

The SP7001/SP7002: Causes of “Output Bus Error Detection”

LED Warning when the Detected CAN Bus Signal Differs from the Sensor’s Output Signals

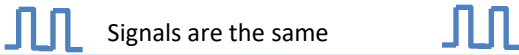
Points

- The SP7000 series non-contact CAN sensor reliably outputs the acquired CAN signal without delay.
- If any signal is output from the device to which this product is connected, the output waveform will change due to the collision between the acquired CAN signal and the signal from the device. At this time, the LEDs corresponding to each channel are alternately lit in red and green by the "output bus error detection" function.



LED lights in normal condition (flashing green)

Detected signal = Output signal



Product status	CH1, CH2 LED
Signal detected	Flashing green



LED lights with “output bus error detection” function (red and green alternately flash)



Signal collision abnormality

Output signal of the Non-Contact CAN Sensor → ← Input signal from the connected device



Product status	CH1, CH2 LED
Output bus error detection	Red/green are alternately lit

The original shape of the CAN signal can break down and trigger the "output bus error detection" function for various reasons. The following are the most common cases.

■ CASE 1: The connected device outputs a CAN signal

The connected device may be outputting a CAN signal such as an output command to an ECU gateway. Please set the connected device to a read-only mode or make sure in another way that it does not output a CAN signal.

■ CASE 2: The pin assignment of the connected device differs from that of the sensor

Please use the sensor after checking that the pin assignment of the connected device is the same as the Non-Contact CAN Sensor. Especially in cases where the CAN High or CAN Low is connected to the GND or Vcc of the connected device, a signal cannot be output.

Pin	Assignment
1	CH2 CAN Low
2	CH1 CAN Low
3	CH1 GND
4	N.C.
5	Shield
6	CH2 GND
7	CH1 CAN High
8	CH2 CAN High
9	N.C.



※Continues to the back

■ **CASE 3: The connected device is sending an error frame**

For one reason or another, the connected device could be having trouble properly acquiring a CAN signal. This can cause the connected device to output an error frame. Below are causes for such a situation.

Cause 1: Incorrect setting of the connected device

The settings for baud rate or sampling point may be incorrect. Especially in the case of CAN FD, an error occurs when the sampling point settings of the ECU and connected device are not the same.

Cause 2: Acknowledge (ACK) signals are not detected (ACK slot remains 1)

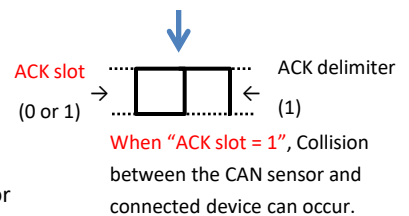
In CAN communication, the node (ECU) that properly receives data sends a dominant (0) during the duration of the ACK slot of the can frame (see below). When there is only one ECU connected to the CAN bus*, since there is no ECU that can send “ACK slot = 0”, the connected device may be judging as a signal error and outputting an error frame. **When using this sensor, always connect two or more ECUs to the CAN bus.**

*This device does not have the ability to inject a signal. Therefore even if the connected device is set to return “ACK slot = 0”, the sensor cannot send back an ACK signal to the CAN bus.

Make-Up of the CAN or CAN FD Frame



- SOF . . . Start of Frame
- ARB Field . . . include information such as ID
- CTRL Field . . . includes identifying information of CAN and CAN FD
- Data Field . . . includes data
- CRC Field . . . checks whether the sent and received information matches
- ACK Field . . . checks if there is at least one node that received without an error
- EOF . . . End of Frame



Cause 3: There is termination resistance from the connected device

The Non-Contac CAN Sensor’s signal output circuit is equipped with termination resistance of 60 Ω (120 Ω // 120 Ω). If termination resistance exists or is connected to the connected device, the signal level declines causing the signal to not be properly received by the connected device. When this happens, the connected devices may send an error frame. If there is termination resistance on the side of the connected device, please remove it. (If the device has an on/off switch setting for termination resistance, please switch it to “off”.)

If cases 1–3 applies, connecting only the CAN sensor to the CAN bus will cause the LED to indicate regular operation (flashing green). When “Output Bus Error Detection” is triggered (red and green alternately flash), first check to see if disconnecting from the device causes the LED to return to indicating regular operation (flashing green).