

Power Supply for Surface Treatment



Technology based on more than half a century of development

We are developing power supply units for surface treatment that keep up with the rapidly diversifying needs of the electronics industry.

Diversified surface treatment technology

The uses and functions of surface treatment technology are diversifying, ranging from decoration, rust prevention, wear resistance, and electrical conduction of electronic parts.

Especially, galvanization bears an important role by the function with excellent the processing technology.

Process of surface treatment

Surface treatment or plating involves a complicated process of pre-treatment, various plating processes, and post-treatment that are considered as the treatment of base materials, in addition to other processes depending on each material and finishing method. Today, stricter quality, improvement in energy efficiency, and process rationalization are required in plating, no matter how complicated and advanced the process is.

Our new power supply units are one way of comprehensively resolving such issues. Plating quality can be improved by using a power supply that controls the current required in various plating processes quickly and more optimally. These new systems greatly reduce noise and pollution as well.

Reformation of surface treatment power supply

With the rapid development of technology in the surface treatment industry, innovation is required in the power supplies used there, and power electronics technology (power semiconductor elements, conversion technology, control technology) that supports technological innovation continues to advance day by day. For example, the use of high-frequency power transistors revolutionized the concept of conventional Plating Rectifiers, and so-called inverter-type power supplies and pulse power supplies were put to practical use.

In the future, power supplies that are more precise and efficient, more compact and lighter, will contribute significantly to the creation of a low-carbon society while saving labor and improving quality.

Our power supply for surface treatment

Result of Know-how Accumulated over Many Years

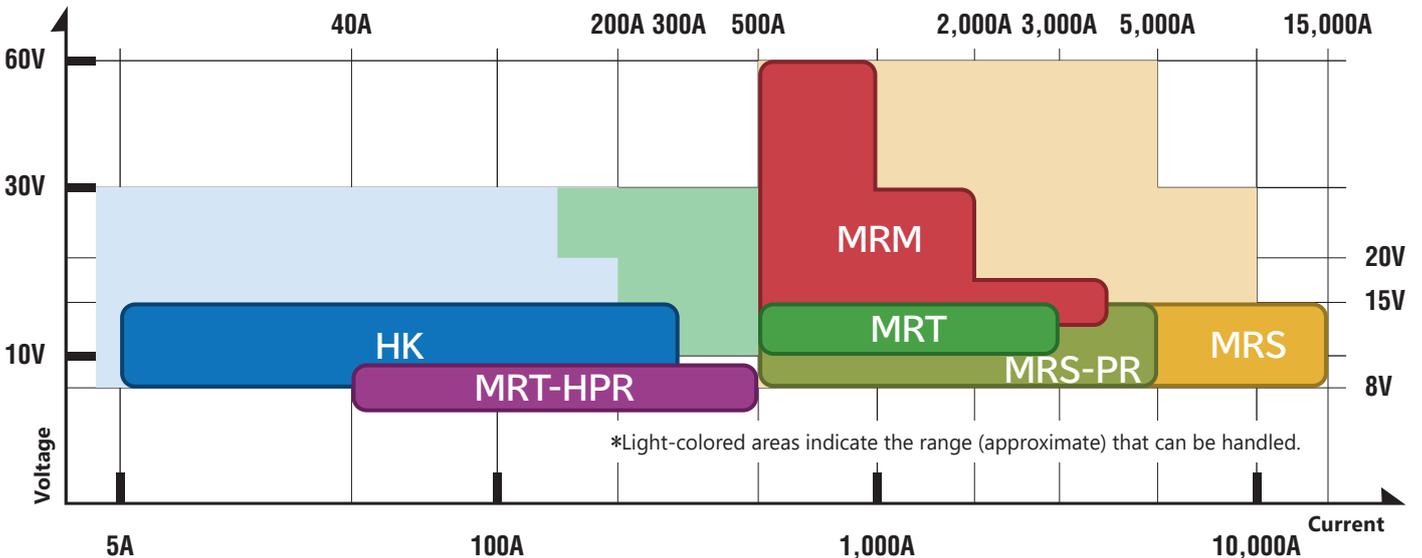
Design based on in depth knowledge of the locus of surface processing ensures stable performance over the long term.

Abundant series

Supports from laboratory use with output current of 5A to large capacity with maximum output current of 15,000A.

A lineup for the inverter power supply with the latest digital control and an efficient electric power semiconductor.

In addition, various power supplies with an output voltage exceeding 200V are also available.



Improved environmental durability

The interior is duct structure. Only heat sink is air-cooled. Electronic components are protected against influence from environment in order to maintain stable characteristics for long time.



Fan with a long service life and easy replacement

Fan motion is varied by operating and there by fan has longer life (mechanically) and reduced noise. In case of defect, fan is easily replace.

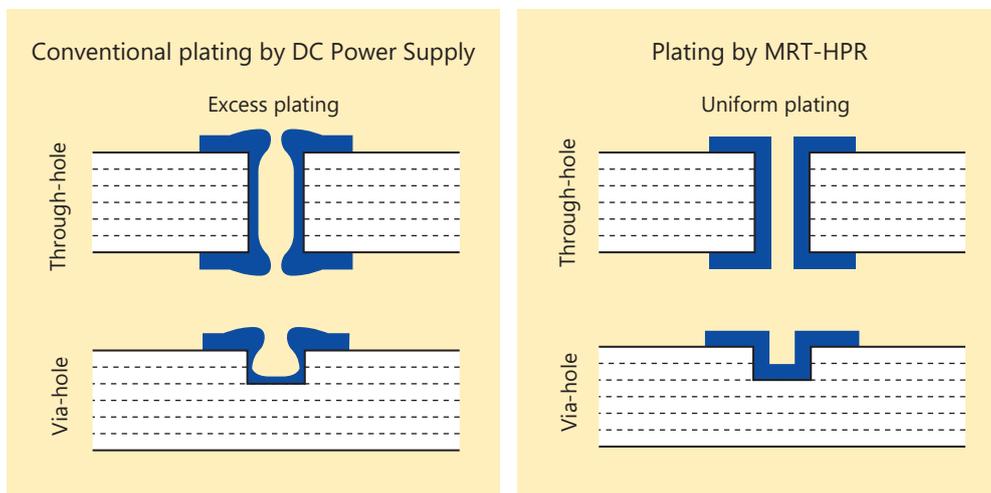
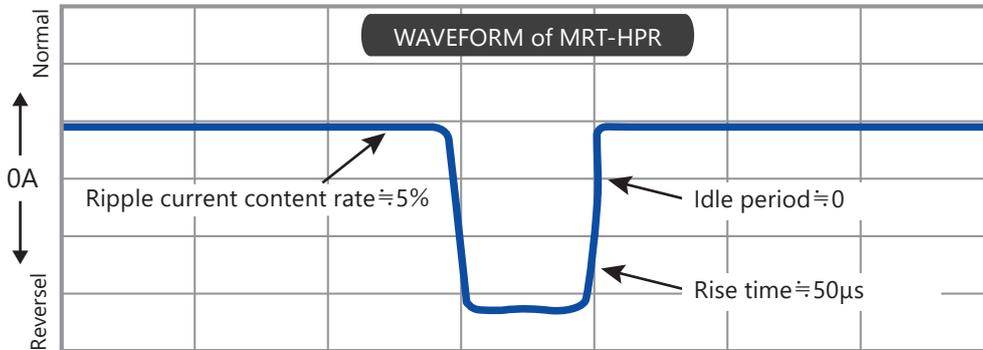


High-speeding of output pulse current

A wavy control that suits a new process is materialized. The challenge of the road to the process with an infinite possibility is supported.

- DC high-speed pulse control
- Positive-Reverse high-speed pulse control
- Reversible high-speed switching

The newly developed high-speed switching circuit has realized high speeding of 50 sec or less of output current polarity switching time (rise and fall time). It contributes to the realization of uniform film formation and the improvement (speedup) of productivity.

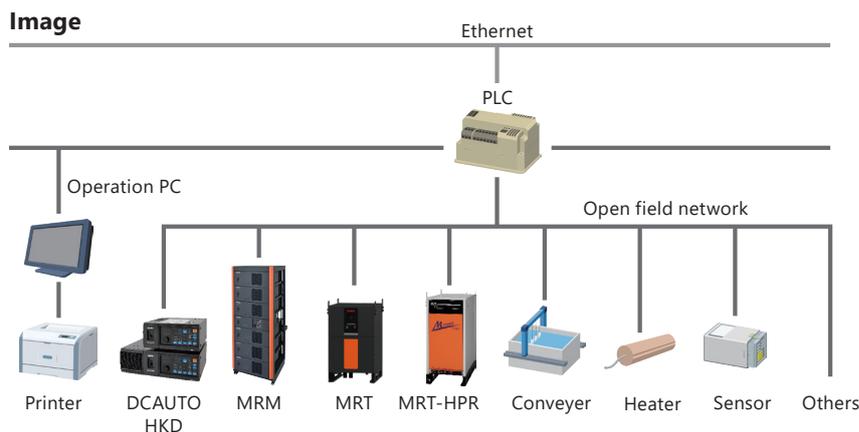


Open Field Network Interface

We mounted the interface in accordance with an international standard. Therefore the system construction of high reliability will be achieved in a short time.

DeviceNet™ CC-Link

In our product, the open network communication such as DeviceNet began to appear in the industry and was installed. It is possible to connect by this function the personal computer, the control equipment such as PLC, and between, and the match with mechanism is also easy. Troublesome program development and a special substrate by special communications such as the current remote controls and RS232C are unnecessary. (There is something that it is not possible to correspond with a part of model.)



Products Lineup

Power Supply for plating of small capacity

3~6

Model : HK



Modular type Inverter Power Supply

7~10

Model : MRM



Inverter Power Supply for various platings and anodizing

11~14

Model : MRT



High-speed PR forward, Reverse pulse power supply for high-precision plating

15~16

Model : MRT-HPR



Thyristor Power Supply for various platings and anodizing

17~18

Model : MRS



Thyristor rectifier for electrolytic degreasing, Hard chromium plating Forward, Reverse rectifier

19~20

Model : MRS-PR



Thyristor rectifier for electrodeposition coating

21

Model : MED



DC integrating AH meter for plating management

22

DIGITAL-7



Ultrasonic Cleaning Systems

23~24

CleanRex



List of Optional Functions

25~26

DCAUTO / MINIREX



Superior model with sophisticated functions and environmental durability



HKD type



HKE type
(HKE:limited function type)

Remote control pendant (Option)

Remote control pendant is easily operated by a jog dial.



for HKD



for HKE

Features

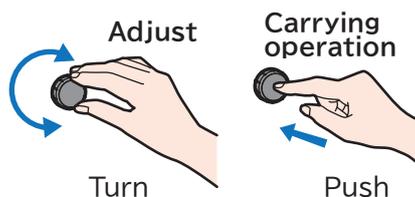
- Reliable technology, high performance, and high environmental resistance backed by a wealth of delivery records**
 As a Plating Rectifier small-capacity plating, we have a standard lineup with a wide range from 5A to 300A.
- Contributing to a low-carbon society by saving energy and space (compared to our conventional products)**
 Realized further energy saving by incorporating our own high efficiency switching circuit. The high power factor converter reduces the input current value and achieves a maximum size reduction of 37% compared to conventional models.
- Improved reliability**
 Predetects cooling fan failure and reduces unexpected shut-down during the line operation. We also have a full line-up of natural air cooling systems with excellent environmental resistance and maintainability.

Unique features of HKD type

- Equipped with various operation modes that can handle various plating conditions**
 DC mode, single-phase full-wave mode, and chopper (pulse) mode are available as standard. GOLDWAVE (free waveform) modes are also available as an option.
- Easy management of plating solution and plating film thickness**
 Equipped with a current integration function as standard, effective for plating film thickness control.
- Capable to control remotely or link with other communication devices**
 Equipped with RS-485 communication as standard, and supports open field network as an option.

Easy setup with jog dial

The jog dial is used for output voltage and current setup. One dial is capable of digit-by-digit numerical value setup and moving through values, which allows easy setup.



Diagnose defects with abnormality indicator and alarm

Individual indication of problems allows for easy analysis. Buzzer and abnormal output signal notify of defects. Continuous operation mode is also available in case of output defects.



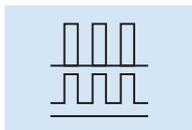
Piling up is allowed

Units can be piled up to 3 stacks.
 *For more stacks piling, we provide exclusive-use rack as an option.



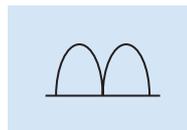
Power Supply for plating of small capacity

Selectable output waveform mode



A. Chopper (pulse) mode

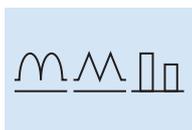
Minimum 1msec pulsation output is possible. Suitable for plating precious ornament and / or lead free soldered components. Synchronized operation of multi-units is possible. (Option)



B. Single phase full wave mode

Suitable for silver plating.

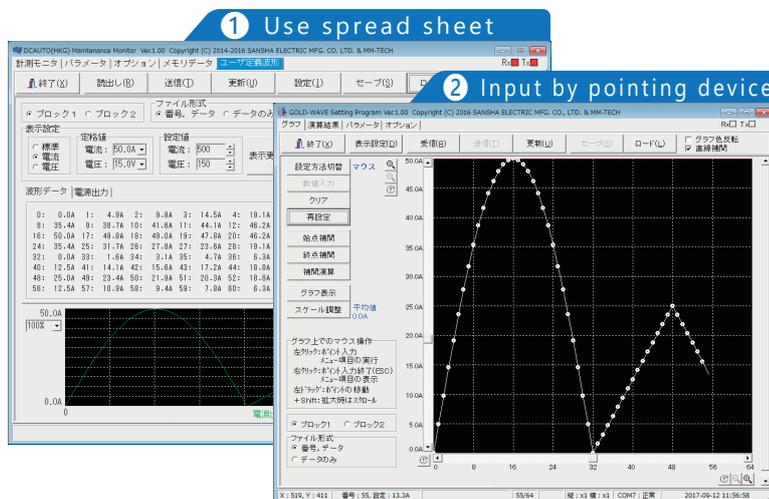
Option



C. GOLDWAVE (Free waveform) mode

If dedicated software (Option) is used, operation with any waveform output becomes possible.

1 cycle	5Hz-150Hz(6.7ms-200ms)
1 cycle resolution	64 points in one cycle
Waveform setting	① Use spread sheet
	② Input by pointing device



High speed communication

RS-485 communication is equipped. Maximum communication speed is 38,400bps.

Option

Open field network applicability

DeviceNet™ CC-Link

With open field network, it can be controlled by simple program on sequencer side. It can be applied to most of mainstream open field networks in the world.

Current integration function

8-digit ampere-hour meter is built in for controlling plating thickness. Current integrated value in each pattern of operation can be shown as ampere-second, ampere-minute or ampere-hour.

Item		Function
Individual	Preset	Set by jog dial, 4 digit display
	Counter	4 digit display
	Setting & Display	1AS-9999AS, 1AM-9999AM 1AH-9999AH (selectable)
Total	Preset	Set by jog dial, 8 digit display
	Counter	8 digit display
	Display	1AH-99999999AH

Energization timer

Energization time can be controlled by a timer for controlling plating thickness.

Operation pattern memorizing

A. Memorized operation

Memorized operation function workable at any set values is provided. 90 patterns of operation parameters can be memorized.

B. Patterned operation

Continuous operation at different parameters memorized in memorized operation.

Item		Function
Memory (Parameters setting)	90 patterns	With operation mode select key, parameters can be set. Memory 1: CV:8.0V Preset: 150AM Memory 2: CC: 150A As shown above, different parameters are memorized individually and integrated into any operation conditions by one-touch operation.

Common specification

Item		Specification		
Input	Voltage	Single phase	100V/200V Changeover*1 100V-110V/200V-230V*2 200V 200V-230V	
		3-phase	200/400V Changeover*1 200V-220V/380V-440V	
	Frequency	50Hz/60Hz		
	Voltage range	±10%		
Output	Control method	PWM control switching method		
	Control	Constant Voltage (CV) or Constant Current (CC)		
	Accuracy (Warranty) range	10% to 100% of rated value (current/voltage)		
	Accuracy	Variance of input power	Rated value ±0.5% or below	
		Load variance	Rated value ±0.5% or below	
	Ripple	RMS 1% or below (of rated value at rated input/output)		
Working condition	Location	Indoors		
	Ambient temperature	0°C-40°C		
	Relative humidity	30%-85%		
	Altitude	1000m or below		

*1 Input voltage is automatically detected and can be selected with a single press of a button.

*2 120V, 208V can also be manufactured. Please consult with us for details.

Product list

Output Current	Output Voltage	Standard Product		Built-to-order Product*1	
		8V	15V	20V	30V
5A	Input	Single phase100V/200V(Changeover)			
	Input kVA	0.11	0.14	0.20	0.26
	Externa dimesion	A type			
	Cooling method	Natural cooling			
10A	Input	Single phase100V/200V(Changeover)			
	Input kVA	0.15	0.22	0.28	0.41
	Externa dimesion	A type			
	Cooling method	Natural cooling			
20A	Input	Single phase100V/200V(Changeover)		Single phase100V/200V(Changeover)	
	Input kVA	0.23	0.37	0.54	0.79
	Externa dimesion	A type		B type	
	Cooling method	Natural cooling		Forced air cooling	
30A	Input	Single phase100V/200V(Changeover)		Single phase 100V/200V(Changeover)	Single phase 200V
	Input kVA	0.32	0.54	0.77	1.12
	Externa dimesion	A type		B type	
	Cooling method	Natural cooling		Forced air cooling	
50A	Input	Single phase100V/200V(Changeover)		Single phase 200V	
	Input kVA	0.53	0.90	1.24	1.82
	Externa dimesion	B type		B type	
	Cooling method	Forced air cooling		Forced air cooling	
100A	Input	Single phase 100V/200V(Changeover)	Single phase 200V*2	3-phase200V/400V(Changeover)	
	Input kVA	1.01	1.76	3.01	4.38
	Externa dimesion	B type*2		C type	
	Cooling method	Forced air cooling		Forced air cooling	
200A	Input	3-phase 200V/400V(Changeover)		3-phase200V/400V(Changeover)	
	Input kVA	2.56	3.92	5.80	—
	Externa dimesion	C type		D type	
	Cooling method	Forced air cooling		Forced air cooling	
300A	Input	3-phase200V/400V(Changeover)			
	Input kVA	4.00	6.38	—	—
	Externa dimesion	D type			
	Cooling method	Forced air cooling			

*1 Made-to-order products 20V and 30V are available only in HKD. Please consult with us for details.

*2 3-phase 200V/400V machines are also available.

The external shape of the three-phase 200V/400V machine is C type. Please contact us if you are considering output voltages and currents other than those listed above. Rectifiers of less than 5A (A type) and 30V/150A (D type) can also be manufactured.

Functions

Model		HKD	HKE
Function	Panel start / stop	●	●
	External start / stop	●	●
	Output adjustment	●	●
	CV/CC selection	●	●
	Output waveform selection	●	—
	Digital voltmeter	●	●
	Digital ammeter	●	●
	Ah preset counter	●	—
	Ah total counter	●	—
	External command	○	●
	Output current monitor	○	●
	Output voltage monitor	○	●
	Abnormal output	○	●
	Open field network*1	○	—
	RS-485 communication	●	—
	Remote control	○	○
	Soft start	●	●
Crossover control	○	○	
Initial current setting	●	○	

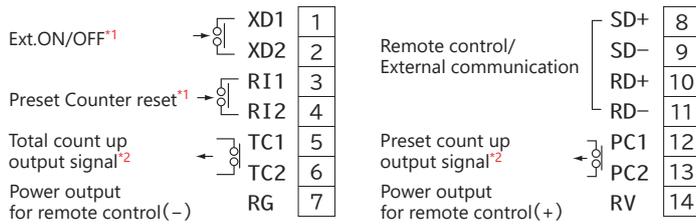
● : Standard ○ : Option — : Not available

*1 We provide dedicated PCBs for DeviceNet , CC-Link and Ethernet respectively.

Power Supply for plating of small capacity

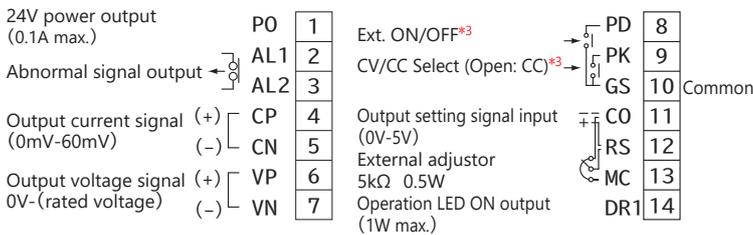
External connection diagram

HKD Control terminal



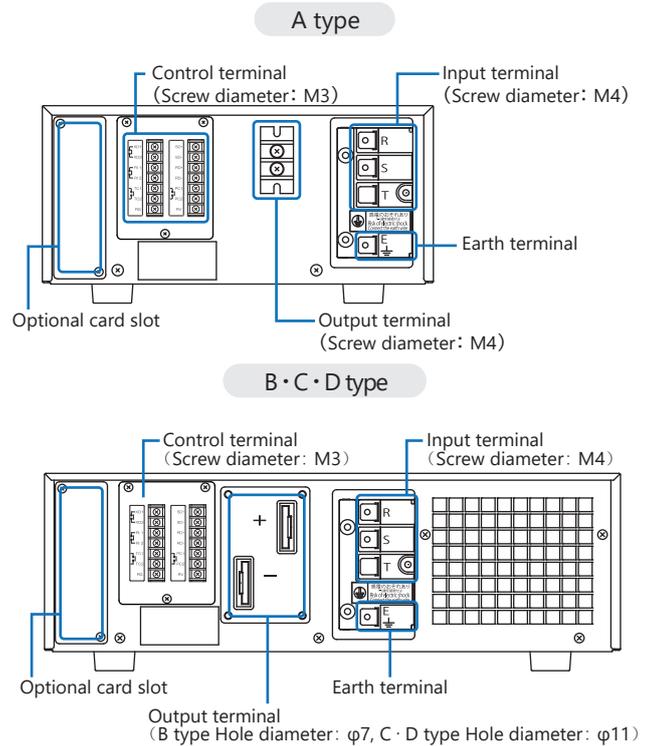
*1 For actuation, use a contact signal which is capable of switching on/off DC30V 20mA.
*2 Contact rating is AC125V 0.4A/DC30V 0.5A (Resistive load).

HKE Control terminal



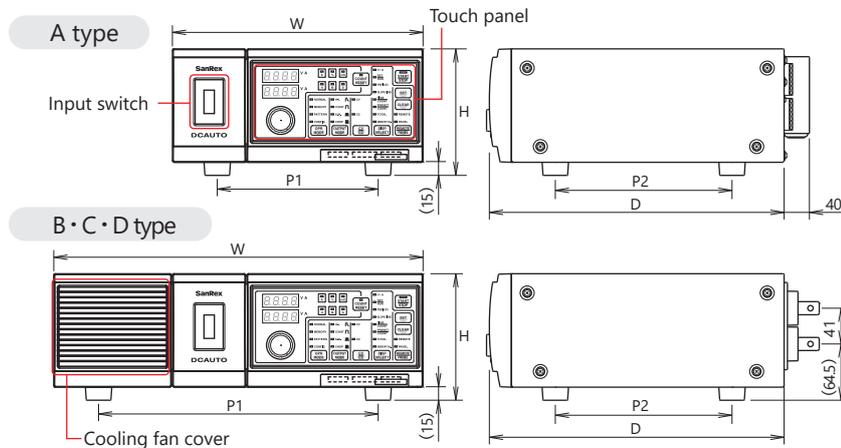
*3 For actuation, use a contact signal which is capable of switching on /off DC30V 20mA.
• CP and CN, and VP and VN are not insulated.
• The signal given between RS and CO must be insulated.

Rear surface



External dimension diagram(mm)

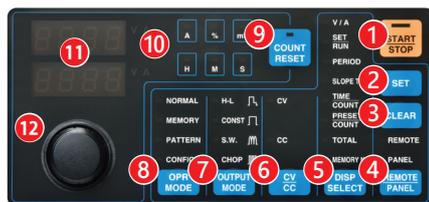
*Numbers in parentheses are auxiliary dimensions.



Type	Dimension(mm)					Mass (Approx.) (kg)
	W	H	D	P1	P2	
A type	285	145	335	183	201	7
B type	420	145	335	318	201	10
C type	420	145	500	318	381	18
D type	420	145	670	318	500	24

Touch panel

HKD type



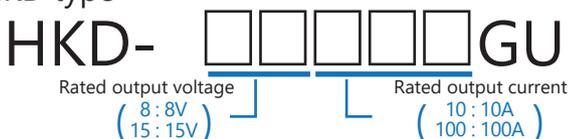
HKE type



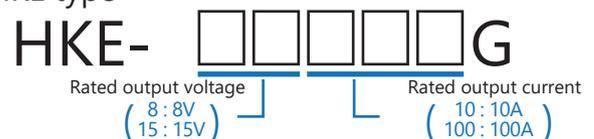
- 1 Output ON/OFF key
- 2 Set key
- 3 Clear key
- 4 Main body/Remote select key
- 5 Display mode select key
- 6 CV/CC select key
- 7 Waveform mode select key
- 8 Operation mode select key
- 9 Count reset key
- 10 Display unit lamp
- 11 4 digit display LED
- 12 Jog dial

How to read the model name

HKD type



HKE type



Air-cooled model

Water-cooled model



Power modular
(Air-cooled model: output 15V,500A)



Control modular + Power modular



Power modular
(Water-cooled model: output 15V,500A)



Features

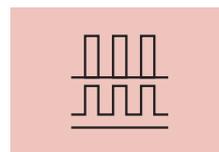
- **Supports a wide range of output currents and voltages**
Power modulars can be connected (expanded) in parallel, series, and series-parallel to meet needs over a wide range of output current and output voltage.
- **Adaptable to input voltage in worldwide**
Input voltage 200V – 240V, 380V – 480V are available. Usable in wide range of countries from North, South America to Japan, Asia etc.
- **Improved reliability**
Predetects cooling fan failure and reduces unexpected shut-down during the line operation. Isolated electronic circuits and major components from outer air.
- **Usable to wide variety of applications**
Enables to set for CV/CC control mode and usable for various applications.
- **Capable to control remotely or link with other communication devices**
Analog signals, RS-485 communication are equipped as standard and other open field networks are also available as an option.
- **Supports operating modes with various output waveforms**
Features DC mode, pulse output as standard. GOLDWAVE (free waveform) modes are also available as an option.
- **DC integrating Ah meter function**
Enable to set Ah meter value for plating solution control by using remote controller. (Option)

The following functions are same as DCAUTO HK. (see P.4)
 • High speed communication • Open field network applicability (Option)
 • Current integration function • Energization timer • Operation pattern memorizing

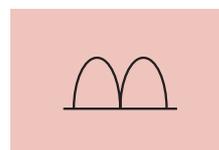
Features unique to water-cooled models

- **Improved environmental resistance (Power modular section)**
Compared to the air-cooled model, the inside of the product is isolated from the outside air, realizing a structure that is less affected by the surrounding environment. It can be installed near the plating bath, and the shortest output wiring contributes to the reduction of power loss.
- **Improved cooling performance**
Ambient temperature upto 50°C. (*When using the power modular alone.)
- **Industrial water can be used**
Our unique water pipes are used for the internal piping, allowing the use of not only pure water but also industrial water.

Selectable output waveform mode



A. Chopper (pulse) mode
10A minimum of 10ms pulse output can be set. Suitable for plating on precious metals and plating for lead-free products. Synchronized operation of multi-units is possible. (Option)



B. Single phase full wave mode
Suitable for silver plating.

Modular type Inverter Power Supply

Common specification

Control modular		Air-cooled/Water-cooled models common	
Model		MRM-CM	
Input specifications	Voltage tolerance	Single-phase 200V-240V 50Hz/60Hz 380V-480V 50Hz/60Hz	
	Select input voltage	Auto	
Input capacity		0.2kVA	
External dimensions	W×H×D	435mm × 128mm × 300mm	
Mass		Approx. 6kg	
Cooling method		Natural cooling	

Power modular		Air-cooled model	Water-cooled model
Model		MRM-PM-15005	
Input specifications	Voltage tolerance	3-phase 200V-240V 50Hz/60Hz 380V-480V 50Hz/60Hz	
	Select input voltage	Manual	
Input capacity		10.5kVA	
Output specifications		15V/500A	
Output	Control	Constant voltage or Constant current	
	Accuracy	Both voltage/current Rated value ±1% (F.S.) or below	
	Accuracy (Warranty) range	Both voltage/current 10% to 100% of rated value	
	Current ripple factor	RMS 1% or below ^{*1} (of rated value at rated input/output)	
External dimensions	W×H×D	435mm × 150mm × 550mm	
Mass		Approx. 24kg	Approx. 29kg
Working condition	Location	Indoors	
	Ambient temperature	0°C-40°C	0°C-50°C ^{*2}
	Relative humidity	30%-85% ^{*3}	
Cooling system	Altitude	1000m or below	
	Method	Forced air cooling	Water-cooled ^{*4}
	Flow rate	—	5L/min

- Option card is available to "MRM-PM-15005".
- *1 Commercial component (300Hz/360Hz), rated input/output 15V 500A, with resistive load
- *2 When using with one power modular *3 However, no condensation
- *4 Pure water and industrial water

Functions

Functions	Model	MRM-CM	MRM-PM	I/O signal
External start / stop		●	○	Contact input
Output selection for CV/CC mode		●	○	Contact input
Abnormal output		●	○	Contact output
Output setting signal (CV/CC output individual setting)		●	○	Analog input
Output voltage monitor / Output current monitor		●	○	Analog output
RS-485 communication		●	○	Digital communication

*1 Enables to support by using remote controller. (Option) *2 We provide dedicated PCBs for DeviceNet, CC-Link, Ethernet.

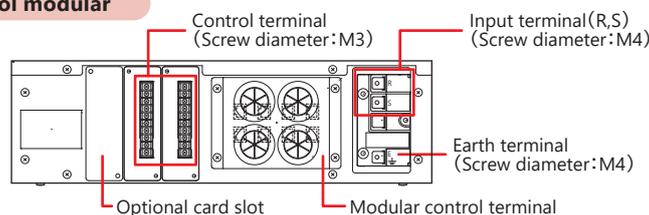
External connection diagram

MRM-CM Control terminal

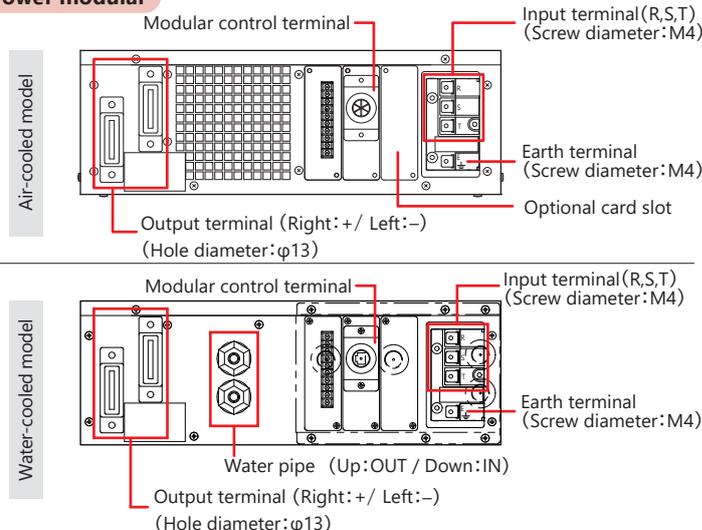
Ext. ON/OFF (PD/GS) ^{*1}	PD	1	11	AL1	Abnormal signal output
CV/CC Select (PK/GS) ^{*1}	PK	2	12	AL2	
Preset Counter reset (RI/GS)	RI	3	13	PC1	Preset count up output signal ^{*3}
	GS	4	14	PC2	
Output setting signal input (RS+/CO-) 0-5V	CO	5	15	SD+	Remote control/ External communication
	RS	6	16	SD-	
External adjustor (MC/RS/CO) 5kΩ 0.5W	MC	7	17	RD+	
	CP	8	18	RD-	
Output current signal (CP/CO2) ^{*2} 0-5V(0-Rated current)	VP	9	19	RV	Power output for remote control(+)
	CO2	10	20	RG	Power output for remote control(-)

- *1: For actuation, use a contact signal which is capable of switching on / off DC30V 20mA.
- *2: CP and CO2, and VP and CO2 are not insulated.
- *3: Contact rating is AC125V 0.4A/DC30V 0.5A. (Resistive load)

Control modular



Power modular



● : Standard ○ : Option

Functions	Model	MRM-CM	MRM-PM
Remote control		○	○
Initial current setting		○ ^{*1}	○ ^{*1}
Preset counter / Total counter		○ ^{*1}	○ ^{*1}
Soft start (1 sec- 9999 sec)		○ ^{*1}	○ ^{*1}
Start / Stop		○ ^{*1}	○ ^{*1}
Output adjustment (CV/CC output individual setting)		○ ^{*1}	○ ^{*1}
Output waveform selection (DC • Square wave)		○ ^{*1}	○ ^{*1}
Digital voltmeter / Digital ammeter		○ ^{*1}	○ ^{*1}
Open field network		○ ^{*2}	○ ^{*2}

Product list [Air-cooled model , Water-cooled model]

Model	Air-cooled model Water-cooled model	MRM - <input type="checkbox"/> MRM - <input type="checkbox"/> - W	15005	15010	15015	15020	15025	15030	15035	15040
Output specifications			15V-500A	15V-1000A	15V-1500A	15V-2000A	15V-2500A	15V-3000A	15V-3500A	15V-4000A
① Control modular			1 units							
② Power modular			1 units	2 units	3 units	4 units	5 units	6 units	7 units	8 units
When the manufacturer's rack is used.	③ Rack	Input terminal W×H×D	MRM-RK/IK3 3 stacks configuration*1 520mm×835mm×570mm			MRM-RK/IK6 6 stacks configuration*2 520mm×1370mm×570mm			MRM-RK/IK8 8 stacks configuration 520mm×1730mm×570mm	
	④ Output terminal		—	MRM-OK2	MRM-OK3	MRM-OK4	MRM-OK6	MRM-OK8		
	⑤ Wiring terminal		—	MRM-WK3		MRM-WK4	MRM-WK6		MRM-WK8	
	⑥ Piping kit (Water-cooled models only)		—	MRM-CK4			MRM-CK8			
Mass (Approx.)*3			60kg/69kg	85kg/99kg	111kg/130kg	154kg/178kg	182kg/213kg	206kg/242kg	252kg/293kg	276kg/322kg
Input specifications			3-phase 200V-240V/380V-480V 50Hz/60Hz							
Input capacity			10.7kVA	21.2kVA	31.7kVA	42.2kVA	52.7kVA	63.2kVA	73.7kVA	84.2kVA
Output	Control		Constant voltage or Constant current							
	Accuracy		Both voltage/current Rated value ±1% (F.S.) or below							
	Accuracy (Warranty) range		Both voltage/current 10% to 100% of rated value							
Output connection diagram			—	(1)	(2)	(3)	(4)		(5)	
Working condition	Location		Indoors							
	Ambient temperature/ Relative humidity		0°C-40°C/30% -85%(However, no condensation)							
	Altitude		1000m or below							
For water-cooled model	Cooling method (water quality)		Water-cooled (Pure water and industrial water*4)							
	Water temperature		5°C-35°C(However, no condensation)							
	Flow rate*5		5L/min	5L/min*6	12L/min*6		16L/min*6		21L/min*6	

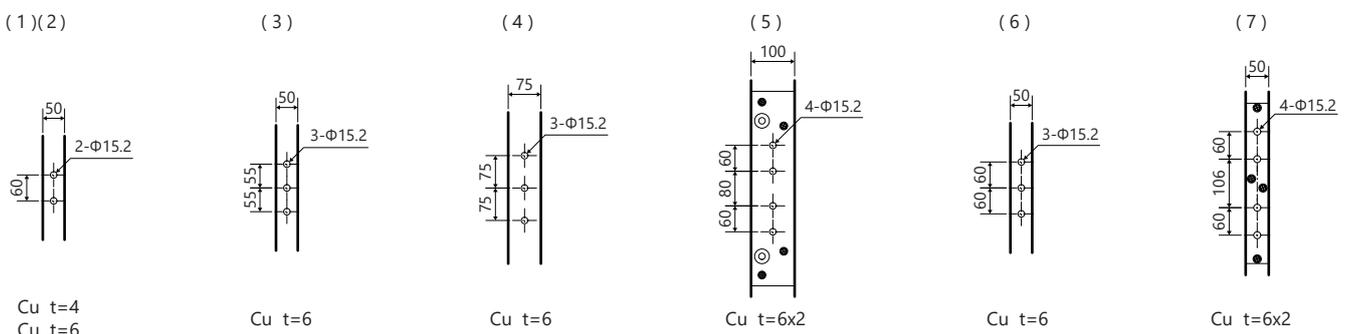
• 1 control modular enables to control up to 8 units (of power modular)
 *1 Up to 3-tier configuration can be used in multi-tier stacking without racks. *2 Six-tier racks are provided as standard products. The three- and eight-tier racks are built-to order products according to customers' needs.*3 Excludes the mass of MRM-WK and MRM-CK. *4 Based on the Water Quality Guidelines for Refrigeration and Air Conditioning Equipment. (JRA-GL-02-1994) *5 Supply pressure 0.12MPa(1kg/cm²) Discharge pressure 0.05Mpa(0.5kg/cm²) *6 Cooling piping to the power modular is based on parallel connection based on 2 series.

Product list [Air-cooled model (Series-parallel type)]

Model	MRM - <input type="checkbox"/> - B	30005	45005	60005	30010	45010	30015	60010	30020	
Output specifications		30V-500A	45V-500A	60V-500A	30V-1000A	45V-1000A	30V-1500A	60V-1000A	30V-2000A	
① Control modular		1 units								
② Power modular		2 units	3 units	4 units	4 units	6 units	6 units	8 units	8 units	
When the manufacturer's rack is used.	③ Rack	Input terminal W×H×D	MRM-RK/IK3 3 stacks configuration 520mm×835mm×570mm			MRM-RK/IK6 6 stacks configuration 520mm×1370mm×570mm			MRM-RK/IK8 8 stacks configuration 520mm×1730mm×570mm	
	④ Output terminal*7	MRM-OK-SA	SA : 1pcs	SA : 2pcs		SA : 4pcs	SA : 2pcs	SA : 6pcs	SA : 4pcs	
		-SB	—	—	SB : 1pcs	P6 : 1pcs	P6 : 1pcs	SB : 1pcs	P8 : 1pcs	
		-P6	—	—	—	—	—	P6 : 1pcs	—	
⑦ Output cover		MRM-SK3			MRM-SK6			MRM-SK8		
Mass (Approx.)*8		Air-cooled model	85kg	109kg	151kg	159kg	197kg	209kg	269kg	
Input specifications		3-phase 200V-240V/380V-480V 50Hz/60Hz								
Input capacity		21.2kVA	31.7kVA	42.2kVA		63.2kVA		84.2kVA		
Output	Control		Constant voltage or Constant current							
	Accuracy		Both voltage/current Rated value ±1% (F.S.) or below							
	Accuracy (Warranty) range		Both voltage/current 10% to 100% of rated value							
Output connection diagram		—	(6)				(7)			
Working condition	Location		Indoors							
	Ambient temperature/Relative humidity		0°C-40°C/30%-85%							
	Altitude		1000m or below							

• If you require a water-cooled model or series-parallel type, please contact our sales representative.
 *7 Please contact us for the details of the connection of the output terminal. *8 Excludes the mass of MRM-SK.

Output terminal connection part (dimensions)Unit : mm



Modular type Inverter Power Supply

Product configuration

This product consists of the following seven product models.
You can purchase necessary products according to your application.
Please contact our sales representatives for details on product selection and installation.

1 Control modular (MRM-CM)

This control modular is capable of parallel operation of up to eight MRM-PM units.
The control terminal and option card slot are available as external interfaces.

2 Power modular (MRM-PM)

A switch mode rectifier with 15V, 500A output. There are two models for the cooling method of the rectifier, air-cooled and water-cooled. A series-parallel type that can connect up to 4 series is also available.

3 Rack/Input terminal kit (MRM-RK/IK)

A rack for storing control modulators and power modulators.
The input wiring case and relay busbars (R, S, T, E) are integrated with the rack.
Wiring from the relay bus bar to each unit becomes easy.
Can store 1 control modular unit and 6 power modular units MRM-RK/IK6 is available as standard.
We can also accept orders for racks that can store 3 units and 8 units.

4 Output terminal kit (MRM-OK)

This is a total output terminal for integrating the output of power modulators.
It can be connected to the total output terminal with a busbar.

5 Wiring terminal kit (MRM-WK)

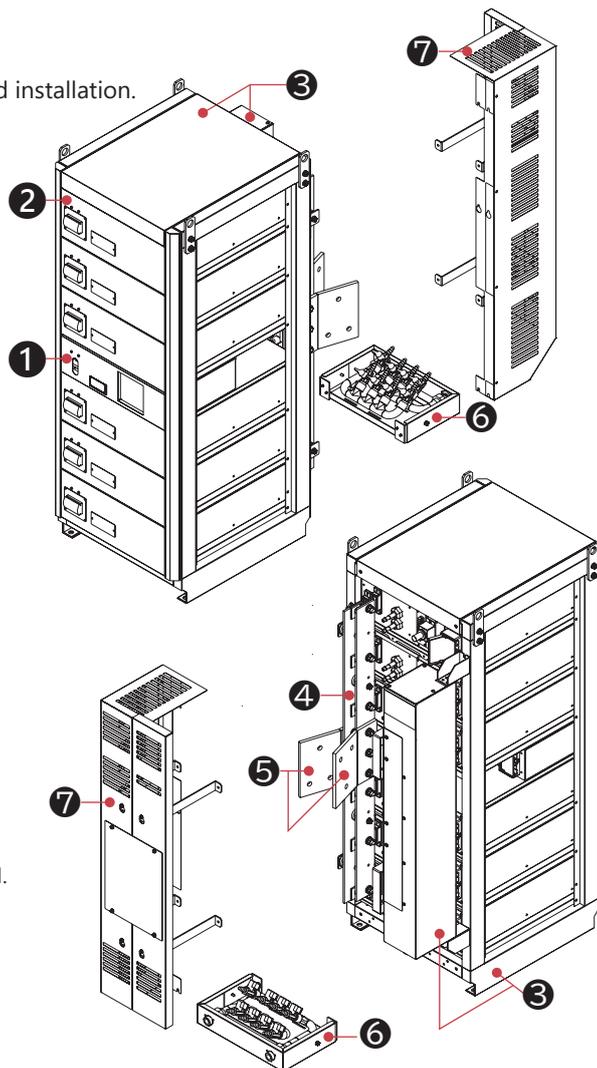
This is an output terminal when using an electric wire (cable) for wiring to the output terminal.

6 Water-cooled piping kit (MRM-CK)

This branch faucet is connected to the power modular of the water-cooled model.
With a cock, water can be stopped when replacing the power modular.

7 Output cover kit (MRM-SK)

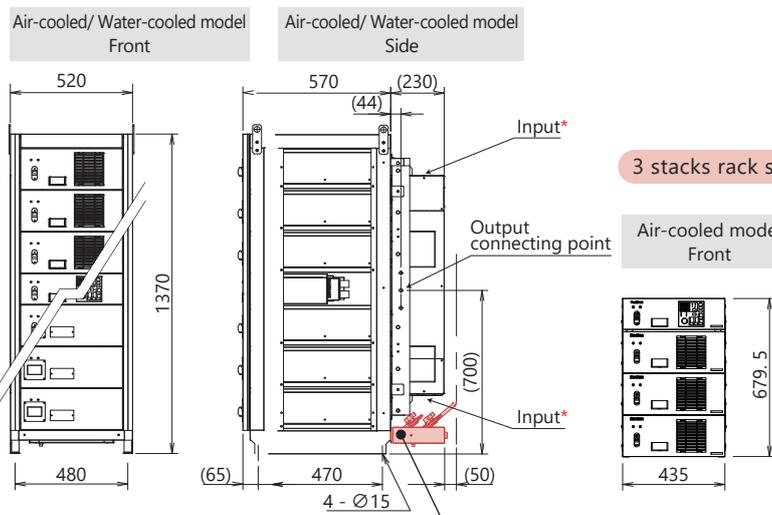
A protective cover to prevent accidental contact with the output terminals.
Use it for series-parallel type products with high output voltage.



External dimension diagram(mm)

*Numbers in parentheses are auxiliary dimensions.

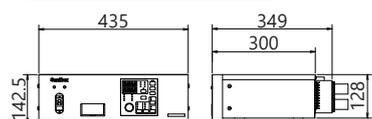
6 stacks rack set



When the water-cooled piping kit is installed.

*It is also possible to wire input from above of the main unit.

Control modular



Power modular



How to read the model name

"Control modular", "Power modular", "Rack set"

MRM-□□△△△-▼

Rated output voltage (15 : 15V) (60 : 60V)
Rated output current (005 : 500A) (040 : 4000A)
Blank : Air-cooled model
W : Water-cooled model
B : Air-cooled (Series-parallel type)

*Series-parallel type(30 : 30V)(45 : 45V)(60 : 60V)

Control modular

MRM-CM-▲▼

A : Air-cooled/Water-cooled model
B : Air-cooled (Series-parallel type)
Blank : With panel
N : No panel

Power modular

MRM-PM-15005-▼◆

Rated output voltage (15 : 15V)
Rated output current (005 : 500A)

Blank : Air-cooled model
W : Water-cooled model
B : Air-cooled (Series-parallel type)
Factory default settings (T : 200V-240V connection) (Y : 380V-480V connection)

Cooling plumbing kit

MRM-CK◇

Number of rack stages (4 : Applicable for 2stacks/3stacks/4stacks) (8 : Applicable for 5stacks/6stacks/7stacks/8stacks)



MRT-C : Standard model



MRT-EC : High efficiency model



• For details on the remote control, see the list of optional functions (p. 25).

Features

- Capable of using worldwide input voltage**
 Lineup to AC200V - 220V and 380V - 440V.
- High quality and accuracy**
 Constant voltage/current accuracy: $\pm 1\%$ or less.
 Current ripple factor (commercial freq.): 1% or less RMS.
- Various operation modes are standard**
 - Chopper (pulse) mode
 - Pulse control with a minimum pulse width of 10ms (→)
 - Single-phase full-wave mode
 - Gold wave (arbitrary waveform) mode is available as an option.
- More durable against severe environment**
 Tightly sealing treatment or coating treatment has improved environment proof quality.
 Source are protected against influence from environment in order to maintain stable characteristics for a long time.
- Output Current integration function is standard**
 Effective for plating solution control and plating film thickness control.
- Can be linked to other facilities and controlled from outside**
 An option card slot is used.
 (For details, see the list of optional functions (p. 25).)
- Efficiency**
 High-efficiency models are 6% - 10% more efficient than the MRT-B series.
 (Based on our measurements. For details of each model, please contact our sales office.)

Specification

Output		10V-500A	15V-500A	10V-1000A	15V-1000A	10V-1500A
Standard model	Model	MRT-10005C	MRT-15005C	MRT-10010C	MRT-15010C	MRT-10015C
	Input capacity	7.2kVA	10.2kVA	13.7kVA	19.3kVA	19.5kVA
	External form	A type	A type	B type	B type	B type
	Mass	38kg	40kg	45kg	50kg	50kg
	Control method	PWM inverter system with IGBTs				
High-efficiency model	Model	MRT-10005EC	MRT-15005EC	MRT-10010EC	MRT-15010EC	MRT-10015EC
	Input capacity	6.9kVA	9.7kVA	12.5kVA	18.4kVA	18.4kVA
	External form	C type	C type	D type	D type	D type
	Mass	48kg	55kg	60kg	70kg	70kg
	Control method	PWM inverter method with SiC, synchronous rectification method with FET				

- Models other than the above are under development; see MRT-B (p. 13) for 20kW 30kW.
- Output voltages other than the above 20V and 30V are also available.

Common specification

Input/Output Specifications	Input voltage	3-phase 200/220V AC $\pm 10\%$ or 380/400/440V AC $\pm 10\%$ 50/60Hz	Working condition	Rated, Cooling	Continuous / Forced air cooling
	Output range	10% - 100% of rated value for both voltage and current		Location	Indoors
	Constant voltage control accuracy	Within $\pm 1\%$ of rated DC voltage		Ambient temperature	0°C - 50°C※1
	Constant current control accuracy	Within $\pm 1\%$ of rated DC current		Relative humidity	30% - 85%
	Current ripple factor	RMS 1% or less (relative to rated value at rated input/output)		Altitude	1000m or below

※1 Usable by derating when temperature exceeds 40°C • For more information, please contact our sales office.

Inverter Power Supply for various platings and anodizing

Functions For details, see the list of optional functions (p. 25)

● : Standard ○ : Option

External start / stop	●	Output voltage monitor	○
External CV/CC selection	○	Abnormal output	○
External output setting	○	Open field network	○
External output adjustment	○	RS-485 communication	●※1
Ah preset count	○	Soft start	○
Ah total count	○	Crossover control	○
Output current monitor	○		

※1 Optional board is required when using remote control and RS-485 communication at the same time.

External dimension diagram (mm)

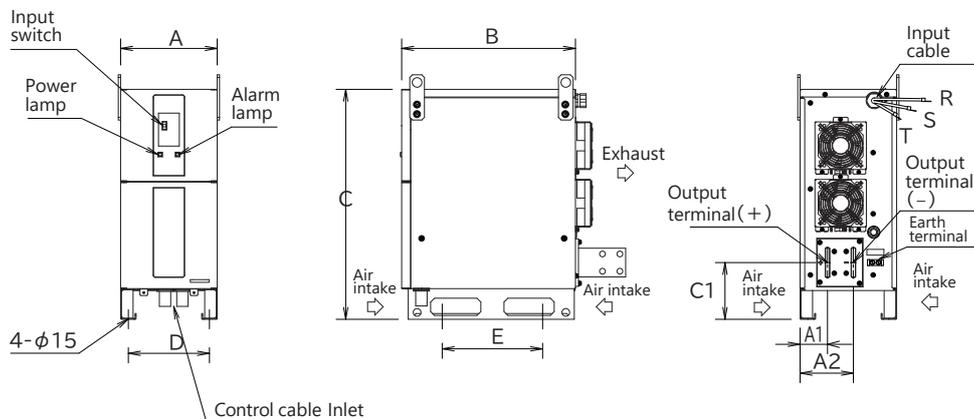
Case type	Outline(mm)								Output terminal
	A	B	C	D	E	A1	A2	C1	
A type	250	450	600	210	260	71	138	148	(1)
B type	250	450	600	210	260	71	138	148	(2)
C type	360	450	600	320	260	126	193	148	(1)
D type	360	450	600	320	260	126	193	148	(2)

External connection

MRT-C/EC Control terminal

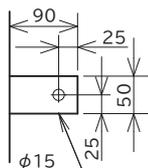
Ext. ON/OFF※1	XD1	1
	XD2	2
Remote control/ External communication	SD+	3
	SD-	4
	RD+	5
	RD-	6
Power output for remote control(+)	RV	7
Power output for remote control(-)	RG	8

※1 The signal to be supplied must be a 30VDC, 20mA open/close contact signal. Use a contact signal that can be opened and closed.

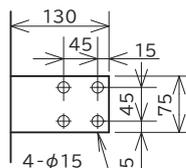


Output terminal(mm)

(1) Cu t=10



(2) Cu t=10



How to read the model name

MRT-10005

Rated output voltage
10 ... 10V
15 ... 15V

Rated output current

005 ... 500A
010 ... 1000A
015 ... 1500A

Model
C ... Standard model
EC ... High-efficiency model

Input voltage
Blank ... 200/220V
Y ... 380/400/440V



Remote control(option)



- For details on the remote control, see the list of optional functions (p. 25).

Features

- Capable of using worldwide input voltage**
 Lineup to AC200V - 220V and 380V - 440V.
- Function improvement by the digital technology**
 Output setting is possible before operation. (Preset function)
- Easy setting by jog dial on remote control pendant**
 A jog dial employed to set output voltage and current. By rotating jog dial, value in each figure can be adjusted, and then by pushing jog dial, the value is set and moved up to next figure.
- More durable against severe environment**
 Tightly sealing treatment or coating treatment has improved environment proof quality. Source are protected against influence from environment in order to maintain stable characteristics for a long time.
- Defect diagnosis by abnormality indication and alarm function**
 Contents of troubles/defects are individually shown and therefore trouble-shooting is easy.
- Optional function**
 - Operation with any waveform output becomes possible.
 - Current integration function
 - Open Field Network Applicability
 - High Speed Communication(RS-485)
 - Operation pattern memorizing

Specification

Model	MRT-15015B	MRT-10020B	MRT-15020B	MRT-10030B
Output	15V-1500A	10V-2000A	15V-2000A	10V-3000A
Input voltage	3-phase 200/220V AC $\pm 10\%$ or 380/400/440V AC $\pm 10\%$ 50/60Hz			
Output range	10% - 100% of rated value for both voltage and current			
Input capacity	30.2kVA	26kVA	40.7kVA	39.5kVA
Control method	PWM inverter system with IGBTs			
Rated, Cooling	Continuous / Forced air cooling			
Constant voltage control accuracy	Within $\pm 3\%$ of rated DC voltage			
Constant current control accuracy	Within $\pm 3\%$ of rated DC current			
Current ripple factor	RMS 5% or less (relative to rated value at rated input/output)			
Working condition	Location	Indoors		
	Ambient temperature	0°C - 40°C		
	Relative humidity	30% - 85%		
	Altitude	1000m or below		

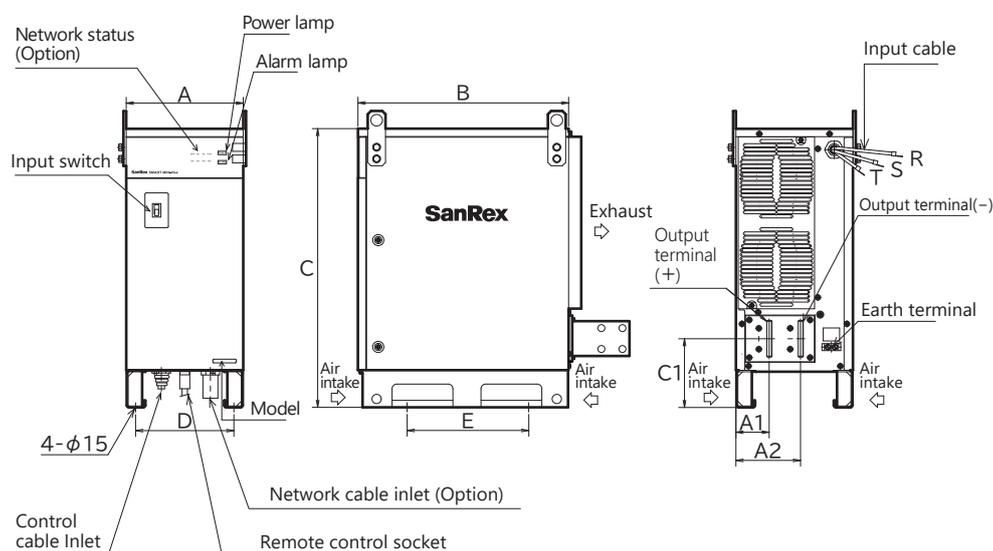
- Output voltages other than the above 20V and 30V are also available.
- For models other than the above with output capacities of 5kW, 7.5kW, 10kW, and 15kW, refer to MRT-C (p. 11).

Inverter Power Supply for various platings and anodizing

External dimension diagram(mm)

Model	Output	Outline(mm)								Mass (Approx.) (kg)	Output terminal
		A	B	C	D	E	A1	A2	C1		
MRT-15015B	15V-1500A	360	570	750	320	380	80	230	180	89	(1)
MRT-10020B	10V-2000A	360	570	750	320	380	80	230	180	89	(2)
MRT-15020B	15V-2000A	360	570	900	320	380	80	230	180	112	(2)
MRT-10030B	10V-3000A	360	570	900	320	380	80	230	180	112	(3)

● Output voltages other than the above 20V and 30V are also available.



External connection

MRT-B Control terminal

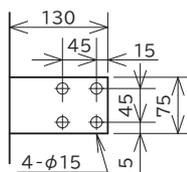
Ext. ON/OFF ※1	PD	1
	GS	2
Abnormal signal output ※2	AL1	3
	AL2	4
Output setting signal input (0V-5V)	RS (+)	5
	CO (-)	6
Output current signal (0mV-60mV)	CP	7
	CN	8
Output voltage signal (0-F.S.)	VP	9
	VN	10

※1 The signal to be supplied must be a 30 VDC, 20 mA open/close contact signal. Use a contact signal that can be opened and closed.

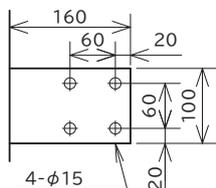
※2 Contact rating is 125 VAC 0.4A/30VDC 0.5A (resistive load).

Output terminal(mm)

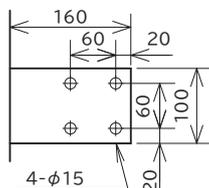
(1) Cu t=10



(2) Cu t=10



(3) Cu t=20



How to read the model name

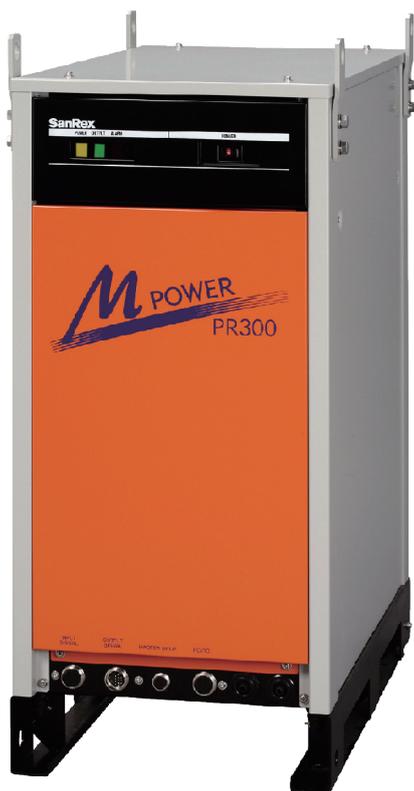
MRT-10020

Rated output voltage
10 10V
15 15V

Rated output current
015 1500A
020 2000A
030 3000A

Model
B Standard model

Input voltage
Blank 200/220V
Y 380/400/440V



Features

■ **High-speeding of output pulse current (50μs TYP)** [see P.2](#)

■ **No generation of idle period during output current polarity switching operation**

In switching the output current pulse polarity, an idle period has been momentarily generated in a conventional method, but there is no such idle period in this new method realizing high-quality plating.

■ **Abundant series**

There are abundant series in 4 types ranging from laboratory type of 40A output current to large-capacity type of 500A max.

■ **Measurement monitoring function**

The main body is furnished with RS-485 communication port as standard specification. Multiple power sources can be controlled from a personal computer. It is able to monitor the power output and to display the total current, etc. Thereby assuring reliability in use. Further, a personal computer software capable of easily setting the output condition, etc. is available to be used for experiment. (Option)

■ **Reduction of ripple of output current**

Output ripple current may cause insufficient glossing of the plated surfaces. This device has reduced the ripple content to 5% or less solving the problem of insufficient glossing due to the high frequency inverter circuit technology.

■ **Output wave form switching possible**

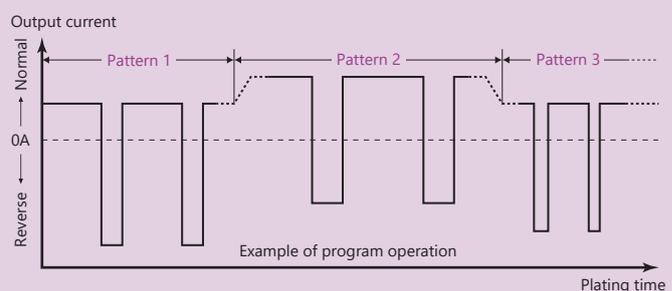
It is free to select the DC output, pulse output of positive side only, and positive/reverse pulse output according to the purpose.

■ **Parallel operation by synchronous operation function**

This power source employs a synchronous operation function and is able to perform parallel operation by multiple units. It assures uniform plating on the surface and back of the object and high-quality stable plating of large-sized objects. (Option)

■ **Program operation function**

It stores up to 10 patterns in the memory, one pattern including a combination of normal/reverse pulse peak current value, pulse width and plating time of each normal/reverse polarity. and it is possible to perform program operation with individual patterns combined in order.



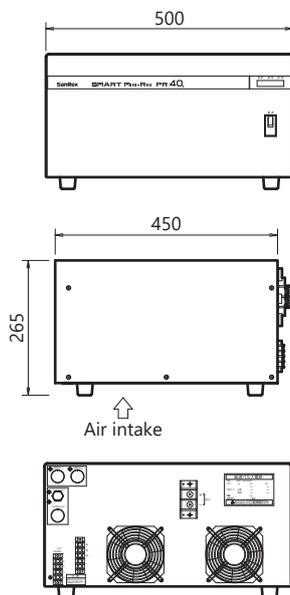
High-speed PR forward/ reverse pulse power supply for high-precision plating

Specification

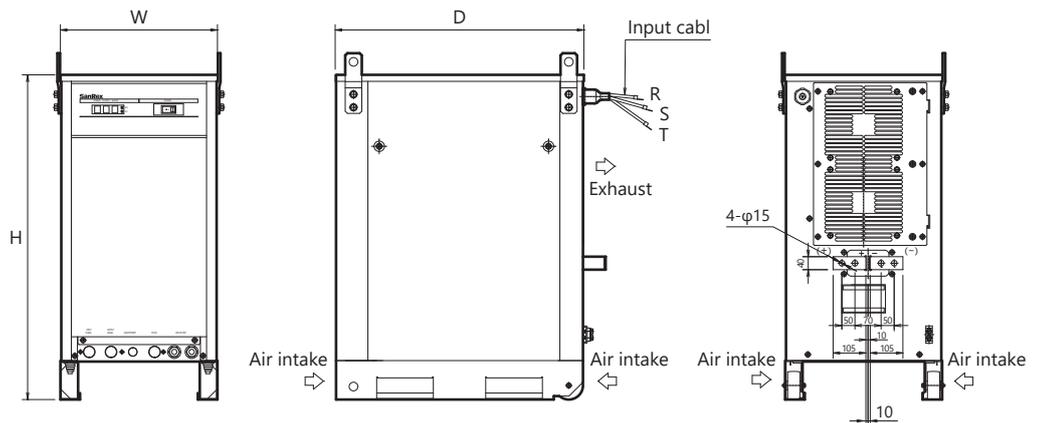
Model		MRT-800.4HPR	MRT-8001HPR	MRT-8003HPR	MRT-8005HPR
Output	Normal peek current	40A	100A	300A	500A
	Reverse peek current	100A	300A	900A	1500A
	Constant current control accuracy	±3.0%			
	Normal polarity pulse width	10ms-99.9ms			
	Reverse polarity pulse width	0.1ms-2.0ms			
	Normal/reverse current switching time	50μs(TYP)			
	Normal polarity voltage peak value	8V			
	Reverse polarity voltage peak value	15V			
	Normal/reverse pulse ratio	5 : 1 or over			
Input voltage		3-phase AC200V/220V ±10% 50Hz/60Hz			
Main circuit system		PWM inverter controlled by IGBT			
Rated, Cooling		Continuous / Forced air cooling			
Working condition	Location	Indoors			
	Ambient temperature	0°C-40°C			
	Relative humidity	30%-85%			
	Altitude	1000m or below			
Dimensions	Width	500mm	360mm	360mm	360mm
	Height	265mm	750mm	800mm	900mm
	Depth	450mm	570mm	670mm	750mm
Mass (Approx.)		50kg	80kg	120kg	170kg

External dimension diagram(mm)

MRT-800.4HPR



MRT-8001HPR / MRT-8003HPR / MRT-8005HPR



How to read the model name

MRT-8001HPR

Rated output voltage
8 ... 8V

Normal peek current
00.4 ... 40A 003 ... 300A
001 ... 100A 005 ... 500A



Features

■ High-quality and environment-proof

Environment-proof quality has been improved due to introducing a first-rate insulation type thyristor, epoxy-sealed special transformer, and tightly closed up control circuit – one of its key components.

■ Energy-saving type

The MRS series incorporates a large-capacity low-loss multi diode (500A) to simplify the internal makeup, resulting in saving energy.

■ Compact, light, and space-saving

SanRex unique cooling system produces an extremely light compact product. The front dimension is reduced, therefore requiring less floor area and thus saving space. A unit can be mounted on another unit of the same size. (up to 5,000A)

■ Complete protection functions

The rectifier is protected by either of its built-in circuits; a current-limiting circuit that functions under constant voltage operation or a voltage-limiting circuit that function under constant current operation.

The rectifier is protected against problems in the cooling system by a built-in abnormal temperature detector in case of a fan failure or the like.

The fan stops when the rectifier is not running.

■ Efficient control functions

- Function for soft start
- Function for setting CV-CC changeover
- Function for setting lower limit of current
- Function for setting lower limit of voltage
- Function for setting constant current density
- Function for independently setting output voltage and output current (crossover control) optional

Specification

Model	If output: 8V → 8, If output: 15V → 15												
	MRS-12005	MRS-12010	MRS-12015	MRS-12020	MRS-12030	MRS-12040	MRS-12050	MRS-12060	MRS-12070	MRS-12080	MRS-12100	MRS-12120	MRS-12150
Output	12V-500A	12V-1000A	12V-1500A	12V-2000A	12V-3000A	12V-4000A	12V-5000A	12V-6000A	12V-7000A	12V-8000A	12V-10000A	12V-12000A	12V-15000A
Input voltage	3-phase AC200V ± 10% 50Hz/60Hz												
Output range	Voltage : 1/3 – rated voltage, Current : 10% to 100% of the rated current												
Input capacity	8kVA	16kVA	24kVA	32kVA	47kVA	63kVA	79kVA	96kVA	110kVA	126kVA	158kVA	191kVA	239kVA
Control	Thyristor-based continuous step less control												
Rated, Cooling	Continuous / Forced air cooling												
Working condition	Location	Indoors											
	Ambient temperature	0°C-40°C											
	Relative humidity	30%-85%											
	Altitude	1000m or below											

Thyristor Power Supply for various platings and anodizing

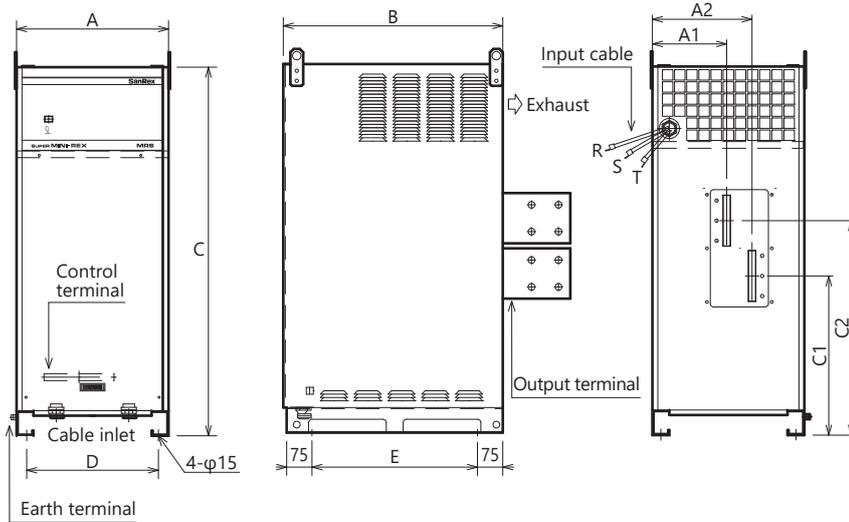
External dimension diagram(mm)

Model	Output	Outline(mm)										Mass (Approx.) (kg)	Output terminal
		A	B	C	D	E	A1	A2	C1	C2			
MRS-12005	12V- 500A	300	500	700	240	340	60	100	305	400	90	(1)	
MRS-12010	12V- 1000A	330	550	850	270	390	155	230	355	635	140	(2)	
MRS-12015	12V- 1500A	330	550	850	270	390	155	230	355	635	160	(3)	
MRS-12020	12V- 2000A	450	650	1100	390	490	220	295	475	640	240	(4)	
MRS-12030	12V- 3000A	450	650	1100	390	490	220	295	475	640	270	(5)	
MRS-12040	12V- 4000A	530	700	1450	470	540	185	265	560	840	420	(6)	
MRS-12050	12V- 5000A	530	700	1450	470	540	185	265	560	840	450	(6)	
MRS-12060	12V- 6000A	650	950	1450	550	790	230	400	640	900	630	(7)	
MRS-12070	12V- 7000A	700	1000	1550	600	840	240	440	710	1025	850	(8)	
MRS-12080	12V- 8000A	700	1000	1550	600	840	240	440	710	1025	920	(8)	
MRS-12100	12V-10000A	700	1000	1550	600	840	240	440	710	1025	1000	(9)	
MRS-12120	12V-12000A	800	1100	1750	700	940	290	490	785	1125	1300	(10)	
MRS-12150*	12V-15000A	800	1100	1750	700	940	290	490	785	1125	1500	(10)	

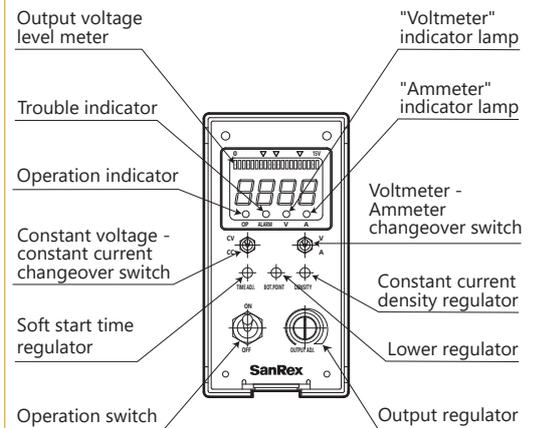
↑ If output : 8V → 8, If output : 15V → 15.

• 20V - 60V can also be manufactured. Please consult with us for details.

* Please consult with us regarding the sizes as they vary depending on output voltage and frequency.

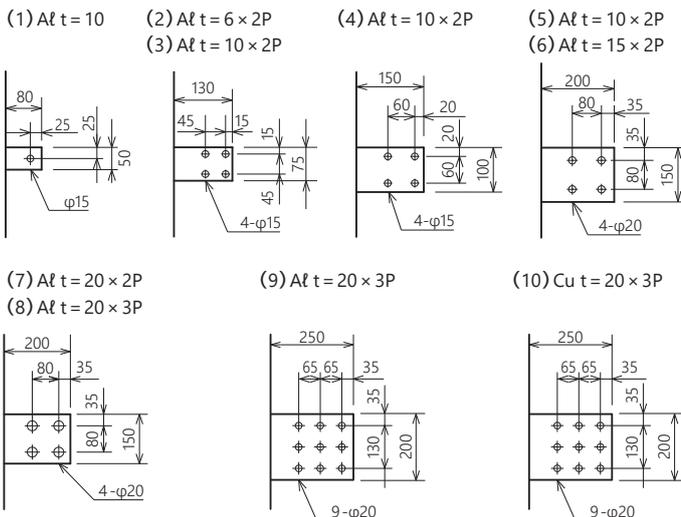


Remote control pendant



■ A 10 meter cable is attached. (It can be extended up to 30 meter)

Output terminal(mm)



How to read the model name

MRS-12005

Rated output voltage
 8 ... 8V
 12 ... 12V
 15 ... 15V

Rated output current
 005 ... 500A 040 ... 4000A 100 ... 10000A
 010 ... 1000A 050 ... 5000A 120 ... 12000A
 015 ... 1500A 060 ... 6000A 150 ... 15000A
 020 ... 2000A 070 ... 7000A
 030 ... 3000A 080 ... 8000A



Features

■ A highly reliable non-contact pole changing system

A fully automatic non-contact pole changing system is adopted so that reliable pole change is able to function best as a PR power source.

■ The current can be freely and smoothly adjusted either to forward operation or backward operation

The current can be freely and smoothly adjusted either to forward operation or backward operation, and a 60-second time setting can be arbitrarily made. The product can be used with direct current only so that it can be also used for plating for which no PR is necessary.

■ High-quality and environment-proof

Environment-proof quality has been improved due to introducing a first-rate insulation type thyristor, epoxy-sealed special transformer, and tightly closed up control circuit-one of its key components.

■ Compact, light, and space-saving

SanRex unique cooling system produces an extremely light compact product. The front dimension is reduced, therefore requiring less floor area and thus saving space. A unit can be mounted on another unit of the same size. (up to 2,000A)

■ Complete protection functions

The rectifier is protected by either of its built-in circuits; a current-limiting circuit that functions under constant voltage operation or a voltage-limiting circuit that functions under constant current operation.

The rectifier is protected against problems in the cooling system by a built-in abnormal temperature detector in case of a fan failure or the like.

The fan stops when the rectifier is not running.

■ Efficient control functions

- Function for soft start
- Function for setting CV-CC changeover
- Function for setting lower limit of current
- Function for setting lower limit of voltage
- Function for setting constant current density

Specification

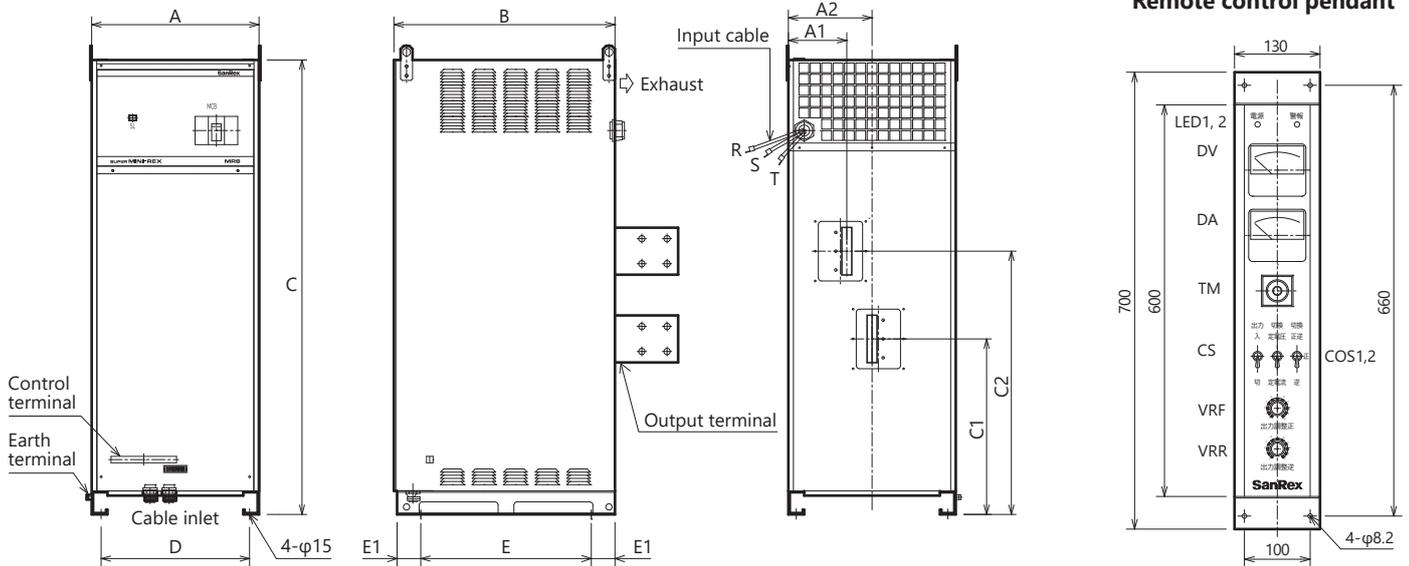
Model	If output: 8V → 8, If output: 15V → 15						
	MRS-12005PR	MRS-12010PR	MRS-12015PR	MRS-12020PR	MRS-12030PR	MRS-12040PR	MRS-12050PR
Output	12V-500A	12V-1000A	12V-1500A	12V-2000A	12V-3000A	12V-4000A	12V-5000A
Input voltage	3-phase AC200V ±10% 50Hz/60Hz						
Output range	Voltage : 1/3 – rated voltage, Current : 10% to 100% of the rated current						
Input capacity	9kVA	18kVA	25kVA	35kVA	50kVA	71kVA	89kVA
Control	Thyristor-based continuous step less control						
Rated, Cooling	Continuous / Forced air cooling						
Working condition	Location	Indoors					
	Ambient temperature	0°C-40°C					
	Relative humidity	30%-85%					
	Altitude	1000m or below					

Thyristor rectifier for electrolytic degreasing/ hard chromium plating Forward/reverse rectifier

External dimension diagram(mm)

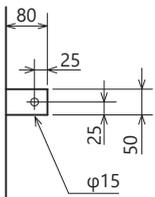
Model	Capacity	Outline(mm)										Mass (Approx.) (kg)	Output terminal
		A	B	C	D	E	E1	A1	A2	C1	C2		
MRS-12005PR	12V- 500A	300	500	700	240	340	75	150	190	290	500	100	(1)
MRS-12010PR	12V-1000A	330	550	850	270	390	75	155	230	355	635	170	(2)
MRS-12015PR	12V-1500A	450	650	1100	390	490	75	220	295	475	640	270	(3)
MRS-12020PR	12V-2000A	450	650	1100	390	490	75	220	295	475	640	320	(4)
MRS-12030PR	12V-3000A	450	700	1350	390	490	100	220	295	475	740	460	(5)
MRS-12040PR	12V-4000A	530	800	1450	470	540	125	185	265	560	840	580	(6)
MRS-12050PR	12V-5000A	530	800	1450	470	540	125	185	265	560	840	670	(6)

If output : 8V → 8, If output : 15V → 15.

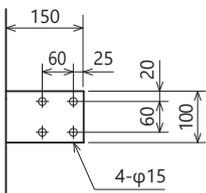


Output terminal(mm)

(1) A t = 10

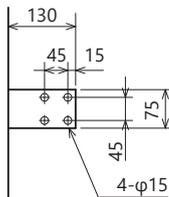


(4) A t = 10 × 2P



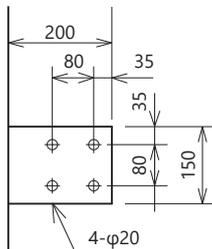
(2) A t = 6 × 2P

(3) A t = 10 × 2P



(5) A t = 10 × 2P

(6) A t = 15 × 2P



How to read the model name

MRS-12005PR

Rated output voltage

8 ... 8V
12 ... 12V
15 ... 15V

Rated output current

005 ... 500A
010 ... 1000A
015 ... 1500A
020 ... 2000A
030 ... 3000A
040 ... 4000A
050 ... 5000A



Features

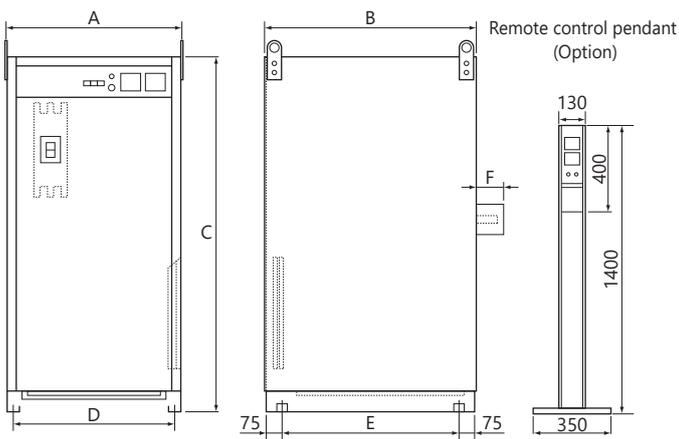
- **Low ripple**
Voltage ripple of 5% or less during rated output.
- **Enhanced operability**
Operating section centralized on the front panel.
- **Soft start function**
Soft starting with a period of 10 to 60 seconds available.
- **Constant voltage and constant current control**
Constant voltage and constant current control selectable.
- **Various control input and output**
Operation with electrodeposition tank.
Remote control function.
Connection to external computer.

Specification

Model		MED2-3520
Input voltage	3-phase 200V/220V 50Hz/60Hz or 3-phase 380V/400V/440V 50Hz/60Hz	
Output range	Voltage: 1/10-rated voltage, Current: 1/10-rated current	
Rated, Cooling	Continuous/Forced air cooling	
Output control method	3-Phase full wave rectification Thyristor based phase control	
Control characteristic	CV-CC control switch Soft start time 10-60 sec. setting available	
Ripple	RMS 5% at rating output (Option : RMS 2% at half load)	
Operating method	Manual (panel setting) or auto (external signal)	
Working condition	Location	Indoors
	Ambient temperature	0°C-40°C
	Relative humidity	30%-85%
	Altitude	1000m or below

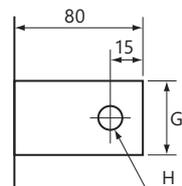
Output current (A)		Output voltage (V)								
		50	100	150	200	250	300	350	400	500
Upper Input capacitance (kVA)	200	13 A type	26 A type	45 B type	50 B type	60 B type	75 C type	85 C type	99 D type	129 D type
	250	16 A type	32 A type	53 B type	62 B type	76 B type	93 C type	105 C type	123 D type	152 D type
	300	19 A type	38 A type	56 B type	73 B type	90 B type	110 C type	127 C type	145 D type	182 D type
Lower Type	350	22 A type	44 A type	65 B type	86 B type	110 C type	130 C type	150 C type	174 D type	218 D type
	400	25 A type	52 A type	77 B type	103 B type	127 C type	152 C type	177 C type	202 D type	252 D type

Dimension diagram(mm)



Type	Dimension(mm)						Mass (Approx.) (kg)
	A	B	C	D	E	F	
A type	460	700	1100	390	540	110	300
B type	600	800	1350	530	640	110	500
C type	650	950	1450	550	790	110	840
D type	700	1000	1550	630	840	110	1000

Output terminal(mm)

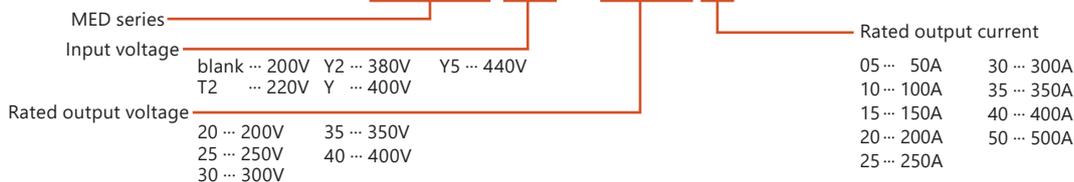


Output current (A)	G	H	Thickness
150-250	25	φ9	t = 6
300-350	30	φ9	t = 6
400-500	50	φ15	t = 6

* A terminal block is used for output currents of 100A or less.

How to read the model name

MEDY2-3520





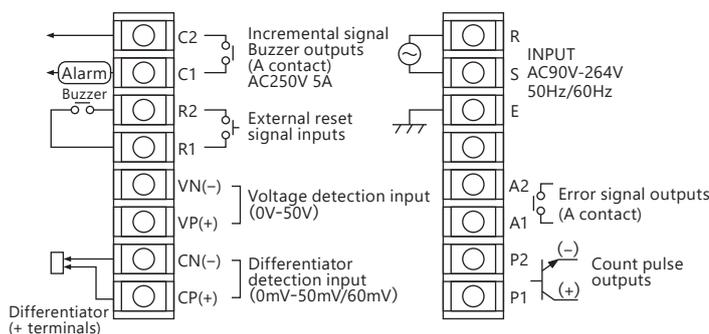
Features

- **Conspicuous digital display**
All set values and measurement values displayed digitally.
- **Touch panel LED display**
Operability is outstanding due to the adoption of a touch panel method. Further, modes can be switched with a single touch, and the set mode is displayed using LED.
- **4 roles per device multifunctionality**
There are four built-in functions required to monitor the AC power supply for display management: 4-digit preset integral ammeter, 8-digit total integral ammeter, an ammeter, and a voltmeter.
- **Memory function**
An integral function has memory function using EEPROM. (Electrically Erasable Programmable Read-Only Memory) The measured values are stored until the reset signal is input.
- **Full range of optional functions**
 - Meter relay function
 - Count pulse outputs
 - Communications function

Specification

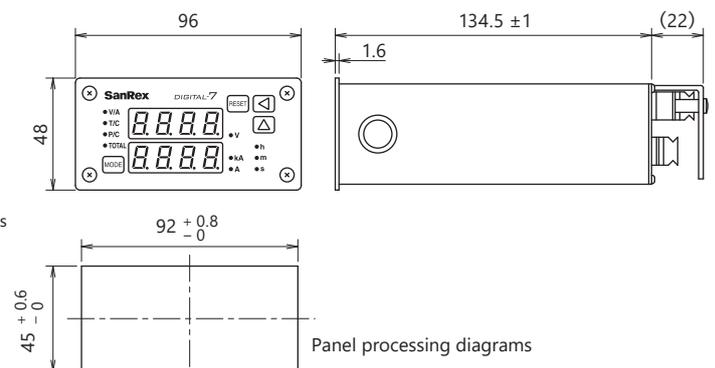
SHA-7 (DIGITAL-7)				
Power supply voltage	AC90V-264V 10VA 50Hz/60Hz	Reset function	Preset counter : Depending on keyboard switches and external signals Total counter : Depending on keyboard switches	
Differentiator detection input	DC0mV-50mV/DC0mV-60mV	Rated current range	0.010A-9999kA	
Voltage detection input	DC0V-50V	Integrated current units	AS/AM/AH	
Incremental signal output	AC250V 5A DC30V 5A (Resistance load) AC250V 2A DC30V 2A (Induction load COSφ=0.4)	Integrated current range	×1/×10	
Accuracy	Voltage display and integrated current ± 1.0% (F.S.) Current display ± 0.5% (F.S.)	Working condition	Location	Indoors
Display function	Voltage/current, count/preset, and total display mode switching (Using keyboard switches)		Operating temperature	0°C-50°C
No. of digits displayed	Voltage/current display : 4 digit Preset counter display : 4 digit Total counter display : 8 digit		Operating humidity	90%RH ≧
			Altitude	1000m or below
		Isolation resistance	20MΩ ≧ (by DC500V megger)	
		Mass (Approx.)	540g	

Connection terminals



External dimension diagram(mm)

*Numbers in parentheses are auxiliary dimensions.



Single Sweep Shot Three modes of operation

Adjustable output range increased from 25% to 100%.

Ultrasonic Oscillator



Ultrasonic Vibrator



Designed for Open field networks (Option)

DeviceNet™

CC-Link

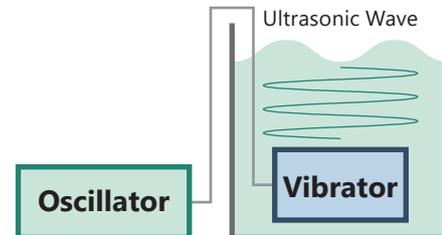
Features

Oscillator High reliability and stable output power

- Provides powerful sweep function to reduce uneven cleaning and shot function for improved degassing performance, in addition to single function. Full operation possible even in sweep mode.
- Full digital control. Features user-friendly touch panel operation and superior integrated tracking function. Maintains ultrasonic output at a constant level regardless of power supply fluctuations or variation caused by addition or removal of cleaning targets. Details of malfunctions displayed as error codes.
- Compact, lightweight design. Both 600W and 1,200W models have same dimensions. Stackable installation possible. (A maximum of four units can be stacked on top of each other.)
- Adjustable output range increased from 25% to 100%, allowing optimum output to best suit the target.
- Wealth of experience in surface treatment industry ensures excellent environmental durability. Everything except for ventilation channels is sealed, providing superior durability even in harsh environments.
- Built-in timer gives advanced warning when vibrator lifetime approaches.
- Unique tracking function eliminates the need for bothersome tuning procedures when replacing vibrators, cutting down on time required for replacement work. Conventional electrostrictive vibrators can also be used.
- Optional card provides open field network communication. (DeviceNet and CC-Link)

Vibrator High-powered, low frequency cleaning with no unevenness

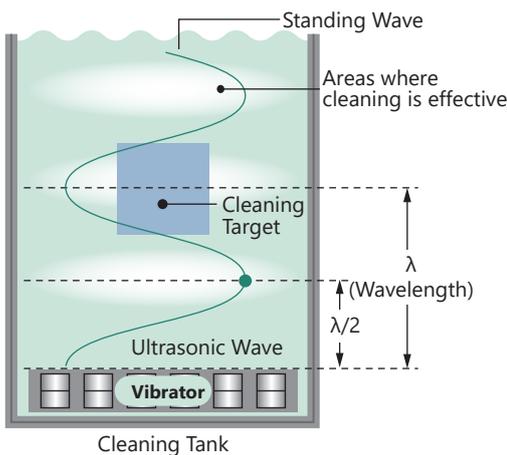
- Lead wire connections are produced using a special structure enhancing the sealing property.
- Lead wires employ a flexible shield wire within a PTFE tube that is all encased in a stainless steel braided sleeving for maximum flexibility and durability. Additionally, the blade, made with stainless steel is covered. (for the 2.5 m opening part)
- Resistant to solvents, alkaline aqueous solutions and other chemicals.
- Employs Bolt-clamped Langevin Transducers (BLT) that allow use in higher temperature cleaning solutions Max 80°C.
- The elements are directly and mechanically connected to the stud bolts enabling superior cleaning performance even when using high temperature cleaning solutions.



Description of functions

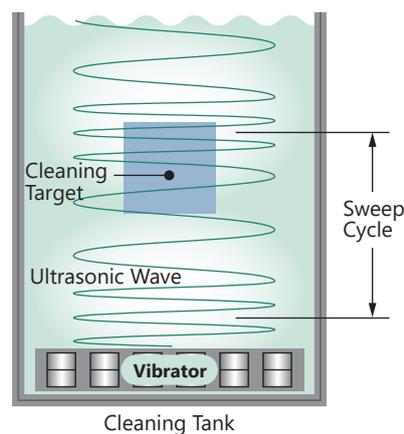
Single Mode

Cleaning is achieved by effective use of standing wave



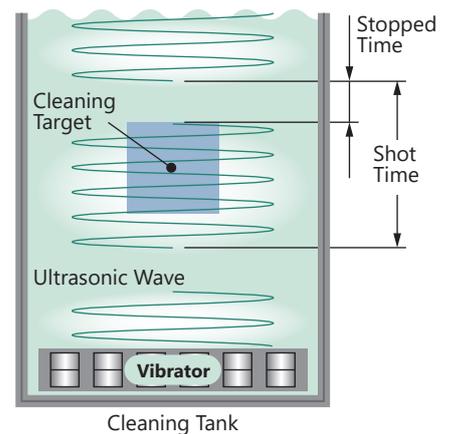
Sweep Mode

Standing wave is altered to satisfactorily even cleaning performance



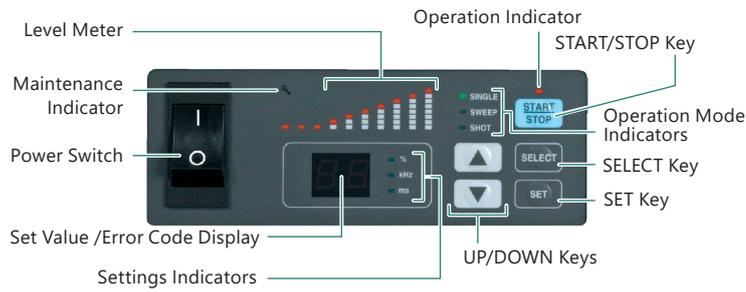
Shot Mode

Degassing is encouraged by interrupting operation at set intervals

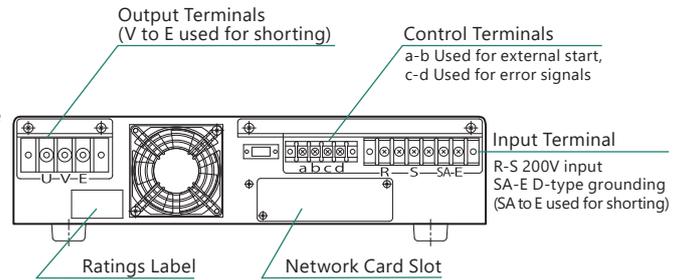


Oscillator

Operation panel



Rear panel



Specifications

Output	600W		1200W	
Model	GED028060	GED040060	GED028120	GED040120
Nominal frequency	28kHz	40kHz	28kHz	40kHz
Power supply	Single-phase 200V +40V 50Hz/60Hz -20V			
Power capacity	1.2kVA		2.4kVA	
Cooling system	Forced air cooling			
Adjustable power range	25%-100%			
Alarm circuit	During error LED on/external contacts 1A contact (Input voltage drop/Temperature error/Output power drop/Output over-current)			
Automatic tracking feature	Built-in			
Working condition	Location	Indoors		
	Ambient temperature	0°C-40°C		
	Relative humidity	30%-85%		
	Altitude	1000m or below		
External dimensions W×H×D	415mm × 95mm × 345mm			
Mass (Approx.)	9kg			



Vibrator

Specifications

Nominal input	Vibrator model	Dimensions of radiation surface (mm)	Power density (W/cm ²)	External dimensions (mm)			Mounting dimensions*1 (mm)	Mass (Approx.) (kg)	Compatible oscillators
				W	D	H			
28kHz 600W	TE028063H Standard	350 × 350	0.49	350	350	98	180 × 380	16	GED028060
	TE028066H High-Powered	300 × 180	1.11	300	180	110	324 × 160	12	
	TE028067H Semi high-powered	425 × 240	0.59	425	240	100	455 × 180	16	
	TE028064H Wide area	455 × 325	0.41	455	325	110	405 × 342	20	
28kHz 1200W	TE028121H Semi high-powered	455 × 325	0.81	455	325	110	405 × 342	23	GED028120
40kHz 600W	TE040063H Standard	350 × 350	0.49	350	350	98	180 × 380	14	GED040060
	TE040066H High-Powered	300 × 180	1.11	300	180	80	324 × 160	10	
40kHz 1200W	TE040121H Semi high-powered	455 × 325	0.81	455	325	80	405 × 342	18	GED040120

*1 Figures do not include external wiring or mounting brackets.

Expanded functions

An optional remote control can be added for panel operation or operation away from the rectifier. For models equipped with an option card slot, adding an option card will improve operability and expand communication functions such as open field networking. Adopting the remote control and option card that best suits your application will greatly enhance the benefits of your surface preparation power supply.

List of Functions : Various optional variations and product combinations are shown below.

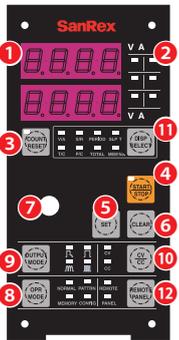
● : Standard equipment ①-②:Remote control ③-⑪:Option cards

Operation		HKD-G			HKE-G			MRM-CM			MRM-PM	MRT-C		MRT-B	Remarks	
		Slot	Control terminal	Other	Slot	Control terminal	Other	Slot	Control terminal	Other	Slot	Standard equipped terminal	Slot(L)	Slot(R)		Control terminal
Panel	Control panel			●			●			●						
	High-performance remote control		①					①			①		①⑥	①		Use either RS-485 communication or remote control
	Limited function remote control				②⑦										②	
Communication	RS-485 communication		●					●		●				●		Use either RS-485 communication or remote control
	CC-Link communication	③						③		③		③				
	DeviceNet communications	④						④		④		④				
	8units of one-bracket communication											⑤	③④			
Analog setting	External volume (non-isolated)					●		●					⑨			
	Output voltage signal (non-isolated)					●		●					⑨		●	
	Output setting signal (isolated)	⑧						⑧		⑧		⑧		⑧	●	
	CV/CC switching	⑧				●		●		⑧		⑧		⑨		
Monitor	Output current signal (non-isolated)					●		●					⑨		●	
	Output voltage signal (non-isolated)					●		●					⑨		●	
	Output current signal (isolated)	⑧						⑧		⑧		⑧		⑧		
	Output voltage signal (isolated)	⑧						⑧		⑧		⑧		⑧		
External input	Ext. ON/OFF		●			●				●				●	●	
	Integral current preset count reset		●					●				⑩⑪				
	Totalized current total count reset											⑩⑪				
	Abnormal reset											⑩⑪				
External output	Abnormal signal output	⑧				●		●		●		⑩⑪			●	
	Integrated current preset count-up output signal		●					●				⑩⑪				
	Totalized current total count-up output signal		●									⑩⑪				
	Individual Abnormal signals (temperature, FAN, system, output, etc.)											⑩⑪				Can be set by rectifier parameters
	LED lighting output for operation					●						⑪				

Remote control

① High-function remote control panels and ② Remote control panels with limited functions correspond to the numbers in the above function list.

① High-function remote control
Model : HKD-RE PANEL



- | | | | |
|--------------|------------|---------------|--------------|
| HKD-G | MRM | MRT-EC | MRT-C |
|--------------|------------|---------------|--------------|
- ① 4-digit display LED
 - ② Display unit lamp
 - ③ COUNT RESET key
 - ④ Operation switch
 - ⑤ Set key
 - ⑥ Clear key
 - ⑦ Jog dial
 - ⑧ OPR MODE key
 - ⑨ OUTPUT MODE key
 - ⑩ CV/CC selection key
 - ⑪ Display mode selection key
 - ⑫ Main unit/remote selection key

② Limited function remote control
Model : HKE-RE PANEL



- | | |
|--------------|--------------|
| HKE-G | MRT-B |
|--------------|--------------|
- ① 4-digit display LED
 - ② Display unit lamp
 - ③ Operation switch
 - ④ Set key
 - ⑤ Clear key
 - ⑥ Jog dial
 - ⑦ CV/CC selection key
 - ⑧ Display mode selection key
 - ⑨ Main unit /remote selection key

■ Standard cable 10m (max. 30m is available) If over 30m, please contact our sales office.

Number of option card slots



Number of slots 1

- | | |
|--------------|------------|
| HKE-G | MRM |
| HKD-G | |

Option card slot



Number of slots 2

- | | |
|---------------|--------------|
| MRT-EC | MRT-C |
|---------------|--------------|

Option card slot(R)

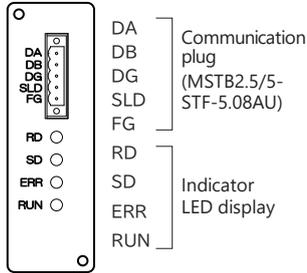
Option card slot(L)

Option card ③-⑪ correspond to the numbers in the function list on p. 25.

③ CC-Link communication

Model : HKD-G CC-LINK I/F CARD

Expansion card for direct communication with various control devices via CC-Link.

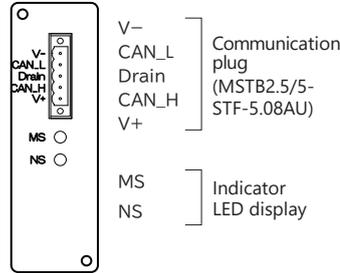


- Refer to CC-Link communication specifications for details.

④ DeviceNet communication

Model : DEVICENET3 I/F CARD

Expansion card for direct communication with various control devices via DeviceNet. DeviceNet communication with various control devices.

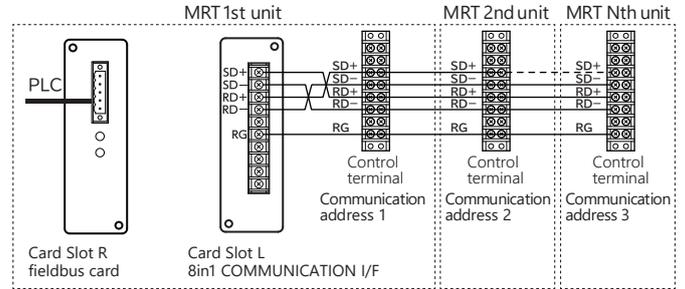


- Refer to the DeviceNet communication specification for details.

⑤ 8units of one-bracket communication

Model : 8in1 COMMUNICATION I/F CARD

By converting a fieldbus card(CC-Link or DeviceNet) to RS-485 communication, a single fieldbus card can operate up to 8 power supplies. However, output modes and other functions are restricted with respect to normal fieldbus communication.

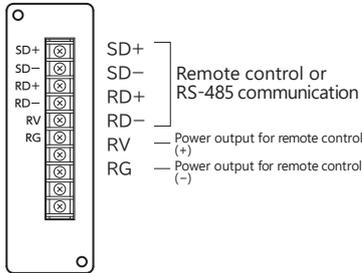


- For details, please refer to the instruction manual of the rectifier itself and the 8in1 communication specifications.

⑥ RS-485 communication

Model : RS-485 I/F CARD

Expansion card for RS-485 communication and remote control.

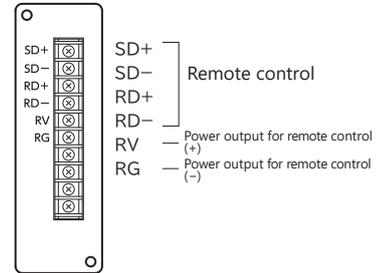


- Refer to the instruction manual of the rectifier itself for details.

⑦ Remote control connection

Model : HKE-G RC I/F CARD

This is an expansion card for using a remote control with HKE-G.

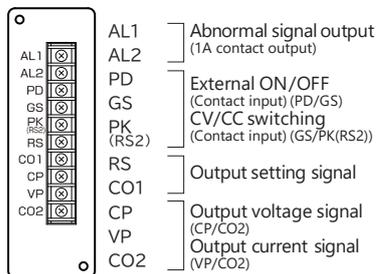


- Please refer to the instruction manual that comes with the card for details.

⑧ Analog signal(isolated)

Model : ISOAMP2 I/F CARD

Analog signals are isolated from the rectifier. Use this card when connecting multiple rectifiers to the PLC. When connecting multiple rectifiers to a PLC, use this card.



- Crossover mode can be supported.

Analog signal ranges are as follows.

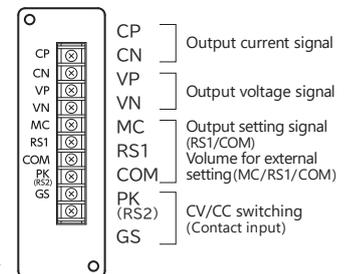
Analog signal	Range			
	0V~5V	0V~10V	4mA~20mA	0mV~60mV
Output setting signal	●	●	●	
Output voltage signal	●	●	●	
Output current signal	●	●	●	●

- Please refer to the instruction manual that comes with the card for details.

⑨ Analog signal (non-isolated)

Model : ANALOG I/F CARD

The analog signal is isolated from the rectifier. Use this card when connecting multiple rectifiers to the PLC.



- Crossover mode can be supported.

Analog signal ranges are as follows.

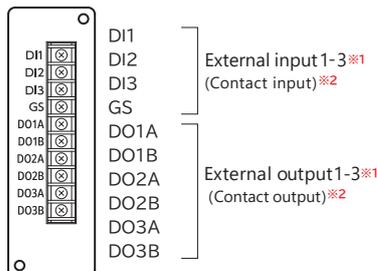
Analog signal	Range
Output setting signal	0V - 5V / Setting 0% - 100%
Output voltage signal	0V - F.S. V / Output 0% - 100%
Output current signal	0mV - 60mV / Output 0% - 100%

- Refer to the instruction manual of the rectifier itself for details.

⑩ External contact signal

Model : I/O CONTACT I/F CARD

External inputs 1-3 and external outputs 1-3 can be used to operate the rectifier and check its status.



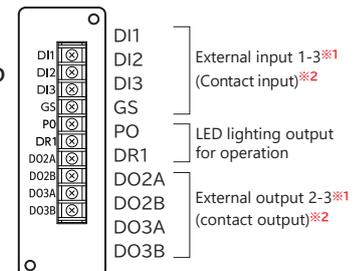
- Refer to the instruction manual of the rectifier itself for details.

⑪ External contact signal (with LED output)

Model : I/O CONTACT2 I/F CARD

In addition to external inputs 1 to 3 and external outputs 2 to 3, LEDs can be connected to the LED lighting outputs for operation.

Output voltage: 24VDC
Output current: approx. 40mA (max. 1W)



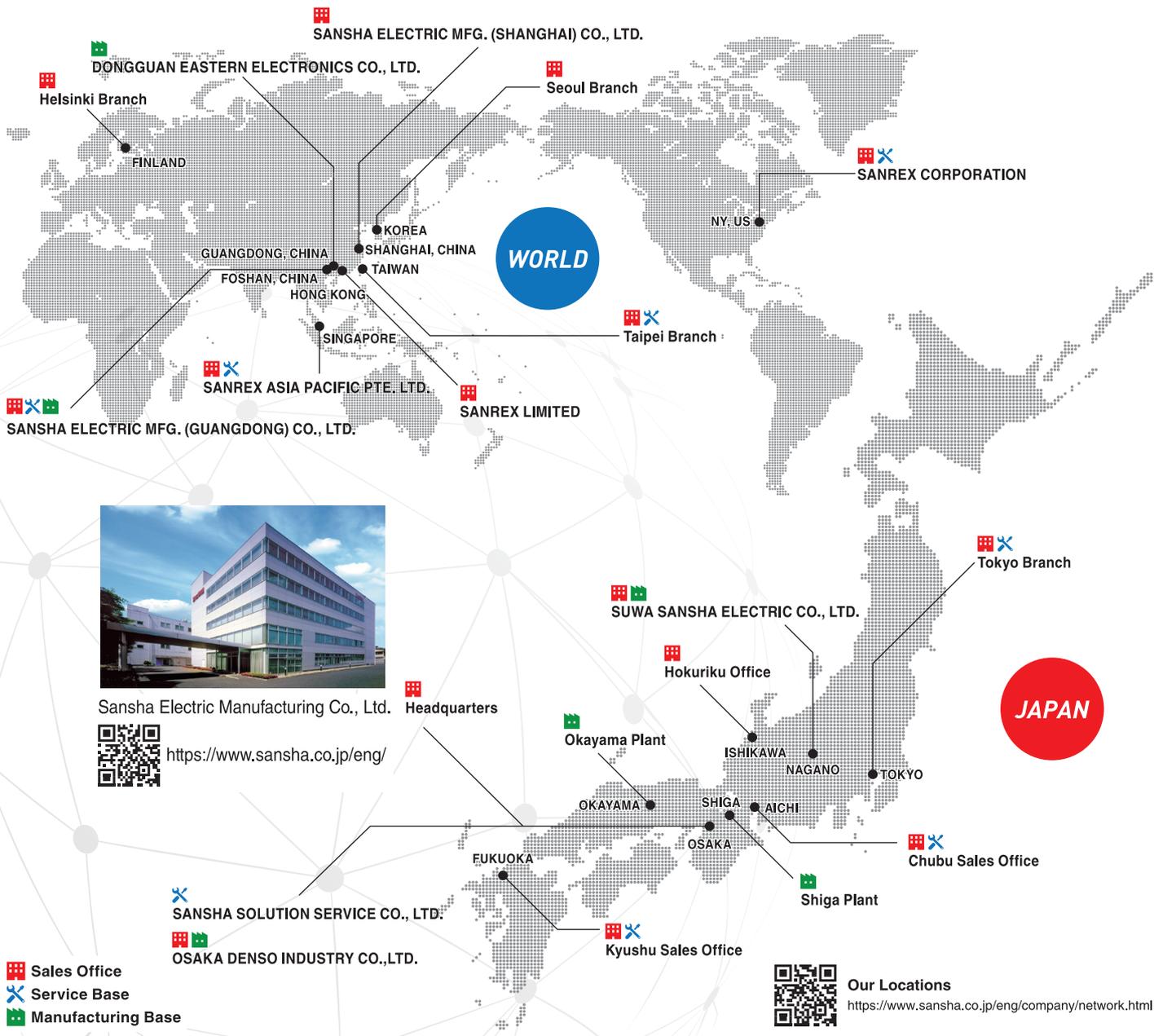
- Refer to the instruction manual of the rectifier itself for details.

*1 The external input and output signals can be changed by parameters on the rectifier itself. The default values are as follows.

*2 Electrical rating specifications for contact input and contact output are as follows.

External input1	Preset count reset signal.	External output1	Preset count reset signal.
External input2	Abnormal reset.	External output2	Abnormal reset.
External input3	Total preset count reset signal.	External output3	Total preset count reset signal.

Contact input	AC125V 0.4A / DC30V 0.5A(Resistive load).
Contact output	30V DC, 20mA open/close contact signal.



QR Code We can also customize to your requirements. Please feel free to contact us.
Inquiry
<https://www.sansha.co.jp/eng/contact/>

Attention Read and understand the entire Operating Manual and your employer's safety practices before installing, or using the equipment. Do not install the equipment in an area where water, high humidity, steam, dust or oil are located. It may cause damage to the equipment or result in a fire or electrical shock.

If the product is intended to be used for any of the following applications, consult us in advance.

- a. Use for medical devices, systems, etc. directly influence human lives
- b. Use for transportation systems such as electric trains, elevators, etc. that can lead to damage to human bodies
- c. Use for trunk systems that play important roles socially and publicly
- d. Devices and systems that are similar to any of the above

For devices and systems that are involved in the safety of people and have serious influence on the maintaining of public functions, special considerations are required to be given to their operation, maintenance, and management, such as multiplexing of systems, installation of power generation equipment for emergency use, and the like. Even in the case of an accident caused by our product, we are not in a position to make compensation for any and all damages including damages related to abnormality and failure of devices, connected equipment, and software as well as other secondary and consequential damages.

*SanRex and Techno Block are trademarks or registered trademarks of Sansha Electric Manufacturing Co., Ltd. *Please be aware that the replacement cost of serviceable parts (fans, fuses, etc.) will be charged when they are replaced. Please keep all accessories in a safe place. *Please consult with us if you intend to use the product for purposes other than those described in this publication. *These specifications are subject to change without notice for performance improvement.