KYOWA

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NETWORK TERMINAL BOX

NTB-100A/B SERIES

INSTRUCTION MANUAL

(FOR HARDWARE)

Thank you for purchasing KYOWA's product NTB-100A/B series Network Terminal Box.
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.
This Manual only describes Hardware operation of the NTB-100A/B series.
For Software operation, refer to the NTB-10A Network Terminal Box Control Software Instruction Manual.

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STANDARD ACCESSORIES

The NTB-100A/B series Network Terminal Box (hereinafter referred to as the NTB-100A/B series) comes with the following accessories. After unpacking, check to be sure that they are included.

● Instruction Manual	1 (CD-R)
● Simplified Software (*1) ● Control Software for the NTB-100A/B series (*1) (NTB-10A)	Included in NTB-100A/B-120, NTB-100A/B-350, NTB-101A-120, NTB-101A-350, NTB-110A/B-350 and NTB-111A-350. Not included in NTB-100A/B-120-0, NTB-100A/B-350-0, NTB-101A-120-0, NTB-101A-350-0, NTB-110A/B-350-0, and NTB-111A-350-0.

(*1) An USB-CAN converter driver is not included.

● Diagram sticker	1
● DC power cable (P-57 or P-76)	1
● Warranty and Test Data Sheet	1 each
● Ground wire	1
● Rubber foot	4
● Small screwdriver	1 Not included in the following. NTB-101A-120, NTB-101A-350, NTB-111A-350, NTB-101A-120-0, NTB-101A-350-0, NTB-111A-350-0
● Soldering terminal	30 Not included in the following. NTB-101A-120, NTB-101A-350, NTB-111A-350, NTB-101A-120-0, NTB-101A-350-0, NTB-111A-350-0

OPTIONS

- Handy data logger — SME-100A/101A

- Control software for the NTB-100A/B series (*1) (NTB-10A) — Standard accessory for the following.
  NTB-100A/B-120, NTB-100A/B-350, NTB-101A-120, NTB-101A-350, NTB-110A/B-350, NTB-111A-350

(*1) The USB-CAN converter driver is not included.

- Connection cable — N-70 (Input terminal ← For sensor connection with NDIS connector, 10 cm, not compatible with TEDS)
  N-97 (Input terminal ← For sensor connection with NDIS connector, 10 cm, not compatible with TEDS)
  U-25 (Input terminal ← For sensor connection with NDIS connector, 50 cm, TEDS compatible)
  U-26 (Input terminal ← For sensor connection with NDIS connector, 1 m, TEDS compatible)

- Communication cable — N-102 (1 m)
  *Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

- Y cable — N-103

- AC adapter — SA-10A-EDS (100 to 240 VAC)

- Coupling plate — CN-1A

Others

- USB-CAN converter — Kvaser Leaf Light HS (Kverser Inc.) discontinued model
  Kvaser Leaf Light HS V2 (Kverser Inc.)
- Terminating resistance — CANterm120 (Vector Japan Co., Ltd.)

- DIN rail (suggested) — TAKACHI ELECTRONIC INDUSTRIAL Co., Ltd. (35 mm)

- DIN rail mounting plate (suggested) — DRA-1 (TAKACHI ELECTRONIC INDUSTRIAL Co., Ltd.)

SAFETY PRECAUTIONS

The NTB-100A/B series is designed in accordance with "9. Specifications."
Do not use the NTB-100A/B series in an environment exceeding the specifications. Or, failure of the NTB-100A/B series may result.

PRIOR TO USE

For safe use of the NTB-100A/B series, do not forget to read the "Safety Precautions" prior to use.
Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damages resulting from user's failure to comply with the safety precautions.

SAFETY SYMBOLS

- For safety operation of the NTB-100A/B series, the following symbol mark is attached to the NTB-100A/B series.

 **GND**	Indicates "PROTECTIVE GROUND TERMINAL." Be sure to connect the GND terminal to the ground.

- For safety operation of the NTB-100A/B series, the following symbol marks are used in the Instruction Manual.

⚠ **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

- **Power Supply**
  To prevent a fire hazard, before connecting the power cable, be sure to check the local line voltage is matched with the operating voltage (11 to 16 VDC) specified for the NTB-100A/B series.
- **AC adapter**
  To prevent an electric shock or fire hazard, always use the optional AC adapter.
- **Avoid Using in Environment with Inflammable Gas, etc.**
  To prevent the risk of fire hazard or explosion, do not use the NTB-100A/B series in environment with inflammable gas, vapor or dust.
- **If Any Trouble Occurs**
  To prevent a fire hazard, if smoke is emitted from the NTB-100A/B series, immediately disconnect the AC adaptor from the receptacle and stop using the NTB-100A/B series.
- **Avoid Measuring Object Applied With High Voltage**
  Although the NTB-100A/B series is insulated, if it is used for measuring objects with excessive high voltage, it may deteriorate its performance and cause trouble.
- **If the NTB-100A/B series faulty, emitting smoke or offensive odor, or producing abnormal sound, immediately turn OFF the power.**
- **In case if any foreign matters or water are entered or the NTB-100A/B series is dropped, immediately turn OFF the power.**
- **Do not put liquid near the NTB-100A/B series.**
  If the liquid is spilled into the NTB-100A/B series, it may cause trouble, fire hazard or explosion.
- **When it started thundering, do not touch the NTB-100A/B series or cables.**
  Or, electric shock hazard may result.
- **When placing the NTB-100A/B series, do not place the NTB-100A/B series on an unstable place.**
  Or, the NTB-100A/B series may drop and surroundings will be damaged.
- **Ground terminal (E)**
  For input lighting surge protection such as JB-100C, be sure to earth (ground) the ground terminal (E).
- **Do not operate the NTB-100A/B series at a location with excessive vibration.**
- **Protective Ground**
  Do not forget to connect the protective ground terminal. Or. electric shock hazard, deteriorated performance, and damage of the product may result.

To prevent troubles and accidents caused by erroneous handling and installation, fully understand the operating instructions and operating environment and properly use the NTB-100A/B series with special care to have the NTB-100A/B series safely fulfill its performance.

⚠ CAUTION

- Before wiring, always confirm a terminal arrangement of the target NTB-100A/B series.
- Before moving the NTB-100A/B series, disconnect all cables.
- Use the NTB-100A/B series in the specified operating temperature range -10 to 50ºC.
  Use at temperatures exceeding the specified range may lower the performance and cause trouble.
  If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.
- Use the NTB-100A/B series in the specified operating humidity range 20 to 85% RH.
  Use in a humid place exceeding the specified range or where it is exposed to splashing water may lower the performance and cause trouble.
- Immediately stop the NTB-100A/B series if operating environment changes abruptly.
  Leave the NTB-100A/B series as it is until it becomes adaptable to the environment.
  Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation result to deteriorate its performance and cause trouble.
- Do not use the NTB-100A/B series under dusty environment.
  Use the NTB-100A/B series under environment where the PC may be used.
- To prevent short-circuit trouble, fasten screws on a terminal board.
- Do not use or storage the NTB-100A/B series under environment with excessive vibration or high impact.
  Use the NTB-100A/B series under environment with excessive vibration or high impact.
  Do not apply excessive vibration or high impact to the NTB-100A/B series. It may lower the performance and cause trouble.
- Do not use the NTB-100A/B series in strong electromagnetic field.
  Use the NTB-100A/B series in a magnetic field environment where the PC may be used.
  If the NTB-100A/B series is used near devices generating strong magnetic field such as a telemetry system, microwave oven, electric furnace, etc., its performance may be lowered and erroneous operation and trouble may result.
- Use the NTB-100A/B series within an operating power voltage range.
  Use the NTB-100A/B series with 11 to 16 VDC and in an environment with no instantaneous power failure and little interfering noise.
- Do not pull cords and cables.
  Lay cords and cables with a certain allowance so that unreasonable force is applied to the connections.
  Pulling or applying unreasonable force may cause trouble or interrupt the measurement.
- Do not disassemble or remodel the NTB-100A/B series.
  Or, it may cause electrical shock or trouble.
- Do not insert foreign matters to connector.
  Or, it may cause trouble.
- Handle the CD-R with care.
  Do not expose the CD-R to direct sun light, high temperature, or high humidity.
  Do not apply pressure to the CD-R by laying object or bending.
  Handle with care to avoid any fingerprint, dirt, scratch on both sides.
- Preheat the NTB-100A/B series before use.
  Preheat the NTB-100A/B series for about 30 minutes after the power ON.

LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE

The product consists of various electronic components and those components, if not all, have a useful life.
Using them exceeding the years specified according to each part type (useful life) may affect the characteristics of the product, resulting in a malfunction or a failure. You need to replace parts on a regular preventive maintenance schedule.

Limited life parts used with the product are as follows.

- Relay
  A relay's insulation will inevitably degrade or a relay itself will be damaged.
- Aluminum electrolytic capacitor
  The signal-noise ratio will lower due to capacity shortage or smoke will be emitted due to liquid leak, resulting in a malfunction of the product.
- EEPROM
  EEPROM will result in malfunctions or degraded performance.
- One-touch lock type terminal block (NTB-100A)
  The one-touch lock type terminal block is a consumable item.
  The terminal block is made of plastic. Through repeated connections/disconnections, the lock function will gradually wear out and may give a poor connection (unable to be locked or unable to be released).
  The one-touch lock type terminal block is considered to be a consumable item. It is not covered under the terms of the warranty.
  The replacement frequency is about two years, assuming twice a day (insertion and removal) of use, 20 days a month.
  * Due to the discontinuity of the one-touch lock type terminal block, the NTB-100A is discontinued in 2017.
    The quantities are limited and not made available to everyone.
    After the stock runs out, we will use the NTB-100B one-touch type terminal block.
- One-touch type terminal block (NTB-100B,110B)
  The one-touch type terminal block is a consumable item.
  The one-touch type terminal block has leaf springs. Through repeated connections/disconnections, the leaf spring will gradually wear out and retaining force may decrease. The one-touch lock type terminal block is considered to be a consumable item. It is not covered under the terms of the warranty.
  The replacement frequency is about two years, assuming twice a day (insertion and removal) of use, 20 days a month.
- AC adapter (optional accessory)
  Heat and smoke will be emitted, resulting in an unstable voltage.

To operate the product normally, finding a sign of the product failure early by daily/periodic inspections and taking the corrective action are required.
For inspection, contact Kyowa or our representatives.

*All components do age and will fail

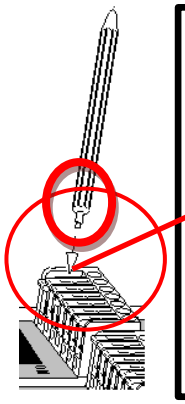
NTB-100A/B REPLACEMENT BEFORE THE END OF SERVICE LIFE

Preventive maintenance and replacement parts are a cost-effective way of keeping the performance and extending the service life of the product.
Regardless of the replacement parts, the product itself gradually deteriorates with age.
Before the expected service life is reached, consider replacing the product with a new one or the latest series as preventive maintenance.

Read this notes carefully in order to make full use of the high performance capabilities of an One-touch Lock Terminal.
Note that the instructions of the one-touch lock terminal are different from that of the one-touch terminal.

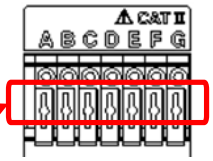
Notes for using one-touch lock terminal (NTB-100A,110A)

● Notes for connecting lead wires



● Press the following position.

Do not press the edge of the lock buttons. Or, the lock buttons may causes troubles such as unable to be locked or unable to be unlocked.



Be sure to press the above position with the accessory small screwdriver.

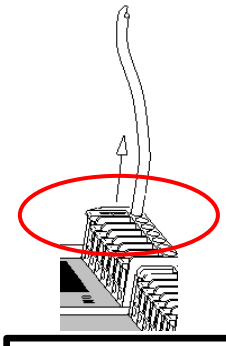
● For connection, always use the accessory small screwdriver or an object with a fine head.
● If the lock button does not work, insert the lead wire all the way to its end with pressing the lock button.

● Insert the lead wire with its coating peeled off about 10 mm all the way to its end into the round hole of the input terminal.While holding the lead wire, set back the lock button to the original position with your finger. Be sure to insert the lead wire all the way to its end. Or, it will not fix firmly.

● For connecting a strain gage, do not connect gage leads (lead wires directly connected from the strain gage) directly.
● Use a gage terminal and convert the gage leads to the applicable lead wires or use a strain gage with pre-attached lead cables.
● If you connect gage leads directly, gage leads may be broken since they are too thin.

●Available lead wires are as follows.
Solid wire: φ0.4 mm to φ1.2 mm (UL AWG16 to 26)
Stranded wire: 0.2 mm^2 to 0.75 mm^2 (UL AWG20 to 24)
Be sure to use the above lead wires. Or, a breaking or connection error will happen.

● Notes for setting back lock buttons



● Never set back the lock buttons violently with your fingers or a small screwdriver.
Terminals will be deformed and the following troubles will happen.
- The lock buttons will unable to be locked.
- The lock buttons will unable to be unlocked.
- The lock buttons will be deformed.
- The lead wires will fall out.

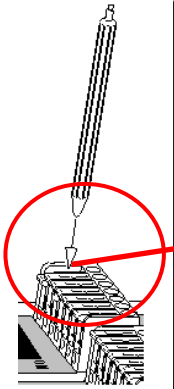
● Gently set back the lock buttons to the original position with your fingers.

The one-touch lock terminal block is made of plastic.Over time and with use, the lock button will gradually fail.
(unable to be locked or unable to be unlocked).
It is not covered under the terms of the warranty.
The replacement frequency is about two years, assuming twice a day (insertion and removal) of use, 20 days a month.

Read this notes carefully in order to make full use of the high-performance capabilities of a one-touch terminal.
Note that the instructions of the one-touch lock terminal are different from that of the one-touch terminal.

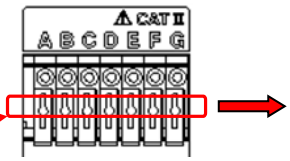
Notes for using one-touch type terminal block (NTB-100B,110B)

● Notes for connecting lead wires



● Press the following position.

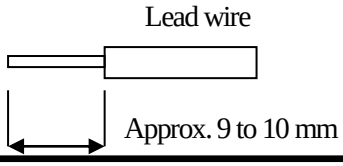
Do not press the edge of the button. Otherwise, it may cause troubles.



Be sure to press the above position with the accessory small screwdriver.

● For connection, always use the accessory small screwdriver or an object with a fine head.
● With pressing the button, insert the lead wire with its coating peeled off all the way to its end into the round hole of the input terminal. Release the button to fasten the lead wire.
● Gently pull the lead wire to check if it is securely fastened.

● Insert the lead wire with its coating peeled off approx. 10 mm all the way to its end into the round hole of the input terminal.



● For connecting a strain gage, do not connect gage leads (lead wires directly connected from the strain gage) directly.
● Use a gage terminal and convert the gage leads to the applicable lead wires or use a strain gage with pre-attached lead cables.
● If you connect gage leads directly, gage leads may be broken since they are too thin.

● The available wires are as follows.
Solid wire: φ0.4 mm to φ1.2 mm (UL AWG16 to 26)
Stranded wire: 0.2 mm^2 to 0.75 mm^2 (UL AWG20 to 24)
Be sure to use the above lead wires. Or, a breaking or connection error will happen.

The one-touch type terminal block is a consumable item.
The one-touch type terminal block has leaf springs. Through repeated connections/disconnections, the leaf spring will gradually wear out and retaining force may decrease. The one-touch lock type terminal block is considered to be a consumable item. It is not covered under the terms of the warranty.

NOTATIONS USED IN THE INSTRUCTION MANUAL

Certain notations are used in this Instruction Manual.

- **Quotations**
  Names described on the panel surface are expressed in double quotation mark (“ “).

- **Informational Notes**
  Certain notations are used as necessary to attract your attention to information that requires special care when handling the NTB-100A/B series, and to information provided for reference purposes.

Examples of Notations

NOTE

Essential precautions required when handling the NTB-100A/B series.

MEMO

Reference items required when handling the NTB-100A/B series.

1. OUTLINE OF NTB-100A/B SERIES

1-1 OUTLINE OF NTB-100A/B SERIES

The NTB-100A/B series is an indicator that is capable of measuring signal only by connecting the USB-CAN converter to the PC.
Capable of measuring signal easily with the strain gage and strain gage transducer connected by using the Control Software for the NTB-100A/B series (hereinafter referred to as the NTB-10A).
Capable of measuring signal at the site without circumstance by using an optional Handy Data Logger (SME-100A/101A).
CAN card of the KYOWA EDX series can also be used.

The NTB-100A is a one-touch lock terminal . The NTB-100B is a one-touch terminal . Excluding the terminal , the NTB-100A (one-touch lock terminal) have the same functions as the NTB-100B (one-touch terminal).
* Due to the discontinuity of the one-touch lock terminal , the NTB-100A is discontinued in 2017.

1-2 FEATURES

- One communication cable and one DC power are enough for the multiple NTB-100A/B units since the units can be coupled with each other.
- Capable of distributing the NTB-100A/B units over a wide range since the units can be placed maximum 1km from the PC or SME-100A/101A.
- PC and USB-CAN converter are used for connection.
- For the quarter bridge method, the NTB-100A/B series can measure strain by itself since the unit incorporates a bridge box.
- Capable of using applicable equipments (one-touch lock terminal and screw solder terminal) to the target sensor.
- When measuring 4-CH/unit with the NTB-10A, maximum 8 units (32-CH) can be measured. The NTB-100A/B series can widely be used from small to medium scale measurement.
- When using a TEDS-compatible sensor, measuring condition setting can be labor saved by reading the sensor information with the TEDS function.
  In addition, capable of writing the preset channel name in the sensor information of the TEDS-compatible sensor.

■ NTB-100A/B series

Model	Bridge Excitation	Shape of sensor input terminal	Resistance value applicable to a gage.
NTB-100A-120	Constant-voltage bridge excitation	One-touch lock terminal	120 ohm
NTB-100B-120		One-touch terminal	
NTB-101A-120		Screw solder terminal	
NTB-100A-350		One-touch lock terminal	350 ohm
NTB-100B-350		One-touch terminal	
NTB-101A-350		Screw solder terminal	
NTB-110A-350	Constant-current bridge excitation	One-touch lock terminal	(For full bridge method only)
NTB-110B-350		One-touch terminal	
NTB-111A-350		Screw solder terminal	

■ Measuring target

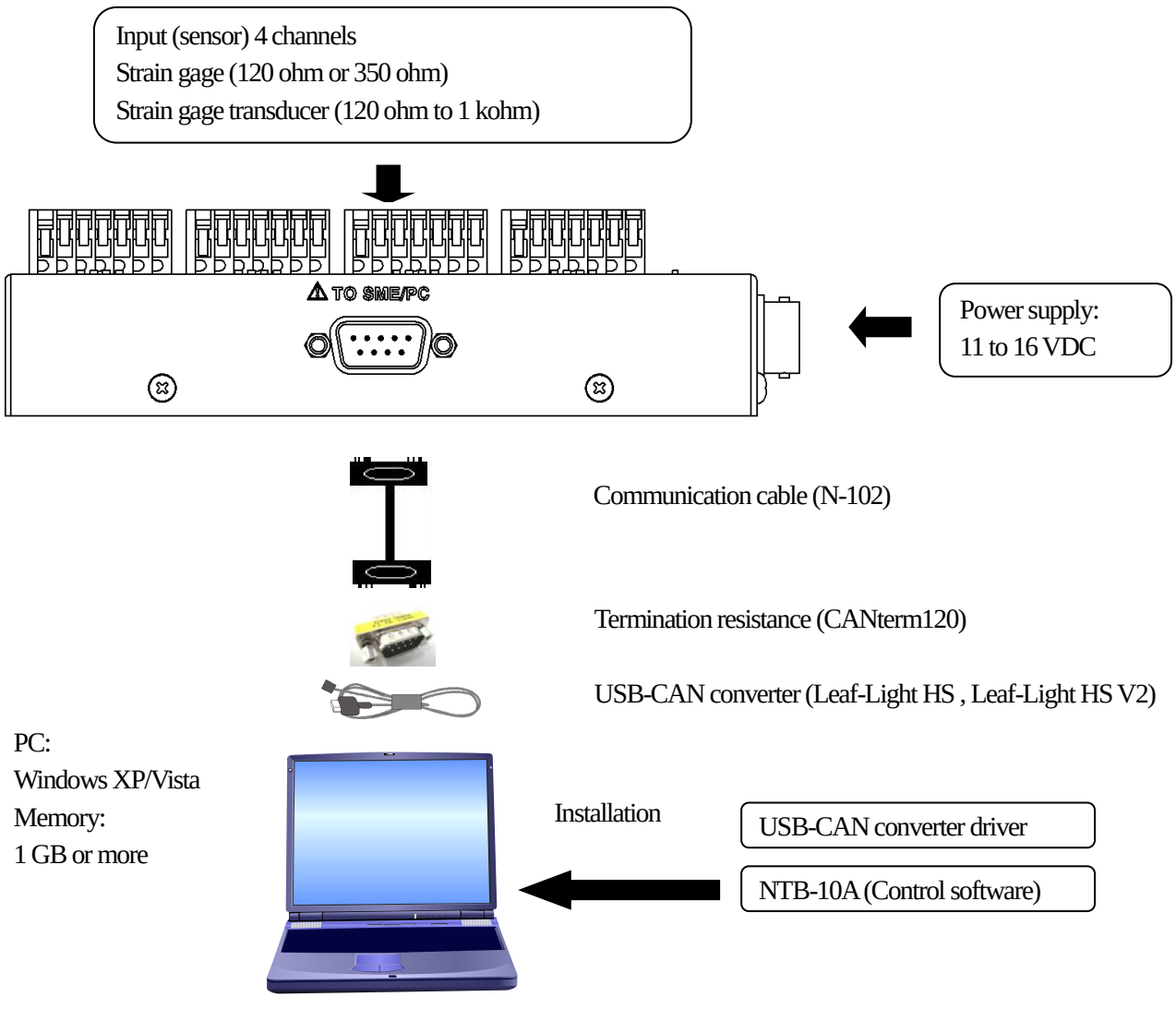
Bridge Excitation	Measuring Target			Target NTB-100A/B series		
				For general strain measurement		For civil engineering measurement
				NTB-100A-120 NTB-100B-120 NTB-101A-120	NTB-100A-350 NTB-100B-350 NTB-101A-350	NTB-110A-350 NTB-110B-350 NTB-111A-350
Constant-voltage bridge excitation	Strain gage	Quarter bridge method	120 ohm	○	×	×
			350 ohm	×	○	×
	Strain gage transducer	Half bridge method 120 ohm to 1000 ohm	Active-active method	○	○	×
		Full bridge method 120 ohm to 1000 ohm	Full-bridge method	○	○	×
Constant-current bridge excitation	Civil Engineering transducer	Full bridge method 350 ohm	Full-bridge method	×	×	○
			Transducer with temperature measuring function	×	×	○

1-3 SYSTEM CONFIGURATION

1-3-1 For Using NTB-10A

PC:

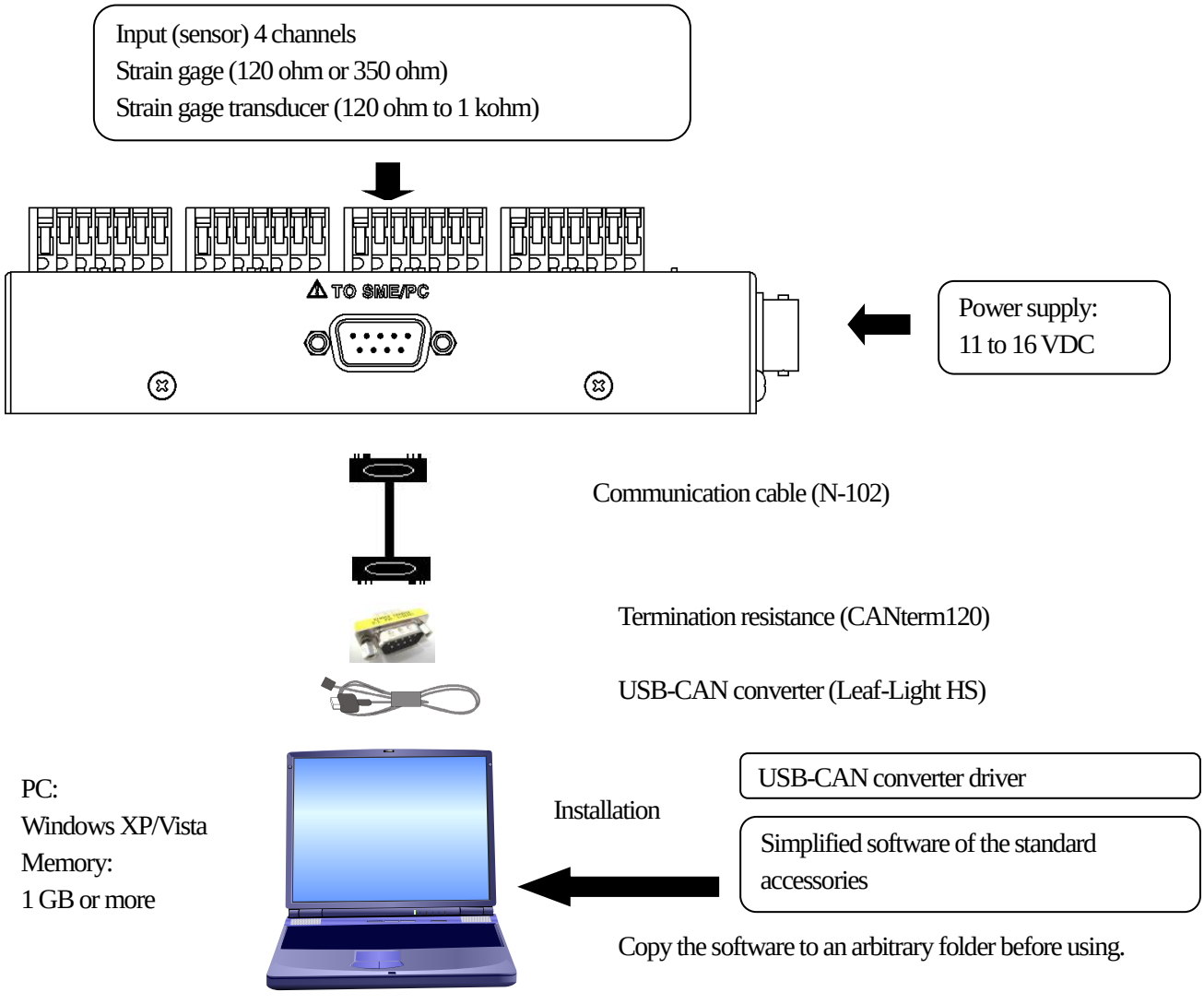
CPU	Pentium 4 2 GHz or more
OS	Microsoft Windows XP (32-bit version) Japanese and English versions Microsoft Windows Vista (32-bit version) Japanese and English versions
Memory	1 G bytes or more For Microsoft Windows Vista: 2 G bytes or more
Hard disk	Residual capacity: 10 Mbyte or more (not including the recording data file size)
Display	Resolution: 1024 × 768 dots or more Colors: Full color or more
Y cable	N-103 (for distributed arrangement)
Communication cable	N-102 (1 m) Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.
Termination resistance	CANterm120 (Vector Japan Co., Ltd.)
USB-CAN converter	Leaf Light HS (Kvaser Inc.)



1-3-2 For Using Simplified Software of Standard Accessories

PC:

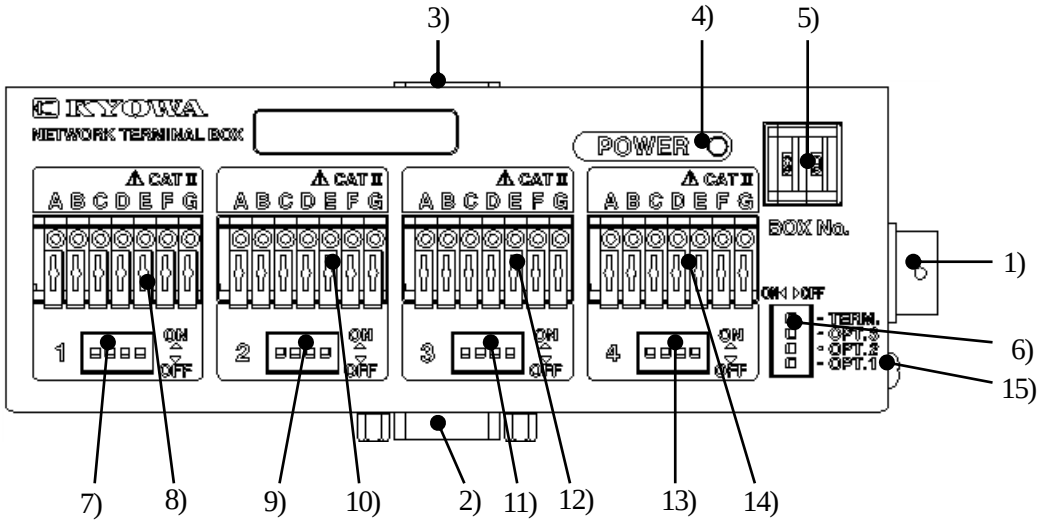
CPU	Pentium 4 2 GHz or more
OS	Microsoft Windows XP (32-bit version) Japanese and English versions Microsoft Windows Vista (32-bit version) Japanese and English versions
Microsoft Office Excel	XP, 2003, 2007
Memory	1 G bytes or more For the Microsoft Windows Vista: 2 G bytes or more
Hard disk	Residual capacity: 10 Mbyte or more (not including the recording data file size)
Display	Resolution: 1024 × 768 dots or more Colors: Full color or more
Y cable	N-103 (For distributed arrangement)
Communication cable	N-102 (1 m) Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.
Terminator	CANterm120 (Vector Japan Co., Ltd.)
USB-CAN converter	Leaf Light HS (Kvaser Inc.)



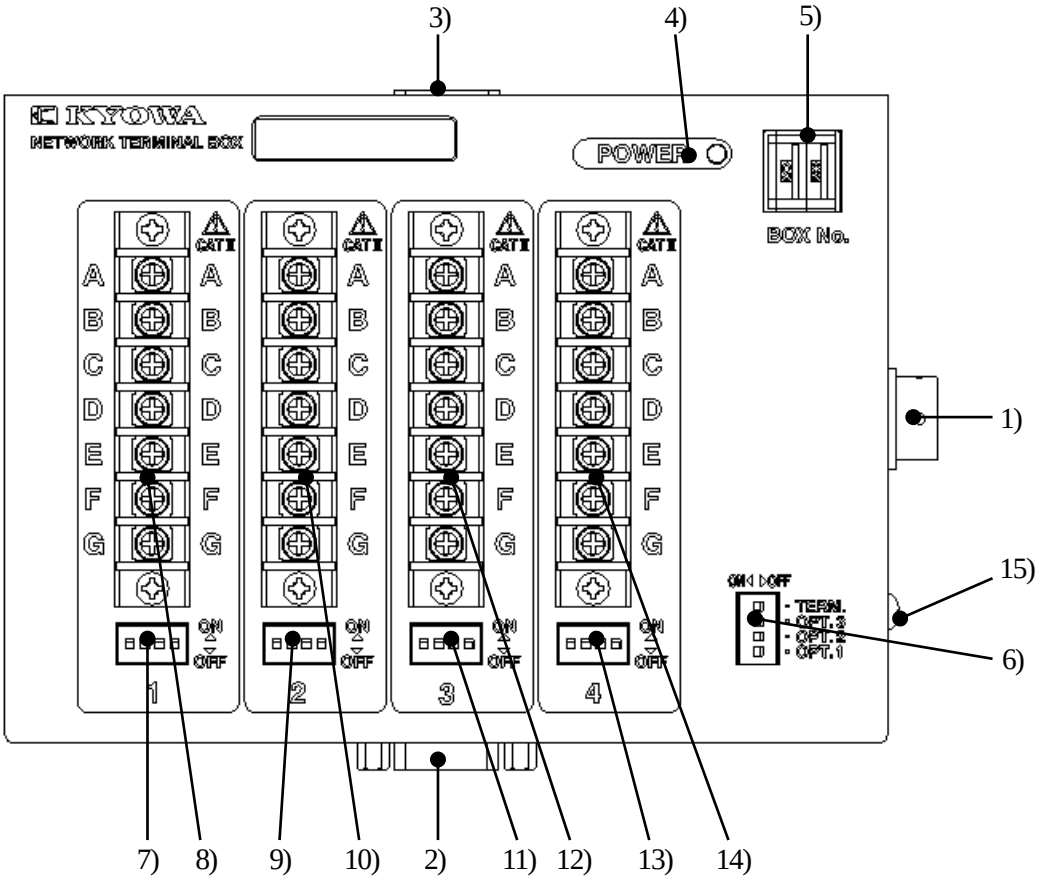
2. PARTS AND FUNCTIONS

2-1 TOP PANEL

"NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350"



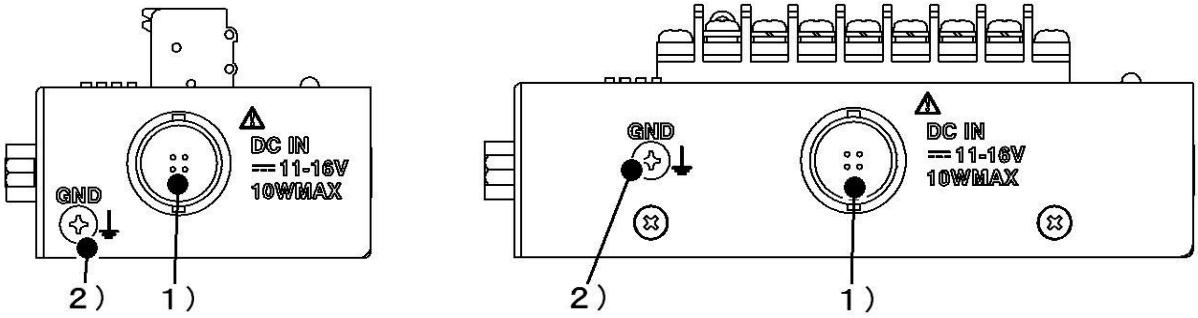
"NTB-101A-120,NTB-101A-350,NTB-111A-350"



1)	Power connector	Power connector Power voltage range is 11 to 16 VDC.
2)	Communication connector	For connecting the PC or SME-100A/101A.
3)	Coupling connector	For coupling the other NTB-100A/B series.
4)	"Power" LED	Lights up while turning ON the NTB-100A/B series.
5)	"BOX No."	Digital switch for setting the BOX No.
6)	DIP switch for option	For function settings.
7)	DIP switch for changing CH1 mode	For setting a CH mode of the CH1.
8)	CH1 input terminal	Input terminal for strain measurement of CH1.
9)	DIP switch for changing CH2 mode	For setting a CH mode of the CH2.
10)	CH2 input terminal	Input terminal for strain measurement of CH2.
11)	DIP switch for changing CH3 mode	For setting a CH mode of the CH3.
12)	CH3 input terminal	Input terminal for strain measurement of CH3.
13)	DIP switch for changing CH4 mode	For setting a CH mode of the CH4.
14)	CH4 input terminal	Input terminal for strain measurement of CH4.
15)	"GND" terminal	GND terminal (protective grounding) Connect the earth.

2-2 SIDE PANEL (POWER CONNECTOR SIDE)

"NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350"　"NTB-101A-120,NTB-101A-350,NTB-111A-350"



1) Power connector　　Power connector
Power voltage range is 11 to 16 VDC.

2) "GND" terminal　　GND terminal (protective grounding)
Connect the earth.

NOTE

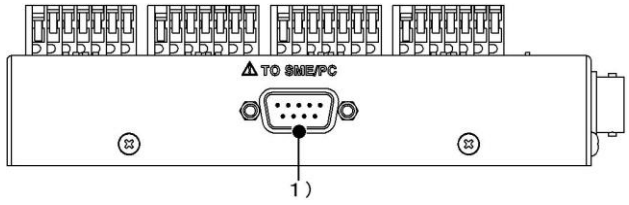
- Before connecting the DC power, check the power voltage.
  The operating power voltage is from 11 to 16 VDC.
  If the power voltage exceeds the above specified voltage range, no connection is made and it may cause trouble or damage to the NTB-100A/B series.
  In addition, use the P-57 cable (accessory) for connecting the DC power.

MEMO

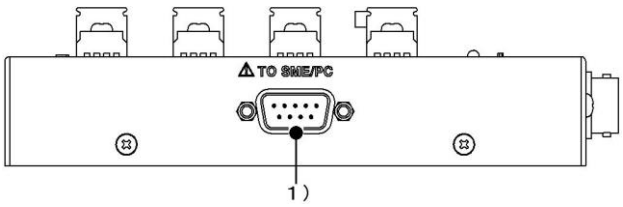
- For using the AC adapter, use the following recommended AC adapter.
  Recommended AC adapter: SA-10A-EDS (100 to 240 VAC)

2-3 SIDE PANEL (SME-100A/101A, PC CONNECTION SIDE)

"NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350"



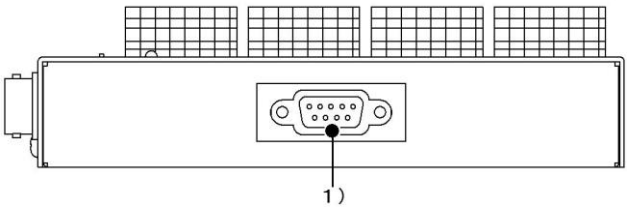
"NTB-101A-120,NTB-101A-350,NTB-111A-350"



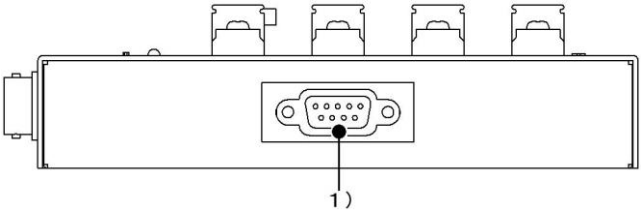
1) Communication connector For connecting the SME-100A/101A or PC.

2-4 SIDE PANEL (NTB-100A/B SERIES COUPLLING SIDE)

"NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350"



"NTB-101A-120,NTB-101A-350,NTB-111A-350"



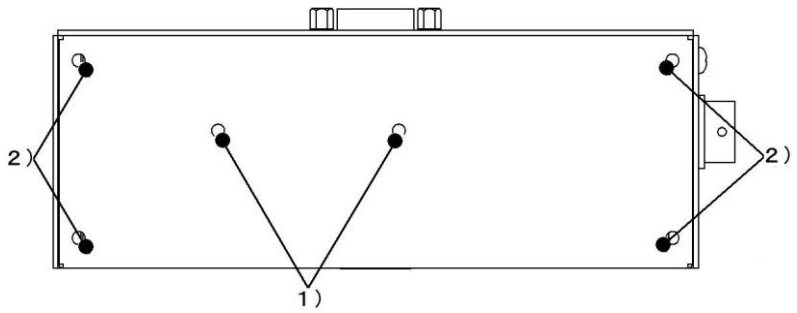
1) Coupling connector For coupling the other NTB-100A/B series.

NOTE

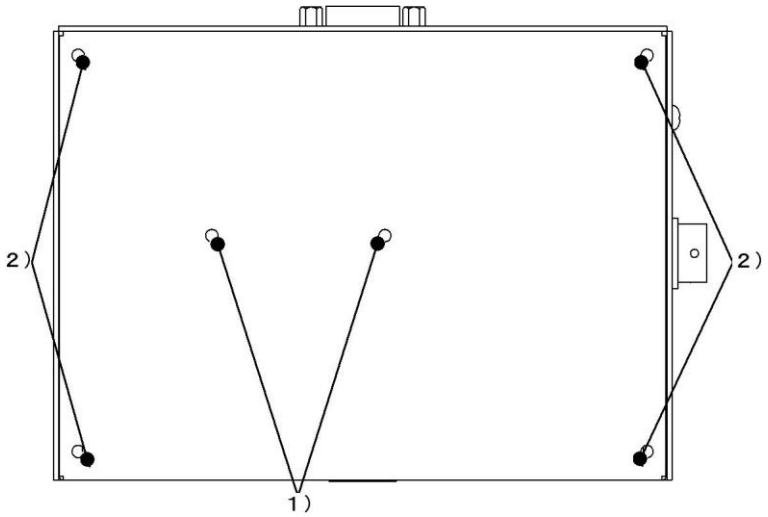
Do not connect the PC and SME-100A/101A to the "Coupling connector."

2-5 BOTTOM PANEL

"NTB-100A/B-120/NTB-100A/B-350/NTB-110A/B-350"



"NTB-101A-120/NTB-101A-350/NTB-111A-350"



1) Fixing hole for DIN rail mounting plate — Used for fixing the NTB-100A/B series to the DIN rail. (Width between the holes: 42 mm)

2) Fixing hole for coupling the NTB-100A/B series units — Used for coupling the NTB-100A/B series units. (When not using the DIN rail)

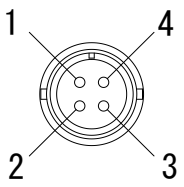
NOTE

- When mounting the optional DIN rail mounting plate or coupling plate, use the option's accessory screws. Pay attention to the screw lengths.
- For the coupling plate, use flat head machine screws (M3 × 6).
- For the DIN rail mounting plate, use binding head machine screws (M3 × 6).

2-6 POWER CONNECTOR

Model and pin No. of the power connector are described in the following.

Pin No.	Name
1	+DC IN
2	+DC IN
3	−DC IN
4	−DC IN



Manufacture: HIROSE*
Model: RM12BRD-4PH

* HIROSE ELECTRIC CO., LTD

NOTE

- Before connecting the DC power, check the power voltage.
  The operating voltage range is 11 to 16 VDC.
  When the power voltage range exceeds the above range, never connect the NTB-100A/B series.
  Or, it may cause trouble or accident.
  In addition, use the P-57 cable (accessory) for connecting the DC power.

MEMO

- When using the AC adapter, use the following recommended AC adapter.
  Recommended AC adapter: SA-10A-EDS (100 to 240 VAC)

2-7 STATUS OF POWER LED

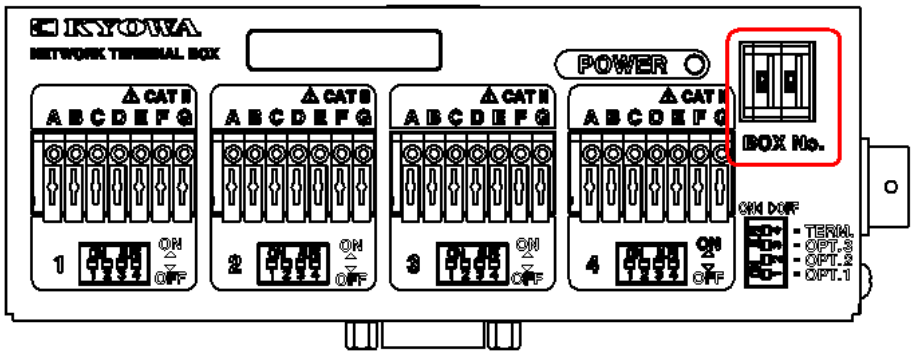
Statuses of the "POWER" LED are described in the following.

Status of the "POWER LED"	Operation of the NTB-100A/B series
Light out	OFF/Power saving
Light up	ON
Blinking (low speed)	Measuring
Blinking (high speed)	BOX No. Error The BOX No. is set to 00. The BOX. No. is overlapping.

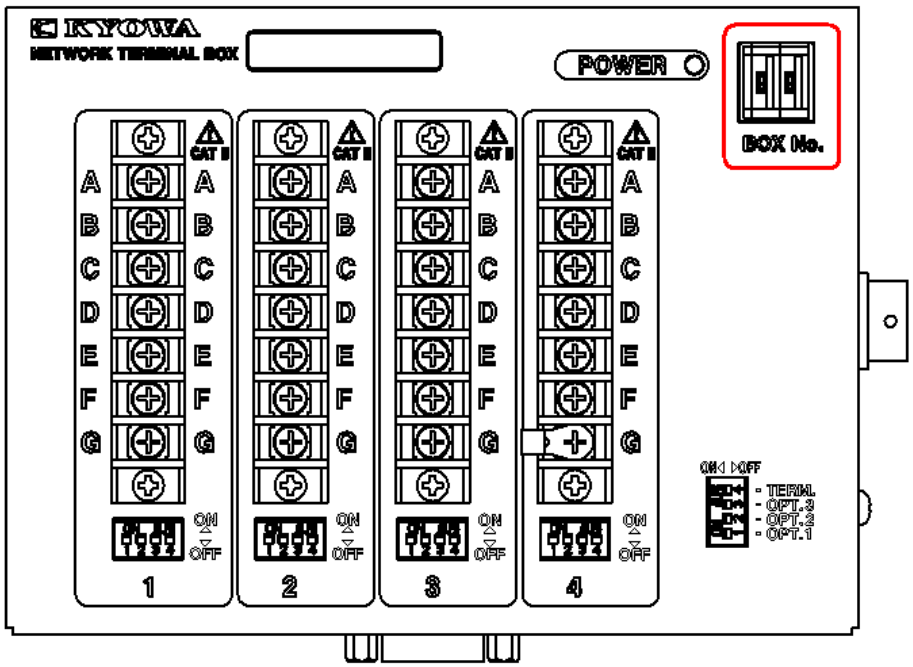
2-8 DIGITAL SWICH FOR BOX No.

Digital switches are for specifying the measuring CH No.
For increasing the CH No., dial numbers to the downward, for decreasing, dial to the upward.
Be sure not to overlap the digital switches in the same network.
The settable range of the digital switch for the BOX No. is 01 to 99.

"NTB-100A/B-120/NTB-100A/B-350/NTB-110A/B-350"



"NTB-101A-120/NTB-101A-350/NTB-111A-350"



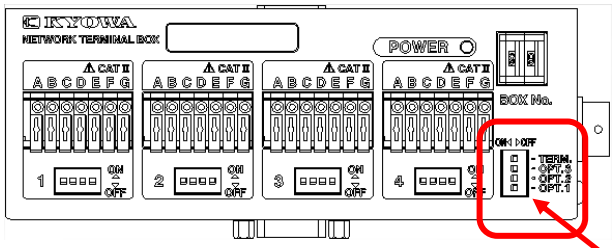
NOTE

- Do not set 00 to the "BOX No." Neither communication nor measurement can be conducted.

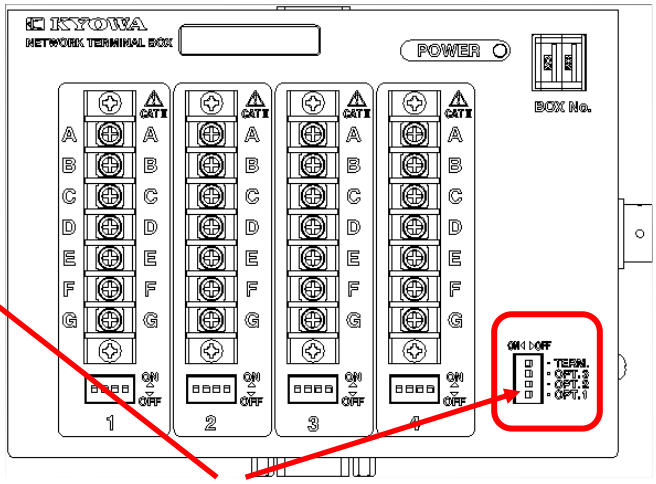
2-9 DIP SWITCH FOR OPTION

Functions of the DIP switch for option are described in the following.

"NTB-100A/B-120/NTB-100A/B-350/NTB-110A/B-350"



"NTB-101A-120/NTB-101A-350/NTB-111A-350"



SW4 ("TERM."): For setting the termination resistance.
ON: Termination resistance ON
OFF: Termination resistance OFF

SW3 ("OPT. 3"): For setting the power saving function.
ON: Power saving function ON
OFF: Power saving function OFF

SW2 ("OPT. 2"): For setting measuring functions of the KYOWA's EDX series.
ON: Measuring functions of the KYOWA's EDX series ON
OFF: Measuring functions of the KYOWA's EDX series OFF
(For measuring the signal with the SME, NTB-10A, or simplified software, set to OFF.)

SW1 ("OPT. 1"): For extension (set to OFF)

ON: Valid
OFF: Invalid

NOTE

- When coupling or distributing the multiple NTB-100A/B series units, turn ON the termination resistance ("TERM") of the endmost NTB-100A/B series.
  For termination resistance, see "3-3."
- The setting of the DIP switch for option becomes valid after the NTB-100A/B series is turned ON or after clicking the **File** – **Environment Setting** - **NTB comm. check** button of the NTB-10A
- Do not set the DIP switch (SW1) for extension to ON.

MEMO

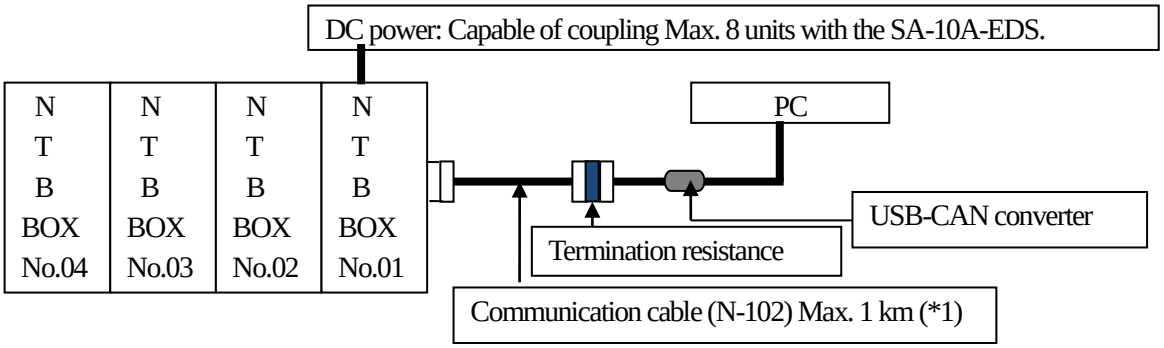
1) If the power save function SW3 ("OPT. 3") is set to ON, the NTB-100A/B series becomes power saving status after turning ON.(The POWER LED lights out.)
2) For communication and measurement, the power saving status is temporarily released. (The POWER LED lights up and flickers.)
3) After the communication or measurement is not conducted for 3 minutes or more, the NTB-100A/B series becomes power saving status again. (The POWER LED lights out.)
4) The NTB-100A/B series automatically repeats the operations in 2) and 3) in accordance with the status.

2-10 FOR COUPLING AND DISTRIBUTED ARRANGEMENT WITH OTHER NTB-100A/B SERIES

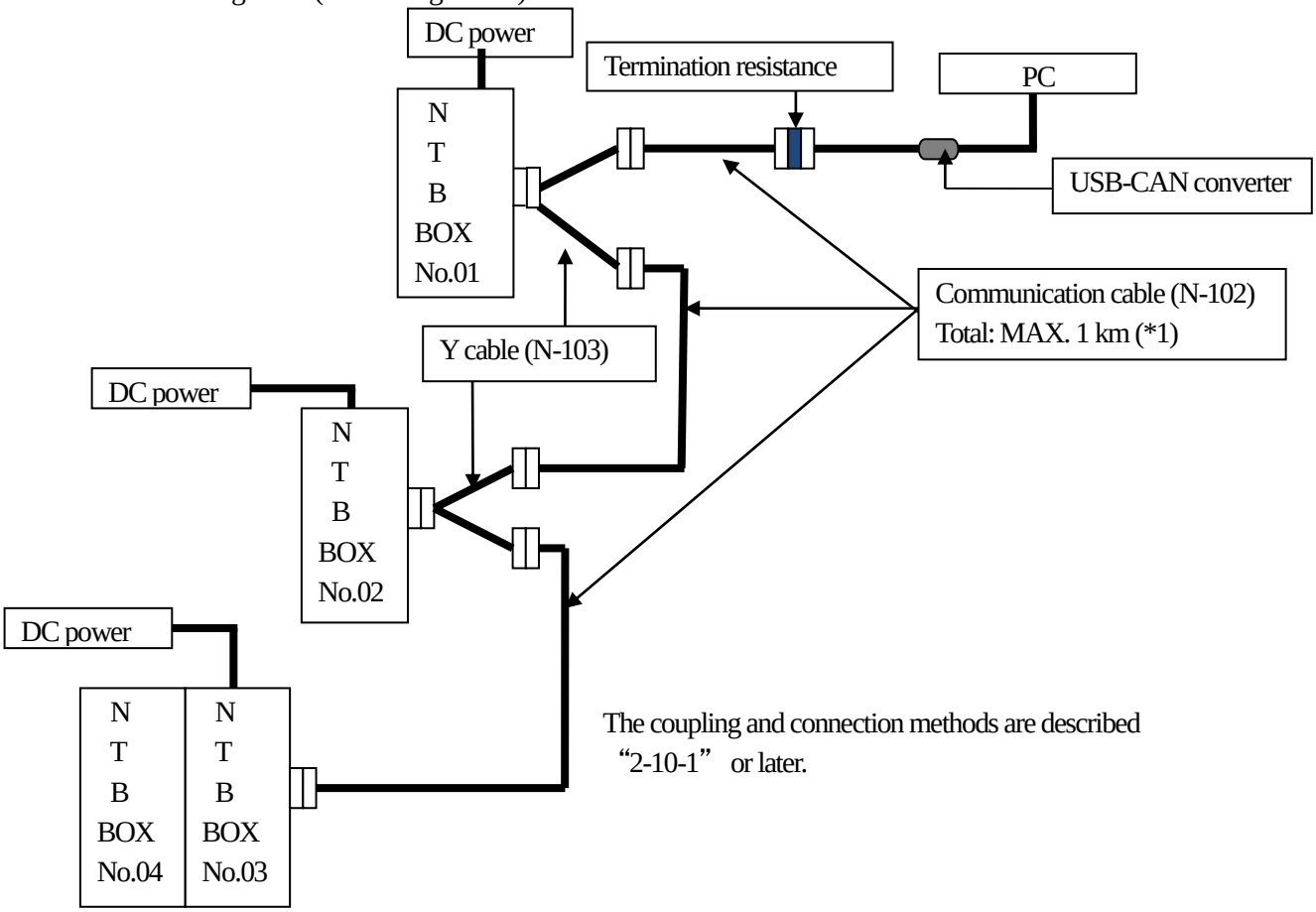
Capable of coupling the NTB-100A/B series with the other NTB-100A/B series unit by using the "Coupling connector."
If coupled, wire-saving layout can be obtained since the coupled units require one DC power, USB-CAN converter, termination resistance, and communication cable each.
Use the DIN rail (option) or coupling plate (option, model: CN-1A) for coupling.

For distributed arrangement, use the Y cable and communication cable for connecting the other NTB-100A/B series units.
At that time, every NTB-100A/B series requires power.

■ For coupling (when using the PC)

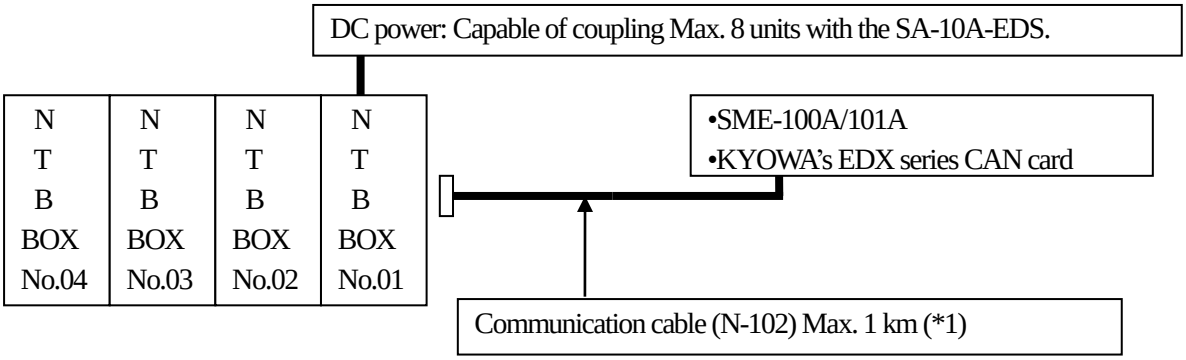


■ For distributed arrangement (when using the PC)

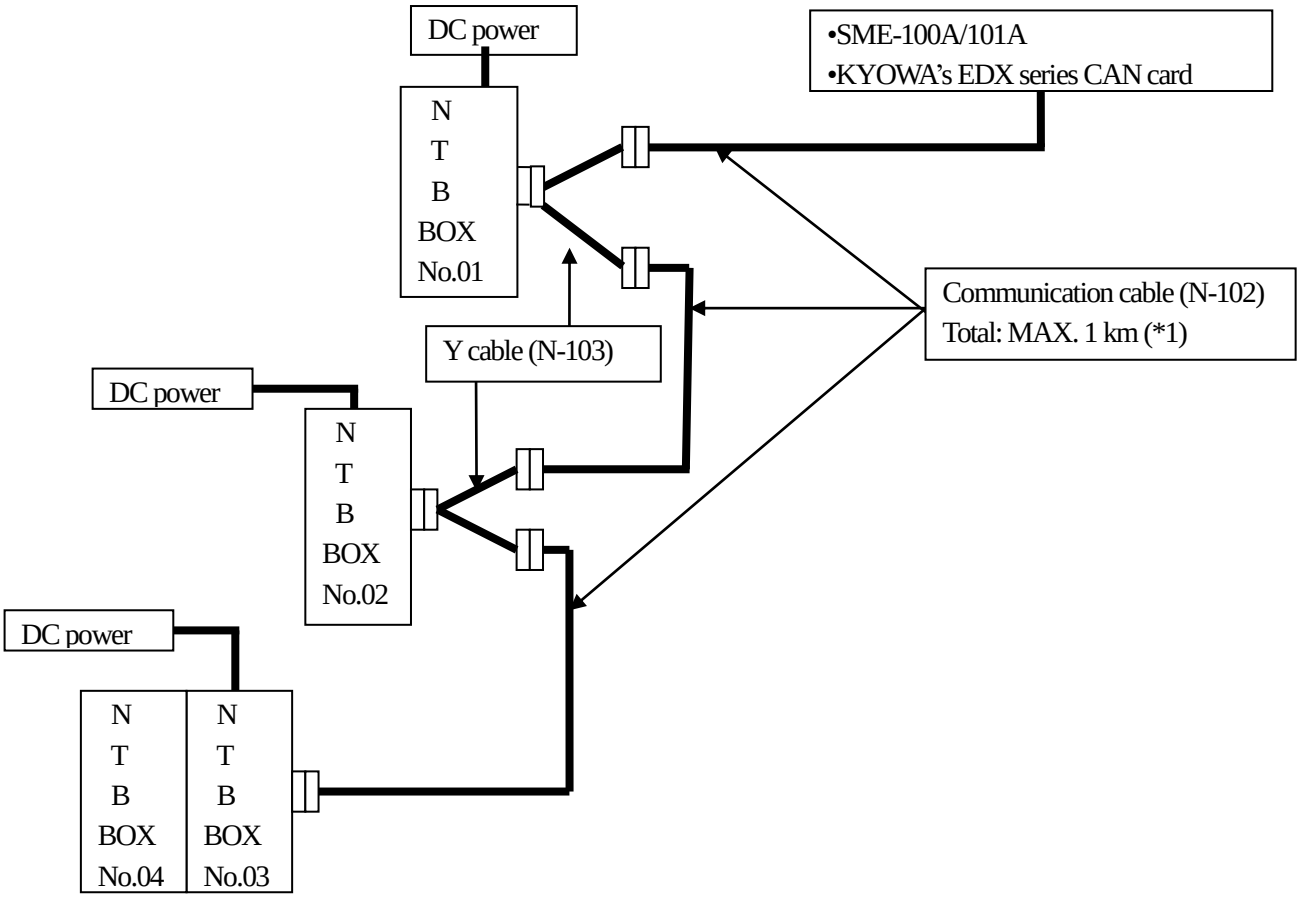


*Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

■ For coupling (when using the SME-100A/101A or KYOWA's EDX series CAN card)



■ For distributed arrangement (when using the SME-100A/101A or KYOWA's EDX series CAN card)



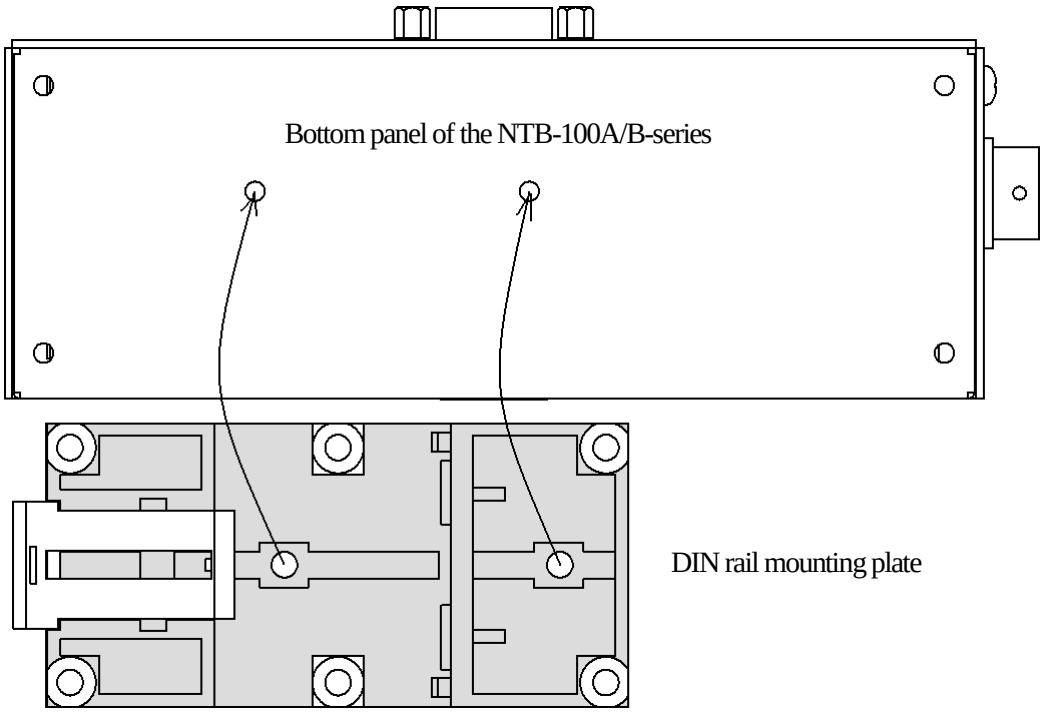
The coupling and connection methods are described "2-10-1" or later.

*Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

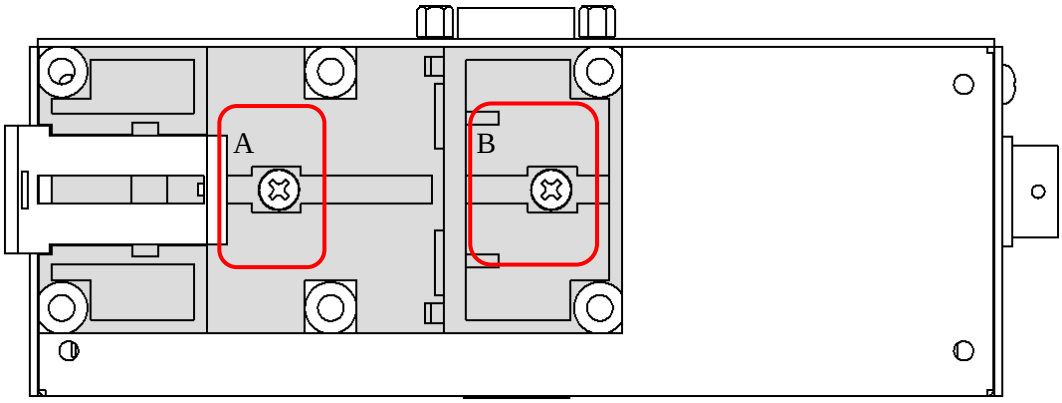
2-10-1 For mounting NTB-100A/B series units (2) to DIN rail

This section describes how to mount the any 2 units of the NTB-100A/B-120, NTB-100A/B-350, and NTB-110A/B-350 to the DIN rail.

1) Set the DIN rail mounting plate (option) to the bottom panel of the NTB-100A/B-series.

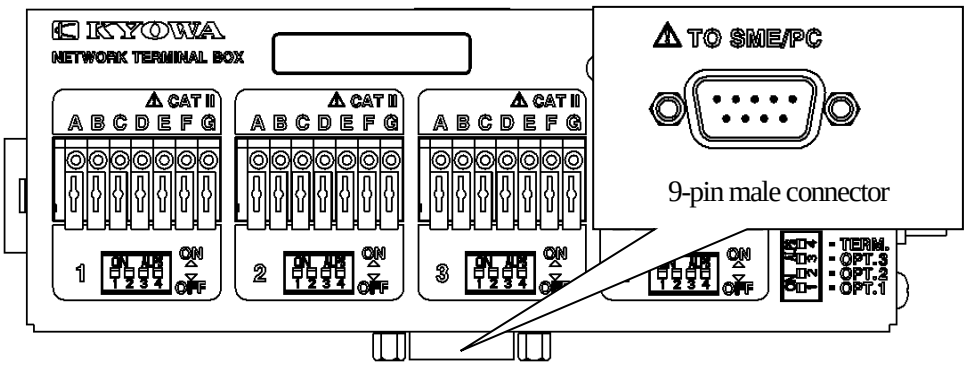


2) Fasten the screws of the DIN rail mounting plate to the NTB-100A/B series.
(Fasten the A and B screws in the following.)



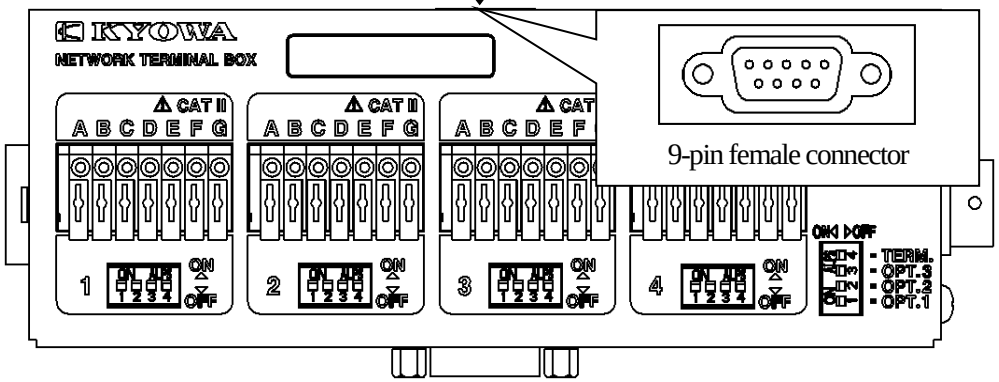
3) Connect the Coupling connector of the 1st NTB-100A/B series and Communication connector of the 2nd NTB-100A/B series.

- NTB-100A/B series (2nd unit)

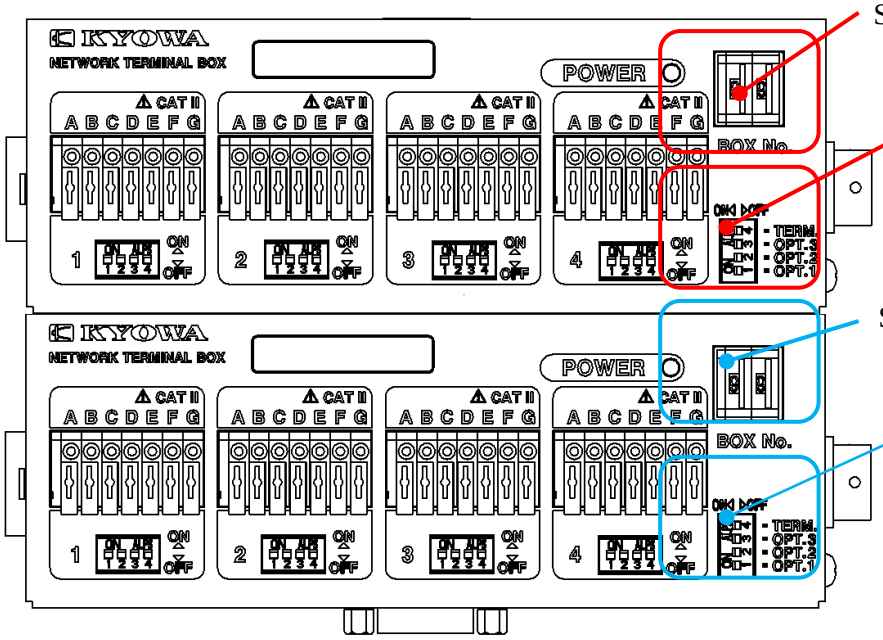


Connect the Coupling connector of the 1st unit and Communication connector of the 2nd unit.

- NTB-100A/B series (1st unit)



■ When coupling 2 units



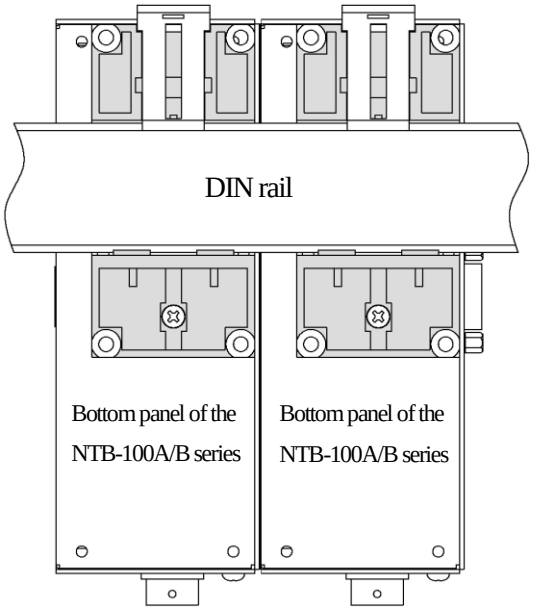
Set the BOX No. of the 2nd unit to 02.

Set the SW4 ("TERM.": termination resistance) of the DIP switch for option to ON.

Set the BOX No. of the 1st unit to 01.

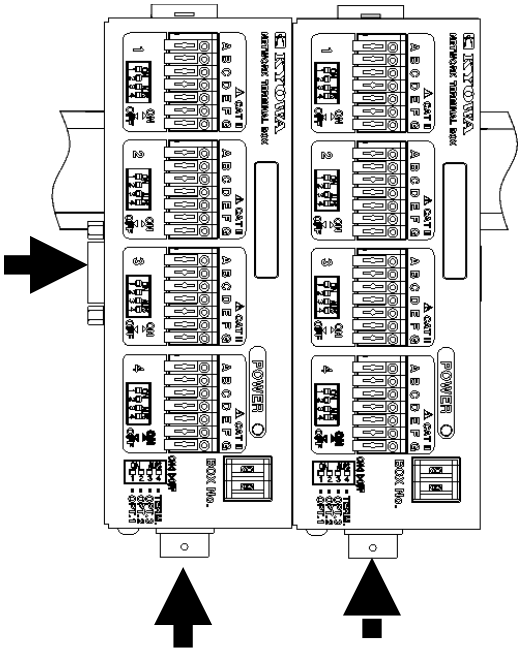
Set the SW4 ("TERM.": termination resistance) of the DIP switch for option to OFF.

4) Mount the coupled NTB-100A/B series units to the DIN rail.



5) Connect the DC power and connect the termination resistance and USB-CAN converter with the communication cable (N-102 *Note) to the 1st NTB-100A/B series.

Connect the termination resistance and USB-CAN converter with the communication cable (N-102 *Note).



Connect the DC power.

The DC power is not required for the 2nd NTB-100A/B series (and after).

*Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

NOTE

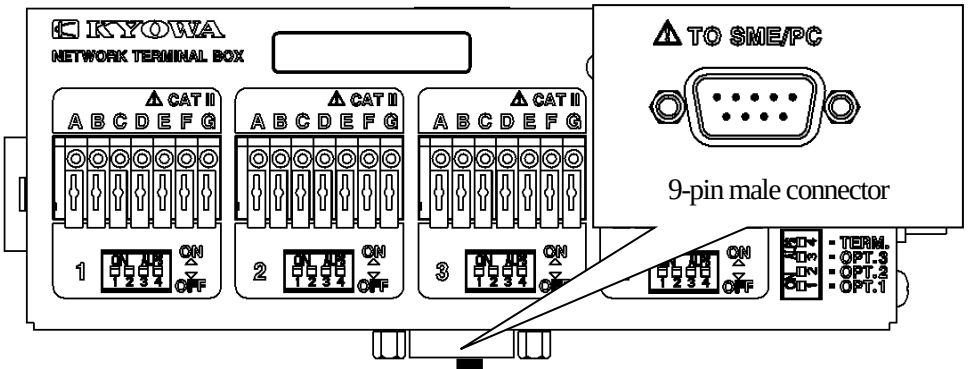
- When using the multiple NTB-100A/B series units by coupling or in a same network, set the termination resistances ("TERM.") of the NTB-100A/B series units of both sides in the network to ON. For termination resistance, see "3-3."
- When coupling the multiple NTB-100A/B series units, set the "BOX No." so as not to overlap.
- After changing the "BOX No.", turn OFF and ON the power. Or click the **File** → **Environment Setting** → **NTB comm check** in the NTB-10A.
- For mounting the optional DIN rail mounting plate to the NTB-100A/B series, use the accessory screws. Pay attention to the screw lengths. Use binding head machine screws (M3 × 6).

2-10-2 For Using NTB-100A/B Series Units by Coupling

This section describes how to couple the any 2 units of the NTB-100A/B-120, NTB-100A/B-350, and NTB-110A/B-350.

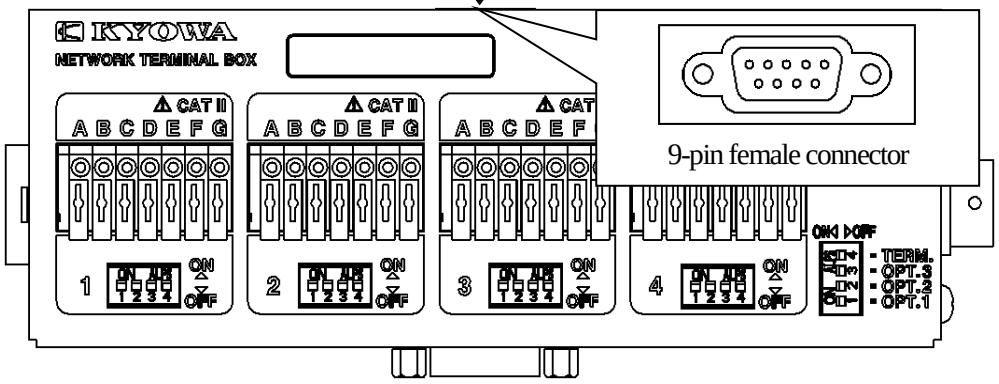
1) Connect the Coupling connector of the 1st NTB-100A/B series and Communication connector of the 2nd NTB-100A/B series.

- NTB-100A/B series (2nd unit)

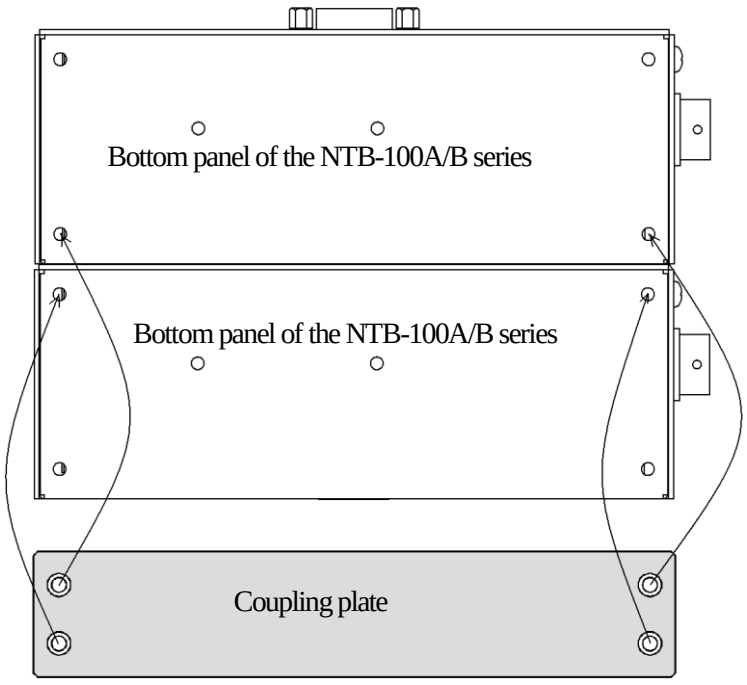


Connect the Coupling connector of the 1st unit and Communication connector of the 2nd unit.

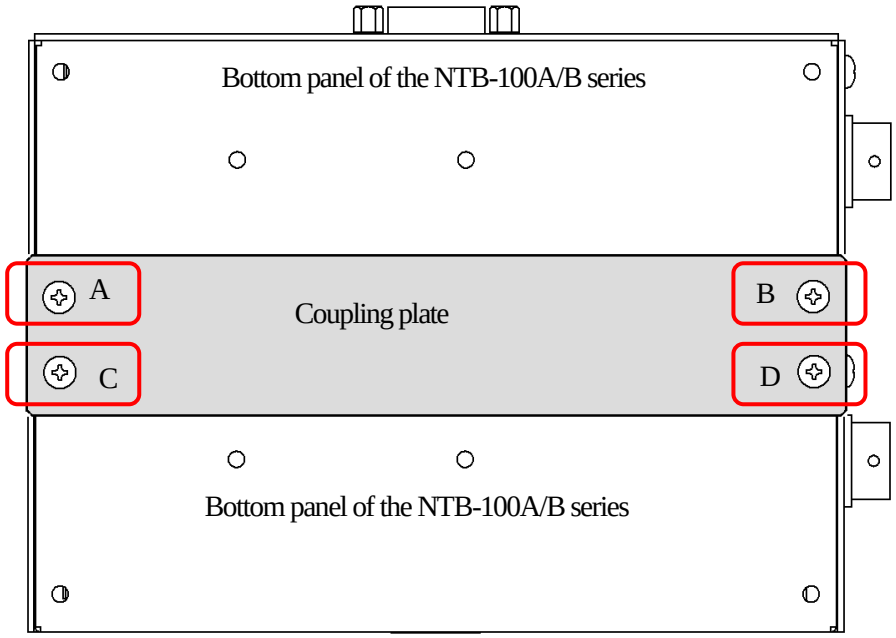
- NTB-100A/B series (1st unit)



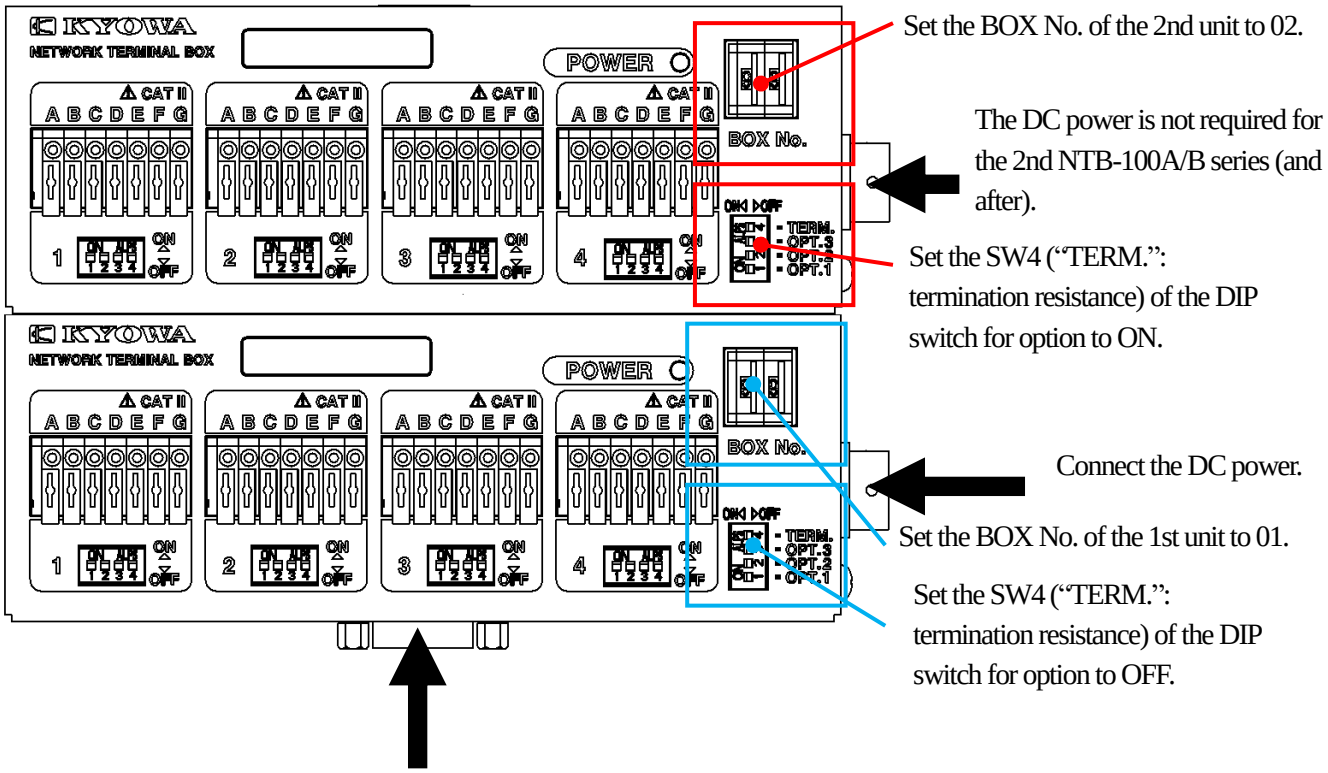
2) Set the optional coupling plate (CN-1A) to the bottom panel of the NTB-100A/B series units.



3) Fasten screws on the coupling plate to couple the NTB-100A/B series units.
(Fasten the A, B, C, and D screws in the following.)



4) Connect the DC power and connect the termination resistance and USB-CAN converter with the communication cable (N-102 *Note) to the 1st NTB-100A/B series units.



Connect the termination resistance and USB-CAN converter with the communication cable (N-102 *Note).

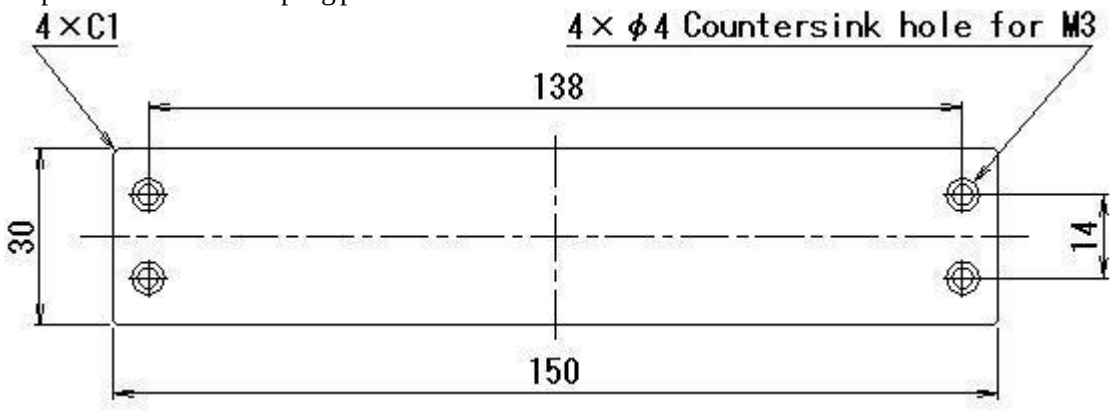
*Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

NOTE

- When using the multiple NTB-100A/B series units by coupling or in a same network, set the termination resistances ("TERM.") of the NTB-100A/B series units of both sides in the network to ON. For terminator, see "3-3."
- When coupling the multiple NTB-100A/B series units, set the "BOX No." so as not to overlap.
- After changing the "Box No.", turn OFF and ON the power.
  Or click the **File** → **Environment Setting** → **NTB comm check** in the NTB-10A.
- For mounting the optional DIN rail mounting plate to the NTB-100A/B series, use the accessory screws. Pay attention to the screw lengths. Use binding head machine screws (M3 × 6).

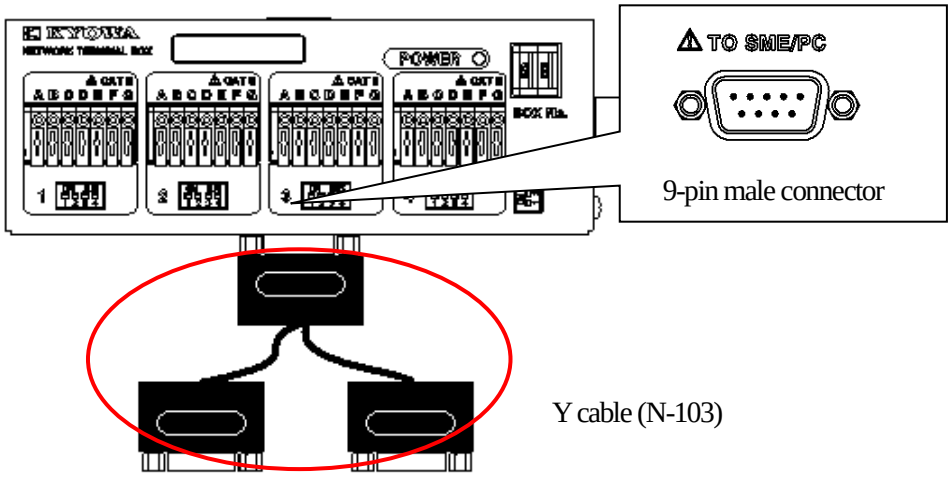
MEMO

- Specifications of the coupling plate

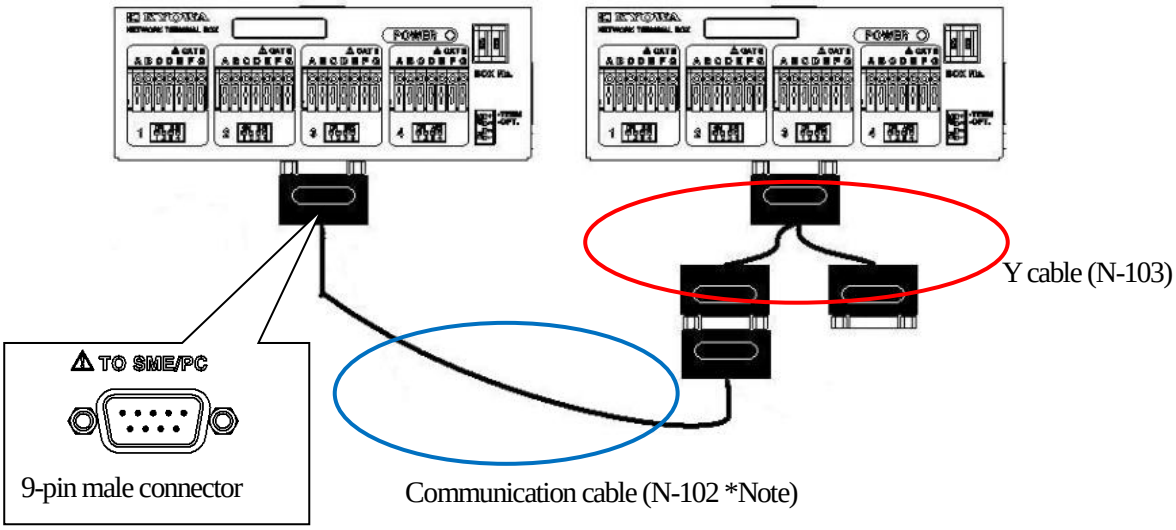


2-10-3 For Using NTB-100A/B Series Units in Distributed Arrangement

1) For the 1st NTB-100A/B series, connect the Y cable (N-103) to the "TO SME/PC" communication connector.

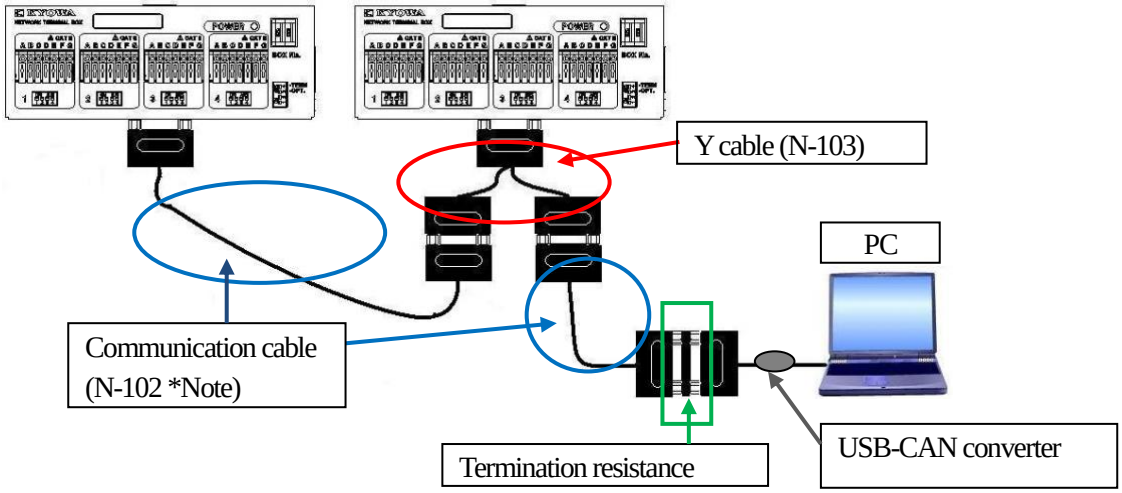


2) Connect the "TO SME/PC" communication connector of the 2nd NTB-100A/B series and an one end of the Y cable of the 1st NTB-100A/B series with the communication cable (N-102 *Note).

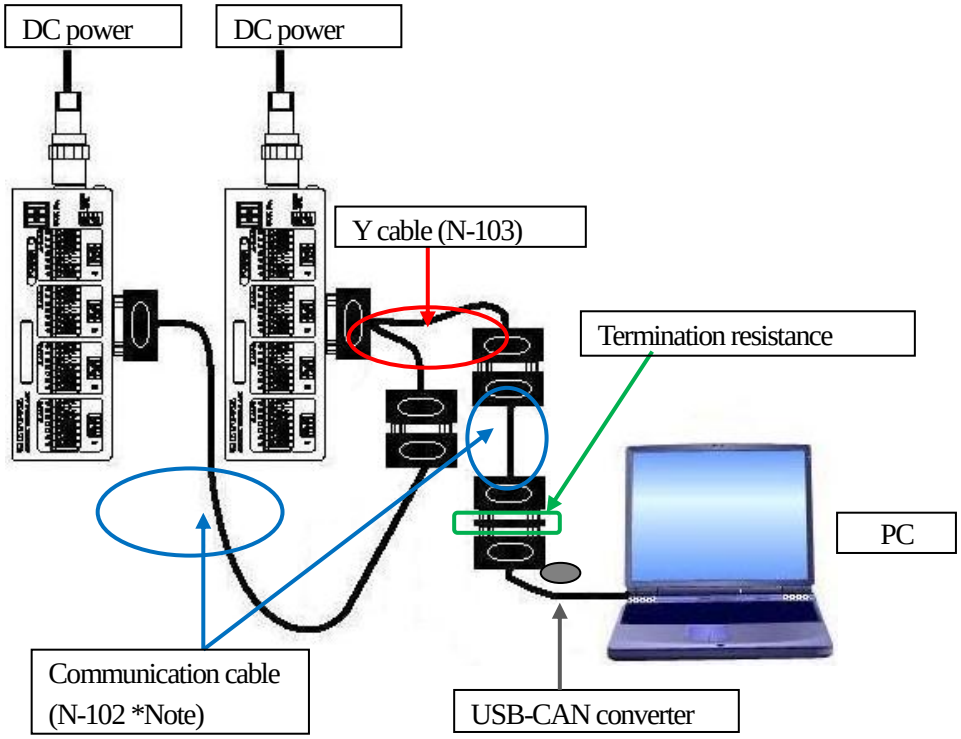


*Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

3) Connect the communication cable (N-102 *Note) to another end of the Y cable (N-103). And connect the termination resistance to another end of the communication cable and USB-CAN converter. Then connect the PC to the USB-CAN converter.



4) Supply power to the every NTB-100A/B series.



*Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.

NOTE

- When using the multiple NTB-100A/B series units by coupling or in a same network, set the termination resistance ("TERM.") of the NTB-100A/B series units of both sides in the network to ON. For termination resistance, see "3-3."
- When coupling the multiple NTB-100A/B series units, set the "BOX No." so as not to overlap.
- After changing the "BOX No.", turn OFF and ON the power.
  Or click the **File** → **Environment Setting** → **NTB comm check** of the NTB-10A.

3. HOW TO INSTALL

3-1 INSTALLATION PROCEDURES

This section describes necessary preparations from installation to measurement.
Follow the following procedures as far as possible.

Section 3-2	Set the BOX No.	••• Set the BOX No. of the NTB-100A/B series.
	↓	
Section 3-3	Set the termination resistor	••• Set the termination resistance.
	↓	
Section 3-4	Connect the sensor and set the CH mode	••• Connect various sensors and set the CH mode.
	↓	
Section 3-5	Grounding	••• Ground the earth (Ground).
	↓	
Section 3-6	Connect the power	••• Connect the DC power or AC adapter.
	↓	
Chapter 4	Measure with the simplified software	••• Prepare for the measurement and measure the signal with the simplified software. See "4. FOR MEASURING WITH SIMPLIFIED SOFTWARE."
Chapter 5	Measure with the KYOWA's EDX series	••• Prepare the measurement and measure the signal with the KYOWA EDX series. See "5. FOR MEASURING WITH KYOWA's EDX SERIES."

For measuring the signal with the NTB-10A (NTB-100A/B series control software), refer to the NTB-10A Network Terminal Box Control Software Instruction Manual.

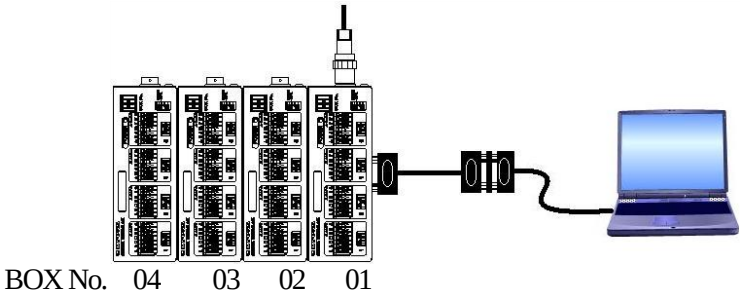
For the signal with the KYOWA's Handy Data Logger (SME-100A/101A), refer to the SME series Handy Data Logger Instruction Manual.

3-2 SET BOX N0.

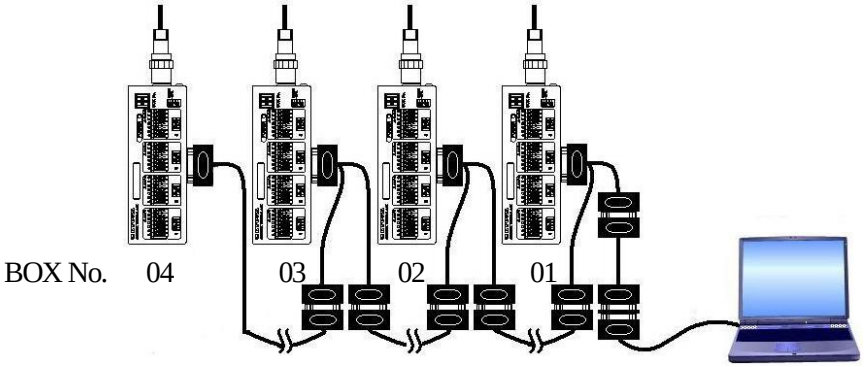
Before setting the BOX No., disconnect the power.

Set the "BOX No." on the top panel of the NTB-100A/B series.
The measuring CH number is specified by the BOX No. and CH No.
From "1" to "4" on the top panel of the NTB-100A/B series units are corresponding to the actual CHs in the following table.

1) For coupling (with the PC)



2) For distributed arrangement (with the PC)



BOX No.	CH No.	Actual CH No	Box No.	CH No.	Actual CH No.
01	1	CH1 of the Box No. 01	03	1	CH1 of the Box No. 03
	2	CH2 of the Box No. 01		2	CH2 of the Box No. 03
	3	CH3 of the Box No. 01		3	CH3 of the Box No. 03
	4	CH4 of the Box No. 01		4	CH4 of the Box No. 03
02	1	CH1 of the Box No. 02	04	1	CH1 of the Box No. 04
	2	CH2 of the Box No. 02		2	CH2 of the Box No. 04
	3	CH3 of the Box No. 02		3	CH3 of the Box No. 04
	4	CH4 of the Box No. 02		4	CH4 of the Box No. 04

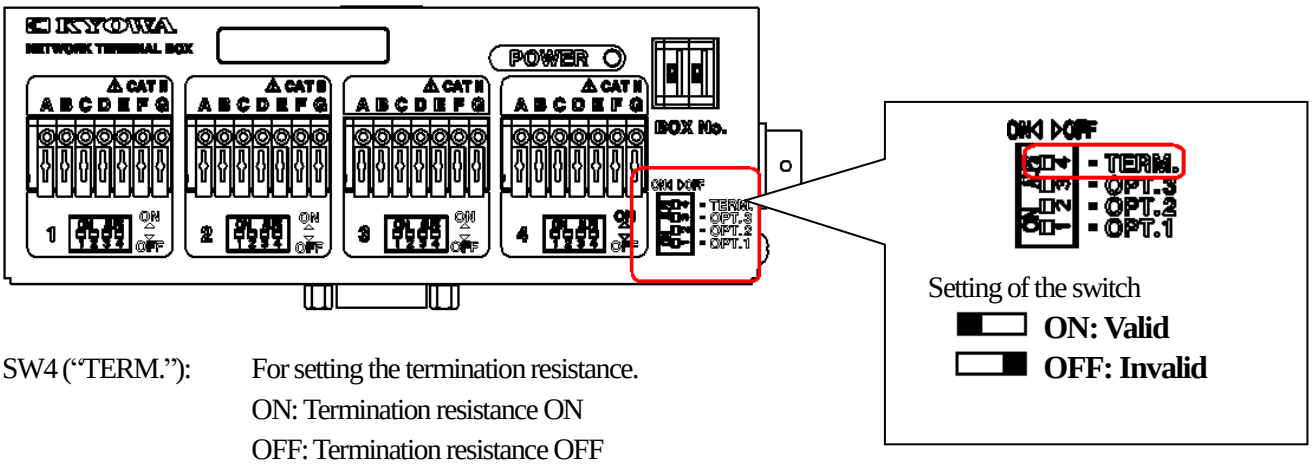
NOTE

- When turning ON the NTB-100A/B series, the Box No. is read.
  Therefore, set the Box No. before turning ON the NTB-100A/B series. After that, turn ON the power.
- Setting range of the Box No. is 01 to 99. Do not set 00.
- Set the BOX No. so as not to overlap.

3-3 SET TERMINATION RESISTANCE

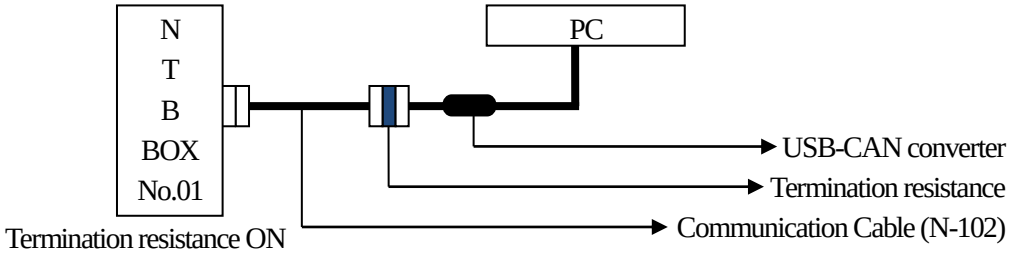
Before setting the termination resistance, disconnect the power.
It is required to set the termination resistance.

- When using one NTB-100A/B series: Set the termination resistance ("TERM.") switch of the "DIP switch for option" to ON.
- When using 2 or more NTB-100A/B series units: Turn ON the terminal resistance ("TERM.") switch of the furthest NTB from the PC.(SME-100A/101A)

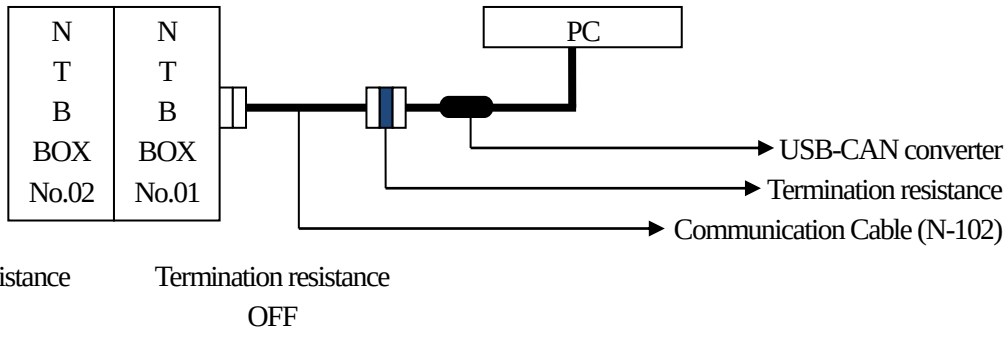


SW4 ("TERM."): For setting the termination resistance.
ON: Termination resistance ON
OFF: Termination resistance OFF
SW3 ("OPT. 3"): For setting the power saving function.
SW2 ("OPT. 2"): For setting the measuring function of the KYOWA's EDX series.
SW1 ("OPT. 1"): For extension. (OFF only)

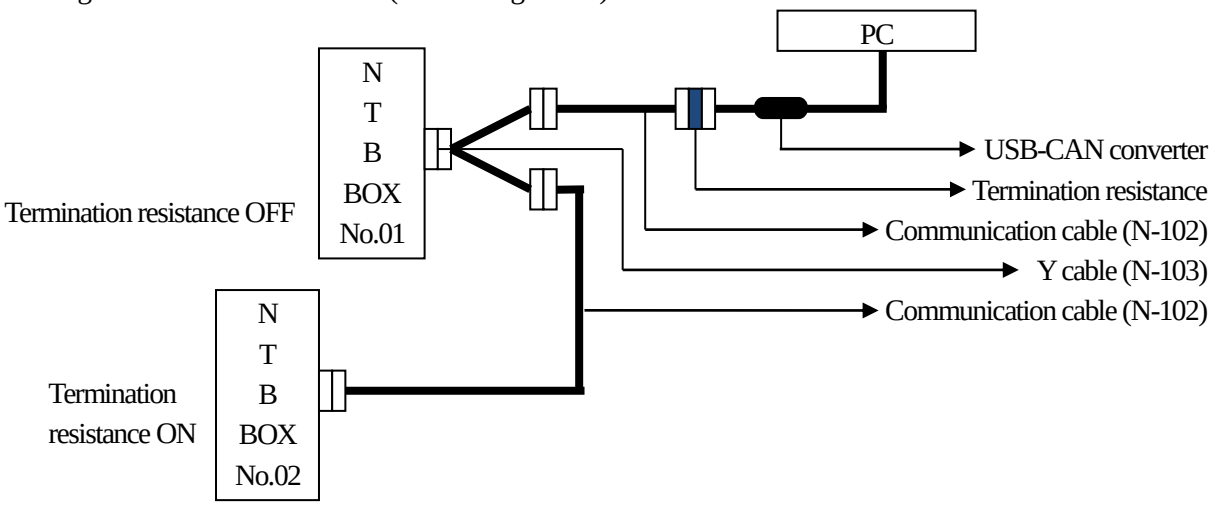
- For connecting one NTB-100A/B series (When using the PC)



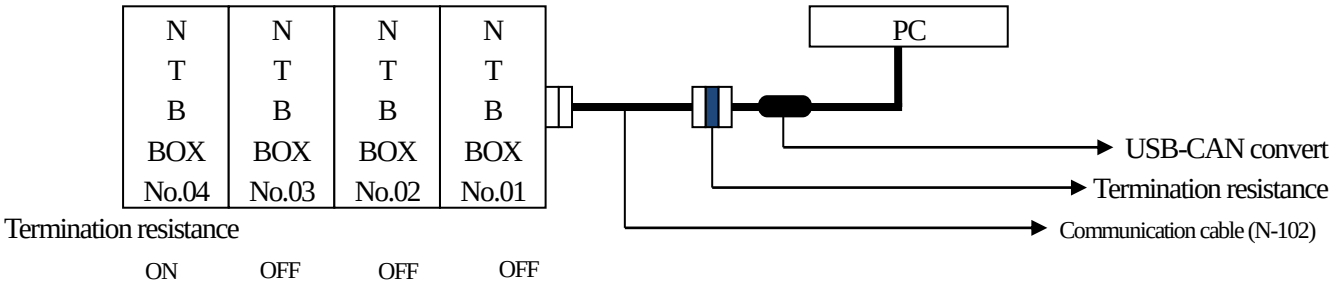
- For coupling 2 NTB-100A/B series units (When using the PC)



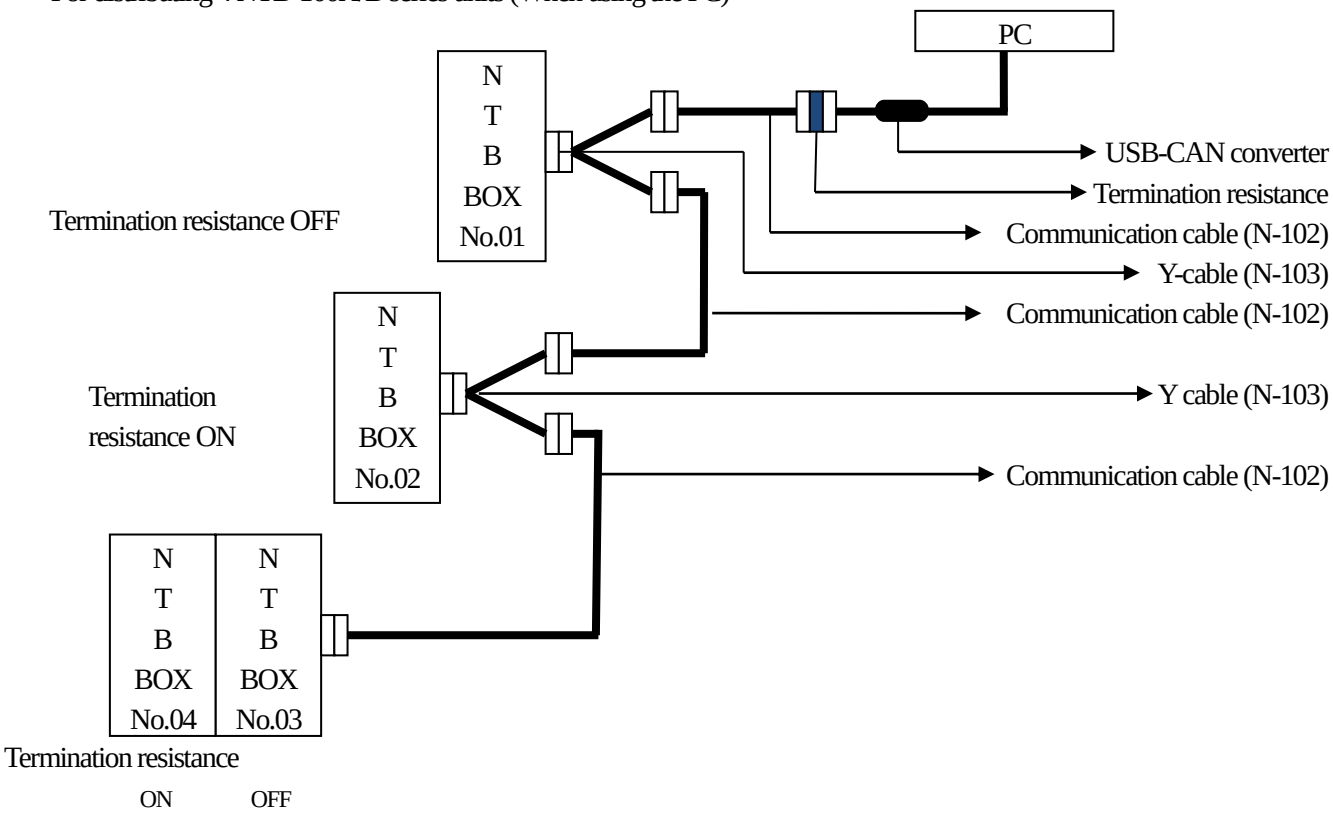
- For distributing 2 NTB-100A/B series units (When using the PC)



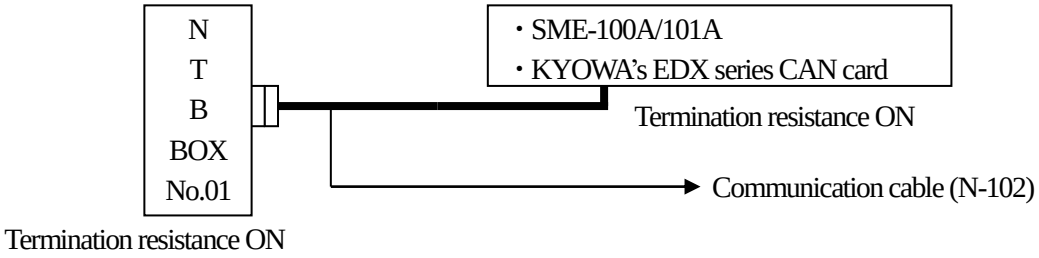
- For coupling 4 NTB-100A/B series units (When using the PC)



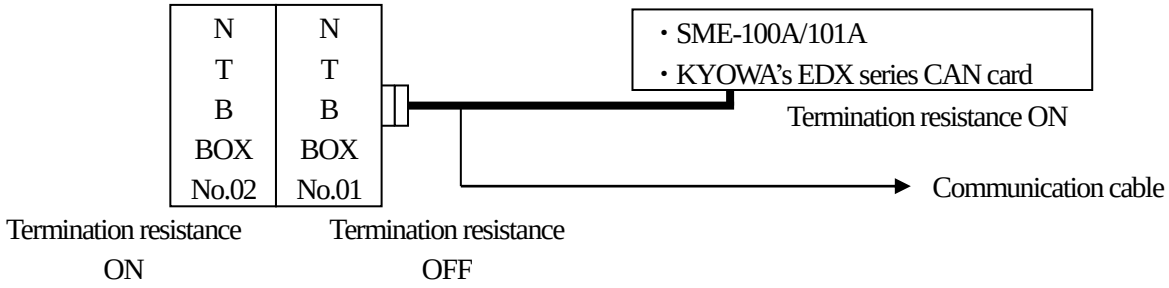
- For distributing 4 NTB-100A/B series units (When using the PC)



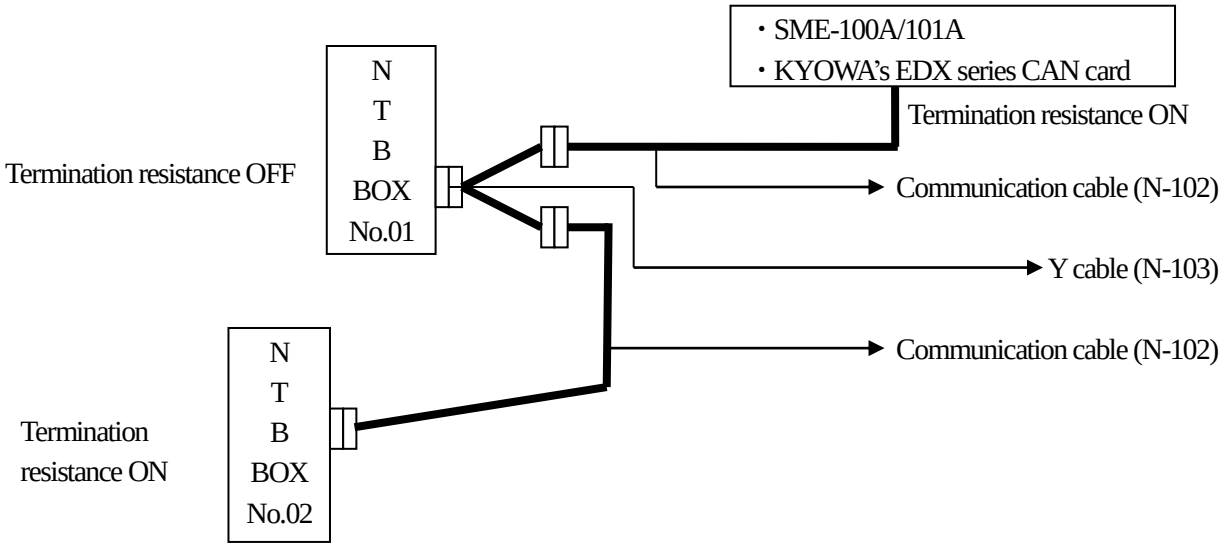
- For connecting one NTB-100A/B series (When using SME-100A/101A or KYOWA's EDX series CAN card)



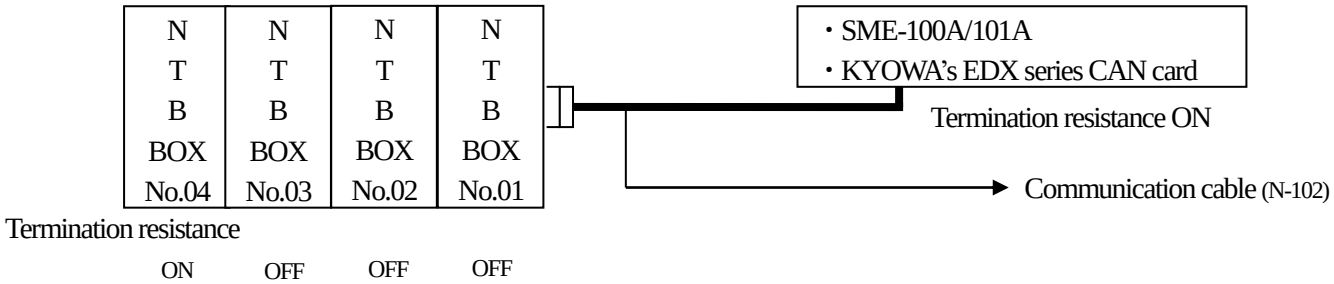
- For coupling 2 NTB-100A/B series units (When using SME-100A/101A or KYOWA's EDX series CAN card)



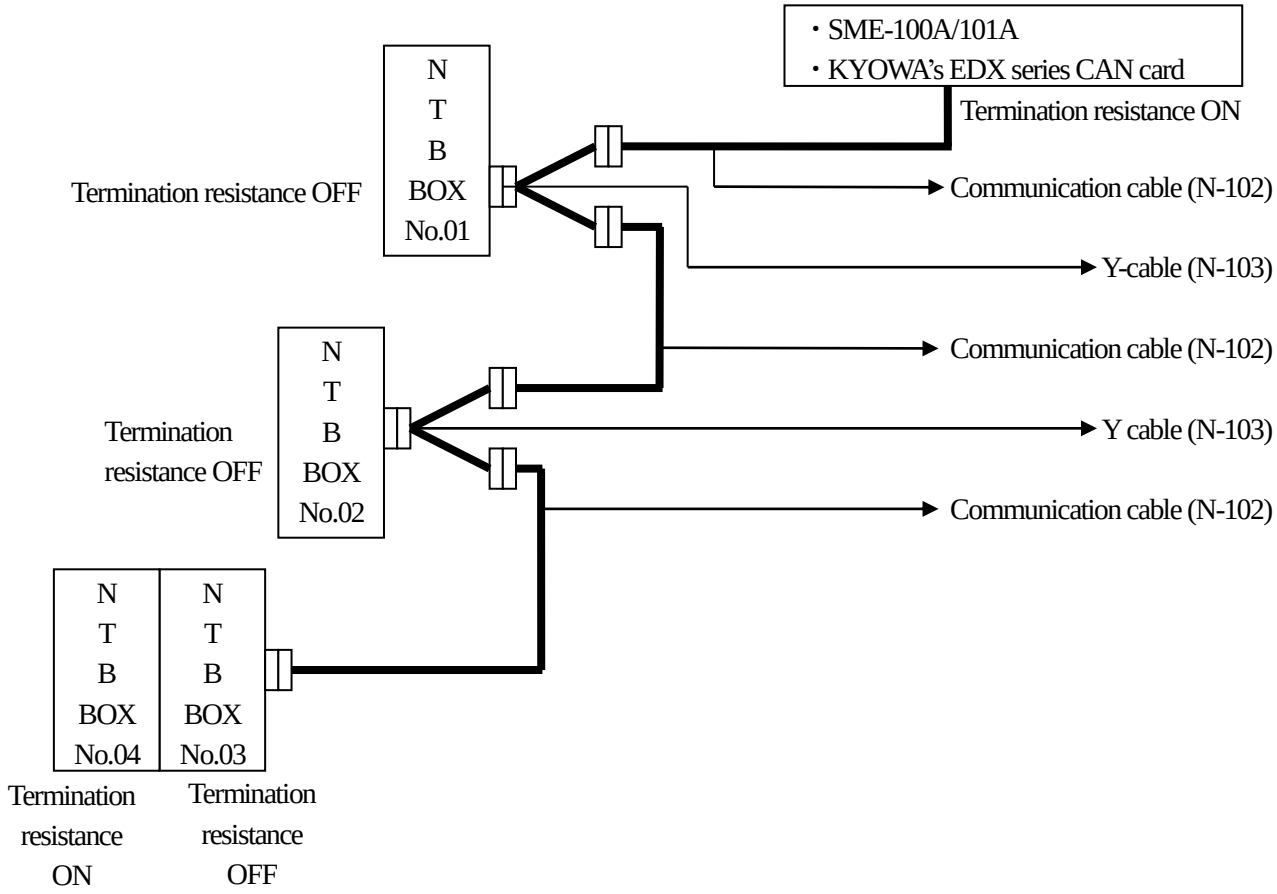
- For distributing 2 NTB-100A/B series units (When using SME-100A/101A or KYOWA's EDX series CAN card)



- For coupling 4 NTB-100A/B series units (When using SME-100A/101A or KYOWA's EDX series CAN card)

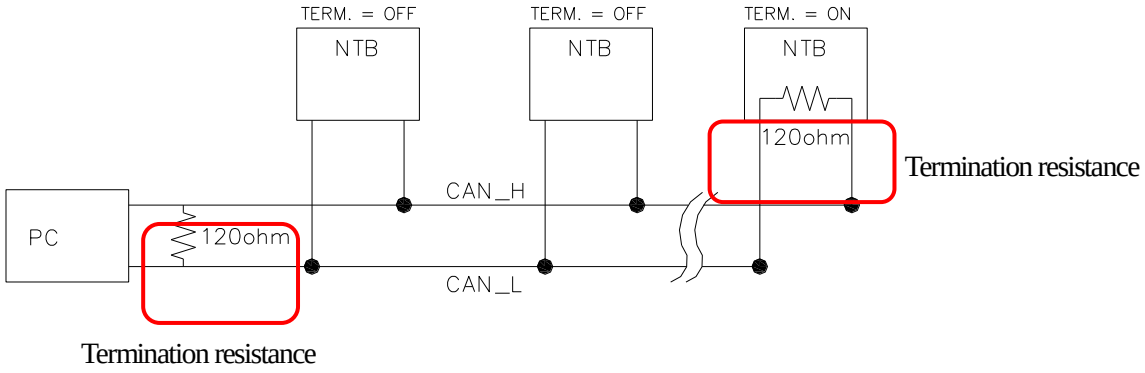


- For distributing 4 NTB-100A/B series units (When using SME-100A/101A or KYOWA's EDX series CAN card)



■ What is termination resistance?

It is required to terminate at both ends of the pair signal lines (CAN_H and CAN_L).
That is because the CAN bus allows two-way communication.
In a standard 9-pin D-sub connector, a CAN_L: pin2 and CAN_H: pin7.
The terminator on the cable should be match with the nominal impedance of the cable.
Since the ISO 11898 requires a cable with nominal impedance 120 ohm, the resistor of the 120 ohm should be used for the terminal.
When installing multiple devices on the cable, the devices on the both end of the cable require terminator.
Example of the termination method is described in the following.



3-4 CONNECT SENSOR AND SET CH MODE

3-4-1 Connect Sensor

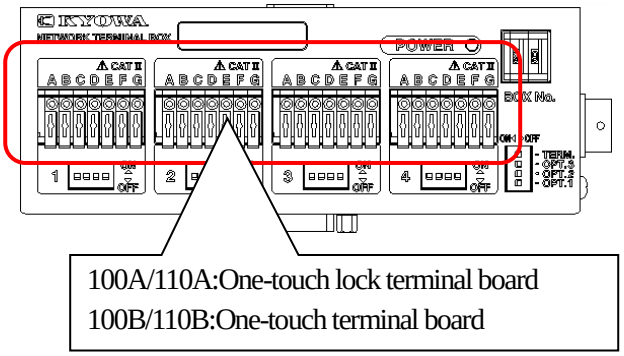
Before connecting the sensor, disconnect the power.

For connecting the lead wire with no connector at the tip of the lead wire such as strain gage, etc., peel off the tip of the lead wire about 9 to 10 mm in advance for connection.

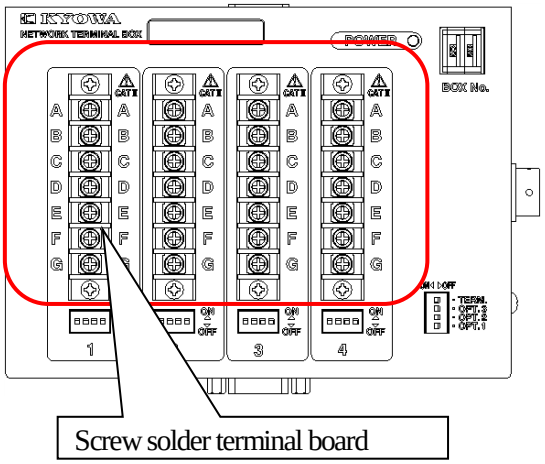
For connecting the lead wire with a NDIS connector at the tip such as the strain gage transducer, use the connection cable (receptacle with lead wire, option: N-97, N-70, U-25, U-26) for connection.

■ Types and features of the terminal board for input

"NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350"



"NTB-101A-120,NTB-101A-350,NTB-111A-350"



- One-touch lock terminal board: Push the lock button with the accessory small screwdriver or object with a fine head and connect the sensor.
  After that, set back the lock button with your finger.
  TEDS-compatible.
  For the connection method, see "3-4-3" and "3-4-4."
- One-touch terminal board: Push the button with the accessory small screwdriver or object with a fine head and connect the sensor.
  TEDS-compatible.
  For the connection method, see "3-4-3" and "3-4-4."

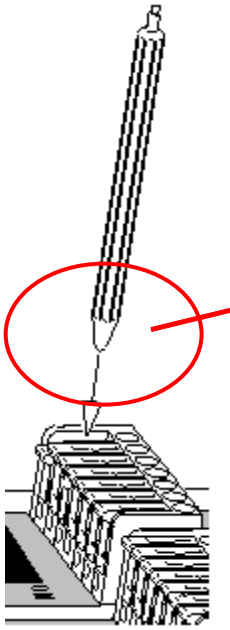
MEMO

- Range of electric wire that can be used
  Solid wire φ0.4mm to φ1.2mm (UL AWG16 to 26)
  Stranded wire 0.2mm^2 to 0.75mm^2 (UL AWG20 to 24)

- Screw solder terminal board: Loose a screw with a phillips-head screwdriver and connect the sensor.
  Then, fasten the screw.
  For soldering, remove the screw once, inset the accessory soldering terminal, fasten the screw, and solder the sensor to the terminal for soldering.
  TEDS-compatible.
  For the connection method, see "3-4-3" and "3-4-4."

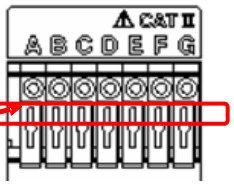
■ Connection method for the one-touch lock terminal(NTB-100A-120,NTB-100A-350,NTB-110A-350)

1) Push the lock button until it is locked with the accessory small screwdriver.



NOTE

- Press the following position.



Be sure to press the above position with the accessory small screwdriver.

- For connection, always use the accessory small screwdriver or an object with a fine head.
- If the lock button does not work, insert the lead wire all the way to its end with pressing the lever.

NOTE

- The range of the electric wire that can be used is as follows.

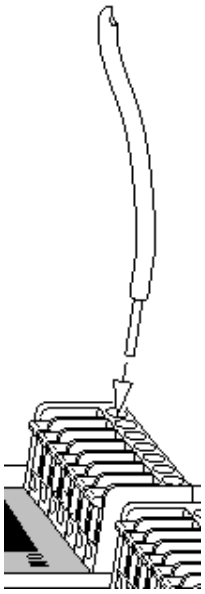
  Solid wire φ0.4mm to φ1.2mm（UL AWG16 to 26）
  Stranded wire 0.2mm^2 to 0.75mm^2（UL AWG20 to 24）

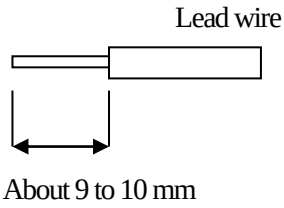
  Please connect it after it bends doubly or treble and it is twisted when the diameter of wire is thin.

NOTE

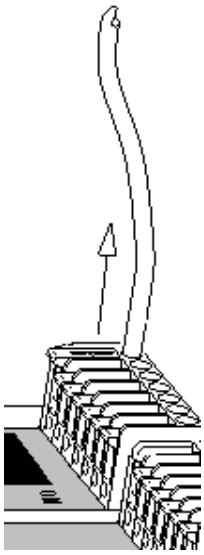
- For connecting a strain gage, do not connect gage leads (lead wires directly connected from the strain gage) directly.
  Use a gage terminal and convert the gage leads to the applicable lead wires or use a strain gage with pre-attached lead cables.
  Or, gage leads may be broken since they are too thin.

2) Insert the lead wire with its coating peeled off about 10 mm all the way to its end into the round hole of the input terminal.





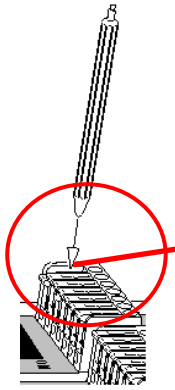
3) While holding the lead wire, set back the lever to the original position with your finger.



4) Gently pull the lead wire to check if it is securely inserted.

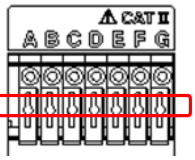
■ Connection method for the one-touch terminal(NTB-100B-120,NTB-100B-350,NTB-110B-350)

1) Push the button with the accessory small screwdriver to open the round hole.



NOTE

● Press the following position.



Do not press the edge of the button. Otherwise, it may cause troubles.

Be sure to press the above position with the accessory small screwdriver.

● For connection, always use the accessory small screwdriver or an object with a fine head.

MEMO

The available wires are as follows

Solid wire: φ0.4 mm to φ1.2 mm (UL AWG26 to 26)

Stranded wire: 0.2 mm^2 to 0.75 mm^2 (ULAWG20 to 24)

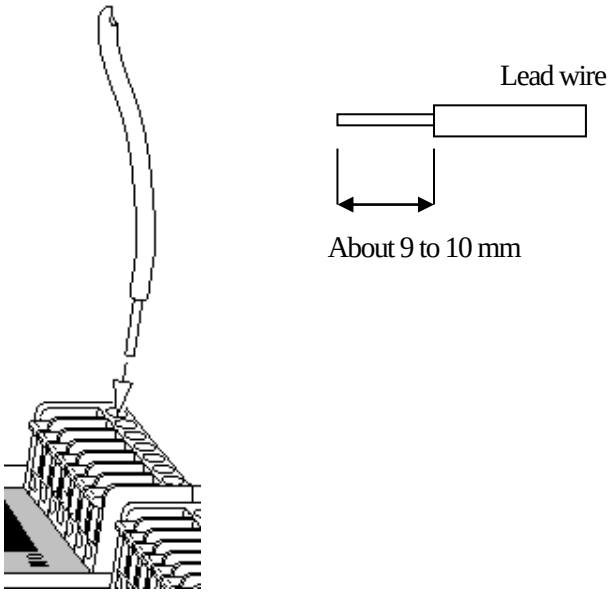
Be sure to use the above lead wires. Or, a breaking or connection error will happen.

NOTE

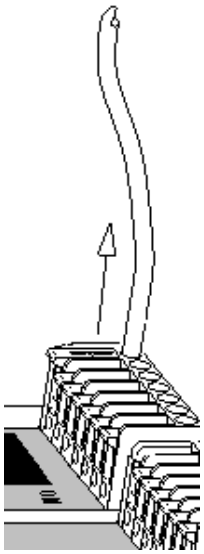
The one-touch terminal is a consumable item.

The one-touch terminal has leaf springs. Through repeated connections/disconnections, the leaf spring will gradually wear out and retaining force may decrease. The one-touch terminal is considered to be a consumable item. It is not covered under the terms of the warranty.

2) Insert the lead wire with its coating peeled off approx. 10 mm all the way to its end into the round hole of the input terminal.



3) Release the small screwdriver.
The round hole closes to fasten the lead wires.
Be sure to insert the lead wire all the way to its end. Otherwise, it will not fix firmly.



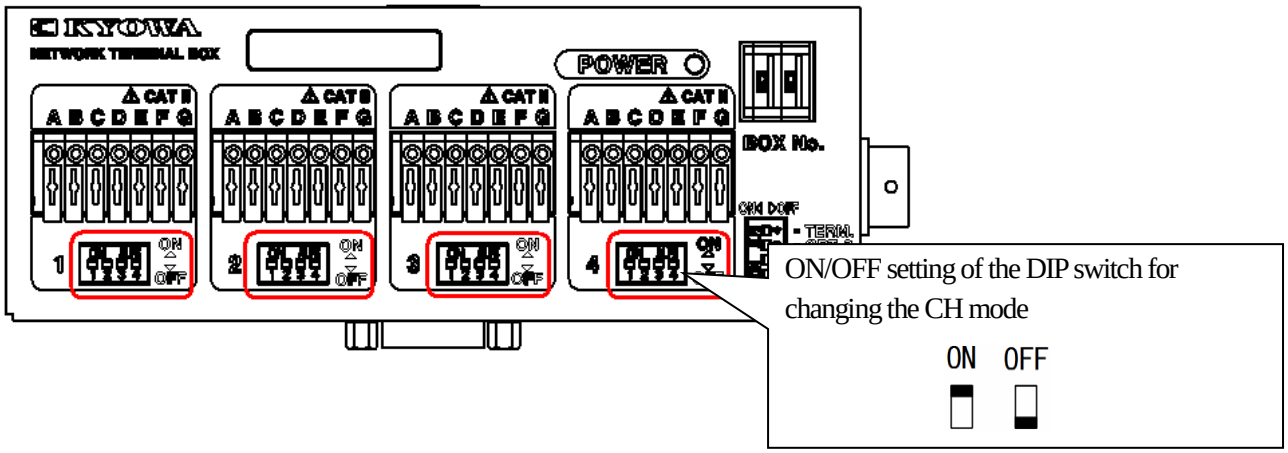
4) Gently pull the lead wire to check if it is securely inserted.
If the lead wire comes out, try again from the item 1).

3-4-2 Set CH mode

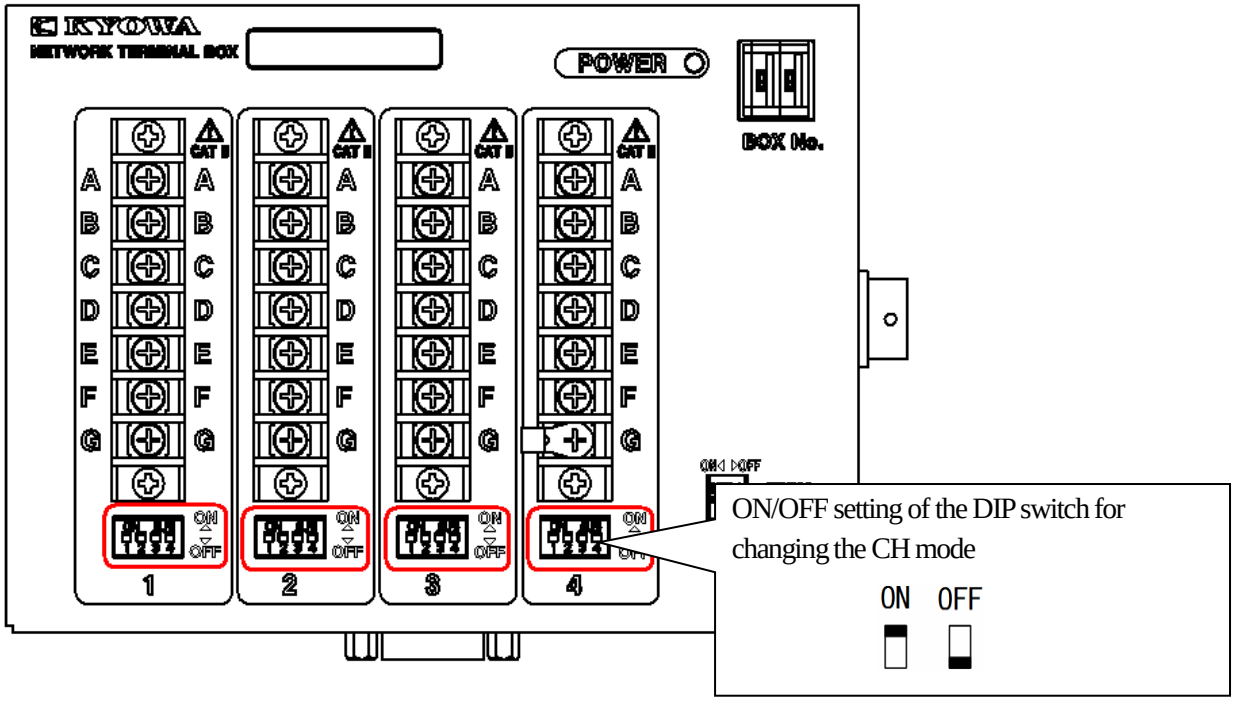
Before setting the CH mode, disconnect the power.

This section describes a relation between a target CH mode and DIP switch for changing the CH mode.
Set the CH mode to every CH.
For the settings other than described, the CH modes become SKIP and the measurements are not conducted.
(For the CH mode, see "3-4-3" and "3-4-4.")

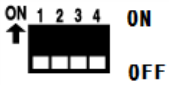
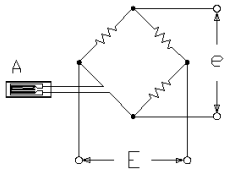
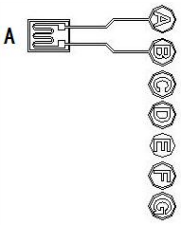
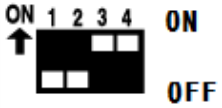
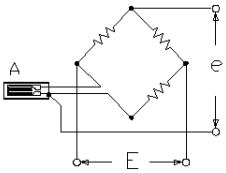
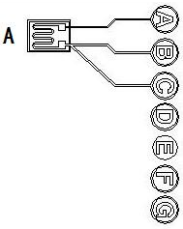
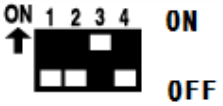
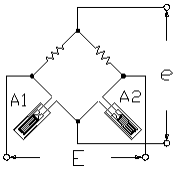
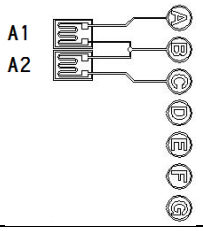
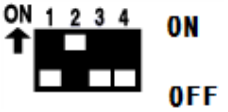
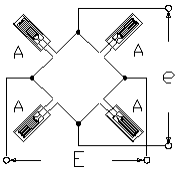
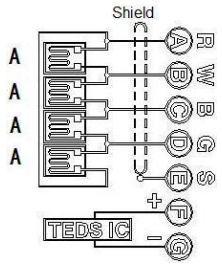
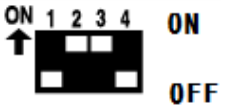
"NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350"



"NTB-101A-120,NTB-101A-350,NTB-111A-350"



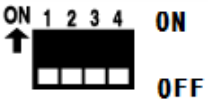
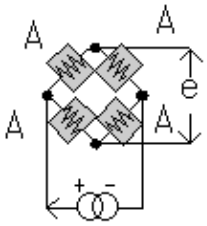
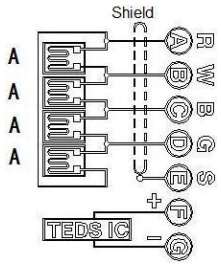
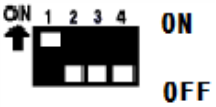
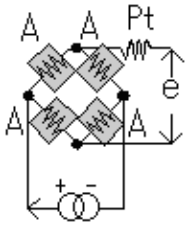
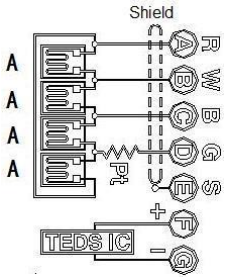
3-4-3 CH modes and connection methods of NTB-100A/B,NTB-101A

Measuring Method	Bridge Circuit : Strain gage : Built-in fixed resistor A: Active gage E: Bridge exciter e: Bridge output	Connection Method A: Active gage	Setting of the DIP switch	CH mode
No measurement. Measuring data is +999999.				SKIP
Quarter bridge method (2-wire system connection) Gage resistance NTB-100A/B-120: 120 ohm NTB-101A-120: 120 ohm NTB-100A/B-350: 350 ohm NTB-101A-350: 350 ohm				1G120 ohm (2W) 1G350 ohm (2W)
Quarter bridge method (3-wire system connection) Gage resistance NTB-100A/B-120: 120 ohm NTB-101A-120: 120 ohm NTB-100A/B-350: 350 ohm NTB-101A-350: 350 ohm				1G120 ohm (3W) 1G350 ohm (3W)
Half bridge method (Active-active method) Gage resistance 120 ohm to 1000 ohm				2G
Full bridge method (Strain gage transducer) Gage resistance 120 ohm to 1000 ohm				4G

MEMO

- For the quarter bridge method, it is recommended to adopt a "3-wire system" connection method that has less error factors such as temperature influence due to gage lead wire, dislocation of the initial value, etc.
- For the wiring, use the KYOWA shielded low-noise lead wire (L-13, L-14, L-15, L-16) and 4-conductor shielded wire.
  In addition, keep the NTB-100A/B series off from the power line or noisy wiring.
- For the instability of the measurement value, connect (ground) the GND of the NTB-100A/B series to the earth.

3-4-4 CH modes and connection methods of NTB-110A/B/NTB-111A

Measuring Method	Bridge Circuit : Strain gage A: Active gage E: Bridge exciter e: Bridge output	Connection Method A: Active gage	Setting of the DIP switch	CH mode
No measurement. Measuring data is +999999.				SKIP
Full bridge method (Constant current excitation) (Strain gage transducer) Bridge resistance 350 ohm				4G/I
Full bridge method (Constant current excitation) Civil-engineering transducer with temperature measuring function Bridge resistance 350 ohm				4G/T

MEMO

- For the wiring, use the KYOWA shielded low-noise lead wire (L-13, L-14, L-15, L-16) or 4-conductor shielded wire.
  In addition, keep the NTB-100A/B series off from the power line or noisy wiring.
- For the instability of the measurement value, connect (ground) the GND of the NTB-100A/B series to the earth.

3-5 GROUNDING

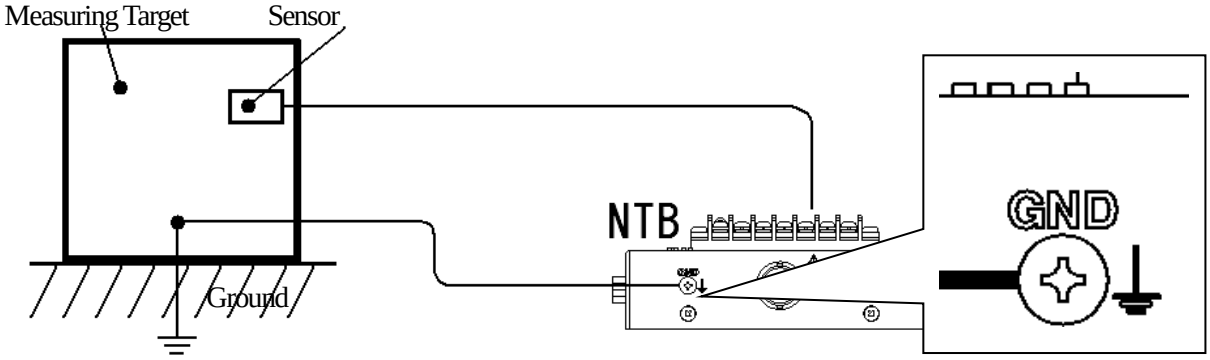
Before grounding, disconnect the power.

Ground the "GND" terminal (protective grounding terminal) on the side panel (power connector side).

1) Example 1: When measuring target is grounded

Check that the measuring target (specimen) is surely grounded and connect as follows.

(1) Connect the measuring target (specimen) and "GND" terminal (ground) of the NTB-100A/B series with the accessory ground wire.

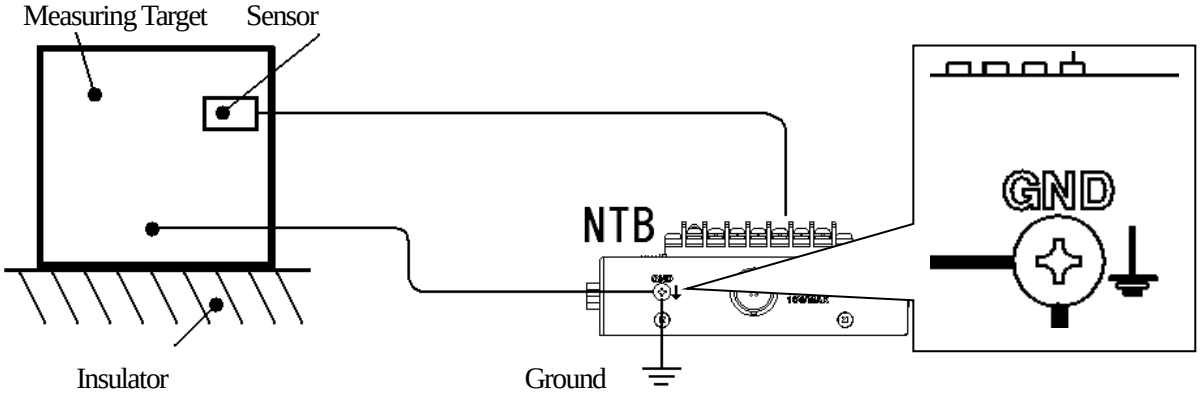


2) Example 2: When measuring target is insulated from ground

Check that the measuring target (specimen) is surely insulated and connect as follows.

(1) Connect the "GND" terminal of the NTB-100A/B series and earth (ground) with the accessory ground wire.

(2) Connect the measuring target (specimen) and "GND" terminal (ground) of the NTB-100A/B series with the accessory ground wire.



MEMO

- Ground the "GND" terminal to prevent the NTB-100A/B series from being affected by noise as well as receiving electric shock due to leaks in the electric current. Be sure to ground the GND terminal.
- Use the accessory ground wire for wire rod.
- When a length or the number of the ground wire is short, use green heat-resistance vinyl coated wire having a nominal diameter of 0.75 mm^2 or more.
- Basis of the grounding is one-point grounding. If the grounding is made at more than 2 points, it should be noted that a loop may be formed resulting to cause the NTB-100A/B series easily affected by noise.
- Grounding should be independently made from the power system 300 V or more.

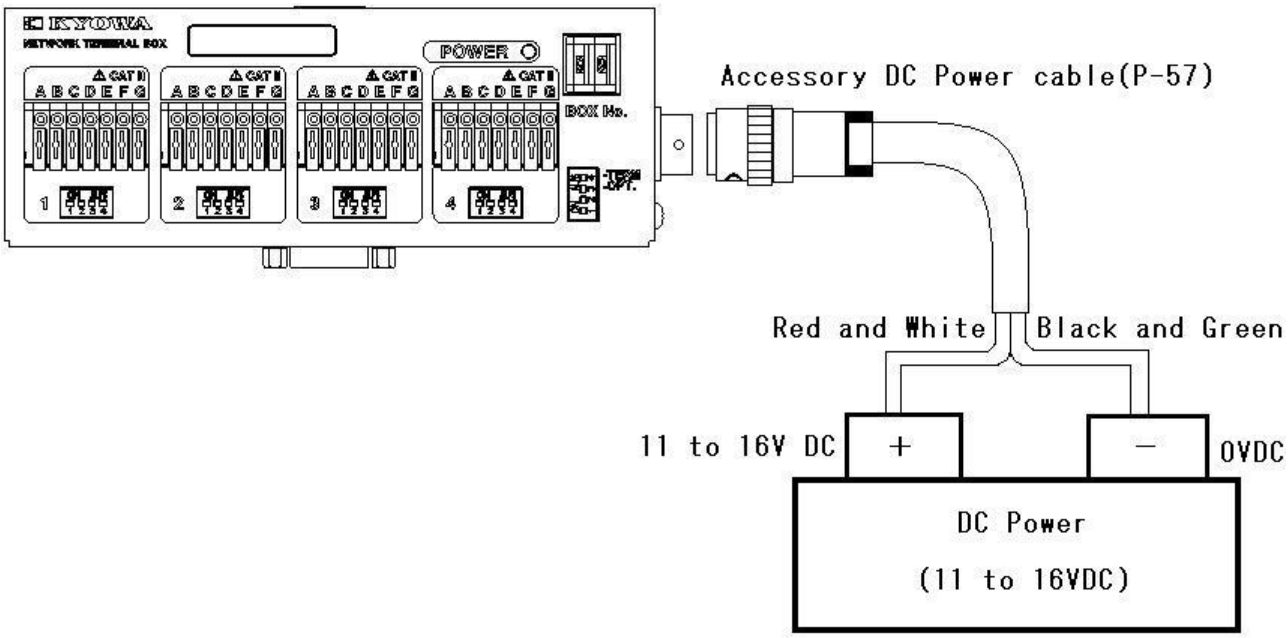
3-6 CONNECT POWER

1) Connect DC power

Before connecting the DC power cable, check the power voltage.
The operating power voltage of the NTB-100A/B series is from 11 to 16 VDC. Be sure to keep this operating power voltage.
Use the DC power 10 W or more. (Capable of coupling the 8 NTB-100A/B series units with 10 W.)
Supply power with the accessory DC power cable (P-57).

Connect a connector side of the power cable to the NTB-100A/B series.
Connect black and green wires at the end of the power cable to the – side of the DC power.
Connect red and white wires at the end of the power cable to the + side of the DC power.

Connection diagram of the DC power is described in the following.



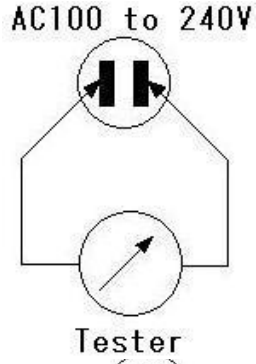
NOTE

When the power voltage exceeds the above operating voltage range or when the + and – sides are connected adversely, it may cause trouble and accident.

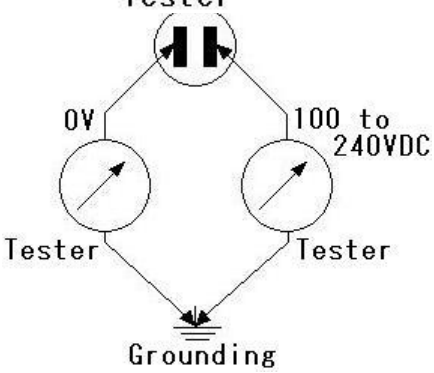
2) Connect AC adapter

Connect the optional AC adapter (SA-10A-EDS) to the power connector on the side panel to supply power.
Before connecting the power cable of the AC adapter to the AC outlet, check the power voltage.
The operating power voltage of the AC adapter is from 100 to 240 VAC. Be sure to keep this operating power voltage.
If the power voltage exceeds the above specified voltage range or if the power voltage terminal has potential with excessive power voltage against the ground, no connection is made and it may cause trouble or damage to the NTB-100A/B series.
Method of confirming the power voltage is described in the following.

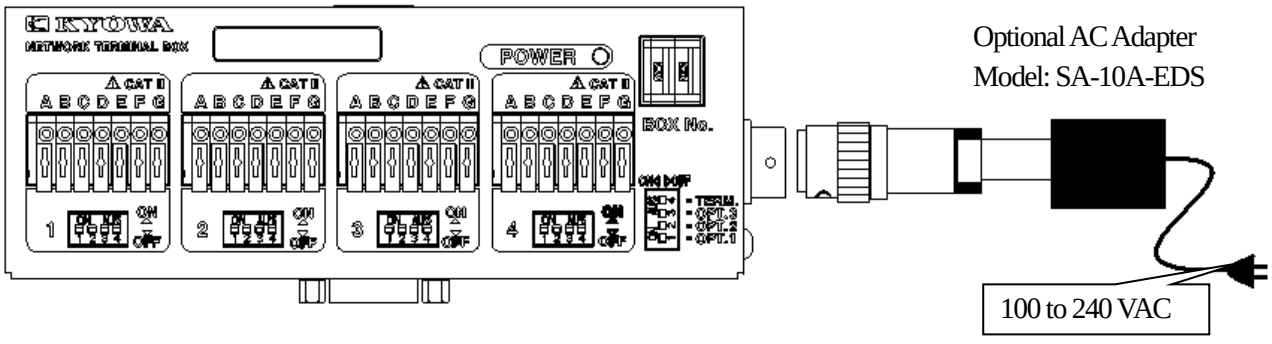
(1) Measure voltage between AC receptacle terminals with a tester and confirm it is between 100 to 240 VAC.



(2) Measure the voltage between the ground and each end of the AC power receptacle with a tester. Confirm one end has 0 V and the other, 100 to 240 VAC.



(3) If the NTB-100A/B series is used at site using apparatuses generating interfering noise, for example, induction motor, electric welding machine, etc., power supply condition may be deteriorated due to excessive noise. Take appropriate measures against the noise by using an insulation transformer or commercially available noise-cut transformer.



(4) If the power voltage excessively varies, it is recommended to use a stabilized power supply unit.

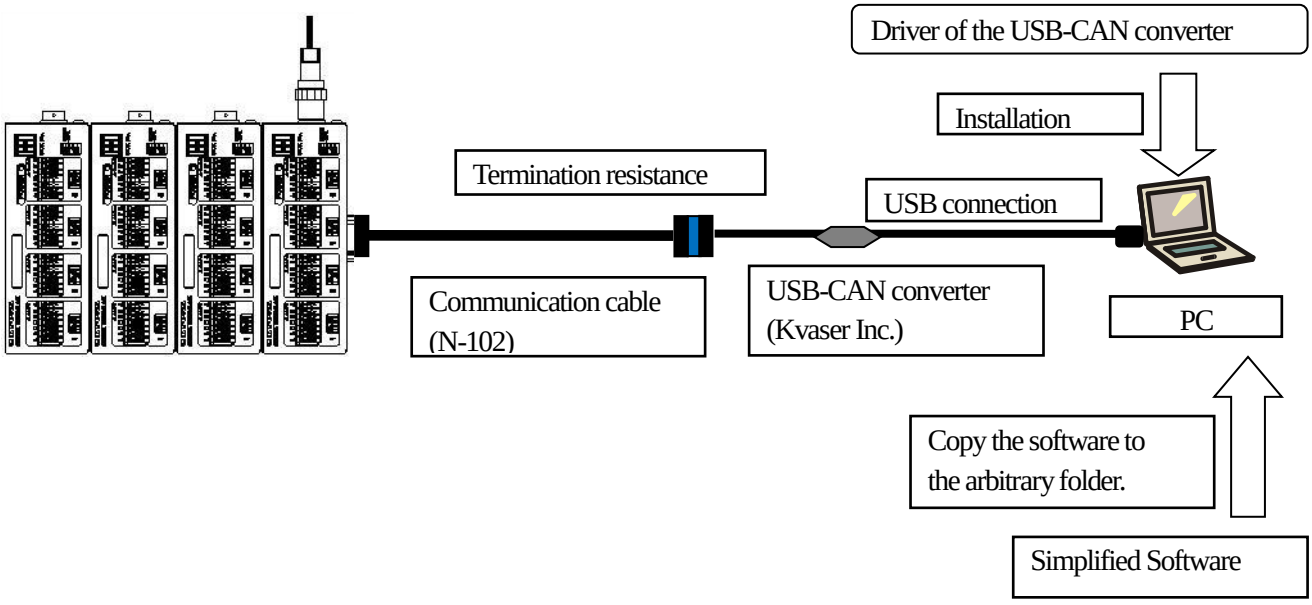
4. FOR MEASURING WITH SIMPLIFIED SOFTWARE

The Simplified Software is the software to control the NTB-100A/B series from the PC and numerically display the measured data on the EXCEL sheet.
For activating this Simplified Software, it is required to install a driver of the USB-CAN converter.
Capable of creating your original software by referring this Simplified Software.

4-1 SYSTEM CONFIGURATION AND SPECIFICATIONS OF SOFTWARE WHEN USING SIMPLIFIED SOFTWARE

■ System Configuration

CPU	Pentium 4 2 GHz or more
OS	Microsoft Windows XP (32-bit version) Japanese and English versions Microsoft Windows Vista (32-bit version) Japanese and English versions
Microsoft Office Excel	XP, 2003, 2007
Memory	1 G byte or more For the Microsoft Windows Vista: 2 G byte or more
Hard disk	Residual capacity: 10 Mbyte or more (not including the recording data file size)
Display	Resolution: 1024 × 768 dots or more Colors: Full color or more
Y cable	N-103 (For distributed arrangement)
Communication cable	N-102 (1 m) Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.
Termination resistance	CANterm120 (Vector Japan Co., Ltd.)
USB-CAN converter	Leaf Light HS (Kvaser Inc.)



■ Specifications of the Software

- The number of connecting units: 1 to 8 (the number of MAX. channels: 32)
- Measuring function: Measure initial unbalance value (zero value) of the strain with no compensation.
- Measuring times: MAX. 65000 times.

■ CAN communication condition

- CAN communication standard: High speed CAN
- Communication speed: 50 kbps

4-2 INSTALLING AND UNINSTALLING USB-CAN CONVERTER DRIVER

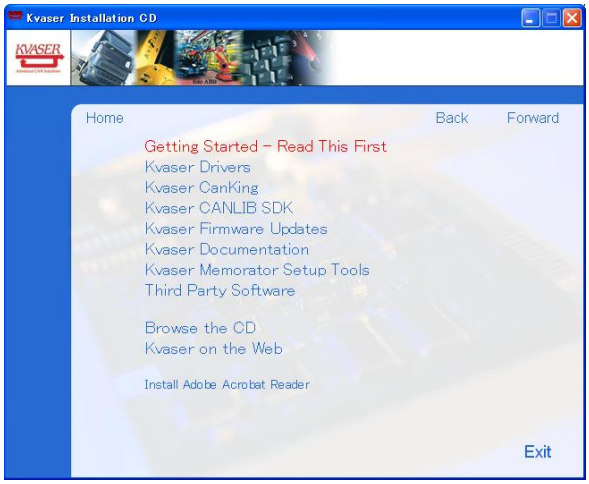
4-2-1 Installing USB-CAN Converter Driver

NOTE

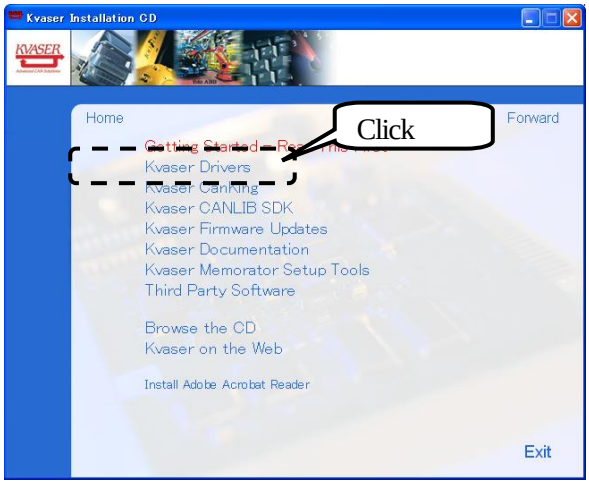
Do not connect the USB-CAN converter to the PC yet.

* Be sure to install the driver of the USB-CAN converter.

1) Set the accessory CD-ROM of the USB-CAN converter (Leaf Light HS of the Kverser Inc.) to the CD drive.
2) The following setup window appears.
   If the setup window does not appear execute **autorun. exe** in the CD-ROM.



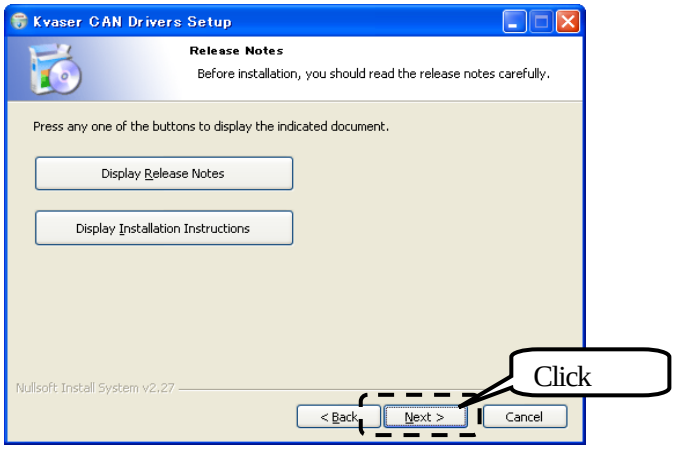
3) Click **Kveaser Drivers**.



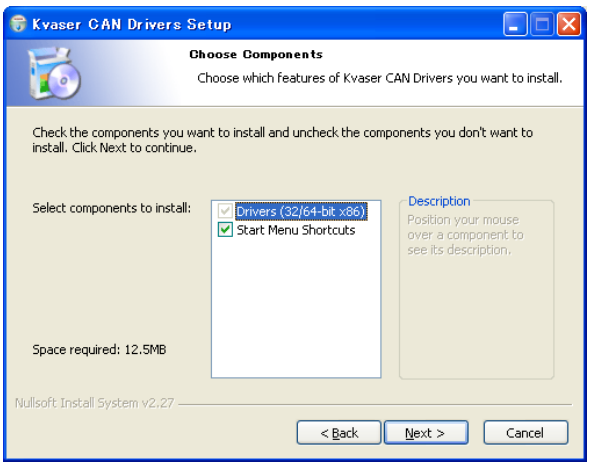
4) Click **Windows Vista, Server, XP, 2000**.

5) Click **NEXT>** button.

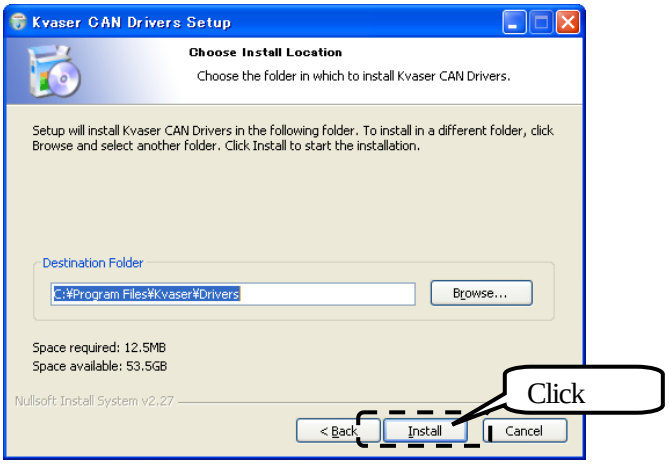
6) Click the **NEXT>** button.



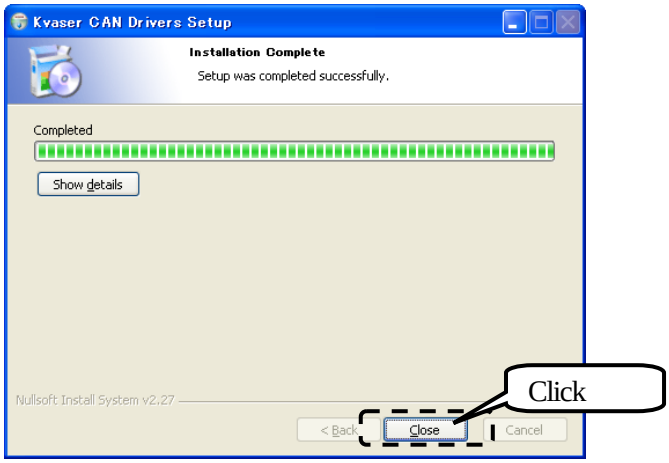
7) Click the **NEXT>** button.



8) Click **Install** button.



9) Click **Close** button for completing the driver installation.



4-2-2 Connect USB-CAN Converter to the PC

Connect the USB-CAN converter to the USB port to automatically start the installation.
*For the Windows XP, follow the following procedures.
For the Windows Vista, the installation is automatically completed. Go "4-2-3."

- For the Windows XP

When the **Found New hardware Wizard** window appears, select as follows.

1) No, not this time. (For the Windows XP SP2 only)
2) Click **Install the software automatically (Recommended)**.
3) Click the **NEXT>** button.
4) Click **Finish** button.

4-2-3 Checking After Connection

This section describes how to check that the USB-CAN converter is correctly recognized.

1) Open the device manager.

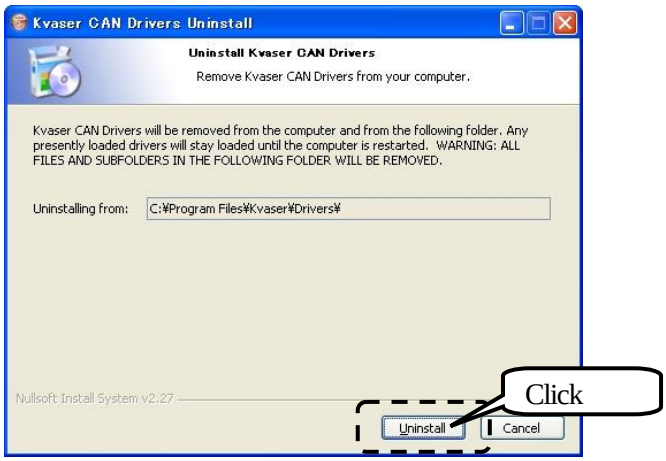
- For the Windows Vista: Click **Start** and right click **Computer** to display **Property**.
  Click the **Property**.
  Click the **Device Manager**.
  When the **User Account Control** window appears, click **Continue** button.

- For the Windows XP: Click **Start** and right click **My Computer**.
  Click **Hardware** tab.
  Click the **Device Manager**.

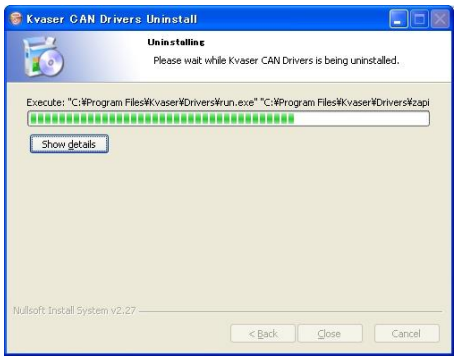
2) After checking, close the **Device Manager** window.

4-2-4 Uninstalling the USB-CAN Converter Driver

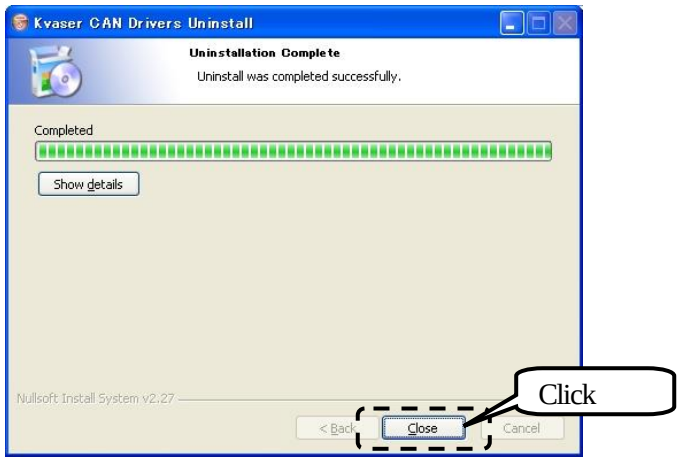
1) Click the **Start** button and **Control Panel**.
2) Click **Add or Remove programs**.
   Add or Remove programs window appears. Click **Kvaser CANDrivers** and **Delete** button.
3) Click **Uninstall** button.



4) Uninstalling window.



5) After completing the uninstallation, **Close** button becomes valid. Click the **Close** button to finish the uninstallation.



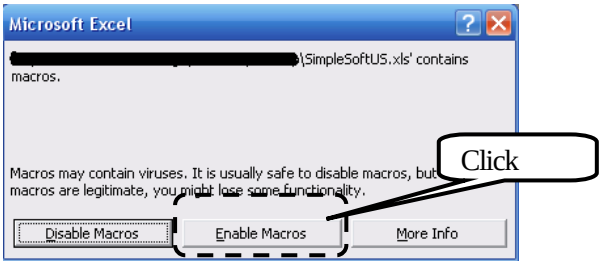
4-3 STARTING UP SIMPLIFIED SOFTWARE

Click "NTB-100A/B" – "AttachedSoftware" – US" in the accessory CD-R and copy SimpleSoftUS. xls to the arbitrary folder in your PC.

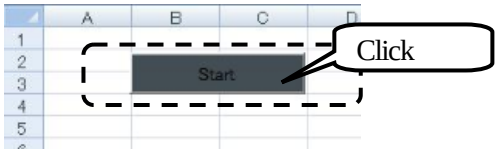
1) Start up the "SimplSoftUS. xls".

-----For the EXCEL 2003-----

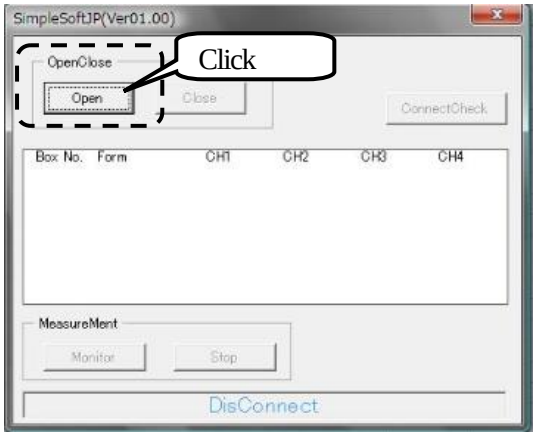
When the **Security Warning** dialog box is displayed, click **Enable Macros** button.



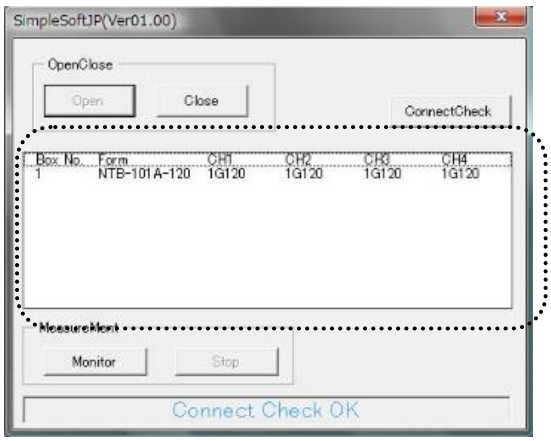
2) Click the **Start** button on the Menu sheet.



3) Click the **Open** button.



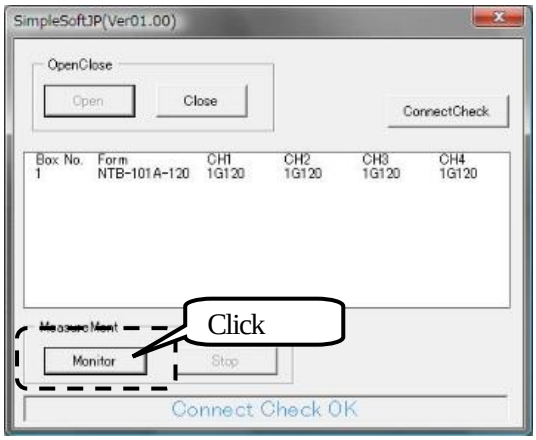
4) Information of the connecting NTB-100A/B series appears.

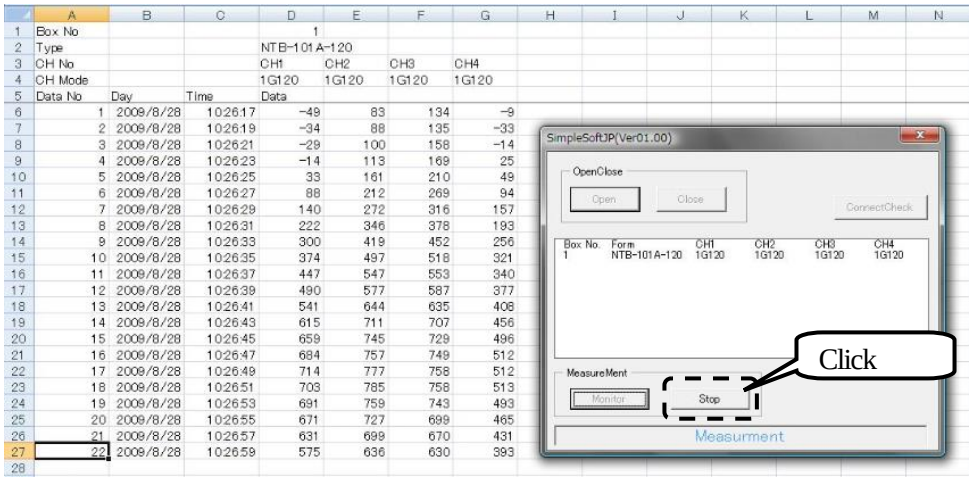


Information of the connecting NTB-100A/B series appears here.

●Box No., model, and CH mode appear for the number of connecting units.

5) Click **Monitor** button to start the measurement.



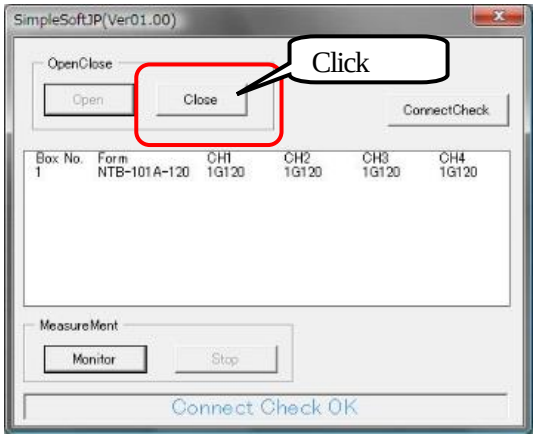


	A	B	C	D	E	F	G
1	Box No			1			
2	Type			NTB-101A-120			
3	CH No			CH1	CH2	CH3	CH4
4	CH Mode			1G120	1G120	1G120	1G120
5	Data No	Day	Time	Data			
6	1	2009/8/28	10:26:17	-49	83	134	-9
7	2	2009/8/28	10:26:19	-34	88	135	-33
8	3	2009/8/28	10:26:21	-29	100	158	-14
9	4	2009/8/28	10:26:23	-14	113	169	25
10	5	2009/8/28	10:26:25	33	161	210	49
11	6	2009/8/28	10:26:27	88	212	269	94
12	7	2009/8/28	10:26:29	140	272	316	157
13	8	2009/8/28	10:26:31	222	346	378	193
14	9	2009/8/28	10:26:33	300	419	452	256
15	10	2009/8/28	10:26:35	374	497	518	321
16	11	2009/8/28	10:26:37	447	547	553	340
17	12	2009/8/28	10:26:39	490	577	587	377
18	13	2009/8/28	10:26:41	541	644	635	408
19	14	2009/8/28	10:26:43	615	711	707	456
20	15	2009/8/28	10:26:45	659	745	729	496
21	16	2009/8/28	10:26:47	684	757	749	512
22	17	2009/8/28	10:26:49	714	777	758	512
23	18	2009/8/28	10:26:51	703	785	758	513
24	19	2009/8/28	10:26:53	691	759	743	493
25	20	2009/8/28	10:26:55	671	727	699	465
26	21	2009/8/28	10:26:57	631	699	670	431
27	22	2009/8/28	10:26:59	575	636	630	393
28							

The measured data is pasted to cells.

6) Click the **Stop** button to stop the measurement.

7) Be sure to click the **Close** button for finishing this Simplified Software.



8) For requiring the measured data, save the file and close the EXCEL.

4-4 COMMANDS USED IN SIMPLIFIED SOFTWARE

4-4-1 Communication Protocol

This section describes communication protocol.

For controlling the NTB-100A/B series, send and receive the data of MAX. 8 bytes (variable 0 to 8).
Attached IDs are used for identifying the commands.

Hereinafter, the communication data is described as follows in this Instruction Manual.Example)

ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x111	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08

For the communication data more than 1 byte, the data is described as byte 0 to 1 and byte 4 to 7.Example)

ID	Byte0 to 1	Byte2	Byte3	Byte4 to 7
0x123	0x0123	0x02	0x03	0x0456789A

In addition, the data assignment is little endian in this protocol.
Therefore, the actual data of the above example is as follows.Example)

ID	Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x123	0x23	0x01	0x02	0x03	0x9A	0x78	0x56	0x04

- Box No.

The Box No. is used for identifying the NTB-100A/B series.
Set the Box No. so as not to overlap.
Arbitrary set the Box No. from 01 to 99. (00 cannot be set.)

4-4-2 Description of Command

(1) NTB information reading command

<Description>

For reading the information (model No.) of the connecting NTB-100A/B series.

♦ Request (PC → NTB-100A/B series: The number of bytes = 2 bytes)

ID	Command No. (byte0)	BOX No. (byte1)
0x000	0x81	Sending BOX No.

● Capable of sending a command to all connecting NTB-100A/B series by specifying 0x00 to the BOX No. of the byte1.

♦ Response (NTB-100A/B series → PC: The number of bytes = 2 bytes)

ID	Byte0	Byte1 to 6	Byte7
0x700 + BOX No.	0x00	0x000000000000 fixed	Model No.

*The model No. and model names are as follows.

Model No. (byte7)	Model Name
0x01	NTB-100A/B-120
0x02	NTB-101A-120
0x03	Not using
0x04	Not using
0x05	NTB-100A/B-350
0x06	NTB-101A-350
0x07	NTB-110A/B-350
0x08	NTB-111A-350

(2) Measurement start command

<Description>

For sending the measured data from the connecting NTB-100A/B series.

For the CH mode with no temperature measuring data, the data is sent as 999999 (0x497423f0).

When the CH mode is set to Skip, both the strain data and temperature measuring data are sent as 999999(0x497423f0).

♦ Request (PC → NTB-100A/B series: The number of bytes = 2 bytes)

ID	Command No. (byte0)	BOX No. (byte1)
0x000	0x01	Sending BOX No.

● Specify 0x00 to the BOX No. of the byte1 to start the measurement of the all connecting NTB-100A/B series.

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0 to 3	Byte4 to 7
0x0180 + BOX No.	Strain data of the CH1	Temperature measuring data of the CH1

ID	Byte0 to 3	Byte4 to 7
0x0280 + BOX No.	Strain data of the CH2	Temperature measuring data of the CH2

ID	Byte0 to 3	Byte4 to 7
0x0380 + BOX No.	Strain data of the CH3	Temperature measuring data of the CH3

ID	Byte0 to 3	Byte4 to 7
0x0480 + BOX No.	Strain data of the CH4	Temperature measuring data of the CH4

(3) Measurement stop command (The number of sending bytes: 2 bytes)

<Description>

For stopping the measurement of the connecting NTB-100A/B series.

♦ Request (PC → NTB-100A/B series)

ID	Command No. (byte0)	BOX No.(byte1)
0x000	0x02	Sending BOX No.

● Specifying 0x00 to the BOX No. in the byte1 to stop the measurement of the all connecting NTB-100A/B serise.

(4) CH mode reading command

<Description>

For reading a CH mode that is set to every CH of the NTB-100A/B series.

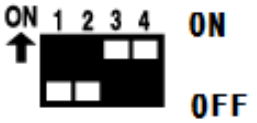
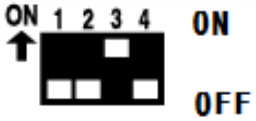
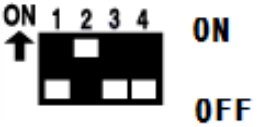
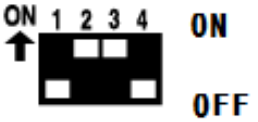
♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

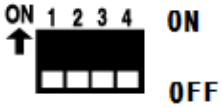
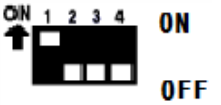
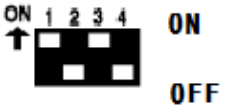
ID	Byte0	Byte1 to 2	Byte3	Byte4	Byte5	Byte6	Byte7
0x0600 + BOX No.	0x40	0x3100	0x01	0x00	0x00	0x00	0x00

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4	Byte5	Byte6	Byte7
0x0580 + BOX No.	0x43	0x3100	0x01	CH mode of the CH1	CH mode of the CH2	CH mode of the CH3	CH mode of the CH4

● CH mode data that is sent from the NTB-100A/B series

NTB-100A/B-120/NTB-100A/B-350/NTB-101A-120/NTB-101A-350			
CH mode name		Setting of the DIP switch	CH mode data that is sent from the NTB-100A/B series
SKIP (1) (2) (3) (4) OFF OFF OFF OFF 0 0 0 0			D7 D6 D5 D4 D3 D2 D1 D0 0 0 0 0 0 0 0 0 :0x00
1G120 ohm (2W)/1G350 ohm (2W) (1) (2) (3) (4) OFF OFF ON ON 0 0 1 1			D7 D6 D5 D4 D3 D2 D1 D0 1 0 0 0 0 0 0 0 :0x80
1G120 ohm (3W)/1G350 ohm (3W) (1) (2) (3) (4) OFF OFF ON OFF 0 0 1 0			D7 D6 D5 D4 D3 D2 D1 D0 1 0 0 0 0 0 0 0 :0x80
2G (Active-active method) (1) (2) (3) (4) OFF ON OFF OFF 0 1 0 0			D7 D6 D5 D4 D3 D2 D1 D0 0 1 0 0 0 0 0 0 :0x40
4G (Full bridge method) (1) (2) (3) (4) OFF ON ON OFF 0 1 1 0			D7 D6 D5 D4 D3 D2 D1 D0 1 1 0 0 0 0 0 0 :0xC0

NTB-110A/B-350/NTB-111A-350			
CH mode name		Setting of the DIP switch	CH mode data that is sent from the NTB-100A/B series
SKIP (1) (2) (3) (4) OFF OFF OFF OFF 0 0 0 0			D7 D6 D5 D4 D3 D2 D1 D0 0 0 0 0 0 0 0 0 :0x00
4GI(350 ohm) (1) (2) (3) (4) ON OFF OFF OFF 1 0 0 0			D7 D6 D5 D4 D3 D2 D1 D0 0 0 1 0 0 0 0 0 :0x20
4G/T(350 ohm) (1) (2) (3) (4) ON OFF ON OFF 1 0 1 0			D7 D6 D5 D4 D3 D2 D1 D0 1 0 1 0 0 0 0 0 :0xA0

(5) Setting standard resistance value

<Description>

For setting the standard resistance value of every CH of the NTB-100A/B series.
Only for when the CH mode is 4G/T (transducer with temperature measuring function).
When requiring the setting, set the standard resistance value before starting the measurement.

- Setting the standard resistance value of the CH1
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x22	0x3200	0x01	Standard resistance value (float) of the CH1

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x60	0x3200	0x01	(0x00000000) fixed

- Setting the standard resistance value of the CH2
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x22	0x3200	0x02	Standard resistance value (float) of the CH2

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x60	0x3200	0x02	(0x00000000) fixed

- Setting the standard resistance value of the CH3
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x22	0x3200	0x03	Standard resistance value (float) of the CH3

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x60	0x3200	0x03	(0x00000000) fixed

- Setting the standard resistance value of the CH4
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x22	0x3200	0x04	Standard resistance value (float) of the CH4

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x60	0x3200	0x04	(0x00000000) fixed

6) Reading standard resistance value

<Description>

For reading the standard resistance value of every CH of the NTB-100A/B series.

- Reading the standard resistance value of the CH1
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x40	0x3200	0x01	(0x00000000) fixed

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x43	0x3200	0x01	Standard resistance value (float) of the CH1

- Reading the standard resistance value of the CH2
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x40	0x3200	0x02	(0x00000000) fixed

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x43	0x3200	0x02	Standard resistance value (float) of the CH2

- Reading the standard resistance value of the CH3
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x40	0x3200	0x03	(0x00000000) fixed

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x43	0x3200	0x03	Standard resistance value (float) of the CH3

- Reading the standard resistance value of the CH4
  - ♦ Request (PC → NTB-100A/B series: The number of bytes = 8 bytes)

ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0600 + BOX No.	0x40	0x3200	0x04	(0x00000000) fixed

♦ Response (NTB-100A/B series → PC: The number of bytes = 8 bytes)

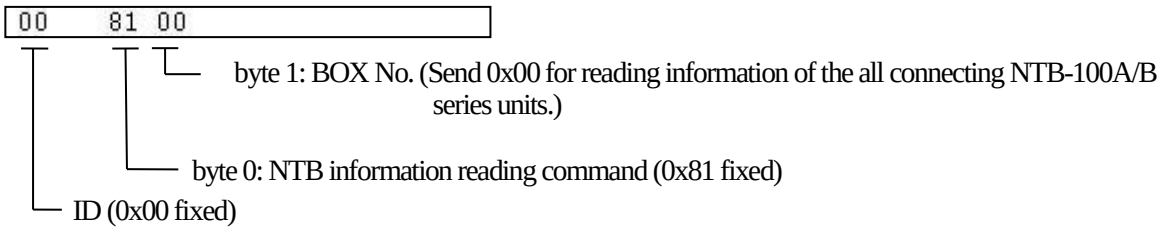
ID	Byte0	Byte1 to 2	Byte3	Byte4 to 7
0x0580 + BOX No.	0x43	0x3200	0x04	Standard resistance value (float) of the CH4

4-4-3 Reading NTB Information and CH Mode

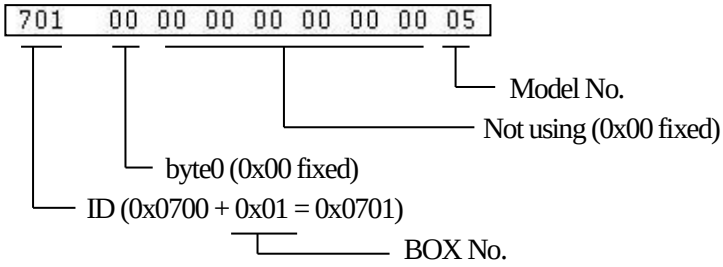
The following example is when the NTB-100A/B series of the BOX No. 01 is connected.

ID	Data	
00	81 00	(1)
701	00 00 00 00 00 00 00 05	(2)
601	40 00 31 01 00 00 00 00	(3)
581	43 00 31 01 80 80 80 80	(4)

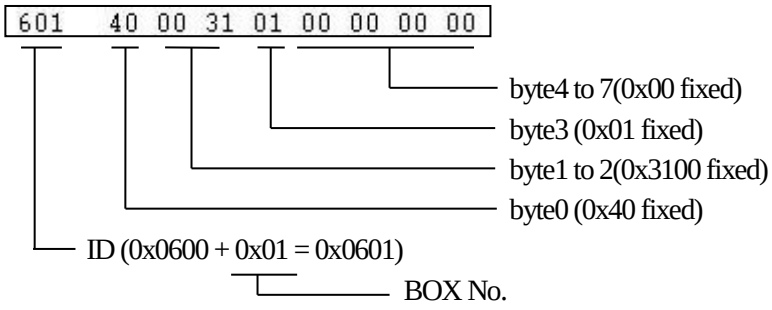
1) Send the NTB information reading command for reading the NTB information. (PC → NTB)



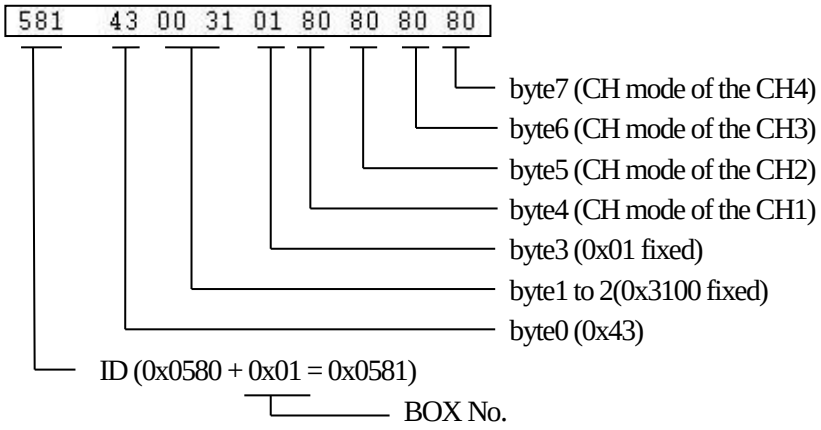
2) The NTB-100A/B series received the command and send the information. (NTB-100A/B series → PC)



3) Send the reading command of the CH mode of the connecting NTB-100A/B series. (PC → NTB-100A/B series)

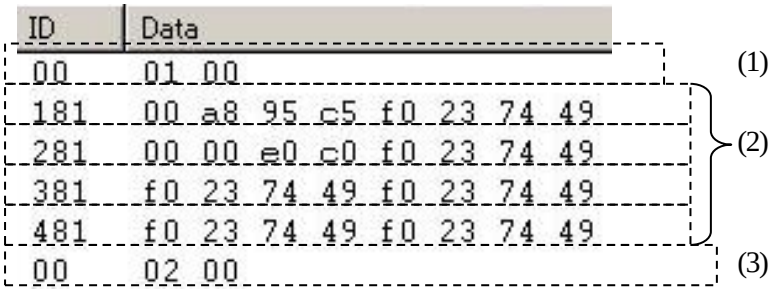


4) The NTB-100A/B series send the CH mode information. (NTB-100A/B series → PC)

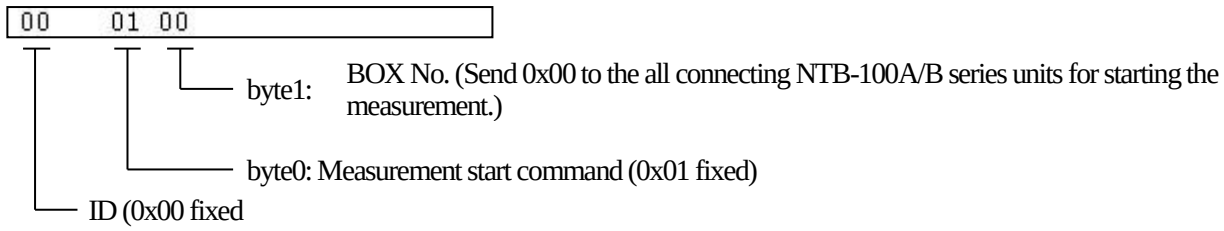


4-4-4 Measurement Start and Stop

The following example is when the NTB-100A/B series of the BOX No. 01 is connected.

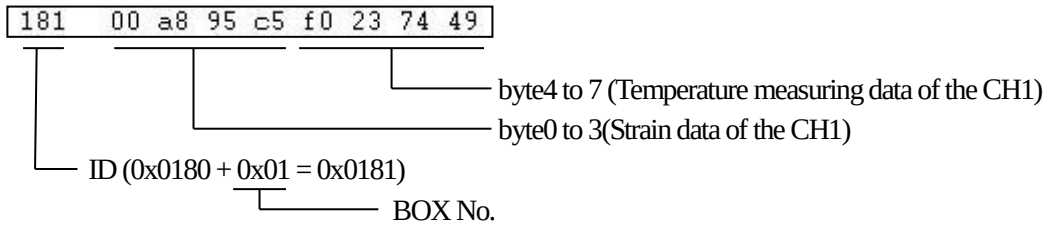


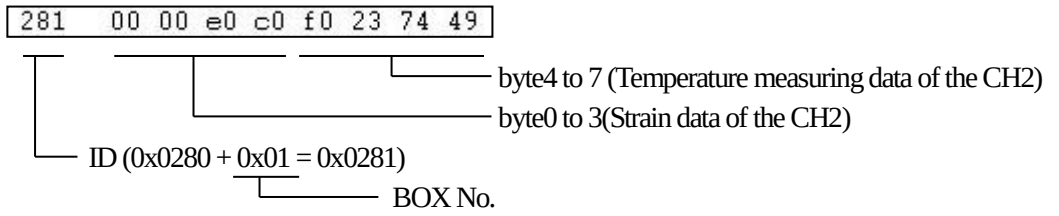
1) Send the measurement start command. (PC → NTB-100A/B series)

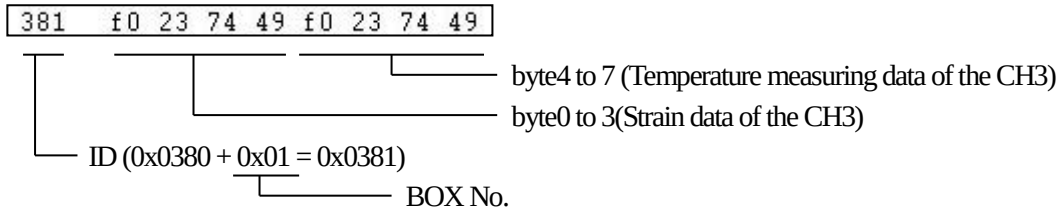


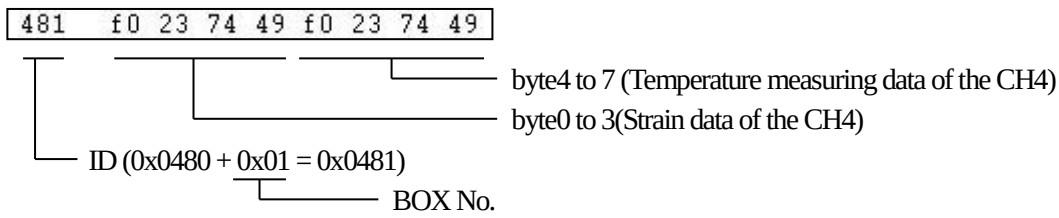
(The NTB-100A/B series becomes measuring state.)

2) The measured data is sent from the NTB-100A/B series. (NTB-100A/B series → PC)



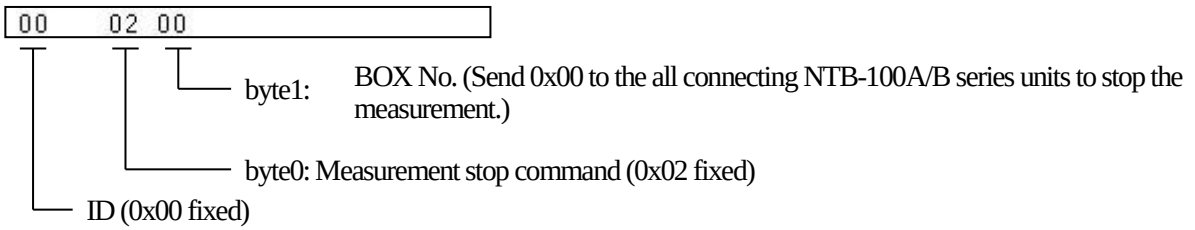






(The measured data is sent from the NTB-100A/B series until the measurement stop command is sent.)

3) Send the measurement stop command. (PC → NTB-100A/B series)

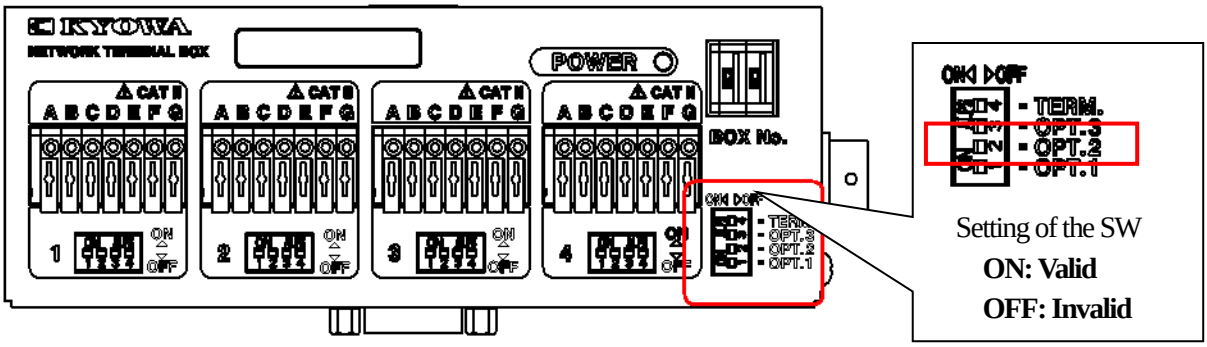


(The NTB-100A/B series becomes measuring stop state.)

5. FOR MEASURING WITH KYOWA'S EDX SERIES

The NTB-100A/B series can also record the measured data with the CAN card of the KYOWA's EDX series.

5-1 SET NTB-100A/B SERIES



Set the OPT. 2 of the DIP switch for option to ON.
After connecting the CAN card, the NTB-100A/B series automatically and continuously output the measured data by turning ON the DIP switch.

NOTE

- For connecting the PC or SME-100A/101A, be sure to set the OPT. 2 of the DIP switch for option to OFF.
- When using the multiple NTB-100A/B series units by coupling or in a same network, set the termination resistances ("TERM.") of the NTB-100A/B series units of both sides in the network to ON.
  For termination resistance, see "3-3."
- When coupling the multiple NTB-100A/B series units, set the "BOX No." so as not to overlap.

5-2 CAN CONDITION OF NTB-100A/B SERIES

5-2-1 CAN Communication Condition

Communication standard: High speed CAN
Communication speed: 50 kbps

5-2-2 CAN-ID Condition

Format: Standard ID
ID: CH1 = 0x0180 + BOX No.
CH2 = 0x0280 + BOX No.
CH3 = 0x0380 + BOX No.
CH4 = 0x0480 + BOX No.
Data length: 8
Endian: Little

<Example>
When the BOX No. is 17 (0x11):
CH1: 0x0180 + 0x11 = 0x0191
CH2: 0x0280 + 0x11 = 0x0291
CH3: 0x0380 + 0x11 = 0x0391
CH4: 0x0480 + 0x11 = 0x0491

5-2-3 CAN-CH Condition

Data type: Float

ID	Byte0 to 3	Byte4 to 7
0x0180 + BOX No.	Strain data of the CH1	Temperature measuring data of the CH1

ID	Byte0 to 3	Byte4 to 7
0x0280 + BOX No.	Strain data of the CH2	Temperature measuring data of the CH2

ID	Byte0 to 3	Byte4 to 7
0x0380 + BOX No.	Strain data of the CH3	Temperature measuring data of the CH3

ID	Byte0 to 3	Byte4 to 7
0x0480 + BOX No.	Strain data of the CH4	Temperature measuring data of the CH4

For the CH mode with no temperature measuring data, the data is sent as 999999 (0x497423f0).
When the CH mode is set to Skip, both the strain data and temperature measuring data are sent as 999999(0x497423f0).

5-3 FOR MEASURING WITH EDX-2000A

5-3-1 Set the communication Condition

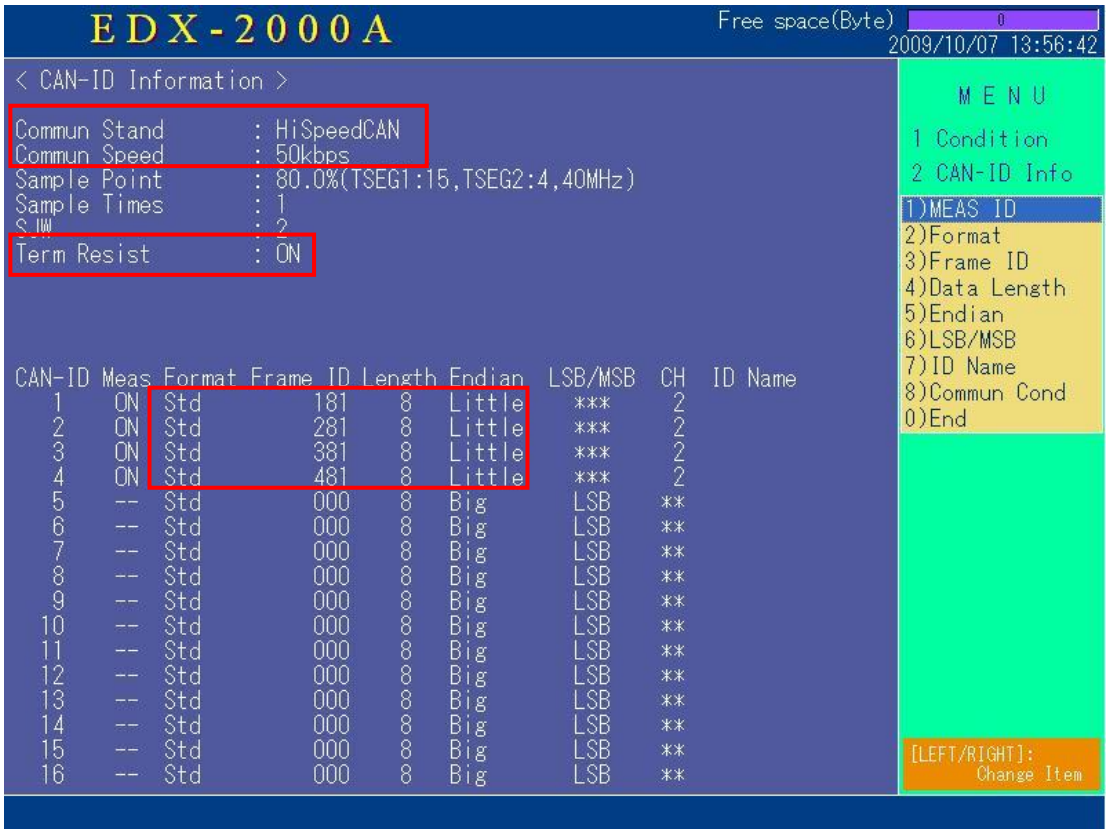
[Condition Setting] – [CAN-ID Information] – [Communication Condition]

Commun Stand:	High speed CAN
Commun Speed:	50 kbps
Sample Point:	Default value for general purpose. But the Sample Point varies with the system conditions.
Sample Times:	Default value for general purpose.
SJW:	Default value for general purpose. But the SJM varies with the system conditions.
Term Resist	ON (OFF for the terminated system)

5-3-2 CAN-ID Information

[Condition Setting] – [CAN-ID Information]

Format:	Standard
Frame ID:	0x0180 + BOX No. (The following is for the BOX No. = 01(0x01))
	0x0280 + BOX No.
	0x0380 + BOX No.
	0x0480 + BOX No.
Data Length:	8
Endian:	Little



5-3-3 CAN-CH Condition

[Condition Setting] – [CAN-CH Condition]

(1) Mode for setting a bit position with the bit number in the data flame

- Strain Data

  Start Bit (SB): 0
  Bit Length (LN): 32
  Data Type: Float
  Cal Coef: Set the required number. (Set 1 to the calibration value to obtain strain value.)
  Offset Set zero value if required.
  Max: Set the expecting maximum value of the input.
  Unit: Set the required unit.

- Temperature Measuring Data

  Start Bit: 32
  Bit Length: 32
  Data Type: Float
  Cal Coef: 1
  Unit: ℃

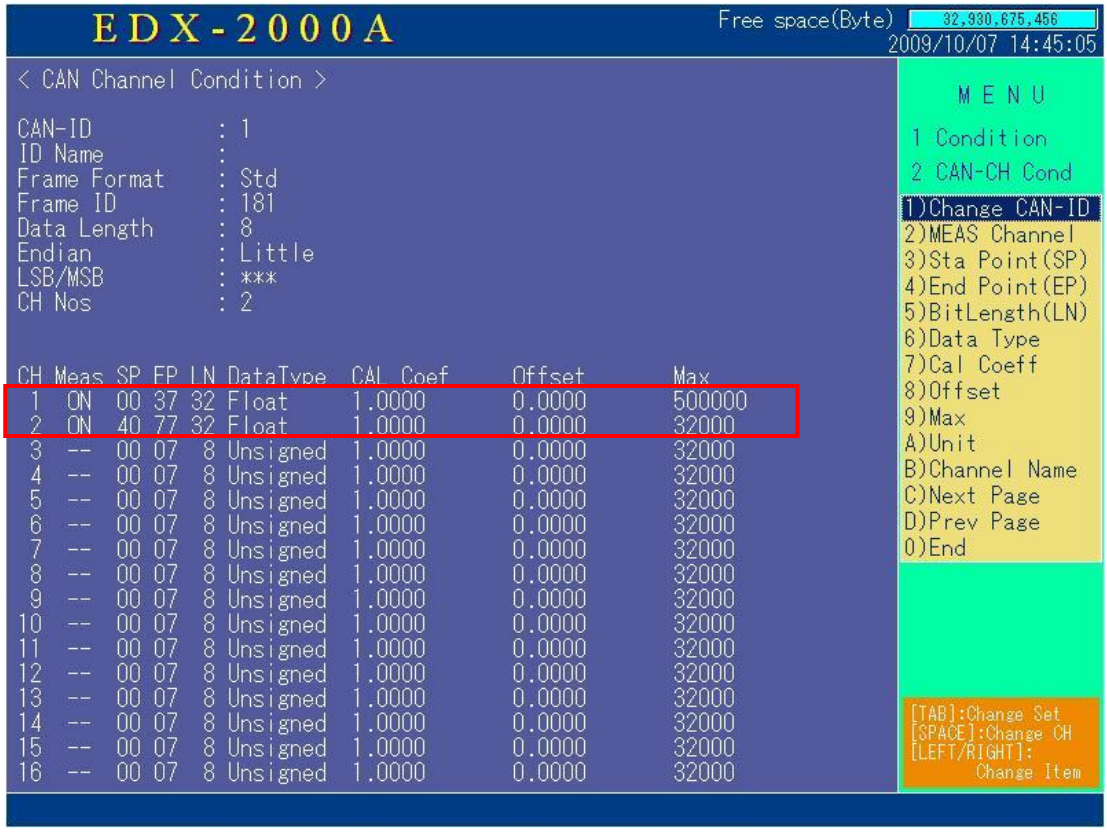
(2) Mode for setting a bit position with the byte number and bit number in the byte.

- Strain Data

  Sta Point (SP): 00
  End Point (EP): 37
  Bit Length (LN): 32
  Data Type: Float
  Cal Coef: Set the required number. (Set 1 to the calibration value to obtain strain value.)
  Offset Set zero value if required.
  Max: Set the expecting maximum value of the input.
  Unit: Set the required unit.

- Temperature measuring Data

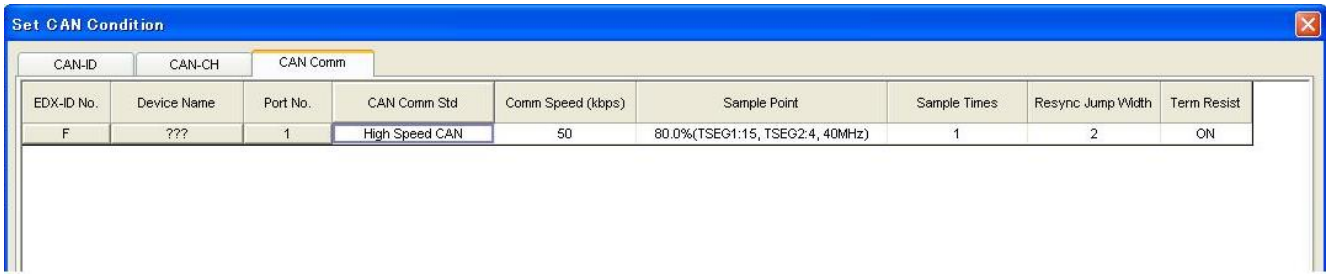
  Sta Point (SP): 40
  End Point (EP): 77
  Bit Length (LN): 32
  Data type: Float
  Cal Coef: 1
  Unit: ℃



5-4 FOR MEASURING WITH EDX-100A/B (DCS-100A/B)

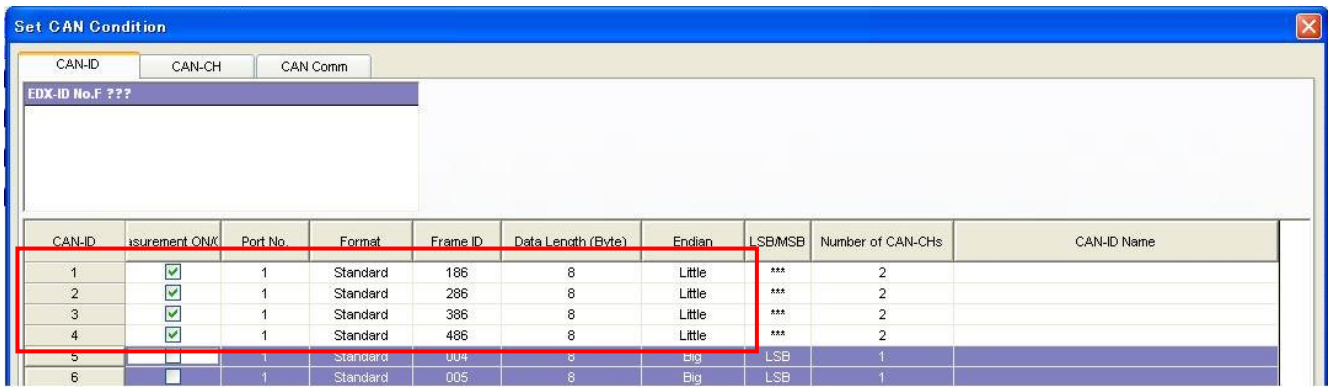
5-4-1 CAN Communication Condition

CAN Comm Std:	High speed ON
Comm Speed (kbps):	50 kbps
Sample Point:	Default value for general purpose. But the Sample Point varies with the system conditions.
Sample Times:	Default value for general purpose.
Resync Jump Width:	Default value for general purpose. But the SJM varies with the system conditions.
Term Resist:	ON (OFF for the terminated system)



5-4-2 CAN-ID Condition

Format:	Standard
Frame ID:	0x0180 + BOX No. (The following is for the BOX No. = 06(0x06))
	0x0280 + BOX No.
	0x0380 + BOX No.
	0x0480 + BOX No.
Data Length (Byte):	8
Endian:	Little



5-4-3 CAN-CH Condition

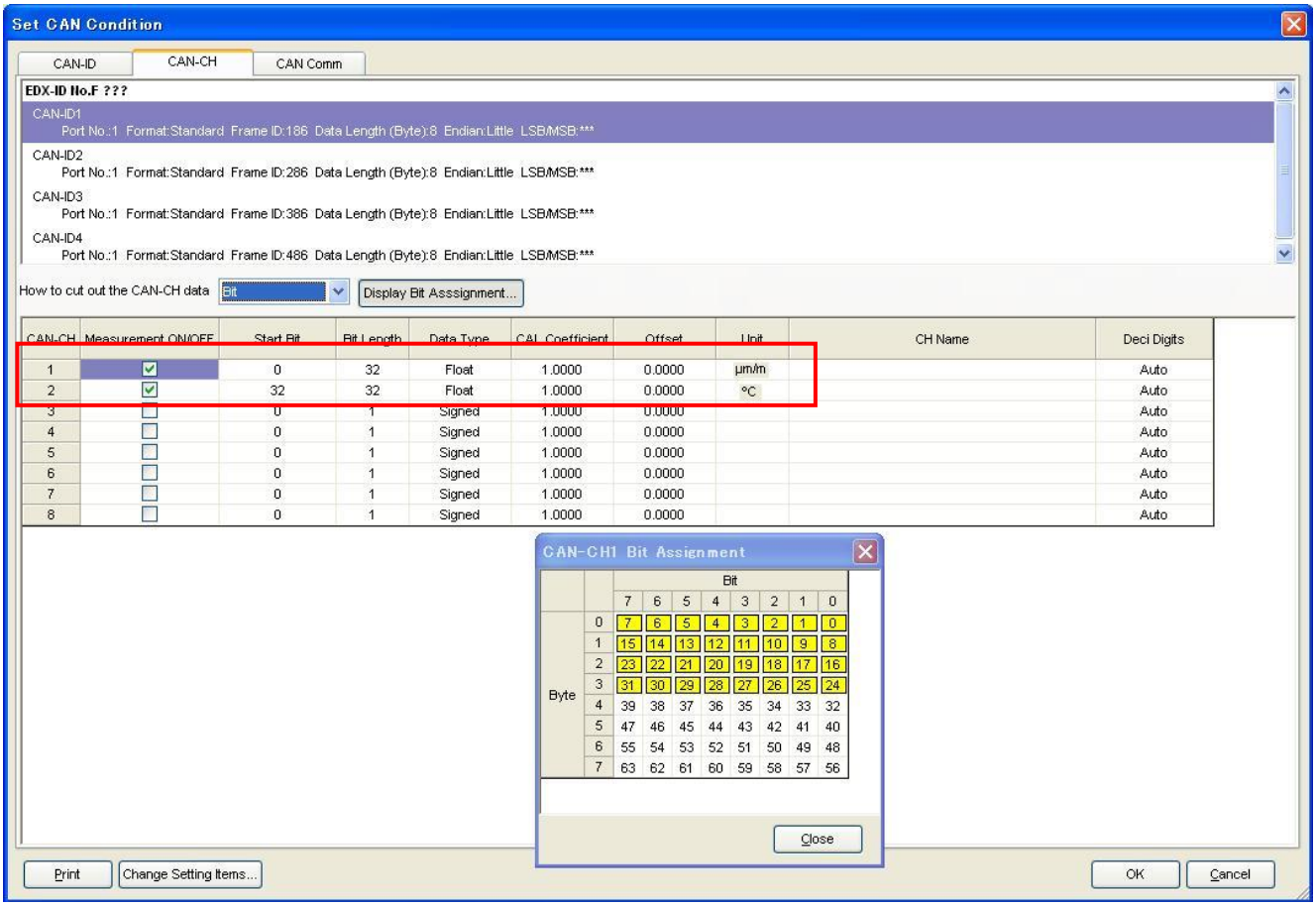
(1) To cut out the CAN-CH data with bit.

- Strain Data

  Start Bit: 0
  Bit Length: 32
  Data Type: Float
  CAL Coefficient: Set the required number. (Set 1 to the calibration value to obtain strain value.)
  Offset Set zero value if required.
  Unit: Set the required unit.

- Temperature measuring Data

  Start Bit: 32
  Bit Length: 32
  Data Type: Float
  CAL Coefficient: 1
  Unit: ℃



The above Bit Assignment is for strain data.

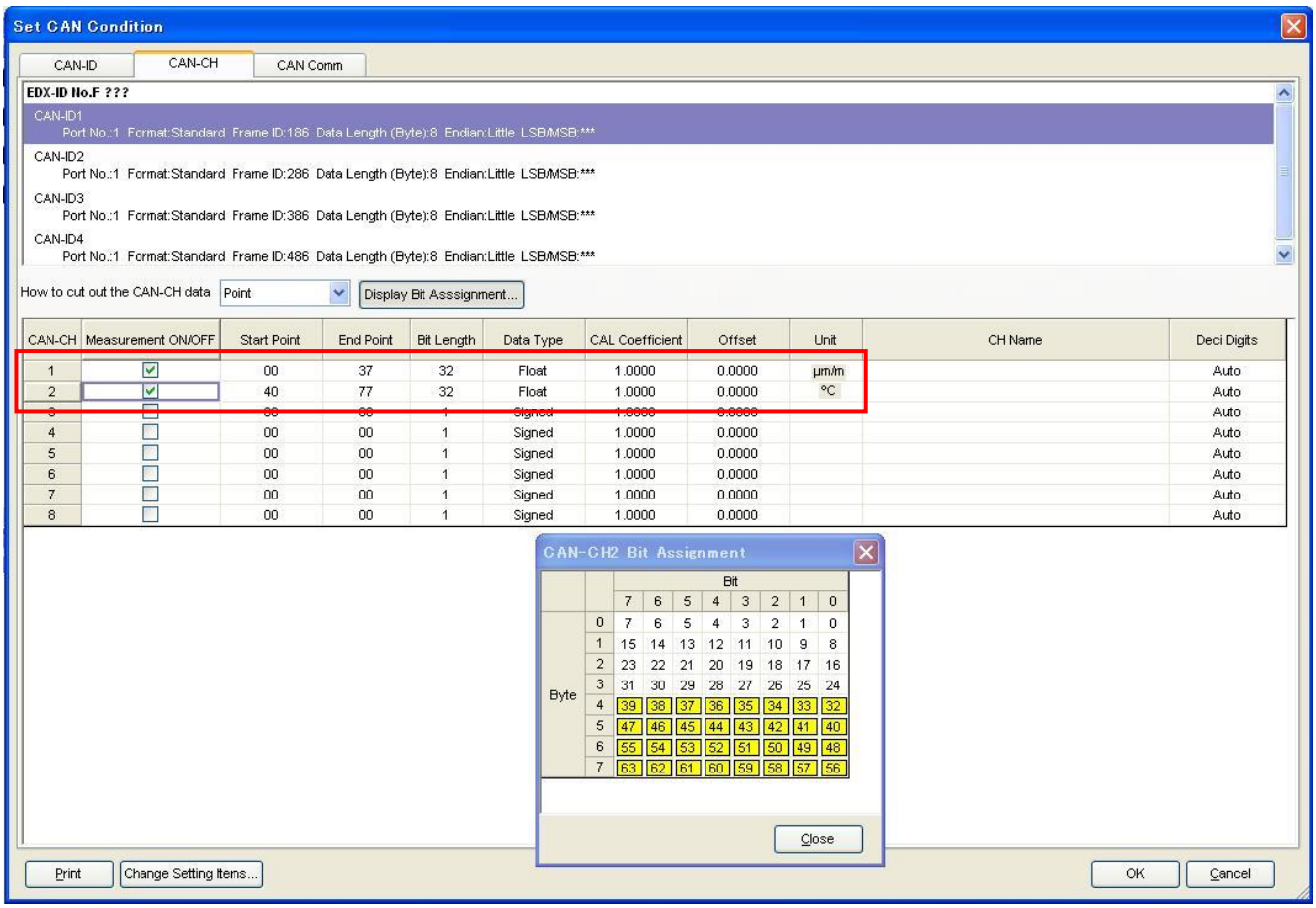
(2) To cut out the CAN-CH data with point.

- Strain Data

  Start Point: 00
  End Point: 37
  Bit Length: 32
  Data Type: Float
  CAL Coefficient: Set the required number. (Set 1 to the calibration value to obtain strain value.)
  Offset Set zero value if required.
  Unit: Set the required unit.

- Temperature measuring Data

  Start Point: 40
  End Point: 77
  Bit Length: 32
  Data type: Float
  CAL Coefficient: 1
  Unit: ℃



The above Bit Assignment is for temperature measuring data.

6. FURTHER INFORMATION ON OPTIONS

6-1 DESCRIPTIONS OF OPTIONS

For details of the options that are used in combination with the Network Terminal Box (NTB-100A/B series), see the following table.

Name	Model	Function
Control software for the NTB-100A/B series	NTB-10A	● For controlling the NTB-100A/B series from the PC.
Connection cable	N-70 N-97 U-25 U-26	● Connecting cable from the NDIS connector to input terminal of the NTB-100A/B series. •N-70, N-97: Not compatible with TEDS •U-25, U-26: TEDS compatible
AC adapter	SA-10A-EDS	● For supplying power to the NTB-100A/B series. Power voltage of the AC adapter is from 100 to 240 VAC (50/60 Hz).
Communication cable (1 m)	N-102	● For connecting the NTB-100A/B series and USB-CAN converter, NTB-100A/B series and SME-100A/SME-101A. ● For connecting the multiple NTB-100A/B series units in the distributed arrangement. Note: When requiring the cable other than 1-m long, contact KYOWA or our representatives.
Y cable	N-103	● For using multiple NTB-100A/B series units in the distance.
Coupling plate	CN-1A	● For coupling multiple NTB-100A/B series units without using the DIN rail.
Handy logger	SME-100A/101A	● For controlling the NTB-100A/B series without using the PC.
USB-CAN converter	Kvaser Leaf Light HS (Kvaser Inc.,)	● USB-CAN converter for connecting the PC and NTB-100A/B series. ● The NTB-10A (Control Software) and accessory sample software are operated by this interface.
Termination resistance	CANterm120 (Vector Japan Co., Ltd.)	● Before connecting the communication cable, be sure to connect the termination resistance to the USB-CAN converter.
DIN rail (recommended)	(TAKACHI)*	
DIN rail mounting plate (recommended)	DRA-1 (TAKACHI)*	● For fixing the NTB-100A/B series to the DIN rail.

* TAKACHI ELECTRONIC INDUSTRIAL Co., Ltd.

7. TROUBLESHOOTING

7-1 TROUBLESHOOTING

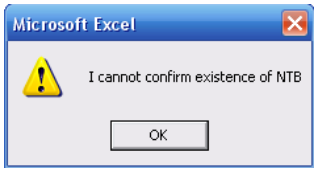
If the NTB-100A/B series does not operate as expected or in a stable manner, examine the facts that may be causing such a condition before concluding that the system has failed. Items to be checked and countermeasures for various symptoms are described below.
If the problem still occurs even after corrective action is taken, contact KYOWA or our representative.

Symptom	Check item and/or countermeasures
1) No power is ON. (The "POWER LED" does not light up.)	● Does the DC power connector have the specified voltage? ● Are the both ends of the AC power cable securely connected? ● Is the "Power connector" securely connected? → Check the connection and securely connect it. ● Is the "OPT. 3" switch set to ON? → The power saving function is set to ON. You may use the NTB-100A/B series as it is. But if not requiring power saving function, set the "OPT. 3" switch to OFF.
2) After turning ON the power, the "POWER LED" flickers.	● Is the "BOX No." set to 00? → Set the "BOX No." other than 00. ● Are the "BOX No." overlapping? → Set the "BOX No." so as not to overlap.
3) The NTB-100A/B series stops operation and accepts no operation.	● The NTB-100A/B series operation failed due to external interfering noise. → Turn OFF and ON the power once again. If any phenomenon generates caused by external interfering noise, take countermeasures against noise from operating environment, power supply, etc. ● Is the "BOX No." set to 00? → Set the "BOX No." other than 00. ● Is the termination resistance correctly set? → For single: Set the termination resistance ("TERM.") switch to ON. → For multiple: Set the endmost termination resistance ("TERM.") switch of the connecting NTB-100A/B series to ON. *For the termination resistance, see "3-3." ● Is the "OPT. 2" switch is set to ON? → Set the "OPT. 2" switch to OFF.
4) Measured value varies and not stable.	● Operation of the NTB-100A/B series failed due to external interfering noise. → Turn OFF and ON the power once again. If any phenomenon generates caused by external interfering noise, take countermeasures against noise from operating environment, power supply, etc. ● Are the input lead wire and input cable correctly connected to the input terminal? → If the connections to the input terminal (soldering, screwing, one-touch connection) are not stable, the measured value varies. Check the connection and securely connect it.
5) No mode changes even if the "DIP switch for changing mode" is changed.	● The mode is updated by turning OFF and ON the NTB-100A/B series or clicking the **File** – **Environment Setting** - **NTB comm check** button of the NTB-10A. → Turn OFF and ON the power once again or conduct the 'communication check' of the NTB-10A.

6)	No optional function changes even if the "DIP switch for option" is changed.	● The function is updated by turning OFF and ON the NTB-100A/B series or clicking the **File** – **Environment Setting** - **NTB comm. check** button of the NTB-10A. → Turn OFF and ON the power once again or conduct the 'communication check' of the NTB-10A. However, turn ON and OFF the NTB-100A/B series to update the termination resistance setting (ON/OFF of the "TERM.").
7)	Measured value is faulty.	● Are the setting and connecting method of the "DIP switch for changing mode" correct? → Correctly set and connect the DIP switch. ● Are input lead wire and input cable correctly connected to the input terminal? → If the connections to the input terminal (soldering, screwing, one-touch connection) are not stable, the measured value varies. Check the connection and securely connect it.
8)	The NTB-100A/B series does not operate.	● Is the termination resistance correctly set? → For single: Set the termination resistance ("TERM.") switch to ON. → For multiple: Set the endmost termination resistance ("TERM.") switch of the connecting NTB-100A/B series to ON. *For the termination resistance, see "3-3." ● Is the "BOX No." overlapping? → Set the "BOX No." so as not to overlap. ● Are the PC/SME and NTB-100A/B series securely connected? → Check the connection and securely connect it. ● Is the "OPT. 3" switch is set to ON? → Set the "OPT. 3" switch to OFF.
9)	Measurement of multiple NTB-100A/B series units is not available.	● Are the "BOX No." overlapping? → Set the "BOX No." so as not to overlap. ● Are the PC/SME and NTB-100A/B series securely connected? → Check the connection and securely connect it.
10)	The NTB-100A/B series does not come back from the power saving mode.	● Are the both ends of the AC power cable securely connected? ● Is the "power connector" securely connected? → Check the connection and securely connect it. ● Are the PC/SME and NTB-100A/B series securely connected? → Check the connection and securely connect it.
11)	The TEDS information cannot be read.	● Is the TEDS compatible sensor is inserted to the "Input terminal"? → Check that the last 3 characters in the model of the sensor are "-ID (for the KYOWA's sensor)" or not. ● Is the "Input Terminal" correctly connected? → F terminal of the "Input terminal" is for TEDS (+), G terminal is for TEDS (-).Check the connection. ● Are you using a 6-conductor extension cable? → Fro reading the TEDS information, use the 6-conductor extension cable for validating. Use the 6-conductor extension cable. ● Are you using the extension cable? → Check that the extension cable is 6-conductor or not.

12)	The TEDS information cannot be written.	● Are you using a sensor other than KYOWA made? → User's area of the TEDS information varies with manufactures. ● Is the TEDS compatible sensor is inserted to the "Input terminal"? → Check that the last 3 characters in the model of the sensor are "-ID (for the KYOWA's sensor)" or not. ● Is the "Input Terminal" correctly connected? → F terminal of the "Input Terminal" is for TEDS (+), G terminal is for TEDS (-). Check the connection. ● Did you write 28 or more characters in the user's area? → Writing to the user's area should be 28 characters or less. Write 28 characters or less. ● Are you using the 6-conductor extension cable? → Fro reading the TEDS information, use the 6-conductor extension cable for validating. Use the 6-conductor extension cable. ● Are you using the extension cable? → Check that the extension cable is 6-conductor or not.
13)	No measurement can be conducted with the CAN card of the EDX series.	● Is the "OPT. 2" switch of the DIP switch for option is set to ON? → Set the "OPT. 2" switch to ON. The NTB-100A/B series becomes automatically and continuously output the data. ● Is the terminator correctly set? → Check the setting of the termination resistance. *For the termination resistance setting, see "3-3. ● Is the communication standard High Speed CAN? (Setting of the EDX side) → Check that the standard is High Speed CAN. ● For the CAN-40A Is the NTB-100A/B series connected to the High Speed CAN port? → Check that the NTB-100A/B series is connected to the High Speed CAN port. ● Is communication speed 50 kbps? (Setting of the EDX side) → Check that the speed is 50 kbps or not. ● Is format of the ID Standard? (Setting of the EDX side) → Check that the format is Standard. ● Are IDs correctly set in hex? (Setting of the EDX side) → Check that the ID is correctly set. CH1: 0x0180 + BOX No. CH2: 0x0280 + BOX No. CH3: 0x0380 + BOX No. CH4: 0x0480 + BOX No. ● Is Data length 8? (Setting of the EDX side) → Check that the Data length is 8. ● Is Endian Little? (Setting of the EDX side) → Check that the Endian is Little. ● Is Data type Float? (Setting of the EDX side) → Check that the Data type is Float. ● Are the CAN conditions of the CAN correct? (Setting of the EDX side) → 0 to 3 byte: Strain data 4 to 7 byte: Temperature measuring data

7-2 ERROR MESSAGE (FOR SIMPLIFIED SOFTWARE)

Error Message	Check item and/or countermeasures
	● Are the PC and NTB-100A/B series correctly connected? → Check the connection and securely connect it. ● Is the DC power correctly connected to the connecting NTB-100A/B series? → Check the connection and securely connect it. ● Is the “BOX No.” set to 00? → Set the “BOX No.” other than 00. ● Is the termination resistance correctly set? → For single: Set the termination resistance (“TERM.”) switch to ON. → For multiple: Set the endmost termination resistance (“TERM.”) switch of the connecting NTB-100A/B series to ON. *For the termination resistance, see “3-3.” ● Is the “OPT. 2” switch set to ON? → Set the “OPT. 2” switch to OFF.
	● Are 9 or more NTB-100A/B series units connected? → Connect the number of the NTB-100A/B series from 1 to 8.
	● Is the USB-CAN converter correctly connected? → Check the connection and securely connect it. ● Was the driver of the USB-CAN converter already installed? → Check the driver by opening the Device Manager.

8. TECHNICAL INFORMATION REQUIRED FOR MEASUREMEMT

8-1 COMPENSATING NONLINEARITY IN STRAIN GAGE (QUARTER BRIDGE METHOD)

An ideal bridge output in strain measurement can be obtained by the following equation.

$$\text{Output Voltage } e = \frac{1}{4} Ks \bullet \varepsilon \bullet E$$

where, Ks: Gage factor
ε: Strain value
E: Excitation voltage

Assume that only one side of the Wheatstone bridge is regarded as the strain gage and when only the said side changes, nonlinearity generates between the strain value and output voltage.
Nonlinearity generated in relation between strain value and output voltage. The output voltage at that time is obtained by the following equation resulting to cause error as shown in the following table.

$$\text{Output Voltage } e = \frac{\varepsilon}{1+\varepsilon}$$

True Strain Value	Error
1,000 um/m	-0.1%
10,000 um/m	-1.0%
100,000 um/m	-9.1%

MEMO

- The NTB-100A/B series automatically conducts compensation calculation for the output voltage to obtain the true strain value.

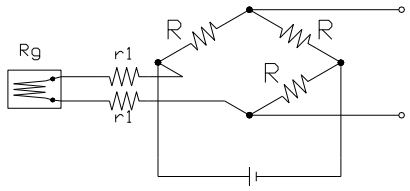
$$\textit{Output Voltage } \varepsilon = \frac{e}{1-e}$$

Compensation equation regarding CH mode in strain measurement is described in the following table.

Measuring Method	CH Mode	Compensation Equation	Compensation
Quarter bridge method (3-wire system connection) (2-wire system connection)	1G120 1G350	$\varepsilon = \frac{e}{1-e}$	Compensated
Half bridge method (Active-active method)	2G	$\varepsilon = e$	Not compensated
Full bridge method	4G 4G/I 4G/T	$\varepsilon = e$	Not compensated

8-2 HOW TO COMPENSATE TEMPERATURE INFLUENCE ON LEAD WIRE (3-WIRE SYSTEM CONNECTION)

When a lead wire is extended from the gage to a bridge circuit using a SELCOM gage as shown in the following, resistance change of the lead wire caused by temperature is viewed as an apparent strain.
With this state, it is not available to fully exert effective features of the SELCOM gage in strain measurement.
An apparent strain caused by temperature effect on the lead wire can be obtained by the following equation.



$$\varepsilon = \frac{\Delta R}{R} \bullet \frac{1}{Ks} = \frac{r1 \bullet 2l \bullet \alpha \bullet \Delta t}{Rg + r1 \bullet 2l} \bullet \frac{1}{Ks}$$

where, Rg: Gage resistance value (ohm)
α: Resistance temperature coefficient of lead wire (/°C)
Δt: Temperature change (°C)
l: Lead wire length (m)
r1: Resistance value of 1-m long lead wire (ohm/m)
Ks: Gage factor = 2.00

For example, when one way of parallel vinyl coated wire having cross-section 0.3 mm^2 in 10 meter (Resistance value: 0.062 ohm/m, Resistance temperature coefficient: 3.93×10^{-3}/°C) is 10 m, an apparent strain per degree temperature change shall be obtained by the following expression.

$$\varepsilon = \frac{0.062\times 2\times 10\times 3.93\times 10^{-3}\times 1}{120+0.062\times 2\times 10}\times\frac{1}{2} \cong 20 \quad \mu m/m$$

In the same manner, the apparent strains for 20 meter and 50 meter lead wires are obtained as follows resulting to have large difference…

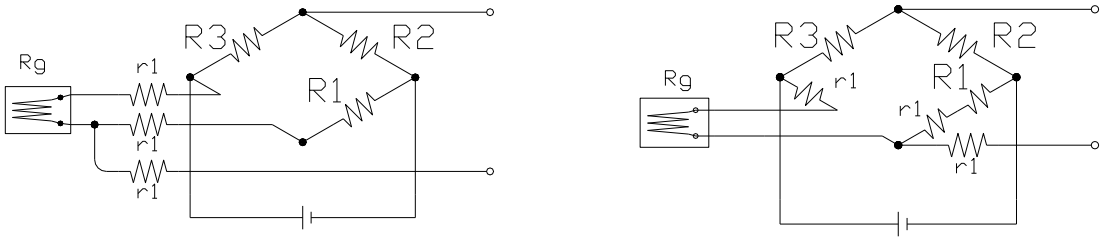
20 m: 40 um/m/°C
50 m: 100 um/m/°C

In addition, when a parallel vinyl coated wire having cross-section 0.08 mm^2 in diameter (Resistance value: 0.239 ohm/m, Resistance temperature coefficient: 3.93×10^{-3}/°C) is used and calculated in the same manner, the apparent strain shall be obtained by the following expression.

10 m: 145 um/m/°C
20 m: 290 um/m/°C
50 m: 725 um/m

As a result, an apparent strain generates that is larger than the parallel vinyl coated wire with cross-section 0.3 mm^2.
Thus, the smaller the cross-section of the lead wire and longer the length of the lead wire, the larger it becomes the temperature influence.
As a method for removing the temperature effect on the lead wire, 3-wire system connection is currently widely adopted in strain meter measuring instrument.

Principle of the 3-wire system connection is described in the following.
In the following figures, Rg represents a strain gage, R1, R2, and R3 represent internal fixed resistance, and rl represents lead wire resistance. Figure (b) is a simplified figure of a basic circuit of figure (a).
In the above figures, the 3-wire system connection is configured by using 3 lead wires for strain gage lead wire to have one lead wire resistor provided to the adjacent side.
With this connection method, temperature effect on lead wire is cancelled and ignored.
As essential precautions when using the 3-wire system connection method, in order to have the same temperature effect on the lead wire, the 3 lead wires should be of same type, should have the same length, cross section, and coating color.
To satisfy the above requirements, a 3-wire parallel vinyl coated wire is applicable.



(a) (b)

8-3 COMPENSATING GAGE FACTOR

The NTB-100A/B series is designed to conduct measurement with gage factor 2.00. When the gage factor of the current gage is not 2.00, it is required to compensate the strain gage. Compensation can be conducted by the following expression.

$$\text{True strain gage} = \text{Measured strain gage} \times \frac{2.00}{\text{Gage factor of the current strain gage}}$$

The above calculation can be carried out by using the coefficient calculation function.

8-4 COMPENSATION FOR LONG LEAD WIRE AND CABLE

If the length of the lead wire is extended in quarter bridge method and half bridge method connections, bridge circuit of the strain gage may be structured with unnecessary lead wire resistance in series and gage factor of the apparent strain lowers.

$$\text{True strain gage} = \text{Measured strain gage} \times \frac{\text{Gage resistance} + \text{Lead wire resistance}}{\text{Gage resistance}}$$

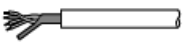
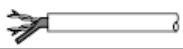
The above resistance of the lead wire is resistance of the whole lead wire (Round-trip resistance).
However, for the 3-wire system connection method, substitute one-way resistance.

If the length of the cable is extended full bridge method (transducers), bridge circuit may be structured with unnecessary cable resistance in series and sensitivity is deteriorated due to decrease in excitation voltage.

$$\text{True strain gage} = \text{Measured strain gage} \times \frac{\text{Bridge resistance} + \text{Cable resistance}}{\text{Gage resistance}}$$

The above cable resistance is resistance of the whole cable (Round-trip resistance).
The above expression can be obtained by coefficient calculation function.
Example of round-trip resistance per meter for lead wire and cable is described in the following table.
The resistance may slightly vary with the wire rod actually used. If you can check the resistance of the actually used wire rod, use the correct value.

● L-type Leadwire Cables

Operating Temperature Range	Model	Type	Conductor Material	Nominal Cross Section of Conductor (mm^2)	Number of Strands/ Wire Diam. (mm)	Reciprocating Resistance per meter (Ω)	Coated Wire Diameter (mm)	Unit Length
Room temp. to 350	L-1	 High-temperature leadwire	CuNi alloy wires	0.07	1/0.30	14.20	0.50	50m
–10 to 80	L-2	 Vinyl-coated flat 3-wire cable	Copper wires	0.30	12/0.18	0.12	2.30	100m
–269 to 250	L-3	 Fluoroplastic-coated high/low-temp. 3-wire cable	Silver-plated copper wires	0.14	7/0.16	0.28	0.98	50m
Room temp. to 350	L-4	 High-temperature leadwire	Nickel-clad copper wires	0.20	1/0.50	0.18	0.70	30m
–10 to 80	L-5	 Vinyl-coated flat 2-wire cable	Copper wires	0.50	20/0.18	0.07	2.50	100m
–10 to 80	L-6*1	 Vinyl-coated flat 2-wire cable	Copper wires	0.08	7/0.12	0.44	1.00	100m
–10 to 80	L-7*2	 Vinyl-coated flat 3-wire cable	Copper wires	0.08	7/0.12	0.44	1.00	100m
–10 to 80	L-9*1	 Vinyl-coated flat 2-wire cable	Copper wires	0.11	10/0.12	0.32	1.00	100m
–10 to 80	L-10*2	 Vinyl-coated flat 3-wire cable	Copper wires	0.11	10/0.12	0.32	1.00	100m
–100 to 150	L-11	 Middle-temperature 2-wire cable	Silver-plated copper wires	0.08	7/0.12	0.50	0.86	100m
–100 to 150	L-12	 Middle-temperature 3-wire cable	Silver-plated copper wires	0.08	7/0.12	0.50	0.86	100m
–10 to 80	L-13	 Vinyl-coated normal-temp. low-noise 3-wire cable	Tin-plated copper wires	0.09	7/0.13	0.46	3.50	100m
–50 to 90	L-14	 Chloroprene-coated normal-temp. low-noise 4-wire cable	Tin-plated copper wires	0.08	7/0.12	0.48	4.00	100m
–269 to 250	L-15	 Fluoroplastic-coated high/low-temp. low-noise 3-wire cable	Silver-plated copper wires	0.08	7/0.12	0.48	2.50	10m
–269 to 250	L-16	 Fluoroplastic-coated high/low-temp. low-noise 4-wire cable	Silver-plated copper wires	0.08	7/0.12	0.48	3.30	10m
–269 to 350	L-17	 High/low-temperature 3-wire cable	Nickel-plated copper wires	0.07	1/0.30	0.50	0.38	30m

*1. These models have a suffix R, W, G, Y or B indicating the coating color; red, white, green, yellow or black. e.g. L-6B: Black vinyl coated.
*2. These models have a suffix WR, WL or WY indicating the stripe color; red, blue or yellow on white vinyl coating. e.g. L-7WR: Red stripe on white coating.

9. SPECIFICATONS

(1) Model

Model	Bridge Excitation	Shape of sensor input terminal	Resistance value applicable to a gage.
NTB-100A-120	Constant-voltage bridge excitation	One-touch lock terminal	120 ohm
NTB-100B-120		One-touch terminal	
NTB-101A-120		Screw solder terminal	
NTB-100A-350		One-touch lock terminal	350 ohm
NTB-100B-350		One-touch terminal	
NTB-101A-350		Screw solder terminal	
NTB-110A-350	Constant-current bridge excitation	One-touch lock terminal	(For full bridge method only)
NTB-110B-350		One-touch terminal	
NTB-111A-350		Screw solder terminal	

(2) Measuring Target

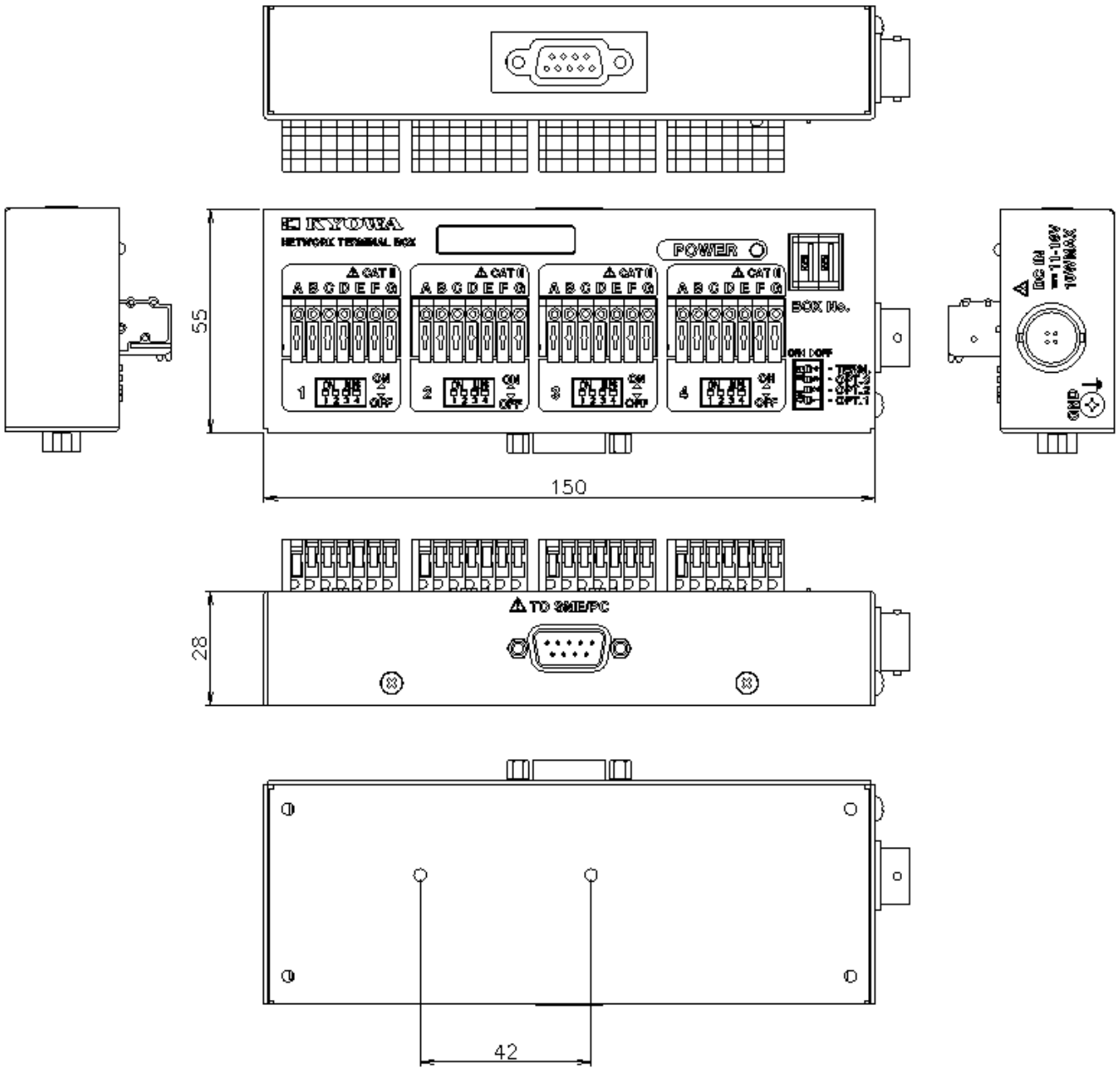
Bridge Excitation	Measuring Target			Target NTB-100A/B series		
				For general strain measurement		For civil engineering measurement
				NTB-100A-120 NTB-100B-120 NTB-101A-120	NTB-100A-350 NTB-100B-350 NTB-101A-350	NTB-110A-350 NTB-110B-350 NTB-111A-350
Constant-voltage bridge excitation	Strain gage	Quarter bridge method	120 ohm	○	×	×
			350 ohm	×	○	×
	Strain gage transducer	Half bridge method 120 ohm to 1000 ohm	Active-active method	○	○	×
		Full bridge method 120 ohm to 1000 ohm	Full-bridge method	○	○	×
Constant-current bridge excitation	Civil Engineering transducer	Full bridge method 350 ohm	Full-bridge method	×	×	○
			Transducer with temperature measuring function	×	×	○

(3)	Number of measuring CHs	4
(4)	Scanning speed	Approx. 0.5 sec/CH: 0 to ± 30000 um/m Approx. 1sec/CH: ± 30000 to ± 300000 um/m Approx. 1 sec/CH: Measurement with transducer with temperature measuring function
(5)	Measured data	Initial unbalance value (zero value) of the strain with no compensation.
(6)	Coefficient calculating function	None
(7)	Bridge excitation	Constant-voltage bridge excitation: Approx. 2 VDC Constant-current bridge excitation: Approx. 5.6 mA (With bridge resistance 350 ohm)
(8)	Measuring range	When measuring strain 0 to ± 300000 um/m (Constant-voltage bridge excitation) 0 to ± 30000 um/m (Constant-current bridge excitation) Temperature measurement with transducer with temperature measuring function: -30.0 to 70.0 °C
(9)	Resolution	When measuring strain 0 to ± 30000 um/m : 1 um/m ± 30000 to ± 300000 um/m : 10 um/m Temperature measurement with transducer with temperature measuring function: 0.1 °C
(10)	Accuracy	When measuring strain(Full bridge method) 0 to ± 30000 um/m : ±(0.05% rdg +2) um/m ± 30000 to ± 300000 um/m : ±(0.1% rdg +20) um/m Temperature measurement with transducer with temperature measuring function: ±0.5 °C
(11)	TEDS	Reading function from the TEDS sensor CH name writing function (When the manufacture ID is KYOWA)
(12)	Power saving function	Valid after no measurement is conducted for 3 minutes. Capable of selecting ON/OFF of the power saving function with the "OPT. 3" DIP switch.
(13)	Interface	Dedicated interface (CAN-compliant)
(14)	Operating temperature range	-10 to 50 °C
(15)	Operating humidity range	20 to 85%RH (Non-condensing)
(16)	Power supply	11 to 16 VDC
(17)	Consumption current (when operating 12 VDC)	Constant-voltage bridge excitation When measuring: 100 mA or less When waiting: 60 mA or less When waiting: 40 mA or less (with the power saving function) Constant-current bridge excitation When measuring: 70 mA or less When waiting: 60 mA or less When waiting: 40 mA or less (with the power saving function)

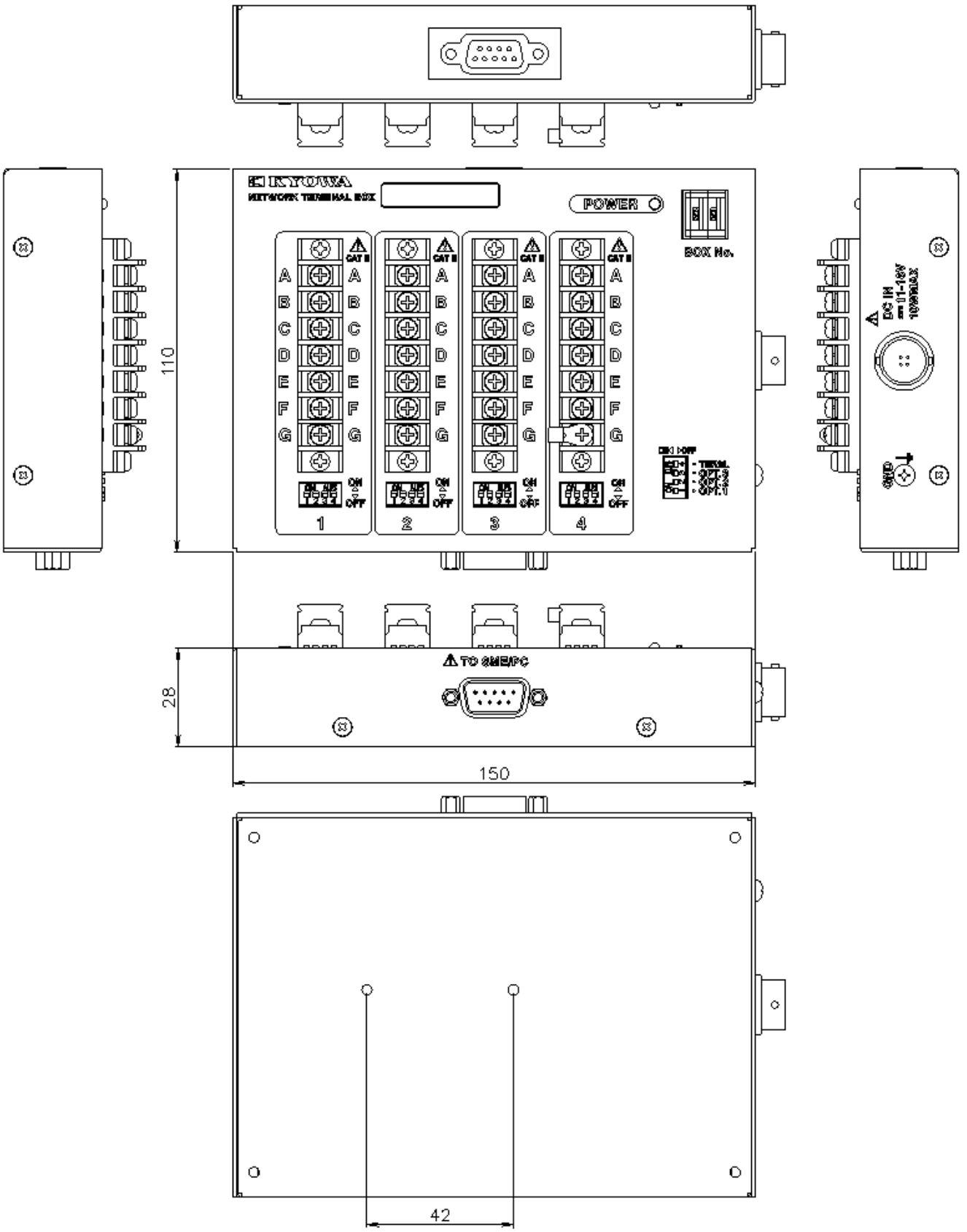
(18)	Dimensions	One-touch lock terminal : 150 (W) × 28 (H) × 55 (D) mm (Protruded portion not included) One-touch terminal : 150 (W) × 28 (H) × 55 (D) mm (Protruded portion not included) Screw solder terminal : 150 (W) × 28 (H) × 110 (D) mm (Protruded portion not included)
(19)	Weight	One-touch lock terminal : Approx. 310 g One-touch terminal : Approx. 310 g Screw solder terminal : Approx. 650 g

10. OUTSIDE DRAWING

10-1 NTB-100A/B-120,NTB-100A/B-350,NTB-110A/B-350



10-2 NTB-101A-120,NTB-101A-350,NTB-111A-350



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