

GURLEY SERIES M136 MAGNETIC ROTARY ENCODERS

MOTION TYPE:

ROTARY

USAGE GRADE:

LIGHT INDUSTRIAL

OUTPUT:

FOUR CHOICES

MAX RESOLUTION:

4096 COUNTS

OR

12 BITS



SMALL PACKAGE - BIG PERFORMANCE

The series **M136** magnetic rotary encoders are designed for light industrial applications that require up to twelve bits of resolution (4096 words or counts/turn) in a very small package. The four models share these features:

- Non-contact; frictionless; bi-directional rotation
- Maximum rotating speed: 30,000 RPM
- Protection: IP64 standard (IP 68 optional)
- Shock: 1000 m/s²; 6 ms (non-operating)
- Vibration: 100 m/s² @ 55 to 2000 Hz
- 36-mm body; blind hollow-shaft
- Weight: Encoder with 1m cable (no connector) 85 grams, magnet carrier 12 grams

Models Available:

M136-P	Parallel binary 12 bit
M136-S	Synchro-serial interface (SSI) 12 bit
M136-I	Incremental, 4096 counts/rev. (after quadrature decode)
M136-A	Analog (Voltage or Current)

ingenuity@work[®]

ISO
9001
CERTIFIED

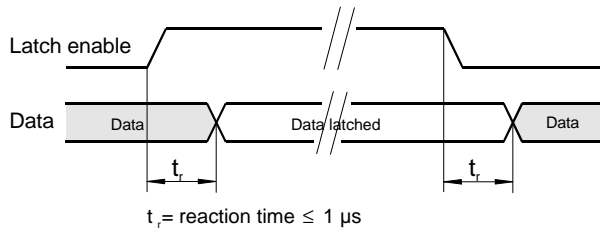
Gurley Precision Instruments
514 Fulton Street
Troy, NY 12180 U.S.A.
(800) 759-1844, (518) 272-6300, fax (518) 274-0336,
Online at www.gurley.com, e-mail: info@gurley.com



SPECIFICATIONS

M136P Binary Parallel Interface

Timing diagram:



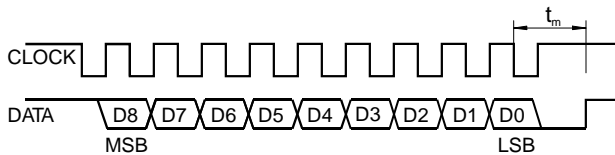
$t_r =$ reaction time $\leq 1 \mu s$
 Output increases with CW rotation
 Maximum sampling rate is 500 kHz

Power Supply: 8V to 26V DC
 Power Consumption: 20 mA
 Output Voltage: $V_h \geq V_{supply} - I$ at $-I_h \leq 10 \text{ mA}$
 $V_L \leq 1V$ at $I_L \leq 10 \text{ mA}$
 Resolution: max. 9 bits (512 words/turn)
 Hysteresis: 0.5 bit
 Accuracy: ± 1 bit
 Repeatability: ≤ 0.1 bit
 Output signals: D0 (LSB) - D8 (MSB) - natural binary
 Output Type: Push-pull @ 40mA,
 open collector NPN @ 25mA
 Data inputs: LE - latch enable input signal, active high
 Max. Cable length: 10m
 Connector: DA-15P or pigtailed
 Temp. Range: -25 C to 125 C

M136S Binary Synchro-Serial Interface (SSI)

256 to 4096 words per revolution

Timing diagram:

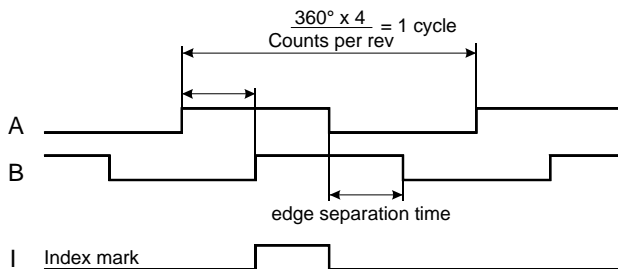


Clock = 50 kHz to 1MHz
 $t_m = 13 \mu s$ to $20 \mu s$
 Output increases with CW rotation

Power Supply: 5V DC
 Power Consumption: 35 mA
 Resolution: max. 12 bits (4096 words/turn)
 Hysteresis: 0.2°
 Accuracy: 0.3°
 Repeatability: ≤ 0.1 bit
 Output signals: Serial data (RS 422) - natural binary
 Data inputs: Clock (RS422)
 Max. Cable length: 100m (at 1 MHz)
 Connector: DE-9P or pigtailed
 Temp. Range: -25 C to 85 C
 Max Speed: 18000 rpm @ 4096, otherwise 20000 rpm

M136I Incremental Output

Output diagram:



B leads A for CW rotation

Power Supply: 5V DC
 Power Consumption: 35 mA
 Output TTL signals: A, B, I, /A, /B, /I, (RS 422)
 Resolution (max): 4096 counts/rev. (after quadrature decode)
 Accuracy: ± 0.3 deg.
 Max. cable length: 20m
 Connector: DE-9P
 Temp. Range: -25 C to 85 C
 Edge separation time: $1 \mu s$ -sec minimum
 Max. Speed: 10000 rpm @ 4096, otherwise 20000 rpm

M136

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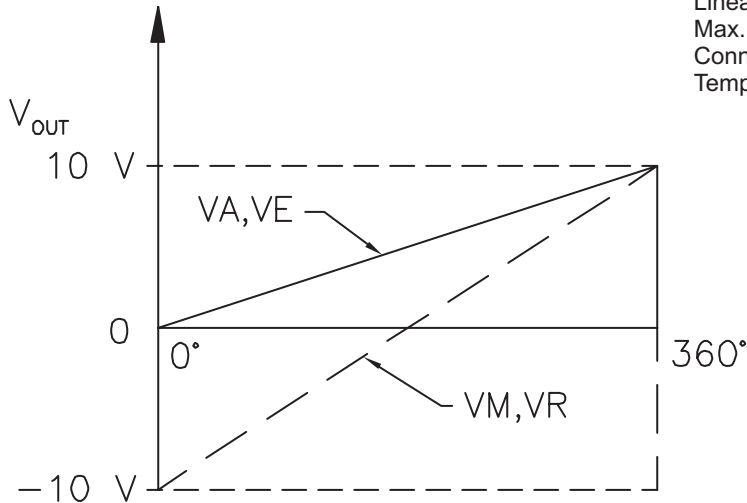


SPECIFICATIONS

M136A Analog - Voltage Output

VA 0 to 10 Vdc, CW
 VE 0 to 10 Vdc, CCW
 VM -10 to +10 Vdc, CW
 VR -10 to +10 Vdc, CCW

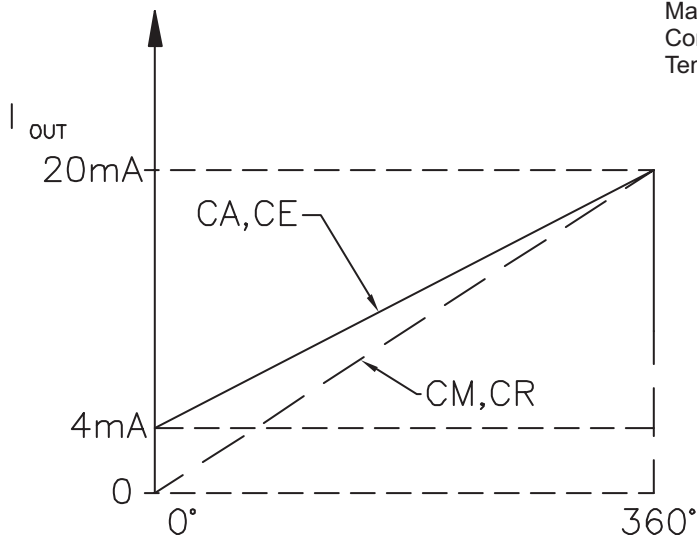
Power Supply: VA & VE, +20 to 30 Vdc
 VM & VR, ± 12 to ± 16 Vdc
 Power Consumption: 40 mA (typical)
 Output Voltage: VA, VE 0-10 Vdc
 VM, VR -10 to +10 Vdc
 Output Loading: Max. 10 mA
 Linearity: 1%
 Max. Cable Length: 20m (65 feet)
 Connector: DE-9P or pigtails
 Temp. Range: -25 C to +70 C (operating)
 -25 C to 125 C (storage)



M136A Analog - Current Output

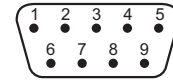
CA 4 to 20 mA, CW
 CE 4 to 20 mA, CCW
 CM 0 to 20mA, CW
 CR 0 to 20 mA, CCW

Power Supply: +20 to 30 Vdc
 Power Consumption: 50 mA plus output current
 Output Current: CA, CE 4 TO 20 mA
 CM, CR 0 to 20 mA
 Output Loading: $R_L = 0$ to $V_{ps}/I_{out\ max}$
 Linearity: 1%
 Max. Cable Length: 20m (65 feet)
 Connector: DE-9P or pigtails
 Temp. Range: -25 C to +70 C (operating)
 -25 C to +125 C (storage)



Pin	SC (SSI)		IC (Incremental)	
	Function	Wire Color (a,b)	Function	Wire Color (a,b)
1	Shield		Shield	
2	Clock	White	Index	White
3	Clock	Brown	B	Green
4	NC	-	A	Gray
5	+V	Red	+V	Red
6	Data	Green	Index	Brown
7	Data	Yellow	B	Yellow
8	NC	-	A	Pink
9	GND	Blue	GND	Blue

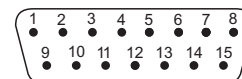
DE - 9P



Pin	VA, VE, VM, VR (Analog - Voltage)			CA, CE, CM, CR (Analog - Current)		
	Function	Wire Color (a)	Wire Color (b)	Function	Wire Color (a)	Wire Color (b)
1	Shield			Shield		
2	NC	-	-	NC	-	-
3	V _{out}	Black	Green	I _{out}	Black	Green
4	NC	-	-	NC	-	-
5	+V _{dd}	Red	Red	V _{dd}	Red	Red
6	-V _{dd} (c)	Brown	Brown	NC	-	-
7	NC	-	-	NC	-	-
8	NC	-	-	NC	-	-
9	GND	Orange	Blue	GND	Orange	Blue

Pin	PA, PB (Parallel)		
	Function	Wire Color (a)	Wire Color (b)
1	Shield	-	-
2	D8	White	White
3	D7	Brown	Brown
4	D6	Green	Green
5	D5	Yellow	Yellow
6	D4	Gray	Gray
7	D3	Pink	Pink
8	+V _{dd}	Red	Red
9	D2	Black	Black
10	D1	Violet	Violet
11	D0	Gray/Pink	Orange
12	NC	-	-
13	NC	-	-
14	LE	Red/Blue	Clear
15	GND	Blue	Blue

DA-15P



- (a) standard EMC grade; shield and case connect to pin 1.
- (b) high EMC grade; inner shield connects to pin 1, outer shield connects to encoder case.
- (c) VM & VR only



ORDERING INFORMATION

MODEL	LINES	IND	V	OUT	PG	CAB	CONN	EXIT	DIA	SF
M136B	00512	N	5	SC	D	10	S	S	06M	N

MODEL

M136B 36mm magnetic encoder, blind hollow shaft

LINES - Disc line count or output resolution

00001 (any analog)	00400 (IC, SC)
00064 (IC)	00500 (IC, SC)
00080 (IC)	00512 (IC, SC, PA, PB)
00100 (IC)	00800 (SC)
00125 (IC)	01000 (SC)
00128 (IC)	01024 (IC, SC)
00200 (IC)	01600 (SC)
00250 (IC)	02000 (SC)
00256 (IC, SC)	02048 (SC)
00320 (SC)	04096 (SC)

IND - Index format

Q	Quarter cycle gated index (IC)
N	No Index (all others)

V - Input Voltage

5	+5 Vdc (IC, SC)
R	+8 to 26 Vdc (PA, PB)
S	+20 to 30 Vdc (VA, VE, CA, CM, CR)
T	+/-12 to +/-16 Vdc

OUT - Output format

PA	Parallel, push-pull
PB	Parallel, open collector
SC	SSI
IC	Incremental
CA	Analog, 4 to 20 mA, CW
CE	Analog, 4 to 20 mA, CCW
CM	Analog, 0 to 20 mA, CW
CR	Analog, 0 to 20 mA, CCW
VA	Analog, 0 to 10 Vdc, CW
VE	Analog, 0 to 10 Vdc, CCW
VM	Analog, -10 to 10Vdc, CW
VR	Analog, -10 to 10 Vdc, CCW

PG - Protection Grade

A	IP53, high EMC grade
B	IP64, high EMC grade
C	IP68, high EMC grade
D	IP53, standard EMC grade (default)
E	IP64, standard EMC grade
F	IP68, standard EMC grade

CAB - Cable Length

10	1.0 meters (standard)
XX	9.9 meters is maximum

EXIT - Cable Exit Position

S	Side-exit cable
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CONN - Connector

P	Pigtails (no connector)
Q	DA-15P (PA, PB)
S	DE-9P (all others)

DIA - Shaft diameter (magnet carrier)

04M	4mm
05M	5mm
06M	6mm (default)
08M	8mm
10M	10mm
03E	3/16"
04E	1/4"
06E	3/8"
000	supplied without a magnet carrier

SF - Special features

N	No special features
#	Issued at time of order to define special customer requirements

SPECIAL CAPABILITIES

For special situations, we can optimize catalog encoders to provide higher frequency response, greater accuracy, wider temperature range, reduced torque, non-standard line counts, or other modified characteristics. In addition, we regularly design and manufacture custom encoders for user-specific requirements. These range from high-volume, low-cost, limited-performance commercial applications to encoders for military, aerospace and similar high-performance, high-reliability conditions. We would welcome the opportunity to help you with your encoder needs.

WARRANTY

Gurley Precision Instruments offers a limited warranty against defects in material and workmanship for a period of one year from the date of shipment.



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