

LINEEYE

DATA LINE MONITOR

LE-170SA

INSTRUCTION MANUAL

《Ver.4 2024.01 》

Introduction

Thank you for your purchase of LE-series.

To use it correctly, you are advised to read and understand this instruction manual thoroughly. Keep this together with the warranty.

If you encounter any problems, you will find helpful information in this manual.



NOTICE

It is prohibited to reprint or duplicate any part of this manual without prior permission from LINEEYE.

The content of this manual and specification of the product is subject to change without any notice.

This instruction manual has been designed and edited with great care to give you all necessary information. If you have any questions, feel free to direct your inquiries to LINEEYE.

LINEEYE makes no warranty or guarantee, either expressed or implied with respect to its quality, performance, merchantability, or fitness for a particular purpose. LINEEYE shall not be liable for direct, in-direct, special, incidental, or consequential damages resulting from any defect in the product. The warranty and remedies set forth above are exclusive and in lieu of all others.



USER LIMITATION

This product has been developed for the purpose of using as an line monitor only.

When you use this product with the following devices that are required to function with a high degree of reliability, safety and accuracy, use it under considering the safe design of the system in order to maintain reliability and safety for that system;

*Devices that are directly related to transportation such as airplanes, trains, cars etc.

*Devices for crime prevention and disaster prevention.

*Each kind of safety devices and so on.

This product has not been developed for the use that needs exclusively high reliability and safety: aerospace apparatus, trunk communication apparatus, nuclear control apparatus, medical apparatus related with life maintenance etc. Therefore, do no use for those purposes.

=== Notice ===

When you dispose of it, please follow the regulation of the region

Safety Information

Read this first!!

This Safety Information includes the following important information in order to not only have you learn the right way to use the line monitor, but also prevent you from causing damage to people and property. Before using, please read the main contents after you understand the following symbols & marks.



Warning

There is a possibility of getting hurt, such as a death or a serious injury



Caution

There is a possibility of getting injured or damaging the product.








Prohibition













necessity



Warning


	* Do not disassemble, modify or repair the line monitor. This may result in an injury, electric shock, and ignition.
	* Do not put the line monitor in a fire or place near the heater. This may result an injury, ignition and explosion.
	* Do not use the line monitor if there is inflammable gas. This may result in ignition and explosion.
	* Turn off the power and unplug the line monitor immediately when emanating smoke or odor. Continuous use may result in an electric shock burn and ignition.
	* Turn off the power and unplug the line monitor immediately when liquid or foreign substance gets into the line monitor. Continuous use may result in ignition, electric shock and malfunction.

 Warning

	<p>* Do not touch the line monitor with wet hand. This may result in an electric shock and malfunction.</p>
	<p>* Do not give a strong impact on the product, such as dropping and crashing.</p>
	<p>* Use the batteries and USB charger which LINEEYE recommends. It may cause the generation of heat, ignition, electric shock and malfunction.</p>
	<p>* Do not use the batteries other than Ni-MH batteries or alkaline batteries. This may result generation of heat, ignition, leaking and malfunction.</p>
	<p>* Do not leave the batteries near children. If drinking them, please go to see your doctor.</p>
	<p>* Please check + / - of the batteries before inserting them. Do not short the electrode of batteries. It may cause the generation of heat, ignition, explosion, leaking and malfunction.</p>
	<p>* Do not charge the Alkali batteries. It may cause leaking, generation of heart, explosion and malfunction.</p>
	<p>* Do not touch the liquid of batteries. It may result in serious injury, such as losing your eyesight. If you touch it, wash out the part first and go to see your doctor.</p>
	<p>* Do not use the new battery and old battery at the same time. Do not use the batteries which are different manufactures. It may cause the leaking, generation of heat, explosion and malfunction.</p>
	<p>* Remove the batteries from the line monitor if you do not use it for a while. It may cause leaking, generation of heat, explosion and malfunction.</p>



Caution

	<p>* Do not place the line monitor in following conditions. It may cause the generation of heat, burn, electric shock, malfunction and degradation.</p> <ul style="list-style-type: none">* Magnetic field or dusty place. Have static electricity.* Temperature or humidity is above the specification.* Temperature is changing rapidly. Have condensation.* Not flat or vibrated place.* Place where leaking water or electricity.* Receive direct sun. Place near the fire or room with hot air. <p> Do not leave the line monitor in the car during a hot summer.</p>
	<p>* Do not use the line monitor near the following devices. The radio emitted from this device (radiation noise) may cause a malfunction of other devices in the following situations.</p> <ul style="list-style-type: none">* Medical devices, such as a heart pacemaker and hearing aid.* Automatic control devices, such as automatic door and fire alarm.* Microwave, high-level electronics, TV, or radio.* Microwave, high-level electronics, TV, or radio.* Wireless station for mobile communications or a specified low power radio station.
	<p>* Do not remove the label of batteries or damage them. It may cause leaking, generation of heat, and explosion.</p>
	<p>* Remove the batteries from the line monitor before throwing it away.</p>
	<p>* Stick adhesive tape on the terminals of batteries before throwing or keeping them.</p>



Warning



* Attention for using the USB charger.

It may cause the generation of heat, burn, electric shock and malfunction.

- * Do not use it above the specification of input.
- * Do not use the broken one.
- * Do not twist the cable or insert it upside down.
- * Do not use it near the heater. Do not heat it itself.
- * Do not disassemble or damage it.
- * Remove the USB cable from the charger after using it.
- * Do not put many loads on one electrical outlet.
- * Insert it well to the electrical outlet.
- * Remove the dust on the AC plug.
- * Unplug the charger if you do not use it.
- * Do not pull the cable when you unplug it.

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Chapter 1 Before Using the Product

1.1 Guide to This Manual


Screen Display Representation

- Printed representation of screen displays in this manual may not be the same as that actually displayed concerning the font and special symbols.
- Descriptions of parts of the screen being displayed are enclosed in double quotation marks “ ”.
- Flashing of the cursor or the like is not represented in this manual.

Representation of the Operating Procedure

- Keys and touch panels are indicated in [].
e.g. Press  → Press [Menu]
- Successive key operation is represented by putting their symbols one after another.
e.g. : Press [Menu], then press [System] to make a selection.
→ Press [Menu][System]
- Pressing two keys at the same time is expressed by combining their symbols with “+”.
e.g. : Press [A] and [B] at the same time. → Press [A]+[B].
- Touch screen is described as “Touch”.
- Touch screen and slide the finger is described as “Swipe”.
- Some details might be omitted if it is not necessary.

1.2 Unpacking

 When you unpack the product, make sure of the following:

- Product has not been damaged during transport.
- You have received all the standard accessories listed below.

• Line Monitor	(LE-170SA)	1
• Dsub 9pin Moutor Cable	(LE-009M2)	1
• 10pin External Input / Outoput Cable	(LE-10ES1)	1
• Micro USB Cable		1
• AA-sized NiMH batteries		2
• Utility CD		1
• Carrying Bag	(LEB-02)	1
• Instruction manual		1
• Warranty, Registration Card		1

Please let us know if you find any damage to the product or accessories lacking.

■ Utility CD

This CD contains the following:

- Manual folder : Instruction manual in PDF format.
- Utility folder : Transferring software for firmware.
- Driver folder : USB driver for line monitor to connect with PC.

1.3 Major Functions and Features

LE-170SA is the handheld data monitor which is useful to develop, test and analyze CAN / LIN communications.

Functions

- ◆ **Monitor**
Monitors communication protocol or data to check for existence of hindrance in the line, or to monitor the communications.

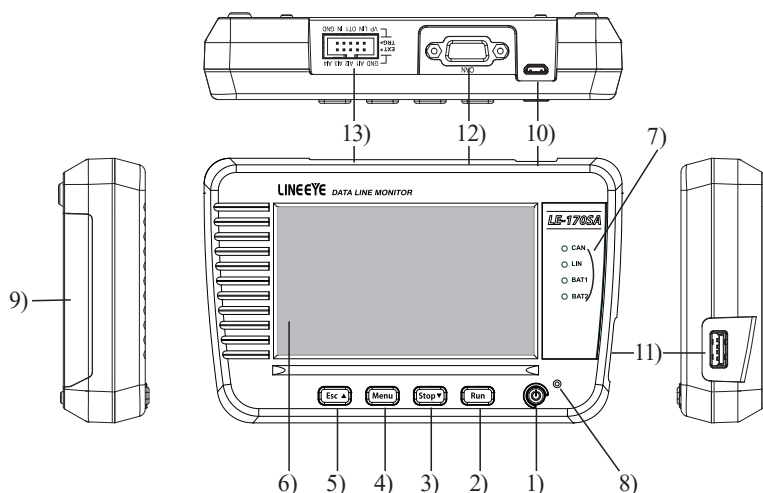
- ◆ **Simulate**
Executes operating transmission of data as communication partner for tested devices / equipment.

Features

- * Display communication data in real time in the 4.3 inch TFT color display.
- * The capacitive touch screen offers easy control by soft touch and swipe.
- * Support 20Kbps to 1Mbps of CAN communications (ISO 11898 conformity).
- * Support 400bps to 26Kbps of LIN communications (ISO 9141 conformity).
- * High resolution of time stamp and idle time are useful for analyzing data.
- * Record the analog value of 4 external inputs, along with communication data.
- * Measured data and configuration can be saved in a USB flash drive.
- * Light-weight (about 300g) handheld body is easy to carry around.
- * Able to select a power supply - USB bus power, Ni-MH batteries, or AA alkaline batteries.

1.4 Explanation of Each Part

[LE-170SA]

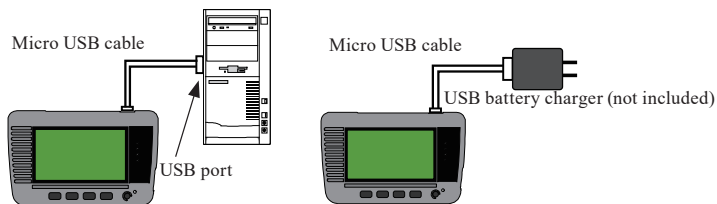


N a m e		F u n c t i o n
1)	Power Switch	Turn on / off the power.
2)	[Run] key	Start monitoring / simulating.
3)	[Stop] key	Stop monitoring / simulating.
4)	[Menu] key	Display the top menu.
5)	[Esc] key	Return to the previous display.
6)	LCD	4.3 inch color LCD with touch panel.
7)	Line State LED	Light in red when signal is active.
8)	Power LED	Light in green when turning on the power. Light in red: battery full charged. Blink in red: Still Charging the battery.
9)	Battery Cover	Open to change the batteries.
10)	USB Device Port	Micro-USB connector. Connect to the USB port of PC or USB battery charger.
11)	USB Host Port	Standard A USB connector. Connect to the USB flash drive.
12)	CAN port	Measurement port for CAN.
13)	LIN / External signal port	LIN port, External signal input / output port.

1.5 Power and Battery

USB Bus Power

Supply power from a PC, or USB charger (option).




Connect attached micro USB cable to the USB device port of line monitor.

Attention:

- Do not use the USB charger which outputs 9V or 12V. (use 5V only)
- Batteries inserted in the line monitor are used when USB bus power is OFF.
- However, do not remove the batteries from the line monitor while using with USB bus power.

Battery Drive

The line monitor is able to run for about 5 hours with attached Ni-MH batteries. For temporary use, it is able to use AA-size Alkali batteries (LR6) and run for about 2 hours.

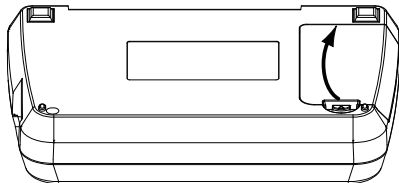
-  The running time is just a standard time. It might be different if using batteries of different manufactures.

< Attention for Alkali batteries >

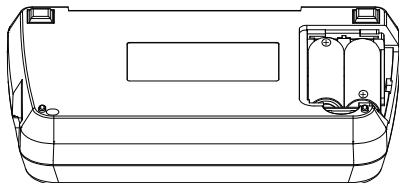
Please follow the instruction. It may cause leaking and damaging the batteries.

- * Use Alkali batteries for temporary use. Put back the Ni-MH batteries for normal use.
- * Do not use old and new batteries together at the same time. Do not use the batteries of different manufactures.
- * Change the batteries immediately if remaining quantity of batteries is low.
- * Do not charge the Alkali batteries.
- * Do not touch the liquid of batteries directly. Please go to see your doctor when having it on your body.

- To insert the batteries
- 1) Pull up the battery cover.



- 2) Insert two batteries. Positive pole of battery has to be inserted to the side where it is labeled.



- 3) Put back the battery cover.

Charge Ni-MH Batteries




As a factory setting, the line monitor cannot charge Ni-MH batteries to prevent charging Alkali batteries by mistake. You can charge them using the Ni-MH battery charger for AA-size.

LINEEYE confirms the performance of Ni-MH battery chargers: “BQCC23” and “BQCC55” of Panasonic. “TNHC-34SMC” and “TNHC-34HBC” of Toshiba.

■ Charge Ni-MH batteries by the line monitor

Change the settings of line monitor to charge Ni-MH batteries.

→ 2.6 Settings for Charging Batteries

-  There is a natural discharge on the batteries. If you do not use the line monitor for a while, remove the batteries from the line monitor. We recommend charging the batteries one in a year.
-  LINEEYE and our distributors are able to supply spare batteries.
-  We do not warrant the batteries.

Chapter 2 Basic Operation and Set-Up

2.1 Power Source ON

Press the power switch and following screens will be displayed.



- ☰ If “Self Check NG” is displayed, it is necessary to have a repairing.
- ☰ Press the power switch for a while to turn off the power.

After a few seconds, data screen window will be displayed.

- ☰ Or press [Esc] to go to the data screen window.

2.2 Operation

There are 5 keys and touch panels to control the line monitor.

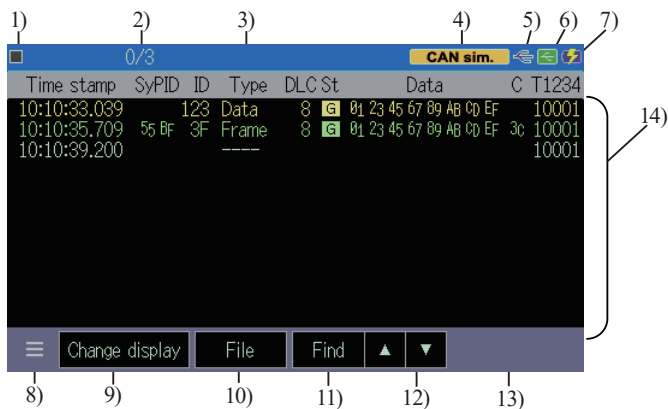
Touch panels enable to select settings by soft touch or to scroll the display by swipe.



- ☰ Pressing two (three) keys at the same time has a special function.

e.g. : [Menu]+[Esc] → 5.6 Save a Screen Image
[Esc]+turn on the power → 10.1 How to make it back to default state
[Stop]+[Run]+turn on the power → 10.2 Update Firmware

2.3 Data Display window



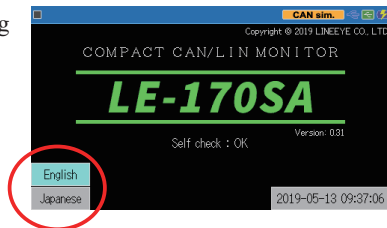
1)	Measuring [], Pause []
2)	Position of data / all data. Able to input the position of data.
3)	Other status.
4)	Selected Mode [CAN / LIN] : Monitor CAN / LIN [CAN sim] : Simulate CAN [LIN master] : LIN master simulation [LIN slave] : LIN slave simulation
5)	Status of USB device mode (Green: Connected)
6)	Status of Host port (Green: Connected) ^(*)
7)	Level of remained battery. [] indicates "bus power"
8)	Display more items.
9)	Change display mode of measured data. Data display -> Analog display of external input.
10)	Stop updating data on the display while measuring. Save data or read files.
11)	Selected data code. Change data code.
12)	[] : Search earlier data. [] : Search later data.
13)	Read the data table for simulation.
14)	Other operations.

* 1 : It becomes in red while accessing to the USB flash drive.

2.4 Languages (Japanese / English)

It is able to select a language (Japanese / English).

Select a language from opening screen.

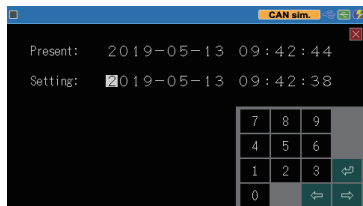



2.5 Date and Time Setting

Set date & time in the line monitor correctly. Timestamp information will be used for the measured data and saved file names.

Touch the display of date and time. (e.g. : 2018-09-10 09:07:31) from the opening screen to set the date and time.

You can also the display of data and time from pressing [Menu] key.



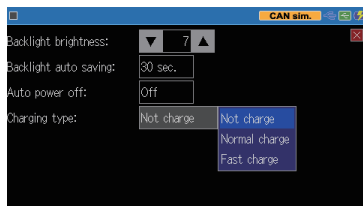
Use [0]-[9] keys and [→][←] keys to set the time and touch[] to apply it.

Batteries and inner condenser keep the time information. If your remove the batteries from the line monitor for a while, the time information will go back to “2018/01/01” as an initial setting.

2.6 Settings for Charging Batteries

As a factory setting, the line monitor cannot charge Ni-MH batteries to prevent charging Alkali batteries by mistake. Change the settings of line monitor to charge Ni-MH batteries.

Supply the USB bus power to the line monitor and then press [Menu] → [System Settings] and select [Charging type]




Not charge : Do not charge anything. Set this if using Alkali batteries.

Normal charge : Charge 70-90% of Ni-MH batteries in about 12 hours. Set this if charging from USB port of PC.

Fast charge : Charge 70-90% of Ni-MH batteries in about 4 hours (turn off the power of line monitor). Set this if charging from optional USB charger. If turn on the power of line monitor, it works almost same as “Normal Charge”.

→ 1.5 Power and Battery

 The line monitor cannot charge 100% of Ni-MH batteries. To charge them full, you need to use the Ni-MH battery charge for AA-size.

LINEEYE confirms the performance of Ni-MH battery chargers: “BQCC23” and “BQCC55” of Panasonic. “TNHC-34SMC” and “TNHC-34HBC” of Toshiba.

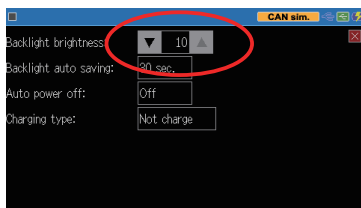
--- Attention before charging Ni-MH batteries ---

- * Do not insert any Alkali batteries in the line monitor when selecting “Normal Charge” and “Fast Charge”.
- * “Fast Charge” exceeds the ability of USB bus power of USB 2.0 port. Therefore, do not connect to the USB port of PC while selecting “Fast Charge”.

2.7 Adjust LCD Back Light

It is able to adjust the brightness of LCD back light.

Press [Menu] → [System setting] → [Backlight brightness] and adjust the brightness using [▼] [▲] keys.



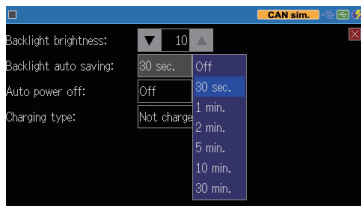
- While holding down [Menu], press [Run] to make the screen lighter or press [Stop] to make the screen darker. Make sure you press two keys at the same time, otherwise measurement will be started or stopped.
- Brighter the screen consumes more electricity.

→ 2.8 Power saving Mode

2.8 Power saving Mode

Using power saving mode extends the battery running time of line monitor.

Press [Menu] → [System Settings] → set [Backlight auto saving] and [Auto power off].

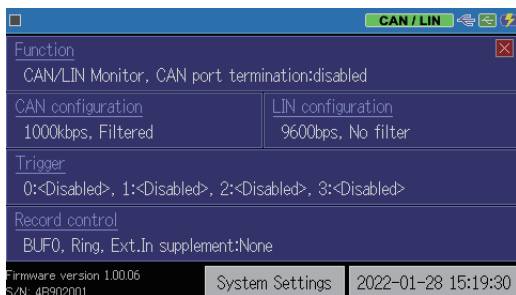


- Backlight auto saving**
The LED backlight will be darker after the setting time to save power consumption.
Press any button to go back to the normal brightness. Initial setting is one minute.
 - Auto power off**
Turn off the power of line monitor automatically if there is not any operation on the line monitor. Selection are Off (initial setting), 5, 10, 30 or 60 minutes.
- This setting will not be work while measuring communications.

Chapter 3 Basic Settings




3.1 Setting Menu

Press [Menu] to set basic settings.



- Function : Select a function of line monitor.
- CAN Configuration : Set the CAN communication conditions.
- LIN Configuration : Set the LIN communication conditions.
- Trigger : Select trigger factors and actions. Set the timer / counter for trigger function.
- Record Control : The setting of how to use the capture buffer, recording condition of the external input, Auto save function, Auto backup function, and Auto measurement condition.

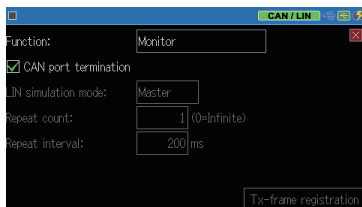
Select an item and set details.

-  Touch [System setting] to set a power saving mode and battery charging type.
-  Touch the time display in the right bottom, (e.g.) [2019-05-13 09:37:27], to set date and time.
-  Firmware and serial number are displayed in the left bottom.

3.2 Functions

Touch [Menu] → [Function].

Select a function according to the target device and interface.



■ Function

Monitor : Monitor send / receive data between CAN or LIN devices.

→ Chapter 5 Monitor Function

CAN Simulation : Simulate CAN test data.

→ Chapter 6 Simulation Function

LIN Simulation : Simulate LIN test data.

→ Chapter 6 Simulation Function

■ Terminal Control of CAN

Mark on the box of “CAN port termination” to have the terminal control for CAN port.

■ LIN Simulation Mode

Select the master or slave mode.

■ Repeat count

Set the number of times to simulate the LIN test frames.

☰ Set “O” to send the test frames repeatedly.

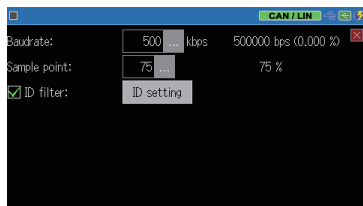
■ Repeat interval

Set the interval (1 to 99999 ms) of sending test frames for LIN simulation.

3.3 CAN Configuration

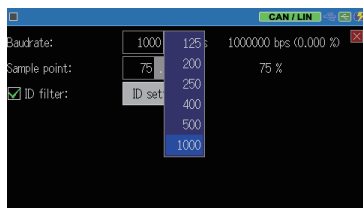
Communication conditions have to be set according to the target devices.

Press [Menu] → [CAN Configuration].



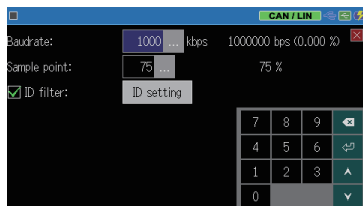
■ Speed

Touch [...] and select a preset speed. If appropriate speed cannot be found in the preset speed, it is able to type any speed using [0]-[9] keys.



Touch [↵] to apply the setting.

On the right side of the set speed, a tolerance percentage will be displayed.



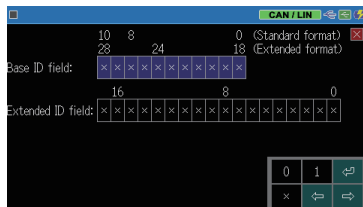
☰ If the actual speed is much different, the line monitor may not be able to monitor properly.

■ Sample Point

Touch [...] and select the sample point from 60% to 90%. If appropriate sample point cannot be found, it is able to type any number. Then, the actual sample point will be displayed on the right side.

■ ID Filter

Set the ID filter to capture the specific ID frames. Touch [ID filter] and set the ID in decimal. It is possible to set the “don't care (X)”.



3.4 LIN Configuration

Communication conditions have to be set according to the target devices.

Press [Menu] → [LIN Configuration].

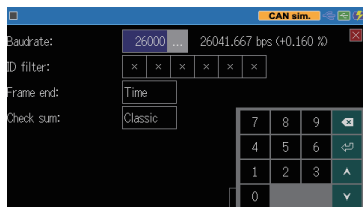


■ Speed

Touch [...] and select a preset speed. If appropriate speed cannot be found in the preset speed, it is able to type any speed using [0]-[9] keys. Touch [Enter] to confirm the speed.



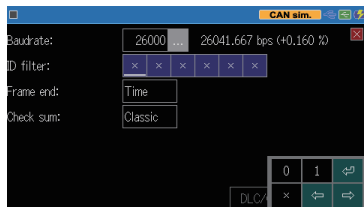
Touch [Enter] to apply the setting. On the right side of the set speed, a tolerance percentage will be displayed.



📖 If the actual speed is much different (more than 3%), the line monitor may not be able to monitor properly.

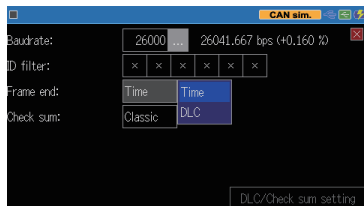
■ ID Filter

Set the ID filter to capture specific ID frames. Touch [ID filter] and set the ID in decimal. It is possible to set the “don't care (X)”.



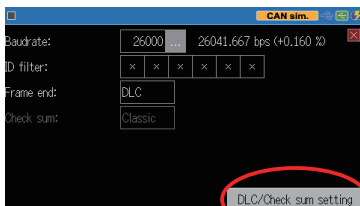
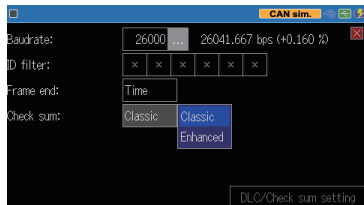
■ Frame End

Select the type of frame end from “Time” and “DLC (Data Length Code)”.

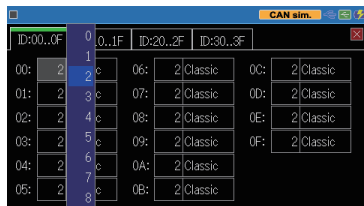
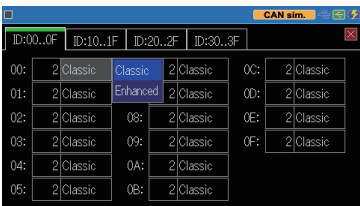


■ Checksum

If selecting “Time” for frame end, select the checksum type from “classic” and “Enhanced”.



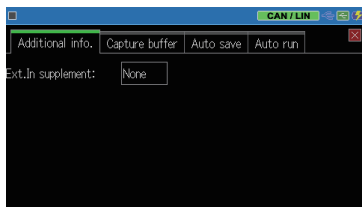
If select “DLC” for frame end, touch “DLC / checksum setting” and set the checksum type and DCL for each ID.



3.5 External signal sampling method

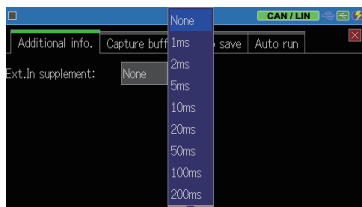
You can set the capture timing of four external signals that can be input from the external signal port.

Press [Menu], then touch [Record Control] of the setting items, and then select [Additional info.] tab to set them.



■ Recording area

Touch the current set item and touch one of the displayed options to set it.



None : Records the state of the external signal when a CAN / LIN frame is received.

1ms~10 sec. : In addition to when a CAN / LIN frame is received, the status of the external

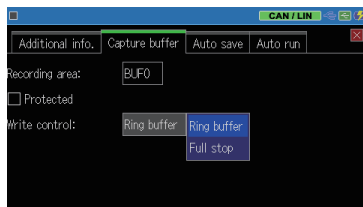
3.6 Capture Memory

LE-170SA has an inner memory of 16Mbyte for about 500K data.

- Each time a CAN or LIN communication frame is received, it uses 32 bytes of memory to record communication data and external signal status. It also uses 32 bytes of memory for each cycle of an interpolate measurement of external signals when it occurs.

→ 3.5 External signal sampling method

Press [Menu], then touch [Record Control] of the setting items, and then select [Capture buffer] tab and touch the current set item to select it.



■ Recording area

Whether an inner memory is used as one capture buffer (BUF0) or two capture buffers (BUF1 / BUF2) can be selected. BUF1: Inner memory is divided in two and used the first half (second half for BUF2).

Mark on “Protected”, if you do not want to overwrite data.

■ Write control

Ring buffer : Data will be overwritten from the beginning of capture buffer. In short, old data will be deleted.

Full stop : The operation will stop as soon as a memory capacity is full.

3.7 Auto Save Function (automatic saving)

The monitored data in the capture memory can be automatically saved in the USB memory continuously as a measurement log file (auto save file) of the specified size for a long time. Since it can be divided into multiple files and recorded, the monitored data can be narrowed down and analyzed from the time stamp of the auto save file which was automatically saved during the communication failure time zone.

Preparation and Setting

Insert a USB flash memory to this device.

Press [Menu], then touch [Record control] and [Auto save] in order and then touch the current set item of [Auto save] to set it.

■ Auto Save


Set the condition of the Auto save function.

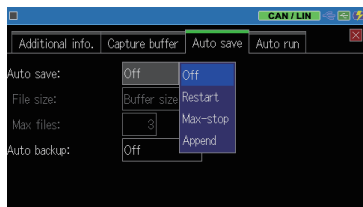
Off : The function does not work.

Restart : Continuous ring recording of auto-save files within the maximum number of files

Max-stop : Saves auto save files up to the specified number of files and stops measurement

Append : Continuous ring recording from the file of the file number next to the existing auto save file number

 The auto-save file name that is automatically saved is # XXXXXXXX.DT (XXXXXXX is a serial number that increases by 1 in order from 0000000).



Note:

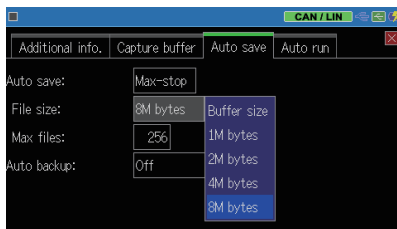
- When "Restart" or " Max-stop" is set, all existing auto save files are deleted at the start of measurement.
- When saving a long-time measurement log with the auto save function, set the main unit capture memory to the ring buffer. Also, make sure that no trigger conditions to stop the measurement have been set.

→ 3.6 Capture Memory

→ 7.3 Trigger setting

■ File size

Specify the file size of the auto save file from "buffer size", 1M bytes, 2M bytes, 4M bytes, and 8M bytes. The "buffer size" is the same as the capture memory size.



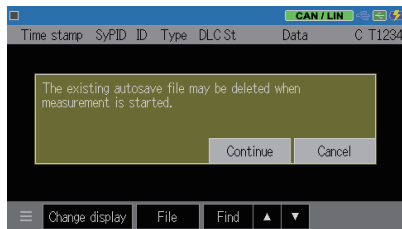
■ Max files

Set the maximum number of auto-save files to be automatically saved.

- 📄 You can set from 1 to 256. However, the file size x maximum number of files is limited to 4GB. Normally, set 3 or more.
- 📄 Even if the storage device has free space, it may not be able to save up to the specified number of files due to media restrictions.
- 📄 When it is set to record 256 8-Mbyte auto-save files, the communication log for about 18 hours can be recorded even for a communication line in which CAN / LIN communication frames are always transmitted at 1 msec intervals.

Start Measurement


At the start of measurement with [RUN], an overwrite confirmation message is displayed if there is an auto save file in the USB memory. As it starts measurement if you touch [RUN] or “Continue”, when you need to save the existing auto save file, stop it with [STOP] and save it on the HDD of your computer etc.



After the measurement starts, every time the specified amount of data is recorded in the capture memory, the auto save file is continuously saved in the USB memory. When the operating condition is "Append" or "Restart", if the number of auto-save files exceeds the specified maximum file number during file recording, or if the free space of the storage device is insufficient, the old file (auto save file which has the lowest number in its file name) is deleted before the new file is saved.

Measurement Stop

Click [STOP] to stop the measurement. When the operating condition is "Max-stop", the measurement automatically ends when the number of auto save files reaches the specified maximum number of files or when the free space of the USB flash memory is exhausted.

-  When you press [STOP] to finish the measurement, "Under cleanup" is displayed until the saving process of the measurement data into the auto save file is completed.

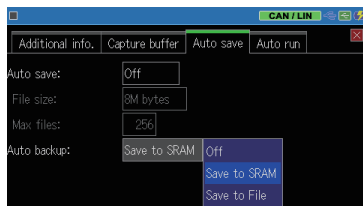
Note:

- When using the auto save function, use a bus-powered power supply and take sufficient care not to cause a power failure beyond the battery operating time. When the battery is insufficiently charged if the power is turned off during the auto save it may cause file corruption or storage device failure.
- Never remove the storage device while auto-save is being executed, including when "Under cleanup" is displayed, as it may make the entire storage device inaccessible, not just the files.

3.8 Auto Backup

Data in the capture memory will be deleted when turning off the power of line monitor. “Auto backup” function can save measured data in the USB flash drive automatically after the measurement.

Press [Menu], then touch [Record control] and [Auto save] in order, and then touch the current set item of [Auto backup] to set it.



Off No auto backup.

Save to SRAM The last measured data for about 30K byte are saved in the inner SRAM. This data will be loaded automatically to the capture memory when turning on the power of line monitor.

Save to File Save measured data in the USB flash drive automatically after the measurement. The name of file will be “@AUTOBU0.DAT”. “n” represents the Buffer number (BUF0 / BUF1 / BUF2) which you currently use.

📄 If the line monitor cannot receive enough power supply while recording, it may loose some data.

3.9 Automatic Measurement Function (Auto Run)

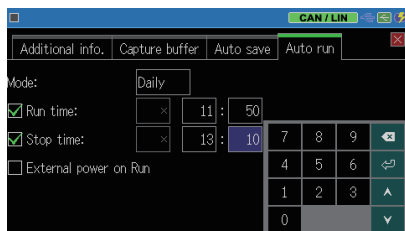
By using the automatic measurement function, you can automatically repeat the measurement for the specified period by specifying the date and time of the start and end of the measurement. It is also possible to start the measurement when the power is turned on and automatically end the measurement at the specified date and time.

Setting

Press [MENU], then touch [Record control] and [Auto run] in order and then touch each item to set them.

■ Mode

Select the measurement repetition period from monthly (run monthly), daily (run daily), and hourly (run hourly).




■ Run time

Set the date and time of measurement start according to the mode. It becomes effective when checked.

■ Stop time

Set the date and time of the end of measurement according to the mode. It becomes effective when checked.

 “Run time” and “Stop time” can be used by checking one/two of them.

■ External power Run

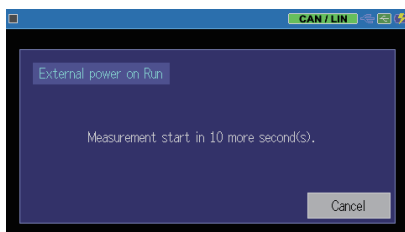
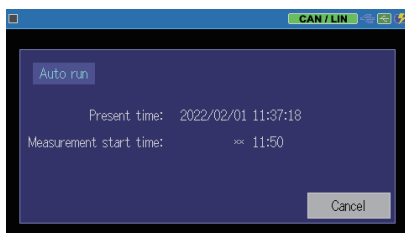
When checked, the measurement will start 10 seconds after the start of USB bus power supply. It is used when you want to start measurement in conjunction with turning on the external power supply.

Operation

When "Run time" is checked, press [RUN] to enter the measurement standby state until the specified time comes. To cancel the standby state, touch [STOP] or "Cancel". Measurement starts automatically at the specified time, and when

"Stop time" is checked, measurement is performed until the specified time and measurement is automatically stopped at the time.

This operation is repeated according to the "Mode" specification. When "External power Run" is checked, the power is automatically turned on when USB bus power supply is started while the power of this unit is off, and 10 seconds later it automatically starts the measurement without pressing [RUN] .

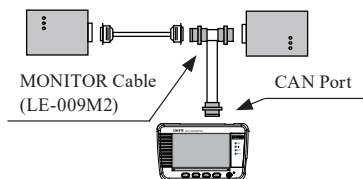
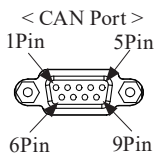


 This function does not work when USB bus power is continuously supplied.

Chapter 4 Connect to the Target Devices

4.1 Connect to CAN interface

Connect the CAN port of analyzer and target device using the attached monitor cable.



Dsub 9-pin male, inch screw #4-40				
Pin	Signal name	Input / output ^{*1}		Description
		Monitor	Simulation	
1	-	-	-	Non-use
2	CAN-	I	I / O	CAN bus signal
3	GND	-	-	Signal ground
4	-	-	-	Non-use
5	FG	-	-	Field ground
6	-	-	-	Non-use
7	CAN+	I	I / O	CAN bus power
8	-	-	-	Non-use
9	PWR	I	I	CAN bus Power ^{*2}

*1 : "I" indicates "input to analyzer" and "O" indicates the "output from analyzer".

*2 : LED of "BAT1" lights when using the bus power.

When the signal arrangement of the DSUB 9-pin is different, please use a conversion terminal block, etc.

Terminal block for DSUB 9-pin (screwless)

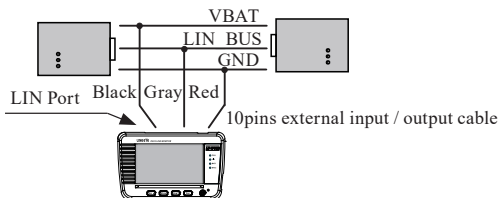
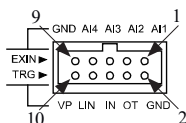
Sold separately (optional). Model number: LE-9TB



4.2 Connect to LIN interface

Connect the LIN port of analyzer and target device using the attached cable (10 pin external input / output cable) or optional cable (5-lines probe cable, “LE-5LS”).

< LIN Port >



MIL box type 10pin cable ^{*1}					Cable color ^{*2}	
Signal name	Description	Pin	Input / output ^{*3}		LE-10ES1	LE-5LS
			Monitor	Simulation		
A11	External Input1 ^{*4}	1	I	I	Brown	Brown
A12	External Input2 ^{*4}	3	I	I	Orange	Red
A13	External Input3 ^{*4}	5	I	I	Green	Orange
A14	External Input4 ^{*4}	7	I	I	Purple	Yellow
GND	Signal Ground	9	-	-	White	Green
GND	Signal Ground	2	-	-	Red	
OT	External Trigger Output	4	O	O	Yellow	
IN	External Trigger Input	6	I	I	blue	
LIN	LIN bus signal	8	I	I / O	Gray	
VP	LIN bus power ^{*5}	10	I	I	Black	

* 1 : 2 lines.2.54mm pitch. Equivalent to “HIF3FC-10PA-2.54DS(71)” of HIROSE Electric. CO., LTD.

* 2 : Lead colors of attached cable (LE-10ES1) and optional cable (LE-5LS).

* 3 : “I” indicates “input to analyzer” and “O” indicates the “output from analyzer”

* 4 : Analog voltage range: 0 – 52V (AD resolution 12bit)
Digital logic: VIH2.3V (Min.) / VIL 0.8V (Max.)

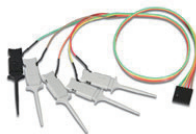
* 5 : LED of “BAT2” lights when using the bus power.

10pins external input / output cable
accessory : LE-10ES1



length 300mm

5lines probe cable (LE-5LS)
Option : LE-5LS



length 360mm

To use the analyzer near the device easily affected by radiation noise, use the shielded cable or add the ferrite core.

Chapter 5 Monitor Function

5.1 Overview

Monitor function records communication data in the capture buffer without affecting the communication line. Communication data is displayed with time stamp, external analog input signal and external trigger signal at real time.

There is the trigger function which controls the operation of measurement when the function detects the specific status, and the search function which find specific data in the capture memory.

5.2 Start and Stop Monitoring

Setting and Connection

Set the communication conditions for monitoring.

Connect the line monitor and target devices.

→ 3.2 Functions


→ 3.3 CAN Configuration

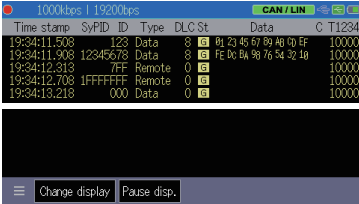
→ 3.4 LIN Configuration

→ Chapter 4 Connect to the Target Devices

Start Monitoring

Press [Run] to start monitoring.

“” will be displayed in the upper left. Measured data is displayed at real time and record data in the capture.



Time stamp	SyPID	ID	Type	DLC	St	Data	C
19:34:11.508	123		Data	8	0	01 23 45 67 89 00 0F	10000
19:34:11.908	12345678		Data	8	0	FE 00 00 00 76 54 32 10	10000
19:34:12.313	FFF		Remote	0	0		10000
19:34:12.708	1FFFFFFF		Remote	0	0		10000
19:34:13.218	000		Data	0	0		10000

Change display Pause disp.

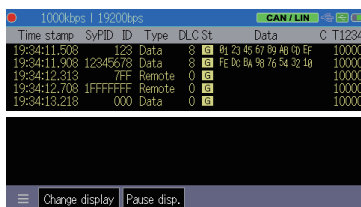
Stop Displaying Data

Touch [Pause disp.] in the bottom or press [Esc] to stop displaying data while measurement are still going. The displaying color of [Pause disp.] becomes in green. To cancel this operation, touch [Pause disp.] or [Esc] key again.

Change Data Format

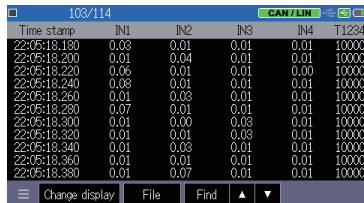
Touch [Change display] in the bottom to change the data format. Data format is selectable from “Communication data” and “analog data of external input”.

[Communication Data]



Time stamp	SyPID	ID	Type	DLC	St	Data	C
19:34:11.508	128		Data	8		FE D3 46 67 80 49 09 EF	10000
19:34:11.908	12345678		Data	8		FE D3 BA 98 76 54 32 10	10000
19:34:12.313	7FF		Remote	0			10000
19:34:12.708	1FFFFFFF		Remote	0			10000
19:34:13.218	000		Data	0			10000

[Analog data of external input]



Time stamp	IN1	IN2	IN3	IN4	T1234
22:05:18.180	0.03	0.01	0.01	0.01	10000
22:05:18.200	0.01	0.04	0.01	0.01	10000
22:05:18.220	0.06	0.01	0.01	0.00	10000
22:05:18.240	0.08	0.01	0.01	0.01	10000
22:05:18.260	0.01	0.03	0.01	0.01	10000
22:05:18.280	0.07	0.01	0.01	0.01	10000
22:05:18.300	0.01	0.00	0.03	0.01	10000
22:05:18.320	0.01	0.01	0.03	0.01	10000
22:05:18.340	0.01	0.03	0.01	0.01	10000
22:05:18.360	0.01	0.01	0.01	0.01	10000
22:05:18.380	0.01	0.07	0.01	0.01	10000



Each data is displayed in specific colors. CAN frame -> yellow. LIN frame -> green. External input data -> white

Display	Description												
Time stamp	Time of receiving frames (H / M / S / ms) : Matched with trigger condition												
SyPID	Sync byte field and Protected ID field of LIN (in HEX).												
ID	Standard / expansion ID of CAN, or LIN frame ID (in HEX).												
Type	Frame type. <table border="1"> <tbody> <tr> <td>Data</td> <td>Data frame of CAN.</td> </tr> <tr> <td>Remote</td> <td>Remote frame of CAN</td> </tr> <tr> <td>Frame</td> <td>Frame of LIN.</td> </tr> <tr> <td>Illegal</td> <td>Illegal frame of LIN</td> </tr> <tr> <td></td> <td>Unknown data on the LIN bus.</td> </tr> <tr> <td>----</td> <td>Supplemental data for external input.</td> </tr> </tbody> </table>	Data	Data frame of CAN.	Remote	Remote frame of CAN	Frame	Frame of LIN.	Illegal	Illegal frame of LIN		Unknown data on the LIN bus.	----	Supplemental data for external input.
Data	Data frame of CAN.												
Remote	Remote frame of CAN												
Frame	Frame of LIN.												
Illegal	Illegal frame of LIN												
	Unknown data on the LIN bus.												
----	Supplemental data for external input.												
DLC	Data length code of CAN, or DL set in the LIN configuration (in decimal). (If frame end time is set as “time” in LIN Configuration, this will not be displayed.)												
St	Frame status. <table border="1"> <tbody> <tr> <td></td> <td>Normal frame.</td> </tr> <tr> <td></td> <td>Sync Byte Field error of LIN (other than 55h).</td> </tr> <tr> <td></td> <td>Parity error of LIN.</td> </tr> <tr> <td></td> <td>Long data error of LIN.</td> </tr> <tr> <td></td> <td>Non-response data of LIN (less than 1 byte)</td> </tr> <tr> <td></td> <td>Checksum error of LIN.</td> </tr> </tbody> </table>		Normal frame.		Sync Byte Field error of LIN (other than 55h).		Parity error of LIN.		Long data error of LIN.		Non-response data of LIN (less than 1 byte)		Checksum error of LIN.
	Normal frame.												
	Sync Byte Field error of LIN (other than 55h).												
	Parity error of LIN.												
	Long data error of LIN.												
	Non-response data of LIN (less than 1 byte)												
	Checksum error of LIN.												

Data	Data field (in HEX).
C	Checksum of LIN (HEX).
T1234	External trigger or external inputs (0: Low, 1:High)

Other display

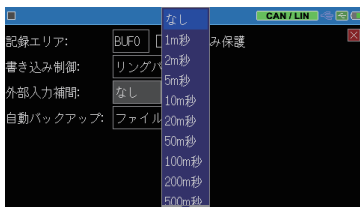
: Hex data in red color stands for the framing error.

-  For CAN it can monitor only normal frames. Please note that error frames such as ACK error and CRC error are not captured.
-  The logic of the external signal is always recorded every time a communication frame is received.


→ 3.5 External signal sampling method


■ Supplemental Data for External Input

Touch [Record control] ->[Ext. In supplement]. Set the interval of receiving the external input. Selecting “None” records data of external trigger input or external input only when receiving any frames.



Stop Monitoring

Press [Stop] to stop monitoring. “” will be displayed in the upper left.

-  It is able to stop monitoring automatically by setting the trigger condition and capture memory (when capture memory is full).

→ 3.6 Capture Memory

→ Chapter 7 Trigger Function

5.3 Scroll

Once the measurement ends, the latest captured data is displayed on the screen. To check the previous data, you can scroll the data.

■ Scroll Data

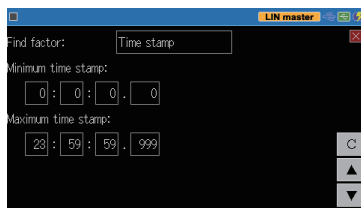
Swipe your finger on the screen to scroll data.

5.4 Retrieval Function

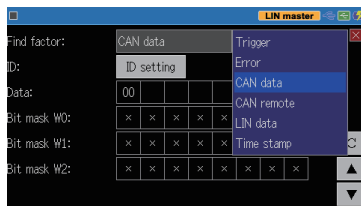
The retrieval function enables you to find specific data among the vast amount of data in the capture memory. It also enables you to count the number of data which satisfies a particular conditions.

Setting of Retrieval Condition

Touch [Find] and it will be changed in green. Touch [Find setup]



Select a find factor from the list.



Trigger ^{*1}	Data satisfied with the trigger condition.
Error	Various LIN errors.
CAN data ^{*2*3}	Specific CAN data frames.
CAN remote ^{*2*3}	Specific CAN remote frames.
LIN data ^{*2*3}	Specific LIN remote frames.
Time stamp	Data during the specified time stamp.

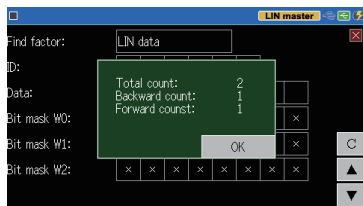
*1: Invalid if the trigger condition is “timer / counter”.

*2: “don’t care (X)” can be set.

*3: Bit mask (W0, W1, W2) can be set.

Touch [▲] or [▼] in the right bottom to display the matched data.

Touch [C] to count the number of matched data.



Retrieve

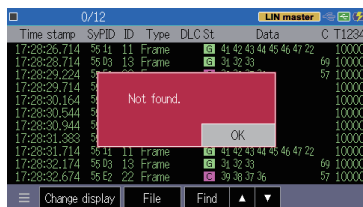
Touch [▲] or [▼] in the right bottom to start the retrieval.

[▲] [Esc] : The retrieval is executed from the head in the screen to the backward (older data) direction.

[▼] [Stop] : The retrieval is executed from the head in the screen to the forward (newer data) direction.

Upon a complete retrieval, data which satisfies the condition is displayed at the top of the screen.

“Not found” is displayed if nothing found.



5.5 LED display

LED lights tell the type of commutation and bus power.


LED	Signal	Level	Light
CAN	CAN data	recessive	OFF
		dominant	ON
LIN	LIN data	recessive	OFF
		dominant	ON
BAT1	VBAT of CAN	more than 8.0V	ON
		less than 4.8V	OFF
BAT2	VBAT of LIN	more than 8.0V	ON
		less than 4.8V	OFF

5.6 Save a Screen Image

Screen images can be saved in a USB flash drive.



Operating Procedure

- 1) Insert a USB flash drive into the line monitor, and turn on the power of line monitor.
- 2) Display the data in the screen.
- 3) While holding down [Menu], press [Esc].
“SCRNSHOT” folder will be made in the USB flash drive and the data is saved in the bit map format. The file name will be the date and time of the measurement. (DDHHMMSS.BMP)
 e.g.) Day: 8, Hour: 14, Min: 56, Sec: 21 → 08145621.BMP.

Saved file can be used in some PC software (Paint, Pixia etc).

Chapter 6 Simulation Function

6.1 Overview

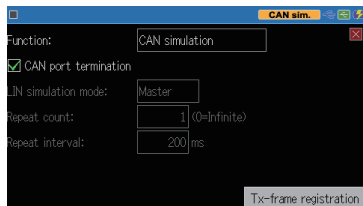
When you do not have communication partner for your development, the line monitor plays the role and can send / receive the data by this function. You can send the CAN / LIN test frame by this function.

6.2 Registration of Transmission Data

First, configure the simulation condition and transmission data before use it.

<CAN>

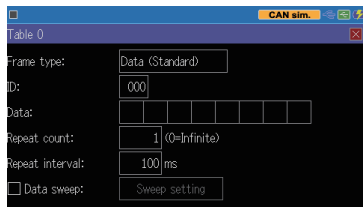
Touch “Function” on [Menu] and select “CAN Simulation” on “Function”. “TX-frame registration” appears, then touch it to display send frame table.



It has 16 types (No.0 to F) of registration area.

No.	Data	ID:000	Data:	Sweep:off
0	Data	ID:000	Data:	Sweep:off
1	Data	ID:000	Data:	Sweep:off
2	Data	ID:000	Data:	Sweep:on
3	Data	ID:000	Data:	Sweep:off
4	Data	ID:000	Data:	Sweep:off

Touch the table number where you want to register the data.



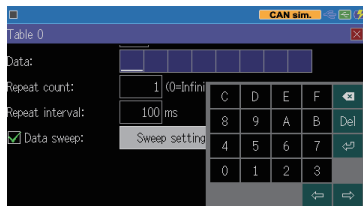
- Frame type
Select the data frame (standard / extended) and the remote frame (standard / extended).
- ID
Set the ID in HEX.

■ Data

Touch [0] to [9] and [A] to [F] to input the transmission data in HEX.

■ Repeat time

Set how much it repeats the transmission of the frame. It keeps repeating the transmission of it when “0” is set.



■ Repeat interval

Set the interval of the transmission from 1 to 99999msec.

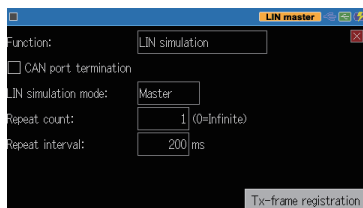
■ Data sweep

By checking here it can sweep the data of transmission.

← 6.3 sweep setting

<LIN>

Touch [Function] of the setting menu display to change the [Function] to “LIN simulation”.



■ LIN simulation mode

Select the mode of the simulation from master or slave.

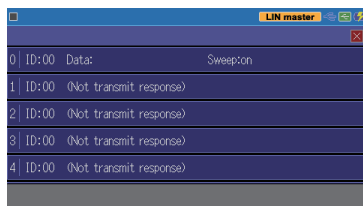
■ Repeat time

Set how much it repeats the transmission of the frame in master mode. It keeps repeating the transmission of it when “0” is set.

■ Repeat interval

Set the interval of the transmission in master mode from 1 to 99999msec.

Touch [TX-frame registration] to display the table of send frames. It has 16 types (No.0 to F) of registration area.



Touch the table number where you want to register the data.

■ ID

Set the ID in HEX.

■ Transmit response

By checking here it transmits the contents set in “Data” as a response.

■ Data

Touch [0] to [9] and [A] to [F] to input the transmission data in HEX.

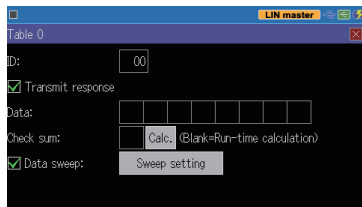
■ Check sum

Set the checksum in HEX. By touching [Calc.] it sets the automatically calculated value.

■ Data sweep

By checking here it can sweep the data of transmission.

← 6.3 sweep setting



6.3 Sweep setting

Touch [Sweep setting] to display the parameter to sweep.

■ Sweep size

Select the data size to sweep from 8 or 16 bit. For 16 bit select the endian from big-endian or little-endian.

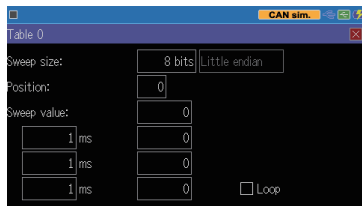
e.g. When setting 0123h.

Little-endian

23	01
----	----

Big-endian

01	23
----	----



■ Position

Set the position to insert a data to sweep from 0 to 7.

e.g. When the size is “16 bit” and the position is “2”.

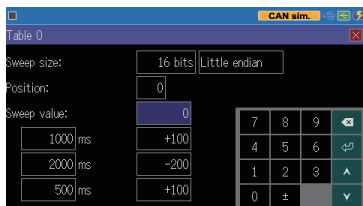
The data in the net sweeps. In addition to the one to sweep it transmits the data set in “Data”.



■ Sweep value

Set the target value on the right. Set the in decimal “initial value”, “first target value”, “second target value”, and “third target value” from top to bottom.

Press [±] to change the symbol of the target value. Negative values are transmitted by 2's complement.



Set the time for sweep.

Set the times needed to change to the “first target value”, “second target value”, and “third target value” in millisecond from top to bottom.

With the setting in the display, it argument from 0 (initial value) to 100 in 1 second and then diminish it to -200 in two second. Then it changes the data to 100 in 0.5 second.

When “Loop” is checked it keeps sweeping.

6.4 Start and stop of simulation




Setting and connection check

Check the measurement port selection, “Simulation” setting, and communication condition.

- 3.2 Functions
- 3.3 CAN Configuration
- 3.4 LIN Configuration
- Chapter 4 Connect to the Target Devices

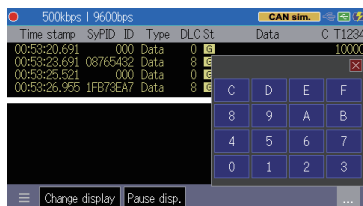
Start the communication test

Press [RUN] to start measurement and then it is ready to transmit a test data.

“”appears on the top line of the display.

<CAN>

Press [Menu] or touch [...] on the bottom to display the transmission frame selection window. Press [0] to [F] to select the frame to sent. While repeated transmission the buttons are highlighted and you can stop repetition by touching it again. Press [Esc] or touch [...] again to close the window and back to the display.



<LIN>

■ Master mode

Press [Menu] or touch [...] on the bottom to display the transmission frame selection window. Press [0] to [F] to select the frame to sent. While repeated transmission the buttons are highlighted and you can stop repetition by touching it again. Press

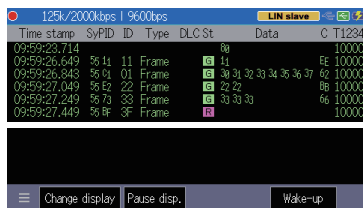
[Esc] or touch [...] again to close the window and back to the display.

■ Slave mode


The response with the ID which corresponds with the header from the master will be sent.

 No data will be sent when no response data is registered.

Touch [Wake-up] to generate the dominant status of 80h byte as a wakeup request.



Stop of the simulation test

Press [Stop] to stop the measurement and “”appears on the top.

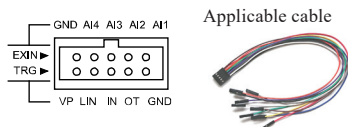
Chapter 7 Trigger Function

7.1 Trigger Function

With the trigger function, the line monitor make specific measurement / control action by the occurrence of a specific factor such as communication error. By controlling the timer / counter it can measure the communication response time or can count how much a specific event occurred. This function is useful to analyze the current of communication by seeing the target condition.

7.2 External trigger input / output

It can use a signal from external devices as a trigger input, or can detect an occurrence of specific factor on the communication line and transmit it to an external analyzer such as an oscilloscope.



Applicable cable

10-pin external I / O cable
LE-10ES1 (same as the attached one)

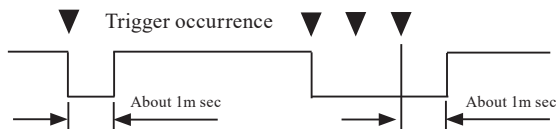
→4.2 Connect to LIN interface

	Signal name	Remarks
IN	External trigger input	TTL level input *1
OUT	External trigger output 1	Open collector output *2

* 1 : +3.3V, 10K Ω pull-up, input voltage range -0.5V to 6.0V

* 2 : +3.3V, 10K Ω pull-up, outputs L pulse of about 1m sec when all the trigger factor occurs.

📄 When a new trigger occurs while trigger pulse output, it turns to be high level after about 1m sec from the last trigger occurrence.

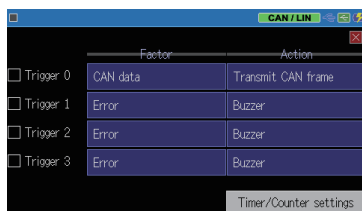


7.3 Trigger setting

You can set the 4 pairs of the trigger factor and the action for it.

Press [Menu] and touch [Trigger] to display the trigger setting display.

Check the box of the trigger to be valid. The valid / invalid condition of the trigger can be controlled by the trigger action while measurement.



Touch the setting display of the factor and action of trigger 0 to 3 to set at each setting display.

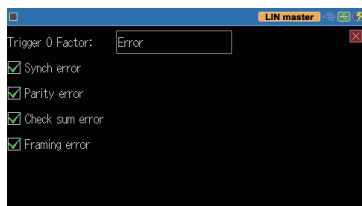
When you use timer / counter on the trigger function, touch [Timer / Counter setting] to set it in advance. → 7.4 Timer / Counter function

Trigger factor setting

Touch the factor of each trigger to select the trigger factor to be specified.

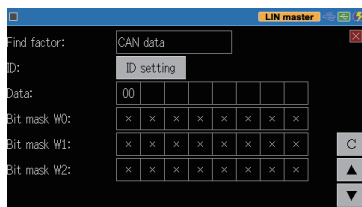
■ Error

Check the one to be selected from LIN synchronous error (the value of the sync-field is other than 55h), parity error, checksum error, or framing error (the stop bit is dominant).



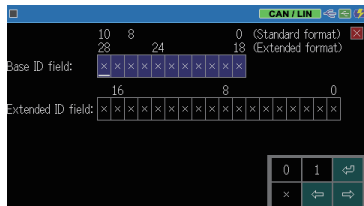
■ CAN data

Set the target for a CAN data frame. ID and the data up to 8 byte can be set. X(Don't Care) and bit mask (W0,W1,W2) can be set too.



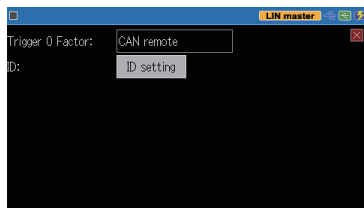
Touch [ID setting] to set the target ID.X(don't care) can be set too.

The standard frame which corresponds with the standard ID and the extended frame which corresponds with the extended ID are to be target.



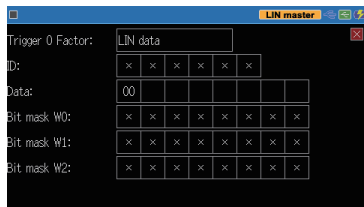
■ CAN remote

Set the target for a CAN remote frame. Touch [ID setting] to set the ID.



■ LIN data

Set the target for a LIN frame. ID and the data up to 8 byte can be set. X(Don't Care) and bit mask (W0,W1,W2) can be set too.

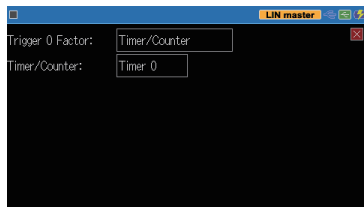


■ Timer / Counter

Set the type to judge the value agreement from the timer or counter.

The value to be compared is needed to be set in advance at the timer / counter setting display.

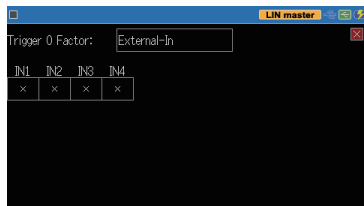
→ 7.4 Timer / Counter function



■ External-In

Specify the detection logic of external input signal by 1(h), 0(L), and X(Don't Care)

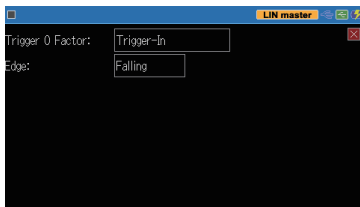
By the AND condition of the all signals, when the condition changes from non-agree to agree the condition meets.



■ Trigger-In

Specify the negative going edge and positive going edge of the external trigger input

- 📄 The hold time more than 100uS is needed.

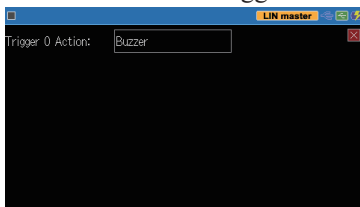


📖 Trigger action setting

Touch the setting display of trigger action to select the trigger action to be specified.

■ Buzzer

It buzzers for about 0.3 second.



■ Stop measurement

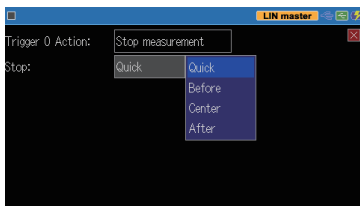
Stops the measurement after the specified quantity of measurement.

Quick : Immediately stops

Before : About 64K data

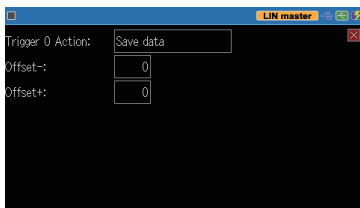
Center : Data of the half of capture memory

After : Data a little bit lesser than quantity of the capture memory



■ Save data

It saves the measurement data of before the trigger (offset -) and after the trigger (offset +) for max 9999 data as "TRGSAVEnn.DT" file(*1) into the USB memory.

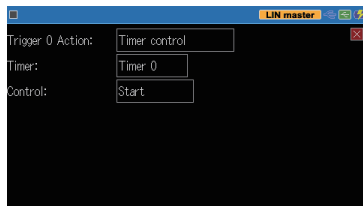


- 📄 The consequent saving process is ignored while saving process. When you stopped the measurement while the saving process the file will not be saved.

* 1 : The “nn” part of the file is automatically named in the order of saving from 00 to 99 and when it passes 99 it overwrites from 00. When you restart the measurement by [Run] the nn part naming starts from 00 and overwrites the older one.

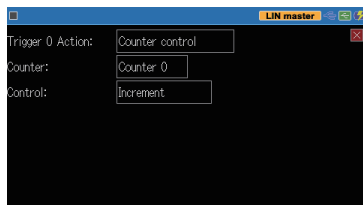
■ Timer control

It starts, stops, or restarts from 0 the specified timer.



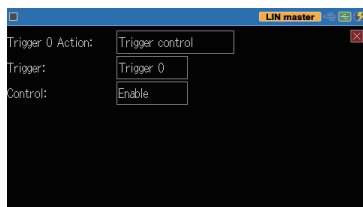
■ Counter control

It increments or clears to 0 the specified counter.



■ Trigger control

It makes the specified trigger factor valid, invalid, or different condition (inverts valid / invalid).

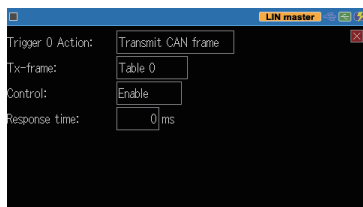


■ Transmit CAN frame

It transmits the specified send table frame after the time specified at “response time” (0 to 99999 ms). This function is valid only in the “CAN simulation mode”.

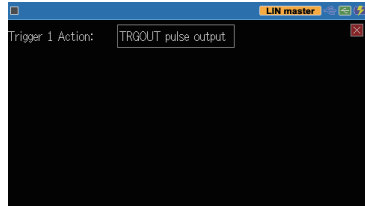
→ Chapter 6 Simulation

Function



📄 The consequent transmission process is ignored while transmission process.

- **TRGOUT pulse output**
It outputs a L pulse of about 1ms to the external trigger output (OUT).



7.4 Timer / Counter function

Timer for use with the trigger function (Timer0 / Timer1), the counter (Counter0 / Counter1), and the counter to count CAN frame / LIN frame (CAN Counter / LIN Counter) are available.

Timer / Counter action

- The action of the timer (Timer0 / Timer1)
 - 1) The counter is cleared to 0 when the measurement starts and turns to be stopped condition.
 - 2) By the trigger action of the trigger function it starts (0 : Start), stops(1 : Stop), or restarts(2 : Restart). It increases the current value of the timer by the preset time resolution when it starts or restarts.
 - 3) The set value for comparison of the timer 0,1 and the agree information of the current value of the timer 0,1 are used as a trigger factor of the timer agree.
 - 4) When the current value overflows, it continues clocking from 0.
 - 5) The timer stops when you stop the measurement.

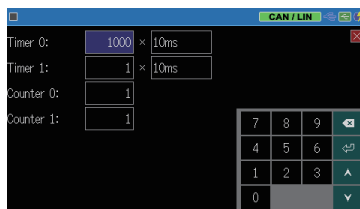
- The action of the counter (Counter0 / Counter1)
 - 1) The counter is cleared to 0 when the measurement starts.
 - 2) By the trigger action of the trigger function the counter is incremented (0 : Increment) or cleared (1 : Clear).
 - 3) The set value for comparison of the counter 0,1 and the agree information of the current value of the counter 0,1 are used as a trigger factor of the counter agree.
 - 4) When the current value overflows, it continues counting from 0.

- The action of the send / receive counter (CAN Counter / LIN Counter).

- 1) The counter is cleared to 0 when the measurement starts.
- 2) The CAN frame is incremented by 1 for each every time when it receive CAN / LIN frame data. (The max value is 4294967295.)

Timer / Counter setting

Press [Menu] and touch [Trigger] of the setting item to display the trigger setting display, then touch [Timer / Counter] to display the setting display. Touch the set value of the timer / counter to set the comparison set value from 1 to 999999 range.

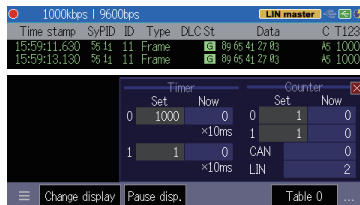


Also touch the time resolution of each timer and touch the option (100ms, 10ms, or 1ms) to set it.

Timer / Counter display

Touch [≡] on the last line of the data display and select [Timer / Counter] to display the timer / counter window.

Touch [X] of the window or touch [≡] again and touch [Timer / Counter] to close the window.





Chapter 8 Data Save and Read

8.1 File Management Function

You can save the measured data or setting data into a USB memory and reload it when you need it.

[Attention]

Do not pull off the USB flash or do not turn off the power of line monitor while it accesses the USB flash as the data and the USB flash will be broken.

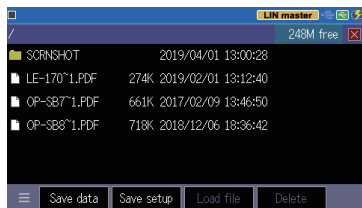
 The red mark appears on the icon of USB host port when it accesses a USB memory. 

■ Usable USB flash

USB2.0 / USB3.0, 1Gbyte to 32Gbyte

Insert the flash to line monitor and touch [File] on the bottom to display the file management display.

You can control the file from this display.

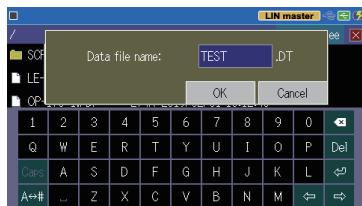


8.2 Save

When you want to save the measured data, touch [Save data] on the bottom of file management display. When you want to save the setting, touch [Save setup].

Input the file name at the display. The following extension is added automatically.

- .DT for measurement data
- .SU for setting data



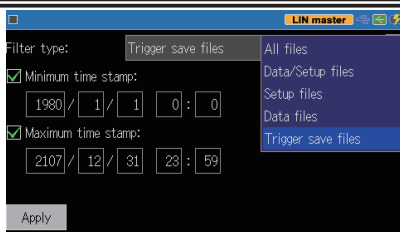
By touching [OK], it starts saving and returns to file management display when it finishes saving.

- ☰ If the data amount to be saved surpasses the available capacity of USB memory it stops saving with an error message. You need to delete a file to make a capacity for the data saving before retry saving.

8.3 Filter Function

You can display the specific files in the file management display.

Touch [☰] on the bottom and select [Filter]. Then select a filter condition.



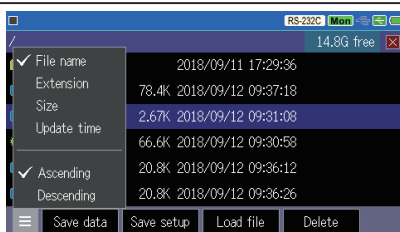
Filer type	Description
All files	All the files
Data / Setup files	Files of .DT and .SU
Setup files	Files of .SU
Data files	Files of .DT
Trigger save files	Files of TGSAVEnn.DT(nn=00 - 99)

By checking “Minimum time stamp” you can specify the files with the date after the date value set here. By checking “Maximum time stamp” you can specify the files with the date before the date value set here.

By touching [Apply] on the bottom, only the files which meet the specified condition appear in the file management display.

☰ File Sort

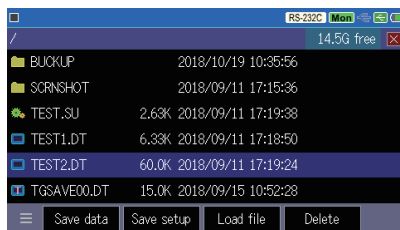
By touching [☰] on the bottom and [Sort], the sort conditions appear. By selecting a condition by touching it, the order of the files change according to the condition.




8.4 Reload (Read)

You can reload .DT and .SU file at file management display.

Find the file to be read by swiping the display, touch the file to select it. Then touch [Load file] on the bottom to reloads the file.



 By reloading the current setting data and contents in the capture memory are overwritten.

File Name Change

You cannot change the file name directly. When you want do so reload the file and resave it with the name which you want to set.

8.5 Delete

Find the file to be deleted by swiping the display, touch the file to select it. Then touch [Delete] on the bottom to display the confirmation window. Click [OK] to delete it or click [Cancel] to cancel the delete.

Chapter 9 Documents

9.1 Specification

Item	LE-170SA
Interface	CAN (ISO11898) / LIN (ISO9141)
Protocol	CAN 2.0LIN (Rev. 1.1, 1.2, 1.3, 2.0, 2.1)
Communication speed(bps)	CAN: 20kbps to 1Mbps LIN: 400bps to 26kbps
Capture memory	16M bytes (about 500K data) Two-division use and automatic backup at the end of measurement are available
CAN monitor function	Supports standard/extended formats, bit capture timing can be set, capture filter can be set, arbitrary speed can be set.
LIN monitor function	Frame delimiting by ID setting or specified-time elapse of frame, capture filter can be set, arbitrary speed can be set.
Simulation function	Test data transmission (data sweep is available.)
Additional functions *1	Auto save function, Time specified auto RUN / STOP function, power-on RUN function
External Trigger	Input 1, Output 1
External input	44 Measurement of 4 signals. Range: 0 to 52V. Resolution: 12bit. Digital threshold: VIH 2.3Vmin. VIL 0.8Vmax.
Display	4.3 inch TFT color display (480x272dot) Capacitive touch screen
USB2.0 device port	Micro B connector
USB2.0 host port	Standard A connector. For USB flash drive.
Power	USB bus power 5V / 500mA, two AA Ni-MH batteries, or two AA alkaline batteries
Drive time *2	AA sized Ni-MH batteries: about 5 hours AA sized alkaline batteries: about 2 hours
Temperature & humidity	In operation: 0 to +40°C, In storage: -10 to +50°C, 20 to 85%RH (No condensation)
Standard	CE (class A), EMC (EN61326-1:2013)
Size & Weight	158mm x 100mm x 31mm, 300g(including batteries)

*1: Firmware Ver.1.01 or later.

*2: Under the normal operation.

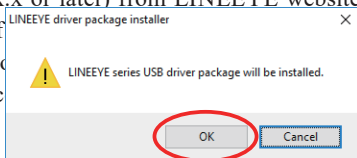
9.2 Option

- **USB charger (Model: LE-P1USB)**
Used to provide bus-power to the line monitor or to charge Ni-MH batteries.
- **5 wires TTL probe cable (Model: LE-5LS)**
The cable with IC clip.
- **OBD2-DSUB9 cable (Model: OBD2-DB9-09)**
The cable to be connected with OBD2 connector of a car to monitor the CAN communication.
- **Terminal block for DSUB 9-pin (model number: LE-9TB)**
The signals on the DSUB 9-pin can be taken out from the screwless terminal block.

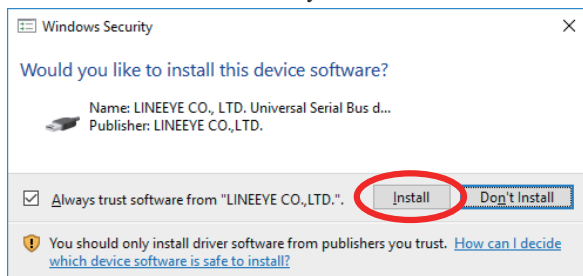
9.3 USB Driver Installation

You can update the firmware of the line monitor from a PC. The USB driver should be installed to the PC before connecting the line monitor with it.

- **How to install the USB driver**
 - 1) Start **WITHOUT** connecting it with a PC.
 - 2) Set the attached CD-ROM to the PC. Or download the USB driver for LE-170SA series (lewusbd_v1.1.x.x or later) from LINEEYE website and decompress it to any folder of
 - 3) Run the “setup.exe” file in the deco
 - 4) Click “Yes” at the “User account c
 - 5) Click “OK” at the “LINEEYE driver package installer” window.



- 6) Click “Next” at the install wizard.
- 7) Click “Install” at “Windows security” window.



- 8) Click “Finish” at the finish window of the install wizard.
- 9) Then connect the line monitor With the PC using the attached USB cable. When the installation is finished successfully, it appears on the “Universal serial bus device”.

Chapter 10 After Support and Maintenance

10.1 How to make it back to default state

By the software reset, you can clear the internal setting of line monitor and make it back to the default state of shipment.

■ Software reset control

Turn on the power of the line monitor while pushing [Esc].

Then “Initialized!!” message appears

- ☰ When there is any problem in the behavior of line monitor, this operation may solve it.
- ☰ Please note that by this operation measured data in the buffer memory is also all cleaned.

10.2 How to Update the Firmware

The latest firmware will be available from LINEEYE website.

https://www.lineeye.co.jp/html/download_update.html

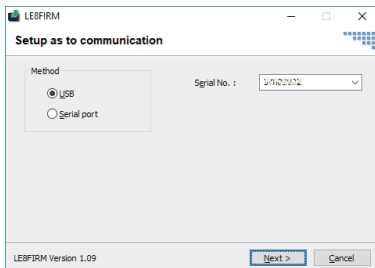
Use the software for firmware update “le8firm.exe” included in the Utility folder of attached CD-ROM. Install the USB driver into the PC which is used for updating in advance.

→ 9.3 USB driver installation

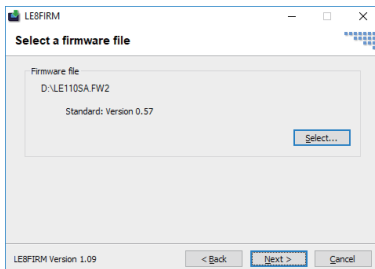
■ How to update

- 1) Download the firmware to the PC and decompress it to any folder.
Confirm it contains the firmware of FW2 extension.
- 2) Turn on the power while pressing [RUN] and [STOP]. Then the line monitor runs in the firmware transfer mode and it displays ## Firmware loader ##.
- 3) Connect the line monitor with PC by USB cable.
- 4) Double-click le8firm included in the attached CD-ROM to run it.

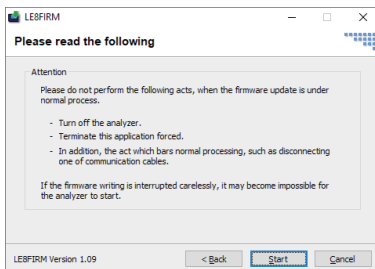
Select USB at Connection Method and select the serial number at Serial number. Then click [Next].



5) Click [Select] and select the firmware file. Then click [Next].




6) It starts transfer of the firmware by clicking [Start].



7) Then the finish window appears to inform that it finished the update.

8) Click [Close] to close the software.

9) Turn off the power of line monitor and then turn on the power to run with the new firmware.

 Please refer to le8firm.txt included in the attached C D-ROM for the detail.

Attention:

Do NOT turn off the power of line monitor while firmware update. If do so, the line monitor will be broken and not be able to run. It will need to be repaired at LINEEY factory.

10.3 Troubleshooting

Problem	Cause / Remedy
Cannot turn on the power The power turn off immediately	<ul style="list-style-type: none"> • Charge the battery when powered by batteries. • Try another USB cable when powered by bus power. • Remove the battery and put it again after a few seconds.
Battery cannot be recharged Battery cannot be recharged fully	<ul style="list-style-type: none"> • Check the charge setting. • With the line monitor the batteries cannot be fully charged. Use the dedicated charger sold in the market. 「→ 2.6 Settings for Charging Batteries」 • When it does not run enough although you have charged the batteries well, the batteries' lifetime is coming to its end.
The display does not light well. It becomes dark soon.	<ul style="list-style-type: none"> • Control the back light setting. • The automatic backlight-off function is working. 「→ 2.7 Adjust LCD Back Light」 「→ 2.8 Power saving Mode」
The measured data disappeared.	<ul style="list-style-type: none"> • By [Run] the previous measured data disappears. • The measured data disappears when turning off the power. 「→ 3.6 Auto Backup」
The communication setting has changed unintentionally. The date clock often gets strange.	<ul style="list-style-type: none"> • When you remove the batteries from the line monitor for a while or when the batteries run out the settings in the memory IC and clock IC are initialized. Please put charged batteries in the line monitor.
Date or time is not displayed correctly.	<ul style="list-style-type: none"> • Set the current date and time correctly.
Cannot operate any keys	<ul style="list-style-type: none"> • You cannot control it while it accesses the USB memory. • You cannot control it while it connects with a PC by the PC link software. • Try removing the batteries and all the cables.
Cannot work well A part of display is not correct	<ul style="list-style-type: none"> • Turn off the power and then turn on the power again. • Try the soft reset operation. 「→ 10.1 How to make it back to default state」
Line state LED does not light	<ul style="list-style-type: none"> • Configure the measurement port as same as the condition of the target device. 「→ 3.2 Functions」 • Check if there is any breaking of the wires, wiring error, or loosening of the connectors.

<p>The line state LEDs light but nothing appears on the display.</p>	<ul style="list-style-type: none"> • Press [Run] to start measurement. • Check if the communication speed is configured correctly.
<p>The line state LEDs light but it cannot monitor correctly. The error message appears.</p>	<ul style="list-style-type: none"> • Configure the communication condition correctly such as speed, data length, and parity bit. • If communication data run when you start measurement, the line monitor may misunderstand a part of data bit as a start bit and the initial part of measurement are displayed as an error.
<p>The power downs when pressing [RUN]. The power downs when connecting a USB flash.</p>	<ul style="list-style-type: none"> • When the batteries are running out, the power may down with these situations. Exchange the batteries or use it by USB bus power.
<p>It cannot transmit data when using in the simulation function.</p>	<ul style="list-style-type: none"> • Check the configuration of the measurement port and connection with the target device.
<p>A USB flash cannot be accepted by the line monitor.</p>	<ul style="list-style-type: none"> • Try another USB flash.
<p>A PC does not recognize the line monitor although connected by USB.</p>	<ul style="list-style-type: none"> • Install the USB driver in the attached CD-ROM into the PC. • Check if security softwares interrupt it.

10.4 Warranty and After Service

Warranty

■ Trouble

Contact the distributor or LINEEYE.

■ Warranty Card

The warranty card is attached to the product.

Confirm the content and fill out the blanks and keep it.

Warranty period: 1 year from the purchase (Does not include the one for the software.)

User registration

For the after support and the information for the product please register your product from LINEEYE website.

Repair

- Although the configuration and setting is checked and are correct but the product does not work well, contact us with the detailed information.

Model	LE-170SA
Serial number	8 digits number of Serial No.
Purchase date	Day / month / year
Situation	More detailed information is appreciated.

■ Repair within the warranty period

We will repair it following our warranty policy. First please inform us the situation and then send it back to us with the warranty card.

■ Repair after the warranty period

We will repair the product when the repair is possible. Check the price guide in our website and then send it back to us with the repair request document.

https://www.lineeye.com/

LINEEYE CO., LTD.

4F., Marufuku Bldg., 39-1, Karahashi Nishihiragaki-cho, Minami-ku,
Kyoto, 601-8468, Japan

Tel : 075(693)0161 Fax : 075(693)0163

URL <https://www.lineeye.co.jp> Email :info@lineeye.co.jp

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