

## STEPPER MOTOR CONTROL AND DRIVE SYSTEM FAMILY

### DESCRIPTION

The **GS-DC200** series is a family of single Eurocard boards that contain all the logic necessary to operate a stepper motor, including the instructions decoding, the step timing generation, the storage of the program to be executed. The motor interface can deliver phase current up to 2.5A.

The boards can be used as a stand alone complete motion control system or they can be driven by a central host computer.

The **GS-DC200** family is built around the **GS-C200**, **GS-C200S**, **GS-D200**, **GS-D200S** modules, (see the relevant data sheet) and it retains all the features of these modules.



### SELECTION CHART

Ordering Number	Controller Sequencer Driver	Instruction Set Commands	Phase Current (A)
<b>GS-DC200</b>	GS-C200+GS-D200	25	2.0
<b>GS-DC200S</b>	GS-C200+GS-D200S	25	2.5
<b>GS-DC200SS</b>	GS-C200S+GS-D200S	29	2.5

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>s</sub>	DC Supply Voltage	42	V
T <sub>stg</sub>	Storage Temperature Range	-40 to +105	°C
T <sub>hop</sub>	Max Operating Heatsink Temperature (GS-D200/200S)	+85	°C

## GS-DC200 Family

### ELECTRICAL CHARACTERISTICS (T<sub>amb</sub> = 25°C and V<sub>S</sub>=24V unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V <sub>S</sub>	DC Supply Voltage		12		40	V
I <sub>S</sub>	Quiescent Supply Current			150		mA
V <sub>i</sub>	Logic Input Voltage	Low High	2		0.8 5	V V
V <sub>O</sub>	Logic Output Voltage	Low High	2		0.8 5	V V
I <sub>ph</sub>	Programmable Phase Current	GS-DC200 GS-DC200S/SS			2 2.5	A A
f <sub>c</sub>	Chopper Frequency			17		kHz
t <sub>cpw</sub>	Clock Pulse Width				5	μs
t <sub>rpw</sub>	Reset Pulse Width (Internal)				500	μs

### MOTION CHARACTERISTICS

Speed Range	10 to 10000 steps
Speed Resolution	10 steps
Ramp Length	1 to 999 steps
Ramp Resolution	1 step
Positioning Range (GS-DC200/S)	0 to 9999999
Positioning Range (GS-DC200SS)	-8388608 to +8388607
Single Movement Range	1 to 9999999 steps
Positioning Resolution	1 step
Positioning Repeatability	± 0 step
Program Storage Capability	119 Bytes

### COMMUNICATION PORT CHARACTERISTICS

SIGNAL LINES	3(TXD, RXD, GND)
BAUD RATE RANGE	110 to 9600
FORMAT	1 Start Bit 7 Data Bit 2 Stop Bit Odd Parity

Figure 1. GS-DC200, GS-DC200S and GS-DC200SS Block Diagram

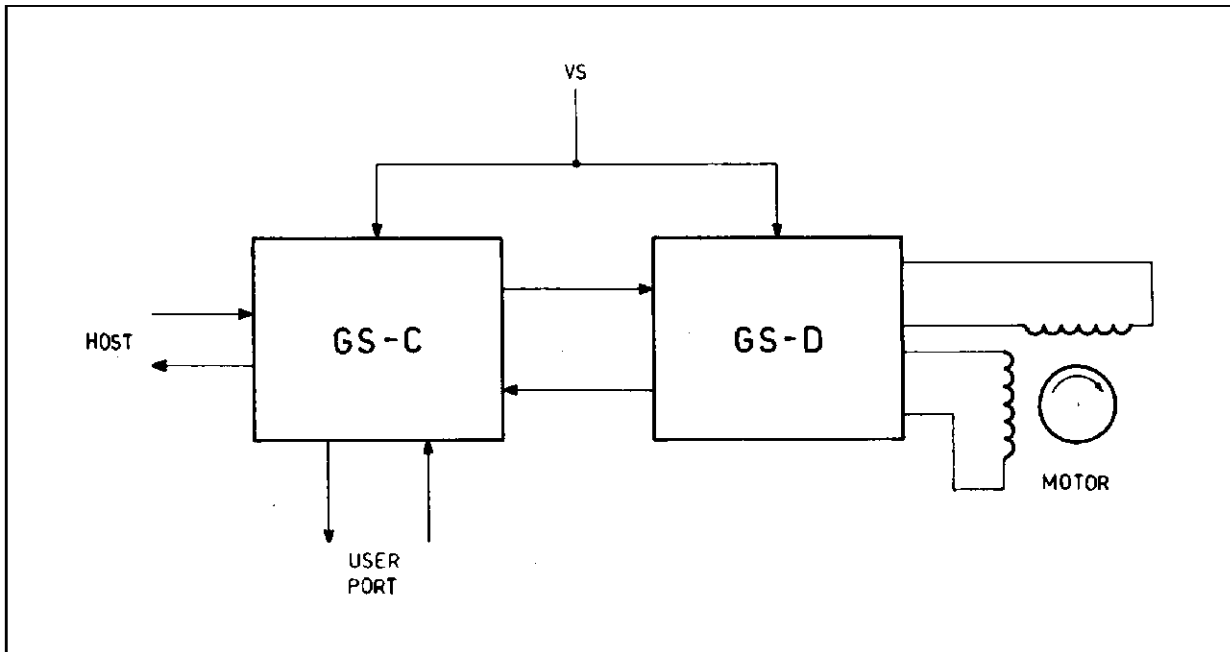
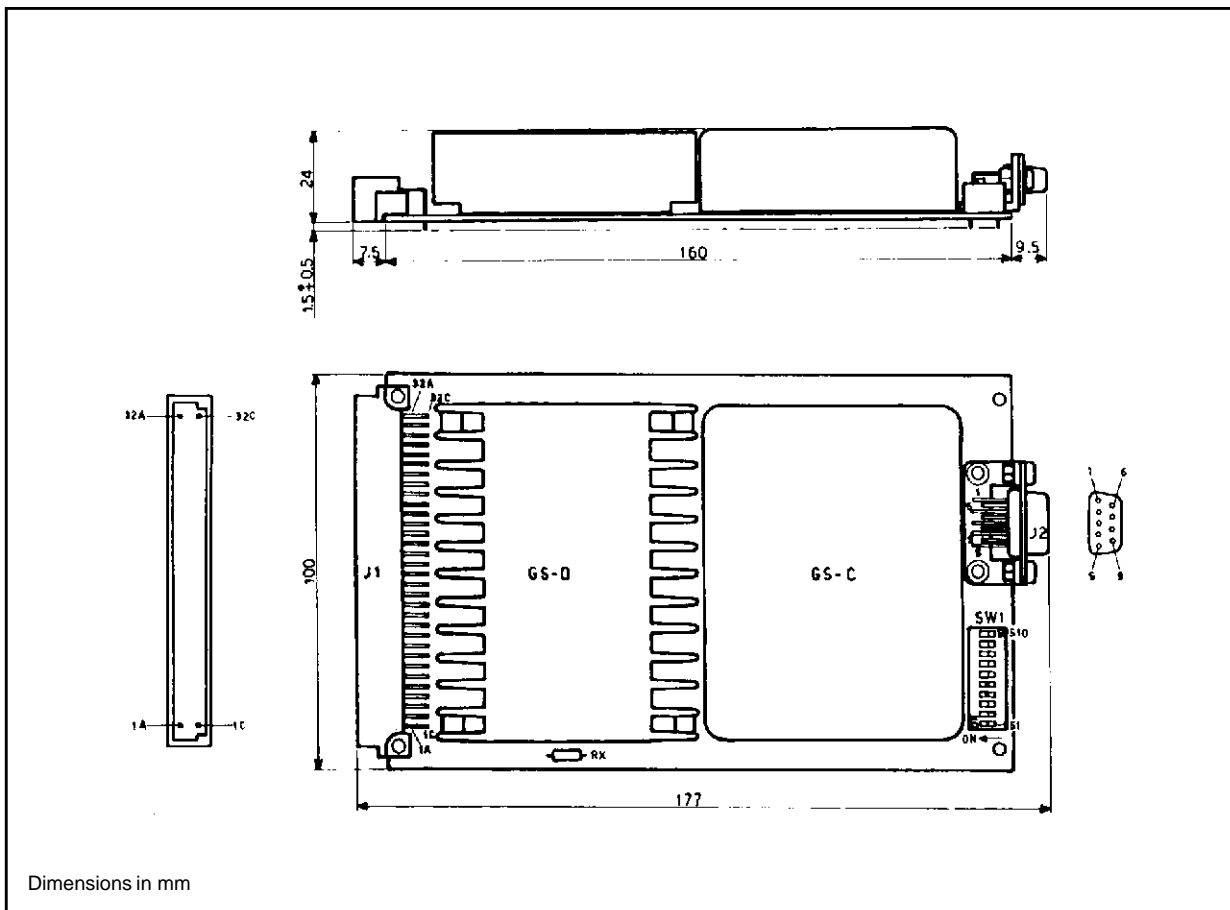
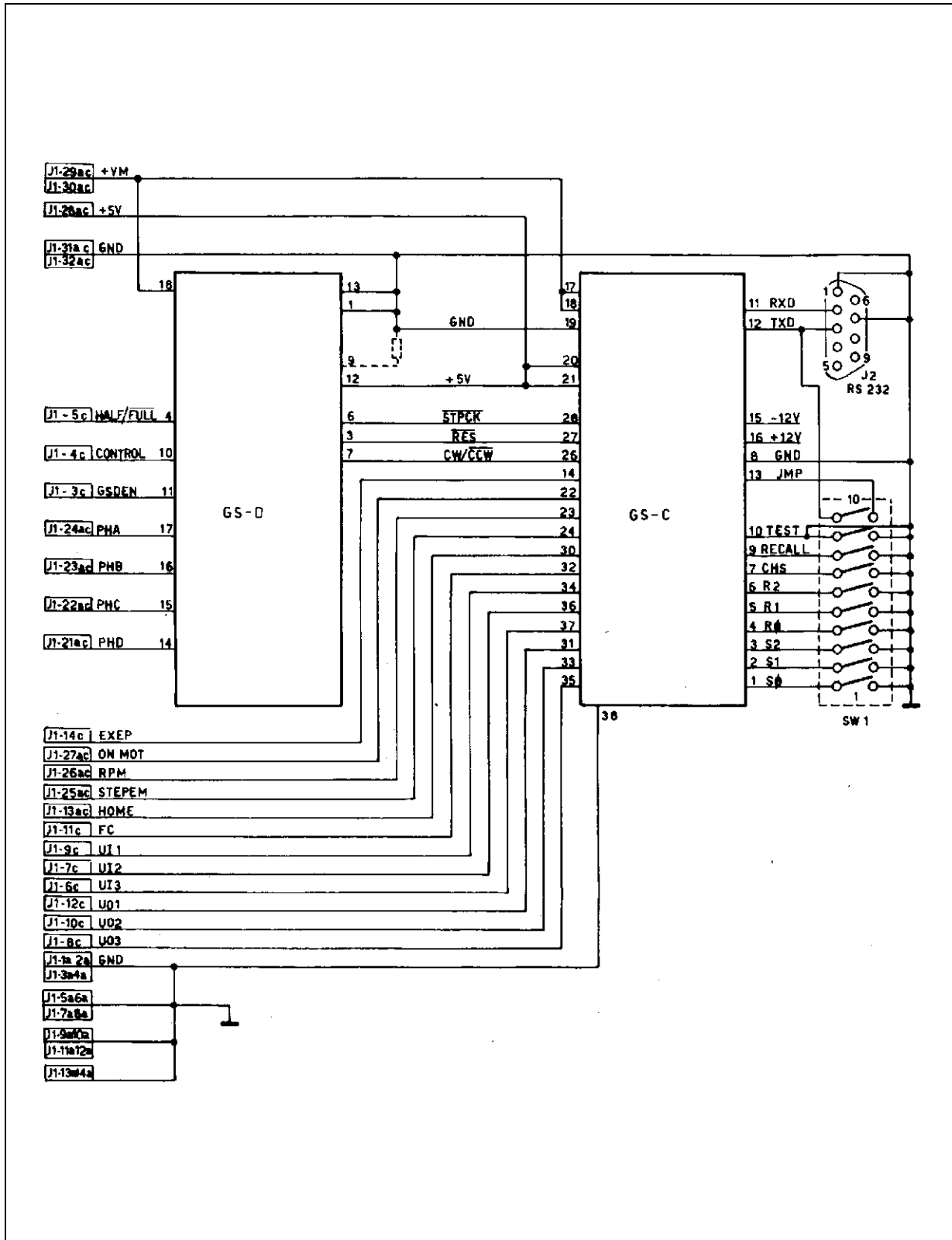


Fig. 2 - GS-DC Stepper Motor Driver/Controller Board



# GS-DC200 Family

Fig. 3 - GS-DC200, GS-DC200S and GS-DC200SS Schematic Diagram



**GS-DC FAMILY BUS CONNECTOR PINS DESCRIPTION**

The GS-DC family uses a 32 pin (16+16) DIN 41612-VG 95324 male connector and a RS-232 connector.

**DIN BUS CONNECTOR (J1)**

Pin	Row a Signal	Row c Signal
1	Ground	Not used
2	Ground	Not used
3	Ground	Power driver enable input
4	Ground	Power driver control input
5	Ground	Half/Full step select
6	Ground	User input 3
7	Ground	User input 2
8	Ground	User output 3
9	Ground	User input 1
10	Ground	User output 2
11	Ground	End-of-travel switch
12	Ground	User output 1
13	Ground	Home switch
14	Ground	Prog. underexecution output
15	Not used	Not used
16	Not used	Not used
17	Not used	Not used
18	Not used	Not used
19	Not used	Not used
20	Not used	Not used
21	Phase D output	Phase D output
22	Phase C output	Phase C output
23	Phase B output	Phase B output
24	Phase A output	Phase A output
25	Step enable input	Stop enable input
26	Ramp in execution logic output	Ramp in execution logic output
27	Motor moving	Motor moving
28	+5V output	+5V output
29	Supply voltage	Supply voltage
30	Supply voltage	Supply voltage
31	Supply ground	Supply ground
32	Supply ground	Supply ground

## GS-DC200 Family

### RS-232 CONNECTOR (J2 - DB9)

Pin 1	Ground
Pin 2	Received data input
Pin 3	Transmitted data output
Pin 7	Ground

### GS-DC FAMILY HARDWARE AVAILABLE COMMANDS

Dip switch configuration selection (0=OFF 1=ON)

S1	S2	S3	Address	Protocol
0	0	0	–	Point-to-point
1	0	0	1	Multipoint
0	1	0	2	Multipoint
1	1	0	3	Multipoint
0	0	1	4	Multipoint
1	0	1	5	Multipoint
0	1	1	6	Multipoint
1	1	1	7	Multipoint

S4	S5	S6	Baud rate
0	0	0	110
1	0	0	150
0	1	0	300
1	1	0	600
0	0	1	1200
1	0	1	2400
0	1	1	4800
1	1	1	9600

S7	Checksum
1	Disable
0	Enable

S8	Stand alone operation
1	Enable
0	Disable

Note: Switch position 9 is not used.

S10	RS232 TXD pull-down
0	Not connected
1	Connected

Rx	Phase peak current programming
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**USER NOTES**

To correctly operate the GS-DC boards family, it is recommended to read the following data sheets: GS-C200/200S; GS-D200/200S; GS-C200 PROG.

**Supply Voltage**

The recommended operating maximum supply voltage must include the ripple voltage on the  $V_s$  supply rail and it must not exceed 40V to avoid permanent damage to the board.

The boards have internal capacitors connected between the supply and ground pins to assure the electrical stability. These capacitors cannot handle high values of current ripple and they would be permanently damaged if the voltage source impedance is not adequately low.

The use of a low ESR, high current ripple, 470µF/50V capacitor located as close as possible to the board is recommended. Suitable units are the Sprague type 672 D or 678 D, the RIFA type PEC 126 or any equivalent unit.

**Board Protections**

The GS-DC200 board is protected against occasional or permanent short circuits to the supply voltage of the phase output pins.

The GS-DC200S and GS-DC200SS are protected also against short circuits to ground or to another phase output.

For the GS-DC200S and GS-DC 200SS the protection is of the latching type i.e. when an overload occurs, the board is automatically disabled. To restart the operations, the supply voltage must be switched off for at least 100 ms.

**Motor Connection**

When long wires are needed to connect a remote motor, it is recommended to use twisted pair cables with a proper cross section to minimize DC losses and RFI problems.

**Phase Current Programming**

The maximum output current/phase can be programmed by changing the value of the  $R_x$  resistor. The factory setting is for maximum current of

1 A GS-DC 200

2 A GS-DC200S / GS-DC200SS.

The new value of  $R_x$  resistor for a different value of maximum phase current I (A) can be calculated according to the following formulas:

**GS-D200**

$I > 1,07$

$$R_x = \left[ \frac{10 - I}{(0.993 * I) - 1} \right] \text{ k}\Omega \quad R_x \geq 8.2\text{K}\Omega$$

$I < 1,07$

$$R_x = \left[ \frac{I}{1 - (0.993 * I)} \right] \text{ k}\Omega$$

**GS-D200S**

$I > 2,11$

$$R_x = \left[ \frac{10 - (0.33 * I)}{(0.473 * I) - 1} \right] \text{ k}\Omega \quad R_x \geq 50\text{K}\Omega$$

$I < 2,11$

$$R_x = \left[ \frac{I}{3.03 - (1,43 I)} \right] \text{ k}\Omega$$

The maximum programmed current must not exceed 2.0A for the GS-DC200 and 2.5A for the GS-DC200S/GS-DC200SS.

**Thermal Characteristics**

The maximum power dissipation occurs on the GS-D200/GS-D200S modules used on the boards. The thermal resistance case-to-ambient of the integral heatsink of these modules is 5°C/W. This means a 50°C temperature increase of the heatsink if the internal power dissipation is 10W.

The maximum allowed heatsink temperature is 85°C. Therefore, according to the ambient temperature and/or the internal power dissipation, forced ventilation may be required.

**Programming**

To correctly program motion sequences, see the GS-C200/200S and/or GS-C200 PROG data sheets.

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