

## ▼ CHAPTERS

Manual Stages

Motorized Stages

Multi-Axis  
Platforms

Actuators

Controllers

## ▼ SECTIONS

T-Cube Overview

Benchtop  
OverviewRack System  
Overview

DC Servo

Stepper Motor

Piezo/Strain  
Gauge

Auto-Alignment

Solenoid

apt Control  
Software

Tutorials

**Benchtop Stepper Motor Controllers (Page 1 of 2)**

**BSC101**  
50 W Drive Compatible  
Single-Channel Model

**Features**

- One-, Two-, and Three-Channel Models Available
- Supports 2-Phase Bipolar Steppers up to 50 W
- Differential Encoder Feedback (QEP) Inputs for Closed-Loop Positioning
- USB Plug-and-Play Plus Multi-Axis Expansion
- Motor Control I/O Port (Jogging, Interlocks)
- Full Software GUI Control Suite
- High-Resolution Microstepping Control (For Very Fine Positioning Applications)
- Stable and Predictable Low-Speed Operation (For Velocity-Sensitive Applications)
- ActiveX® Programming Interfaces
- Seamless Software Integration with apt™ Family

The BSC series apt™ stepper motor controllers are designed to drive larger framed 2-phase bipolar stepper motors, with and without encoder feedback. One-, two-, and three-channel models are available. These units are capable of delivering powers up to 48 V/50 W peak (25 W average) and are compatible with all of our stepper-driven nanopositioning actuators and stages except the ZST Series.

The controllers combine the latest high-speed digital signal processors (DSP) with low-noise analog electronics and ActiveX® software technology for effortless one-, two-, or three-axis motion. Additional axes can be driven by connecting one or more benchtop units via a standard USB hub. The controllers are supplied with a full suite of software support tools.

An intuitive graphical instrument panel allows immediate control and visualization of the operation of the controller. See pages 654 - 656 for a full description of the apt™ system software.

**Driver Functionality**

Stepper motors give excellent low-speed performance and positioning stability. A wide range of 2-phase bipolar stepper motors and associated actuators are commercially available, each with its own characteristics such as step resolution, peak phase current or voltage, and leadscrew pitch. For this reason the apt™ stepper unit operation is fully configurable with key settings exposed through the associated graphical interface panels.

Motor step resolution and leadscrew pitch can be set for a particular motor/actuator combination, phase currents can be limited to suitable peak powers as required, and limit switch configuration is accommodated through a flexible set of limit switch logic settings.

Moreover, relative and absolute motion can be initiated with motion profiles that are set using velocity profile parameters. Similarly, home sequences have a full set of associated parameters that can be adjusted for a particular stage or actuator.

For simplicity of operation, the apt™ software incorporates preconfigured settings for each of our stages and actuators, while also allowing the user to enter each parameter for use with other stepper motor driven systems. For convenience and ease of use, adjustment of many key parameters is possible through direct interaction with the graphical panel. For example, movement to the next position can be initiated by clicking directly on the position display and entering a new value. Note that all such settings and parameters are also accessible through the ActiveX® programmable interfaces for automated motion control sequences.



See pages 654 - 656 for more information on the apt™ software included with the BSC Series Controllers.

## Benchtop Stepper Motor Controllers (Page 2 of 2)

### Specifications

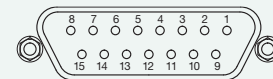
- **Input/Output:**
  - **Motor Drive Channel (15-Pin D-Type Female)**
    - 2-Phase Bipolar Motor Drive Output
    - Differential Quadrature Encoder Interface
    - Forward, Reverse Limit Switch Inputs
  - **Motor Control (15-Pin D-Type Female)**
    - Jog Forward/Back
    - Enable/Disable Interlock
    - User Logic Outputs/Inputs
    - Single-Ended Analog Input (0 - 10 V)
    - Trigger In/Out (TTL)
- **Resolution**
  - 128 Microsteps per Full Step
  - 200 Step Motor – 25,600 Microsteps per Revolution
- **Compatible Motors**
  - **Peak Powers:** 5 - 50 W
  - **Average Power (Max):** 25 W
  - **Step Angle Range:** 20° - 1.8°
  - **Coil Resistance (Nominal):** 4 - 15 Ω
  - **Coil Inductance (Nominal):** 4 - 15 mH
  - **Rated Phase Currents (Nominal):** 100 mA - 1 A
- **Motor Power (Peak):** Up to 50 W
- **Motor Drive Voltage (Max):** 48 V
- **Motor Speeds:** Up to 600 RPM (for 200 Full Step Motor)
- **Encoder Feedback Bandwidth:** 500,000 Counts/Sec
- **Housing Dimensions (W x D x H):**
  - **BSC101**  
6" x 9.6" x 4.1"  
(152 mm x 244 mm x 104 mm)
  - **BSC102, BSC103**  
9.5" x 14.2" x 5.2"  
(240 mm x 360 mm x 133 mm)
- **Input Power Requirements**
  - **Voltage:** 85 - 264 VAC
  - **Power (Peak):** BSC102 and BSC103: 200 W  
BSC101: 100 W
  - **Fuse:** 3.15 A
- **Weight:**
  - **BSC101**  
7 lbs (3.18 kg)
  - **BSC102, BSC103**  
14.75 lbs (6.7 kg)



**BSC103**  
Three-Channel Model

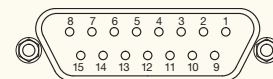
See our full line of motorized flexure stages starting on page 548.

### Motor Drive Connector Pin Out



Pin	Description	Pin	Description
1	Encoder A +ve	9	CW Limit Switch
2	Encoder A -ve	10	CCW Limit Switch
3	Encoder B +ve	11	0 V User
4	Encoder B -ve	12	Not Used
5	5V User	13	Not Used
6	Not Used	14	Phase B +
7	Phase B -	15	Phase A +
8	Phase A -		

### Control I/O Connector External Control Pin Out



Pin	Description	Pin	Description
1	5 V User I/O	9	0 V User
2	Jog Fwd	10	Jog Back
3	Not Used	11	Analog In
4	Trig In	12	Trig Out
5	Not Used	13	Not Used
6	For Future Use	14	For Future Use
7	Digital User In	15	User Out (o/c)
8	Keyed Pin		

### Full Support for Encoder Feedback

The apt™ stepper unit also supports encoder feedback through dedicated quadrature encoded pulse (QEP) inputs, one for each channel of operation. A built-in algorithm can be enabled to allow the stepper system to reach and maintain an encoded position through an iterative move sequence. Please see page 516 for details on our linear-encoded LNR stage and apt™ stepper drive package.

### Software Developers Support CD

A developers' kit ships with all of our apt™ series controllers. This additional software is intended for use by software developers working on large system integration projects which incorporate apt™ products. The kit contains an extensive selection of useful code samples as well as tutorial information.

See pages 654 - 656 for more information on the apt™ software included with the BSC Series Controllers.

ITEM #	\$	£	€	RMB	DESCRIPTION
BSC101	\$ 1,285.00	£ 925.20	€ 1,118.00	¥ 10,241.45	One-Channel apt™ Stepper Motor Controller
BSC102	\$ 2,095.00	£ 1,508.40	€ 1,822.70	¥ 16,697.15	Two-Channel apt™ Stepper Motor Controller
BSC103	\$ 2,670.00	£ 1,922.40	€ 2,322.90	¥ 21,279.90	Three-Channel apt™ Stepper Motor Controller