

Syringe Pump (Loader Type) Operating Manual

(EP100, eS-pump[®])

NanoNC
www.nanonc.co.kr

1. Specifications

Syringes(min/max.)	10 μ l/50ml
Flow Rate	
Minimum	0.01 μ l/hr
Maximum	50.00ml/min
Driver Motor	0.9° Steppinger Motor
Motor Driver Control	1/16 microstep
Linear Force	20kg
Power	220VAC/60Hz
Weight	3.1kg



10cc syringe setup on pump
*no cylindrical metal guide



The attachment of cylindrical metal guide : **stable electrospinning at nozzle tip**

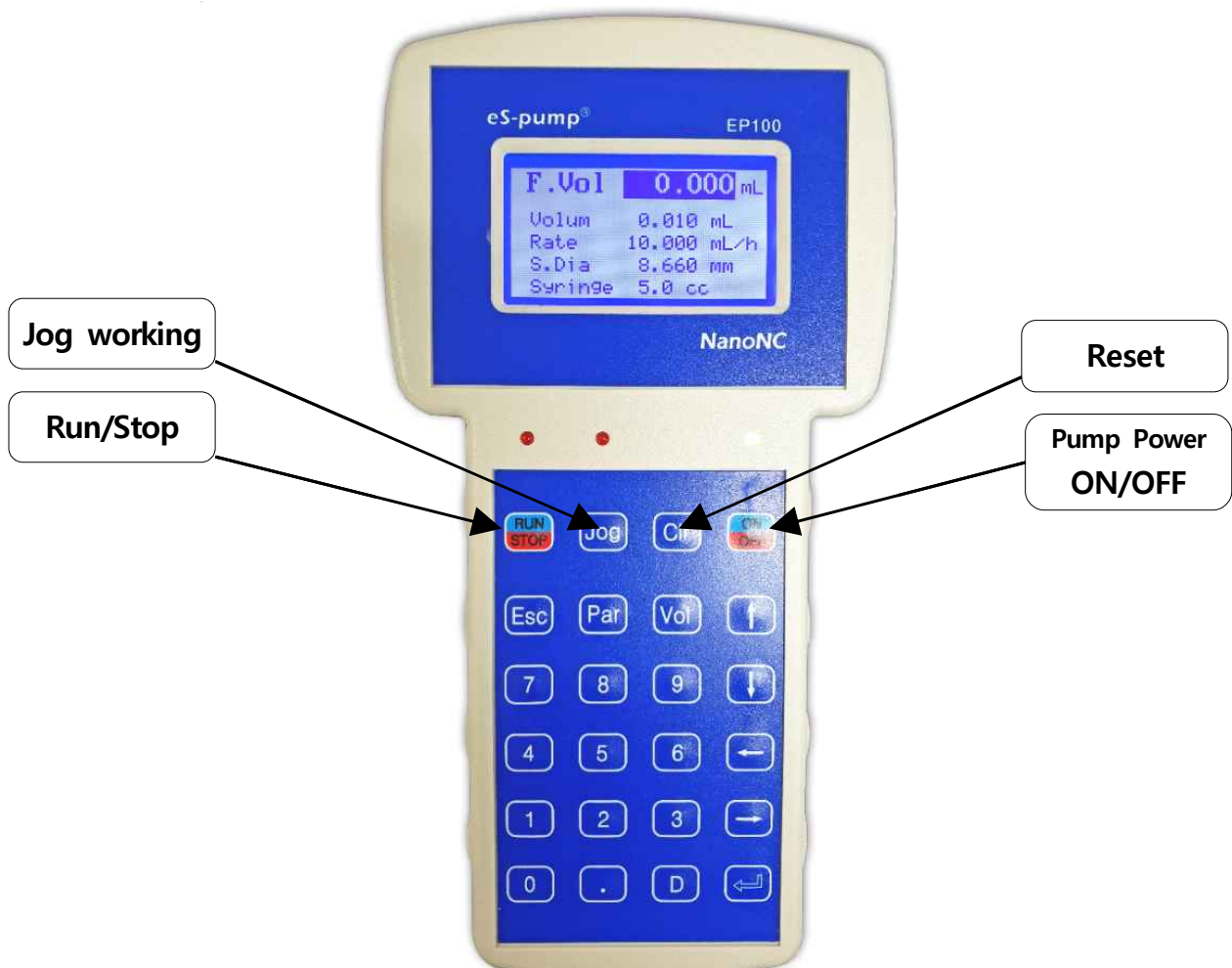


1cc, 2.5cc syringe setup: syringe setting inside syringe cover



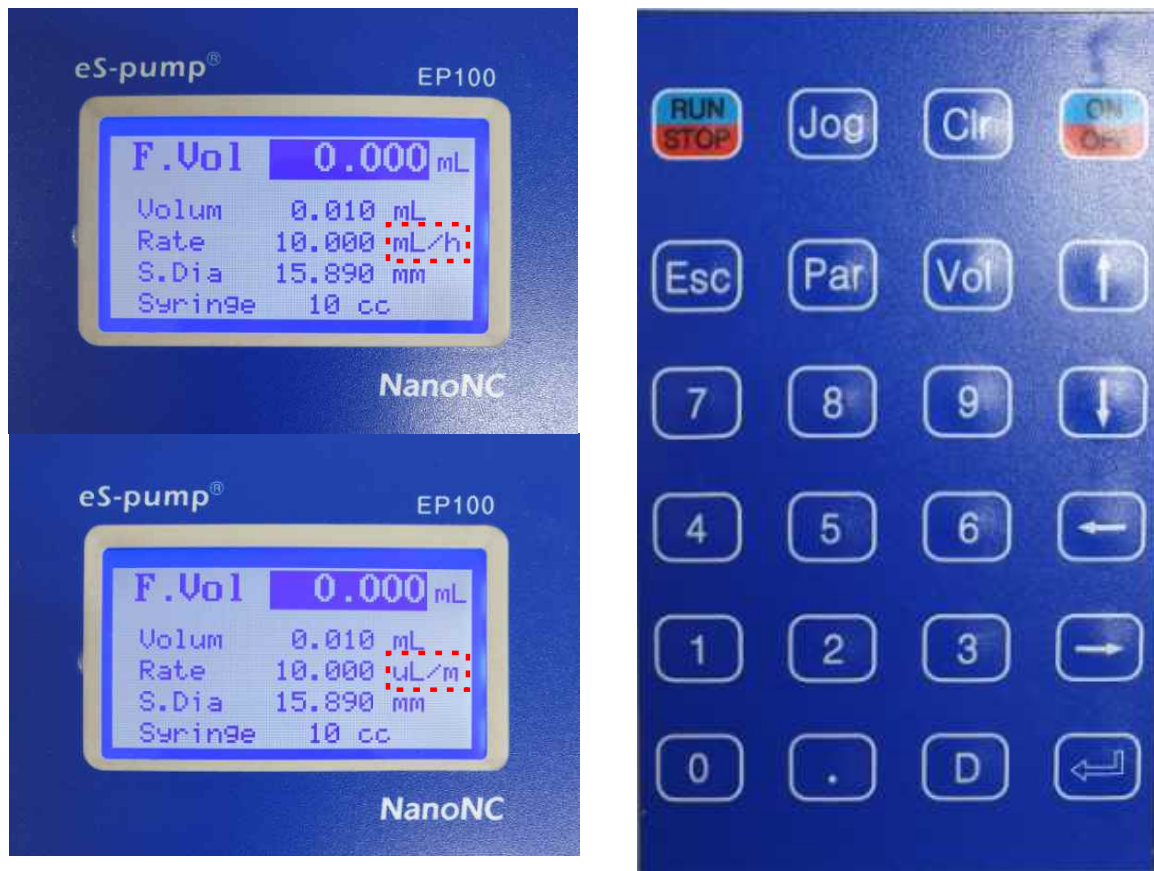
coaxial nozzle setup
*after separation of nozzle holder(L bracket)

2. Teach Pendant Function & Operating Method



※Remark: After finishing experiment, push "OFF" button and pull out(release) the power cord!!

2-1. Description of the monitor




- ◇ F . Vol 0.000 mL :Flow Volume value, displaying an actual discharge volume after operating RUN
- ◇ Volume 000000 mL :Displaying a total discharge volume
- ◇ Rate 000000 **mL/h, uL/min**: Displaying a solution discharge rate
- ◇ S.Dia 000000 mm :Displaying an inner diameter of the syringe
- ◇ Syringe 00 cc :Displaying a volume size of the syringe

2-2. Functions of main Keys

- ON OFF** : power ON/OFF (pressed for 2~3 seconds)
- Jog** : used when discharging the solution within a short time.
Direction of the pump operation - forward (↓), backward (↑)
- Clr** : reset the volume to 0
- Esc** : used for switching to a former mode after a parameter is input
- Par** : parameter input key
- Vol** : used for inputting a total discharge volume of the solution

2-3. Setting of Parameter [Par]

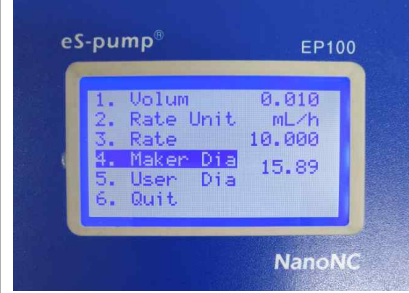
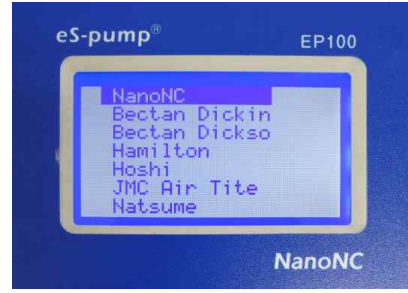
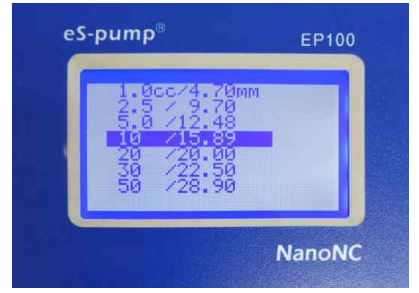
Press  (parameter input key) on front screen

Use arrow keys (↑ or ↓) on loader to move the cursor!!

1. volume : setting a total discharge volume of the solution
2. **rate unit** : after pressing [enter], a flow rate unit(mL/h or uL/min) is selected by using an up (↑) or down (↓) arrow key
3. **rate** : setting a discharge volume of the solution
4. **maker dia.** : selecting a syringe manufacturer and a syringe of each manufacturer
 If the [enter] key is pressed, a syringe maker is displayed.
 After a maker is selected, if the [enter] key is pressed, the inner diameter of the syringe is displayed.
 At this time, after the syringe is selected, if the [enter] key is pressed, automatic setting is performed.
5. user dia : If a manufacturer is not found in "[4. Maker Dia]" above, the inner diameter of the syringe can be directly input.
6. quit : If the [enter] key is pressed, this returns to the start-up screen for inputting.

1)To select syringe size (example:NanoNC, 10cc),

select "Maker Dia", and then select "syringe maker" & "syringe volume/inner diameter(syringe size)"

		
<p>①Select "4. Maker Dia." by moving "cursor" with "↓" , and then press "Enter Key"</p>	<p>②Select "NanoNC" among maker(syringe company) by moving "cursor " with "↓" and then press "Enter Key"</p>	<p>③Select "10cc" among "syringe volume/inner diameter" by moving "cursor " with "↓" and then press "Enter Key"</p>

2-4. Method for releasing the "Trip" function

1) "Trip" message problem of the Syringe Pump

If the solution in the syringe is entirely exhausted to apply a specific high pressure, the EP100 pump stops operation together with a "Trip" message. If a specific pressure is applied and a motor cannot rotate any more, the encoder instantly detects the non-rotation signal and stops the pump.

If it is difficult to normally operate the pump due to the "trip" message signal, the trip function may be released. In this case, the encoder does not instantly detect the non-rotation signal and the pump may normally operate.

At this time, in the pump condition setting, [Volume(ml.)] must be set slightly smaller than the amount of the syringe solution. If so, the pump may stop operation before the syringe solution is entirely exhausted to give a pressure.

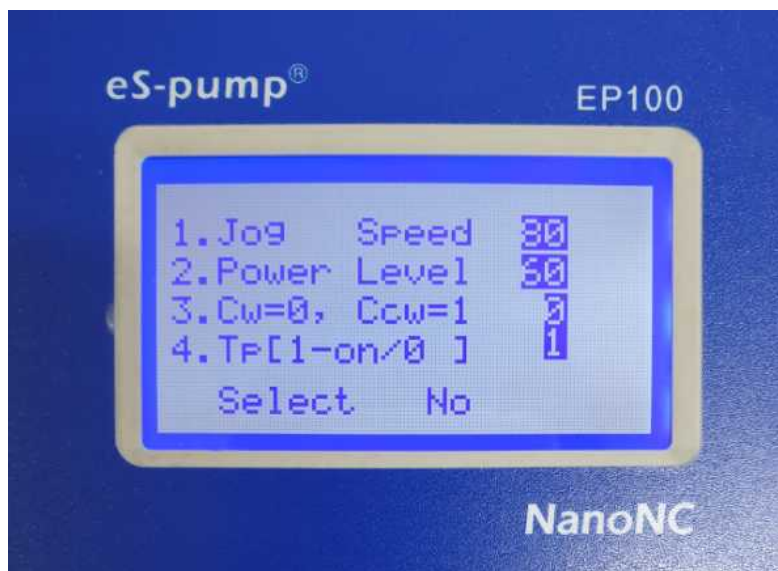
2) Method for releasing the Syringe Pump Trip function

Press [ESC] key and [↑] key at the same time

The Tp value on a normal state is "1".

*Default :

- 1.Jog speed : 80
- 2.Power Level : 60
- 3.Cw : 0
- 4.Tp : 1



To release the trip function,

** input the number "0" in Item "4" of the above window.*

(Operation Example)


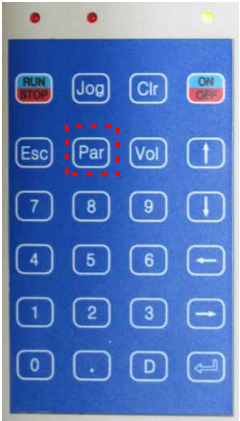
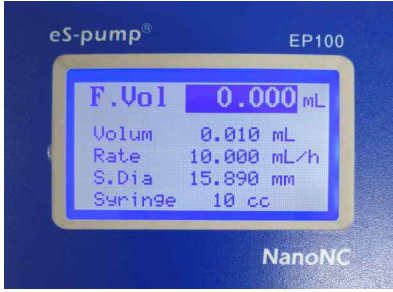
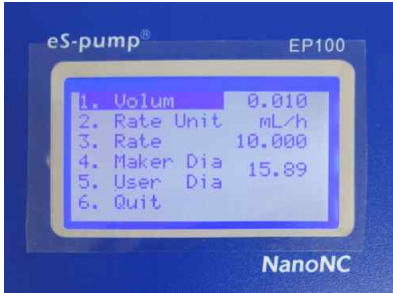

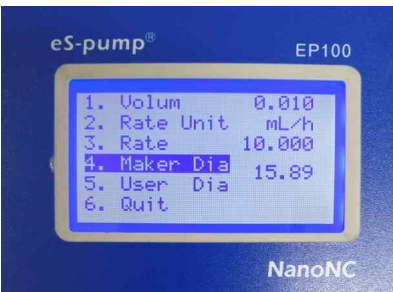

- ◆ For setting a syringe with the volume of 10 ml(NanoNC, 10ml), a flow rate of 30 $\mu\text{l}/\text{min}$, and a total discharge volume of 5 ml.


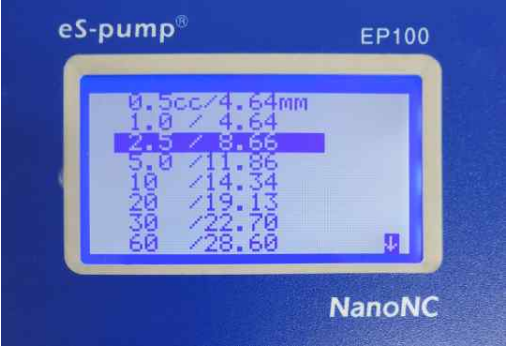
1. Press "ON" and hold for 2~3 seconds for power on.
 2. After pressing "Par", move to [1. Volume], and then press "enter key(\leftarrow)".
After inputting 5(ex> 5ml), press "enter key(\leftarrow)"
 3. Move to [2. Rate Unit] by pressing "down arrow key(\downarrow) or up arrow key(\uparrow), and then press "enter key(\leftarrow)". Select $\mu\text{l}/\text{m}$ ro mL/h by using \uparrow or \downarrow , and then Enter(\leftarrow)
 4. Move to [3. Rate] by pressing "down arrow key(\downarrow) or up arrow key(\uparrow), and then press "enter key(\leftarrow)". Input "30(ex> 30ul/min)", and then Enter(\leftarrow).
 5. Move to [4. Maker dia] by pressing "down arrow key(\downarrow) or up arrow key(\uparrow), and select Maker(NanoNC), and then press "enter key(\leftarrow)". Finally, select 10/15.89(ex> 10ml) by pressing "down arrow key(\downarrow) or up arrow key(\uparrow), and press Enter(\leftarrow).
 6. Press "ESC" key to return front page.
 7. Press "RUN" to work ES-pump
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※ After finishing experiment,

- ☞ 1.press "Stop" key, and then "light" will be off
- ☞ 2.press and hold OFF
- ☞ 3.please separate power cord

※To select other syringe(ex. Syringe of Becton Dickinson(BD) Co. _plastic syringe),

Execution	Result
<p>1. Press  (parameter input key) on front screen</p> 	 
<p>2. Select "[4. Maker Dia]" by moving "cursor" with down arrow key("↓") , and then press "Enter Key"</p>  <p style="text-align: center; color: red;">(OR)</p> <p style="text-align: center; color: red;">※Direct input of syringe size</p> <p>Select "[5. User Dia]" by moving "cursor" with "↓" , and then press "Enter Key", Finally, input "8.66" and then after pressing "Enter Key", press "ESC" key</p>	 

<p>3. Select "Bectan Dickso" among maker(syringe company) by moving "cursor" with "↓" and then press "Enter Key"</p>	 <p>The screenshot shows the NanoNC EP100 interface with a list of manufacturers: NanoNC, Bectan Dickin, Bectan Dickso (highlighted), Hamilton, Hoshi, JMC Air Tite, and Natsume.</p>
<p>4. Select "Bectan Dickso" by moving "syringe volume/inner diameter(syringe size)" with "↓" and then press "Enter Key"</p>	 <p>The screenshot shows the NanoNC EP100 interface with a list of syringe specifications: 0.5cc/4.64mm, 1.0 / 4.64, 2.5 / 8.66 (highlighted), 5.0 / 11.86, 10 / 14.34, 20 / 19.13, 30 / 22.70, and 60 / 28.60.</p>
<p>5. Press "ESC"</p>	

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NanoNC
High Voltage Generator
(HV Power Supply)
(Model:ESN-HV30/ESN-HV30N)
Manual

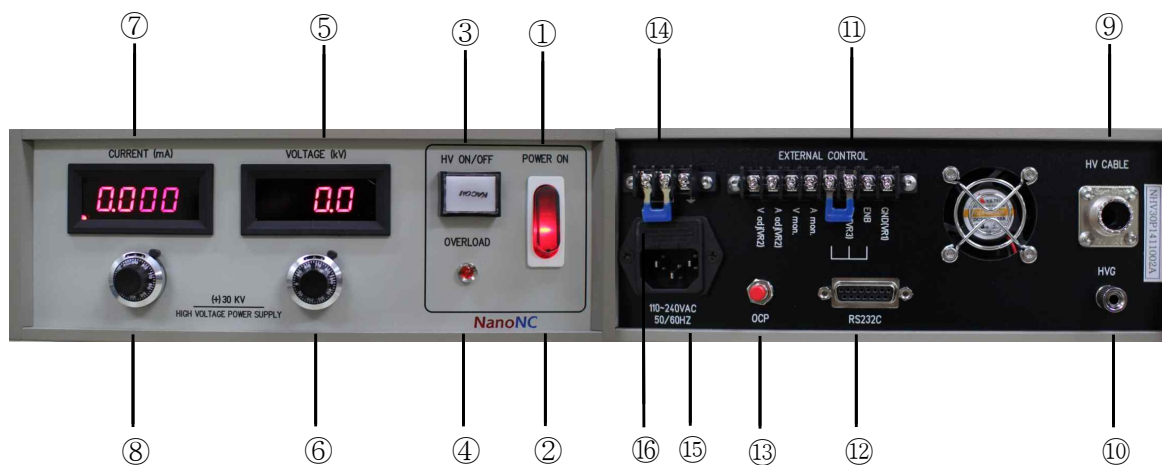
(+)30kV-1mA(Portable Type-B)
(-)30kV-1mA(Portable Type-B)

나노엔씨 **NanoNC**
www.nanonc.co.kr

A.Specifications

1. Input Voltage : 110 ~ 240VAC, 50/60Hz , single phase
2. Output Voltage : DC 1KV ~ 30KV
3. Out Current : 0 ~ 1mA
4. Stability : max load $\pm 0.1\%$
5. Ripple : less than 0.1%
6. Dimensions(mm) : 250(W) x 310(D) x 95(H)
7. Weight(kg) : ~ 5.1Kg

B.Functions



1.Front Panel

- ①② Power ON/OFF switch
- ③ HV(High Voltage) output ON/OFF switch
- ④ Alarm lamp for overcurrent protection
- ⑤ Output voltage meter : display 0.0 ~ 30.0KV $\pm 2\%$
- ⑥ Output voltage adjustable potentiometer(voltage regulator,10K Ω) : 0 ~ 30KV
- ⑦ Output current meter : display 0.000 ~ 0.999 mA $\pm 2\%$
- ⑧ Output current adjustable potentiometer(current regulator,10K Ω) : 0 ~ 1mA

2.Rear Panel

- ⑨ HV cable
- ⑩ Ground(HVG) terminal
- ⑪ External control terminal(Remote control)
- ⑫ RS232C Port (Option)
- ⑬ Overcurrent limitation selection switch
- ⑭ Power ON/OFF switch
- ⑮ AC input connector, 110Vac or 220Vac
- ⑯ Fuse 3A

C. Operation Method

1. Power ON

a) First, check whether the current lever number is turned to the maximum value, or the median value (current lever number about "5").

b) Second, check **whether the [HV ON/OFF] button is in a pressed down state(light on).**

※ When the [HV ON/OFF] button is pushed out, the voltage do not increase even though the voltage lever is raised.

c) Turn on [POWER ON] S/W

d) Raise the voltage lever slowly and set the optimal value during solution discharge or solution injection.

2. Power OFF

a) Turn the voltage lever counter clockwise to make zero.

b) Afterwards, check whether the [HV ON/OFF] button is pulled off, and turn off the power switch.

※ **About [HV ON/OFF].....**

When [HV ON/OFF] button is set to protrude, the voltage value shown in the voltage indicator window falls down to "0". When the button is pressed again, it recovers the original voltage value set.

[HV ON/OFF] button is used on equipment actuation, cleaning the nozzle part, and when temporally blocking the power for another task.

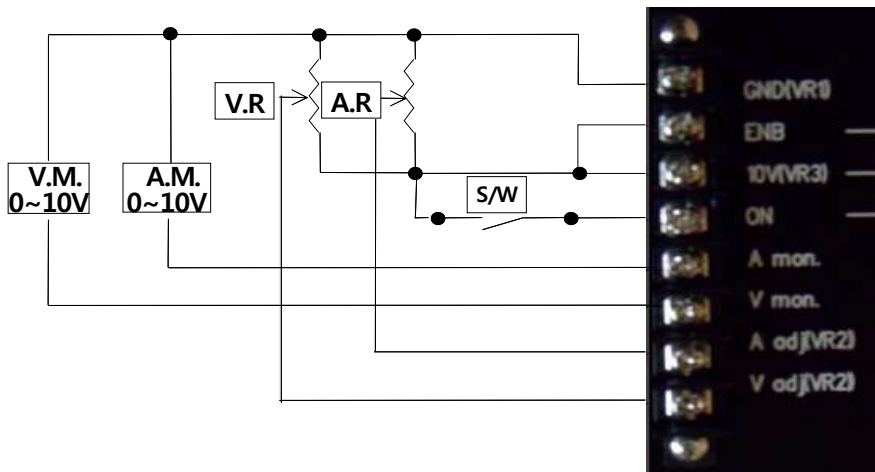
※ **About current value.....**

Current is a disturbance current of DC power applied on the solution, and most solutions apply very small currents below 0.5mA.

If the current value shows more than 0.5mA value, there is a current flowing in an unnecessary place, therefore equipment inspection must be done.

D. External Control(Remote Control)

※External Control Terminal Port function



- 1) V.R.(voltage regulator) control : connection with Voltage Volume Regulator(10K Ω) for external control.
- 2) A.R.(ampere regulator) control : connection with Current Volume Regulator(10K Ω)for external control.
- 3) V.M.(voltage monitor) 0~10V : 0 ~ 30KV Correspondence Monitor
- 4) A.M.(ampere monitor) 0~10V : 0 ~ 1mA Correspondence Monitor
- 5) S/W : High Voltage ON/OFF Switch for external control.

E. Cautions

※ The alligator clip must rest on insulated materials, in other words, part where electricity do not pass. If the metal part is in contact with high voltage applied line, and is discharged somewhere else with small noises(tic, tic, tic), or shows momentary spark effect, the equipment must be inspected immediately.

- Product Support & Call Center-

The term of warranty is one year from the date of purchase. Within this period, the warranty does not apply to damage caused by consumer, and repairs or replacement due to the damage will be made at a charge to the customer for parts or labor, provided the customer shall be responsible for any transportation cost.

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