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FD-11605

SAFETY, ENVIRONMENTAL, AND REGULATORY INFORMATION

FD-11605

8-Channel, ± 60 V Voltage Input Device for FieldDAQ

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Icons



Notice—Take precautions to avoid data loss, loss of signal integrity, degradation of performance, or damage to the model.



Caution—Take precautions to avoid injury. Consult the model documentation for cautionary statements when you see this icon printed on the model. Cautionary statements are localized into French for compliance with Canadian requirements.



Shock Warning—Take precautions to avoid electrical shock.

Safety Guidelines



Caution Do not operate the FD-11605 in a manner not specified in this user guide. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.



Attention Le FD-11605 ne doit en aucun cas être utilisé d'une autre façon que celle spécifiée dans ce guide de l'utilisateur. Une mauvaise utilisation du produit peut s'avérer dangereuse. Si le produit est endommagé de quelque manière que ce soit, la sécurité intégrée dans le produit risque d'être compromise. Si le produit est endommagé, renvoyez-le à NI pour réparation.

The FD-11605 is rated for use in DRY or WET LOCATIONS.

Safety Guidelines for Hazardous Voltages

If hazardous voltages are connected to the device, take the following precautions. A hazardous voltage is a voltage greater than 42.4 V peak voltage or 60 V DC in DRY LOCATIONS, and 22.6 V peak or 35 V DC in WET LOCATIONS.



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



Attention S'assurer que le câblage à tension dangereuse est effectué par du personnel qualifié respectant les normes électriques locales.



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



Attention Ne pas combiner des circuits avec des tensions dangereuses et des circuits accessibles aux personnes sur le même appareil.



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



Attention Lorsqu'une haute tension dangereuse est appliquée aux bornes de l'appareil, s'assurer que les appareils et les circuits auxquels il est connecté sont correctement isolés de tout contact humain.



Caution All wiring must be insulated for the highest voltage used.



Attention Tout le câblage doit être isolé pour la plus haute tension utilisée.

Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-channel isolation	
Nominal working voltage ¹	60 V DC (Dry/Wet Locations)
Maximum working voltage	100 V DC (Dry/Wet Locations)
Transient overvoltage ²	1,000 V RMS, verified by 5 s withstand
Channel-to-earth ground isolation	
Nominal working voltage	60 V DC (Dry/Wet Locations)
Maximum working voltage	100 V DC (Dry/Wet Locations)
Transient overvoltage	1,000 V RMS, verified by 5 s withstand
Overvoltage protection ³	±100 V between any two pins on the analog input connector

These test and measurement circuits are *not* rated for measurements performed on circuits directly connected to the electrical distribution system referred to as MAINS.

MAINS is a hazardous live electrical supply system to which equipment is designed to be connected to for the purpose of powering equipment. This product is rated for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

 **Warning** Do not connect the FD-11605 to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINS circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.

 **Mise en garde** Ne connectez pas le FD-11605 à des signaux dans les catégories de mesure II, III ou IV et ne l'utilisez pas pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions transitoires supérieures à ce que le produit peut supporter. Le produit ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous risque d'endommager et de compromettre l'isolation. Le produit risque de tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

Safety Compliance Standards

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

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1

 **Note** For UL and other safety certifications, refer to the product label or the [Product Certifications and Declarations](#) section.

EMC Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

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 changes or modifications to the product not expressly approved by NI could void your authority to operate it under your local regulatory rules.

Electromagnetic Compatibility Notices

Refer to the following notices for cables, accessories, and prevention measures necessary to ensure the specified EMC performance.

 **Notice** To ensure the specified EMC performance, operate this product only with shielded Ethernet cables.

¹ Working voltage rating is the highest RMS value of the AC or DC voltage across the insulation that can continuously occur when the equipment is supplied at rated voltage.

² Withstand rating is the highest RMS value of the AC or DC voltage the insulation can withstand without flashover or breakdown for a specified time.

³ Temporary overvoltage rating is the overvoltage of relatively long duration.

Special Conditions for Marine Applications

Some models are approved for marine (shipboard) applications. To verify marine approval certification for a model, visit ni.com/product-certifications, search by model number, and click the appropriate link.

-  **Notice** In order to meet the EMC requirements for marine applications, install the model in a shielded enclosure with shielded and/or filtered power and input/output ports. In addition, take precautions when designing, selecting, and installing measurement probes and cables to ensure that the desired EMC performance is attained.

Electromagnetic Compatibility Standards

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

- EN 61326-1 (IEC 61326-1): Class A emissions; Industrial immunity
- EN 55011 (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-003: Class A emissions

-  **Note** Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

-  **Note** In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

-  **Notice** For EMC declarations and certifications, and additional information, refer to the [Product Certifications and Declarations](#) section.

Environmental Guidelines

-  **Notice** To meet the shock and vibration specifications in this document, you must panel mount the system.

Environmental Characteristics

Refer to the *FD-11605 User Guide* for more information about meeting these specifications.

Temperature and Humidity

Temperature	
Operating	-40 °C to 85 °C
Storage	-40 °C to 100 °C
Operating and storage humidity	Up to 100% relative humidity, condensing or noncondensing
Ingress protection	IP65/IP67
Pollution Degree	4
Maximum altitude	5,000 m

-  **Note** Failure to follow the mounting instructions in the *FD-11605 User Guide* can cause temperature derating.

-  **Note** M12 connectors must be mated to cables or have caps installed on them to meet IP65/IP67 requirements. Cover the unused connectors with the included plastic caps whenever water, dust, or dirt are present.

-  **Note** Avoid long periods of exposure to sunlight.

Shock and Vibration

Operating vibration	
Random	10 g RMS, 5 Hz to 2,000 Hz
Sinusoidal	10 g, 20 Hz to 2,000 Hz 12.4 mm minimum pk-pk displacement, 5 Hz to 20 Hz
Operating shock	100 g, 11 ms half sine, 3 shocks at 6 orientations, 18 total 40 g, 6 ms half sine, 4,000 shocks at 6 orientations, 24,000 total

Environmental Management

NI 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 *Commitment to 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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, 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.)

Environmental Standards

This product meets the requirements of the following environmental standards for electrical equipment.

- IEC 60068-2-1 Cold
- IEC 60068-2-2 Dry heat
- IEC 60068-2-6 Sinusoidal operating vibration
- IEC 60068-2-27 Operating shock
- IEC 60068-2-30 Damp heat cyclic (12 + 12h cycle)
- IEC 60068-2-64 Random operating vibration

 **Note** To verify marine approval certification for a product, refer to the product label or visit ni.com/certification and search for the certificate.

Power Requirements

 **Notice** The protection provided by the FD-11605 can be impaired if it is used in a manner not described in the *FD-11605 User Guide*.

Voltage input range

V_{in}	9 V DC to 30 V DC
V_{aux}	Up to 30 V DC

Device power consumption⁴

Nominal	4.6 W
Maximum	6 W

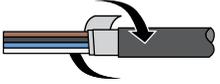
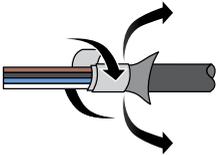
Assembling the FD-11954 Field Serviceable Connector

The FD-11954 (part number 785894-01) is a field terminable I/O connector you can attach to unterminated (pigtail) cables for use with the 4-pin high-voltage FD-11605 device. The kit contains one 4-pin field terminal connector and conductive tape.

 **Notice** Do not unscrew the interior wire holder from the end cap.

Complete the following steps to set up the FD-11954.

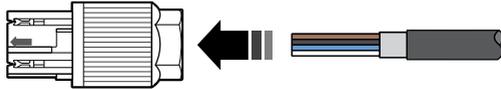
1. On the cable, use wire strippers to remove 80 mm (3.14 in.) of the cable jacket. Strip cable shield such that it extends approximately 6 mm (0.2 in.) from the end of the jacket. Do not strip the signal wires.
2. Prepare the exposed shield for your cable.

Cable Diameter	Instructions	Diagram
6 mm–9.7 mm (0.24 in.–0.34 in.)	Wind the conductive tape around the exposed shield.	
5 mm–6 mm (0.2 in.–0.24 in.)	Fold the exposed shield over the jacket and wind the conductive tape around the exposed shield.	

3. Feed the cable wiring through the hexagonal end of the cable-side of the connector until it bottoms out. The conductive tape makes contact with the interior of the connector.

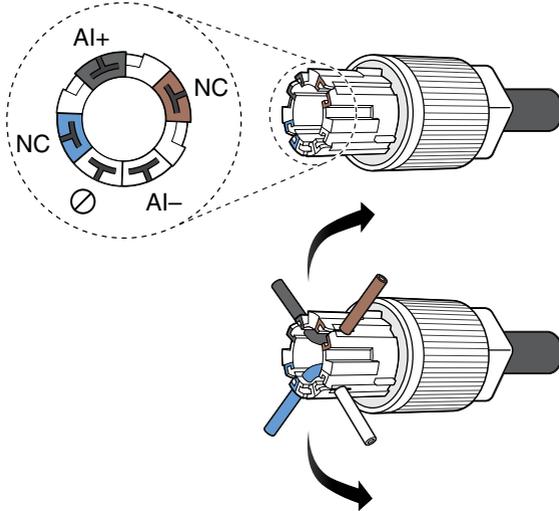
⁴ The total amount of power drawn by the device from the power input connector.

Figure 1. Inserting the Cable



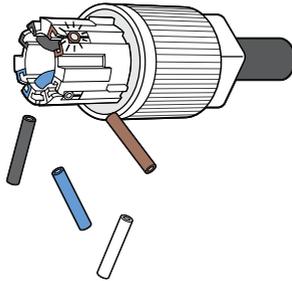
4. Align each signal wire with its color-coded channel inside the connector. Take care to distinguish the white slot for terminal 2 (AI-) from the uncolored, unused slot adjacent clockwise to it.
5. Bend the wires out of the connector, guiding them through the appropriate slot to lock in place.

Figure 2. Cable-Side Connections



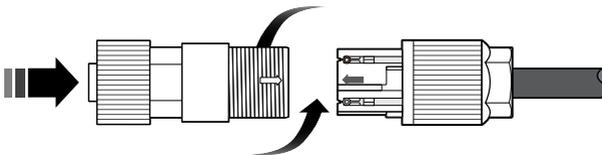
6. Use a side cutter to cut the exposed signal wires flush with the connector.

Figure 3. Cutting the Signal Wires



7. Align the arrows on both ends of the connector to reattach. Screw both ends together to a torque of $5 \text{ N} \cdot \text{m}$ (44.25 lb · in.) with a 15 mm wrench.

Figure 4. Reattaching the Connector



8. Connect your cable to the voltage input connector on your FieldDAQ device with a torque of $0.6 \text{ N} \cdot \text{m}$ (5.31 lb · in.).

Current Limits

-  **Caution** Exceeding the current limits may cause damage to the device. Stay below a maximum of 10 A shared between both Input and Aux terminals.
-  **Attention** Dépasser les limites d'intensité de courant risque d'endommager l'appareil. Restez en dessous d'un maximum de 10 A partagés entre les bornes Input et Aux.

Power IN/OUT terminals	
V_{in}	10 A maximum
V_{aux}	10 A maximum total (combined with V_{in})
Recommended external overcurrent protection	16 A, slow blow fuse

Physical Characteristics

Dimensions	198.5 mm × 77.4 mm × 47.1 mm (7.8 in. × 3.0 in. × 1.9 in.)
Weight	1.2 kg (42 oz)
Input connection	
Number	8
Type	4-pin A-coded male M12 connectors
Torque for M12 connectors (power, Ethernet, input connections)	0.6 N · m (5.31 lb · in.)

Maintenance

If you need to clean your device, wipe it with a dry towel.

-  **Note** M12 connectors must be mated to cables or have caps installed on them to meet IP65/IP67 requirements. Cover the unused connectors with the included plastic caps whenever water, dust, or dirt are present.
-  **Note** Avoid long periods of exposure to sunlight.

CE Compliance

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)

Export Compliance

This model is subject to control under the U.S. Export Administration Regulations (15 CFR Part 730 et. seq.) administered by the U.S. Department of Commerce's Bureau of Industry and Security (BIS) (www.bis.doc.gov) and other applicable U.S. export control laws and sanctions regulations. This model may also be subject to additional license requirements of other countries' regulations.

Additionally, this model may also require export licensing before being returned to NI. The issuance of a Return Material Authorization (RMA) by NI does not constitute export authorization. The user must comply with all applicable export laws prior to exporting or re-exporting this model. See ni.com/legal/export-compliance for more information and to request relevant import classification codes (e.g. HTS), export classification codes (e.g. ECCN), and other import/export data.

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

Additional Resources

Visit ni.com/manuals for more information about your device, including specifications, pinouts, and instructions for connecting, installing, and configuring your system.

- *FD-11605 User Guide*
- *FD-11605 Specifications*

Worldwide Support and Services

The NI website 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.

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