Modular Programmable DC Electronic Load

MDL4UB Series



USB | LAN | RS232 | GPIB

Features and benefits

- Power range up to 2400 W (Up to 4800 W with mainframe extension)
- Voltage range up to 600 V
- Current range up to 120 A
- CC/CV/CR/CW operating modes
- Removable modules for easy system configurability
- Support for up to 16 channels using dual channel modules with mainframe extension
- Operate identical modules in parallel mode for high current applications
- Synchronous load on/off function
- Standard LAN, GPIB, USB, and RS232 interfaces with USBTMC/SCPI protocol support
- Analog current control and monitoring
- Transient mode up to 25 kHz
- List mode (sequence mode) - minimum 20 μs step width with 84 user programmable steps
- Adjustable slew rate in CC mode
- 16-bit voltage and current measurement system providing high resolution of 0.1 mV and 0.01 mA
- Front and rear panel load input terminals
- 4U form factor
- Remote sense
- LabVIEW™ drivers and operating software included
- Rack-mount brackets with handles included

The MDL4UB Series is a multi-channel modular programmable electronic load system in a compact 4U form factor. Nine different modules of programmable DC loads ranging in power from 200 W to 600 W provide users the flexibility to test a wide range of power sources from multi-output DC power supplies to batteries, fuel cells, and photovoltaic arrays.

The mainframe consists of a controller and four open slots that can be populated with any combination of modules up to 2400 W (up to 4800 W with mainframe extension). The high-performance electronic load modules of the MDL4UB Series are capable of operating in constant current (CC), constant voltage (CV), constant resistance (CR), and constant power (CW).

Easily edit the load's parameters such as voltage, current, slew rate, and width via the front panel. Increase productivity by saving your test parameters into any one of the 101 memory areas for quick system recall. Additionally, the MDL4UB Series provides 16-bit resolution as well as numerous protection modes and a power-on system self-test to ensure stable and reliable operation.

For remote communication, the MDL4UB Series provides LAN, USB (USBTMC-compliant), RS232, and GPIB standard interfaces that support SCPI command protocol.

Backwards Compatibility

The MDL4UB Series modules are compatible with existing MDL4U (non B) modules and can share the same mainframe. This enables users to upgrade their modules or expand their test setup without having to buy a new mainframe.

Populate the mainframe or mainframe extension with any combination of four modules.

Model	MDL4U102B	MDL4U200B	MDL4U252B	MDL4U302B	MDL4U305B	MDL4U400B	MDL4U502B	MDL4U505B	MDL4U600B
Power	*150 W / 50 W	200 W	*250 W / 50 W	*300 W / 300 W	300 W	400 W	*250 W / 50 W	500 W	600 W
Operating Voltage	80 V	80 V	80 V	80 V	600 V	80 V	600 V	600 V	80 V
Rated Current	20 A	40 A	20 A	45 A	20 A	60 A	15 A	30 A	120 A
No. of Channels	2	1	2	2	1	1	2	1	1

* The MDL4U102B, MDL4U252B, MDL4U302B, and MDL4U502B are dual channel modules where total power is allocated between channels. For example, the MDL4U102B can allocate a maximum of 150 W to either channel up to 200 W total (e.g. 150 W/50 W, 100 W/100 W, 50 W/150 W).

Technical data subject to change
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The tools you need

ATE system ready

The MDL4UB Series offers many features for ATE system and integration applications:

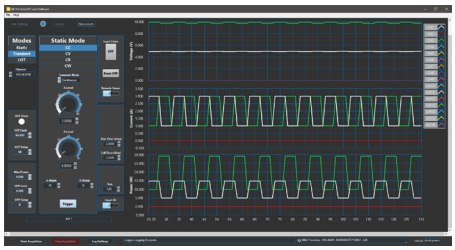
- Sink power on up to 16 channels with the mainframe extension for increased throughput
- LabVIEW™ drivers included
- USB, LAN, and GPIB interfaces standard
- Operating software included
- Rack-mount brackets provided

Modular design

With the removable module design, you can choose suitable load modules to customize the system according to your requirements. This design allows for multiple channels, and is ideal for testing several units, especially power supplies with multiple outputs. At the same time, all load modules can be configured to work independently. All load modules, including the high power 500 W and 600 W modules can fit in one slot. Unlike competitor models that require two slots for high power modules, the MDL4UB Series offers a one-slot form factor for all modules.

Operating software

PC software is provided for generating and executing test sequences and data logging without the need to write source code.



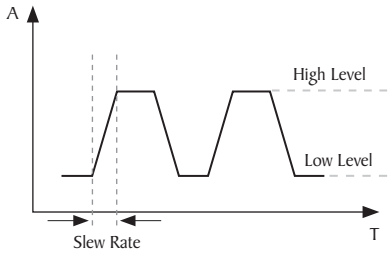
- Log voltage, current, power measurement and export data in spreadsheet format for further analysis
- Configure and run transient operation, list mode programs, and more

Adjustable slew rate

In constant current mode, users can control the rate or slope of the change in current in a transient response test. Set the slew rate to as slow as 0.0001 A/μs or as fast as 2.5 A/μs depending on the module and selected current range.

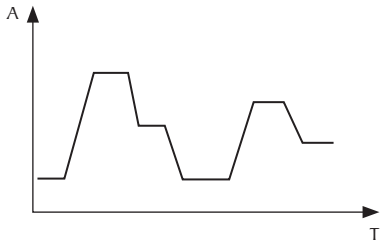
Transient operation

Transient operation enables the module to periodically switch between two load levels. A power supply's regulation and transient characteristic can be evaluated by monitoring the supply's output voltage under varying combinations of load levels, duty cycle, and slew rate. The MDL4UB Series can simulate these conditions at rates up to 25 kHz.



List mode

Not limited to just switching between two levels, list mode lets you generate more complex sequences of input changes with several different levels. Up to 7 groups of list files can be saved in the mainframe. Each list can contain up to 84 steps with a minimum width time of 20 μs per step.

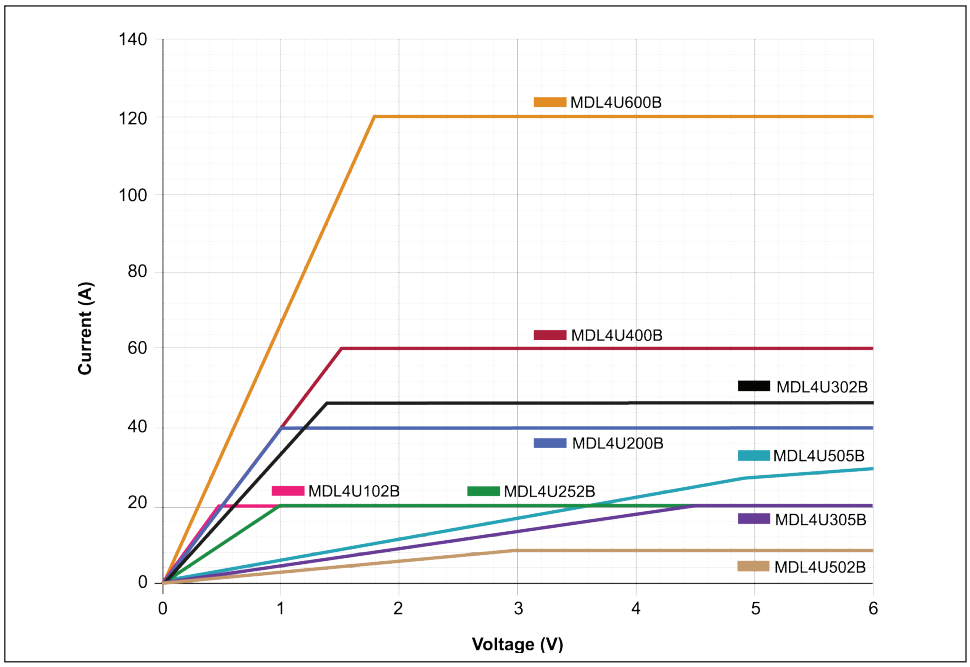


Automatic test mode

The MDL4UB Series can execute multiple test sequences across all channels. Sequences can be cascaded, and each step can be programmed with upper and lower limit values. When applied in automatic production testing, you can easily judge whether the test parameters of your devices are within the specification limits and adjust your process according to the GO/NG verdict.

Low Voltage Operation

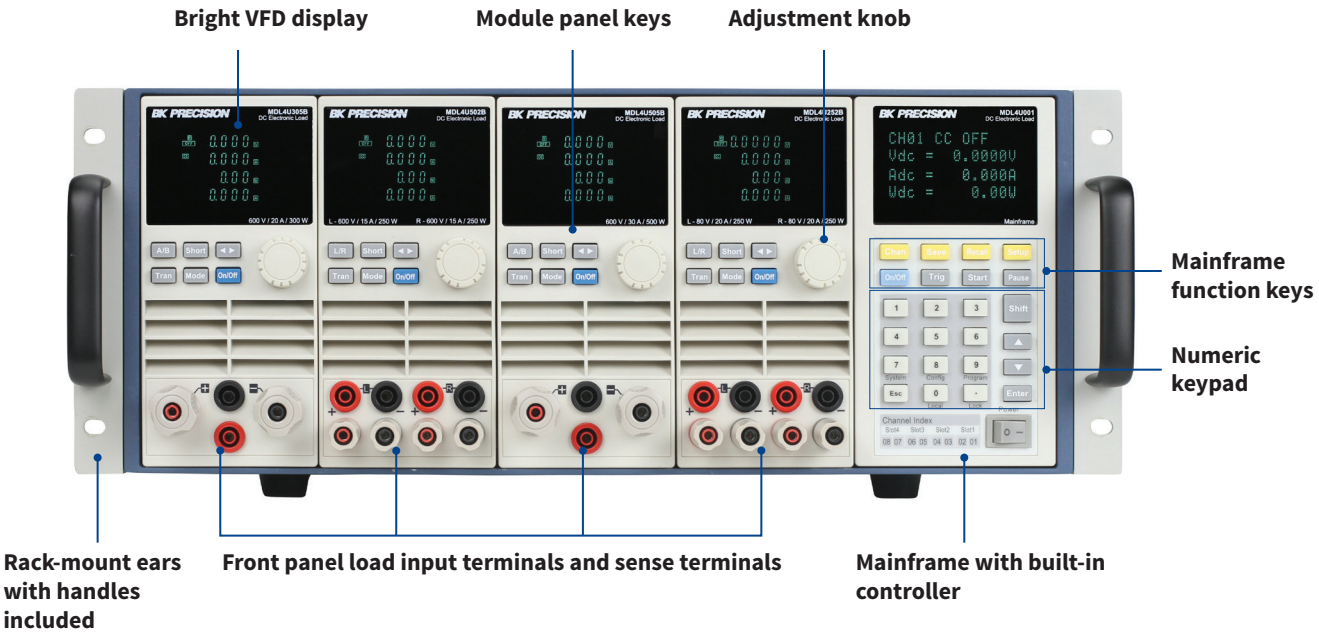
The MDL4UB Series can operate at low voltages for applications such as fuel cell and solar cell testing.



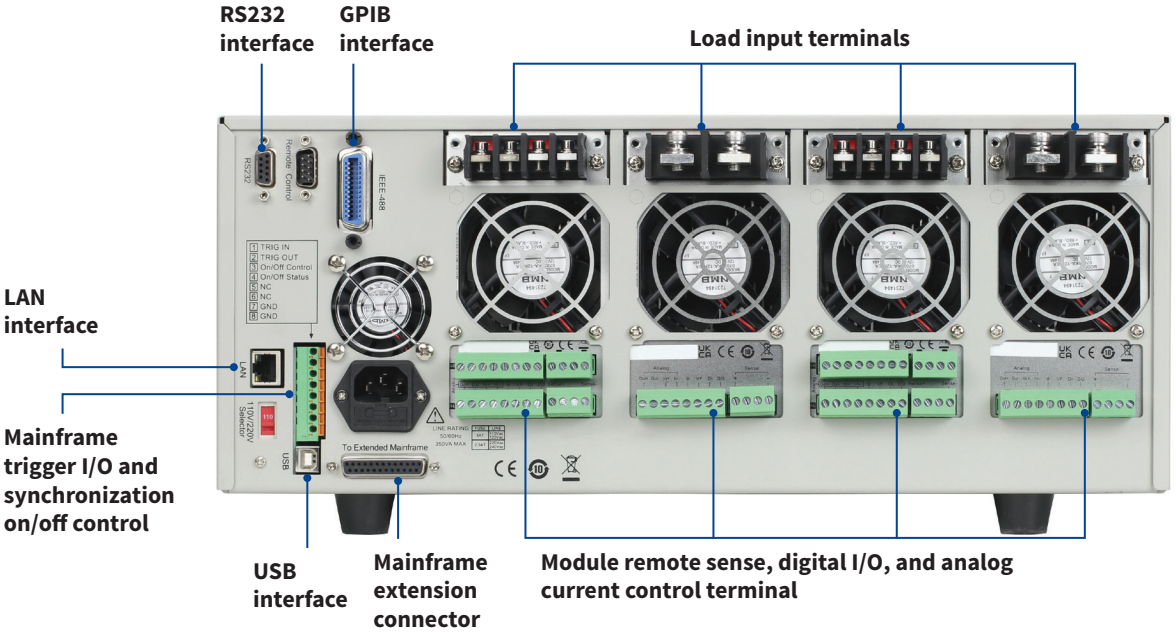
Typical minimum operating voltage at full scale current:

MDL4U102B	MDL4U200B	MDL4U252B	MDL4U302B	MDL4U305B	MDL4U400B	MDL4U502B	MDL4U505B	MDL4U600B
0.6 V	1 V	1 V	1.4 V	4.5 V	1.5 V	3 V	5.4 V	1.8 V

Front panel



Rear panel



Mainframe Extension

The MDL4U002 mainframe extension provides power to additional modules enabling control of up to 8 modules from a connected MDL4U001 mainframe.



Specifications

Note: All specifications apply to the unit after a temperature stabilization time of 15 minutes over an ambient temperature range of 23 °C ± 5 °C. Front panel terminals support a maximum input current of 15 A.

Model		MDL4U102B	MDL4U200B	MDL4U252B	MDL4U302B	MDL4U305B	MDL4U400B	MDL4U502B	MDL4U505B	MDL4U600
Input rating										
Input Voltage		0.1 to 80 V	0 to 80 V	0 to 80 V	0 to 80 V	0 to 600 V	0 to 80 V	0.1 to 600 V	0 to 600 V	0 to 80 V
Input Current	Low	0 to 3 A	0 to 4 A	0 to 3 A	0 to 4.5 A	0 to 3 A	0 to 6 A	0 to 3 A	0 to 3 A	0 to 12 A
	High	0 to 20 A	0 to 40 A	0 to 20 A	0 to 45 A	0 to 20 A	0 to 60 A	0 to 15 A	0 to 30 A	0 to 120 A
Input Power		150 W / 50 W (1)	200 W	250 W / 50 W (1)	300 W / 300 W (1)	300 W	400 W	250 W / 50 W (1)	500 W	600 W
Channels		2	1	2	2	1	1	2	1	1
Minimum Operating Voltage	Low	0.09 V at 3 A	0.10 V at 4 A	0.15 V at 3 A	0.14 V at 4.5 A	0.7 V at 3 A	0.15 V at 6 A	0.6 V at 3 A	0.54 V at 3 A	0.18 V at 12 A
	High	0.6 V at 20 A	1 V at 40 A	1 V at 20 A	1.4 V at 45 A	4.5 V at 20 A	1.5 V at 60 A	3 V at 15 A	5.4 V at 30 A	1.8 V at 120 A
CV mode										
Range	Low	0.1 to 18 V						0.1 to 60 V	0.1 to 18 V	
	High	0.1 to 80 V				0.1 to 600 V	0.1 to 80 V	0.1 to 600 V		0.1 to 80 V
Resolution	Low	1 mV								
	High	10 mV								
Accuracy	Low	± (0.025% + 0.025% F.S.)	± (0.05% + 0.02% F.S.)		± (0.05 % + 0.025% F.S.)	± (0.05% + 0.02% F.S.)		± (0.025% + 0.025% F.S.)	± (0.05% + 0.02% F.S.)	
	High	± (0.025% + 0.025% F.S.)	± (0.05% + 0.025% F.S.)					± (0.025% + 0.025% F.S.)	± (0.05% + 0.025% F.S.)	
CC mode										
Range	Low	0 to 3 A	0 to 4 A	0 to 3 A	0 to 4.5 A	0 to 3 A	0 to 6 A	0 to 3 A	0 to 3 A	0 to 12 A
	High	0 to 20 A	0 to 40 A	0 to 20 A	0 to 45 A	0 to 20 A	0 to 60 A	0 to 15 A	0 to 30 A	0 to 120 A
Resolution	Low	0.1 mA							1 mA	0.1 mA
	High	1 mA							10 mA	1 mA
Accuracy	Low	± (0.05% + 0.05% F.S.)								± (0.05% + 0.1% F.S.)
	High	± (0.05% + 0.05% F.S.)								± (0.1% + 0.1% F.S.)
CR mode										
Range	Low	0.05 Ω to 10 Ω				0.25 Ω to 10 Ω	0.05 Ω to 10 Ω		0.2 Ω to 10 Ω	
	High	10 Ω to 7.5 kΩ								
Resolution		16-bit								
Accuracy	Low	0.01% + 0.08 S								
	High	0.01% + 0.0008 S								
CW mode										
Range		150 W	200 W	250 W	300 W		400 W	250 W	500 W	600 W
Resolution		10 mW								
Accuracy		± (0.2% + 0.2% F.S.)								
Transient mode (CC mode)										
T1&T2(2)		20 µs to 3600 s / Res: 5 µs to 10 ms								
Accuracy		5 µs + 100 ppm								
Slew Rate(3)	Low	0.0001 to 0.3 A/µs	0.0001 to 0.25 A/µs	0.0001 to 0.2 A/µs	0.0001 to 0.25 A/µs	0.0001 to 0.1 A/µs	0.0001 to 0.25 A/µs	0.0001 to 0.3 A/µs	0.0001 to 0.1 A/µs	0.0001 to 0.25 A /µs
	High	0.001 to 2 A/µs	0.001 to 2.5 A/µs	0.001 to 2 A/µs	0.001 to 2.5 A/µs	0.001 to 1 A/µs	0.001 to 2.5 A/µs	0.001 to 1.5 A/µs	0.001 to 1 A/µs	0.001 to 2.5 A/µs

(1) MLD4U102B: The user can allocate 150 W to either channel up to 200 W total (e.g. 150 W/50 W, 100 W/100 W). MDL4U252B: The user can allocate 250 W to either channel up to 300 W total (e.g. 50 W/250 W, 250 W/50 W, 150 W/150 W). MDL4U302B: The user can allocate 300 W to either channel up to 600 W total (e.g. 300 W/300 W). MDL4U502B: The user can allocate 250 W to either channel up to 300 W total.

(2) Fast pulse trains with large transitions may not be achievable.

(3) The slew rate specifications are not warranted, but are descriptions of typical performance. The actual transition time is defined as the time for the input to change from 10% to 90%, or vice versa, of the programmed current values. In case of very large load changes, e.g. from no load to full load, the actual transition time will be larger than the expected time. The load will automatically adjust the slew rate to fit within the range (high or low) that is closest to the programmed value.

Specifications

Model		MDL4U102B	MDL4U200B	MDL4U252B	MDL4U302B	MDL4U305B	MDL4U400B	MDL4U502B	MDL4U505B	MDL4U600B
Readback Voltage										
Range	Low	0 to 18 V								
	High	0 to 80 V				0 to 600 V	0 to 80 V	0 to 600 V		0 to 80 V
Resolution	Low	0.1 mV				1 mV	0.1 mV		1 mV	0.1 mV
	High	1 mV				10 mV	1 mV		10 mV	1 mV
Accuracy		± (0.025% + 0.025% F.S.)								
Readback Current										
Range	Low	0 to 3 A	0 to 4 A	0 to 3 A	0 to 4.5 A	0 to 3 A	0 to 6 A	0 to 3 A		0 to 12 A
	High	0 to 20 A	0 to 40 A	0 to 20 A	0 to 45 A	0 to 20 A	0 to 60 A	0 to 20 A	0 to 30 A	0 to 120 A
Resolution	Low	0.1 mA	0.01 mA				0.1 mA		0.01 mA	0.1 mA
	High	1 mA	0.1 mA				1 mA		0.1 mA	1 mA
Accuracy	Low	± (0.05% + 0.05% F.S.)								± (0.05% + 0.1% F.S.)
	High	± (0.05% + 0.05% F.S.)								± (0.1% + 0.1% F.S.)
Readback Power										
Range		150 W	200 W	250 W	300 W		400 W	250 W	500 W	600 W
Resolution		10 mW								
Accuracy		± (0.2% + 0.2% F.S.)								
Protection Range (typical)										
OPP		165 W	200 W	250 W	310 W	300 W	400 W	275 W	500 W	600 W
OCP	Low	3.3 A	4.4 A	3.3 A	5 A	3.3 A	6.6 A	3.3 A	3.3 A	13.2 A
	High	22 A	44 A	22 A	50 A	22 A	66 A	16.5 A	33 A	132 A
OVP		85 V	82 V			510 V	82 V	630 V	510 V	82 V
OTP		185 °F (85 °C)						194 °F (90 °C)	185 °F (85 °C)	
General (typical)										
Short Circuit										
Current (CC)	Low	3 A	4 A	3 A	5 A	3 A	6 A	3 A	3 A	12 A
	High	20 A	40 A	30 A	50 A	20 A	60 A	30 A		120 A
Voltage (CV)		0 V								
Resistance (CR)		50 mΩ	25 mΩ	50 mΩ	30 mΩ	220 mΩ	25 mΩ	50 mΩ	180 mΩ	15 mΩ
Input Terminal Impedance		300 kΩ				1 MΩ	300 kΩ		1 MΩ	300 kΩ
Safety		EN61010-1:2010+A1:2019, EU Low Voltage Directive (LVD) 2014/35/EU								
Electromagnetic Compatibility		Meets EMC Directive 2014/30/EU, EN61326-1:2013								
Warranty		3 Years								
Dimensions		3.2" x 6.7" x 22.6" (82 x 170.5 x 573 mm)								
Weight		11 lbs (5 kg)								

Mainframe Specification (MDL4U001 and MDL4U002)

Number of Slots	Power Input	Operating Temperature	Storage Temperature	Humidity
4	110/220 V ± 10%, 50/60 Hz	32 to 104 °F (0 to 40 °C)	14 to 140 °F (-10 to 60 °C)	Indoor use, ≤ 95%

Specifications

Mechanical Specifications

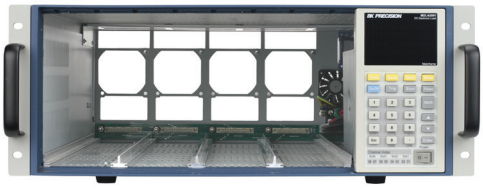
Model	MDL4U001	MDL4U002	MDL4U102B	MDL4U200B	MDL4U252B	MDL4U302B	MDL4U305B	MDL4U400B	MDL4U502B	MDL4U505B	MDL4U600B
Type	Mainframe	Mainframe extension	Module								
Dimensions (W x H x D)	17.3" x 7" x 21.6" (440 x 177.3 x 549 mm)	17.3" x 7" x 21.6" (440 x 177.3 x 549 mm)	3.2" x 6.7" x 22.6" (82 x 170.5 x 573 mm)								
Weight	34 lbs (15.4 kg)	34 lbs (15.4 kg)	11 lbs (5 kg)								

Standard Accessories

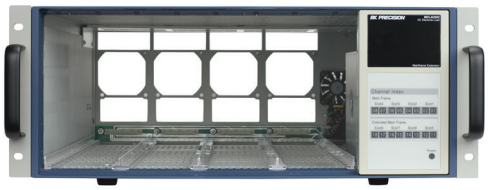
Mainframes	Modules
Power cord, USB cable (MDL4U001 only), mainframe extension cable (MDL4UB002 only)	Certificate of calibration

Ordering Information

① Start with the MDL4U001 mainframe required to house and control up to 4 DC load modules. Add the MDL4U002 mainframe extension for up to 8 modules total.



MDL4U001 Mainframe



MDL4U002 Mainframe Extension

② Populate the mainframe or mainframe extension with any combination of modules.

Model	Description
MDL4U102B	Dual-channel DC load module 80 V / 20 A / 200 W total
MDL4U200B	Single-channel DC load module 80 V / 40 A / 200 W
MDL4U252B	Dual-channel DC load module 80 V / 20 A / 300 W total
MDL4U302B	Dual-channel DC load module 80 V / 45 A / 600 W total
MDL4U305B	Single-channel DC load module 600 V / 20 A / 300 W
MDL4U400B	Single-channel DC load module 80 V / 60 A / 400 W
MDL4U502B	Dual-channel DC load module 600 V / 15 A / 300 W total
MDL4U505B	Single-channel DC load module 600 V / 30 A / 500 W
MDL4U600B	Single-channel DC load module 80 V / 120 A / 600 W

Backwards Compatibility

The MDL4UB Series modules are compatible with the MDL4U001 mainframe and MDL4U002 mainframe extension. Both MDL4UB Series and MDL4U (non B) Series modules can be used together in the same mainframe.

About B&K Precision

For more than 70 years, B&K Precision has provided reliable and value-priced test and measurement instruments worldwide.

Our headquarters in Yorba Linda, California houses our administrative and executive functions as well as sales and marketing, design, service, and repair. Our European customers are most familiar with B&K through our French subsidiary, Sefram. Engineers in Asia know us through our B+K Precision Taiwan operation. The independent service centers in Singapore and Brasil service customers in Singapore, Malaysia, Vietnam, Indonesia and South America, respectively.



B&K Precision group member Independent service center Service center location

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B&K Precision Corporation is an ISO9001 registered company employing traceable quality management practices for all processes including product development, service, and calibration.

ISO9001:2015

Certification body NSF-ISR
Certificate number 6Z241-IS8

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