



VER 2.0

Technical Manual

DS-OL57-IRS4



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1. Product Introduction

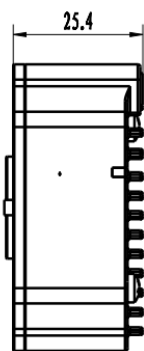
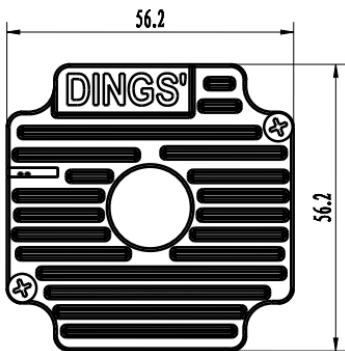
1.1 Features

- Input power : DC 24 - 48V
- Output rated current (peak value) : 5.6 A / Phase
- Pulse, support MODBUS RTU communication protocol, I/O trigger control, Internal programming
- Protection function : Over current, Over voltage, Under voltage

1.2 Technical Parameters

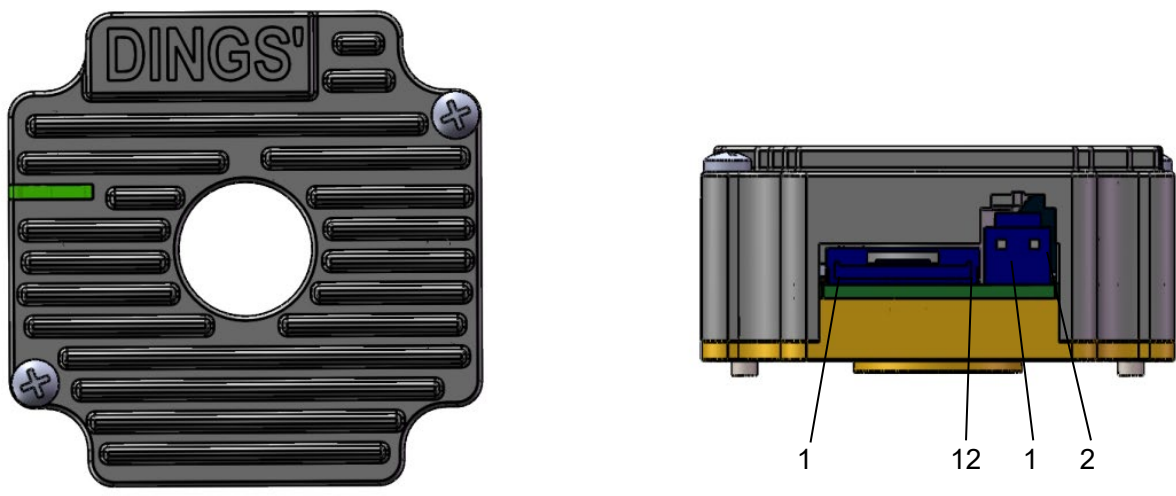
Drive model		DS-OL57-IRS4
Adapted motor		Suitable for two-phase hybrid stepping motor
Power supply		DC 24V ~ 48V
Output current		Max. rated current 5.6A/phase (peak)
Drive way		Full-bridge bipolar PWM drive
Input signal	IN1 (pulse) signal	Optocoupler input voltage: H = 3.5 - 26V, L = 0 - 0.8V On current 5 ~ 8mA
	IN2 (direction) signal	
	IN3 (offline) signal	Optocoupler input voltage: H = 3.5 - 5V, L = 0 - 0.8V On current 5 ~ 8mA
	IN4 (alarm clear) signal	
		Signal power supply 12VDC series resistance R = 1 KΩ Signal power supply 24VDC series resistance R = 2.2 KΩ Depending on the input signal voltage, such as a 12V or 24V fix
Output signal		Optocoupler output, voltage up to 30VDC, maximum current 10mA
Device initialization time		2s
Working Environment	Precaution	Avoid dust, oil mist and corrosive gases
	Humidity	< 85 % RH, Non-condensing
	Temperature	0°C - +40°C
	Cooling	Installation in a ventilated environment

1.3 Dimensional Drawing



Unit : mm

2. Schematic and Interface Definition



2.1 Power Input (as shown, arranged from left to right)

Pin	Name	Description
1	V+	24V – 48VDC
2	GND	Power supply ground

2.2 Signal Input (as shown, arranged from left to right)

Pin	Name	Description
1	IN1+	External pulse mode : Pulse Internal pulse mode : Universal input port 5 -24V effective, Max. input frequency 500KHz, signal definition configurable
2	IN1-	
3	IN2+	External pulse mode : Direction Internal pulse mode : Universal input port 5 -24V effective, Max. input frequency 500KHz, signal definition configurable
4	IN2-	
5	COMIN	Single-ended input signal common Both positive and negative (5VDC) compatible
6	IN3	External pulse mode : Offline Internal pulse mode : Universal input port, 5V effective Max. input frequency 1KHz, signal definition configurable
7	IN4	External pulse mode : Alarm clear Internal pulse mode : Universal input port, 5V effective Max. input frequency 1KHz, signal definition configurable
8	OUT+	Optoelectronic isolated output, max. voltage 30VDC, max. saturation current 10 mA
9	OUT-	
10	485-GND	485 Communication Port
11	485-A	
12	485-B	

2.3 Indicator Function

2.3.1 Status Indication :

Status	Communication code	Description
Stopping	2	The motor is holding but the motor is not running
Running	3	The motor is running
Motor free	1	The motor can move freely

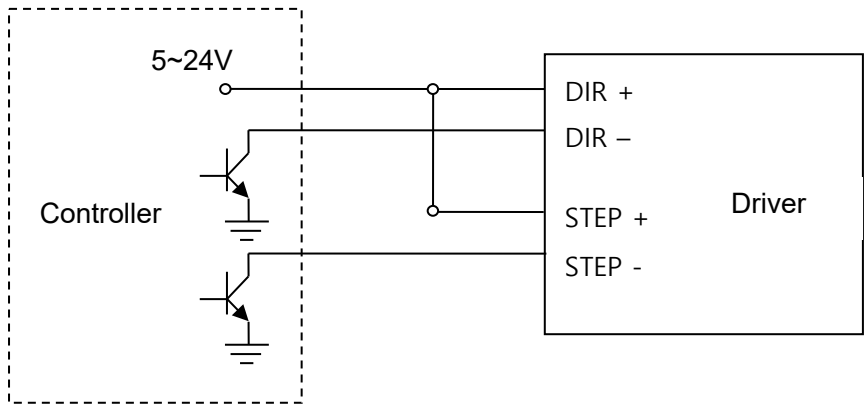
2.3.2 Error Indication :

Error Code	LED Blinks	Communication Value	Description
Over current	1	10	Motor phase current over or drive failure
Motor phase	2	11	Motor wire were not connected
Over voltage	3	14	Power voltage is over than 42V
Under voltage	4	13	Power voltage is less than 18V

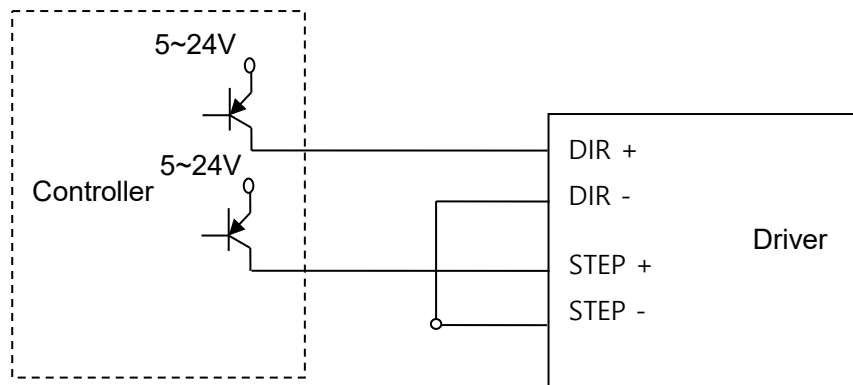
3. Typical Signal Connection

3.1 High Speed Input Port

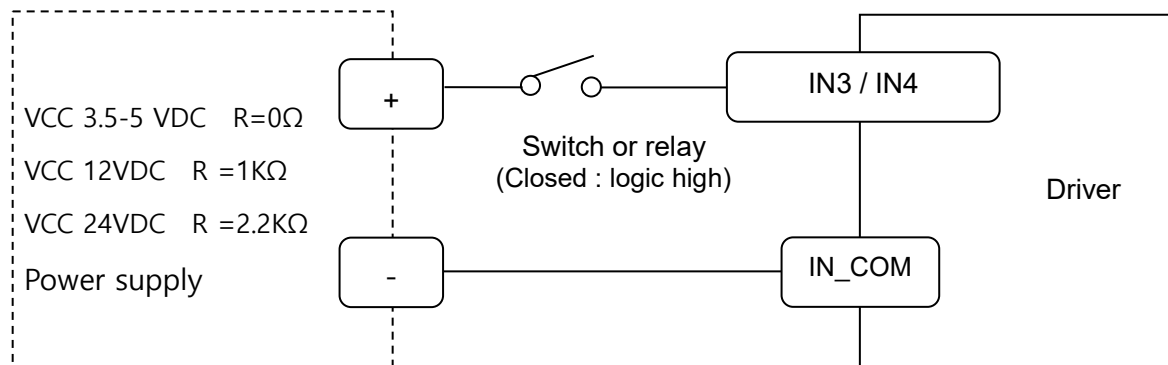
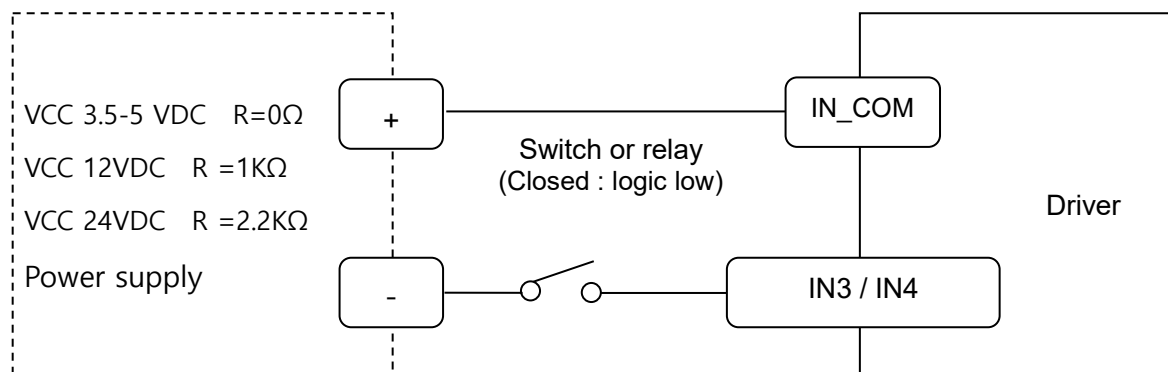
Common positive connection



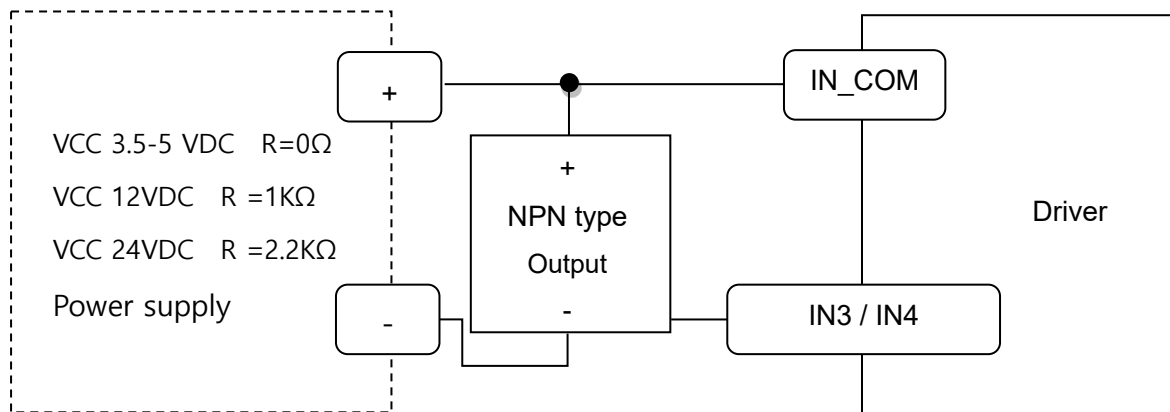
Common negative connection



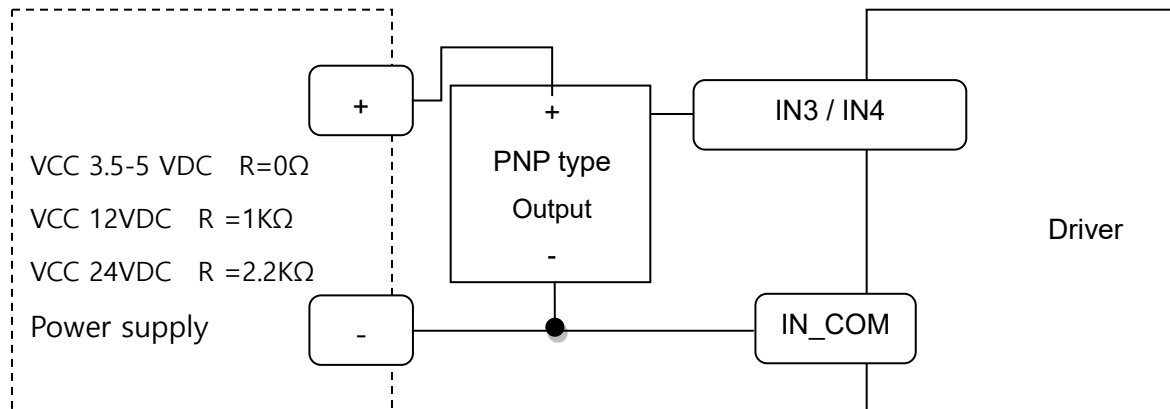
3.2 Input Signal of Switch or Relay Connection



3.3 Connection of Input Signal and NPN Type Output



3.4 Connection of Input Signal and PNP Type Output



4. Control Parameter

4.1 Status (Class 00)

adr	word	content	Elaborate	Range / unit
0100	1	Actual motor current	Real-time current value	0.1%
0101	1	Input voltage	Real-time input power voltage value	1V
0104	2	Microstep resolution	Setted Microstep resolution value	ppr
0106	1	Pulse mode	1 is pulse + direction mode, 2 is double pulse mode	1-2
0108	1	Error code	Please refer to the alarm code for details, and display "0" for no fault	

Error Code	LED Blinks	Communication value	Description
Over current	1	10	Motor phase current over or drive failure
Motor phase	2	11	Motor wire were not connected
Over voltage	3	14	Power voltage is over than 42V
Under voltage	4	13	Power voltage is less than 18V

Drive running status, content indicator flashing description

Status	Communication value	Description
Stopping	2	The motor is holding but the motor is not running
Running	3	The motor is running
Motor free	1	The motor can move freely

0109	1	Operating status	
0110	1	Hardware version	Drive hardware version -
0111	1	Software version	Drive software version -
0117	2	Target position	Target position pulse
0119	1	Actual speed	Real-time speed value 0.01rps
0126	1	Actual position	Real-time Position value pulse

4.2 Basic Settings (Class 01)

adr	word	content	Elaborate	Range / unit
0201	1	Direction switch	Direction settings: 0:Default 1:Reverse running direction	0 ~ 1
0202	1	Pulse edge	Pulse edge setting, pulse mode only: 0:Falling edge 1:Rising edge	0 ~ 1
0213	1	Half current proportion	Stop current percentage setting. Open-loop mode only	10%~100%
0224	1	Smooth filter	The smaller the value, the smoother the operation and the higher the delay time	0~700
0234	1	Pulse filter	The filter coefficient of the input pulse, The higher the value, the lower the pulse frequency response. Pulse mode only.	1~15
0241	1	Current setting	Current setting(mA)	100~5600 0.1A~-5.6A
0242	2	Microstep setting	Microstep setting(ppr).	200~102400 ppr
0244	1	Pulse mode	Pulse mode, pulse mode only:	1~2

			1:Pulse + Dir 2:Pulse + Pulse	
0245	1	Half current time	Delay time(ms) for motor to enter stop state after stop running. Open-loop mode only	1~30000 ms
0296	1	Control mode	Control mode: 0:Pulse control 1:Integrate control	0~1
0298	1	Station number	Station NO. settings. Reconnect is needed after modification.	1~250
0299	2	Baud rate	Baud rate setting. Take effect after the driver restart. Settable value:4800,9600,14400,19200,38400,57600,11520 0.	4800~11520 0

4.3 Motion Settings (Class 04)

addr	word	content	Elaborate	Range / unit
0301	1	Start velocity	Start velocity, invalid in pulse control mode. Unit:0.01rps	1~1000 0.01~20rps
0302	1	Start velocity	Start velocity, invalid in pulse control mode. Unit:0.01rps	1~1000 0.01~20rps
0303	1	Acceleration	Acceleration, invalid in pulse control mode. Unit:rps ²	5~500 rps ²
0304	1	Deceleration	Acceleration, invalid in pulse control mode. Unit:rps ²	5~500 rps ²
0305	1	Homing mode	Homing mode, invalid in pulse control mode: 0:Forward to origin 1:Backward to origin 2:Forward to limit+ 3:Backward to limit-	0~3
0306	1	Velocity for position mode	The maximum velocity for position mode, invalid in pulse control mode. Unit:0.01rps.	1~5000 0.01~50rps
0307	1	Velocity for velocity mode	The maximum velocity for velocity mode, invalid in pulse control mode. Unit:0.01rps.	-5000~5000 -50~50rps
0308	1	Velocity for JOG mode	The maximum velocity for JOG mode, invalid in pulse control mode. Unit:0.01rps.	1~5000 0.01~50rps
0309	1	Homing approach velocity	Approach velocity for homing, invalid in pulse control mode. Unit:0.01rps.	1~5000 0.01~50rps
0310	1	Homing creep velocity	Creep velocity for homing, invalid in pulse control mode. Unit:0.01rps.	1~5000 0.01~50rps
0311	2	Homing offset	The homing offset, invalid in pulse control mode.	-2000000000~ 2000000000 pulse
0313	2	Target Position		
0317	2	Soft limit+	Soft limit+ setting, invalid in pulse control mode.	-2000000000~ 2000000000 pulse
0319	2	Soft limit-	Soft limit- setting, invalid in pulse control mode.	-2000000000~ 2000000000 pulse
0321	2	Set current position	Default: 0	-2000000000~ 2000000000 pulse
0323	1	Control commands	0: empty 1: Absolute running, running to the set distance, running direction is determined by distance plus or minus, speed plus or minus value is invalid, it is effective to modify target position	0~29

during running 2: Relative running, running at a set distance and running speed. The running direction is determined by the distance plus or minus. The speed plus or minus value is invalid. Modifying the movement distance during running is invalid 3: Speed mode 4: Jog forward 5: Reverse jog 6: Deceleration and stop 7: Emergency stop 8: Set the current position, which can only be set when the motor is stopped 12: Back to origin 13: Alarm clear 20: Enable Default: 0

0324	1	Memory switch	Memory switch setting, invalid in pulse control mode: bit0: Disable or enable Soft limit+ bit1: Disable or enable Soft limit- Maximum acceleration, invalid in pulse control mode. Unit:rps2	0-65535
0325	1	Max acceleration		5-10000

4.4 Input Settings (Class 05)

addr	word	content	Elaborate	Range / unit
			0: No function 1:Absolute position run, invalid in pulse control mode 2:Relative position run, invalid in pulse control mode 3:Velocity run, invalid in pulse control mode 4:JOG+, invalid in pulse control mode 5:JOG-, invalid in pulse control mode 6: Stop. Slow down nad stop, invalid in pulse control mode 7:E-Stop.Quick stop 8:Set position trigger, invalid in pulse control mode, current position is set by addr-321 9:Limit+ signal 10:Limit- signal 11:Orgin signal 12:Homing run, invalid in pulse control mode; 13:Alarm clear 14:Not Supported 15:Not Supported 16:Pramgram run, invalid in pulse control mode 17:Pramgram suspend, invalid in pulse control mode 18:Pramgram stop, invalid in pulse control mode 19:Not Supported 20:Servo ON/OFF control 21:Move forward for a distance, invalid in pulse control mode 22:Move backward for a distance, invalid in pulse control mode 23:Not Supported 24:Not Supported 25:Program select bit0, invalid in pulse control mode 26:Program select bit1, invalid in pulse control mode 27:Program select bit2, invalid in pulse control mode 28:Program select bit3, invalid in pulse control mode 29:Program select bit4, invalid in pulse control mode	
0400	1	IN1 function		0~30
0401	1	IN2 function	The setting content is the same as IN1 (default value: 0)	0~30

0402	1	IN3 function	The setting content is the same as IN1 (default value: 0)	0~30
0403	1	IN4 function	The setting content is the same as IN1 (default value: 0)	0~30
0429	1	Universal digital input logic	Input port logic, range:1 ~ 32767, corresponding IN[7:1]: 0000000 ~ 1111111.	0~32767

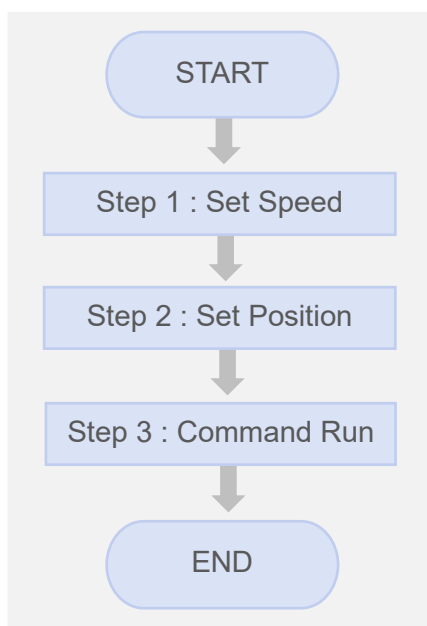
4.5 Output Settings (Class 06)

adr	word	content	Elaborate	Range / unit
0420	1	OUT1 function	100:Controllable output, controlled by addr 428 101:Alarm out, no output when alarm occurs 102:In-position indication 103:Servo ON/OFF indication, no output when servo ON	100~103
0430	1	Output port logic	Output port logic, range:0 ~ 15, corresponding OUT[4:1]: 0000 ~ 1111.	0~15

5. Modbus-RTU Example

5.1 Running Motor

5.1.1 Absolute Position Mode



Step	Add.	Word	Content	Range	Unit
1	0306	1	Velocity for position mode	1 ~ 5000	0.01 rps
2	0313	2	Target Position	-2,000,000,000 ~ 2,000,000,000	pulse
3	0323	1	Control commands	0 ~ 29	-

● Example. 1

Step 1 : Set Speed

Slave ID	1 (0x01)	Driver ID
Function	6 (0x06)	Write Single Register
Address	306 (0x0132)	Running Speed
Data	1200 (0x04B0)	1200 = 12 RPS = 720 RPM
CRC	0x8D2A	CRC-16

Request							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x32	0x04	0xB0	0x2A	0x8D
CRC 16							

Response							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x32	0x04	0xB0	0x2A	0x8D
CRC 16							

● Example. 2

Step 2 : Set Position

Slave ID	1 (0x01)	Driver ID
Function	16 (0x10)	Write Multi Register
Address	313 (0x0139)	Target Position
Quantity	2 (0x02)	Quantity of Registers
Data	5000 (0x00001388) -5000 (0xFFFFFEC78)	5000 pulse -5000 pulse

Request												
Slave ID	Function	Starting Address		Quantity of Registers		Byte Count	Data 1		Data 2		CRC 16	
		Hi	Lo	Hi	Lo		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x10	0x01	0x39	0x00	0x02	0x04	0xEC	0x78	0xFF	0xFF	0x88	0x78
CRC 16												

Response							
Slave ID	Function	Starting Address		Quantity of Registers		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x10	0x01	0x39	0x00	0x02	0x90	0x39
CRC 16							

● Example. 3

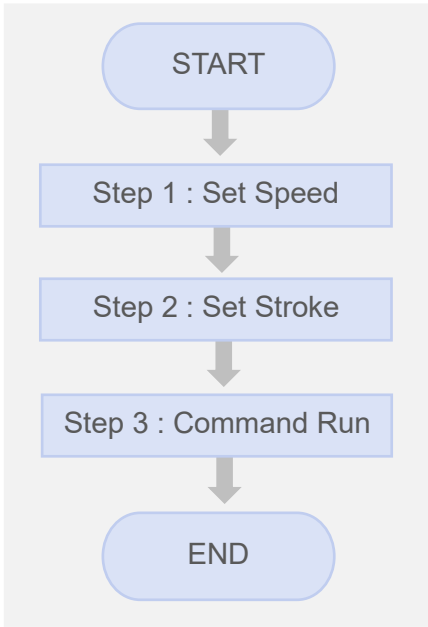
Step 3 : Command Run

Slave ID	1 (0x01)	Driver ID
Function	6 (0x06)	Write Single Register
Address	323 (0x0143)	Command Run
Data	01 (0x0001)	1 : Absolute running
CRC	0x23F8	CRC-16

Request							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x43	0x06	0x01	0xB8	0x22
CRC 16							

Response							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x43	0x00	0x01	0xB8	0x22
CRC 16							

5.1.2 Relative Position Mode



Step	Add.	Word	Content	Range	Unit
1	0306	1	Velocity for position mode	1 ~ 5000	0.01 rps
2	0313	2	Target Position	-2,000,000,000 ~ 2,000,000,000	pulse
3	0323	1	Control commands	0 ~ 29	-

● Example. 1

Step 1 : Set Speed	Slave ID	1 (0x01)	Driver ID
--------------------	----------	----------	-----------

Function	6 (0x06)	Write Single Register
Address	306 (0x0132)	Running Speed
Data	1200 (0x04B0)	1200 = 12 RPS = 720 RPM
CRC	0x8D2A	CRC-16

Request							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x32	0x04	0xB0	0x2A	0x8D
CRC 16							

Response							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x32	0x04	0xB0	0x2A	0x8D
CRC 16							

● Example. 2

Step 2 : Set Stroke

Slave ID	1 (0x01)	Driver ID
Function	16 (0x10)	Write Multi Register
Address	313 (0x0139)	Running Stroke
Quantity	2 (0x02)	Quantity of Registers
Data	5000 (0x00001388) -5000 (0xFFFFEC78)	5000 pulse -5000 pulse

Request												
Slave ID	Function	Starting Address		Quantity of Registers		Byte Count	Data 1		Data 2		CRC 16	
		Hi	Lo	Hi	Lo		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x10	0x01	0x39	0x00	0x02	0x04	0x13	0x88	0x00	0x00	0xB9	0xEF
CRC 16												

Response							
Slave ID	Function	Starting Address		Quantity of Registers		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x10	0x01	0x39	0x00	0x02	0x90	0x39
CRC 16							

- **Example. 3**

Step 3 : Command Run

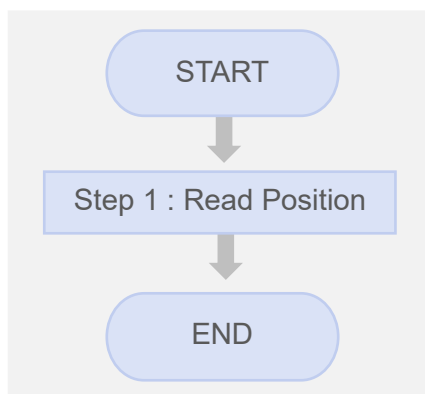
Slave ID	1 (0x01)	Driver ID
Function	6 (0x06)	Write Single Register
Address	323 (0x0143)	Command Run
Data	02 (0x0002)	2 : Relative running
CRC	0x23F8	CRC-16

Request							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x43	0x00	0x02	0xF8	0x23
CRC 16							

Response							
Slave ID	Function	Starting Address		Data		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x06	0x01	0x43	0x00	0x02	0xF8	0x23
CRC 16							

5.2 Read Motor Status

5.2.1 Read Current Position



Step	Add.	Word	Content	Range	Unit
1	0117	2	Target position	-2,000,000,000 ~ 2,000,000,000	pulse

- **Example**

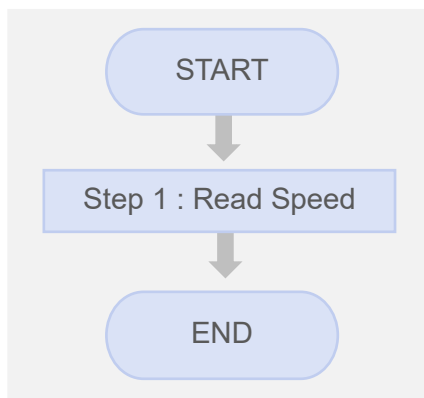
Step 1 : Read Current Position

Slave ID	1 (0x01)	Driver ID
Function	3 (0x03)	Read Register
Address	117 (0x0075)	Current Position
Quantity	2 (0x02)	Quantity of Registers

Request							
Slave ID	Function	Starting Address		Quantity of Registers		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x03	0x00	0x75	0x00	0x02	0xD5	0xD1
CRC 16							

Response IF : current position = 5000 (0 x 00001388)								
Slave ID	Function	Byte Count	Read Registers 126		Read Registers 127		CRC 16	
			Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x03	0x04	0x13	0x88	0x00	0x00	0x7E	0x9D
CRC 16								

5.2.2 Read Current Speed



Step	Add.	Word	Content	Range	Unit
1	0119	1	Actual speed	1 ~ 5000	0.01 RPS

● Example

Step 1 : Read Current Speed	Slave ID	1 (0x01)	Driver ID
	Function	3 (0x03)	Read Register
	Address	119 (0x0077)	Current Speed
	Quantity	1 (0x01)	Quantity of Registers

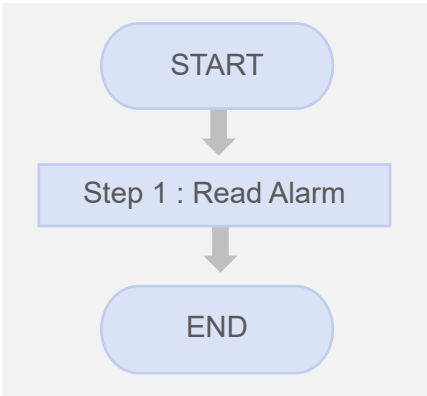
Request							
Slave ID	Function	Starting Address		Quantity of Registers		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x03	0x00	0x77	0x00	0x01	0x34	0x10
CRC 16							

Response IF : current speed = 1200 (0 x 04B0)							
Slave ID	Function	Byte Count	Read Registers 119		CRC 16		
			Hi	Lo	Lo	Hi	

0x01	0x03	0x02	0x04	0xB0	0xBB	0x30
CRC 16						

5.3 Read Alarm Status

5.3.1 Alarm Status



Step	Add.	Word	Content	Range	Unit
1	0108	1	Error code	-	-

● Example

Step 1 : Read Alarm Status

Slave ID	1 (0x01)	Driver ID
Function	3 (0x03)	Read Register
Address	108 (0x006C)	Alarm Status
Quantity	1 (0x01)	Quantity of Registers

Request							
Slave ID	Function	Starting Address		Quantity of Registers		CRC 16	
		Hi	Lo	Hi	Lo	Lo	Hi
0x01	0x03	0x00	0x6C	0x00	0x01	0x44	0x17
CRC 16							

Response IF : alarm status = 11 (0 x 000B) = Motor phase loss						
Slave ID	Function	Byte Count	Read Registers 176		CRC 16	
			Hi	Lo	Lo	Hi
0x01	0x03	0x02	0x00	0x0E	0xF9	0x83
CRC 16						



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