JKBLD750 Brushless DC Motor Drive Manual V1.1

Usage characteristics

- Acc/Dec time setting
- Motor pole number selection
- Open/closed loop control
- Maximum current output setting
- Motor stall torque maintenance
- Restart

- Alarm signal
- Internal potentiometer RV speed control
- External potentiometer speed setting
- External analog signal speed setting
- Pulse frequency speed control

Electrical performance and environmental indicators

1. Electrical indicators

| Driver parameters	Minimum value	Rated value	Maximum value
Input voltage（V）	18	48	52
Output current（A）			25
Suitable motor speed（rpm）	0		20000
Hall sennsor voltage（V）			5
Hall sennsor current（mA）		20	
External speed control potentiometer（KΩ）		10	

2. Environmental indicators

Environmental factor	Environmental indicators
Cooling method	Natural cooling or forced cooling
Application	Avoid dust, oil stains, and corrosive gases
Operating temperature	+10℃ ～ +50℃
Ambient humidity	80%RH（No condensation）

Vibrate	5.7m/S2 max
Storage temperature	0℃ ～ +60℃

Driver interface and wiring diagram

1. Driver interface
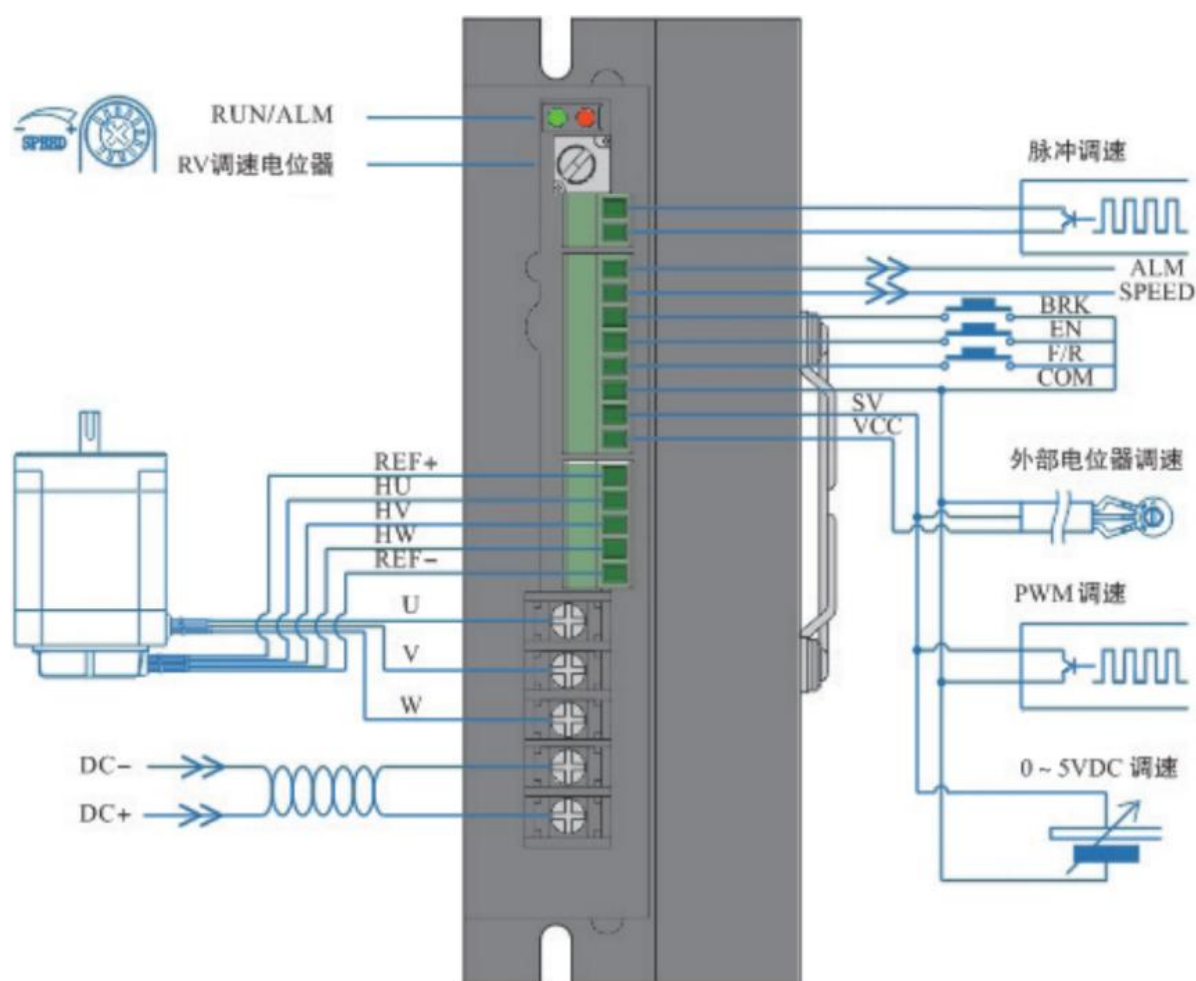
2. Port signal description

Singal category	Terminal	Functional Description
Output signal	ALM	The output signal of the motor or drive control fault signal is normally 5V, and in the event of a fault, it is 0V.

	SPEED	Output a pulse frequency that matches the operating speed of the motor. The motor speed can be calculated using SPEED-OUT. The calculation formula is: $N(rpm) = (F/P)\times60/3$ F：Output pulse frequency (Hz); P：Number of motor poles; N：motor speed
Control Singal	PUL+	Pulse frequency input positive pole
	PUL-	Pulse frequency input negative electrode.
	BRK	When the BRK terminal and COM terminal are disconnected or high-level input, the motor brake stops, and when short circuited or low-level input, the motor runs.
	EN	When the EN terminal and COM terminal are disconnected or high-level input, the motor slowly stops, and when short circuited or low-level input, the motor runs.
	F/R	When the F/R terminal and COM terminal are disconnected or high-level input, the motor rotates forward, and when short circuited or low-level input, the motor reverses.
	COM	Common port (OV reference level).
	SV	①External potentiometer speed control; ②External analog signal input; ③ PWM input
	VCC	External potentiometer interface
Hall Singal	REF+	Hall Sensor Signal Power Supply +
	HU	Hall Sensor Signal HU
	HV	Hall Sensor Signal HV
	HW	Hall Sensor Signal HW
	REF-	Hall Sensor Signal Power Supply -
Motor connection	U	Motor line U phase
	V	Motor line V phase
	W	Motor line W phase
Power connection	DC-	Input Power supply negative electrode
	DC+	Input power supply negative electrode (24V-52VDC)

Function settings

1．Acc/Dec time setting

Set the acceleration and deceleration time of the motor through **the side potentiometer ACC/DEC of the driver**. Adjusting the ACC/DEC potentiometer clockwise/counterclockwise can increase/decrease the acceleration/deceleration time. Setting range: 0.2-15S. Acceleration time refers to the time required for the motor to reach the rated speed from a stationary state; The deceleration time refers to the time

required for the motor to stop from the rated speed.

2. Open/closed loop control setting

Select open loop control or closed loop control through **the driver side dial switch SW1**.

ON：closed loop control;

OFF： open loop control.

Attention: When using closed-loop control, please first set SW2 based on the number of motor poles.

3. Motor pole number selection

In order to better match DC brushless motors with different pole pairs, the pole pairs of the motor can be set through **the driver side dial switch SW2**.

ON：2 pairs of poles;

OFF：4 pairs of poles.

Attention: When using closed-loop control, please first set SW2 based on the number of motor poles.

4. SV port signal/pulse frequency speed regulation switching

Select SV port signal speed regulation or pulse frequency speed regulation through **the driver side dial switch SW4**.

ON：Pulse frequency regulation, with the positive pole of the pulse signal connected to the PUL+port and the negative pole connected to the PUL - port;

OFF: SV port signal speed regulation can be achieved by using an external potentiometer, external analog signal speed regulation, or PWM speed regulation.

5. Peak output current setting

Set the peak output current through **the P-sv potentiometer on the side of the driver**. When the load suddenly increases, the output current will be limited to the set value, reducing the motor speed and

protecting the motor from damage.

Please set the peak output current according to the scale on the driver's label, with a setting range of 4 to 32A.

Due to the error between the set value and the actual value being approximately ± 10%, to ensure safety, please adjust the peak output current appropriately.

6. Locked rotor output current limit

When the motor is locked, the output current will be limited to 3A to protect the driver and motor from damage.

7. Locked rotor torque maintenance function

When the motor is locked, the driver has a simple torque holding function.

Attention: Locked rotor holding torque is a short-term behavior, please do not use it for braking locked rotor.

8. Restart function

When situations such as motor blockage occur, the driver will stop working. After 5 seconds, the drive will automatically start. After restarting, if a malfunction occurs again, the driver will stop working and give an alarm.

9. Start and Stop

① Start and slow stop

The factory setting for EN and COM ends is to connect the EN and COM ends. Connecting or disconnecting the connecting wires between the EN and COM ends can control the operation and stop of the motor.

When the EN end and COM end are connected, the motor runs; When the EN and COM terminals are disconnected, the motor slowly stops.

② Fast stop

The factory setting for the BRK and COM ends is to connect the BRK and COM ends. Connecting or disconnecting the connecting wires between the BRK and COM ends can control the natural operation and quick stop of the motor.

When the BRK end and COM end are connected, the motor operates normally; When the BRK end and COM end are disconnected, the motor quickly stops.

Note: Differences and usage choices between EN and BRK:

• EN control naturally stops, BRK control quickly stops;

• The start status of EN and BRK control is the same;

• When selecting one of the EN or BRK methods to control the start stop, the wiring of the other method should remain in the factory state.

10. Direction control

The factory setting for the F/R and COM terminals is that they are not connected. Connecting or disconnecting the connecting wires between the F/R and COM ends can control the forward and reverse rotation of the motor.

When the F/R end and COM end are disconnected, the motor rotates forward; When the F/R end and COM end are connected, the motor reverses.

Attention: Observing from the direction of the motor shaft, clockwise represents forward rotation and counterclockwise represents reverse rotation.

Speed setting methods

1. Speed setting via built-in potentiometer

Rotate the built-in speed control potentiometer RV clockwise and make a "click" sound before the motor starts running. Continuing to rotate clockwise increases the motor speed. Rotate the potentiometer RV counterclockwise to reduce the motor speed. Continue to rotate counterclockwise until the potentiometer emits a "click" sound, and the built-in speed control potentiometer RV closes, causing the motor to stop running.
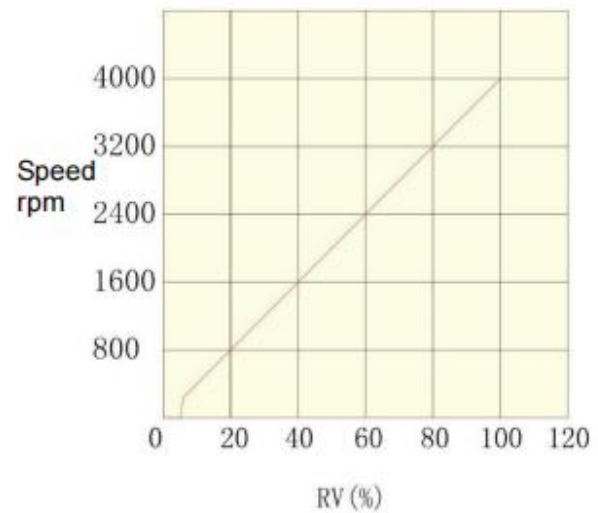
Attention: When switching to external SV input or pulse frequency control speed mode, the built-in speed control potentiometer RV must be in the closed state, that is, rotate
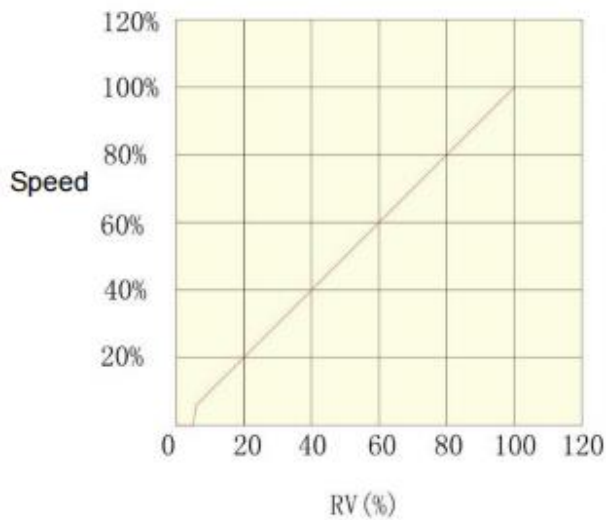
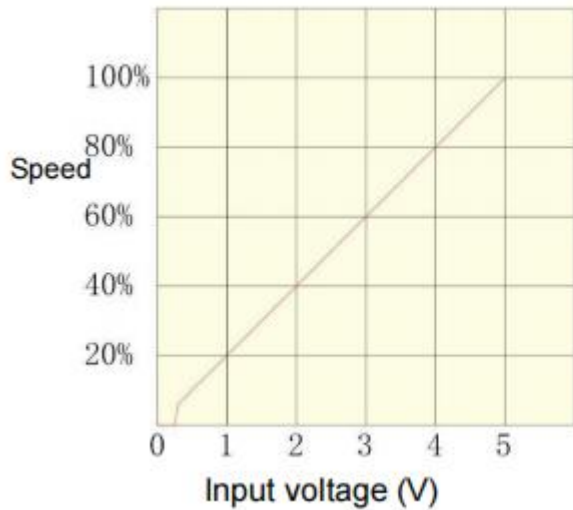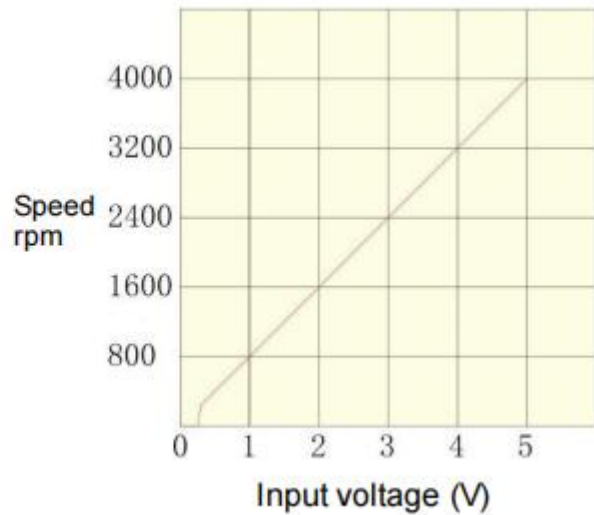| Relationship between built-in speed setting potentiometer and motor speed (open-loop no-load)	Relationship between built-in speed setting potentiometer and motor speed (closed-loop no-load)

2. External potentiometer speed setting

When using an external speed regulating potentiometer for speed regulation, it is necessary to first turn SW4 to OFF. Please use a potentiometer with a resistance value of 10K Ω. The middle lead end of the potentiometer is connected to the SV end, and the lead ends on both sides are connected to the VCC and COM ends respectively.

3. External analog signal speed setting DC

When using an external analog signal for speed regulation, it is necessary to first set SW4 to OFF. The SV port of the driver is connected to the signal positive pole, and the COM port is connected to the signal negative pole. The external analog signal requires 0-5V and above 1mA.

Relationship between analog signal voltage and motor speed (open loop no-load)

Relationship between analog signal voltage and motor speed (closed loop no-load)

4. PWM Speed setting

When using PWM speed regulation, it is necessary to first turn SW4 to OFF. The SV port of the driver is connected to the signal positive pole, and the COM port is connected to the signal negative pole. The PWM signal requires an amplitude of 5V and a frequency of 1-3KHz.

Relationship between duty cycle and motor speed (open loop no-load)
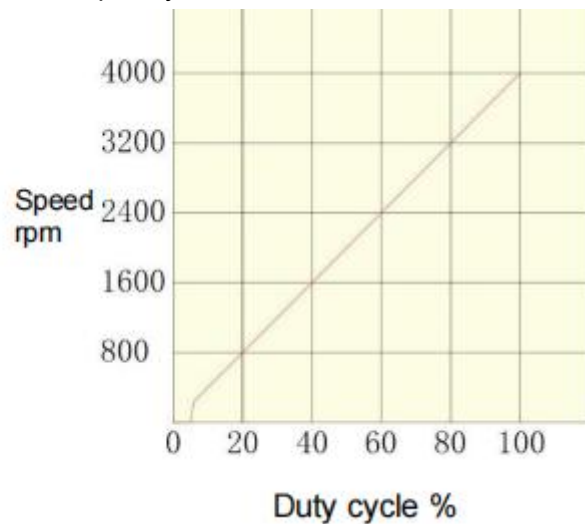
Relationship between duty cycle and motor speed (closed loop no-load)

5. Pulse frequency speed control

When using pulse frequency speed regulation, it is necessary to first set SW4 to ON. The driver PUL+port is connected to the signal positive pole, and the PUL - port is connected to the signal negative

pole. The pulse signal requires an amplitude of 5V and a duty cycle of 50%.

Two input methods, common anode or common cathode, can also be used. When using a voltage higher than 5V, it is necessary to add a current limiting resistor at the signal end to ensure that the current passing through each LED does not exceed 20mA.

Optoelectronic isolation common anode input interface circuit
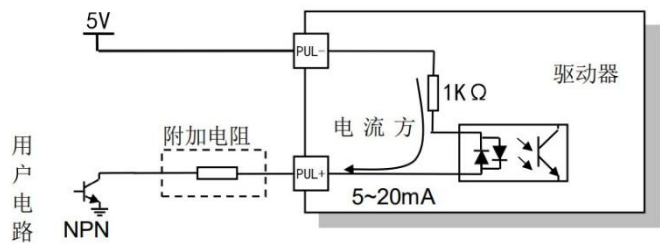
Optoelectronic isolation common cathode input interface circuit
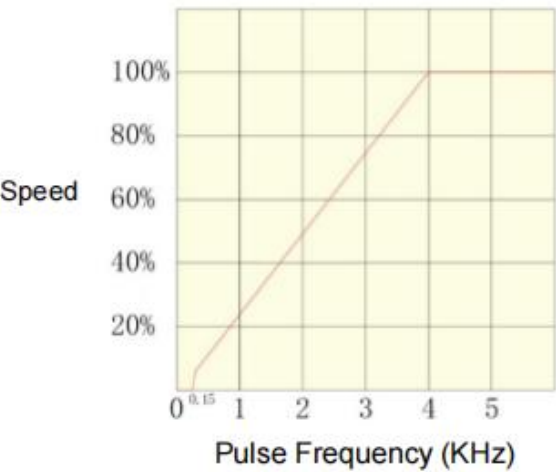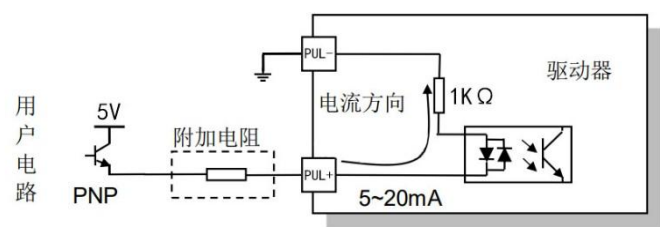
Relationship between pulse frequency and motor speed (open loop no-load)

Relationship between pulse frequency and motor speed (closed loop no-load)

Fault indication and handling methods

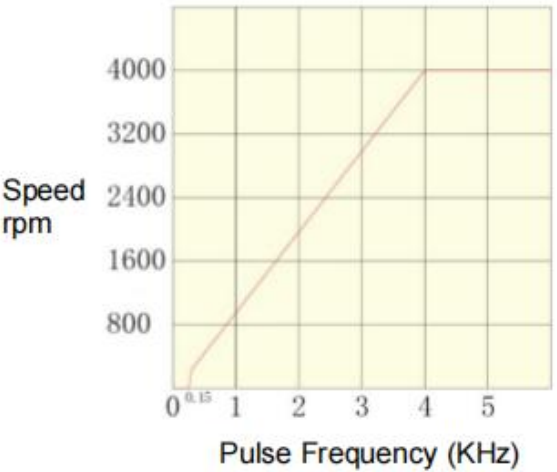When the motor experiences overcurrent, Hall signal input error, locked rotor, over temperature, overvoltage, etc., the driver will issue an alarm signal. When a fault occurs, the driver will stop working, and the fault alarm output terminal (ALM) will output a low level and the alarm light will flash.

Alarm	Status statements	Solutions
Red Led flashes twice	Over voltage Alarm	Detect bus voltage.
Red Led flashes three times	Power tube overcurrent alarm	Determine if the selection is correct.
Red Led flashes four times	Overcurrent alarm	Check P-sv settings and verify motor parameters, or increase the acceleration time.
Red Led flashes five times	Under voltage Alarm	Check the voltage power supply and also check if the power supply meets the condition of being greater than 1.5 times the motor power.
Red Led flashes six times	Hall singal loss	Check if the motor wiring is secure.
Red Led flashes seven times	Locked rotor alarm	Check if the motor load is too large.
Red Led flashes eight times	Hall wire sequence error	Check if the motor wiring sequence is correct.
Red Led flashes nine times	Over temperature alarm	Check if the working environment temperature is too high; Check if the radiator fan is working properly.

Communication control instructions

Communication method: serial asynchronous half duplex

Communication format：MODBUS RTU

Baud rate: 485 interface defaults to 115200bps; RJ11 interface fixed 9600bps

Data Bits：8 bits

Check digit: None

Starting bit: 1 bit

Stop bit: 1 bit

Slave address: default 01

Data frame format:

Address	Function Code	Data	CRC check
8bits	8bits	N*8bits	16bits

Register Data Definition:

Add	Function Code	Content	Size	read-write	Range	Unit	Remark
4000	3/6	address	Word	read-write	1-255	---	Default to 1
4001	3/6	Polar logarithm	Word	read-write	1-10	---	
4002	3	Overcurrent	Word	Only read	Hardware setup	A	
4003	3/6	Current limiting	Word	read-write	3-35	A	
4004	3/6	PWM maximum	Word	read-write	10-100（10%-100%）		Default to 100
4005	3/6	control model	Word	read-write	0：open loop control 1：closed loop control		Default to 0
4006	3/6	Closed-loop speed	Word	read-write	100-4000	rpm	Control Mode 1
4007	3/6	Open loop speed	Word	read-write	100-1000（10%-100%）		Control Mode 0
4011	3/6	acceleration	Word	read-write	300-15000	ms	Acc and dec time
4034	3/6	Communication activation	Word	read-write	0 stop 1 start		Default to 0
4035	3/6	turn	Word	read-write	0 foreward 1 reverse		Default to 0
4036	3/6	brake	Word	read-write	0 Release the brake 1 put on the brake		Default to 0

4037	3/6	Command Source	Word	read-write	0 IO 1 communication		Default to 0
4038	3	voltage	Word	Only read		V	
4039	3	current	Word	Only read		10mA	
4040	3	power	Word	Only read		0.1W	
4041	3	speed	Word	Only read		rpm	
4042	3	Fault code	Word	Only read	Refer to software fault codes		
4043	6	Fault clearing	Word	Write	1		Write 1 clear to zero
4044	3/6	485baud rate modification	Word	read-write	0：115200 1：57600 2：38400 3：19200 4：9600		Default to 0 Effective after re powering on

Read register format: (Read current speed)

Slave address	Function Code	Register address high order	Register address low order	Number of Registers High Order	Number of Registers Low Order	CRC high bit	CRC low bit
01	03	40	41	00	01	10	07

Read register feedback format: (current speed is 1000rpm)

Slave address	Function Code	number of bytes	4041h high order	4041h lower order	CRC high bit	CRC low bit
01	03	02	0E	38	B8	4E

Write register format: (modified to control motor operation with communication instructions)

Slave address	Function Code	Register address	Register address	data-high	data-low	CRC high bit	CRC low bit

		high order	low order				
01	06	40	37	00	01	EC	04

Write register feedback format

Slave address	Function Code	Register address high order	Register address low order	data-high	data-low	CRC high bit	CRC low bit
01	06	40	37	00	01	EC	04

Example of communication control motor operation:

sequence	Sending message	Feedback message	description
1	01 06 40 37 00 01 EC 04	01 06 40 37 00 01 EC 04	Set as communication command control
2	01 06 40 07 00 32 AC 1E	01 06 40 07 00 32 AC 1E	Modify the open-loop speed control to 50%
3	01 06 40 34 00 01 1C 04	01 06 40 34 00 01 1C 04	Motor enabled, start running

Software fault code:

2: Software overcurrent

3: Hardware overcurrent

4: Undervoltage

5: Overvoltage

6: Locked rotor

7: Hall loss

8: Hall wire sequence error

9: Overtemperature

Version Revision History

Version	Description	Date	Remark
V1.0	the first edition	2022.10.30	
V1.1	the second edition	2023.6.2	Change the minimum acceleration and deceleration time from 1.5s to 0.2s