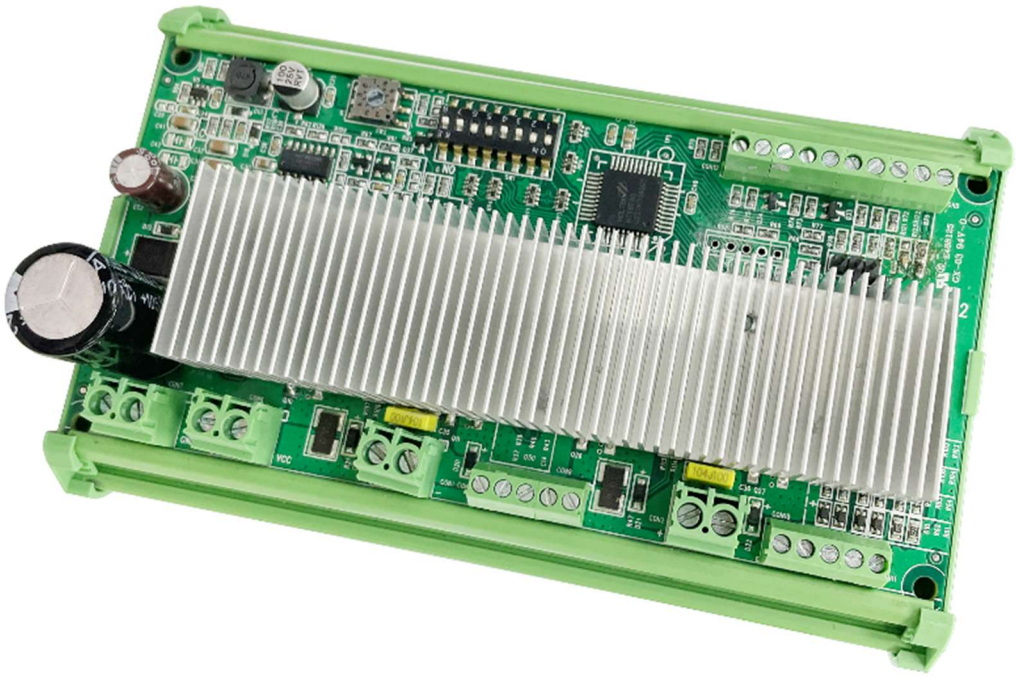
GF85-1601 User Manual



Manufacturer Revision	2023.12.12

Note: Technical changes for product improvements may be made without notice.

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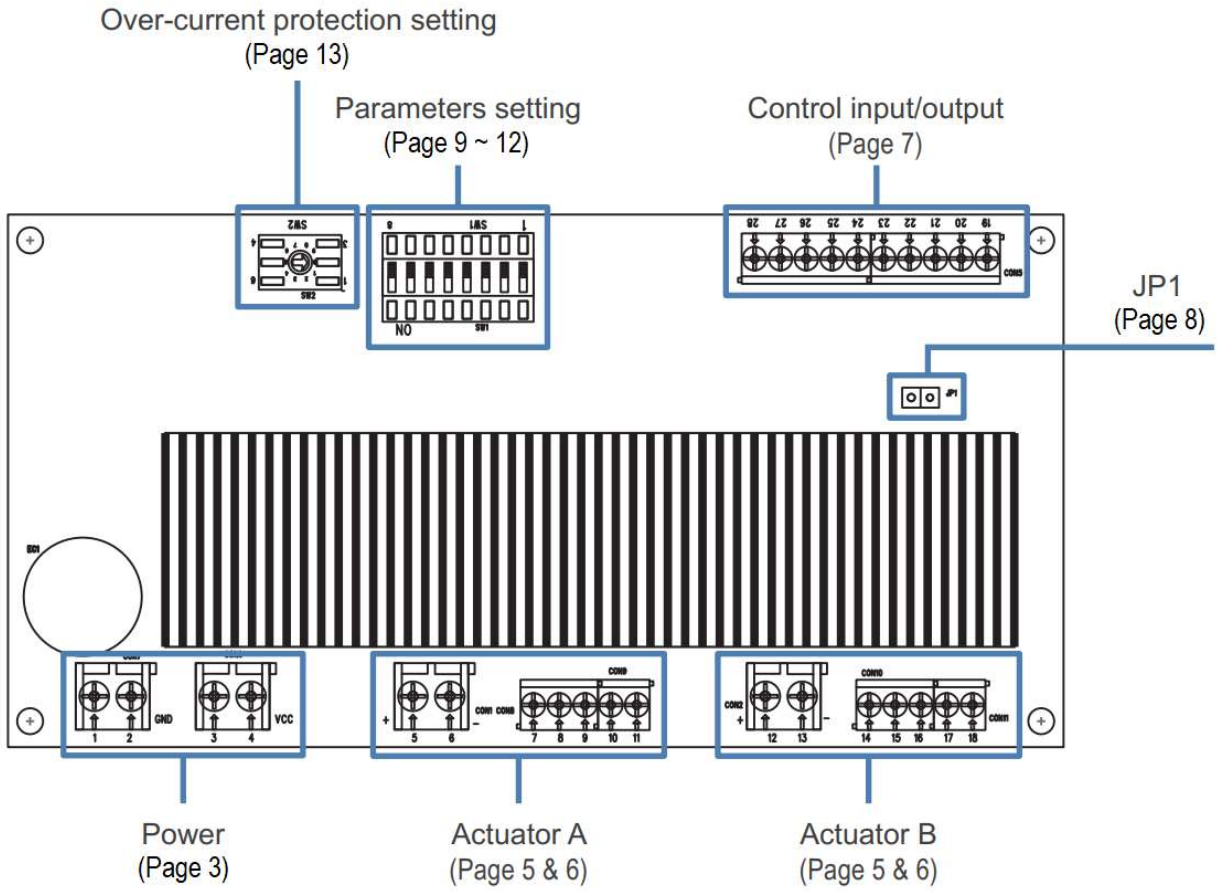
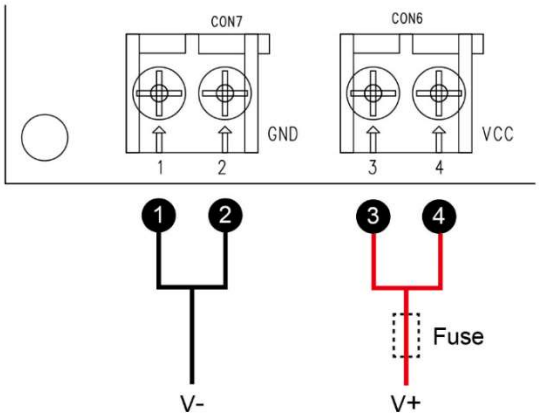
- Pay attention to insulation protection during installation to avoid possible risks and hazards for users to touch.
- Please confirm the actuator specifications before connecting, and fix the actuator with appropriate mechanical installation.

Switches and terminals



Power input



Port	Definition	Description
❶ ❷	V-	• GND • For each terminal, the allowable maximum cross-sectional area of the copper wire is 3.3mm² (12AWG)
❸ ❹	V+	• Nominal 12/24V DC (acceptable input voltage range 9V ~ 32V DC) • For each terminal, the allowable maximum cross-sectional area of the copper wire is 3.3mm² (12AWG)

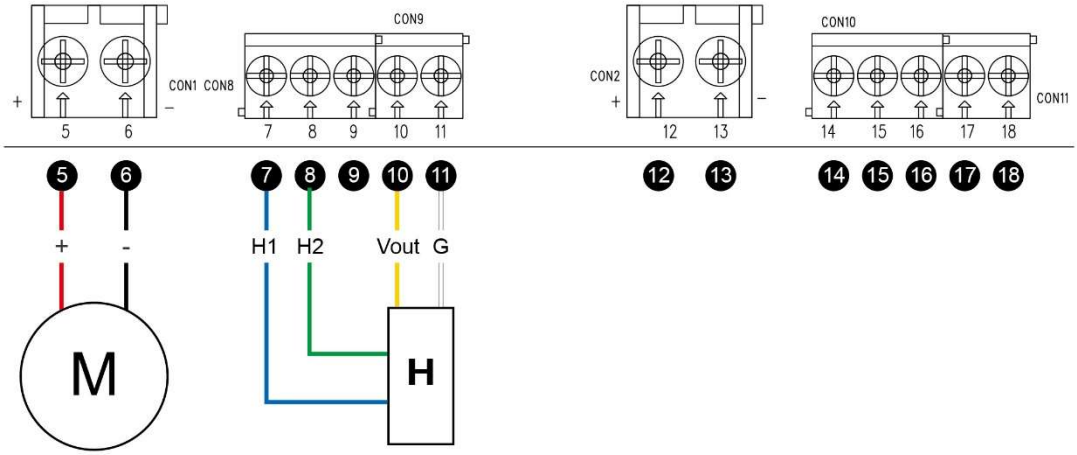
Notes:

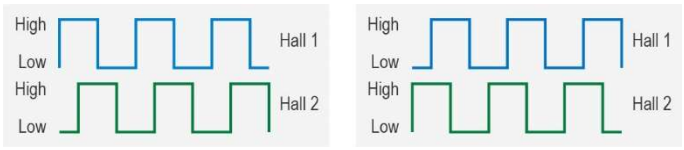
1. Install a slow-blow fuse between the GF85-1601 and the power supply for protection. The fuse is connected by the customer. The recommended specification is 50A Max.
2. In order to avoid malfunctions caused by voltage drop, the cross-sectional area of the power cord must be large enough, and the wire length from the power supply to the control board and from the control board to the actuator motor is as short as possible, and it is recommended not to exceed 1 meter. If the total load current is less than 30A, a single wire with a cross-sectional area of 3.3mm² (12AWG) can be used. If the total load current is as high as 30A ~ 50A, it is recommended to use two wires with a cross-sectional area of 2.0mm² (14AWG) or more in parallel.

- When the actuator starts, an inrush current will be generated for about 0.2 seconds. The starting inrush current of actuator can be as high as 3 times the typical current of the actuator's maximum load.
- If a power supply is used, it must be able to withstand the inrush current when the under maximum physical load. Inrush current is not usually a problem if a battery is used as the power source. In addition, the connectors, switches, and relays used in the application must also be sized to withstand the inrush current.
- It is forbidden to use PWM power input or to adjust the input voltage in an attempt to control the speed of the connected actuators.

Actuator terminals

- With Hall effect sensor(s)

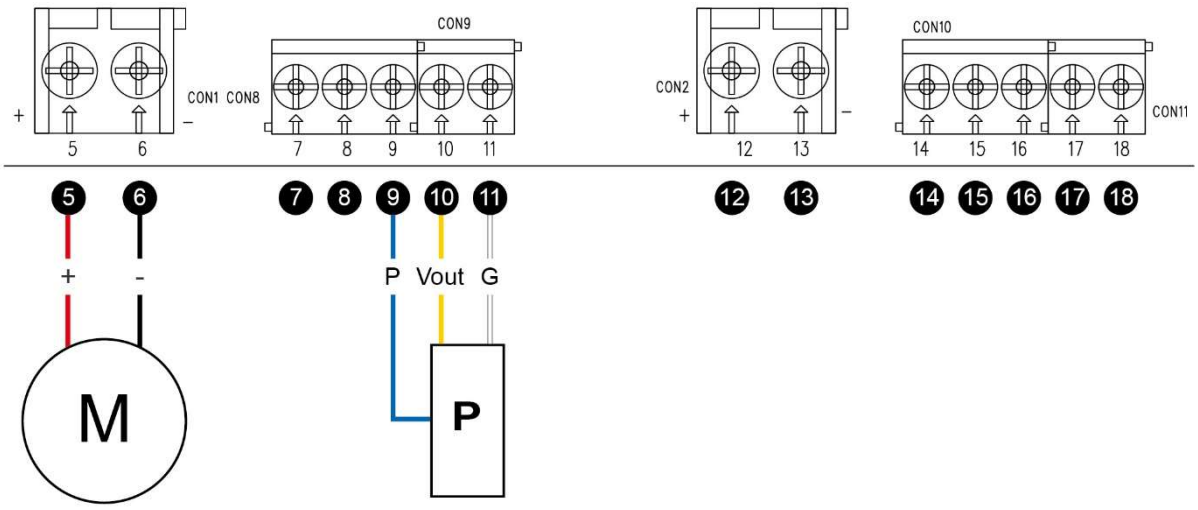


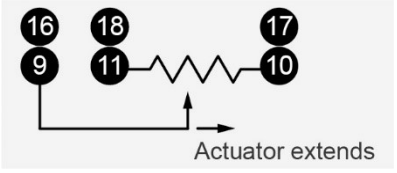
Port		Definition	Description	
5	12	M+	12V or 24V DC output. When controlling the actuator to extend, M+ / M- are VDC+ / VDC- respectively. When retracting the actuator, the polarity is reversed.	
6	13	M-		
7	14	H1	Hall 1 input	Hall signal data: Actuator extends  Both types are acceptable
8	15	H2	Hall 2 input	
10	17	Vout	5V power output, for actuator's Hall module (Max current 20mA)	
11	18	G	GND	

Notes:

1. For port 5 6 12 13, the recommended cross-sectional area of each copper wire is 0.5mm² ~ 3.3mm² (20AWG ~ 12AWG).
2. For port 7 ~ 11, 14 ~ 18, the recommended cross-sectional area of each copper wire is 0.2mm² ~ 0.83mm² (24AWG ~ 18AWG).
3. For single actuator mode, please use only terminals 5 ~ 11.
4. For single Hall sensor actuator, please use only terminals 7 and 14 (Hall 1).

- With Potentiometer

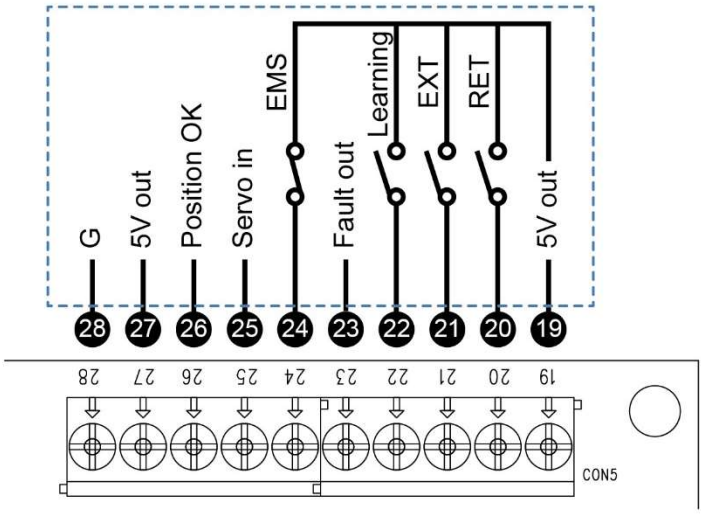


Port		Definition	Description	
5	12	M+	12V or 24V DC output. When controlling the actuator to extend, M+ / M- are VDC+ / VDC- respectively. When retracting the actuator, the polarity is reversed.	
6	13	M-		
9	16	P	Voltage (POT value) input	Wiring: 
10	17	Vout	5V power output for actuator's Potentiometer (Max current 20 mA)	
11	18	G	GND	

Notes:

1. For port 5 6 12 13, the recommended cross-sectional area of each copper wire is 0.5mm² ~ 3.3mm² (20AWG ~ 12AWG).
2. For port 9 ~ 11, 16 ~ 18, the recommended cross-sectional area of each copper wire is 0.2mm² ~ 0.83mm² (24AWG ~ 18AWG).
3. For single actuator mode, please use only terminals 5 ~ 11.

Control input / output



Port	Definition	Description
19	5V out	• 5V output to the switches
20	RET	• 'Retraction' signal input. Can use 5V of terminal 19 or external 5V power source. • Actuator retracts when switch on
21	EXT	• 'Extension' signal input. Can use 5V of terminal 19 or external 5V power source. • Actuator extends when switch on
22	Learning	• 'Learning' signal input. Can use 5V of terminal 19 or external 5V power source • When triggered by switching on for > 2.0 seconds, the system will automatically learn the stroke of the actuators. (see **Parameter Setting and Test Run** part 2)
23	Fault out	• Error signal output • Outputs a 5V signal in response to an overcurrent condition, or loss of the feedback signal from an actuator.

㉔	EMS	• Input signal for emergency stop switch(es) (Normally Closed) or loop • For customer to install NC emergency stop switch(es) or loop between terminals ⑲ and ㉔. • To use this function, the JP1 jumper must be removed.
㉕	Servo in	• Input voltage (0~5V) to run the actuator(s) to the specified position. (Evenly distributes 0~5V to the full stroke defined by the software limit switches) • The 0~5V control signal can be provided by an external source or by using the 5V at terminal ㉗ via a potentiometer.
㉖	Position OK	• Output signal indicating actuator(s) reached target position • When using the servo control mode, this terminal will output a signal (5V) after reaching the target position (defined by terminal ㉕ input).
㉗	5V out	• 5V power supply to the servo circuit
㉘	G	• GND • When using the servo control mode, the GND of the power source must be connected here.

Note:

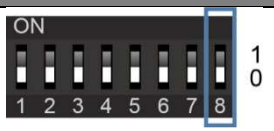
For port ⑲ ~ ㉘ , the recommended cross-sectional area of each copper wire is 0.2mm² ~ 0.83mm² (24AWG ~ 18AWG).

Parameter Setting and Test Run

- For safety and proper operation, please confirm that each actuator and all necessary control input/output terminals are connected properly before turning on the input power.
- Please confirm the actuator specifications before setting.
- Re-learning is required after each parameter adjustment (if there is no position sensor, re-learning is not required).
- The factory default position is 0 for all DIP switches.
- If an emergency stop switch is installed, Jumper JP1 must be removed, and normal operation is possible only when the circuit is closed. If an emergency stop switch is *not* used, JP1 must be installed (closing the circuit) for normal operation.
- The temperature of the heat sinks cannot exceed 131°F (55°C). Overheating will activate the protection function and render it inoperable.
- If the selected control mode is "servo control" (see section 1.1), the actuator must be equipped with positioning feedback function (Hall sensors or potentiometer).
- If actuators without positioning sensors are used, they must have limit switches that can cut off the power and stop by themselves, otherwise there is a high risk of damage to the GF85-1601.
- If two actuators without positioning sensors are used, the controller provides simultaneous motion only, but without synchronization.

1. Parameter setting

1.1 Control input mode

Parameters	Set	DIP switch
Switch control	**0**	
Servo control (0~5V DC)	**1**	

1.2 Number of actuators to control

Parameters	Set	DIP switch
2 x Actuator	**0**	
1 x Actuator	**1**	

1.3 Types of actuator positioning

Parameters	Set	DIP switch
With dual Hall effect sensors	**00**	
With single Hall effect sensor	**01**	
With potentiometer (POT)	**10**	
Without positioning sensor	**11**	

1.4 Software stroke limit setting

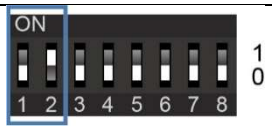
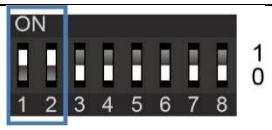
Parameters		Set	DIP switch
With Hall effect sensor	With potentiometer		
Set the limit position at 40 pulses before both mechanical limits.	Set the limit position at 2% of the full stroke before both mechanical limits.	**00**	
Set the limit position at 20 pulses before both mechanical limits.	Set the limit position at 1% of the full stroke before both mechanical limits.	**01**	
Set the limit position at 10 pulses before both mechanical limits.	Set the limit position at 0.5% of the full stroke before both mechanical limits.	**10**	
No software limit (Use only with actuators that have physical limit switches).	No software limit (Use only with actuators that have physical limit switches).	**11**	

Notes:

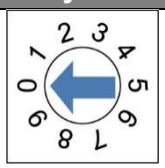
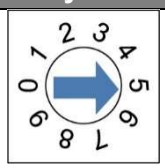
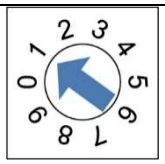
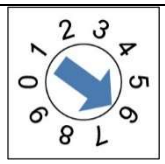
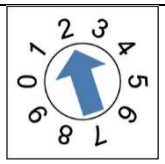
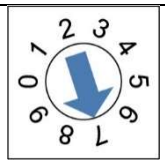
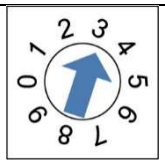
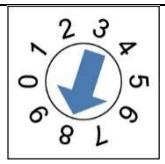
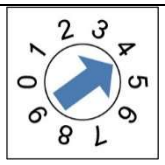
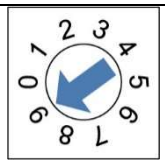
Please refer to the actuator's Data Sheet for the relationship between its Hall sensors' Pulse counts and the stroke distance.

1.5 Soft start/stop ramp setting

- This parameter is used to set the time duration of soft starts and soft stops.
- For setting value > 00, soft starts will occur from any position within the full stroke range.
- If the servo control mode is selected, soft stops may begin from any position within the full stroke range
- If the switch control mode is selected, soft stops only occur at both ends of the stroke; there is no soft stop in the middle.

Parameters	Set	DIP switch
0 second (No soft start / stop)	**00**	
0.5 seconds	**01**	
1.0 seconds	**10**	
1.5 seconds	**11**	

1.6 Over-current protection setting

Parameters	Set	Rotary switch	Parameters	Set	Rotary switch
2.0A	0		10.0A	5	
3.0A	1		12.5A	6	
4.0A	2		15.0A	7	
6.0A	3		20.0A	8	
8.0A	4		25.0A	9	

Notes:

1. The default factory setting is 0 (2.0A).
2. It is recommended to use the typical full load current in the actuator data sheet plus 20% as the set value.

2. Learning the actuators stroke

- The learning function must be performed under no load condition.
- If the actuator has no positioning sensor, there is no need to learn. Please test run directly (section 3).
- Before the learning function is initiated, it is recommended to set both the software stroke limit (section 1.4) and soft start/stop parameters (section 1.5) to 00.

Step 1. After the settings are configured, turn on terminal 22 (Learning) for more than 2.0 seconds to trigger the learning sequence. The system will automatically learn the actuator stroke.

Step 2. When the learning process is triggered:
1. The actuator retracts to the mechanical lower limit from any position.
2. The actuator extends to the mechanical upper limit.
3. The actuator retracts to the starting position (1).

Step 3. After learning, please check the default starting position of the actuator, and adjust the software limit parameters according to the situation (see section 1.4).

Step 4. Re-learn after adjusting the parameters. Try tuning different parameters for the best effective stroke.

Note (1)
- In switch control mode (see section 1.1), the starting position is the selected software lower limit position. In servo control mode and port 25 (see **Control input / output** section) is connected with input signal, the starting position is the specified position by the input signal.
- If port 25 is floating in servo control mode, the starting position is the selected software upper limit position.

3. Test run

Step 1. Test run the full stroke.

Step 2. Set soft start/stop parameter according to requirements (see section 1.5).

Step 3. Test run again after adding appropriate load to confirm the best parameter settings.

The speed of actuators controlled by the GF85-1601 will be lower than the typical values stated in the actuator's data sheet. The maximum speed loss is up to 25%.

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Due to continuing product improvements, all products are subject to change without prior notice.
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