

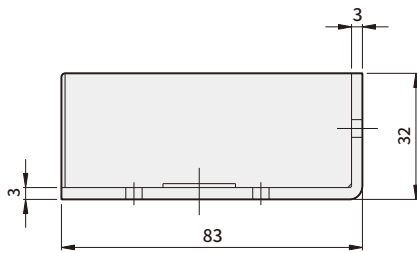
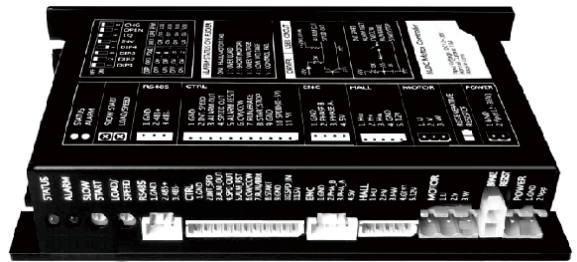
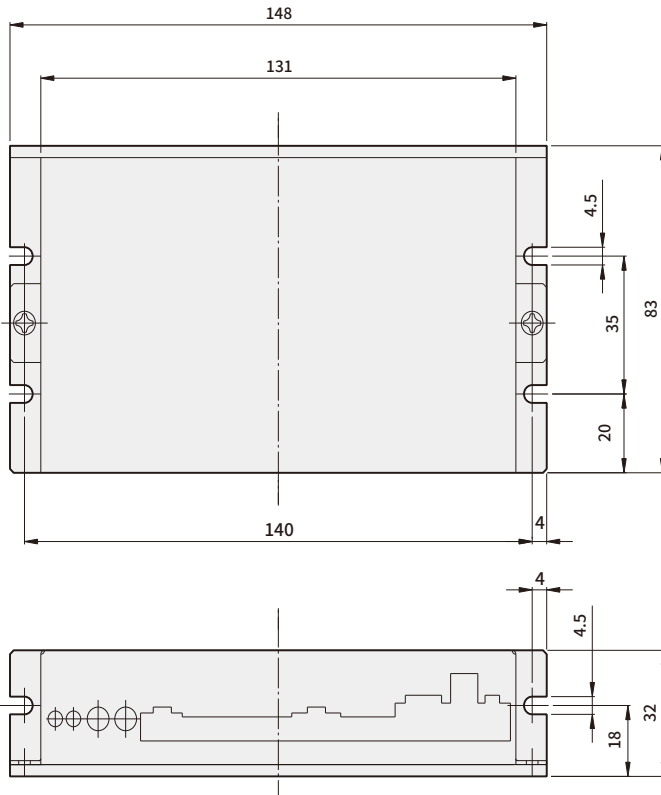
BLDC SPEED CONTROL UNIT



GUL-2-100 L Series motor applied product

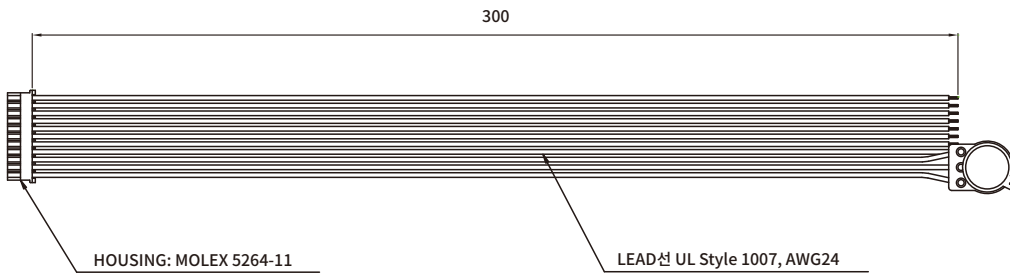
Product appearance

■ Driver main part outside view

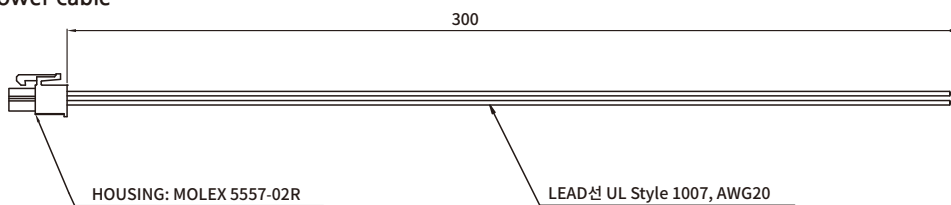


[Accessory]

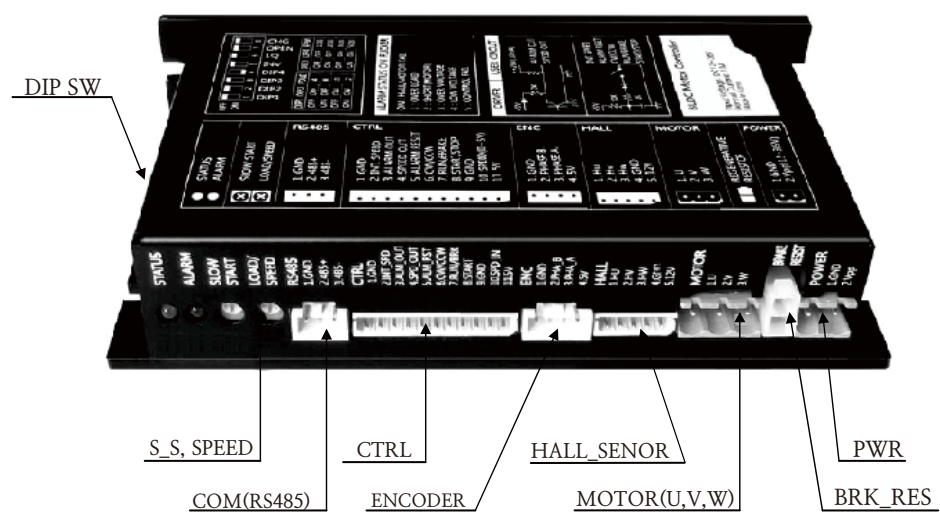
■ Driver input signal cable, External volume



■ Driver power cable



→ Name and functions of each part



1. Input / Output specification

Items	Details	Note
External size(mm)	146 × 125 × 55	
Power input, Controller output	DC24V(±10%), Normal 10A	
Signal system	Input signal type : Pull-Up, Output signal type : Open-Collector	
Communication(Optional)	RS485 1ch, Baudrate : 19, 200bps, 1 stop bit, no-parity	
Speed range	100~3,000rpm	
Speed variation ratio	Less than ±1 %	

2. LED specifications

Pin No.	Naming	Color	Number of blink	Contents
1	ALARM	RED	0 (Series lighting) 1 2 3 4 5	- Motor hall sensor signal failure or inverse direction in rotating speed signal.(INV) - Overload : Blink every 1 second. - Short circuit of motor coil or current more than 30% of rated current. - Input voltage is higher than upper limit. - Input voltage is lower than lower limit. - The motor speed is not within ±15% of reference speed during 5s.
2	STATUS	GREEN	1	- Blink every 1 second normally.

3. Motor connector specification

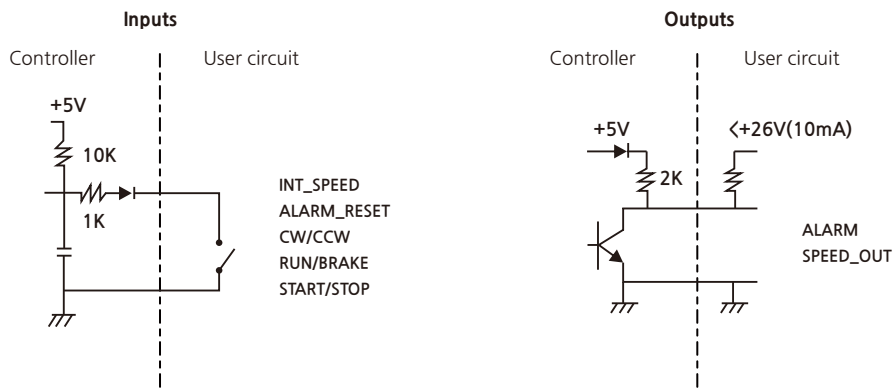
Connector Name	Pin No.	Naming	Details	Note
HALL_SENOR MOLEX, 5267-05	1~3	Hw, Hv, HU	Hall sensor signal input	MOLEX, 5264-05
	4, 5	Gnd, 12V	Hall sensor power	
MOTOR BR508LH-3	1~3	U, V, W	Motor power line	
PWR BR508LH-2	1	Gnd	Ground	
	2	V+	24V (±10%)	
RS485 Yeonho Electronics SMAW250-03	1	GND	RS485 connector	SMH250-03
	2	485+		
	3	485-		
ENC SMAW250-04	1~4	GND, B, A, 5V	Encoder input (PHASE_A, PHASE_B) (Option)	SMH250-04
BRK_RES MOLEX, 5566-02			It is used especially in minus load circumstance, in large load inertia or in high speed operation. The external regenerative brake resistor in range of 5 to 10Ω is recommended and the power rating of the resistor needs to be determined properly. (5Ω resistor with 50W is recommended for 200W load.)	MOLEX, 5557-02
CTRL MOLEX, 5267-11			Input/output signals for controlling motor controller Refer to CTRL connector below.	MOLEX, 5264-11

4. Input/output signals (MOLEX 5267-11)

Signal line is at pull-up internally. If it is L (GND), in other words, if the signal line is connected with GND or if electric potential is at GND level, NC (disconnected with GND), then it gets turned off.

Pin No.	Signal name	Direction	Color	Details
1	GND		BLACK	Ground
2	INT_SPEED	IN	GREEN	ON : Set the speed by internal volume(LOAD/SPEED) OFF : Set the speed by external volume(SPEED_IN) and limit the load current by internal volume(LOAD/SPEED)
3	ALARM	OUT	PURPLE	When alarm occurs, the output transistor is ON (L). At normal condition, the output transistor is OFF. If there is any alarm, the alarm LED blinks according to the alarm status. To drive ALARM output in reverse, invert it by using communication command or DIP_SW.
4	SPEED_OUT	OUT	ORANGE	Output pulses are came out proportional to the BLDC motor speed. The number of pulses per revolution is 30 pulses.
5	ALM_RESET	IN	GREY	The signal restarts controller after removing the cause of any alarm. To actually reset the controller, turn OFF ALARM_RESET from ON while keeping START/STOP off or speed command in zero.
6	DIR	IN	BROWN	Used to set rotating direction. CW : Conncted to the GND (ON) CCW : Disconnected from the GND (OFF) CW/CCW is the rotating direction when motor is viewed from rotor. If DIR is ON while CHG at DIP_SW setting is ON, the motor turns to CW. If controlled by communication, this is used as CW limit-switch. Therefore it must be conected to GND.
7	RUN/BRAKE	IN	WHITE	ON(L) : Motor starts to run. OFF : Turning OFF the signal during motor run makes the motor stop quickly.
8	START/STOP	IN	MAGENTA	ON : Motor starts to run. OFF : Turning OFF the signal during motor run makes the motor stop in free run. If START/STOP is ON while CHG at DIP_SW setting is ON, the motor turns to CCW. If controlled by communication, this signal is used as CCW limit-switch. Therefore it must be connected to GND.
9	GND		BLUE	Ground
10	SPEED_IN	IN	YELLOW	Analog input to adjust the motor speed. The range is from 0 to 5V DC.
11	5V	OUT	RED	Used to supply 5V DC to the external volume. Do not use it for another purpose.

■ Input/output signals



Basic procedure to run the motor is as follows.

Set the rotation direction in CW or CCW by using DIR

Turn ON RUN/BRAKE while START/STOP is ON

Adjust speed command by applying command voltage to SPEED_IN

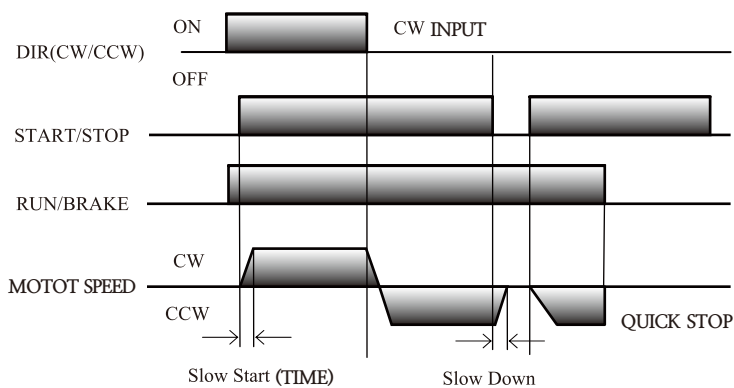
For quick stop, turn OFF RUN/BRAKE as the table below. To stop the motor in free run state, turn OFF START/STOP signal.

5. Control conditions by START/STOP and RUN/BRAKE (Applied when CHG(position 8 in DIP_SW) is off)

START/STOP	RUN/BRAKE	State
ON(L)	ON(L)	Normal driving
ON(L)	OFF(H)	Quick stop
OFF(H)	ON(L)	Free run stop depending on load inertia

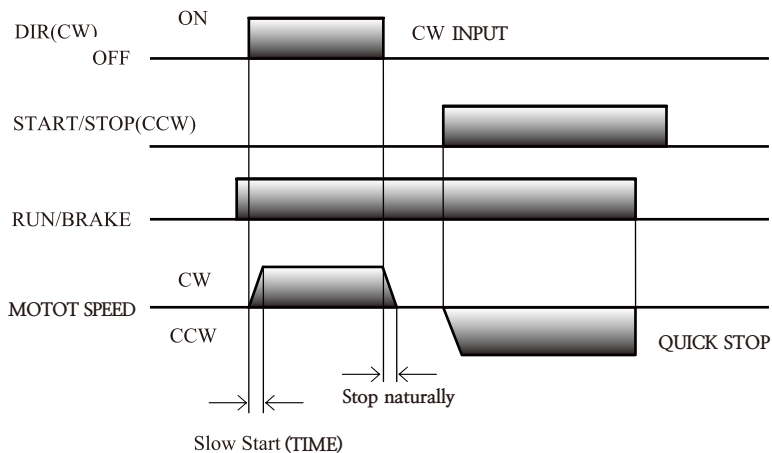
■ When CHG signal, No.8 in DIP_SW, is OFF

Motor moves when RUN/BRAKE and START/STOP are ON.



■ When CHG signal, NO.8 in DIP_SW, is ON

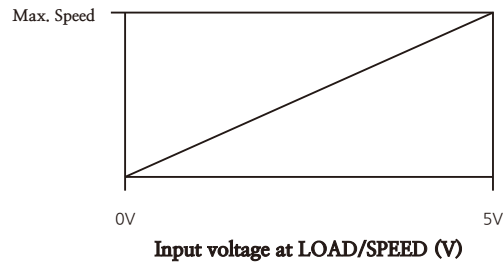
Motor moves when RUN/BRAKE is ON.



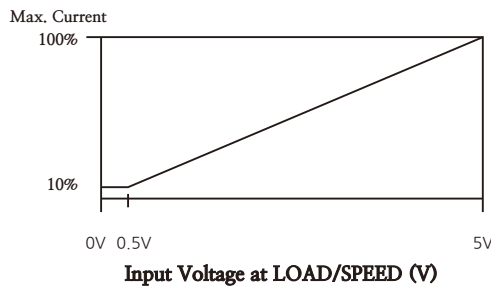
6. Internal variable resistance(LOAD/SPEED)

■ Maximum allowed load setting and internal speed setting : (LOAD/SPEED) :

When INT_SPEED at Pin2 in CTRL connector is turned ON, internal volume

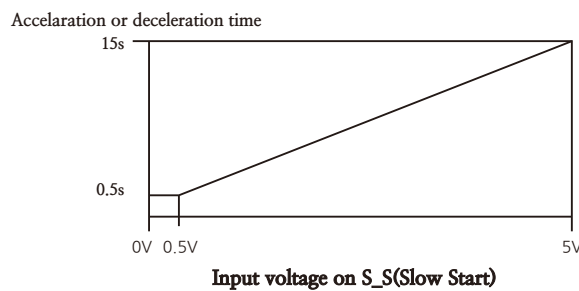


When INT_SPEED at Pin 2 in CTRL connector is turned OFF, internal volume LOAD/SPEED is used to limit the maximum current of motor. Allowable maximum current increases as the volume is turned in CW.



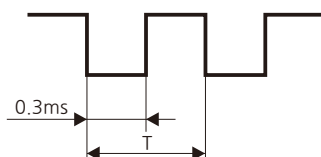
■ Acceleration/deceleration rate, internal speed setting/current limit : SS(Slow Start), SD(Slow Down)

Slow start and slow down determines the slope of acceleration and deceleration. When these volume are set to maximum, acceleration time from stop to maximum speed or deceleration time from maximum to stop is about 15 sec. Acceleration or deceleration time at the lowest level is within 0.5sec although actual speed depends on motor status. SS volume sets both acceleration and deceleration slope equally in the case of controller without SD volume.



7. SPEED output (SPEED_OUT)

Output signal on the number of poles, 10
30pulses per one revolution.



■ Safety switches and driving condition when communication command used I/O

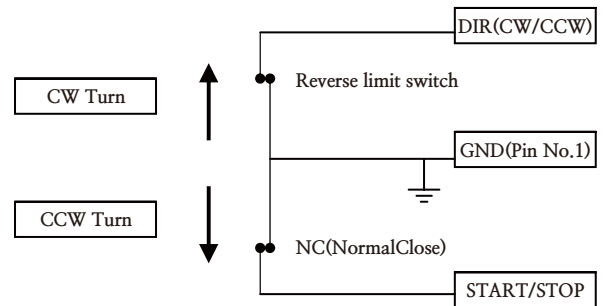
If you use communication command, then the controller uses the CTRL signals as limit switches for system safety. Set the DIR(CW/CCW) and START/STOP signals to ON(connected to GND) to drive motor.

The relationship of the moving direction and the signals.

CW direction running should be on status in sixth DIR pin, CCW direction running should be on status in eighth START/STOP pin.

Prevent in advance controller breakage and device breakage by incorrect operation when limit switch connect to sixth, eighth signal cable and control motor in locked condition of device like lift.

Reference direction (Speed and position control)	RUN/BRAKE		Motor status
	DIR(CW/CCW)	START/STOP	
CW Reverse	ON	X	Driving
	OFF	X	Stop
CCW Forward	X	ON	Driving
	X	OFF	Stop



Wiring condition on the moving direction and limit switches

■ Analyzing failure and treatment

Check out according to below items when motor's operation is not normally executed.

Items	Cause	Solutions
Motor don't move	RUN/BRAKE and START/STOP signals are not ON status.	Set the RUN/BRAKE and START/STOP inputs to ON(connection to GND) status.
	DIP SW No.8 CHG is not ON and RUN/BRAKE is not ON or, DIR or START/STOP are not ON.	Set RUN/BRAKE to ON, and wants to move to CW direction, set DIR to ON or CCW direction, START/STOP to ON.
	When using the internal volume, LOAD/SPEED as a speed input, CTRL connector No.2, INT_SPEED is not ON.	Set the INT_SPEED to ON.
	External speed setting device (external variable resistor volume) failure.	Check out if voltage 0~5V is input at CTRL connector tenth pin.
	The external volume(speed in)is malfunction.	At the CTRL connector No.10, check 0~5V input voltage.
	Alarm LED ON.	Check out motor's hall sensor connection. Check motor connector disconnection and connection failure.
Stop during rotation	Protection function operation.	Check out LED flickering number. Identify LED specification by flickering number.
control malfunction with wanted speed and motor has no power.	Internal volume, LOAD/SPEED is not proper setting.	Turn this volume to CCW direction to increase limit of max. current.
Wrong direction	DIR signal is not proper	Set the valid status of DIR(CW/CCW) signal.
	Gearhead connected.	The direction of axis is depend on the gearhead ratio. Change the DIR status.
Unstable run or vibration	Motor axis is not aligned well with load axis.	Check if coupling is well and then use flexible coupling if it is not well aligned.
	Dsturbed by external noise	Eliminate noise source by applying noise filter or metal case when the system is affected by strong EMI source such as welder. Check if shield wires is being used for signal line or add ferrite beads on the lines.
	Type of motor is not correct.	Set the correct number of motor poles by DIP_SW no.1~4
Motor does not stop quickly	Motor stop is being done by START/STOP.	Stop the motor by RUN/BRAKE input.
	Load inertia is too large.	Decrease load inertia or increase the friction of load
Motor does not stop quickly	Setting of SS(SlowStart) or SD(SlowDown) is not proper.	Set the volume SS or SD properly by turning it in CW or CCW.
Motor runs in max. Speed and then stops shortly while alarm LED is on	Connection for encoder lines or motor line is wrong.	Set the DIP_SW no.5, INV to ON. And reboot the controller.
Running noise is high and correspondance is low.	The motor is driven by 1Q mode.	Set the DIP_SW no.6, 1Q to OFF, the motor is driven by sine wave PWM.