

MODEL ADC-89A

FEATURES

- ▶ Counter Type
- ▶ No Adjustments
- ▶ Unipolar or Bipolar
- ▶ Binary or BCD Coding
- ▶ Up to 10,000 Conv./Sec.
- ▶ Low Cost

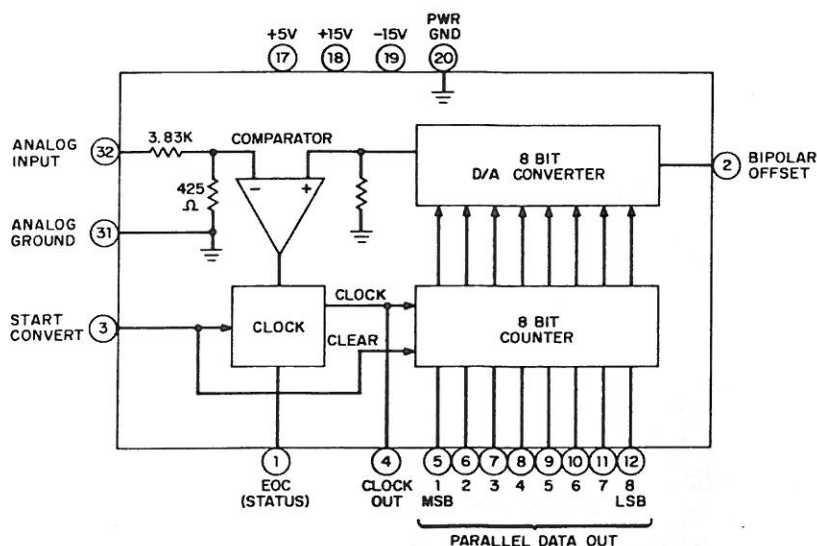
GENERAL DESCRIPTION

Model ADC-89A is a low cost, 8 bit A/D converter using the counter method of conversion. The converter operates by using a digital counter to step the output of the D/A converter until it is equal to the input voltage. At this time the conversion is complete and the 8 bit parallel output data is valid. The simplified operation, small size, and low cost of this converter make it an ideal choice for OEM applications where 8 bit resolution with moderate speed are required.

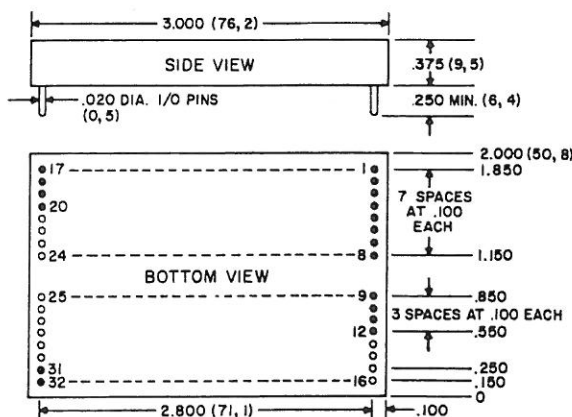
The ADC-89A is available with either binary or BCD output coding. The binary version operates in both unipolar and bipolar modes with a full scale conversion time of 200 μ sec. maximum (5kHz word rate). The BCD version operates in unipolar mode only with a 100 μ sec. full scale conversion time (10kHz rate). The conversion time is proportional to the input analog voltage and is, therefore, faster for smaller inputs. No external adjustments are required and 8 bit accuracy with monotonic operation is achieved over the full 0°C to 70°C operating temperature range. The input voltage ranges are 0V to +10V unipolar and -5V to +5V bipolar; unipolar or bipolar operation is determined by the external connection of pin 2.

Outputs include 8 parallel lines of data, end of conversion (status) pulse, and a clock output for external synchronizing and counting applications. Other specifications include full scale temperature coefficient of 50ppm/°C maximum and long term stability of .05% per year. Power requirement is ± 15 VDC and +5VDC.

The ADC-89A is an improved version of Datel's former model ADC-89. The new model is identical in specifications and pin positions to the previous model except for a small change in input impedance, an added Clock Out pin, and an increase in +5V power supply current.



**MECHANICAL DIMENSIONS
INCHES (MM)**



NOTES:
1. OPEN DOTS DESIGNATE OMITTED PINS
2. 0.100 INCH = 2.5mm

**INPUT/OUTPUT
CONNECTIONS**

PIN	FUNCTION
1	E.O.C. (STATUS)
2	BIPOLAR OFFSET
3	START CONVERT
4	CLOCK OUT
5	BIT 1 OUT (MSB)
6	BIT 2 OUT
7	BIT 3 OUT
8	BIT 4 OUT
9	BIT 5 OUT
10	BIT 6 OUT
11	BIT 7 OUT
12	BIT 8 OUT (LSB)
17	+5V POWER IN
18	+15V POWER IN
19	-15V POWER IN
20	POWER GROUND
31	ANALOG GROUND
32	ANALOG IN

SPECIFICATIONS, ADC-89A

(Typical at 25°C, ±15V & +5V supplies unless otherwise indicated)

INPUTS

Input Range 0V to +10V FS or ± 5V FS
Impedance 4.25K ohms, ± 15 ohms
Input Overvoltage, no damage ± 20V
Start Conversion 2V min. to 5.5V max. positive pulse with duration of 150 nsec. min. Rise and fall times <500 nsec. Logic "1" resets converter Logic "0" initiates conversion Loading: 4 TTL loads

OUTPUTS

Parallel Output Data 8 parallel lines of data held until next conversion command.
Vout ("0") ≤ +0.8V
Vout ("1") ≥ +2.4V
Each output capable of driving up to 6 TTL loads.

Coding, Unipolar Operation Straight Binary, positive true
Bipolar Operation Offset Binary, positive true (BCD version does not operate in bipolar mode).

End of Conversion (E.O.C.) Conversion Status signal.
Vout ("0") ≤ +0.8V indicates conversion completed.
Vout ("1") ≥ +2.4V during reset and conversion period.
Loading: 8 TTL loads.

Clock Output Internal clock pulse train of 320 nsec. 0 to +5V pulses gated on during conversion time. Each negative transition occurring after the rise of the EOE indicates one count (255 FS. binary, 99 FS BCD).
Loading: 8 TTL loads.

PERFORMANCE

Resolution 8 Bits (1 part in 256) for Binary. 2 Digits (1 part in 100) for BCD.

Accuracy at 25°C ± 0.2% of FS ± 1/2 LSB

Linearity ± 1/2 LSB

Temp. Coeff. of Gain ± 50ppm/°C max.

Temp. Coeff. of Offset, Unipolar ± 50 μV/°C max.
Bipolar ± 50ppm of FS/°C max.

Long Term Stability ± .05%/year

Power Supply Rejection ± .07% of FS/% supply

Conversion Time 200 μsec. max. (Binary)
100 μsec. max. (BCD)

POWER REQUIREMENT +15VDC ± 0.25V @ 25mA max.
-15VDC ± 0.25V @ 15mA max.
+ 5VDC ± 0.25V @ 90mA max.

PHYSICAL-ENVIRONMENTAL

Operating Temp. Range 0°C to 70°C

Storage Temp. Range -55°C to +85°C

Relative Humidity Up to 100% non-condensing

Case Size 2 x 3 x 0.375 inches (50.8 x 76.2 x 9.5mm)

Case Material Black diallyl phthalate per MIL-M-14

Pins020" round, gold plated, .250" long min.

Weight 3 oz. max. (85g.)

ORDERING INFORMATION

ADC-89A

PRICES (1-9)

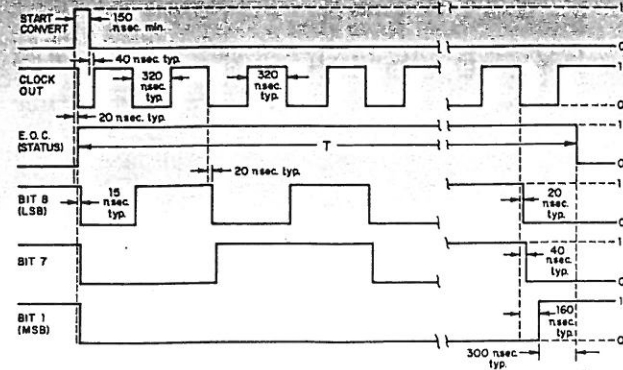
NO. OF BITS & CODING

8B = 8 BINARY BITS
8D = 2 DIGIT BCD

ADC-89A8B \$69.00
ADC-89A8D \$69.00

THE ADC-89A8B & ADC-89A8D ARE COVERED UNDER GSA CONTRACT

TIMING DIAGRAM FOR ADC-89A8B Output: 1000 0000



NOTE: If V_{IN} is less than -FS or greater than +FS, the output code will be 0000 0000.
T = 200 μsec. max. for binary coding
T = 100 μsec. max. for BCD coding

OUTPUT CODING

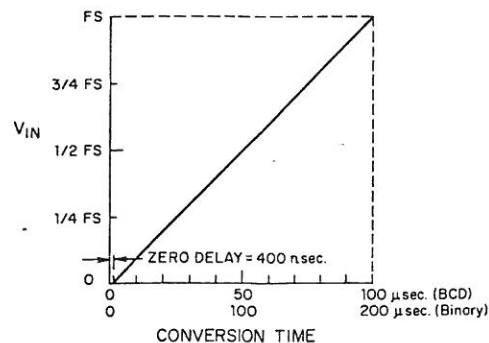
UNIPOLAR (0 TO +10V)

SCALE	INPUT VOLTAGE	STRAIGHT BINARY	SCALE	INPUT VOLTAGE	2 DIGIT BCD
+FS-1 LSB	+9.96V	1111 1111	+FS-LSD	+9.9V	1001 1001
+7/8 FS	+8.75V	1110 0000	+87 FS	+8.7V	1000 0111
+3/4 FS	+7.50V	1100 0000	+3/4 FS	+7.5V	0111 0101
+1/2 FS	+5.00V	1000 0000	+1/2 FS	+5.0V	0101 0000
+1/4 FS	+2.50V	0100 0000	+1/4 FS	+2.5V	0010 0101
+1 LSB	+0.04V	0000 0001	+1 LSD	+0.1V	0000 0001
0	0.00V	0000 0000	0	0.0V	0000 0000

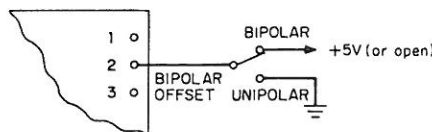
BIPOLAR (-5V TO +5V)

SCALE	INPUT VOLTAGE	OFFSET BINARY
+FS-1 LSB	+4.96V	1111 1111
+3/4 FS	+3.75V	1110 0000
+1/2 FS	+2.50V	1100 0000
0	0.00V	1000 0000
-1/2 FS	-2.50V	0100 0000
-3/4 FS	-3.75V	0010 0000
-FS+1 LSB	-4.96V	0000 0001
-FS	-5.00V	0000 0000

CONVERSION TIME VS. V_{IN}



UNIPOLAR & BIPOLAR OPERATION (Binary Version)



For bipolar operation Pin 2 is connected to the +5V supply or left open. This turns on the internal offset current. For unipolar operation Pin 2 is connected to ground, turning off the internal offset current. The BCD output model (ADC-89A8D) has no internal connection to Pin 2 and therefore Pin 2 need not be connected externally.

For modules with extended temperature range operation the following suffixes are added to the model number. Consult factory for pricing.

-EX -25°C to +85°C operation
-EXX-HS -55°C to +85°C operation with hermetically sealed semiconductor components.

NOTE: ADC-89A8B & 8D replace former Datel models ADC-898B & 8D and are improved models of these units respectively. The only difference from the previous models is the additional output Clock Out (pin 4), the change in input impedance from 5K ohms to 4.25K ohms, and the change in 5V supply current from 75 mA typical to 90 mA maximum.

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE