

NEW

Ultra Compact DC Power Supply

Palmtop size Variable DC Power Supply

R4K-36 series

2 to 40V / 0.1 to 4A / 0.2 to 36W

Weight : 500g



- ▶ Ultra compact, lightweight design that fit in the palm of your hand.
- ▶ There are models that can control the output current at 0.1mA increment.
- ▶ Excellent quietness is achieved by natural air-cooling system.

Ultra Compact DC Power Supply

R4K-36 series



R4K-36 series is ultra-compact, high-performance DC power supply that achieves sufficient output of 36W in the "palm-sized". There are models that can set and output the current at the 0.1mA increment, so the best power supply for applications which require quite precise control of current such as evaluation test of LED or EL lamps. All models include the four-digit output voltage/current meter, and digital interfaces as standard equipment. These strong points allow you to use R4K-36 for the usage such as various quality tests and the production line of electronic components.

We pursue usability !

- Compact and light weight space saving design
- Unique low noise power conversion technology for research application
- Multiple units operation with master / slave and digital interface
- Very quiet due to the adopting natural air-cooling system without cooling fan. Suitable for applications requiring the quietness.

New Functions

- 4-digit meter
- High resolution D/A, A/D converter integrated
- Digital Interface is also available.
- Programmable waveform with pulse and ramp sequence function without external signal.
- Output voltage and output current can be set speedily.

When setting output voltage and output current by rotary encoder on front panel, every time fine switch is pressed, setting digit on digital display will be switched. In case, setting small output value or change setting value widely, setting can be done speedily. (Fine switch cannot be used when output value is set by remotely.)

Ultra compact !

You can realize how small it is with comparison to a mouse.



Lineup

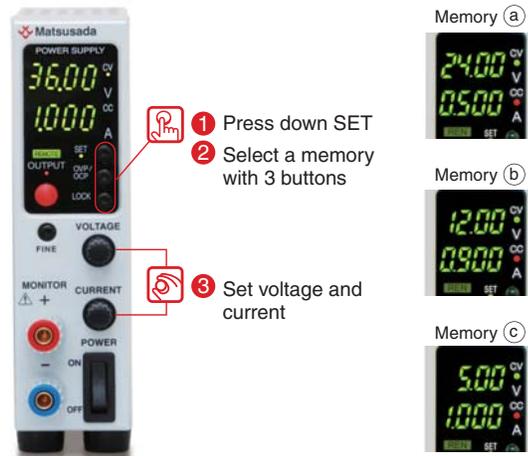
*1 : Value at local control. More precious can be available with remote digital control. Please see P.5 "Various Digital Control Functions".
 *2 : -L(230V) option(»»P.8)

Output voltage (V)	Output current (A)	Output Power (W)	MODEL	Ripple		Minimum setting unit *1		AC input			Weight (typ)
				(mVrms)	(mArms)	Output voltage	Output current	Input voltage	Input current (typ)		
									at AC in 115V	at AC*2 in 230V	
0 to 2	0 to 0.1	0.2	R4K2-0.1	1	1	1mV	0.1mA	115V ± 10%*2 230V ± 10% 50/60Hz single phase	0.1A	0.05A	500g
0 to 36	0 to 0.1	3.6	R4K36-0.1	3	1	10mV	0.1mA		0.5A	0.25A	
0 to 8	0 to 3	24	R4K8-3	5	5	1mV	1mA		1A	0.5A	
0 to 6	0 to 4		R4K6-4	5	10	1mV	1mA		1A	0.5A	
0 to 40	0 to 0.6		R4K40-0.6	5	1	10mV	0.1mA		1A	0.5A	
0 to 36	0 to 1	36	R4K36-1	5	5	10mV	1mA		1A	0.5A	
0 to 18	0 to 2		R4K18-2	5	10	10mV	1mA		1A	0.5A	

FUNCTIONS

Multi Setting Function

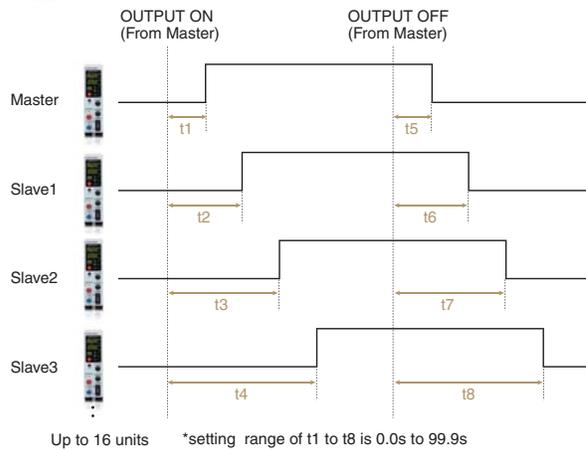
Function to memorize 3 different voltage and current settings in addition to standard preset function. No need to adjust the output when different setting, and convenient function for production inspection process or testing which require frequent data sampling.



Delay Trigger Function

In case -LUs1,-LRmf option is selected, only one unit of R4K-36 series can be used.

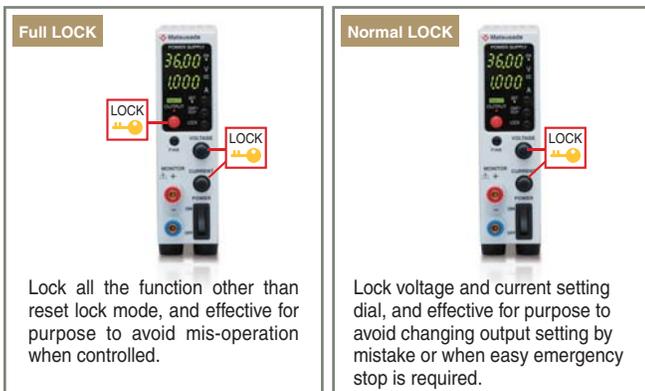
Function to delay the OUTPUT ON/OFF time. It is possible to use in case single unit of R4K-36 series is used, and also when connecting several Matsusada power supplies(*1) using master-slave connection terminal(*2) and output voltage / output current are set individually, delay trigger function can be used.(*3)



- *1 : R4K-80 series, RK-80 series, RK series and REK series. Detail catalog for each model is available. Please contact nearby sales office.
- *2 : Can be connected up to 16pcs.
- *3 : Only for slave-local. In case of slave remote control, exact same model of power supply need to be used. Also, in case of slave-local, each output voltage and current can be set individually. In case of slave-remote, output voltage and current can be set with one-control function which each slave unit follows the master unit setting.

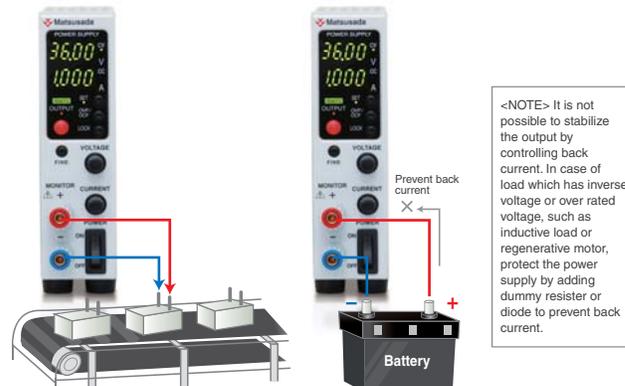
Two Mode Lock Function

Function to select two different lock functions for two different purposes. "Full Lock" locks all the function on front panel, and "Normal Lock" locks all the function except for ON/OFF. "Full Lock" mode shall be good in case mis-operation have to be completely avoided, and "Normal Lock" mode shall be good in case to avoid mis-operation but secure the way for emergency stop of power supply. You can select the best mode according to your level of "Security", (in both modes, emergency stop is possible with Power Switch.)



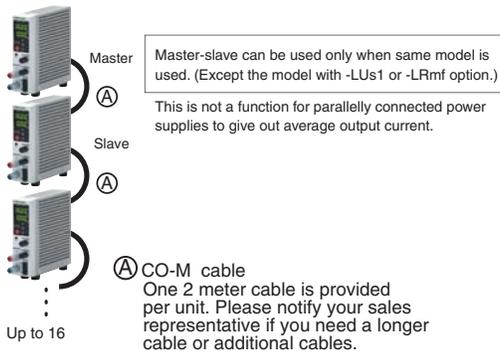
Sink Current / Sink Current Prevention Function

R4K-36 series features function to sink current, and enable to decrease the voltage quickly when turning off the output or when control the voltage down, which increase the safety of operation. In case burn-in tests such as aging test are conducted one after another in short interval, connectors can be attached or removed quickly and go for the workexchange. which increases the efficiency of process after the output OFF operation. On the contrary by using sink current prevention function, it is possible to prevent voltage drop on the load by decreasing the current flow from load to power supply when turning off the power supply or when decrease the output voltage.



<NOTE> It is not possible to stabilize the output by controlling back current. In case of load which has inverse voltage, such as inductive load or regenerative motor, protect the power supply by adding dummy resistor or diode to prevent back current.

Master / Slave Control



Various Digital Control Functions

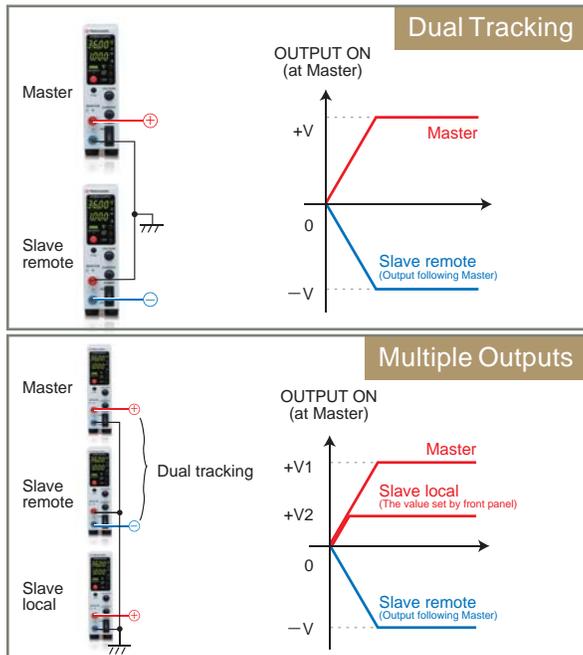
Control function	Output ON/OFF setting	
	Status output (fault/output/OVP/OCP/OT/ACF/reversible sense connection)	
	Maximum 16 units digital control	
Write function	Collective control function for multiple units	
	Output voltage setting /Output current setting	Percent mode(100.00%), *voltage current value mode (maximum rated voltage and current value)
	OVP setting /OCP setting	Percent mode(100.0%), voltage current value mode (maximum over voltage / over current protection value)
Reading function	Output voltage reading /Output current reading	Percent mode(100.00%), *voltage current value mode (maximum rated voltage and current value)
	Output voltage setting /Output current setting	Percent mode(100.00%), *voltage current value mode (maximum rated voltage and current value)
	OVP setting /OCP setting	Percent mode(100.0%), voltage current value mode (maximum over voltage / over current protection value)

* Minimum value of each model is same as minimum display of front panel meter.

Dual Tracking, Multiple Outputs

Dual tracking control, which enables both positive and negative outputs simultaneously in master slave operation, is possible. Multi outputs and various versatile operations are also possible by combining above dual tracking control and slave local mode. Positive and negative output(+V, -V) of dual tracking control and set output voltage of slave local mode can be output simultaneously by turning on the master unit.

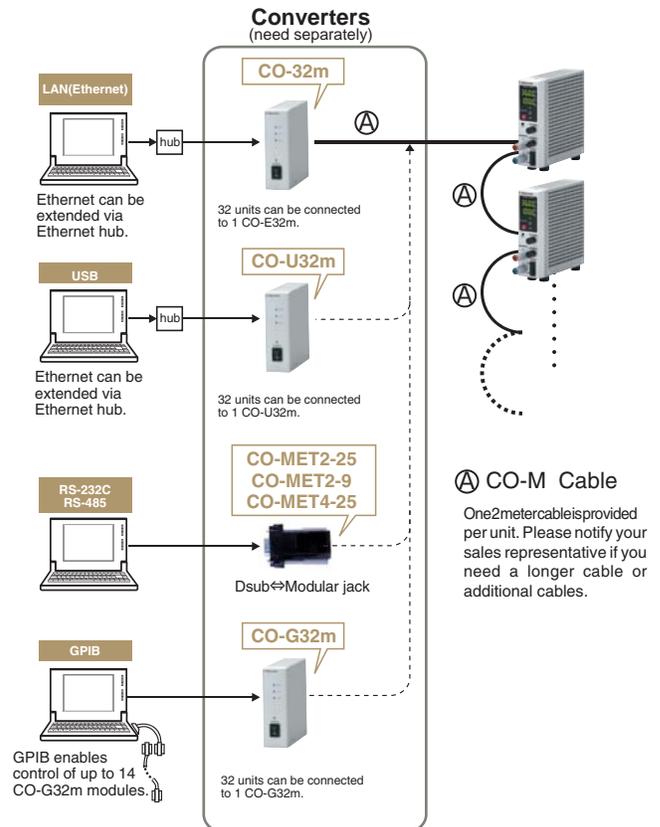
*Please refer to P.10 for connection details.



Digital Interface

Digital control of USB / Ethernet* / RS-232C / RS485 / GPIB and one-control on master slave operation.

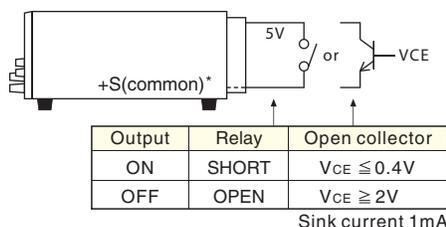
*Ethernet is a registered trademark of Xerox Corporation.



Remote Control Functions

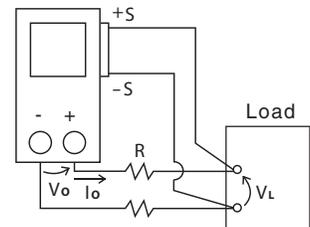
Remote switch ON/OFF

* +S is common. So external control voltage shall be input with +S as reference. Otherwise it can cause failure.

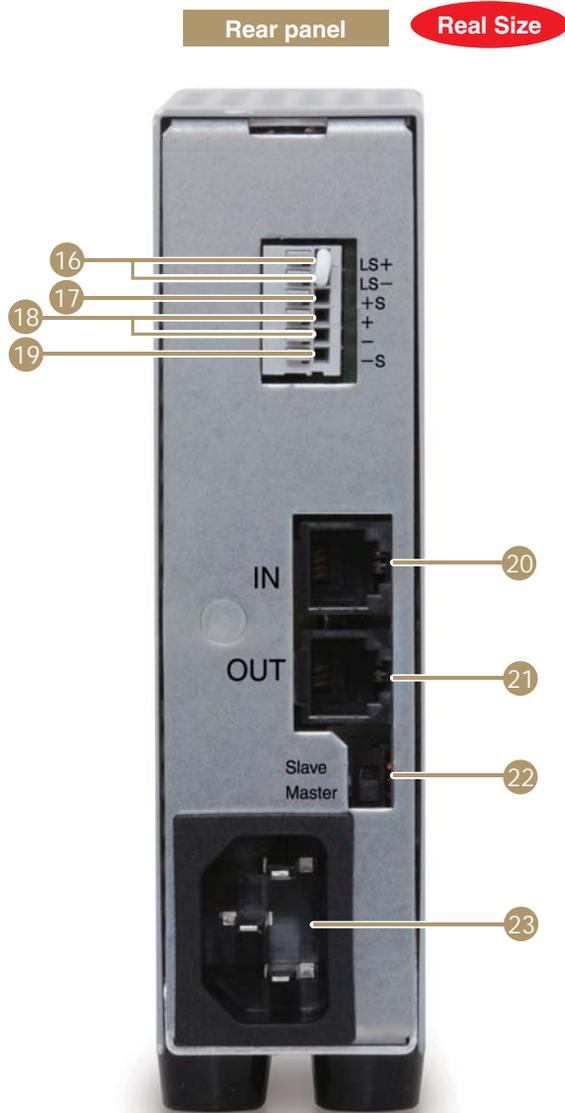
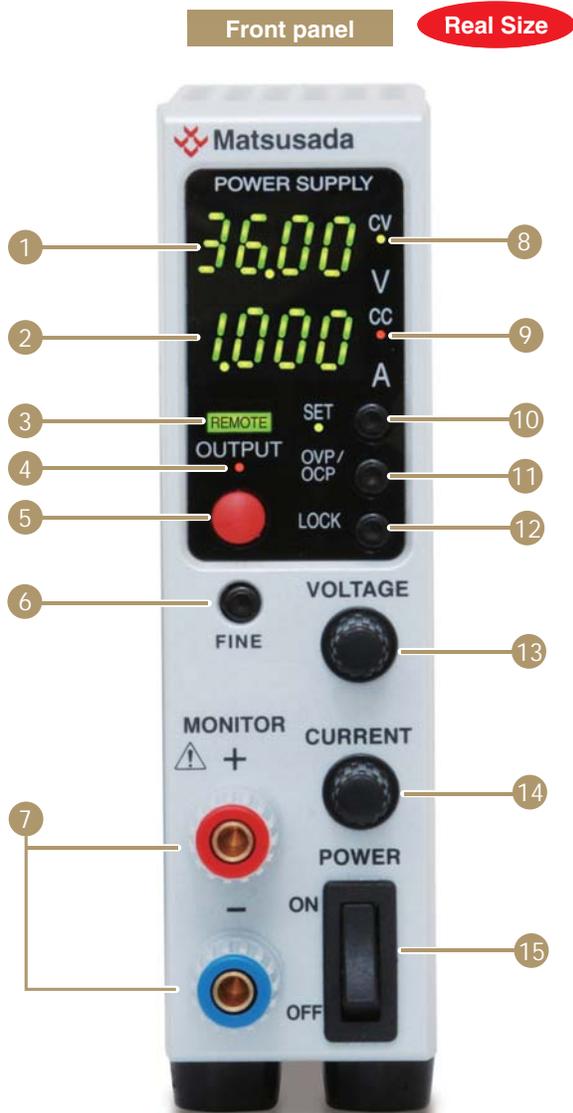


Remote sensing

Compensate the voltage drop ($V_0 - V_L$) due to resistance of output lead or drop of stability by contact resistance. (maximum 0.5V)



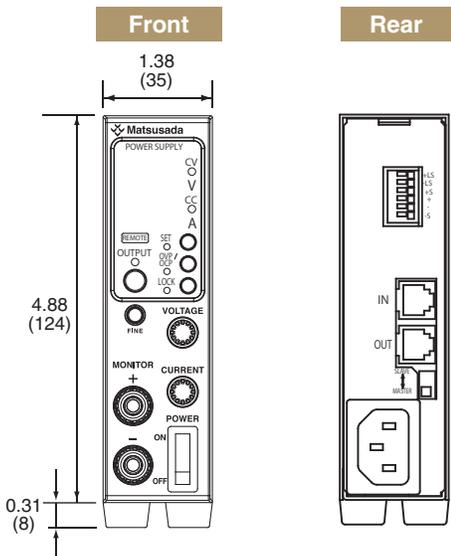
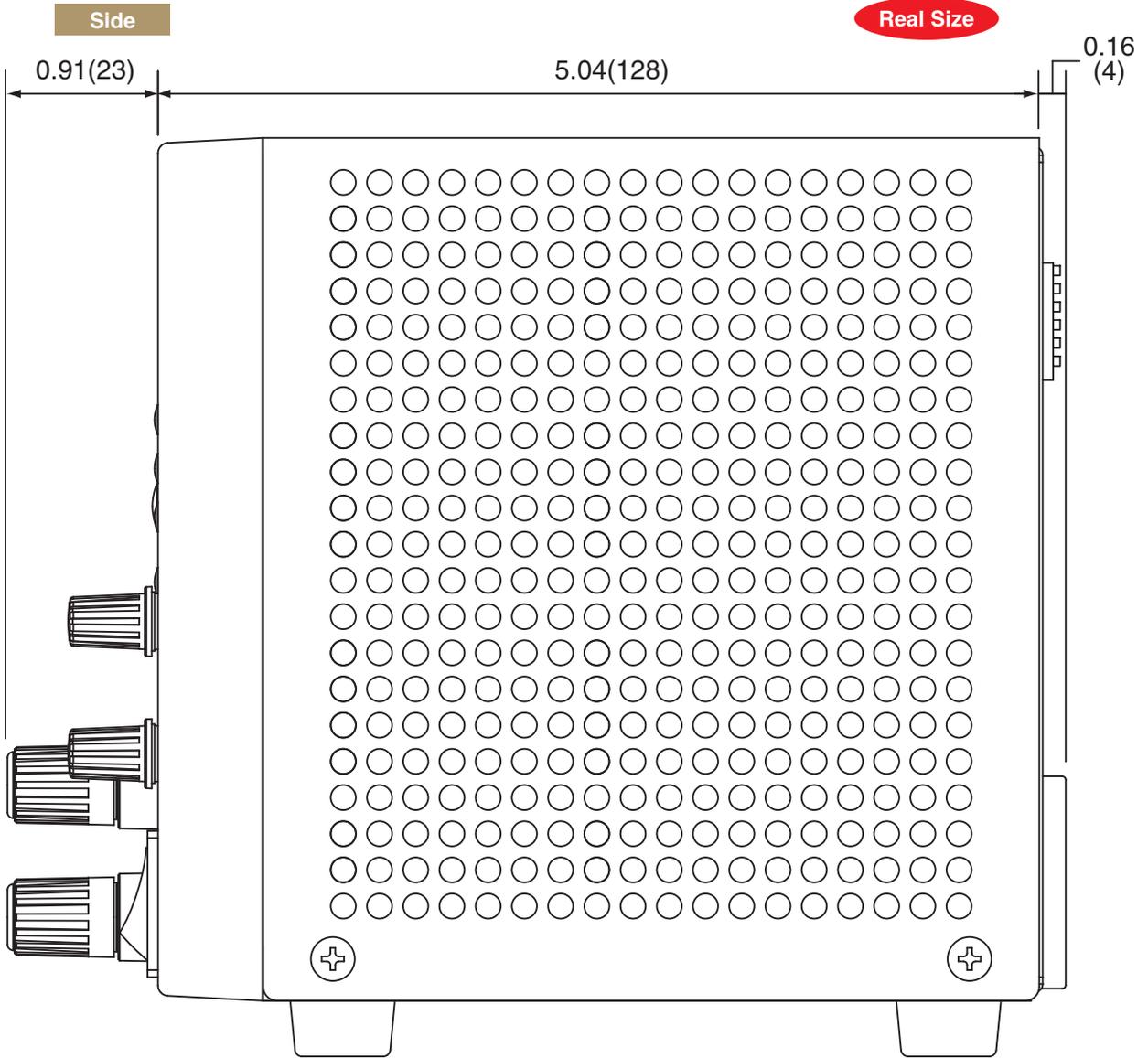
Functions



- 1 Output voltage and OVP setting display
- 2 Output current and OCP setting display
- 3 Remote programming display
Light up when output voltage/current control in remote mode.
- 4 Output display
Light up when output is on.
- 5 OUTPUT ON/OFF switch
To be used to turn output on/off when local mode as well resetting protection functions.
- 6 FINE switch
Switching setting digit when setting output voltage and current.
- 7 Monitor terminal and Output terminal
- 8 Constant voltage operation mode display
- 9 Constant current operation mode display
- 10 Output PRESET switch
- 11 OVP/OCP switch

- 12 LOCK switch
- 13 OUTPUT voltage · OVP setting dial
- 14 OUTPUT current · OCP setting dial
- 15 Power ON/OFF switch
This has priority over all operations for safety reason
- 16 Remote output ON/OFF switch
- 17 +Sense
- 18 OUTPUT terminal (up to 3A)
- 19 -Sense
- 20 Digital interface IN (as well as Master/Slave and Delay trigger function)
- 21 Digital interface OUT (as well as Master/Slave and Delay trigger function)
- 22 Master/Slave selector switch
- 23 AC inlet

Dimensions inch(mm)



AC input cable

<p>CABLE TYPE 1 125V / 10A (Standard)</p>	
<p>CABLE TYPE 3 250V / 10A for -L(230V)option</p>	
<p>CABLE TYPE 4 250V / 10A (Separate)</p>	

Specifications

Output Control	CV Mode : By rotary encoder on front panel CC Mode : By rotary encoder on front panel
Stability	0.05% of maximum output voltage / 8Hr
Temperature coeff.	$\pm 0.01\%$ / °C(CV), $\pm 0.02\%$ / °C(CC),
Lock Function	Lock function locks the output voltage and current setting
Output Display *1	Voltage : 4-digit digital meter. Accuracy is $\pm 0.2\%$ rdg ± 4 digits Accuracy of preset setting is $\pm 0.2\%$ Setting ± 40 mV *2 Current : 4-digit digital meter. Accuracy is $\pm 0.4\%$ rdg ± 5 digits Accuracy of preset setting is $\pm 0.4\%$ Setting ± 5 mA *2
Protections	Over voltage protection (OVP) : Cut off the output at set value Setting range : appx. 5% to 110% of rated maximum voltage Setting : By front panel rotary encoder Reset : By output ON/OFF switch or remote switch (manual control) Over current protection (OCP) : Cut off the output at set value Setting range : appx. 5% to 110% of rated maximum current Setting : By front panel rotary encoder Reset : By output ON/OFF switch or remote switch (manual control) Over temperature protection (OTP) : Cut off output at abnormal temperature. Reset(after temperature go down to normal) : Output switch or Remote switch (manual control) Input brownout(ACF)-Blackout protection : Output is cut off when input voltage decreased. Reset (when normal voltage value or recovery from blackout) : Manual recovery by Output switch or Remote switch for blackout protection Automatic recovery when blackout protection is canceled
Other Functions	Remote sense reverse connection Remote switch ON/OFF(TTL or external relay), Remote sensing Delay trigger : Individual setting of ON delay and OFF delay(0.0 to 99.9sec) Multi setting function : Voltage and current memory "a", "b" and "c" setting in addition to standard voltage and current preset
Operation Temp.	0°C to +40°C
Storage Temp.	-20°C to +70°C
Storage humidity	20 to 80%RH (no condensation)
Dielectric voltage	Between input power supply and output terminal : AC1000V 1min. Between input power supply and chassis : AC1000V 1min.
Isolation voltage	± 250 V-DC (Positive or Negative terminal grounding)
Accessories	AC Input cable 2.5m single phase 3-pin type(1) Instruction manual(1) CO-M cable 2m(1) (without -LUs1,-LRmf option) Ground plate(1)



For safer operation, connect ground plate to output terminal.

*1 : At 1% to 100% of rated output.

*2 : The accuracy of the preset value varies according to rated output value of each product.
Refer to the following table.

Voltage	Accuracy of preset value	Current	Accuracy of preset value
up to 9V	$\pm 0.2\%$ setting ± 4 mV	up to 999mA	$\pm 0.4\%$ setting ± 0.5 mA
10V to 99V	$\pm 0.2\%$ setting ± 40 mV	1A to 9A	$\pm 0.4\%$ setting ± 5 mA
more than 100V	$\pm 0.2\%$ setting ± 400 mV	10A to 99A	$\pm 0.4\%$ setting ± 50 mA

Options

-Llc : Output current accumulation function

Accumulate the output current and display its value(up to 100Ah).
Accumulated value is stored even when output is off.
Also, accumulated value which stop the output can be set preliminarily,
it is very suitable to the application such as controlling plating solution. *1

-L(Mc0.5)*4, -L(Mc0.15)*4 : Communication cable length change

Change length of CO-M cable to 0.5, 0.15-meter long.

-LUs1 : USB interface board *2 *3 *4

Enable digital control with USB. One power supply can be connected per one USB port which computer equipped. In case USB port which computer equipped is not enough, please use USB hub. However, depending on USB hub, it may not work correctly.

OS : Microsoft Windows XP / Vista / 7 / 8
(Both 32-bit version and 64-bit version are available.)

Microsoft Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

-L(230V) : 230VAC ± 10% input

Refer Lineup (page3) for input current.

-LH : Higher isolation voltage

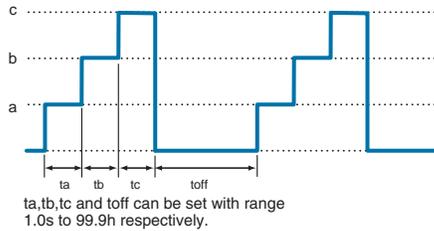
This option make the isolation voltage to be ±1kV, which enable extended capability of series operation.

Pulse / Ramp sequence, Master follow function(-LDe option)

above output control, between A to D is available.

A. Pulse Sequence

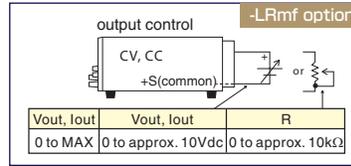
Using the stored voltage and current setting in each memory of a, b and c and multi set function, sequence operation is possible. The setting of repetition to say nothing of a continuous driving can be set. Various different operations, such as repetition of memory a and b or b ,c and off, are possible by setting the set time of memory a, b, c, and/or off to be 0.0. Thus, it makes this model suitable for evaluation test or other applications.



-LRmf : Remote multi function *2 *4

It is possible to control output voltage and output current by external voltage or external resistance.

(+S is common. So external control voltage shall be input with +S as reference.)



*1 Please consider the location of usage. High humidity environment can be the cause of failure and corrosion.

*2 When these options are selected, standard digital interface will not be equipped. Also, these options cannot be equipped together.

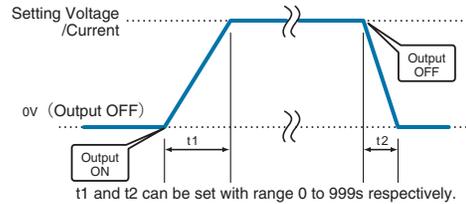
*3 For detailed specification of USB and digital interface, please refer data sheet of CO series.

*4 -LUs1 or -LRmf option cannot be equipped together with -L(Mc0.15) and -L(Mc0.5) option.

B. Ramp

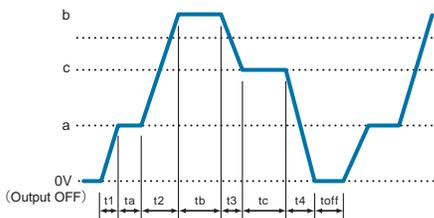
This function controls the ramping up and down the voltage and current to the set value (or from set voltage and current value to 0V/0A). It is convenient to increase(decrease) the voltage and current value slowly.

*The Ramp sequence can be selected from [both set voltage and current], [only set voltage], and [only set current].



C. Combination of Pulse and Ramp Sequence

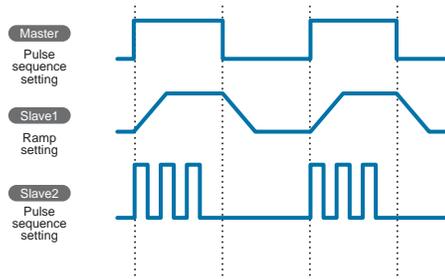
Features of pulse sequence operation and ramp sequence operation can be combined for more convenient operation. In addition, by adding multi set function, sequence operation can be operated using stored voltage and current settings in each memory. The setting of repetition to say nothing of a continuous driving can be set. For example it is possible to slowly ramp up and down the voltage and current to the three different settings, and so, it is useful for various scenes.



D. Master follow

When the pulse sequence operation and the ramp work master-slave, the output signal to the slave unit is transmitted. The slave unit can be output in an output status different from the master unit.

(Master follow function cannot be used with -LUs1 option.)



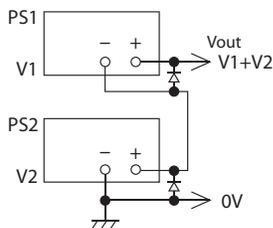
Note The operation accuracy of the timer when sequencing is 0.5%. Be careful when you use it by the long-term running operation.

When ordering, suffix the above option number to the model number. <e.g.>R4K36-1-LDcHcUs1(200V), R4K18-2LDcH(Mc0.5)(200V) alphabetical, AC input order

Operation example

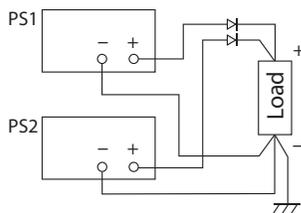
R4K-36 power supply of same model number can be connected in series or parallel to increase output voltage or current. In that case, local control or the control in the digital master slave is recommended. Because the common of the outside input/output control connector (TB1) is connected to the positive output, please do not connect common more than two.

Series operation



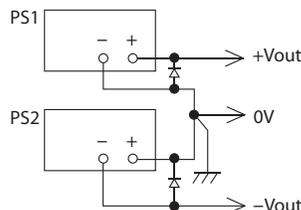
Total output voltage is to be up to 250V (-LH option models : 1kV). Therefore for models with output voltage of over 250V (or 1kV), series operation cannot be conducted. Output current is to be the smallest current of those.

Parallel operation



Please keep all the settings of voltage the same. Output current will be the summation of each current. Please keep OVP level of power supply maximum to prevent any damage.

Split operation



Positive output and negative output are available.

R4K-36 series Accessory Kit

*Power supply is not included in the accessories.

Various accessories are available for convenient use of the unit.

NEW Quintette case (R4K-36QC)



Special designed case to bind 5-unit of R4K-46 series. Power ON / OFF switch will be consolidated, and also AC input line on rear panel will be bundled to one. Also, handle on the top makes easy to carry.

- Accessories**
- One set of translator for AC cable of five R4K-36
 - Input AC cable 2.5m single phase (3-pin type) (1)
 - Instruction manual (1)
 - CO-M cable 2m (1), 0.5m (4)

- * R4K-36 installation into the case to be conducted by customer. Please consult with sales office in case R4K-36 expected to be fit into the case by manufacturer side.
- * Ambient temperature must not exceed the power supply's operation temperature (see page 8) in order for the temperature inside power supply to remain in the operation temperature. (power supply life time could be shortened to 50% if it operates in a condition where ambient temperature is 10°C higher)
- It is user's sole responsibility to monitor the ambient temperature not to exceed the specification.
- * Input AC for Quintet case is 115V. In case 5 units of R4K-36 series power supply ordered with option -L(230V) are expected to use with the case, please specify R4K-36QC-L(230V) at the purchase.

Rack mount holder [RMO series]

10 Units/1 rack holder, and can be placed in a cabinet. Easy to take one unit out. Best suitable for a system operation. With fan unit for forced air cooling.



Power Supply stand

For one unit operation...





TECHNICAL NOTE

Connection Operation

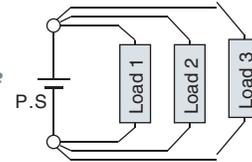
■ Connection of load

- Please use a short lead wire that is sufficiently thick for the connection.
- Please use PVC electric cable (105°C) that can fully tolerate the voltage used. It is necessary to consider current capacity, length limit of output wire by sensing (0.5V/lead) and so on for wiring with load. Please refer to the following diagram to determine the thickness of cable.

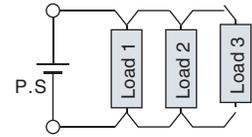
AWG	mm ²	Max current(A)
18	1.1	2
16	1.3	7
14	2.1	11
12	3.3	18
10	5.3	23
8	8.4	39
6	13	67

■ Parallel connection of load

○ Good example



✗ Bad example

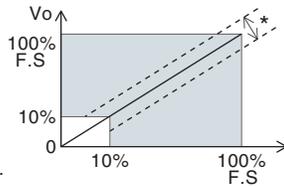


Definition of specifications

Specification in this catalog, except otherwise specified, refer to value when maximum rating output (full scale*) after 2-hour warm up.

Applicable scope of specifications

"F.S x catalog value(+)" is applied for ripple, stability, regulations and temperature coefficient, and "value if F.S x ±0.5%(+)" is applied for high-voltage output linearity, monitor linearity and display linearity, both in the range of 10% to 100% of maximum rating output.



Ripple

Indication is in rms that includes high-frequency noise.

Preset

Preset value does not show the actual output status accurately. If you need an accurate setting, conduct actual output without load and set a voltage. As for setting current, for setting current, conduct output after shorting the output terminal and gradually raise current before setting at a desired value.

When selecting DC power supply

▶ Important Notice

Products on this catalog have been manufactured with consideration of safety as DC power supply, however please follow instruction manual for operation and make sure to ground the ground terminal for your safety.

Products on this catalog have been manufactured on the precondition that they are used in ground electric potential or within the range of the above series operation. Please contact our sales staff when using the product for floating of high electric potential, etc.

Products on this catalog are manufactured with consideration for protection against load discharge. However for specific experiment or continuous discharge such as sputtering, product may need discharge resistance between power supply and load or could not be used at all. Please consult with our sales staff in advance.

We recommend that you contact our sales staff with your requirement before choosing a product so that you can get the best product and the safety as high-voltage equipment is assured.

