Matsusada Precision

DIGITAL CONTROLLER
CO Series

NEW

Digital Controllers

—— for Matsusada's power supplies

Ehternet supported modules makes possible the construction of large-scale system

CO series

- USB, Ethernet, RS-232C, RS-485, and GPIB supported.
  (Ethernet is a registered trademark of Xerox Corporation.)
- Resolution : 16-bit (1/65535)
- Isolation : Fiber optic cable (optical link only)

www.matsusada.com

Digital Controller

CO series

The CO series is a line of adapters used to digitally control Matsusada's High Voltage, DC, and AC power supplies via personal computer. In addition to enabling manufacturing line automation and speeding up R&D, the CO series is ideally suited to building safe, stable, varsatile and highly accurate automatic inspection and measurement systems, saving your time and cutting labor costs.

The addition of an ethernet supported module to our product lineup makes large-scale systems and remote location control possible.

The CO series utilizes fiber optic cables for the digital communication, assuring high quality communication in even the noisiest environments, such as in the factory floor. The fiber optic connection also secures electrical isolation, resulting in safer operation even when combined with power supplies of different potentials.

The CO series boasts a multitude of functions, including high resolution 16-bit(1 / 65535) control and read back or status output. This promises the CO series is ideal for Research & Development, quality control, and 24 / 7 production lines that require high accuracy. The CO series is also ultra-compact, allowing you to place them practically anywhere, saving valuable shelf and floor space.

Features

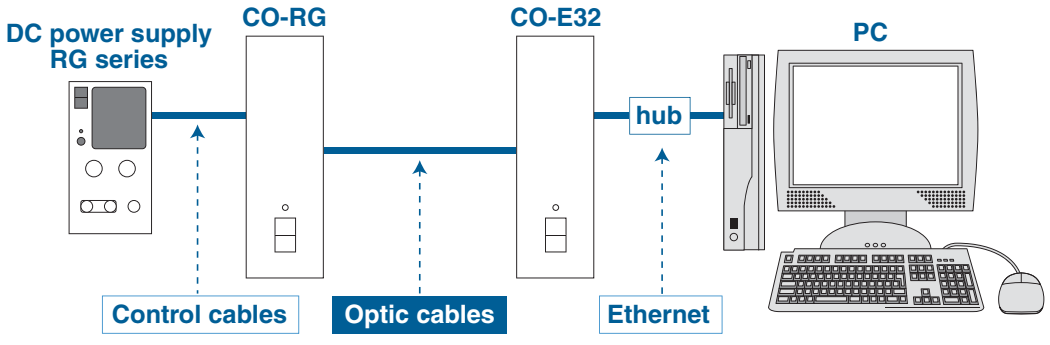
- USB, Ethernet, RS-232C, RS-485, and GPIB supported.
  (Ethernet is a registered trademark of Xerox Corporation.)
- **Resolution :** 16-bit(1 / 65535)
- **Isolation :** Fiber optic cable(optical link only)
- **Functions :** PC Control, Listener / Talker, Read Back or Status
- **Size :** 1.5"W × 4.9"H × 5.9"D
- **Enable to directly control from sequencer(PLC)***

* Require a RS-232 port for communication

PSS2 is the dedicated software which can actuate various power supplies, electronic loads and digital controller for power supplies manufactured by Matsusada Precision Inc. with simple set up.

Detailed catalog of PSS2 is available.
Please feel free to contact us.

Example of communication with optical fiber



- Stable communication is possible even in high noise environment.
- Extremely safe operation is possible due to no limit to voltage it can withstand.

Function

*Please contact near by sales office for AC power supplies, Electric Load, and the others which is not listed below.

Power Supply		RE series EPR series*3		R4G series			RG series	AU, AF / AE, AK, AKP, ES, EJ, W, K12-R, XR series *9
type		Power supply integrated interface	Optical communication	Modular cable	Power supply integrated interface	Optical communication	Optical communication	Optical communication
Combination of adapters / Functions	Adapters1 with Ethernet	-LEt option	CO-E32	CO-E32m	———	CO-E32	CO-E32	CO-E32
	Adapters1 with USB	-LUs1 option	CO-U32	CO-U32m	-LUs1 option	CO-U32	CO-U32	CO-U32
	Adapters1 with RS-232C	———	CO-OPT2-25 CO-OPT2-9	CO-MET2-25 CO-MET2-9	-LRs option	CO-OPT2-25 CO-OPT2-9	CO-OPT2-25 CO-OPT2-9	CO-OPT2-25 CO-OPT2-9
	Adapters1 with RS-485	———	CO-OPT4-25	CO-MET4-25	———	CO-OPT4-25	CO-OPT4-25	CO-OPT4-25
	Adapters1 with GPIB	-LGb option	CO-G32	CO-G32m	———	CO-G32	CO-G32	CO-G32
	Adapters2 Combine with Adapters 1	———	-LGob option	-LGmb option	———	-LGob option	CO-RG, CO-RG-LH	CO-HV
Output Voltage control and setting checking		16-bit or 100.00 % *4		100.00 % or voltage value			16-bit or 100.00 %	16-bit or 100.00 %
Output Current control and setting checking		16-bit or 100.00 % *5		100.00 % or current value			16-bit or 100.00 %	16-bit or 100.00 % *10
Output voltage monitor		12-bit or 100.00 % *4		100.00 % or voltage value			12-bit or 100.00 %	12-bit or 100.00 %
Output current monitor		12-bit or 100.00 % *5		100.00 % or current value			12-bit or 100.00 %	12-bit or 100.00 %
Remote ON / OFF		○		○			○	○
OVP control		16-bit or 100.00 % *6		100.00 % or voltage value			—	—
OCP control		—		100.00 % or current value			—	—
CV / CC mode status		CV / CC		CV / CC			—	—
OVP status		○ *6		○			—	—
OCP status		—		○			—	—
OTP status		○ *6		—			—	—
ACF status		○ *6		—			—	—
LD(Interlock) status		—		○			—	—
UV status *1		O (UV setting : 16-bit or 100.00 %)		—			—	—
UC status *2		O (UC setting : 16-bit or 100.00 %)		—			—	—
Output status		ON or stop by FLT *6		○			OUTPUT switch position	ON or OFF *11
Output reset		○ *7		○ *8			—	○ *12
Polarity change		—		—			—	○ *13

Power Supply		RK-80 series			R4K-80, R4K-36 series			RK, TB, RKT, REKJ, REK series		
type		Modular cable	Power supply integrated interface	Optical communication	Modular cable	Power supply integrated interface	Optical communication *16	Modular cable	Power supply integrated interface	Optical communication
Combination of adapters / Functions	Adapters1 with Ethernet	CO-E32m	———	CO-E32	CO-E32m	———	CO-E32	CO-E32m	-LEt option *14	CO-E32
	Adapters1 with USB	CO-U32m	-LUs1 option	CO-U32	CO-U32m	-LUs1 option *14	CO-U32	CO-U32m	-LUs1 option *14	CO-U32
	Adapters1 with RS-232C	CO-MET2-25 CO-MET2-9	———	CO-OPT2-25 CO-OPT2-9	CO-MET2-25 CO-MET2-9	———	CO-OPT2-25 CO-OPT2-9	CO-MET2-25 CO-MET2-9	———	CO-OPT2-25 CO-OPT2-9
	Adapters1 with RS-485	CO-MET4-25	———	CO-OPT4-25	CO-MET4-25	———	CO-OPT4-25	CO-MET4-25	———	CO-OPT4-25
	Adapters1 with GPIB	CO-G32m	———	CO-G32	CO-G32m	———	CO-G32	CO-G32m	———	CO-G32
	Adapters2 Combine with Adapters 1	-LGmb option	———	-LGob option	*14 Standard	———	*14*16 -LGob option	*14 Standard	———	*14 -LGob option
Output Voltage control and setting checking		100.0 % or voltage value			100.00 % or voltage value			100.00 % or voltage value		
Output Current control and setting checking		100.0 % or current value			100.00 % or current value			100.00 % or current value		
Output voltage monitor		100.0 % or voltage value			100.00 % or voltage value			100.00 % or voltage value		
Output current monitor		100.0 % or current value			100.00 % or current value			100.00 % or current value		
OVP control		100.0 % or voltage value			100.00 % or voltage value			100.0 % or voltage value		
OCP control		100.0 % or current value			100.00 % or current value			100.0 % or current value		
Remote ON / OFF		○			○			○		
CV / CC mode status		CV / CC			CV / CC			CV / CC		
OVP status		○			○			○		
OCP status		○			○			○		
OTP status		○			○			○		
OPP status		○			○		*16	—		
ACF status		○			○			○		
RS(Reverse connection of sensing) status		○			○			○		
LD(Interlock) status		—			—			○		
Output status		○			○			○		
Output reset		○ *15			○ *15			○ *17		

*1 Indicate the status of voltage drop due to the cases as short circuit. (RE series only)

*2 Indicate the status of current drop that happens when output line disconnects, etc. (RE series only)

*3 As for EPR series, only optical communication is available.

*4 As for EPR series, output voltage value is also available.

*5 As for EPR series, output current value is also available.

*6 Only RE series.

*7 Reset the output cut off status due to OVP. (RE series only)

*8 Reset output cut-off status due to OVP, OCP and interlock function.

*9 AF, AE, ES and EQ series need -LG option to connect to CO series adapters.

*10 Except AF, AE, ES, and K12-R series.
For AU series, this becomes overload trip control and setting checking.

*11 Except EJ, K12-R and XR series.

*12 Unit with OCP option only.

*13 K12-R and EJ series only.

*14 If you select -LUs1, -LGob or -LEt options, standard digital interface will not be equipped.

*15 Reset output cut-off status due to OVP, OCP, OTP, OPP and reverse connection of sensing function.

*16 Except R4K-36 series.

*17 Reset output cut-off status due to OVP, OCP, OTP, OPP, reverse connection of sensing and interlock function.

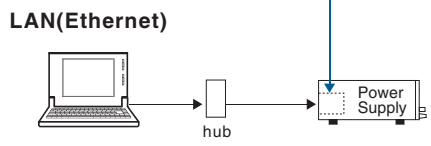
Constitution

Combination with power supplies

Refer to P.7 “Accessories” for the cable of Ⓐ toⒹ

Configuration example of
DC power supplies(R4G, RK-80, R4K-80, R4K-36, RK, TB, RKT, REKJ, REK) and HV power supply(EPR)

RK, TB, RKT, REKJ, REK option -LEt



Application System when controls with Ethernet.

Connection A hub will be required between computer and power supply when control several power supply.

Features Full-controll type with control features and status features. It enables you to configure the system with many units at low cost.

R4G, RK-80, R4K-80, R4K-36, RK, TB, RKT, REKJ, REK option -LUs1

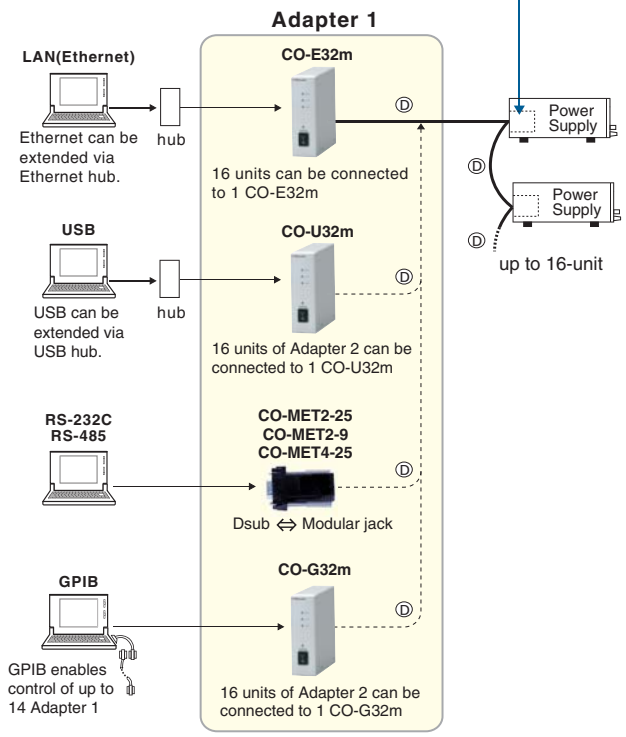
Application System when control with USB.

Connection USB hub will be required between computer and power supply when control several power supply. Number of unit is to be determined by hub to be used.

Features Full control type with various control functions and status functions. An system of lot of units can be built with low cost.

R4G, RK-80 option -LGmb

R4K-80, R4K-36, RK, TB, RKT, REKJ, REK : Standard



Application System when control one or several power supplies with Ethernet, USB,GPIB, RS-232C or RS-485.

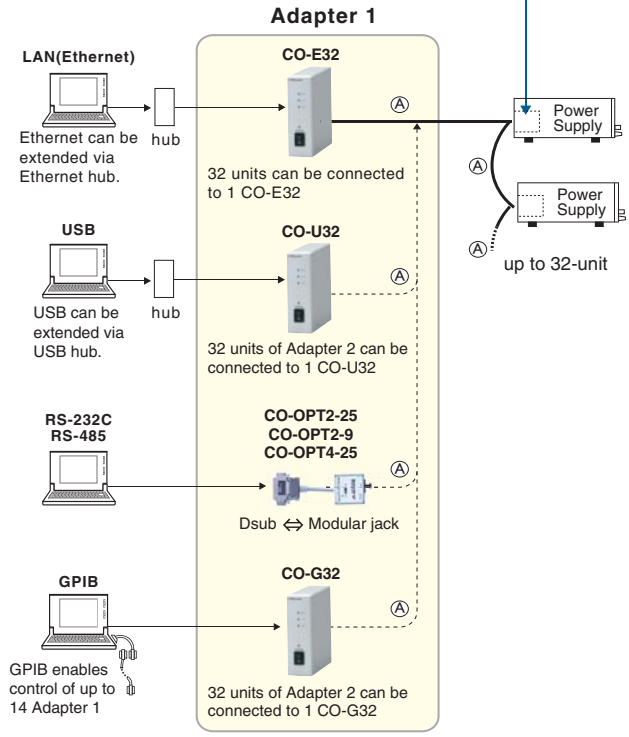
Connection Adapter 1 is to be connected to power supplies with modular cable.

Number of unit 16 units of power supplies can be connected to 1 Adapter 1. In case of GPIB maximum 224 units (14 address × 16 units) can be connected using address.

Features Full control type with various control functions and status functions. An system of lot of units can be built with low cost.

When computer control is not in use, master-slave control by local control is available. (Adapter1 is not necessary.)
When increasing output current by connecting multiple power supplies in parallel it is possible to control them as if controlling one power supply.

R4G, RK-80, R4K-80, RK, TB, RKT, REKJ, REK, EPR option -LGob



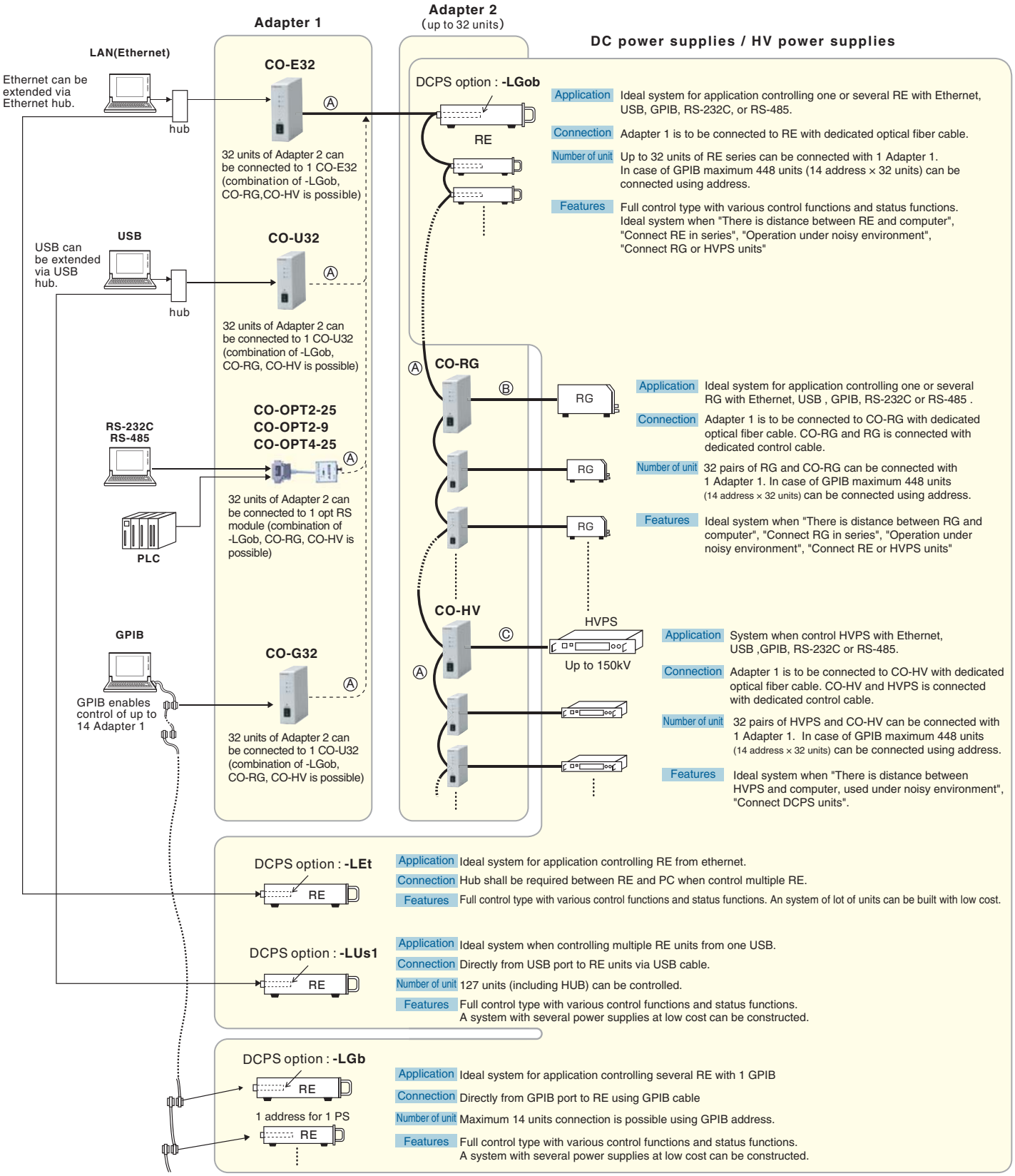
Application System when control one or several power supplies with Ethernet, USB, GPIB, RS-232C or RS-485.

Connection Adapter 1 will be connected to power supplies by dedicated optical fiber.

Number of unit 32 units of power supplies can be connected to 1 Adapter 1. In case of GPIB maximum 448 units (14 address × 32 units) can be connected using address.

Features Full control type with various control functions and status functions. Ideal system when "There is distance between power supplies and computer, used under noisy environment", "Connect HVPS units".

Connection with DC power supplies / HV power supplies



Accessories / Interface specifications / Specifications

Accessories

CO-G32,CO-G32m,CO-RG,CO-HV CO-U32,CO-U32m,CO-E32,CO-E32m	Instruction Manual (1), Rubber feet (4) (Ruber foot will be glued on depending on installation method.)
-LGmb	Modular cable(Case Ⓓ) CO-M cable (1) Standard : CO-M cable 1 (2 m length) -L(Mc#) option : CO-M cable 1 (#m length)…See “Options”
CO-RG	Opt cable(Case Ⓐ) Standard : CO-OPT cable 1 (2 m length) -L(Fc#) option : CO-OPT cable 1 (#m length)…See “Options” --- Control cable(Case Ⓑ) Standard: CO-RG cable (1) / -LH option : CO-RGH cable (1) -LH option is required for CO-RG unit when combined with RG series of over 120 V voltage. When ordering cable alone, specify CO-RG cable or CO-RGH cable.
-LGob	Opt cable(Case Ⓐ) Standard : CO-OPT cable 1 (2 m length) -L(Fc#) option : CO-OPT cable 1 (#m length)…See “Options”
CO-HV	Opt cable(Case Ⓐ) Standard : CO-OPT cable 1 (2 m length) -L(Fc#) option : CO-OPT cable 1 (#m length)…See “Options” --- Control cable(Case Ⓒ) Either CO-AU cable, CO-AF cable, CO-W cable, CO-K12 cable, CO-EJ cable or CO-XR cable (Both cables' length are 2 m.) > CO-AU cable is required when combined with AU series. > CO-AF cable is required when combined with AE, AF or ES series. > CO-W cable is required when combined with W series. > CO-K12 cable is required when combined with K12-R series. > CO-EJ cable is required when combined with EJ series. > CO-XR cable is required when combined with XR series. > When ordering only CO-HV or cable, specify the cable part number.

Interface specifications

Digital specifications

[USB] USB1.1 conformable (attach Windows driver)

[Ethernet] IEEE802.3 version 2.0 compliant
Network interface : 10BASE-T/100BASE-TX
Protocol : TCP/IP, Telnet, DHCP, BOOTP, Auto IP, HTTP

[RS-232C / RS-485]

Speed	Asynchronous 9600 bps(fixed)
Data Length	8 bit
Parity	None
Stop Bit	1 bit
Flow control	None
Dsub connector	25 pin(Male) : CO-OPT2-25 / CO-OPT4-25 / CO-MET2-25 / CO-MET4-25 9 pin(Female): CO-OPT2-9 / CO-MET2-9

RS-232C 25 pin:	Data input	PinNo.2	Data output	PinNo.3	GND PinNo.7
RS-232C 9 pin:	Data input	PinNo.3	Data output	PinNo.2	GND PinNo.5
RS-485	:Data input+	PinNo.16	Data input−	PinNo.19	
	Data output+	PinNo.13	Data output−	PinNo.14	GND PinNo.7

*Cable to connect optical RS-232C module, optical RS-485 module and port is not enclosed.

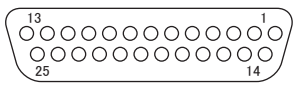
[GPIB]

Electrical specification	IEEE488-1978 compliant
Mechanical specification	IEEE488-1978 compliant
Interface function	SH1, AH1, L4, T6, SR1, RL0, PP0, DC1, DT0, C0
Address setting	Desired address can be assigned from 0 to 30 with address switch.
Delimiter	Combination of EOI, CR and LF
Service Request Function	Indication of output status and shut off status of controlled power supply

Analog specifications (CO-RG,CO-HV)

● **Control section**	**Setting accuracy**	+0.1 %
	Temp. Coeff.	100ppm / °C
● **Monitor section**	**Reading accuracy**	±0.2 %±2digit
	Temp. Coeff.	200ppm / °C

Dsub25 socket



Pin No.	Function	command
1	Output voltage setting(0 V to 10 V)	CH0,VCN
2	Output current setting(0 V to 10 V)	CH1,ICN
18	Over voltage protection setting(0 V to 10 V)	CH2,OVP
15	Voltage monitor(0 V to 10 V)	MN1,VM
3	Current monitor(0 V to 1 0V)	MN2,IM
4, 21	Output ON / OFF signal	SW
8	Cut off reset signal	RST
20	Remote / Local setting	REN / GLT
16	SRQ	SRQ
11	Fault status	SRQ
12	CV mode status	STS
13	CC mode status	STS
5, 6, 10	COMMON	—

Specifications

CO-G32, CO-U32, CO-E32, CO-G32m, CO-U32m, CO-E32m, CO-RG, CO-HV

Input voltage : 100 V to 240 VAC, 47 to 63 Hz, single phase
Isolation voltage : AC1.5 kV for 1 min between primary-secondary
AC input cable : 1.8 m

CO-OPT2-25, CO-OPT2-9, CO-OPT4-25, CO-MET4-25

Input voltage : 100 V to 240 VAC, 47 to 63 Hz, single phase
AC input cable : 1.8 m

CO-MET2-25, CO-MET2-9

Input power is not required.

● Application program

Sweep control program for CO series

Summary

This program is a program to gradually change the output of the controllable DC power supply and high voltage power supply in the digital controller 'CO series'. Any setting, voltage value and current value to start the output, voltage value and current value that the output arrives at, a time before attainment, and voltage value and current value after attainment, is possible. And, letting a power supply do the output followed them is also available.
It is very convenient in the use that it is necessary to repeat the output by changing the output gently and a decided pattern, as transformation process of the capacitor, aging of electronic components and burn-in testing of semi-conductor etc.

Features

· Fine setting of output voltage and output current is available by high- resolution of 16-bit.
· Each voltage value and each current value can be set individually.
· Ethernet, USB, RS-232C, RS-485 and GPIB communication are available. (Ethernet is a registered trademark of Xerox Corporation.)

Usage example

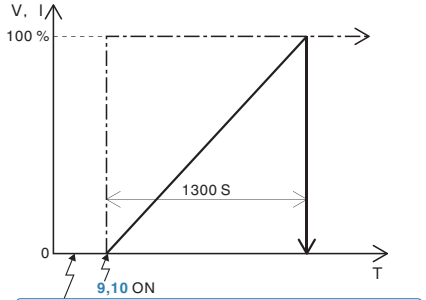
1. Output voltage value setting
2. Output current value setting
3. Attained voltage value setting
   (can be set below value lower than above 1.)
4. Attained current value setting
   (can be set below value lower than above 2.)
5. Attained time setting
6. Output voltage setting after attainment
   (select from 0 V, remain, or value before sweep)
7. Output current setting after attainment
   (select from 0 V, remain, or value before sweep)
8. Choose whether output status signal will be output or not
9. Output ON
10. Sweep ON

Operation image

Drawing is with resistive load. Output rise and fall time is prioritized by power supply's performance.

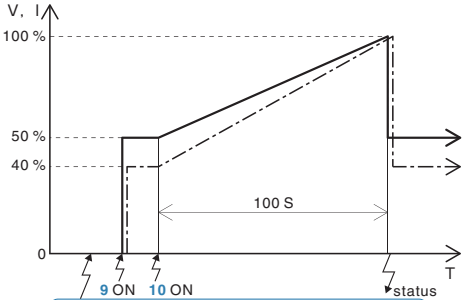
V — Send control signal from controller
I — Send status signal from power supply

Example of usage only constant voltage



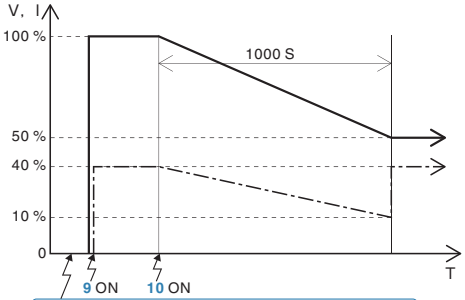
1 Don't send 2 100.00 % 3 100.00 % 4 100.00 %
5 1300.0 S 6 0 V or value before sweep 7 Don't send

Example of usage that sweeps from constant value to undo it after attainment



1 50.00 % 2 40.00 % 3 100.00 %
4 100.00 % 5 100.0 S
6, 7 Value before sweep 8 Status signal is output

Example of usage lowering output value by sweeps



1 100.00 % 2 40.00 % 3 50.00 % 4 10.00 %
5 1000.0 S 6 Don't send 7 Value before sweep

Specification

Setting range	Voltage : 0 to max. output voltage 16-bit or percentage (Min. step 0.01 %) Current : 0 to max. output current 16-bit or percentage (Min. step 0.01 %) Time : 0 to 1,300 sec; min.step 0.1 sec (Accuracy : +/-0.3 %)
Time resolution	20 ms fixed
Voltage / Current resolution	Depending on present value, attainment value, attainment time Calculation : 1 / (attainment time / 20 ms) × (attainment value – present value) Min. value : 1 / 65535 of rated max. output (above formula, from 0.1 sec min. attainment time value)
Output after attainment	0, keep attainment value, or value before sweep (Voltage and current can be selected)
Status after attainment	Can be set whether output status signal or not (Notify unit number)

Available models

- CO-HV (Digital controller for HV power supply)
- CO-RG (Digital controller for RG series of DC power supply)
- With -LGb, -LGob, -LUs1 or -LEt optional models of RE series of DC power supply

* See individual catalog for detail of each product.

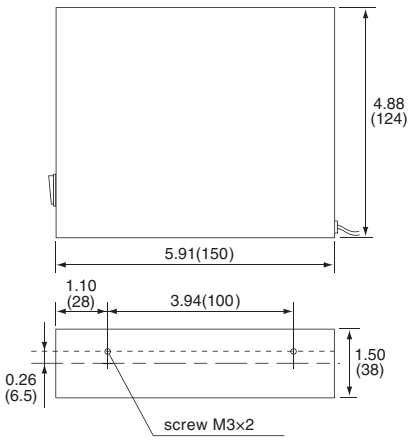
How to Order

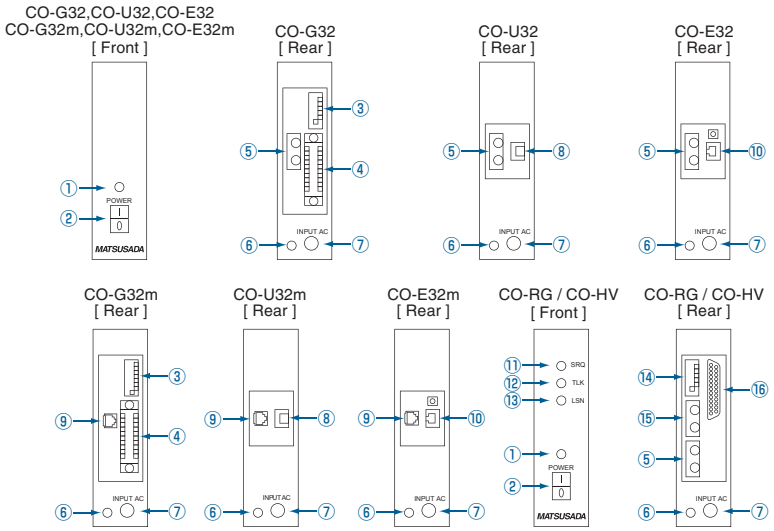
When ordering, suffix (s) to the above available models' model name.
<e.g> RE10-110-LGob(s), CO-HV(s)

Dimensions / Options

Dimensions inch(mm)

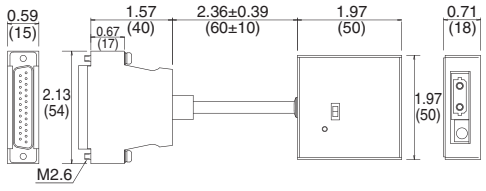
CO-G32.CO-U32,CO-E32,CO-G32m,CO-U32m,CO-E32m,CO-RG,CO-HV



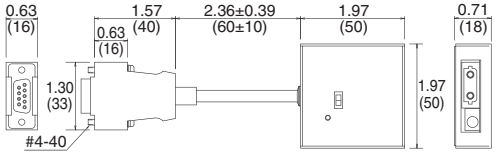


① POWER LED
② POWER ON / OFF switch
③ ADDRESS switch
④ IEEE-488 connector
⑤ Opt fiber connector(OUT)
⑥ GROUND terminal
⑦ AC input
⑧ USB connector
⑨ Module cable connector(OUT)
⑩ Ethernet cable connector
⑪ SRQ LED
⑫ TLK LED
⑬ LSN LED
⑭ Unit # / Upper connection unit setting switch
⑮ Opt fiber cable connection(IN)
⑯ Control cable connector(Dsub25 socket)

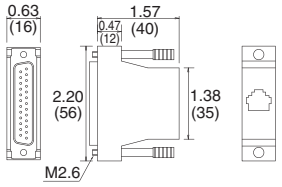
CO-OPT2-25



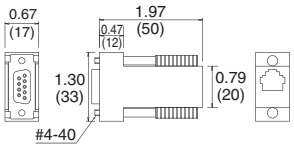
CO-OPT2-9



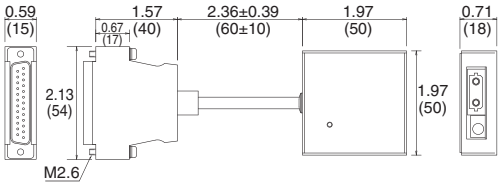
CO-MET2-25



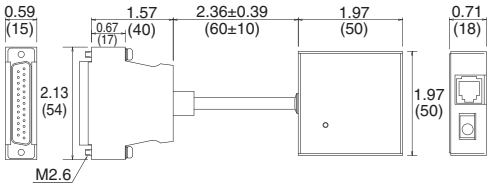
CO-MET2-9



CO-OPT4-25



CO-MET4-25



Options

-LH : High voltage isolation (only for CO-RG)
∗Needed when combined with RG of over 120 V output.

-L(Fc0.5) : When CO-OPT cable of 0.5 m is required.∗1

-L(Fc5) : When CO-OPT cable of 5 m is required. ∗1

-L(Fc10) : When CO-OPT cable of 10 m is required. ∗1

-L(Fc20) : When CO-OPT cable of 20 m is required. ∗1

-L(Fc40) : When CO-OPT cable of 40 m is required. ∗1

-L(#4) : inch screws for D-sub fixing screws. (#4)
∗For CO-OPT2-25, CO-OPT4-25, CO-MET4-25

-L(Mc0.15) : When CO-M cable of 0.15 m is required.∗2

-L(Mc0.5) : When CO-M cable of 0.5 m is required. ∗2

∗1 : For CO-HV, CO-RG and -LGob option models.
∗2 : For the standard models of R4K-80, R4K-36, RK, RKT, REKJ and REK, or -LGmb option models.

When ordering, please suffix the above option number to the model number in alphabetical order.
<e.g.>CO-RG-L(Fc5)H(U)
When ordering CO-HV, please specify control cable name.
<e.g.>CO-HV-L(Fc10)(U)(with CO-AU cable)

FAX

USA/Canada : +1-888-652-8651
other countries : +81-6-6150-5089

Customer Inquiry Sheet (CO 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 un available 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
http://www.matsusada.com/site/warranty.html

Matsusada Precision Inc.

Website www.matsusada.com

San Jose Office : 2570 N.First Street Suite 200 San Jose, CA 95131
Tel: +1-408-273-4573 Fax: +1-408-273-4673
Boston Office : 859 Willard Street, Suite 400, Quincy, MA 02169
Tel: +1-781-353-6407 Fax: +1-781-353-6476

North Carolina Office : 5960 Fairview Rd. Suite 400, Charlotte, NC 28210
Tel: +1-704-496-2644 Fax: +1-704-496-2643

International Office : Osaka-City, Osaka Japan
Tel: +81-6-6150-5088 Fax: +81-6-6150-5089
Headquarters : 745 Aoji-cho Kusatsu Shiga 525-0041 Japan