# **Battery Testing Software**

# PC-Software for Battery Testing

# Main Features / Functionality

- Software for running tests with batteries
- Main functionality
  - Implementation of charge and/or discharge routines, access to internal charge counter
  - Burden the battery according to given drive cycles (e.g. FTP75, ECE/EUDC)
  - Discharge / charge the battery according to recorded data (record & replay)
- Automatic execution of sequences of TopCon power supply commands.

# Main window:

Overview of core data for charge and discharge operation. Shows live data from TopCon power supply

- Presentation / setting core data
- Energy and Charge counter
- Progress information from BatScript

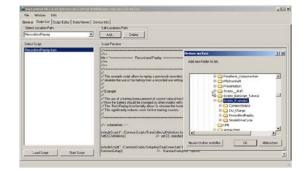


Manual control window with charge/energy counter

### Script Selection List:

Main entry point for execution of functional programs and of own functionality (BatScript)

- Selecting folder with BatScripts
- Check and preview the Batscript
- Immediately start a BatScript



Select scripts from an arbitrary folder

### LiveViewer:

Multi-channel data logger for long lasting data acquisition and immediate observertion

- Virtually unrestricted signal recording with direct transmission to PC file.
- Collection of data from different data sources.
- Arbitrary selection from a set of possible signals to be recorded from TopCon.
- Recording with realtime stamp.

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Multi-channel data live viewer (various sources)

- Start/Stop programmable by software command.
- Export to CSV data format for further processing of recorded data.

### Script Editor and Programming / Debugging

### Scripting:

- Software editor with easy to learn (JavaScript alike) script language
- Immediately run a BatScript
- Execute a BatScript in execution mode

### **Programming:**

- allows for arbitrary command sequences and automatic test cycles
- programming with intelligent editing support
- Extended debugging capabilities: single step mode, slow motion, interactive loop break
- Printing data being recorded during execution of a script to file, importing data from file to be processed in a script
- Support for up to 3 TopCons (e.g. for synchronized use of test benches)

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Scripts are open and easy to use. They can be edited and modified with changing requirements

# **Battery Testing Software**

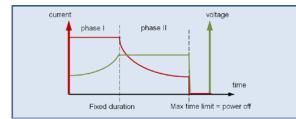
# PC-Software for Battery Testing

# BatControl

Version 0.3.4

## Example: I-U-charge

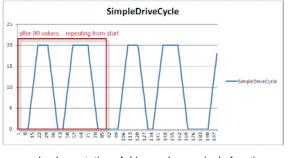
- Implementation of I-U charge process
- Example implementation with time based switching (fixed / max duration)



Provided example implements a I-U-charging process

# **Example: Drive Cycle**

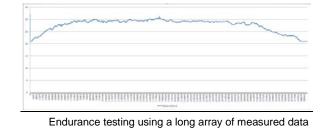
- A script allows to repeatingly run a drive cycle.
- Given example implements a simple two parted drive cycle to explain the underlying concept, easy adaptation to other drive cycles by modification of function "GetSpeedAtTime ( ...)". Automatic execution of sequences of TopCon power supply commands.



Implementation of drive cycles as single function eases repeating tests

# Example: "Record-and-Replay" (R'n'R)

- Reading in data from CSV file
- Replay measurement in lab environment
- Tested with more than 400.000 data points



### BatScript example:

The following example...

- charges battery for 1hour with 40 Amps
- then
- waits until theout current decreases to 5 Amps.
- Afterwards power is switched off

// Start of Script
,//*** Simple charge algorithm //***
, //***********************************
TC_1.SetCurrentRef (40) // charge with 40Amps TC_1.SetVoltageRef (344) // start at 344 Volts
TC_1.PowerOn() // switch output on
BaseFunction.Wait_min (60)  // wait for 60 min
// wait while charge still bigger than 5 Amps while ( TC_1.GetCurrentAct() > 5) {
BaseFunction.Wait_s (30) // check all 30s
TC_1.PowerOff() // disconnect battery
/ End Of Script

### Integration of external hardware:

On request it is possible to integrate external hardware into BatControl. For example:

- AD/DA Converter
- Temperature sensors
- ...

Configuration of temperature converter

Connect to Device	Select a device with specific serial number	Set
Act value	Am- Am- Am- Am- Am- Am- Am- Am-	Digital In: × Digital Out Analog Dut 1.000

#### **General information**

 Swiss made: developed, implemented and tested in Switzerland by Regatron AG, manufacturer of TopCon product family.

### Scope of delivery

- Newest version of TopCon firmware including all needed functionality
- Installer package for PC including:
  - BatControl Test Automation Engine with charge and energy counter.
  - TCIO.DLL (communications functions), TCIOWrapper DLL (enhanced communications + .NET support)

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Version 0.3.4

- Examples (Charging, drive cycle, Record-and-Replay)
- Operations and Programming Handbook
- Described examples (free to be modified by end user)
- Teaching examples (thoroughly explained in Programming Handbook)

# **Optional support**

Installation support from your sales partner

Your distributor:



**CREGATRON**