

CAN CARD WITH 2 INPUT PORTS

FOR EDX-100A

CAN-41A

INSTRUCTION MANUAL

Thank you for purchasing KYOWA's product CAN-41A, CAN CARD WITH 2 INPUT PORTS FOR EDX-100A UNIVERSAL RECORDER

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Do not use the product in methods other than described in this Manual.

In addition, read "EDX-100A Universal Recorder Instruction Manual for Hardware," "DCS-100A Dynamic Data Recording Software Instruction Manual for EDX-100A Operation," and "DCS-100A Dynamic Data Recording Software Instruction Manual for Common Operation."

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STANDARD ACCESSORIES

The following accessories are packed in CAN-41A, CAN Card with 2 input ports for EDX-100A Universal Recorder (hereinafter referred to as the CAN-41A). When unpacking, check the contents to ensure that all accessories are enclosed.

Term and Conditions of Product Warranty	1
‘Please Read First’ Sheet	1
Cross-recessed Head Screw M3×6	2

SAFETY PRECAUTIONS

Do not forget to read the **SAFETY PRECAUTIONS** prior to use.

The CAN-41A is designed to be used according to “6. Specifications” Do NOT use the CAN-41A in environment exceeding the scope of the above specifications. Or, system failure may result in.

PRIOR TO USE

For safe use of the CAN-41A, be sure to read the following precautions.

Kyowa Electronic Instruments CO., LTD. assumes no liability for any damages resulting from the user's failure to comply with the safety precautions.

SAFETY SYMBOLS

For safety operation of the CAN-41A, the following **WARNING** and **CAUTION** symbols are used in **Safety Precautions** of this manual and indicated on the product.

 WARNING	Improper operation of the system may result in death or severe injury of the operator.
 CAUTION	Improper operation of the system may result in injury of the operator and physical damage of the system.

 WARNING
• WARNING Take special notice of warning items described in the “EDX-100A Universal Recorder Instruction Manual for Hardware.” • Maximum Input Voltage Range Input voltage range of the high speed CAN is from -36V to 36V and that of the low speed CAN is from -27V to 40V. Do NOT input voltage exceeding the specified range. Or, electric shock hazard, system failure, or damage to the system may result in.

 CAUTION
• CAUTION Take special care of caution items described in the “EDX-100A Universal Recorder Instruction Manual for Hardware,” “DCS-100A Dynamic Data Recording Software Instruction Manual for EDX-100A Operation,” and “DCS-100A Dynamic Data Recording Software Instruction Manual for Common Operation.”

NOTATIONS USED IN THE INSTRUCTION MANUAL

INFORMATIONAL NOTES

Certain notations are used as necessary to attract your attention to information that requires special care when handling the CAN-41A, and to information provided for reference purposes.

Examples of Notations

NOTE

Essential precautions required when handling the CAN-41A.

MEMO

Reference items required when handling the CAN-41A.

1. OUTLINE OF THE PRODUCT

1-1 OUTLINE

- CAN-41A is a CAN card for the EDX-100A designed to measure data frame on the CAN (Controller Area Network).
- Capable of recording data up to 32 types of data frame.
- Since communication condition of 2 input ports can be separately set on the CAN-41A, the CAN-41A is capable of recording different 2 CAN bus data at the same time.
- CAN data is simultaneously recorded together with the regular analog data and saved into the same data file (KS2 format).

1-2 CAN-41A HANDLING PRECAUTIONS

- The CAN-41A is not compatible for the EDX-2000A.
- Only '1' CAN-41A can be installed in the last slot (2nd slot of 2 slots EDX-100A or the 4th slot of the 4 slots EDX-100A). If the CAN-41A is installed in slots other than the above, since it is not correctly recognized, no measurement is available.
- Maximum sampling frequency is 1 kHz.
When recording the CAN data, irrespective of the number of REC channels, upper limit of sampling frequency is 1 kHz.
- Immediately after starting the measurement, CAN data is displayed with '0.' During the measurement, previous data is maintained until the new data is received.
- Although the CAN-41A is correctly installed in the last slot of the EDX-100A, if **UNKNOWN** is displayed as the card type in Check Connected Device of the DCS-100A, it is required to update the EDX-100A hardware.

Please ask the operating member of our company about update of EDX-100A hardware and DCS-100A software.

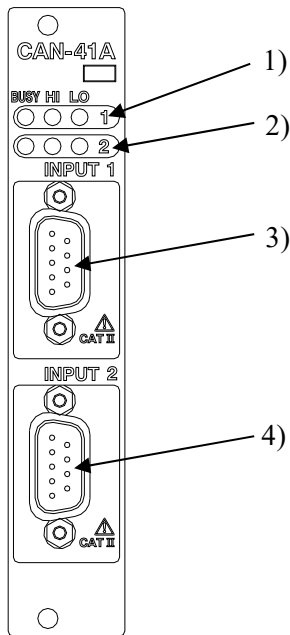
CAN-41A compatible version

- EDX-100A Firmware V01.08 or later
- DCS-100A V01.14 or later

NOTE

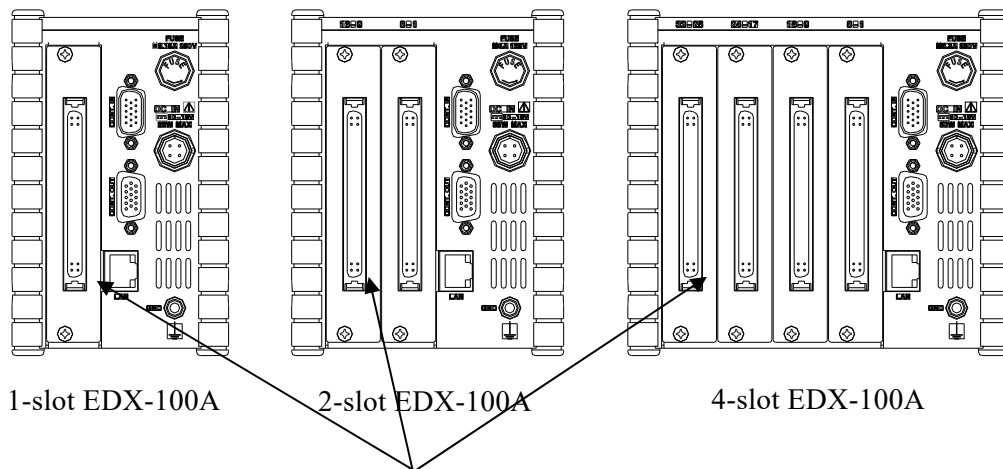
Settings of the CAN-41A are not available by selecting the regular **Set CH Condition** menu.
To set required conditions to the CAN-41A, select **Set CAN Condition** menu from **Set** on the menu bar.

1-3 CONTROLS AND INDIATORS



- 1) Port 1 status LED
 - BUSY Flickers when receiving data during the measurement.
 - Slowly flickers while setting condition.
 - HI Lights up when high speed CAN is selected.
 - LO Lights up when low speed CAN is selected.
- 2) Port 2 status LED
 - BUSY Flickers when receiving data during the measurement.
 - Slowly flickers while setting condition.
 - HI Lights up when high speed CAN is selected.
 - LO Lights up when low speed CAN is selected.
- 3) Input Port 1
- 4) Input Port 2

1-4 INSTALLATION OF CAN-41A BOARD



Do not forget to turn OFF the EDX-100A power before installing the CAN-41A to the above slots.

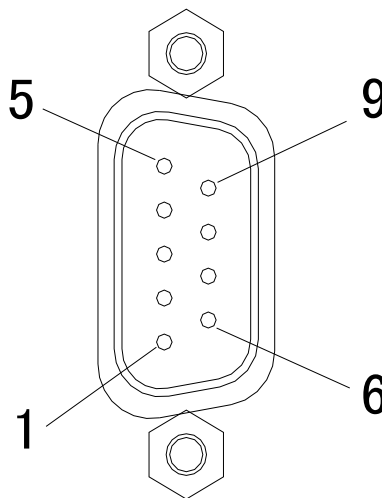
NOTE

- Do not forget to turn OFF the EDX-100A power before installing the CAN-41A. Or, the CAN-41A may be damaged.
- Only '1' CAN-41A is installed in the above slots of the EDX-100A.
If it is installed in slots other than the above, **DISABLE** is indicated as the **Card Type** on the system menu window and no measurement is available.

1-5 CONNECTING CAN BUS

For both port 1 and port 2, pin assignment of the CAN-41A input connector is arranged as described in the following figure.

Pin No.	Name
1	NC
2	CAN_L
3	CAN_GND
4	NC
5	NC
6	NC
7	CAN_H
8	NC
9	NC



Model: ESDE-9P-RIN-F (ITTCANON made)

Connectable connector is HDEB-9S HIROSE, etc.

Common port for high and low speed CANs. Select and set with the Software. For details, see “2-1 SETTING CAN COMMUNICATION CONDITION.”

Do not connect the input connector to anything other than the CAN bus. Or, electric shock hazard, deteriorated performance and system failure may result in.

2. SETTING REQUIRED CONDITIONS TO CAN-41A

This Chapter describes methods for setting required conditions to the CAN-41A.

For DCS-100A, refer to the following Instruction Manuals.

- “DCS-100A Dynamic Data Recording Software Instruction Manual for EDX-100A Operation”
- “DCS-100A Dynamic Data Recording Software Instruction Manual for Common Operation”

Correctly install the CAN-41A in the EDX-100A, set menus in due order from **Set - Set CAN Condition**.

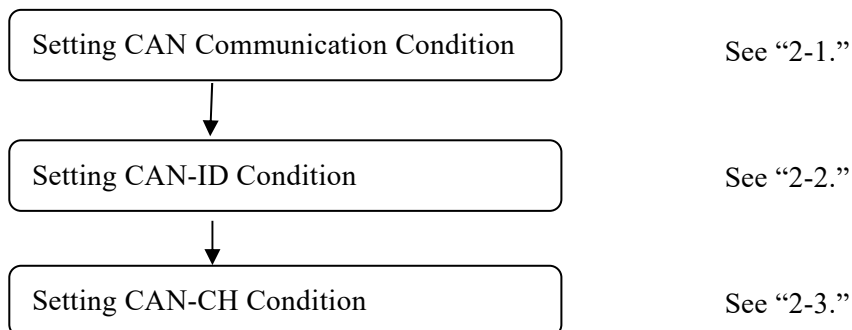
Selecting the **Set CAN Condition** menu opens the **Set CAN Condition** window.

The **Set CAN Condition** window has the following 3 tabs.

CAN Comm: CAN Communication conditions is set.
CAN-ID: Data frame ID information is set.
CAN-CH: Various data conditions in data frame ID are set.

Although the CAN-41A is correctly recognized, if selecting the **Set - Set CAN Condition** menu is not available, check sampling frequency of the data recording.

Following are procedures for setting required items when recording the CAN data.



MEMO

Regarding method for setting required conditions, refer to “11. SETTING CAN CONDITION” in DCS-100A Dynamic Data Recording Software Instruction Manual for EDX-100A Operation.

2-1 SETTING CAN COMMUNICATION CONDITION

CAN communication conditions are set.

Prior to recording the CAN data, do not forget to set communication conditions.

EDX-ID No.	Device Name	Port No.	CAN Comm Std	Comm Speed (kbps)	Sample Point	Sample Times	Resync Jump Width	Term Resist
F	Master	1	High Speed CAN	500	80.0%(TSEG1:15, TSEG2:4, 40MHz)	1	2	OFF
		2	Low Speed CAN	125	80.0%(TSEG1:15, TSEG2:4, 40MHz)	1	2	OFF

■ Description of Items

EDX-ID No.	ID No. of the EDX-100A with CAN-41A installed
Device Name	Device name of the EDX-100A that is set in Register Device Information in Environment
Port No.	Port No. of the CAN-41A
CAN Comm Std	Communication standard
Comm Speed (kbps)	Communication speed
Sample Point	Sampling point
Sample Times	The number of sampling times
Resync Jump Width	Resynchronization jump width
Term Resist	Termination resistor

MEMO

When above item (s) is not displayed, press the **Change Setting Items...** button to display the desired item.

2-1-1 Setting CAN Communication Standard

Communication standard is set.

For connection, see “1-5 CONNECTING CAN BUS.”

Select from the following options in the list box.

■ Options

- High speed CAN
- Low speed CAN

If the communication standard is changed, initial value of the communication condition is set as described in the following table.

	High Speed CAN	Low Speed CAN
Communication Speed (kbps)	500	125
Sample Point	80.0% (TSEG1:15, TSEG2:4, 40 MHz)	
Sample Times	1	
Resynchronization Jump Width	2	

2-1-2 Setting Communication Speed

Communication speed is set.

Select from the following options in the list box.

■ Options

Communication speed varies according to the preset communication standard.

- High speed CAN: 1000, 800, 500, 250, 125, 100, 83.3, 62.5, 50, 33.3, 25, 20 and 10 (kbps)
- Low speed CAN: 125, 100, 83.3, 62.5, 50, 33.3, 25, 20 and 10 (kbps)

2-1-3 Setting Sample Point

Sample point is set.

For details of the sample point, see “5-1 SAMPLE POINT.”

Select from the following options in the list box.

■ Options

Setting available sample points are listed up the following. On setting the sample point, values TSEG1 and TSEG2 are automatically determined. In addition, values 40 MHz/32 MHz in parentheses () are values of CAN controller operation clock.

Communication speed other than 800 kbps

- 85.0% (TSEG1: 16, TSEG2: 3, 40 MHz)
- 80.0% (TSEG1: 15, TSEG2: 4, 40 MHz)
- 75.0% (TSEG1: 14, TSEG2: 5, 40 MHz)
- 70.0% (TSEG1: 13, TSEG2: 6, 40 MHz)
- 65.0% (TSEG1: 12, TSEG2: 7, 40 MHz)
- 60.0% (TSEG1: 11, TSEG2: 8, 40 MHz)
- 80.0% (TSEG1: 7, TSEG2: 2, 40 MHz)
- 70.0% (TSEG1: 6, TSEG2: 3, 40 MHz)
- 60.0% (TSEG1: 5, TSEG2: 4, 40 MHz)
- 87.5% (TSEG1: 13, TSEG2: 2, 32 MHz)
- 81.3% (TSEG1: 12, TSEG2: 3, 32 MHz)
- 75.0% (TSEG1: 11, TSEG2: 4, 32 MHz)
- 68.8% (TSEG1: 10, TSEG2: 5, 32 MHz)
- 62.5% (TSEG1: 9, TSEG2: 6, 32 MHz)
- 56.3% (TSEG1: 8, TSEG2: 7, 32 MHz)
- 75.0% (TSEG1: 5, TSEG2: 2, 32 MHz)
- 62.5% (TSEG1: 4, TSEG2: 3, 32 MHz)

Communication speed 800 kbps

- 85.0% (TSEG1: 16, TSEG2: 3, 32 MHz)
- 80.0% (TSEG1: 15, TSEG2: 4, 32 MHz)
- 75.0% (TSEG1: 14, TSEG2: 5, 32 MHz)
- 70.0% (TSEG1: 13, TSEG2: 6, 32 MHz)
- 65.0% (TSEG1: 12, TSEG2: 7, 32 MHz)
- 60.0% (TSEG1: 11, TSEG2: 8, 32 MHz)
- 80.0% (TSEG1: 7, TSEG2: 2, 32 MHz)
- 70.0% (TSEG1: 6, TSEG2: 3, 32 MHz)
- 60.0% (TSEG1: 5, TSEG2: 4, 32 MHz)

NOTE

Only items having TSEG2 values that are exceeding the preset resynchronization jump width are listed in the list box. If the target sample point is not shown on the list, check resynchronization jump width value once again.

2-1-4 Setting Sample Times

The number of sample times is set.

Select from the following options in the list box.

■ Options

1 and 3 (times)

2-1-5 Setting Resynchronization Jump Width

Resynchronization jump width is set.

The resynchronization jump width is expressed in **Time Quanta** unit. (See “5-1 SAMPLE POINT.”)

Select from the following options in the list box.

■ Options

1, 2, 3, and 4

NOTE

On the **Resync Jump Width** setting window, only items having TSEG2 values that are below the preset sample point are shown. If desired value of the resynchronization jump width is not shown on the list, check the sample point value.

2-1-6 Setting Termination Resistor

Termination resistor is set.

Select from the following options in the list box.

For details of termination resistor, see “5-2 CAN BUS STATE WHEN INSERTING TERMINATION RESISTOR.”

■ Options

ON and OFF

NOTE

Termination resistor should be turned ON/OFF in a state with no measuring CAN operating. It is turned ON/OFF using photoMOS relay. When the power is turned OFF, high speed CAN is set to OFF and low speed CAN is set to ON.

Although switching ON/OFF of the termination resistor is partially limited, you can set the termination resistor with dip switches provided on the CAN-41A board. When the termination resistor is set with the switch on the board, the switch has priority. See “5-3 SETTING TERMINATION RESISTOR WITH DIP SWITCHES ON CAN-41A BOARD.”

2-2 CAN-ID CONDITION

This section describes data frame conditions that are received by the CAN-41A. The EDX-100A is capable of recording a maximum of 32 types of data frame IDs.

CAN-ID	Measurement ON/OFF	Port No.	Format	Frame ID	Data Length (Byte)	Endian	LSB/MSB	Number of CAN-CHs	CAN-ID Name
1	☒	2	Standard	000	8	Big	LSB	1	
2	☐	1	Standard	001	8	Big	LSB	1	
3	☐	2	Standard	002	8	Big	LSB	1	
4	☐	1	Standard	003	8	Big	LSB	1	
5	☐	2	Standard	004	8	Big	LSB	1	
6	☐	1	Standard	005	8	Big	LSB	1	
7	☐	2	Standard	006	8	Big	LSB	1	
8	☐	1	Standard	007	8	Big	LSB	1	
9	☐	2	Standard	008	8	Big	LSB	1	
10	☐	1	Standard	009	8	Big	LSB	1	
11	☐	2	Standard	00A	8	Big	LSB	1	
12	☐	1	Standard	00B	8	Big	LSB	1	
13	☐	2	Standard	00C	8	Big	LSB	1	
14	☐	1	Standard	00D	8	Big	LSB	1	
15	☐	2	Standard	00E	8	Big	LSB	1	
16	☐	1	Standard	00F	8	Big	LSB	1	
17	☐	2	Standard	010	8	Big	LSB	1	
18	☐	1	Standard	011	8	Big	LSB	1	
19	☐	2	Standard	012	8	Big	LSB	1	
20	☐	1	Standard	013	8	Big	LSB	1	
21	☐	2	Standard	014	8	Big	LSB	1	
22	☐	1	Standard	015	8	Big	LSB	1	
23	☐	2	Standard	016	8	Big	LSB	1	
24	☐	1	Standard	017	8	Big	LSB	1	
25	☐	2	Standard	018	8	Big	LSB	1	
26	☐	1	Standard	019	8	Big	LSB	1	
27	☐	2	Standard	01A	8	Big	LSB	1	
28	☐	1	Standard	01B	8	Big	LSB	1	
29	☐	2	Standard	01C	8	Big	LSB	1	
30	☐	1	Standard	01D	8	Big	LSB	1	
31	☐	2	Standard	01E	8	Big	LSB	1	
32	☐	1	Standard	01F	8	Big	LSB	1	

■ Description of Items

Display ID	ID No. of the CAN-41A installed data frame is displayed in serial number
CAN-ID	ID No. of maximum 32 types of data flames
Measurement ON/OFF	Set whether or not the data frame is measured
Port No.	Port No. of the data frame ID
Format	Format of the data frame ID
Frame ID	Data frame ID
Data Length (Byte)	Data length of the data frame
Endian	Endian of the data frame
LSM/MSB	Set a point to start extracting data of the data frame to either from LSB or MSB side
Number of CAN-CHs	Number of CHs with measurement ON in the CAN-CH tab
CAN-ID Name	Name of the data flame

MEMO

- Column **Number of CAN-CHs** in the above window denotes the number of individual data preset in the data frame. Current numbers are merely displayed as reference and not able to change on this window. Changing these numbers is available by selecting **CAN-CH** tab window from the **Set CAN Condition** in the **Set** on the menu bar.
- When above item (s) is not displayed, press the **Change Setting Items...** button to display the desired item.

2-2-1 Setting Measurement ON/OFF

The CAN-41A is capable of recording data of up to 32 types of data frame IDs.

Only data frame ID with its **Measurement ON/OFF** column checked (ON) is subjected to monitoring and recording.

MEMO

CAN-ID with its **Measurement ON/OFF** column checked (ON) shall be a target for monitoring as well as for recording.

In addition, by unchecking (OFF) the above column of the CAN-ID tab that requires no data recording, the size of the data files decreases.

2-2-2 Setting Port No.

Port No. of the data frame ID is set.

Select from the following options in the list box.

■ Options

1 or 2

2-2-3 Setting Format

Format of data frame ID is set.

Select from the following options in the list box.

■ Options

Standard or Extended

2-2-4 Setting Data Frame ID

Data frame ID is set in hexadecimal numbers.

■ Setting Range

- For standard data frame format: 0 to 7FFH (11 bits)
- For extended data frame format: 0 to 1FFFFFFFH (29 bits)

NOTE

Suppose a **CAN-ID** is set to measurement ON. If a data frame ID is overlapped and set with the same data frame format and port No., when the **CAN-ID** tab is terminated by pressing the **OK** button, settings of the overlapped data frame ID shall be changed to measurement OFF.

2-2-5 Setting Data Length (Byte)

Data length of the inner data frame is set.

■ Setting Range

1 to 8 bytes

NOTE

Suppose data length is changed. Then, various conditions such as **Start Bit**, **Bit Length**, and **Data Type** of **CAN-CH** tab may be automatically changed.

When changing the data length, always confirm the **CAN-CH** tab.

2-2-6 Setting Endian

Endian of the data frame is set.

Select from the following options in the list box.

■ Options

Little, Big

■ Description

• Little Endian

The low-order byte of the number is arranged at the lowest address, and the high-order byte at the highest address. (The little end comes first.)

Example 1) Data length: 8 bytes

7	0	15	8	23	16	31	24	39	32	47	40	55	48	63	56
---	---	----	---	----	----	----	----	----	----	----	----	----	----	----	----

LSB

MSB

(Least Significant Byte)

(Most Significant Byte)

Example 2) Data length: 4 bytes

7	0	15	8	23	16	31	24				
---	---	----	---	----	----	----	----	--	--	--	--

LSB

MSB

(Least Significant Byte)

(Most Significant Byte)

• Big Endian

The high-order byte of the number is arranged at the lowest address, and the low-order byte at the highest address. (The big end comes first.)

Example 1) Data length: 8 bytes

63	56	55	48	47	40	39	32	31	24	23	16	15	8	7	0
----	----	----	----	----	----	----	----	----	----	----	----	----	---	---	---

MSB

LSB

(Most Significant Byte)

(Least Significant Byte)

Example 2) Data length: 4 bytes

31	24	23	16	15	8	7	0				
----	----	----	----	----	---	---	---	--	--	--	--

MSB

LSB

(Most Significant Byte)

(Least Significant Byte)

2-2-7 Setting LSB/MSB

Select and set a point to start extracting data of the data frame from either LSB or MSB side. For details, see “2.3 CAN-CH CONDITION.”

This setting is enabled only when the endian of the data frame is set to **Big** endian. If the endian is set to **Little**, data is arranged from the LSB side.

■ Options

LSB or MSB

2-2-8 Setting ID Name

Data frame ID name is set.

■ The Number of Input Available Characters

Input the ID name within 40 characters.

MEMO

When setting **CAN-CH**, **CAN-ID No.** and **ID Name** are displayed.

Since it is difficult to distinguish data only with CAN-ID Nos., it is recommended to set an easy-to-recognize ID name.

2-3 CAN-CH CONDITION

By selecting **Set CAN Condition** from the **Set** on the menu bar, required conditions are set for individually extracting data in CAN bus flowing data frame.

A maximum of 8 channels per data frame can be defined as CAN-CH data.

On the **Set CAN Condition** window, select the **CAN-CH** tab to switch the following modes 1) and 2).
(For method for switching modes, see “2-3-2 Setting How to Extract CAN-CH Data.”)

1) Mode for setting bit position with bit No. in the data frame. (See “2-3-4 Setting Start Bit.”)

The screenshot shows the 'Set CAN Condition' window with the 'CAN-CH' tab selected. The 'How to cut out the CAN-CH data' dropdown is set to 'Bit'. Below the dropdown is a 'Display Bit Assignment...' button. The main table lists 8 channels with columns: CAN-CH, Measurement ON/OFF, Start Bit, Bit Length, Data Type, CAL Coefficient, Offset, Unit, CH Name, and Deci Digits. Channel 1 is selected, and its 'Unit' is set to 'V'.

CAN-CH	Measurement ON/OFF	Start Bit	Bit Length	Data Type	CAL Coefficient	Offset	Unit	CH Name	Deci Digits
1	☒	0	16	Signed	1.0000	0.0000	V		Auto
2	☐	0	16	Signed	1.0000	0.0000	V		Auto
3	☐	0	16	Signed	1.0000	0.0000	V		Auto
4	☐	0	16	Signed	1.0000	0.0000	V		Auto
5	☐	0	16	Signed	1.0000	0.0000	V		Auto
6	☐	0	16	Signed	1.0000	0.0000	V		Auto
7	☐	0	16	Signed	1.0000	0.0000	V		Auto
8	☐	0	16	Signed	1.0000	0.0000	V		Auto

2) Mode for setting bit position with byte No. and bit No. in the byte.
(See “2-3-5 Setting Start Point” and “2-3-6 Setting End Point.”)

The screenshot shows the 'Set CAN Condition' window with the 'CAN-CH' tab selected. The 'How to cut out the CAN-CH data' dropdown is set to 'Point'. Below the dropdown is a 'Display Bit Assignment...' button. The main table lists 8 channels with columns: CAN-CH, Measurement ON/OFF, Start Point, End Point, Bit Length, Data Type, CAL Coefficient, Offset, Unit, CH Name, and Deci Digits. Channel 1 is selected, and its 'Unit' is set to 'V'.

CAN-CH	Measurement ON/OFF	Start Point	End Point	Bit Length	Data Type	CAL Coefficient	Offset	Unit	CH Name	Deci Digits
1	☒	70	67	16	Signed	1.0000	0.0000	V		Auto
2	☐	70	67	16	Signed	1.0000	0.0000	V		Auto
3	☐	70	67	16	Signed	1.0000	0.0000	V		Auto
4	☐	70	67	16	Signed	1.0000	0.0000	V		Auto
5	☐	70	67	16	Signed	1.0000	0.0000	V		Auto
6	☐	70	67	16	Signed	1.0000	0.0000	V		Auto
7	☐	70	67	16	Signed	1.0000	0.0000	V		Auto
8	☐	70	67	16	Signed	1.0000	0.0000	V		Auto

For bit No. in the data frame used in the mode 1), see “2.2.6 Setting Endian.”

Details of byte No. and bit No. in the byte used in the mode 2) are described in the following.

Data in the data frame is numbered in serial order in bytes as 0, 1, 2, ...from the data frame head and also bits in the bytes are numbered with bit No. from the least significant bit. A bit position is expressed as ‘Byte No.’ + ‘Bit No.’ For example, the bit position of the number ‘07’ shall be 7th bit of the 0th byte in the data frame.

Example 1) Data length: 8 bytes, Endian: Big

07	00	17	10	27	20	37	30	47	40	57	50	67	60	77	70
MSB								LSB							

Example 2) Data length: 4 bytes, Endian: Big

07	00	17	10	27	20	37	30				
LSB											

↑
 0th byte
 MSB

↗
 7th bit

If the endian is set to **Little** endian, although the bit position is expressed as same as the Big endian, sequential order of data is set according to bit No. in the data frame of the preset endian.

Example 3) Data length: 8 bytes, Endian: Little

07	00	17	10	27	20	37	30	47	40	57	50	67	60	77	70
LSB								MSB							

Example 4) Data length: 4 bytes, Endian: Little

07	00	17	10	27	20	37	30				
MSB											

↑
 0th byte
 LSB

↗
 7th bit

Bit positions of modes 1) and 2) can be set in the same table as shown in the following. In the mode 2), the same bit position as in the mode 1) can be obtained by selecting byte No. on the table left end, and bit No. in the byte on the upper table as shown in the following.

Example 1) Data length: 8 bytes, Endian: Big

	7	6	5	4	3	2	1	0	
0	63	62	61	60	59	58	57	56	←Bit No. in the byte Bit No. in the data frame
1	55	54	53	52	51	50	49	48	
2	47	46	45	44	43	42	41	40	
3	39	38	37	36	35	34	33	32	
4	31	30	29	28	27	26	25	24	
5	23	22	21	20	19	18	17	16	
6	15	14	13	12	11	10	9	8	
7	7	6	5	4	3	2	1	0	

↑

Byte No.

Example 2) Data length: 4 bytes, Endian: Big

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

Example 3) Data length: 8 bytes, Endian: Little

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

Example 4) Data length: 4 bytes, Endian: Little

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

Setting example 1)

The following is an example of a data frame with data length: 8 bytes and endian: Big including 3 CH data. When LSB/MSB setting is set to **LSB**, a point to start extracting data (Start Bit and Start Point) shall be from the LSB side.

Data frame in mode 1)

63	32	31	16	15	0
CH3		CH2		CH1	

Data frame in mode 2)

07	30	47	50	67	70
CH3		CH2		CH1	

MSB

LSB

When setting the bit position with mode 1)

	Start Bit	Data Length
CH1	0	16
CH2	16	16
CH3	32	32

When setting the bit position with mode 2)

	Start Point	End Point	Data Length
CH1	70	67	16
CH2	50	47	16
CH3	30	07	32

Setting example 2)

Suppose data is included in the data frame as in the example 1. When LSB/MSB is set to **MSB**, a point to start extracting data shall be from the MSB side.

Data frame in mode 1)

63	32	31	16	15	0
CH3		CH2		CH1	

Data frame in mode 2)

07	30	47	50	67	70
CH3		CH2		CH1	

MSB

LSB

When setting the bit position with mode 1)

	Start Bit	Data Length
CH1	15	16
CH2	31	16
CH3	63	32

When setting the bit position with mode 2)

	Start Point	End Point	Data Length
CH1	67	70	16
CH2	47	50	16
CH3	07	30	32

Setting example 3)

The following is an example of a data frame with data length: 8 bytes and endian: Little including 3 CH data. When the endian is **Little** endian, a point to start extracting data shall be from the LSB side.

Data frame in mode 1)

7	0	31	24	39	32	47	40	55	48	63	56
CH3				CH2				CH1			

Data frame in mode 2)

07	00	37	30	47	40	57	50	67	60	77	70
CH3				CH2				CH1			

LSB

MSB

When setting the bit position with mode 1)

	Start Bit	Data Length
CH1	48	16
CH2	32	16
CH3	0	32

When setting the bit position with mode 2)

	Start Point	End Point	Data Length
CH1	60	77	16
CH2	40	57	16
CH3	00	37	32

NOTE

- CAN-CH Condition of recording data file (KS2)

The following information items are not stored in the recording data file.

- 1) Information set by setting **LSB/MSB**
- 2) Information of setting data extracting point with start/end points

The above information items are stored by converting data into start bit and bit length in the EDX-100A.

■ Description of Items

How to extract the CAN-CH data	Method for extracting the data
Display CH	CH No. when graphically and numerically displaying the CAN data in CH unit
CAN-CH	CAN-CH No. of maximum 8 CHs
Measurement ON/OFF	CAN-CH for displaying data recorded on monitor and data reproduce windows in physical value
Start Bit	Start bit to start extracting data
Start Point	A point to start extracting data
End Point	A point that ends extracting data
Bit Length	Bit length of the extracted data
Data Type	The type of the extracted data
CAL Coefficient	Calibration coefficient that converts the extracted data into physical value
Offset	Set offset value for shifting the physical value converted data
Unit	Unit of the extracted data
CH Name	Data name of the extracted data
Deci Digits	The number of digits below decimal point in numeric display
Display Bit Assignment...	Click the Display Bit Assignment... button to display the Bit Assignment Table

MEMO

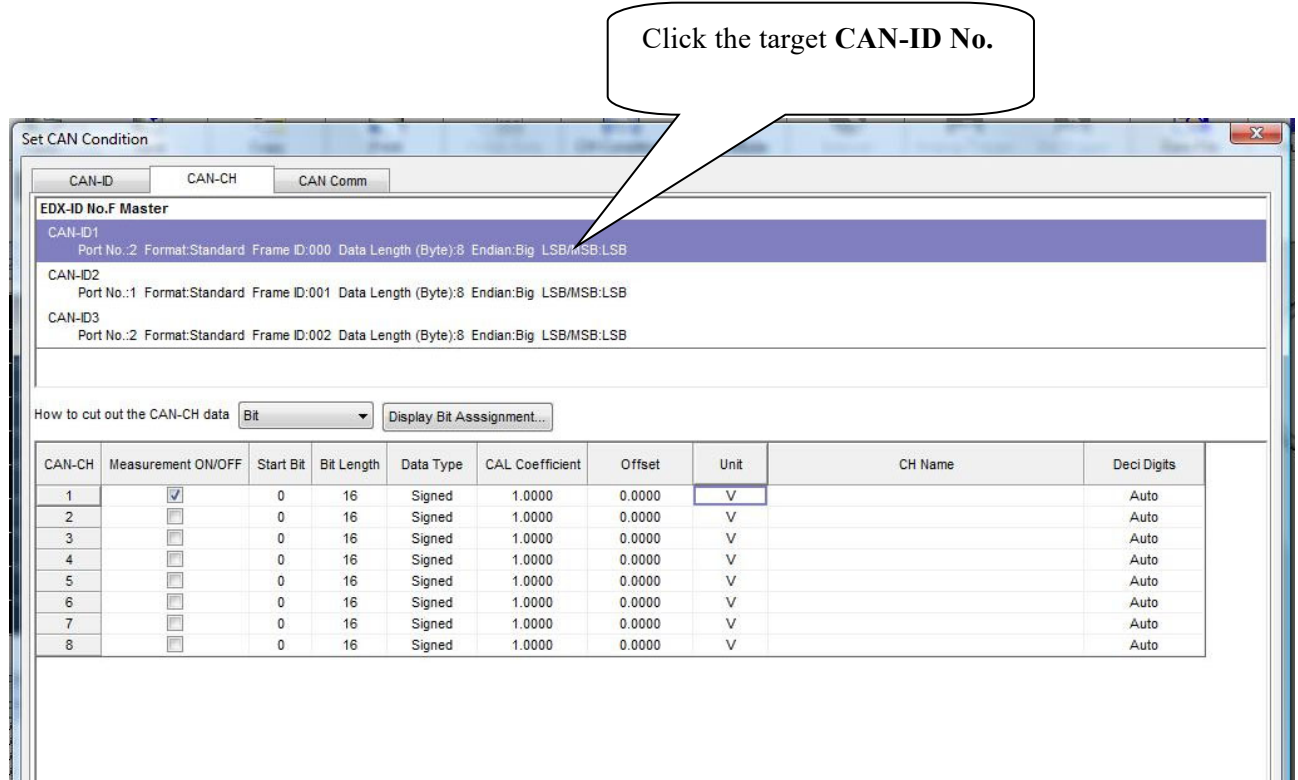
When above item (s) is not displayed, press the **Change Setting Items...** button to display the desired item.

2-3-1 Changing CAN-ID

How to change the target **CAN-ID** is described.

Changing available **CAN-ID** is only a **CAN-ID** that is set to **Measurement ON** on **CAN-ID** tab window.

■ Operation Method



2-3-2 How to Extract the CAN-CH Data

Method for extracting the data is set.

Select from the following options in the list box.

■ Options

- Bit: Set data position with Bit No.
- Point: Set data position with Byte No. and Bit No. in the byte.

2-3-3 Measurement ON/OFF

CAN-CH is set to display data recorded on monitor and data reproduce windows in physical value.

■ Options

- Measurement ON Data is extracted from the measured data frame with the preset conditions; **Start Bit**, **Bit Length**, **Data Type**, etc. and numerically displayed on the window.
- Measurement OFF Displaying data extracted from the measured data frame is not allowed. In addition, you can not set all the CAN-CHs to measurement OFF. If all the CAN-CHs are not measured, set **Measurement ON/OFF** column on the **CAN-ID** tab to OFF.

MEMO

- Irrespective of settings of **Measurement ON/OFF**, the whole data of the preset data frame ID are stored in the recorded data. However, to have the data displayed in physical value, take care that MEAS channel is correctly set. Or, data is not displayed.
- It is recommended to set the number of CHs that is set to measurement ON to the number of data types in each of the data frames.

2-3-4 Setting Start Bit

A point that starts extracting CAN-CH data is set with bit No.

(See “2-3 SETTING CAN-CH CONDITION.”)

The item **Start Bit** is displayed when how to extract the CAN-CH data is set to **Bit**.

■ Setting Available Range

- 0 to 63 Setting range of the start bit varies with data length and bit length of the data frame.

MEMO

Click the **Display Bit Assignment...** button and refer to the bit assignment table.

2-3-5 Setting Start Point

A point that starts extracting data is set with XY (X: Byte No., Y: Bit No.).

(See “2-3 SETTING CAN-CH CONDITION.”)

The item **Start Point** is displayed when how to extract the CAN-CH data is set to **Point**.

■ Setting Available Range

- X: Byte No. 0 to 7
- Y: Bit No. 0 to 7 Start point setting range varies with data length and bit length of the data frame.

2-3-6 Setting End Point

A point that ends extracting data is set with XY (X: Byte No., Y: Bit No.)

(See “2-3 SETTING CAN-CH CONDITION.”)

The item **End Point** is displayed when how to extract the CAN-CH data is set to **Point**.

■ Setting Available Range

- X: Byte No. 0 to 7
- Y: Bit No. 0 to 7 End point setting range varies with data length and bit length of the data frame.

2-3-7 Setting Bit Length

Bit length of the extracted CAN-CH data is set.

■ Setting Available Range

- 1 to 64 Setting range of the bit length varies with data length and start bit of the data frame.

2-3-8 Setting Data Type

The type of the extracted data is set.

Select from the following options in the list box.

■ Options

- Signed Integer type data with sign.
- Unsigned Integer type data with no sign.
- Float Real number type data (32 bits: 4 bytes)
Float type data range: -3.4028E+38 to -1.1755E-38, 0,
1.1755E-38 to 3.4028E+38
- Double Real number type data (64 bits: 8 bytes)
Double type data range: -1.7976E+308 to -2.2250E-308, 0,
2.2250E-308 to 1.7976E+308

NOTE

- Float and Double data types are selected only when each of the data length of the data frame is set to more than 4 bytes and 8 bytes, respectively.
If selecting the above data type is not available, check **Data Length** column on the **CAN-ID** tab window.
- When the real number type data is selected, the start bit and bit length may be automatically changed. After setting the data type, do not forget to check them. In addition, be sure to correctly set the data length and endian of the data frame. Or, faulty operation of the system may occur.
- The DCS-100A is capable of displaying only data in the Float type data range. Therefore, when selecting the real number type data, correct value may not be displayed.

2-3-9 Setting CAL Coefficient

CAL coefficient is set for converting the extracted data into physical value.

Data is converted into physical value by the following expression.

Physical value = $\text{Extracted data} \times \text{CAL coefficient} + \text{Offset}$

MEMO

Generally, CAL coefficient and offset are set when Integer type data is converted into physical value data. If this setting is not required, set 1.0 for CAL coefficient and 0.0 for offset.

NOTE

If physical value converted data exceeds the Float type data range, no correct value is displayed.

■ Input Available Range

- $-1.0\text{E}8$ to $-1.0\text{E}-8$ or $1.0\text{E}-8$ to $1.0\text{E}8$

2-3-10 Setting Offset

Offset is set by shifting the reference point to a certain value to the physical value converted data.

■ Input Available Range

- $-1.0\text{E}8$ to $-1.0\text{E}-8$ or 0.0 or $1.0\text{E}-8$ to $1.0\text{E}8$

2-3-11 Setting Unit

Unit of the extracted data is set.

■ Options

KS1/KS2 Format unit					
☐ $\mu\text{m/m}$	☐ e	☐ mV	☒ V	☐ mA	☐ A
☐ mm	☐ cm	☐ m	☐ $^{\circ}\text{C}$	☐ $^{\circ}\text{F}$	☐ gf/cm^2
☐ kgf/mm^2	☐ kgf/cm^2	☐ kgf/m^2	☐ mmHg	☐ kPa	☐ MPa
☐ g	☐ kg	☐ ton	☐ gf	☐ kgf	☐ tonf
☐ N	☐ $\text{kgf}\cdot\text{mm}$	☐ $\text{kgf}\cdot\text{cm}$	☐ $\text{kgf}\cdot\text{m}$	☐ Nm	☐ OHM
☐ kOHM	☐ MOHM	☐ %	☐ dB	☐ ppm	☐ cm/s
☐ m/s	☐ m/min	☐ km/h	☐ Hz	☐ kHz	☐ MHz
☐ $^{\circ}$	☐ deg	☐ rad	☐ kN	☐ kNm	☐ kW
☐ rpm	☐ cm/s^2	☐ m/s^2	☐ G	☐ daN	☐ mile/h
☐ *100kpa	☐ deg/s	☐ msec	☐ sec	☒ min	☐ hour
☐	☐	☐			

2-3-12 Setting CH Name

Channel name is set for the extracted data.

- The number of Input Available Characters
Within 40 characters

2-3-13 Deci Digits

Set the number of digits below decimal point of numeric value display.

Select from the following options in the list box.

On selecting the **Auto**, the numeric having 5 numbers with no sign is automatically displayed.

For details, refer to “3-7 SETTING ENVIRONMENT” in DCS-100A Dynamic Data Recording Software Instruction Manual for Common Operation.

3. MONITORING CAN DATA

For monitoring the CAN data, refer to “11-4 MONITORING CAN DATA” in the DCS-100A Dynamic Data Recording Software Instruction Manual for EDX-100A Operation.

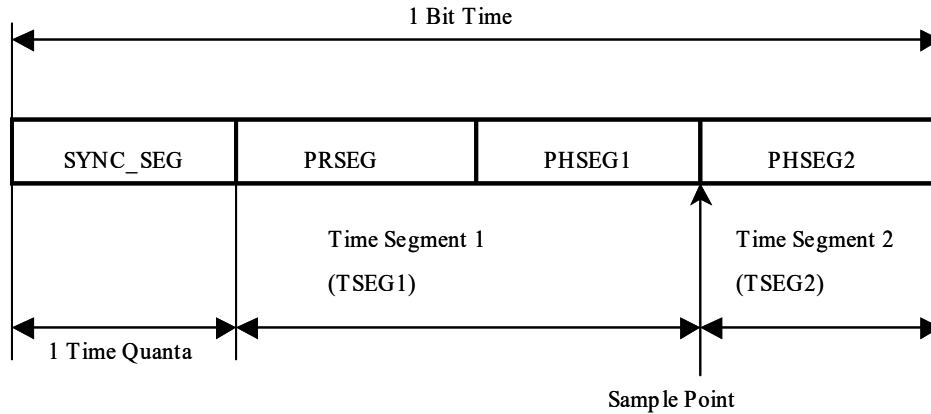
4. REPRODUCING CAN DATA

For reproducing the CAN data, refer to “4. REPRODUCING DATA” in the DCS-100A Dynamic Data Recording Software Instruction Manual for Common Operation.

5. OTHER SETTING INFORMATION

5-1 SAMPLE POINT

Sample point in CAN-41A indicates a sample position in percentage when '1' bit time is determined as '1' sample point. Regarding a CAN controller (Model HD64F7047: Renesas Technology made) used in the CAN-41A, the '1' bit time shall be in the following structure.



By referring to the above structure, assume $TSEG1 = 15TQ^*$ and $TSEG2 = 4TQ$.

Then, '1' bit time and sample point can be obtained by the following expression.

$$1 \text{ Bit time} = \text{SYNC_SEG}(1TQ) + TSEG1(15TQ) + TSEG2(4TQ) = 20(TQ)$$

$$\text{Sample Point} = (\text{SYNC_SEG}(1TQ) + TSEG1(15TQ)) / 1 \text{ Bit time}(20TQ) \times 100 = 80\%$$

* TQ denotes Time Quanta. TQ can be obtained by the following expression.

$$TQ = (BPR + 1) / F_{clk} \quad \text{where, } BPR \text{ denotes Baud Rate Prescaler value}$$

F_{clk} denotes 1 half frequency of CAN controller operation clock

BRP value of sample point when '1' bit time is 20 (TQ) or 16 (TQ).

Communication Speed (kbps)	BRP
1000	1
800	1
500	2
250	4
125	8
100	10
83.3	12
62.5	16
50	20
33.3	30
25	40
20	50
10	100

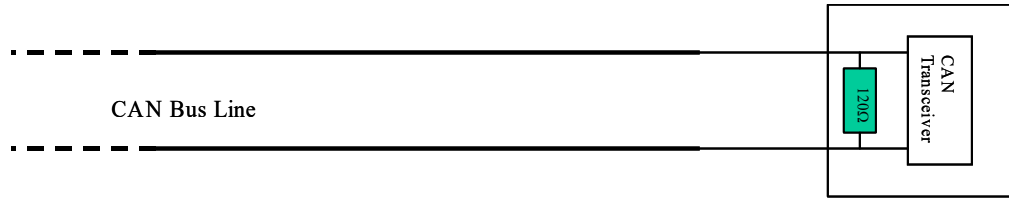
BRP value of sample point when ‘1’ bit time is 10 (TQ) or 8 (TQ).

Communication Speed (kbps)	BRP
1000	2
800	2
500	4
250	8
125	16
100	20
83.3	24
62.5	32
50	40
33.3	60
25	80
20	100
10	200

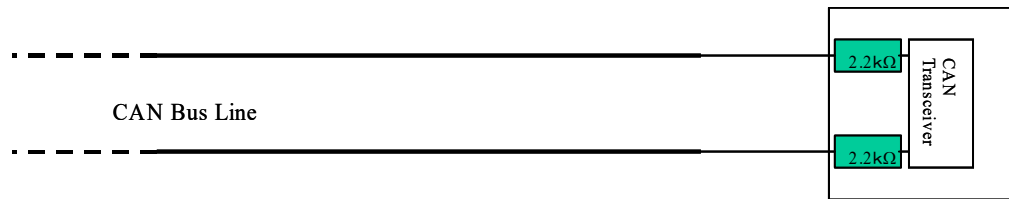
5-2 CAN BUS STATE WHEN INSERTING TERMINATION RESISTOR

When termination resistor of the CAN-41A is set to ON, CAN-bus shall be in the following states.

- High Speed CAN

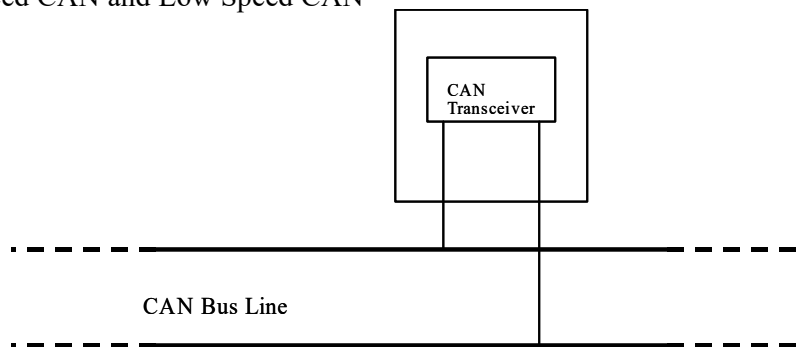


- Low Speed CAN



When termination resistor of the CAN-41A is set to OFF, CAN-bus shall be in the following state.

- High Speed CAN and Low Speed CAN



For ON/OFF of the termination resistor, see “2-1-6 Setting Termination Resistor” and “5-3 SETTING TERMINATION RESISTOR WITH DIP SWITCHES ON CAN-41A BOARD.”

5-3 SETTING TERMINATION RESISTOR WITH DIP SWITCHES ON CAN-41A BOARD

CAN-41A can be set as follows with dip switches provided on the CAN-41A board. The following figure shows the location of dip switches on the CAN-41A board.

When setting termination resistor with the dip switches, set the **Term Resist** to OFF on the **CAN Comm** tab window menu as described in “2-1-6 Setting Termination Resistor.”

Port 1 High Speed CAN

Switch	Termination Resistor
S3, S4: ON	Always ON
S3, S4: OFF	Setting termination resistor. (See “2-1-6 Setting Termination Resistor.”)

Port 1 Low Speed CAN

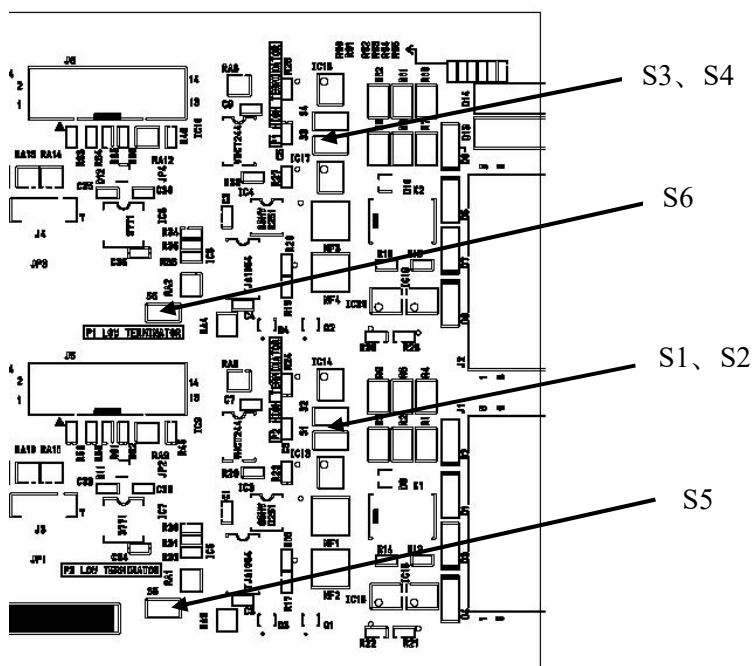
Switch	Termination Resistor
S6: ON	Always ON
S6: OFF	Setting termination resistor. (See “2-1-6 Setting Termination Resistor.”)

Port 2 High Speed CAN

Switch	Termination Resistor
S1, S2: ON	Always ON
S1, S2: OFF	Setting termination resistor. (See “2-1-6 Setting Termination Resistor.”)

Port 2 Low Speed CAN

Switch	Termination Resistor
S5: ON	Always ON
S5: OFF	Setting termination resistor. (See “2-1-6 Setting Termination Resistor.”)



6. SPECIFICATIONS

6-1 HARDWARE SPECIFICATIONS

Compatible CAN Version	Bosch 2.0B active compatible (Conforming to ISO-11898 specifications)
Communication Standard	High speed CAN/Low speed CAN
The number of Ports	2/Card
Connector Type	CAN-DSUB9 male pin (2 pins: CAN_L, 7 pins: CAN_H, 3 pins: CAN_GND)
Operation Clock of CAN Controller	40 MHz/32 MHz
The number of MEAS IDs	Maximum 32 IDs for 2 ports
Communication Speed (kbps)	For high speed CAN: 1000/800/500/250/125/100/83.3/62.5/50/33.3/25/20/10 For low speed CAN: 125/100/83.3/62.5/50/33.3/25/20/10
Sample Point	Communication speed other than 800 kbps • 85.0% (TSEG1: 16, TSEG2: 3, 40 MHz) • 80.0% (TSEG1: 15, TSEG2: 4, 40 MHz) • 75.0% (TSEG1: 14, TSEG2: 5, 40 MHz) • 70.0% (TSEG1: 13, TSEG2: 6, 40 MHz) • 65.0% (TSEG1: 12, TSEG2: 7, 40 MHz) • 60.0% (TSEG1: 11, TSEG2: 8, 40 MHz) • 80.0% (TSEG1: 7, TSEG2: 2, 40 MHz) • 70.0% (TSEG1: 6, TSEG2: 3, 40 MHz) • 60.0% (TSEG1: 5, TSEG2: 4, 40 MHz) • 87.5% (TSEG1: 13, TSEG2: 2, 32 MHz) • 81.3% (TSEG1: 12, TSEG2: 3, 32 MHz) • 75.0% (TSEG1: 11, TSEG2: 4, 32 MHz) • 68.8% (TSEG1: 10, TSEG2: 5, 32 MHz) • 62.5% (TSEG1: 9, TSEG2: 6, 32 MHz) • 56.3% (TSEG1: 8, TSEG2: 7, 32 MHz) • 75.0% (TSEG1: 5, TSEG2: 2, 32 MHz) • 62.5% (TSEG1: 4, TSEG2: 3, 32 MHz) Communication speed 800 kbps • 85.0% (TSEG1: 16, TSEG2: 3, 32 MHz) • 80.0% (TSEG1: 15, TSEG2: 4, 32 MHz) • 75.0% (TSEG1: 14, TSEG2: 5, 32 MHz) • 70.0% (TSEG1: 13, TSEG2: 6, 32 MHz) • 65.0% (TSEG1: 12, TSEG2: 7, 32 MHz) • 60.0% (TSEG1: 11, TSEG2: 8, 32 MHz) • 80.0% (TSEG1: 7, TSEG2: 2, 32 MHz) • 70.0% (TSEG1: 6, TSEG2: 3, 32 MHz) • 60.0% (TSEG1: 5, TSEG2: 4, 32 MHz)
Sample Times	1/3
Resynchronization Jump Width (TQ)	1/2/3/4 (Resynchronization jump width $\leq$ TSEG2)

Termination Resistor	Select ON/OFF
Others	Only '1' CAN-41A is installed in the last slot of the EDX-100A. When measuring CAN data, maximum sampling frequency of the EDX-100A is 1 kHz.
External Dimensions	22 (W) × 119 (H) × 213 (D) mm (Protruded portions not included)
Weight	Approximately 330 g
Compliance	Directive 2014/30/EU(EMC) Directive 2011/65/EU,(EU)2015/863(10restricted substances) (RoHS)

6-2 SOFTWARE SPECIFICATIONS

Setting Measuring Conditions

■ ID Condition

MEAS ID Condition	Maximum 32 types
Measurement ON/OFF	Settable
Data Frame ID Format	Standard/Extended
Data Frame ID	Standard: 0 to 7FFH (11 bits) Extended: 0 to 1FFFFFFFH (29 bits)
Data Length	1 to 8 (bytes)
Endian	Little/Big
Data Frame ID Name	Within 40 characters

■ CH Condition

(Physical value conversion condition: $\text{Physical value} = \text{Extracted data} \times \text{CAL coefficient} + \text{Offset}$)

Measuring CH condition	Maximum 8 channels/Data frame
Measurement ON/OFF	Settable
Start Bit	0 to 63 (Varies with data and bit lengths)
Bit Length	1 to 64 (Varies with data and bit lengths)
Data Type	Signed/Unsigned/Float/Double
CAL Coefficient	-1.0E8 to -1.0E-8 or 1.0E-8 to 1.0E8
Offset	-1.0E8 to -1.0E-8 or 0.0 or 1.0E-8 to 1.0E8
Unit	Settable from defined 60 types or user setting.
Channel Name	Within 40 characters

For other software specifications, refer to “DCS-100A Dynamic Data Recording Software Instruction Manual for EDX-100A Operation” and “DCS-100A Dynamic Data Recording Software for Common Operation.”

7. OUTSIDE DRAWING

