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USER GUIDE AND SPECIFICATIONS

NI USB-9263

4-Channel, ±10 V, 16-Bit Analog Voltage Output Module

This user guide describes how to use the National Instruments USB-9263 and lists the device specifications.

Introduction

The NI USB-9263 provides a USB interface for four channels of analog output with integrated signal conditioning. The NI USB-9263 consists of two components: an NI 9263 module and an NI USB-9162 carrier, as shown in Figure 1.

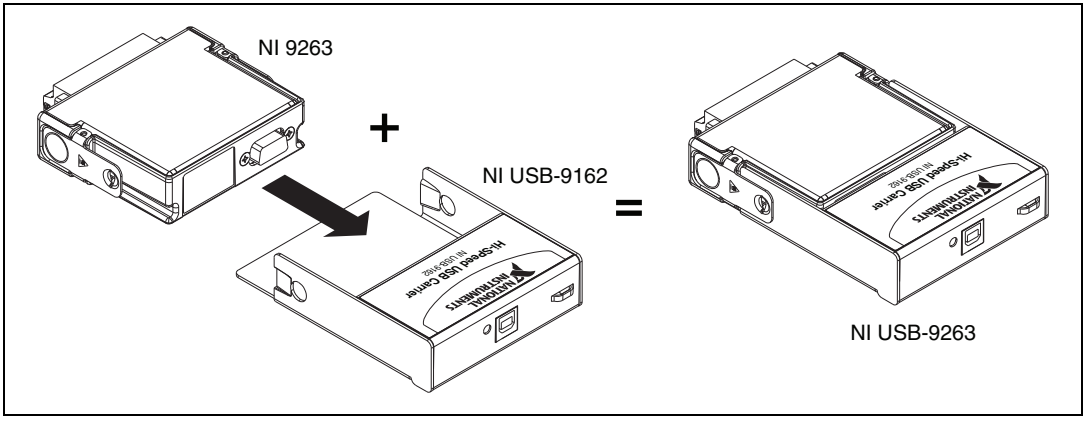


Figure 1. NI USB-9263 Components

Dimensions

Figure 2 shows the NI USB-9263 device dimensions.

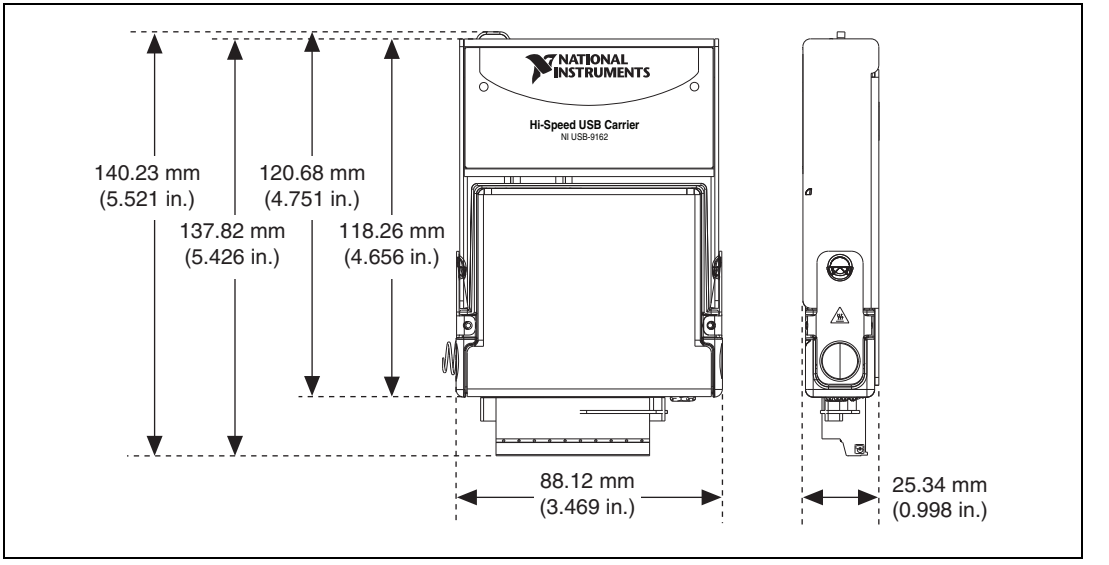


Figure 2. NI USB-9263 Device in Millimeters (Inches)

Safety Guidelines

Operate the NI USB-9263 only as described in these operating instructions.

Hot Surface This icon denotes that the component may be hot. Touching this component may result in bodily injury.

Safety Guidelines for Hazardous Voltages

If hazardous voltages are connected to the module, take the following precautions. A hazardous voltage is a voltage greater than 42.4 V_{pk} or 60 VDC to earth ground.

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

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

Caution Make sure that devices and circuits connected to the module are properly insulated from human contact.

Caution When module terminals are hazardous voltage LIVE (>42.4 V_{pk}/60 VDC), you must ensure that devices and circuits connected to the module are properly insulated from human contact. You must use the NI 9932 connector backshell kit, illustrated in Figure 3, to ensure that the terminals are *not* accessible. Refer to the *Module Dimensions In Millimeters (Inches)* section for more information about the backshell.

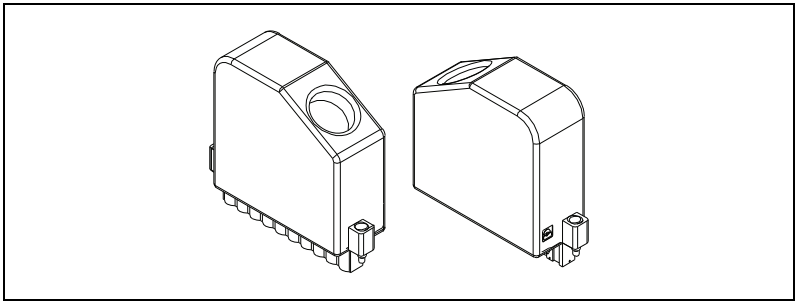


Figure 3. NI 9932 Connector Backshell

Information Resources

Refer to `ni.com/manuals` for the most recent documentation. Refer to `ni.com/info` and enter `rdusbrd` for more information about documentation related to this device.

Installing the Software

Software support for the NI USB-9263 for Windows Vista/XP/2000 is provided by NI-DAQmx. The *DAQ Getting Started Guide*, which you can download at `ni.com/manuals`, offers NI-DAQmx users step-by-step instructions for installing software and hardware, configuring channels and tasks, and getting started developing an application.

Installing Other Software

If you are using other software, refer to the installation instructions that accompany your software.

Example Programs

The NI-DAQmx disk contains example programs that you can use to get started programming with the NI USB-9263. Refer to the *NI-DAQmx for USB Devices Getting Started Guide* that shipped with your device, and is also accessible from **Start»All Programs»National Instruments» NI-DAQ**, for more information.

Mounting the NI USB-9263 to a Panel

Threaded inserts are located in the NI USB-9263 for mounting it to a panel. Refer to Figure 4 for dimensions.

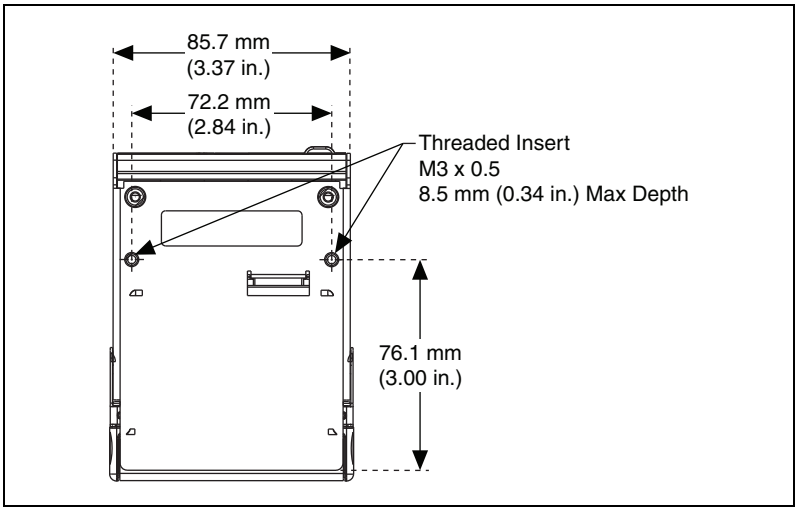


Figure 4. Module Dimensions In Millimeters (Inches)

Installing the NI USB-9263 Device

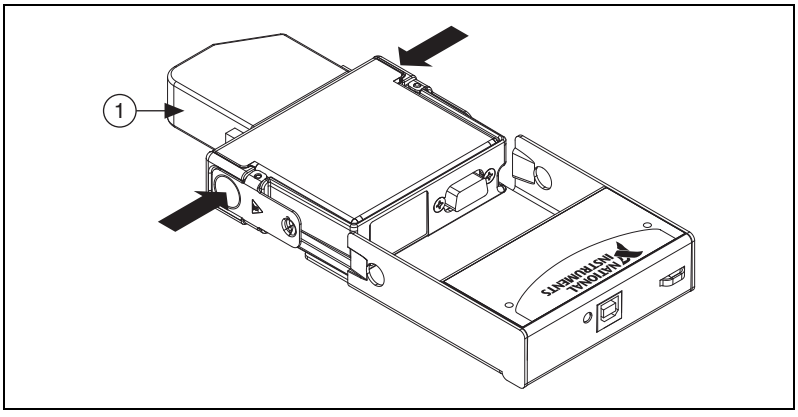
Before installing the device, you must install the software you plan to use with the device. Refer to the *Installing the Software* section of this guide and the documentation included with the software for more information.

Installing the NI 9263 Device into the NI USB-9162 Carrier

The NI 9263 module and NI USB-9162 carrier are packaged separately. Refer to Figure 5 while completing the following assembly steps:

1. Make sure that no signals are connected to the NI 9263 module and the USB cable is not connected to the device.
2. Remove the protective cover from the 15-pin D-SUB connector.

3. Align the I/O module with the carrier, as shown in Figure 5.



1 High Voltage Screw Terminal Backshell

Figure 5. Module Installation

4. Squeeze the latches and insert the NI 9263 module into the NI USB-9162 carrier.
5. Press firmly on the connector side of the NI 9263 module until the latches lock the module into place, as shown in Figure 6.

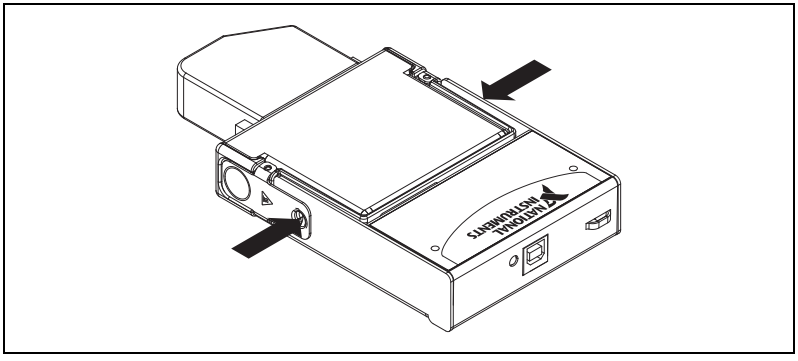


Figure 6. Locking Module into Place

Connecting the NI USB-9263 to a Computer

Plug one end of the USB cable into the NI USB-9263 and the other end into an available USB port on the computer. Refer to the *NI-DAQmx for USB Devices Getting Started Guide* that shipped with your device, and is also accessible from **Start»All Programs»National Instruments»NI-DAQ**, for more information.

LED Indicator

The NI USB-9263 device has a green LED next to the USB connector. The LED indicator indicates device status, as listed in Table 1. When the device is connected to a USB port, the LED blinks steadily to indicate that the device is initialized and is receiving power from the connection.

If the LED is not blinking, it may mean that the device is not initialized or the computer is in standby mode. In order for the device to be recognized, the device must be connected to a computer that has NI-DAQmx installed on it. If your device is not blinking, make sure your computer has the latest version of NI-DAQmx installed on it, and the computer is not in standby mode.

Table 1. LED State/Device Status

LED State	Device Status
Not lit	Device not connected or in suspend.
On, not blinking	Device connected, but no module installed.
Single-blink	Operating normally.
Double-blink	Connected to USB Full-Speed port. Device performance might be affected. Refer to the *Specifications* section for more information.
Quadruple-blink	Device error. Refer to `ni.com/support`.

Wiring the NI USB-9263 Device

Caution A high voltage screw terminal backshell must be installed when using hazardous voltages (>42.4 V_{pk}, 60 VDC).

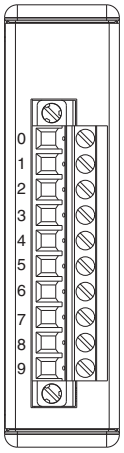
Note Table 2 illustrates the accessories available from `ni.com` for use with the NI USB-9263.

Table 2. Accessories

Accessory	Accessory Description
NI 9932	10-position strain relief and high-voltage connector
NI 9936	10 screw-terminal plugs

The NI USB-9263 has a 10-terminal, detachable screw-terminal connector that provides connections for four analog output channels. Each channel has a terminal to which you can connect the positive lead of a voltage signal, AO. The NI USB-9263 also has common terminals, COM, that are internally connected to the isolated ground reference of the module. Refer to Table 3 for the terminal assignments for each channel.

Table 3. Terminal Assignments

Module	Terminal	Signal
	0	AO 0
	1	Common (COM)
	2	AO 1
	3	Common (COM)
	4	AO 2
	5	Common (COM)
	6	AO 3
	7	Common (COM)
	8	No Connection
	9	Common (COM)

Wiring for High-Vibration Applications

National Instruments recommends using ferrules for terminating wires to the detachable screw-terminal connector or using the NI 9932 backshell kit to protect the connections when you use the NI USB-9263 in high-vibration applications. Refer to Figure 7 for an illustration.

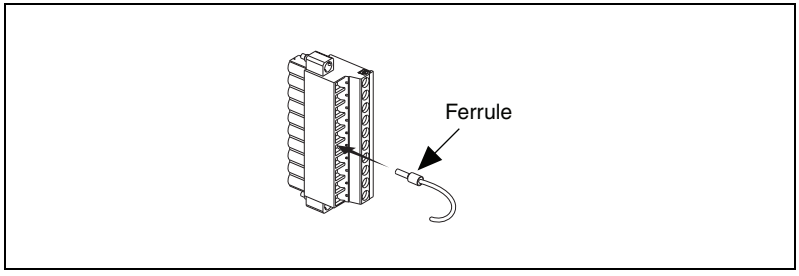


Figure 7. 10-Pin Detachable Screw-Terminal Connector with a Ferrule

Connecting a Load to the NI USB-9263

Connect the positive lead of the load to the AO terminal. Connect the ground of the load to a COM terminal.

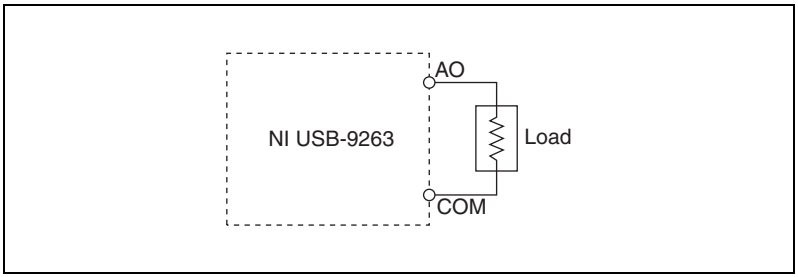


Figure 8. Connecting a Load to the NI USB-9263

NI USB-9263 Circuitry

The NI USB-9263 channels share a common ground that is isolated from the other modules in the system. Each channel has a digital-to-analog converter (DAC) that produces a voltage signal. By default, NI-DAQmx software allows you to write scaled values to the analog output channels. Refer to your software documentation for more information.

Each channel also has overvoltage and short-circuit protection. For more information about the overvoltage and short-circuit protection, refer to the *Specifications* section.

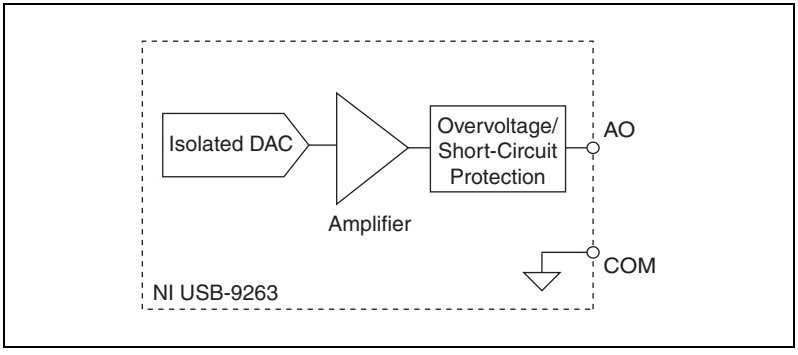


Figure 9. Output Circuitry for One Channel

When the module powers on, the output channel drives the power-on voltage. Refer to the *Specifications* section for more information about power-on voltage. Refer to your software documentation for information about configuring initial output values in software.

Specifications

The following specifications are typical for the range 0 to 60 °C, unless otherwise noted. All voltages are relative to COM unless otherwise noted.

Output Characteristics

Number of channels ..... 4 analog output channels

DAC resolution ..... 16 bits

Type of DAC..... String

Startup voltage ..... 0 V[1]

Power-down voltage ..... 0 V[2]

Output range..... ±10 V

Operating voltage

- Nominal ..... ±10.7 V
- Minimum ..... ±10.4 V
- Maximum..... ±11 V

Current drive ..... ±1 mA per channel max

Output impedance ..... 2 Ω

Accuracy

Error	Percentage of Reading	Percent of Range*
Calibrated, max (–40 to 70 °C)	0.35%	0.75%
Calibrated, typ (25 °C, ±5 °C)	0.03%	0.1%
Uncalibrated, max (–40 to 70 °C)	2.2%	1.7%
Uncalibrated, typ (25 °C, ±5 °C)	0.3%	0.25%
* Range equals ±10.7 V		

Stability

- Gain drift..... 14 ppm/°C
- Offset drift..... 110 µV/°C

[1] When the device powers on, a glitch occurs for 20 µs peaking at –1.5 V.

[2] The power-down voltage peaks at 1.8 V before exponentially dishcarging to 0 V in 100 µs. You can add a 10 kΩ to reduce the peak voltage.

Protection

Overvoltage .....±30 V

Short-circuit.....Indefinitely

Update time[1]

Number of Channels	Update Time
One	3 µs min
Two	5 µs min
Three	7.5 µs min
Four	9.5 µs min

Noise

Updating at 100 kS/s .....600 μV_{rms}

Not updating .....260 μV_{rms}

Slew rate .....4 V/µs

Crosstalk .....76 dB

Settling time (100 pF load, to 1 LSB)

Full-scale step.....20 µs

1 V step.....13 µs

0.1 V step.....10 µs

Capacitive drive .....1,500 pF min

Monotonicity .....16 bits

DNL .....±1 LSBs max

INL (endpoint).....±12 LSBs max

Power Requirements

Current consumption from USB.....500 mA, max

Suspend mode.....2.5 mA, max

Bus Interface

USB specification .....USB 2.0 Hi-Speed

[1] Full performance requires the use of a USB 2.0 Hi-Speed host controller and USB 2.0 hubs.

Physical Characteristics

Screw terminal wiring ..... 12 to 24 AWG copper conductor wire with 10 mm (0.39 in.) of insulation stripped from the end

Torque for screw terminals ..... 0.5 to 0.6 N · m (4.4 to 5.3 lb · in.)

Ferrules..... 0.25 mm^2 to 2.5 mm^2

Weight..... Approx. 302 g (10.6 oz)

Safety

If you need to clean the module, wipe it with a dry towel.

Safety Voltages

Channel-to-COM ..... ±11 V max

Isolation

- Channel-to-channel ..... None
- Channel-to-earth ground
  - Continuous ..... 250 V_{rms}, Measurement Category II
  - Withstand ..... 2,300 V_{rms}, verified by a 5 s dielectric withstand test

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (for example, 115 V for U.S. or 230 V for Europe). Do *not* connect to signals or use for measurements within Measurement Categories III or IV.

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Hazardous Locations

The USB-9263 is not certified for use in hazardous locations.

Environmental

The NI USB-9263 is intended for indoor use only, but may be used outdoors if installed in a suitable enclosure.

Operating temperature .....0 to 60 °C

Storage temperature .....–40 to 85 °C

Ingress protection .....IP 40

Operating humidity.....10 to 90% RH, noncondensing

Storage humidity.....5 to 95% RH, noncondensing

Maximum altitude.....2,000 m

Pollution Degree (IEC 60664).....2

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Industrial Immunity
- EN 55011 Emissions (CISPR 11); Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note For EMC compliance, operate this device with shielded cables.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EEC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

Calibration

You can obtain the calibration certificate and information about calibration services for the NI USB-9263 at `ni.com/calibration`.

Calibration interval ..... 1 year

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at `ni.com/support` and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 662 457990-0,
Belgium 32 (0) 2 757 0020, Brazil 55 11 3262 3599,
Canada 800 433 3488, China 86 21 5050 9800,
Czech Republic 420 224 235 774, Denmark 45 45 76 26 00,
Finland 358 (0) 9 725 72511, France 01 57 66 24 24,
Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737,
Italy 39 02 41309277, Japan 0120-527196, Korea 82 02 3451 3400,
Lebanon 961 (0) 1 33 28 28, Malaysia 1800 887710,
Mexico 01 800 010 0793, Netherlands 31 (0) 348 433 466,
New Zealand 0800 553 322, Norway 47 (0) 66 90 76 60,
Poland 48 22 328 90 10, Portugal 351 210 311 210,
Russia 7 495 783 6851, Singapore 1800 226 5886,
Slovenia 386 3 425 42 00, South Africa 27 0 11 805 8197,
Spain 34 91 640 0085, Sweden 46 (0) 8 587 895 00,
Switzerland 41 56 2005151, Taiwan 886 02 2377 2222,
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