HIOKI

MR8904

Instruction Manual

CAN UNIT

EN

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MR8904A981-03 18-09H

6003690 63

Contents

Introduction

Thank you for purchasing the Hioki Model MR8904 CAN Unit. To obtain maximum performance from the MR8904, please read this manual first, and keep it handy for future reference.

Registered trademarks

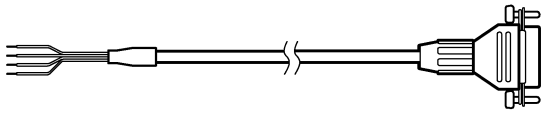
- Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.
- CANdb is a registered trademark of Vector Infomatik in Germany.

Confirming Package Contents

When you receive the MR8904, inspect it carefully to ensure that no damage occurred during shipping. In particular, check the accessories and connectors. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

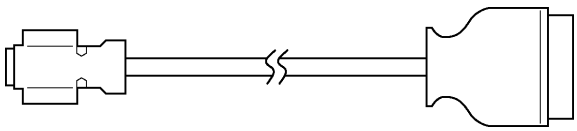
Options

■ Model 9713-01 CAN Cable



(No connector on one end; approx. 2 m)

■ Model 9713-02 CAN Cable



(For vehicle equipment connectors; approx. 2 m; made to order; check specifications and availability)

Safety Notes

This manual contains information and warnings essential for safe operation of the MR8904 and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

DANGER

This MR8904 is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the MR8904. Using the MR8904 in a way not described in this manual may negate the provided safety features.
Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from MR8904 defects.

Safety Symbols

⚠	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the MR8904.
	The ⚠ symbol printed on the MR8904 indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.

Hazard Labeling

The following symbols in this manual indicate the relative importance of cautions and warnings.

DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
WARNING	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the MR8904.
NOTE	Indicates advisory items related to performance or correct operation of the MR8904.

Notation

- Unless otherwise specified, “Windows” represents Windows XP, Windows Vista, Windows 7, or Windows 8.
- Menus, commands, dialogs, buttons in a dialog, and other names on the screen and the keys are indicated in brackets.

(p.)	Indicates the location of reference information.
	Indicates quick references for operation and remedies for troubleshooting.

Mouse action terminology

Click	Press and quickly release the left button of the mouse.
Right-click	Press and quickly release the right button of the mouse.
Double click	Quickly click the left button of the mouse twice.
Drag	While holding down the left button of the mouse, move the mouse and then release the left button to deposit the chosen item in the desired position.
Activate	Click on a window on the screen to activate that window.

Usage Notes

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

Operating temperature and humidity: As per Memory HiCorder specifications

Storing temperature and humidity:

Temperature: -20°C to 60°C (-4 to 140°F)

Humidity : -20°C to 40°C (-4 to 104°F) 80%RH or less (non-condensating)
40°C to 45°C (104 to 113°F) 60%RH or less (non-condensating)
45°C to 60°C (113 to 140°F) 50%RH or less (non-condensating)

Avoid the following locations that could cause an accident or damage to the instrument.

Exposed to direct sunlight
Exposed to high temperature

In the presence of corrosive or explosive gases

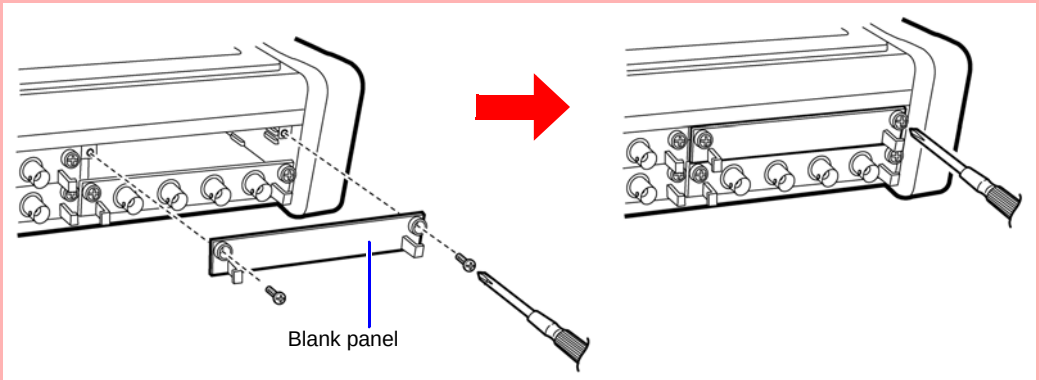
Exposed to water, oil, other chemicals, or solvents
Exposed to high humidity or condensation

Exposed to high levels of particulate dust

When Installing and Removing the MR8904 into and from the Memory HiCorder

⚠WARNING

- **To avoid electric shock accident, before removing or replacing an MR8904, confirm that the instrument is turned off and that the power cord and connection cables are disconnected. The mounting screws must be firmly tightened or the MR8904 and the Memory HiCorder may not perform to specifications, or may even fail.**
- **To avoid the danger of electric shock, never operate the Memory HiCorder with an input module removed. To use the Memory HiCorder after removing an input module, install a blank panel over the opening of the removed module.**



⚠CAUTION

Measurements made without a blank panel installed may fail to meet specifications because of temperature instability within the input modules.

See: "3.1 Installing and Removing the MR8904 into and from a Memory HiCorder" (p.11)

When Connecting the MR8904 and the Object under Measurement

⚠DANGER **This device is designed to collect messages being transferred on the CAN bus and to send messages to the CAN bus. Do not connect it to anything other than a CAN bus. In addition to damaging the Memory HiCorder, CAN Unit, and measurement target, doing so may cause bodily injury.**

⚠WARNING **Use of the CAN Unit may affect the operation of the CAN bus as well as systems connected to the CAN bus. The resulting operation may cause bodily injury or property damage. Verify how CAN Unit use, both proper and inadvertent, may affect associated systems before use.**

⚠CAUTION

- When connecting the MR8904 to a CAN bus, exercise care not to connect the power supply and ground lines backwards. Doing so may damage the MR8904 and measurement target.
- When measuring low-speed CAN or single-wire CAN buses, the Memory HiCorder ground and measurement cable ground lines are not isolated. Wire the system so that no potential difference occurs between the ground lines. Failure to do so may damage the Memory HiCorder, CAN Unit, and measurement target.
- When connecting the CAN unit to a low-speed CAN or single-wire CAN bus, power must be supplied form an external source. Since the Memory HiCorder's ground and measurement cable ground lines are not isolated in this configuration, be sure to provide power from a circuit with the same ground. Failure to do so may damage the Memory HiCorder, CAN Unit, and measurement target.

See: "3.2 Connecting the Unit to the Measurement Target" (p.12)

Transport and Handling

⚠CAUTION To avoid damage to the MR8904, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.

NOTE This device may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Before Use

Before using the MR8904 for the first time, verify that it operates normally to ensure that no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.

⚠WARNING **Before using the MR8904, make sure that the insulation on the cables is undamaged and that no bare conductors are improperly exposed. Using the product in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.**

Product Overview Chapter 1

The MR8904 is an input module for Memory HiCorder that captures necessary data from CAN bus signaling and transfers analog or logic signals to a Memory HiCorder as waveform data.

- When you connect the Memory HiCorder to a PC with a USB cable, you can configure the MR8904 from the PC with the MR8904 CAN Editor application (the USB cable and application are included with the Memory HiCorder).
- Up to 200 CAN definitions can be registered.

The MR8904 is a Memory HiCorder option. It should only be used when installed in a Memory HiCorder.
Supported models: MR8875

1.1 Features

Extensive number of output channels

The MR8904 provides an extensive number of output channels, including 15 analog channels and a 16-bit logic channel.

Two independent input ports

The device's independent CAN1 and CAN2 ports allow it to be connected to different networks with different CAN bus types or baud rates.

Support for three types of CAN bus

A single MR8904 provides support for three types of CAN bus: high-speed CAN, low-speed CAN, and single-wire CAN.

Automatic baud rate configuration

The MR8904 monitors the CAN bus and automatically configures the baud rate accordingly, eliminating the need to make troublesome settings (12 baud rates are supported: 10k, 20k, 33.3k, 50k, 62.5k, 83.3k, 100k, 125k, 250k, 500k, 800k, and 1 Mbps). The baud rate can also be set manually.

PC-accessible advanced settings

Advanced settings concerning data captured from the CAN bus can be configured with the MR8904 CAN Editor, an application featuring exceptional usability.

Real-time waveform observation

The MR8904 converts CAN signals into analog and logic data in real time, allowing signals to be observed as waveforms on the Memory HiCorder.

Support for mixed recording

Used in combination with other Memory HiCorder optional input modules, the MR8904 can be used to implement mixed recording of sensor data and control signals on a CAN bus as well as signals that cannot be acquired on a CAN bus.

Ability to send data to the CAN bus

The MR8904 can send ACK responses to CAN messages as well as CAN messages themselves, allowing it to be used in simple simulations.

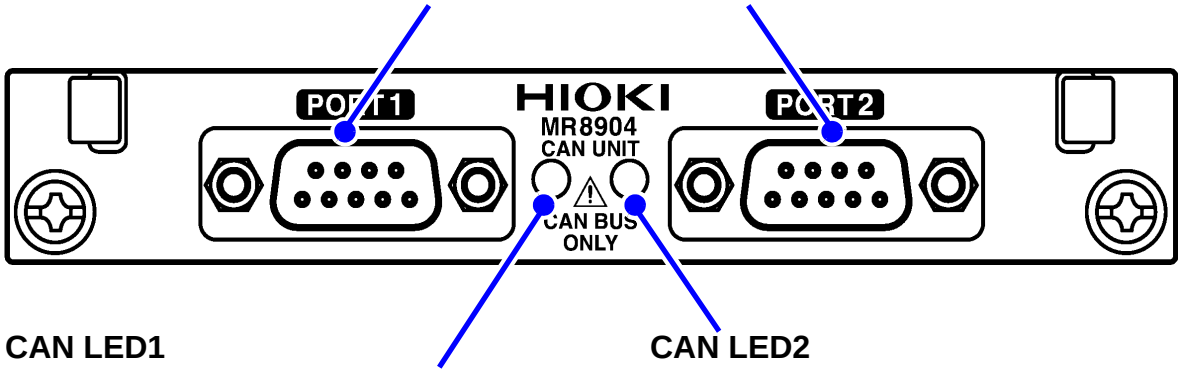
Use of CANdb files

The MR8904 can use Vector's CAN communications database files. If you already have a CANdb file, there is no need to create new CAN definitions.

Names and Functions of Parts Chapter 2

CAN input port 1 (left) and 2 (right)

CAN signal input terminals. CAN1 and CAN2 are independent and can be connected to different networks.



CAN LED1

- Turns green when a CAN message allocated to the port 1 output channel is input.
- Turns red when port 1 experiences an error.

CAN LED2

- Turns green when a CAN message allocated to the port 2 output channel is input.
- Turns red when port 2 experiences an error.

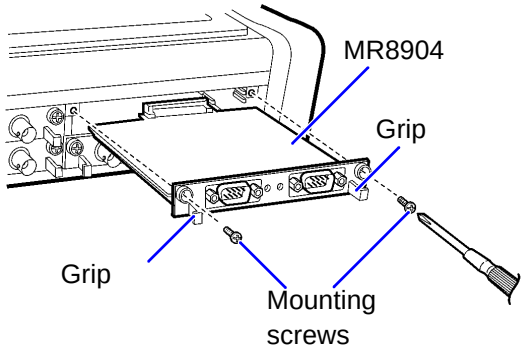
NOTE When an error is encountered, the port in question will enter ACK OFF mode, making it unable to send messages or issue ACK responses.
The error state will return to normal after measurement completes.
When a port enters an error state, verify that the wiring and CAN communications conditions are correct.

Connections Chapter 3

3.1 Installing and Removing the MR8904 into and from a Memory HiCorder

Before connecting the device, be sure to read "When Installing and Removing the MR8904 into and from the Memory HiCorder" (p.4), which describes how to install a newly purchased MR8904 into a Memory HiCorder and how to switch between it and other input modules.

(Example: MR8875)
Required items: Phillips head screwdriver (No.1)



1 **Turn the Memory HiCorder POWER switch off and unplug the AC adapter and any measurement cords.**

2 **With attention to the orientation of the MR8904, insert it firmly all the way in.**

3 **Using the Phillips screwdriver, tighten the two MR8904 mounting screws.**

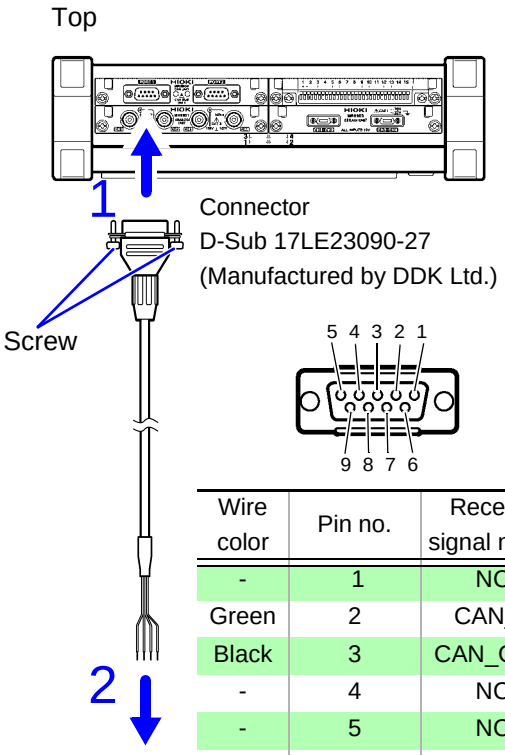
To remove the MR8904, turn off the Memory HiCorder, disconnect any cords that are connected to the MR8904, and remove the device by reversing the procedure described above.

3.2 Connecting the Unit to the Measurement Target

Before connecting the unit, be sure to read "When Connecting the MR8904 and the Object under Measurement" (p.5). Then connect the MR8904 to the measurement target with a CAN cable.

Example: Connecting the unit with the 9713-01

Required items: Model 9713-01 CAN Cable, Phillips head screwdriver (No.1)



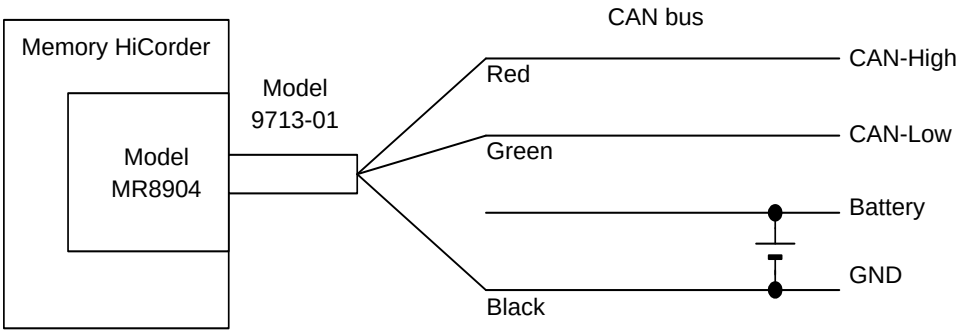
Wire color	Pin no.	Receive signal name
-	1	NC
Green	2	CAN_L
Black	3	CAN_GND
-	4	NC
-	5	NC
-	6	NC
Red	7	CAN_H
-	8	NC
White	9	CAN_V+
-	Shield	GND

1 **Connect the CAN cable to one of the MR8904 CAN Unit's ports. Take care to orient the connector properly. Tighten the fixing screw with a Phillips head screwdriver to secure the connector to the unit.**

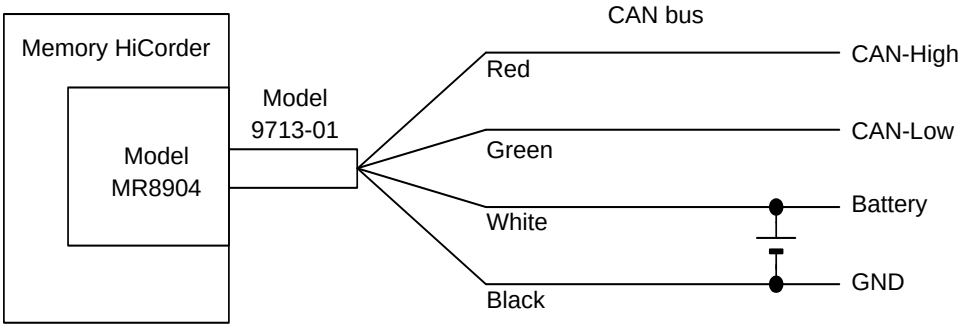
2 **Attach to the measurement object.**

Connection diagram when using Model 9713-01

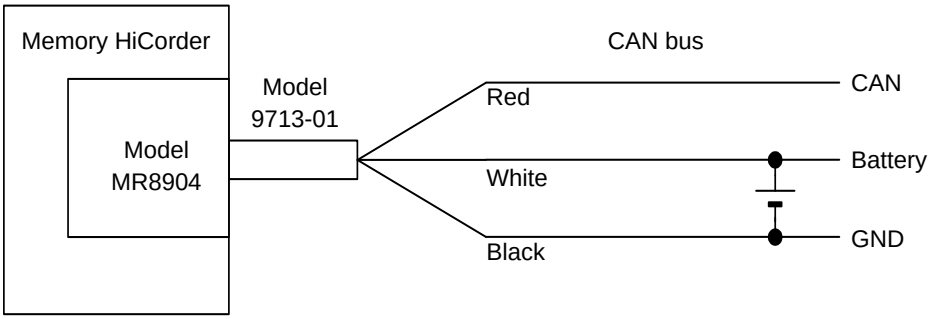
High-Speed CAN



Low-Speed CAN



Single-Wire CAN



3.3 Connecting the Unit to a PC

The MR8904 can be configured from a PC via the Memory HiCorder. Before starting the configuration process, install the USB driver and connect the PC and Memory HiCorder.

Installing the USB driver

Install the USB driver before you use the Memory HiCorder with a USB connection.

CAUTION Do not plug in or unplug the USB cable while the Memory HiCorder is operating.

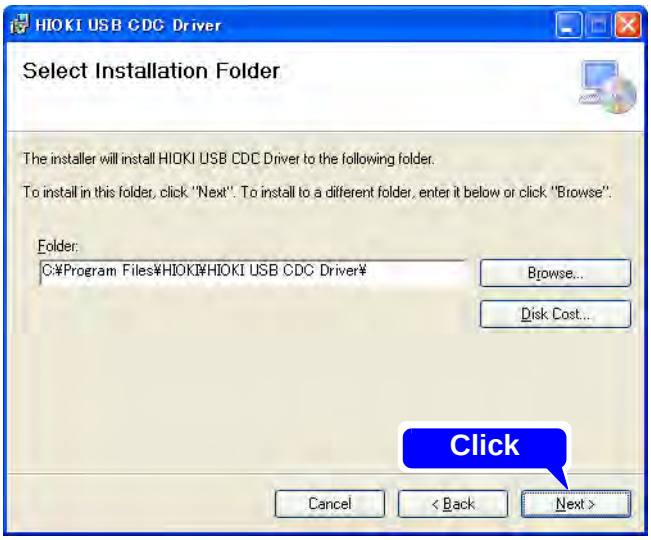
NOTE Use a user account with administrator privileges to perform the installation.

1 Execute the **[HiokiUsbCdcDriver.msi]** file in the X:\Driver folder on the CD.
("X" indicates the CD-ROM drive. The letter varies with the PC.)

NOTE Depending on the environment, the dialog box may take some time to appear so please wait till it does so.

2 **Click [Next].**

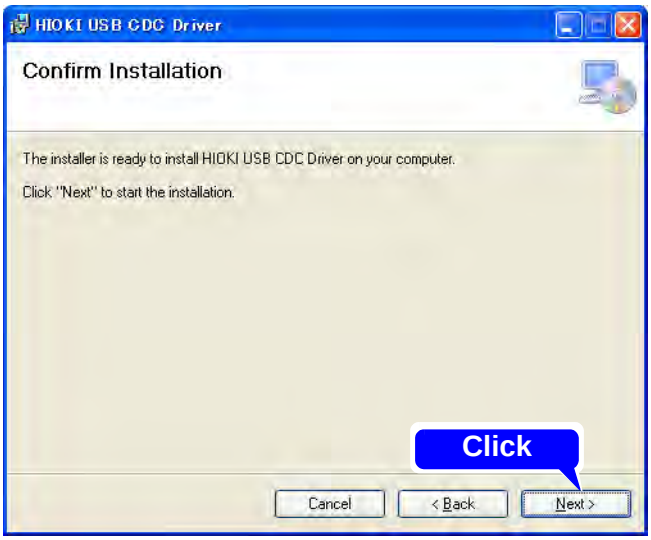
3 Click [Next].



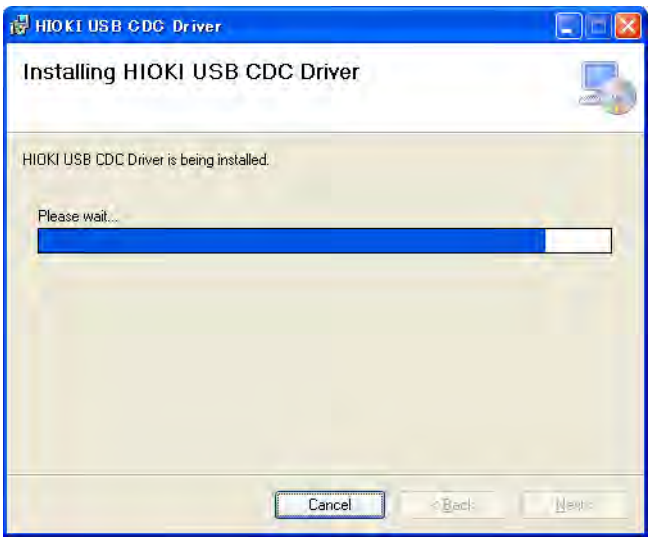
When you want to change the installation destination

Click **[Browse...]** to change the folder to install into. Normally, there is no need to change.

4 Click [Next] to start installing.

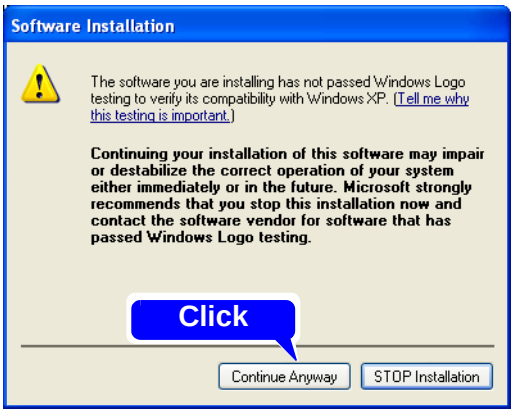


The installation of the software will begin.



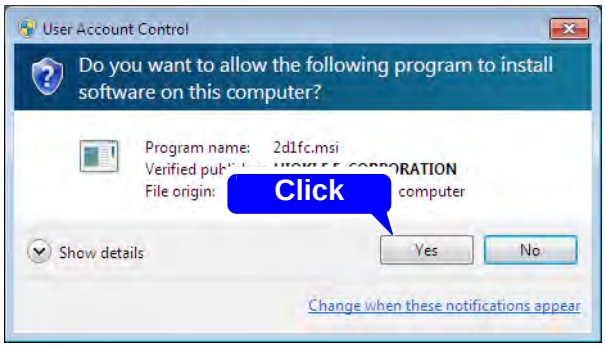
For Windows XP

During the installation, a message saying that the software has not passed Windows Logo testing will appear a few times, click **[Continue Anyway]** to continue installing.

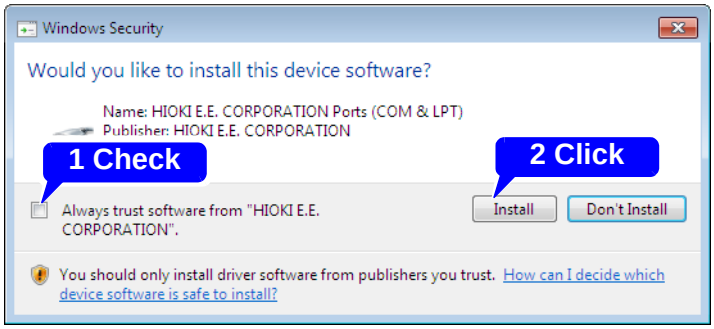


For Windows Vista/7/8

When a dialog box requesting your permission to continue the program appears, click **[Yes]**.

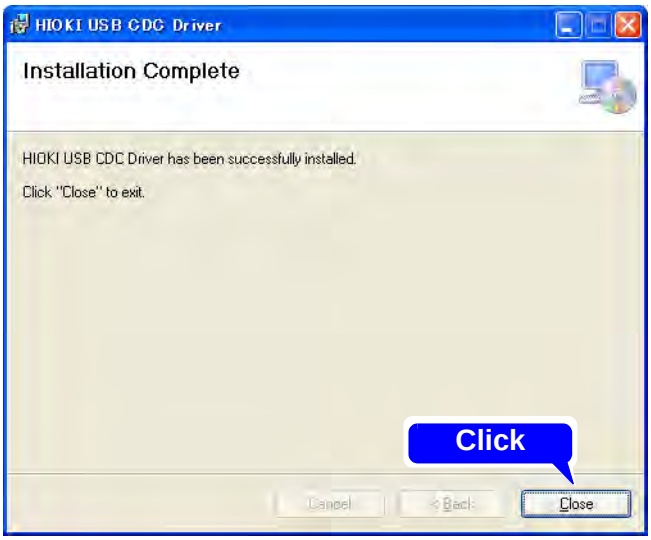


Sometimes another dialog box requesting your permission to install the software may appear. When it does, check **[Always trust software from "HIOKI E.E. CORPORATION"]** and click **[Install]** to continue.



5 When installation is completed and the dialog box appears, click [Close] to exit.

This completes the driver installation.



Connecting the Memory HiCorder and PC

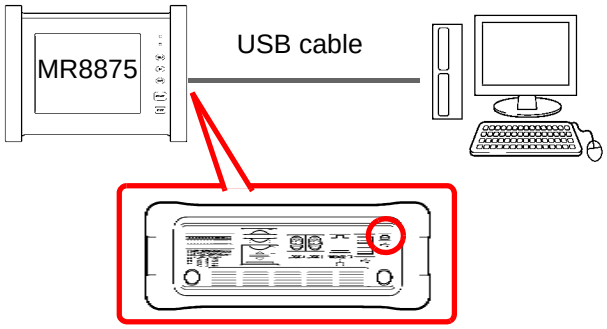
PC Requirements: A personal computer running Windows XP, Vista, 7 or 8.

⚠CAUTION

- To prevent a malfunction, do not disconnect the USB cable during communication.
- The Memory HiCorder and PC should be connected to the same earth ground. If grounded separately, potential difference between the ground points can cause malfunctions or damage when connecting the USB cable.

1 **Connect one end of the USB cable to the USB cable slot on the Memory HiCorder while making sure the plug is oriented correctly.**

2 **Connect the other end of the cable to a USB port on the PC.**



The first time you connect the Memory HiCorder and PC, perform the following procedure to enable the PC to recognize the Memory HiCorder.

For Windows Vista/7/8

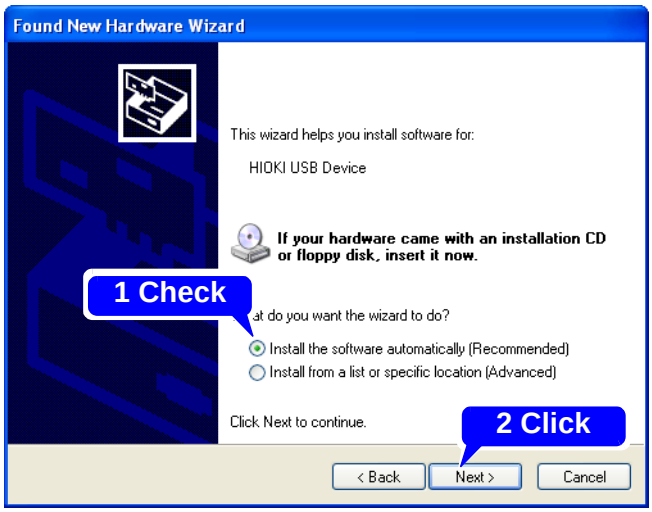
The Memory HiCorder is recognized automatically, and the preparation to use the device completes.

For Windows XP

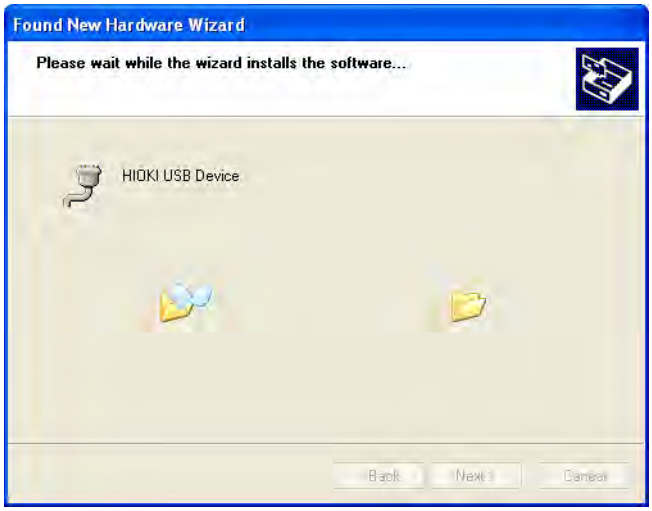
A **[Found New Hardware Wizard]** dialog box will appear and the new hardware detection wizard will begin.

1 **Check [No, not this time] and click [Next].**

2 Check [Install the software automatically (Recommended)] and click [Next].



Please wait while the driver is being installed.



3 Click [Continue Anyway].

A message saying that the software has not passed Windows Logo testing will appear a few times, click **[Continue Anyway]** to continue installing.

4 **When installation is completed and the dialog box appears, click [Finish] to exit.**

This completes the driver installation.

Uninstalling the USB Driver

When the USB driver is no longer needed, uninstall it with the following procedure.

1 **From the Windows Start menu, select the [Control Panel], and double click [Add or Remove Programs].**

The **[Add or Remove Programs]** screen appears.

2 **From the list of installed programs, select [HIOKI USB CDC Driver], and remove it.**

You are returned to the **[Add or Remove Programs]** screen.

Chapter 4 Preparing the MR8904 CAN Editor

The latest version can be downloaded from our web site.

4.1 Operating Environment

This application requires the following operating environment:

Supported operating systems	Windows XP : 32-bit Windows Vista/7/8 : 32-bit and 64-bit
Recommended screen resolution	1280 x 960
Interface	USB

4.2 Installing the MR8904 CAN Editor

Install the application using the following procedure. This explanation uses Windows XP as an example.

1 **When you insert the Application Disk (CD) into the CD-ROM drive, the opening page should appear automatically.**
If it does not appear, open the "index.htm" file with your Web browser.

2 **Select the language to display (click the [English] icon).**

3 **Click the [MR8904 CAN Editor] icon to view MR8904 CAN Editor specifications and revision history.**

4 **Click the [Install] icon at the top right of the page to open the [File Download] dialog.**

5 **Click [Open] to display the confirmation dialog to proceed with installation.**

6 **Click [Next] to open the installation destination selection window.**
Click the **[Browse]** button to change the installation folder.

7 **Click [Next] to start installation.**
The program is now installed.

4.3 Uninstalling the MR8904 CAN Editor

Uninstall the application using the following procedure.

1 **Select [Start]-[Control Panel] on the Window Start Menu.**

2 **Click the [Add or Remove Programs] icon and open [Add or Remove Programs].**

3 **Select [HIOKI MR8904 CAN Editor] on the [Add or Remove Programs] list and click the [Remove] button.**

The above process will launch the uninstaller and delete the software safely. Settings and other files will remain and should be deleted manually as necessary.

Settings Chapter 5

Before launching the MR8904 CAN Editor, connect a PC to the Memory HiCorder containing the MR8904 with a USB cable.

See:"Chapter 3 Connections" (p.11)

Next, launch the MR8904 CAN Editor and configure settings.

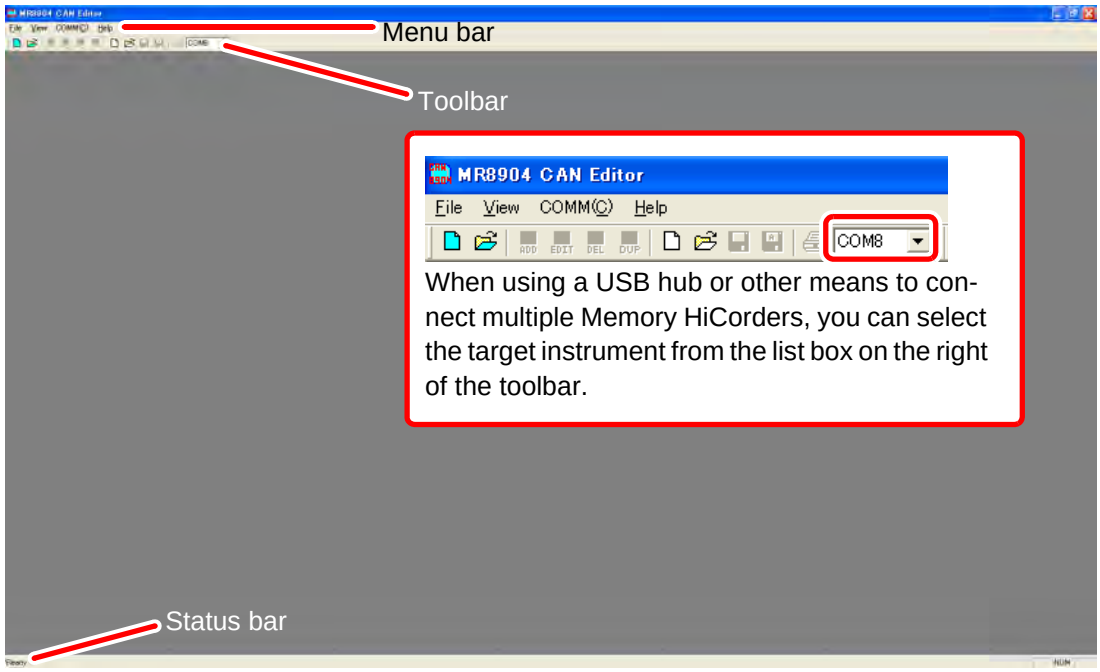
The CAN definition data file and condition settings file will be created and sent to the Memory HiCorder containing the CAN unit.

NOTE Although it is possible to create and edit CAN definition data files and condition setting files while not connected to the Memory HiCorder, you will not be able to send or receive conditions.

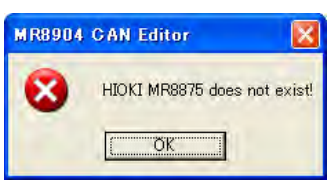
5.1 Launching and Exiting the Software

Launching the MR8904 CAN Editor

Select **[Start]**-**[All Programs]**-**[HIOKI]**-**[MR8904 CAN Editor]** on the Windows Start Menu to display the Launch window, shown below.



NOTE The message shown to the right will be displayed if you launch the MR8904 CAN Editor while the PC is not connected to the Memory HiCorder or if you execute the **[Search MR8875]** command.



If you click **[OK]** without connecting a Memory HiCorder, the Launch window will be displayed, but the list box on the right of the toolbar will be blank.

To connect a Memory HiCorder after launching the MR8904 CAN Editor

Select **[Comm]**-**[Search MR8875]** on the menu bar to update information about connected Memory HiCorders.

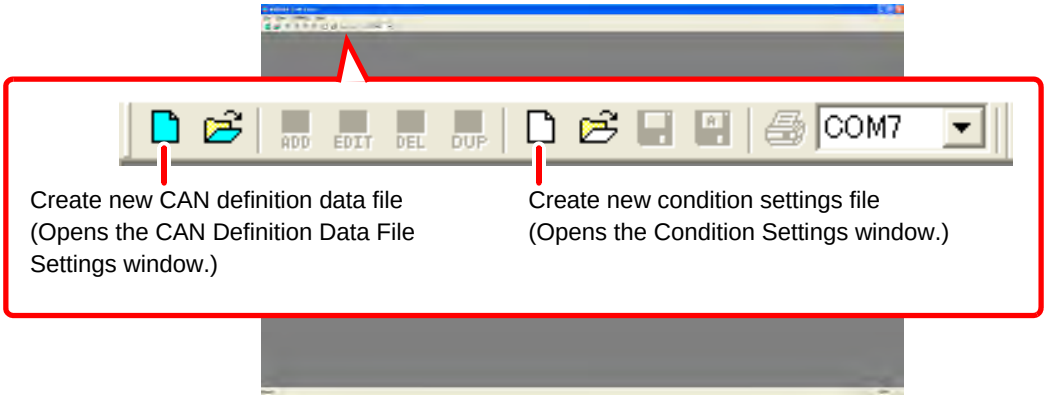
Exiting the MR8904 CAN Editor

Click **[File]**-**[Exit]** on the menu bar or click  on the top right of the displayed window.

5.2 Screen Types

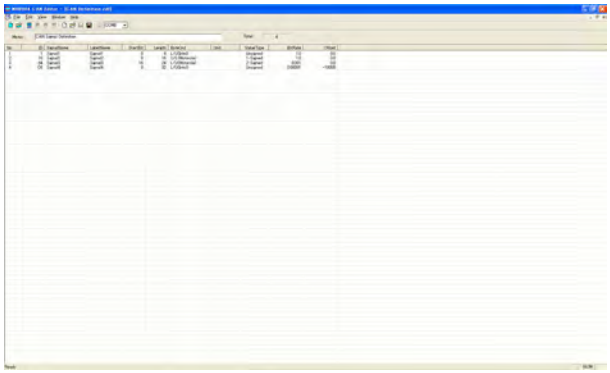
Broadly speaking, the application consists of a total of three windows: the Launch window, the CAN Definition Data File Settings window, and the Condition Settings window.

Launch window



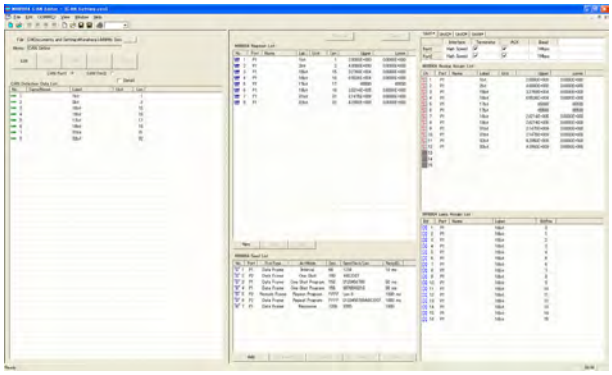
CAN Definition Data File Settings window

Creates and edits the CAN definition data files used on the Condition Settings window.



Condition Settings window

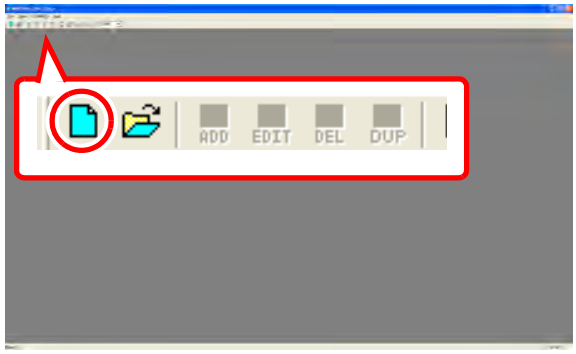
Configures the MR8904 channel settings based on a previously created CAN definition data file by allocating MR8904 channels and sending configuration data to the Memory HiCorder.



5.3 Creating a CAN Definition Data File

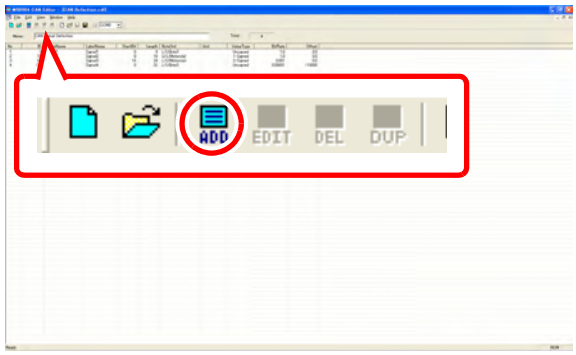
This section describes how to create a CAN definition data file for configuring the MR8904's channel settings.

1 **Click on the Launch window.**



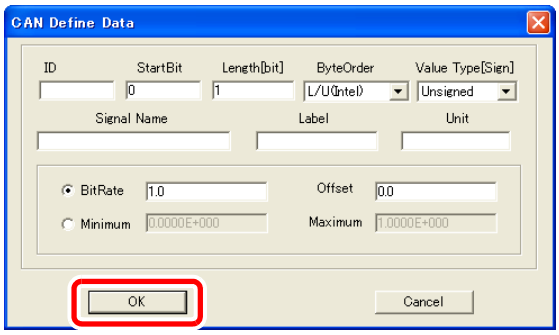
A blank CAN Definition File Settings window will be displayed.

2 **Click .**



The **[CAN Define Data]** dialog box will be displayed.

3 **Enter the necessary fields for the CAN data being registered and click [OK].**



Setting Contents (*Default setting)

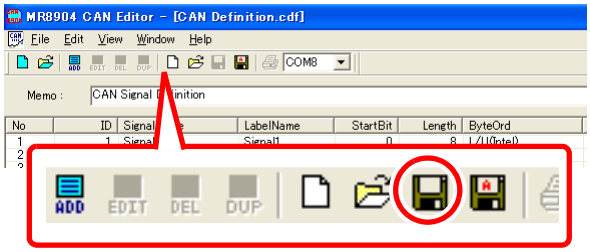
ID	Sets the message ID for the message containing the data you wish to assign to the channel. Enter a hexadecimal* value. Both 11-bit base IDs and 29-bit extended IDs are supported. (Valid setting range: 0 to 1FFFFFFF)
StartBit	Sets the data start position in the message frame. Specify the LSB (Least Significant Bit) for the signal being captured. (Initial value: 0; valid setting range: 0 to 63) **See:** "Calculating the start bit (data start position)" (p.28)

* A system of numerical notation based on the number 16. The 10 digits represent the numbers 0 through 9, while the letters A, B, C, D, E, and F are used for the decimal numbers 10, 11, 12, 14, 14, and 15.

Setting Contents (∗Default setting)

Length[bit]	Enter the size of the data you wish to capture in bits. Definitions from 17 to 32 bits require that 2 analog channels be allocated. (Initial value: 1; valid setting range: 1 to 32)
ByteOrder	Sets the data byte order. Select whether the corresponding data is in Motorola or Intel format. U/L (Motorola): Motorola format; upper bytes are sent first. L/U (Motorola): Data is extracted in Motorola format and then the upper and lower byte order is reversed. L/U (Intel)* : Intel format; lower bytes are sent first. **See:** "Byte order" (p.29)
Value Type[Sign]	Selects the sign type to use for the corresponding data. Unsigned*: Unsigned 1-signed : 1's complement; when converting the data to express a negative value, the bits of the original positive value are reversed. Example: For an 8-bit signal, -10 would be expressed by reversing 00001010 (10), yielding 11110101. 2-signed : 2's complement; when converting the data to express a negative value, the bits of the original positive value are reversed, and 1 is added. Example: For an 8-bit signal, -10 would be expressed by reversing 00001010 (10) and adding 1, yielding 11110110.
Signal Name	Enter the signal name for the corresponding data. Up to 40 characters can be entered. Spaces, commas, single quotation marks, and double quotation marks cannot be entered.
Label	Enter a label by which the Memory HiCorder can identify the corresponding data. Up to 16 characters can be entered. Spaces, commas, single quotation marks, and double quotation marks cannot be entered.
Unit	Enter the unit used to express physical quantities in the corresponding data. Up to 7 characters can be entered. Spaces, commas, single quotation marks, and double quotation marks cannot be entered.
BitRate/Offset Minimum/Maximum	Sets the scale used to convert physical quantities in the corresponding data. BitRate/Offset* : Enter the conversion scale and offset value. (Initial values: bit rate of 1.0 and offset of 0.0) Minimum/Maximum : Enter the minimum and maximum values. (Initial values: **[Minimum]** of 0.0000E+000 and **[Maximum]** of 1.0000E+000; valid setting range: **[BitRate]** of -9.9999E+9 to 9.9999E+9 [however, values in the range of -9.9999E-10 to 9.9999E-10 cannot be set] and **[Offset]** of -9.9999E+9 to 9.9999E+9)

The entered information will be registered on the window list.



4 Click to specify a filename and save the information displayed on the window.

NOTE To change the filename and save the information displayed on the window to a new file, click on the toolbar and follow the instructions to select a new filename. (Files have the extension .CDF.)

How to count the bit position

1. The least significant bit (LSB) in the first byte of data in the data frame is assigned the number 0, and the number is increased 1 for each bit toward the most significant bit (MSB).
2. Once processing reaches the MSB position, it will attempt to move to the next byte of data and continue counting up from the LSB toward the MSB.
3. Since the maximum data frame size is 8 bytes (64 bits), the last MSB position for the 8th byte of data from the start will be 63, yielding bit position values of 0 to 63 as shown below:

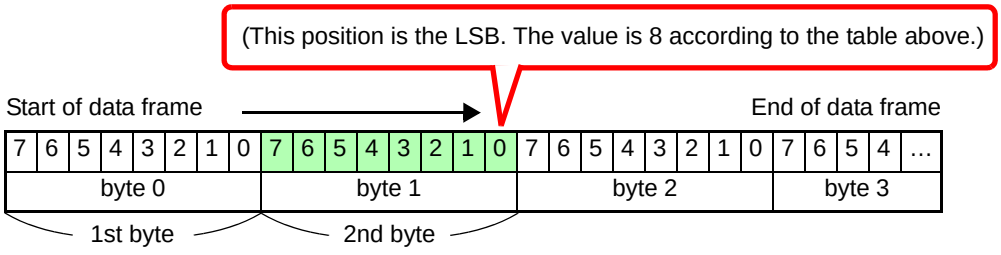
MSB ← LSB

		7 bit	6 bit	5 it	4 bit	3 bit	2 bit	1 bit	0 bit
Start	byte 0	7	6	5	4	3	2	1	0
	byte 1	15	14	13	12	11	10	9	8
	byte 2	23	22	21	20	19	18	17	16
	byte 3	31	30	29	28	27	26	25	24
	byte 4	39	38	37	36	35	34	33	32
	byte 5	47	46	45	44	43	42	41	40
	byte 6	55	54	53	52	51	50	49	48
End	byte 7	63	62	61	60	59	58	57	56

Calculating the start bit (data start position)

For example, if you wish to capture 8 bits of data for the 2nd byte from the start, the LSB value would be 8 (see below).

: Length of data you wish to capture (in bits)



Byte order

Even if the data start position (start bit) and data length are the same, the byte order (extraction method) will vary depending on whether Motorola or Intel byte order is used. The following table provides an example for a bit length of 10 and a data start position (LSB position) of bit 16:

Motorola format

	7 bit	6 bit	5 it	4 bit	3 bit	2 bit	1 bit	0 bit
byte 0	7	6	5	4	3	2	1	0
byte 1	15	14	13	12	11	10	9	8
byte 2	23	22	21	20	19	18	17	16
byte 3	31	30	29	28	27	26	25	24

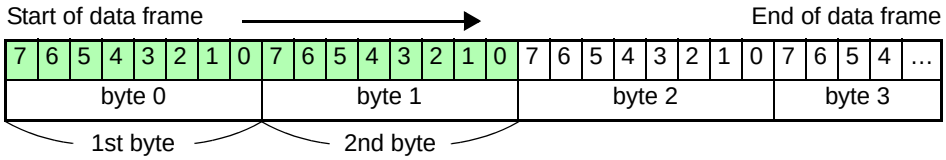
*The MSB is 9.

Intel format

	7 bit	6 bit	5 it	4 bit	3 bit	2 bit	1 bit	0 bit
byte 0	7	6	5	4	3	2	1	0
byte 1	15	14	13	12	11	10	9	8
byte 2	23	22	21	20	19	18	17	16
byte 3	31	30	29	28	27	26	25	24

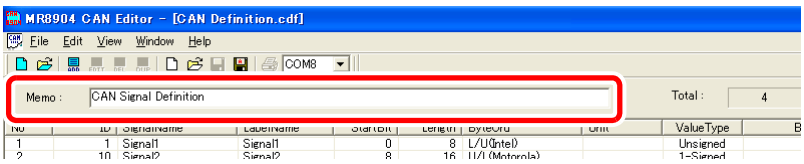
*The MSB is 25.

For example, if the value of byte 0 is FF and the value of byte 1 is 00 in 16 bits of data, as shown below,
U/L (Motorola) value : FF00
L/U (Motorola) value : 00FF
L/U (Intel) value : 00FF
(In Motorola format, the data start position is 8, while in Intel format, the data start position is 0.)



To read a saved CAN definition data file

Click on the Launch window and follow the instructions to open the desired file. You can add a memo to saved CAN definition files, for example to describe the application for which the file is to be used. You can enter up to 50 characters in the “Memo” field above the list.



To load an existing CANdb file

You can convert an existing CANdb file (.DBC) into a CAN definition data file (.CDF) by selecting **[File]**-**[CAN Define Data File]**-**[Convert DBC File and Open]** on the window. You can edit and save an opened file as a CAN definition data file.

To set a password when opening a saved CAN definition data file

You can set a password with **[Edit]**-**[Modify Password]** on the CAN Definition Data File Setting window. Passwords can be up to 20 alphanumeric characters in length.

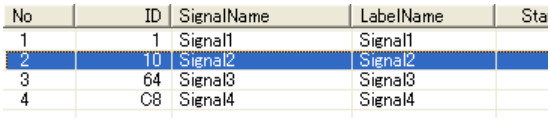
To delete, edit, or duplicate registered CAN definition data

You can delete, edit, and duplicate the data items shown in the list on the CAN Definition Data File Settings window.

See: "Deleting CAN definitions" (p.31), "Editing CAN Definitions" (p.32), "Duplicating CAN definitions" (p.33)

Deleting CAN definitions

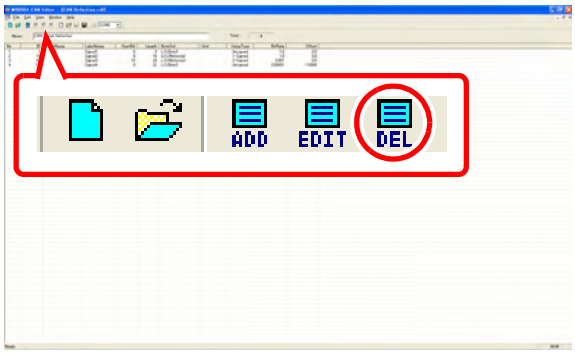
1 Click the line of the item you wish to delete.



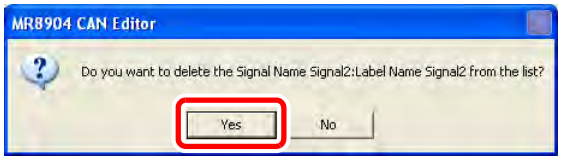
To select multiple items, use any of the following methods:

- Click the first line in the target range and drag the mouse to the last line.
- Click the first and then the last line in the target range while pressing the **Shift** key on the keyboard.
- Click the target lines while pressing the **Ctrl** key on the keyboard.

2 Click DEL.

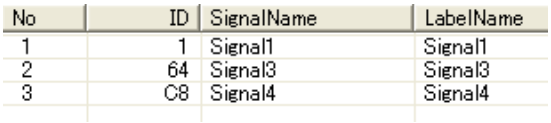


A dialog box will be displayed.



3 Click [Yes].

The selected items will be deleted and removed from the list.



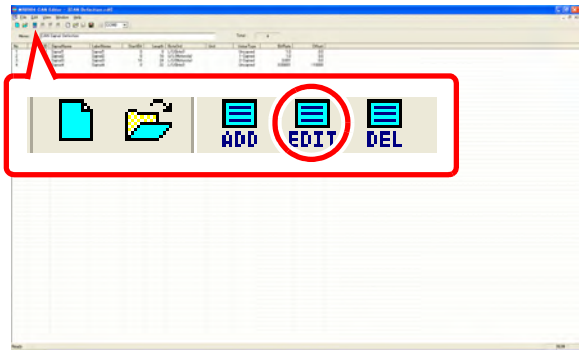
4 Click on the toolbar to save the file by overwriting the existing file, or to save the changed display contents to a new file.

Editing CAN Definitions

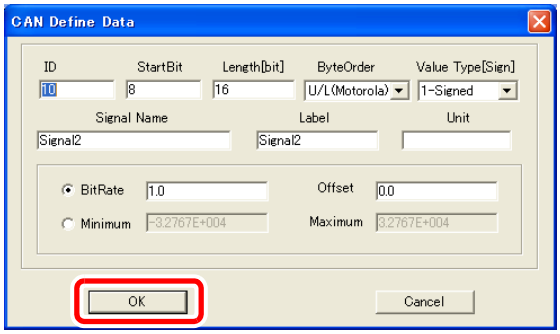
1 **Click the line of the item you wish to edit.**

No	ID	SignalName	LabelName	StartBit
1	1	Signal1	Signal1	0
2	10	Signal2	Signal2	8
3	64	Signal3	Signal3	16
4	C8	Signal4	Signal4	0

2 **Click EDIT or double-click the item's line.**



The **[CAN Define Data]** dialog box for the current definition content will be displayed.



3 **Edit the settings as necessary and click [OK].**

The list display will be updated with the edited content.

4 **Click on the toolbar to save the file by overwriting the existing file, or to save the changed display contents to a new file.**

Duplicating CAN definitions

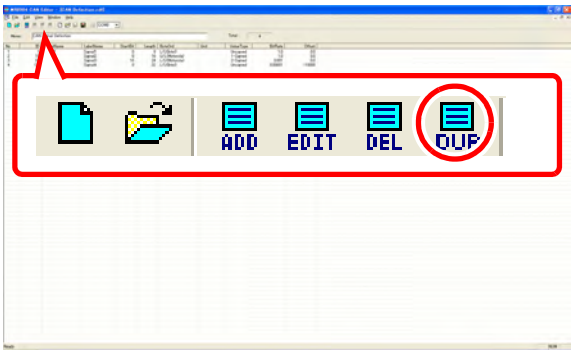
1 Click the line of the item you wish to duplicate.

No	ID	SignalName	LabelName	StartBit
1	1	Signal1	Signal1	0
2	10	Signal2	Signal2	8
3	64	Signal3	Signal3	16
4	C8	Signal4	Signal4	0

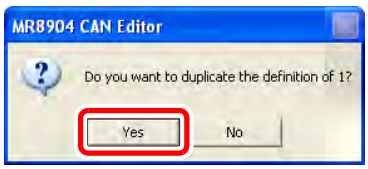
To select multiple items, use any of the following methods:

- Click the first line in the target range and drag the mouse to the last line.
- Click the first and then the last line in the target range while pressing the **Shift** key on the keyboard.
- Click the target lines while pressing the **Ctrl** key on the keyboard.

2 Click DUP.



A dialog box will be displayed.



3 Click [Yes].

The selected items will be duplicated and added at the bottom of the list. The labels of the duplicate definitions will be set by adding "-c" to the labels of the original definitions.

No	ID	SignalName	LabelName	StartBit
1	1	Signal1	Signal1	0
2	10	Signal2	Signal2	8
3	64	Signal3	Signal3	16
4	C8	Signal4	Signal4	0
5	10	Signal2	Signal2-c	8

4 Click on the toolbar to save the file by overwriting the existing file, or to save the changed display contents to a new file.

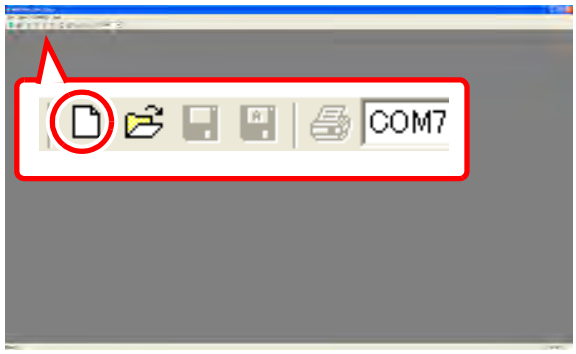
5.4 Creating Condition Settings Files

The following procedure is used to create condition settings files:

Loading a CAN definition data file

First, load a CAN definition data file.

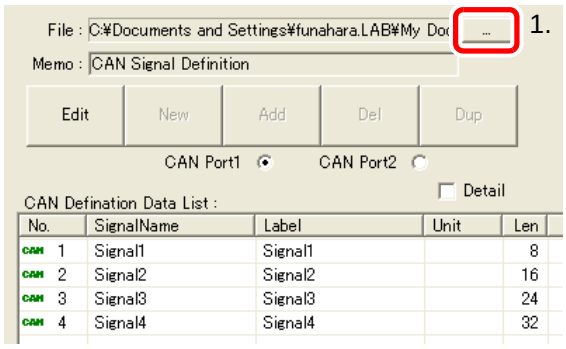
1 Click on the Launch window or the CAN Definition Data File Settings window.



A blank Condition Settings window will be displayed.

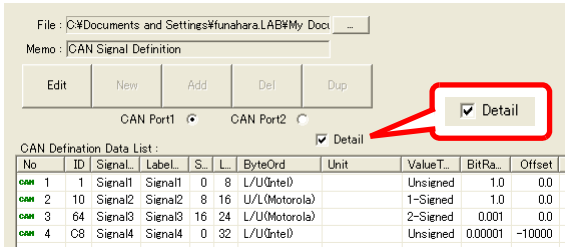
2 Load the CAN definition data file from the [CAN Definition Data List] using the following procedure:

1. Click ... .
   (The Open File dialog box will be displayed.)



2. Open the CAN definition data file (.CDF) or the CANdb file (.DBC).
3. (The contents of the opened file will be displayed under **[CAN Definition Data List]**.)

   Selecting the **[Detail]** checkbox displays more detailed information in the list.



See: "To edit the [CAN Definition Data List]" (p.35)

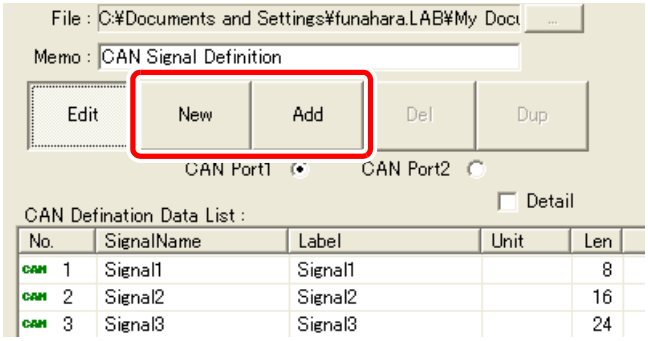
3 Create the [MR8904 Register List] from the contents shown under [CAN Definition Data List].

See: "Registering CAN definitions (creating an MR8904 register list)" (p.36)

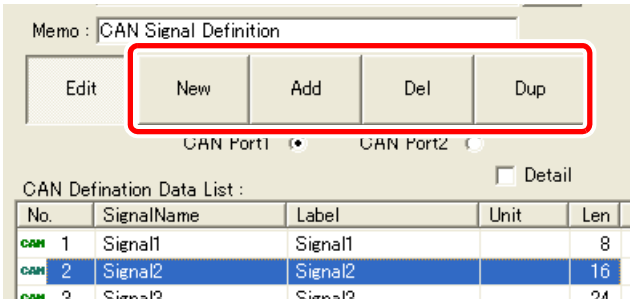
To edit the [CAN Definition Data List]

If a password has been assigned to the CAN definition data, a password entry dialog box will be displayed. Enter the set password to begin editing the data.
Selecting **[Edit]** activates the **[New]** and **[Add]** buttons, allowing the content shown in the list to be edited.

[New] : Initializes the current display by setting all fields to blank space.
[Add] : Displays the **[CAN Define Data]** dialog box, allowing data to be added.



Double-clicking an item in the list allows you to edit the content of the definition. Clicking an item in the list activates the **[Del]** and **[Dup]** buttons.



(Continues on next page.)

[Del], **[Dup]**:
Deletes or duplicates the selected item.
To delete or duplicate multiple items, click the appropriate button after selecting the target items using any of the following methods:

- Click the first line in the target range and drag the mouse to the last line.
- Click the first and then the last line in the target range while pressing the **Shift** key on the keyboard.
- Click the target lines while pressing the **Ctrl** key on the keyboard.

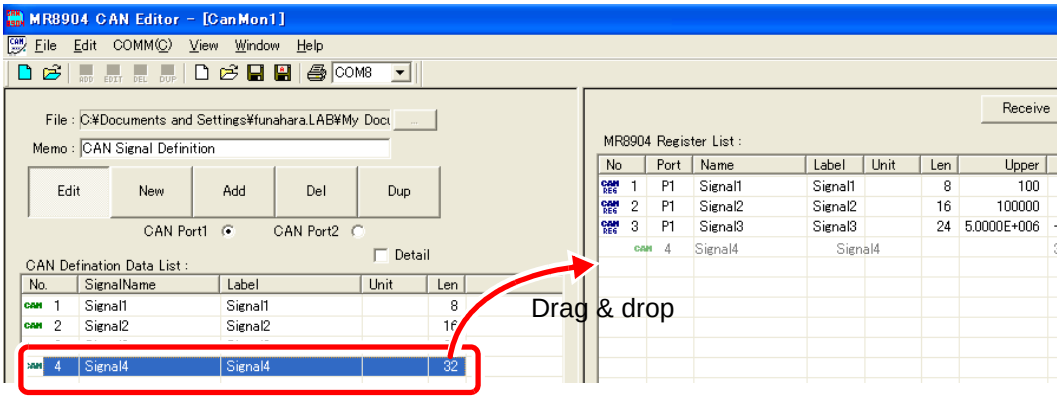
Clicking **[Edit]** again saves the edited definition list. When the confirmation dialog box is displayed, click **[OK]** to save the data and provide a filename.

NOTE CANdb files (.DBC) can be read but not edited.

Registering CAN definitions (creating an MR8904 register list)

Next, create an MR8904 register list (to register the CAN definitions).

Drag and drop the [CAN Definition Data List] data items you wish to allocate to the MR8904's channels to [MR8904 Register List].



NOTE
- You can select which of the target MR8904's two CAN ports to use to receive the data items being registered under **[MR8904 Register List]** by selecting the **[CAN Port1]** or **[CAN Port2]** radio button.
- You can also use the **[Add]** button at the bottom of the list to register data to the **[MR8904 Register List]** (see next page).

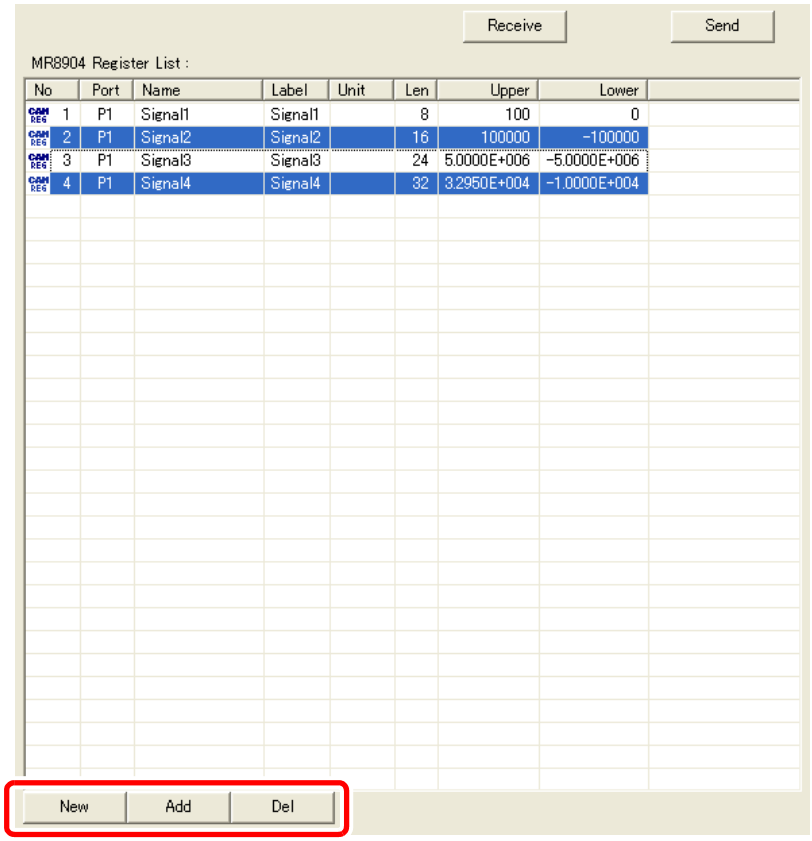
To edit the [MR8904 Register List]

[New] : Initializes the settings by setting the current register list as well as any analog or logic signals that have been assigned from the register list to blank space.

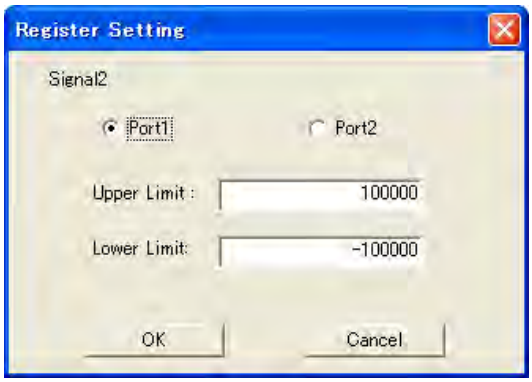
[Add] : Clicking on a row under **[CAN Definition Data List]** and then clicking this button causes the item to be added to the **[MR8904 Register List]**.

[Del] : Click the row of the item you wish to delete and then click this button. To delete multiple items, click the button after selecting the target items using any of the following methods:

- Click the first line in the target range and drag the mouse to the last line.
- Click the first and then the last line in the target range while pressing the **Shift** key on the keyboard.
- Click the target lines while pressing the **Ctrl** key on the keyboard.



Double-clicking an item in the register list displays a dialog box:



This dialog box allows you to set the channel port to which the definition is to be allocated as well as upper and lower limits for the waveform display on the Memory HiCorder.

Setting CAN communications conditions

Next, set the CAN communications conditions. Read the following precautions carefully before setting the conditions:

⚠WARNING **When ACK response is enabled, the unit may affect the operation of the CAN bus as well as systems connected to the CAN bus. Improper settings may cause CAN communications to become corrupted, and proper operation may also affect system operation, causing bodily injury or property damage. Use only after carefully considering these effects.**

⚠CAUTION

- If the interface does not match the interface of the CAN bus being measured, the instrument will be unable to make measurements, and if ACK is turned on, CAN communications may become corrupted. Use only after verifying that settings match the CAN bus to which the unit is connected.
- The use of too few or too many terminating resistors on the CAN bus may prevent data from being sent and received properly not only by the unit, but by other nodes as well. Verify carefully and set so that there are two 120 Ω resistors for the entire CAN bus.
- If the baud rate differs from the baud rate of the CAN network to which the unit is connected, the instrument will be unable to make measurements, and if ACK is turned on, CAN communications may become corrupted. Use only after verifying that the baud rate matches the network's baud rate.

NOTE

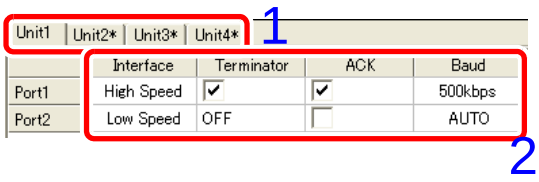
- The terminator setting is valid only when the interface is set to high-speed. Separate terminator resistors are necessary when using low-speed or single-wire settings.
- If the ACK response setting is disabled, no message will be sent, even if the transmit ID frame has been set. To send messages, enable ACK response.
- Baud rate automatic detection is enabled only when ACK is off. When ACK is on, select the appropriate baud rate for the network.
- A number of messages must be received before the baud rate can be automatically detected. Messages cannot be properly received until the detection process completes. Have the unit receive several messages before starting measurement and verify that they are being properly received, for example by observing the LEDs.

1 **Click the [Unit1] to [Unit4] tabs above the [MR8904 Analog Assign List] and select the position of the unit for which the condition settings file is being created.**

(An asterisk after the unit number indicates a position at which no unit is installed.)

2 **Set the CAN communications conditions for each port.**

(Selecting the checkbox for a setting turns it on or enables it.)



Example screen

Device insertion position	Unit 1
CAN port 1	• High speed • Terminator on • ACK response enabled • Baud rate: 500 kbps
CAN port 2	• Low speed • Terminator off • ACK response disabled • Baud rate automatic detection

Setting Contents (∗Default setting)

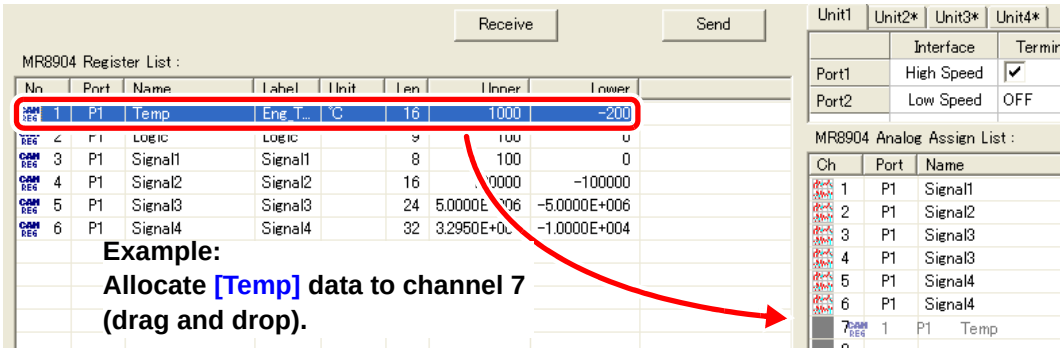
Interface	Selects the type of the CAN bus to which the unit will be connected. The following CAN bus standards are supported: High Speed* : ISO 11898-2 Low Speed : ISO 11898-3 Single-wire : SAE J2411
Terminator	When using the high-speed interface, the unit's internal 120 Ω termination resistor can be connected to the bus as necessary. On : Connects the 120 Ω resistor between CAN-H and CAN-L. OFF*: Does not connect the termination resistor.
ACK	Sets whether to enable sending ACK bits, error frames, and messages from the unit. Enable : Enables sending of ACK bits, error frames, and messages. Disable*: Disables sending of ACK bits, error frames, and messages.
Baud	Sets the CAN communications baud rate. AUTO (automatic detection)*: Detects the baud rate automatically based on messages being sent on the CAN bus. This setting can be used only when ACK is disabled. Manual setting : Select a baud rate from 10k, 20k, 33.3k, 50k, 62.5k, 83.3k, 100k, 125k, 250k, 500k, 800k, and 1 Mbps.

Allocating channels (Creating MR8904 analog/logic assign lists)

Next, allocate channels by creating an MR8904 analog assign list and MR8904 logic assign list from the MR8904 register list.

Drag and drop items displayed in the [MR8904 Register List] to the [MR8904 Analog Assign List] and [MR8904 Logic Assign List].

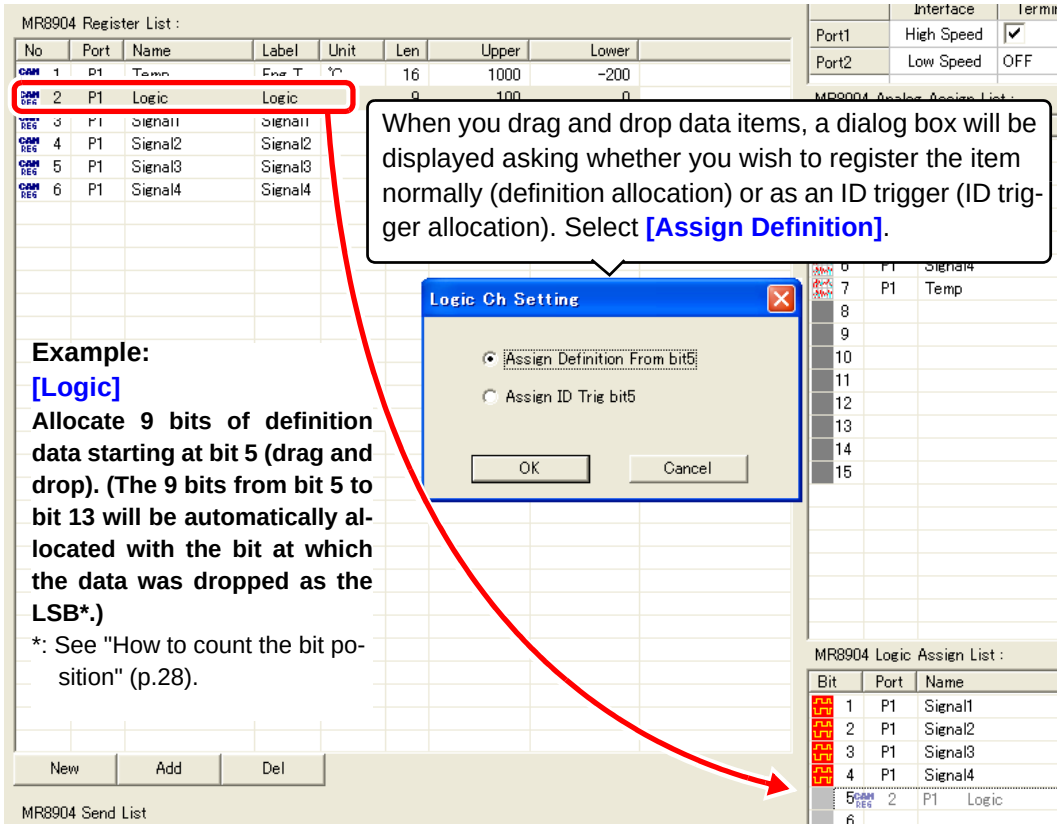
<<[MR8904 Analog Assign List]>>



NOTE

- A total of 15 data items corresponding to channels 1 to 15 can be allocated in the [MR8904 Analog Assign List]. You can drag and drop each item to the desired channel number (1 to 15) shown in the [Ch] column.
- Definitions of 17 to 32 bits use two analog channels.

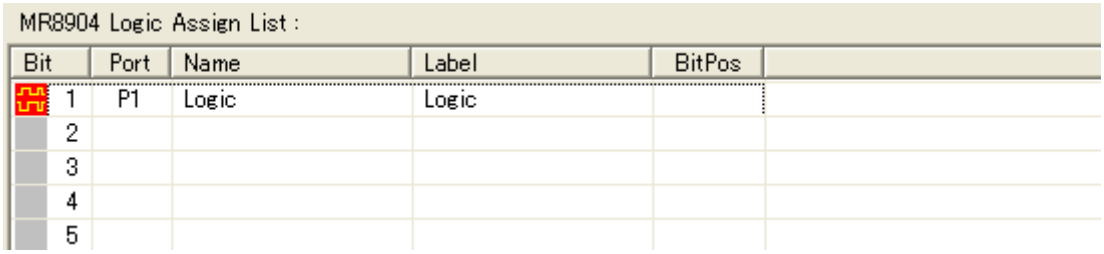
<<[MR8904 Logic Assign List]>>



NOTE The **[MR8904 Logic Assign List]** allows data items from the **[MR8904 Register List]** to be allocated to each bit of a 16-bit signal. If the data item consists of 8 bits, 8 bits will be automatically allocated with the bit position at which the item was dropped (1 to 16) as the LSB.

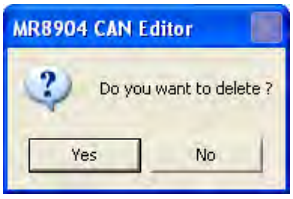
What is an ID trigger?

You can register an ID trigger by selecting **[Assign ID]** when you drag and drop the data item. This function outputs a high pulse to the registered logic channel when a CAN message with the registered definition's ID is received. When an ID trigger is registered, a red mark will be shown for the logic channel.



Deleting data from an assign list

Right-click on the item you wish to delete to display the following message. (You can also select multiple items and delete them at once.)



Click **[Yes]** to delete the item(s).

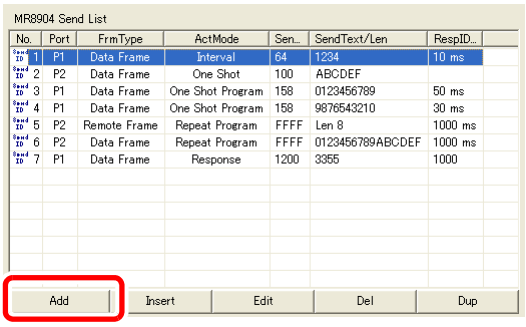
NOTE Up to 200 μs of dead time occurs between the time the CAN message with the registered definition's ID is received and the time that the data is transferred to the Memory HiCorder. If multiple CAN messages are received during the dead time, the received CAN message may not be applied to the data.

Configuring transmission (creating an MR8904 Send list)

Finally, create an MR8904 send list (which will serve as the transmission condition settings). To do so, register frames to be sent to the CAN bus to which the unit is connected along with the timing with which they are to be sent to the **[MR8904 Send List]**.

1 Click the [Add] button at the bottom of the [MR8904 Send List].

NOTE Clicking an item registered in the list will cause the **[Insert]**, **[Edit]**, **[Del]**, and **[Dup]** buttons to activate.



To edit the [MR8904 Send List]

[Insert] : Inserts a transmission setting into the selected item.

[Edit] : Edits the settings for the selected item.

[Del], **[Dup]**:

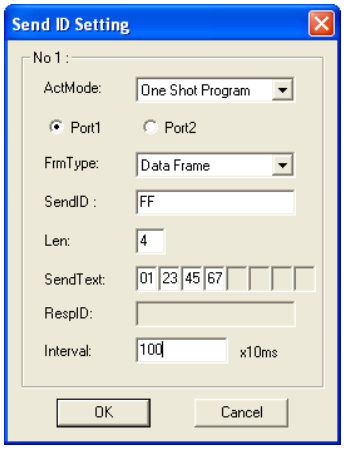
Deletes or duplicates the selected item.

To delete or duplicate multiple items, click the button after selecting the target items using any of the following methods:

- Click the first line in the target range and drag the mouse to the last line.
- Click the first and then the last line in the target range while pressing the **Shift** key on the keyboard.
- Click the target lines while pressing the **Ctrl** key on the keyboard.

The **[Send ID Setting]** dialog box will be displayed.

2 Configure the settings.



(Continues on next page.)

Setting Contents (∗Default setting)

ActMode	One Shot : Sends one message only. Response : Sends responses to the ID set with **[RespID]**. Responses are sent as soon as the set ID is received, and no delay time before frame transmission can be set. Interval* : Sends messages regularly at the interval set with **[Interval]**. One Shot Program : Sends messages tagged for **[One Shot Program]** one at a time, starting with the lowest number and proceeding in order until each has been sent once. The interval between the transmission of one program and the next is set with **[Interval]**. Repeat Program : Repeatedly sends messages tagged for **[Repeat Program]** in order, starting with the lowest number. The interval between the transmission of one program and the next is set with **[Interval]**.
Port1 / Port2	Selects the CAN port with which to send the frame.
FrmType	Data frame* : Sends a data frame. Remote frame: Sends a remote frame.
SendID	Sets the frame ID to use to send the set content as a hexadecimal value. (Valid setting range: 1 to 1FFFFFFF)
Len	Enter the byte length of the frame to send. (Valid setting range: 0 to 8)
SendText	Enter the text to send with the **[SendID]** frame as a hexadecimal value. Input boxes for the length specified with **[Len]** will be displayed, and one byte of data should be entered into each. (For example, if **[Len]** is 4, 01 45 AB EF.)
RespID	The set frame will be sent when a port with the message ID (hexadecimal*) set here is received. This setting is valid when **[ActMode]** is set to **[Response]**. (Valid setting range: 1 to 1FFFFFFF)
Interval	Sets the interval at which to send the frame ID set here as a multiple of 10 ms. This setting is valid only when **[ActMode]** is **[Interval]**, **[One Shot Program]**, or **[Repeat Program]**. (Valid setting range: 1 to 9,999 [X 10 ms])

* A system of numerical notation based on the number 16. The 10 digits represent the numbers 0 through 9, while the letters A, B, C, D, E, and F are used for the decimal numbers 10, 11, 12, 13, 14, and 15.

3 **Click [OK] to accept the settings.**

The dialog box will close.

(You can click [Cancel] to close the dialog box without adding the definition.)

NOTE Since it is not possible to send and receive data simultaneously, when allocating a definition with the same ID as the transmit frame to be received by the same port as used for transmission, the set transmit frame will not affect measured values.

Saving a list (saving a condition settings file)

Click  on the toolbar to assign a name and save the communications condition settings, MR8904 register list, MR8904 analog assign list, MR8904 logic assign list, and MR8904 send list as a condition settings file (.CES).

To re-save content under a new filename, click  on the toolbar and follow the instructions.

To load a previously saved condition settings file

Click  on the toolbar on the Condition Settings window. Following the instructions to open the file will cause the display to be updated.

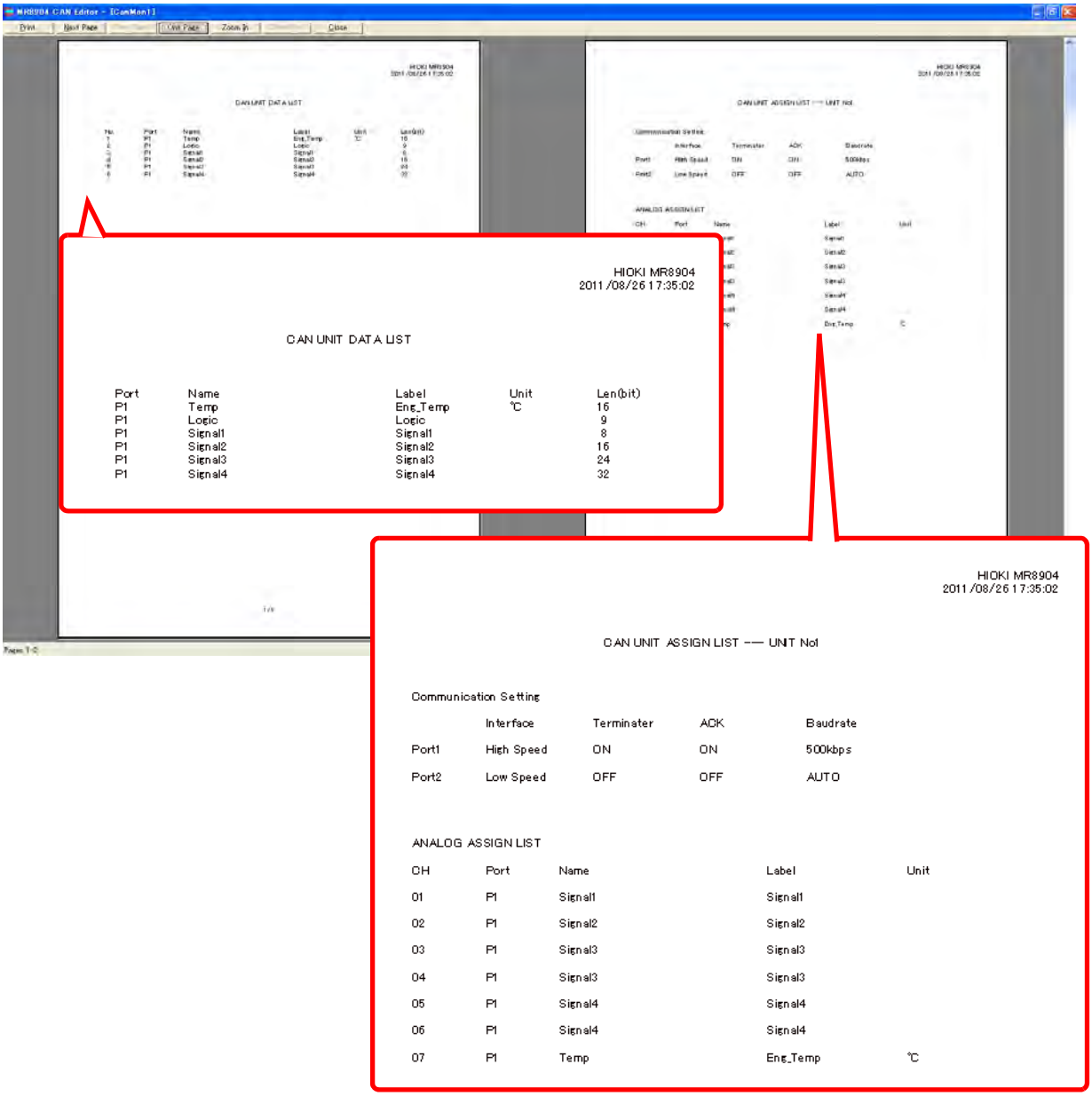
NOTE You can save communications condition settings, MR8904 register lists, MR8904 analog assign lists, MR8904 logic assign lists, and MR8094 send lists as a condition settings file (.CES) and send it to the Memory HiCorder. You can also load information sent to the Memory HiCorder into each of these lists.

See: "5.6 Sending and Receiving Condition Settings" (p.46)

5.5 Printing a Condition Settings File

You can print the currently displayed communications condition settings, **[MR8904 Register List]**, **[MR8904 Analog Assign List]**, **[MR8904 Logic Assign List]**, and **[MR8904 Send List]** by clicking  on the toolbar of the Condition Settings window.

You can preview the information that will be printed by selecting **[File]**-**[Print Preview]** on the menu bar.



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2011/08/26 17:35:02

CAN UNIT DATA LIST

Port	Name	Label	Unit	Len(bit)
P1	Temp	Eng_Temp	℃	16
P1	Logic	Logic		9
P1	Signal1	Signal1		8
P1	Signal2	Signal2		16
P1	Signal3	Signal3		24
P1	Signal4	Signal4		32

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2011/08/26 17:35:02

CAN UNIT ASSIGN LIST --- UNIT No1

Communication Setting

	Interface	Terminater	ACK	Baudrate
Port1	High Speed	ON	ON	500kbps
Port2	Low Speed	OFF	OFF	AUTO

ANALOG ASSIGN LIST

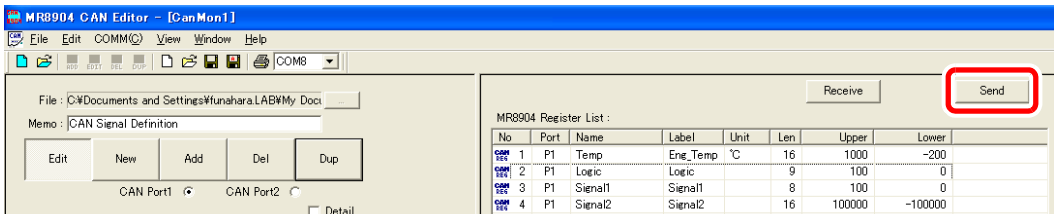
CH	Port	Name	Label	Unit
01	P1	Signal1	Signal1	
02	P1	Signal2	Signal2	
03	P1	Signal3	Signal3	
04	P1	Signal3	Signal3	
05	P1	Signal4	Signal4	
06	P1	Signal4	Signal4	
07	P1	Temp	Eng_Temp	℃

5.6 Sending and Receiving Condition Settings

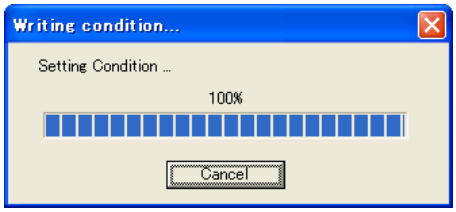
This section describes how to send settings to the Memory HiCorder after saving a condition settings file.

Sending condition settings

1 **Click [Send].**



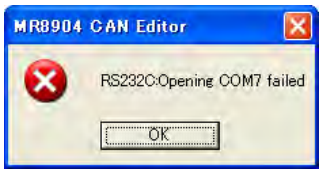
The dialog box shown to the right will be displayed when the transmission starts properly.



When the transmission completes, the dialog box to the right will be displayed.

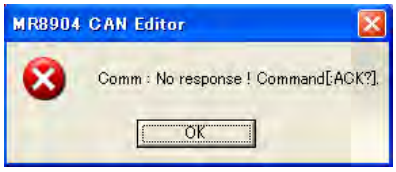
2 **Click [OK].**

If the unit is unable to send the data for some reason, the message to the right will be displayed. This message indicates that the unit was unable to connect to the port attempting to send or receive the settings.



See: An error is displayed.: "8.1 Troubleshooting" (p.63)

If no response is received from the Memory HiCorder for some reason, the message to the right will be displayed. Resend the settings. If the error persists, restart the Memory HiCorder and then resend the settings.



If the message shown to the right is displayed, there may be an illegal value in a definition registered in the register list. Refer to p.26 and p.27 and remove the illegal definition.

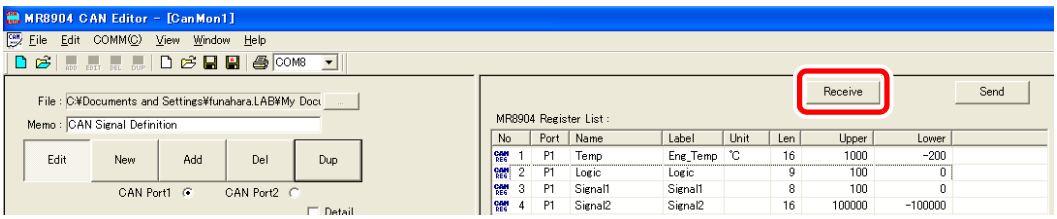
The message to the right will be displayed when the Memory HiCorder is in the process of performing measurement or calculations.

Resend the settings once the measurement, calculations, or other process completes.

Receiving condition settings

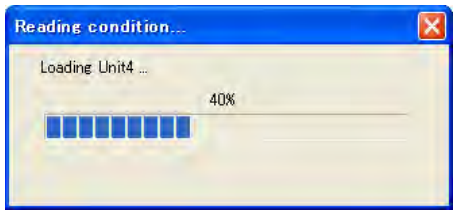
The MR8904 can also receive condition settings from the Memory HiCorder.

1 Click [Receive].



The MR8904 settings information with which the Memory HiCorder is currently configured will begin to load.

The dialog box to the right will be displayed while the data is loading.



Once data has been loaded into the window, the Condition Settings window display will be updated.

NOTE When receiving conditions, the upper and lower limit values on the display will be set to initial values calculated from the bit length, bit rate, and offset.

5.7 Window Menu Commands

This section describes the commands and functions available on the menus on each window as well as the toolbar icon layout and functions.

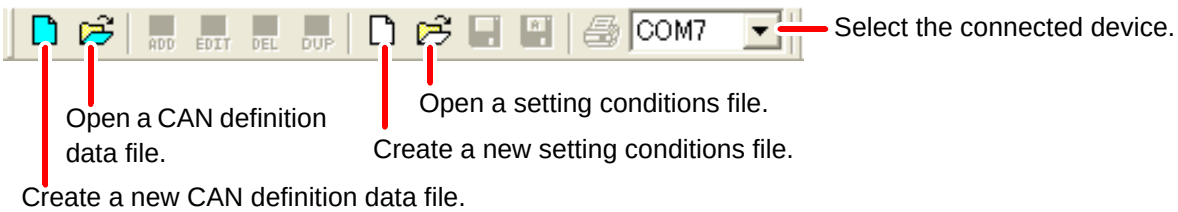
Launch window

Menu bar

Menu		Explanation
File	Open	Displays a new Condition Settings window.
	Open	Loads data from a previously created condition settings file (.CES file) and displays it in a Condition Settings window.
	CAN Define Data File	New : Displays a new CAN Definition Data File Settings window. Open : Loads data from a previously created CAN definition data file (.CDF file) and displays it in a CAN Definition Data File Settings window. Convert DBC File and Open: Converts an existing CANdb file (.DBC file) into a CAN definition data file and displays it in a CAN Definition Data File Settings window.
	Print Setup	Configures the printer used to print the Condition Settings window's register list, communications condition settings, channel assign list, and send list.
	Exit	Exits the MR8904 CAN Editor.
Comm	Search MR8875	Searches for connected Memory HiCorders.
View	Toolbar	Toggles the toolbar display on and off.
	Status Bar	Toggles the status bar display on and off.
Help	About MR8904 CAN Editor	Displays version information for the MR8904 CAN Editor.

Toolbar

In this window, there are four active icons.

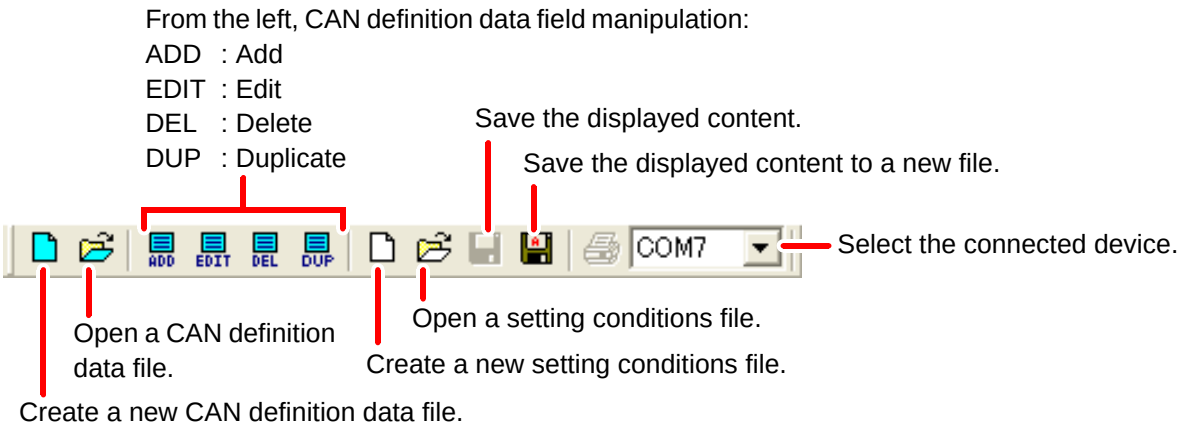


CAN Definition Data File Settings window

Menu bar

Menu		Explanation
File	New	Displays a new CAN Definition Data File Settings window.
	Open	Loads data from a previously created CAN definition data file (.CDF file) and displays it in a CAN Definition Data File Settings window.
	Convert DBC File and Open	Converts an existing CANdb file (.DBC file) into a CAN definition data file and displays it in a CAN Definition Data File Settings window.
	Close	Closes the currently displayed CAN Definition Data File Settings window.
	Save	Saves the contents of the currently displayed CAN Definition Data File Settings window to the corresponding file.
	Save As	Saves the contents of the currently displayed CAN Definition Data File Settings window to a new file.
	Print	No function
	Print Preview	No function
	Print Setup	Configures the printer used to print the Condition Settings window's register list, communications condition settings, channel assign list, and send list.
	Exit	Exits the MR8904 CAN Editor.
Edit	Modify Password	Sets the password required when opening the CAN definition data file.
View	Toolbar	Toggles the toolbar display on and off.
	Status Bar	Toggles the status bar display on and off.
Window	Cascade	When the CAN Definition Data File Settings window and Condition Settings window are open at the same time, displays them in a cascading manner.
	Tile	When the CAN Definition Data File Settings window and Condition Settings window are open at the same time, arranges them side by side.
Help	About MR8904 CAN Editor	Displays version information for the MR8904 CAN Editor.

Toolbar

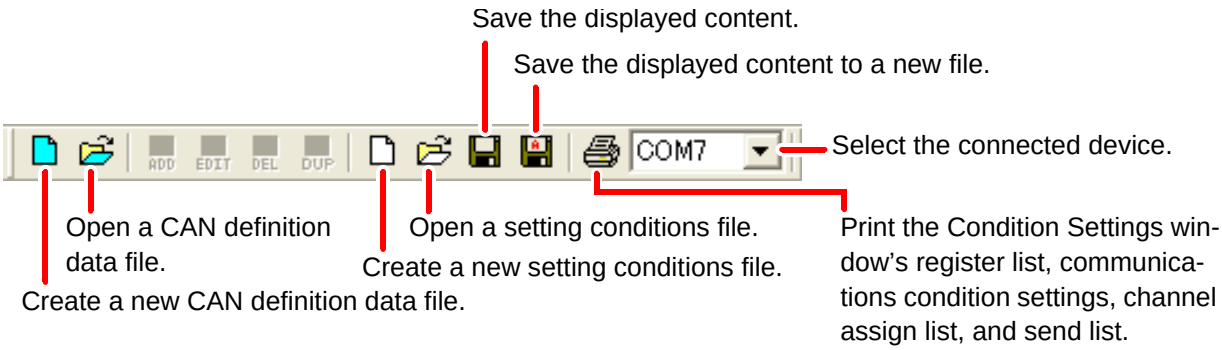


Condition Settings window

Menu bar

Menu		Explanation
File	New	Displays a new Condition Settings window.
	Open	Loads data from a previously created condition settings file (.CES file) and displays it in a Condition Settings window.
	Close	Closes the currently displayed Condition Settings window.
	Save	Saves the contents of the currently displayed Condition Settings window to the corresponding file.
	Save As	Saves the contents of the currently displayed Condition Settings window to a new file.
	CAN Define Data File	New : Displays a new CAN Definition Data File Settings window. Open : Loads data from a previously created CAN definition data file (.CDF file) and displays it in a CAN Definition Data File Settings window. Convert DBC File and Open: Converts an existing CANdb file (.DBC file) into a CAN definition data file and displays it in a CAN Definition Data File Settings window.
	Print	Prints print the Condition Settings window's register list, communications condition settings, channel assign list, and send list.
	Print Preview	Generates a print preview for the Condition Settings window's register list, communications condition settings, channel assign list, and communications list.
	Print Setup	Configures the printer used to print the Condition Settings window's register list, communications condition settings, channel assign list, and communications list.
	Exit	Exits the MR8904 CAN Editor.
Edit	Modify Password	Valid only when editing a definition file. Sets the password required when opening the CAN definition data file.
Comm	Search MR8875	Searches for connected Memory HiCorders.
View	Toolbar	Toggles the toolbar display on and off.
	Status Bar	Toggles the status bar display on and off.
Window	Cascade	When the CAN Definition Data File Settings window and Condition Settings window are open at the same time, displays them in a cascading manner.
	Tile	When the CAN Definition Data File Settings window and Condition Settings window are open at the same time, arranges them side by side.
Help	About MR8904 CAN Editor	Displays version information for the MR8904 CAN Editor.

Toolbar



Configuring Settings with the Memory HiCorder Chapter 6

This chapter describes how to use a Memory HiCorder to check settings sent from the MR8904 CAN Editor and how to configure frame transmission timing.

The MR8875 Memory HiCorder is used as an example.

6.1 Checking and Editing Settings

On the MR8875, display **[Setting Display]** ▶ **[System]** ▶ **[Initialize]** ▶ **[CAN Unit Setting List]**.

You can check and edit settings configured with the MR8904 CAN Editor.

Create an MR8904 send list (which will serve as the transmission condition settings).

See: "Configuring transmission (creating an MR8904 Send list)" (p.42)

Allocate channels by creating an MR8904 analog assign list and MR8904 logic assign list from the MR8904 register list.

See: "Allocating channels (Creating MR8904 analog/logic assign lists)" (p.40)

Set the CAN communications conditions.

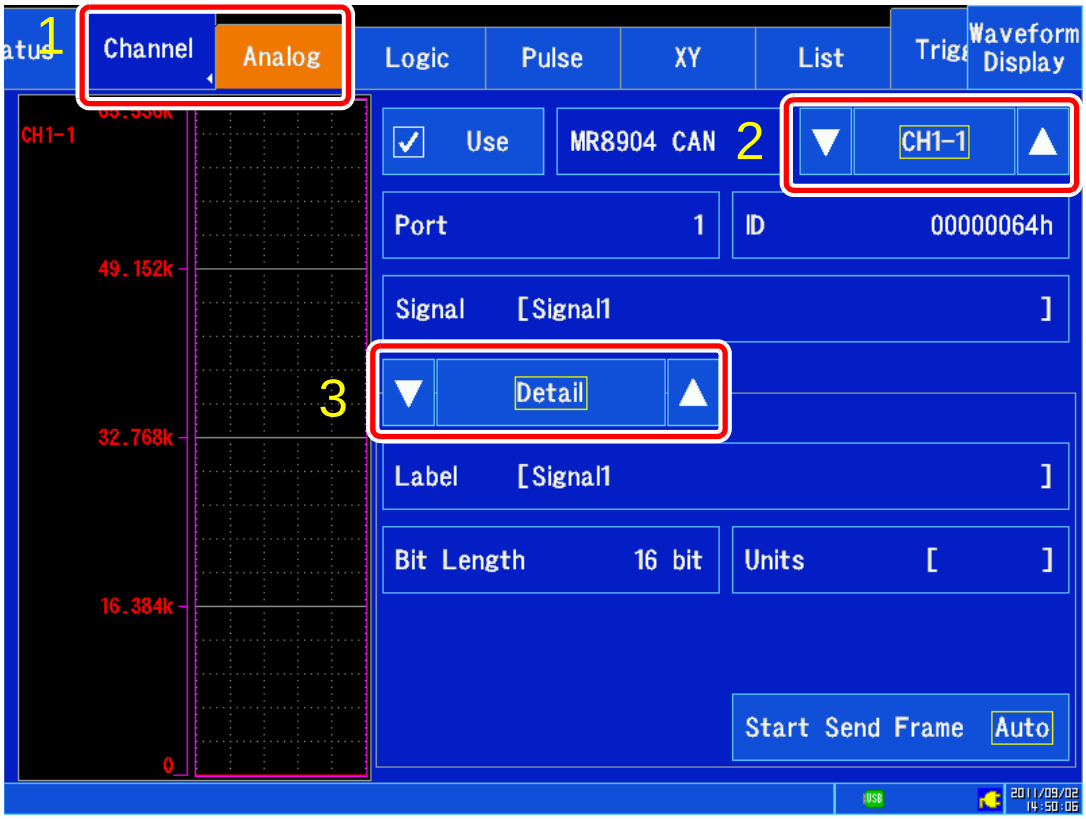
See: "Setting CAN communications conditions" (p.38)

6.2 Checking Analog Channel Allocation

You can check analog channel allocation as configured with the MR8904 CAN Editor.

1 **Display [Setting Display] ▶ [Channel] ▶ [Analog] on the MR8875.**

2 **Select the analog channel to which CAN definitions were allocated.**



Port	Number of the port with which data will be received
ID	Message ID to receive
Signal	Name associated with received messages

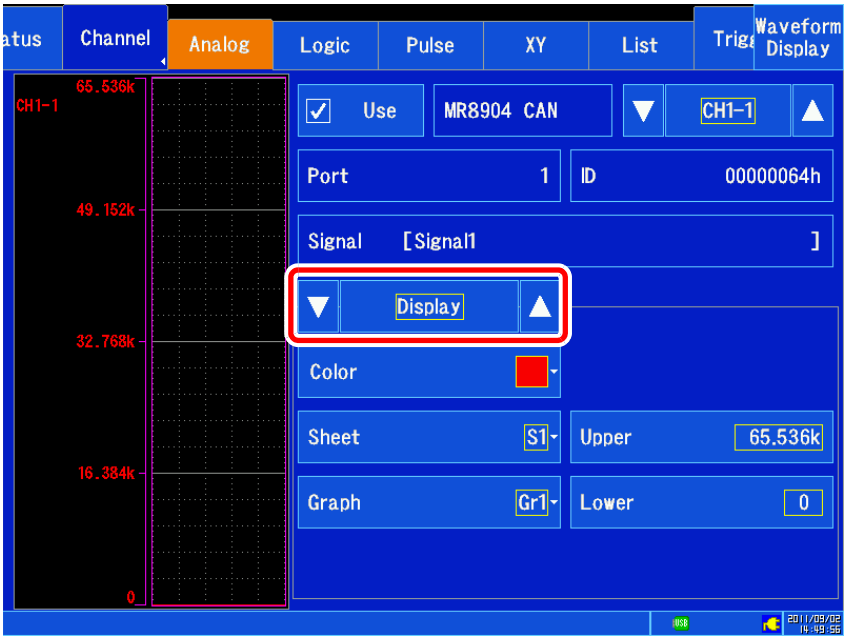
3 **Select [Detail].**

The following information will be displayed:

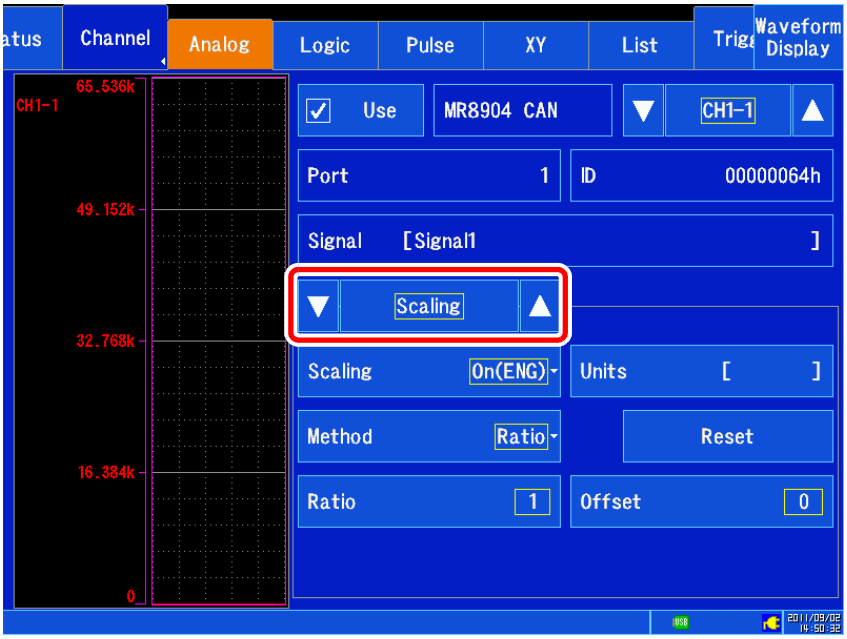
Label	Identifying label associated with received messages
Bit Length	Bit length of received messages
Units	Unit for received messages
Start Send Frame	Selects the timing at which to send messages. **See:** "6.4 Setting the Transmission Timing" (p.55)

Display settings and scaling are automatically set based on the bit rate and offset values set with the MR8904 CAN Editor. For more information about settings, see the MR8875 instruction manual.

Display Settings screen



Scaling screen



NOTE

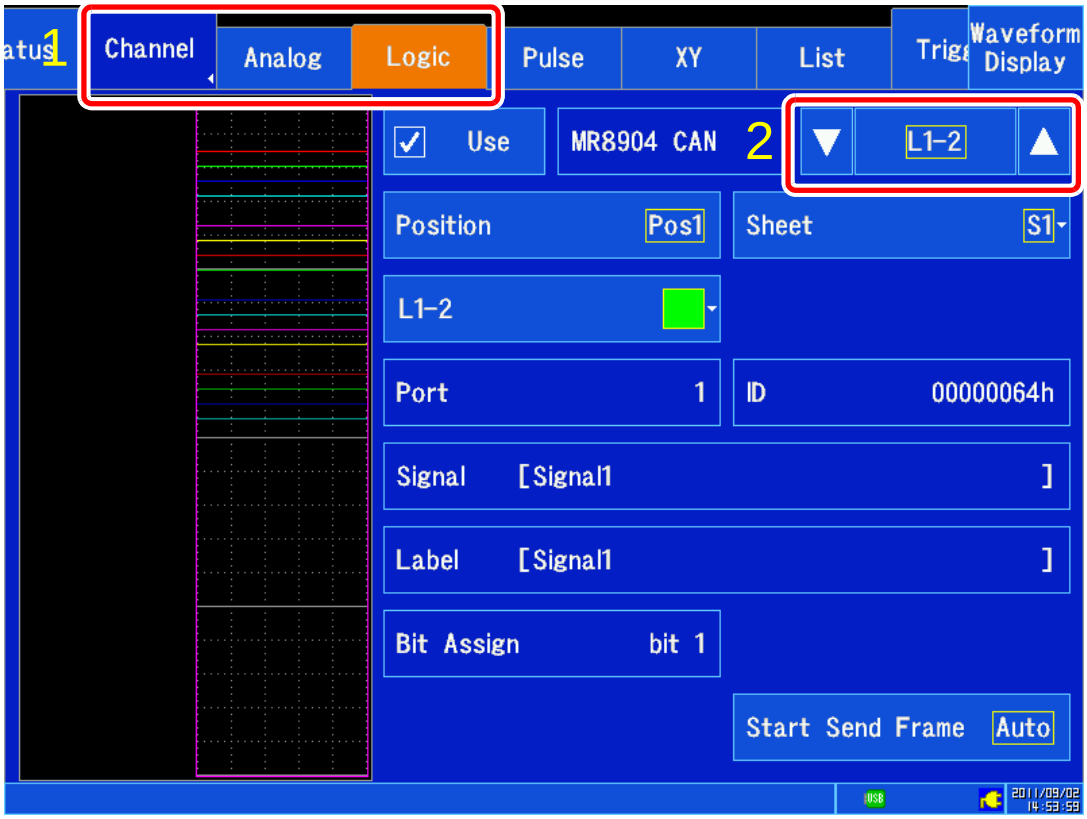
- The display upper limit, display lower limit, scaling conversion ratio, offset, and unit display settings default to the values set with the MR8904 CAN Editor. They can also be changed on the Memory HiCorder.
- The display range can only be set with the display upper limit and display lower limit. Scale factor, zero position, waveform mirroring, and Vernier settings cannot be used.

6.3 Checking Logic Channel Allocation

You can check logic channel allocation as configured with the MR8904 CAN Editor.

1 **Display [Setting Display] ▶ [Channel] ▶ [Logic] on the MR8875.**

2 **Select the channel to which CAN definitions were allocated.**



The following information will be displayed:

Port	Number of the port with which data will be received
ID	Message ID to receive
Signal	Name associated with received messages
Label	Identifying label associated with received messages
Bit Assign	Indicates how many bits from the LSB* of the received message to measure. When an ID trigger has been allocated, displays “ID trigger.” *: See "How to count the bit position" (p.28).
Start Send Frame	Selects the timing at which to send messages. **See:** "6.4 Setting the Transmission Timing" (p.55)

NOTE The display position can be selected as follows:

- When the logic recording width is **[Normal]**, Pos1 / Pos2.
- When the logic recording width is **[Wide]**, Pos1.

6.4 Setting the Transmission Timing

This section describes how to set when to start transmission as configured with the MR8904 CAN Editor.

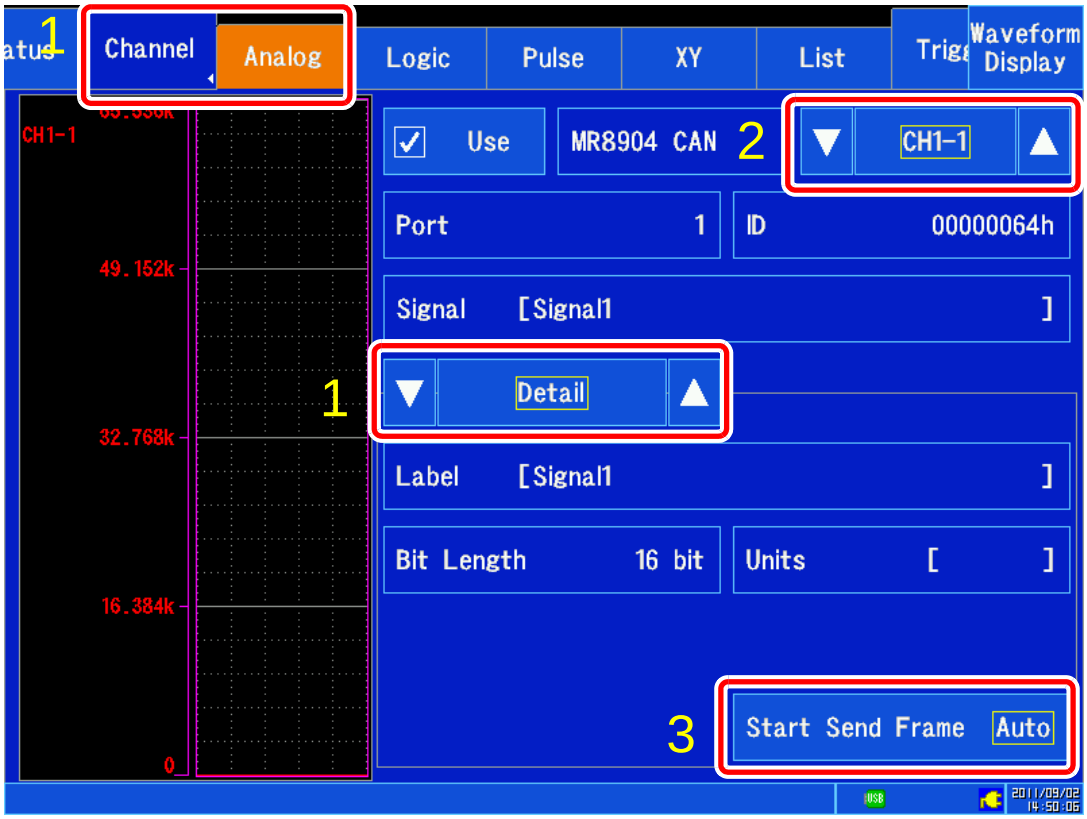
1 **Display [Setting Display] ▶ [Channel] ▶ [Analog] ▶ [Detail] on the MR8875. If using a logic channel, display [Setting Display] ▶ [Channel] ▶ [Logic].**

2 **Select the channel to which CAN definitions were allocated.**

3 **Select the transmission timing with the [Start Send Frame] setting.**

Setting Contents (∗: Default setting)

Auto*	Frame transmission starts when measurement starts and stops when measurement stops.
Manual	Transmission starts and stops when a button on the Waveform screen is touched during measurement. Frames cannot be sent when measurement is not in progress, manually or otherwise.

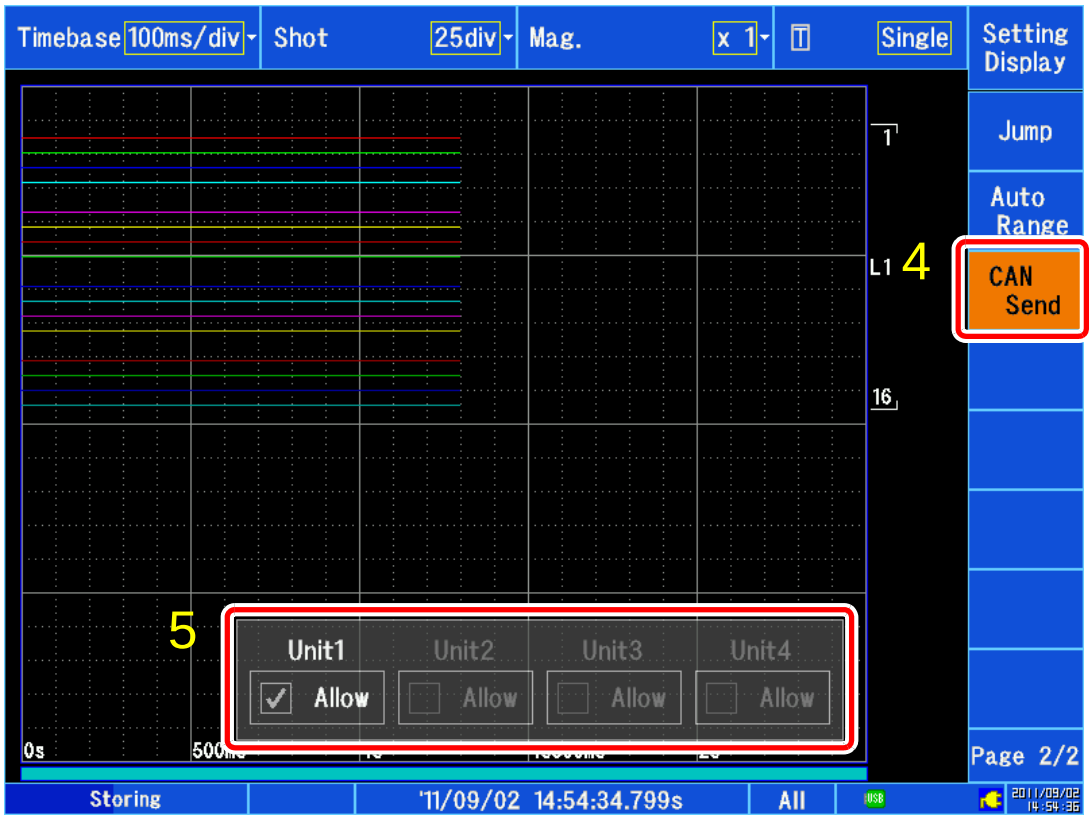


(Continues on next page.)

(When set to **[Manual]**)

4 Press the [Waveform Display] ▶ [CAN Send] button.

A dialog box will be displayed.



5 Enable or disable the unit.

Setting Contents (∗: Default setting)

On	☑	Enable starting.
Off*	☐	Enable stopping.

The transmission enable setting is only valid while measurement is in progress.

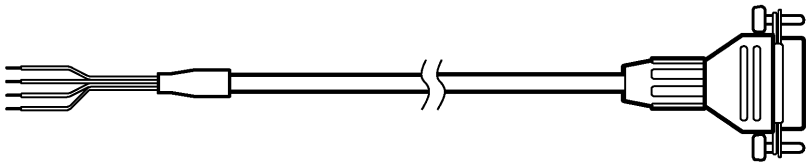
Specifications Chapter 7

7.1 Model MR8904 Specifications

Compliant CAN standards	ISO 11898 CAN 2.0b ISO 11898-1 CAN protocol ISO 11898-2 High-speed physical layer for CAN ISO 11898-3 Low-speed fault-tolerant physical layer for CAN SAE J2411 Single wire physical layer for CAN
No. of CAN ports	2 (Port 1, Port 2)
Input CAN connectors	Two D-sub 9-pin male connectors
CAN interfaces	User-selectable high-speed CAN, low-speed CAN, or single-wire CAN for each port (built-in compatible transceiver) from the MR8904 CAN Editor
ACK On/Off	ACK transmission can be turned on and off for CAN signal reception with MR8904 CAN Editor.
Terminators	Built-in 120 ±10 Ω terminator; on/off setting with commands
Communications speeds	High-speed CAN : 1M, 800k, 500k, 250k, 125k, 100k, 83.3k, 62.5k, 50 kbps Low-speed CAN : 125k, 100k, 83.3k, 62.5k, 50k, 33.3k, 20k, 10kbps Single-wire CAN : 83.3k, 62.5k, 50k, 33.3k, 20k, 10kbps Baud rate settings can be made either with the MR8904 CAN Editor or using automatic detection.
Signal resolution output channels	15 channels equivalent to 16-bit analog signal 16 1-bit channels equivalent to logic signal
Target signal format	1-bit signals : Use 1 logic channel or 1 analog channel. 1- to 16-bit signals : Use 1 analog channel. 17- to 32-bit signals : Use 2 analog channels. Signals over 32 bits : Not supported.
ID trigger	When the set ID is received, a high-level pulse is output to the specified logic channel. The pulse width is 50 μs if the time axis is within 5 ms/div or 1 sample if the time axis is more than 10 ms/div.
Response time	Within 200 μs of CAN message reception completion
CAN message transmission	The set CAN message is transmitted to the bus for each port. One Shot : Transmission once only Interval : Transmission at the set interval (10 ms to 99.99 s) Response : Transmission when the set ID is received Program : Transmission in the set order at the set interval (10 ms to 99.99 s) Transmission timing depends on the start time and message transmission key.
Status indicator LEDs	Separate for ports 1 and 2 Turn green when a CAN signal with the set ID is received. Turn red when an error occurs.
Operating temperature and humidity	As per the Memory HiCorder into which the MR8904 has been installed
Operating environment	As per the Memory HiCorder into which the MR8904 has been installed
Storage temperature and humidity	Temperature : -20 to 60°C (-4 to 140°F) Humidity : -20°C to 40°C (-4 to 104°F) 80% RH or less (no condensation) 40°C to 45°C (104 to 113°F) 60% RH or less (no condensation) 45°C to 60°C (113 to 140°F) 50% RH or less (no condensation)
Dimensions	Approx. 119.5W×18.8H×151.5D mm (4.70”W x 0.74”H x 5.96”D)
Product warranty period	3 years

Mass	Approx. 185 g (6.5 oz.)
Applicable Standards	EMC EN61326 Class A Safety EN61010
Options	Model 9713-01 CAN Cable Model 9713-02 CAN Cable

7.2 Model 9713-01 CAN Cable Specifications (Terminates in Bare Wires on One End)

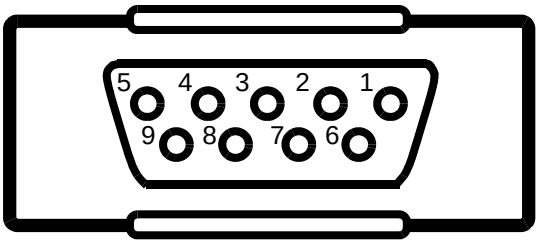


Basic Specifications

Operating temperature and humidity	Temperature: -10°C to +55°C (14 to 131°F), Humidity: 80% RH or less (no condensation)
Storage temperature and humidity	Temperature: -20°C to 70°C (-4 to 158°F), Humidity: 90% RH or less (no condensation)
Rated voltage	60 VDC
Rated current	2 A
Dimensions	Approx. 2000 mm (78.74”)
Mass	Approx. 110 g (3.9 oz.)

Connector: D-Sub 17LE23090-27 (Manufactured by DDK Ltd.)

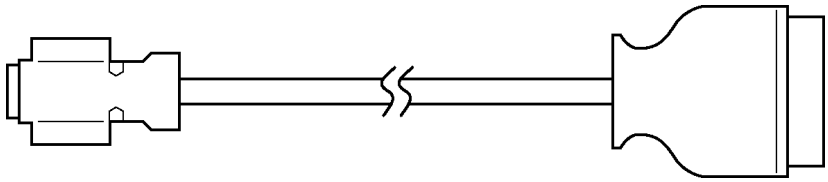
Wire color	Pin no.	Receive signal name
-	1	NC
Green	2	CAN_L
Black	3	CAN_GND
-	4	NC
-	5	NC
-	6	NC
Red	7	CAN_H
-	8	NC
White	9	CAN_V+
-	Shield	GND



Male (9-pin)

7.3 Model 9713-02 CAN Cable Specifications (for Onboard Vehicle Connectors)

Made to order; check specifications and delivery time.



Basic Specifications

Operating temperature and humidity	Temperature: -5°C to 60°C (23 to 140°F), Humidity: 90%RH or less (no condensation)
Storage temperature and humidity	Temperature: -20°C to 80°C (-4 to 176°F), Humidity: 90%RH or less (no condensation)
Rated voltage	60 VDC
Rated current	2 A
Dimensions	Approx. 2000 mm (78.74”)
Mass	Approx. 150 g (5.3 oz.)

7.4 MR8904 CAN Editor General Specifications

Supported operating systems	Windows XP 32-bit Windows Vista/7/8 32-bit and 64-bit
Recommended display resolution	1280 x 960
Interface	USB
Supported measuring instrument	Hioki MR8875 Memory HiCorder
CAN definition settings	1. Item number: Starting at 1 2. CAN message ID: 0 to 1FFFFFFF H 3. Start position: 0 to 63 4. Data length: 1 to 32 5. Data order: U/L (Motorola), L/U (Motorola), L/U (Intel) 6. Sign: Unsigned, 1-signed, 2-signed 7. Signal name: Up to 40 characters 8. Label name: Up to 16 characters 9. Scaling unit: Up to 7 characters 10. Scaling value: Bit rate/offset value or maximum value/minimum value
Definition file memo	Memos consisting of up to 50 characters can be stored in the CAN definition file.
Password	A password of up to 20 characters can required in order to edit CAN definitions.
CANdb file	1. Supported: Loading, conversion to CAN definition data file format (.CDF), registration to register list 2. Not supported: Editing 3. Data of 33 bits and more is not supported. 4. Data order: Conversion from Motorola (CANdb file) to U/L (Motorola) 5. Conversion from signed (CANdb file) to 2-signed; IEEE float and double (CANdb file) are not supported. 6. Conversion from signal name (CANdb file) to label 7. Conversion from comment (CANdb file) to signal name
Register list settings	1. CAN input port setting: Select port 1 or port 2. 2. Item number: 1 to 200 3. Display upper and lower limit value settings on Memory HiCorder
Set unit position	Unit 1 to Unit 4
CAN communications settings	1. Set (2) to (5) for each port. 2. Interface: High-speed, low-speed, or single-wire 3. Terminator: On/off (on is valid with high-speed interfaces only) 4. ACK: On/off 5. Baud rate: Auto (valid during ACK off only) High-speed CAN: 1M, 800k, 500k, 250k, 125k, 100k, 83.3k, 62.5k, 50 kbps Low-speed CAN: 125k, 100k, 83.3k, 62.5k, 50k, 33.3k, 20k, 10kbps Single-wire CAN: 83.3k, 62.5k, 50k, 33.3k, 20k, 10kbps
Analog channel settings	1. Number of channels: 15 2. Definitions on register list within 16 bits are allocated to 1 channel. 3. Definitions on register list from 17 to 32 bits are allocated to 2 channels.
Logic channel settings	1. Number of channels: 16 2. Definitions on register list within 16 bits and their bit position are allocated. 3. Definitions on register list are allocated as ID triggers.

Transmission settings	1. Transmission number: 1 to 16 2. Operating mode: Interval, Response, One Shot, One Shot Program, Repeat Program 3. CAN output port settings: Port 1, port 2 4. Frame types: Data frame, remote frame 5. Transmission ID: 1 to 1FFFFFFF H 6. Transmission byte length: 0 to 8 7. Transmit data: (Transmit byte length) bytes of data are set using hexadecimal notation. 8. Response ID: 1 to 1FFFFFFF H (response transmission only) 9. Transmission interval: 1 to 9,999 (× 10 ms) (Interval, One Shot Program, and Repeat Program only)
Communications with Memory HiCorder	1. Search for USB-connected Memory HiCorder; when multiple instruments are connected, select one. 2. Send register list, CAN communications settings, analog channel settings, logic channel settings, transmission settings, and display upper and lower limit values to the Memory HiCorder. 3. Receive register list, CAN communications settings, analog channel settings, logic channel settings, transmission settings, and display upper and lower limit values from the Memory HiCorder.
Display functions	1. CAN definition data list display: Displays all CAN definition data settings. 2. Register list display: Displays the item number, input port number, signal name, label, unit, data length, and display upper and lower limit values. 3. Unit position: Displays an asterisk (*) at positions in the connected device where no MR8904 is present. 4. CAN communications settings display: Displays all CAN communications settings. 5. Analog assign list display: Displays the channel, input port number, signal name, label, unit, and display upper and lower limit values. 6. Logic assign list display: Displays the channel, input port number, signal name, label, and bit position. 7. Send list display: Displays all transmission settings.
Print functions	1. Print register list: Prints the item number, input port number, signal name, label, unit, and data length. 2. Print CAN communications settings: Prints all CAN communications settings. 3. Print analog assign list: Prints the channel, input port number, signal name, label, and unit. 4. Print logic assign list: Prints the channel, input port number, signal name, label, and bit position. 5. Print send list: Prints all transmission settings.
Save functions	1. CAN definition data: Binary format (extension of .CDF, compatible with the software for Model 8910) 2. Settings data: Binary format (extension of .CES, all settings except CAN definition data)

Maintenance and Service Chapter 8

- If damage is suspected, check the "Troubleshooting" section before contacting your dealer or Hioki representative.
- Pack the MR8904 so that it will not sustain damage during shipping, and include a description of existing damage. We do not take any responsibility for damage incurred during shipping.
- The circuit on which power is supplied form the CAN bus incorporates a built-in fuse. If you are unable to send or receive data using low-speed or single-wire CAN, the fuse may be broken. The fuse cannot be replaced or repaired by the customer, so please contact your Hioki distributor.

8.1 Troubleshooting

Symptom	Check Item	Remedy and Reference
• You cannot communicate with the PC. • You cannot send condition settings data. (An error is displayed.)	Is the USB cable properly connected?	Connect the USB cable properly. **See:** "3.3 Connecting the Unit to a PC" (p.14)
	Has the USB driver been properly installed?	Install the USB driver properly. **See:** "Installing the USB driver" (p.14)
	Is the Memory HiCorder turned on?	Turn on the Memory HiCorder.
	Has the connected device been properly set?	Search for the device using **[Comm]**-**[Search MR8875]** on the menu bar and set the connected device.
You cannot capture signals from the CAN bus.	Is the CAN cable properly connected?	Connect the CAN cable properly. **See:** "3.2 Connecting the Unit to the Measurement Target" (p.12)
	Has the data been properly configured?	Check the data settings. **See:** "5.3 Creating a CAN Definition Data File" (p.26) "5.4 Creating Condition Settings Files" (p.34)
	Have the signals been allocated to the proper unit position?	Check the unit position to which the signals have been allocated. There is no unit installed at locations where an asterisk (*) is shown on the tab. **See:** "Setting CAN communications conditions" (p.38)
	Has data been allocated to the output channel?	Check the data settings. **See:** "Allocating channels (Creating MR8904 analog/logic assign lists)" (p.40)

Symptom	Check Item	Remedy and Reference
The device encounters an error (the red LED lights up).	Is the CAN cable properly connected?	Connect the CAN cable properly. **See:** "3.2 Connecting the Unit to the Measurement Target" (p.12)
	Has the interface been properly configured?	Configure the interface so that it matches the interface of the CAN bus being measured. **See:** "Interface" (p.39)
	Has the baud rate been properly set?	Set the baud rate so that it matches the baud rate of the CAN bus being measured. **See:** "Baud" (p.39)
	Have the terminators been configured properly?	Configure the terminators so that there are two for the entire CAN bus. **See:** "Terminator" (p.39)

If the cause of the error remains unknown, perform a system reset with the Memory HiCorder. This will reset all settings to their values when the unit was shipped from the factory.

After performing the system reset, send the settings data from the PC again.
See:"5.6 Sending and Receiving Condition Settings" (p.46)

8.2 Cleaning

To clean the MR8904, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.

Warranty Certificate

HIOKI

Model	Serial number	Warranty period Three (3) years from date of purchase (___ / ___)

Customer name: _____

Customer address: _____

Important

- Please retain this warranty certificate. Duplicates cannot be reissued.
- Complete the certificate with the model number, serial number, and date of purchase, along with your name and address. The personal information you provide on this form will only be used to provide repair service and information about Hioki products and services.

This document certifies that the product has been inspected and verified to conform to Hioki's standards.
Please contact the place of purchase in the event of a malfunction and provide this document, in which case Hioki will repair or replace the product subject to the warranty terms described below.

Warranty terms

1. The product is guaranteed to operate properly during the warranty period (three [3] years from the date of purchase). If the date of purchase is unknown, the warranty period is defined as three (3) years from the date (month and year) of manufacture (as indicated by the first four digits of the serial number in YYMM format).
2. If the product came with an AC adapter, the adapter is warrantied for one (1) year from the date of purchase.
3. The accuracy of measured values and other data generated by the product is guaranteed as described in the product specifications.
4. In the event that the product or AC adapter malfunctions during its respective warranty period due to a defect of workmanship or materials, Hioki will repair or replace the product or AC adapter free of charge.
5. The following malfunctions and issues are not covered by the warranty and as such are not subject to free repair or replacement:
   -1. Malfunctions or damage of consumables, parts with a defined service life, etc.
   -2. Malfunctions or damage of connectors, cables, etc.
   -3. Malfunctions or damage caused by shipment, dropping, relocation, etc., after purchase of the product
   -4. Malfunctions or damage caused by inappropriate handling that violates information found in the instruction manual or on precautionary labeling on the product itself
   -5. Malfunctions or damage caused by a failure to perform maintenance or inspections as required by law or recommended in the instruction manual
   -6. Malfunctions or damage caused by fire, storms or flooding, earthquakes, lightning, power anomalies (involving voltage, frequency, etc.), war or unrest, contamination with radiation, or other acts of God
   -7. Damage that is limited to the product's appearance (cosmetic blemishes, deformation of enclosure shape, fading of color, etc.)
   -8. Other malfunctions or damage for which Hioki is not responsible
6. The warranty will be considered invalidated in the following circumstances, in which case Hioki will be unable to perform service such as repair or calibration:
   -1. If the product has been repaired or modified by a company, entity, or individual other than Hioki
   -2. If the product has been embedded in another piece of equipment for use in a special application (aerospace, nuclear power, medical use, vehicle control, etc.) without Hioki's having received prior notice
7. If you experience a loss caused by use of the product and Hioki determines that it is responsible for the underlying issue, Hioki will provide compensation in an amount not to exceed the purchase price, with the following exceptions:
   -1. Secondary damage arising from damage to a measured device or component that was caused by use of the product
   -2. Damage arising from measurement results provided by the product
   -3. Damage to a device other than the product that was sustained when connecting the device to the product (including via network connections)
8. Hioki reserves the right to decline to perform repair, calibration, or other service for products for which a certain amount of time has passed since their manufacture, products whose parts have been discontinued, and products that cannot be repaired due to unforeseen circumstances.

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