

Incremental Encoders

Position Tracking

Encoder feedback can provide improved system accuracy, stall detection and peace of mind. Closed-loop positioning is most frequently used in critical applications to compensate for the mechanical elements of the system.

Position Tracking provides circuitry to interface an incremental optical encoder with a Compumotor Indexer. Dual-channel incremental encoder with quadrature and with single-ended or differential-TTL outputs may be used. The encoder may be used as part of a closed-loop system or as an independent means to verify position. The encoder may also be used to detect whether a stall has occurred during a move. The Compumotor Indexers listed below support Position Tracking, using virtually any incremental encoder.

Model Number:

500, AT6400, AT6200, PC21, 4000, SX, 6200, 6201

The number of encoder steps seen by the Indexer is equal to four times the number of encoder "lines". For example, a 1,000-line encoder mounted directly on the motor will generate 4,000 encoder steps for each revolution of the motor shaft. A minimum of three motor steps per encoder step is required for successful operation of the Position Maintenance function. In the example above, a motor resolution of better than 12,000 steps/rev would be required.

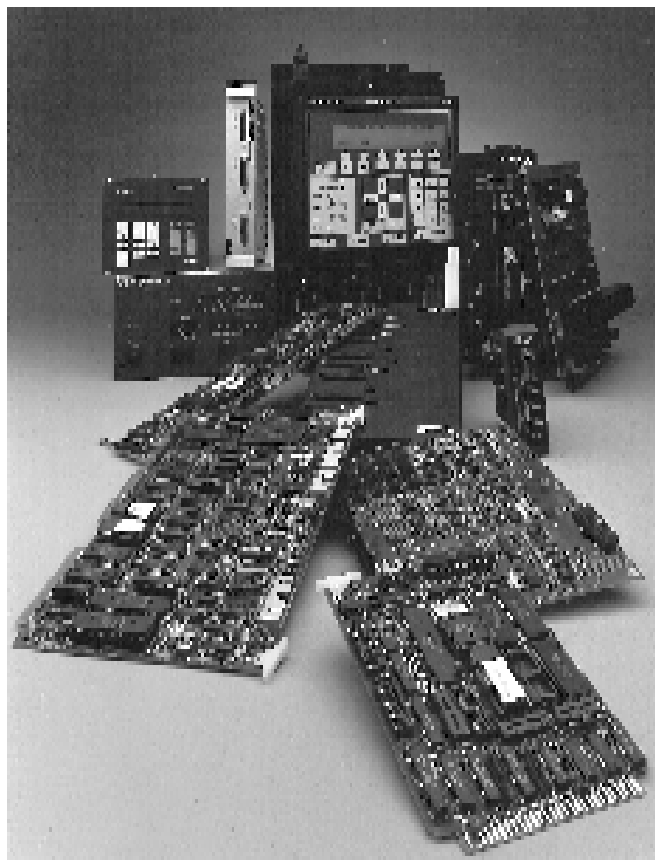
If a reducer is introduced between the motor shaft and the encoder, the number of encoder steps/rev must be divided by the equivalent gear ratio to define the number of encoder steps received by the indexer.

Motor Stall Detection

When the motor is being moved, the indexer repeatedly compares the number of encoder steps coming in against the number of motor steps being sent out. If the encoder position deviates excessively from the desired position in the course of a move, the indexer assumes the motor has stalled.

This feature has several optional configurations. These include setting a "window" of allowable deviation to account for mechanical backlash and motor wind-up, terminating the move and/or sending an output signal if all stall is detected.

Applications where stall detection could be useful include: positioning glass vials in blood analysis, chemical mixing, X-ray head/table positioning, laser or water jet cutting, polishing mirrors for telescopes or drawing fiber optics.



Encoder Position Maintenance

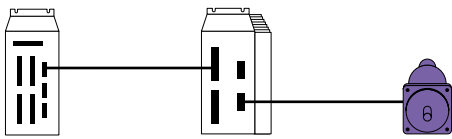
The indexer may be configured to resist any spontaneous change in position when at rest. In Position Maintenance mode, the indexer repeatedly compares actual encoder step reference position with desired position while the motor is stopped. If external forces cause the encoder position to change, an error will be detected. The magnitude of this error determines the magnitude of the indexer's correction response. The correction response calculation yields a correction velocity, the stepper will then drive at the correction velocity until the error is reduced to zero.

Encoder position maintenance is often used in machining and metal removal applications. During a metal removal operation, forces can be developed and transmitted that cause the motor shaft to deflect. The indexer will sense the movement by counting the subsequent encoder steps. To maintain or compensate for the undesirable movement, the indexer will command the motor to return to the desired stop location.

Encoder Referenced Positioning

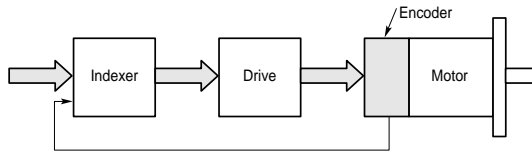
Indexers typically operate using position parameters in units of motor steps. With Position Tracking, the parameters can be in units of encoder steps. In this mode, when making a preset move, the indexer sends out step pulses to the motor until the correct number of encoder steps is returned.

Position information provided by the indexer may be in units of either encoder steps or motor steps.



-E Option

The -E option is an incremental 1,000-line rotary encoder, factory mounted and coupled directly to the rear shaft and end bell of a stepping motor. These can also be ordered as kits for field retrofits.



Compumotor offers the -E options on the S and LN series microstepping motor/drive systems, which are also compatible with the following Compumotor Indexers; 500, AT6400, 6200, 4000, PC21, and SX.

Specifications

Mechanical

Starting torque (oz-in) at 77°F (25°C) (N-m)	0.5 (.003)
Moment of inertia	0.22 oz-in sec ²
Weight oz (kg)	10 (0.28)
Bearing life	1x10 ⁹ revolutions
Max operating speed	3,000 rpm

Electrical

Input power	5VDC ±5%, 125 ma
Output format	2 channels (A and B) quadrature Z channel once/rev

Environmental

Temperature Operating	32° to 158°F (0° to 70°C)
Storage	-25° to 194°F (-32° to 90°C)
Shock	10 G's for 11 msec duration
Vibration	20 to 2,000 Hz at 5 Gs

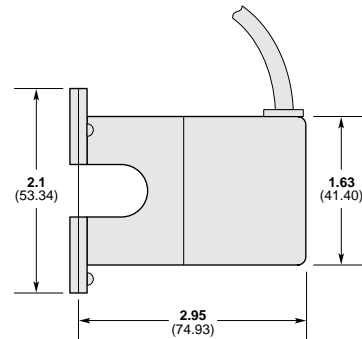
Pin Connections

All -E option encoders come standard with a 10-foot cable and 25-pin "D" connector.

Pin No.		Description
1	Brown	Channel A
2	Brown/White	Channel A return
3	Green	Channel B
4	Green/White	Channel B return
5	Orange	Channel Z
6	Orange/White	Channel Z return
7	—	NC
8	Shield	Case Ground
9-13	—	NC
14	Black	Common
15-22	—	NC
23	Red	5VDC
24-25	—	NC

Dimensions (—) denotes millimeters

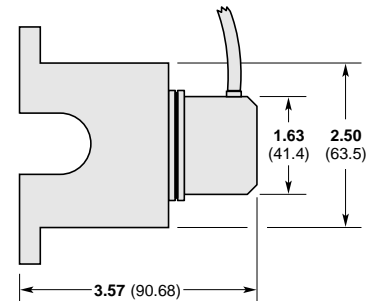
E57



-E option (57 size) encoder can be ordered with the following motor/drives:

SX57-51	S57-51	LN57-51	6201-57-51-MO
SX57-83	S57-83	LN57-83	6201-57-83-MO
SX57-102	S57-102	LN57-102	6201-57-102-MO

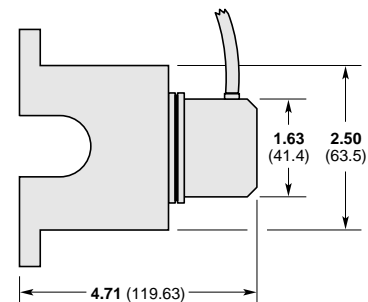
E83



-E option (83 size) encoder can be ordered with the following motor/drives:

SX(F)83-62	S83-62	LN83-62
SX(F)83-93	S83-93	6201-83-62-MO
SX(F)83-135	S83-135	6201-83-93-MO
		6201-83-135-MO

E106



-E option (106 size) encoder can be ordered with the following motor/drives:

SX(F)106-178	S106-178
SX(F)106-250	S106-250
SX(F)106-205	S106-205