Flow Instrumentation

Digital-to-Analog Converter

DESCRIPTION

Cox Digital-to-Analog Converters accept frequency outputs from turbine flow meters and produce an analog signal output. These converters are designed for magnetic or radio frequency (RF) pickoffs in two different product configurations. Converters are offered as either pucks only with wiring terminals, or in a "Y-3" explosion-proof enclosure for use with magnetic or radio frequency pickoffs.

Non-interacting ZERO and SPAN adjustments make it easy to calibrate to any measurement range. All inputs and outputs are fully protected against reverse polarity or shorts to the power supply or ground.

APPLICATION

Digital to analog converters enable flow meters with frequency outputs to integrate into control systems, PLCs and rate indicators requiring analog inputs.

OPERATING PRINCIPLE

Flow meter frequency output is fed into the digital-to-analog converter, which in turn, produces an analog signal output. By inputting the frequency representing zero flow, analog output can be adjusted to either 4 mA or 10 mA. Likewise, by inputting the frequency representing 100 percent of flow, analog output can be adjusted to either 20 mA or 50 mA. The same procedure is used for analog voltage outputs for either 0…5V DC or 0…10V DC.

CONSTRUCTION

Model	Description	Input Type
DAC-250-NP	Aluminum Enclosure with DAC-251 Puck	Magnetic
DAC-251	PVC with Solid Epoxy Encapsulation	
DAC-252-NP	Aluminum Enclosure, DAC-253 Puck	RF Carrier Frequency
DAC-253	PVC with Solid Epoxy Encapsulation	

INSTALLATION

Use the following tables to set up the converter for the application. Refer to the wiring diagrams for installation.

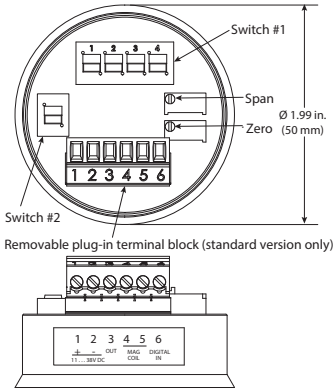


Figure 1: Magnetic puck

Magnetic Puck

Position	Switch #1 #1	Switch #1 #2	Switch #1 #3	Switch #1 #4	Switch #2 #1
■ □	Current Mode	10…50 mA	0…5V	Frequency High *	Digital
□ ■	Voltage Mode	4…20 mA	0…10V	Frequency Low *	Mag. Coil

Radio Frequency Puck

Position	#1	#2	#3	#4
■ □	Current Mode	10…50 mA	0…5V	Frequency High*
□ ■	Voltage Mode	4…20 mA	0…10V	Frequency Low*

NOTE: Black box indicates position switch high side.

* Refer to Specifications table for frequency ranges.

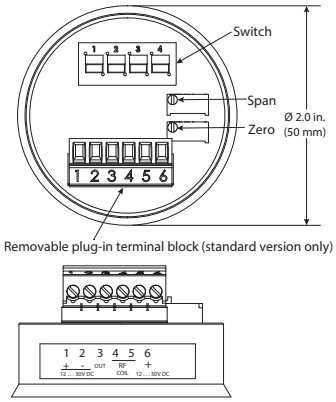


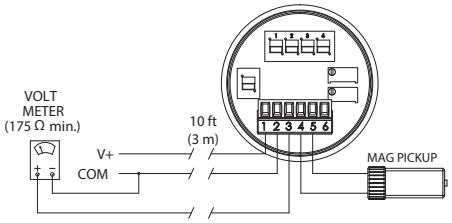
Figure 2: Radio frequency puck

Badger Meter

Product Data Sheet

DAC-251 (MAG)

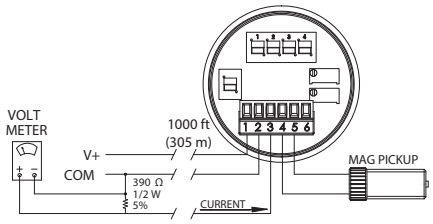
3-Wire Voltage Measurements <10 Feet



Switch Settings	
Range	0…5V or 0…10V
Mode	Voltage
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	V+
2	COM
3	Meter positive
4	Mag.
5	Mag.
6	NC

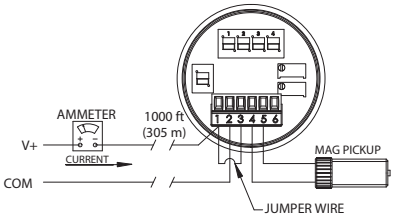
3-Wire Voltage Measurements 10…1000 Feet



Switch Settings	
Range	50 mA for 0…10V
	20 mA for 0…5V
Mode	Current
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	V+
2	COM
3	Meter negative
4	Mag.
5	Mag.
6	NC

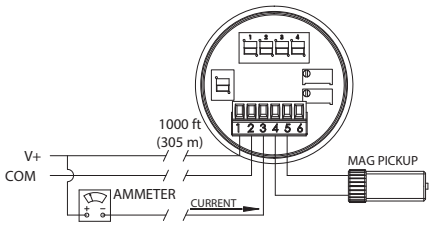
2-Wire Current Measurements



Switch Settings	
Range	10…50 mA
	4…20 mA
Mode	Current
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	Meter neg. & jumper
2	COM
3	Jumper from #1
4	Mag.
5	Mag.
6	NC

3-Wire Current Measurements

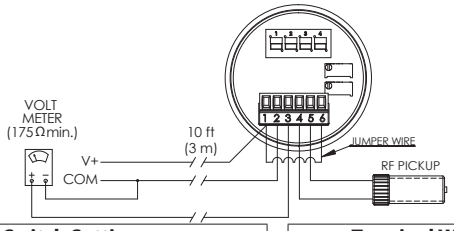


Switch Settings	
Range	0…50 mA or 10…50 mA
	0…20 mA or 4…20 mA
Mode	Current
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	V+ & Meter positive
2	COM
3	Meter negative
4	Mag.
5	Mag.
6	NC

DAC-253 (RF)

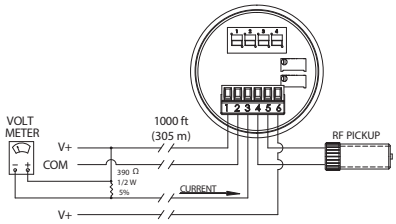
3-Wire Voltage Measurements <10 Feet



Switch Settings	
Range	0…5V or 0…10V
Mode	Voltage
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	V+ & Jumper
2	COM
3	Meter positive
4	RF Pickup
5	RF Pickup
6	Jumper from #1

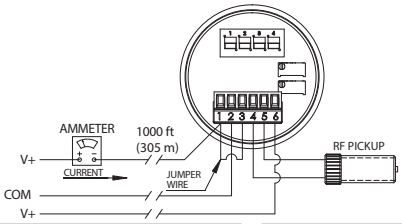
3-Wire Voltage Measurements 10…1000 Feet



Switch Settings	
Range	50 mA for 0…10V
	20 mA for 0…5V
Mode	Current
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	V+
2	COM
3	Meter negative
4	RF Pickup
5	RF Pickup
6	V+

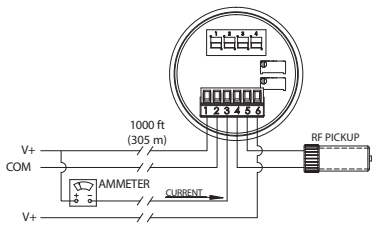
2-Wire Current Measurements



Switch Settings	
Range	10…50 mA
	4…20 mA
Mode	Current
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	Meter neg. & jumper
2	COM
3	Jumper from #1
4	RF Pickup
5	RF Pickup
6	V+

3-Wire Current Measurements



Switch Settings	
Range	0…50 mA
	0…20 mA
Mode	Current
Frequency	Frequency High
	Frequency Low

Terminal Wiring	
1	V+ & Meter positive
2	COM
3	Meter negative
4	RF Pickup
5	RF Pickup
6	V+

SPECIFICATIONS

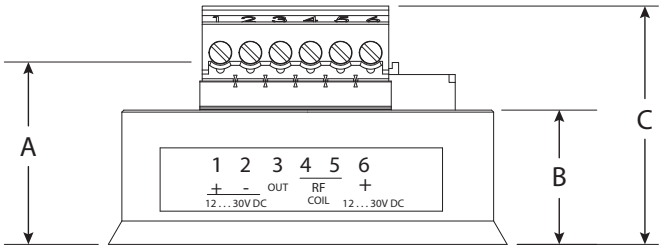
CE Compliance EN 55011, EN 50022-2

Input Voltage	DAC-251 (Mag)	9…38V DC	
	DAC-253 (RF)	12…30V DC	
Input Protection	DAC-251 (Mag)	50V AC, Reversed Leads	
Input Current Standard	DAC-251 (Mag)	25 mA	
	DAC-253 (RF)	5 mA	
Temperature Range	–40…160° F (–40…70° C)		
Frequency Input Range (Max Full Scale)	DAC-251 (Mag)	Low	75…1100 Hz
		High	1100…10,000 Hz
	DAC-253 (RF)	Low	115…1100 Hz
		High	1100…5000 Hz
Input Sensitivity	50 mV P-P		
Output Protection	Short to +V DC, common or signal out continuous		
Output Analog Voltage Standard	0…5V 0…10V		
Output Analog Current Standard	4…20 mA 10…50 mA		
Output Ripple and Noise	Voltage mode: 0.25V full scale is maximum allowed Current mode: 1 mA full scale is maximum allowed		
Temperature Coefficient	Voltage mode: 0.0065V/°C is maximum allowed Current mode: 0.026 mA/°C is maximum allowed		
Response Time	180 mS (Full Scale change to 95% of final value)		
Explosion-Proof Housing Rating	Class 1, Division 1 Groups C and D Class 2, Division 1 Groups E, F and G Class 3		

When ordering DAC-250-NP, it is recommended that the meter be recalibrated due to a possible variance in magnetic gauss rating; compared to the original calibrated pickoff/meter combination.

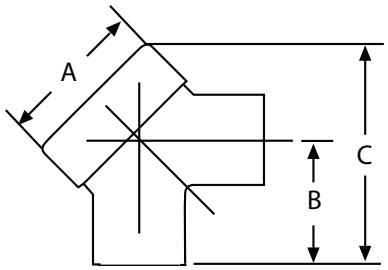
DIMENSIONS

DAC-251 and DAC-253



Dimension	Inches	Millimeters
A	0.91 in.	23 mm
B	0.67 in.	17 mm
C	1.19 in.	30 mm

DAC-250-NP and DAC-252-NP



Dimension	Inches	Millimeters
A	2.61 in.	66 mm
B	2.12 in.	54 mm
C	3.72 in.	95 mm

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