16 Channel DC Current Monitor

MCM-1600PV

Instruction Manual

Thank you for purchasing our model MCM-1600PV DC Current Monitor.

Before use the instrument, read this instruction manual thoroughly and operate it correctly.

Keep this instruction manual carefully to take out whenever you need.

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・・・CAUTION FOR INSTRUCTION MANUAL・・・

●Carefully read this instruction manual and comprehend the contents completely before using the instrument.

●Keep this instruction manual carefully, as it would not be reissued.

●Cannot guarantee the safety for the use other than the original applications of this instrument and provided in this instruction manual.

●Follow the instructions about the safety in this manual by all means.

●The contents of this manual are subject to change without notice due to the development of specifications & functions of the instrument in the future.

●There may be the differences between the display of the instrument mentioned in this instruction manual and the actual instrument.

●The drawings in this manual may have been omitted partially and or been abstracted.

●Although trying to make assurance doubly sure, please inform us through the dealers if you find any suspicious point, error and or omission in this instruction manual.

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●Read carefully the guarantee regulations at the final page.

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Contents

SAFETY SUMMARYobserve by all means

● To use this instrument safely, read this " SAFETY SUMMARY " carefully and apply the instrument correctly.
● The CAUTIONs and WARNINGs which appear on the following pages are stated to prevent the operator & other people from the dangers and their properties from the damages beforehand.

⚠ WARNING : This symbol indicates the contents " Possibilities of the death or the serious wound can be supposed " caused from mis-operations.

⚠ CAUTION : This symbol indicates the contents " Possibilities of the injury or only the material damage can be supposed" caused from mis-operations.

○ OPERATION ENVIRONMENT

⚠ CAUTION

● Do not use or storage this instrument under the condition of direct rays of the sun, high temperature & humidity and or condensation, as it may cause the deformation and or the isolation defect of the instrument.
● Do not use this instrument in the environment influenced by acids, alkalis, organic solutions, corrosive gas, etc.
● Do not use or storage this instrument where the mechanical vibration can be directly transmitted, as it may cause defect of the instrument.
● Do not use this instrument nearby the appliances which generate strong magnetic field and or electrified, as it may cause mis-movement of the instrument.
● This instrument does not have the water / dust-proof structure. Do not use this instrument in the environment with a lot of dust and drops of water, as it may cause defect of the instrument.

○ OPERATION CONDITION & CONNECTION

⚠ WARNING

● Take notice that the measurement wetted instrument and or wetted hands may cause the electrical shock accident. If the water gets into the inside of instrument, stop the operation immediately.
● In case of measurement for active lines, use protection tools such as rubber gloves, etc. for the safety and to avoid electrical shock.
● Before input the power, confirm that the voltage indicated on AC Adapter of this instrument conforms with the power supply voltage to be used.
● Do not apply the voltage except the indicated power supply voltage, as it may cause the damage to the instrument and or the electrical accident.
● Do not put foreign substance into the USB connector and current input terminal

○ CONNECTIONS FOR SENSOR CORDS AND OPERATION OF ACCESSORIES

⚠ DANGER

● Apply Clamp CTs only to the coated cables and do not clamp bare cables, as it may cause electrical shock.
● If excessive current is applied to CT, it will be heated. Use the CT according to the rating current, as it may cause electrical shock or fire hazard accident.
● Examine the connection cable sensors(including power supply cable) every time before use(disconnection,contact defect, break of coating, etc.). If there is anything unusual after examination, do not use it definitely.

○ TO USE SAFELY

⚠ CAUTION

● Do not drop the instrument & CTs and or do not give the strong shock.
● Do not put heavy goods on the cables of instrument, CTs & accessories and do not modify those cables.
● If dropping CTs and or giving strong shock, the joint surface of CTs are damaged and it may cause wrong influences to the measurement.
● To avoid defect of CTs due to the break of cables, do not bend and or pull the cables at the base of CTs. Handle them very carefully.
● This instrument is for the use of low voltage circuit.
Apply to the insulated conductor with less than DC 600V.
Before use, confirm the circuit voltage to be measured.
● Use the exclusive AC adapter from the accessories. It may cause the damage of instrument, in case of the use of other adapters than designated.

・・・SOFTWARE UTILIZATION AGREEMENT・・・
(MCM-1600PV Transmission Software)

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2.Occasionally, the specifications of "MCM-1600PV Transmission Software" will be changed and or the offer of services will be stopped without any prior notice to the users.
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1. INTRODUCTION

This instrument can memorize the current values generated by PV systems and DC load current of related apparatus for long period in average between internals.   The memorized data can be transmitted to PC in CSV format.   The numbers of measuring circuit are 16 and the measurement can be made for 16 channels per each string in PV system at the same time.   Using clamp type current sensor enables safe and easy measurement.

2. SUGGESTIONS BEFORE USE

After opening the package, check the appearance of the instrument and the accessories.

If you find any damage of appearance and/or the lack of accessories, contact the dealer you bought from.

[ACCESSORIES]

Transmission Cable (USB A Connector Male – Female, approx..90cm)   1 pce.
AC Adapter (RC45-09))   1 pce.
CD-ROM(MCM-1600PV Transmission Software)   1 pce.
Instruction Manual   1 pce.
Hand Carrying Case   1 pce.

3. NAME AND FUNCTION OF THE INSTRUMENT
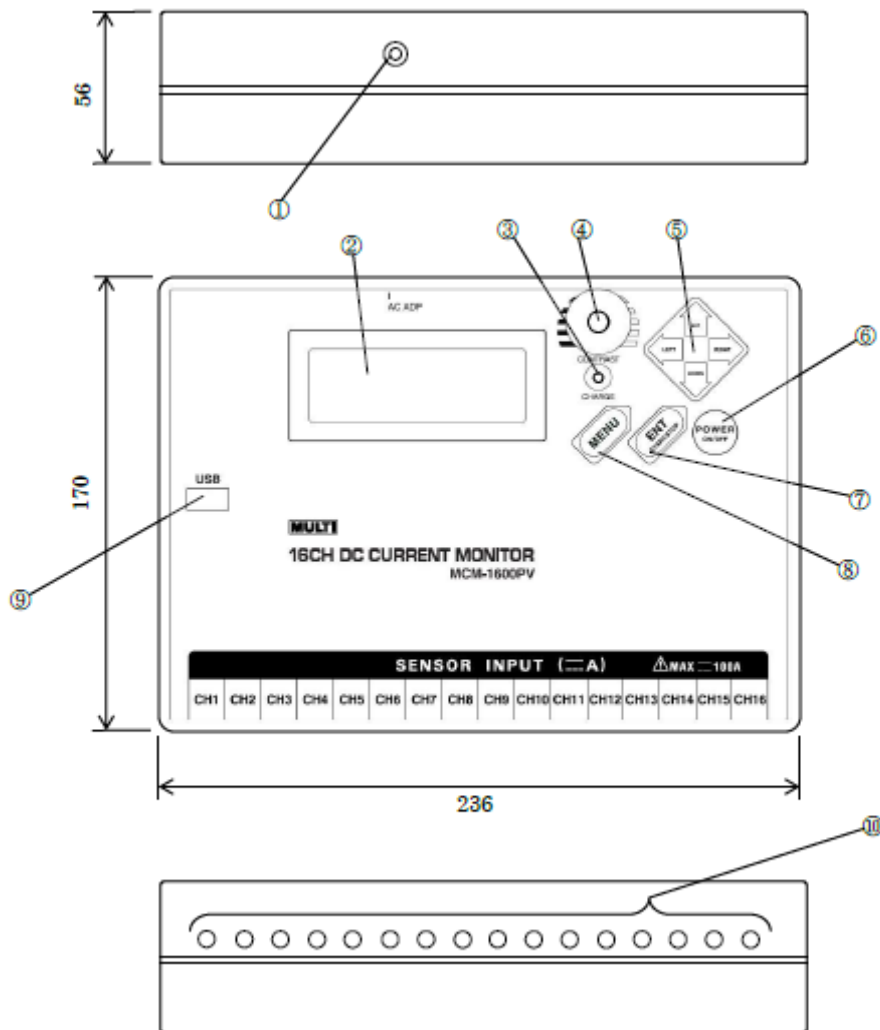
① AC Jack for ADP(Automatic Data Processing): to connect AC adaptor.

② Display: 4 lines x 20 letters for the display of configured items for measurement condition and measured values.

③ Charge Lamp: During charge by AC adaptor to the internal battery, this lamp is lightening.　Red lamp is showing rapid charging and green is for trickle charge.

④ Contrast: for adjustment of light and shade of the LCD. When the display value or letter can be hardly read, adjust lightness by turning this knob.

⑤ LEFT, RIGHT, UP, and DOWN key: to move the cursor on the display and or to see the values

⑥   Power Switch: for power on or off. Power will be turned off automatically 10 minutes after last operation. When AC adaptor inserted, timer-set set out to on, and logging, auto-power off won't

⑦   Setting Switch (ENT):　Switch for inputting the configured measuring condition and values to the internal memory.　Also, using for start/stop of logging mode.

⑧   Menu key (MENU):　press this key to go back to the initial display.

⑨   USB Terminal: to insert the belonging USB cable for storing the measured data in PC.

⑩   Current Input Terminal: for current input. Connect clamp CT (option).

4. CAUTION FOR MEASUREMENT

1) Remark for Connection

   Power on the instrument after connected current sensor (CT).

<div align="center">△WARNING</div>

● Do not apply CT by wet hand to prevent electric shock.
● Do not put foreign substance into the current input terminal.

2) Confirmation of Current Measuring Range

   The current measuring range is DC 0 ～ $\pm$99.9A (Display will become "OVER" more than $\pm$100A).

5. OPERATION

5.1 Preparation before use

 1) Install "MCM-1600PV Transmission Software" on your PC

 (1) Start Windows (Operating Systems: Windows XP/7)

 (2) Insert the CD-ROM to CD Drive.

 (3) Copy "MCM-1600PV Transmission Software" of CD-ROM to desk top or appropriate
        folder.

 2) Power Charge of Instrument

    In case of the operation by internal charging battery only, make power charge as
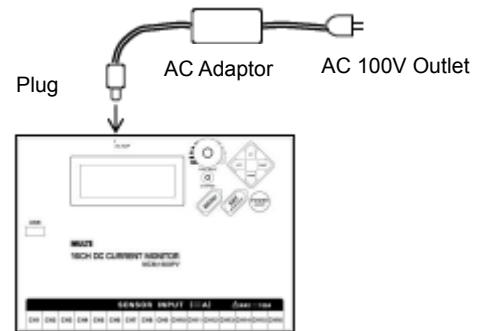   followings:

 (1) Insert the plug of AC adaptor to the jack of
        The instrument body (AC ADP), as right drawing.

 (2) Connect AC adaptor to the outlet (AC 100V).

 (3) Charging lamp lightens in red and rapid charge
        starts.

 (4) Charge will finish in approx.. 4 hours and charging
        lamp will change to green.

 ＊ In case of long time operation, use AC adaptor.

△CAUTION

◆   Do not input power to AC adaptor except the indication, as it may cause a fire.

◆   Do not touch the plug with wet hands or in the condition of water drops, as it may
     cause electrical shock.

◆   Do not use AC adaptor other than accessory, as it may cause damage of instrument
     and or electrical accident.

 About Charging Battery Pack

＊This instrument has Ni-hydride charging battery pack internally. For the operation, use
   correctly according to the contents as under:

In case of not operation and no use for long time

* Make power charge once a half year.   Charging may not be done sufficiently, in case of
   not charged battery for a long time.

* Storage the instrument at dry place.

* If not using for a long time, even fully charged battery pack will be consumed by self
   discharge.   Use the instrument after charged definitely.

Battery life

In case of short operating time even after full charge, the battery life is ended.   Replace the
battery pack to new one.   Contact the dealer you bought the instrument in case of
replacement.

5.2 Operation Procedure

1)Press "POWER" ⑥ switch once.

2)Set measurement condition

(1)Press "DOWN" ⑤ key twice, from initial display.

  (Set configuration)

(2)Press "ENT" ⑦ key once.

  Move cursor to desired item and press "ENT" key.

Move the cursor down by pressing
"DOWN" key ⑤ once.
Move the cursor up by pressing
"UP" key ⑤ once.

(Display)

```
DC Current Monitor
MCM-1600PV  1.00
```

(Initial Display)

```
(TopMenu)
Measure
Operate  Memory
■Set  Configuration
```

Cursor blinks→

↓ ENT key

```
■Set Timer        OFF
 Interval        1min
 SetNo.(System)    16
```

↓ DOWN key

```
■Set  Zero(System)
  2013/10/31  08:00
 Start  time(Loging)
  2013/11/30  18:00
```

↓ DOWN key

```
■Stop  time(Loging)
  2013/12/31  09:30
 RS232C(System)
   8/NON/1/9600
```

↓ DOWN key

```
■Now  Time(System)
  2013/10/01  17:26
```

3) Contents of Measuring Condition

(1) Set "Timer"

Move cursor to "Set Timer" and press "ENT" key to set "Set Timer".

Determine whether using timer or not in the logging mode.

Use "UP" or "DOWN" key to set "ON" or "OFF" and press "ENT" key.

```
(Timer Set)
■OFF
 ON
```

(2) Set "Interval"

Move cursor to "Interval" and press "ENT" key to set the interval time for importing data on the logging mode.

Use "UP", "DOWN", "RIGHT", or "LEFT" key to set the interval time.

Move cursor to desired interval time and press "ENT" key.

```
(Interval)
■   1  min      15  min
    5  min      30  min
   10  min      60  min
```

(3) Set "No."

Move cursor to "No. Set" and press "ENT" key.

Move cursor to desired channel number by UP/DOWN key and press "ENT" key.

```
( No. Set )
16
```

(4) Set "Zero"

Move cursor to "Zero Set" and press "ENT" key.

Store the measured value at the time of input current "0" (offset value) and make it "0".

Move cursor to "OFF" or "ON" by UP/DOWN key and press "ENT" key.

In case of selecting "OFF", the internally memorized data (offset value at the last time zero set) will be displayed.

In case of selecting "ON", the newly memorized data

after started measurement (offset value at this time zero set) will be displayed.

```
(Zero  Set)
 OFF
■ON
```

```
(Zero Set)
    2013/10/01  11:00
 1 : +0.3A      3 : +0.1A
 2 : −0.2A      4 : −0.1A
```

↓ DOWN key
↓ DOWN key
↓ DOWN key

```
(Zero Set)
    2013/10/01  11:00
 13 : +0.3A    15 : ————A
 14 : −0.2A    16 : ————A
```

Example: Right drawing is showing in case of 14 channels ("- - - - A" will be displayed for not using channel).

(5) Set "Start Time (Logging)"

Move cursor to "Start Time" and press "ENT" key, to set the start time at logging mode by timer.

```
(Start)
 2013/10/01  20:00
```

By using "UP" or "DOWN" key, set the number from Year and by using ""RIGHT" key move cursor to the side by turns. After finishing Minute entry, press "ENT" key.

(6) Set "Stop Time(Logging)"

Move cursor to "Stop Time" and press "ENT" key. Determine whether using timer or not in the logging mode.

```
(Stop)
 2013/10/01  22:00
```

Set from Year to Minute as same as setting start time and press "ENT" key.

(7) Set "RS232C (System)"

Move cursor to "RS232C" and press "ENT" key to set the transmission condition.

```
>(char)8bit / 7bit
 (Pari)ODD/EVEN/NON
 (Stop)1bit / 2bit
 (BPS)96/192/384/576
```

Char: Character Length Setting 8bit/7bit

Pari: Parity Setting   ODD: odd number

EVEN: even number NON: no number

Stop: Stop Bit Setting 1bit/2bit

BPS: Port Rate Setting 96: 9600bit/sec 192: 19200bit/sec.

384: 38400bit/sec. 576: 57600bit/sec.

By using "LEFT" or "RIGHT" key, set from Character Length and by using "DOWN" key, move cursor to below.   After completed each setting, press "ENT" key.

When transmitting the logging data to PC, these settings must be same between the instrument and PC.

(8) Set "Now Time(System)"

Move cursor to "Now Time" and press "ENT" key to set the present time.

```
■Now  Time(System)
  2013/10/01  17:26
```

In the same manner as for start time, set the numbers from Year to Minute and then, press "ENT" key.

＊ Please note that Minute might not be updated at Now Time (System) as clock sees date of Real Time Clock Data once a 30 seconds.

After completed all settings, go back to "Top Menu" by pressing "MENU" key.

＊When pressing "MENU" key, the message "Wait !! (Save !!)" will be displayed and settings will be applied.

When the power is turned off without being pressed "MENU" key, the settings will not be applied and return to the previous setting.

4) Measurement

(1) General Measurement

After connected current detection sensor (CT) to the instrument, set power on.

Move cursor to "Measure" on the initial display (Top Menu) and press "ENT" key.

```
2013/10/01  17:36      ←        Now Time Display

1 : +12.4A  3 : +  9.9A
2 : +17.2A  4 : − 21.9A
```

↓ DOWN key   ↑ UP key

```
2013/10/01  17:36

5 : −8.1A  7 : +  20.2A
6 : +9.7A  8 :   OVER  A  ←      "OVER" Display when more than ±100A
```

↓ DOWN key   ↑ UP key

```
2013/10/01  17:36

 9 :  +12.4A  11 : ————A
10 : ————A  12 : ————A
```

↓ DOWN key   ↑ UP key   For not using channel.

```
2013/10/01  17:36                                   "————A" Display.

13 : ————A  15 : ————A
14 : ————A  16 : ————A
```

⚠CAUTION

When "B" sign lightening on the display, the internal battery is almost exhausted.

Charge the battery by AC adaptor immediately.

Measurement can be made even during charge.

(2)Measurement by Logging Mode

①Manual Operation

After connected current detection sensor (CT) to the instrument, set power on.

If the measured values are not unusual, the data will be taken into the internal memory of instrument by configured interval.

(Auto power off function does not work during logging).

*Press "ENT(START/STOP)" key once at the display of general measurement.

```
  2013/10/01  17:36  R ←
         3d  19h  59m
1 : +12.4A  3 : +  9.9A
2 : +17.2A  4 : − 21.9A
```
[R] sign is blinking on the display at the right upper position. Logging mode starts.

↓ DOWN key   ↑ UP key
```
  2013/10/01  17:36  R
         3d  19h  59m ←
5 : −8.1A  7 : +  20.2A
6 : +9.7A  8 :   OVER  A
```
Display the elapsed time from the start by day, hour and minute.

↓ DOWN key   ↑ UP key
```
  2013/10/01  17:36  R
         3d  19h  59m
 9 :  +12.4A  11 : −−−−A
10 : −−−−A  12 : −−−−A
```

↓ DOWN key   ↑ UP key
```
  2013/10/01  17:36  R
         3d  19h  59m
13 : −−−−A  15 : −−−−A
14 : −−−−A  16 : −−−−A
```
For not using channel,
「----A」 Display

*To stop the logging mode, press "ENT (START/STOP)" key once more.

[R] sign will disappear and the display will become general measurement.

<center>△CAUTION</center>

●By pressing "ENT(START/STOP)" key in case that the memory blocks (0-9) are fully occupied, a message, "Memory Over!!(Clear Block)" is shown on the display and logging mode does not start. In this case, delete the memory block and then, start the measurement again.

●When the battery is exhausted, the measurement may stop on the way. Use AC adaptor for logging mode measurement.

②Operation with Timer

The logging mode can start at the appointed time by setting Timer Set.

●Connect AC adaptor with the instrument.

●Set the display to "Set Configuration" and enter "Start Time" and "Stop Time".

●Set "Set Timer" to "ON"

●Get the instant measurement display.

●Keep the power on by the instant measurement display.

●At the "Start Time", "R" gets lightening and the logging mode starts.

●At the "Stop Time", "R" gets off and the logging mode terminated.

⚠CAUTION

●When setting "Set Timer" on, the auto power off function does not work.

●When the internal battery is exhausted, the measurement may stop on the way.
  Use AC adaptor for logging mode measurement.

●Before setting "Timer ", check the status of memory block. In case that all memory blocks are occupied, the logging will not start. To delete memory block, refer to P18-P19.

●The manual operation is prior to "Timer".

●When setting the timer, please take care the stop time settings. For example, if you would get the measuring data during 12:00-18:00 with 5 minutes interval, set the "Stop Time" to 18:05. If you set it to 18:00, you cannot get the data during 17:55-18:00.

5)Memory Management (Import Data)

Manage the data imported to the memory in the following manner.

(1)Operation for memory (Disp Block)

```
(TopMenu)
 Measure
■Operate  Memory
 Set  Configuration
```

● Set cursor to "Operate Memory" on the initial display

↓ ENT key

```
(Memory)
■Disp  Block
 Clear  Block
 Clear  All  Memory
```

● Press "ENT" key once.
● Set cursor to "Disp Block" and press "ENT" key once.

↓ ENT key

```
(Block)
■1)2013/09/26  17:00
 2)2013/10/17  11:35
 3)2013/10/20  09:15
```

● The information about the memory blocks currently occupied is shown on the display. Memory blocks are divided into 6 and the block not in use is shown as "Empty Block".

↓ DOWN key   ↑ UP key

```
(Block)
■4)2013/10/22  13:25   ←      Start time of logging
 5)Empty  Block  ⎤
 6)Empty  Block  ⎦   ←      Block not in use
```

● Display when numbers of data are exceeding 1 memory block.

```
(Block)
■1)2013/09/26  17:05  ⎤  In block No. 2, the succeeding data of No. 1
 2)Continue  Block   ⎦  are contained.
 3)Empty  Block   ←      Block not in use
```

①To get the internal information of one memory block, set cursor to the memory block position to be shown and press "ENT" key.

```
 Block01)
 Start :13/09/26  17:00  ←      Start Time
 Intv  :5min  ←      Interval Setting
 Size  :12  ←      Number of Data
```

②Confirm the detailed data in memory block

Press "ENT" key at the last display on P16.

Select channel No. by UP/DOWN key and data No. by RIGHT/LEFT key. Return to the former display by "MENU" key.

```
Block  01)         00001 ←──── Logger data No. (Size No.).
Time:  13/09/26   17:05 ←──── Logging time
1 : +12.4A  3 : +   9.9A ┐
                          ├── Average current value
2 : +17.2A  4 : − 21.9A ┘    for the interval
```

↓ DOWN key   ↑ UP key

```
Block  01)         00001
Time:  13/09/26   17:05
5 : −8.1A  7 : +   20.2A
6 : +9.7A  8 : +   98.2A
```

↓ DOWN key   ↑ UP key

```
Block  01)         00001
Time:  13/09/26   17:05
 9 :  +12.4A   11 : −−−−A ←── 「−−−−A」 display of the
10 :  −−−−A    12 : −−−−A      channel not in use.
```

↓ DOWN key   ↑ UP key

```
Block  01)         00001
Time:  13/09/26   17:05
13 : −−−−A   15 : −−−−A
14 : −−−−A   16 : −−−−A
```

●Display of internal information when moved cursor to Empty Block and pressed "ENT".

```
Block03)
Start: −−/−−/−−   −− : −−
Intv  :min
Size  :0
```

(To go back to the initial display, press "MENU" key twice or three times.)

⚠CAUTION

●The logger numbers memorized into one block are for max. 12 days with 5 minutes interval.   Make logging setting in this condition as a standard.

●In case of the wrong termination during logging mode (ex. The power turned off or the internal battery is exhausted), "Error" message will be shown at Size on Block display. The data will be broken consequently.

(2)Deletion of Memory

```
(TopMenu)
 Measure
■Operate  Memory
 Set  Configuration
```

↓ ENT key

```
(Memory)
 Disp  Block
■Clear  Block
 Clear  All  Memory
```

↓ ENT key

```
(Block)
■1)2013/09/26  17:00
 2)2013/10/17  11:35
 3)2013/10/20  09:15
```

↓ DOWN key   ↑ UP key

```
(Block)
■4)2013/10/22  13:25
 5)Empty  Block
 6)Empty  Block
```

↓ ENT key

```
 Block  Clear ?
 NO            ■YES
```

●Set cursor to "Operate Memory" on the initial display.

●Press "ENT" key once.

●Set cursor to "Clear Block" and press "ENT" key once.

●Set cursor to the block to be deleted and press "ENT" key once.

●Set cursor to "YES" by RIGHT/LEFT key and press "ENT" key.

(For example, when deleted Block 1)

Block 1 remained the same

Block 2 deleted

Block 3 moved to Block 2

Block 3 becomes Empty

(3)Deletion of All Memories

```
(TopMenu)
Measure
■Operate  Memory
 Set  Configuration
```

↓ ENT key

```
(Memory)
Disp  Block
Clear  Block
■Clear  All  Memory
```

↓ ENT key

```
Clear  All  Memory ?
NO                ■YES
```

●Set cursor to "Operate Memory" on the initial display.

●Press "ENT" key.
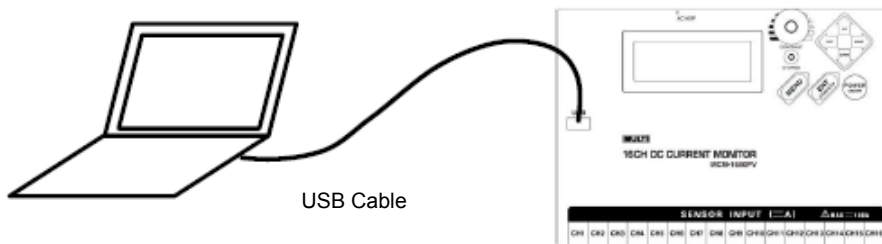●Set cursor to "Clear All Memory" and press "ENT" key once.

●On the display, will show #Clear All Memory?". Set cursor to "Yes" by using RIGHT/LEFT key and press "ENT" key.
●All memories are deleted.

6)Store the logging data to PC

①Connect USB terminals of the instrument and PC by USB cable.
　(Do not use USB cable in the standard accessories for other purpose).

USB Cable

②Start up PC software (MCM-1600PV Transmission Software).
　(According to PC setting, there might be a sign "Warning of Security". Select "Enable Contents" as MCM-1600PV Transmission Software is safe).

③Power on MCM-1600PV.

④Set the transmission conditions of MCM-1600PV and software to the same.
　(baurate "BPS", character length "Char", parity "Pari", stopbit "Stop").

⑤Set the serial port numbers of PC USB terminal and MCM-1600PV software to the same.
　(Transmission port can be set in the range of 1~255).

⑥Select "Connection" in MCM-1600PV transmission software.　Data transmission starts under correct connection.

⑦Select "Acquisition" key of data list to be taken.

⑧Downloaded logging data are displayed on the worksheet in excel new book.
　Store the data by naming file and choosing same location according to necessity.

⑨At the termination of MCM-1600PV transmission software, the display will ask "Store the alteration ?".　Select "not store" and terminate.

6. SPECIFICATION

6-1 Measuring Specifications

1) Nos. of Measuring Circuit : 16 (16 channels)
2) Detection Method : Clamp CT method (hall element)
3) Measuring Ranges : DC 0~±99.9A ("OVER" display more than ±100A)
4) Minimum Resolution : 0.1A
5) Measuring Accuracy : ±3%rdg±5dgt (after "0" adjustment)
6) Sampling Rate : approx.. 20msec.
7) Actual Time Accuracy : ±200ppm±10sec. (at 25℃)

6-2 Function Specifications

(General Measuring Mode)
1) Time Display : Now time display in AD. Year, Month, Day, Hour, Minute (internal clock time)
2) Instantaneous Value Display : Generated current (load current) value by each channel.

(Logging Measuring Mode)
3) Time Display : Now time display in AD. Year, Month, Day, Hour, Minute (internal clock time)
4) Passing Time Display : Passing time from the start of logging. Day, Hour, Minute
5) Instantaneous Value Display : Generated current (load current) value by each channel.

(Setting Mode)
1) Set Timer : ON, OFF of logging timer
2) Measuring Interval : Selection 1/5/10/15/30/60 minutes (16 channels common.
3) Number of Channel : Setting the measuring channels. 1~16
4) "0" Adjustment : ON, OFF of zero adjustment
5) Timer Setting : Time setting for start & stop of logging in AD. Year, Month, Day, Hour, Minute.
6) Setting of Transmission : Setting for baudrate (BPS), character length (Char), Condition Parity (Pari), stop bit (Stop).
7) Clock Setting : In AD. Year, Month, Day, Hour, Minute.

(Memory Function)
1) Memory Contents : Start time of measurement, measuring interval average current value in measuring interval, numbers of measuring channel.
2) Confirmation of Memory : Start time of measurement, measuring interval, Contents average current value in measuring interval.
3) Memory Capacity : 12 days per 1 block with 5 minutes interval, 72 days for 6 blocks continuously.

(Warning Function)

1) Over Display : [OVER] will be displayed at each channel in case of more than ±DC100A.
2) Low Battery Indication : [B] mark is blinking on right upper side of LCD.
3) Logging Mode Indication : [R] mark is blinking on right upper side of LCD.

(Other Functions)

1) Auto Power Off : After final key operation, automatically power off in 10 minutes (When using AC adaptor, timer set is on, during logging and data transmission, this function does not work).

2) Contrast Adjustment : Adjusting by the contrast knob.

3) Battery Charging Display : Red lamp lightens during rapid charging and green lamp for trickle charging.

6-3 General Specifications

1) Operation Place : Indoor, up to 2000m height.

2) Storage Temp. & Humidity : -10°C ~60°C, less than 80% RH (non-condensation)

3) Operation Temp. & Humidity : 0°C~50°C, less than 80% RH (non-condensation)

4) Operation Circuit Voltage : Less than DC600V (insulated conductor)

5) Withstanding Voltage : AC2200V(50/60Hz)/1 minute between CT hole & case.

6) Insulation Resistance : more than 50MΩ between power supply and case by 500V insulation tester.

7) Power Supply Source : AC adaptor (battery charger, primary input voltage: AC100V~240V, 50/60Hz) and internal Ni-hydride Charging battery pack.

8) Current Consumption :Approx. 65mA for the instrument.
Approx. 5mA for CT per 1 channel.

9) Battery Run Time : At the time of full charge of internal battery,
Approx. 60 hours continuous for the instrument + CT 1 channel. Approx. 29 hours continuous for the instrument + CT 16 channels. Run time will be changed according to numbers of CT channels and charge/discharge times.

10) Dimension & Weight : 236(W) x 170(H) x 56(D)mm, approx.. 840g(the instrument only).

11) Standard Accessories : USB Cable x 1, AC Adaptor (RC45-09) x 1, Instruction Manual x 1, Carrying Case x 1.

12) Option : CT φ30mm (LAD-240PV) with cable & plug (approx.. 280mm). CT Carrying Case.

7. REPAIR SERVICE

When requesting for repair service, please bring the instrument directly to the dealer
where you bought.
When mailing the instrument, always pack it in its original or equivalent packing materials to
avoid any damage during the transportation and also put together with documents showing
your name, address, phone number and defect point.

8. WARRANTY

This instrument is sent out from our factory after the sufficient internal inspections
but if you find any defect due to the fault in our workmanship or the original parts,
please contact the dealer where you bought the instrument.

The warranty period is 12 months from the date of purchase and the instrument shall be
repaired at free of charge, provided that we judge the cause of defect is obviously resulted
from our responsibility.