

PARAMETERS FOR UNITEK BAMOCAR D3 and BAMO D3 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.

The screenshot shows the NDrive V2.0beta45 software interface. The 'Parameters' tab is active, displaying various motor and servo parameters. A red box highlights the 'I nom' parameter in the 'Motor' section, which is currently set to 120.0 A. A red arrow points from the text below to this parameter. The interface includes a left sidebar with status indicators and a bottom status bar showing 'File is shown.', 'Firmware: 406', and 'Axis: AT'.

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.

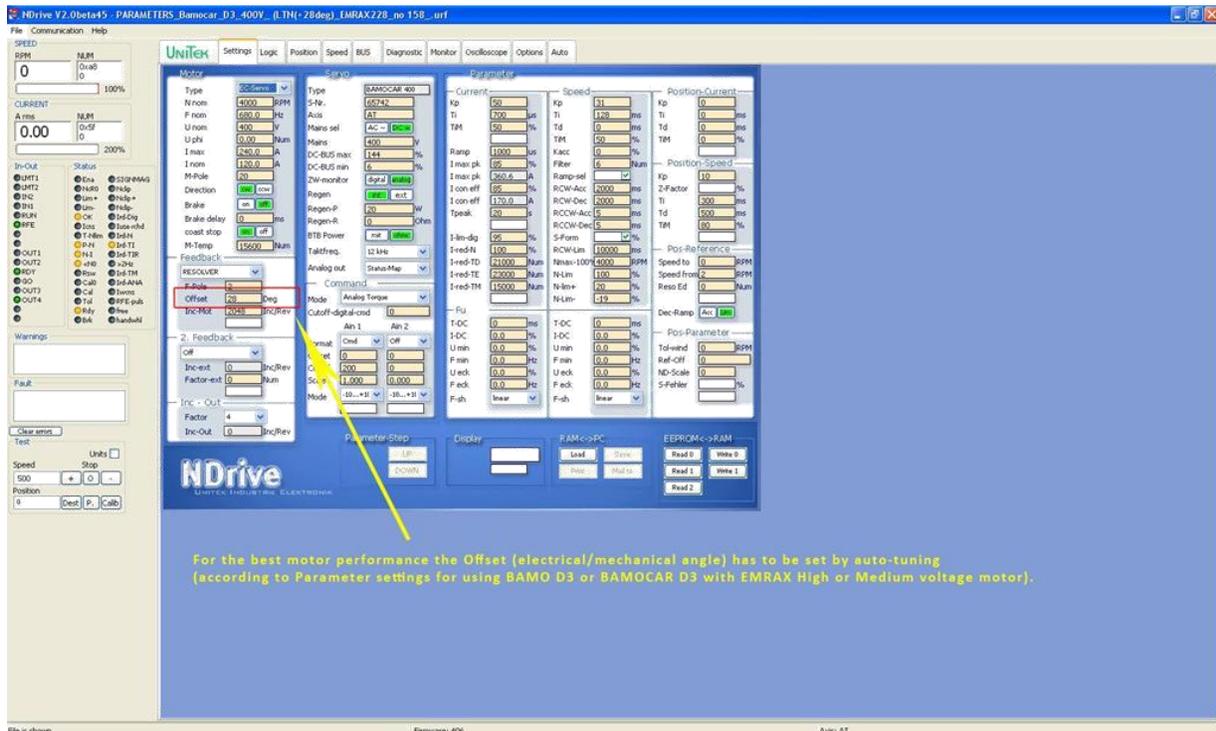
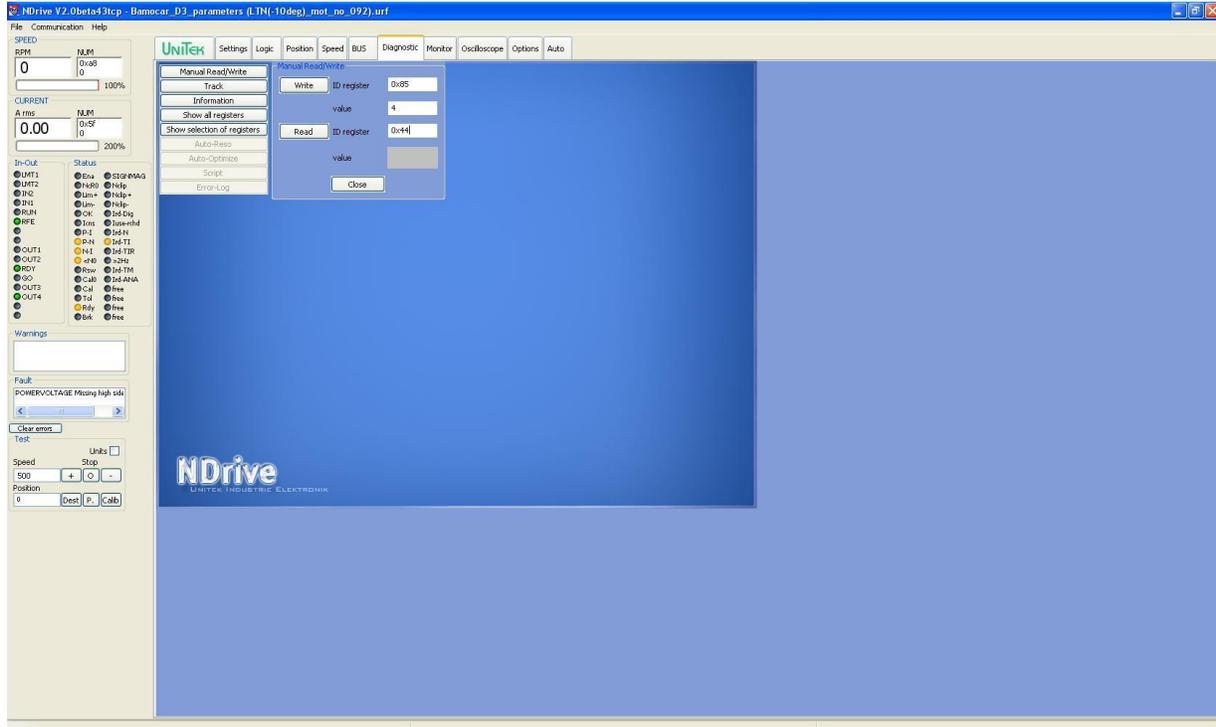
4. DIAGNOSTIC TAB – AUTOTUNING / AUTOMATIC ADJUSTMENT – VERY IMPORTANT!

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**.



For the best motor performance the Offset (electrical/mechanical angle) has to be set by auto-tuning (according to Parameter settings for using BAMO D3 or BAMOCAR D3 with EMRAX High or Medium voltage motor).

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.

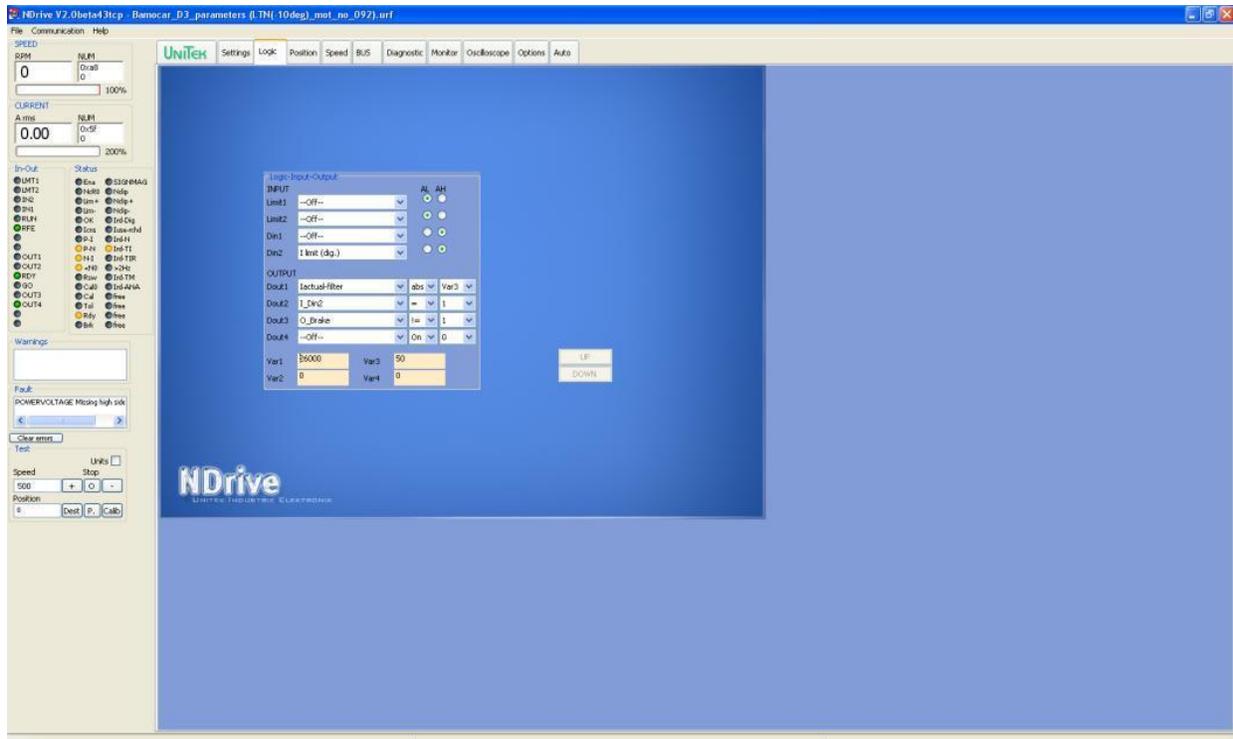
Open the window 'manual read/write' on the page 'diagnosis'. Enter '0x85' in the 'write/Id register' input field. Enter '4' in the 'write/value' input field.

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

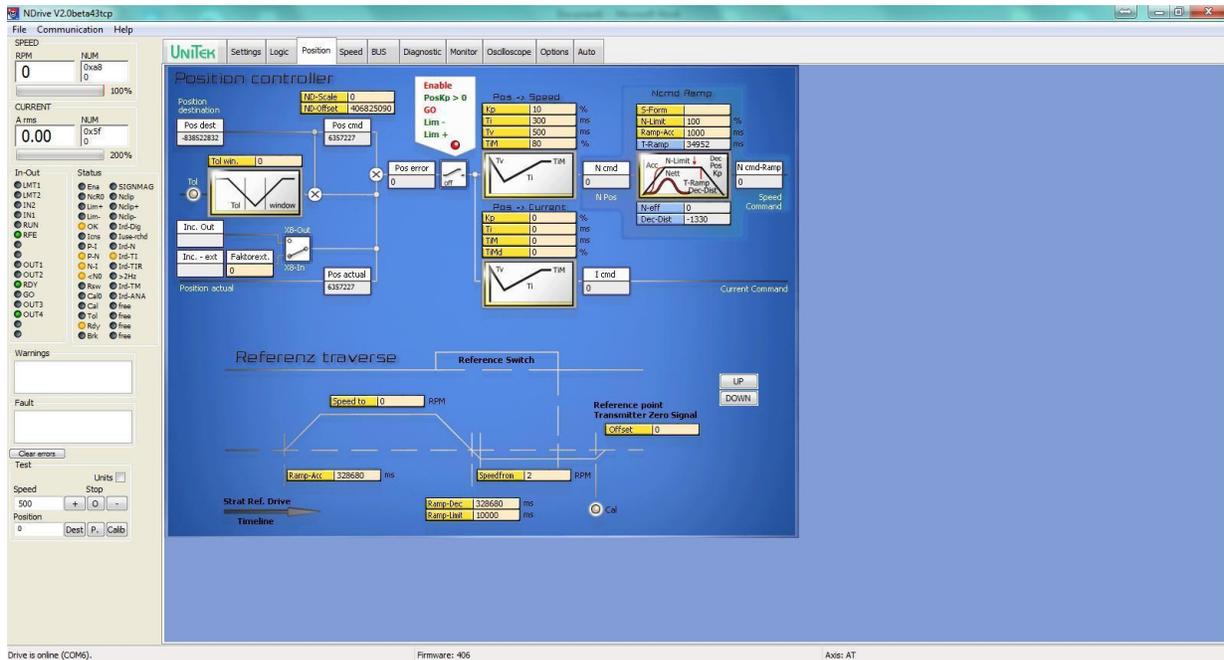


The screenshot shows the NDrive software interface with the 'Logic-Input-Output' configuration window open. The interface includes a top menu bar with 'Settings', 'Log', 'Position', 'Speed', 'BUS', 'Diagnostic', 'Monitor', 'Oscilloscope', 'Options', and 'Auto'. On the left, there are control panels for 'SPEED' (0 RPM), 'CURRENT' (0.00 A rms), and 'Warnings'. The 'Logic-Input-Output' window has several sections:

- Logic-Input-Output:** Includes 'LIMIT' (Limit1, Limit2, Dir1, Dir2) and 'OUTPUT' (Dout1, Dout2, Dout3, Dout4) settings.
- Var1-Var4:** Variable settings for Var1 (35000), Var2 (0), Var3 (50), and Var4 (0).
- Buttons:** 'UP' and 'DOWN' buttons.

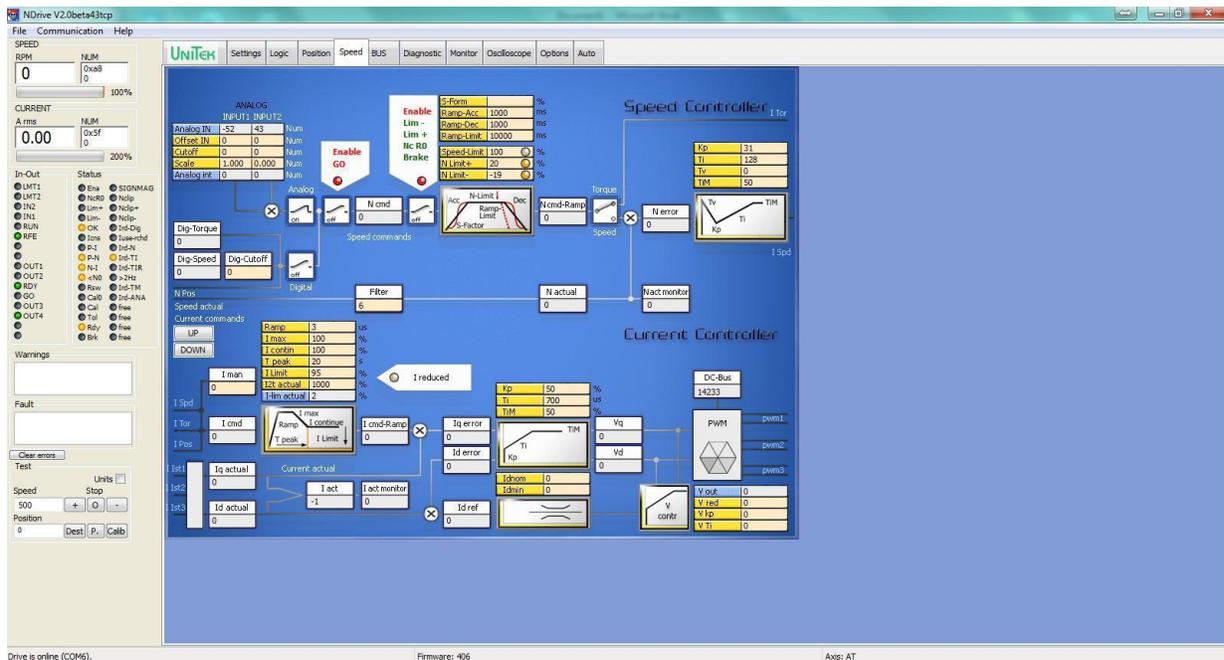
The background shows the 'NDrive' logo and 'UNITEX' branding.

6. POSITION TAB

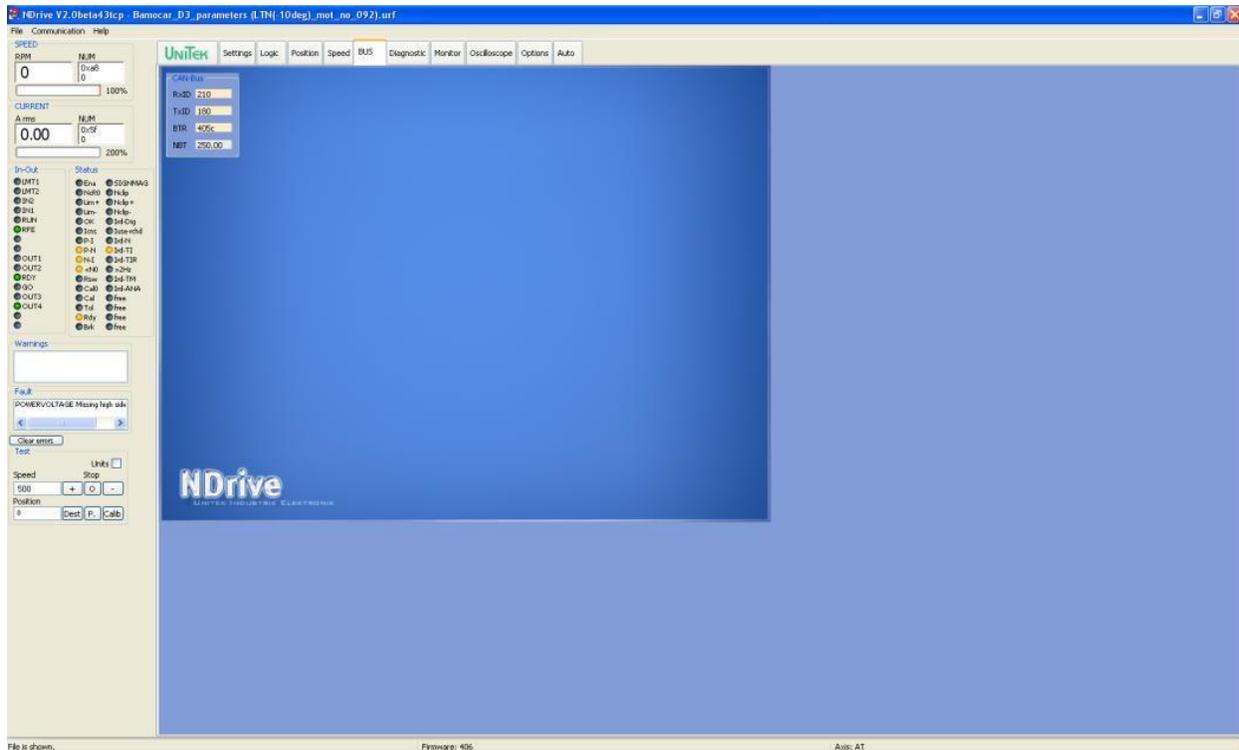


7. SPEED TAB – magnetic field weakening

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



8. BUS TAB



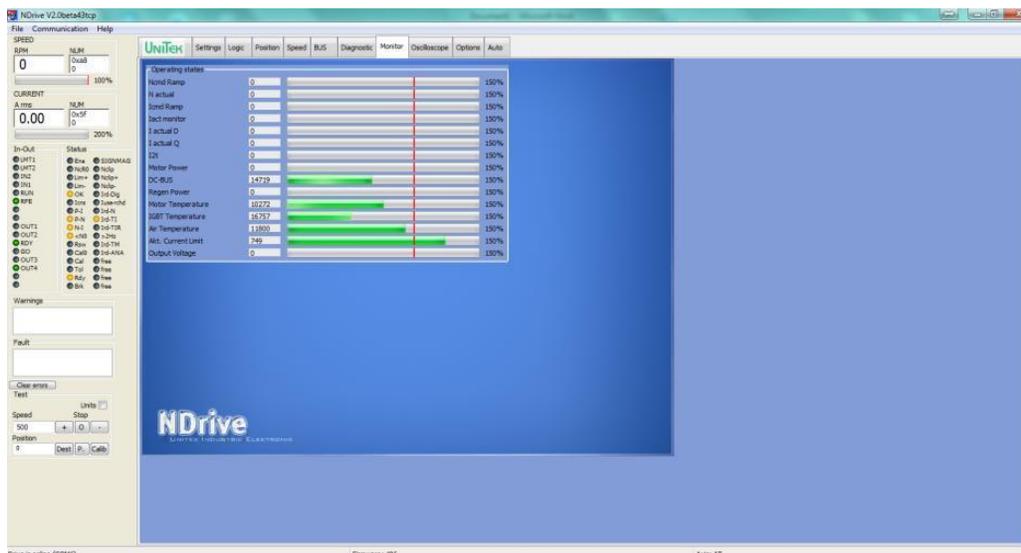
9. MONITOR TAB

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).



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 $I_{cont} = 1 \text{ mA}$.

AMBIENT TEMPERATURE		TEMP. COEFF.	KTY81-210				KTY81-220			
($^{\circ}\text{C}$)	($^{\circ}\text{F}$)	(%/K)	RESISTANCE (Ω)			TEMP. ERROR (K)	RESISTANCE (Ω)			TEMP. ERROR (K)
			MIN.	TYP.	MAX.		MIN.	TYP.	MAX.	
-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

The screenshot displays the Oscilloscope tab in the NDrive software. The central area features a waveform display with two channels. The left sidebar provides a comprehensive status overview, including In-Out signals (e.g., IMT1, IMT2, IN1, IN2, RUN, STOP, etc.) and Warnings/Faults. The top navigation bar includes File, Communication, and Help. The main window has tabs for Settings, Logic, Position, Speed, BUS, Diagnostic, Monitor, Oscilloscope, Options, and Auto. The right sidebar contains channel settings (e.g., Channel 1, Channel 2) and a detailed Trigger configuration panel. The bottom status bar shows 'Drive is online (COM6)', 'Firmware: 406', and 'Axis: AT'.

11. OPTIONS TAB

The screenshot displays the Options tab in the NDrive software. The central area is a large blue field with the NDrive logo and 'SERVO MOTOR ELECTRONICS' text. The left sidebar provides a comprehensive status overview, including In-Out signals (e.g., IMT1, IMT2, IN1, IN2, RUN, STOP, etc.) and Warnings/Faults. The top navigation bar includes File, Communication, and Help. The main window has tabs for Settings, Logic, Position, Speed, BUS, Diagnostic, Monitor, Oscilloscope, Options, and Auto. The right sidebar contains two Free Trigger configurations with Name and Register-ID fields. The bottom status bar shows 'Drive is online (COM6)', 'Firmware: 406', and 'Axis: AT'.

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.

The screenshot displays the NDrive V2.0beta45 software interface. The main window is titled "NDrive V2.0beta45 - PARAMETERS_Bamacar_D3_400V_ (LTN(-28deg)_EMRAX228_no158..._url". The interface is divided into several sections:

- Left Panel:** Contains various status indicators and controls. It includes sections for "SPEED" (RPM, 0), "CURRENT" (A rms, 0.00), "In-Out" (IMT1-4, IN1-4, RLIN, RFFE, etc.), "Warnings", "Fault", "Clear errors", and "Test" (Speed, Position, Units, Stop).
- Top Panel:** Features a menu bar with "Settings", "Logic", "Position", "Speed", "BUS", "Diagnostic", "Monitor", "Oscilloscope", "Options", and "Auto".
- Main Area:** Displays the "Unitek" logo and a "Sonderfunktionen, Regler gesperrt" (Special functions, Controller locked) status. It shows a dropdown menu set to "idle" and a message "keine Sonderfunktion ausgewählt" (no special function selected). Below this, it indicates "Regler in Standard-Betrieb nach Parametern und I/O" (Controller in standard operation after parameters and I/O) and "keine Sonderfunktion" (no special function). There are buttons for "Regler freigeben" (Release controller), "keine Anforderung" (no request), and "Werte übernehmen?" (Accept values?).
- Motor-Parameter Table:** A table listing various motor parameters and their values:

Motor-Parameter	Value
Lsigna-d	0.17
Lsigna-q	0.18
R-Stator	0.018
Lm	13.915
R-Rotor	0.00
T-Rotor	100.0
Motor MT	0
- Bottom Panel:** Shows "File is shown.", "Firmware: 406", and "Axis: AT".

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

