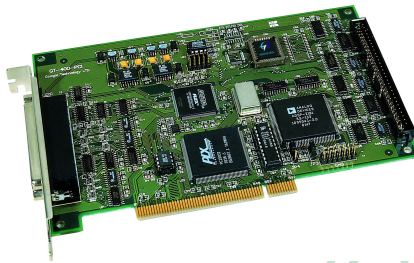


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# GT Series Motion Controllers

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*General Purpose Model*

***General Purpose Model***



**Googol Technology (HK) Limited**

*Control & network factories of the future*

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## The Company



Googol Technology (HK) Limited, the headquarter office, is located at Hong Kong University of Science & Technology.



Googol Technology (SZ) Limited is located at the Hi-Tech Industrial Park in Shenzhen, China

## Mission

To provide high-performance and cost-effective motion control systems for the market

## Objectives

To become a leading provider of innovative motion control products and service to the clients, and to contribute the development of the region as a world-class manufacturing base in electronics and IT products.

## Products and Services:

### **Motion controllers**

- GH/GT/GE/GO series standard motion controllers
- GU series embedded motion controllers
- Special-purposed motion controllers
- GN series network based motion controllers
- PC-based and CNC control systems
- Control system development platforms
- OEM/ODM services

### **Education products**

- Experiment equipments for motion control theoretical research and control engineering;
- Equipments for automation control, robotics and mechatronics
- Process control systems and facilities
- Logistic automation systems
- Flexible manufacturing systems (FMS)

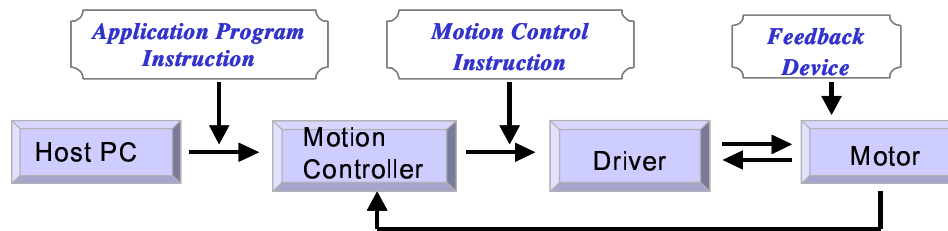
## Motion Control Technology

*–“Way of Building Machinery”–*

Motion controller is developed on the basis of a high-performance digital signal processor (DSP) and field-programmable gate array (FPGA). The PC-based, open-architecture motion controller is now the most powerful motion controller that has been widely used in automation applications worldwide.

Simply put, a motion controller is a device to control, in real time, the position and velocity of an actuator, such that the moving parts to complete a motion according to the preset trajectory and given motion parameters. Depending on the characteristics and applications of motion controller, motion controller can be classified into three types: Point-to-point motion controller, contour motion controller and coordinated motion controller

### The typical architecture of a motion control system:



This open-architecture motion controller fully utilizes the resources of a PC. A motion control application program can be developed by using third-party software on the PC. Application program instruction can be transferred to the motion controller via PC bus. A PC-based motion controller is the core of the whole motion control system. It accepts the application program commands from the host PC, fulfills the corresponding real-time motion planning (point-to-point motion, multi-axis interpolation motion or multi-axis coordinated motion) and outputs the corresponding motion instructions to the motor driver.

### Typical applications

#### *Point-to-point motion control*

[PCB drilling machine](#)  
[SMT](#)  
[automatic wafer feeder](#)  
[IC inserter](#)  
[wire bonding machine](#)  
[transmission device](#)  
[packaging system](#)  
[stacking machine](#)  
[laser measuring](#)  
[PCB testing](#)  
[ultrasonic inspection](#)  
[automatic weaving machine](#)  
[fixed length cutting](#)  
[bending machine, .....](#)

#### *Contour motion control*

[NC lathe](#)  
[NC milling machine](#)  
[engraving machine](#)  
[laser cutting machine](#)  
[laser welding machine](#)  
[laser engraving machine](#)  
[NC pressing machine](#)  
[rapid prototyping machine](#)  
[ultrasonic welding machine](#)  
[water jet cutter](#)  
[PCB milling machine](#)  
[wafer cutting machine](#)  
[and more.....](#)

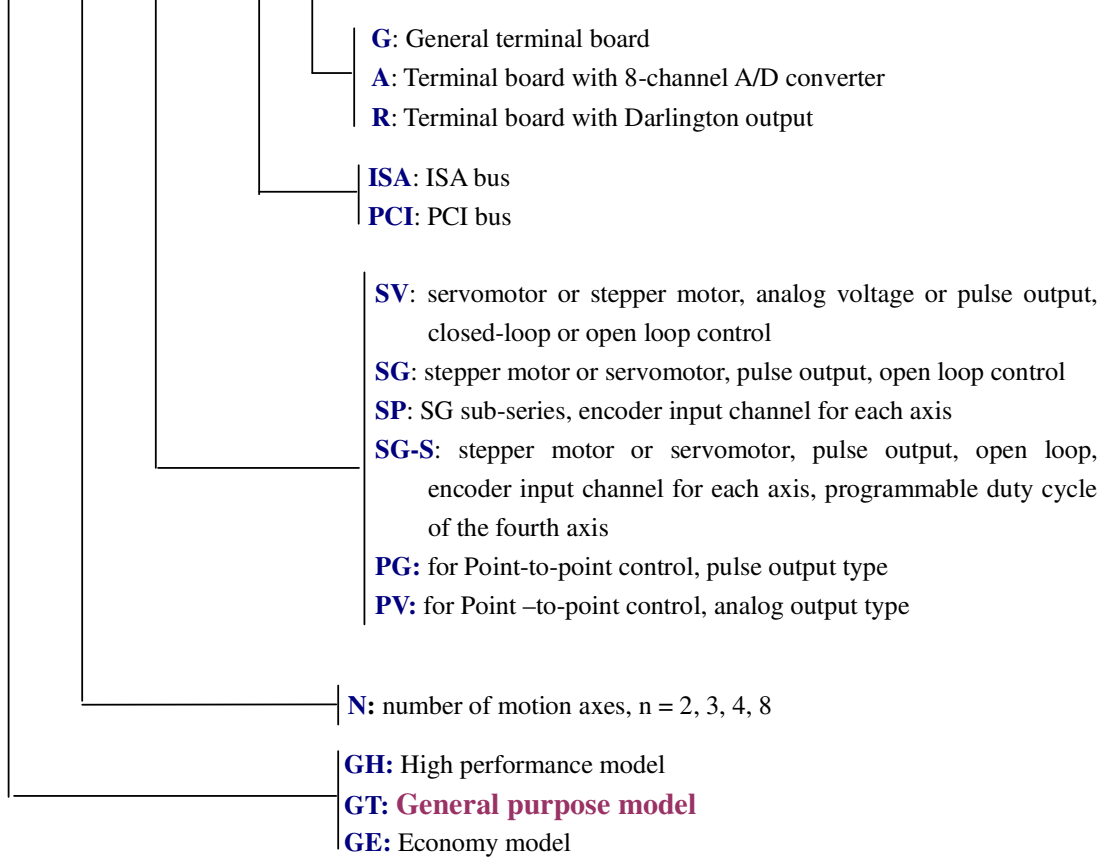
#### *Coordinated motion control*

[Chromolithographing machine](#)  
[packaging machine](#)  
[weaving machine](#)  
[flying shear cutter](#)  
[drawbench](#)  
[papermaking](#)  
[steel plate expansion](#)  
[steel plate rolling](#)  
[slitting and splitting](#)  
[and more.....](#)

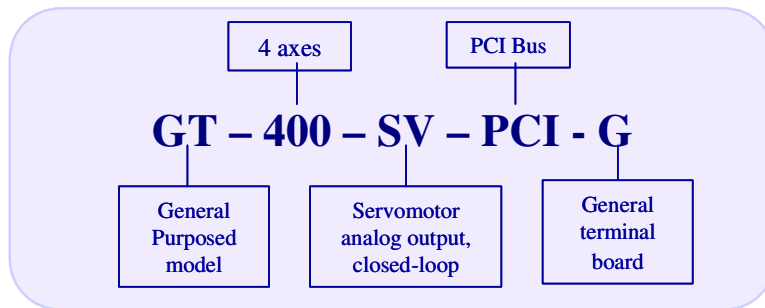
## Motion Controller Selection Guide

### Nomenclature

**GX - X00 - XX - XXX - X**



### Sample



## GT Series ordering Information

### GT series Model List:

Model Number	No. of Axes	Output mode	Feedback Input	Bus Supported	Network Support
GT-X00-SV	<a href="#">2</a> , <a href="#">4</a>	Analog /Pulse	8/4/2 encoder input, 2 channels auxiliary encoder input	ISA/PC104 (PCI)	Yes (No)
GT-X00-SG	<a href="#">2</a> , <a href="#">4</a> , <a href="#">8</a>	Pulse	2 channels auxiliary encoder input	ISA/PC104 (PCI)	Yes (No)
GT-X00-SP	<a href="#">2</a> , <a href="#">4</a> , <a href="#">8</a>	Pulse	8/4/2 encoder input, 2 channels auxiliary encoder input	ISA/PC104 (PCI)	Yes (No)
GT-X00-SG-S	<a href="#">2</a> , <a href="#">4</a> , <a href="#">8</a>	Pulse	4/2 encoder input, 2 channels auxiliary encoder input	ISA/PC104 (PCI)	Yes (No)

### Standard Accessories

- ACC1 interconnect board
- ACC2 terminal board
- ACC3 1.5m 62-pin shielded cable (x2)
- ACC4 60-pin flat cable



ACC1 & ACC4



ACC2



ACC2

## GT Series Function List

≡ Included

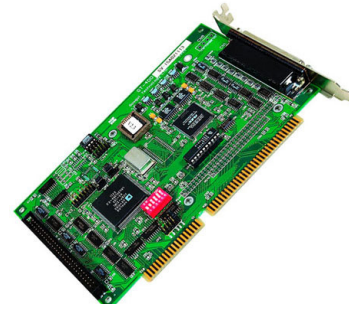
- Excluded

\* Optional

Features		SV	SG	SP	SG-S
Bus	ISA/ PCI	≡	≡	≡	≡
	RS232	*	*	*	≡
Program memory	64K Byte ROM	*	*	*	*
	512K Byte SRAM	*	*	*	*
Sampling period	Programmable	≡	≡	≡	-
Analog output	Range: -10V to +10V	≡	-	-	-
Pulse output	Maximum frequency up to 1MHz	≡	≡	≡	≡
Programmable duty ratio	1 axis	-	-	-	≡
Encoder channel	Quadrature incremental encoder. Max. Counting frequency: 8MHz (SD, SG-S Max. 4MHz)	≡	-	≡	≡
Auxiliary encoder	2 channels of quadrature incremental encoder. Max. Counting frequency: 8MHz (SD, SG-S Max. 4MHz)	≡	≡	≡	≡
Limit switch	Left and right limit switch of each axis	≡	≡	≡	≡
Home switch	Home switch of each axis	≡	≡	≡	≡
Driver alarm signal	1 channel of driver alarm signal of each axis	≡	≡	≡	≡
Driver activation signal	1 channel driver activation signal of each axis	≡	≡	≡	≡
Driver reset signal	1 channel driver reset of each axis	≡	≡	≡	≡
Uncommitted digital input	16 channels	≡	≡	≡	≡
Uncommitted digital output	16 channels	≡	≡	≡	≡
Probe input	Occupy 1 channel of uncommitted digital input	≡	≡	≡	≡
A/D	8 channels	*	*	*	*
Watchdog	Monitor DSP work status in real time.	≡	≡	≡	≡
On-board linear and circular interpolation	On-board linear and circular interpolation	≡	≡	≡	≡
Program buffer	Look ahead.	≡	≡	≡	≡
Point-to-point motion	S-curve, T-curve, jogging motion and electronic gear motion modes	≡	≡	≡	≡
	Variable S-curve; Exponent curve	-	-	-	-
Filter	PID + Velocity Feedforward + Acceleration Feedforward	≡	-	-	-
Hardware capture	Index signal of encoder	≡	-	≡	≡
	Index signal of auxiliary encoder	≡	≡	≡	≡
	Home switch	≡	≡	≡	≡
Safety	Following error limit.	≡	-	≡	-
	Acceleration limit.	≡	-	-	-
	Controller output limit.	≡	-	-	-

## GT-200 Series Motion Controller

GT-200 series motion controller is a universal controller developed by Googol Technology Ltd. The series have several product versions, GT-200-SV, GT-200-SG, widely used in applications ranging from simple point-to-point motion control equipment to highly complicated profile motion control equipment, such as measuring machine, engraving machine, NC lathe, machining center and robot.



### Main Features:

- Adopt high-performance DSP and FPGA technology
- Each card can control 2 servo/step motors
- Programmable sampling rate. The minimum interpolation period of four axes is 200us. The minimum control period of single-axis point-to-point motion is 25us
- Modes of motion: point-to-point motion, linear interpolation, circular interpolation, velocity control, interface to manual pulse generator, and electronic gearing
- Programmable trapezoid curve planning and S-curve planning and update parameters on-the-fly
- All registers for computational parameters and trajectory planning parameters are 32 bits
- Hardware capture of home switch and index signal of encoder
- Set following-error limit, acceleration limit and output limit, to ensure safe and reliable control
- PID (Proportional-Integral-Derivative) digital filter with velocity and acceleration feed-forward, and with integral limit and bias compensation (for SV card).
- Network communication port (Ethernet, Profibus-DP, RS232, RS232/485) (Optional).
- User-defined coordinate system for ease of programming
- Coordinated motion of 2 axes, linear interpolation, and circular interpolation
- Continuous interpolation function
- On-board memory buffer to improve communication efficiency
- Programmable event interrupt: external input interrupt, event interrupt and time interrupt
- On-board EEPROM to update firmware and parameters
- Drivers and DLL for Windows98/2000/NT, C and C++ function library

### Technical Specification

#### **Axis Channels**

- 2 channels of 16-bit analog voltage output signal or pulse output signal with a frequency up to 1MHz
- 4 channels of quadrature incremental encoder input 2 channels used for feedback signal input of each axis, 2 channels are used for the auxiliary encoder input

#### **Position Capture**

1 channel of probe input for capturing the positions of 2 axes simultaneously, 1 channel of home capture signal and 1 channel Index capture signal for each axis

#### **Bus Type:**

- Standard ISA/PCI104 bus.
- Standard PCI bus.

- Encoder sampling rate up to 8MHz
- Flexible combination of analog voltage output and pulse output mode

**Analog Input (Optional):**

- 8 channels of independent 12-bit  $\pm 10V$  analog input

**Uncommitted Digital Input/Output:**

- 16 channels of uncommitted opto-isolated digital input
- 16 channels of uncommitted opto-isolated digital output with

**Dedicated Digital Input/Output:**

- Dedicated opto-isolated inputs for each axis: 2 channels for limit switch signal, 1 channel for home signal, and 1 channel for drive alarm signal input
- Dedicated opto-isolated outputs for each axis: 1 channel for drive enable signal and 1 channel for drive alarm signal reset

- Stand-alone through standard network interface (Optional).

**System Software:**

- Demo software in Windows environment.
- Windows 98/2000/NT equipment drivers.
- C/C++ function library and demo software in DOS.

**Power Consumption:**

- +5V, Icc=2A, power supplied from PC.
- $\pm 12V$ , Icc=60mA, power supplied from PC.
- +24V or +12V, Icc=2A, external power provided by user.

**Environment:**

- Operating temperature: 0 - 60°C
- Relative humidity: 5% - 90%, non-condensing

**Mechanical Dimension:**

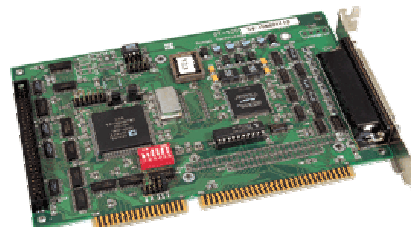
- 122mm x 185mm.

**Ordering Information**

Model	Number of Control Axes	Motor Type	Control Mode	PC Bus Type
GT-200-SV	2	Servo/Step Motor	Closed loop/Open loop	ISA/PC104 or PCI
GT-200-SG	2	Step Motor	Open loop	ISA/PC104 or PCI

## GT-400 Motion Controller

GT-400 series motion controllers developed by Googol Technology Ltd is a general-purpose type of 4-axis DSP based motion controllers. The series have several product models as listed below, widely used in applications ranging from simple point-to-point motion control equipment to highly complicated profile motion control equipment, such as measuring machine, PCB drilling machine, SMT, engraving machine, NC lathe, machining center, water jet cutter, laser cutting machine, robot and more.



### Ordering Information

Model	Number of Axes	Motor Type	Control Mode	Feedback Input	PC Bus Type
GT-400-SG -G	4	Step/Servo	Pulse output, open loop control	2 channels auxiliary encoder input	ISA/PCI/PC104
GT-400-SP -G	4	Step/Servo	Pulse output, open loop control, encoder input	4 encoder input, 2 channels auxiliary encoder input	ISA/PCI/PC104
GT-400-SV -G	4	Step/Servo	Analog output & Pulse output, close loop control, encoder input	4 encoder input, 2 channels auxiliary encoder input	ISA/PCI/PC104
GT-400-SG -S	4	Step/Servo	Pulse output, open loop control, high interpolating accuracy	4 encoder input, 2 channels auxiliary encoder input	ISA/PCI/PC104

### Main Features

- Adopt high-performance DSP and FPGA technology
- Each card can control 4 servo/step motors
- Programmable sampling period. The minimum interpolation period of four axes is 200us (GT-400-SG-S is 400 us). The minimum control period of single-axis point-to-point motion is 25us
- Modes of motion: point-to-point motion, linear interpolation, circular interpolation, velocity control, manual pulse generator input and electronic gearing
- Programmable trapezoid curve, and S-curve of velocity profile and update parameters on-the-fly
- All registers for computational parameters and trajectory planning parameters are 32 bits
- User-defined coordinate system
- Set following-error limit, acceleration limit and output limit, to ensure safe and reliable control
- PID (Proportional-Integral-Derivative) digital filter with velocity and acceleration feedforward, and with integral limit and bias compensation and low-pass filter (for SV & PV cards).
- Coordinated motion up to 4 axes, 2-4 axes linear interpolation, and 2 axes circular interpolation
- Continuous interpolation function
- On-board circle program buffer up to 4KHz.
- Programmable event interrupt: external input interrupt, event interrupt and time interrupt.

- Network communication port (Ethernet, Profibus-DP, RS232, RS422/485) (Optional function).

## **Technical Specification**

### **Axis Channels**

- 4 channels of 16-bit analog voltage output signal or pulse output signal with a frequency up to 1MHz
- 6 channels of quadrature incremental encoder input, 4 channels used for feedback signal input of each axis (except PG, SD, SG cards), 2 channels are used for the auxiliary encoder input
- Encoder sampling rate up to 8MHz
- Flexible combination of analog voltage output and pulse output mode (for SV, PV cards)

### **Analog Input (Optional)**

- 8 channels of independent 12-bit  $\pm 10V$  analog input

### **Uncommitted Digital Input/Output**

- 16 channels of uncommitted opto-isolated digital input
- 16 channels of uncommitted opto-isolated digital output

### **Dedicated Digital Input/Output**

- Dedicated opto-isolated input per axis, 2 channels for limit switch signal, 1 channel for home signal, and 1 channel for drive alarm signal input.
- Dedicated opto-isolated output per axis, 1 channel for drive enable signal and 1 channel for drive alarm signal reset.

### **Position Capture**

- 1 channel of probe input can capture the positions of four axes simultaneously, 1 channel of home hardware capture signal for each axis and 1 channel Index hardware capture signal.

### **Bus Type**

- Standard ISA/PCI104 bus.
- GE motion controller + PC
- GE motion controller + embedded system.
- Stand-alone through standard network interface (Optional).

### **System Software**

- Demo software in Windows environment.
- Windows 98/2000/NT equipment drivers & DLL.
- C/C++ function library and Example source code in DOS.

### **Power Consumption**

- +5V, Icc=2A, power supplied from PC.
- $\pm 12V$ , Icc=60mA, power supplied from PC.
- +24V or +12V, Icc=2A, external power provided by user.

### **Environment**

- Operating temperature: 0 - 60°C
- Relative humidity: 5% - 90%, non-condensing

### **Mechanical Dimension**

122mm x 185mm

## Application Samples

### **Point-to-point motion control applications**



*PCB Drilling Machine*



*PCB Packaging Machine*



*SMT*

### **Contour motion control applications**



*3D Engraving Machine*



*Laser Engraving Machine*



*Engraving Machine*



*NC Milling Machine*

### **Coordinated motion control applications**



*Printing Machine*



*Textile machinery*

## Company Contacts

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