HIOKI

SP7001/SP7002 NON-CONTACT CAN SENSOR
SP7100/SP7150 CAN INTERFACE
SP9200/SP9250 SIGNAL PROBE

Quick Start Manual

EN

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Warranty Certificate   HIOKI

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

Customer name:
Customer address:

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

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

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

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http://www.hioki.com   18-07 EN-3

* The SP9200 Signal Probe and SP9250 Signal Probe are not covered by the warranty.

Introduction

Thank you for choosing the Hioki SP7001/SP7002 Non-Contact CAN Sensor, SP7100/SP7150 CAN Interface, and SP9200/SP9250 Signal Probe. Keep this manual accessible so that you can take full advantage of the product's functionality throughout its service life.

Be sure to review the following documentation before using the product:

Document	Content	Paper edition	Electronic edition
Quick Start Manual (this manual)	The Quick Start Manual provides a brief overview of how to use the product.	✓	–
Instruction Manual	The Instruction Manual contains detailed instructions about how to use the product.	–	✓
Operating Precautions (0990A905)	"Operating Precautions" contains important information about how to use the product safely.	✓	–

This is the Quick Start Manual. Be sure to download the most recent version of the Instruction Manual from Hioki's website.

https://www.hioki.com/global/support/download/

Communications standards

The Non-Contact CAN Sensor supports the following communications standards:

Model	Communications standards	
SP7001	CAN	CAN FD
SP7002	CAN	–

Use of the product

Before using the product, review proper handling of the product, bus systems, and related systems.
Only individuals who understand both safe product use and the potential impacts arising from using the product should use the product. Use of the product by others may cause bodily injury or damage to the product or other devices.
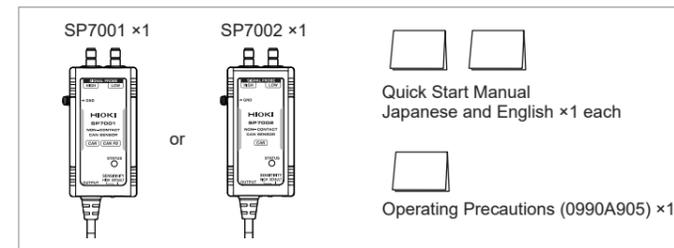
Overview

The SP7001/SP7002 Non-Contact CAN Sensor can detect CAN communications signals, which are used in control communications in automobiles and in a variety of devices, from outside cables' insulation.
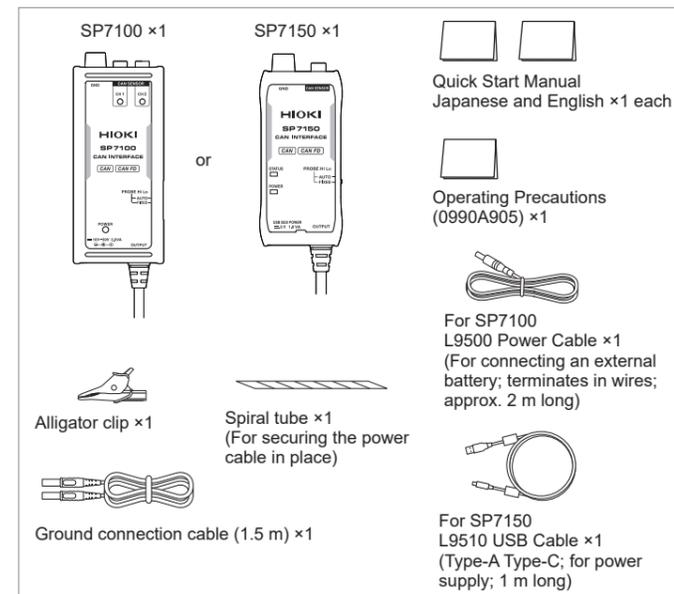Captured CAN signals can be connected to analyzers, loggers, and other measuring instruments with a CAN interface.

Verifying Package Contents

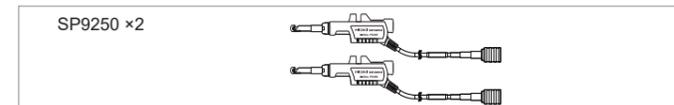### SP7001/SP7002 Non-Contact CAN Sensor

SP7001 ×1   SP7002 ×1

or

Quick Start Manual Japanese and English ×1 each

Operating Precautions (0990A905) ×1

SP7100/SP7150 CAN Interface

SP7100 ×1   SP7150 ×1

or

Quick Start Manual Japanese and English ×1 each

Operating Precautions (0990A905) ×1

Alligator clip ×1

Spiral tube ×1 (For securing the power cable in place)

For SP7100 L9500 Power Cable ×1 (For connecting an external battery; terminates in wires; approx. 2 m long)

Ground connection cable (1.5 m) ×1

For SP7150 L9510 USB Cable ×1 (Type-A Type-C; for power supply; 1 m long)

SP9200 Signal Probe

SP9200 ×2

SP9250 Signal Probe

SP9250 ×2

Specifications

Operating environment	Indoors, Pollution Degree 2 altitude up to 2000 m (6562 ft.)
Operating temperature and humidity	Temperature: −40°C to 85°C (−40°F to 185°F) Humidity: −40°C to 60°C (−40°F to 140°F), 80% RH or less (no condensation) 60°C to 85°C (140°F to 185°F), 60% RH or less (no condensation)
Storage temperature and humidity	−40°C to 85°C (−40°F to 185°F) 80% RH or less (no condensation)
Dustproofness and waterproofness	IP40 (EN 60529) SP7001/SP7002: When 2 Signal Probes connected SP7100/SP7150: When Non-Contact CAN Sensor connected

For other specifications, see "4 Specifications" in the downloaded Instruction Manual.

Operating Precautions

⚠ WARNING

Do not use the product in locations such as those listed below. Doing so may result in product damage or cause an accident.
🚫
- Locations where the product would be subject to direct sunlight or high temperatures
- Locations where corrosive or explosive gases are present
- Locations where there is powerful electromagnetic radiation or that are close to electrically charged objects
- Close to inductive heating equipment (high-frequency inductive heating equipment, IH cooktops, etc.)
- Locations with an excessive amount of mechanical vibration
- Locations where the product would be exposed to water, oil, chemicals, solvents, or other liquids
- Locations with excessive humidity or condensation
- Locations with excessive dust

IMPORTANT
When using the SP7150 CAN Interface:
The product requires a current of at least 200 mA to operate.
If supplying power from a USB terminal with USB bus power functionality, verify that the device operates properly prior to use.

The Non-Contact Sensor is capable of extremely stable CAN frame acquisition. However, the product is not guaranteed to achieve an error rate of 0% under all conditions. Errors may be caused by factors including the condition of the vehicle being tested and the quality of the power supply being used. Please verify that the product functions properly with the vehicle to be tested prior to use.

Maintenance and Service

⚠ WARNING

🚫
Do not attempt to modify, disassemble, or repair the product.
Doing so may result in fire, electric shock, or bodily injury.

Troubleshooting

If you believe the product may be malfunctioning, contact your authorized Hioki distributor or reseller after reviewing the contents of downloaded Instruction Manual "Before sending the product to be repaired."
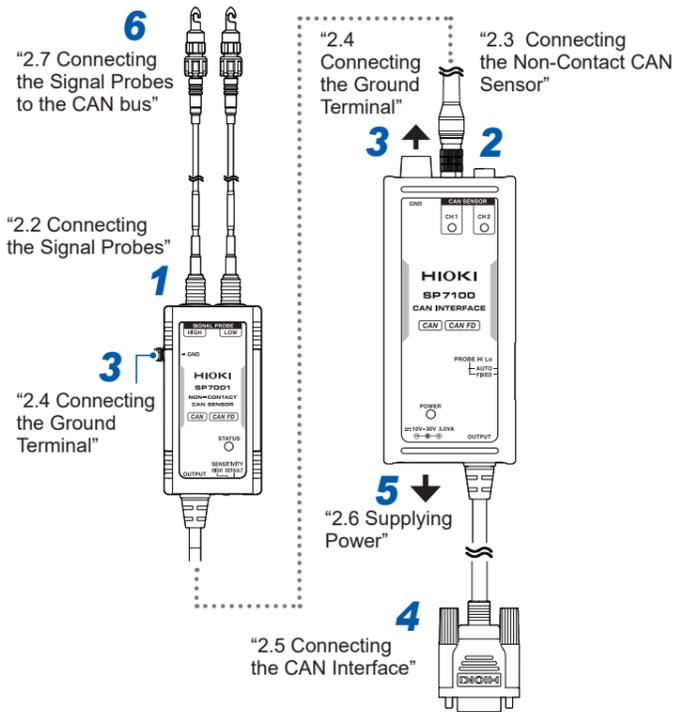
IMPORTANT
When shipping the product, do not disconnect the SP9200/SP9250 Signal Probes from the SP7001/SP7002 Non-Contact CAN Sensor. Doing so may soil or degrade the connectors' contacts, adversely impacting signal detection.

When sending the product to be repaired, attach a description of the issue.

Preparations

For details, see "2 Preparing Before Use" in the downloaded Instruction Manual.

Connection example:

"2.7 Connecting the Signal Probes to the CAN bus"

"2.4 Connecting the Ground Terminal"

"2.3 Connecting the Non-Contact CAN Sensor"

"2.2 Connecting the Signal Probes"

"2.4 Connecting the Ground Terminal"

"2.6 Supplying Power"

"2.5 Connecting the CAN Interface"

LED lighting/flashing specifications

SP7001/SP7002 Non-Contact CAN Sensor

Product status	STATUS LED
Self-test error (failure)	🔴 Steady red
Signal not detected	🟢 Steady green
Signal detected	🟢 Flashing green
Probe high/low reverse connection warning	🔴 Flashing red

SP7100/SP7150 CAN Interface

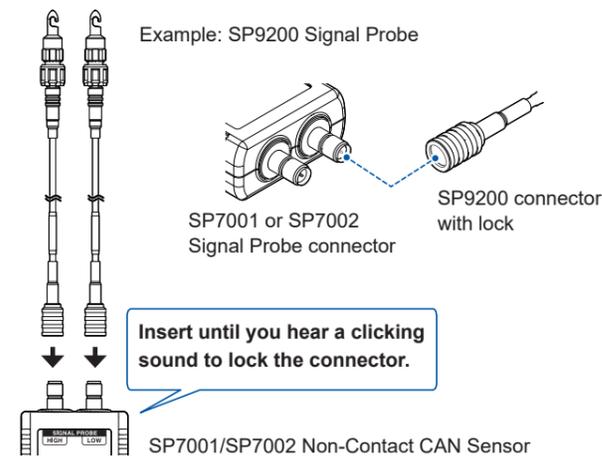| Product status	POWER LED	SP7100 CH1, CH2 LED	SP7150 STATUS LED
Self-test error (failure)	🟢 Flashing green	🔴 Steady red	
CAN sensor not connected	🟢 Steady green	⚫ Unlit	
CAN sensor connected	🟢 Steady green	Reflects CAN Sensor's STATUS LED.	
Output bus error detection	🟢 Steady green	🔴🟢 Quickly alternating red/green	

Detection Procedure

⚠ CAUTION

🚫 Do not connect the probes to bare conductors with exposed metal or cables with damaged insulation. Do not allow the tips of the probes to come into contact with any energized part.

Doing so may damage the equipment you are using (the vehicle) or cause it to malfunction.
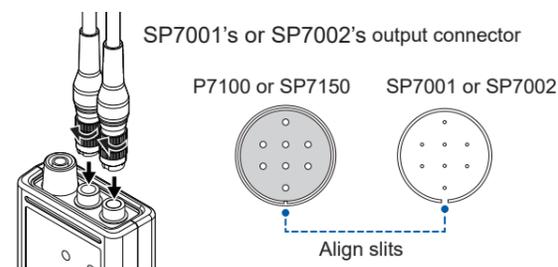
IMPORTANT
The Signal Probe's connector incorporates a locking mechanism. Always use the probe with the connector in the locked state to ensure signals can be properly detected and to prevent damage to the connector.
- Leave the Signal Probe connected to prevent deterioration of the Signal Probe and Non-Contact CAN Sensor's connector's contacts and to keep out dirt.
- Any dirt on the cable under test could affect signal detection. Remove any dirt before affixing (connecting) the Signal Probe.
- Do not connect both the SP9200 and SP9250 to the same Non-Contact CAN Sensor. Doing so may increase susceptibility to the effects of noise.

1 **Connect the Signal probe to the Non-Contact CAN Sensor's signal probe connector.**

Example: SP9200 Signal Probe

SP9200 connector with lock

SP7001 or SP7002 Signal Probe connector

Insert until you hear a clicking sound to lock the connector.

SP7001/SP7002 Non-Contact CAN Sensor

2 **Connect the Non-Contact CAN Sensor to the CAN Interface.**

SP7001's or SP7002's output connector

P7100 or SP7150   SP7001 or SP7002

Align slits

Example: SP7100 CAN Interface

3 **Connect the CAN Interface's ground terminal to the vehicle's ground.**

If connecting the CAN interface's ground terminal to the ground cannot reduce the noise, connect the Signal probe's ground terminal to the vehicle's ground.

4 **Connect the CAN Interface's CAN signal output connector to the CAN interface-equipped device with which you wish to use it.**

Pin assignment of CAN signal output connector

Pin	Assignment	
	SP7100	SP7150
1	CH2 CAN Low	N.C.
2	CH1 CAN Low	CAN Low
3	CH1 GND	GND
4	N.C.	N.C.
5	Shield	Shield
6	CH2 GND	N.C.
7	CH1 CAN High	CAN High
8	CH2 CAN High	N.C.
9	N.C.	N.C.
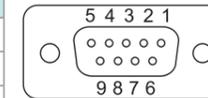
SP9900 Split Cable (dedicated option for SP7100)

If the input interface provided by the device you plan to use does not support 2-channel input, use the SP9900 Split Cable.
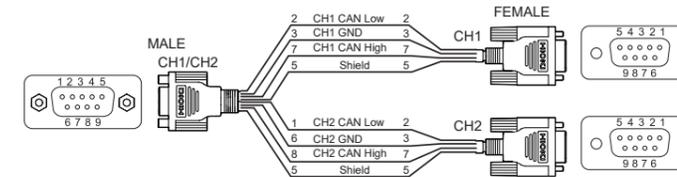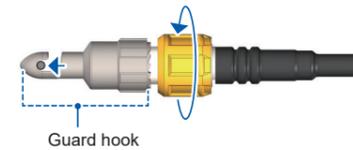

5 **Supply power to the CAN Interface**

6 **Connect the Signal Probe to the cable under test.**

When using the SP9200 Signal Probe:

1. **Rotate the grip of Signal Probe to press the cable under test against the detection electrode.**

Connect the Signal Probe connected to the terminal labeled **HIGH** to the CAN_H line and the other Signal Probe to the CAN_L line.

Guard hook

2. **Tighten the grip until it no longer rotates.**

The probe contains a built-in spring that supports the cable under test.

When using the SP9250 Signal Probe:

1. **Press the open/close lever to open the guard hook.**

2. **Clamp the hook around the cable whose signals you wish to detect and release the open/close lever.**

The probe will be secured to the cable under test.

IMPORTANT
- Position the probe so that the cable under test is in contact with the back of the detection electrode.
- Proper detection will be impossible if the cable under test is positioned too shallowly or angled in the guard hook.

Functionality

Switching the Non-Contact CAN Sensor's Signal Detection Sensitivity

This section describes how to switch the Non-Contact CAN Sensor's signal detection sensitivity (**SENSITIVITY**). Use the **DEFAULT** setting for most applications. Select **HIGH** as necessary depending on the CAN signal level and cable effects.

Setting	Description
DEFAULT	The DEFAULT setting represents the normal mode. It is recommended to use DEFAULT mode since it delivers the optimal level of vibration and noise resistance.
HIGH	The HIGH setting represents high-sensitivity mode. Use this mode when you encounter detection errors due to the low signal levels detected by the Signal Probes. The product is more susceptible to vibrations and various types of noise when used in this mode.

Probe Setting Function (Automatic Polarity Selection)

The probe setting function automatically selects the Signal Probe's polarity.
It is a convenient function that automatically switches the sensor input when the SP9200 or SP9250 signal probes have been connected in reverse to the Non-Contact CAN Sensor input label (HIGH/LOW).

IMPORTANT
- Depending on the signal quality condition of the CAN bus, the Probe Setting Function (Automatic Polarity Selection) may make a misjudgment.In a misjudged condition, the STATUS LED blinks red even if the Signal Probes are connected to the CAN bus correctly.
- When performing rigorous evaluations, for example in bus testing that includes verification of wiring consistency, connect the high and low Signal Probes to the CAN bus's high and low lines and use fixed input polarity (**FIXED**) mode. In automatic input polarity mode (**AUTO**), correct detection is not guaranteed under all conditions.

Setting	Description
FIXED	The FIXED setting represents fixed input polarity mode. If the Non-Contact CAN Sensor detects that the Signal Probes are connected to the CAN bus in reverse, it will indicate this state with the **STATUS** LED, which will flash red.
AUTO	The AUTO setting represents automatic input polarity mode. If the Non-Contact CAN Sensor detects that the Signal Probes are connected to the CAN bus in reverse, it will switch the high and low detected signals via its internal circuitry. This function will operate in approximately 2 seconds as long as the CAN bus load factor is approximately 5% or greater.

Output Bus Error Detection Function

This function determines that an output error has occurred when the SP7100 or SP7150 CAN Interface is unable to output a proper CAN signal to the bus connected to the CAN signal output connector.
The SP7100 CAN interface output does not have CAN signal arbitration functionality. CAN communications signals detected by the Non-Contact CAN Sensor are output without modification.
The output bus error detection function operates when the Non-Contact CAN Sensor is connected properly to the CAN_H and CAN_L lines (as per the labels on the Non-Contact CAN Sensor inputs).