Variable Range Output

Versatile DC Power Supplies

**TB** series

Max. output voltage: 35 V to 1000 V
Max. output current: 1 A to 108 A
Max. output power: 360 W, 720 W, 1080 W

Available for the pulse / ramp sequence operation without using a PC

- Suppressing the overshoot is possible by the standard function that can change CV mode and CC mode optionally
- The programmable internal resistance function allows you to simulate rechargeable batteries

www.matsusada.com
TB series
DC power supplies with wider output coverage

Wide range output is possible with “turbo function” installed.

TB series is programmable DC power supply with distinctive turbo function which realises 3 times wider coverage of output voltage and current in comparison to conventional DC power supply with equivalent output power.

All TB series allow flexible voltage and current output within its rated power, resulting user not to require to search for power supply with unnecessary wider rated voltage and current. Thus single TB unit can be used for much wider user application.

Not only its flexible output, but the general performance of the power supply is pursued to achieve overwhelming quality, resulting; power factor correction circuit with 0.99 power factor, speedy and accurate 4 digit display panel as well as adoption of precision rotary encoder. TB series’s high energy efficiency contributes to user’s reduction of CO2 emission.

Digital communication(*1) with LAN(Ethernet*2), USB, RS-232C, RS-485 and GPIB is optionally selectable, best for automatic measuring or integration to production equipment.

(*1) A conversion adapter or additional option is required separately.

(*2) Ethernet is the registered trademark of Xerox Co., Ltd.

TB series are also available in such a use.

[For simulation of solar cells]  *This is customization.
It is possible to test or inspect micro inverter because TB can do simplified simulation of I-V characteristic of the solar panel. If you want to talk with us for details, please tell our sales office “the model number of solar cell which you want to simulate” and “specifications of micro inverter for testing or inspection”.

02
Typical Applications

Evaluation of electrics elements for automobile
Covered from 12 V to Higher Volt. by this One Unit.

Evaluation for devices
For devices with different rated values.

Evaluation with series / parallel connected power supplies
Suitable for battery, capacitor evaluation with series / parallel connected power supplies.

Evaluation of Communication Equipment
To various Tests for Servers and Rooter.

Evaluation of Power Conditioners
For simulation of Solar Battery and Fuel Battery.

Features

- It realizes Wide Range Output by installed Turbo Function.
- CV / CC preference function helps to suppress voltage / current overshoot at output trigger.
- Simplified Simulation of rechargeable batteries, photovoltaic cell and fuel cell with the variable internal resistance.
- Usage for High Speed Response and Usage to Keep Voltage is applicable by Switching Function for Sink/Anti-Sink.
- Best fit to Research and Development by the Low Noise Switching System.
- Free to Service Space with the Power Factor Correction Circuit and Worldwide Input System.

Lineup

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Output</th>
<th>Ripple</th>
<th>Dim. (P.B-9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volt</td>
<td>Current</td>
<td>Power</td>
</tr>
<tr>
<td>TB35V36A360W</td>
<td>35 V</td>
<td>36 A</td>
<td>360 W</td>
</tr>
<tr>
<td>TB35V72A720W</td>
<td>72 A</td>
<td>720 W</td>
<td>15</td>
</tr>
<tr>
<td>TB35V108B1080W</td>
<td>108 A</td>
<td>1080 W</td>
<td>20</td>
</tr>
<tr>
<td>TB80V14A360W</td>
<td>80 V</td>
<td>14 A</td>
<td>360 W</td>
</tr>
<tr>
<td>TB80V28A720W</td>
<td>28 A</td>
<td>720 W</td>
<td>15</td>
</tr>
<tr>
<td>TB80V42A1080W</td>
<td>42 A</td>
<td>1080 W</td>
<td>10</td>
</tr>
<tr>
<td>TB160V8A360W</td>
<td>160 V</td>
<td>8 A</td>
<td>360 W</td>
</tr>
<tr>
<td>TB160V15A720W</td>
<td>15 A</td>
<td>720 W</td>
<td>20</td>
</tr>
<tr>
<td>TB160V22A1080W</td>
<td>22 A</td>
<td>1080 W</td>
<td>20</td>
</tr>
<tr>
<td>TB250V5A360W</td>
<td>250 V</td>
<td>5 A</td>
<td>360 W</td>
</tr>
<tr>
<td>TB250V10A720W</td>
<td>10 A</td>
<td>720 W</td>
<td>25</td>
</tr>
<tr>
<td>TB250V15A1080W</td>
<td>15 A</td>
<td>1080 W</td>
<td>30</td>
</tr>
<tr>
<td>TB850V1.2A360W *</td>
<td>850 V</td>
<td>1.2 A</td>
<td>360 W</td>
</tr>
<tr>
<td>TB850V2.4A720W *</td>
<td></td>
<td>2.4 A</td>
<td>720 W</td>
</tr>
<tr>
<td>TB850V3.6A1080W *</td>
<td></td>
<td>3.6 A</td>
<td>1080 W</td>
</tr>
<tr>
<td>TB1000V1A360W *</td>
<td>1000 V</td>
<td>1 A</td>
<td>360 W</td>
</tr>
<tr>
<td>TB1000V2A720W *</td>
<td></td>
<td>2 A</td>
<td>720 W</td>
</tr>
<tr>
<td>TB1000V3A1080W *</td>
<td></td>
<td>3 A</td>
<td>1080 W</td>
</tr>
</tbody>
</table>

* The front panel does not have monitor terminals.

Images of Output Range

Possible to output wide range volt. and current compared with traditional DC power supplies by the turbo function.
**Principal Functions**

**Function for Pulse & Ramp Sequence and Master Follow**

Output control as next A to D are possible.

### A. Pulse Sequence

Sequential operation is possible by using voltage and current set on each memory a, b and c in combination with multi-set function. Not only continuous operation, but also it is possible to specify the times. It is best fit to evaluation tests for products as various operations, like as repeat of a and b only or repeat of b, c and off only, are enabled by setting time of memory a, b, c and off to 0.0.

### B. Ramp

It enables to make ramp action up to set voltage or current (or from the set voltage or current to 0 V or 0 A). It is useful to like to rise (reduce) voltage or current slowly. It helps sensitive electrical load not to get damaged by overshoot.

* For ramp action, it is possible to select “both of set voltage and current”, “only set voltage” or “only set current”.

### C. Pulse Sequence + Ramp

It is also possible to use pulse sequence combined with ramp action. If multi-set function is combined with the too, it is able to make sequence action by using voltage or current set on memory a, b and c. Not only continuous operation, but also it is possible to specify the times. It is useful in various aspects as it is possible to rise (reduce) voltage or current slowly up to 3 set value.

### D. Master Follow

Pulse sequence actions at master-slave and output signal to slave units at ramp action are transmitted. By this function, it is possible to make slave units to output on different output condition from the master unit.

---

**Important point**

1. This function can not be used with Delayed trigger function (refer to page. 5) and -LFs option (refer to page. 10) together.
2. Accuracy of the timer at sequence action ±0.5 %. Please take care usage at long running.
CC / CV Preferred setting

CV (constant voltage) or CC (constant current) preferred mode can be selectable. When a load is such as a diode whose resistance value can dramatically change at certain point, overshoot of current may take place if power supply is triggered under CV mode. TB series can help suppress this overshoot by choosing CC mode trigger as preference. This feature is highly valued for lowering the risk of damaging expensive load typically such as high power laser diode module.

Internal resistance value variable function (CV mode only)

By setting the internal resistance value as any value, it causes voltage drop due to load current. This is best fit for simulating battery, solar cell panel, fuel cell battery. (Programmable range of the internal resistance value is 0 Ω to rated voltage / rated current)

Function for Multi-setting

3 values for voltage and current are memorized in addition to usual ones of preset. It is very useful for experiment to collect repeatedly data and inspection of products.

2 Modes for Lock

Either of 2 Modes can be selected and set, “Full Lock” that locks all operation from the front panel or “Normal Lock” that locks only output ON / OFF. (the above 2 modes can stop the output emergently with the power switch.)

Delay Trigger Function

The delayed trigger function allows it to delay the time for output start and output stop and work based on it during OUTPUT ON / OFF. The delayed trigger function can be used when 1 unit of TB is used, of course. The delayed trigger function can also be used when output voltage / output current are set individually by connecting several Matsusada power supplies using master-slave connection terminal.

Switching function of Sink / Anti-Sink

Sink Function is built in power supplies. It is safe because it can lower voltage quickly even when it is at cut-off output and high voltage setting point. And, when make continuously burn-in with short interval, it is possible to disconnect and change work quickly after cut-off operation of output. Conversely, when supply power to battery, condenser and so on which is capacious load, it decrease reverse current from the load to power supplies and avoids voltage depression by using Anti-Sink Function at cut-off output or when lower setting voltage.

Dual Tracking and Multi-Output

By connecting power supplies to make the output of it become positive and negative at master-slave, the output of positive and negative can be controlled at the save time. (Dual tracking control) Multi-output can be configured in combination with actions of local mode and of dual tracking. Plus and minus output voltage and optional output voltage set on a local slave are outputted in synchronizing with ON of the master unit.

Note: It is impossible to stabilize by reverse current control. If the load is what reverse voltage becomes higher than rated voltage (induced load, regenerative motor, etc.), please protect the power supply by connecting dummy resistor, reverse current protection diode and so on.

* As for connection, please refer to “examples for operation applied” on Page 11.

*1: This function can not be used with Function for Pulse & Ramp sequence and Master Follow (refer to page. 4) and -LS option (refer to page. 10) together.
*2: Can be connected up to 16 units.
*3: R4K-36 series, R4K-80 series, RK-80 series, RK series and REK series. Detail catalog for each model is available. Please contact nearby sales office.
*4: 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-remote, output voltage and current can be set with one-control function which each slave unit follows the master unit setting.
Principal Functions

Remote Switch ON / OFF

Digital Interface

In addition to digital control with LAN (Ethernet), USB, RS-232C, RS-485 and GPIB, one control is enabled in master-slave operation.

Various Adapter

(CO-E32m)

Can be add thru hub

Up to 16 units can be connected to 1 CO-E32m.

(CO-U32m)

Can be add thru hub

Up to 16 units can be connected to 1 CO-U32m.

Total 14 CO-E32m can be hooked with 1 port of GPIB.

Up to 16 units can be connected to 1 CO-G32m.

When noisy environment is presumed, -LGob (optical interface) is required. See page 10 for detail.

Master-sлаve Control

(Digital interface)

Master unit can control multiple units connected as slave. Please refer to P. 4 “D. Master Follow”, P. 5 “Delayed Trigger Function” and “Dual Tracking and Multi-Output”.

* This is not a function for parallelly connected power supplies to give out average output current.

Remote Control

● Switching REMOTE / LOCAL

Output Monitor

● Output Control

Output of Status

● ON for the status of OVP, OCP, OTP, ACF reverse sense connection and interlock (LD).

COMMON is floating with the output of Open Collector for each COMMON. Voltage Resistance 30 Vdc, Sink Current ≤ 5 mA
Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Voltage</strong></td>
<td>100 to 240 VAC, 50 / 60 Hz Single Phase</td>
</tr>
<tr>
<td><strong>Input Current</strong></td>
<td>5.2 Amx(360W Model), 11 Amx(720W Model), 16 Amx(1080W Model) at 100 VAC input</td>
</tr>
<tr>
<td><strong>Output Control</strong></td>
<td>Local : Constant Voltage Rotary Encoder on the front Panel (if output power is set beyond max. output, output volt, output current is lowered automatically.)</td>
</tr>
<tr>
<td><strong>Voltage Regulation</strong></td>
<td>For Input : 0.05 % of maximum output (to±10 % of AC change)</td>
</tr>
<tr>
<td><strong>Current Regulation</strong></td>
<td>For Load : 0.1 % of maximum output (to 10 % to 100 % of load change)</td>
</tr>
<tr>
<td><strong>Stability</strong></td>
<td>0.05 % / 8H of maximum output voltage</td>
</tr>
<tr>
<td><strong>Temp. Coefficient</strong></td>
<td>0.01 % /°C of maximum output voltage 0.04 % /°C of maximum output current</td>
</tr>
<tr>
<td><strong>Output Display</strong></td>
<td>Output Voltage : 4 digits for digital indicator (±0.5 %rdg±5 digit, at 23 °C±5 °C)</td>
</tr>
<tr>
<td><strong>Protection</strong></td>
<td>Overvoltage Protection (OVP) : Cut off the output at the set pointS</td>
</tr>
<tr>
<td><strong>Miscellaneous Functions</strong></td>
<td>Prevention of Miss Operation by Locked Key (A change of normal lock and full lock is possible.)</td>
</tr>
</tbody>
</table>

A lot of Digital Control Functions

<table>
<thead>
<tr>
<th>Control Functions</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output ON / OFF set</strong></td>
<td>Digital Control for 16 units(-LGob models : 32 units)</td>
</tr>
<tr>
<td><strong>Digital Control for 16 units</strong></td>
<td>Package Control for Multi-hooked Units</td>
</tr>
<tr>
<td><strong>Display of Various Status</strong></td>
<td>Error Display (Status of Output / OVP / OPP / OTP / ACF / Reverse Connection of sense / Interlock)</td>
</tr>
</tbody>
</table>

Additional Notes:
- The current regulation (for load) of the model whose maximum output current is 0.2 %. (for the load change of 10 % to 100 %)
- Minimum value for each model is the same with the minimum displayed digit the indicator on the front panel.

07
Description of functions

1. Display Output Voltage and OVP setting
2. Display Output Current and OCP setting
4. Display OUTPUT lighted during output.
5. ON / OFF Switch for Output, used for ON / OFF for output at remote and reset of Protections.
6. Preset Switch for Output
7. Setting Switch OVP / OCP
8. Setting Switch Key Lock
9. Intake hole
10. Display Constant Voltage Operation Mode
11. Setting Knob for Output Voltage(shared OVP Setting)
12. FINE Switch
13. Setting Knob for Output Current(shared OCP Setting)
14. Display Constant Current Operation Mode
15. ON / OFF Power Switch
16. Terminals for a Monitor(up to 20 A. The size is M6)
17. Ventilation Hole
18. Digital Interface used for master-slave and delay trigger too.
19. Connector for remote control (TB1)
20. Grounding terminal

Input Terminal
- 360W, 720W Model : AC inlet
- 1080W Model : Terminal board

Output Terminal
- 360W Model : Terminal board
- 720W, 1080W Model : Busbar

Remote Sensing
Prevent to degrade stability due to volt. drop (Vo-VL) by resistance (R) of output wiring or contact resistance. (up to max. 0.5 V)

Specifications of cables to use

<table>
<thead>
<tr>
<th>Appropriate wire</th>
<th>Usable wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single wire : 1.2 mm in diameter (AWG16)</td>
<td>Single wire : 0.4 mm to 1.2 mm (AWG22 to 16)</td>
</tr>
<tr>
<td>Diameter of strand : more than 0.18 mm</td>
<td>Diameter of strand : more than 0.18 mm</td>
</tr>
</tbody>
</table>

Standard length of the part which peeled coating
11 mm

Suitable tool for pulling / connecting the wire
Flat-blade screwdriver
(Axial diameter : 3 mm, the width of the edge of a blade : 2.6 mm)

Caution about the diameter or a cross-section of wires mentioned above. When the dimensions that are prescribed by AWG do not conform to the value of cross-section, please apply the latter.

Specifications of cables to use

Dimensions inch (mm)

360W Models

<table>
<thead>
<tr>
<th>2.76 (70)</th>
<th>0.87 (22)</th>
<th>13.78 (350)</th>
<th>0.71 (18)</th>
</tr>
</thead>
</table>

Weight : 3 kg approx.

3xM6
**B 360W Models**

- **Weight**: 3 kg approx.

**C 720W Models**

- **Weight**: 5 kg approx.

**D 720W Models**

- **Weight**: 5 kg approx.

**E 1080W Models**

- **Weight**: 8 kg approx.

**F 1080W Models**

- **Weight**: 8 kg approx.
**Options**

- **-LMi : Multi-digital interface**
  (only for the models whose dimensions are A in P.8)
  Digital control by LAN(Ethernet), USB(USBTMC) and RS-485(Multidrop) is available. (These simultaneous use is impossible. And, RS-485 supports only FULL DUPLEX communications.) This option includes -L(SCR) option, and attaches I/O driver corresponding to SCPI command. It makes it easy for control program development with various programming languages such as LabView, VisualBasic and C# etc.

- **-LGoB : Optical interface Board**
  -LGoB  Optical Interface board + Optical cable 2 m
  -LGoB(Fs10) Optical Interface board + Optical cable 10 m
  -LGoB(Fs20) Optical Interface board + Optical cable 20 m
  -LGoB(Fs40) Optical Interface board + Optical cable 40 m

  Insulation control is made with optical communication. As perfect insulation is made by optical fiber it is able to forestall miss operation as transient phenomenon caused by surge, dielectric thunder or foreign noise, etc.

**-LGoB : Optical interface Board**

Various Adapter (sold separately)

- **-LGoB** Optical Interface board + Optical cable 2 m
- **-LGoB(Fs10)** Optical Interface board + Optical cable 10 m
- **-LGoB(Fs20)** Optical Interface board + Optical cable 20 m
- **-LGoB(Fs40)** Optical Interface board + Optical cable 40 m

- **-LIc : Output current accumulation function**
  The accumulated value which stop the output can be set preliminarily, it is very suitable to the application such as controlling plating solution.

- **-LIC : Current display function**
  The output voltage and output current of the entire system can be displayed on the master unit.

- **-LEt : LAN(Ethernet) Interface Board**
  Digital control is enabled through LAN(Ethernet). If you control plural TB via Ethernet, please use them according to one of the following ways.
  - Utilizing a USB hub between a PC and TB
  - Connecting all TB which have optical I/F board serially
  - Connecting all TB serially, the first TB is optical I/F board type, and all TB after the 2nd are standard I/F board type.

  OS for Personal Computers: Microsoft Windows Xp / Vista / 7 / 8

  Both of 32 bits and 64 bits are applicable

  (Microsoft and Windows are registered trademark of Microsoft Corp. in USA and other.)

- **-L(Mc0.5), -L(Mc0.15) : Change Communication Cable Length**
  Length of CO-M cable is to be 0.5 m and 0.15 m, respectively.
  (only either one is selectable.)

- **-LZ : Handle for carrying**
  The top panel has a handle for easy carrying, so height of TB becomes higher. 
  [Added height] 360W models : 0.31” (8 mm), 720W models : 0.43” (11 mm), 1080W models : 0.39”(10 mm)

- **-Llc : Output current accumulation function**
  Accumulate the output current and display its value(up to +9999.999 Ah).
  The accumulated value is stored even when output is off. Because, the accumulated value which stop the output can be set preliminarily, it is very suitable to the application such as controlling plating solution.

**How to Order**

*Please suffix above optional codes on the tail of Model number. (Example) TBSV86A800W-LF(LGdO(10)LMc2)(alphabetical order)*

*1 : These options can not be selected together.
*  Refer to the catalogue of digital controller for power supplies “CO series” for the detail of digital interface function.

*2 : Please consider the location of usage. High humidity environment can be the cause of failure and corrosion.
Example for Applied Actions

With TB series of the same model, output voltage and current can be increased by connecting power supplies in series or parallel. Control must be set on each individual unit. Do not connect together COMMON of 2 units or more as the COMMON of connector for remote control (TB1) is connected with output.

Series Operation

- Sum of output is up to 250 V. It is impossible to series operation for one exceeds 250 V in output volt.
- Output current is of the min. one of power supply among them.

Parallel Operation

- Make all setting voltage same value. Output current is sum of each current. In addition, make OVP level for all power supplies maximum to prevent damage.

Split Operation

- Possible to output on positive(+) or negative (-).

Connection and Application Operation

- **Connection of Loads**
  - Connect short with leads of sufficient thickness.
  - Use PVC wire (105 °C) which endure enough to applied voltage. Consideration of ampacity and limitation for lead wire length by sensing (0.5 V) requires for wiring to the load.

- **Paralleling of Loads**
  - Good Connection
  - Wrong Connection

Technical Notes

- **Applied range of specifications**
  - Ripple, Stability, Variations and Temp. coefficient are applied “F.S x Catalogue Value” and Linearity of output. Linearity of monitor, Linearity of indications are applied “F.S x value of ±0.5 % (*)” at the applied range of 10 % to 100 % of maximum rated output.

- **Ripple**
  - Indication is in rms including high-frequency noise.

- **Preset**
  - Preset value does not indicate exactly actual output state. If require exact setting, set voltage value by making actually output in no-load.

- **Conception of Specification**

When Select DC power Supplies

- **Products on this catalogue are manufactured on consideration for safety fully as direct current power supplies, but please observe the Instruction Manual for operation and earth always grounding terminals for safety.**

- **Products on this catalogue are manufactured under the premise that applied on ground potential or in the range of series operation. Please consult our sales staff when they use them on high potential floating.**

- **Products on this catalogue are manufactured on consideration for protection against electric discharge from loads fully, but when use them for some of continuous discharge like as spattering or for special withstand voltage test, please consult our sales staff in advance.**

- **We recommend contact our sales staff and inform them your requirement prior to your selection in order to secure safety as power supply equipment and make your best fit selection.**
Customer Inquiry Sheet (TB series)

Please copy this page and above fax number after filling out form below.

I would like

- [ ] A quotation
- [ ] An explanation of product
- [ ] A demonstration
- [ ] To purchase
- [ ] Other ( )

Give us your requirement / comment

Please fill in below.

Address:

Company: Dept.: Title:

Name: Tel: Fax:

E-mail:

Manufacturer warranty

We warrant the specification, unless otherwise specified, at max. rated output after warm up, and scope of application is between 10% and 100% of max. rated output. We warrant that products contained in this catalog (hereinafter, the “Products”) are free from defects in material and workmanship under normal use for a period of one (1) year from the date of shipment thereof. However, the warranty period for X-ray detectors and X-ray source shall be either one (1) year from the date of shipment or 1,000 hours, whichever shorter. The above warranty shall not apply to any Product which, at our sole judgment, has been: i) Repaired or altered by persons unauthorized by us; or ii) Connected, installed, adjusted or used otherwise than in accordance with the instructions furnished by us (including being used in an inappropriate installation environment, such as in corrosive gas, high temperature and humidity). We are not liable for any loss, damage or failure of the Products after the shipment thereof caused by external factors such as disasters. We will not inspect, adjust or repair any of our power supply products in the field or at any customer site. If you suspect that there has been a power supply failure in the field, please inspect your whole unit by yourself in an effort to determine that the problem is, in fact, arising out of our power supply products. If it is found that the problem is arising out of such power supply product after inspection, please contact your local sales office for additional troubleshooting. A “Return Merchandise Authorization” is required in case the power supply must be sent back to the factory in Japan for inspection and repair. We, at our sole discretion repair or replace such defective products at no cost to the purchaser. We assume no liability to the purchaser or any third party for special, incidental, consequential, or other damages resulting from a breach of the foregoing warranty. This warranty excludes any and all other warranties not set forth herein, express or implied, including without limitation the implied warranties of merchantability or fitness for a particular purpose. The Products are not designed and produced for such applications as requiring extremely high reliability and safety, or involving human lives (such as nuclear power, aerospace, social infrastructure facility, medical equipment, etc.). The use under such environment is not covered by this warranty and may require additional design and manufacturing processes. No modification or supplement of this warranty shall be binding unless in writing and signed by a duly authorized officer of Matsusada. Matsusada reserves the right to make any changes in the contents of catalogs or specifications at any time without advance notice. Due to compelling reason such as unavailability of components used, products might be unavailable or unable to repair. The products specified in catalogs or specifications are designed for use by the person who has enough expertise or under the control of such person, and not for general consumers. Schematics of products shall not be submitted to users. Test result or test data for the products shall be available upon request with charge.

Make sure you read the specification in the latest catalog before you order. Contact nearby sales office for the latest catalog.

Please see the link below for the complete warranty terms.

https://www.matsusada.com/site/warranty.html

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