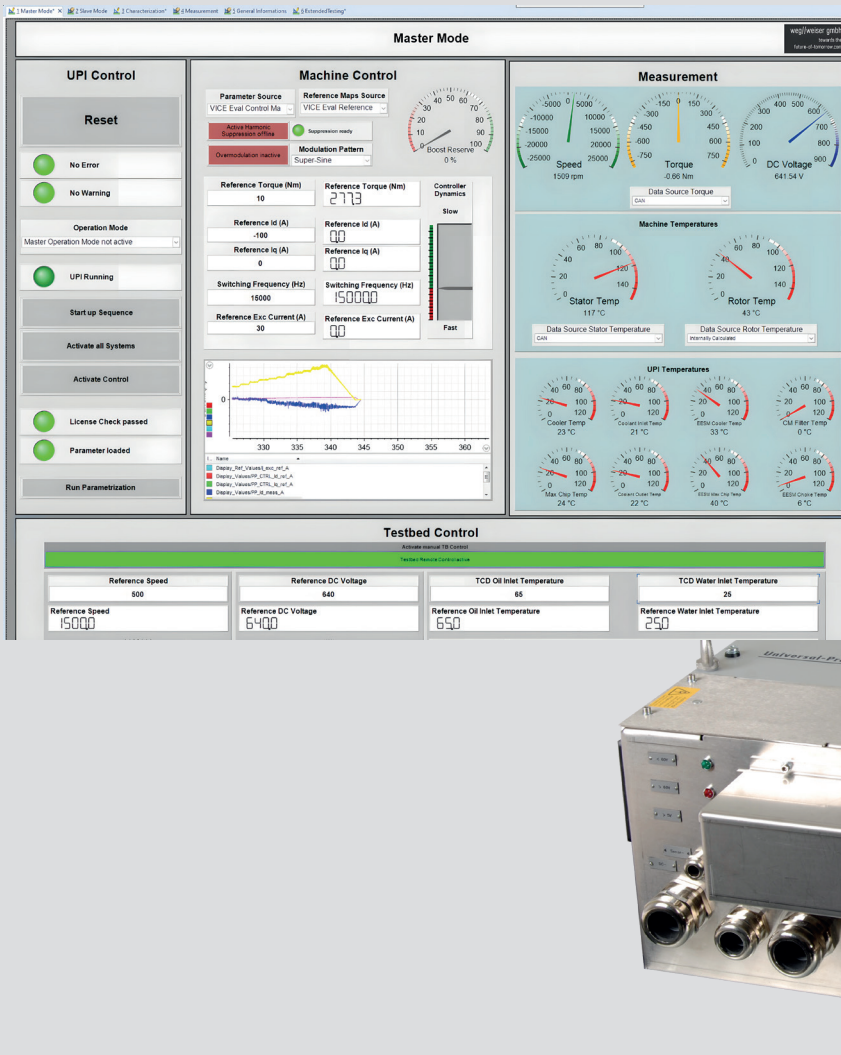


## Fully automated characterization and operation of Electric Machines



## Our Mission

“Enable our customers to perform their tests in the shortest time with highest performance.”

## Who should use our System

- **Developers of electric machines**, who want to carry out in-depth analyses of the machines on the test bench
- **Test engineers** who carry out component, function, or system validations
- **Application engineers**, who need to determine operating data, system performance and thermal tests of unknown electrical machines
- **Software developers**, who need to quickly test self-developed functions in the real environment

## Key Benefits

### Fast commissioning:

Typical machines are fully operational within two days including sufficient torque accuracy, peak power, and torque dynamic



### Easy to use:



User-friendly operating concept offers a “one-click” solution for commissioning, characterization, and evaluation of electric machines. power, and torque dynamic

### Highly adoptable:

Be ready for every machine type, angle sensor and test environment that might occur in the future. Our software offers a



wide range of configurations to be prepared for all test scenarios

### High performance:



With switching frequencies up to 20 kHz, a maximum DC link voltage range from 48 V to 1000V and currents up to 1000Arms the test system is ready for future challenges

### Easy integration:

The system can be integrated in existing testbed system. Your testbed automation and predefined test scenarios can be used as before. No limitation to individual testbed manufacturers



## Hardware

### Universal test bench inverter UPI for 3/6-phase electrical motors

**UPI800 (800 V/500 Arms)**

**UPI1000 (1000 V/1000 Arms)**



19" rack with MicroLabBox®

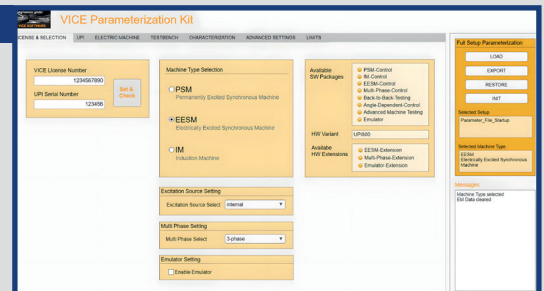
- Power electronics with SiC modules with suitable driver control
- Control and data acquisition via dSPACE MicroLabBox® with 50-pin DSub connectors
- AC and DC voltage acquisition ( $\pm 0,6\%$ , 0 – 800 kHz)
- DC current acquisition ( $\pm 1\%$ , 0 – 140 kHz) and AC current acquisition ( $\pm 1\%$ , 0 – 240 kHz)
- Heat sink temperature sensing
- Connection possibilities for resolver and incremental encoders via interface cards
- Protection against overcurrent and overvoltage
- DC power supply via battery simulator or vehicle battery possible
- Internal FPGA logic for self-protection (max. frequency, hot branch, heat sink temperature)

	UPI800	UPI1000
Max. voltage DC:	800V	1000V
Continuous output AC:	490 kVA @ 560 Veff	1200 kVA @ 700 Veff
Continuous current AC:	500 Arms	1000 Arms
Overload current AC:	650 Arms for 30s/750 Arms for 10s	
Switching frequency:	1 kHz – max. 20 kHz	1 kHz – max. 25 kHz
DC link capacity:	1,2 mF	1,68 mF
Protection class:	1, PE connection with min. 70 mm <sup>2</sup>	1, PEconnection with min. 70 mm <sup>2</sup>
Protection:	IP30	IP30
Permitted ambient temperature:	5 – 40 °C, non condensing humidity	5 – 40 °C, non condensing humidity
Auxiliary power supply:	230 V (max. 500 VA) for inverter 230 V (max. 100 VA) for MicroLabBox	230 V (max. 500 VA) for inverter 230 V (max. 100 VA) for MicroLabBox

## Software – Workflow

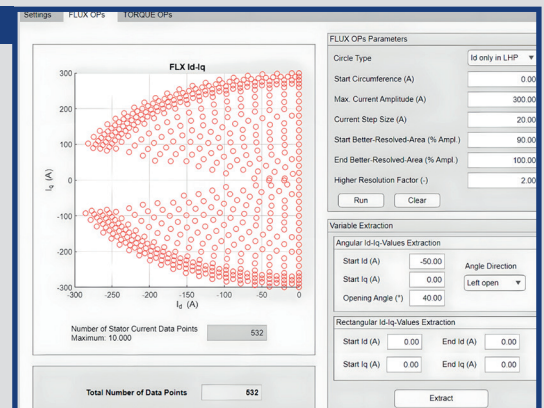
### 1. Parametrization

- Select machinetype (IM, PSM, EESM, RSM...)
- Setup angle sensor type
- Define limits
- Integrate external sensors (torque, temperature ...)



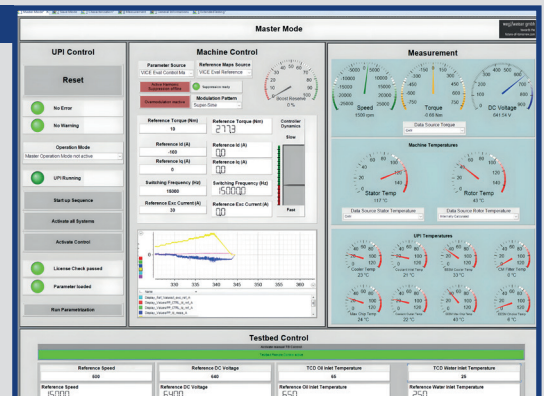
### 2. Test setup

- Quick definition of I<sub>d</sub> and I<sub>q</sub> operating points
- Define rotor and stator temperature limits
- Define different speeds, excitation currents, ...



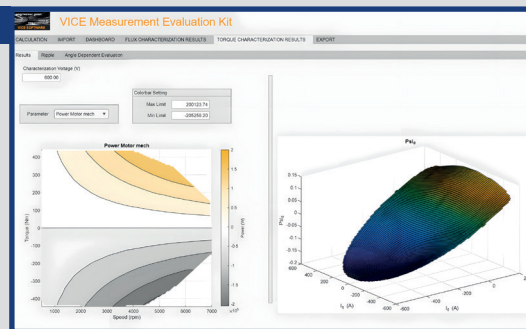
### 3. Operate machine

- Live visualization and control of all relevant data
- Automatic commissioning for easy setup
- Perform automatic tests or remote control the system



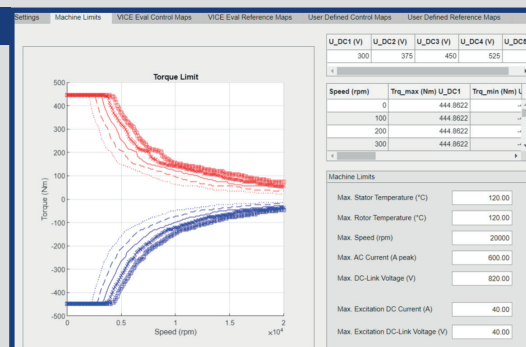
## 4. Data evaluation

- Derive relevant control parameters
- Calculate reference look-up tables for torque control
- Visualization of measured data and automatic report generation



## 5. Further tests

- Perform torque characterization for efficiency maps
- Automatic characterization of continuous and overload power
- Analyse results directly in VICE measurement KIT



## Special Features

- Variable switching frequency (can be changed online)
- Fully remote controllable
- “Back-to-Back testing”
- Multiphase operation: 3, 5 and 6 phases
- Repetitive control to eliminate or control harmonics
- Measurement and analysis of harmonics
- Supervision and reference value saturation of machine, inverter and testbed limits
- Integration of testbed derating in test scenarios
- Flight recorder to analyse system shutdowns in the aftermaths
- Suitable for all common angle sensor types
- Integration of temperature sensors without additional hardware
- Easy set up with angle sensor wiring swap, phase swap, automatic sensor alignment, automatic derivation of lumped parameters
- Variety of modulation methods, overmodulation and six step modulation integrated
- Analysis of transient short circuit currents with our TASC module
- Detailed data analysis with our VICE evaluation kit, access to all data in MATLAB and EXCEL format
- Easy visualization of measured and evaluated data
- Fully automated measurement of efficiency maps, torque accuracy maps, peak power maps, continuous power maps, ...
- Automatic report generation for quick data visualization

## Let's get in touch with the future

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