LINEAR SCALE AT402E
Linear encoder for NC feedback system

In addition to the high measuring accuracy the world-class vibration resistance (20G) and shock resistance (40G) are achieved.
Linear Scale for NC control with high vibration/shock resistance and linear thermal characteristics

**Features**

- Achieving the world-class vibration resistance (20G) and shock resistance (40G) for using with a heavy cutting machine tool.
- Multi-point elastic fixing for very linear and smooth expansion and contraction with temperature changes.
- 1Vpp/20µm signal output for high connectivity with various machine controllers.
- Absolute Interval Code for a simple and affordable Absolute Measuring System.
- High-responce speed of 120m/min
- High measuring accuracy of ±2µm (up to 540mm)

**Absolute Interval Code**

Absolute Interval Code system provides reference marks at every 20mm interval with a 0.02mm offset. This enables unique origin position setting by detection of only two marks (minimum), and the initial setting time required is less.

**World-class vibration/shock resistance**

Vibration test at 20G

- X-axis: ±4.55µm
- Y-axis: ±3.55µm
- Z-axis: ±2.70µm

Shock test at 1/2 sin and 11msec

- Acceleration (G)
- Peak change during impact (µm)
Linear Scale AT402E

• Connectable NC Controller
  - Controller
    - SIEMENS
    - HEIDENHAIN
    - FANUC
    - SELCA
  - Lead wires type
  - Connectable to Euro controller
  - Connectable to FANUC serial board C
  - Direct plug in!

• Higher traverse speed performance reserve
  - Traversing speed test
    - Scanning Frequency (kHz)
    - Signal Amplitude (%)
    - 2.0m/s
    - 3dB Cutoff
  - Signal Output and Output Circuit
    - Sin wave output signals
      - Differential signal amplitude: 1.0Vpp
    - Scale reference point signals
      - Differential signal amplitude: 0.5Vp

• FEM analysis of AT402E head mold.

10Ω 120Ω 220pF Phase A, B, Z
10Ω 10kΩ 34.8kΩ 34.8kΩ 10pF 10pF 10pF
Phase A, B, Z, XA, XB, XZ

10Ω 10kΩ 220pF Phase A, B, Z

10Ω 10kΩ 220pF Phase A, B, Z

34.8kΩ 10pF
Vref
### Mounting Dimensions

<table>
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<th>Order No. (w/o cable)</th>
<th>Order No. (w/ 3m cable A)</th>
<th>Order No. (w/ 3m cable B)</th>
<th>Order No. (w/ 3m cable C)</th>
<th>Effective length ( L_0 )</th>
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Cables:
- **A**: Lead wires type
- **B**: Connectable to Euro controller
- **C**: Connectable to FANUC serial board C

*Note: 1. "G" indicates the machine guide.
2. "P" indicates the opposite side for attaching the aluminum frame.
3. "S" indicates the opposite side for attaching the detector head.
4. "Q" and "R" indicate this linear scale's reference surface for attachment.*
Specifications

Effective length $L_0$ (mm): 140, 240, 340, 440, 540, 640, 740, 840, 940, 1040, 1140, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 2040, 2240, 2640, 2840, 3040

Detecting method: Optoelectronic linear encoder

Signal output: 1Vpp (4-phase sin wave), Differential origin point pulse (Absolute Interval Code - Distance Code compatible -)

Signal pitch: 20µm

Maximum response speed: 120m/min (sin wave with -3dB amplitude)

Indication accuracy (20°C): ±2µm ($L_0$: 140 to 540mm), ±3µm ($L_0$: 640 to 940mm), ±3µm/1m ($L_0$: 1040 to 3040mm)

Coefficient of linear expansion: $8.5 \times 10^{-6} /°C$

Temperature (operation): 0°C to 45°C, 20%PH to 80%PH (with no condensation)

Temperature (storage): -20°C to 70°C, 20%PH to 80%PH (with no condensation)

Vibration resistance: 20G (55 to 2000Hz)

Shock resistance: 40G (1/2Sin 11ms)

Power supply: DV5V±5%

Power consumption: 120mA

Dust/water protection: IP53 level

Nozzle for air supply: Provided

Signal cable

- Lead wires type:
- Connectable to Euro controller
- Connectable to FANUC serial board C

No.09AAC071A (1m)
No.09AAC071B (3m)
No.09AAC071C (6m)
No.09AAC071D (9m)
No.09AAC079A (1m)
No.09AAC079B (3m)
No.09AAC079C (6m)
No.09AAC079D (9m)
No.09AAC073A (1m)
No.09AAC073B (3m)
No.09AAC073C (6m)
No.09AAC073D (9m)
Specifications are subject to change without notice.

Note: All information regarding our products, and in particular the illustrations, drawings, dimensional and performance data contained in this pamphlet, as well as other technical data are to be regarded as approximate average values. We therefore reserve the right to make changes to the corresponding designs, dimensions and weights. The stated standards, similar technical regulations, descriptions and illustrations of the products were valid at the time of printing. In addition, the latest applicable version of our General Trading Conditions will apply. Only quotations submitted by ourselves may be regarded as definitive.