INSTRUCTION MANUAL
DX200 S83

IM DX200-S83E
2nd Edition

**DX200
S83**

CONTENTS

Appendix: Drawings

1. Foreword

Thank you for purchasing the DX200. This user's manual contains hardware specification and additional firmware specifications for DX200 listed below. Please refer to DX200 standard user's manual (IM04L02A01-01E).

- Hardware specifications(Westronics 3200 panel cut size)
- Addition of TC/RTD input types
- Message expansion
- Automatic monitor window recovery
- Split trend display (only for DX100)
- Simultaneous use of log input and Math options
- Scale display and display rate switching
- Green band and alarm mark display
- Media FIFO
- Internal switch
- MEDIA key
- Auto Recovery Function of Modbus Master
- Daylight saving time
- Gradual Time Correction Function
- SNTP Server/Client
- Addition of Waveform Colors
- Increased Number of Characters Used in Arithmetic Expressions

2. Hardware Specificarions

2.1. Construction

- Material

   Case:Drawn steel, Bezel:Polycarbonate
- Case color: Grayish blue green(Munsell 2.0B 5.0/1.7 or equivalent)
- Bezel color: Black
- Dimensions

   Please refer to appendix.
- Weight

   DX204/S83:approx. 7.5kg

   DX208/S83:approx. 7.7kg

   DX210/S83:approx. 7.5kg

   DX220/S83:approx. 7.8kg

   DX230/S83:approx. 8.2kg

   DX204/S83:approx. 7.5kg
- Front panel

   Water and dust-proof: not available
- Key panel

   MEDIA key is added.This will be pressed when the external storage medium is inserted to the drive.The storage medium is detected and operation to save the data to the external storage medium can be followed.
- Terminal arrangement of back panel

   Please refer to appendix.
- Panel cut

   Please refer to appendix.
- Fuse

   There is not the fuse on DX.

2.2. Safety and EMC Standards

- Safety standards

   Certificated by CSA22.2 No.1010.1

   Complies with EN61010-1
- EMC standards

   Complies with EN61326-1

2.3. Optional Functions

Following optional functions can not be specified.

   /CF1, /H2, /H5ﻒ, /P1, /D5

2.4. Application Software

Only DAQSTANDARD S120 supports the setting of additional firmware functions.

3. Additional Firmware Specifications

3.1. Addition of TC and RTD Input Types

3.1.1. Additional TC Inputs (Thermo-coupler)

- Table 3.1.1 shows added TC inputs.

Table3.1.1 TC Inputs to be added

Range	Range name	Measurement range	Measurement accuracy	Max. resolution
Kp vs Au7Fe	Kp	0.0 to 300.0 K	0 to 20K Within ± 4.5K 20 to 300K Within ± 2.5K	0.1K
PLATINEL	PLATI	0.0 to 1400.0°C 32 to 2552°F	±(0.25% of rdg + 2.3°C)	0.1°C 1°F

PR40 - 20	PR	0.0 to 1900.0°C
		32 to 3452°F
			0 to 450 °C
			        Accuracy not guaranteed
			450 to 750°C
			        ±(0.9% of rdg + 16.0°C)
			750 to 1100°C
			        ±(0.9% of rdg + 6.0°C)
			1100 to 1900°C
			        ±(0.9% of rdg + 2.0°C)
				0.1°C
				1°F

NiNiMo	NiMo	0.0 to 1310.0°C 32 to 2390°F	±(0.25% of rdg + 0.7°C)	0.1°C 1°F
WRe3 - 25	WRe	0.0 to 2400.0°C 32 to 4352°F	±(0.3% of rdg + 2.8°C)	0.1°C 1°F
W/WRe26	W/WRe	0.0 to 2400.0°C 32 to 4352°F	Within 0 to 400 °C ± 15.0°C 400 to 2400°C ±(0.2% of rdg + 2.0°C)	0.1°C 1°F
TypeN (AWG14)	N2	0.0 to 1300.0°C 32 to 2372°F	±(0.2% of rdg + 1.3°C)	0.1°C 1°F

3.1.2. RTD Inputs (Resistance Temperature Detector)

- Table 3.1.2 shows added RTD inputs if the system.

Table3.1.2 RTD Inputs added (Without /N1 option)

Range	Range name	Measurement range	Measurement accuracy	Max. resolution
JPt50	PT3	-200.0 to 550.0°C -328.0 to 1022.0°F	±(0.3% of rdg + 0.6°C)	0.1°C 0.1°F
Ni100 (SAMA)	Ni1	-200.0 to 250.0°C -328.0 to 482.0°F	±(0.15% of rdg + 0.4°C)	0.1°C 0.1°F
Ni100 (DIN)	Ni2	-60.0 to 180.0°C -76.0 to 356.0°F	±(0.15% of rdg + 0.4°C)	0.1°C 0.1°F
Ni120	Ni3	-70.0 to 200.0°C -94.0 to 392.0°F	±(0.15% of rdg + 0.4°C)	0.1°C 0.1°F
J263∗B	J263	0.0 to 300.0 K	0 to 40K Within ±3.0K 40 to 300K Within ±1.0K	0.1K
Cu53	CU8	-50.0 to 150.0°C -58.0 to 302.0°F	±(0.15% of rdg + 0.8°C)	0.1°C 0.1°F
Cu100	CU9	-50.0 to 150.0°C -58.0 to 302.0°F	±(0.2% of rdg + 1.0°C)	0.1°C 0.1°F

- Table 3.1.3 shows added RTD inputs with /N1 option.

Table 3.1.3 RTD Inputs added (with /N1 option)

Range	Range name	Measurement range	Measurement accuracy	Max. resolution
JPt25	PT4	-200.0 to 550.0°C -328.0 to 1022.0°F	±(0.15% of rdg + 0.6°C)	0.1°C 0.1°F

3.2. Message Expansion

3.2.1. Basic Specifications

    a) There are 7 groups of messages with 8 messages per group.

- Any message can be written using keypad and communication commands.
- A message can be assigned to a remote inputs and USER key for activation.
- Assign a group name for message groups.

    b) There are eight types of free messages.

Free messages can be written using keys, communication commands and via Web. *

    *: Only free messages can be written via web. Message character strings that have been defined on DX will remain unchanged if a message is written.

Table 3.2.1 Message types and writing enable/disable

Message type	Key operation	Communication command	Remote input	USER key	Web
Message Groups 1 to 6	✓	✓			
Message Group 7	✓	✓	✓	✓	
Free message	✓	✓			✓

    c) With Yokogawa's Viewer software such as DAQSTANDARD, groups numbers. and message numbers are displayed in the tens digit and ones digit, respectively.

        <Example> A message of Group No. 1 and Message No. 3 shall be displayed as "13".

    d) System messages (power failure message, display rate change message) are displayed as messages of Group No. 0 and Message No. 9.

3.2.2.　Procedure

3.2.2.1.　Setting Message

1. Press the "MENU" key to enter the Set mode.
2. Press the "Next" soft key untill "Message" appears.
3. Press the soft key corresponding to "Message".
4. Select the group No. of the message you want to set, and then specify the desired group name and enter message contents (up to 16 characters).

Fig. 3.2.1 Message setting window

3.2.2.2.   Writing Pre-determined Messages

1. Press "FUNC" key and press soft key corresponding to "Message".

2. A list of message group Nos. and group names will appear.
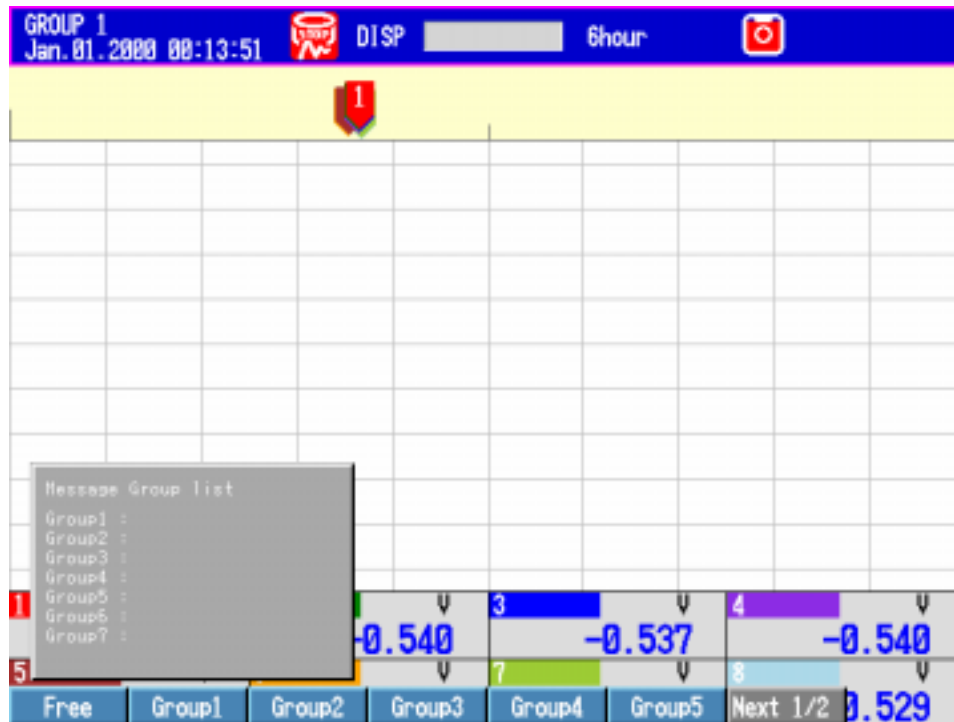
Fig. 3.2.2 Writing pre-determined messages -1

3. Select the group No. of the message you want to write.
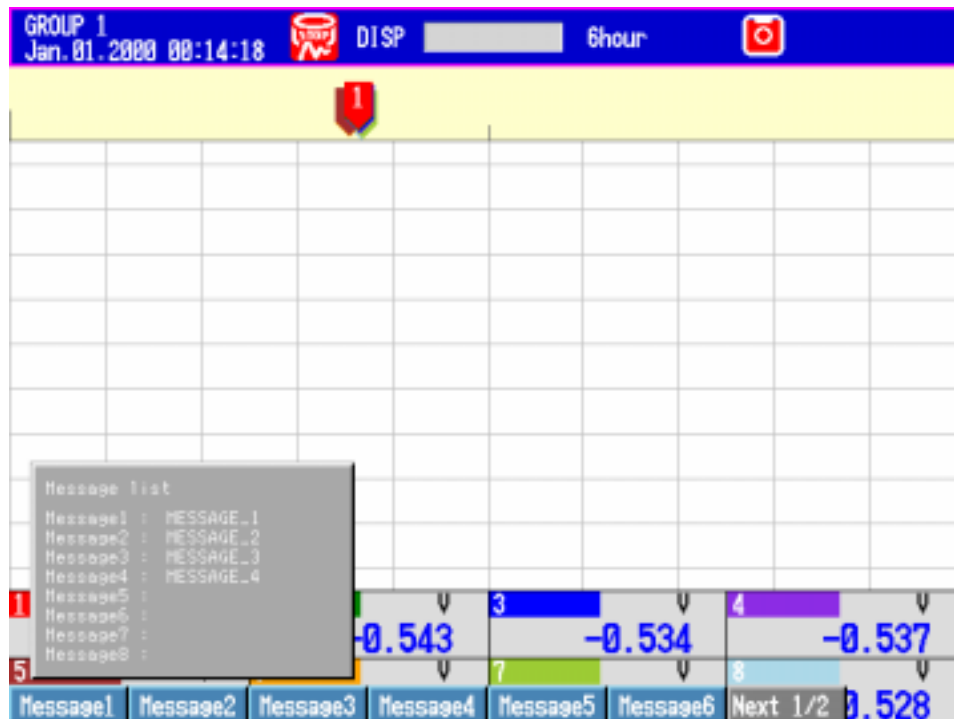
Fig. 3.2.3 Writing pre-determined messages -2

4. Click the soft key corresponding to the message you want to write. The message will be written.

3.2.2.3. Writing Free Messages

1. Press "FUNC" key, press soft key corresponding to "Message".

2. A list of message group Nos. and group names will appear.

3. Press the soft key corresponding to "Free".

4. Select the desired message No.*

*: Each message No. has its own color mark.
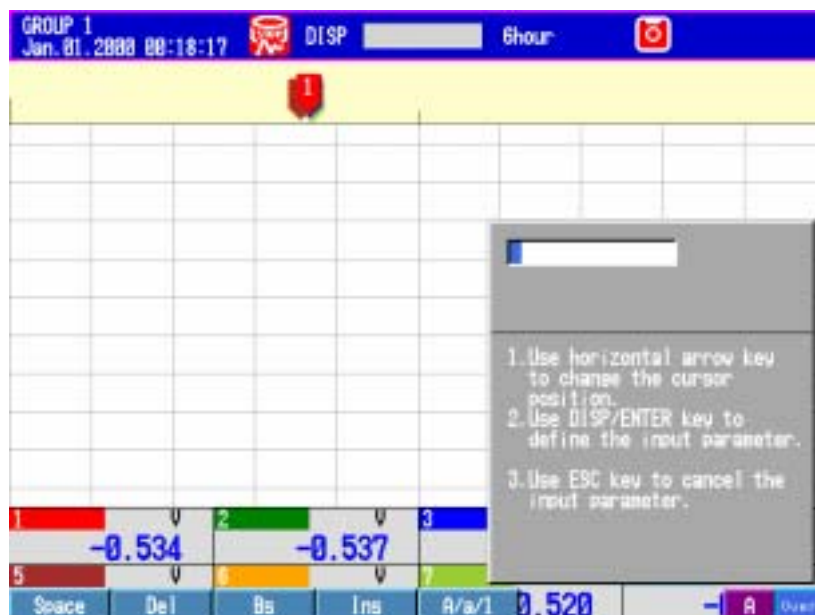
Fig. 3.2.4 Entering contents of free message

5. A window allowing you to enter message contents will appear. Enter the desired characters and press the "DISP/ENTER" key. The message will be written.

3.2.3. Communication Command

A command for automatic monitor window recovery added.

a) Message character strings setting
  SG p1, p2, p3
        p1: Message group No. (1-7)
        p2: Message No. (1-8)
        p3: Message (16 alphanumeric characters)
  b) Message Write
    MS p1, p2
        p1: Message group No. (1-7)
        p2: Message No. (1-8)
  c) Message group name setting
    BG p1, p2
        p1: Message group No. (1-7)
        p2: Group name (16 alphanumeric characters)
  d) Free message Write
    BJ p1, p2
        p1: Message group No. (1-7)
        p2: Group name (16 alphanumeric characters)

3.3. Automatic Monitor Window Recovery Function

3.3.1. Basic Specifications

a) This function causes the pre-registered monitor window to appear automatically in cases where no keys have been pressed for a certain period of time.

b) The time to be elapsed before the pre-registered monitor window appears after no keys have been pressed for a certain period of time is selected from the following.

1min, 2min, 5min, 10min, 20min, 30min, 1h

c) This function is effective for monitor window only.

3.3.2. Procedure

1. Press the "MENU" key to enter the Set mode.
2. Press the soft key corresponding to "Display".
3. Press the soft key corresponding to "View, direction, LCD".
4. Move the cursor to "Jump default display, time" and select "time".

Fig 3.3.1 Automatic monitor recovery function setting menu

3.3.3. Registering the Window to be Automatically Recovered

1. Display the desired monitor window .
2. Press the "FUNC" and press soft key corresponding to "Standard display".
   The monitor window type and group No. in effect when the soft key is pressed is registered as the monitor window to be recovered automatically.
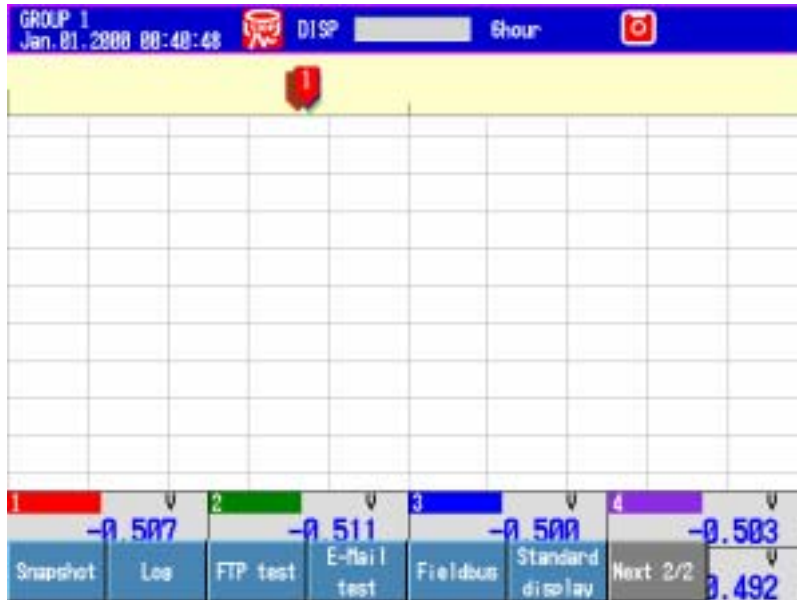
Fig. 3.3.2 Registering the monitor window to be recovered

3.3.4. Communication Command

A command for automatic monitor window recovery added.

QGp1 Allows you to set automatic monitor window recovery.

   p1: Time to be expired before the pre-registered monitor window is automatically displayed

   Off: Disables the automatic recovery function.

   1min, 2min, 5min, 10min, 20min, 30min, 1h

3.4. Log Display and Simulation Function

3.4.1.   Specifications

a) Log display

Displays the measured data using a Log scale (common logarithm).

The equation is given by

$$Y=10^{(SU-SL)\times(X-VL)/(VU-VL)+SL}$$

where

Input voltage: X Lower limit of display span: VL   Upper limit of display span: VU

Lower limit of scaling: SL Upper limit of scaling: SU   Displayed value: Y

b) Simulation function

You can stop the updating of the display by applying a signal to the remote control terminal or by using a communication command.

The relationship between the signal that is applied to the remote control terminal and the updating of the display is as follows.
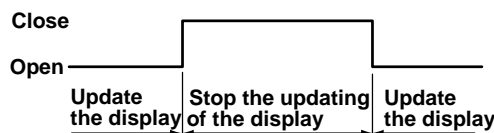
When the updating of the display is resumed, the current waveform is displayed from the stopped position.
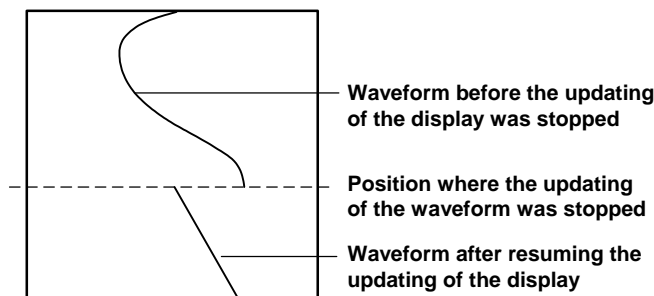
c) Clearing the internal memory/displayed waveform

You can clear the internal memory and the displayed trend by applying a signal to the remote control terminal.

Both the internal memory and the trend are cleared when the input signal to the remote control terminal changes from open to close.

d) Turning ON/OFF the time display

You can turn ON/OFF the time display.

e) The number of displayed digits for measured data

You can set the number of digits of the mantissa to two or three digits when displaying the digital value in exponential form.

Note

- Allows log input for models equipped with the math option.

- If the log input channel is included in arithmetic expressions, setting shall be allowed but an error will occur for math results.

- An error will appear for statistical computation if the log input channel is assigned to the report channel.

- In the Tlog file, an error will be set for measurement results for the log input channel.
  With Yokogawa's Viewer software such as DAQSTANDARD, "LACK"
  will be displayed.

3.4.2. Procedure

3.4.2.1. Log display

1. **Press the "MENU" key to enter the Set mode.**
2. **Press the soft key corresponding to "Range, Alarm".**
3. **Set the channels for "First channel" and "Last channel".**
4. **Set the measurement range and span.**
5. **Set the exponent of the upper and lower limits of the scale.**

Note

- You can set the scale value in the range from 1.0E-15 to 1.0E+15.

- The maximum exponential difference between the lower and upper limits of the scale is 15.

- The alarm hysteresis is fixed to 0%.

- The alarm value is set using a voltage value.

- Alarm type is H/L/T/t.

3.4.2.2. Setting remote control

In the procedure given in section 10.9 in the DX200 User's Manual, assign "Freeze" or "Memory clear" to the remote control action.

3.4.2.3. Turning ON/OFF the time display

1. **Press the "MENU" key to enter the Set mode.**
2. **Press the "FUNC" key for three seconds to enter Setup mode.**
3. **Press the "Next" soft key numerous times until "AUX" appears.**
4. **Press the soft key corresponding to "AUX" to display the setting screen.**
5. **Move the cursor to "Time indicate" and set ON/OFF.**
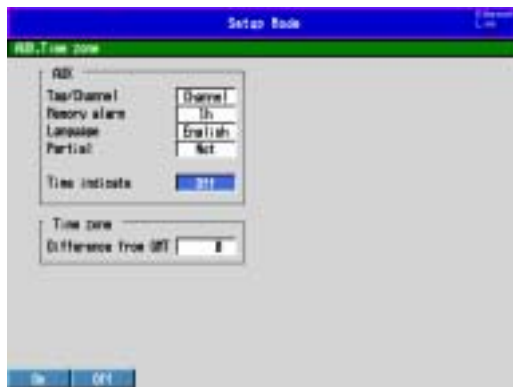
Fig. 3.4.1 Turning ON/OFF the time display

3.4.2.4. Setting the number of displayed digits for measured data

1. Press the "MENU" key to enter the set mode.

2. Press the "FUNC" key for three seconds to enter setup mode.

3. Press the soft key corresponding to "A/D" (DX100) or "Alarm, A/D" (DX200) to display the setting screen.

4. Move the cursor to "Display digits" and set 2 or 3.
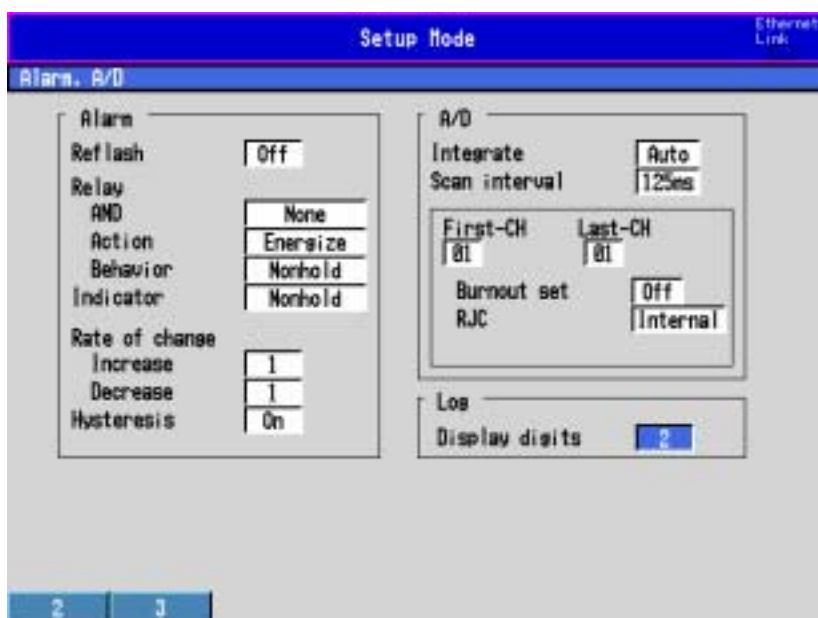
Fig. 3.4.2 Setting the number of displayed digits for measured data

3.4.3. Communication Commands

SR   Sets the input range.

Syntax	SR p1, p2, p3,p4, p5, p6, p7, p8, p9<terminator>
	p1 Channel number (DX100: 01 to 12, DX200: 01 to 30)
	p2 Input type (Log)
	p3 Measurement range (20 mV, 60 mV, 200 mV, 2 V, 6 V, 20 V, 50 V)
	p4 Lower limit of span
	p5 Upper limit of span
	p6 Lower limit of exponent (-15 to 15)
	p7 Upper limit of exponent (-15 to 15)
	p8 Decimal position (fixed to 0)
	p9 Unit (up to 6 characters)
Query	SR?
Example	Set CH2 to log display, the measurement range to 6 V, the span to -6 V to 6 V, the upper limit of exponent to -5, upper limit of exponent to 6, the decimal position to 0, and the unit to abc.
	SR 02, Log, 6V, -6000, 6000, -5, 6, 0, abc
Description	Make sure p7 - p6 does not exceed 15.
	For details on the other parameters, see the Communication Interface User's Manual.

QA   Sets the number of displayed digits of the mantissa.

Syntax	QA p1<terminator>
	p1 Number of displayed digits
		2 Display using two digits
		3 Display using three digits
Query	QA?
Example	Set the number of displayed digits of the mantissa to two.
	QA 2

QB   Stops/Resumes the updating of the display and clears the internal memory and the trend.

Syntax	QB p1<terminator>
	p1 Operation
		0 Resume the updating of the display.
		1 Stop the updating of the display.
		2 Clear the internal memory and the trend.
Query	QB?
Example	Stop the updating of the display.
	QB 1

QC   Turns ON/OFF the time display.

Syntax   QC p1<terminator>

                    p1   Turn On/Off the time display.

Query   QC? On: Time indicate On

                     Off: Time indicate Off

Example   Turn Off the time display.

             QC Off

3.5. Scale Display and Switching Display Rate

3.5.1. Specifications

a) Scale Display

You can display the current value instead of a mark for the trend display in the bar graph.

If several channels are assigned to a scale, only the first channel specified in the display group settings can be displayed for the current value of the scale in the bar graph.

Bar Graph Starting Point

When the direction of the trend display is vertical:

The starting point for the scale bar graph is the same as that when the measured value bar graph is horizontal.

When the measured value bar graph is vertical, the starting point for the scale bar graph also reverts to Standard.

When the display direction of the trend display is horizontal:

The starting point is the smallest numeric value on the height of the display from top to bottom.

b) Switch the Display Rate

When writing data to the internal memory by pressing START, the trend display update rate changes to the previously specified setting. If the display update rate is changed while data is being written to the internal memory, monitor data are created (separate from display data) to be used for displaying trend data.

- Monitor data cannot be saved to an external memory medium or output through communications.
- With historical trends, display data is displayed rather than monitor data.
- When loading trend displays by specifying an item in a summary list, display data is loaded.
- The position when the display update rate was changed is written to message 9.

Trend Display Data

DX200 models set to Horizontal trend display mode:

One scale, digital off, display trend screen is19.5 divisions of data

One scale, digital on, display trend screen is15 divisions of data

With combinations of total channels and maximum math computations configured for some DX200 models, past trend trace data may be less than the full screen 19.5 or 15 divisions as described above. The minimum trend trace data will always be at least 13 divisions of recent trend data once the unit has initially recorded the information. No data is lost in the archived data files. This may be noticed when switching screens or powering off and on the unit.

Number of Data

The number of TLOG, report, and manual sample data that can be saved to the internal memory is as follows:

	Main Unit	Standard DX
TLOG	30	400
Report	5	40
Manual Sample	5	50

When using Autosave, the above limits on the number of data do not apply since data is saved to the external memory medium at each "time up." When saving TLOG data using Autosave, a TLOG file is created every 30 data.

Note

If no external memory medium is installed, the number of data that can be saved to internal memory is reduced.

c) Message Display upon Restart after Power Failure

If a power failure occurs while saving data to the internal memory, once the power is resumed the time of resumption is displayed.

Message 9 appears in burgundy as follows: [Time/Date of Power Resumption Power Fail] (Ex.: May. 15 Power Fail). The time the message was written is displayed before the message.

Note

With the DX200's 4-screen display, no message is displayed.

With trend screen of DX200's 4-screen display, scale is displayed.

3.5.2. Procedure

3.5.2.1. Scale Display

1. Press DISP/ENTER to display the screen menu.
2. Press the right arrow key to display the submenu.
3. Choose SCALE BAR from the submenu. If the SCALE BAR does not appear, select the view display items then press DISP/ENTER one or two times. The display toggles between SCALE BAR, SCALE OFF, and SCALE ON.

3.5.2.2. Switching the Display Rate

1. Press MENU to enter set mode.
2. Press the #3 soft key to display the set screen.
3. Set the second display update rate. The available settings are the same as the standard display update rate settings.
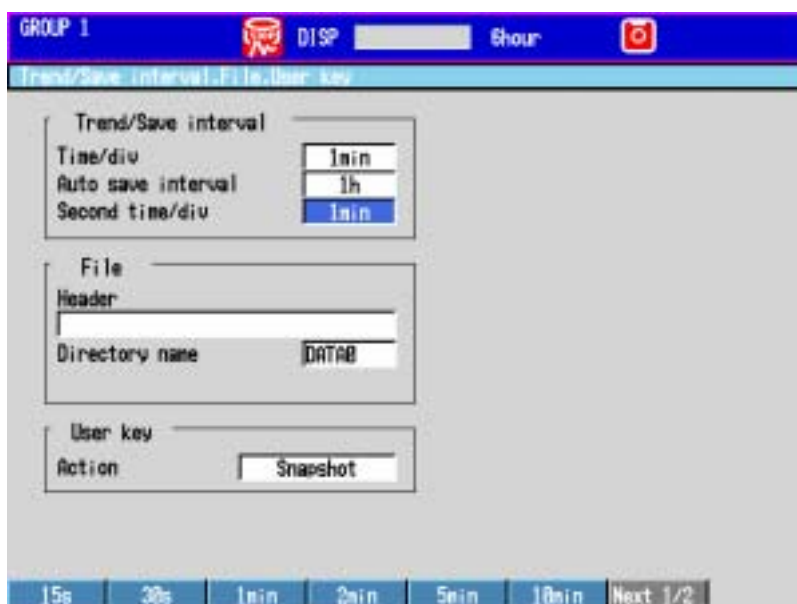
Fig. 3.5.1 Switching the Display Rate

Switching the Display Update Rate

There are four methods for switching the display update rate.

- Using the FUNC key (see section 3.4, "Run Mode" in the standard user's manual).
- Using the remote control function (with the /R1 option, see section 10.9, "Setting the Remote Control Functions (/R1 Option, Basic Setting Mode)" in the standard user's manual.
- Using communications commands (see page 20)

- Using internal switch function (see page 29)

3.5.3.   Communication Commands

QE   Set the 2nd display update rate

Syntax   QE p1<terminator>

>> p1   2nd display rate
>>
>> (15 s*, 30 s*, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, 1 h, 2 h, 4 h, 10 h)
>>
>> *:15 s and 30 s for the DX102, DX104, DX204, and DX208 only

QF   Switching the display update rate

Syntax   QF p1<terminator>

>> p1   Operation Type
>>
>> 0 Changes to the 1st rate (standard rate)
>>
>> 1 Changes to the 2nd rate

UD p1, p2, p3, p4, p5

Adds p4 to BAR

Syntax   UD p1, p2, p3, p4, p5<terminator>

>> p1   Switching the Display (4)
>>
>> p2   Enables/disables automatic monitor scroll (ON, OFF)
>>
>> p3   Switches all channel display and group display (ALL, GROUP)
>>
>> p4   Turns scale display on and off, and sets the type (ON, OFF, BAR)
>>
>> On Displays the scale display with a mark (same as standard unit)
>>
>> OFF   No scale display
>>
>> BAR   Displays scales in a bar graph
>>
>> p5   Turns the digital display ON/OFF (ON/OFF)
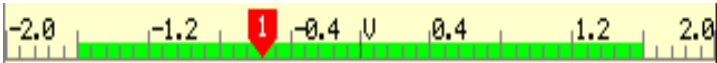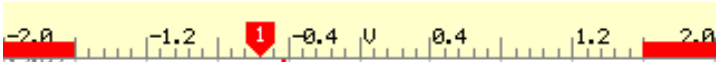
3.6. Green Band and Alarm Mark Display Functions

3.6.1. Green Band Display Function

3.6.1.1. Specifications

a) In the scale and bar graph views of the trend window, green bands are displayed in the specified color. (For display examples, refer to Figs. 3.6.1 and 3.6.2.)

b) The green band area can be set either inside or outside the specified positions.

Table 3.6.1 Green Band type

Selection	Display example
Inside	
Outside	

c) The top and bottom of the Green Band area are set within the range of 0 to 100%. Up to 1% width can be set.

3.6.1.2. Green Band Display Image

a) Trend Window
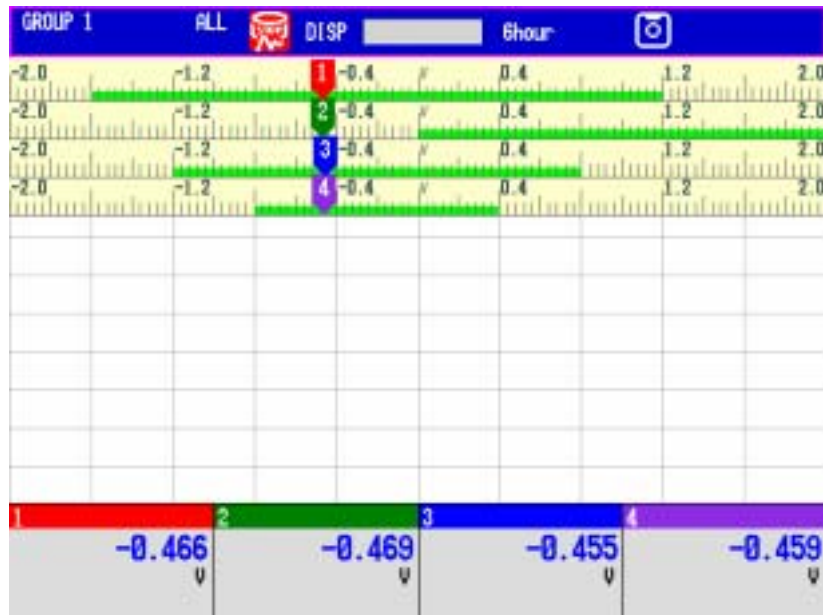
Fig. 3.6.1 Green Bands on scales

b) Bar Graph Window
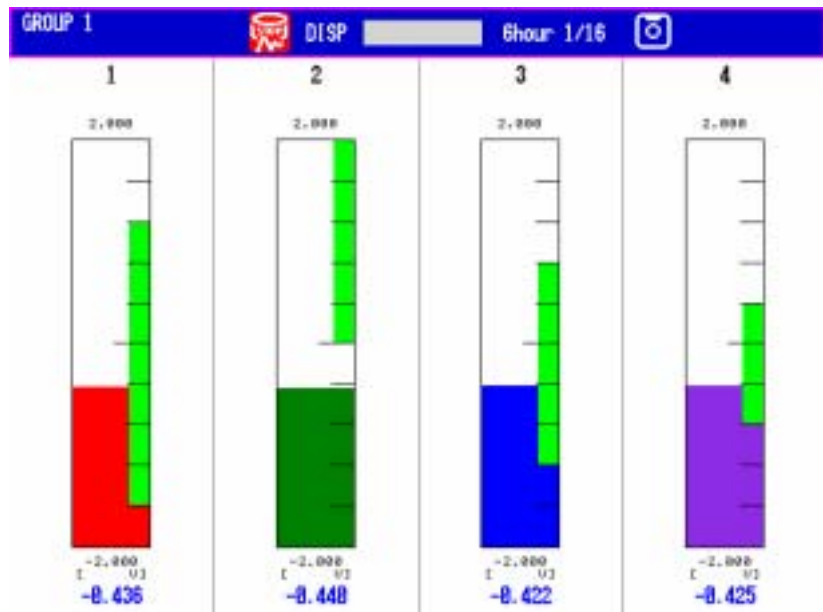
Fig. 3.6.2 Green Bands on bar graphs

3.6.2. Alarm Mark Display Function

3.6.2.1. Specifications

a) Displays alarm marks on the scales and bar graphs of the trend window.

b) Alarm marks are shown in the following colors.
The display colors will not change even if alarms occur.

Table 3.6.2 Alarm Mark display colors

Alarm level	Color
Level 1	Red
Level 2	Orange
Level 3	Orange
Level 4	Red

c) Alarm marks will be displayed only for the following alarm types.

- Upper-limit alarm (H)
- Lower-limit alarm (L)
- Delay upper-limit alarm (T)
- Delay lower-limit alarm (t)

d) If an alarm value is set beyond the scale upper or lower limit, an alarm mark will be displayed at the corresponding edge of the scale.

3.6.2.2.   Display Images

a) Trend Window
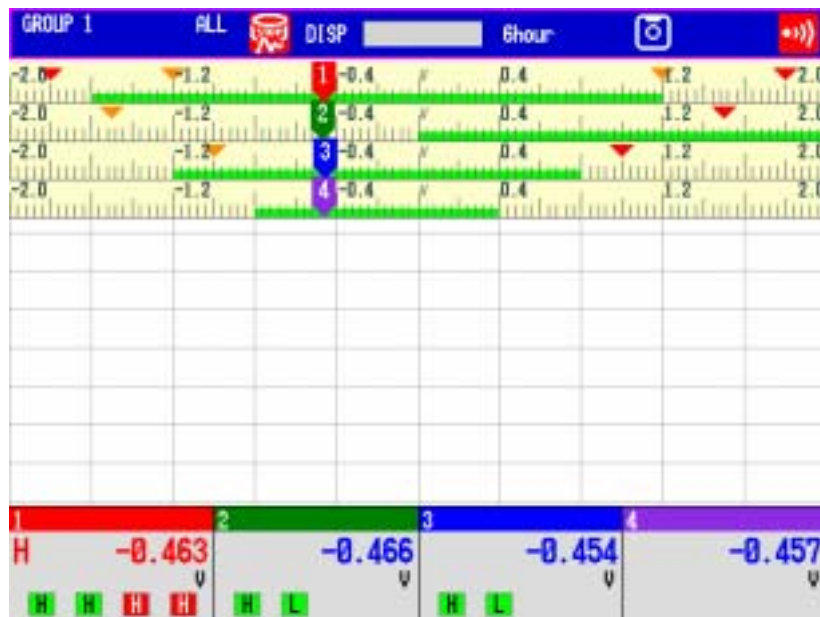
Fig. 3.6.3 Alarm Marks on scales

b) Bar Graph Window
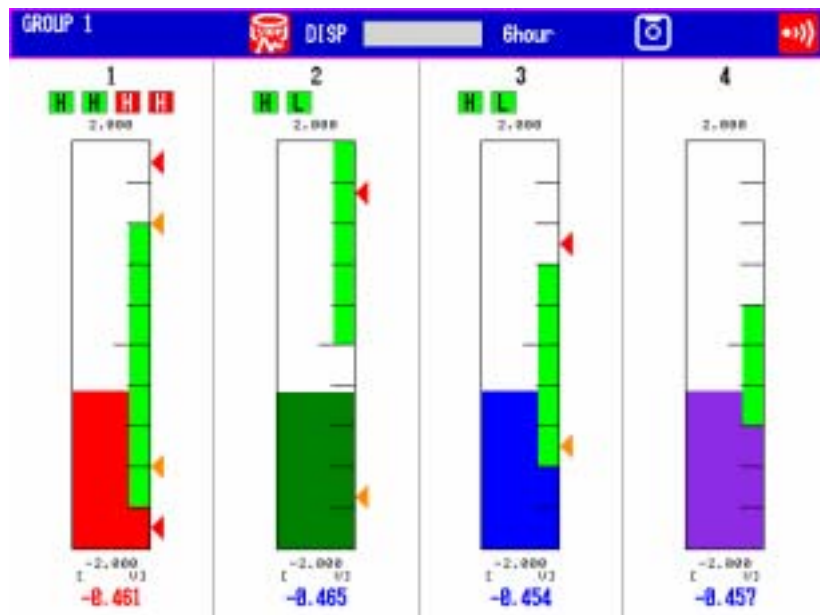
Fig. 3.6.4 Alarm Marks in bar graphs

3.6.3. Procedure

1. Press the "MENU" key to enter the Set mode.
2. Press the soft key corresponding to "Display".
3. Press the soft key corresponding to "Zone, Graph".
4. Move the cursor to items shown in Table 3.6.3 and select items or input number.
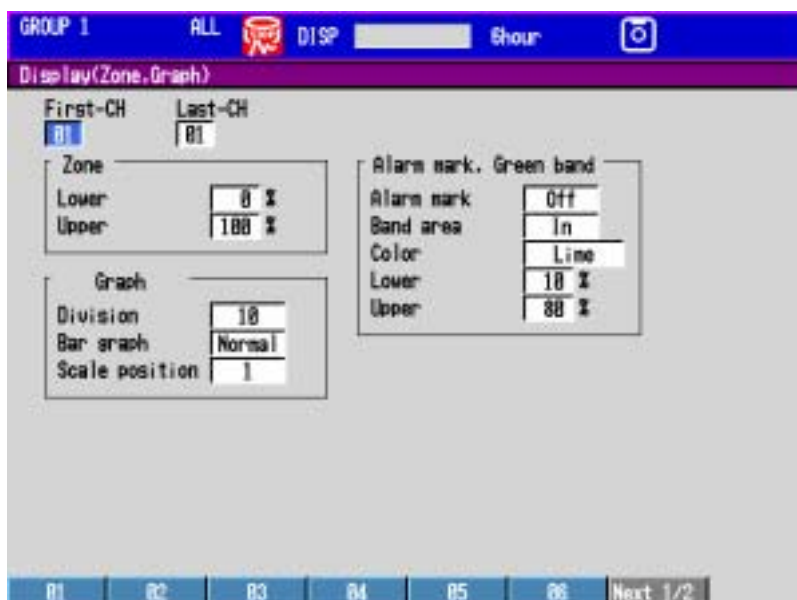
Fig. 3.6.5 Green Band and Alarm Mark setting menu

Table 3.6.3 Items to be added

No.	Description	Item Name	Selection	Description
1	Presence/absence of alarm marks on scale	Alarm mark	On	Displayed
			Off	Not displayed *
2	Presence/absence of green bands	Band area	Off	Not displayed
			In	Displayed inside specified positions
			Out	Displayed outside specified positions
3	Green band color	Color	Selectable color for waveform	
4	Green band position (lower)	Lower	0 to 99	%
5	Green band position (upper)	Upper	1 to 100	%

*: If "None" is selected, alarm marks on bar graphs shall be the same as those provided on the standard model.

3.6.4. Communication Commands

- A new command to show or hide alarm marks and green bands shall be added.

  QHp1, p2, p3, p4, p5, p6   Display settings for alarm mark and green band

  - p1: Channel no. (01 to 60)
  - p2: Set whether to show or hide alarm marks on scale. (ON/OFF)
  - p3: Set whether to show or hide green bands on scale. (ON/IN/OUT)
  - p4: Green band color. (RED, GREEN, BLUE, BROWN, PURPLE, ORANGE, LIGHT BLUE, GRAY, VIOLET, YELLOW, DARK BLUE, CYAN, Y. GREEN, LIME, B. VIOLET, LIGHT GRAY, BLACK)
  - p5: Green band bottom position (0 to 99)
  - p6: Green band top position (1 to 100)

3.7. Media FIFO Function

3.7.1. Specifications

a) When media FIFO is selected, when the external media becomes full or the number of files in the folder reaches 1,000, the oldest file will be deleted and the latest data file will be saved.

b) All the files in the specified folder are subject to automatic deletion.

c) In the following cases, files will not be deleted even if they are old.
   * If the folder name is changed, data files in the previous folder name will not be deleted.
   * Read-only files, system files, hidden files

d) No warning will be given even if the remaining capacity on the external media reaches less than 10% of total capacity. The following will take place if an error occurs with the external media.
   * The media icon in the status display area switches to an error mark.
   * Memory full relay will be excited.
   * An E-mail will be sent.
   * Status information of communication interface will be shown.

e) ACK will be issued as shown below in case of media error.
   * After media error occurrence, media check is performed in case of the front door closed, and ACK will be issued if it is confirmed that the media is normal and if media format is done normally. However, ACK will not be issued if the front door is closed in the basic setting mode (setup mode).
   * After ACK is issued, the media icon will return to the original mark.

f) The following files will be re-created when they exceed 100 k bytes in file size. (The files will be divided into blocks.)
   * Manual sample, report data (weekly report, monthly report) *, TLOG data
     *: For hourly and daily reports, the file split function is provided as standard feature

g) The media FIFO function is effective only for those models equipped with ZIP or ATA card.

3.7.2. Procedure

1. Press the "MENU" key to enter the Set mode.
2. Press the "FUNC" key for three seconds to enter the Setup mode.
3. Press the "Next" soft key numerous times until "AUX" appears.
4. Press the soft key corresponding to "AUX" to display the setting screen.
5. Move the cursor to "Media FIFO" and select "On/Off".
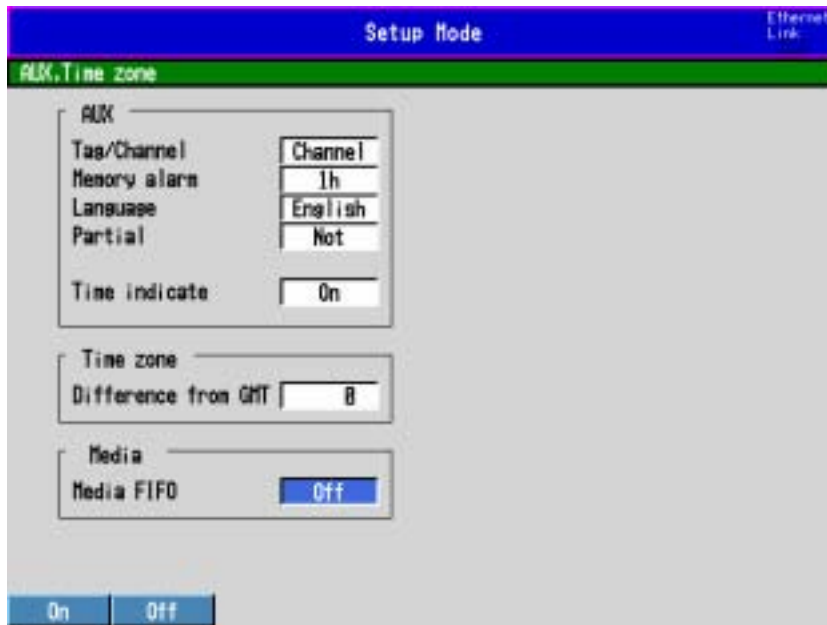
Fig. 3.7.1 Enabling/Disabling media FIFO function

3.7.3. Communication Commands

- A command allowing you to enable or disable the media FIFO function added.

  QIp1

  p1: Set whether to enable or disable the media FIFO function. (ON, OFF) With the floppy disk model, it is not possible to select "ON".

3.8. Internal Switch Function

3.8.1. Specifications

a) 30 internal switches (S01 to S30) added.

∗ Assignment to internal switches is made using alarm relay setting item.
In addition to I01 to I36, S01 to S30 can be selected.

b) Assignment of actions in the basic setting menu.

∗ Actions that can be assigned are given in the table below.

Table 3.8.1 Functions that can be assigned to Internal switches and their names

Function	English	
	Menu	FUNC key
Memory start/stop	MemoryStart/Stop	Memory (DX100) Start/Stop(DX200)
Event data trigger	Trigger	Trigger
Alarm ACK	AlarmACK	AlarmACK
Math start/stop	MathStart/Stop	Math
Math reset	MathReset	Math rst
Manual sample	ManualSample	M.sample
Snap shot	SnapShot	Snapshot
Message writing [1]	Message	Message
Screen refresh stop (Simulation)	Freeze	Freeze
Memory clear (Simulation)	Memory Clear	Clear
Display rate change	Rate Change	Change
No assignment	None	None

*1: Message group Nos. and message Nos. need to be set separately
*2: Used by the simulation function.
*3: To be added for this custom-made order.

3.8.2. Procedure

1. Press the "MENU" key to enter the Set mode.

2. Press the "FUNC" key for three seconds to enter the Setup mode.

3. Press the "Next" soft key numerous times until "Switch-Action settings" appears.

4. Press the soft key corresponding to "Switch-Action settings" to display the setting screen.

5. Move cursor to items that are shown in Table 3.8.2 and select one.

Fig. 3.8.1 Setting Internal switches

Table 3.8.2 Items to be added

No.	Description	Item Name	Selection
1	Internal switch No.	Switch No.	S01 to S30
2	Action to be assigned to internal switch	Action	Refer to Table 10.1
3	Message group No.	Message group	1 to 7
4	Message No.	Message No.	1 to 8

3.8.3.   Communication Commands

- Commands to assign actions to internal switches shall be added.

QJp1, p2, p3, p4

    p1: Internal switch No. (S01 to S30)

    p2: Action to be assigned

NONE	No action
ALARM ACK	Alarm ACK
MEMORY START/STOP	Memory start/stop
MANUAL SAMPLE	Manual sample
TRIGGER	External trigger input (event data)
MESSAGE	Message writing
MATH START/STOP	Math start/stop
MATH RESET	Math reset
SNAPSHOT	Snap shot
FREEZE	Screen refresh stop
MEMORYCLEAR	Memory clear
RATECHANGE	Display rate change

    p3: Message group No.
          Effective when p2 = MESSAGE
          1 to 7

    p4: Message No.
          Effective when p2 = MESSAGE
          1 to 8

3.9. MEDIA key

3.9.1. MEDIA key

This will be pressed when the external storage medium is inserted to the drive.
The storage medium is detected. And the icon of external storage medium appears on the status display section.

3.9.1. Manual Save

In case that the way of manual save setting is selected as saving to the external storage medium, save data as following directions.

a) Insert the external storage medium into the drive .

b) Push MEDIA key and the external storage medium will be inspected.
   The internal memory data can be saved into the external storage medium.

3.10. Auto Recovery Function of Modbus Master

3.10.1. Specifications

a) Auto recovery function, which functions if the communication is disconnected by communication fail or faulty slave device, is built-into the Modbus master function.

b) The Modbus master auto recovery is set up using the communication setup "Modbus master" in the setup mode. When using the auto recovery function, an auto recovery cycle is set at the same time.

c) The Modbus master auto recovery function is performed at intervals of cycles set in from the hour (zero minute position). The auto recovery is performed for all connected slave devices.

3.10.2. Procedure
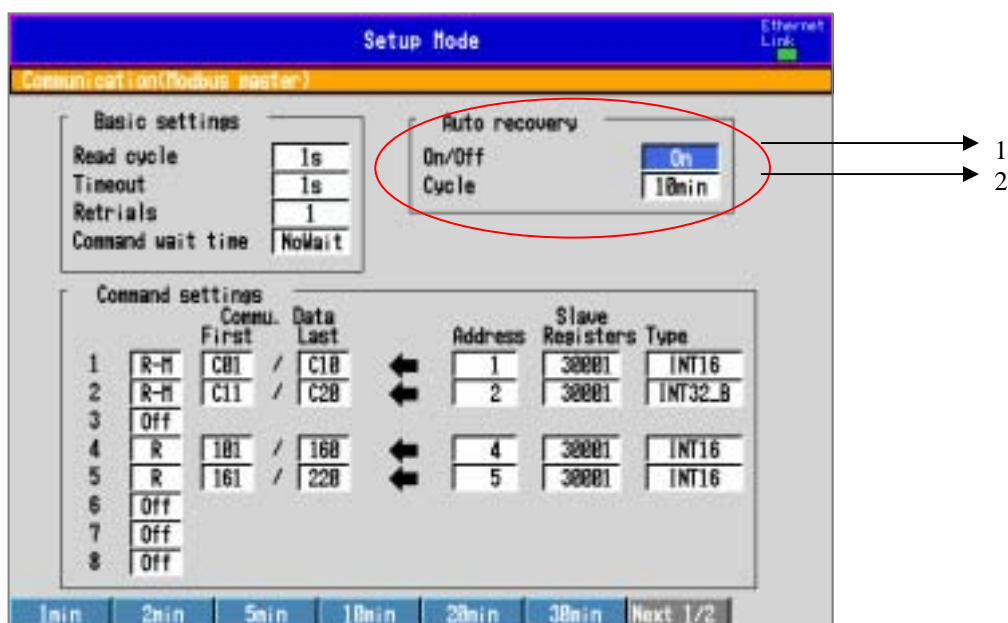
Fig. 3.10.1   Modbus master setup screen

Table 11.1 shows the setting items of the Modbus master auto recovery.

Table 3.10.1   Setting items of Modbus master auto recovery

No.	Setting item	Setting range	Contents
1	On, Off	On, Off	Set whether or not the auto recovery function is used. When selecting [On], items used to set the auto recovery cycle are displayed.
2	Cycle	1min, 2min, 5min, 10min, 20min, 30min, 1h	When using the auto recovery function, set an auto recovery cycle.

3.10.3 Communication Commands

The following shows the communication command to set the Modbus master auto recovery.

MM p1,p2

p1:   Auto recovery function On/Off (On/Off)

p2:   Auto recovery cycle (1min/2min/5min/10min/20min/30min/1h)

3.11. Changing of DST (Daylight saving time) setting method

3.11.1. Specifications

By setting the month, day of the week, week, and time, it becomes unnecessary to set the DST every time the system is started up.
Be sure to set Time Zone when using DST.

3.11.2. Procedure

The DST is set on the screen in the set mode.
When selecting the [DST] soft key, the DST setup screen (see Fig. 3.11.1) will appear.
On this screen, the specified DST can be set.
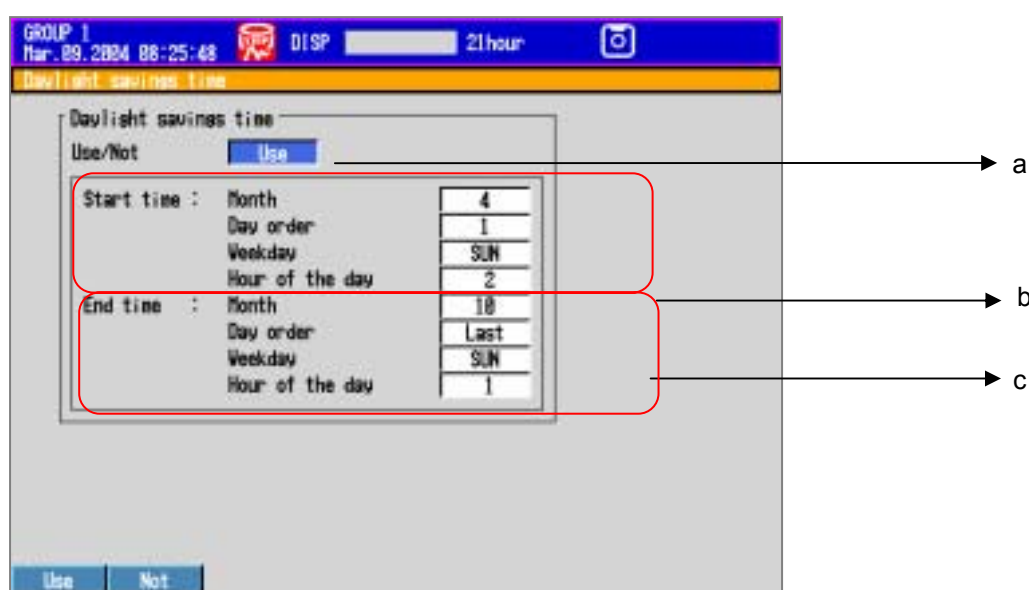
Fig. 3.11.1 DST setup

a) DST Use/Not setting
- To use the DST, select [Use].
- When selecting [Use], the summer time/winter time setting item screen will appear.

b)   DST setting (Start time)
1. [Month]:

A month to change the time system to the DST is set. (1 to 12)

2. [Day order]:

Where the day of the week to change the time system to the DST ranks in the month is set.

([1], [2], [3], [4], [Last])

3. [Weekday]:

The day of the week to change the time system to the DST is set. (Sunday to Saturday)

4. [Hour of the day]:

An hour to change the time system to the DST is set. (0 to 23)

c) Winter time setting (End time)

1. [Month]:A month to change the time system to the standard time is set. (1 to 12)

2. [Day order]:

Where the day of the week to change the time system to the standard time ranks in the month is set. ([1], [2], [3], [4], [Last])

3. [Weekday]: The day of the week to change the time system to the standard time is set. (Sunday to Saturday)

4. [Hour of the day]:

An hour to change the time system to the standard time is set. (0 to 23)

3.11.3. Communication Commands

a) DST enable/disable setting

RD p1

p1:   DST enable/disable (On/Off)

b) Summer/winter time setting

RT p1,p2,p3,p4,p5,p6,p7,p8

p1:   Month to change to the DST

p2:   Week No. to change to the DST (Where the day of the week to change to the DST ranks in the month.)

p3:   Day of the week to change to the DST

p4:   Hour to change to the DST

p5:   Month to change to the winter time

p6:   Week No. to change to the standard time (Where the day of the week to change to the standard time ranks in the month.)

p7:   Day of the week to change to the standard time

p8:   Hour to change to the standard time

3.12. Gradual Time Correction Function

3.12.1. Basic Specifications

a) A function is added that corrects the time gradually and completes the time change without effects on the measurement interval if it is required to change the time when operating the key during memory start.

b) This gradual time correction function applies to all time changes of DX during memory start.

1. Time change by key operation
2. Time change by communication command
3. Time change by remote time adjustment function
4. Time change by SNTP client function (For details about SNTP, see section 3.13, SNTP server/client functions.)

c) Before using the gradual time correction function, a critical value is set for the difference between the current time and the time to be adjusted.

1. When the difference between the time to be adjusted and the time set on DX exceeds the set critical value if any factor needing the time change arises, the time is not corrected gradually, but the time is corrected at once.
2. When [Off] is selected during setting of time deviation limit, the gradual time correction function does not function.

d) The gradual time correction function adjusts the time at a rate of 15.625 msec./sec.

e) The time on the status display screen is shown in yellow while the time is being corrected gradually.

f) The gradual time correction function functions only when the following two conditions are satisfied. In other case, the time is not corrected gradually, but the time is changed at once.

1.   Operation must be in the memory start status
2. The difference between the time to be adjusted and the time set on DX must be within time deviation limit if any factor needing the time change occurs.

3.12.2. Gradual Time Correction Function Setting

3.12.2.1. Settings on Screen

a) To set up the gradual time correction function, select [Date & Time, Time zone] in the setup mode.

b) When selecting [Date & Time, Time zone], the screen shown in Fig. 3.12.1 will appear.

c) Set a critical value for the difference between the time to be adjusted and time set on DX in the [Time deviation limit] setting item.

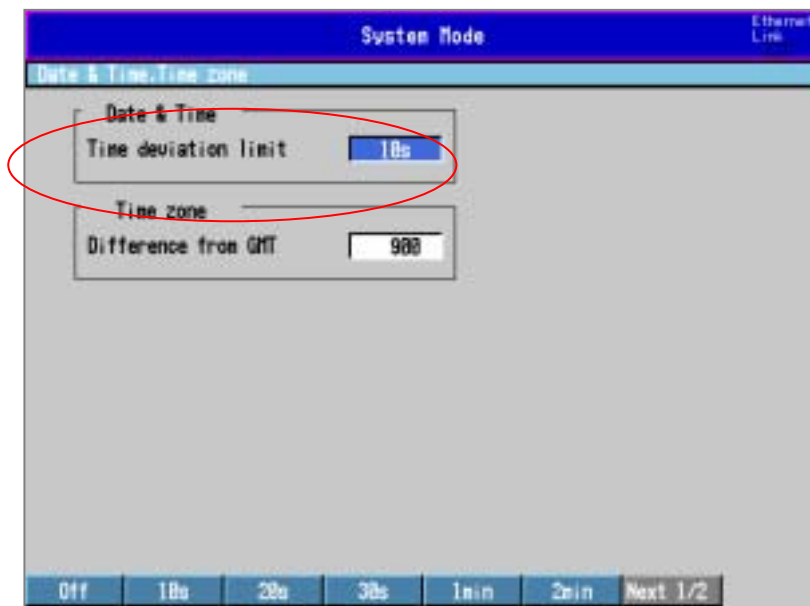d) Select a desired setting from the following.

Fig. 3.12.1 Gradual time correction function setup screen

3.12.2.2. Communication Command

The gradual time correction function is set using the "RG" command.

RG p1

p1:   Critical value for difference between time to be adjusted and current time

3.13. SNTP Server/Client Functions

3.13.1. Specifications of SNTP Server Function

a) DX is operated as SNTP server.

b) When operated as SNTP server, the time resolution becomes 15.625 msec.

c) When operated as SNTP server, the port number is fixed at "123".

3.13.2. Specifications of SNTP Client Function

a) When using the SNTP client function, the time of DX is adjusted to the time of the SNTP server.

b) There are three kinds of methods to access the time of the SNTP server as described below.

1. Periodic access
- The access interval may vary depending on the setting.
2. Access when executing the memory start
- This operation may vary depending on the On/Off setting.
3. Access by manual operation

c) The time correction operation may vary depending on the memory sample status of DX.

1. During memory start: When the gradual time correction function is set enabled, the ime is corrected gradually. (For details, see section 3.12, Gradual time correction function.)
2. During memory stop: The time is adjusted at once as the time adjustment is requested.

d) The access log from the SNTP client to the SNTP server is recorded in "SNTP log". The "SNTP log" can be checked through the screen of DX or by outputting the log using the communication command.

e) An error of 125 msec. or less is not corrected.

f) If the time cannot be corrected by the SNTP client function, relevant error is given. The following shows error occurrence conditions.

1. Access to the SNTP server is failed due to response time-out.
2. The contents of the response from the SNTP server are illegal.
3. If the time difference between DX and the SNTP server exceeds ±10 min. during periodic access, the time is not corrected.

3.13.3. Procedure

a) To set up the SNTP function on the screen, select the [SNTP] soft key in the setup mode.

b) When selecting the [SNTP] soft key, two selection items related to SNTP are shown as described below.

1. [#1 Basic settings]
- Make the settings related to the basic operation of the SNTP server/client.

2. [#2 SNTP synched to start]
- Set the time access On or Off when executing the memory start.

3.13.3.1. SNTP Basic Setting

When selecting [#1 Basic settings], the screen shown in Fig. 3.13.1 will appear.
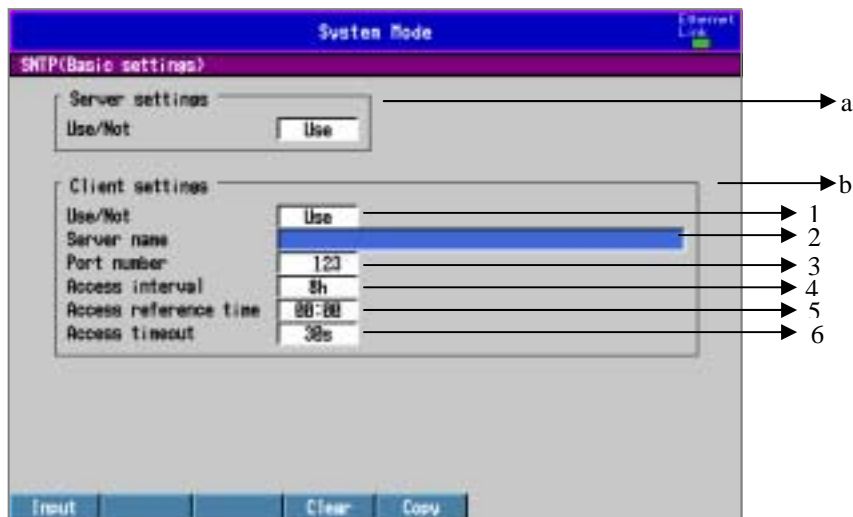
Fig. 3.13.1 SNTP basic setup screen

a) SNTP server function setting
- This setting is used to set up whether or not DX is operated as SNTP server.
- Select [Use] or [Not].

b) SNTP client function setting
1. SNTP client function enabled/disabled
- Select [Use] or [Not].
- When [Not] is selected, the following setting items cannot be set.
   [Server name, port number, access interval, access reference time, time-out]
2. Server name
- Set a SNTP server name using the host name or IP address.
3. Port number
- Set a port number of the SNTP server.
- The initial value is "123".

4. Access interval
- Set a time interval to access the time of the SNTP server.
- When [Off] is selected, the periodic access to the SNTP server is not performed.
5. Access reference time
- The access to the SNTP server is performed at intervals based on the set reference time.
- Set a hour and minute.
- When the access interval is set at [Off], this setting becomes invalid.
6. Time-out
- Set a period of time to wait for response from the SNTP server.
- Select a time-out from [10s], [30s], and [90s].

3.13.3.2. Communication Commands for SNTP Basic Setting

a) The SNTP server function is set using the [WA] command.

WA p1

p1:   SNTP server function enabled/disabled. (Use, Not)

b) The SNTP client function is set using the [WB] command.

WB p1, p2, p3, p4, p5, p6

p1:   SNTP client function enabled/disabled. (Use, Not)

p2:   SNTP server name (Up to 64 alphanumeric characters)

p3:   Port number of SNTP server (0 to 65535)

p4:   Access interval (Off, 1h, 8h, 12h, 24h)

p5:   Access reference time (00:00 to 23:59)

p6:   Time-out (10s, 30s, 90s)

3.13.3.3. SNTP Operation Setting at Memory Start

a) When selecting [#2 SNTP synched to start], the screen shown in Fig. 3.13.2 will appear.

b) This setting is used to correct the time using the SNTP client when executing the memory start.

c) Select [On] or [Off].

d) The memory start is executed regardless of the time adjustment by SNTP.

e) This setting is valid even in the memory start by the remote or communication command.

Fig. 3.13.2   Screen for SNTP setup at memory start

3.13.3.4. Communication Command for SNTP Operation Setting at Memory Start

The SNTP operation at memory start is set using the [WC] command.

WC p1

p1:   SNTP time adjustment On/Off at memory start (On, Off)

3.13.4. SNTP Operation at Memory Start

a) The access to the SNTP is performed at memory start. However, if any response is not received from the SNTP server within 2 sec. after that, the memory start is executed regardless of access to the SNTP server.

b) If the access to the SNTP server is succeeded after memory start, the same operation as the time setting during memory start is performed.

c) The communication response of the memory start (PS0) by the communication command shows whether or not the memory start is succeeded.

   Whether or not the SNTP access is succeeded at memory start is checked using "status information 2" of the status byte.

Table 3.13.1 Status information 2 of SNTP operation at memory start

Bit	Name	Description
4	SNTP operation at start	This bit becomes "1" if the time is not adjusted by SNTP.

3.13.5 SNTP Operation with Manual Operation

a) From the menu screen that appears by selecting the FUNC key, select [SNTP] to execute the SNTP operation.

- [SNTP] can be selected only when the SNTP client function is set at [Use].
- The SNTP operation can be executed regardless of the memory start/memory stop status.

b) If any response is not returned from the SNTP server or if the contents of the response are illegal, relevant error is given.

c) Communication command
- The SNTP operation is performed using the "CL" command.

   CL p1

   p1:   Time adjustment with manual operation (0: Run)

3.13.6. SNTP Log

a) The operation log of the SNTP (SNTP log) can be checked on the screen of DX.

- From the menu screen that appears by selecting the FUNC key, select [LOG] and [SNTP] in that order. The SNTP log appears on the screen.

- Fig. 3.13.3 shows an example of the SNTP log screen.
- Table 3.13.2 shows the list of detailed codes shown on the SNTP log screen.


```
(002/002) Time          No. Code
Feb.29.2004 16:32:15     SUCCESS
Feb.29.2004 16:31:52  290 LINK
```

Date and time when getting   Error No   Detailed code
access to the SNTP server

Fig. 3.13.3 Example of SNTP log screen

Table 3.13.2 List of SNTP log error codes

Detailed code	Contents
SUCCESS	Succeeded.
OVER	Value exceeds the correction critical value.
DORMANT	Internal process error
HOSTNAME	It is failed to match the host name.
TCPIP	Internal process error
SEND	It is failed to send the request.
TIMEOUT	Response time-out occurs.
BROKEN	Packet is corrupted.
LINK	Data link is broken.

b) The SNTP log is output through the communication using the [FL] command.

1. Communication command

    FL p1,p2

    p1:   Type of log (SNTP)

    p2:   Maximum read-out length of log (1 to 50)

2. Output format

    yy Year (00 to 99)

    mo Month (01 to 12)

    dd Day (01 to 31)

    hh Hour (00 to 23)

    mi Minute (00 to 59)

    ss Second (00 to 59)

    nnn   Error code (blank or __1 to 999)

    xxxxxxxxx Detailed code (9 characters)

3.14. Others

3.14.1. Addition of Waveform Colors

a) Black color added as waveform color.

b) The background of the historical trend window is changed to a color that allows recognition of the black color.

c) With Yokogawa's Viewer software such as DAQSTANDARD, dark blue will be used.

3.14.2. Increased Number of Characters Used in Arithmetic Expressions

a) Up to 120 characters can be used in arithmetic expressions.

b) Stack (number of channels and constants used in arithmetic expressions) shall be extended to 35.

c) The number of constants for DX100 are increased to 30.

3.14.3. Changing Historical Window Switch Method

1. When the "DISP/ENTER" key is pressed on the trend window, the cursor is placed on the historical trend menu.

   ∗ Pressing the "DISP/ENTER" key again causes historical trend to reappear.
   ∗ If the "DISP/ENTER" key is pressed on a window other than the trend window, the cursor shall be placed on the menu that indicates the current window.
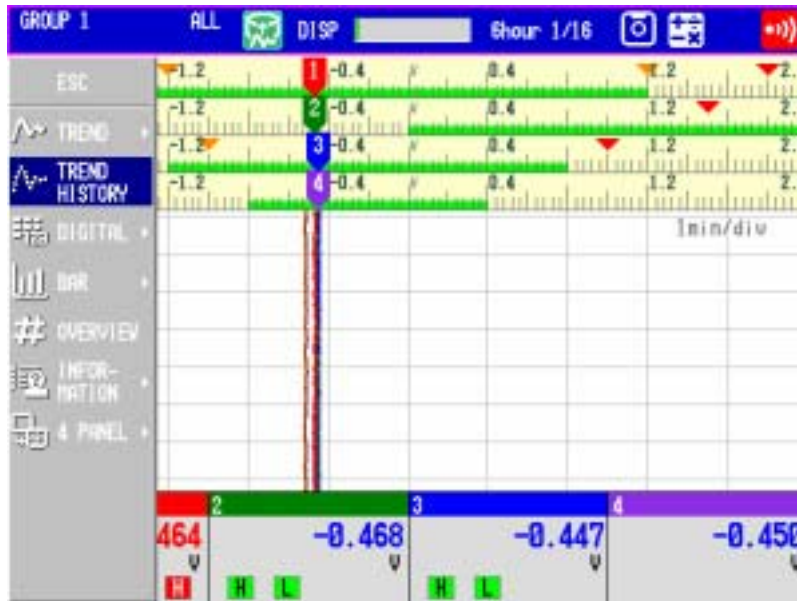
2. The menu to switch to the historical window is located below the trend.

Fig. 3.14.1 Window switch menu