

# **PC RECORDER**

## **FOR 53U MULTI POWER MONITOR**

**Software model: MSR128LUS, MSR128LUV**

# **Users Manual**



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## **INTRODUCTION**

Thank you for choosing M-System's PC Recorder. This instruction manual describes functions of PC Recorder for the 53U and L53U (hereunder referred only with '53U') Multi Power Monitor, its PC requirements, input module, and how to operate the MSR128LUS and MSR128LUV (hereunder referred 'MSR128LU') software programs.

The MSR128LU is a Windows-PC-based software program dedicated to be used with the 53U Multi Power Monitor, to monitor and record its measured data. To program the 53U's configurations, you need to access its program via the front keys, or to use the dedicated PC configuration software, model PMCFG. Other hardware modules cannot be used with the MSR128LU.

The data used for the recorder is saved in CSV format allowing easy export to other Windows programs (e.g. Microsoft Excel).

In order to ensure maximum performance of the PC Recorder, we recommend that you carefully examine the environments of the PC and other connected devices. Please remember that the overall reliability of the MSR128LU as a recording device depends upon that of the PC including its OS.

# 1. GENERAL DESCRIPTIONS

## 1.1 PRECAUTIONS TO USE THE MSR128LU ON YOUR PC

1. The MSR128LU is designed as package application, usable on PC running Windows 2000 and Windows XP. Consider the fact that the MSR128LU constantly reads input signal and plots entire chart screen at its fastest storing cycle of 0.5 sec. when you choose the CPU and graphic capabilities of PC.
2. DO NOT use another application program while the MSR128LU is running.
3. Remember that the overall reliability of the MSR128LU as a recording device depends upon that of the PC including its OS.
4. The MSR128LU is designed to use in a single window on a single PC, not for use in multiple windows or to be shared on LAN.
5. Disable the power saving mode: Select on the PC's desktop 'Properties – Screen Saver – Power – Power Schemes' and set 'Never' to all items. With laptops, disable any key operations to initiate an automatic shutdown other than the power switch. Disable also the system stand-by mode or any other power saving features.
6. Disable animating screen savers in order to avoid extra load to the PC when running the MSR128LU.
7. It is recommended not to copy more than necessary shortcuts or exe. files on the desktop. We recommend to delete exe. files related to web site contents in order to avoid any disturbance in plotting.
8. Storing cycles of 500 msec. or slower are usable. High speed mode (50 msec. storing cycle) is unavailable.
9. Use an independent LAN for the MSR128LU. Sharing the network with other systems may cause an instability or interference on both systems.
10. If you intend to use the PC Recorder in the following environments or conditions, redundant and/or failsafe system designs should be used to ensure the proper degree of reliability and safety.
  - Environments or conditions which are not defined in this manual
  - Nuclear power control devices, railway control devices, aircraft control devices, transportation vehicles, fuel control equipment, medical equipment, recreational equipment, safety equipment, and other critical equipment for which safety must be secured according to relevant laws.
  - Those devices which inherently require extremely high level of safety and reliability.

## 1.2 FEATURES OF THE MSR128LU

On the Record view, the MSR128LU reads and plots input signals on the screen, and saves data as record files.

Additionally, it compares the signals with the preset alarm conditions and accordingly outputs a contact signal to the predetermined output point. Pen configurations including alarm setting can be modified on this view.

On the Retrieve view, the MSR128LU searches and shows historical recorded data files. The MSR128LU continues sampling even while the main recording window is inactive.

The data files are saved in CSV format, which can be directly exported to general-purpose spreadsheet programs such as Microsoft EXCEL. They can be stored also in removable storage media for later use, for example, using the Retrieve view or Microsoft Excel program on another PC.

In addition to the functions of conventional recorders, those of data logging is incorporated all-in-one into the MSR-128LU, thanks to extensive, analytical, communicative and administrative capabilities of a PC.

It can be called as “chartless” recorder.

Figure 1.2 shows a map of various options available on the menu bar and control panel in the MSR128LU program.

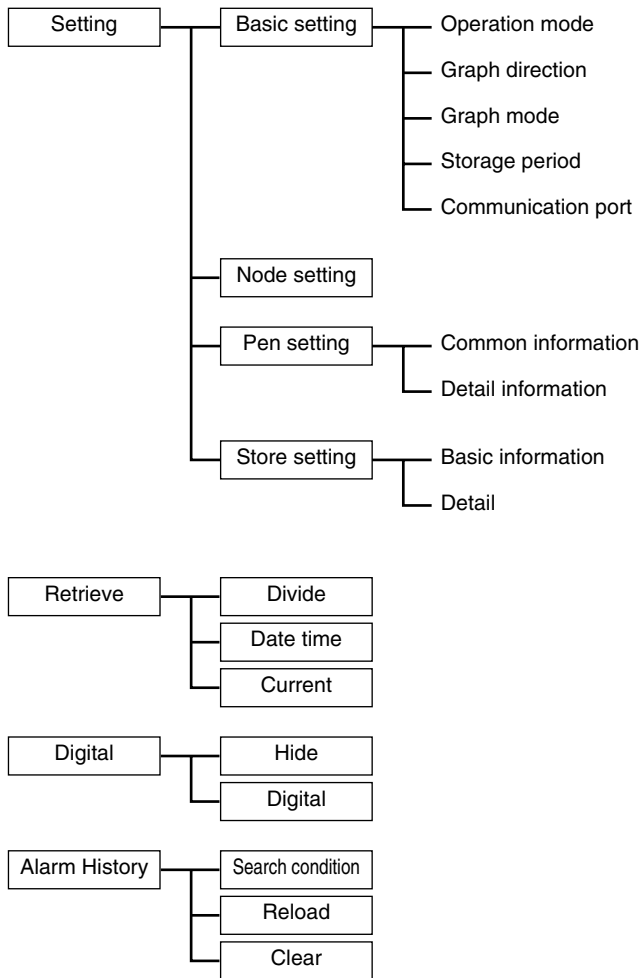


Figure 1.2: MSR128LU options map.

### 1.3 PC REQUIREMENTS

PC: IBM PC/AT or compatible  
RS-232C port may have predefined use for certain types of PC, which could require modifications in driver software or system configuration.

Operating system: Windows 2000 or Windows XP SP1, SP2

Screen area: MSR128LUS 800 by 600 pixels  
MSR128LUV 640 by 480 pixels

Display colors: 65000 colors or more (16 bit high color)

CPU: Pentium III 800 MHz or higher (Use the secondary cache with Celeron CPU)

Memory: 128 MB recommended for Windows 2000, 256 MB for Windows XP

Input device: 53U, L53U

Protocol converter: Models 72EM-M4, 72EM2-M4, R2K

Hard disk area: Using an internal drive is recommended. Performance of the MSR128LU may be impaired with using external one, connected via SCSI for example.  
The hard disk must have a enough space, and removable storage media must be available for data transfer.

Remark: The MSR128LU may not be able to store every bit of data depending upon the PC's performance levels. These missing data will be substituted by the last stored data.

## 2 HARDWARE SETUP

### 2.1 CONFIGURING THE 53U

#### NODE NUMBER SETTING

Each 53U module connected to the MSR128LU must have an unique node number (1 – 1F, up to 31 nodes).

#### MODBUS SETTING

Confirm the baud rate, parity and stop bit setting on the 53U module. All these settings must be equal to the factory default setting in order to communicate with the MSR128LU.

Refer to the figure below or the operating manual of the 53U to set the node number and other Modbus properties.

Once a new node number is set, the power supply to the device must be turned off and on to implement it.

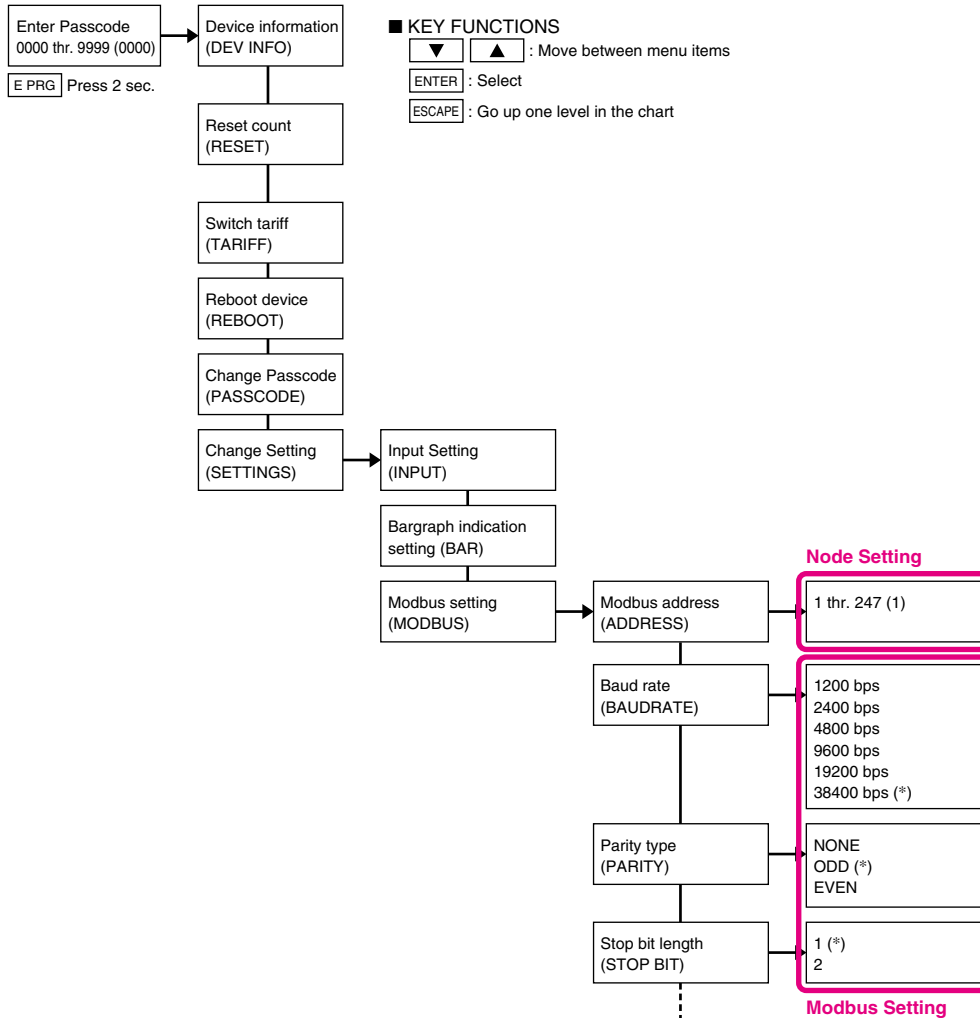


Figure 2.1: Modbus node and property setting.



## 2.2 CONNECTING TO THE PC

The 53U modules are connected to the PC either via a COM port or via a LAN port. Using both ports at once is Not Possible.

- COM Port: The MSR128LU communicates with the 53U using Modbus RTU Protocol via RS-232C as physical layer. Insert Model R2K-1 RS-232C/RS-485 Converter close to the PC.
- LAN Port: The MSR128LU communicates with the 53U using Modbus TCP/IP Protocol via Ethernet as physical layer. The 53U, Modbus RTU modules are interfaced via Model 72EM(2)-M4 Communication Adaptor.

### 2.2.1 MODBUS RTU

As shown in Figure 2.2.1a, the 53U module is connected to PC's COM port (COM1 through COM5) via the RS-232C/RS-485 Converter (model: R2K-1).

Connect the 53U to the R2K-1 with a RS-485 twisted pair cable. Connect the R2K-1 to the PC with a straight RS-232C cable with 9-pin D-sub connectors.

When more than one 53U module are to be monitored, connect these modules with RS-485 twisted pair cables.

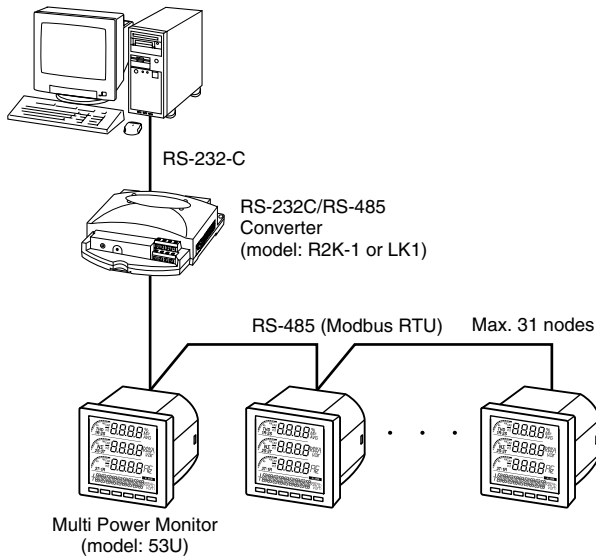


Figure 2.2.1a: System configuration example, Modbus RTU.

Detail of Modbus wire configuration is as shown in Figure 2.2.1b.

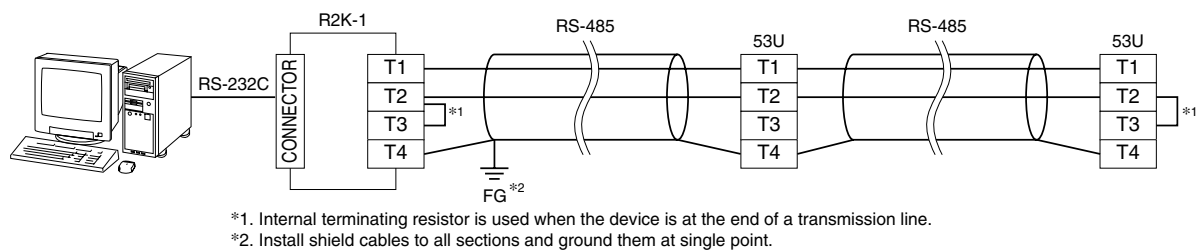


Figure 2.2.1b: Modbus wiring detail with the R2K-1.

## 2.2.2 ETHERNET MODBUS TCP/IP

Figure 2.2.1a shows a system configuration example via Ethernet using Model 72EM(2)-M4 Ethernet/RS-485 Communication Adaptor. Only one (1) 72EM(2)-M4 can be connected to one PC.

If the 72EM(2)-M4 is directly connected to the PC (Not via a switch/hub), use a 'cross' type Ethernet cable.

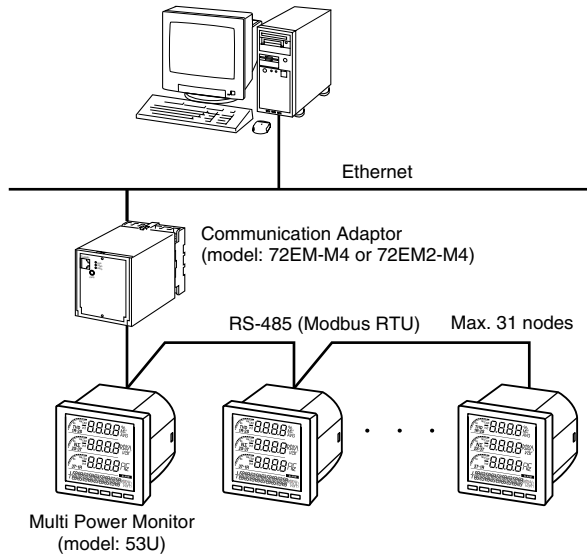
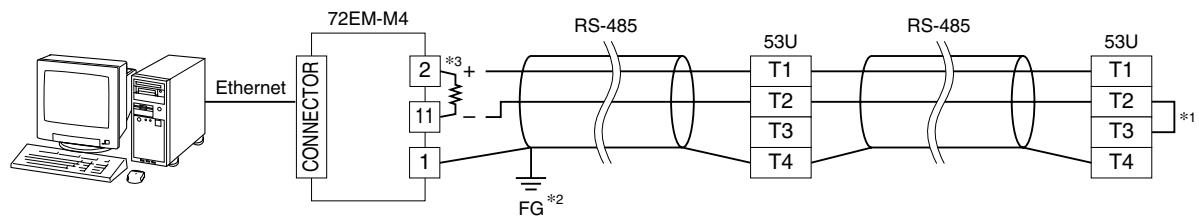


Figure 2.2.2a: System configuration example, Modbus TCP/IP.

Detail of Modbus wire configuration is as shown in Figure 2.2.2b.



- \*1. Internal terminating resistor is used when the device is at the end of a transmission line.
- \*2. Install shield cables to all sections and ground them at single point.
- \*3. When the 72EM unit is located at an end of transmission line via twisted-pair cable (= when there is no cross wiring), close across the terminal 2 – 11 with the terminating resistor attached to the product. Remove the resistor from those located between the end points.

Figure 2.2.2b: Modbus wiring detail with the 72EM(2)-M4.

## 3 INSTALLING THE MSR128LU

### 3.1 INSTALLING THE MSR128LU FROM THE DOWNLOADED ARCHIVE

No automatic installation instruction window appears on the screen. Install the MSR128LU program following instructions.

1. Locate the downloaded archive using Explorer on the Windows desktop, and double-click it to automatically start uncompressing process.
2. Locate the uncompressed program folder and double-click SETUP.exe icon to start installing the MSR128LU program following instructions.
3. Installation complete, "PC Recorder" is now listed in the program menu.

### 3.2 UNINSTALLING THE MSR128LU

1. Press Start on the task bar and choose Control Panel from Settings menu. (Double-click My Computer icon on the desktop and choose Control Panel.)
2. Double-click Add/Remove Programs and uninstall the MSR128LU program following instructions.

### 3.3 STARTING THE MSR128LU

Choose Program > M-SYSTEM > MSR128LU > MSR128LUV or MSR128LUS.

Figure 3.3 shows the initial state of Record view.

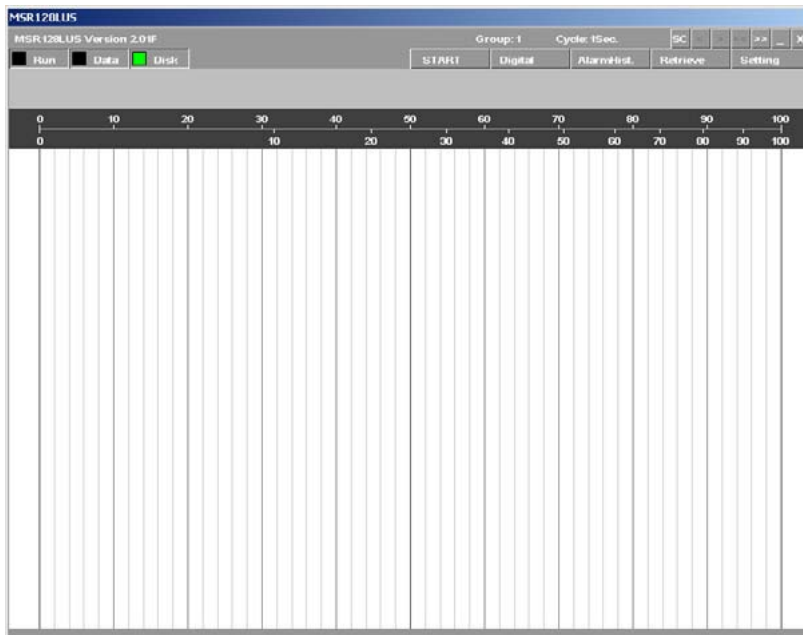


Figure 3.3: Record (initial) view.

## 4 SETTING UP THE MSR128LU

Select Setting button on the top control panel to show the Setting Menu (Figure 4.0).

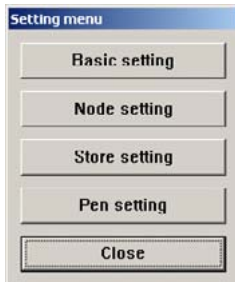


Figure 4.0: Setting menu.

### 4.1 BASIC SETTING

Selections in the Setting Menu determine the system configuration for the MSR128LU. Most of these selections are changeable only when the Record view is stopped. You can review the current setting while the program is running.

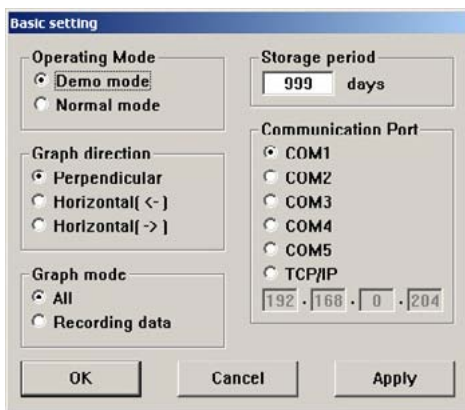


Figure 4.1: Basic setting.

#### 4.1.1 OPERATING MODE

- Demo mode: You can run the MSR128LU program without actual signal input when you choose the Demo mode. In the Demo mode, the MSR128LU creates a sinusoidal (analog) waveform or square (discrete) waveform for each pen. 'DEMO' appears on the background of the screen while the MSR128LU is operating.
- Normal mode: 0.5-sec. or slower storing cycle is applicable in this mode. Service channel numbers are 120 at the maximum, using Group 1 through Group 10 views (12 channels/group).

#### 4.1.2 GRAPH DIRECTION

Graph (chart) direction can be changed during the program is running.

- Perpendicular: Data stream from the top to the bottom (Figure 4.1.2a)
- Horizontal (→): Data stream from the left to the right (Figure 4.1.2b)
- Horizontal (←): Data stream from the right to the left (Figure 4.1.2c)

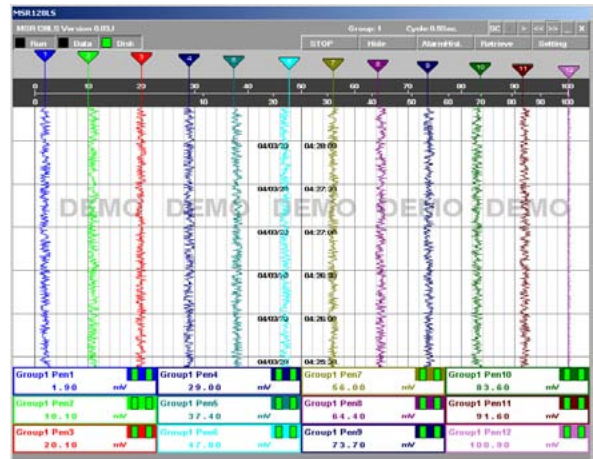


Figure 4.1.2a: Perpendicular graph.

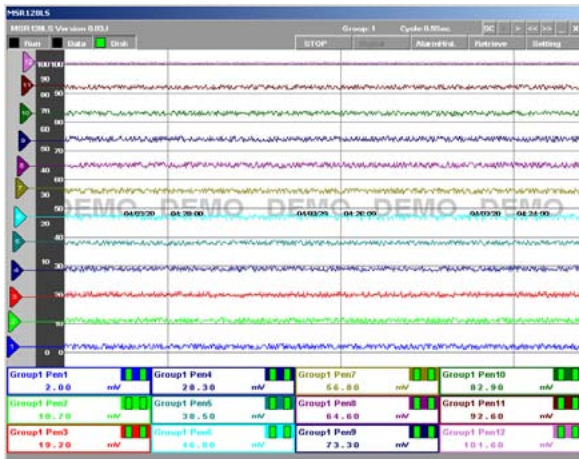


Figure 4.1.2b: Horizontal graph (→).

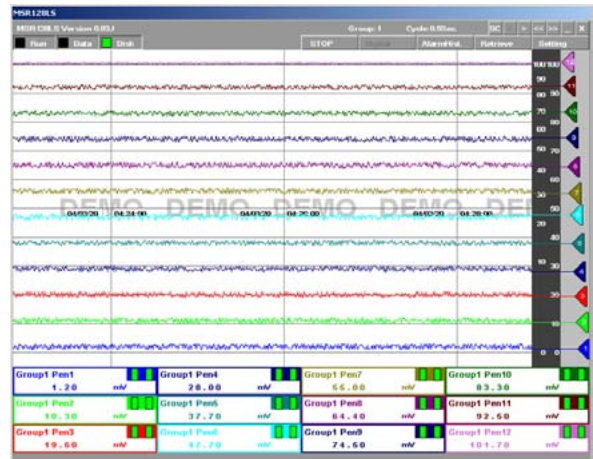


Figure 4.1.2c: Horizontal graph (←).

#### 4.1.3 GRAPH MODE

Selecting Graph Mode limits the data to be plotted on the screen.

- All: Trends graphs for all active pens are plotted regardless of the data storing mode.
- Recording data: Trend graphs are plotted only when the data is recorded in the hard disk. While no recording is executed, the digital meters (indicators) at the lower part of the screen show the current values/status but there is no plotting on the screen.

#### 4.1.4 STORAGE PERIOD

Stored data files are deleted automatically after the specified days have been elapsed. If one recording cycle is over two days and the storage period is elapsed after the first, the file for the first file is deleted at 0:00:00 even during the recording.

Specify between 1 and 998 days. If you do not wish any file deleted, set to 999 days.

#### 4.1.5 COMMUNICATION PORT

Select one of the RS-232C ports (COM1 through COM5) of the host PC or Ethernet (TCP/IP) communication.

When TCP/IP is selected, specify also the IP address of the host PC. Be sure to set the same subnet mask as for the one specifically assigned to the host PC.

Connected device types and node assignments are specified in Setting Menu – Node Setting.

#### Caution !

1. DO NOT connect one I/O device to both COM and Ethernet ports at once.
2. With the Ethernet communication via Model 72EM(2)-M4 Communication Adaptor, the power supply to the 72EM(2)-M4 must be turned off and on after its cable to the PC is disconnected and re-connected.

#### HOW TO CONFIRM ETHERNET CONNECTION

If the MSR128LU is not able to establish Ethernet communication showing 'Connect Error,' confirm the connection using 'ping' command on the MS-DOS prompt.

1. Connect Error Message

Modbus/TCP Connect Error!! ST = (\*,\*)

or

Socket connect error!!

(\* ,\*) indicates the station and node numbers of the device detected as error source.

2. MS-DOS Prompt

Select Start menu – Program – Accessories – Command Prompt.

3. PING Command

Enter the following command:

```
C:\WINDOWS>ping ***.***.***.***
```

Enter the IP address in decimal representation to (\*\*\*.\*\*\*.\*\*\*.\*\*\*).

ping \*\*\*.\*\*\*.\*\*\*.\*\*\* with 32 byte data:

```
Reply from ***.***.***.*** : byte = 32 time < 10ms TTL = 64
```

```
Reply from ***.***.***.*** : byte = 32 time < 10ms TTL = 64
```

```
Reply from ***.***.***.*** : byte = 32 time < 10ms TTL = 64
```

```
Reply from ***.***.***.*** : byte = 32 time < 10ms TTL = 64
```

```
Ping statistics for ***.***.***.***
```

```
Packets : Sent = 4, Received = 4, Lost = 0 (0% loss)
```

The above messages are shown when the Ethernet is connected normally. If the connection is not established due to e.g. wrong IP address, messages such as 'Time Out' are shown. Reconfirm physical connection between the devices and the IP address again.

## 4.2 NODE SETTING

The node number is described in hexadecimal. Be sure to match the node number specified here and selected by the device.

The node number and device type information is used when assigning specific channel per pen. Be sure to mark 'Enable' so that each device (node) information is correctly indicated and set in Pen setting and Alarm setting.

No.	Enable	Device	No.	Enable	Device	No.	Enable	Device	No.	Enable	Device
1	<input checked="" type="checkbox"/>	53[54]U	9	<input type="checkbox"/>	53[54]U	11	<input type="checkbox"/>	53[54]U	19	<input type="checkbox"/>	53[54]U
2	<input checked="" type="checkbox"/>	53[54]U	A	<input type="checkbox"/>	53[54]U	12	<input type="checkbox"/>	53[54]U	1A	<input type="checkbox"/>	53[54]U
3	<input type="checkbox"/>	53[54]U	B	<input type="checkbox"/>	53[54]U	13	<input type="checkbox"/>	53[54]U	1B	<input type="checkbox"/>	53[54]U
4	<input type="checkbox"/>	53[54]U	C	<input type="checkbox"/>	53[54]U	14	<input type="checkbox"/>	53[54]U	1C	<input type="checkbox"/>	53[54]U
5	<input type="checkbox"/>	53[54]U	D	<input type="checkbox"/>	53[54]U	15	<input type="checkbox"/>	53[54]U	1D	<input type="checkbox"/>	53[54]U
6	<input type="checkbox"/>	53[54]U	E	<input type="checkbox"/>	53[54]U	16	<input type="checkbox"/>	53[54]U	1E	<input type="checkbox"/>	53[54]U
7	<input type="checkbox"/>	53[54]U	F	<input type="checkbox"/>	53[54]U	17	<input type="checkbox"/>	53[54]U	1F	<input type="checkbox"/>	53[54]U
8	<input type="checkbox"/>	53[54]U	10	<input type="checkbox"/>	53[54]U	18	<input type="checkbox"/>	53[54]U			

Figure 4.2: Node setting.

1. Enable the node number of the connected device.
2. Pull down Device menu and select an I/O type.

### Caution !

1. Be sure to 'Disable' all unused nodes. Be sure to 'Disable' these nodes if they are used in Pen Setting.
2. Depending upon the number of nodes, the MSR128LU may not be able to record in 0.5-sec. storing cycle.

Note) For L53U select '53U'

## 4.3 PEN SETTING

The selections in Pen setting, except those as listed below, are changeable only when the recording is stopped. You can view the current setting when the MSR128LU is running.

Changeable items: Indication; Color; Thick line; Plot range in analog Detail information; Decimal; Alarm setpoint, deadband for analog Detail information; Alarm setting in discrete Detail information.

Group xx and Pen xx are indicated on the left top of the dialog box. In order to move from one channel to another, use [ << ] [ >> ] [ < ] [ > ] buttons.

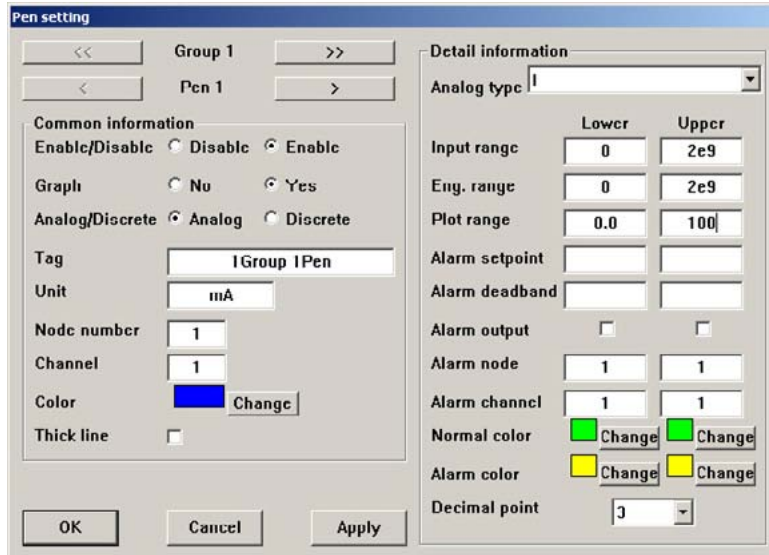


Figure 4.3: Pen setting.

### Caution !

If the Pen setting window appears too large to fit in the screen, change DPI setting to 'Normal size' or 'Small fonts' (Windows 2000) on the Windows: Display properties > Settings > Advanced > DPI setting.

### 4.3.1 COMMON INFORMATION

#### Enable / Disable

Use this button to enable or disable recording of each pen in the hard disk.

#### Graph

Use this button to enable or disable plotting of each pen on the screen. Instantaneous values in the digital display area are indicated regardless of this setting if the pen is enabled in Enable/Disable setting.

#### Analog / Discrete

Choose the signal characteristic for the pen.

#### Tag

Enter up to 16 characters. DO NOT use characters used to separate cells in CSV format (period, comma, space, tab, etc.).

#### Unit

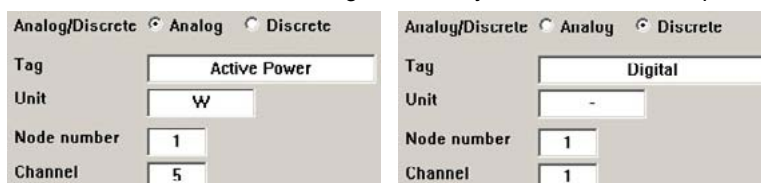
Enter up to 6 characters.

#### Node Number and Channel Number (Modbus Address)

Specify the node number of the 53U. Channel number for analog signal means the parameter's Modbus address. Please refer to the operating manual of the 53U (EM-6485-B), L53U (EM-1958-B) under 'MEASURED VARIABLES.' For example, to assign the momentary active power (P), specify the channel number to '5.'

For discrete signal, specify channel '1.' (See examples below)

Be sure to confirm correct setting whenever you have added an input device or changed a node address.





## Color

Clicking Change button opens Color dialog box. (Figure 4.3.1a)

You can choose a specific color among Basic Colors for each pen.

You can also define a custom color by clicking Define Custom Colors button. Pick up a specific color and press Add to Custom Colors so that it is shown on the additional color palette. (Figure 4.3.1b)



Figure 4.3.1a: Color dialog box.

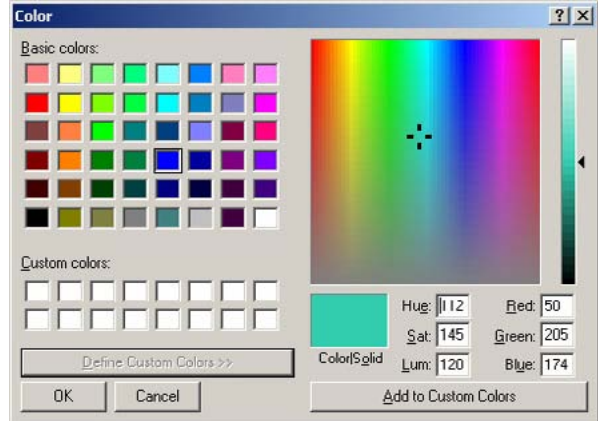


Figure 4.3.1b: Define Custom Colors.

## Thick Line

Select this option when you want thick plot lines.

### 4.3.2 DETAIL INFORMATION (ANALOG)

When 'Analog' is selected in Common Information setting, the following details are selectable.

#### Analog Type

Input selections available to the input module type designated by Node Setting appear in the field. Be sure to set Node and Channel numbers before the Analog Type setting in order to get appropriate selections.

DEVICE TYPE	PARAMETER	ANALOG TYPE ID	RANGE (UNIT)
53(54)U	Current	I	0 to 2e9 (mA)
	Voltage	U	0.00 to 2.00e7 (V)
	Active power	P	-2e9 to 2e9 (W)
	Reactive power	Q	-2e9 to 2e9 (var)
	Apparent power	S	0 2e9 (VA)
	Power factor	PF	-1.00 to 1.00
	Frequency	F	0.00 to 70.00 (Hz)
	Phase direction	DIR	0 or 1
	Active energy	EP	0 to 1.0e8 (kWh)
	Reactive energy	EQ	0 to 1.0e8 (kvarh)
	Apparent energy	ES	0 to 1.0e8 (kVAh)
	Energy count time	TIMER	0 to 1.0e8 (hours)
	Harmonic distortion	THD	0 to 999.9 (%)
		HD	0 to 999.9 (%)

Table 4.3.2: Analog input type selections and ranges.

#### Input Range

The upper and lower range values referred to as 0% (left field) and 100% (right field) according to the selected input type are automatically displayed.

#### Engineering range

Specify the range in actual engineering unit. This range is used for display, alarm and plotting.

When the engineering range is equal to the input range, measured input values are directly used. Measured data is converted and recorded in the unit specific to each parameter.

Example: Address 41 (Delta voltage, Line 1 – 2)  
 Modbus data = 40000  
 Unit = V/100 (0.01V)  
 Recorded data = 400.00 (when 'Decimal Point' is set to '2')

You may want to set a different value for the engineering range to convert the engineering unit (e.g. from mA to A).

Example: Address 1 (Current)  
 Modbus data (input range) = 2e9  
 Engineering range = 0 to 2e9 → Recorded data = 2e9 mA

	Lower	Upper
Input range	0	2e9
Eng. range	0	2e6

Engineering range = 2 to 2e6 → Recorded data = 2e6 A

	Lower	Upper
Input range	0	2e9
Eng. range	0	2e9

### Plot Range

These values are usually the same as Engineering Range values. Set a narrower range in this field when you want to enlarge a particular section of the full-scale of the Engineering Range.

For example, if you have a voltage input:

	UNIT	LOWER LIMIT	UPPER LIMIT
Scaled Range	V	-10	10
Plotted Range	V	-10	10

This is the most common setting. Eng. Range and Plot Position values are the same. Scales are -10V at the left edge, 10V at the right edge of the chart.

	UNIT	LOWER LIMIT	UPPER LIMIT
Scaled Range	V	-10	10
Plotted Range	V	0	5

This is used when you want to enlarge a particular section of the Eng. Range. The chart is used only for a narrower range of 5V, between 0V at the left edge and 5V at the right edge, against the full-scale range of 20V.

### Alarm Setpoint

Specify Lower and Upper setpoints in engineering unit within the Engineering Range. The alarm trips when the signal goes above the upper setpoint and below the lower setpoint. The alarm function is not available in High Speed mode. If an alarm setpoint is changed during operation, the alarm functions in the new setting the moment the new setting is applied.

### Alarm Deadband

Alarms are reset when the signal goes out of the alarm zone by the deadband values specified for each alarm setpoint.

### Alarm Output

Mark 'X' to when you want to output the alarm trip at the 53U's Do terminal. Specify also the node number of the device and the channel number '1.'

### Caution !

The 53U module's local alarm setting has a priority over that on the MSR128LU. Setpoints, deadbands and alarm output setting will be ignored if they are specified at the 53U module.

In order to output alarms from the MSR128LU at the 53U's Do terminal, the discrete I/O setting for the 53U must be set to 'Undefined.' Please refer to the 53U operation manual for more information.

Output contact logic (N.O. or N.C.) depends upon the 53U setting.

### Normal & Alarm Colors

Colors specified for normal and alarm conditions are used for the alarm indicators in the digital display area on the Record view.

Use the color palette.

### Note: Alarm setting for Power Factor

When a limit value is set for the power factor signal, it is automatically mirrored for both LEAD and LAG spheres. For example, setting lower limit value 0.8 means that the same value is applied to both LEAD and LAG spheres.

You cannot set different limit values for LEAD and LAG spheres. Choose between -1.0 and 1.0. A value out of this range will be rounded either to -1.0 or 1.0.

### Decimal Point

Specify the decimal point position of the data displayed on the digital indicator. This setting is also valid to stored data. However, if more decimal places are set to greater values than those the original Modbus data have, these missing decimal places will be simply filled with zeros. Please confirm the effective number of digits and decimal point position in the unit when you choose this value.

### 4.3.3 DETAIL INFORMATION (DISCRETE)

When 'Discrete' is selected in Common Information setting, the following details are selectable. Operation Function is not available with discrete inputs.

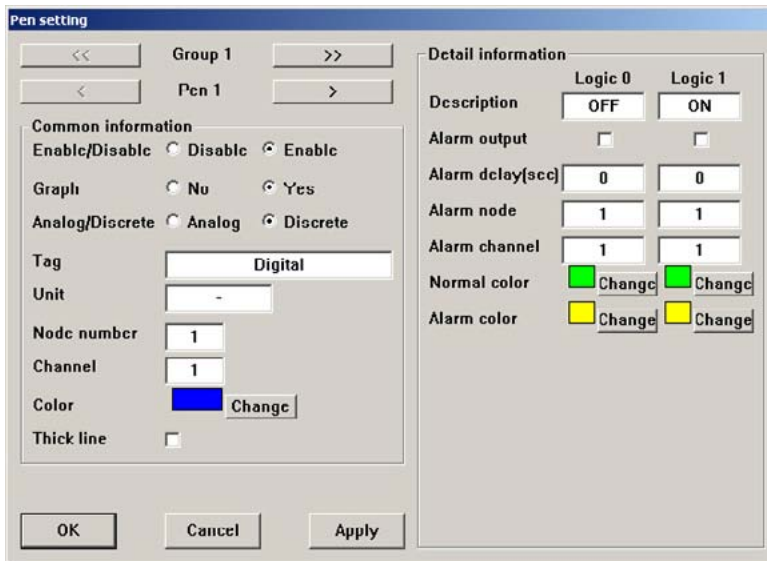


Figure 4.3.3: Detail information (discrete).

#### Alarm Description

Short description for ON (1) and OFF (0) status can be specified. Max. 10 characters. DO NOT use characters used to separate cells in CSV format (period, comma, space, tab, etc.).

#### Alarm Output

Mark 'X' when you want to output the alarm trip at the 53U's Do terminal.

#### Caution !

The 53U module's local alarm setting has a priority over that on the MSR128LU. Setpoints, deadbands and alarm output setting will be ignored if they are specified at the 53U module.

In order to output alarms from the MSR128LU at the 53U's Do terminal, the discrete I/O setting for the 53U must be set to 'Undefined.' Please refer to the 53U operation manual for more information.

Output contact logic (N.O. or N.C.) depends upon the 53U setting.

#### Alarm Delay

Once the discrete signal status is changed, the alarm is tripped only after the predefined time has elapsed in order to avoid unwanted trips caused by noise interference. Enter the time in seconds.

#### Alarm Node & Channel

Specify the node number of the device and the channel number '1.'

#### Normal & Alarm Colors

Colors specified for normal and alarm conditions are used for the alarm indicators in the digital display area on the Record view.

Use the color palette.

### 4.3.4 OTHER CONTROLS

- Apply: Click this button to apply new settings without closing the dialog box.
- Cancel: Click this button to close the dialog box without applying new settings.
- OK: Click this button to apply new setting and close the dialog box.

## 4.4 STORE SETTING

Figure 4.4 shows Store Setting dialog box. These selections are changeable when the Record view is stopped. You can view the current setting when the MSR128LU is running.



Figure 4.4: Store setting.

Four storing modes are available:

- Normal: The MSR128LU stores data continuously in the preset storing cycle.
- Remote Trigger: The MSR128LU stores data only during the predetermined condition is true (the remote trigger contact signal is either ON or OFF).
- Event Recording: The MSR128LU detects an external event by trigger signal, and stores preset number of samples before and after the moment of event.
- Auto: The MSR128LU starts recording at a specific time for a specific time duration.

### 4.4.1 STORING CYCLE

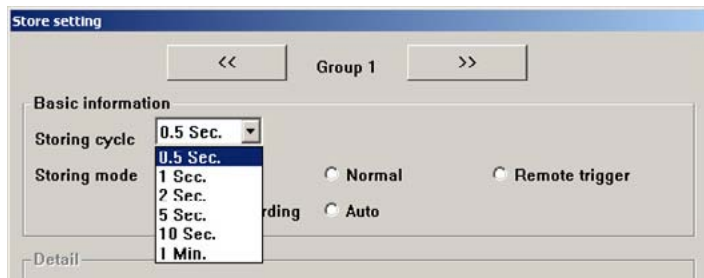


Figure 4.4.1: Storing cycle.

0.5-sec., 1-sec., 2-sec., 5-sec., 10-sec., or 1-minute intervals are available.

Selecting 5-sec. interval diminishes data size to the one-tenth, compared from 0.5-sec. interval, 10-sec. interval to the one-twentieth. (The actual file size does not diminish as much.)

#### Caution !

Storing cycle means the time rate in which data is stored on the PC Recorder. Sampling cycle means the time rate in which data is scanned and taken from an input device. The latter depends on the number of devices and channels. When there are more number of input devices/channels than the specified storing cycle can handle, the PC Recorder may not be able to store data accurately. For more information, contact M-System.

### 4.4.2 NORMAL MODE

In this mode, a recording is turned on or off by operating START/STOP button on the Control Panel.

### 4.4.3 REMOTE TRIGGER

Selecting Remote Trigger shows detailed items to be specified for Remote Trigger Mode (Figure 4.4.3).

Figure 4.4.3: Remote trigger storing mode.

Data is automatically recorded while the external trigger condition (input) is true.

- Condition: Specify whether the recorder should identify ON (closed at the 53U DI terminal) or OFF (open at the 53U DI terminal) of the contact signal as trigger condition. For example, when the State is set to ON, the MSR128LU stores data while the signal is ON and stops recording when it is turned to OFF.
- Node Number: Specify the discrete input contact at the 53U to trigger the recording. Specify the 53U's node number.

### 4.4.4 EVENT RECORDING

Selecting Event Recording shows detailed items to be specified for Event Recording Mode (Figure 4.4.4).

Figure 4.4.4a: Event recording mode.

Recording is automatically initiated according to predetermined trigger conditions and the preset number of samples before and after the moment of event are stored.

- Condition: Specify whether the recorder should identify a rise or sink of the contact signal as trigger.
- Node Number: Specify the discrete input contact at the 53U to trigger the recording. Specify the 53U's node number.
- Pretrigger / Posttrigger: 1200 samples at the maximum for each can be stored. Specify numbers of samples to be stored before (Pretrigger) and after (Posttrigger) the event respectively.

If a new trigger contact input is received during recording of the last event, the new event is disregarded.

In the CSV data file for the Event Recording, Column C indicates '1.' See Figure 4.4.4b.

	A	B	C	D	E	F	G	H	I
1				Group1 Pe	Group1 Pe	Group1 Pe	Group1 Pe	Group1 Pe	Group1 Pe
2				mV	mV	mV	mV	mV	mV
3	1:40:49	0	0	0	0	0	0	0	0
4	1:40:49	500	0	0	0	0	0	0	0
5	1:40:50	0	0	0	0	0	0	0	0
6	1:40:50	500	1	0	0	0	0	0	0
7	1:40:51	0	1	0	0	0	0	0	0
8	1:40:51	500	1	0	0	0	0	0	0
9	1:40:52	0	1	0	0	0	0	0	0
10	1:40:52	500	1	0	0	0	0	0	0
11	1:40:53	0	1	0	0	0	0	0	0
12	1:40:53	500	1	0	0	0	0	0	0
13	1:40:54	0	0	0	0	0	0	0	0
14	1:40:54	500	0	0	0	0	0	0	0
15	1:40:55	0	1	0	0	0	0	0	0

Figure 4.4.4b: CSV file created from an Event Recording.

#### 4.4.5 AUTO MODE

Selecting Auto shows detailed items to be specified for Auto Mode (Figure 4.4.5).

Figure 4.4.5: Auto storing mode.

Choose either 'One Time Only' or 'Every Day' under Condition option.

- One Time Only: Data is stored once at a predefined time. Specify Year-Month-Day and Hour-Min-Sec. to start the recording and the time duration.
- Every Day: The MSR128LU runs recording once per day at a predefined time. Specify Hour-Min-Sec. to start the recording and the time duration.

The MSR128LU refers to the PC's internal clock.

#### 4.4.6. FILE VOLUME

The volume of a created CSV file depends upon the storing cycle, the storing mode and the pen numbers.

Storing Cycle	0.5 sec.	1 sec.	5 sec.	1 min.
Pen Numbers	12	12	12	12
Approx. Volume	23 MB	12 MB	3 MB	200 KB

## 5. RECORD

The Record view shows currently recorded data. It consists of Menu Bar, Control Panel, Pen Panel, Chart and Digital Displays.

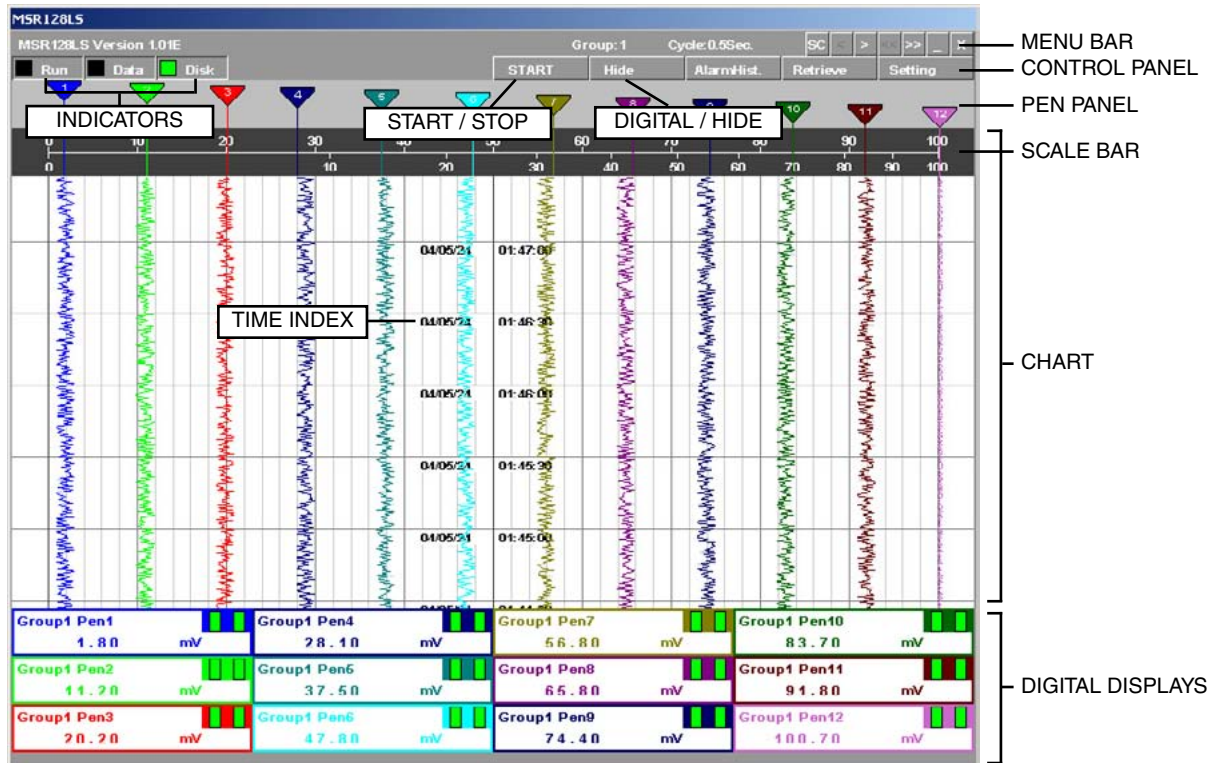


Figure 5.0: Record view, twelve pens.

### 5.1 MENU BAR

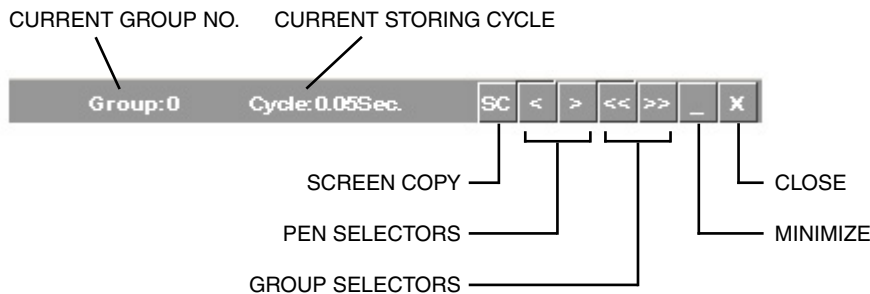


Figure 5.1a: Menu bar.

#### Screen Copy

Click [ SC ] button to copy the current screen in bitmaps. The file is stored in: C:\MSR128L\_U\_DATA folder.

#### Pen Selectors

Clicking [ < ] or [ > ] every time switches pens to be displayed in the Digital Display area: All 12 pens – Pen 1 – Pen 2 ... Pen 11 – Pen 12 – All 12 pens.

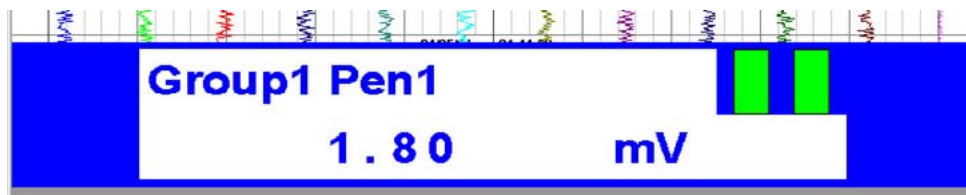


Figure 5.1b: Record view, single pen.

#### Group Selectors

Clicking [ << ] or [ >> ] every time switches groups to be displayed. These buttons are not available in High Speed mode.

## 5.2 ELEMENTS ON THE RECORD VIEW

### Start / Stop

This is used to turn the recorder on and off. When the switch is OFF, pens are invisible on the Pen Panel, and no recording is executed. When it is turned ON, pen points other than those specified as Disable start plotting.

While the recorder is operating, the Start button is replaced with the Stop button.

### Retrieve

Clicking Retrieve button switches the screen to the Retrieve view. Refer to Section 6.

### Digital / Hide

The digital meters (indicators) showing instantaneous value of each enabled pen appear at the lower half of the screen when Digital button is clicked.

Digital displays include the tag name selected in the Pen Setting, alarm status, and analog engineering unit value or discrete signal status description, in specified pen colors.

While the digital display area is indicated, the Digital button is replaced with the Hide button. Click Hide button to hide the digital meters/indicators.

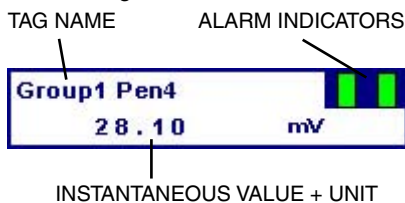


Figure 5.2a: Digital display, analog signal.

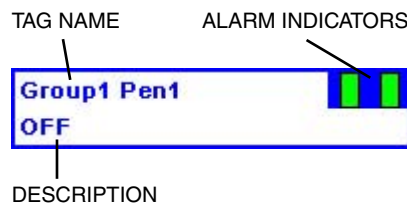


Figure 5.2b: Digital display, discrete signal.

### Scale Bar

Two scales, linear and square root from 0 to 100%, are indicated on the scale bar. The scales apply to the plot range specified in Pen Setting.

Engineering scale for a specific pen can replace the standard scale by clicking the digital meter/indicator for the pen. In order to return the scale to 0 to 100%, click the scale.

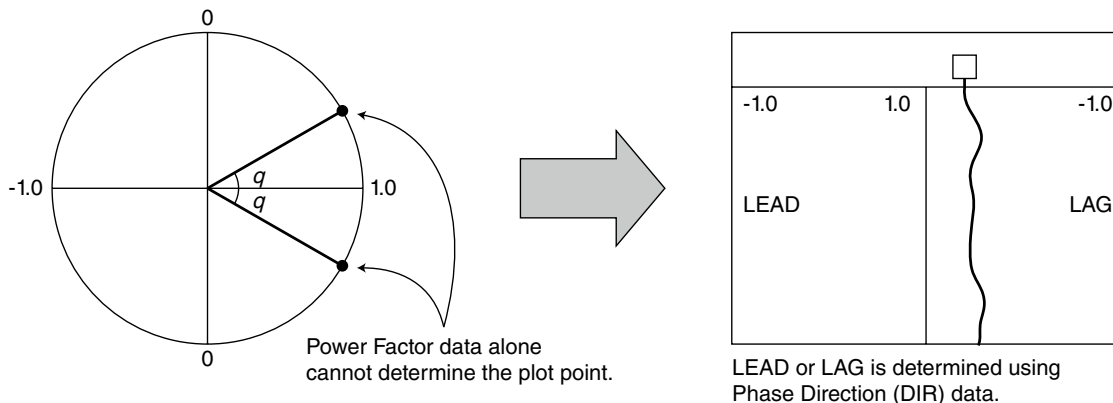
If you want the scale with fractions, specify the decimals for the plot range in Pen Setting. With the plot range set to an integer, the scale divisions are also rounded to integers. Decimals setting is applicable only to the perpendicular chart.

### Chart

Perpendicular and horizontal charts are selectable. On the perpendicular chart, data stream from top to bottom. On the horizontal chart, data stream from left to right or vice versa.

Analog data trend is plotted in the Plot Range specified in Pen Setting. Discrete data trend (square wave) is plotted on the screen, each pen position offset by one-twelfth of the full-scale range.

Power Factor (PF) is represented on the screen based on the power factor data and the Phase Direction (DIR) data (0 = LAG, 1 = LEAD). It ranges from -1.0 (LEAD) at the left end of the chart, to 1.0 in the middle, to -1.0 (LAG) at the right end of the chart.



### NOTES

1. Input range, Engineering range and Plot position are NOT available for change.
2. DIR data is irrelevant for the maximum and minimum power factor values. Therefore no reference to DIR data is used to plot these values on the screen.
3. DIR data cannot be included in retrieved data. Power Factor data is directly read in and plotted on the screen.



Time index is shown at the center of the chart, in 'YY/MM/DD HH:MM:SS' format. Divisions of time index depend upon the storing cycle as listed below.

<b>STORING CYCLE</b>	<b>0.5 sec.</b>	<b>1 sec.</b>	<b>2 sec.</b>	<b>5 sec.</b>	<b>10 sec.</b>	<b>1 min.</b>
Time span between stamps (perpendicular chart, no digital display)	30 sec.	1 min.	2 min.	5 min.	10 min.	1 hour
Time span between stamps (horizontal chart)	2 min.	4 min.	10 min.	20 min.	30 min.	2 h o u r s
Time span for the entire chart (perpendicular chart, MSR128LUS)	4 min.	8 min.	16 min.	30 min.	80 min.	8 h o u r s
Time span for the entire chart (perpendicular chart, MSR128LUV)	3.5 min.	6.5 min.	13 min.	35 min.	65 min.	6 h o u r s

**Caution !**

DO NOT change Windows' clock while the MSR128LU is recording. Close the MSR128LU before changing the clock.

**Indicators**

Green light of the Run indicator blinks while the MSR128LU is running.

Green light of the Data indicator blinks while the MSR128LU is recording.

Disk light indicates free hard disk area. Green light turns on when there is 500 MB or larger free area. Red light blinks when the free area is smaller than 500 MB.

## 6. RETRIEVE

Stored data are searched and displayed on the Retrieve view.

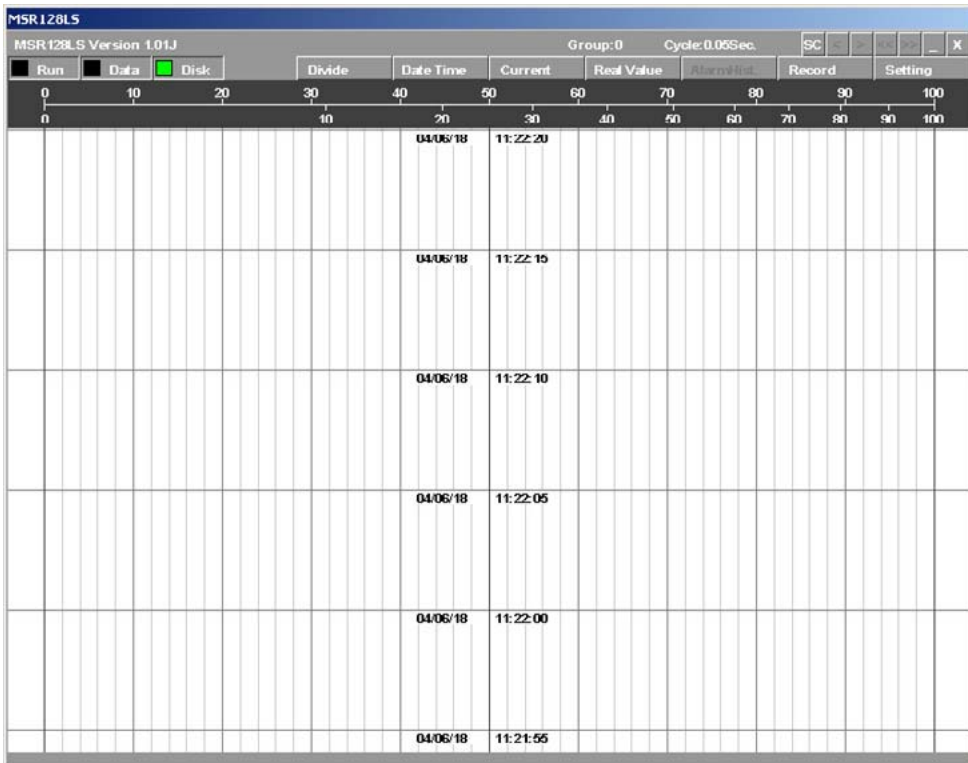


Figure 6.0: Retrieve view.

### 6.1 MENU BAR

Refer to 5.1.

### 6.2 ELEMENTS ON THE RETRIEVE VIEW

#### Scale Bar

The scale bar section of the view is identical to that of the Record view.

#### Chart

The chart section of the view is identical to that of the Record view.

## Divide / Normal

Clicking Divide button opens an additional view at the lower part of the screen (Figure 6.2a). Then two sets of data can be compared by specifying time index using 'Date Time' button and 'Current' button.

While two sets of data are displayed, the Divide button is replaced with the Normal button. Click Normal to close the divided views.

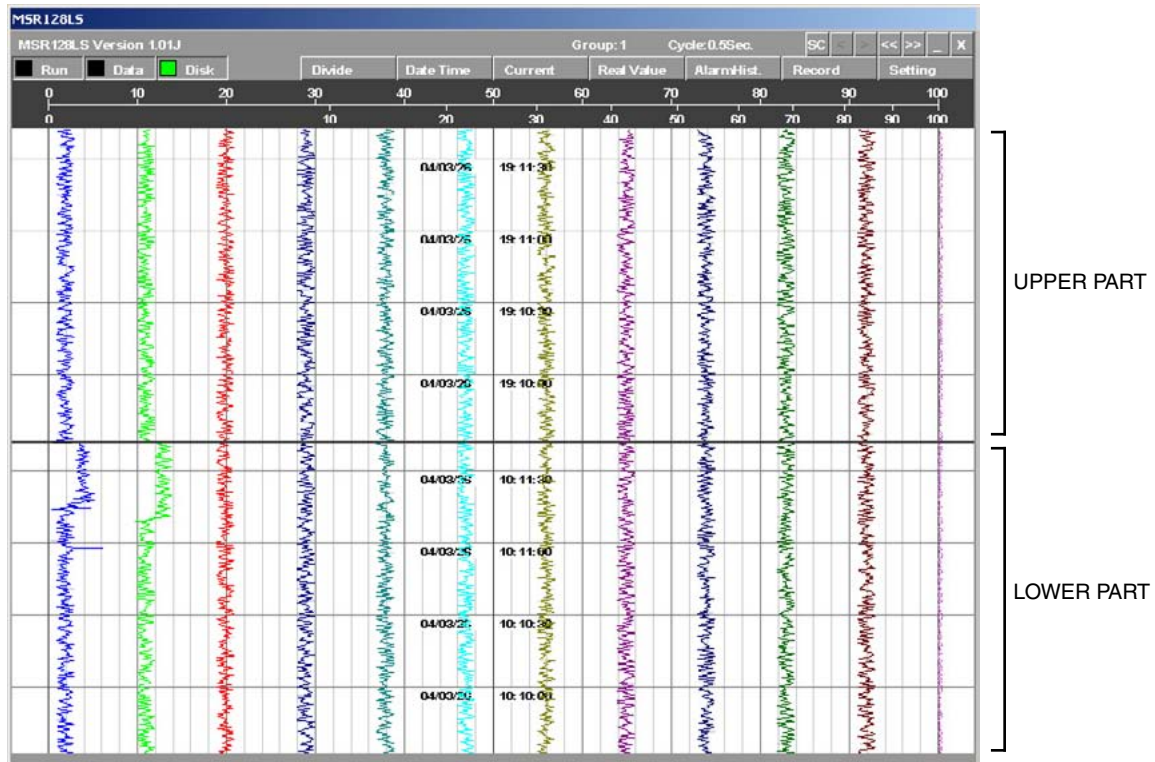


Figure 6.2a: Divided screen.

## Date Time

Data at a specific time index can be called up in the Retrieve view. Clicking the Date Time button shows the time index dialog box (Figure 6.2b). While the screen is divided, the dialog box shows two sets of time for the upper and lower half of the screen.

Specify the time and click Apply.

Date time							
Date time	Year	Mon.	Day	Hour	Min.	Sec.	
	04	6	16	15	42	15	Apply
							Close

Figure 6.2b: Specifying the time index, Normal mode.

Date time							
	Year	Mon.	Day	Hour	Min.	Sec.	
Upper side	04	3	20	0	13	33	Apply
Lower side	04	3	20	0	13	33	Apply
							Close

Figure 6.2c: Specifying the time index, Divide mode.

## Current

Clicking Current button opens the latest data stored in the hard disk. While the screen is divided, the latest data is shown in the upper part of the screen.

### Real Value

When Real Value button is clicked, a red cursor appears on the screen, with the digital display area at the bottom (Figure 6.2d).

The digital meters/indicators show values at the time point indicated with the cursor. Move the mouse pointer to a specific point on the screen, and click.

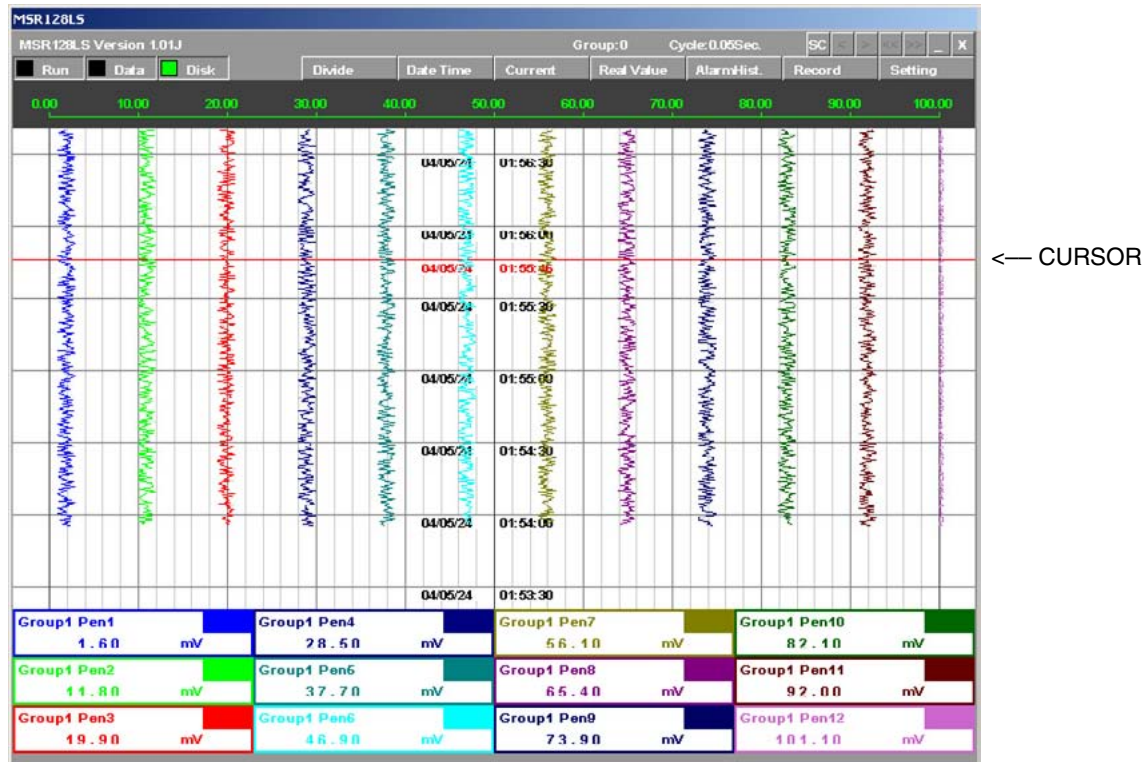


Figure 6.2d: Digital displays showing real value.

### Record

Clicking Record button switches the screen to the Record view. Refer to Section 5.

## 7. ALARM HISTORY

When an analog signal is within the range pre-determined as alarm condition, the alarm event is recorded. For a discrete signal, signal status is recorded regardless of the alarm setting.

All alarm events are recorded in an Alarm History file. Up to 2000 events are recorded. When the record numbers reach 2000, the oldest event record is deleted in order to record the new one.

Clicking Alarm Hist. on the Control Panel opens a window in which a record of alarm events can be viewed. The list shows the latest event at the top. Click Reload to call a data update.

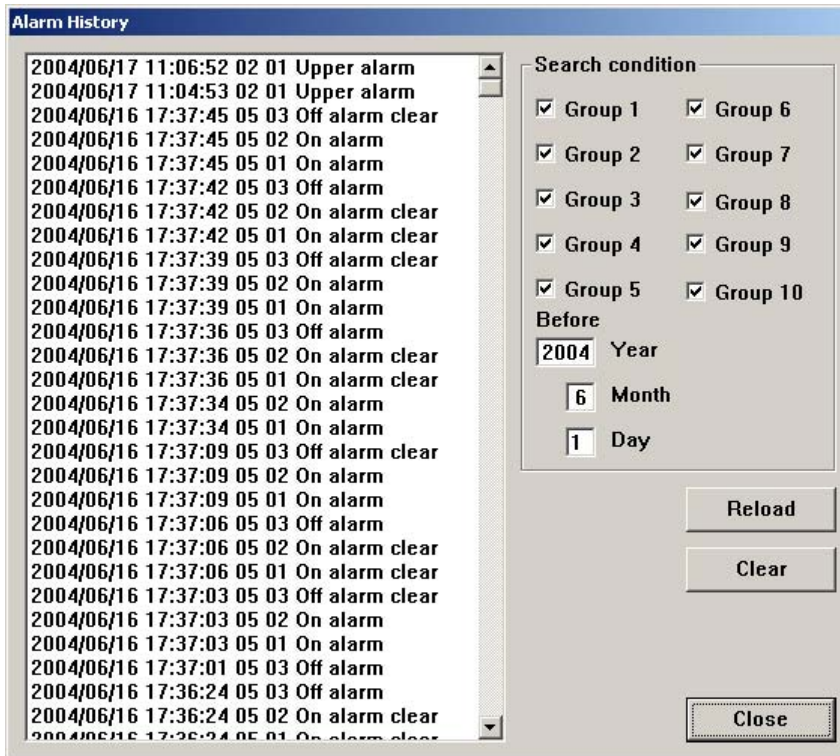


Figure 7.0: Alarm History.

### Search Condition

Alarm event history for selected groups and time can be displayed. Specify the conditions and click Reload.

### Clear

Clicking Clear button deletes the alarm history data.

## 8. FILE

### 8.1 DATA FILE & FOLDER

When the MSR128LU is installed in a hard disk, the data folder 'MSR128L\_U\_DATA' is automatically created in the same directory.

Data files are named 'GR\*.CSV' (\* = Group No.), stored in the folder named the recorded date such as '20070323' indicating the folder contains data recorded in March 23, 2007.

The MSR128LU creates one file per Group per day in CSV format. If multiple recording cycles are repeated during a day, the second and the following data are simply added at the end of the last cycle in the same file. If one recording cycle is over two days, the file of the first day is closed at the end of the day but the recording is continued without interruption in the new file for the second day created at the same time. For example, if you start recording at 10:00 on the 23rd March, 2007, the folder '20070323' contains data up to 23 hours, 59 minutes, 59 seconds, 500 milliseconds, and the folder '20070324' contains data from 0 hour on the 24th March.

Caution: DO NOT open a data file while data is recorded in it. Attempting to open the file presently used by the application software may cause an error. Stop recording first.

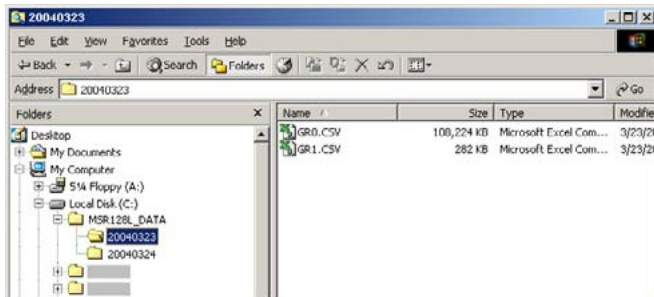


Figure 8.1: Data file.

### 8.2 PARAMETER FILE

A parameter file (MSR128L.LPPU) is automatically created and stored in MSR128L\_U\_DATA folder whenever a new setting is applied. In order to apply a parameter file from an external source, close the MSR128LU program and move the parameter file to the MSR128L\_U\_DATA folder and restart the program.

When you are going to open a data file stored in a different setting, move the data file and the parameter file together to MSR128L\_U\_DATA folder if the data must be displayed in the original setting. If the new PC is located in another time zone, time stamps will be updated to match it.

#### Caution !

1. A parameter file transferred from another PC may be set to 'Read Only,' and the MSR128LU cannot start with such parameter file. Open 'Property' of the file and remove this setting before using the file.
2. MSR128LU data are not compatible with other programs.

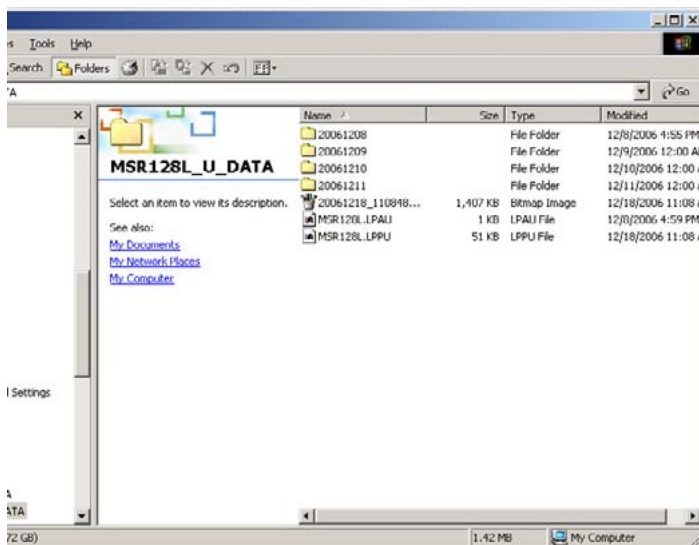


Figure 8.2: Parameter file.

### 8.3 MSR128LU FILE TYPES

FILE TYPE	CONTENTS	FILE NAME FORMAT	ATTRIBUTE
Data file	Data sampled on the MSR128LU	GR*.CSV (* = Group No.)	CSV
Parameter file	Setting for the MSR128LU	MSR128L.LPPU	LPP
Alarm history file	Alarm history record	MSR128L.LPAU	LPA
Screen copy file	Screen copy of the MSR128LU screen.	yyyymmdd_hhssmm_group.bmp	bmp

Table 8.3: MSR128LU data file types.

### 8.4 CSV DATA FORMAT

Figure 8.4a shows a MSR128LU data file opened on Windows WordPad. The first row contains the pens' tag names, the second contains the engineering units, and the third and following rows contain recorded data.

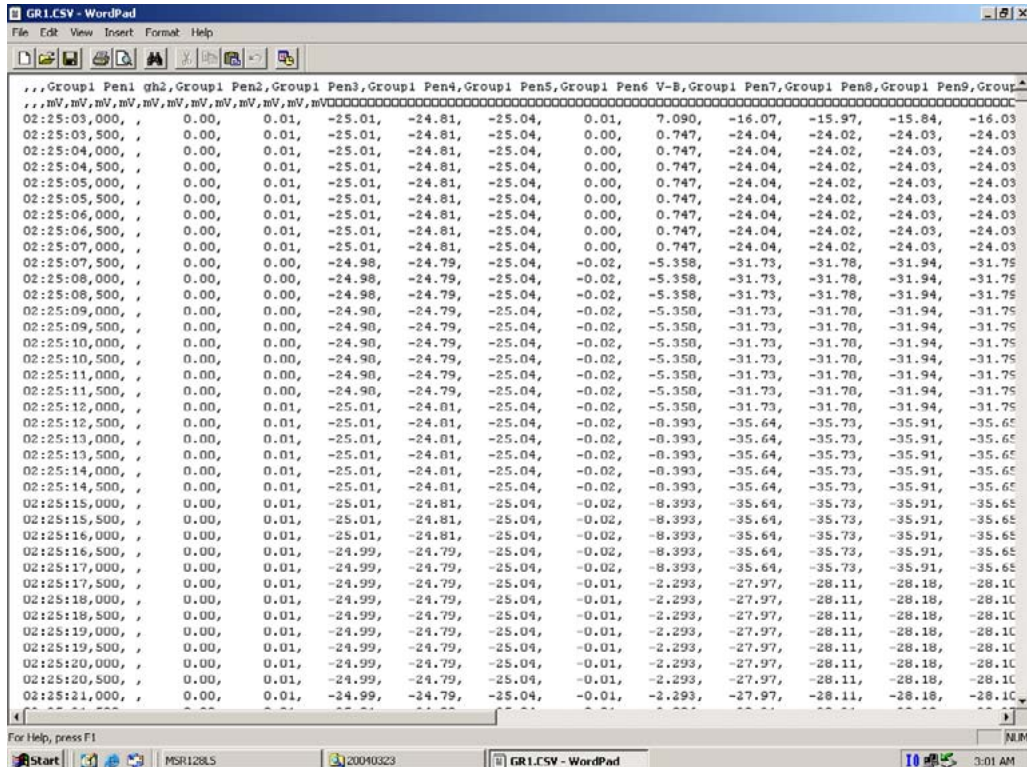


Figure 8.4a: CSV text file.

Figure 8.4b shows a MSR128LU data file imported into Excel worksheet.

- Row 1: Tag name
- Row 2: Engineering unit
- Row 3 .... : Recorded data
- Column A: Time index (HH:MM:SS). For example, 13:52:44 means that the data is stored at 13 hours, 52 minutes, 44 seconds.
- Column B: Time index (milliseconds).  
0.5-sec. storing cycle  
0 : 0 sec., 5 : 0.5 sec.
- Column C: Blank (used only for Event Recording)
- Column D: Data (D: Group 1 Pen 1, E: Group 1 Pen 2, ....)

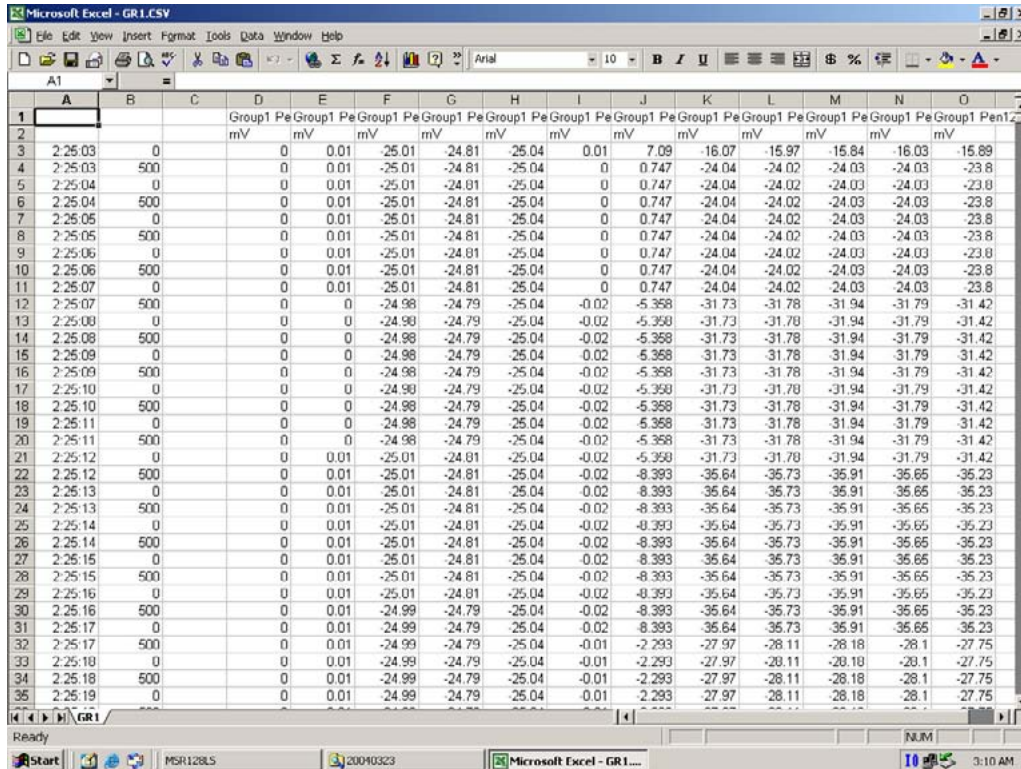


Figure 8.4b: CSV text imported into Excel worksheet.

The CSV file could be too large to be directly opened and displayed on the Microsoft Excel. Divide the file using WordPad before importing into Excel. The Excel can handle approximately 170 MB at the maximum.



# Appendix A: Software version information

MSR128LU software version is indicated at the left end of the menu bar.

