PRODUCT FLYER

FieldDAQ™

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16 September 2019

What Are FieldDAQ Devices?

FD-11601, FD-11603, FD-11605, FD-11613, FD-11614, FD-11634, and FD-11637

- Rugged, IP65/67 rated water-proof and dust-tight design with shock and vibration resistance over 100 g/10 grms conditions
- Thermally stable design allows for minimal accuracy drift over -40 °C to 85 °C range
- Distributed Time Sensitive Networking (TSN) architecture reduces cabling cost, installation time, and enclosure requirements
- 24-bit resolution and sample rates up to 100 kS/s for fast, accurate measurements
- Sensor-specific signal conditioning and filtering for voltage, strain/bridge, accelerometer, microphone, and thermocouple measurements
- Easier software development with the NI-DAQmx driver and FlexLogger support.

Superior Measurements in the Most Severe Environments

FieldDAQ dust-proof and water-proof data acquisition devices are TSN enabled for simplified distribution into rugged environments. As test engineers move away from centralized measurement systems that can be susceptible to noise and toward distributed measurement nodes where digitization and signal conditioning occur as close to the sensors as possible, they have an increased need for data acquisition devices that withstand harsh test environments. From off-highway vehicles to extreme temperature test cells, FieldDAQ delivers unprecedented rugged specifications to NI's portfolio and enables engineers to deploy accurate measurement systems closer to their sensors in rain, sleet, snow, or mud.

FieldDAQ devices feature IP65/67-rated ingress protection and incorporate standard industrial connectors to prevent cable disconnections in vibration-heavy environments. These devices use sensor-specific signal conditioning and filtering to reduce measurement noise along with a thermally stable design, so you can minimize accuracy drift over the entire -40 °C to 85°C operating range. With 24 bits of resolution and sample rates of up to 100 kS/s, FieldDAQ can accurately measure a wide variety of signals.

FieldDAQ features synchronization over TSN, allowing for a large network of distributed nodes to be synchronized within <1 µs. TSN synchronization effectively eliminates routing delays in distributed systems, which removes the need to correlate data across a large system. FieldDAQ devices also house a switch for easy daisy-chained distribution of devices, which reduces cabling costs.

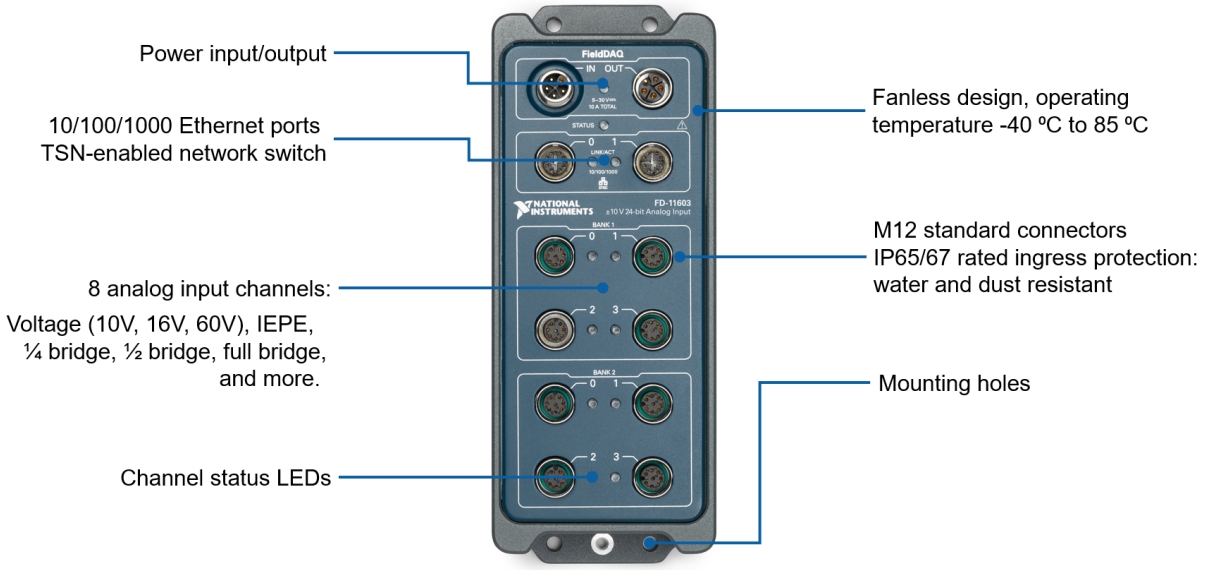
You can use FlexLogger to quickly and easily configure your devices, take measurements, and establish synchronization within just a few clicks. FlexLogger is configuration-based software designed to make data logging simple. You can also use LabVIEW system design software and the NI-DAQmx driver to acquire data from FieldDAQ devices through hundreds of prewritten libraries for timing, synchronization, acquisition, analysis, and logging. These validated software libraries can reduce the time you spend piecing together software components from different vendors and troubleshooting compatibility issues.

FieldDAQ Device Specifications

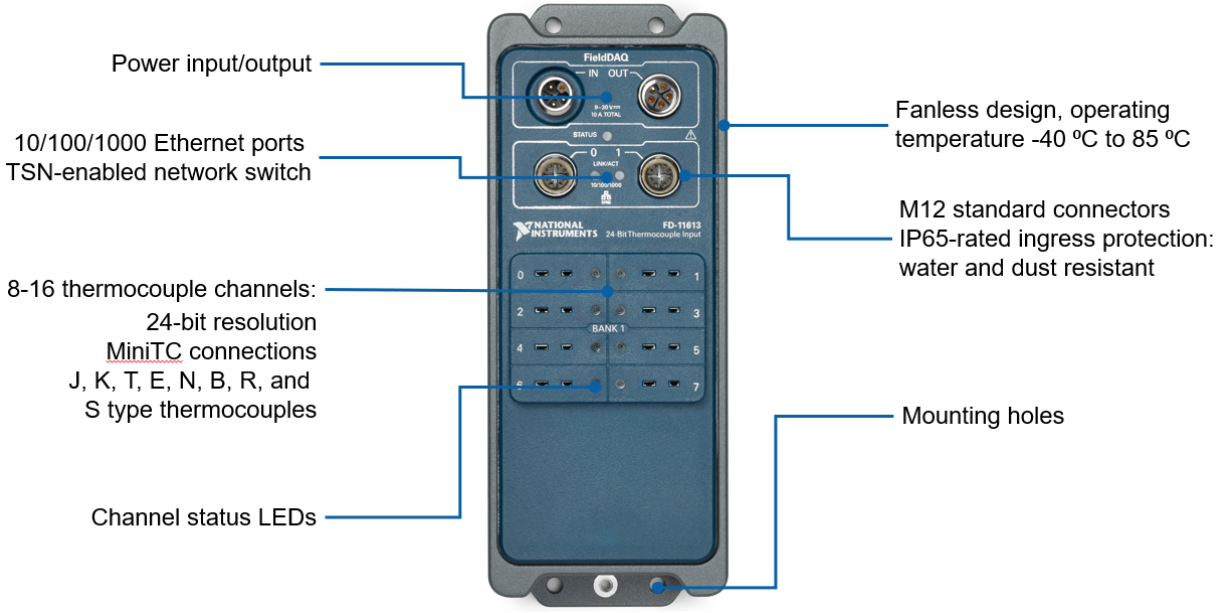
Feature	FD-11601 Voltage (±10V) w Sensor Power	FD-11603 Voltage (±10V)	FD-11605 Voltage (±60V)	FD-11613/14 Temperature	FD-11634 Sound/Vibration	FD-11637 Strain/Bridge
Channel Count	8 Analog Input	8 Analog Input	8 Analog Input	8/16 Isolated TC, 2 CJC	8 Sound & Vibration Input	8 Strain-Bridge
Supported Sensors	±10V Analog Input with Sensor Power	±10V Analog Input	±60V / ±16V Analog Input	Thermocouple Type: J, K, T, E, N, B, R, S	IEPE Accelerometers & Microphones	Strain Gauge: Quarter, Half and Full-Bridge
Input Connector Type	5-pin A-coded M12 Connectors	5-pin A-coded M12 Connectors	4-pin L-coded M12 Connectors	Universal Miniature Thermocouple Jack	8-pin A-coded M12 Connectors	8-pin A-coded M12 Connectors
Resolution	24 Bits	24 Bits	24 Bits	24 Bits	24 Bits	24 Bits
Sample Rate (Simultaneous)	Up to 102.4 kS/s/ch	Up to 102.4 kS/s/ch	Up to 102.4 kS/s/ch	Up to 85 S/s/ch	Up to 102.4 kS/s/ch	Up to 102.4 kS/s/ch
Absolute Accuracy Typical (5 °C to 40 °C)	1.4 mV at Full Scale	1.4 mV at Full Scale	24.12mV at Full Scale (60V)	0.65 °C (K-Type)	7.5 mV at Full Scale	22 µV/V of Full Scale
Absolute Accuracy (-40 °C to 85 °C)	8.3 mV of Full Scale	8.3 mV of Full Scale	114.6mV at Full Scale (60V)	3.04 °C (K-Type)	24 mV of Full Scale	86 µV/V of Full Scale
Sensor Power or Excitation Output	5 V to 24 V, 600 mW per channel	N/A	N/A	N/A	4 mA	3 V, 5 V, or 10 V
Filtering	Anti-Alias, Butterworth, Comb Filtering	Anti-Alias, Butterworth, Comb Filtering	Anti-Alias, Butterworth, Comb Filtering	50-60 Hz Rejection	Anti-Alias, Butterworth, Comb Filtering	Anti-Alias, Butterworth, Comb Filtering
Isolation	Ch-Ch Isolation $60V_{DC}$ Working, $1000V_{RMS}$ Withstand	Ch-Ch Isolation $60V_{DC}$ Working, $1000V_{RMS}$ Withstand	Ch-Ch Isolation $100V_{DC}$ Working, $1000V_{RMS}$ Withstand	Ch-Ch Isolation $60V_{DC}$ Working, $1000V_{RMS}$ Withstand	Ch-Ch Isolation $60V_{DC}$ Working, $1000V_{RMS}$ Withstand	Ch-Ch Isolation $60V_{DC}$ Working, $1000V_{RMS}$ Withstand

Detailed Views of FieldDAQ

FD-11601, FD-11603, FD-11605, FD-11634, FD-11637: M12 Analog Input



FD-11613 and FD-11614: Mini-TC Thermocouple Input



Key Features

Reliability in Rugged Environments

With FieldDAQ, you can take accurate measurements as close to your sensor as possible under a full range of environmental conditions. FieldDAQ devices have an ingress protection rating of up to IP67, making these devices dust-proof, resistant to water submersion, and resistant to jet spray downs. These devices can operate in -40 °C to 85 °C environments while dissipating heat through passive cooling, which eliminates fragile moving parts such as fans.

FieldDAQ devices use standard industrial M12 connectors to prevent cables from detaching during operation. They can withstand up to 100 g shock and 10 grms conditions. FieldDAQ devices offer channel-to-channel isolation over 1000 V to eliminate noise from ground loops and protect instrumentation circuitry from high transient voltages.

Figure 1. FieldDAQ uses M12 industrial connectors for harsh and vibration-heavy environments.

Accurate Sensor Measurements

Each FieldDAQ device combines sensor-specific signal conditioning, connectivity, and digitization to directly interface to common sensors and signals such as thermocouples, strain gages, accelerometers and more. The rugged design of FieldDAQ allows for shortened sensor cables to minimize noise by digitizing data as close as possible to the sensors.

FieldDAQ devices offer resolution up to 24 bits and simultaneous sample rates up to 100 kS/s to detect and acquire full-range signals with varying amplitudes and bandwidths. These devices incorporate premium signal conditioning and diagnostic features, such as built-in filtering, open thermocouple detection, and shunt calibration to reduce the effect of external interference and increase measurement accuracy.

FieldDAQ also features a best-in-class thermally stable design to minimize accuracy drift over its -40 °C to 85 °C operating range. The FD-11603 voltage module, for example, features an absolute accuracy of 0.019V from -40 °C to 85 °C, less than 0.2% of the total measurement range.

Microsecond-Synchronized, Distributed Architecture With TSN

FieldDAQ accurately synchronizes measurement data over long distances by using Time Sensitive Networking (TSN). TSN is the next evolution of the IEEE 802.1 Ethernet standard, providing submicrosecond synchronization over a distributed network of DAQ nodes. Precise timestamps and packet-based communication are used to share a common notion of time on all nodes in the network, which eliminates signal propagation delays that can result in intensive post-processing to align data timestamps. FieldDAQ devices can be daisy-chained to other TSN-enabled devices – all timestamps will be synchronized within 1 microsecond.

Time-based synchronization over Ethernet also minimizes the cabling traditionally found in physical systems test and monitoring applications, resulting in a cleaner and more cost-effective solution. TSN allows trigger and synchronization information to be sent over the network using the same cable for data transfer, which eliminates the need for physical synchronization cables. Each FieldDAQ device has an integrated network switch and built-in power circuitry, so you can daisy chain multiple devices together and eliminate the need for external switches or multiple power supplies in your system.

Figure 2. Daisy-Chained FieldDAQ Devices in Line Topology

FieldDAQ is built on NI's open, software-centric platform and expands the NI TSN product ecosystem. You can customize the setup of your system by effortlessly connecting and synchronizing FieldDAQ with other TSN products, such as Industrial Controllers, CompactDAQ devices, and CompactRIO devices, to acquire, visualize, and analyze real-world signals and make data-driven decisions.

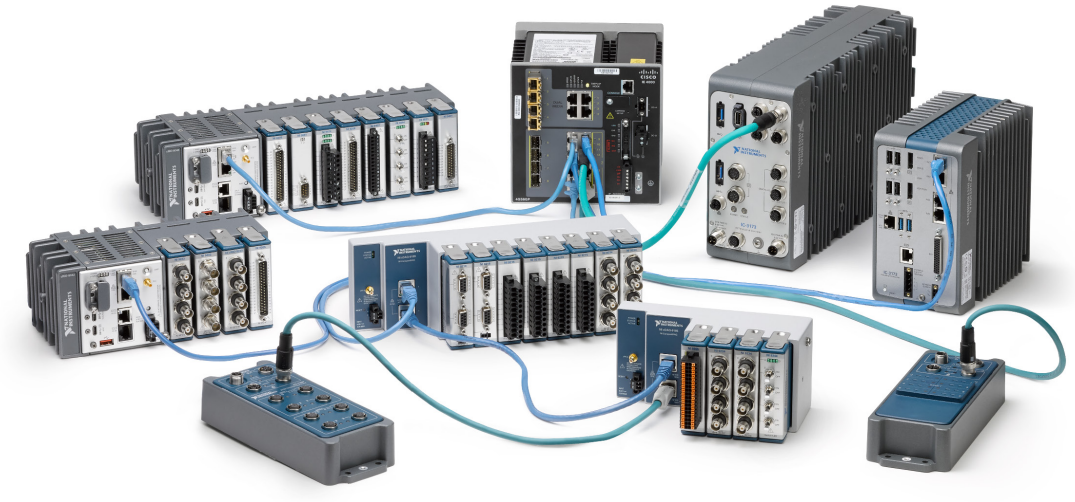


Figure 3. TSN-Enabled NI Products Including FieldDAQ, CompactDAQ, CompactRIO, and NI Industrial Controllers

Easily Log, Store, and Analyze Data with NI Software

LabVIEW systems engineering software is designed for applications that require test, measurement, and control. Expandable with real- time capabilities, FPGA graphical programming, and a host of toolkits offering specialized functionality for specific applications, LabVIEW ensures seamless integration between hardware and software.

FlexLogger is data-logging application software for physical test. It provides sensor-focused configuration workflows for a flexible measurement system with a mix of analog sensors and automotive networks. FlexLogger can also extend the functionality of a system to integrate third-party components and custom analysis with LabVIEW plug-ins.

DIAdem is specifically designed to help engineers quickly locate, inspect, analyze, and report on measurement data using one software tool. With DIAdem, you can locate and load data from any source; interactively visualize, analyze, and report your data; and save time by automating tasks.

NI-DAQmx Application Programming Interface (API)

The NI-DAQmx driver includes a best-in-class API that works directly with a variety of development options including LabVIEW, LabVIEW NXG, C, C#, and Python. The native integration provides exceptional performance and a seamless experience without the need for manual wrapping of functions. To ensure long-term interoperability of DAQ devices, the NI-DAQmx driver API is the same API used for all NI DAQ products, meaning you can minimize your redevelopment efforts regardless of hardware changes or upgrades. Additionally, the driver provides access to help files, documentation, and dozens of ready-to-run shipping examples you can use as a starting point for your application.

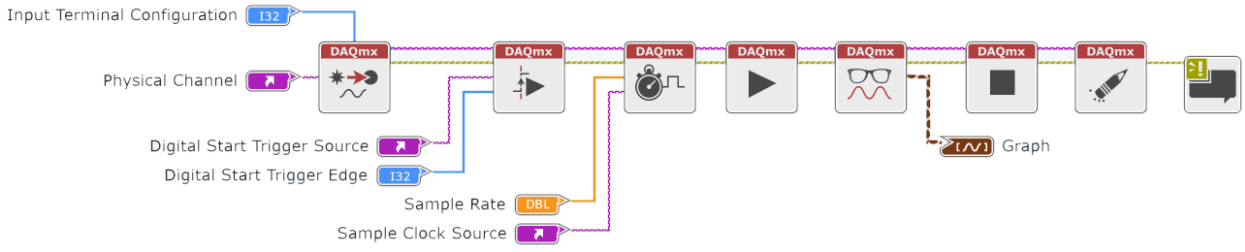


Figure 4. Analog Input Task Designed With the NI-DAQmx Driver and LabVIEW Software

The NI-DAQmx driver helps you synchronize multiple TSN-enabled devices and channels. You can use redefined start trigger libraries to share a start time between multiple channels and multiple devices, achieving synchronization within 1 µs in common synchronization use cases.

Hardware Services

All NI hardware includes a one-year warranty for basic repair coverage, and calibration in adherence to NI specifications prior to shipment. PXI systems also include basic assembly and a functional test. NI offers additional entitlements to improve uptime and lower maintenance costs with service programs for hardware. Learn more at ni.com/services/hardware.

	Standard	Premium	Description
Program Duration	1, 3, or 5 years	1, 3, or 5 years	Length of service program
Extended Repair Coverage	•	•	NI restores your device's functionality and includes firmware updates and factory calibration.
System Configuration, Assembly, and Test[1]	•	•	NI technicians assemble, install software in, and test your system per your custom configuration prior to shipment.
Advanced Replacement[2]		•	NI stocks replacement hardware that can be shipped immediately if a repair is needed.
System Return Material Authorization (RMA)[1]		•	NI accepts the delivery of fully assembled systems when performing repair services.
Calibration Plan (Optional)	Standard	Expedited[3]	NI performs the requested level of calibration at the specified calibration interval for the duration of the service program.

[1]This option is only available for PXI, CompactRIO, and CompactDAQ systems.
[2]This option is not available for all products in all countries. Contact your local NI sales engineer to confirm availability.
[3]Expedited calibration only includes traceable levels.

PremiumPlus Service Program

NI can customize the offerings listed above, or offer additional entitlements such as on-site calibration, custom sparing, and life-cycle services through a PremiumPlus Service Program. Contact your NI sales representative to learn more.

Technical Support

Every NI system includes a 30-day trial for phone and e-mail support from NI engineers, which can be extended through a Software Service Program (SSP) membership. NI has more than 400 support engineers available around the globe to provide local support in more than 30 languages. Additionally, take advantage of NI's award winning online resources and communities.