

## 4 Channels Wheel-Speed Sensor Emulator

AL-1040 for SLSC

This document describes the SLSC AL-1040 for National Instruments SLSC-12001 chassis.



### Overview

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The AL-1040 is a 4-channel wheel-speed sensor emulation unit to be connected between the Device Under Test (DUT) and the instrumentation part of the test system.

The unit is made to interface with NI PXI and/or Compact-RIO instrumentation devices for the purposes of test and validation of software and hardware.

Custom device for VeriStand is included for Hardware-In-the-Loop applications.

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## Summary

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The increasing complexity of road traffic makes great demands on drivers. Driver assistance systems relieve drivers and optimize safety on the road. Therefore, modern driver assistance systems are part of the standard equipment in almost all new cars in Europe, America and Asia and pose new challenges for garages.

The intelligent data communication of the electronic vehicle systems is supported by sensors. In relation to driving safety, wheel speed sensors are of particular importance and are used in numerous applications in various vehicle systems. In driver assistance systems such as ABS, TCS, ESP or ACC, motor control units use these sensors to determine the wheel speed.

Due to this variety of applications, wheel speed sensors make a direct contribution to driving dynamics, driving safety, driving comfort and reduced fuel consumption and emission.

## PXI-based implementation

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The unit is designed to used together with FPGA code implemented in LabVIEW FPGA for pattern generation.

## Advantages

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- The solution replaces the need for real sensors.
- No need to physically simulate sensors environment.
- Allow you to reuse between test applications and give you accuracy, speed, and repeatability.

## Detailed description

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Parameter	Range	Value
Amount of channels		4 ch
RIG supply		15-25V, Nominally 24V
DUT Supply Voltage		8-20 V
Current level		5-30 mA <i>7+7+14mA @12V supply</i>
Rm (V variant)		50 $\Omega$
Digital Pulse Width		20-40 ms
Supported protocol	AK protocol	
Current limits	The unit generates three current limits for each WSS emulator channel, one current level is fixed, and the additional two current levels are controlled by digital signals	
External hardware	NI FPGA; NI digital I/O module,	
Software support	VeriStand, LabVIEW, Python	

## Installation

### Electromagnetic Compatibility

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This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install, and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by Aliaro, could void your authority to operate it under your local regulatory rules.



**Caution** To ensure the specified EMC performance, operate this product only with Shielded cables and accessories.

### Unpacking the module

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- Carefully inspect the shipping container and the module for damage. Check for visible damage.
- to the exterior and interior of the damage. If damage appears to have been caused during
- shipment file a claim with the carrier. Retain the packing material for possible inspection.
- and/or reshipment. If the chassis is damaged, do not install it and contact Aliaro.

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

## Hardware Installation

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To set up and use the module you need the following items:

### Hardware

- SLSC-12001 chassis
- SLSC module(s)
- Power cable
- Power input connector
- Grounding wire
- Grounding lug

### Tools

- Screwdriver as needed for your application.
- Wire stripper

### Caution:



Do not touch the contacts or remove the I/O boards or cables while the system is energized.

The SLSC chassis and the AL-1010 do not support hot plug-in. The entire chassis must be powered off when a module is inserted or removed.

### Procedure:

1. Power off the main DC power source or disconnect the power source from the chassis before installing any modules or RTIs.
2. Ensure that the chassis is powered off. The POWER LED should be off. If the POWER LED is not off, do not proceed until it is off.
3. Loosen the screws on the upper rear panel of the chassis.
4. Position the RTI backplane at the desired slot and insert the securing screws, but do not fully tighten them.
5. Insert a AL-1010 module into the same slot as its corresponding RTI while firmly holding the RTI in place until the RTI is firmly connected to the module.
6. Repeat steps 4 and 5 for all required RTIs.
7. Fully tighten the screws for all RTIs and the upper rear panel of the chassis. Note Waiting until all RTIs and modules are installed to fully tighten the screws ensures proper alignment for future connections between modules and RTIs.
8. Fully tighten the two module mounting screws on each newly installed module.
9. Power on the SLSC chassis

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

## Software Installation, LabVIEW drivers

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When the module is used with LabVIEW or TestStand, Aliaro drivers need to be installed, see Aliaro driver installation instruction.

## Software Installation, Aliaro custom devices

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When AL-WSS is used with VeriStand, Custom Devices needs to be installed, see the Custom Device installation instruction.

## Safety

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**Caution** Observe all instructions and cautions in the user documentation. Using the model in a manner not specified can damage the model and compromise the built-in safety protection. Return damaged models to Aliaro for repair.

## Calibration

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The unit is calibrated for 7 /14 /28mA levels @12V supply and 50 $\Omega$  Load.  
Other levels can be tuned by Aliaro prior to delivery or as a service.

Recommended warm-up time	None.
Calibration interval	1 Year or when other levels are required

## Specification

### Definition and conditions

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Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

The following characteristic specifications describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- Typical specifications describe the performance met by a majority of models.
- Nominal specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are *Typical* unless otherwise noted.

Specifications are valid under the following conditions unless otherwise noted.



**Note** These specifications only apply to the product as provided by Aliaro. Modifications to the module may invalidate these. Be certain to verify the performance of modified modules.



**Caution** Observe all instructions and cautions in the user documentation. Using the model in a manner not specified can damage the model and compromise the built-in safety protection. Return damaged models to Aliaro for repair.

### Environmental Characteristics

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#### Temperature and Humidity

Operating temperature	0 °C to 40 °C
Storage temperature range	-20 °C to 40 °C
Operating relative humidity range	10% to 90%, noncondensing
Storage relative humidity range	5% to 95%, noncondensing

## Safety Guidelines

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### Cautions

Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.

Do not mix hazardous voltage circuits and human-accessible circuits on the same module.

When device terminals are hazardous voltage LIVE, you must ensure that devices and circuits connected to the device are properly insulated from human contact.

All wiring must be insulated for the highest voltage used.

## Product Certifications and Declarations

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Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information.

To obtain product certifications and the DoC for Aliaro products, visit [aliaro.com/certification](http://aliaro.com/certification).

## CE Compliance

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This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

## Electromagnetic Compatibility Standards

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This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 55011-2009 Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement CISPR 11:2009
- EN 55032:2012 Electromagnetic compatibility of multimedia equipment - Emission requirements CISPR 32:2012
- EN 61326-1-2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements IEC 61326-1:201