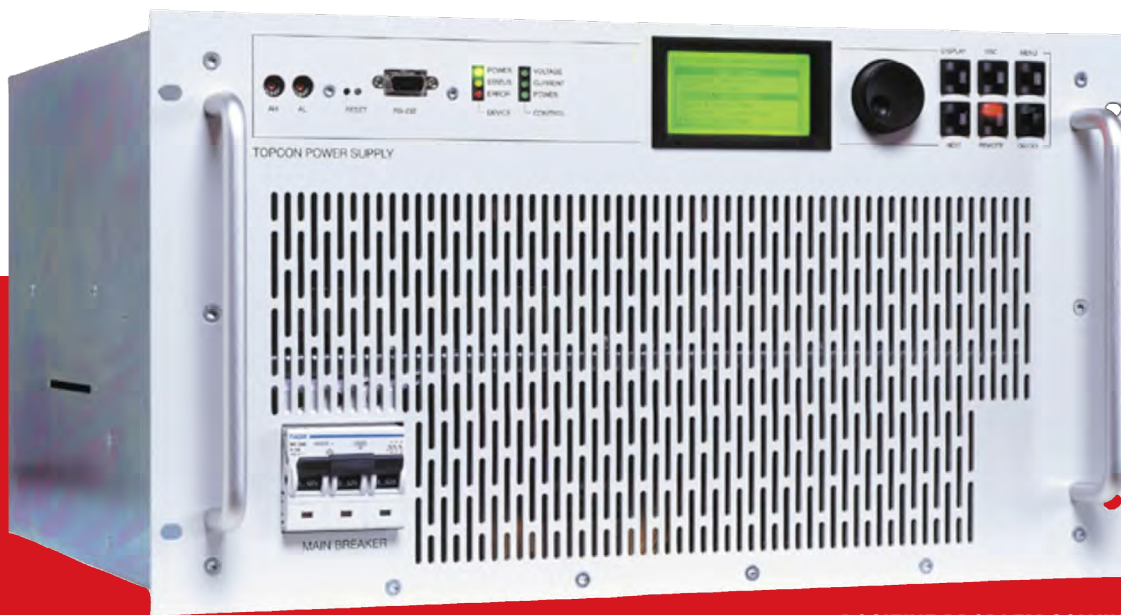


LAB-TC

ADVANCED HIGH POWER DC SOURCES



POSITIVE PROBLEM SOLVING **+ =**

The LAB-TC range is a highly advanced series of Programmable DC power supplies. The units are built into 19" racks and are available in 10kW, 16kW, 20kW and 32kW modules.

Constant voltage, current and power operating modes are provided. The internal resistance can be adjusted making the LAB-TC range ideal for battery simulation. Remote sense is provided to compensate for the voltage drop in the load lines. All regulation, monitoring and communication tasks are conducted by high performance micro-controllers and digital signal processors. This provides exceptional accuracy, reproducibility and long term stability.

- + Parallel, Series & Multi-load Operation**
- + Can be Optimised for Individual Loads**
- + Nominal Voltages from 52V to 1500V**
- + Output Power from 10kW to 2MW+**
- + Adjustable Internal Resistance**
- + Full Digital Regulation**

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STANDARD MODELS

SELECTION TABLE

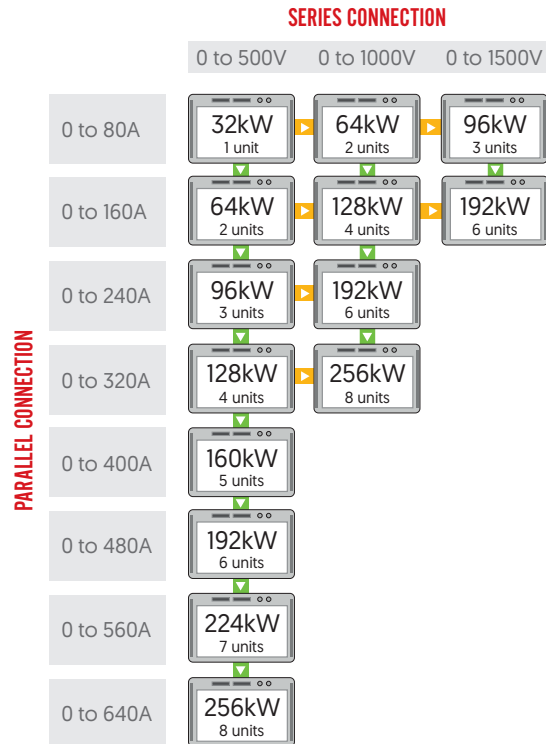
Part Number	Max. Power	Voltage Range	Current Range	Dimensions	Efficiency	Internal Resistance	Weight [kg]
LAB-TC 10-52	10kW	0 - 52V	0 - 250A	19" x 6U x 450mm	92%	0 - 208mΩ	42
LAB-TC 10-65	10kW	0 - 65V	0 - 193A	19" x 6U x 450mm	92%	0 - 337mΩ	42
LAB-TC 10-100	10kW	0 - 100V	0 - 125A	19" x 6U x 450mm	92%	0 - 800mΩ	42
LAB-TC 10-130	10kW	0 - 130V	0 - 96A	19" x 6U x 450mm	92%	0 - 1354mΩ	42
LAB-TC 10-200	10kW	0 - 200V	0 - 63A	19" x 6U x 450mm	92%	0 - 3175mΩ	42
LAB-TC 10-400	10kW	0 - 400V	0 - 31A	19" x 6U x 450mm	92%	0 - 12903mΩ	42
LAB-TC 10-500	10kW	0 - 500V	0 - 25A	19" x 6U x 450mm	92%	0 - 20000mΩ	42
LAB-TC 10-600	10kW	0 - 600V	0 - 20A	19" x 6U x 450mm	92%	0 - 30000mΩ	42
LAB-TC 10-800	10kW	0 - 800V	0 - 16A	19" x 6U x 450mm	92%	0 - 32000mΩ	42
LAB-TC 10-1000	10kW	0 - 1000V	0 - 13A	19" x 6U x 450mm	92%	0 - 32000mΩ	42
LAB-TC 16-52	16kW	0 - 52V	0 - 400A	19" x 6U x 450mm	92%	0 - 130mΩ	44
LAB-TC 16-65	16kW	0 - 65V	0 - 308A	19" x 6U x 450mm	92%	0 - 211mΩ	44
LAB-TC 16-100	16kW	0 - 100V	0 - 200A	19" x 6U x 450mm	92%	0 - 500mΩ	44
LAB-TC 16-130	16kW	0 - 130V	0 - 153A	19" x 6U x 450mm	92%	0 - 850mΩ	44
LAB-TC 16-200	16kW	0 - 200V	0 - 100A	19" x 6U x 450mm	92%	0 - 2000mΩ	44
LAB-TC 16-400	16kW	0 - 400V	0 - 50A	19" x 6U x 450mm	92%	0 - 8000mΩ	44
LAB-TC 16-500	16kW	0 - 500V	0 - 40A	19" x 6U x 450mm	92%	0 - 12500mΩ	44
LAB-TC 16-600	16kW	0 - 600V	0 - 32A	19" x 6U x 450mm	92%	0 - 18750mΩ	44
LAB-TC 16-800	16kW	0 - 800V	0 - 25A	19" x 6U x 450mm	92%	0 - 32000mΩ	44
LAB-TC 16-1000	16kW	0 - 1000V	0 - 20A	19" x 6U x 450mm	92%	0 - 32000mΩ	44
LAB-TC 20-52	20kW	0 - 52V	0 - 500A	19" x 9U x 525mm	95%	0 - 104mΩ	64
LAB-TC 20-65	20kW	0 - 65V	0 - 385A	19" x 9U x 525mm	95%	0 - 169mΩ	64
LAB-TC 20-100	20kW	0 - 100V	0 - 250A	19" x 9U x 525mm	95%	0 - 400mΩ	64
LAB-TC 20-130	20kW	0 - 130V	0 - 192A	19" x 9U x 525mm	95%	0 - 677mΩ	64
LAB-TC 20-200	20kW	0 - 200V	0 - 125A	19" x 9U x 525mm	95%	0 - 1600mΩ	64
LAB-TC 20-320	20kW	0 - 320V	0 - 80A	19" x 9U x 525mm	95%	0 - 4000mΩ	64
LAB-TC 20-400	20kW	0 - 400V	0 - 63A	19" x 9U x 525mm	95%	0 - 6349mΩ	64
LAB-TC 20-500	20kW	0 - 500V	0 - 50A	19" x 9U x 525mm	95%	0 - 10000mΩ	64
LAB-TC 20-600	20kW	0 - 600V	0 - 40A	19" x 9U x 525mm	95%	0 - 15000mΩ	64
LAB-TC 20-800	20kW	0 - 800V	0 - 32A	19" x 9U x 525mm	95%	0 - 25000mΩ	64
LAB-TC 20-1000	20kW	0 - 1000V	0 - 25A	19" x 9U x 525mm	95%	0 - 32000mΩ	64
LAB-TC 20-1200	20kW	0 - 1200V	0 - 20A	19" x 9U x 525mm	95%	0 - 32000mΩ	64
LAB-TC 32-52	32kW	0 - 52V	0 - 700A	19" x 9U x 525mm	95%	0 - 74mΩ	68
LAB-TC 32-65	32kW	0 - 65V	0 - 600A	19" x 9U x 525mm	95%	0 - 108mΩ	68
LAB-TC 32-100	32kW	0 - 100V	0 - 400A	19" x 9U x 525mm	95%	0 - 250mΩ	68
LAB-TC 32-130	32kW	0 - 130V	0 - 308A	19" x 9U x 525mm	95%	0 - 422mΩ	68
LAB-TC 32-200	32kW	0 - 200V	0 - 200A	19" x 9U x 525mm	95%	0 - 1000mΩ	68
LAB-TC 32-320	32kW	0 - 320V	0 - 125A	19" x 9U x 525mm	95%	0 - 2560mΩ	68
LAB-TC 32-400	32kW	0 - 400V	0 - 100A	19" x 9U x 525mm	95%	0 - 4000mΩ	68
LAB-TC 32-500	32kW	0 - 500V	0 - 80A	19" x 9U x 525mm	95%	0 - 6250mΩ	68
LAB-TC 32-600	32kW	0 - 600V	0 - 64A	19" x 9U x 525mm	95%	0 - 9091mΩ	68
LAB-TC 32-800	32kW	0 - 800V	0 - 50A	19" x 9U x 525mm	95%	0 - 16000mΩ	68
LAB-TC 32-1000	32kW	0 - 1000V	0 - 40A	19" x 9U x 525mm	95%	0 - 25000mΩ	68
LAB-TC 32-1200	32kW	0 - 1200V	0 - 33A	19" x 9U x 525mm	95%	0 - 32000mΩ	68

Different output ranges and application/user specific options are possible. Please contact ETPS Ltd. to discuss your requirements.

MODULAR DC SOURCES

Up to 64 LAB-TC modules can be arranged in series, parallel or matrix array configurations. Each module is able to operate independently, so that systems can be reconfigured, expanded or broken up as needs dictate. Inbuilt system comms allow users to switch between various set-ups.

The modular approach is useful for test houses and research labs who regularly test different sized power devices. Individual modules can be used for the day to day testing of multiple small devices, then grouped together for larger projects. The diagram shows all the possible combinations with eight 500V modules.



CABINET OPTIONS

Units can be treated to a laboratory rack or flight case integration. Common options include mains cables, passive indication of any residual DC voltage, isolation monitoring of DC cables and a panel mounted emergency stop. Switch panels with removable DC links can be fitted for modular systems. This simplifies the reconfiguration between series, parallel or independent use. Simple wheeled cabinets are also available.

Having a programmable power system mounted into a flight case on castors is often advantageous, especially when several departments or test cells share the same equipment. Multiple power systems can be fitted into the same flight case. Door hangers are fitted for convenience. Existing ETPS systems can also be retrospectively integrated into new flight cases where requested.



INPUT

STANDARD FEATURES

TECHNICAL DATA	
Input Voltage	3 × 360 - 440 VAC
Line Frequency	48 - 62Hz
Mains Connection Type	3L + PE (no neutral)
Load Regulation (CV, CC)	<± 0.1%
Line Regulation (CV, CC)	<± 0.1% (Typical value for input voltage variation within 360-440 VAC, at constant load and temperature conditions.)

HIGHLIGHTED FEATURE



POWER FACTOR CORRECTION

LAB-TC modules have a Power Factor Correction (PFC) circuit integrated into the input stage as standard. This enhances the overall efficiency of the modules across the output power range when compared to a unit that does not have PFC. The current harmonics of the LAB-TC meet the EN61000-12 regulations for a mains SCE ≥ 120 value. In practice, this means a significant lower peak current value, a decrease of RMS value of the phase current and less perturbations of other equipment running on the same grid.

The inbuilt PFC is also ideal for operating the power supply from a generator. Generators tend to be sensitive against high current peaks, and their voltage controllers may have some stability problems with non-sinusoidal load currents. The PFC feature forms a lowpass filter and therefore, both the repetitive current peaks and also the harmonic content is enhanced. This will help the generator system maintain a stable and reliable output.

OPTIONS

CODE	DESCRIPTION
/480	Input voltage range of 3 × 432-528Vac, 48-62Hz (for models ≥ 16 kW)
/WR	Wide input of 3 × 360-528Vac, 50/60Hz (only available for 1kV units at 20kW or 32kW)
/FILTER	Input air filter

HIGHLIGHTED OPTIONS

+ - CUSTOM DC INPUT

Where users only have access to a DC link, special LAB-TC units have been produced with a DC input. The full functionality of the power supply is still provided. To discuss this option further, please contact ETPS.

↔ WIDE INPUT RANGE (/WR)

A 360-528Vac wide input range is possible for selected models. This is ideal for systems which may regularly travel to different countries, such as when using the LAB-TC as a battery charger for a global motorsports series.

GENERAL SPECIFICATIONS

STANDARD FEATURES

TECHNICAL DATA	
Operating Modes	Constant Voltage (0 - 100% of V_{MAX}) Constant Current (0 - 100% of I_{MAX}) Constant Power (5 - 100% of P_{MAX})
Internal Resistance Range	Adjustable $\Omega_{MAX} = [V_{NOM} / I_{NOM}]$
Interfaces	Analogue & RS-232
Remote Sense	0 - $V_{MAX} + 2\%$
Efficiency	Up to 95%
Response time (10-90%)	<2ms
Over Voltage Protection	0 - 110% of V_{MAX}
Over Current Protection	0 - 110% of I_{MAX}
Output Ripple (300Hz Vrms)	<0.4% [Typical value at nominal ohmic load, line asymmetry < 1 Vrms].
Output Noise (40kHz-1MHz)	<0.1 Vrms [Typical value at nominal ohmic load, line asymmetry < 1 Vrms].
Stability (CV, CC)	< $\pm 0.05\%$ [Maximum drift over 8 hours after 30 minute warm-up time, at constant line input, load and temperature conditions].
Temperature Coefficient (CV)	<0.02% of full scale value per°C [Typical change of output values versus ambient temperature, at constant line input and load conditions].
Temperature Coefficient (CC)	<0.03% of full scale value per°C [Typical change of output values versus ambient temperature, at constant line input and load conditions].

HIGHLIGHTED FEATURES

SENSE COMPENSATION

Sense plus terminals are built into the LAB-TC for the connection of sense wire which compensates for voltage drops in the load lines. This has a number of advantages over traditional sense. It is permitted to interrupt the load line during operation (voltage on). The maximum voltage drop compensation is adjustable. The voltage difference between LAB-TC output and sensing point is monitored. If a set limit is exceeded, the LAB-TC unit shuts off. This is particularly useful for applications with long cables often prone to unwanted voltage drops.

INTERNAL RESISTANCE RANGE

Each module is built with a user programmable internal resistance range as standard. This makes the power supplies ideal for simulating the output of energy storage devices such as battery packs, fuel cell stacks and super capacitors. The exact range varies by module and can be viewed in the selection table. An extended programming range is available on request by selecting the /IRXTS option below.

OPTIONS

CODE	DESCRIPTION
/IRXTS	Maximum adjustable internal resistance range extended to 32,000mΩ
/CANCABLE	Connecting cable for multi-unit operation
/RMB	Remote Measure Box for higher dynamics in multi-unit operation
/EMIFILTER	EMI filter for DC output

SOFTWARE/SOFT TOOLS

STANDARD TOP CONTROL GUI

All LAB-TC units come with a simple and intuitive TopControl operating GUI as standard. Live values of the power supply are displayed graphically along with any warning and error messages. The software provides a variety of second level parameters, ideal for users who like to optimise their test processes. In standard user mode the operator can remotely program set values, enable voltage output as well as the ability to analyse different variables including set and actual values via the integrated scope.

The scope function can simultaneously record up to 8 system variables. Recording can be started manually or by a defined trigger event from any variable of the system. All actual and set values (currents/voltages/power/internal resistance) can be recorded. Other recordable items include system temperatures, intermediate DC circuit, low voltage auxiliary power supplies, error related values and variables from the controller section.

A password protected section is available to the advanced user and service technician. In addition to the standard functions the authorised user is able to:

- + Program linear ramp functions at start up and set value steps during operation
- + Configure multi-unit operation
- + Program the PID controller parameters
- + Program the unit's limit values
- + Calibrate and adjust values as necessary
- + Update the firmware



OPTIONAL SOFTWARE

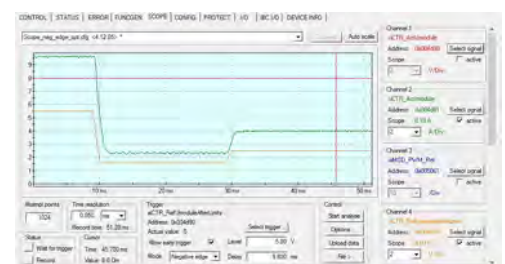
CODE	DESCRIPTION
/TFE	Integrated function generating engine with application area (parametric) programming
/SASCONTROL	Solar array simulation GUI (includes TFE option)
/BATSIM	GUI simulating battery characteristics with adjustable parameters
/CAPSIM	GUI simulating the electrical characteristics of capacitors with adjustable parameters
/BATCONTROL	GUI to implement specific battery/capacitor charge profiles and industry specific drive cycles

HIGHLIGHTED OPTION

FUNCTION GENERATOR (/TFE)

Complex DC waveforms can be implemented through an optional embedded function generator. The highly programmable nature of the function generator allows users to plot out exact waveforms. This is often advantageous when emulating a power device with a very specific behaviour profile. For example, when quality testing fuel cell powered equipment, the specific behaviour of a discharging fuel cell can be programmed and replicated.

As well as custom shapes, standard square, sawtooth and sine waveforms can be plotted against time. Voltage/current and voltage/power relationships can also be programmed where necessary. Parametric programming is possible, where instead of the time axis, an input variable (V_{IN} , I_{IN} or P_{IN}) can be selected.



APPLICATION GUI

An application GUI can be used to program hardware to replicate real world behaviour of a power component. This allows specific sections of a circuit to be isolated and researched. Hard to replicate conditions, such as as cranking curve from a cold start, can also be programmed and repeated.

Using a GUI allows a great deal of control, monitoring and reporting to be done remotely. Other advantages include reduced operator errors and preparation time, as well as increased reproducibility and elimination of result variations.

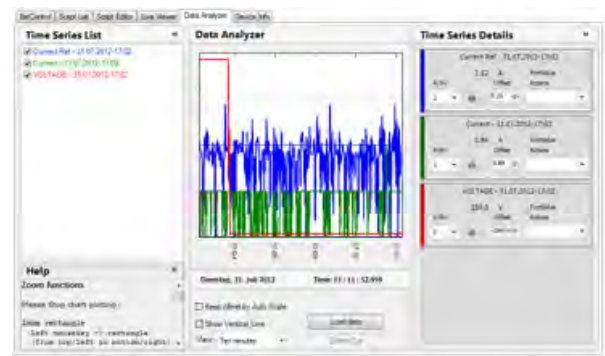
BATTERY EMULATION (/BATSIM)

BatSim provides a convenient method for the LAB-TC to emulate the output of different sized battery stacks. Nearly all relevant electrical characteristics are programmable, including the number of cells, energy capacity, cut off limits, chemistry type and nominal voltage.



ELECTRIC DRIVE CYCLING (/BATCONTROL)

Drive cycle tests can be implemented using BatControl. Previous data obtained from a test track can be imported and recreated, allowing the LAB-TC to simulate a real world driving test inside a lab environment. Battery charging profiles can also be implemented through the GUI.



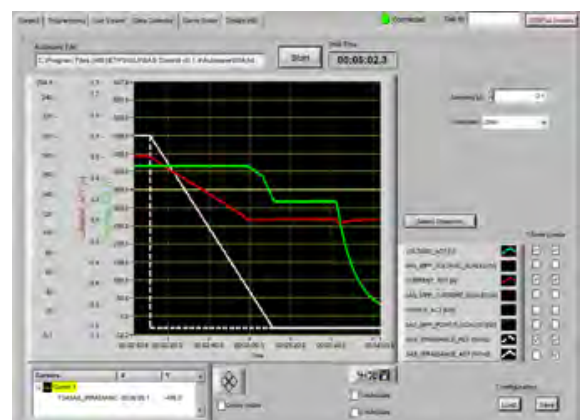
CAPACITOR SIMULATION (/CAPSIM)

The output characteristics of a real capacitor stack can be emulated when CapSim is installed with LAB-TC modules. Number of cells in series/parallel, state of charge, cell cut off limits, dynamic capacitance and resistance are programmable.



SOLAR ARRAY SIMULATION (/SAS)

SASControl software has all EN 50530 tests pre-installed. The GUI allows users to edit irradiance, temperature and amplitude values. Previous tests have been conducted using over 400,000 individual data points, with more possible.



INTERFACES

STANDARD RS-232 INTERFACE

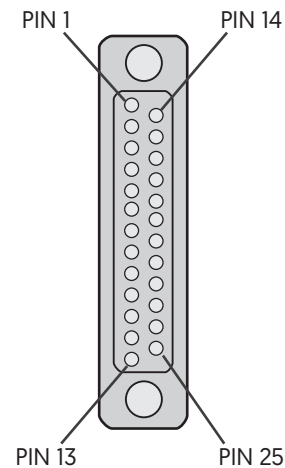
The RS-232 interface is configured as a Sub-D 9 pin connector (female) and is located on the front panel. This interface can be optionally moved to the rear panel. The graphical user interface, TopControl is operated via RS-232. The software runs on Windows and allows the user to control, measure and configure the power supply.

TECHINCAL DATA	
Isolation to Electronics and Earth Configuration	125 Vrms
Baud Rate	38,400 baud
Resolution [programming & readback]	0.025% FS [for V & I], 0.1% FS [for P & Ri]

STANDARD ANALOGUE INTERFACE

The control port is configured as a Sub-D 25 female connector and is located on the rear panel. It allows output values to be set and read proportionally using a 0-10Vdc analogue signal. Digital inputs and outputs enable various functions such as the interlock and output ON/OFF. A 10Vdc reference is provided for analogue control. Digital functions are switched via a high/low signal. A 24Vdc supply voltage is provided for these functions. The control port is labelled X105.

TECHINCAL DATA	
Isolation to Electronics and Earth	125 Vrms
Unit Ready/Error	Relay Contact
Resolution [programming & readback] for V, I, P, Ri	Relay Contact
Actual Voltage Readback 0 - 100%	0 to 10V
Actual Current Readback 0 - 100%	0 to 10V
Resolution [V, I, P, Ri]	0.2% FS
Output Voltage Off/On	0/24VAC/DC
2 Digital Application Inputs	0/24VAC/DC
Interlock Circuit	0/24VDC
Voltage Setting 0 to 100%	0 to 10V
Current Setting 0 to 100%	0 to 0V
Power Setting 0 to 100%	10 to 0V
Internal Resistance Setting	0 to 10V



PIN	SIGNAL	I/O	DESCRIPTION
1	AGND	I	Analogue ground for pins 2–4, 14–16
2	VREF	I	Voltage setpoint input 0–10 V
3	IREF	I	Current setpoint input 0–10 V
4	IACT	O	Current feedback output 0–10 V
5	0 VDC	O	0 VDC I/O ground for pin 25 ¹
6	+10 VDC	O	Analogue reference voltage
7	COM	I	[connected to pin 17] 0VDC DigIn; common ground for pins 8–9, 18–20, 24
8	APP_DIGITALIN_4; CLEAR_ERROR	I	Digital input 0-2V /10-24V DC
9	VOLTAGE_ON	I	Digital input 0-2/10-24V DC
10	OK/ALARM_b ²	O	Relay output 1 normally open
11	OK/ALARM_a ²	O	Relay output 1 common
12	RUN_b ²	O	Relay output 2 normally open
13	RUN_a ²	O	Relay output 2 common
14	PREF	I	Power limit analogue input 0–10 V
15	RREF	I	Ri-simulation analogue input 0–10 V

PIN	SIGNAL	I/O	DESCRIPTION
16	VACT	O	Voltage feedback output 0–10 V
17	COM	I	[connected to pin 7] Common ground to pins 8–9, 18–20, 24
18	APP_DIGITALIN_1	I	Digital input [low] 0-2 VDC/[high] 10–28 VDC
19	APP_DIGITALIN_2	I	Digital input [low] 0-2 VDC/[high] 10–28 VDC
20	APP_DIGITALIN_3; ANAOG_REFERENCE_SELECT	I	Digital input [(low) 0-2 VDC/[(high) 10–28 VDC Analogue reference select
21	WARN_a ²	O	Relay output 3 normally open
22	WARN_b ²	O	Relay output 3 normally closed
23	WARN_c ²	O	Relay output 3 common
24	INTERLOCK_IN_+	I	Input interlock +
25	+24 VDC	O	24VDC I/O Aux power output 24 VDC, max. 0.2 A

¹ Pin 5 (0 VDC) is used as the reference earth for pin 25 [24 VDC] and is connected internally to the equipotential bonding via a 1 kΩ resistor to earth.

² Maximum switching current: 1 A; maximum switching voltage: 24 V.

OPTIONAL INTERFACES

CODE	DESCRIPTION
/HMI	This provides front panel control and measurement via a menu driven LCD screen. Most users prefer their units to be fitted with HMI. For systems comprised of multiple units or where only remote control is required, cost can be saved by not including front panel controls and display.
/RS232REAR	RS-232 on front and rear panel (time shared mode with RS-232 on front).
/RS422	Differential serial interface (time shared mode with RS-232).
/IEEE	When specified, an integrated IEEE 488.2 interface is built into the rear panel (RS-232 only possible on rear panel). The programming terms employed are compliant with Standard Commands for Programmable Instrumentation (SCPI), making the LAB-TC ideal for system integration.
/CANOPEN	On request an additional serial interface built to the CAN/CANopen standards can be integrated into the rear panel (RS-232 only possible on rear panel).
/CANMP	Integrated CANmp interface (RS-232 only possible on rear panel).
/OPTOLINK	Rear panel integrated fibre optic interface (RS-232 only possible on rear panel).
/USB	Integrated USB interface. (RS-232 only possible on rear panel). The graphical user interface, TopControl can be operated over the USB port. RS-232 and USB cannot be used at the same time.
/ETH	Ethernet interface with listener and talker functions over a LAN (RS-232REAR required).
/CAN+USB	Combined CAN and USB interface.

HIGHLIGHTED OPTION

CAN_{MP} CAN MULTI-PURPOSE INTERFACE (/CANMP)

CANmp is a high speed digital interface operating at 1kHz. The interface gives users the capability to customise the CAN protocol. Up to 50 messages are user configurable. Messages can be sent cyclically or upon receipt of a sync or syncID signal.

SAFETY & PROTECTION

STANDARD FEATURES

TECHNICAL DATA	
Max. Reactive Load Voltage	≤ 110% Vmax
Mounted In Cabinet	Up to IP 53
Basic Construction	IP 20 (current bars on rear side excluded)
EMC Emission	EN 61000-6-4
EMC Immunity	EN 61000-6-2

OPTIONS

CODE	DESCRIPTION
/ISR	Integrated safety relay for shutdown to EN954-1 Cat 3/4
/PACOB	Protection against accidental contact of output current bars
/RPP	Protection against reverse polarity of the load

HIGHLIGHTED OPTIONS

REVERSE POLARITY PROTECTION (/RPP)

When researching energy storage devices, Reverse Polarity Protection (RPP) is recommended for devices without a pre-charge circuit. With the LAB-TC energised but output off, the RPP senses the voltage of the connected energy storage device. A contactor is closed after matching the voltage, to prevent large inrush currents and arcing on start up.

PROTECTION AGAINST OUTPUT BARS (/PACOB)

A specially produced cover is available which provides protection against accidental contact of output current bars. This safety option can be provided for both the AC and the DC connections.

INTEGRATED SAFETY RELAY (/ISR)

For additional safety, a mechanical interlock is available for the mains input of the LAB-TC. The integrated safety relay provides shutdown safety according to EN 13849-1 category 2/3. The ISR is connected to the external safety switch loop. If the external loop is opened, the DC-output of the power supply is powered down immediately.

MECHANICAL

STANDARD FEATURES

TECHINICAL DATA	
Dimensions [10kW & 16kW Modules]	19" x 6U x 450mm (W x H x D), a full cabinet integration service is available on request
Dimensions [20kW & 32kW Modules]	19" x 9U x 525mm (W x H x D), a full cabinet integration service is available on request
Weight [10kW & 16kW Modules]	42/44kg
Weight [20kW & 32kW Modules]	64/68kg
Line Input Connections [10kW & 16kW Modules]	Terminal block 4 x 10mm
Line Input Connections [20kW & 32kW Modules]	Terminal block 4 x 25mm
Output Terminals	Nickel-plated copper bars - Length: 40mm, 1 hole 9mm \varnothing in each bar

OPTIONS

CODE	DESCRIPTION
/LCAL	Integrated liquid cooling of the power stage
/RCU	The RCU provides the HMI functions via cable at a distance of up to 40m. The RCU is available in a compact desktop case or as a 19" rackmount unit.
/4062	Ruggedisation specification for vehicle mount projects

HIGHLIGHTED OPTIONS



RUGGEDISATION SPECIFICATION (/4062)

Ruggedisation of units to military standards is possible. Many previous modifications have been carried out for shipborne and vehicle projects. Our design team can work with you to meet specific requirements and standards. This ensures suitability in harsh conditions by providing protection against shock, vibration and humidity.

One previous modification included modifying a LAB-TC system to withstand up to 30g of mechanical shock across X, Y and Z axes. The PSU also could operate from temperatures as low as -10°C all the way up to 55°C. For more information about what ruggedisations have previously been achieved, please contact ETPS.



LIQUID COOLING (/LCAL)

Liquid cooling of the LAB-TC's power stage is available for units which may be subject to naturally hot or uncontrolled environments. This enables operation up to 45°C with no performance derating.

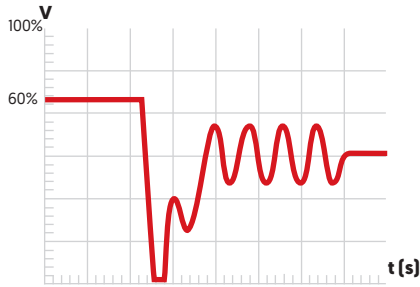


REMOTE CONTROL UNIT (/RCU)

The RCU is an external control unit for controlling multi-module systems, which reduces response times when implementing complex changes. The RCU is available as either a desktop unit or a 19" rackmounting module, with or without an emergency stop.

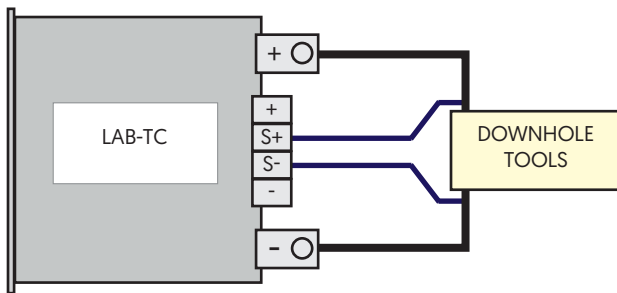
CRANKING CURVE TESTING

Electrical components within a vehicle's subsystem must be able to withstand a wide range of input voltage surges and drops during a start-up. The LAB-TC can accurately recreate these conditions within a lab environment. This increases reproducibility and accuracy of results when compared to using real batteries. Hard to replicate conditions such as voltage cranking during a cold start can be achieved. Voltage/current and voltage/power relationships can be programmed against time where necessary.



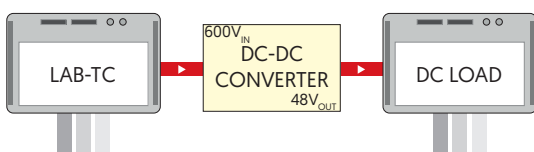
POWERING DOWNHOLE TOOLS

Applications with long load lines often suffer from unintended voltage drops, such as downhole tools used in hydrocarbon exploration. The LAB-TC's sense plus allows voltage drops to be compensated for throughout the entire length of a load line. This feature is also ideal for powering subsea devices.



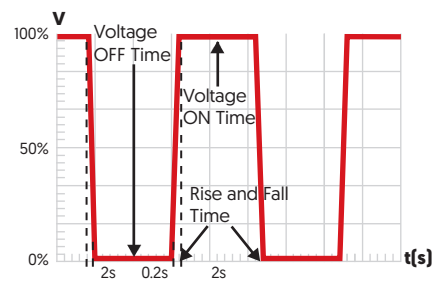
INVERTER/CONVERTER TESTING

The DC input of virtually any power conversion device can be replicated. The influence that variables, such as line voltage variation, have on performance can be isolated and tested. This allows optimum operating conditions to be characterised to improve efficiency and performance.



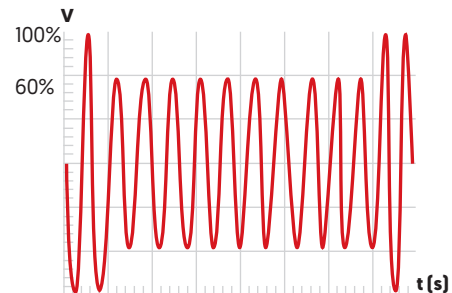
PULSED BATTERY CHARGING

Pulse charging interrupts the traditional DC charging curve with short relaxation periods. The technique is thought to improve battery discharge capacity and help facilitate longer cycle life. Some studies have shown that pulse charging is also helpful in eliminating concentration polarisation. The LAB-TC's embedded function generator allows the PSU to deliver short burst of highly concentrated energy at user defined time intervals. The technique can also be used for powering lasers, electromagnets and plasma generation.



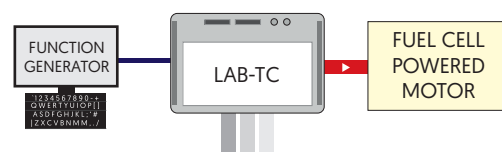
VOLTAGE DROPS & INTERRUPTS

In electronic systems sudden voltage interruptions may cause unexpected behaviour. Supply line disturbances may have several causes, including an additional switch on of large capacitive loads parallel to the supply line or a short circuit caused by loads sharing the supply. The LAB-TC can generate many complex DC waveforms to test devices under realistic conditions to identify any potential issues.



FUEL CELL EMULATION

The discharge behaviour of an FCEV's fuel cell is often irregular. By using the function generator, both conservative and aggressive driver profiles can be replicated. This allows the LAB-TC to perform effective quality testing of fuel cell powered components under all likely operating conditions.



Every effort is made to ensure that the information provided within this technical summary is accurate. However, ETPS Ltd must reserve the right to make changes to the published specifications without prior notice. Where certain operating parameters are critical for your application we advise that they be confirmed at the time of order. ETPS Ltd specialises in modifying its proven platforms to suit your needs. Please contact our office if your requirement is non-standard. Please note that your actual unit may differ from those shown.



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