# PARAMETERS FOR UNITEK <u>BAMOCAR D3</u> and <u>BAMO D3</u> for synchronization with EMRAX High or Medium Voltage motor

For more information take a look at: Software Manual NDRIVE_en.pdf – it can be found in the Help tab in the Ndrive V2 (program for Unitek controller). The program Ndrive V2 can be downloaded from here:  http://www.unitek-online.de/software.html. Software Manual NDRIVE can be downloaded from our website: http://www.enstroj.si/Electric-products/controllers.html

We can send you the main parameters (.urf file) for BAMOCAR D3 or BAMO D3 that are suitable for EMRAX motor by e-mail. Feel free to ask us.

**HOW TO COMBINE UNITEK CONTROLLER WITH EMRAX MOTOR STEP BY STEP:**

### 1. MAIN PAGE



### 2. SET *COM* PORT

Controller must be connected with cable direct to RS232 connector on PC. If the PC does not have RS232 connector, than the RS232/USB adapter must be used.

### 3. SETTINGS TAB – *I nom* - VERY IMPORTANT!

LTN resolver is mounted and adjusted on each motor on the same mechanical angle position. Mechanical rotor angle is variable for app +/- 1° for every motor. Motor has 10 pole pairs (20 poles). Mechanical angle 36° means electrical angle 360°.

Prior to autotuning / automatic adjustment set nominal motor current (*I nom*) to *20 Amps* for High Voltage motor and to *30 Amps* for Medium Voltage motors in the *Motor* category. After the adjustment set nominal motor current to *I nom = 120 Amps* for High Voltage and to *170 Amps* for Medium Voltage Motors.



Set the I nom prior autotuning (automatic adjustment) to 20 Amps for EMRAX HV and to 30 Amps for EMRAX LV). I nom after autotuning should be changed to 120 Amps for EMRAX HV and to 170 Amps for EMRAX LV.

Version 1.2 April 2014

## 4. DIAGNOSTIC TAB – AUTOTUNING / AUTOMATIC ADJUSTMENT – VERY IMPORTANT!

For the best rotor angle adjustments automatic determination (software manual NDRIVE_en.pdf, page 82 – published here http://www.enstroj.si/Electric-products/controllers.html) for the electrical angle must be made.

4.1 Enter all the data like on the picture below in the boxes (**0x85**; **4**; **0x44**).

4.2 Click **Write**.

4.3 Switch on the controller, then autotuning starts (the motor slowly rotates for 360 mechanical degrees) and after autotuning (the motor stops) you click **Read** button. The right value of the electrical angle is seen in the **Value** box and also in the **Settings tab→Feedback→Offset**.

Version 1.2 April 2014

Software manual NDRIVE_en.pdf, page 82
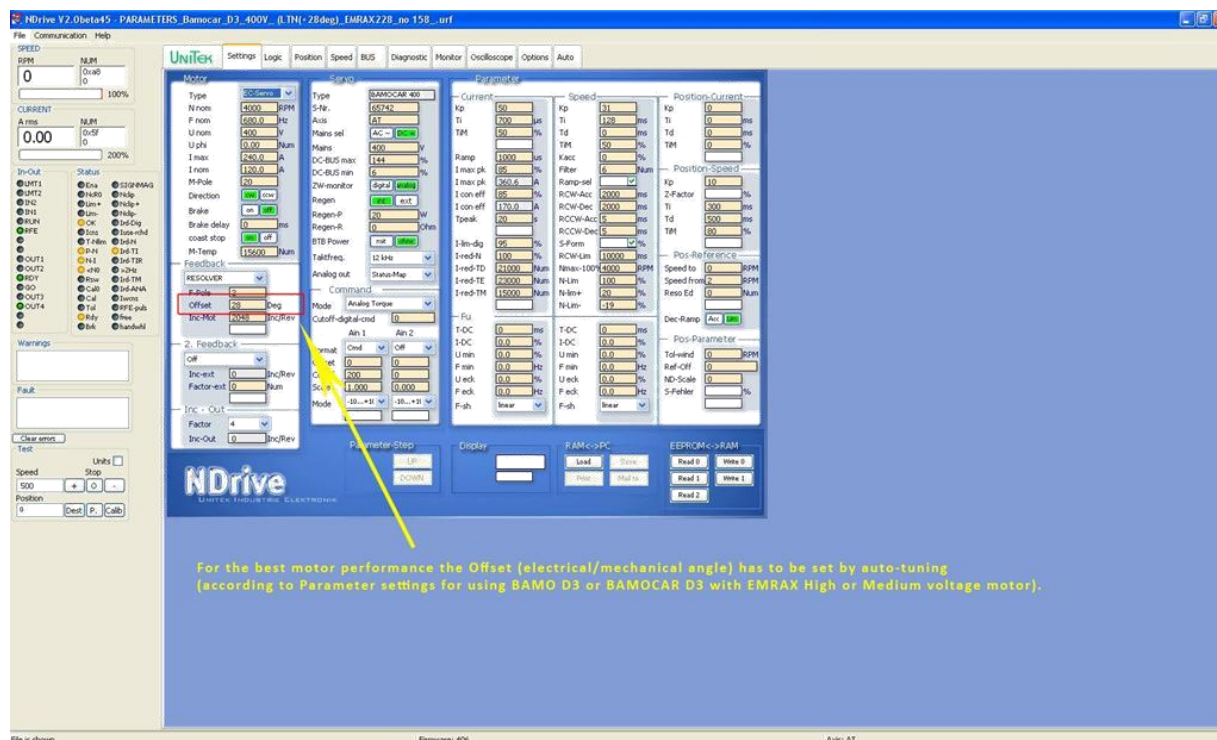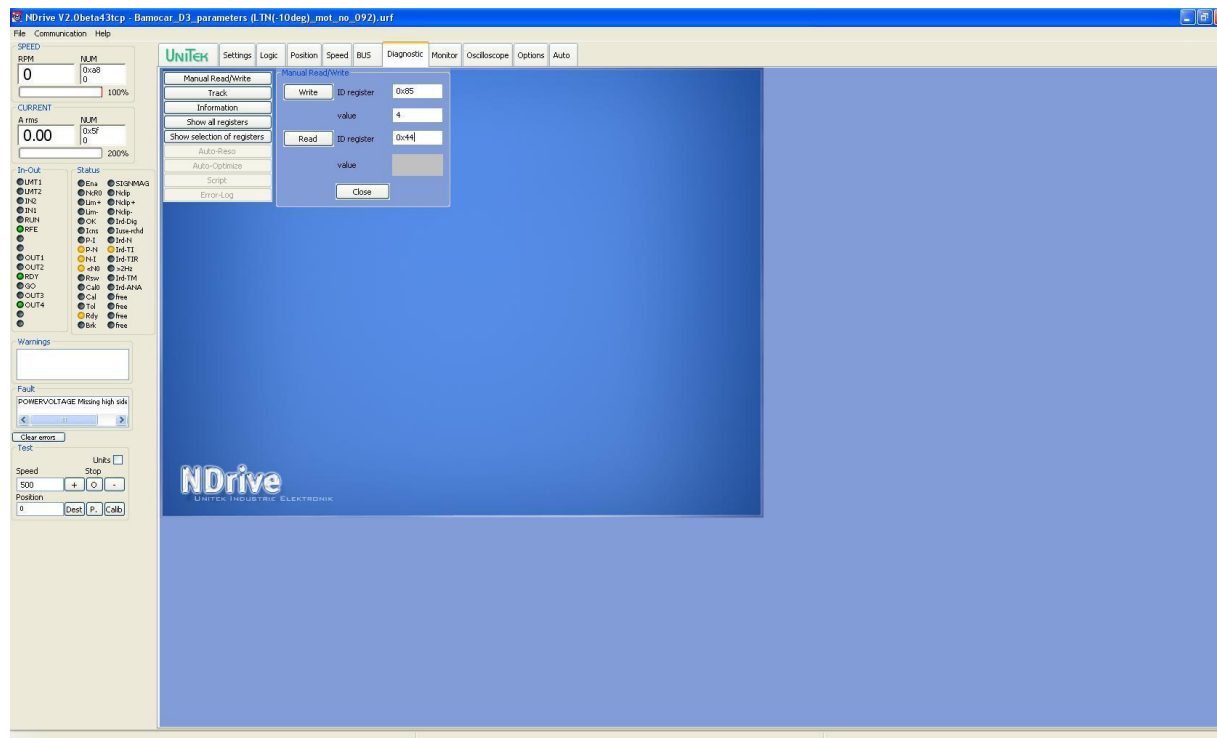


## NDrive .2

**Automatic adjustment functions**
(preliminary functional call with the Read/Write manual)

| Function | Description | ID-address |
|---|---|---|
| | | 0x85 |
| | | 0 |
| | | 1 |
| | | 2 |
| | | 3 |
| Phase rotating | Automatic determination of the rotor angle (reso offset) | 4 |
| Angle | Fix current feed angle, adjusted via reso offset | 5 |
| Analog offset | Automatic adjustment of the analog inputs | 6 |
| Tacho offset | Automatic adjustment of the segment offset for bi-tachos | 7 |

**Phasing (0x85 -4) execution**

Check the no. of motor poles (MOTOR-Pole) and correct them if necessary.
The rotating speed corresponds to the parameter adjustment 'speed from'.

Apply a voltage across the device, enable open.

Open the window 'manual read/write' on the page 'diagnosis'.
Enter '0x85' in the 'write/Id register' input field.
Enter '4' in the 'write/value' input field.

Click 'write' and close the enable within 10s.

| Function | 7-segment display |
|---|---|
| Command taken over (click 'write') | 40 |
| Enable closed | 41 |
| Current applying (rotation starts) | 42 |
| Pole angle and determination of the motor pole no. accomplished | 43 |
| Correct termination | 49 |
| **Error abort** | |
| Enable switched off during measuring process | 47 |
| Time out, measuring time exceeded | 48 |

## 5. LOGIC TAB

Version 1.2 April 2014

## 6. POSITION TAB



## 7. SPEED TAB – magnetic field weakening

For EMRAX motor is possible up to 20 % magnetic field weakening - settings in the *Current Controller* category.

Version 1.2 April 2014
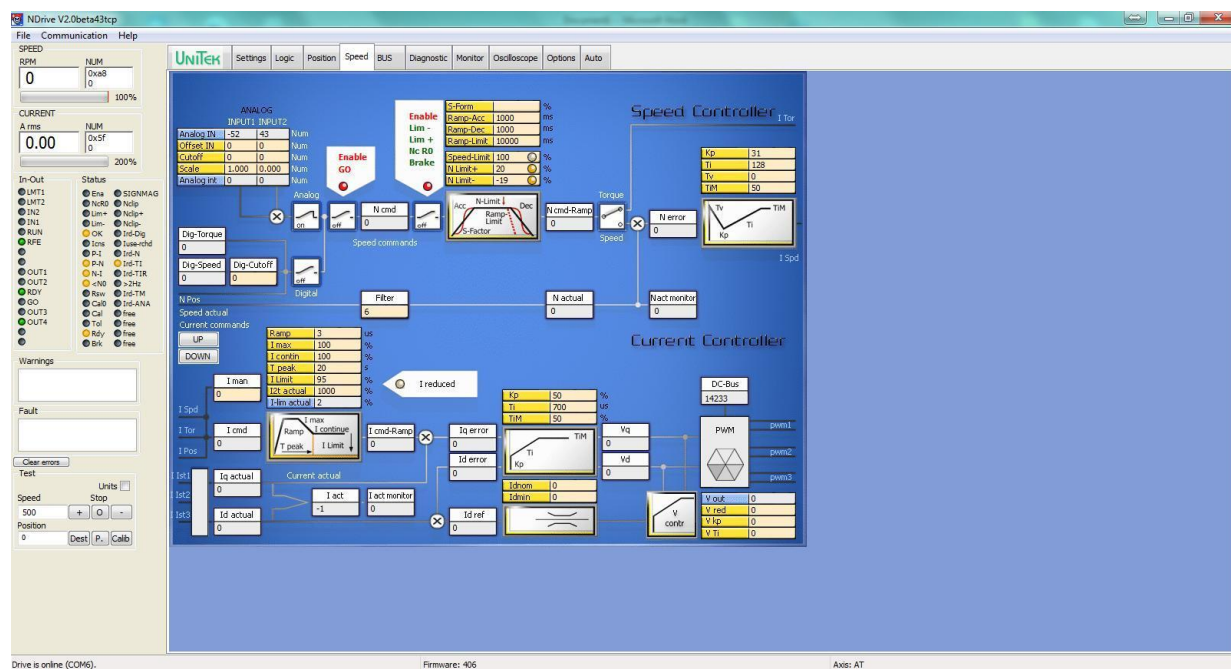
## 8. BUS TAB
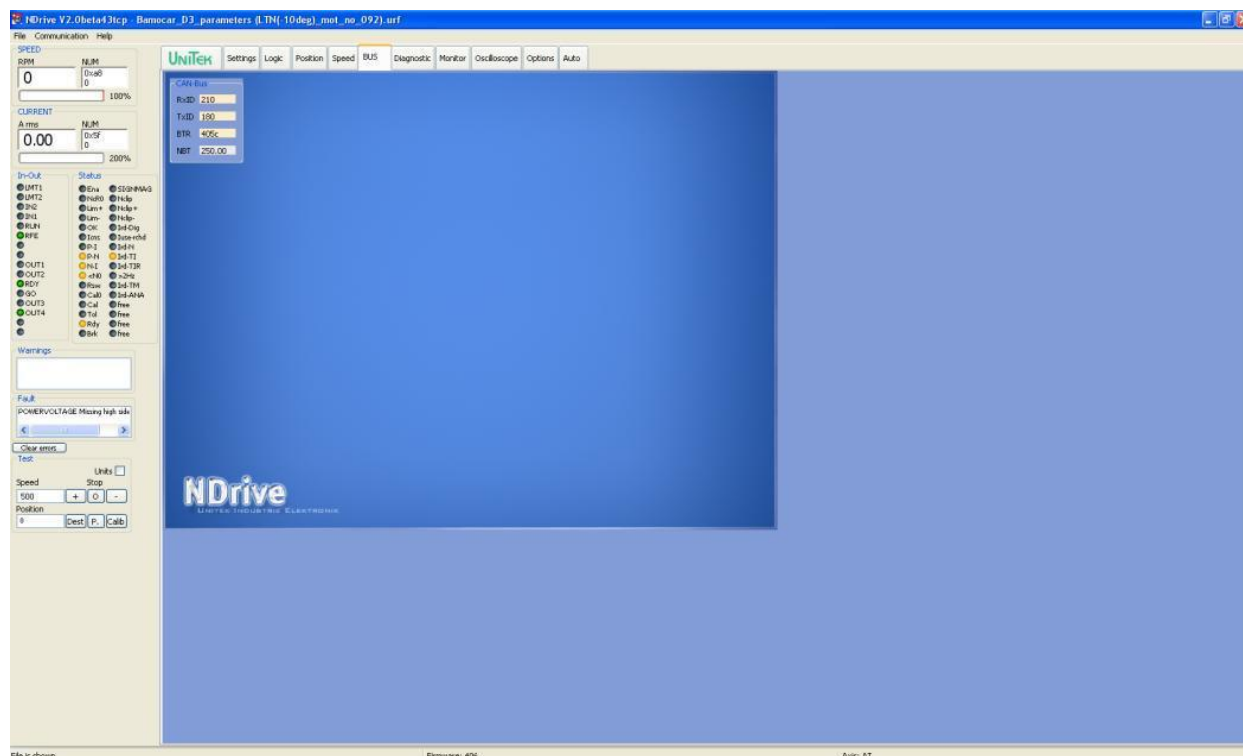


## 9. MONITOR TAB

The motor temperature, which you can see in the **Monitor** tab – numbers, which mean temperature (the convert calculation you can find in the NDRIVE_en.pdf – published on our website - http://www.enstroj.si/Electric-products/controllers.html) are not totally correct for KTY motor temperature sensor. According to the recommendation from the Manual NDRIVE_en.pdf the theoretical results are lower than the real temperature of the motor is. If you want to get practical number you can check the temperature sensor manually - in this case you need to do as follows:

9.1. Run the motor; see the temperature number (digit number) in **Monitor** tab.

9.2. Stop the motor and immediately disconnect the temperature sensor and measure the resistance on the KTY 81/210 - in this case you can find real motor temperature from the Table 1, listed below.

According to these results you can make new settings in software for the motor temperature. Anyway our recommendation is that reduction slope from 14500 to 15000 is a good value (this means app 110-120°C).

Version 1.2 April 2014
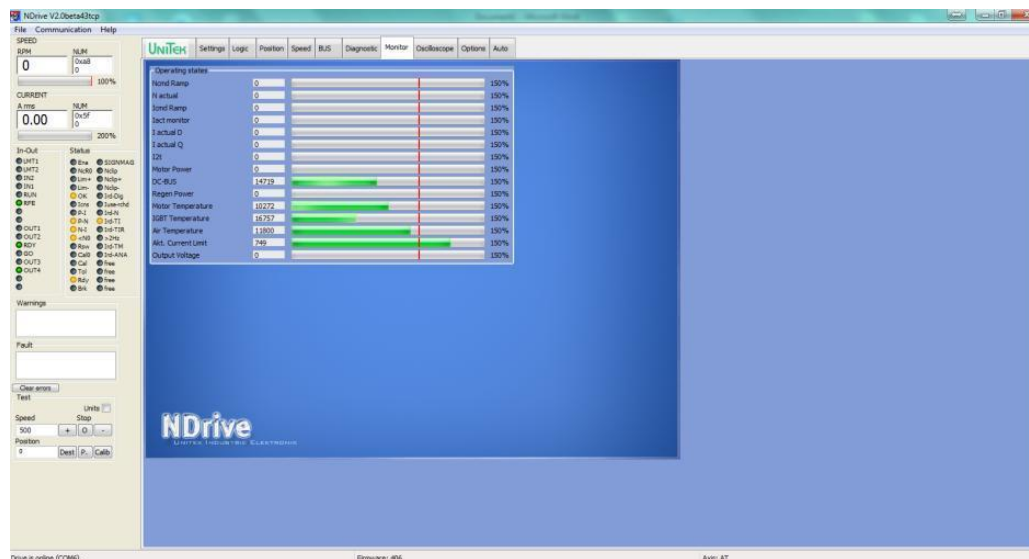
## Silicon temperature sensors

## KTY81-2 series

**Table 1**  Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY81-210 and KTY81-220

$I_{cont}$ = 1 mA.

| AMBIENT TEMPERATURE | | TEMP. COEFF. | KTY81-210 | | | | KTY81-220 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | RESISTANCE ($\Omega$) | | | TEMP. ERROR | RESISTANCE ($\Omega$) | | | TEMP. ERROR |
| (°C) | (°F) | (%/K) | MIN. | TYP. | MAX. | (K) | MIN. | TYP. | MAX. | (K) |
| −55 | −67 | 0.99 | 951 | 980 | 1009 | ±3.02 | 941 | 980 | 1019 | ±4.02 |
| −50 | −58 | 0.98 | 1000 | 1030 | 1059 | ±2.92 | 990 | 1030 | 1070 | ±3.94 |
| −40 | −40 | 0.96 | 1105 | 1135 | 1165 | ±2.74 | 1094 | 1135 | 1176 | ±3.78 |
| −30 | −22 | 0.93 | 1218 | 1247 | 1277 | ±2.55 | 1205 | 1247 | 1289 | ±3.62 |
| −20 | −4 | 0.91 | 1338 | 1367 | 1396 | ±2.35 | 1325 | 1367 | 1410 | ±3.45 |
| −10 | 14 | 0.88 | 1467 | 1495 | 1523 | ±2.14 | 1452 | 1495 | 1538 | ±3.27 |
| 0 | 32 | 0.85 | 1603 | 1630 | 1656 | ±1.91 | 1587 | 1630 | 1673 | ±3.08 |
| 10 | 50 | 0.83 | 1748 | 1772 | 1797 | ±1.67 | 1730 | 1772 | 1814 | ±2.88 |
| 20 | 68 | 0.80 | 1901 | 1922 | 1944 | ±1.41 | 1881 | 1922 | 1963 | ±2.66 |
| 25 | 77 | 0.79 | 1980 | 2000 | 2020 | ±1.27 | 1960 | 2000 | 2040 | ±2.54 |
| 30 | 86 | 0.78 | 2057 | 2080 | 2102 | ±1.39 | 2036 | 2080 | 2123 | ±2.68 |
| 40 | 104 | 0.75 | 2217 | 2245 | 2272 | ±1.64 | 2194 | 2245 | 2295 | ±2.97 |
| 50 | 122 | 0.73 | 2383 | 2417 | 2451 | ±1.91 | 2359 | 2417 | 2475 | ±3.28 |
| 60 | 140 | 0.71 | 2557 | 2597 | 2637 | ±2.19 | 2531 | 2597 | 2663 | ±3.61 |
| 70 | 158 | 0.69 | 2737 | 2785 | 2832 | ±2.49 | 2709 | 2785 | 2860 | ±3.94 |
| 80 | 176 | 0.67 | 2924 | 2980 | 3035 | ±2.8 | 2894 | 2980 | 3065 | ±4.3 |
| 90 | 194 | 0.65 | 3118 | 3182 | 3246 | ±3.12 | 3086 | 3182 | 3278 | ±4.66 |
| 100 | 212 | 0.63 | 3318 | 3392 | 3466 | ±3.46 | 3284 | 3392 | 3500 | ±5.05 |
| 110 | 230 | 0.59 | 3523 | 3607 | 3691 | ±3.93 | 3487 | 3607 | 3728 | ±5.61 |
| 120 | 248 | 0.53 | 3722 | 3817 | 3912 | ±4.7 | 3683 | 3817 | 3950 | ±6.59 |
| 125 | 257 | 0.49 | 3815 | 3915 | 4016 | ±5.26 | 3775 | 3915 | 4055 | ±7.31 |
| 130 | 266 | 0.44 | 3901 | 4008 | 4114 | ±6 | 3861 | 4008 | 4154 | ±8.27 |
| 140 | 284 | 0.33 | 4049 | 4166 | 4283 | ±8.45 | 4008 | 4166 | 4325 | ±11.46 |
| 150 | 302 | 0.20 | 4153 | 4280 | 4407 | ±14.63 | 4110 | 4280 | 4450 | ±19.56 |

## 10. OSCILLOSCOPE TAB



## 11. OPTIONS TAB

Version 1.2 April 2014
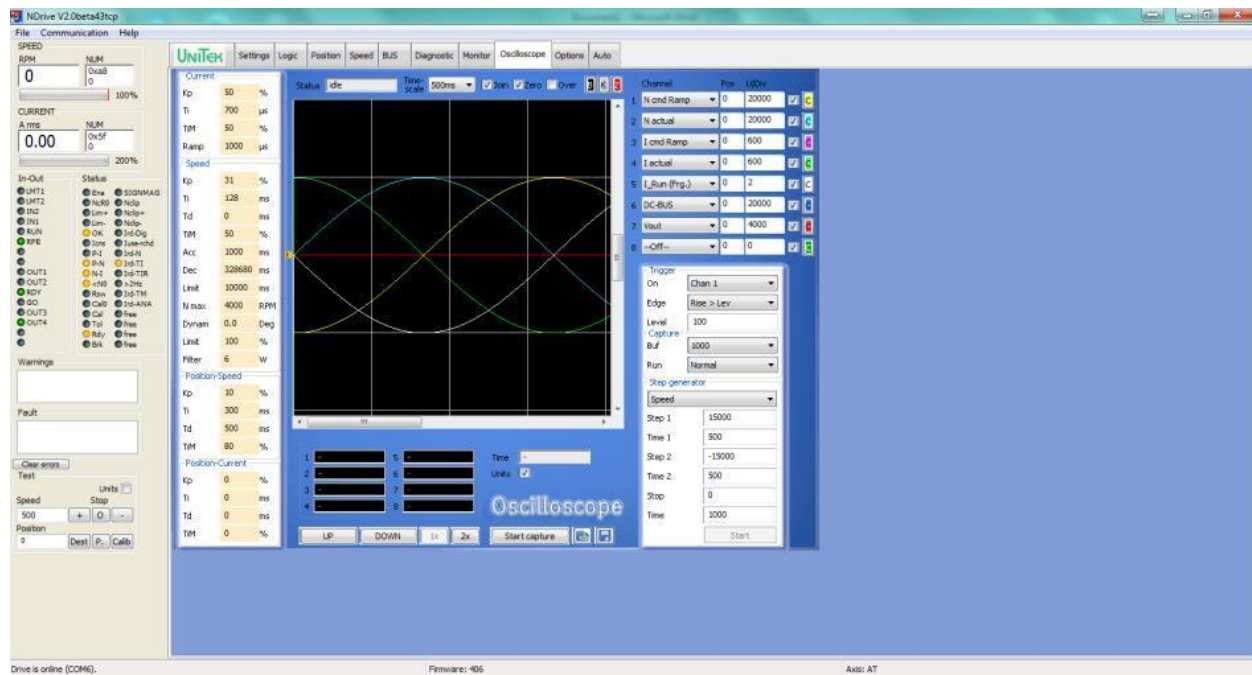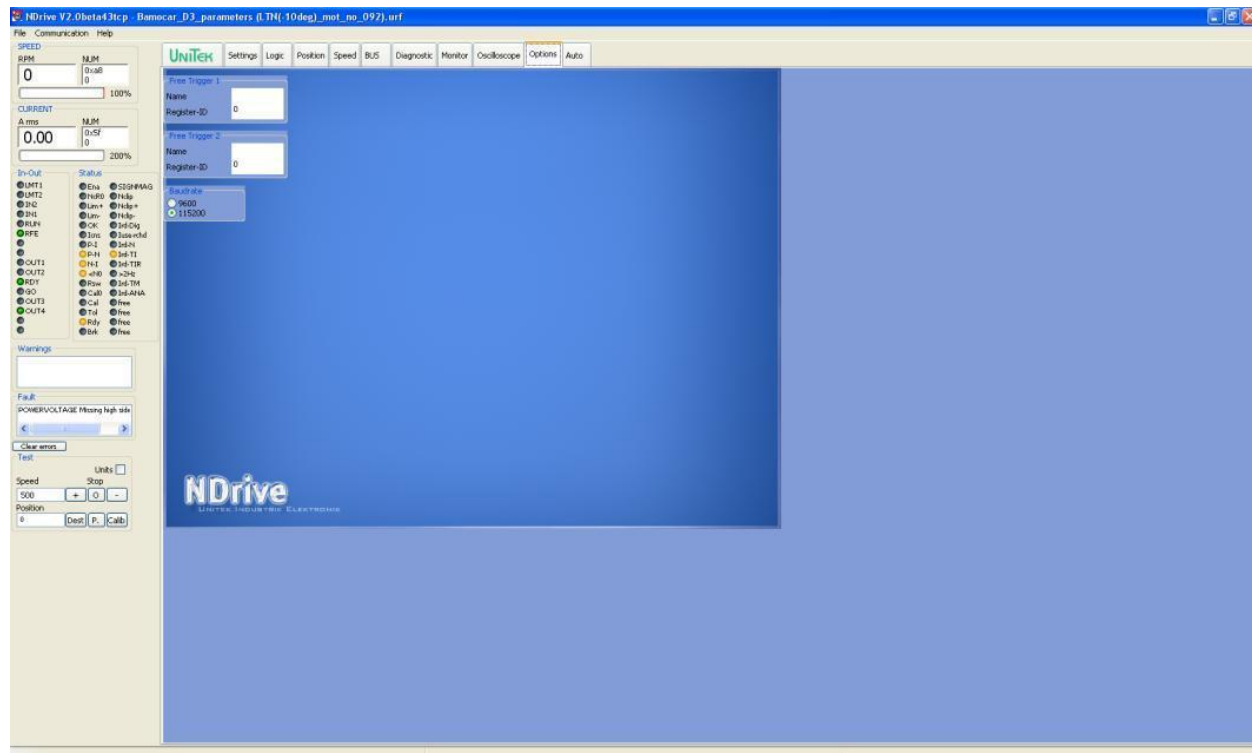
## 12. AUTO TAB - VERY IMPORTANT!

These data in the picture below are valid for EMRAX High Voltage! For Medium and Low Voltage motor, please take a look at Technical Data Tables, which are published in Manual for EMRAX motors and on our website.
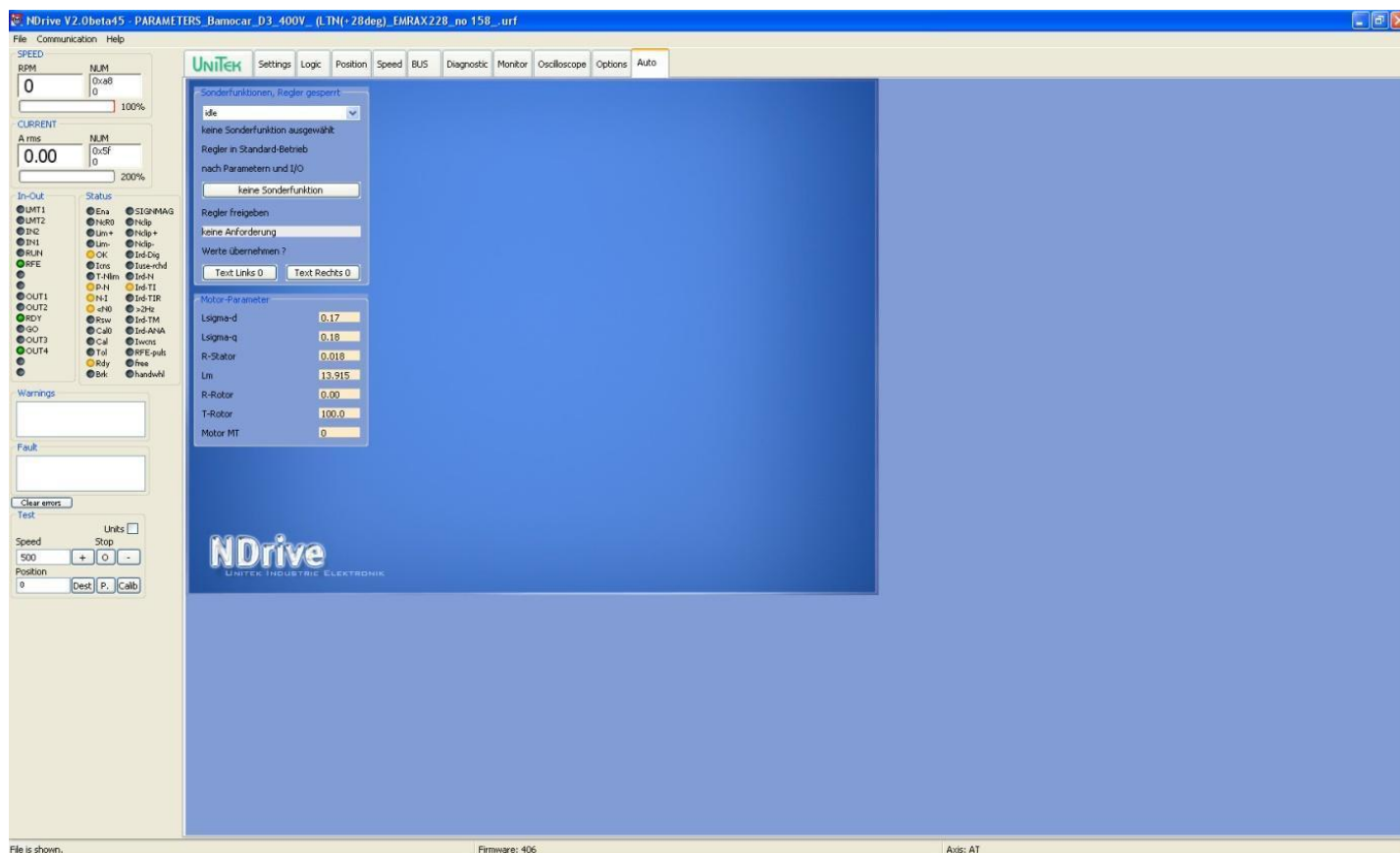


*Other parameters can also be set to the value, which depends on each specific costumer's project. They depend on the battery supply, maximal motor rotation/frequency, switching frequency, operation mode.

Version 1.2 April 2014