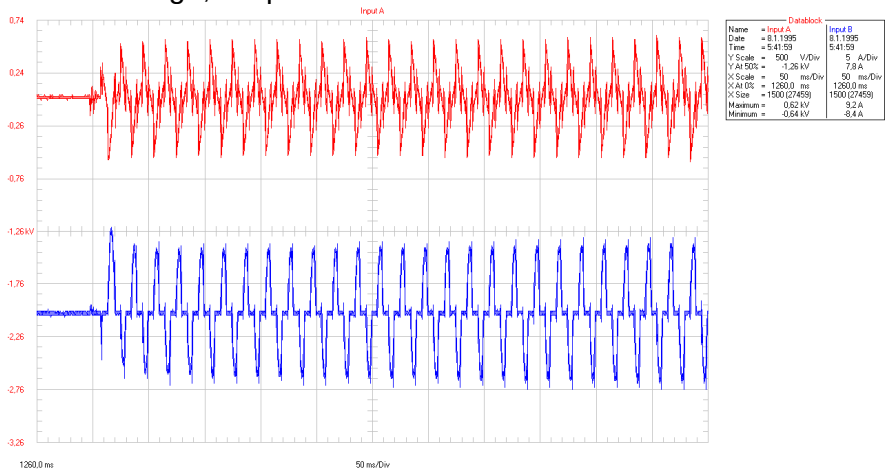
U1-U3 Voltage, U1 phase Current:



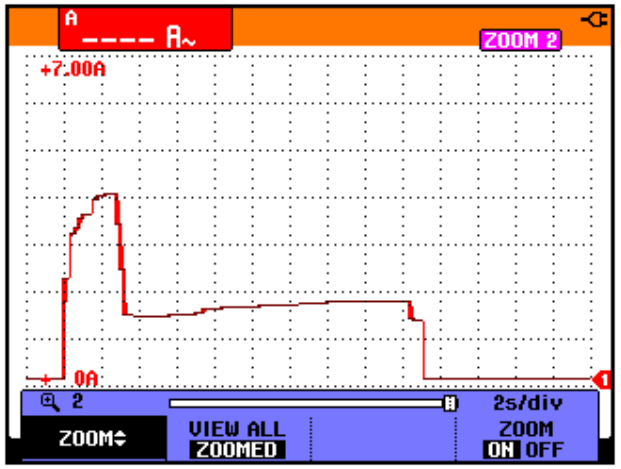
U1-U3 Voltage, U1 phase Current:



U1-U3 Voltage, U1 phase Current:

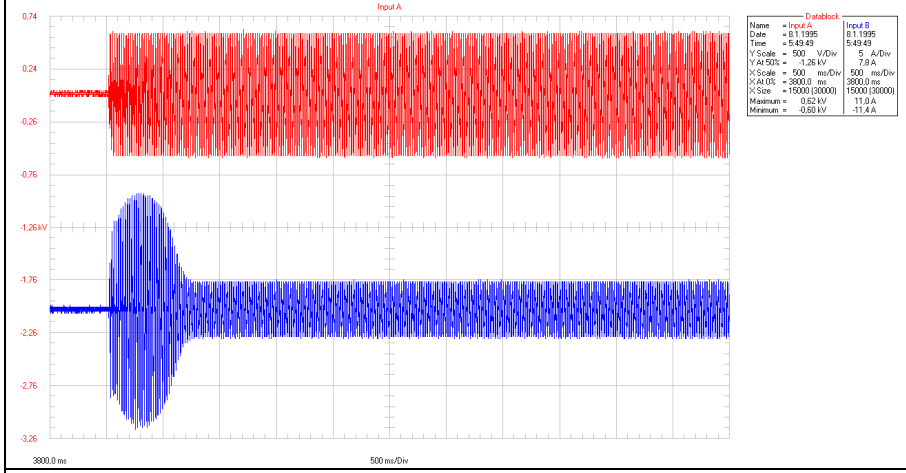


U1 phase Current Effective value for overall starting time:

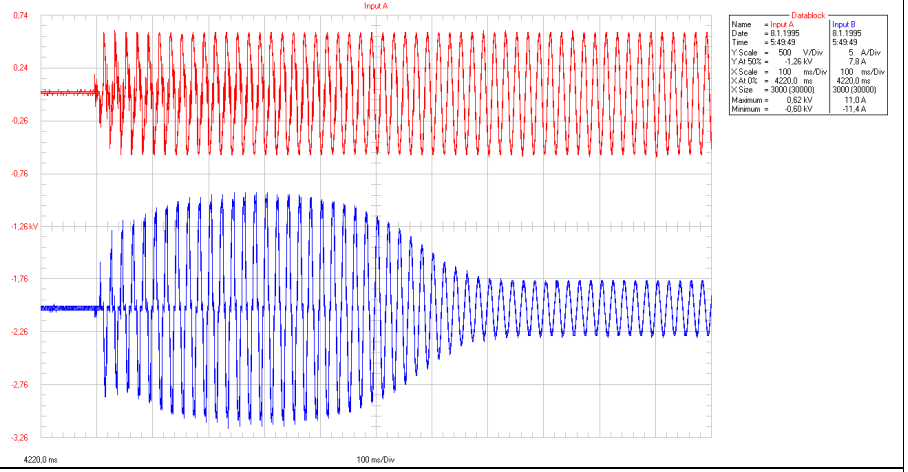


3.3 Combination 3, Start time A, Initial Voltage E

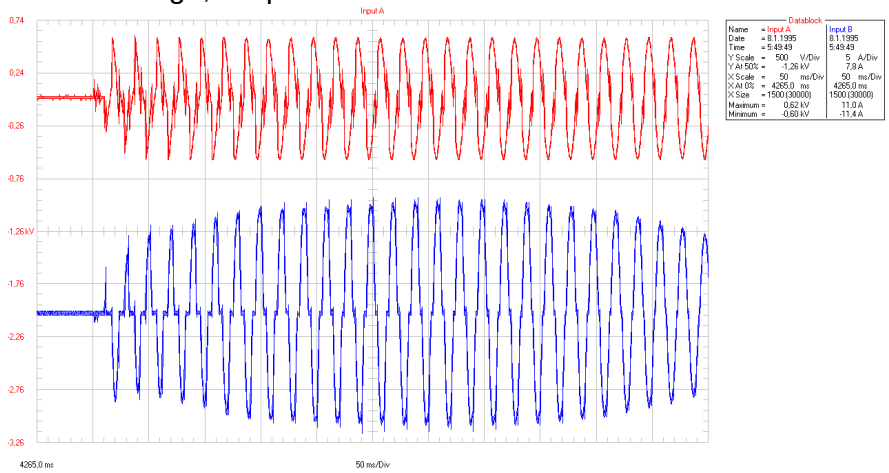
U1-U3 Voltage, U1 phase Current:



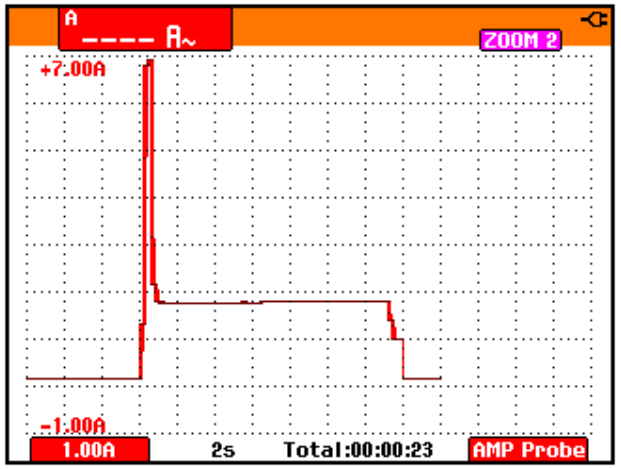
U1-U3 Voltage, U1 phase Current:



U1-U3 Voltage, U1 phase Current:

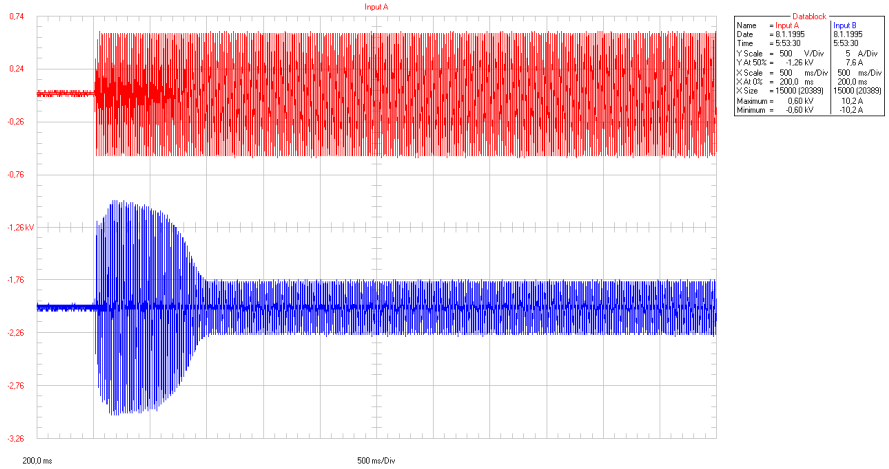


U1 phase Current Effective value for overall starting time:

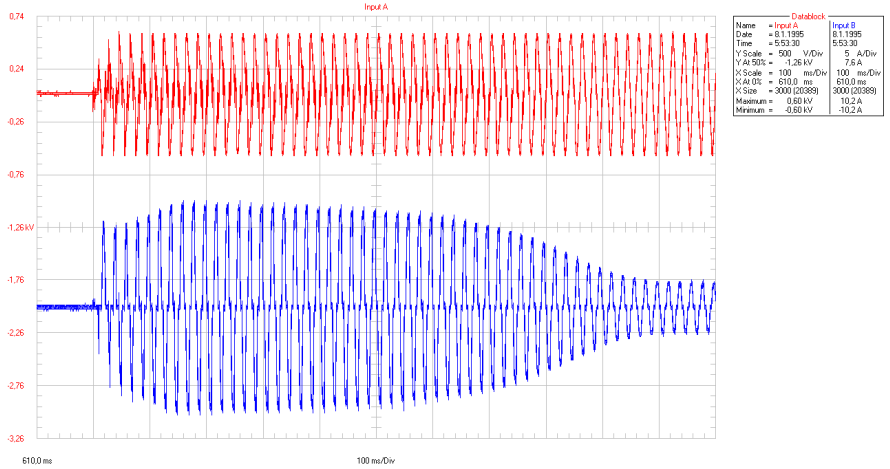


3.4 Combination 4, Start time E, Initial Voltage E

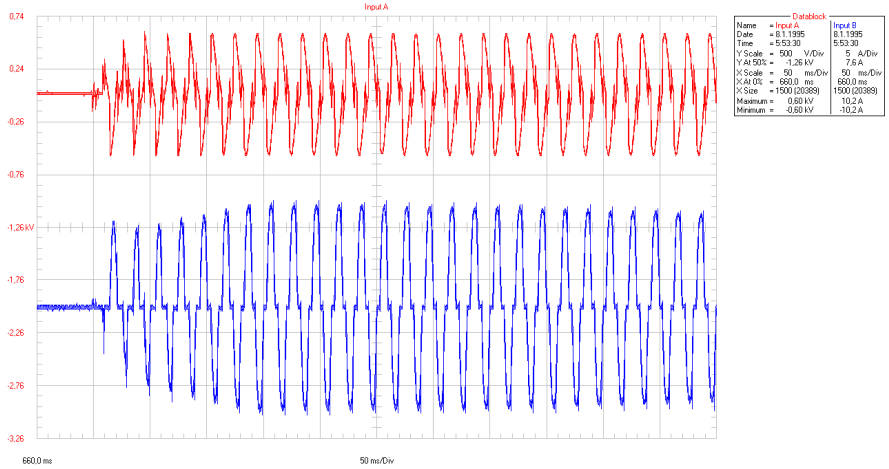
U1-U3 Voltage, U1 phase Current:



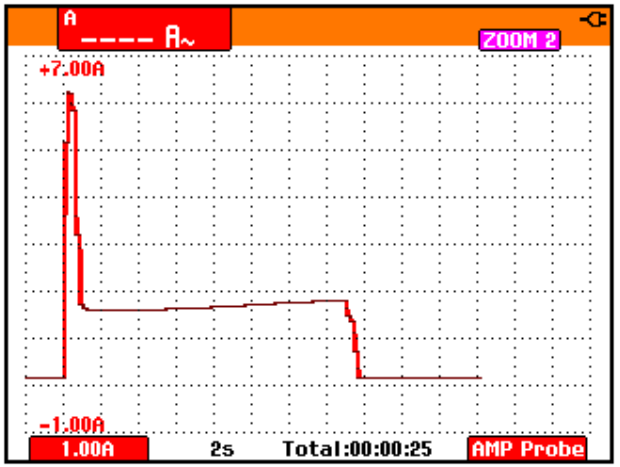
U1-U3 Voltage, U1 phase Current:



U1-U3 Voltage, U1 phase Current:

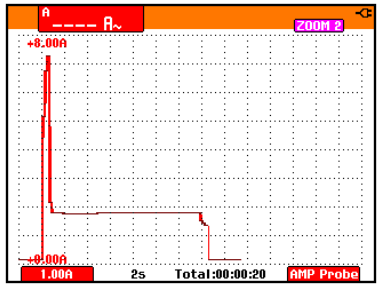


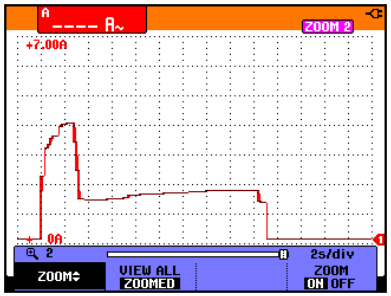
U1 phase Current Effective value for overall starting time:



4. Conclusions

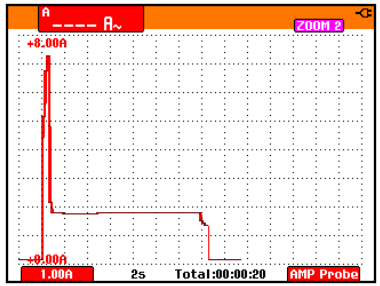
How the peak current and the shape of the motor current changes when only the starting time increases?

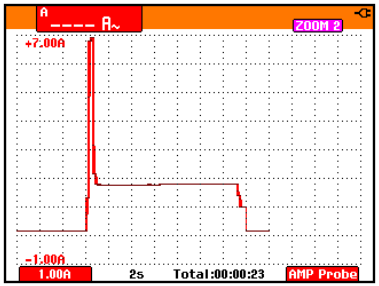




Change of starting time from A to E causes:
- slower motor voltage rise along with prolonged overall motor starting time
- effectively reduced current peaks at the begging of the start
- higher current level or possible current peaks at the end of start time (depends on the mechanic)
- i2t, representing thermal overload of the motor, increases only in few %.

How the peak current and the shape of the motor current changes when only the initial voltage increases?





Change of initial voltage from A to E causes:
- higher initial motor torque
- improved voltage and current shape
- reduced initial current peak a bit

This document is available on http://www.automate.schneider-electric.cz
All information provided in this document is correct to the best knowledge of the author. This approach was designed and tested in laboratory conditions. The environment influences behaviour of electronic devices and therefore the user takes full responsibility for applying presented solutions.