

LAB-MOBI

MULTIPLE OUTPUT BIDIRECTIONAL PSU



POSITIVE PROBLEM SOLVING **+ =**

Bidirectional LAB-MOBI systems have 2 or 4 output channels with nominals up to 1000V/1000A. Each channel is programmable for DC source or DC load functions.

While each channel is independently controllable they share a common rectifier section. This saves cost when compared to separate bidirectional systems. Energy can be recycled between channels above the unit's nominal power. For example a 4 channel 100kW system can sink up to 1MW from a source, such as a battery pack, in the first channel and use the energy directly in the second. The unit's remaining 100kW capability can still be used across the other 2 channels to and from the grid.

- + Dedicated Battery Testing /Emulation Modes**
- + Seamless Transition Between Source/Sink**
- + Nominal Outputs from 100kW to 500kW**
- + Models up to 1000V and $\pm 1000A$**
- + High Efficiencies up to 95%**

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FURTHER DETAILS

The integrated sink/source approach features high dynamics enabling the user to switch seamlessly between quadrants. When sinking energy from the unit under test the LAB-MOBI automatically inverts the DC to AC and synchronises this output to the grid. Dedicated application modes are available for battery cycling and emulation, which can be used to implement specific test routines.

A CANbus, Modbus and VNC over Ethernet interface are provided as standard for remote programming which operate at 100Hz. The fast sampling frequency allows users to record quickly changing data, so that they can identify what's happening at a particular point in time. Optional interfaces include Profibus, Profinet, SCPI over Ethernet, 0-10V analogue, as well as a high speed analogue interface which allows current setting at up to 500Hz.

A large TFT front panel screen displays programming functions and live values from the power supply. Current and voltage settings are adjustable via the panel as well as a host of other features. The screen provides users ease of access and speed when implementing their test programmes.

The robust design makes it extremely suitable for the rigours of industrial and production environments. A common application of the LAB-MOBI is production testing of electric drives. The bidirectional nature of the system allows it actively decelerate the drive at the end of testing. This increases efficiency as you don't have to wait for a motor to freely spin and stop before you can test the next one. Other common test applications include electric motors, fuel cells, super capacitors, solar panels and powering two dynamometers back to back.

HIGHLIGHTED FEATURES



SENSE COMPENSATION

Terminals are built into the LAB-MOBI for the connection of sense wire which compensates for voltage drops in the load lines. This is particularly useful for applications with long cables often prone to unwanted voltage drops.



ADDITIONAL CURRENT RANGES

A second or third current range can be built into systems to give better accuracy and resolution for low current applications. This is particularly useful when testing high voltage equipment, such as electric vehicle battery packs, which typically produce low currents.



BLOCKING DIODE

A blocking diode is available to provide protection for the device under test against any back EMF. This is particularly useful to prevent damage to unidirectional power sources such as fuel cells. The device provides protection up to 1000A and comes in its own wheeled cabinet with 2 voltmeters.



DISCHARGE UNIT

Discharge units are available as an additional safety feature. When the DC output is turned off, energy from the device under test will be discharged into a resistor at up to 500kW per second. This ensures that there is no residual energy on the DC link when disconnecting a device under test. This feature also works when the emergency stop button is pressed.

SELECTION TABLE

Part Number	Max. Power	Q1 Source Voltage Range	Q4 Sink Voltage Range*	Current Range per Channel**	Number of Channels
LAB-MOBI 200-100-600-2	100kW	0 - 200V	5 - 200V	0 ± 600A	2
LAB-MOBI 200-100-600-4	100kW	0 - 200V	5 - 200V	0 ± 600A	4
LAB-MOBI 800-100-600-2	100kW	0 - 800V	5 - 800V	0 ± 600A	2
LAB-MOBI 800-100-600-4	100kW	0 - 800V	5 - 800V	0 ± 600A	4
LAB-MOBI 1000-100-200-2	100kW	0 - 1000V	5 - 1000V	0 ± 200A	2
LAB-MOBI 1000-100-200-4	100kW	0 - 1000V	5 - 1000V	0 ± 200A	4
LAB-MOBI 1000-100-600-2	100kW	0 - 1000V	5 - 1000V	0 ± 600A	2
LAB-MOBI 1000-100-600-4	100kW	0 - 1000V	5 - 1000V	0 ± 600A	4
LAB-MOBI 1000-100-1000-2	100kW	0 - 1000V	5 - 1000V	0 ± 1000A	2
LAB-MOBI 1000-100-1000-4	100kW	0 - 1000V	5 - 1000V	0 ± 1000A	4
LAB-MOBI 200-160-600-2	160kW	0 - 200V	5 - 200V	0 ± 600A	2
LAB-MOBI 200-160-600-4	160kW	0 - 200V	5 - 200V	0 ± 600A	4
LAB-MOBI 800-160-600-2	160kW	0 - 800V	5 - 800V	0 ± 600A	2
LAB-MOBI 800-160-600-4	160kW	0 - 800V	5 - 800V	0 ± 600A	4
LAB-MOBI 1000-160-200-2	160kW	0 - 1000V	5 - 1000V	0 ± 200A	2
LAB-MOBI 1000-160-200-4	160kW	0 - 1000V	5 - 1000V	0 ± 200A	4
LAB-MOBI 1000-160-600-2	160kW	0 - 1000V	5 - 1000V	0 ± 600A	2
LAB-MOBI 1000-160-600-4	160kW	0 - 1000V	5 - 1000V	0 ± 600A	4
LAB-MOBI 1000-160-1000-2	160kW	0 - 1000V	5 - 1000V	0 ± 1000A	2
LAB-MOBI 1000-160-1000-4	160kW	0 - 1000V	5 - 1000V	0 ± 1000A	4
LAB-MOBI 200-250-600-4	250kW	0 - 200V	5 - 200V	0 ± 600A	4
LAB-MOBI 800-250-600-2	250kW	0 - 800V	5 - 800V	0 ± 600A	2
LAB-MOBI 800-250-600-4	250kW	0 - 800V	5 - 800V	0 ± 600A	4
LAB-MOBI 1000-250-200-2	250kW	0 - 1000V	5 - 1000V	0 ± 200A	2
LAB-MOBI 1000-250-200-4	250kW	0 - 1000V	5 - 1000V	0 ± 200A	4
LAB-MOBI 1000-250-600-2	250kW	0 - 1000V	5 - 1000V	0 ± 600A	2
LAB-MOBI 1000-250-600-4	250kW	0 - 1000V	5 - 1000V	0 ± 600A	4
LAB-MOBI 1000-250-1000-2	250kW	0 - 1000V	5 - 1000V	0 ± 1000A	2
LAB-MOBI 1000-250-1000-4	250kW	0 - 1000V	5 - 1000V	0 ± 1000A	4
LAB-MOBI 200-320-600-4	320kW	0 - 200V	5 - 200V	0 ± 600A	4
LAB-MOBI 800-320-600-2	320kW	0 - 800V	5 - 800V	0 ± 600A	2
LAB-MOBI 800-320-600-4	320kW	0 - 800V	5 - 800V	0 ± 600A	4
LAB-MOBI 1000-320-200-2	320kW	0 - 1000V	5 - 1000V	0 ± 200A	2
LAB-MOBI 1000-320-200-4	320kW	0 - 1000V	5 - 1000V	0 ± 200A	4
LAB-MOBI 1000-320-600-2	320kW	0 - 1000V	5 - 1000V	0 ± 600A	2
LAB-MOBI 1000-320-600-4	320kW	0 - 1000V	5 - 1000V	0 ± 600A	4
LAB-MOBI 1000-320-1000-2	320kW	0 - 1000V	5 - 1000V	0 ± 1000A	2
LAB-MOBI 1000-320-1000-4	320kW	0 - 1000V	5 - 1000V	0 ± 1000A	4
LAB-MOBI 200-400-600-4	400kW	0 - 200V	5 - 200V	0 ± 600A	4
LAB-MOBI 800-400-600-2	400kW	0 - 800V	5 - 800V	0 ± 600A	2
LAB-MOBI 800-400-600-4	400kW	0 - 800V	5 - 800V	0 ± 600A	4
LAB-MOBI 1000-400-200-2	400kW	0 - 1000V	5 - 1000V	0 ± 200A	2
LAB-MOBI 1000-400-200-4	400kW	0 - 1000V	5 - 1000V	0 ± 200A	4
LAB-MOBI 1000-400-600-2	400kW	0 - 1000V	5 - 1000V	0 ± 600A	2
LAB-MOBI 1000-400-600-4	400kW	0 - 1000V	5 - 1000V	0 ± 600A	4
LAB-MOBI 1000-400-1000-2	400kW	0 - 1000V	5 - 1000V	0 ± 1000A	2
LAB-MOBI 1000-400-1000-4	400kW	0 - 1000V	5 - 1000V	0 ± 1000A	4
LAB-MOBI 800-500-600-2	500kW	0 - 800V	5 - 800V	0 ± 600A	2
LAB-MOBI 800-500-600-4	500kW	0 - 800V	5 - 800V	0 ± 600A	4
LAB-MOBI 1000-500-200-4	500kW	0 - 1000V	5 - 1000V	0 ± 200A	4
LAB-MOBI 1000-500-600-2	500kW	0 - 1000V	5 - 1000V	0 ± 600A	2
LAB-MOBI 1000-500-600-4	500kW	0 - 1000V	5 - 1000V	0 ± 600A	4
LAB-MOBI 1000-500-1000-2	500kW	0 - 1000V	5 - 1000V	0 ± 1000A	2
LAB-MOBI 1000-500-1000-4	500kW	0 - 1000V	5 - 1000V	0 ± 1000A	4

* The max. current that can be sunk derates as the voltage reduces below 5V. ** The sum total power provided by each channel can't exceed the total system power.



TECHNICAL DATA

	100kW	160kW	250kW	320kW	400kW	500kW
Rectifier Type	Isolation transformer, galvanically isolated					
Power Factor	>0.99 (at >55% load), >0.83 (at 10% load)					
AC Input Voltage/Frequency	400V ¹ ± 10%, 3-phase, (N), PE, 50 / 60Hz ± 6%					
Maximum Output Voltage	See selection table					
Minimum Output Voltage	5V [typical] to sink full current within the maximum power capability					
Measuring Accuracy and Resolution	Voltage: 0.1% F.S. / 16 bit ADC, current: 0.1% F.S. / 16 bit ADC					
Control Accuracy ^{2,3}	Voltage: 0.1% F.S. , current: 0.1% F.S.					
Voltage Tolerance Dynamic	Battery simulator mode: <1% F.S. (0 - 100% I _{NOM} in 3ms), Battery tester mode: <3% F.S. (0 - 100% I _{NOM} in 3ms)					
Voltage Ripple ⁴	≤0.1% rms F.S. [V > 10]					
Current Ripple ⁵	≤0.1% rms F.S. [V > 10]					
Current Rise Time ⁶	Typically <1ms for 10 - 90% load step					
Isolation (Primary/Secondary)	5.3kVdc					
Isolation (Primary/Case)	2.8kVdc					
Isolation (Secondary/Case)	2.8kVdc (models ≤600Vdc), 3.1kVdc (models >600Vdc)					
Short Circuit Behaviour	Short circuit proof [I _k <5kA]					
Standard Interfaces	CANbus, Modbus and VNC over Ethernet					
4 Channel Operating Modes	1. CH1, CH2, CH3 & CH4 in single operation; 2. CH1 & CH2 in parallel operation, CH3 & CH4 in single operation; 3. CH1 & CH2 in parallel operation, CH3 & CH4 in parallel operation; 4. CH1, CH2, CH3 & CH4 in parallel operation					
Overall Efficiency	Typically 92% to 95% (depending on system power)					
Permissible Ambient Temperature	0 - 40°C					
Climate Class	3K3 EN60721 (85% relative humidity non condensing, with cabinet heating up to 95% relative humidity without condensing)					
Cooling	Forced air cooling / air-water heat exchanger					
Minimum Distance from Wall	200mm [standard]					
Minimum Distance from Ceiling	300mm [standard]					
Installation	Operating area with restricted access					
Protection Class	IP20 [IP53 ¹²] IEC 60529					
Safety Features	Over voltage protection, under voltage protection, over temperature protection, over current protection					
Maximum Altitude	1000m above sea level with nominal load					
Acoustic Level at IP20	71dB [A]	73dB [A]	76dB [A]	78dB [A]	78dB [A]	78dB [A]
Safety	EN ISO 13849-1					
Basic Standard	EN 62040					
EMC	EN 61000-2-4 grid disturbances, EN 61000-6-2 interference immunity, EN 61000-6-4 interference emission, EN 61800-3 cat C2 [A1] variable - speed electrical drives					

¹ 380V, 415V, 420V, 440 and 480V inputs are available on request.

² Via 16 bit digital controller.

³ Digital controller [± 600A = 15 bit + sign].

⁴ Resistance as load, operation mode simulator (in constant voltage mode).

⁵ 48/96V battery (constant voltage mode).

⁶ Measured at half nominal voltage with max. 5% overshoot (in constant current mode).

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.



OPTIONS

CODE	DESCRIPTION
/NSV	Non standard AC input voltage (eg. 690Vac).
/SCR	Second current range for improved resolution and accuracy in low current applications.
/TCR	Three current ranges for improved resolution and accuracy in low current applications.
/B-CAP-M-800	External metal box with switchable output capacitors for models $\leq 800V$, with a selection of three different capacitor levels: step 1: 6600 μF , step 2 13200 μF , step 3 19800 μF . The box comes in IP66 metal housing 380mm \times 600mm \times 350m (W \times D \times H) with connection cables.
/B-CAP-P-800	External plastic box with switchable output capacitors for models $\leq 800V$, with a selection of three different capacitor levels: step 1: 6600 μF , step 2 13200 μF , step 3 19800 μF . The box comes in IP66 metal housing 307mm \times 614mm \times 260m (W \times D \times H) with connection cables.
/DC-1000A-1000V	2 \times DC disconnectors rated at 1500V performance level D.
/DCU-2-500	Protection unit which discharges energy from a device under test into a resistor when the output of the LAB-MOBI is turned off. Resistance of 2 Ω at up to 500kW per second is switched via a thyristor. The discharge unit also functions when the emergency stop is pressed.
/SIM	Simulation mode allowing the LAB-MOBI to emulate electrical characteristics of a battery pack.
/SIM-TEST	Allows the LAB-MOBI to be switchable between battery testing mode and battery simulation mode.
/PDSB-1E-2A-600	External cabinet for splitting single output across 2 separate channels up to 1000V/600A. Cabinet is rated IP20 as standard with IP53 available on request. Dimensions are available on request. 2 emergency stops are provided. Up to 2 discharge units (/DCU-X-XX) can be built into the cabinet.
/PDSB-1E-2A-1000	External cabinet for splitting single output across 2 separate channels up to 1000V/1000A. Cabinet is rated IP20 as standard with IP53 available on request. Dimensions are available on request. 2 emergency stops are provided. Up to 2 discharge units (/DCU-X-XX) can be built into the cabinet.
/PDSB-2E-1A-1000	External cabinet for operating 2 \times LAB-MOBI systems in parallel up to 1000V/1000A. Cabinet is rated IP20 as standard with IP53 available on request. Dimensions are available on request. Up to 2 discharge units (/DCU-X-XX) can be built into the cabinet.
/PDSB-2E-1A-2000	External cabinet for operating 2 \times LAB-MOBI systems in parallel up to 1000V/2000A. Cabinet is rated IP20 as standard with IP53 available on request. Dimensions are available on request. Up to 2 discharge units (/DCU-X-XX) can be built into the cabinet.
/PDU-TEST-1000	Wall mounted cabinet cabinet rated to IP54 for the device under test up to 1000A. Dimensions are available on request. A 1000V voltmeter is included, as is a signal light post with indicator light to show insulation monitor status.
/PDU-TEST-2000	Wall mounted cabinet cabinet rated to IP54 for the device under test up to 2000A. Dimensions are available on request. A 1000V voltmeter is included, as is a signal light post with indicator light to show insulation monitor status.
/PDU-SIM-1000	Wall mounted cabinet cabinet rated to IP54 for the device under test up to 1000A. Dimensions are available on request. A 1000V voltmeter is included, as is a signal light post with indicator light to show insulation monitor status. Other features include an installed shorting link, 2 \times MXP capacitor 280 μF /1120Vdc and copper bar for additional LEM converter.
/PDU-SIM-1600	Wall mounted cabinet cabinet rated to IP54 for the device under test up to 1600A. Dimensions are available on request. A 1000V voltmeter is included, as is a signal light post with indicator light to show insulation monitor status. Other features include an installed shorting link, 2 \times MXP capacitor 280 μF /1120Vdc and copper bar for additional LEM converter.
/SCPI	SCPI interface over Ethernet operating at 100Hz for remote programming.
/PROFIBUS	PROFIBUS DP interface operating at 100Hz for remote programming.
/PROFINET	PROFINET interface for remote programming.
/ANALOGUE	0-10V analogue interface operating at 100Hz for remote programming.
/ANALOGUE-IPLUS	High speed 0-10V analogue interface operating at 500Hz with access to I+ controller for remote programming.
/IP21	Top and sides of cabinet rated to protection class IP21. Adds 80mm to the width and depth of the cabinet and 300mm to the height. Cable entry at the bottom of the cabinet is IP00. A protective rubber skirt is available on request.
/IP23	Top of cabinet is rated to protection class IP23. Airflow is front to top so that no distance between the cabinet and wall is needed.
/IP53	Air-water heat exchanger built on to the back and the roof of the cabinet, rated to protection class IP53. A minimum distance of 800mm from the rear of the cabinet to the wall is required for service and maintenance.
/SENSE-M	Sense cable connecting the LAB-MOBI and the device under test or /PDU-XXX.
/CONTROL-M	Control cable connecting the LAB-MOBI and the /PDU-XXX.
/DIODE-1000	Diode providing protection up to 1000A/1000V for the device under test. The diode is provided in a wheeled cabinet. Dimensions are available on request. The cabinet comes with a status indication lamp and 2 voltmeters.
/E-STOP	Emergency stop mushroom button on cabinet door.
/DOOR-STOP	Door fitted interlock. The LAB-MOBI system shuts down when the cabinet door is opened.
/CAB-HALOGEN-FREE	Each cabinet is fitted with halogen free cables.
/CAB-HEATING-SET	100W heating element at the bottom of the cabinet to help guard against condensation.

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CAPACITANCE VALUES

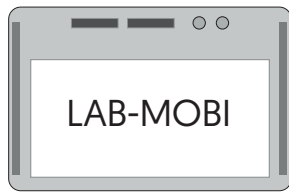
Switchable output capacitance is available to improve stability when operating in constant voltage mode. This is particularly useful to assist the fast current demands when testing drives. Some electric drives require a very stable voltage during a step change. If the voltage drop is too low it could damage the drive.

When choosing the /SIM and /SIM-TEST options an extra level of capacitance is provided. If a test routine requires fast dynamics in constant current mode, then the standard capacitance of the LAB-MOBI can be used in the basic or battery tester operation modes. For people who frequently need to switch between battery tester and simulation modes the /SIM-TEST option is ideal. This provides a simple key switch to change between the lower and higher level of capacitance.

The B-CAP-X-XXX options provide you with additional capacitance from an external box, which can be switched between 3 different levels depending on the requirements of the test application. As a result, users with long load lines can situate the box next to the device under test.

CAPACITANCE BUILT INTO LAB-MOBI SYSTEMS ($\leq 800V$)		
	Standard in Basic and Battery Tester Modes	/SIM-TEST and /SIM Options
Installed or Additional Capacitance	Installed: 1500 μ F	Additional 6600 μ F
Total	1500 μ F	8100 μ F
EXTERNAL CAPACITANCE BOXES FOR LAB-MOBI SYSTEMS ($\leq 800V$)		
	/B-CAP-P-800 (Plastic Capacitance Box) Option	/B-CAP-M-800 (Metal Capacitance Box) Option
Installed or Additional Capacitance	Installed: 19800 μ F Steps possible 6600 μ F, 13200 μ F and 19800 μ F	Installed: 20360 μ F Steps possible 6600 μ F, 13200 μ F and 20360 μ F
Total	19800 μ F	20360 μ F
CAPACITANCE BUILT INTO LAB-MOBI SYSTEMS (1000V)		
	Standard in Basic and Battery Tester Modes	/SIM-TEST and /SIM Options
Installed or Additional Capacitance	Installed: 1120 μ F	Additional 2700 μ F
Total	1120 μ F	3820 μ F

TYPICAL APPLICATIONS



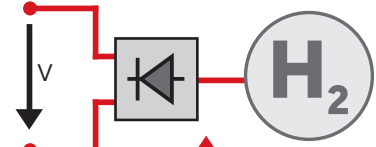
DC SINK/SOURCE AS A BATTERY TESTER

- + Current rise time <math><1\text{ms}</math> (10 - 90%)
- + Output contactor for separation under load (option)
- + Current range switchable for smaller current range (option)
- + Increased accuracy up to 0.05% with control software



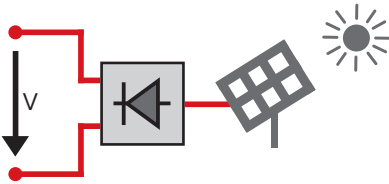
INVERTER FOR FUEL CELL

- + Protection diode for safe sink operation



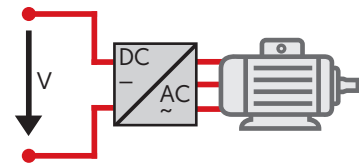
INVERTER WITH WIDE INPUT RANGE FOR SOLAR FEEDING

- + Protection diode for safe sink operation



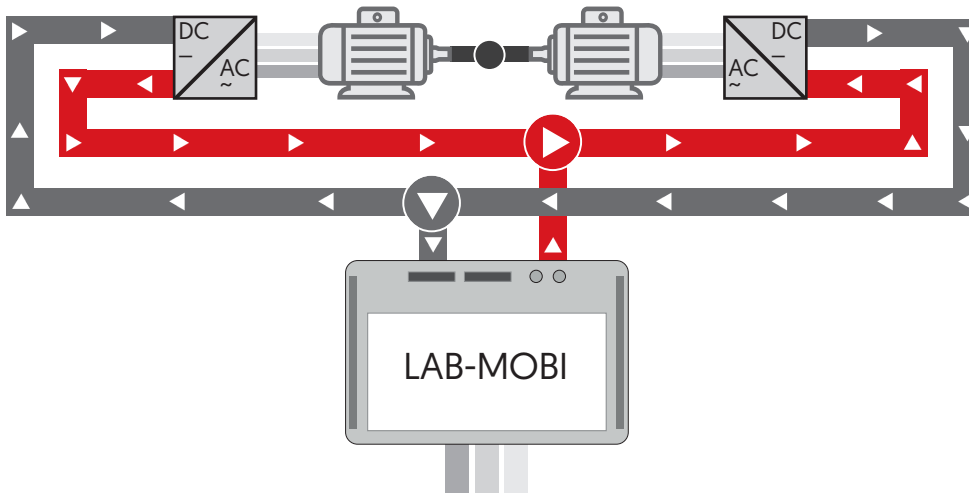
DC SINK/SOURCE FOR BATTERY SIMULATION

- + Regulation time <math><2\text{ms}</math> (0 - 100% load change)
- + Protection of the DUT via discharge resistance (optional)



FEEDING LOSSES IN DYNAMOMETERS

The wide operating ranges of the LAB-MOBI are ideal for operating two dynamometers back to back in a closed circuit, as they feed DC energy into the loop to compensate for losses in the circuit. Rapid response times allow the power supply to react quickly to current demand, which is especially important when testing motorsport vehicles during fast step changes from acceleration and deceleration.





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ETPS engineer electronic power supply and testing systems. Our problem solving skills provide the spark of innovation to some of the world's leading technology brands.



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