Instruction Manual

Model 437902

Setting Software for μRS

IM 4D8B1-01E

YOKOGAWA ◆
Yokogawa Electric Corporation

Model 437902
Setting Software for μRS

IM 4D8B1-01E

4D8B101E01

IM 4D8B1-01E
1st Edition

INTRODUCTION

Thank you very much for purchasing the software for setting your μRS1000/1800 Recorder.
This instruction manual illustrates how to change and store the settings for the μRS1000/1800 Recorder. Please read this manual while referring to the instruction manual (IM 4D6B1-01E/IM 4H4B1-01E) for the μRS1000/1800 Recorder.

NOTES

- YOKOGAWA reserves the right to change this manual at any time without notice.
- If you find any ambiguities or errors in this manual, please inform YOKOGAWA.
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- After having modified the settings of the μRS1000/1800, YOKOGAWA assumes no responsibility for any consequences, such as defects in instrument accuracy, functionality, or reliability or user safety hazards.

TRADEMARK

- MS-DOS is a trademark of Microsoft Corporation.

REVISIONS

- This manual is the first edition, September 1993.

Disk No. MR 19
1st Edition : September 1993 (YG)
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Chapter 1 BEFORE OPERATION

1.1 Checking the Contents of the Package

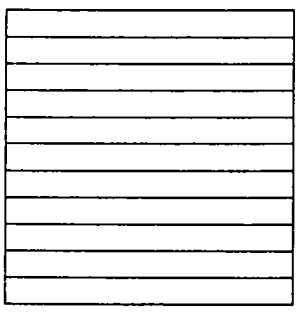
The following constitute this product. Check that none of the items are missing. If you find a certain item is missing, please contact the office where you bought the package or the nearest service office listed on the back cover.

	Quantity
• 3.5-inch floppy disk	1
• RS-232-C interface converter	1
• Nameplate 1 (for the μRS1000)	1
• Nameplate 2 (for the μRS1000)	1
• Nameplate 3 (for the μRS1800)	1
• Transparent sheet of film 1 (for the μRS1000)	2
• Transparent sheet of film 2 (for the μRS1800)	1
• Instruction manual	1

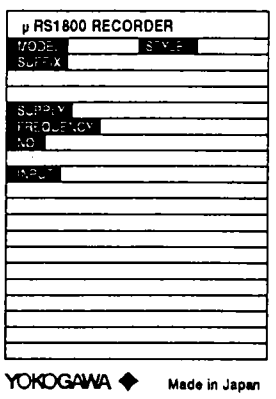
Optional Accessories

Description	Part No.	Quantity
1. Nameplate set for the μRS1000	B9930AD	1
<Nameplate 1 (B9930AA)		1>
<Nameplate 2 (B9930AB)		1>
<Transparent sheet of film (B9930AC)		2>
2. Nameplate set for the μRS1800	B9931AD	1
<Nameplate 3 (B9931AA)		1>
<Transparent sheet of film (B9931GG)		1>
3. Cable	B9930HD	1

Nameplate 1(B9930AA)



Nameplate 2(B9930AB)



Nameplate 3(B9931AA)

1.2 Connecting the μRS Recorder with a Personal Computer

This software operates with the following hardware and software.

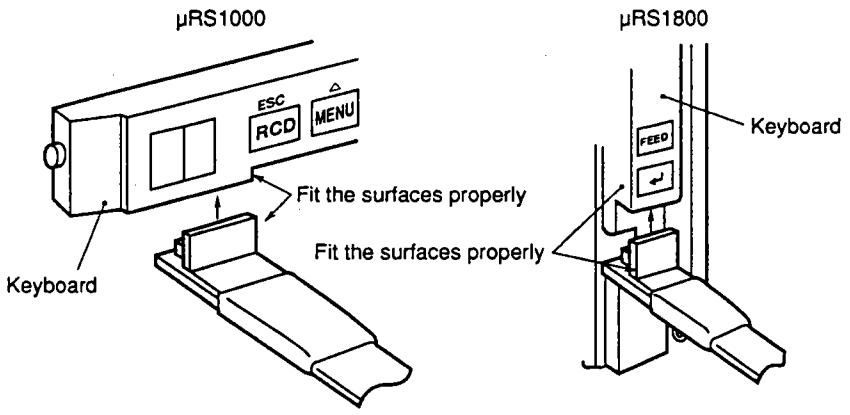
Computer	: IBM-PC/AT
Memory	: More than 640 KB
Disk	: 3.5-inch floppy disk
CRT	: Color or monochrome display VGA (640 * 480)
OS	: DOS version 3.31 or later
Communication	: Using COM1 or COM2 for the RS-232-C incorporated in the computer.

Only those notebook-type personal computers having the complete compatibility of a desk-top computer can be used.
This software cannot be used with software using graphic RAM.

1.2.1 Connecting the μRS Recorder with a Converter

Connect the μRS recorder and converter as follows:

1. Turn off the power switch of the μRS recorder.
2. In case of the μRS1000, open the keyboard by grasping the left end of the keyboard.
3. The connector is in the lower part of the keyboard. Tear off the seal attached to the connector and connect the converter with the μRS recorder as shown in the following illustrations.

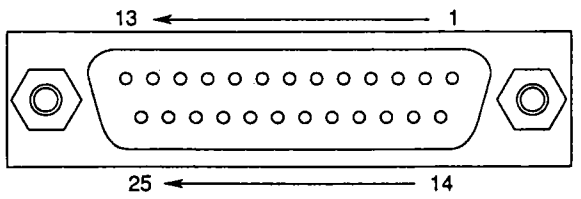


NOTE

- The cable of the converter is not under guarantee. A periodic replacement of the cable is recommended. Refer to Section 1.6, "Replacing the Cables" (page 1-6) for the procedure.
- In an environment with low humidity, malfunctioning due to static electricity may occur. In that case, the converter should be touched only after elimination of the static electricity.

1.2.2 Connecting the Converter with a Personal Computer

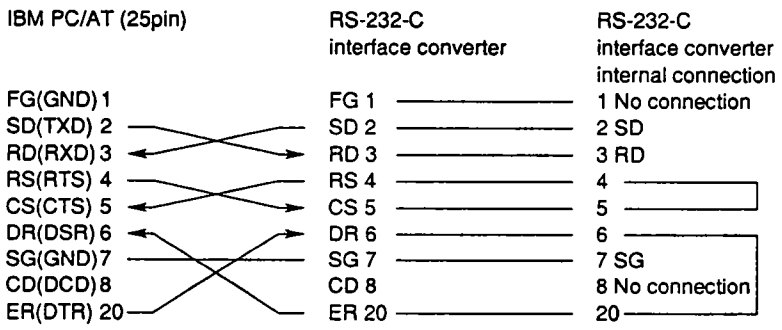
The numbers of the RS-232-C interface converter connector pins are arranged as follows:



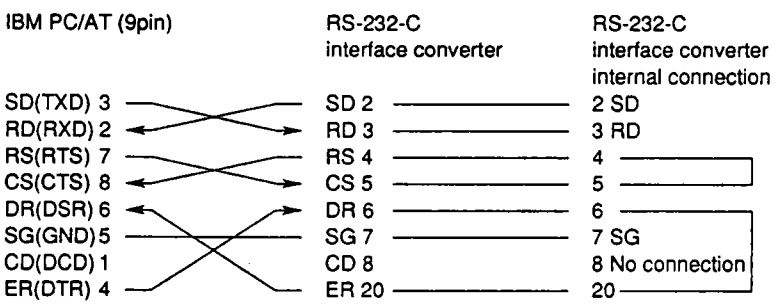
The cable connecting the RS-232-C interface converter with a personal computer should meet the following specifications.

- RS-232-C cross cable (refer to "recommended cables")
- The following connectors are to be used:
  When using COM1, 25 pin D subconnector (male) - 9 pin D subconnector (female);
  When using COM2, 25 pin D subconnector (male) - 25 pin D subconnector (female);
- Since there is no hardware hand-shake function, the RS-232-C interface converter uses the wire connections as shown in the following figure.

Recommended wire connections
(the arrows indicate the direction of signals)



Wire connections in cable
(arrows indicate the direction of signals)



NOTE When installing or removing the RS-232-C cable, be sure to turn off the power switch of the IBM-PC/AT and the μRS1000/1800.

Recommended cables (available on the market)
"Major Computer" product: 800-2509-550-C (with 9pin - 25pin adapter)

1.3 Starting/Quitting Initialization

The procedures for starting and quitting initialization of this software are as follows:

Starting

In order to start this software, a floppy disk drive which can be used except the one for starting the system is needed.

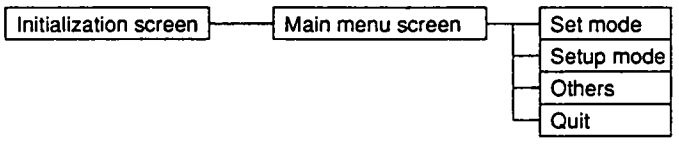
1. This software is started on DOS. First, confirm that DOS is already booted up.
2. Insert the floppy disk of this software into the drive.
3. Move the current directory to the drive where this software disk is inserted.
4. When using COM1 in the communication port, input [URSAT-COM1], or when using COM2 in the communication port, input [URSAT-COM2].
   After that, press the return key. Then, the software is started, and the screen for the first initialization is displayed.

Quitting

Press the f10 key (QUIT) on the screen for initialization, or move the cursor to QUIT on the main menu, and press the RETURN key.
When completing initialization on the main menu, a confirmation message appears. Choose QUIT (When modifying settings, either 'quit after saving' or 'quit without saving' should be chosen).

1.4 Primary Screens

The primary screens are as follows:



1.5 Initialization

In this software, the settings are different according to the specifications of the μRS recorder being used.
With initialization, the settings are determined. The two procedures for initialization are as follows:

- Initialization through communication
- Initialization through reading a file

The selection of the initialization procedure is made with the selector displayed at the start-up of this software.

Initialization through communication

Initialization is performed by reading the settings from μRS recorder directly.

1. Confirm that the muRS recorder is connected with a personal computer.
2. Turn on the switch of the μRS recorder.
   The LED of the converter then lights up. If it is not lit, make sure that the connection is performed correctly. If the connection is performed correctly and the LED is still not lit, contact your nearest Sales/Service center. Addresses may be found on the back cover.
3. Turn on the switch of the personal computer to start this software.
4. Move the cursor to "initialization through communication".
5. Press the RETURN key to start initialization.
6. When initialization is completed, the main menu screen appears.

NOTE If an error occurs during initialization, a message appears, and then the first screen with the selector appears again.

Initialization through reading a file

Initialization is performed by reading a file of setting parameters from the memory:

1. Move the cursor to "initialization through reading a file".
2. Press the RETURN key. Then, the screen for inputting the file name is opened.
   There are two ways to input the file name, which are as follows:

A Direct input

3. Input the file name directly. Then, a path with a drive name can be specified. The procedures specifying the path are performed in the same way as in MS-DOS.
4. Press the RETURN key. Then, the screen for inputting the file name is closed.

NOTE If the f10 (STOP) key is pressed while the file name is being input, loading of the file is stopped and the screen inputting the file name is closed.

B Input with the selector

3. The selector is opened when you are inputting directly as mentioned above, but the file name is not input, or a wildcard (* or ?) is used and after that the RETURN key is pressed.
4. Move the cursor to the location of the file with the cursor key.

NOTE

- If the f10 (STOP) key is pressed, file selection with the selector is stopped, and the selector is closed.
- Only the files operating with this software are displayed on the selector.
- Up to 100 files are displayed on the selector. When more than 100 files are on the directory specified, * appears before the parentheses of the file number display of the selector. If a file to be specified is not included in the 100 files, the number on the display should be reduced to less than 100 by using wildcards.

5. Press the RETURN key. The selector will close, and the file specified is input onto the input screen.
6. In addition, press the RETURN key. Then, the screen for inputting the file name closes, and initialization starts.
7. When initialization is completed, the main menu screen appears again.

1.6 Replacing the Cables

With repeated use of the cables, disconnection of the converter cable and poor contact of the connector might occur (cables and connectors are not under guarantee). In order to avoid such problems, it is recommended that the cables be replaced according to the following procedures periodically.

1. Remove the screws (two).
2. Remove the cover.
3. Pull out the connector. When pulling out the connector, do not pull the cable.
4. Remove the cord bush by pulling it in the direction of arrow B (in the figure below), while holding it where arrow A is pointing.
5. Remove the cable. Pull the connector out of the installing hole of the cord bush.
6. The new cable should be installed in reverse procedure to that of removal. The cord bush is to be attached 8 to 9 cm from the end of the new cable connector (refer to Figure c below). Install it by putting the flat face of the cord bush and that of the cable together.
7. Attach the cord bush to the cable. Pass the connector of the cable through the hole of the case, and push the cord bush till a feeble click is heard. Refer to Figure b for the direction it is to be attached.
8. Insert the connector.
9. Replace the cover and fix it with the 2 screws. At this time, the ONLINE LED should be fit into the hole of the case.

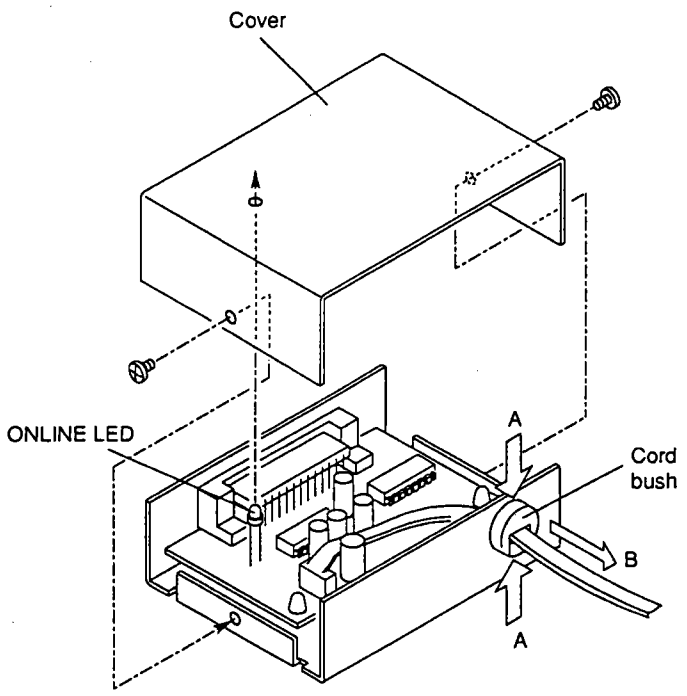


Figure a

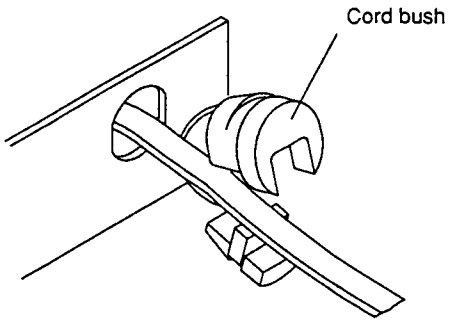


Figure b

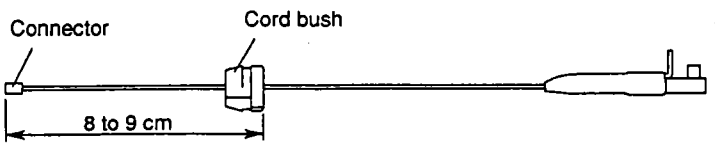


Figure c

Chapter 2 PREPARING THE SETTINGS

2.1 How to Set Up

The method for all settings is standardized in the following procedure. The set mode, setup mode and all other items are set by the same method.

1. Move the cursor (inverted) to the setting item with the cursor key. If there is no setting item on the screen, scroll the screen with the ROLL UP/ROLL DOWN key. The screen can be scrolled by halves.
2. Press the RETURN key and the window for setting the specified item is opened. Then, input the value or item to be set.
3. There are two input methods; one is selecting values from the selection frame, the other is inputting any value yourself. When selecting values from the selection frame, move the cursor to the value with the cursor key and press the RETURN key. When inputting any value, input it in the range of character numbers which can be input by the keyboard, and press the RETURN key.
4. The window for setting will close, and other settings are possible.
5. When the window for setting is closed and the f10 key (MENU) is pressed, the MENU screen appears. It is possible to move to other modes.

NOTE

- When the setting window is open and the f10 key (STOP) is pressed, the window is closed while setting. The setting returns to the one prior to the change.

Jump function

When the setting window is closed on the set mode screen and the f4 key (JUMP) is pressed, the cursor moves to the top of the setting screen or the beginning of any channel. The location where the cursor is moved can be selected by the selector. After that, press the RETURN key.

2.2 Loading a File to Prepare the Settings

A new file can be made by modifying part of an existing file.
This is performed on the screen of the set mode or setup mode which is not open in the setting window. The procedure is as follows:

1. Press the f2 (LOAD) key.
2. The file name to be loaded is indicated on the screen.
   There are two procedures for inputting the file name just as in case of initialization.

A Direct input

3. Input the file name directly. At this time, a path with a drive name can be specified. The method specifying the path is done in the same way as in MS-DOS.
4. Press the RETURN key. The screen inputting the file name will close.
5. The settings can be prepared as in Section 2.1, "How to Set Up" mentioned above.

NOTE If the f10 (STOP) key is pressed while the file name is being input, file loading is stopped and the screen for inputting the file name is closed.

B Input with the selector

3. The selector is opened when you are inputting directly as mentioned above but the file name is not input, or a wildcard (* or ?) is used and then the RETURN key is pressed.
4. Move the cursor to the location of the file to be loaded with the cursor key.

NOTE

- If the f10 (STOP) key is pressed, file selection with the selector is stopped, and the selector is closed.

- Only the files operating with this software are displayed on the selector.
- Up to 100 files are displayed on the selector. When more than 100 files are on the specified directory, * appears before the parentheses of the file number display of the selector. If the file to be specified is not included in the 100 files, the number on the display should be reduced to less than 100 by using wildcards.

5. Press the RETURN key. The selector will close, and the specified file is input onto the input screen.
6. In addition, press the RETURN key. The screen for inputting the file name closes.
7. Prepare the setting data as in Section 2.1, "How to Set Up" (page 2-1).

NOTE

- When loading the setting parameters, the set mode, setup mode and all other contents will be loaded.
- The keys cannot be operated during loading.
- When an error occurs, a message appears, and the screen for inputting the file name appears again.

2.3 Preparing the Settings from the Settings of the μRS Recorder

It is possible to read the settings of the μRS Recorder by using the communication function. This can be done when the setting window is not opened in the set mode or setup mode.

1. Press the f5 (COMMUNICATION) key and the selector will open.
2. Move the cursor to the location for reception of the setting.
3. Press the RETURN key to start reading.
4. Prepare the setting data as in Section 2.1, "How to Set Up" (page 2-1).

NOTE

- The previous setting parameters will be ovewritten by reading the settings. When you want to save the setting parameters, start the reading of the settings after saving the data in the procedure as described in Section 2.5, "Saving Settings" (page 2-3).
- The keys cannot be operated during reading.
- If an error occurs, a message appears and the communication function is halted.

2.4 Setting in the μRS Recorder

It is possible to write settings to the μRS recorder by using the communication function. This can be done when the setting window is not opened in the set mode or setup mode.

1. Press the f5 key (COMMUNICATION) to open the selector.
2. Move the cursor to a spot for reception of the setting.
3. Press the RETURN key to start writing.

NOTE

- Writing setting parameters to the μRS recorder should be done in the set mode, setup mode, or other setting mode, respectively. Write in the contents of each setting mode.
- The keys cannot be operated during writing.
- If an error occurs, a message appears and the communication function is halted.
- When writing setting parameters to a μRS recorder of which the settings and the model are different, the settings cannot be guaranteed.
- When modifying the settings of the μRS recorder, write the range and other modifications on a new nameplate according to Section 2.6, "Inscribing the Nameplate" (page 2-4) and attach the new nameplate over the old one on the recorder. In addition, place the transparent sheet of film over the nameplate. If a new nameplate or transparent sheet of film is needed, order them at your nearest Sales/Service office. Addressed may be found on the back cover.

2.5 Saving Settings

It is possible to save settings prepared on the file of a personal computer. This can be done when the setting window is not opened in the set mode or setup mode.

1. Press the f3 (SAVE) key to open the screen for inputting the file name.
2. Input the file name. Up to 40 characters including the drive or path can be used. If the RETURN key is pressed without inputting a file name, or wildcards such as * or ? are used in a file name, the selector will be opened. Select the desired file from the selector with the cursor key, and press the RETURN key. The file name is written on the screen for inputting the file name, and the selector is closed. Comments besides the file name can be input. The cursor can be moved to the location for inputting comments with the cursor key or tab key.

NOTE

- If the f10 (STOP) key is pressed while the file name is being input, file loading is stopped, and the screen inputting the file name is closed.
- If the f10 (STOP) key is pressed while the selector is opened, file selection with the selector is stopped, and the selector is closed.
- Only a file which can be operated with this software is displayed on the selector.
- Up to 100 files are displayed on the selector. When there are more than 100 files in the specified directory, * appears before the parentheses indicating the file number of the selector. If the file to be specified is not included in the 100 files, the number on the display should be reduced to less than 100 by using the wildcards.
- When inputting the file name and the drive or path is not specified, the file will be saved into the current directory.

3. Press the RETURN key. If the same file already exists, a comment confirming execution is displayed. For execution, select YES or press the "Y" key. For cancellation, select NO or press the "N" key. The screen for inputting the file name is closed.

NOTE

- When saving setting parameters, the set mode, setup mode, and all other modes will be saved.
- The keys cannot be operated during saving.
- If an error occurs, a message appears and the screen for inputting the file name appears again.

2.6 Inscribing the Nameplate

When modifying the settings in the μRS recorder, inscribe the model code, serial number, modifications etc., on a new nameplate with a grease pen, and attach the new nameplate over the old one on the recorder.

MODEL : Copy the inscription on the μRS recorder.
STYLE : Copy the inscription on the μRS recorder.
SUFFIX : Inscribe the kind of input, the range by code number from channel 1 in order, referring to the following table. In the case of code No. 90, inscribe the settings in the following places.
μRS1000 On the other nameplate (B9930AB).
μRS1800 After the item INPUT.
Optional specification code number should be inscribed after the kinds of input and the ranges.
SUPPLY : Copy the inscription on the μRS recorder.
FREQUENCY : Copy the inscription on the μRS recorder.
NO. : Copy the inscription on the μRS recorder.

For the scaling values in the case of scaling and other modifications, the related information for the μRS1000 should be inscribed on the other nameplate (B9930AB); for the μRS1800, it should be inscribed after the item INPUT.
Example of inscription : 1 to 5 CH range -60.00 to 60.00 mV
Scaling 0 to 100%
For settings with no modification, copy as it is.

Basic specification code	Code name
-00	DC voltage range -20.00 to 20.00 mV
-01	DC voltage range -200.0 to 200.0 mV
-02	DC voltage range -2.000 to 2.000 V
-03	DC voltage range -6.000 to 6.000 V
-04	DC voltage range -20.00 to 20.00 V
-10	Thermocouple input type R
-11	Thermocouple input type S
-12	Thermocouple input type B
-13	Thermocouple input type K
-14	Thermocouple input type E
-15	Thermocouple input type J
-16	Thermocouple input type T
-17	Thermocouple input type N
-18	Thermocouple input type W
-19	Thermocouple input type L
-1A	Thermocouple input type U
-20	RTD input JPt100
-21	RTD input Pt100
-30	DC voltage (linear scaling) range -20.00 to 20.00 mV
-31	DC voltage (linear scaling) range -200.0 to 200.0 mV
-32	DC voltage (linear scaling) range -2.000 to 2.000 V
-33	DC voltage (linear scaling) range -6.000 to 6.000 V
-34	DC voltage (linear scaling) range -20.00 to 20.00 V
-40	DC voltage (square-root extraction scaling) range -20.00 to 20.00 mV
-41	DC voltage (square-root extraction scaling) range -200.0 to 200.0 mV
-42	DC voltage (square-root extraction scaling) range -2.000 to 2.000 V
-43	DC voltage (square-root extraction scaling) range -6.000 to 6.000 V
-44	DC voltage (square-root extraction scaling) range -20.00 to 20.00 V
-90	Others than the ones above

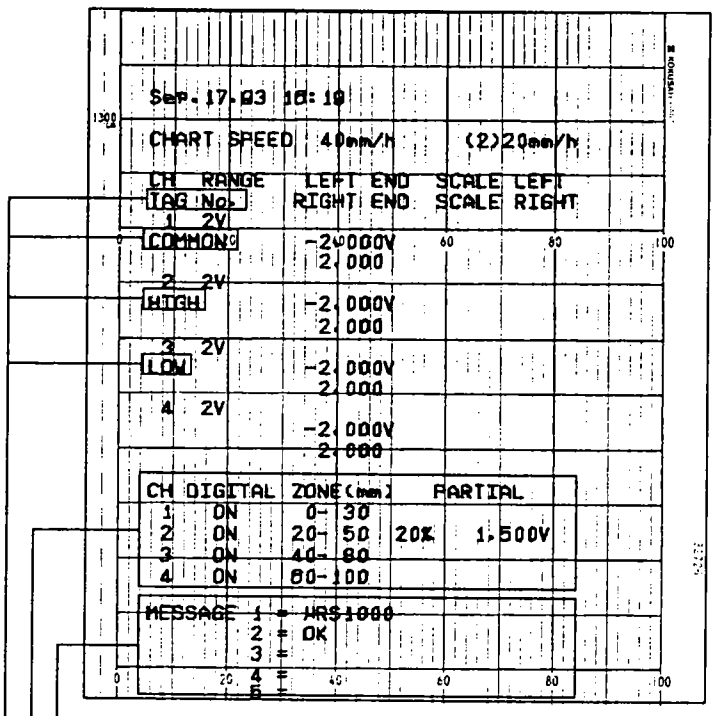
Optional specification codes
/B1 : Burnout up scale
/B2 : Burnout down scale
/D1 : Pen Offset Compensation

NOTE It is possible to set up the input types and the range for each channel in case of the dot printing model. So, inscribe the basic specification codes for each channel.

2.7 List Printout

When modifying the settings of the μRS recorder in this machine, the printout list of the recorder (refer to Subsection 4.6.2 of the μRS recorder instruction manual) might be modified as shown in the following figure:

μRS1000 recorder (pen model)



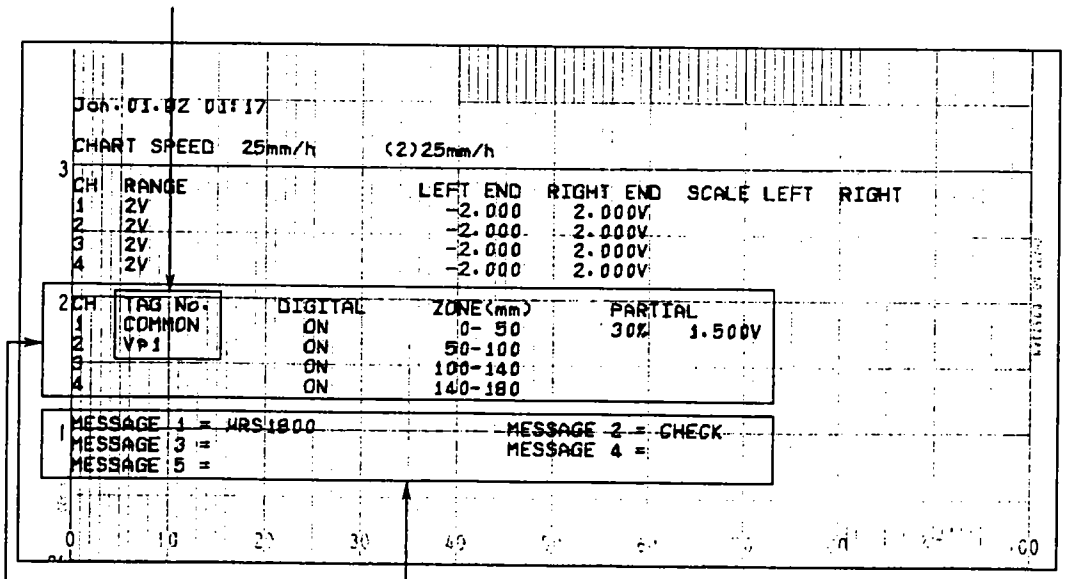
Printout when a message is set.

Printout when the periodic printout function is turned on, and when zone recording and partial expanded recording are set.

Printout when set to TAG at the CH-TAG selection.

μRS1800 recorder (pen model)

Printout when set to TAG at the CH-TAG selection.



Printout when a message is set.

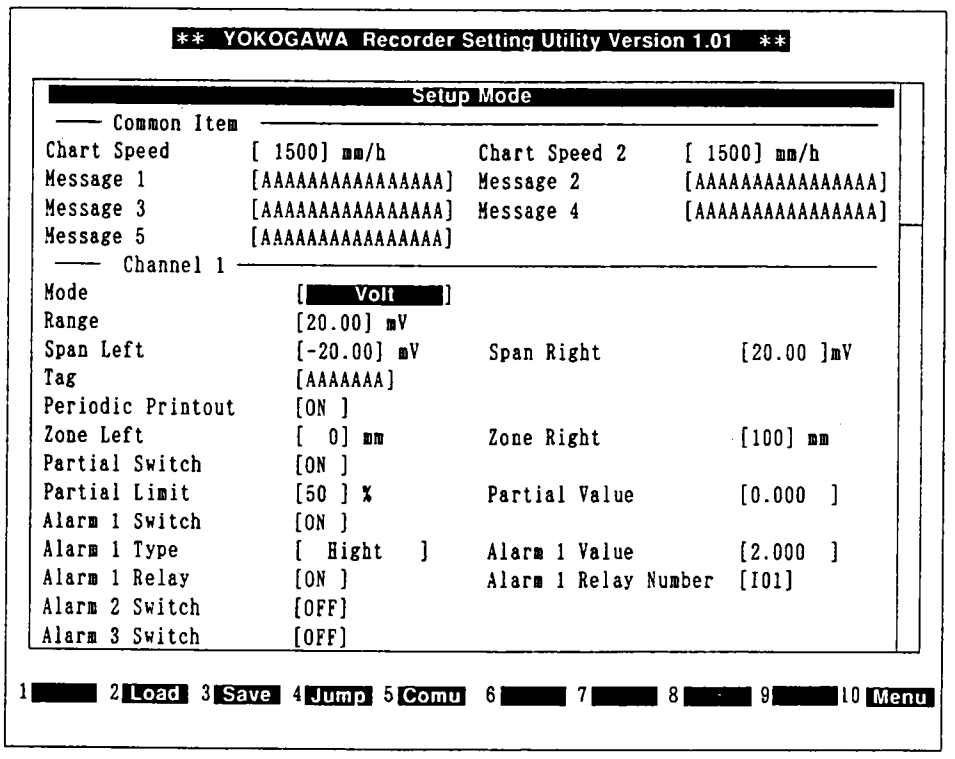
Printout when set to TAG at the CH-TAG selection, and the periodic printout function is turned on, and zone recording and partial expanded recording are set.

Chapter 3 SET MODE

In this chapter, the functions which can be set by the set mode and the methods for setting are explained.

3.1 Setting Screen

The setting screen which appears, looks as follows (the screen changes according to the model of the recorder):



3.2 First Chart Speed/2nd Chart Speed

For regular use of the recorder, only the first chart speed should be set. When using remote control to change the chart speed of a recorder equipped with the remote control option (see page 4-7), a 2nd chart speed must be set. Setting the 2nd chart speed for a recorder having no remote control option will be regarded as invalid. In the case of a recorder equipped with an alarm-output relay option, you can use that option to have the chart speed changed at the time an alarm is generated.

Select the desired chart speed from the following table.

Unit: mm/h

10	15	20	25	30	40	50	60
75	80	90	100	120	150	160	180
200	240	300	360	375	450	600	720
750	900	1200	1500	1800	2400	3000	3600
4500	4800	5400	6000	7200	9000	10800	12000

For a dot printing recorder, select from the cells outlined by the thick line (10 to 1500 mm/h).

NOTE Digital printing is disabled at the following chart speeds:
Pen models

1800 mm/h or greater

Dot printing models

6 or 12 dots: 120 mm/h or greater
18 or 24 dots: 60 mm/h or greater

- Pen models will give increasingly larger error in the position of time ticks in periodical printouts at increased chart speeds (especially in the range of 600 to 1500 mm/h). At a chart speed of 1500 mm/h, the error may be as large as 2 cm.
- Chart speed can be changed through the remote control for a recorder equipped with the remote control option (see page 4-7).

3.3 Messages

You can set as many as five messages with a maximum of 16 characters each. This setting is invalid for a recorder not equipped with the remote control option since message printing is only enabled through remote control. Message printing is also disabled when recording is not in progress or chart speed is 1800 mm/h or greater in the case of pen models or 101 mm/h or greater in the case of dot printing models.

3.4 Range/Span Setting

The following setting can be made on each channel:
The setting is done separately on each channel, so the cursor is moved to the channel to be set.

NOTE

- The input types which can be measured are limited according to the type of recorder. After confirming your type of recorder by its nameplate (refer to page 1-4 in the instruction manual of the recorder), see the following table:
- When modifying the range, span, and scaling values of the μRS recorder, changing the scale is recommended.

The range code of channel 1
The range code of channel 2
The range code of channel 3
The range code of channel 4

Pen model 43650□-□□-□□-□□-□□-□□(μRS1000)
43750□-□□-□□-□□-□□-□□(μRS1800)

Range code	Input type which can be measured
0□	Voltage
1□	Voltage, thermocouple, RTD, contact input
2□	Voltage, thermocouple, RTD, contact input
3□	Voltage
4□	Voltage

Range code

Dot printing model 436506 -□□(μRS1000)
4375□□-□□(μRS1800)

Range code	Kind of input which can be measured
0□	Voltage
1□	Thermocouple, contact input
2□	Voltage, thermocouple, RTD, contact input
3□	Voltage
4□	Voltage
6□	Voltage
7□	Voltage, thermocouple, contact input
8□	Voltage, thermocouple, RTD, contact input

SKIP

Measurement and recording will not be done.

Voltage

Measurement and recording of the DC voltage will be done.
The settings of the measuring range and recording span are needed.
The measuring range is selected from the following table. The recording span cannot be measured except in the area of the measuring range. Also, the maximum and minimum values cannot be set at the same value.

Display	Range
20.00mV	−20.00～20.00mV
60.00mV	−60.00～60.00mV
200.0mV	−200.0～200.0mV
2.000V	−2.000～2.000V
6.000V	−6.000～6.000V
20.00V	−20.00V～20.00V

Thermocouple

Measurement and recording of the temperature due to the thermocouple will be done. The settings of the measurement range and the recording span are needed. The measurement range is selected from the following table. The recording span cannot be measured except in the area of the measurement range. Also, the maximum and minimum values cannot be set at the same value.

TC input type	
Display	Range
R	0.0～1760.0℃
S	0.0～1760.0℃
B	0.0～1820.0℃
K	−200.0～1370.0℃
E	−200.0～800.0℃
J	−200.0～1100.0℃
T	−200.0～400.0℃
N	0.0～1300.0℃
W	0.0～2315.0℃
L(Fe-CuNi)	−200.0～900.0℃
U(Cu-CuNi)	−200.0～400.0℃

RTD

Measurement and recording of the temperature due to RTD will be done.
The settings of the measurement range and the recording span are needed. The measurement range is selected from the following table. The recording span cannot be set except in the area of the measurement range.

RTD input type	
Display	Range
PT(Pt100Ω)	−200.0～600.0
JPt(JPt100Ω)	−200.0～550.0

Contact input

Recording of on/off due to contact input/voltage change will be done.
In the case of contact input, "CONT" is selected, and in the case of voltage change input, "LEVEL" is selected.
The decision for on/off is as follows:
Contact input (CONT): less than 2.4 V OFF (0)
2.4 V or more ON (1)
Voltage change input (LEVEL): Open OFF (0)
Close ON (1)

Difference recording

Recording of the difference between 2 channels set in the same range is made. The settings of the reference channel and the recording span are needed.
The reference channel number must be lower than that of the channel being set. Therefore, setting difference recording on 1 channel cannot be done.

Scaling

In case of measuring VOLT, TC, or RTD, recording is done while changing the system of units (a physical amount) to match the purpose of measurement. Adding units to the scaling values is possible (refer to page 3-6). The settings needed are as follows:

Input type : selected from VOLT, TC, or RTD.
Measurement range: set in the range corresponding to the input type.
Recording span : cannot be set except in the area of measuring range.
Scaling values : the scaling values corresponding to the maximum/minimum values of the recording span are set at the maximum/minimum values. They are set in the range of -20000 to 20000.

Square-root extraction

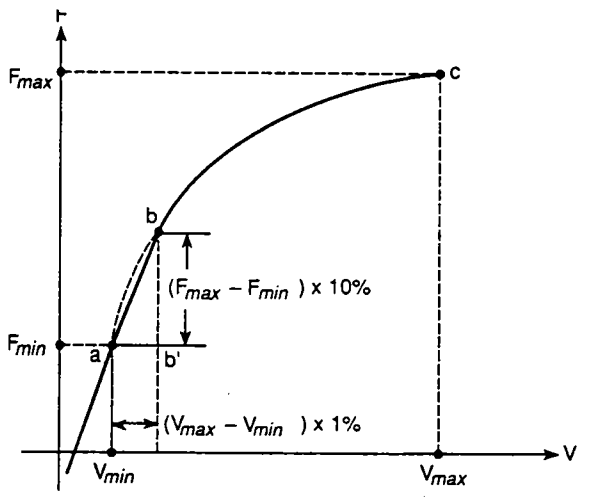
Calculates the square root of the DC voltage input for the scaling recording of the results. It is possible to include a unit to the scaling values (Refer to page 3-6). The settings needed are as follows:

Measuring range : selected from the previous table
Recording span : cannot be set except for the area of the measuring range.
Scaling values : The scaling values corresponding to the maximum/minimum values of the recording span are set at the maximum/minimum values. They are set in the range of -20000 to 20000.

Explanation of square root
The following square-rooting method is used:
Let us define the items as follows:

- V_{min} : minimum value of recording span (LEFT)
- V_{max} : maximum value of recording span (RIGHT)
- F_{min} : minimum value of scale (SCL LEFT)
- F_{max} : maximum value of scale (SCL RIGHT)
- V_x : input voltage
- F_x : scaling value

The relationship between V_x (input voltage) and F_x (scaling value) is as shown in the graph below (the graph configuration is approximate).



Between b and c in the graph, the following relational formula of F_x and V_x is derived.

$$F_x = (F_{max} - F_{min}) \sqrt{\frac{V_x - V_{min}}{V_{max} - V_{min}}} + F_{min}$$

$$F_x = \frac{10(F_{max} - F_{min})}{V_{max} - V_{min}} (V_x - V_{min}) + F_{min}$$

And between a and b, the following relational formula is derived.

3.5 Units

It is possible to set any unit of up to 6 characters for the channels set to scaling and square-root extraction. Units will be printed out in the case of a periodic printout, etc..

3.6 Tags

It is possible to print out a tag instead of the usual channel number in the case of a periodic printout, manual printout, channel printout or alarm printout. Make the setting by referring to Section 4.5, "Channel Number - Change of Tag" in Chapter 4, "SET-UP MODE." The tag can be up to 7 characters for each channel.

NOTE It is necessary to specify this tag setting by referring to Section 4.5, "Channel Number - Change of Tag" (page 4-2) in Chapter 4, "SET-UP MODE".

3.7 Periodic Printouts

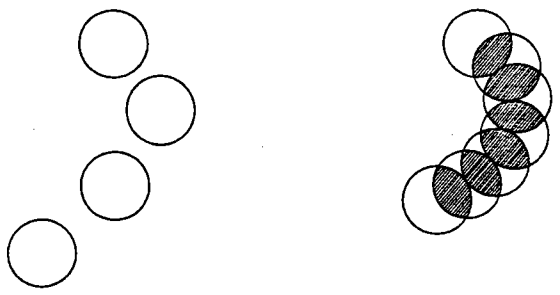
The time and date, channel numbers, or tags, measurement values, units, recording colors (pen model), POC ON marks (*: pen model), scales (printout cannot be made during alarm printout), and chart speeds are printed out.
The printout of measurement values can be selected on/off for each channel.

NOTE For the on/off selection of a scale printout, refer to Section 4.2, "Scale Printouts" (page 4-2).

3.8 Dot Printing Time (Dot Printing Model)

The dot printing time for analog recording is selected from AUTO and FIX.
AUTO : The dot printing time is automatically adjusted according to the chart speed so as not to overlap the dot printings on each other (10 to 90 seconds).
FIX : Regardless of the chart speed, it is possible to perform dot printing at the highest speed.

Highest-speed time	6-dot printing model	10 seconds
	12-dot printing model	15 seconds
	18-dot printing model	20 seconds
	24-dot printing model	30 seconds



AUTO mode FIX mode

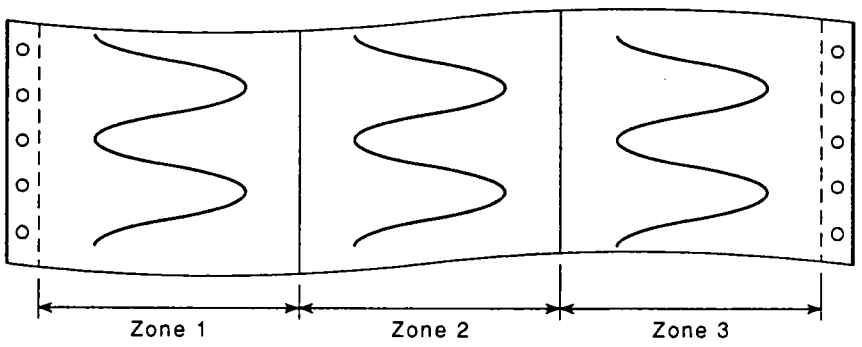
3.9 Zone Recording

\Zone recording allows you to get recording results which are easy to read since there is no overlapping of analog recordings. This is because the recording area on the chart is divided into recording zones for each channel. The left boundary and the right boundary of the recording area are set for each channel. When setting, take note of the following.

NOTE

- The recording zone width cannot be less than 5 mm.
- The left boundary must be less than the right boundary.
- Scales will only be printed for 40 mm and bigger zones.

Here is an example of zone recording:



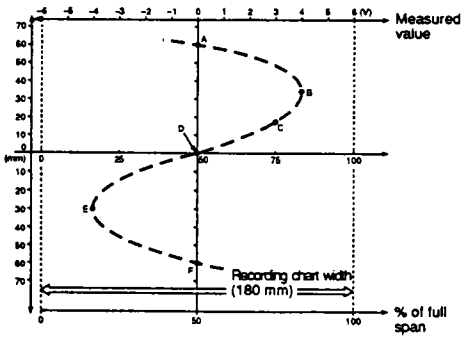
3.10 Partial Expanded Recording

In partial expanded recording, the recording range is compressed partially, which is divided into a part for watching the analog waveforms in detail and one for taking only its outline for recording.
The following settings are made for each channel:

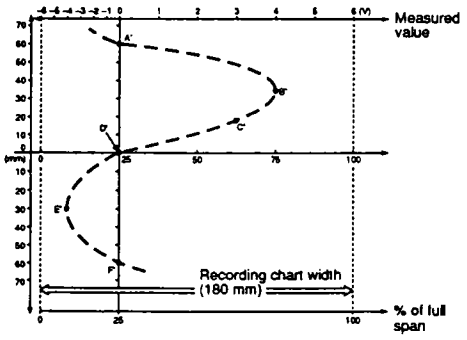
- On/off for partial expanded recording
- The range (1 to 99%) on the chart for compressed part
- The boundary values of compressed part

The boundary values of compressed part must be within the range of the recording span (in the case of the scaling setting, the scaling range).

The following are examples of a normal recording and a recording when the range on the chart for the compressed part is 25% of the total and the boundary value is 0 V.



Normal Recording Example



Partial Recording Example

3.11 Alarms

The following 4 alarm settings can be made for each channel.
Also, up to 4 alarm points (4 levels) can be set per channel.

High limit alarm	: when a measurement rises above the alarm setting point, an alarm occurs.
Low limit alarm	: when a measurement falls below the alarm setting point, an alarm occurs.
Difference high limit-alarm	: when the difference between 2 channels rises above the setting, an alarm occurs. (However, it can be applied to only a channel with the difference recording setting DELT.)
Difference low limit-alarm	: When the difference between 2 channels falls below the setting, an alarm occurs. (However, it can be applied to only a channel with the difference recording setting DELT.)

NOTE When the following settings are modified, the alarm setting of the channel turns off.

- When the input type (VOLT, TC, etc.) is modified
- When the input range is modified
- When the recording span or the scaling value is modified in the case of scaling recording or square-root extraction (including a change in the decimal place)
- When the channel number of the reference channel and the input type or range are modified in difference recording.

Chapter 4 SET-UP MODE

In this chapter, an overview and the setting method of the function which can be set in the set-up mode are explained.

4.1 Setting Screen

The four-pen models and the setting screen with all options are as shown in the following (the screens differ according to the model of recorder to be set):

```
** YOKOGAWA Recorder Setting Utility Version 1.01 **

                    Setup Mode
 ------ Printout Setting ------
Scale Printout              [ON ]    New chart speed Printout   [ON ]
Record start time Printout  [ON ]    CH/TAG Printout            [CH ]
Periodic Printout Trigger   [INT]    Mode & Interval            [AUTO ]
Base time                   [00:00]  Alarm Printout             [ON1]
Record Trigger              [Key Panel ]
 ------ Alarm Setting ------
REFLASH function            [OFF]    Alarm hysteresis           [ON ]
Output relay AND/OR         [NONE  ] Output relay ENERG/DE_EN   [ENERG ]
 ------ Other Setting ------
Key Lock                    [USE]    Key Lock Record key        [LOCK]
Key Lock FEED key           [LOCK]   Key Lock PRINT key         [LOCK]
A/D INTEGRATION TIME        [AUTO]   BURNOUT                    [UP  ]
BURNOUT ON/OFF               1CH=[OFF]  2CH=[OFF]  3CH=[OFF]  4CH=[OFF]
Reference junction           1CH=[EXT]  2CH=[INT]  3CH=[EXT]  4CH=[INT]
Reference junction voltage  1CH=[    0]  3CH=[    0]
Remote control              1=[Record start/stop ]
                            2=[Chart speed change]
                            3=[ Manual Printout  ]

1 [    ] 2 Load 3 Save 4 Comu 5 [    ] 6 [    ] 7 [    ] 8 [    ] 9 [    ] 10 Menu
```

```
** YOKOGAWA Recorder Setting Utility Version 1.01 **

                    Setup Mode
Base time                   [00:00]  Alarm Printout             [ON1]
Record Trigger              [Key Panel ]
 ------ Alarm Setting ------
REFLASH function            [OFF]    Alarm hysteresis           [ON ]
Output relay AND/OR         [NONE  ] Output relay ENERG/DE_EN   [ENERG ]
 ------ Other Setting ------
Key Lock                    [USE]    Key Lock Record key        [LOCK]
Key Lock FEED key           [LOCK]   Key Lock PRINT key         [LOCK]
A/D INTEGRATION TIME        [AUTO]   BURNOUT                    [UP  ]
BURNOUT ON/OFF               1CH=[OFF]  2CH=[OFF]  3CH=[OFF]  4CH=[OFF]
Reference junction           1CH=[EXT]  2CH=[INT]  3CH=[EXT]  4CH=[INT]
Reference junction voltage  1CH=[    0]  3CH=[    0]
Remote control              1=[Record start/stop ]
                            2=[Chart speed change]
                            3=[ Manual Printout  ]
                            4=[Message 1 Printout]
                            5=[Message 2 Printout]
Filter                      1CH=[OFF]  2CH=[OFF]  3CH=[OFF]  4CH=[OFF]
Pen offset Compensation     [OFF]

1 [    ] 2 Load 3 Save 4 Comu 5 [    ] 6 [    ] 7 [    ] 8 [    ] 9 [    ] 10 Menu
```

4.2 Scale Printouts

Scale printout is performed in the case of the periodic printout, etc.. Whether the printout is performed or not is set by on/off.

NOTE This printout is not made when the chart speed is more than 1500 mm/h in pen models, or more than 100 mm/h in the 6- and 12-dot printing models (including the 100-mm model), or more than 50 mm/h in the 18- and 24-dot printing models.

4.3 Chart Speed Modification Printout

When the chart speed is modified, the recording speed, time, and time tick are printed out. Whether the printout is performed or not is set by on/off.

NOTE This printout is not made if the chart speed is more than 1500 mm/h in pen models, or more than 100 mm/h in the 6- and 12-dot printing models (including the 100-mm model), or more than 50 mm/h in the 18- and 24-dot printing models.

4.4 Recording Start-time Printout

When recording is started, the time and time tick are printed out.
Whether the printout is performed or not is set by on/off.

NOTE This printout is not made when the chart speed is more than 1500 mm/h in pen models, or more than 100 mm/h in the 6- and 12-dot printing models (including the 100-mm model), or more than 50 mm/h in the 18- and 24-dot printing models.

4.5 Channel Number - Change of Tag

This selection specifies whether the channel number is printed on the channel printout, periodic printout, manual printout, and alarm printout, or the contents of the tag instead.

4.6 Triggering the Periodic Printout

This selection specifies whether to execute a periodic printout by a trigger of the internal timer (INT) or from the trigger of the remote control (EXT).
When selecting INT, the reference time and the interval are selected (refer to Section 4.7, "Periodic Printout Reference Time" and Section 4.9, "Periodic Printout Mode and Interval").

NOTE The printout is not made when the chart speed is more than 1500 mm/h in pen models, or more than 100 mm/h in the 6- and 12-dot printing models (including 100-mm model), or more than 50 mm/h in the 18- and 24-dot printing models.

4.7 Periodic Printout Reference Time

This setting is required when setting the periodic printout trigger to INT.
The reference time of the periodic printout interval is input by hour only.

4.8 On/off of Alarm Printout

The way to printout alarms when an alarm is generated or released is selected in the following (all alarms are in common):
ON1: printed out when an alarm is generated or cancelled.
ON2: printed out only when an alarm is generated.
OFF: not printed out.

NOTE This printout is not made when the chart speed is more than 1500 mm/h in pen models, or more than 100 mm/h in the 6- and 12-dot printing models (including the 100-mm model), or more than 50 mm/h in the 18- and 24-dot printing models.

4.9 Periodic Printout Mode and Interval

The periodic printout mode is selected from the following:
AUTO: the interval is automatically determined according to the chart speed.
MAN: You may set the interval manually yourself.

The relationship between the chart speed in the case of selecting AUTO and the interval is as follows:

Pen model

Chart speed	Periodic printout interval
10 to 15 mm/h	Every 8 hours
20 to 30 mm/h	Every 4 hours
40 to 60 mm/h	Every 2 hours
75 to 120 mm/h	Every 1 hour
150 to 180 mm/h	Every 30 minutes
200 to 300 mm/h	Every 20 minutes
360 to 1500 mm/h	Every 10 minutes
1800 mm/h or more	No printout

Dot printing model

Chart speed	Periodic printout interval			
	6-dot printing model	12-dot printing model	18-dot printing model	24-dot printing model
10 to 15 mm/h	Every 8 hours	Every 12 hours	Every 12 hours	Every 24 hours
20 to 30 mm/h	Every 4 hours	Every 8 hours	Every 8 hours	Every 12 hours
40 to 50 mm/h	Every 2 hours	Every 4 hours	Every 4 hours	Every 8 hours
60 to 75 mm/h	Every 2 hours	Every 4 hours	No printout	No printout
80 to 100 mm/h	Every 1 hour	Every 2 hours	No printout	No printout
120 to 1500 mm/h	No printout	No printout	No printout	No printout

The interval can be selected from the following: 10, 20, or 30 minutes 1, 2, 3, 4, 6, 8, 12, or 24 hours.

4.10 On/off of Recording

This selection specifies whether recording start/stop is done with the keyboard or by the optional remote control.

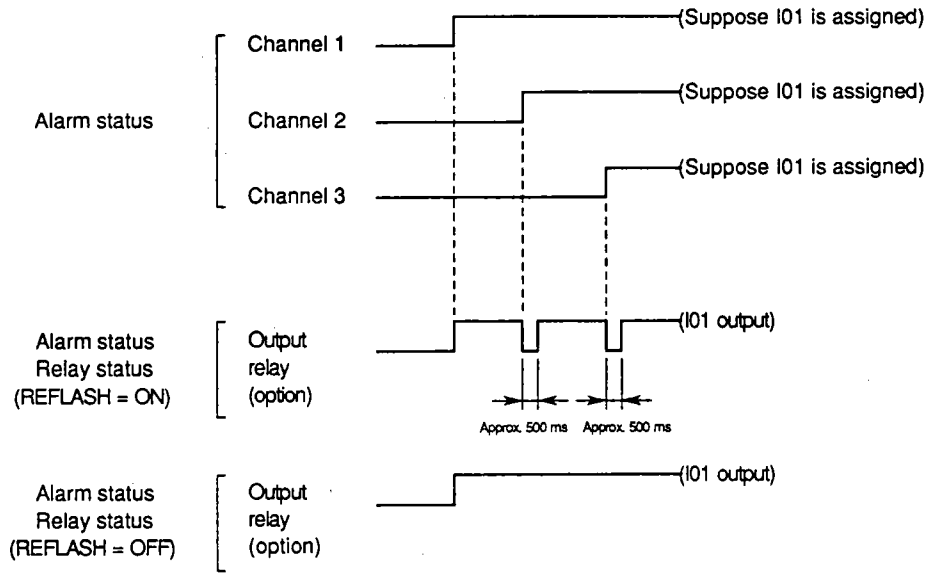
NOTE When selecting remote control, recording start/stop (RECORD) should be selected by referring to Section 4.16, "Remote Control".

4.11 Alarm System

The following settings are made:

•Reflash function

When an alarm is issued again in another channel or at another alarm level, it can be output in the optional output relay (only I01 to I03) by referring to Section 3.11, "Alarms" (page 3-8).
It is set by on/off.



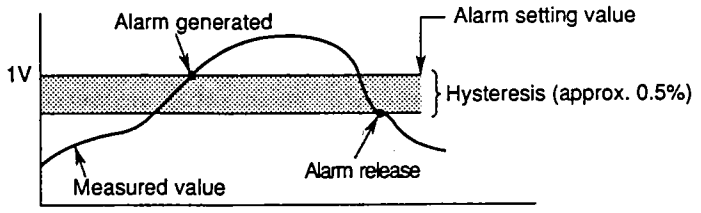
NOTE

- If the reflash function is set to on, I01 to I03 of the output relay cannot be set to AND.
- If the reflash function is set to on regardless of the point of the alarm output, I01 to I03 become an exclusive relay of the reflash function.

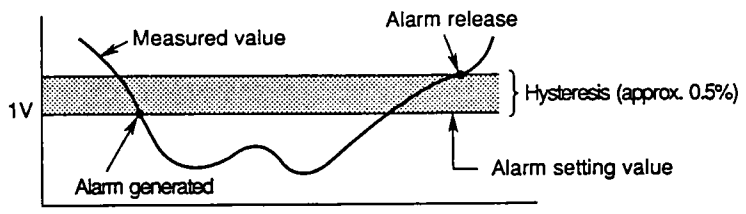
•Alarm hysteresis

The hysteresis can be set at the values of the alarm generation and release. The setting is selected from off (0%) or on (0.5%).

High limit alarm (H)

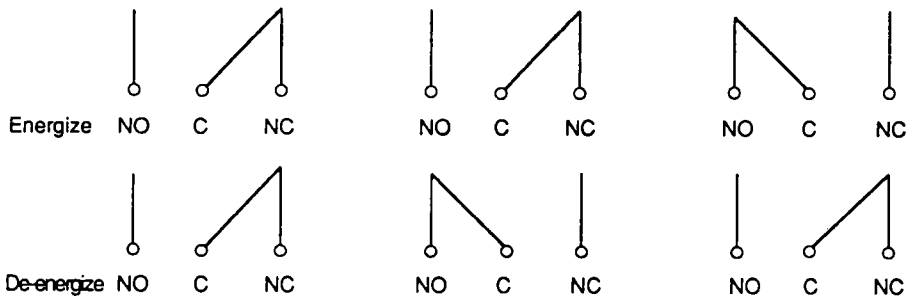


Low limit alarm (L)



•Output relay to be energizing/de-energizing on alarm

The alarm output relays can be selected to be energizing or de-energizing on alarm. By selecting de-energizing, the same output can be produced as that of an alarm generated in the case of being off.

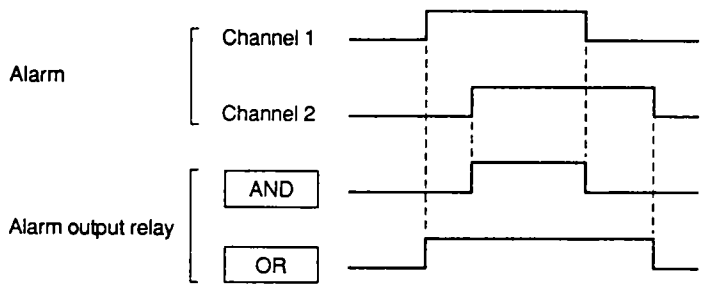


•AND/OR of the alarm output relay

When one alarm output relay is held in common by more than one channel or level, AND/OR can be set.

AND : output only when all alarms are generated simultaneously

OR : output when an alarm is generated in any 1 channel



The setting is selected from the following:

NONE : all is set to OR

I01 : I01 are set to AND, the others are set to OR.

(I01 to) I□□ : I01 to I□□ are set to AND, the others are set to OR.

(□□ are the output relay points mounted on the recorder)

NOTE

- If the alarm output relay option is not incorporated in the recorder, this setting is invalid.
- If the reflash function is set to on, AND/OR can be set at I04 to I24 (in the case of the 180-mm model/AK5).

4.12 Key Lock

The function of the key lock can be enabled, and key locking can be specified. When selecting NOT (disabled), key operation is not affected.

When selecting USE (enabled), the influences to each mode of the recorder are as follows:

Operation mode
The RCD/PRINT/FEED keys can be locked/unlocked individually.

Set mode
You cannot enter the set mode.

Set-up mode
You can enter the set-up mode. And settings can be done.

NOT (disabled) and USE (enabled) are set for each key.

4.13 Input A/D Converter Integration Time

Pen model
The input A/D converter of the μRS recorder has 2 kinds of integration time modes at 50 Hz and 60 Hz. In order to cancel noise to the maximum, changing according to the used power supply is needed.

When the supply frequencies used for the μRS recorder and the measured object are the same, a change between 50 Hz and 60 Hz can be done automatically, by setting to AUTO. When the supply frequencies used for the μRS recorder and the measured object are different, the A/D integration time should be set according to the supply frequency of the equipment with a large amount of noise.
The setting can be selected from 50 Hz, 60 Hz, AUTO.

Dot printing model
The input A/D converter of the μRS recorder has 3 kinds of integration time modes at 50 Hz, 60 Hz, and 100 ms. To cancel noise to the maximum, 100 ms is selected. 50 Hz, 60 Hz, or AUTO (50/60 Hz automatic change) is used to speed up the calculating time depending on the options.
The setting can be selected from 50 Hz, 60 Hz, 100 ms, or AUTO.

4.14 Burnout

In thermocouple (TC) input, if burnout of the thermocouple occurs, the measurements can be divided to UP (plus side) or DOWN (minus side) (with all channels in common). In the setting, up or down is selected, and on/off is selected for each channel.

NOTE This setting is valid for equipment which can measure the temperature with a thermocouple. Refer to Section 3.4, "Range/Span Setting" (page 3-3) for the applicable equipment.

4.15 Reference Junction Compensation (RJC)

In thermocouple (TC) input, the setting at which reference junction compensation is performed INTernally (the internal compensation circuit), or EXTernally (the internal compensation circuit is not used) can be done for each channel.
When EXT is set, the reference junction compensation voltage added to the input is in the range of -20000 μV to 20000 μV.
In this setting, INT/EXT is set for each channel, and reference junction compensation is input into the channel(s) where EXT was set.

NOTE This setting is valid for equipment which can measure temperature with a thermocouple. For the applicable equipment, see Section 3.4, "Range/Span Setting" (page 3-3).

4.16 Remote Control

When the μRS recorder has the remote control option (/R1), the following remote control functions can be applied freely to the 5 remote input terminals.

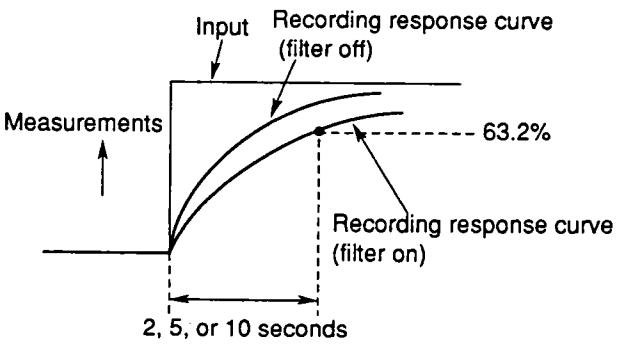
Recording start/stop
Modification of chart speed
Message 1
Message 2
Message 3
Message 4
Message 5
Manual printout (refer to the instruction manual of the recorder (page 4-8))
Periodic printout

The setting is selected from the functions mentioned above for each remote input terminal.

NOTE When the setting for recording start/stop and periodic printout is done, it is necessary to set the remote control by referring to Section 4.10, "On/off of Recording" and Section 4.6, "Triggering the Periodic Printout".

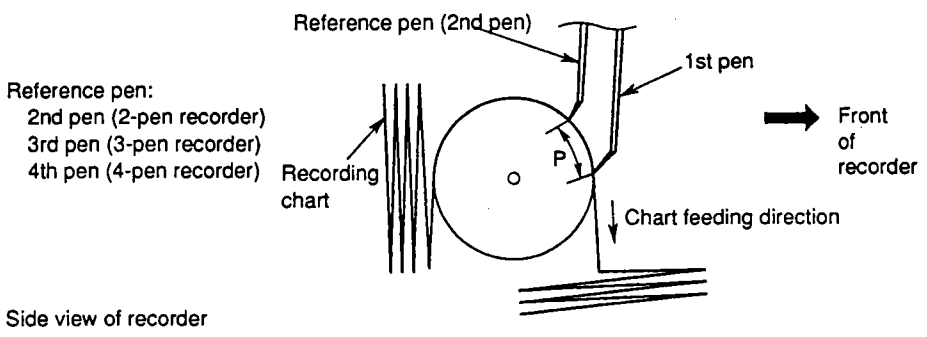
4.17 Input Filter (Pen Model)

If an input filter is used, the unsteadiness of the input is controlled, and smooth results are obtained in recording.
The setting is selected from a time constant of 2, 5, or 10 seconds or off for each channel.



4.18 Pen Offset Compensation (Pen Model)

In the case of 2-, 3-, and 4-pen recorders, there are lags on the time axes (phase differences) between the pens. By using phase synchronism, these lags can be canceled. An explanation of the 2-pen recorder is provided (3- and 4-pen recorders follow the same principle). In the following illustration, the situation in which the 2-pen recorder is recording on chart is shown.



Recording of the same time cannot be done at the same place on the chart, as shown in the above figure, because of the phase difference of length P between 2 pens.
By setting pen offset compensation, the measured data of the pens except the reference pen equivalent to the length P are stored in the memory, and when the chart has moved forward length P, recording is started. Therefore, the phase difference on the chart is canceled.

The setting is selected from on/off.

NOTE

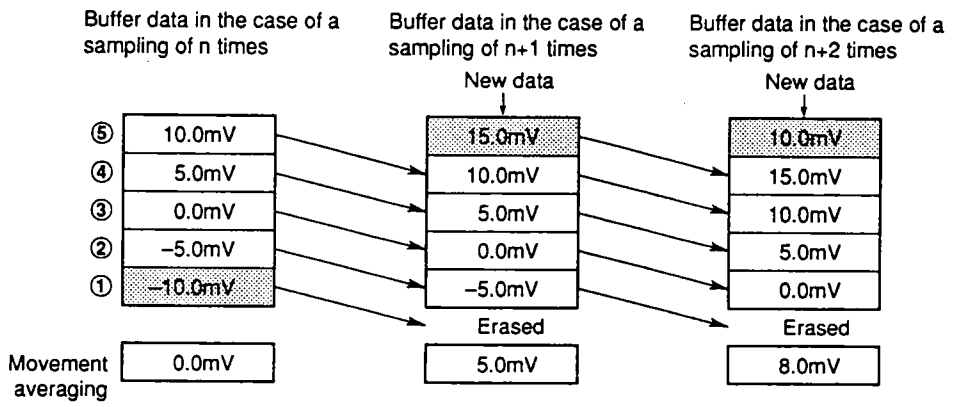
- When stopping the chart, i.e., chart feed is stopped, the measured values stored in the memory are not recorded.
- The pens except the reference pen may seem to have abnormal movement, due to adjustment of the phase difference.
  Immediately after starting recording, only the reference pen moves for a while; the other pens do not move, but this is not a malfunction.
- When using pen offset compensation, an * is printed out at the periodic printout.

4.19 Printing Color (Dot Printing Model)

The analog recording printing colors of each channel can be selected from 6 colors: purple, red, green, blue, brown, or black.
The setting is selected for each channel from the 6 colors.

4.20 Moving Average (Dot Printing Model)

Moving average of the latest measurements for 2 to 16 samplings can be calculated.
By using movement averaging, the unsteadiness of input is controlled and smooth recording results can be obtained.
It is selected from the average number of times for 2 to 16 samplings and off.



It is selected by a sampling number of 1 to 15 times.
The sampling period of the pen model is 125 msec.
The sampling period of the dot printing models is as follows:

Model \ A/D integration time	100ms	50Hz/60Hz
6-dot printing model	2.5 sec	2.5 sec
12-dot printing model	5 sec	2.5 sec
18-dot printing model	10 sec	2.5 sec
24-dot printing model	10 sec	2.5 sec

Chapter 5 OTHER SETTINGS AND ADJUSTMENTS

5.1 Setting Date/Time

There are 2 methods for setting the date/time:
- Setting by the clock of a personal computer.
- Setting by key input.

Confirm that the personal computer and the μRS recorder are connected prior to operation, and the power supply of the μRS recorder is turned on.

Setting methods

1. Select "Others" in the main menu, and select date/time setting from that menu. The window for selecting the settings is opened.

NOTE The time on the personal computer is displayed in the window.

2. Select whether the setting is done by the clock of the personal computer or by key input with the selector. Then, press the return key. When selecting the clock of the personal computer, the setting for the μRS recorder is started. When selecting by key input, the window for setting is opened.
3. When selecting by key input, input the date and time.
   The time when the window is opened is displayed as an initialization.
   Input the year, month, date, time, minute, and second. When the return key is pressed, the input location moves (in the order of year -> month -> day -> time -> minute -> second).
   When the left and right cursor keys are pressed, the digit moves in the items set.
   When the function keys displaying the year, month, day, time, minute, and second are pressed (f1 to f6), the cursor moves to the item pressed.
4. When the return key is pressed after the seconds are input, the setting is started for the μRS recorder.
5. When completing the setting to the μRS recorder, the "Others" menu screen appears again.

NOTE If the f10 (STOP) key is pressed while the key input is being done, the setting is stopped, and the "Others" menu screen appears again.

5.2 Adjustment

Adjustment of the pen location of the μRS recorder and that of dot printing can be made.
Confirm that the personal computer and the μRS recorder are connected prior to operation and the power supply of the recorder is turned on.

Adjustment procedures

1. Select "Others" in the main menu, and select "adjustment" in the "Others" menu.

The window for adjustment is opened.
The procedures are different for pen models and dot printing models, and are as follows:

Pen models

2. The window for selecting the adjusting pen is opened. Select the pen which you want to adjust.
3. Press the return key. The window for adjusting the ZERO location is opened.
4. Increase or decrease the setting with the f1 to f6 keys.
   When the setting is changed, the pen location of the recorder changes. When the settings are increased, the pen moves to the right. When the settings are decreased, the pen moves to the left.
   A change of 1 in the setting corresponds to a movement of the pen by 0.0057 mm in the 100-mm model, 0.0097 mm in the 180-mm model.
5. After completing the adjustment, press the return key.

Proceed to the adjustment for FULL.

6. Adjust FULL like ZERO. After completing the adjustment, press the return key. The selection of the pen appears again.
7. When adjustment of all the pens is completed, press f10 (STOP) on the screen for pen selection. The "Others" menu screen appears again.

Dot printing models

2. The window for adjusting HYS is opened. Increase or decrease the settings with the f1 to f6 keys.
   In the case of Figure a below, increase the setting; decrease it in the case of Figure b.
   A change of "1" in the setting is equivalent to 0.1 mm in the dot printing location.

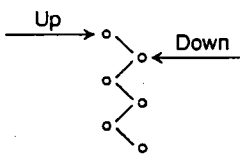


Figure a

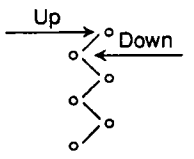


Figure b

3. After completing the adjustment, press the return key. Proceed to the adjustment for ZERO.
4. Increase or decrease the settings the same as for HYS.
   When the setting is increased, the dot printing location moves to the right. When decreased, it moves to the left.
5. After the setting is completed, press the return key. Proceed to the adjustment for FULL.
6. Adjust FULL like the adjustment for ZERO.
7. After completing the adjustment, press the return key. The "Others" menu screen appears again.

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Dec. '97

Printed in Japan , 802(YG)

In the United States, JOHNSON YOKOGAWA Corporation is the dealer for this instrument