KG

KEISOKU GIKEN Co., Ltd.

NEW PRODUCT

High capacity, multi-function, fast current response

Large capacity DC electronic load

# QL-D series

- A single unit can handle 2000A
- Maximum power 150 kW (6 units in parallel operation)
- Maximum slew rate 50A/μs



## New Generation

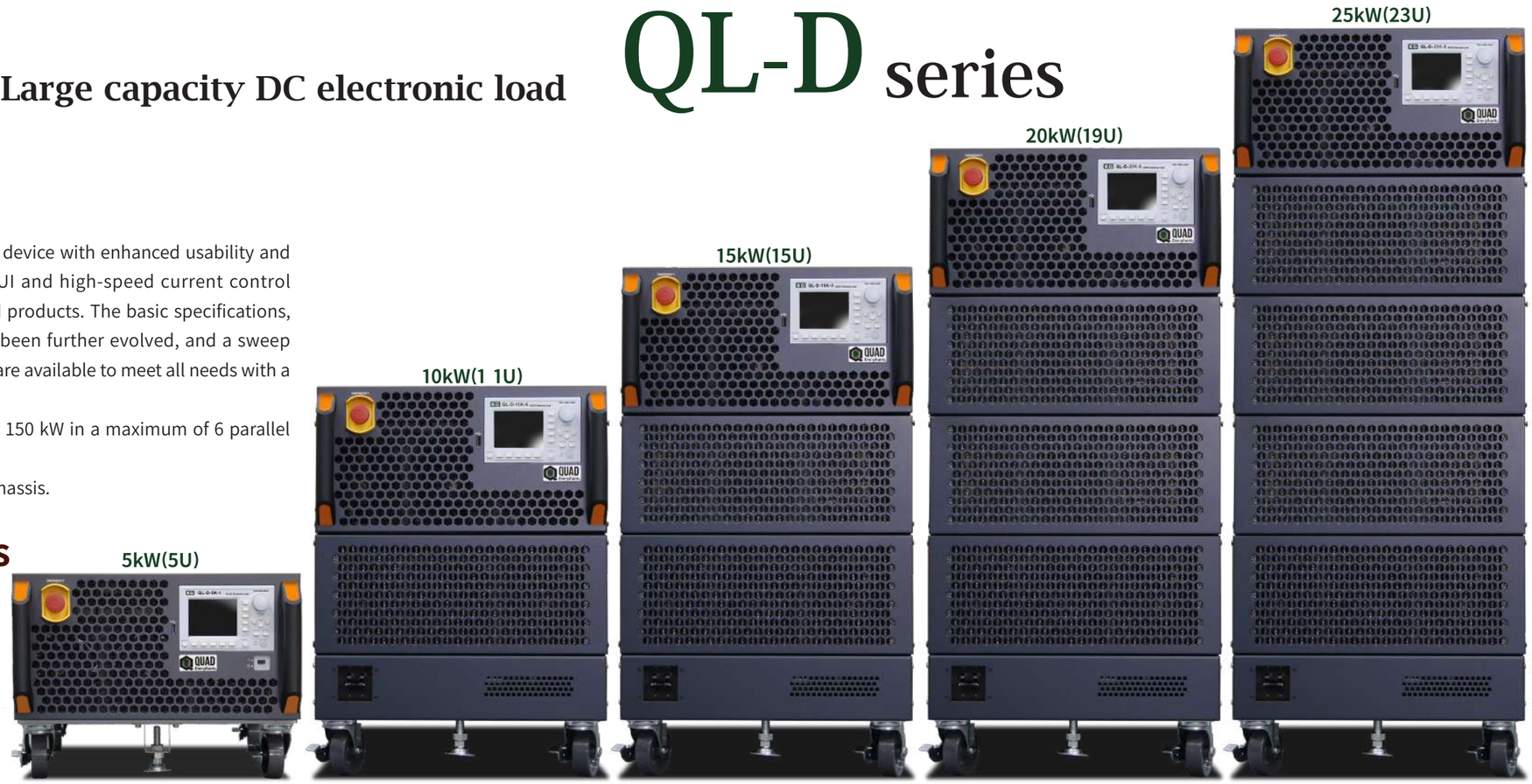



QUAD
Ene-phant®

QUAD
Ene-phant®

# Large capacity DC electronic load QL-D series

The "QL-D Series" capacitive DC electronic load is an electronic load device with enhanced usability and basic electronic load performance, employing Oscilloscope-like UI and high-speed current control technology that have been well-received in previous electronic load products. The basic specifications, performance, and concept of the conventional 34000A series have been further evolved, and a sweep function with various load modes and an MPPT function as an option are available to meet all needs with a variety of functions.
The lineup is expandable up to 25 kW in 5 kW increments and up to 150 kW in a maximum of 6 parallel units. 19-inch rack size and 5 U (height).
The 19-inch rack size and 5U height (5kW model) provide a compact chassis.




## Up to 25kW in 5 kW increments Total lineup of 17 types

Large capacity in a compact body. Three models (150V, 600V, 1000V) with different rated voltages from 5kW minimum to 25kW maximum are available. 150V type can handle high current up to 2000A. Recommended for those who want high capacity at low cost.

### ■ 150V type

| Model | Rated voltage | Rated current | Rated power | Size | Maximum slew rate |
|---|---|---|---|---|---|
| QL-D-5K-1/B | 150V | 500A | 5kW | 5U | 50A/μs |
| QL-D-5K-1 | | 500A | 5kW | 5U | |
| QL-D-10K-1 | | 1000A | 10kW | 11U | |
| QL-D-15K-1 | | 1500A | 15kW | 15U | |
| QL-D-20K-1 | | 2000A | 20kW | 19U | |

* QL-D-5K-1/B is bench-top type. All other types are castor type.
* Size excludes casters and rubber feet.

### ■ 600V type

| Model | Rated voltage | Rated current | Rated power | Size | Maximum slew rate |
|---|---|---|---|---|---|
| QL-D-5K-6/B | 600V | 350A | 5kW | 5U | 20A/μs |
| QL-D-5K-6 | | 350A | 5kW | 5U | |
| QL-D-10K-6 | | 700A | 10kW | 11U | |
| QL-D-15K-6 | | 1050A | 15kW | 15U | |
| QL-D-20K-6 | | 1400A | 20kW | 19U | |
| QL-D-25K-6 | | 1750A | 25kW | 23U | |

* QL-D-5K-6/B is bench-top type. All other types are castor type.
* Size excludes casters and rubber feet.

### ■ 1000Vタイプ

| Model | Rated voltage | Rated current | Rated power | Size | Maximum slew rate |
|---|---|---|---|---|---|
| QL-D-5K-1K/B | 1000V | 200A | 5kW | 5U | 12A/μs |
| QL-D-5K-1K | | 200A | 5kW | 5U | |
| QL-D-10K-1K | | 400A | 10kW | 11U | |
| QL-D-15K-1K | | 600A | 15kW | 15U | |
| QL-D-20K-1K | | 800A | 20kW | 19U | |
| QL-D-25K-1K | | 1000A | 25kW | 23U | |

* QL-D-5K-1K/B is bench-top type. All other types are castor type.
* Size excludes casters and rubber feet.



- Improved usability with LCD color UI for the Load Station series
- Electronic loads with fast current control technology and no overshoot（Industry's first[based on our research]. Guaranteed specifications for rising current range)
- No concept of minimum operating voltage, linear stable operation even in low voltage range
- Equipped with sequence function; program can be saved/loaded via USB memory
- Equipped with Sweep mode, supporting functions such as IV characteristics, over-power and over-current tests, etc. Data logging is also available and can be recorded on USB memory.（CSV format)
- Optional MPPT (maximum power tracking) mode for PV exposure testing and PCS simulation
- Measurement of elapsed time/accumulated current/accumulated power and cut-off function by any value
- In dynamic mode, current rise/fall times can be set independently. Up to 32 steps can be set. Complex current simulations (e.g., overshoot current) can be handled.
- LAN/USB/RS-232C standard (GP-IB optional)
- CC, CV, and CP as external control modes; CC+CV and CP+CV also available for external control
- Capable of superimposing sine and square waves at up to 100 kHz
- Up to 6 units can be connected in parallel (150 kW), and different models can be connected (same voltage models only)

# Version up

Significant evolution from previous products in terms of design concept, basic specifications, and performance

# Deepening

Further deepening high-speed current control to enable response to all external factors.

## Electronic load in comparison

The "QL-D Series" has been updated to broadly cover the specifications and performance of the equivalent conventional product, the "34000A Series.

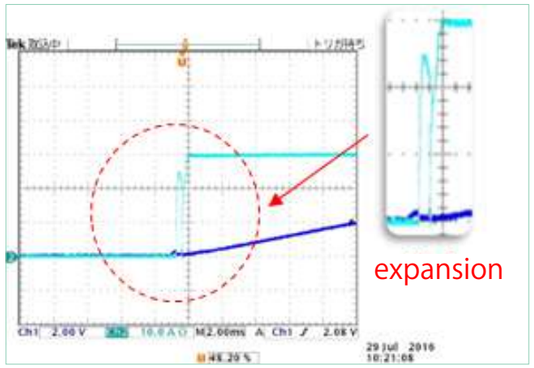
| ■ 34000A Series：34105A (60V/1000A/5kW) | | ■ QL-D Series：QL-D-5K-1 (150V/500A/5kW) |
|---|---|---|
|  | |  |
| Three large LCDs | **Front indicator** | 3.5-inch color LCD |
| Numeric keypad and function keys | **Control button** | Oscillo-like inverted L-shaped button |
| 647(W)×573(H)×766(D)mm | **Dimensions** | 430(W)×322(H)×629(D)mm |
| 0.284㎥ | **Volume** | 0.087㎥ |
| 100kg | **Weight** | 35kg |
| Overcurrent/overpower/short test Execution by dedicated test keys | **Test function** | Sweep function in CC.CR.CP mode Run-time graph display function |
| CC+UVP Mode CP+UVP Mode Discharge time setting mode | **Discharge mode (Cut-off function)** | Load OFF Timer/Specified voltage setting Integral current setting/integral power setting Corresponding to each load mode |
| With 9 file/16 step 150 groups can be saved Resolution 100msec～9.9s CC/CR/CV/CP mode supported | **Sequence function** | Number of Steps：4096 point Resolution：1ms～100h count 65535, infinite CC/CR/CV/CP mode supported |
| 2ch fixed 15A/μs(150V type) | **Dynamic Mode Slew rate** | 32ch 50A/μs(150V type) |
| 20μs | **Minimum load response time** | 5μs |
| Unsupported | **Support for USB memory devices** | Data can be saved to USB memory |
| Unsupported | **Integral measurement function** | Totalized current/Totalized power/ Elapsed time |
| Unsupported | **Limit function** | Current Limit |
| Current monitor (non-isolated) | **Monitor function** | Voltage and current monitor (isolated) |
| Optional GP-IB/USB RS-232C/LAN implementation | **Interface** | Standard：USB/RS-232C/LAN Option：GP-IB |
| Remote operation only | **MPPT mode added** | Factory Options Panel operation/remote operation supported Real-time measurement display |

## Uses high-speed current control technology

High-capacity test environments are affected by the inductance of load cables, which can lead to damage of electronic load devices depending on how they are used. In order to cope with such external factors, the high-speed current control circuit method used in the Load Station series has been further deepened and adopted in the QL-D series.
The new system speeds up the load response, ensures stable operation of overcurrent at high currents, and prevents abnormal oscillation caused by cable inductance when the cable wiring length is extended, thus enabling safer and more reliable use without damaging the DUT (DUT under test).

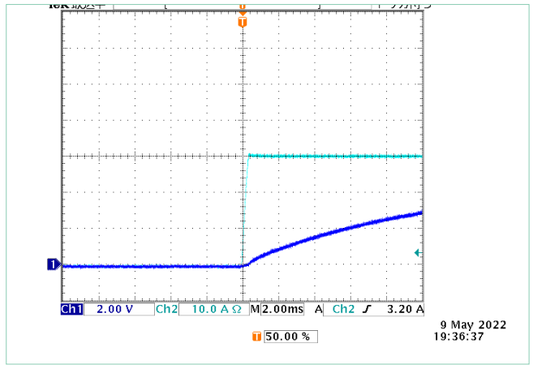
### ■ Inrush current - EUT output in Load ON state in CC mode OFF→ON

**General large-capacity DC electronic load (conventional circuit method)**




Inrush current occurs

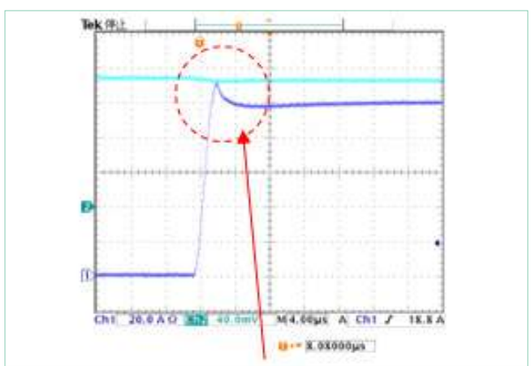
**QL-D series (high-speed current circuit method)**



Ideal current response with no inrush current

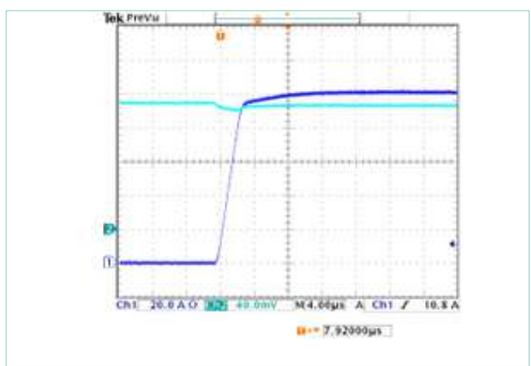
### ■ Overshoot current - Load OFF→ON with EUT output ON

**General large-capacity DC electronic load (conventional circuit method)**



Overshoot current occurs

**QL-D series (high-speed current circuit method)**



Smooth current response

# Evolution —Mode, Feature

To meet every need,
A wide variety of new functions

## Improved operability

The operation panel, which imitates the front part of a typical oscilloscope, handles everything from hardware settings to measurement mode and numerical settings. The panel is designed for ease of use.


① **Data storage by USB memory stick**
② **One-touch memory function for recalling set values**
③ **Easy-to-read 3.5-inch large color LCD**
④ **Oscillo-like inverted L-sequence keys can also be used as numeric keypad for numerical input**
⑤ **Large rotary knob for easy up/down of current value**
⑥ **10-degree sloped key tops for ease of operation**
⑦ **Self-illuminated load ON/OFF button**

## Guaranteed accuracy of each load control mode

Current measurement accuracy of 0.2% is achieved despite the large capacity. Compared to the master-slave method, both setting and measurement errors in various load modes are smaller, and accuracy is guaranteed for both setting and measurement accuracy.

**Integrated model**

**Master-Slave system**

Master device
Slave device
Slave device

## Supports up to 36 modes of testing by combining load and operating modes

It has 12 load modes (CC, CR, CV, CP, Short, CC+CV, CP+CV, EX(CC, CV, CP), EXT(CC+CV, CP+CV)) and 6 operation modes (Normal, Dynamic, Sequence, Sweep, MPPT (optional), Current Limit), which can be combined for a wide variety of load tests.

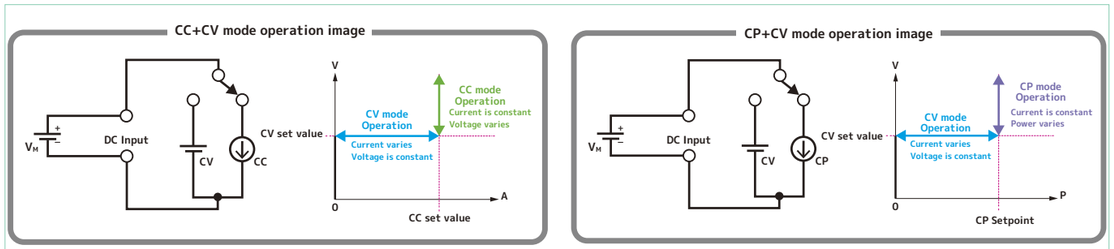
| | | load mode | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CC | CR | CV | CP | CC+CV | CP+CV | EXT CC | EXT CV | EXT CP | EXT CC+CV | EXT CP+CV | SHORT |
| Operation Mode | Normal | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | Dynamic | ○ | ○ | ○ | ○ | — | — | — | — | — | — | — | — |
| | Sequence | ○ | ○ | ○ | ○ | — | — | — | — | — | — | — | — |
| | Sweep | ○ | ○ | — | ○ | — | — | — | — | — | — | — | — |
| | MPPT mode | ○ | — | — | — | — | — | — | — | — | — | — | — |
| | Current Limit | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |



## Optimal operating modes for battery characterization are included as standard

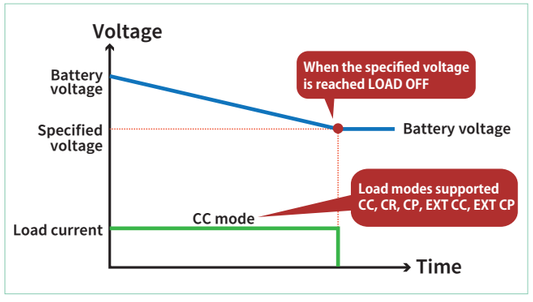
### ■ "CC+CV mode" and "CC+CP mode" are standard

When the voltage becomes the specified voltage while discharging in CC or CP mode, it shifts to CV mode, which is a discharge mode that protects the battery without discharging it below the specified voltage. It can also operate with external analog control.

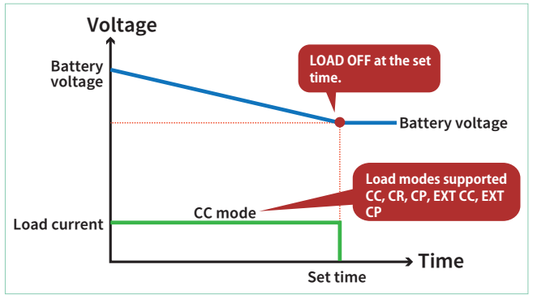



### ■ Functional Application 1: Battery Protection

The specified voltage setting function and elapsed time measurement function can be used to turn LOAD OFF at a specified voltage or at a specified discharge time to protect the battery.



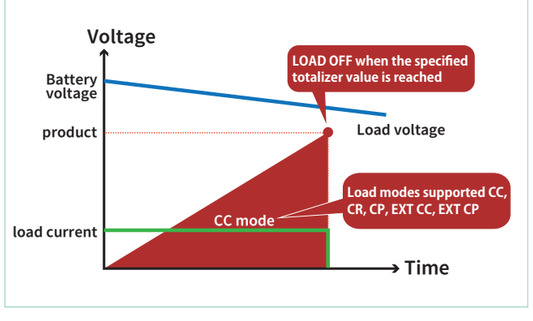

**Operation image at specified voltage setting (in CC mode)**




**Operation image when setting discharge time (in CC mode)**

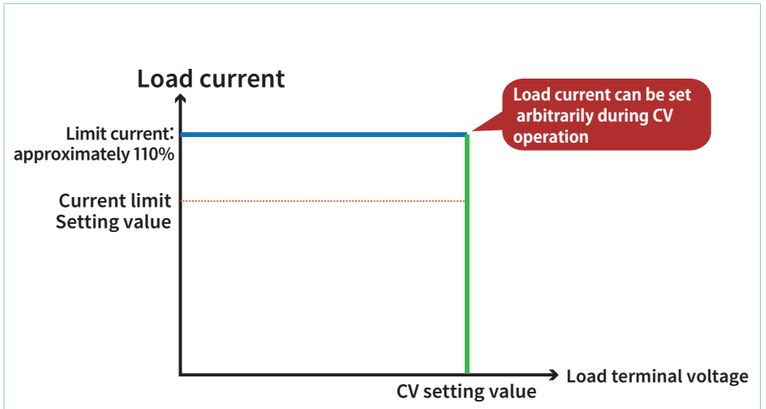
### ■ Function Utilization 2: LOAD OFF

Using the totalizing function (current: AH and power: WH), a function is provided to turn LOAD OFF when the specified totalizing value is reached.



## ■ Function Utilization 3: Current Limit Function

An independent current limit function, different from the load mode control, is provided. When a set current is detected, the load can be limited to 110% of the set limit (current) with the load ON, without turning the load OFF. The operation at the time of limit detection (Load OFF or 110% limit load with Load ON) can be set respectively. This function can be used as a protection function at any limit value.




**CV + Clim mode operation (constant voltage / constant current operation)**

## ■ Function utilization 4: Constant voltage/constant voltage mode (CV+Clim function)

In constant voltage mode, the CV+Clim function enables operation at 110% of the current limit setting value at the set CV voltage by using the current limit together. This function can be used as a constant voltage/constant current mode that can be used for battery discharge, etc.

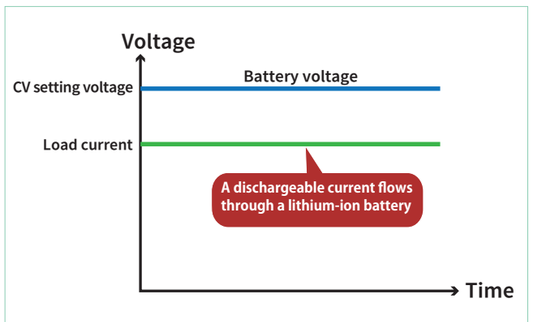



**Image of operation during discharge (conventional CV operation)**

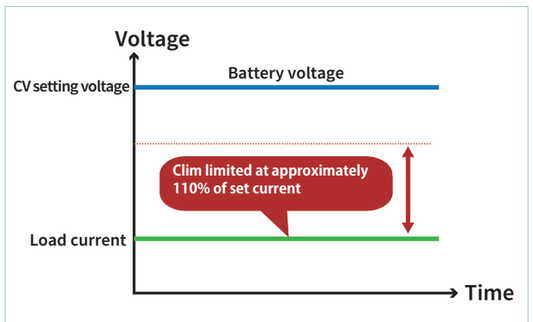
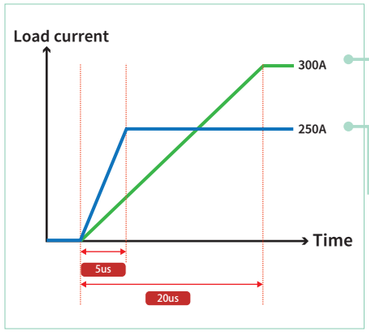



**Image of operation during discharge (CV+Clim operation)**

## Fast response slew rate up to 50A/µs, minimum load response time 5µs

From high-speed current control technology, a high-speed response of up to 50 A/µs (150 V type) is realized. The minimum load response time is 5 µs, realizing fast start-up despite the large capacity and high current.

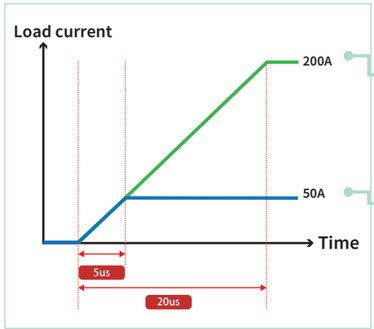
## ■ Set current at maximum slew rate




**In case of 34105A**
Minimum load response time is 20 µs. Therefore, when the maximum slew rate is set to 15 A/µs, the maximum slew rate rise is possible at the set current of 15 A x 20 = 300 A.

**In case of QL-D-5k-1**
Minimum load response time is 5 µs. Therefore, when the maximum slew rate is set at 50 A/µs, rise time at the maximum slew rate is possible at the set current of 50 A x 5 = 250 A.

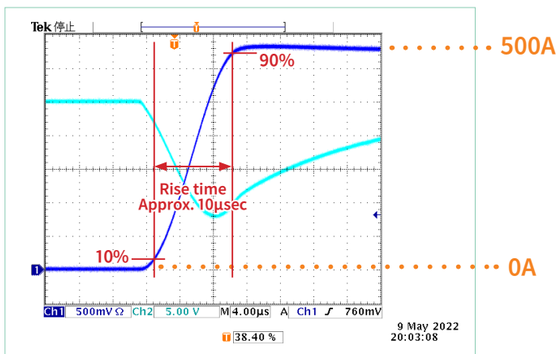
## ■ Difference in current response at a slew rate of 10A/µs at minimum response time




**In case of 34105A**
200A current change per 20µs *Minimum load response time of 20µs

**In case of QL-D-5k-1**
50A current change per 5µs *Minimum load response time of 5µs

## ■ Current rise at maximum slew rate of 50A/µs (when QL-D-5K-1 is used)



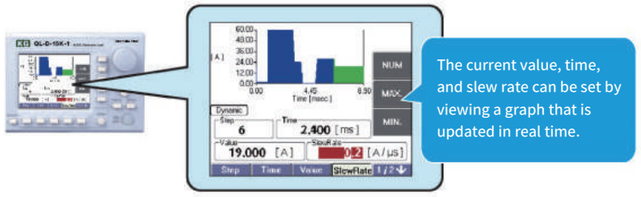

*In general, the slew rate is the rate of change in time and current that the load current varies from 10% to 90% of its maximum value.

# Evolution —Mode, Feature

To meet every need,
A wide variety of new functions

## 32-step Dynamic mode for fine current waveform setting and 1µs minimum pulse width

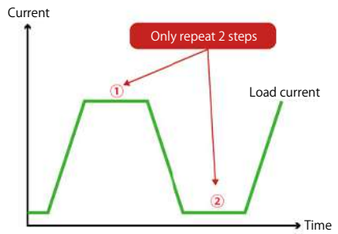
In addition to the general 2-step (HIGH/LOW, binary) dynamic mode, 32-step Dynamic operation is available. This mode supports testing with more detailed current waveforms. The current waveform can be set graphically on the color LCD, and the operation can be set for either time or period (frequency display). Pulse width can be set from 1µs, and frequency can be set up to 500kHz (not including rise/fall time).



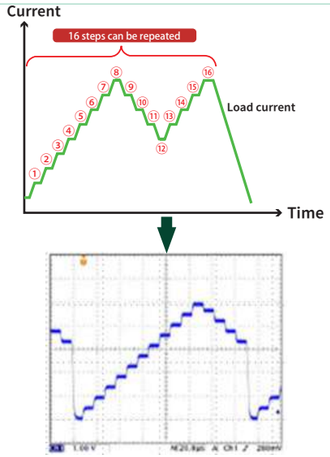

| Setting items | Contents |
|---|---|
| Operation Mode | CC/CR/CV/CP |
| Minimum Time Width | 1µs |
| Slew rate （A/µs） | 0.5A ～ 50A/µs(150V) |
| Set frequency range (approximate) | 0.0083Hz ～ 500kHz |
| Number of Steps | 32ch |

### ■ Condition: Number of Dynamic mode steps

**For the 34000A series**



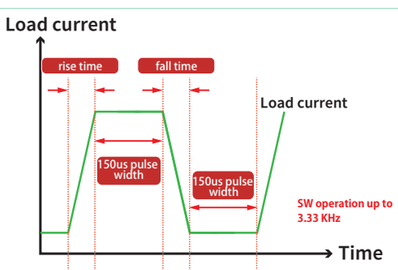

**For QL-D series (high-speed current control circuit method)**



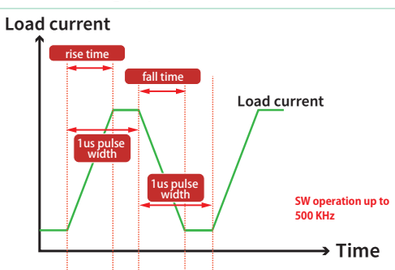

Operating waveform for 16 steps

### ■ Condition: Dynamic mode pulse width

**For the 34000A series**

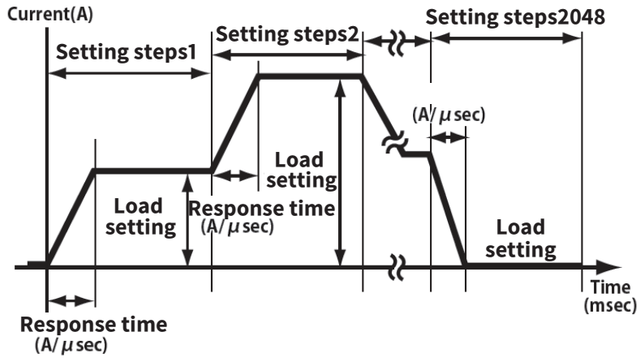



**For QL-D series (high-speed current control circuit method)**




## Equipped with sequence function

The 4,096-word memory for sequence operation allows sequence programs to be created by data transfer or directly from the front panel. Data can be transferred from various communication interfaces, and can also be read and saved from USB memory (CSV file format). (The execution time and slew rate settings for each step are the same. The execution time is in the range of 1 msec to 10 min, and the slew rate setting is the speed of current change (A/µs) when transitioning from step to step in CC mode only.



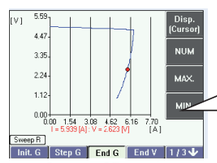

| Setting items | Contents |
|---|---|
| Operation Mode | CC/CR/CV/CP |
| Number of programs | 1 |
| Maximum number of steps | 4096 |
| Slew rate （A/µs） | CC mode only |
| Number of program repetitions | 1 to 65535 or infinity |
| Step execution time | 1ms ～ 100h |
| Time resolution | 1ms |

## Sweep mode with Chart display on LCD panel

Sweep mode is a function that allows voltage and current measurements to be made while changing the load current in three load modes (CC, CR, CP) in detail (sweep), and the measurement results are plotted on the LCD panel in real time for charting (graph).

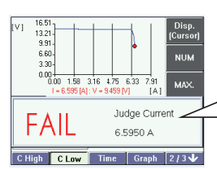
Overcurrent characteristic test (droop characteristic) and overpower characteristic test for SW power supplies and I-V characteristic test for rechargeable batteries, etc. can be performed with a single electronic load. Measurement data can be saved in USB memory in CSV format.
Since it has a judgment function, it can be used as a test mode for OCP and OPP in the same way as the 34000A series, in addition to characteristic evaluation.

| Setting items | Contents |
|---|---|
| Sweep operation mode | CC/CR/CP |
| Step execution time | 200ms or 1000ms |




Measure voltage and current while sweeping the load current and create a graph.
Measurement results can be checked at any point using the encoder and saved to USB memory.

Sweep CR mode execution example (Example: Overcurrent characteristic test)




Judgment values can also be set.
In addition to various characteristic tests, it can also be used for overcurrent tests (OCP) and overpower tests (OPP).

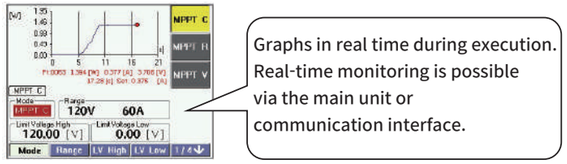
Sweep CR Mode Determination (Example: Overcurrent characteristic test)

# Evolution —Mode, Feature

To meet every need,
A wide variety of new functions

## MPPT (Maximum Power Point Tracking) function is available as a factory-installed option

MPPT function (mountain climbing method) required for testing solar panels (PV), etc., is prepared as an option. This is a control method that continuously adjusts the load current using the CC mode while measuring the load voltage until maximum power is obtained.



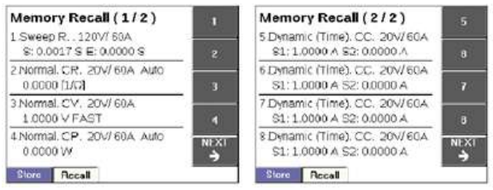

Graphs in real time during execution. Real-time monitoring is possible via the main unit or communication interface.

Example of MPPT CC mode execution

| Setting items | Contents |
|---|---|
| MPPT operation mode | CC |
| During MPPT operation Step time interval | 200ms or 1000ms |
| During the entire scan Step time interval | 200ms or 1000ms |
| Overall scan execution time | 10s ～ 999h59m59s |

## 8 memory functions

Up to 8 load modes, load setpoints, and other conditions can be saved/loaded.




## Communication Interface

LAN/USB/RS-232C as standard. Separately optional GP-IB converter (RS-232C conversion) is also available.


USB for power supply for GPIB/RS-232C converter

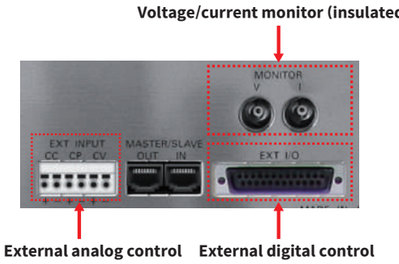
## Compatible with USB memory

By connecting a USB memory device to the dedicated USB port, measurement data such as Sweep mode can be saved to the USB memory device. SEQUENCE mode and Dyanmic mode settings can also be read from and saved to the USB memory.


※USB2.0 16GB or less
Format is FAT32

## Equipped with external analog and digital controls ideal for PLC control

External digital control (EXT I/O) and external analog control (EXT INPUT) are provided for PLC control. It supports analog control load settings (CC, CV, CP) with 0-10Vdc from load mode switching. Current and voltage monitors (isolated) are also provided for reading measured values, and CC+CV and CP+CV modes can be controlled from a PLC.




### EXT I/O (External Digital Control)

| Name | Use |
|---|---|
| Emergency Stop | Emergency stop |
| MODE CONT CC | Load mode setting(CC) |
| MODE CONT CV | Load mode setting(CV) |
| MODE CONT CP | Load mode setting(CP) |
| LOAD ON/OFF CONT | Load On・Off |
| RANGE CONT | Current range setting |
| Alarm Clear | Protection and Alarm Clear |
| TRIG OUT | Trigger output |
| ALARM PROTECTION | Protection/alarm status |
| STATUS CC | load-mode condition(CC) |
| STATUS CV | load-mode condition(CV) |
| STATUS CP | load-mode condition(CP) |
| LOAD ON STATUS | Load on/off state |
| RANGE STATUS | Current range state |

### EXT INPUT (External Digital Control)

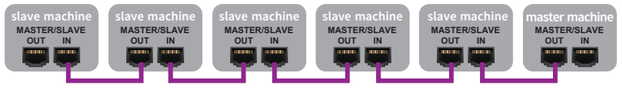
| Name | Use |
|---|---|
| EXT CC | External CC Control 0 ～ 10V Input |
| EXT CV | External CV Control 0 ～ 10V Input |
| EXT CP | External CP Control 0 ～ 10V Input |

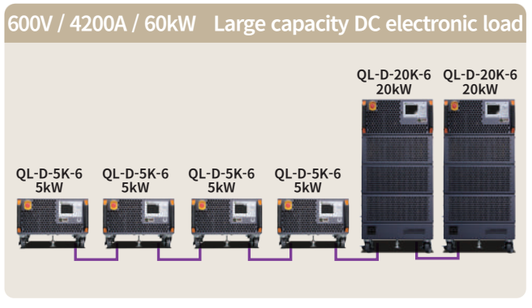
### MONITOR (Isolated output)

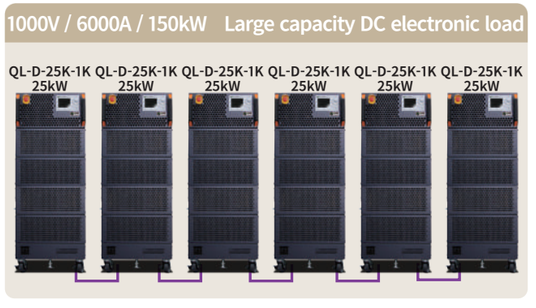
| Name | Use |
|---|---|
| MONITOR V | Voltage monitor output（5V full-scale） |
| MONITOR I | Current monitor output（5V full-scale） |

## Intelligent master-slave functionality

Master-slave connections can be made with a single parallel operation cable. Different capacity models can be flexibly increased up to a maximum of 150 kW with up to 6 units (including the master unit) for the same voltage model.



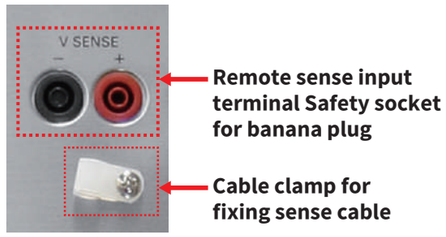



# Evolution —Interface, Case

To meet every need,
A wide variety of new functions

## Remote sensing function

Remote sensing can change the voltage reference point in voltage measurement and CR, CV, and CP modes from the load input terminal to any sensing point. By setting the sensing point at the end of the DUT, the influence of voltage drop due to the resistance of the load cable can be eliminated and the load mode as the voltage reference can be stabilized.




| Model | Input Rated Voltage |
|---|---|
| QL-D-*-1 | 150V |
| QL-D-*-6 | 600V |
| QL-D-*-1K | 1000V |

* denotes load capacity in each model

## Space-saving and lightweight compared to conventional products

Compared to the conventional 34000A series, the volume has been reduced by up to 70% (compared to the 5kW model) and the mass by 65%.
The width has also been reduced from 647 mm to 430 mm, making it easier to secure space for installation.


## Bench-top type (5kW model only) lineup

The standard model is a caster type, but the 5kW model is available in a bench-top type in addition to the caster type. The 5kW model is available in a bench-top type in addition to the caster type. It uses rubber feet similar to those of general bench-top type power supply units, enabling construction of a test environment on a tabletop.
The bench-top type can be easily mounted in a rack by simply removing the rubber feet, making it ideal for system setup using a 19-inch rack.


5U(5kW)
31kg

## Emergency stop switch on front panel as standard equipment


Equipped with an emergency stop switch, which is indispensable in the car electronics industry. It is large enough to be easily seen from the front panel and is equipped with a guard to prevent malfunction. In addition to operation from the front panel, control from external digital control (EXT I/O) is also possible.

## Equipped with box-type safety cover (standard on all models)

Safety covers are provided as standard on all models at the load input terminals that carry high voltages and large currents. The load input terminals are designed for safety and security with maximum consideration of usability.

## Anchor bolt fixing fittings are available for earthquake resistance (optional)

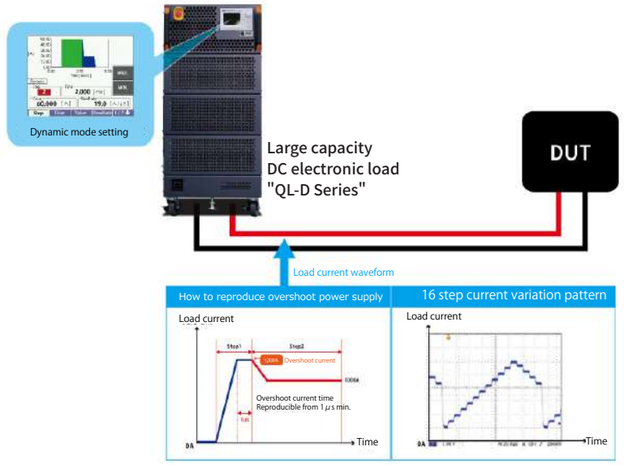
Anchor bolt fixing fittings are available as an option for earthquake-proof measures for large-capacity DC electronic loads. This can be used as a countermeasure against enclosure tipping over.

# Elongation —Applications

From Applications One Step Ahead
Extending the Potential of Electronic Loads

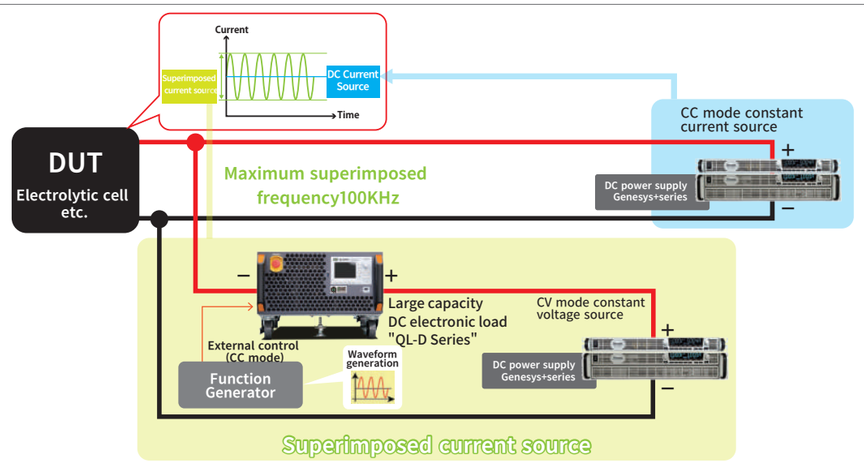
## Reproduction of large current overshoot current

In dynamic mode, the Chart (graph) on the LCD panel changes in real time to make it easier to understand the relationship between the set time and the set current. This allows you to visually check the current fluctuation before testing.




## Constant current power supply capable of current superposition at large currents using electronic loads

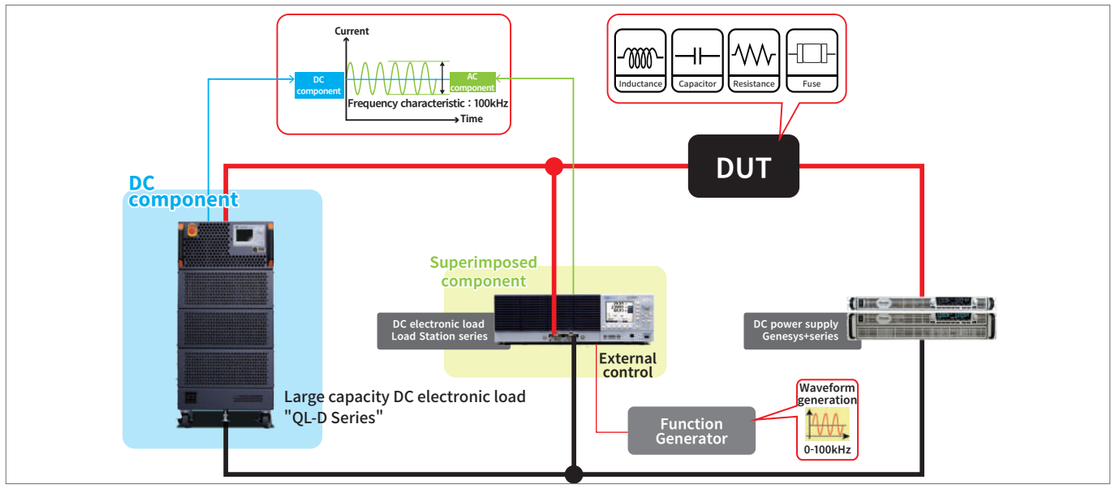
By connecting two constant current sources, a DC current source and a superimposed current source, in parallel, it is possible to construct a constant current source with a large current and high frequency superimposed current (100 kHz).




*The superimposed current changes depending on the wiring and DUT inductance.

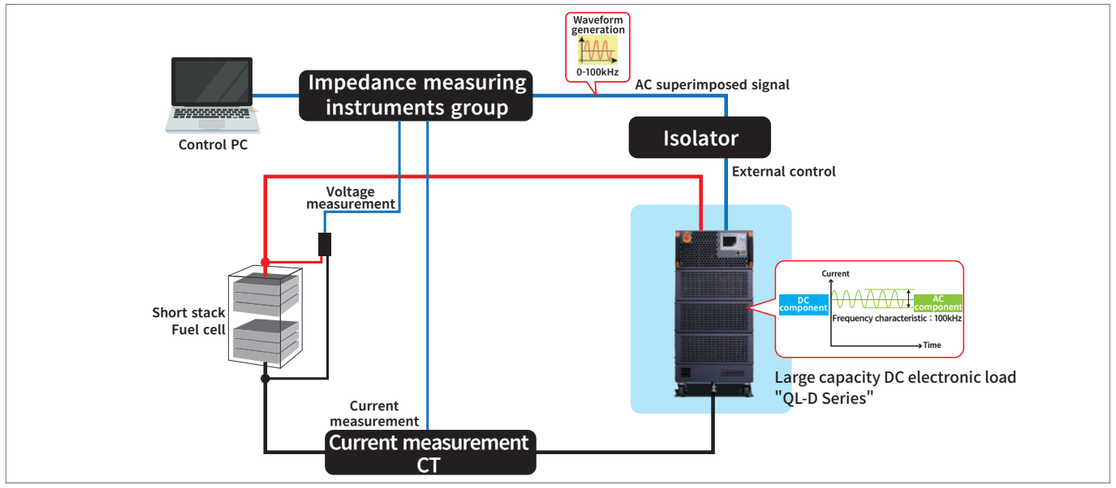
## High-frequency DC ripple-superimposed power supply using electronic loads

Separation of DC and AC components (ripple superposition) enables wideband operation. The superimposed current and DC current can be set separately.




## Electronic load for high-frequency superposition suitable for fuel cell short stack evaluation

Wide bandwidth testing is possible even when DC and AC (superimposed) components are simultaneously loaded. Impedance measurement is possible with sinusoidal superimposed current while maintaining frequency bandwidth up to 100KHz.



# Specification

## 150V Type

S-2501-01

| Model | | | QL-D-5K-1/B | QL-D-5K-1 | QL-D-10K-1 | QL-D-15K-1 | QL-D-20K-1 |
|---|---|---|---|---|---|---|---|
| Load carrying capacity | | | | | | | |
| DC Rating | | Rated voltage | 150 V | | | | |
| | | Rated current | 500 A | | 1000 A | 1500 A | 2000 A |
| | | Rated power | 5000 W | | 10000 W | 15000 W | 20000 W |
| Constant Current (CC) Mode | Current setting range | H | 0 A ~ 500 A | | 0 A ~ 1000 A | 0 A ~ 1500 A | 0 A ~ 2000 A |
| | | L | 0 A ~ 50 A | | 0 A ~ 100 A | 0 A ~ 150 A | 0 A ~ 200 A |
| | Setting resolution | H | 50 mA | | 100 mA | 150 mA | 200 mA |
| | | L | 5 mA | | 10 mA | 15 mA | 20 mA |
| | Accuracy | H | ± {0.2% of Setting + 0.4% of Range} | | | | |
| | | L | ± {0.2% of Setting + 0.4% of Range} | | | | |
| | CC mode slew rate | H | 0.5 A / μs~50 A / μs | | 0.5 A / μs~50 A / μs | 0.5 A / μs~50 A / μs | 0.5 A / μs~50 A / μs |
| | | L | 0.05 A / μs~5 A / μs | | 0.05 A / μs~5 A / μs | 0.05 A / μs~5 A / μs | 0.05 A / μs~5 A / μs |
| | Rise current over /Under Shoot range | H//L | ± {0.2% of Setting + 0.4% of Range} | | | | |
| Constant Resistance (CR) Mode | Voltage range | | 15 V | | | | |
| | Resistance setting range | H | 333.3 S ~ 0.03 S (0.003 Ω ~ 30 Ω) | | 666.6 S ~ 0.06 S (0.0015 Ω ~ 15 Ω) | 999.9 S ~ 0.09 S (0.001 Ω ~ 10 Ω) | 1333.2 S ~ 0.12 S (0.00075 Ω ~ 7.5 Ω) |
| | | L | 33.33 S ~ 0.003 S (0.03 Ω ~ 300 Ω) | | 66.66 S ~ 0.006 S (0.015 Ω ~ 150 Ω) | 99.99 S ~ 0.009 S (0.001 Ω ~ 10 Ω) | 133.32 S ~ 0.012 S (0.0075 Ω ~ 75 Ω) |
| | Resolution | H | 0.03 S | | 0.06 S | 0.09 S | 0.13 S |
| | | L | 0.003 S | | 0.006 S | 0.009 S | 0.013 S |
| | Accuracy | | ± 0.4% of {Setting + Range} | | | | |
| | Voltage range | | 150 V | | | | |
| | Resistance setting range | H | 111.1 S ~ 0.01 S (0.009 Ω ~ 90 Ω) | | 222.2 S ~ 0.02 S (0.0045 Ω ~ 45 Ω) | 333.3 S ~ 0.03 S (0.003 Ω ~ 30 Ω) | 444.4 S ~ 0.04 S (0.002 Ω ~ 25 Ω) |
| | | L | 11.11 S ~ 0.001 S (0.09 Ω ~ 900 Ω) | | 22.22 S ~ 0.002 S (0.045 Ω ~ 450 Ω) | 33.33 S ~ 0.3 S (0.03 Ω ~ 300 Ω) | 44.44 S ~ 0.4 S (0.02 Ω ~ 250 Ω) |
| | Setting resolution | H | 0.01 S | | 0.02 S | 0.03 S | 0.04 S |
| | | L | 0.001 S | | 0.002 S | 0.003 S | 0.004 S |
| | Accuracy | | ± 0.4% of {Setting + Range} | | | | |
| | CR mode slew rate (Typ. value) | | 10.7 A/us | | | | |
| Constant Voltage (CV) Mode | Voltage setting range | H | 0 V ~ 150 V | | | | |
| | | L | 0 V ~ 15V | | | | |
| | Setting resolution | H | 0.01 V | | | | |
| | | L | 0.001 V | | | | |
| | Accuracy | | ± 0.1% of (Setting + Range) | | | | |
| | Response time (Typ. value) | | 600 us | | | | |
| Constant Power (CP) Mode | Voltage range | | 150 V | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | |
| | Voltage range | | 15 V | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | |
| External Control (EXT CC) Mode | Current setting range | H | 0 A ~ 500 A | | 0 A ~ 1000 A | 0 A ~ 1500 A | 0 A ~ 2000 A |
| | | L | 0 A ~ 50 A | | 0 A ~ 100 A | 0 A ~ 150 A | 0 A ~ 200 A |
| | Setting resolution | H | 50 mA | | 100 mA | 150 mA | 200 mA |
| | | L | 5 mA | | 10 mA | 15 mA | 20 mA |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | |
| | Control voltage | | 0~10 V | | | | |
| External Control (EXT CP) Mode | Voltage range | | 150 V | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | |
| | Voltage range | | 15 V | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | |
| | Control voltage | | 0~10 V | | | | |



## 150V Type (Continued from previous page)

| Model | | | QL-D-5K-1/B | QL-D-5K-1 | QL-D-10K-1 | QL-D-15K-1 | QL-D-20K-1 |
|---|---|---|---|---|---|---|---|
| External Control (EXT CV)Mode | Power setting range | H | 0 V ~ 150 V | | | | |
| | | L | 0 V ~ 15V | | | | |
| | Setting resolution | H | 0.01 V | | | | |
| | | L | 0.001 V | | | | |
| | Accuracy | | ± 0.1% of (Setting + Range) | | | | |
| | Response time (Typ. value) | | 600 us | | | | |
| | Control voltage | | 0~10 V | | | | |
| SHORT Mode | | | 500 A | | 1000 A | 1500 A | 2000 A |
| DC operating mode | | | | | | | |
| Dynamic Mode (Variable load) | Control method | | Switching operation (sequential switching between 2 or up to 32 different load conditions) | | | | |
| | Available load modes | | CC / CR / CV / CP mode | | | | |
| | Setting cycle | | ~20 ms / ~200 ms / ~2 s / ~20 s / ~60 s | | | | |
| | Cycle resolution | | 1 μs / 10 μs / 100 μs / 1 ms / 10 ms | | | | |
| | Operation selection | | Single (Time only), Repeat | | | | |
| | Minimum load response time (nominal) | | 5 us | | | | |
| DC sweep mode | | | | | | | |
| Sweep R (V-I characteristic test) | | | Measure current and voltage values while varying the load in CR mode | | | | |
| Sweep C (overcurrent characteristic test) | | | Measure current and voltage values while varying the load in CC mode | | | | |
| Sweep P (overpower characteristic test) | | | Measure power and voltage values while varying the load in CP mode | | | | |
| DC Sequence Mode | | | | | | | |
| Available mode | | | CC / CR / CV / CP Mode | | | | |
| Maximum number of steps | | | 4096 | | | | |
| Step time | | | 1 ms~10 min (Common in each step) | | | | |
| Step time resolution | | | 1 ms(1 ms~100 ms) / 100 ms(100 ms~10 min) | | | | |
| Number of times repeated | | | 1 ~ 65535, or ∞ | | | | |
| DC Measurement Section | | | | | | | |
| DC voltage measurement | Power setting range | H | 0 ~ 150 V | | | | |
| | | L | 0 ~ 15 V | | | | |
| | Measurement resolution | H | 0.01 V | | | | |
| | | L | 0.001 V | | | | |
| | Measurement accuracy | H | ± 0.05% of (Reading + Range) | | | | |
| | | L | ± 0.05% of (Reading + Range) | | | | |
| | Measurement Time | | 100 ms | | | | |
| DC current measurement | Current setting range | H | 0 ~ 500 A | | 0 ~ 1000 A | 0 ~ 1500 A | 0 ~ 2000 A |
| | | L | 0 ~ 50 A | | 0 ~ 100 A | 0 ~ 150 A | 0 ~ 200 A |
| | Measurement resolution | H | 0.05 A | | 0.1 A | 0.15 A | 0.2 A |
| | | L | 0.005 A | | 0.01 A | 0.015 A | 0.02 A |
| | Measurement accuracy | H | ± 0.2% of (Reading + Range) | | | | |
| | | L | ± 0.2% of (Reading + Range) | | | | |
| | Measurement Time | | 100 ms | | | | |
| DC Power Measurement | Measurement method | | Voltage × Current calculation | | | | |
| | Measurement Time | | 100 ms | | | | |
| Limit function | | | | | | | |
| Current Limit | Current setting range | | 0 A ~ 500 A | | 0 A ~ 1000 A | 0 A ~ 1500 A | 0 A ~ 2000 A |
| | Resolution | | 1/1000 of range | | | | |
| | Operation at Limit | | Current limit at load off or 110% of setpoint (selectable) | | | | |
| Power Limit | Rated power | | 5000 W | | 10000 W | 15000 W | 20000 W |
| | Operation at Limit | | Power limiting at 110% of load off or rated power (selectable) | | | | |
| General Specifications | | | | | | | |
| Power supply | Input Rating | | 1Ø2W | | | | |
| | Input Voltage/ Frequency | | AC85 V ~ 264 V, Overvoltage category II / 47 Hz ~ 63 Hz | | | | |
| | Force rate (at maximum load) | | 0.9 or higher | | | | |
| Input power | At maximum load | | 240 VA | | 1810 VA | 1810 VA | 1810 VA |
| Input current | At maximum load | | 3A | | 18 A | 18 A | 18 A |
| Weight (Main body only) | | | 31kg | 35kg | 85kg | 115kg | 145kg |
| Dimension(WxHxD) *Not including protrusions | | | 430×219×550mm | | 430×487×630mm | 430×665×630mm | 430×843×630mm |
| Dimension(WxHxD)*Including protrusions | | | 435×238(foot)×700mm | 430×322×700mm | 430×580×785mm | 430×758×785mm | 430×936×785mm |
| Shape of power supply | | | Inlet | | Terminal block (electrical) | | |
| Load terminal shape | | | M10 terminal | | | | |

# Specification

## 600V Type

S-2501-01

| Model | | | QL-D-5K-6/B | QL-D-5K-6 | QL-D-10K-6 | QL-D-15K-6 | QL-D-20K-6 | QL-D-25K-6 |
|---|---|---|---|---|---|---|---|---|
| Load carrying capacity | | | | | | | | |
| DC Rating | | Rated voltage | 600 V | | | | | |
| | | Rated current | 350 A | | 700 A | 1050 A | 1400 A | 1750 A |
| | | Rated power | 5000 W | | 10000 W | 15000 W | 20000 W | 25000 W |
| Constant Current (CC) Mode | Current setting range | H | 0 A ~ 350 A | | 0 A ~ 700 A | 0 A ~ 1050 A | 0 A ~ 1400 A | 0 A ~ 1750 A |
| | | L | 0 A ~ 35 A | | 0 A ~ 70 A | 0 A ~ 105 A | 0 A ~ 140 A | 0 A ~ 175 A |
| | Setting resolution | H | 10 mA | | 20 mA | 30 mA | 40 mA | 50 mA |
| | | L | 1 mA | | 2 mA | 3 mA | 4 mA | 5 mA |
| | Accuracy | H | ± {0.2% of Setting + 0.4% of Range} | | | | | |
| | | L | ± {0.2% of Setting + 0.4% of Range} | | | | | |
| | CC mode slew rate | H | 0.2 A / µs ~ 20 A / µs | | 0.2 A / µs ~ 20 A / µs | 0.2 A / µs ~ 20 A / µs | 0.2 A / µs ~ 20 A / µs | 0.2 A / µs ~ 20 A / µs |
| | | L | 0.02 A / µs ~ 2 A / µs | | 0.02 A / µs ~ 2 A / µs | 0.02 A / µs ~ 2 A / µs | 0.02 A / µs ~ 2 A / µs | 0.02 A / µs ~ 2 A / µs |
| | Rise current over /Under Shoot range | H//L | ± {0.2% of Setting + 0.4% of Range} | | | | | |
| Constant Resistance (CR) Mode | Voltage range | | 100 V | | | | | |
| | Resistance setting range | H | 83.33 S ~ 0.002 S (0.012 Ω ~ 480 Ω) | | 166.66 S ~ 0.006 S (0.006 Ω ~ 240 Ω) | 249.99 S ~ 0.006 S (0.004 Ω ~ 160 Ω) | 333.32 S ~ 0.008 S (0.003 Ω ~ 120 Ω) | 416.65 S ~ 0.010 S (0.0024 Ω ~ 96 Ω) |
| | | L | 8.333 S ~ 0.0002 S (0.12 Ω ~ 4800 Ω) | | 16.66 S ~ 0.0006 S (0.06 Ω ~ 2400 Ω) | 24.99 S ~ 0.0006 S (0.04 Ω ~ 1600 Ω) | 33.32 S ~ 0.0008 S (0.03 Ω ~ 1200 Ω) | 416.65 S ~ 0.001 S (0.0024 Ω ~ 966 Ω) |
| | Resolution | H | 0.002 S | | 0.004 S | 0.006 S | 0.008 S | 0.01 S |
| | | L | 0.0002 S | | 0.0004 S | 0.0006 S | 0.0008 S | 0.001 S |
| | Accuracy | | ± 0.4% of {Setting + Range} | | | | | |
| | Voltage range | | 600 V | | | | | |
| | Resistance setting range | H | 33.33 S ~ 0.0006 S (0.03 Ω ~ 1800 Ω) | | 66.66 S ~ 0.0012 S (0.015 Ω ~ 900 Ω) | 99.99 S ~ 0.0018 S (0.01 Ω ~ 600 Ω) | 133.33 S ~ 0.0024 S (0.0075 Ω ~ 450 Ω) | 166.66 S ~ 0.003 S (0.006 Ω ~ 360 Ω) |
| | | L | 3.333 S ~ 0.00006 S (0.3 Ω ~ 18000 Ω) | | 6.666 S ~ 0.00012 S (0.15 Ω ~ 9000 Ω) | 9.999 S ~ 0.00018 S (0.1 Ω ~ 6000 Ω) | 13.333 S ~ 0.00024 S (0.075 Ω ~ 4500 Ω) | 16.666 S ~ 0.0003 S (0.06 Ω ~ 3600 Ω) |
| | Setting resolution | H | 0.0006 S | | 0.0012 S | 0.0018 S | 0.0024 S | 0.0030 S |
| | | L | 0.00006 S | | 0.00012 S | 0.00018 S | 0.00024 S | 0.00030 S |
| | Accuracy | | ± 0.4% of {Setting + Range} | | | | | |
| | CR mode slew rate (Typ. value) | | 0.64 A/us | | | | | |
| Constant Voltage (CV) Mode | Voltage setting range | H | 0 V ~ 600 V | | | | | |
| | | L | 0 V ~ 100 V | | | | | |
| | Setting resolution | H | 0.1 | | | | | |
| | | L | 0.01 | | | | | |
| | Accuracy | | ± 0.1% of (Setting + Range) | | | | | |
| | Response time (Typ. value) | H | 75 us | | | | | |
| Constant Power (CP) Mode | Voltage range | | 100 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Voltage range | | 600 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| External Control (EXT CC) Mode | Current setting range | H | 0 A ~ 350 A | | 0 A ~ 700 A | 0 A ~ 1050 A | 0 A ~ 1400 A | 0 A ~ 1750 A |
| | | L | 0 A ~ 35 A | | 0 A ~ 70 A | 0 A ~ 105 A | 0 A ~ 140 A | 0 A ~ 175 A |
| | Setting resolution | H | 10 mA | | 20 mA | 30 mA | 40 mA | 50 mA |
| | | L | 1 mA | | 2 mA | 3 mA | 4 mA | 5 mA |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Control voltage | | 0~10 V | | | | | |
| External Control (EXT CP) Mode | Voltage range | | 100 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Voltage range | | 600 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Control voltage | | 0~10 V | | | | | |



## 600V Type (Continued from previous page)

| Model | | | QL-D-5K-6/B | QL-D-5K-6 | QL-D-10K-6 | QL-D-15K-6 | QL-D-20K-6 | QL-D-25K-6 |
|---|---|---|---|---|---|---|---|---|
| External Control (EXT CV)Mode | Voltage setting range | H | 0 V ~ 600 V | | | | | |
| | | L | 0 V ~ 100 V | | | | | |
| | Setting resolution | H | 0.1 | | | | | |
| | | L | 0.01 | | | | | |
| | Accuracy | | ± 0.1% of (Setting + Range) | | | | | |
| | Response time (Typ. value) | | 75 us | | | | | |
| | Control voltage | | 0~10 V | | | | | |
| SHORT Mode | | | 350 A | | 700 A | 1050 A | 1400 A | 1750 A |
| DC operating mode | | | | | | | | |
| Dynamic Mode (Variable load) | Control method | | Switching operation (sequential switching between 2 or up to 32 different load conditions) | | | | | |
| | Available load modes | | CC / CR / CV / CP mode | | | | | |
| | Setting cycle | | ~20 ms / ~200 ms / ~2 s / ~20 s / ~60 s | | | | | |
| | Cycle resolution | | 1 µs / 10 µs / 100 µs / 1 ms / 10 ms | | | | | |
| | Operation selection | | Single (Time only), Repeat | | | | | |
| | Minimum load response time (nominal) | | 5 us | | | | | |
| DC sweep mode | | | | | | | | |
| Sweep R (V-I characteristic test) | | | Measure current and voltage values while varying the load in CR mode | | | | | |
| Sweep C (overcurrent characteristic test) | | | Measure current and voltage values while varying the load in CC mode | | | | | |
| Sweep P (overpower characteristic test) | | | Measure power and voltage values while varying the load in CP mode | | | | | |
| DC Sequence Mode | | | | | | | | |
| Available mode | | | CC / CR / CV / CP Mode | | | | | |
| Maximum number of steps | | | 4096 | | | | | |
| Step time | | | 1 ms~10 min (Common in each step) | | | | | |
| Step time resolution | | | 1 ms(1 ms~100 ms) / 100 ms(100 ms~10 min) | | | | | |
| Number of times repeated | | | 1~65535, or ∞ | | | | | |
| DC Measurement Section | | | | | | | | |
| DC voltage measurement | Power setting range | H | 0 ~ 600 V | | | | | |
| | | L | 0 ~ 100 V | | | | | |
| | Measurement resolution | H | 0.1 V | | | | | |
| | | L | 0.01 V | | | | | |
| | Measurement accuracy | H | ± 0.05% of (Reading + Range) | | | | | |
| | | L | ± 0.05% of (Reading + Range) | | | | | |
| | Measurement Time | | 100 ms | | | | | |
| DC current measurement | Current setting range | H | 0 A ~ 350 A | | 0 A ~ 700 A | 0 A ~ 1050 A | 0 A ~ 1400 A | 0 A ~ 1750 A |
| | | L | 0 A ~ 35 A | | 0 A ~ 70 A | 0 A ~ 105 A | 0 A ~ 140 A | 0 A ~ 175 A |
| | Measurement resolution | H | 0.05 A | | | 0.01 A | | |
| | | L | 0.005 A | | | 0.001 A | | |
| | Measurement accuracy | H | ± 0.2% of (Reading + Range) | | | | | |
| | | L | ± 0.2% of (Reading + Range) | | | | | |
| | Measurement Time | | 100 ms | | | | | |
| DC Power Measurement | Measurement method | | Voltage × Current calculation | | | | | |
| | Measurement Time | | 100 ms | | | | | |
| Limit function | | | | | | | | |
| Current Limit | Current setting range | | 0 A~500 A | | 0 A~350 A | 0 A~200 A | | |
| | Resolution | | 1/1000 of range | | | | | |
| | Operation at Limit | | Current limit at load off or 110% of setpoint (selectable) | | | | | |
| Power Limit | Rated power | | 5000 W | | 10000 W | 15000 W | 20000 W | 25000 W |
| | Operation at Limit | | Power limiting at 110% of load off or rated power (selectable) | | | | | |
| General Specifications | | | | | | | | |
| Power supply | Input Rating | | 1Ø2W | | | | | |
| | Input Voltage/ Frequency | | AC85 V ~ 264 V, Overvoltage category II / 47 Hz ~ 63 Hz | | | | | |
| | Force rate (at maximum load) | | 0.9 or higher | | | | | |
| Input power | At maximum load | | 240 VA | | 1810 VA | 1810 VA | 1810 VA | 1810 VA |
| Input current | At maximum load | | 3A | | 18 A | 18 A | 18 A | 18 A |
| Weight (Main body only) | | | 31kg | 35kg | 85kg | 115kg | 145kg | 175kg |
| Dimension(WxHxD) *Not including protrusions | | | 430×219×550mm | | 430×487×630mm | 430×665×630mm | 430×843×630mm | 430×1021×630mm |
| Dimension(WxHxD) *Including protrusions | | | 435×238(foot)×700mm | 430×322×700mm | 430×580×785mm | 430×758×785mm | 430×936×785mm | 430×1114×785mm |
| Shape of power supply | | | Inlet | | Terminal block (electrical) | | | |
| Load terminal shape | | | M10 terminal | | | | | |

# Specification

## 1000V Type

S-2501-01

| Model | | | QL-D-5K-1K/B | QL-D-5K-1K | QL-D-10K-1K | QL-D-15K-1K | QL-D-20K-1K | QL-D-25K-1K |
|---|---|---|---|---|---|---|---|---|
| Load carrying capacity | | | | | | | | |
| DC Rating | | Rated voltage | 1000 V | | | | | |
| | | Rated current | 200 A | | 400 A | 600 A | 800 A | 1000 A |
| | | Rated power | 5000 W | | 10000 W | 15000 W | 20000 W | 25000 W |
| Constant Current (CC) Mode | Current setting range | H | 0A ~ 200 A | | 0A ~ 400 A | 0A ~ 600 A | 0A ~ 800 A | 0A ~ 1000 A |
| | | L | 0 A ~ 20 A | | 0 A ~ 40 A | 0 A ~ 60 A | 0 A ~ 80 A | 0 A ~ 100 A |
| | Setting resolution | H | 5 mA | | 10 mA | 15 mA | 20 mA | 25 mA |
| | | L | 0.5 mA | | 1.0 mA | 1.5 mA | 2.0 mA | 2.5 mA |
| | Accuracy | H | ± {0.2% of Setting + 0.4% of Range} | | | | | |
| | | L | ± {0.2% of Setting + 0.4% of Range} | | | | | |
| | CC mode slew rate | H | 0.12 A / µs ~ 12 A / µs | | 0.12 A / µs ~ 12 A / µs | 0.12 A / µs ~ 12 A / µs | 0.12 A / µs ~ 12 A / µs | 0.12 A / µs ~ 12 A / µs |
| | | L | 0.012 A / µs ~ 1.2 A / µs | | 0.012 A / µs ~ 1.2 A / µs | 0.012 A / µs ~ 1.2 A / µs | 0.012 A / µs ~ 1.2 A / µs | 0.012 A / µs ~ 1.2 A / µs |
| | Rise current over /Under Shoot range | H//L | ± {0.2% of Setting + 0.4% of Range} | | | | | |
| Constant Resistance (CR) Mode | Voltage range | | 150 V | | | | | |
| | Resistance setting range | H | 11.11 S ~ 0.0002 S (0.09 Ω ~ 4800 Ω) | | 22.22 S ~ 0.0004 S (0.045 Ω ~ 2400 Ω) | 33.33 S ~ 0.0006 S (0.03 Ω ~ 1600 Ω) | 44.44 S ~ 0.0008 S (0.0225 Ω ~ 1200 Ω) | 55.55 S ~ 0.0010 S (0.018 Ω ~ 960 Ω) |
| | | L | 1.111 S ~ 0.00002 S (0.9 Ω ~ 48000 Ω) | | 2.222 S ~ 0.00004 S (0.45 Ω ~ 24000 Ω) | 3.333 S ~ 0.00006 S (0.3 Ω ~ 16000 Ω) | 4.444 S ~ 0.00008 S (0.225 Ω ~ 12000 Ω) | 5.555 S ~ 0.00010 S (0.18 Ω ~ 9600 Ω) |
| | Resolution | H | 0.0002 S | | 0.0004 S | 0.0006 S | 0.0008 S | 0.001 S |
| | | L | 0.00002 S | | 0.00004 S | 0.00006 S | 0.00008 S | 0.0001 S |
| | Accuracy | | ± 0.4% of {Setting + Range} | | | | | |
| | Voltage range | | 1000 V | | | | | |
| | Resistance setting range | H | 3.333 S ~ 0.00006 S (0.3 Ω ~ 18000 Ω) | | 6.666 S ~ 0.00012 S (0.15 Ω ~ 9000 Ω) | 9.999 S ~ 0.00018 S (0.1 Ω ~ 6000 Ω) | 13.332 S ~ 0.00024 S (0.075 Ω ~ 4500 Ω) | 16.665 S ~ 0.0003 S (0.06 Ω ~ 3600 Ω) |
| | | L | 0.333 S ~ 0.000006 S (3.3 Ω ~ 180000 Ω) | | 0.666 S ~ 0.000012 S (1.5 Ω ~ 90000 Ω) | 0.999 S ~ 0.000018 S (1 Ω ~ 60000 Ω) | 1.332 S ~ 0.000024 S (0.75 Ω ~ 45000 Ω) | 1.665 S ~ 0.00003 S (0.6 Ω ~ 36000 Ω) |
| | Setting resolution | H | 0.00006 S | | 0.00012 S | 0.00018 S | 0.00024 S | 0.00030 S |
| | | L | 0.000006 S | | 0.000012 S | 0.000018 S | 0.000024 S | 0.000030 S |
| | Accuracy | | ± 0.4% of {Setting + Range} | | | | | |
| | CR mode slew rate (Typ. value) | | 1.06 A/us | | | | | |
| Constant Voltage (CV) Mode | Voltage setting range | H | 0 V ~ 1000 V | | | | | |
| | | L | 0 V ~ 150 V | | | | | |
| | Setting resolution | H | 0.1 | | | | | |
| | | L | 0.01 | | | | | |
| | Accuracy | | ± 0.1% of (Setting + Range) | | | | | |
| | Response time (Typ. value) | H | 150 us | | | | | |
| Constant Power (CP) Mode | Voltage range | | 150 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Voltage range | | 1000 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| External Control (EXT CC) Mode | Current setting range | H | 0A ~ 200 A | | 0A ~ 400 A | 0A ~ 600 A | 0A ~ 800 A | 0A ~ 1000 A |
| | | L | 0 A ~ 20 A | | 0 A ~ 40 A | 0 A ~ 60 A | 0 A ~ 80 A | 0 A ~ 100 A |
| | Setting resolution | H | 5 mA | | 10 mA | 15 mA | 20 mA | 25 mA |
| | | L | 0.5 mA | | 1.0 mA | 1.5 mA | 2.0 mA | 2.5 mA |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Control voltage | | 0~10 V | | | | | |
| External Control (EXT CP) Mode | Voltage range | | 150 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Voltage range | | 1000 V | | | | | |
| | Power setting range | H | 0 W ~ 5000 W | | 0 W ~ 10000 W | 0 W ~ 15000 W | 0 W ~ 20000 W | 0 W ~ 25000 W |
| | | L | 0 W ~ 500 W | | 0 W ~ 1000 W | 0 W ~ 1500 W | 0 W ~ 2000 W | 0 W ~ 2500 W |
| | Resolution | H | 0.5 W | | 1.0 W | 1.5 W | 2.0 W | 2.5 W |
| | | L | 0.05 W | | 0.1 W | 0.15 W | 0.2 W | 0.25 W |
| | Accuracy | | ± 1.0% of (Setting + Range) | | | | | |
| | Control voltage | | 0~10 V | | | | | |



## 1000V Type (Continued from previous page)

| Model | | | QL-D-5K-1K/B | QL-D-5K-1K | QL-D-10K-1K | QL-D-15K-1K | QL-D-20K-1K | QL-D-25K-1K |
|---|---|---|---|---|---|---|---|---|
| External Control (EXT CV)Mode | Voltage setting range | H | 0 V ~ 1000 V | | | | | |
| | | L | 0 V ~ 150 V | | | | | |
| | Setting resolution | H | 0.1 | | | | | |
| | | L | 0.01 | | | | | |
| | Accuracy | | ± 0.1% of (Setting + Range) | | | | | |
| | Response time (Typ. value) | | 150 us | | | | | |
| | Control voltage | | 0~10 V | | | | | |
| SHORT Mode | | | 200 A | | 400 A | 600 A | 800 A | 1000 A |
| DC operating mode | | | | | | | | |
| Dynamic Mode (Variable load) | Control method | | Switching operation (sequential switching between 2 or up to 32 different load conditions) | | | | | |
| | Available load modes | | CC / CR / CV / CPモード | | | | | |
| | Setting cycle | | ～20 ms / ～200 ms / ～2 s / ～20 s / ～60 s | | | | | |
| | Cycle resolution | | 1 µs / 10 µs / 100 µs / 1 ms / 10 ms | | | | | |
| | Operation selection | | Single (Time only), Repeat | | | | | |
| | | | Function Request: Set the number of times to repeat (want) | | | | | |
| | Minimum load response time (nominal) | | 5 us | | | | | |
| DC sweep mode | | | | | | | | |
| Sweep R (V-I characteristic test) | | | Measure current and voltage values while varying the load in CR mode | | | | | |
| Sweep C (overcurrent characteristic test) | | | Measure current and voltage values while varying the load in CC mode | | | | | |
| Sweep P (overpower characteristic test) | | | Measure power and voltage values while varying the load in CP mode | | | | | |
| DC Sequence Mode | | | | | | | | |
| Available mode | | | CC / CR / CV / CP Mode | | | | | |
| Maximum number of steps | | | 4096 | | | | | |
| Step time | | | 1 ms～10 min (Common in each step) | | | | | |
| Step time resolution | | | 1 ms(1 ms～100 ms) / 100 ms(100 ms～10 min) | | | | | |
| Number of times repeated | | | 1～65535, 又は∞ | | | | | |
| DC Measurement Section | | | | | | | | |
| DC voltage measurement | Power setting range | H | 0 ~ 1000 V | | | | | |
| | | L | 0 ~ 150 V | | | | | |
| | Measurement resolution | H | 0.1 V | | | | | |
| | | L | 0.01 V | | | | | |
| | Measurement accuracy | H | ± 0.05% of (Reading + Range) | | | | | |
| | | L | ± 0.05% of (Reading + Range) | | | | | |
| | Measurement Time | | 100 ms | | | | | |
| DC current measurement | Current setting range | H | 0A ~ 200 A | | 0A ~ 400 A | 0A ~ 600 A | 0A ~ 800 A | 0A ~ 1000 A |
| | | L | 0 A ~ 20 A | | 0 A ~ 40 A | 0 A ~ 60 A | 0 A ~ 80 A | 0 A ~ 100 A |
| | Measurement resolution | H | 0.01 A | | 0.02 A | 0.03 A | 0.04 A | 0.05 A |
| | | L | 0.005 A | | 0.01A | 0.015 A | 0.02 A | 0.025 A |
| | Measurement accuracy | H | ± 0.2% of (Reading + Range) | | | | | |
| | | L | ± 0.2% of (Reading + Range) | | | | | |
| | Measurement Time | | 100 ms | | | | | |
| DC Power Measurement | Measurement method | | Voltage × Current calculation | | | | | |
| | Measurement Time | | 100 ms | | | | | |
| Limit function | | | | | | | | |
| Current Limit | Current setting range | | 0A ~ 200 A | | 0A ~ 400 A | 0A ~ 600 A | 0A ~ 800 A | 0A ~ 1000 A |
| | Resolution | | 1/1000 of range | | | | | |
| | Operation at Limit | | Current limit at load off or 110% of setpoint (selectable) | | | | | |
| Power Limit | Rated power | | 5000 W | | 10000 W | 15000 W | 20000 W | 25000 W |
| | Operation at Limit | | Power limiting at 110% of load off or rated power (selectable) | | | | | |
| General Specifications | | | | | | | | |
| Power supply | Input Rating | | 1Ø2W | | | | | |
| | Input Voltage/ Frequency | | AC85 V ~ 264 V, Overvoltage category II ／ 47 Hz ~ 63 Hz | | | | | |
| | Force rate (at maximum load) | | 0.9 or higher | | | | | |
| Input power | At maximum load | | 240 VA | | 1810 VA | 1810 VA | 1810 VA | 1810 VA |
| Input current | At maximum load | | 3A | | 18 A | 18 A | 18 A | 18 A |
| Weight (Main body only) | | | 31kg | 35kg | 85kg | 115kg | 145kg | 175kg |
| Dimension(WxHxD) *Not including protrusions | | | 430×219×550mm | | 430×487×630mm | 430×665×630mm | 430×843×630mm | 430×1021×630mm |
| Dimension(WxHxD) *Including protrusions | | | 435×238(foot)×700mm | 430×322×700mm | 430×580×785mm | 430×758×785mm | 430×936×785mm | 430×1114×785mm |
| Shape of power supply | | | Inlet | | Terminal block (electrical) | | | |
| Load terminal shape | | | M10 terminal | | | | | |

# Specification

## Common to all models

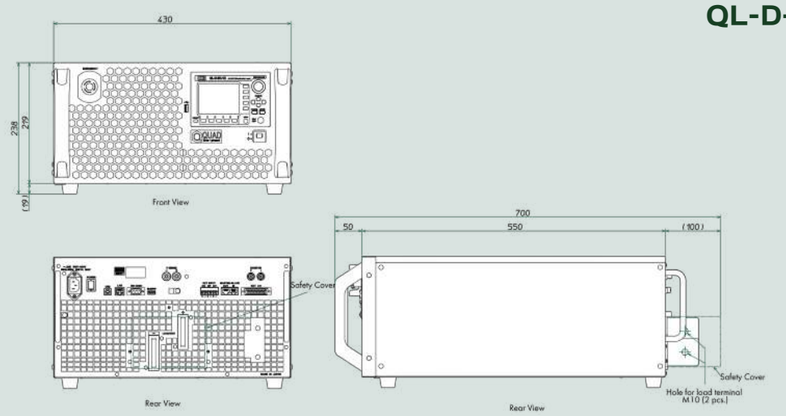
S-2501-01

| | | | | |
|---|---|---|---|---|
| Protection, alarm function | | | | |
| Overcurrent protection | | | | Depends on current limit function (load off or current limit) |
| Overpower protection | | | | Depends on current limit function (load off or current limit) |
| Overheat Protection | | | | load off |
| Overvoltage alarm | | | | load off |
| Reverse connection alarm | | | | load off |
| Voltage sense open alarm | | | | load off |
| Other Functions | | | | |
| Remote sensing | Feature | | | Voltage detection can be selected between INT (load terminal) and EXT (EXT IN terminal) by the main unit setting. |
| | VSENSE terminal (rear panel) | | | Banana terminals, connection with included safety plugs recommended |
| Parallel run | | | | Up to 6 units possible (parallel operation with different capacities is possible for the same voltage specification) |
| Trigger output | Output format | | | Pulse output |
| | Output voltage | | | +5 V |
| | Terminal | | | DI/DO DSUB 25Pin EXT contacts |
| Power output | | | | DI/DO DSUB 25Pin +5V output contact, supply capacity 100mA |
| External control signal Output/Input | | | | |
| Control Input | Load mode setting | CC | Photocoupler LED Input | Shift to CC mode when contact is turned on |
| | | CV | | Shift to CV mode when contact is turned on |
| | | CP | | Shift to CP mode when contact is turned on |
| | Load on/off | | | Load ON when contact is ON, Load OFF when contact is OFF |
| | Current range designation | | | Current high range when contact is ON, current low range when contact is OFF |
| | Emergency stop | | | Emergency stop when contact is ON, emergency stop is canceled when contact is OFF |
| DIDO | Load on/off | | Photo-coupler open collector output | Load ON state when contact is ON, Load OFF state when contact is OFF |
| | Current range | | | Current high range state when contact is ON, current low range state when contact is OFF |
| | Protection/alarm status | | | Alarm state when contact is ON, alarm state when contact is OFF |
| | load-mode condition | CC | | CC mode state when contact is ON |
| | | CV | | CV mode state when contact is ON |
| | | CP | | CP mode state when contact is ON |
| Voltage monitor | Monitor output | | | 5V full scale |
| | Output impedance | | | 50 Ω |
| | Measurement accuracy | | | ±{1% of Conv.Volt. +1% of F.S.} |
| | Terminal | | | BNC |
| Current Monitor | Monitor output | | | 5V full scale |
| | Output impedance | | | 50 Ω |
| | Measurement accuracy | | | ±{1% of Conv.Volt. +1% of F.S.} |
| | Terminal | | | BNC |
| Interface | | | | |
| USB (HOST) | | | | USB2.0 compliant (Fullspeed) |
| USB (DEVICE) | | | | USB2.0 compliant (Fullspeed) |
| LAN | | | | IEEE 802,3 100Base-Tx/10Base-T Ethernet IPv4,RJ-45 connector、TCP/IP、Keep Alive support |
| RS-232C | | | | D-SUB 9pin, baud rate：under consideration (9600/19200/38400/115200 bps), data length：8 bit, stop bit：1 bit, Parity bits：None, Flow control：None/CTS-RTS |
| GPIB (Option) | | | | IEEE488.1 compliant (Address 1～30, Factory default1) |
| General Specifications | | | | |
| Environmental condition | Operating environment | | | Indoor use |
| | Operating temperature | | | 0 °C～ +40 °C |
| | Operating humidity | | | 20 %RH ～ 85 %RH (No dew condensation) |
| | Storage temperature | | | -20 °C～ +60 °C |
| | Storage Humidity | | | 20 %RH ～ 85 %RH (No dew condensation) |
| | Elevation | | | 2000m or less |
| Cooling method | | | | Forced air cooling by fan |
| Withstand voltage | Input-Load Between terminals | | | AC1500 V、Applied for 1 minute |
| | Input - FG | | | |
| Insulation resistance | Input - FG | | | 500 V DC, 30 M Ω or more |
| Compliant Standards | EMC Standards | | | EN55011 |
| | Safety standards | | | EN61010-1 compliant, Pollution degree 2 |
| Accessory | | | | |
| Handling instructions | | | | Included in the attached CD-ROM |
| LOAD terminal cover | | | | Cover to protect the LOAD terminal |
| Screw for LOAD terminal | | | | Fixing screw for fixing the load cable to the LOAD terminal |
| Safety plug (red, black) | | | | Plug for connection to voltage sense terminal |
| Power cord (only for inlet) | | | | Power cable to energize the unit |
| D-sub 25Pin connector | | | | Connector for connection to DI/DO |
| Options | | | | |
| QL-C-01 | MPPT function | | | MPPT (maximum power point tracking) mode option in load mode |
| QO-C-01 | GP-IB/RS-232C converter | | | Option for GP-IB communication / RS-232C communication |
| QO-C-02 | Master-slave connection cable(1m) | | | Cable used for parallel operation |

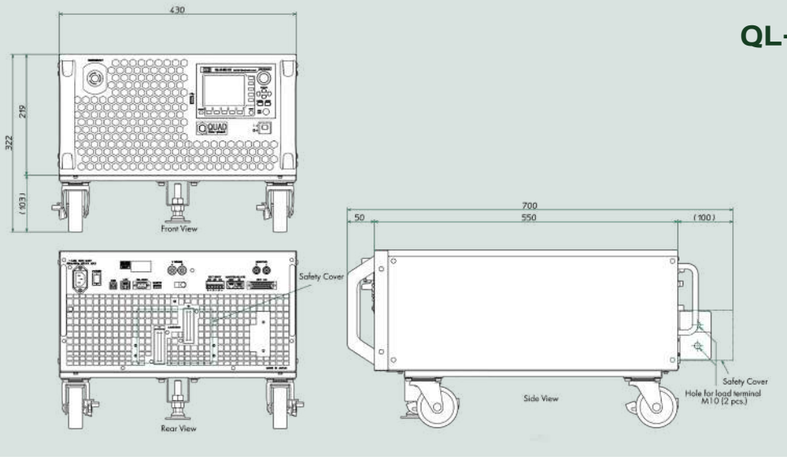


# Drawings

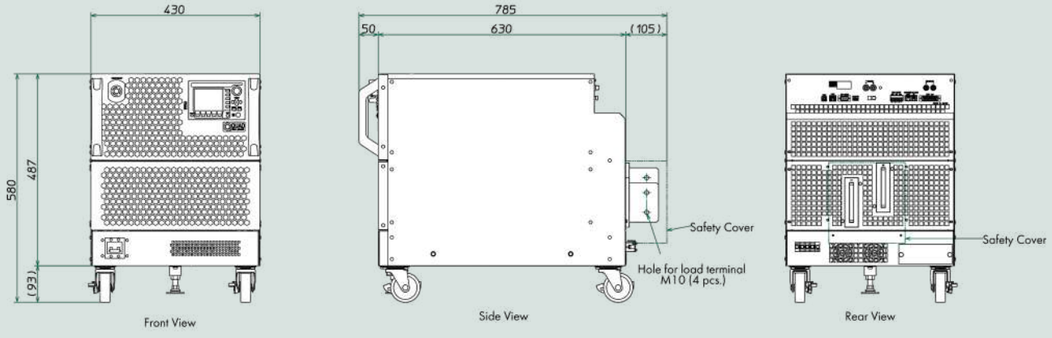
## QL-D-5K-x/B




## QL-D-5K-x

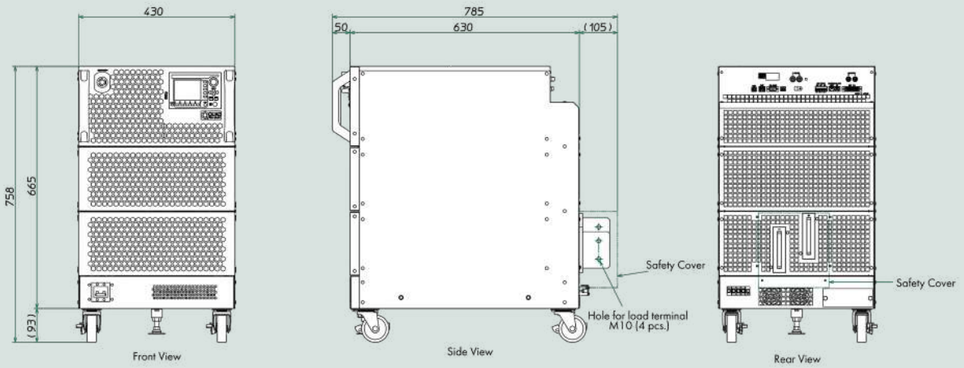



## QL-D-10K-x

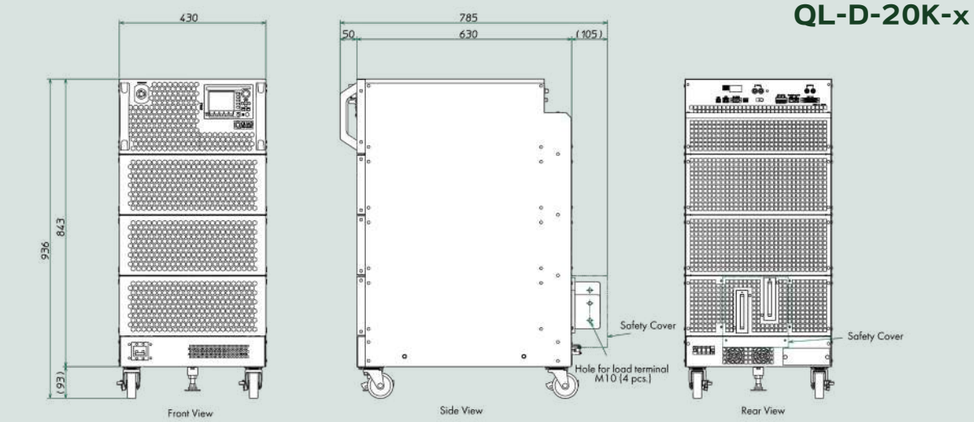


# Drawings

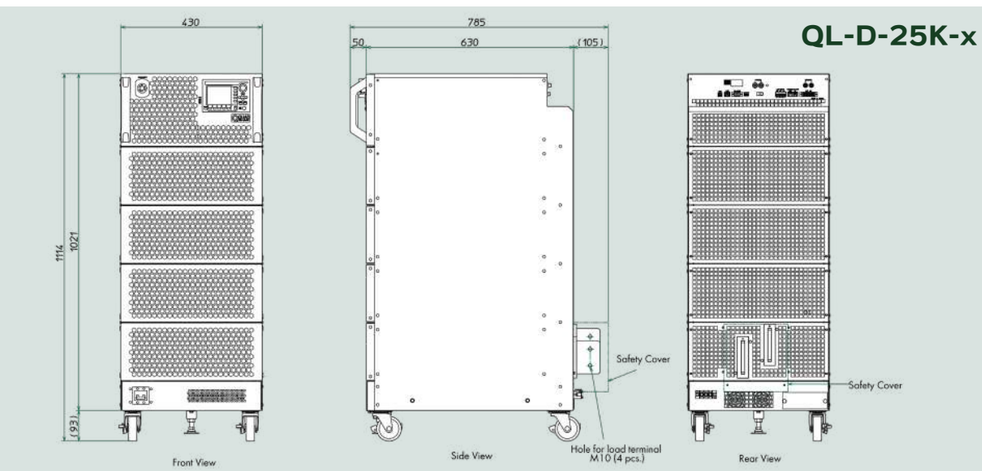
## QL-D-15K-x




## QL-D-20K-x




## QL-D-25K-x






# Price list

## 150V type

| Model | Specification | Price |
|---|---|---|
| QL-D-5K-1/B* | 150V/500A/5kW 50A/μs | Please contact us |
| QL-D-5K-1 | 150V/500A/5kW 50A/μs | |
| QL-D-10K-1 | 150V/1000A/10kW 50A/μs | |
| QL-D-15K-1 | 150V/1500A/15kW 50A/μs | |
| QL-D-20K-1 | 150V/2000A/20kW 50A/μs | |

* QL-D-5K-1/B is bench-top type. All other types are castor type.

## 600V type

| Model | Specification | Price |
|---|---|---|
| QL-D-5K-6/B* | 600V/350A/5kW 20A/μs | Please contact us |
| QL-D-5K-6 | 600V/350A/5kW 20A/μs | |
| QL-D-10K-6 | 600V/700A/10kW 20A/μs | |
| QL-D-15K-6 | 600V/1050A/15kW 20A/μs | |
| QL-D-20K-6 | 600V/1400A/20kW 20A/μs | |
| QL-D-25K-6 | 600V/1750A/25kW 20A/μs | |

*QL-D-5K-6/B is bench-top type. All other types are castor type.

## 1000V type

| Model | Specification | Price |
|---|---|---|
| QL-D-5K-1K/B* | 1000V/200A/5kW 12A/μs | Please contact us |
| QL-D-5K-1K | 1000V/200A/5kW 12A/μs | |
| QL-D-10K-1K | 1000V/400A/10kW 12A/μs | |
| QL-D-15K-1K | 1000V/600A/15kW 12A/μs | |
| QL-D-20K-1K | 1000V/800A/20kW 12A/μs | |
| QL-D-25K-1K | 1000V/1000A/25kW 12A/μs | |

*QL-D-5K-1K/B is bench-top type. All other types are castor type.

## Interface Accessory

| Model | Specification | Price |
|---|---|---|
| QL-C-01 | MPPT (Maximum Power Point Tracking) function | Please contact us |
| QO-C-01 | GPIB/RS-232C Converter | |
| QO-C-02 | Master-slave connection 1m cable | |

## Inspection report

| Model | Specification | Price |
|---|---|---|
| QL-D-5K-■/B/REC | QL-D-5K-■/B Inspection report(5kW) | Please contact us |
| QL-D-5K-■/REC | QL-D-5K-■ Inspection report(5kW) | |
| QL-D-10K-■/REC | QL-D-10K-■ Inspection report(10kW) | |
| QL-D-15K-■/REC | QL-D-15K-■ Inspection report(15kW) | |
| QL-D-20K-■/REC | QL-D-20K-■ Inspection report(20kW) | |
| QL-D-25K-■/REC | QL-D-20K-■ Inspection report(25kW) | |
| TCP | Traceability by product (Inspection report must be ordered) | |
| SCI | Standard Instrument Test Report (Test report must be ordered) | |

"■" will contain the voltage value in each model (1:150V, 6:600V, 1K:1000V).

KG
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