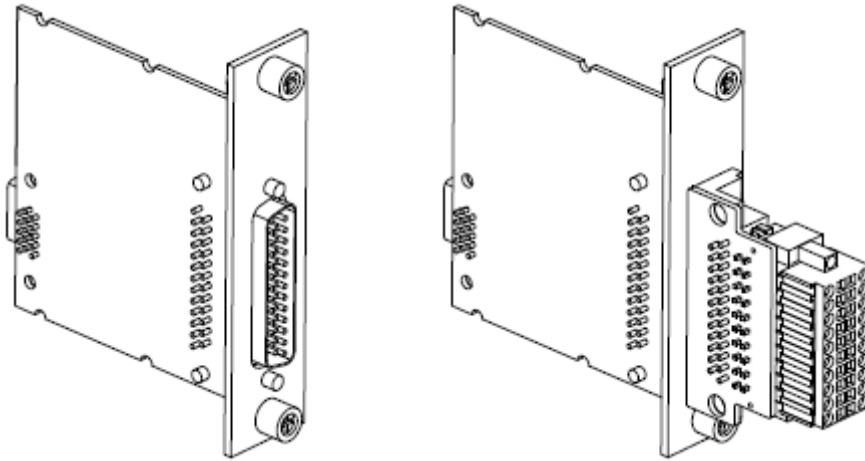DATASHEET

MT E731

16 AO,±10 V, 16 Bit, 25 kS/s/ch Simultaneous

- DSUB or push-in Spring Terminal connectivity

- 250 Vrms, CAT II, channel- to-earth isolation

  (Spring Terminal);60 VDC, CAT I, channel-to-earth

  isolation (DSUB)

The MT E731 is an analog output module for any RobustRIO and FlexDAQ systems. It also features ±30 V overvoltage protection, short-circuit protection, low crosstalk, fast slew rate, high relative accuracy. The MT E731 module includes a channel-to-earth ground double isolation barrier for safety and noise immunity.There are two connector options for the MT E731—a 20-position spring-terminal connector and a 25-position DSUB connector.

MANGOTREE

MT E Series Overview

MT provides more than 20 E Series modules for measurement, control, and communication applications. E Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals

- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground

- -40 ℃ to 70 ℃ temperature range to meet a variety of application and environmental needs

- Hot-swappable

The majority of E Series modules are supported in both RobustRIO and FlexDAQ platforms and you can move modules from one platform to the other with no modification.

RobustRIO

RobustRIO combines an open-embedded architecture with small size, extreme ruggedness, and E Series modules in a platform powered by the Redefinable I/O (RIO) architecture. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of available modular I/O to meet any embedded application requirement.

FlexDAQ

FlexDAQ is a portable, rugged data acquisition platform that integrates connectivity, data acquisition, and signal conditioning into modular I/O for directly interfacing to any sensor or signal. Using FlexDAQ with LabVIEW, you can easily customize how you acquire, analyze, visualize, and manage your measurement data.

Software

LabVIEW Professional Development System for Windows

- Use advanced software tools for large project development
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers
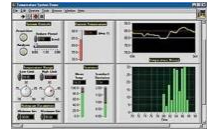
LabVIEW FPGA Module

- Design FPGA applications for MT RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx IP generator functions
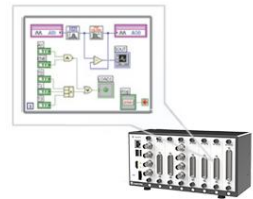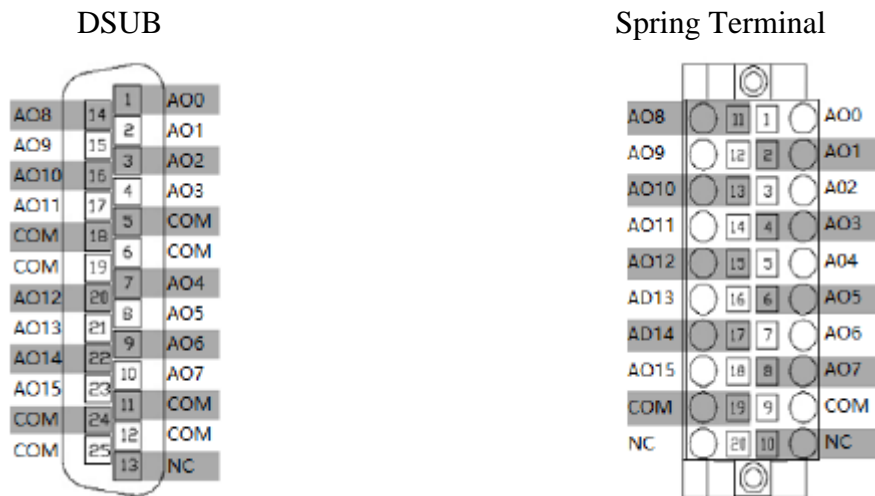
LabVIEW Real-Time Module

- Design deterministic real-time applications with LabVIEW graphical programming
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Take advantage of real-time OS, development and debugging support, and board support
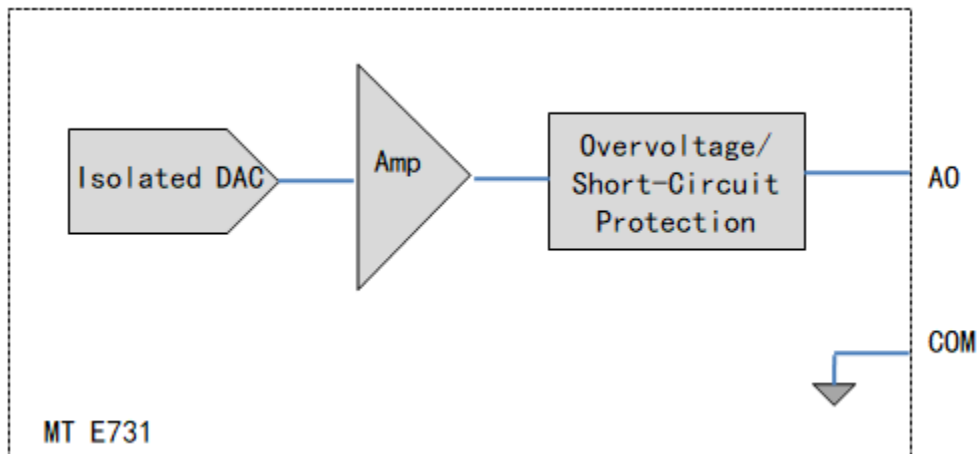
MT E731 Connectivity

Pin definition of DSUB connector and Spring Terminal connector

DSUB

Spring Terminal

AO8	14	1	AO0
AO9	15	2	AO1
AO10	16	3	AO2
AO11	17	4	AO3
COM	18	5	COM
COM	19	6	COM
AO12	20	7	AO4
AO13	21	8	AO5
AO14	22	9	AO6
AO15	23	10	AO7
COM	24	11	COM
COM	25	12	COM
		13	NC

AO8	11	1	AO0
AO9	12	2	AO1
AO10	13	3	A02
AO11	14	4	AO3
AO12	15	5	A04
AD13	16	6	AO5
AD14	17	7	AO6
AO15	18	8	AO7
COM	19	9	COM
NC	20	10	NC

MT E731 Circuitry

Each channel has a digital-to-analog converter (DAC) that produces a voltage signal. Each channel also has overvoltage and short-circuit protection.

MT E731 Specifications

The following specifications are typical for the range -40 ℃ to 70 ℃ unless otherwise noted.

⚠ **Caution** Do not operate the MT E731 in a manner not specified in this document. 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.

⚠ **Caution** The input terminals of this device are not protected from electromagnetic interference. As a result, this device may experience reduced measurement accuracy or other temporary performance degradation when connected cables are routed in an environment with radiated or conducted radio frequency electromagnetic interference. To limit radiated emissions and to ensure that this device functions within specifications in its operational electromagnetic environment, take precautions when designing, selecting, and installing measurement probes and cables

Output Characteristics

Number of channels	16 analog output channels
DAC resolution	16 bits
Type of DAC	String
Output voltage ranges	±10V
Current drive	±10 mA per channel maximum
Output impedance	1 Ω
Output rate	25 kS/s maximum per channel

Table 1. Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range (Offset Error)
Calibrated	Maximum (-40 ℃ to 70 ℃)	0.214%	0.075%
	Typical (25 ℃, ±5 ℃)	0.010%	0.007%

Output voltage drift	5 ppm/℃
Zero-code error drift	±4μV /°C
Protection	
Overvoltage	±30V
Short-circuit	Indefinitely

Noise

Output noise density	170 uV/ $\sqrt{Hz}$
Output noise	50 uVpp

Slew rate	1.8V/us
Crosstalk	76dB
Capacitive drive	1nF
DNL	±1 LSB maximum
INL (endpoint)	±12 LSB maximum

Power Requirements

Power consumption from chassis	500mW maximum
Thermal dissipation (at 70 ℃)	750W maximum

Safety Voltages

Connect only voltages that are within the following limits:

MT E731 with Spring Terminal Isolation Voltages

Channel-to-channel	None

Channel-to-earth ground	
Continuous	250 Vrms, Measurement Category II
Withstand up to 4,000 m	3,000 Vrms, 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.

MT E731 with DSUB Safety Voltages

Isolation	
Channel-to-COM	None
Channel-to-earth ground	
Continuous	60 VDC, Measurement Category I
Withstand up to 2,000 m	1,000 Vrms, verified by a 5 s dielectric withstand test

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is 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.

CE Compliance $C\epsilon$

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)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

Shock and Vibration

To meet these specifications, you must panel mount the system.

Operating vibration	
Random (IEC 60068-2-64)	5 g_{rms}, 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

Environmental

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 ℃ to 70 ℃
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 ℃ to 85 ℃
Ingress protection	IP40
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing Storage
humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing Pollution
Degree	2
Maximum altitude	
For MT E731 with spring terminal	4,000 m

For MT E731	with DSUB	2,000 m

Indoor use only.