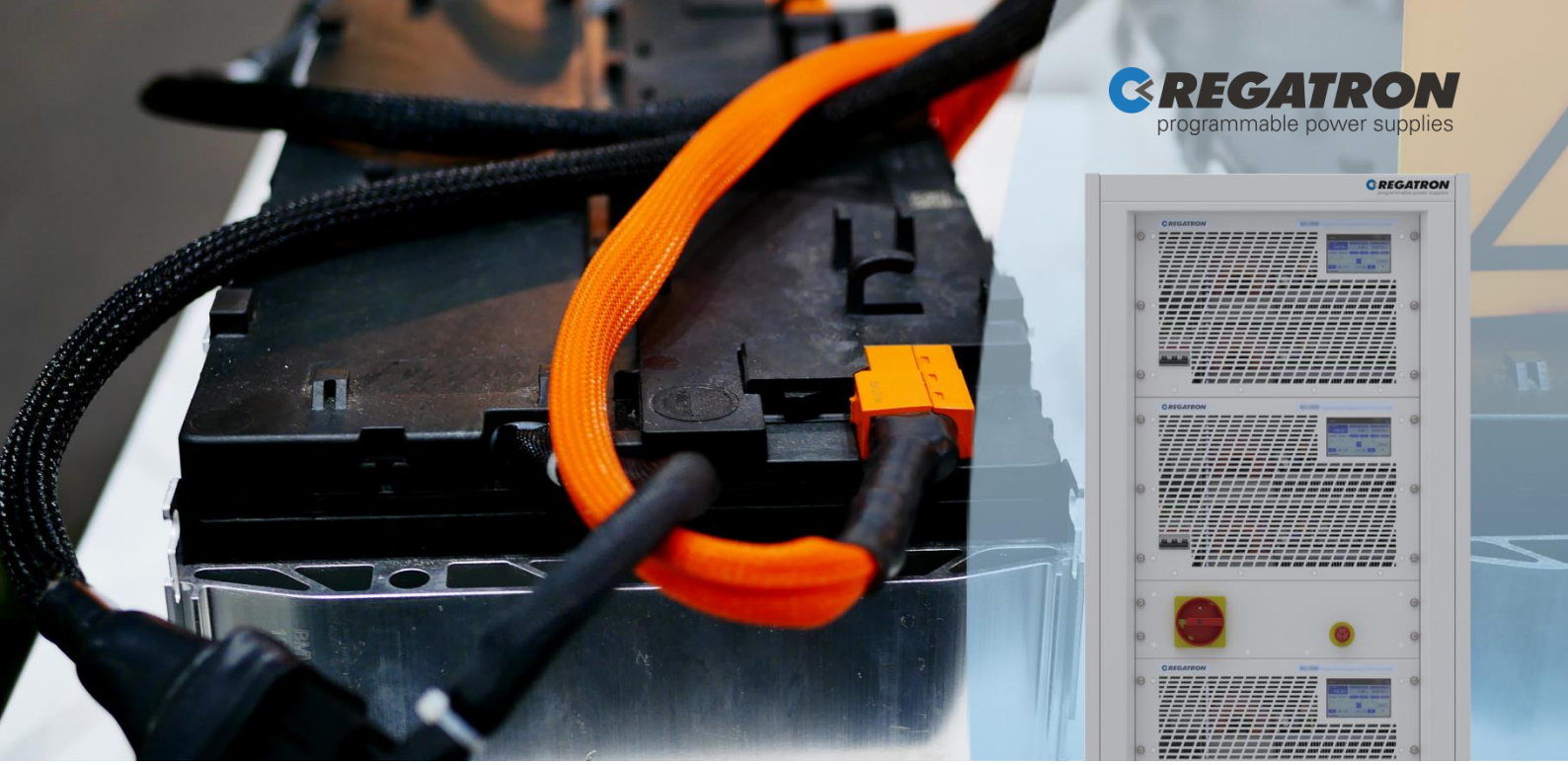

G5.BT Battery Tester Series

The G5.BT series is bidirectional regenerative and it was developed specifically for testing energy storage devices and is suitable for use in laboratories and on test benches. The modular and finely graded G5.BT series is characterized by highly dynamic response times and a wide current-voltage range with an auto-ranging factor 3. The G5.BT series has an outstanding accuracy, an additional high-resolution current measurement range, and a fast current rise time in the 100 µs range. Ripple modulation, an integrated safety relay for PL c according to EN ISO 13849 and a powerful CAN multi-protocol interface (1 kHz, 16 bit) as well as functions to avoid reverse-polarity problems, current surges, and unwanted deep discharges make the G5.BT series the ideal, versatile battery module and battery pack tester.

Device Types

Voltage V	Power kW	Current A	Height U	Order Code
*0...80	9	-338...338	4	G5.BT.9.80.338
*0...80	18	-676...676	4	G5.BT.18.80.676
*0...80	27	-1014...1014	7	G5.BT.27.80.1014
*0...80	36	-1352...1352	7	G5.BT.36.80.1352
*0...80	45	-1690...1690	10	G5.BT.45.80.1690
*0...80	54	-2028...2028	10	G5.BT.54.80.2028
0...160	18	-338...338	4	G5.BT.18.160.338
0...160	36	-676...676	7	G5.BT.36.160.676
0...160	54	-1014...1014	10	G5.BT.54.160.1014
0...240	27	-338...338	7	G5.BT.27.240.338
0...240	54	-676...676	10	G5.BT.54.240.676
0...320	36	-338...338	7	G5.BT.36.320.338
0...500	9	-54...54	4	G5.BT.9.500.54
0...500	18	-108...108	4	G5.BT.18.500.108
0...500	27	-162...162	7	G5.BT.27.500.162
0...500	36	-216...216	7	G5.BT.36.500.216
0...500	45	-270...270	10	G5.BT.45.500.270
0...500	54	-324...324	10	G5.BT.54.500.324
0...1000	18	-54...54	4	G5.BT.18.1000.54
0...1000	36	-108...108	7	G5.BT.36.1000.108
0...1000	54	-162...162	10	G5.BT.54.1000.162
0...1500	27	-54...54	7	G5.BT.27.1500.54
0...1500	54	-108...108	10	G5.BT.54.1500.108

*also as 60 V SELV version for single or parallel operation available, order code example: G5.BT.9.**60**.338

Modular and Easily Scalable Systems

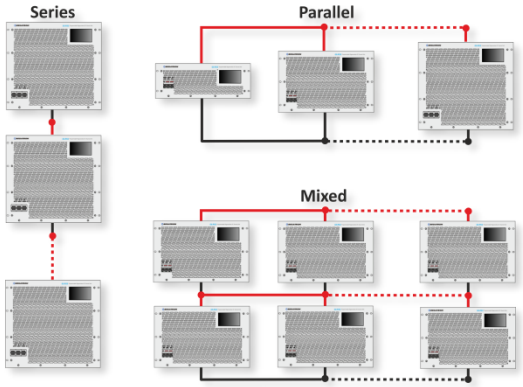

Figure 1: Modular concept for easy power and voltage increase by parallel, series, and mixed operation. The parallel configuration allows even an operation of different power levels, e.g., 18, 36, and 54 kW modules, in one system.

The output of an individual power supply is in the range from 0...9 kW to 0...2000+ kW, up to 3000 VDC. The advantageous modularity of REGATRON power supply solutions allows the system to be easily adapted to ever changing test requirements. It is possible to reconfigure between parallel, series, and mixed operation.

Moreover the system can be expanded with additional power supply units or to be split into smaller units.

Whether for single devices or powerful multi-device multi-unit systems, REGATRON also offers turn-key cabinet solutions or project specific system integration according to customer specifications.

Therefore, the purchase of a REGATRON power supply is a solid investment for the future.

Battery Module / Pack-Testing Features

The G5.BT series has an exceptional electrical performance that offers several advantages for battery testing applications:

- Voltage accuracy of <0.02% FS
- Current accuracy in the range 0.025…0.085% FS depending on model
- Additional high-resolution current measurement range from -10 to 10% FS with an accuracy <0.005% FS
- Current rise time in the 50…200 µs range
- Parameterizable to avoid overshoot
- Current ripple modulation up to 10 kHz

In addition, the G5.BT provides important features for user safety, power supply, and battery protection. It avoids:

- Reverse-polarity problems
- Arcing and high inrush current when connecting the battery to the DC terminals even at unmatched voltage levels
- Deep battery discharge at voltage off state (DC port impedance >10 MΩ)

Features such as adjustable controller settings and the integrated powerful 8-channel digital scope assist the user to quickly and easily achieve optimal system behavior for a special application requirement. The G5.BT series also offers the possibility to store, edit and recall any device configuration on board the power supply.

Control Modes

CV	constant voltage
CC	constant current
CP	constant power
CR	constant resistance
Ri	internal resistance simulation

Dynamics

Maximum speed or minimum overshoot? Figure 2 shows that the dynamic parameters of the G5.BT series can be easily adapted to a specific task.

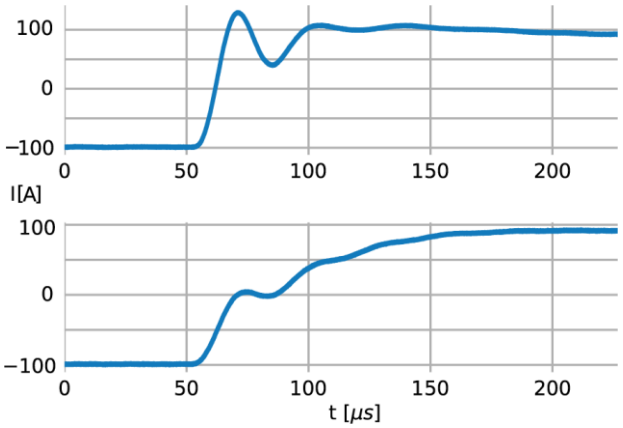

Figure 2: Parameterization example: of a 36 kW, 1000 V, 108 A device: Set-value step current -97…97 A@333VDC in <50 µs with overshoot (top), in <200 µs w/o overshoot (bottom). The dynamic behavior is comparable across the series of G5 devices from low voltage to high voltage

General Dynamic Data

rise/fall time	voltage 0…90%	150…220 µs
set-value step	current -90…90%	35…70 µs
response time load step	CV, recovery within 0.5% set value	50…290 µs

Interfaces

Ethernet and USB

To connect with:

- G5.Control the operating and maintenance software
- BatControl the application software for battery testing
- API .NET programming, e.g., by LabView, Python, Matlab, or REST interface

I/O port

Interface featuring analog and digital signals used for set and actual values or operating states.

CAN Interface

The CAN multi-protocol (CANmp) interface has a 1 kHz data rate, a 16-bit resolution and is adaptable to any proprietary CAN bus. In addition, it supports dbc file handling.

Integrated Safety Relay

Integrated safety relay (ISR) for increased emergency stop reliability supporting performance level PL c / PL e according to EN ISO 13849.

Grid Connection

The wide-band AC input accepts all common AC grid systems and has an active power factor correction.

AC Grid	380…480 VAC ±10% at 50/60 Hz
PF	0.99
Efficiency	91…96%, depending on model

Options

Software and Controls

BatControl

The battery tester is controlled by interfaces such as CANmp for the integration into automated test benches or by the optional application software BatControl for R+D applications in the laboratory.

BatControl allows selecting and running so-called BatScripts. These scripts automate the manually given commands to the G5 Battery Tester and allow the running of these commands according to defined schedules.

- Define charge and discharge algorithms
- Run drive cycles (according to own or already defined standards)
- Repeat previously recorded discharge/charge data

Time-Based Function Generator

The TFE time-based function generator allows programming either through G5.Control operating software, HMI touch display, or CANmp interface.

- Time-dependent functions U = f(t), I = f(t), P = f(t): sine, triangle, or square as well as user-defined data points. Import and export through csv files supported
- Ramp function for amplitude and offset changes
- Small signal modulation up to 10 kHz

HMI / RCU

The HMI built into the front panel allows comprehensive and convenient operation of the power supply via touch display.
With the remote control unit (RCU) it is possible to control the device or system from a distant location in the same manner as with the HMI.

Figure 3: Intuitive control by HMI touch display. Everything you need at a glance.

User Safety

- Discharge of AC filter (XCD), mandatory for mobile use of the device. XCD ensures a discharge time of the AC filter <1 s required by EN 62477-1
- Based on the 80 V models, also a 60 V SELV version is available
- Various terminal protection covers

The different protective covers are designed for integration into 19" rack systems or for use as a tabletop device. The cover for cabinet integration provides protection against accidental contact, whereas the cover for the tabletop version requires a touchproof protection in accordance with standard EN 62477-1.

Voltage V	Power kW	DC-cover acc. contact	DC-cover touchproof	AC-cover touchproof	Tabletop use allowed	Order Code
60…160	≤18	●	○		✓	G5.PAC.DCAC.1
60…320	≥27	●	—	—	—	—
500…1000	≤18	—	●	○	✓	G5.PAC.AC.1
500…1500	≥27	—	●	○	✓	G5.PAC.AC.2

● included
○ optional, mandatory for tabletop use

Rack-Integrated System Solutions

- Mobile rack solutions up to IP54
- Insulation monitoring: remote activation of the insulation measurement, actual insulation value and warning/error status are provided by CANmp interface or by optional HMI
- Easy reconfiguration between parallel, series, and mixed operation

Figure 4: REGATRON's rack-integrated turn-key system solutions with various power levels e.g. 72 kW (left) and 162 kW (right). Various types of AC/DC connectors and cables allow for comfortable handling. Third-party product integration and numerous safety options are additional features.

Environmental Conditions

Front-panel-mounted air filter (AirFilter), recommended for use in dusty environments.

Important Features of the G5.BT Series

Technology

- Technologically advanced, fast switching, compact 19-inch power supplies
- High control dynamics in the 100...200 µs range – even at higher power levels up to 2000+ kW
- Exceptional accuracy and an additional high-resolution measurement range
- Wide current-voltage range with an auto-ranging factor 3
- CV, CC, CP, CR, and Ri-Sim control modes
- Regenerative and highly efficient, resulting in significant reduction of energy consumption and heat dissipation

System Control and Options

- Operating software, extended analysis, parameterization options, and calibration
- Application software with visualization, programming, and data logger
- Powerful application programming interfaces (APIs)

System Capability

- Modular and easily scalable systems
- Parallel, series, and mixed operation with a digital high-speed bus
- Simple multi-unit configuration with the operating software
- Easy rack mounting
- Optional safety features such as 2-channel safety interface and insulation monitoring
- Turn-key cabinet solutions or project-specific system integration according to customer specification

This product is developed, produced and tested according to ISO 9001 by REGATRON.

For detailed technical information, contact REGATRON or your local sales partner.

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