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DATASHEET

NI REM-11115

Analog Output Module for Remote I/O



- Four voltage output ranges to choose from (0 V to 10V, ±10V, 0 V to 5 V, and ±5V)
- Two current output ranges to choose from (0 mA to 20mA, 4 mA to 20 mA)
- Short circuit proof outputs
- Spring-terminal connectors allow fast wiring without tools
- Communication to the higher-level system via EtherCAT
- -25 °C to 60 °C temperature range to meet a variety of application and environmental needs

Remote I/O Overview

Remote I/O is a low-cost, modular system for simple machine control and measurements. A Remote I/O system consists of an EtherCAT bus coupler and individual modules mounted on a DIN rail and is controlled from a Real-Time controller such as a CompactRIO Controller or Industrial Controller.

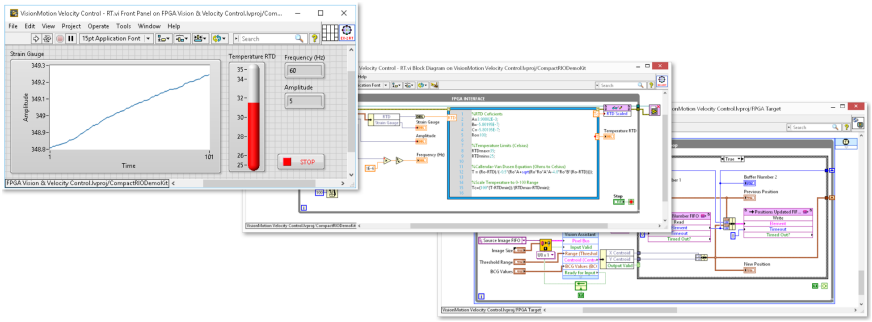
- Round out your system with low-cost I/O for simple tasks while your controller handles advanced tasks such as image processing and high-speed or specialty measurements.
- Add only the I/O you need where you need it with the modular, distributed system.
- Connect multiple Remote I/O systems and EtherCAT chassis to meet your I/O needs.

NATIONAL INSTRUMENTS

Figure 1. NI Remote I/O System

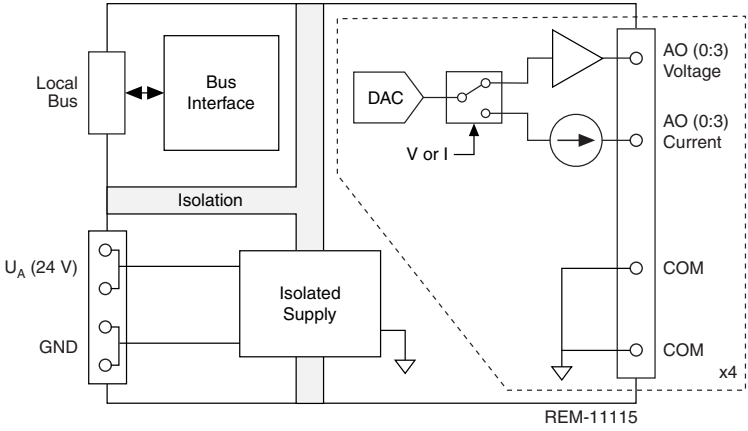


NI Embedded Control and Monitoring Suite



- Use a single toolchain for every phase of your design cycle – from modeling and simulation, to prototyping and validation, to deployment and beyond.
- NI ECM Suite combines LabVIEW Professional Development System with add-on software for programming Real-Time, FPGA, SoftMotion and Vision Acquisition devices.
- Combine LabVIEW with your expertise to efficiently design a system by integrating graphical, C code, .m files, and state-based simulations in one environment.
- Reduce development time with built-in constructs to manage low-level tasks such as timing and memory in an intuitive programming environment.
- Accelerate your development with over 950 available signal processing, analysis, control, and mathematics functions.
- Get to solutions faster with extensive support and training that scale with the complexity of your systems.

REM-11115 Output Circuitry



REM-11115 Specifications

The following specifications are typical for the range -25 °C to 60 °C unless otherwise noted.

Analog Outputs

Number of outputs	4
D/A resolution	16 bit
Representation of output values	16 bits (15 bits + sign)
Process data update	140 µs
Short-circuit and overload protection	Electronic
Transient protection	Suppressor diode
Current	
Current output signal	0 mA to 20 mA, 4 mA to 20 mA
Load/output load current output	≤500 Ω
Precision	0.1%, typical (of output range final value)
Voltage	
Voltage output signal	0 V to 5 V, -5 V to 5 V, 0 V to 10 V, -10 V to 10 V
Load/output load voltage output	>1 kΩ
Precision	0.1%, typical (of output range final value)

Input Scaling

Hex	Dec	0 V to 10 V	±10 V	0 V to 5 V	±5 V	0 mA to 20 mA	4 mA to 20 mA
7FFF to 7F01	—	10.837 V	10.837 V	5.419 V	5.419 V	21.6747 mA	21.3397 mA
7F00	32512	10.837 V	10.837 V	5.419 V	5.419 V	21.6747 mA	21.3397 mA
7530	30000	10 V	10 V	5 V	5 V	20 mA	20 mA
3A98	15000	5 V	5 V	2.5 V	2.5 V	10 mA	12 mA
1	1	333.33 µV	333.33 µV	166.67 µV	166.67 µV	0.6667 µA	4.0005333 mA
0	0	0 V	0 V	0 V	0 V	0 mA	4 mA
FFFF	-1	0 V	-333.33 µV	0 V	-166.67 µV	0 mA	4 mA
C568	-15000	0 V	-5 V	0 V	-2.5 V	0 mA	4 mA
8AD0	-30000	0 V	-10 V	0 V	-5 V	0 mA	4 mA
8100	-32512	0 V	-10.837 V	0 V	-5.419 V	0 mA	4 mA
80FF to 8000[1]	—	Hold last value	Hold last value	Hold last value	Hold last value	Hold last value	Hold last value
8001	Overrange	10.837 V	10.837 V	5.419 V	5.419 V	21.6747 mA	21.3397 mA
8080	Underrange	0 V	-10.837	0 V	-5.419 V	0 mA	Hold last value

Power Requirements

Communications power from U_{Bus}	5 VDC, via bus connector
Current consumption from U_{Bus}	120 mA, typical; 150 mA, maximum
Total power consumption from U_{Bus} and U_A	
Typical	2.04 W
Maximum	3.39 W

[1] Not including 8001 or 8080.

I/O Supply

Supply of analog output modules U_A	24 VDC (I/O supply and sensor supply)
Maximum permissible voltage range	19.2 VDC to 30 VDC (including all tolerances, including ripple)
Current consumption from U_A	40 mA, typical (induced current consumption; no load, 0 V output); 60 mA, typical (4 voltage channels, 10 V output); 110 mA, maximum (4 current channels, 20 mA output, 500 Ω load)
Surge protection	Electronic (35 V, 0.5 s)
Polarity reversal protection	Polarity protection diode
Protection	Suppressor diode
External fuse rating	8 A

Caution Connect an external fuse to the 24 V U_A supply to protect against polarity reversal. The power supply must provide four times the nominal current of the external fuse. This rating ensures that the fuse trips in the event of an error.

Remote I/O Local Bus

Connection method	Bus connector
Transmission speed	100 MBit/s

Physical Characteristics

Note For more information about connecting your device, refer to the device getting started guide on *ni.com/manuals*

Spring-terminal wiring	
Gauge	0.2 mm^2 to 1.5 mm^2 (24 AWG to 16 AWG), solid or stranded
Wire strip length	8.0 mm (0.31 in.) of insulation stripped from the end
Wires per connection	One wire per spring terminal
Dimensions[2]	126.1 mm (4.96 in.) × 35.0 mm (1.38 in.) × 54.0 mm (2.13 in.)
Weight[3]	145 g (5.11 oz)

[2] The depth is valid when a TH 35-7.5 DIN rail is used (according to EN 60715).
[3] With connectors and bus connector.

Note For dimensional drawings of the REM-11115, visit *ni.com/dimensions* and search by module number.

Tolerance Data

The following specifications apply for tolerances at T_A = 25 °C.

- Valid for nominal operation (U_A = 24 V in the default configuration (unless documented otherwise).
- Typical data contains offset error, gain error, and linearity error in the respective default setting.
- All tolerances indicated as a percentage are related to the positive measuring range final value.
- Please also observe the values for temperature drift and the tolerances under influences of electromagnetic interferences.
- Additional tolerances may occur due to the influence of high-frequency electromagnetic interference caused by wireless transmission systems in the near vicinity. The values specified refer to nominal operation in the event of direct interference to components without additional shielding such as a steel cabinet.
- Tolerances can be reduced by providing further shielding measures for the I/O module such as a shielded control box/control cabinet.

Table 1. Tolerances at T_A = 25 °C

Measurement Range	Absolute Tolerance		Relative Tolerance	
	Typical	Maximum	Typical	Maximum
0 V to 5 V, ±5 V, 0 V to 10 V, ±10 V	±10 mV	±30 mV	±0.10%	±0.30%
0 mA to 20 mA, 4 mA to 20 mA	±20 µA	±60 µA	±0.10%	±0.30%

Table 2. Tolerance and Temperature Response at T_A = 25 °C to 60 °C

Measurement Range	Drift[4]	
	Typical	Maximum
0 V to 5 V, ±5 V, 0 V to 10 V, ±10 V	±25 ppm/K	±70 ppm/K
0 mA to 20 mA, 4 mA to 20 mA	±25 ppm/K	±70 ppm/K

Tolerances influenced by electromagnetic interference	
Electromagnetic fields (EN 61000-4-3/IEC 61000-4-3)	<±0.1%
Fast transients (burst) (EN 61000-4-4/IEC 61000-4-4)	<±0.1%
Conducted interference (EN 61000-4-6/IEC 61000-4-6)	<±0.1%

Signal Rise Times

Table 3. Voltage step 0 V to 10 V (Typical Values)

Load	Time for 0% to 99%
1 kΩ	30 µs
1 kΩ || 10 nF	30 µs
1 kΩ || 220 nF	215 µs
1 kΩ + 3 mH	35 µs

Table 4. Current step 0 mA to 20 mA (Typical Values)

Load	Time for 0% to 99%
500 Ω	125 µs
500 Ω || 10 nF	130 µs
500 Ω || 220 nF	300 µs
500 Ω + 2 mH	1 ms

[4] The drift values refer to the relevant measuring range final value.

Isolation Withstand Voltages

Test section	Test voltage
5 V communications power (logic), 24 V supply (I/O)	500 VAC, 50 Hz, 1 min.
5 V supply (logic) / analog inputs	500 VAC, 50 Hz, 1 min.
5 V supply (logic) / functional earth ground	500 VAC, 50 Hz, 1 min.
24 V supply (I/O) / analog inputs	500 VAC, 50 Hz, 1 min.
24 V supply (I/O) / functional earth ground	500 VAC, 50 Hz, 1 min.
Analog inputs / functional earth ground	500 VAC, 50 Hz, 1 min.

Electromagnetic Compatibility

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

- EN 61000-4-2 (IEC 61000-4-2): Electrostatic discharge (ESD); Criterion B; 6 kV contact discharge, 8 kV air discharge
- EN 61000-4-3 (IEC 61000-4-3): Electromagnetic fields; Criterion A; Field intensity: 10 V/m
- EN 61000-4-4 (IEC 61000-4-4): Fast transients (burst); Criterion B, 2 kV
- EN 61000-4-5 (IEC 61000-4-5): Transient surge voltage (surge); Criterion B; DC supply lines: ±0.5 kV/±0.5 kV (symmetrical/asymmetrical); ±1 kV to shielded I/O cables
- EN 61000-4-6 (IEC 61000-4-6): Conducted interference; Criterion A; Test voltage 10 V
- EN 61000-6-2: Noise immunity
- EN 61000-6-3: Noise emission
- EN 55022: Radio interference properties; Class B

CE Compliance CE

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

- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Shock and Vibration

Vibration resistance (EN/IEC 60068-2-6)	5 g
Shock (EN/IEC 60068-2-27)	30 g
Continuous shock (EN/IEC 60068-2-27)	10 g

Environmental

Operating temperature	-25 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Ingress protection	IP20
Protection class	III, EN/IEC 61140, VDE 0140-1
Operating humidity	5% to 95%, non-condensing
Storage humidity	5% to 95%, non-condensing
Maximum altitude	3,000 m
Air pressure	70 kPa to 106 kPa

Indoor use only.

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