User Manual

iR-ETN40P High-Speed Output

This guide covers the high-speed output features and usage of iR-ETN40P.

UM024001E_20240711

Table of Contents

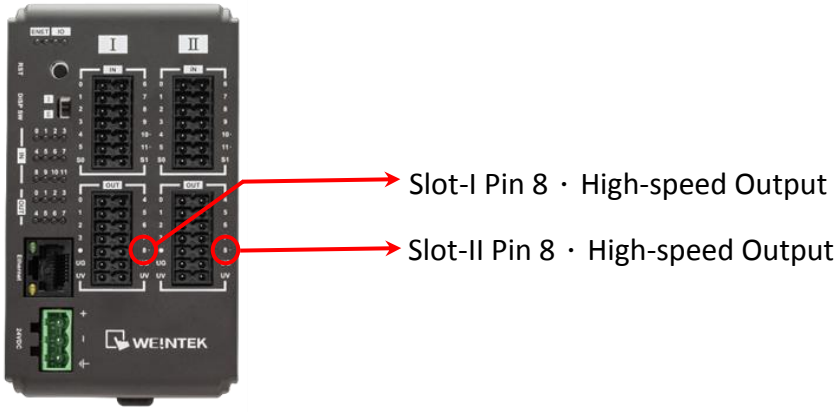
1. Overview

The iR-ETN40P is a powerful many-in-one remote I/O module designed to meet the demands of applications requiring fast response and precise control. In addition to its basic 40 inputs and outputs, it features 4 high-speed inputs and 2 high-speed outputs. With its outstanding performance and flexible design, the iR-ETN40P finds wide applications in automation control systems, machinery control, motion control, and industrial automation.

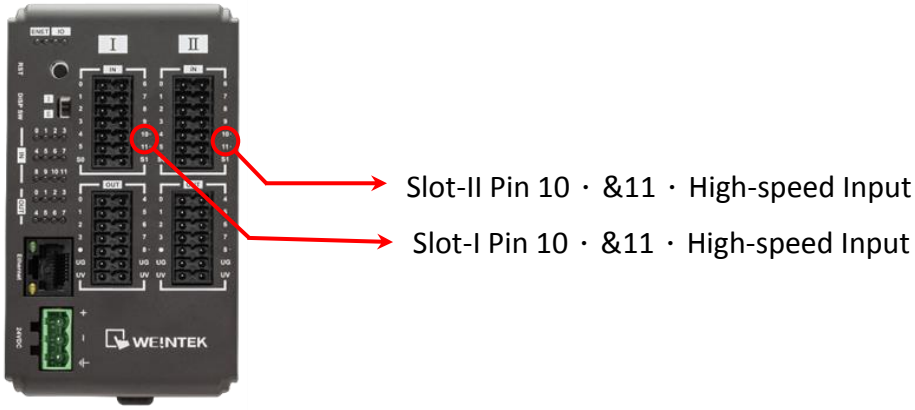
This manual aims to provide users with detailed information about the various parameters and operation methods of the high-speed outputs of iR-ETN40P, enabling users to fully understand and effectively utilize this product.

2. High-speed Outputs / Inputs and Wiring

2.1 High-speed Outputs



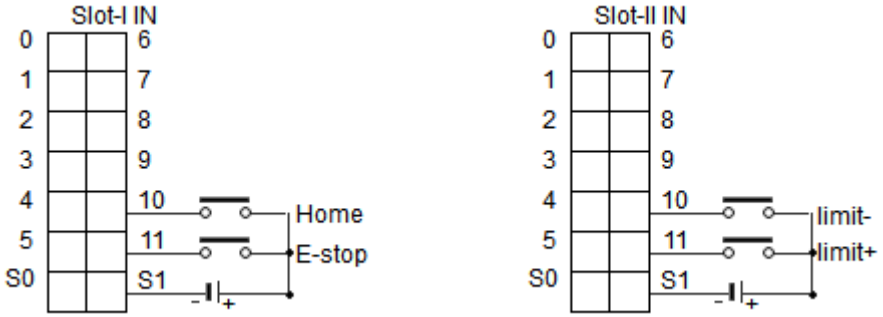
2.2 High-speed Inputs



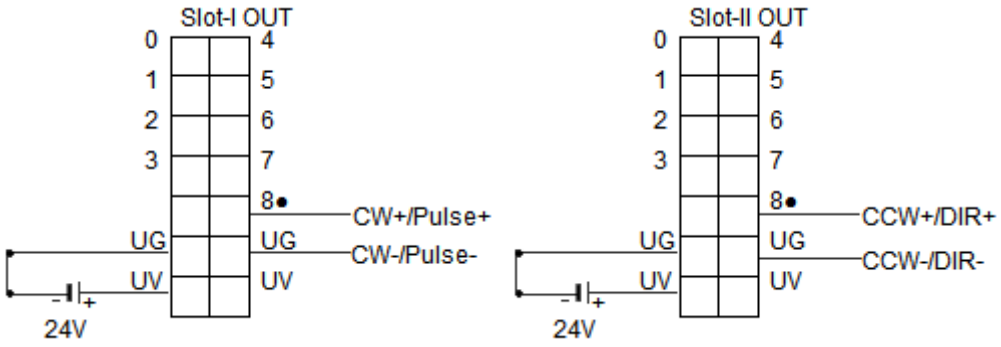
Pin	Definition	Address
Slot1 Pin 10	Home Sensor	4x4044=20
Slot1 Pin 11	Stop Output	
Slot2 Pin 10	Negative Limit	4x4045=20
Slot2 Pin 11	Positive Limit	

2.3 Wiring

High-speed Input Wiring:



High-speed Output Wiring:



3. High-speed Output Registers

3.1 Modbus TCP Registers

Address		Definition	Type	Read/Write
Dec	Hex			
8000	1F40	Operation Mode	WORD	R/W
8001	1F41	Output Mode	WORD	R/W
8002	1F42	PWM Time-Base	WORD	R/W
8003	1F43	LED Indicator	WORD	R/W
8010	1F4A	Digital Output	WORD	R/W
8020	1F54	Slot I PWM Period	WORD	R/W
8021	1F55	Slot I PWM Width	WORD	R/W
8022	1F56	Slot I Total PWM Outputs	WORD	R/W
8023	1F57	Slot I PWM Command	WORD	R/W
8024	1F58	Slot II PWM Period	WORD	R/W
8025	1F59	Slot II PWM Width	WORD	R/W
8026	1F5A	Slot II Total PWM Outputs	WORD	R/W
8027	1F5B	Slot II PWM Command	WORD	R/W
8028	1F5C	Slot I PWM Status	WORD	R
8029	1F5D	Slot II PWM Status	WORD	R
8100	1FA4	Motion Mode	WORD	R/W
8101	1FA5	V-bias	WORD	R/W
8200	2008	JOG Motion Target Velocity	DWORD	R/W
8202	200A	JOG Motion Acceleration/ Deceleration	WORD	R/W
8203	200B	JOG Motion Direction	WORD	R/W
8204	200C	JOG Command	WORD	R/W
8205	200D	JOG Motion Status	WORD	R
8206	200E	JOG Motion Velocity	DWORD	R
8500	2134	POS Pulse Output	DWORD	R/W
8502	2136	POS Motion Target Velocity	DWORD	R/W
8504	2138	POS Motion Acceleration	WORD	R/W
8505	2139	POS Motion Deceleration	WORD	R/W
8506	213A	POS Motion Direction	WORD	R/W
8507	213B	Blending of POS Command	WORD	R/W
8508	213C	POS Command	WORD	R/W
8509	213D	POS Command Execution Result	WORD	R

8510	213E	POS Motion Buffer Status	WORD	R
8511	213F	POS Motion Status	WORD	R
8512	2140	POS Motion Total Pulses Output	DWORD	R
8514	2142	POS Motion Velocity	DWORD	R
8600	2198	Home Motion Mode	WORD	R/W
8601	2199	Home Motion Target Velocity	DWORD	R/W
8603	219B	Home Motion Acceleration	WORD	R/W
8604	219C	Home Motion Deceleration	WORD	R/W
8605	219D	Home Command	WORD	R
8606	219E	Home Motion Completion	WORD	R
8607	219F	Home Motion Direction	WROD	R
8608	21A0	Home Motion Velocity	DWORD	R
8610	21A2	Home Motion Status	WORD	R

3.2 EtherNet/IP Registers

Class code: 0x73

Register Type		Definition	Instance	Attribute	Type	Read/Write
General Settings		Operation Mode	1	1	WORD	R/W
		Output Mode	1	2	WORD	R/W
		PWM Time-Base	1	3	WORD	R/W
		LED Indicator	1	4	WORD	R/W
Digital Output		Digital Output	2	1	WORD	R/W
PWM Mode		Slot I PWM Period	3	1	WORD	R/W
		Slot I PWM Width	3	2	WORD	R/W
		Slot I Total PWM Outputs	3	3	WORD	R/W
		Slot I PWM Command	3	4	WORD	R/W
		Slot II PWM Period	3	5	WORD	R/W
		Slot II PWM Width	3	6	WORD	R/W
		Slot II Total PWM Outputs	3	7	WORD	R/W
		Slot II PWM Command	3	8	WORD	R/W
		Slot I PWM Status	3	9	WORD	R
		Slot II PWM Status	3	10	WORD	R
Motion Mode	General Settings	Motion Mode	4	1	WORD	R/W
		V-bias	4	2	WORD	R/W
	JOG Mode	JOG Motion Target Velocity	5	1	DWORD	R/W
		JOG Motion Acceleration/	5	2	WORD	R/W

		Deceleration				
		JOG Motion Direction	5	3	WORD	R/W
		JOG Command	5	4	WORD	R/W
		JOG Motion Status	5	5	WORD	R
		JOG Motion Velocity	5	6	DWORD	R
	Positioning Mode	POS Pulse Output	6	1	DWORD	R/W
		POS Motion Target Velocity	6	2	DWORD	R/W
		POS Motion Acceleration	6	3	WORD	R/W
		POS Motion Deceleration	6	4	WORD	R/W
		POS Motion Direction	6	5	WORD	R/W
		Blending of POS Command	6	6	WORD	R/W
		POS Command	6	7	WORD	R/W
		POS Command Execution Result	6	8	WORD	R
		POS Motion Buffer Status	6	9	WORD	R
		POS Motion Status	6	10	WORD	R
		POS Motion Total Pulses Output	6	11	DWORD	R
		POS Motion Velocity	6	12	DWORD	R
	Home Mode	Home Motion Mode	7	1	WORD	R/W
		Home Motion Target Velocity	7	2	DWORD	R/W
		Home Motion Acceleration	7	3	WORD	R/W
		Home Motion Deceleration	7	4	WORD	R/W
		Home Command	7	5	WORD	R
		Home Motion Completion	7	6	WORD	R
		Home Motion Direction	7	7	WROD	R
		Home Motion Velocity	7	8	DWORD	R
		Home Motion Status	7	9	WORD	R

3.3 Operation Mode: 4x8000

Definition	Value	Description
Operation Mode	0	Init mode
	1	Pre-operation mode
	2	Operation mode

3.4 High-speed Output Mode: 4x8001

Definition	Value	Mode	Slot I High-speed Output	Slot II High-speed Output
High-speed Output Mode	0	Digital Output	ON/OFF	ON/OFF
	1	PWM Output	PWM	PWM
	2	Motion	CW	CCW
	3		Pulse	Direction

3.5 PMW Time-Base: 4x8002

This setting only applies to PWM.

Definition	Value	Description
PWM Time Unit	1~40	Time unit in microseconds, default value is 1us, setting range is 1~40us.

3.6 High-speed Output LED Indicators: 4x8003

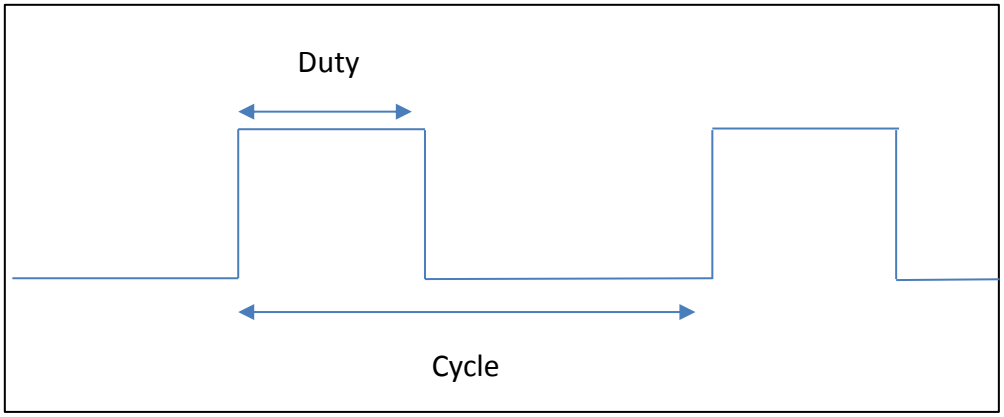
Definition	Value	Description
High-speed Output LED Indicators	0	Do not display the high-speed output status of Slot-I & Slot-II.
	1	LED IN0 displays Slot-I high-speed output status. LED IN1 displays Slot-II high-speed output status.

3.7 Digital Output Status: 4x8010

In digital output mode, the output status of 4x8010 can be set for high-speed output.

Definition	Bit	Description	Value
Digital Output Status	0	Slot-I high-speed output	0: OFF
	1	Slot-II high-speed output	1: ON

3.8 PMW Mode



3.8.1 Slot I/II PMW Period: 4x8020/4x8024

Definition	Value	Description
Slot I/II PWM Period	0~65535	Period=Setting Value*PWM Time-base

*PWM Period setting must be greater than 10us.

*PWM Period must be greater than or equal to the width.

3.8.2 Slot I/II PWM Width: 4x8021/4x8025

Definition	Value	Description
Slot I/II PWM Width	0~65535	Width=Setting Value*PWM Time-base

*PWM Width setting must be greater than 5us.

*PWM Period must be greater than or equal to PWM width.

3.8.3 Slot I/II Total PWM Outputs: 4x8022/4x8026

Definition	Value	Description
Slot I/II Total PWM Outputs	0~65535	1~65534: Total number of output pulses
		65535: Continuous output

3.8.4 Slot I/II PWM Command: 4x8023/4x8027

Definition	Value	Description
Slot I/II PWM Command	1	Start output
	2	Stop output
	3	Pause output
	4	Resume output under pause state

3.8.5 Slot I/II PWM Output Status: 4x8028/4x8029

Definition	Value	Description
Slot I/II PWM Output Status	0	PWM stops output
	1	PWM outputting
	2	PWM output completed
	3	PWM output paused
	4	Not in operation mode (#8000)
	5	Output mode setting error (#8001)
	6	Period setting error
	7	Width setting error

3.9 Motion Mode

3.9.1 Motion Mode: 4x8100

Definition	Value	Description
Motion Mode	1	JOG
	2	Position
	3	Home

3.9.2 V-Bias: 4x8101

Definition	Value	Description
V-Bias	0~40,000	Initial Velocity 0~40kHz

3.9.3 JOG Motion Target Velocity: 4x8200

Definition	Value	Description
JOG Motion Target Velocity	20~40,000	Target Velocity 20~40k pulses/s

3.9.4 JOG Motion Acceleration/Deceleration: 4x8202

Definition	Value	Description
JOG Motion Acceleration / Deceleration	20~40,000	Setting Range 20~40k pulses/s

3.9.5 JOG Motion Direction: 4x8203

Definition	Value	Description
JOG Motion Direction	0	Positive Direction
	1	Negative Direction

3.9.6 JOG Command: 4x8204

Definition	Value	Description
JOG Command	1	Start JOG motion
	2	JOG deceleration and stop

3.9.7 JOG Motion Status: 4x8205

Definition	Value	Description
JOG Motion Status	0	Stop state
	1	JOG running
	4	Not in operation mode (#8000)
	5	Output Mode setting error (#8001)
	6	Velocity setting error
	7	Motion Mode error

3.9.8 JOG Motion Current Velocity: 4x8206

Displays the current velocity of JOG motion.

3.9.9 POS Motion Pulse Output: 4x8500

Total number of pulse outputs for the POS motion command.

3.9.10 POS Motion Target Velocity: 4x8502

Target velocity of the POS motion command.

3.9.11 POS Motion Acceleration: 4x8504

Acceleration of the POS motion command.

3.9.12 POS Motion Deceleration: 4x8505

Deceleration of the POS motion command.

3.9.13 POS Motion Direction: 4x8506

Definition	Value	Description
POS Motion Direction	0	Positive Direction
	1	Negative Direction

3.9.14 Blending of POS Commands: 4x8507

When Blending of POS command=1, executing the POS command will continue with the new POS motion speed after the previous one.

When Blending of POS command=0, executing the POS command will decelerate and stop the previous POS motion before continuing with the new POS motion.

3.9.15 POS Command: 4x8508

POS motion outputs pulses according to the quantity of output pulses, velocity, acceleration, deceleration, and direction (4x8500~4x8506).

Definition	Value	Description
POS Command	1	Execute
	2	Decelerate and stop

3.9.16 POS Command Execution Result: 4x8509

Definition	Value	Description
POS Command Execution Result	0	None
	1	Write successful
	2	Write failed (Buffer: output complete)
	4	Not in operation mode (#8000)
	5	Output Mode setting error (#8001)
	6	Target Velocity error (20~40k)

	7	Motion Mode error

3.9.17 POS Command Buffer Status: 4x8510

Definition	Value	Description
POS Command Buffer Status	0	Currently unable to write POS command
	1	Currently able to write POS command

3.9.18 POS Motion Status: 4x8511

Definition	Value	Description
POS Motion Status	0	Static
	2	Acceleration
	3	Reached target speed
	4	Deceleration
	5	Output completed
	6	Decelerate-stop command

3.9.19 POS Motion Total Pulse Outputs: 4x8512

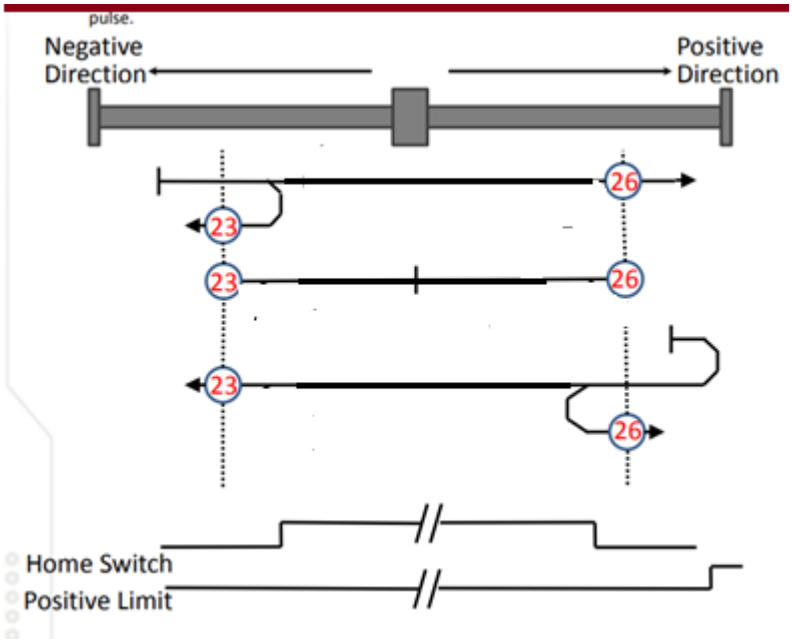
Total number of pulses output by POS motion.

3.9.20 POS Motion Current Velocity: 4x8514

Current velocity of POS motion.

3.9.21 Home Motion Mode: 4x8600

Definition	Value	Description
Home Motion Mode	23	Home motion completed at the negative side of the home sensor
	26	Home motion completed at the positive side of the home sensor



*For detailed homing actions, please refer to Appendix A in this manual.

3.9.22 Home Motion Target Velocity: 4x8601

Target velocity of home motion.

3.9.23 Home Motion Acceleration: 4x8603

Acceleration of home motion.

3.9.24 Home Motion Deceleration: 4x8604

Deceleration of home motion.

3.9.25 Home Command: 4x8605

Definition	Value	Description
Home Command	0	Execute Home motion
	1	Stop Home motion

3.9.26 Home Motion Completion: 4x8606

Definition	Value	Description
Home Motion Completion	0	Home motion not completed
	1	Home motion completed

3.9.27 Home Motion Direction: 4x8607

Definition	Value	Description
Home Motion Direction	0	Positive direction
	1	Negative direction

3.9.28 Home Motion Current Velocity: 4x8608

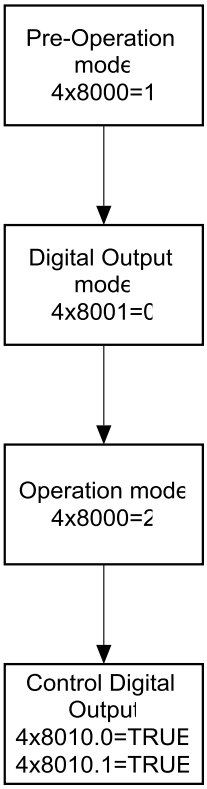
Current velocity of home motion.

3.9.29 Home Motion Status: 4x8610

Definition	Value	Description
Home Motion Status	0	Static
	1	In operation
	4	Not in operation mode (#8000)
	5	Output Mode setting error (#8001)
	6	Target speed error (20~40k)
	7	Motion Mode error
	9	Home Mode error
	10	Home sensor not set
	11	Positive limit not set

4. ModbusTCP Operation Steps

4.1 Digital Output Mode



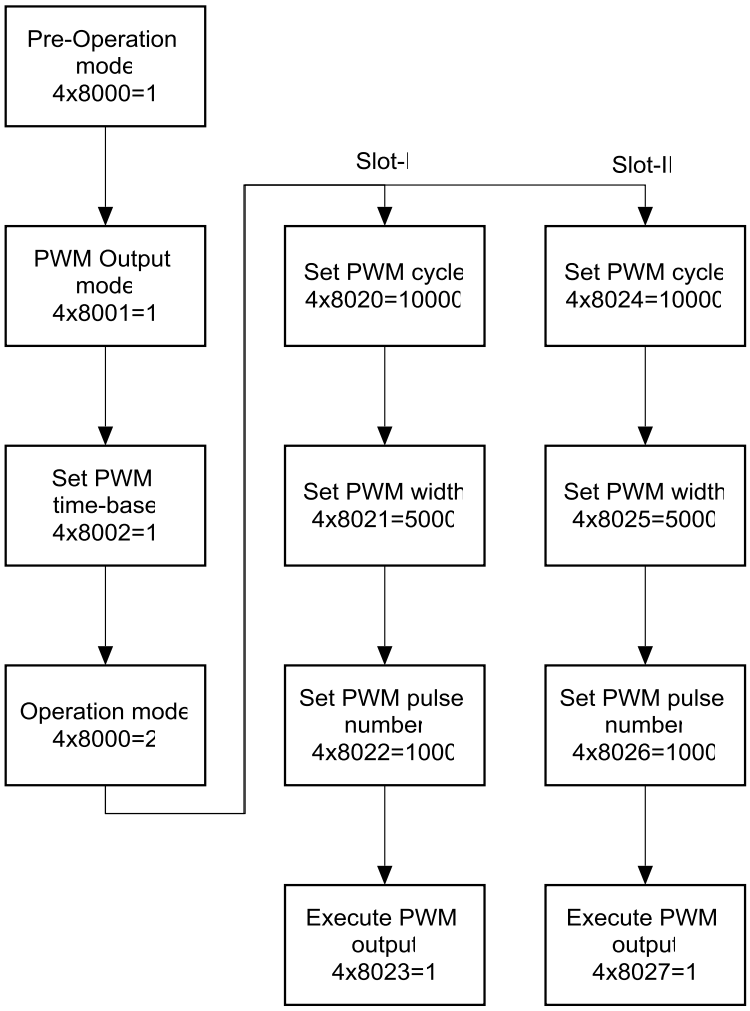
Step 1. Set address 4x8000 to 1 (Pre-operation mode).

Step 2. Set address 4x8001 to 0 (Digital Output mode).

Step 3. Set address 4x8000 to 2 (Operation mode).

Step 4. Bits 0 & 1 of address 4x8010 can control the output status of high-speed outputs.

4.2 PWM Mode



Step 1. Set address 4x8000 to 1 (Pre-operation mode).

Step 2. Set address 4x8001 to 1 (PWM mode).

Step 3. Set address 4x8002 to 1, which sets the time-base for PWM period and width.

Step 4. Set address 4x8000 to 2 (Operation mode).

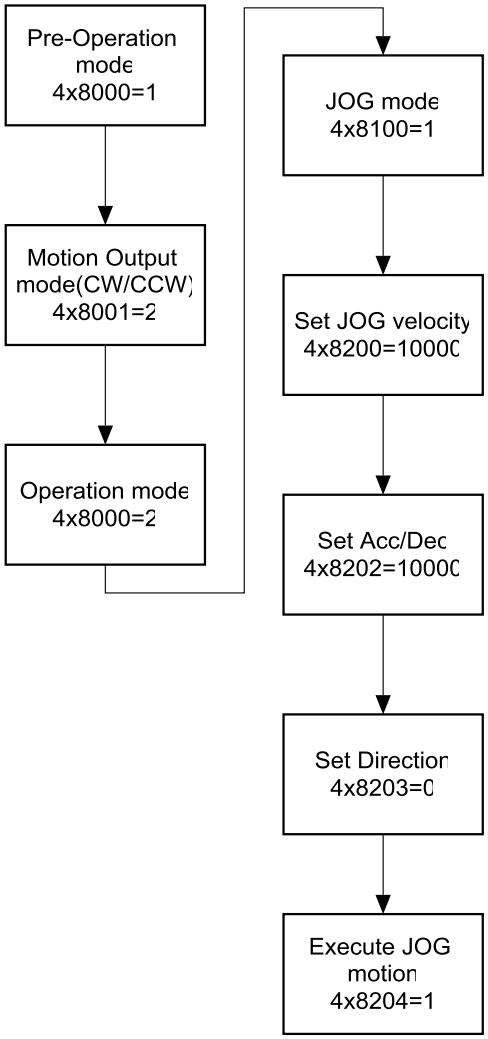
Step 5. Set address 4x8020 to 10000, PWM period for Slot-I is set to 10ms.

Step 6. Set address 4x8021 to 5000, PWM width for Slot-I is set to 5ms.

Step 7. Set address 4x8022 to 1000, PWM pulse quantity for Slot-I is set to 1000 pulses.

Step 8. Write 1 to address 4x8023 (start output), Slot-I starts outputting PWM signal with 1000 periods of 10ms and width of 5ms.

4.3 JOG Motion



Step 1. Set address 4x8000 to 1 (Pre-operation mode).

Step 2. Set address 4x8001 to 2 (CW/CCW mode).

Step 3. Set address 4x8000 to 2 (Operation mode).

Step 4. Set address 4x8100 to 1 (JOG motion).

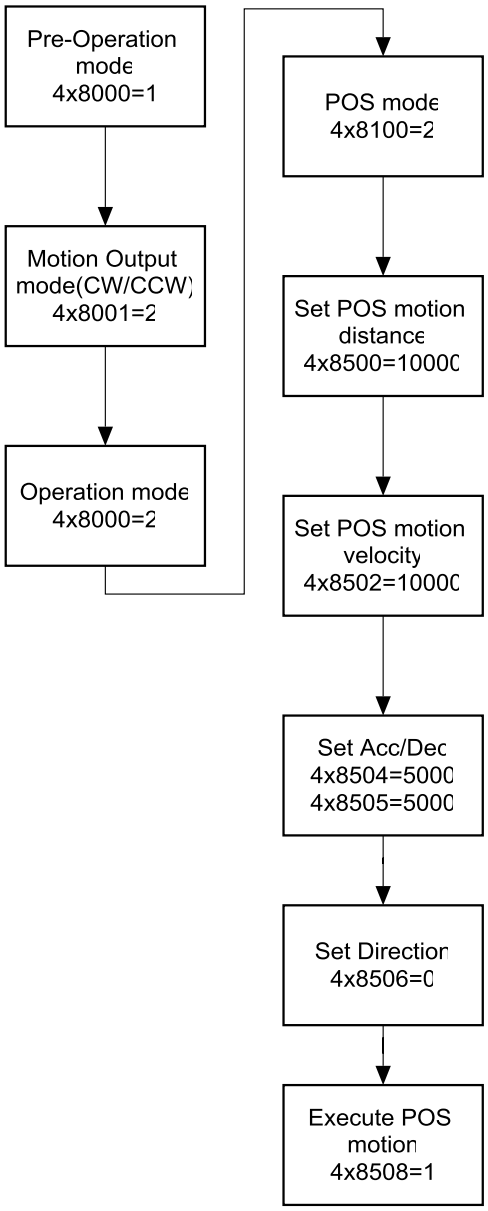
Step 5. Set address 4x8200 to 10,000, JOG motion speed is set to 10,000Hz.

Step 6. Set address 4x8202 to 10,000, JOG motion acceleration/deceleration is set to 10,000 pulses/ms^2.

Step 7. Set address 4x8203 to 0, JOG motion direction is set to forward.

Step 8. Write 1 to address 4x8204, execute JOG forward motion.

4.4 POS Motion



Step 1. Set address 4x8000 to 1 (Pre-operation mode).

Step 2. Set address 4x8001 to 2 (CW/CCW mode).

Step 3. Set address 4x8000 to 2 (Operation mode).

Step 4. Set address 4x8100 to 2 (POS motion).

Step 5. Set address 4x8500 to 10,000, POS motion distance is set to 10,000 pulses.

Step 6. Set address 4x8502 to 10,000, POS motion speed is set to 10,000 pulses/ms.

Step 7. Set addresses 4x8504 & 4x8505 to 5,000, POS motion acceleration & deceleration.

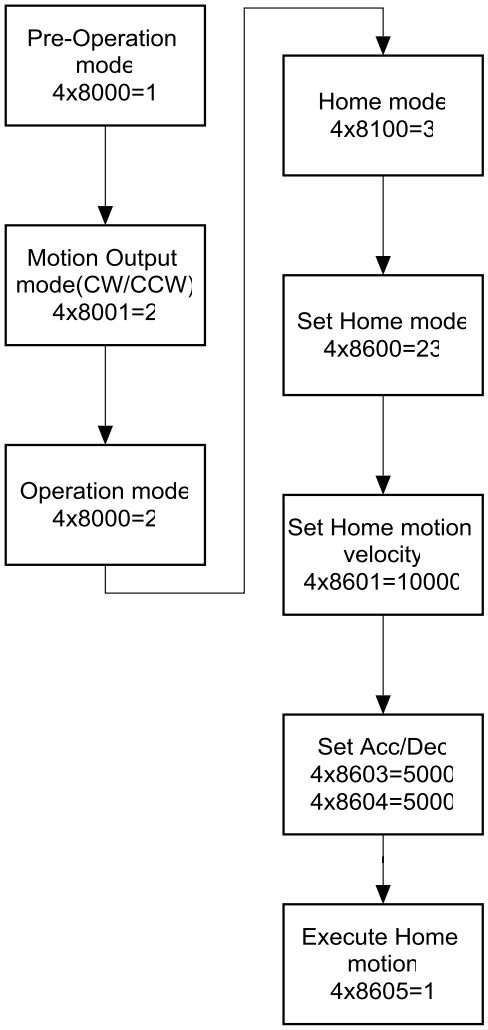
Step 8. Write 0 to address 4x8506, POS motion direction is set to forward.

Step 9. Write 1 to address 4x8508, execute POS forward motion, outputting 10,000 pulses.

4.5 Home Motion

Before executing homing motion, set high-speed input pins to motion mode (4x4044 & 4x4045 = 20).

Pin	Definition	Address
Slot1 Pin 10	Home Sensor	4x4044=20
Slot1 Pin 11	Stop Output	
Slot2 Pin 10	Negative Limit	4x4045=20
Slot2 Pin 11	Positive Limit	



Step 1. Set address 4x8000 to 1 (Pre-operation mode).

Step 2. Set address 4x8001 to 2 (CW/CCW mode).

Step 3. Set address 4x8000 to 2 (Operation mode).

Step 4. Set address 4x8100 to 3 (Home motion).

Step 5. Set address 4x8600 to 23, Home motion mode, completing homing at the negative side of the home sensor.

Step 6. Set address 4x8601 to 10,000, Home motion speed before sensing the home is set to 10,000 pulses/ms.

Step 7. Set addresses 4x8603 & 4x8604 to 5,000, Home motion acceleration & deceleration.

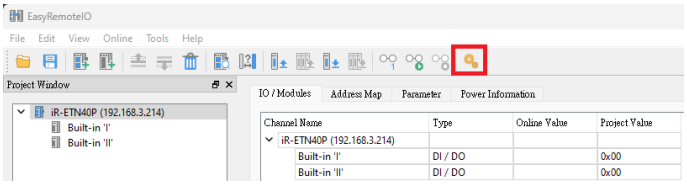
Step 8. Write 1 to address 4x8605, execute Home motion.

5. Tuning Method

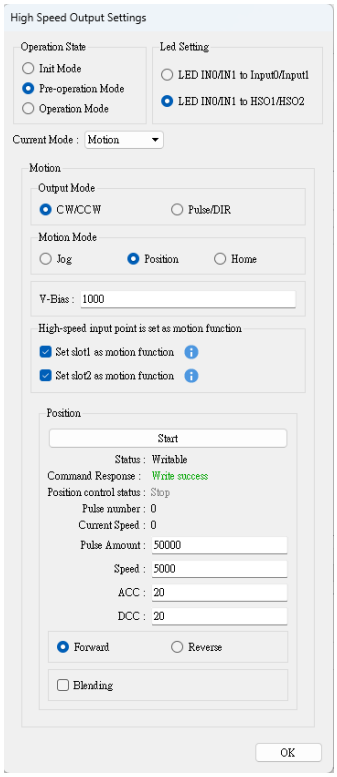
5.1 EasyRemoteIO

Starting from EasyRemoteIO V1.5.0.0, the high-speed output tuning function for iR-ETN40P is available.

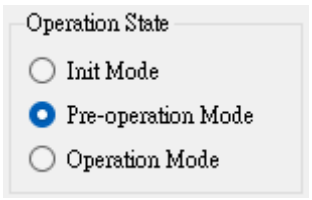
Press the  button to access the tuning interface for high-speed output.



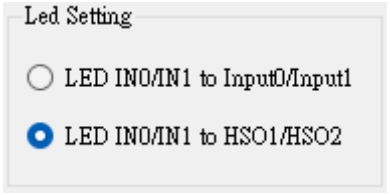
Parameters can be adjusted according to the operating steps in Chapter 4 in this manual.



- Operation State (4x8000):

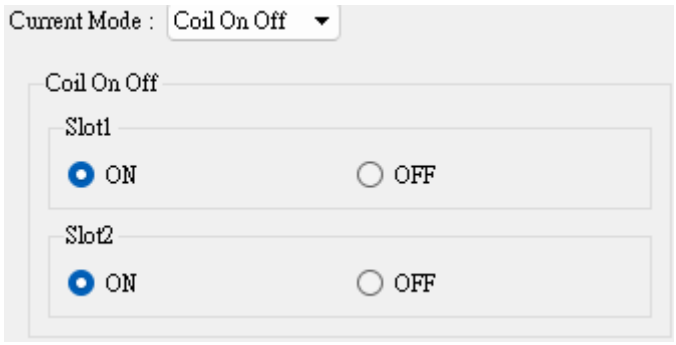


- LED Setting (4x8003):

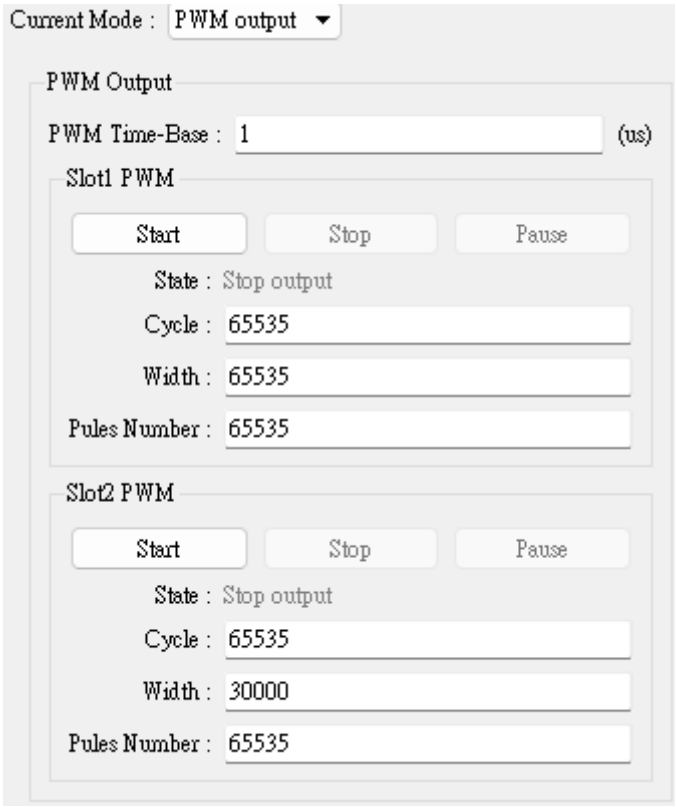


- High-Speed Output Mode (4x8001):

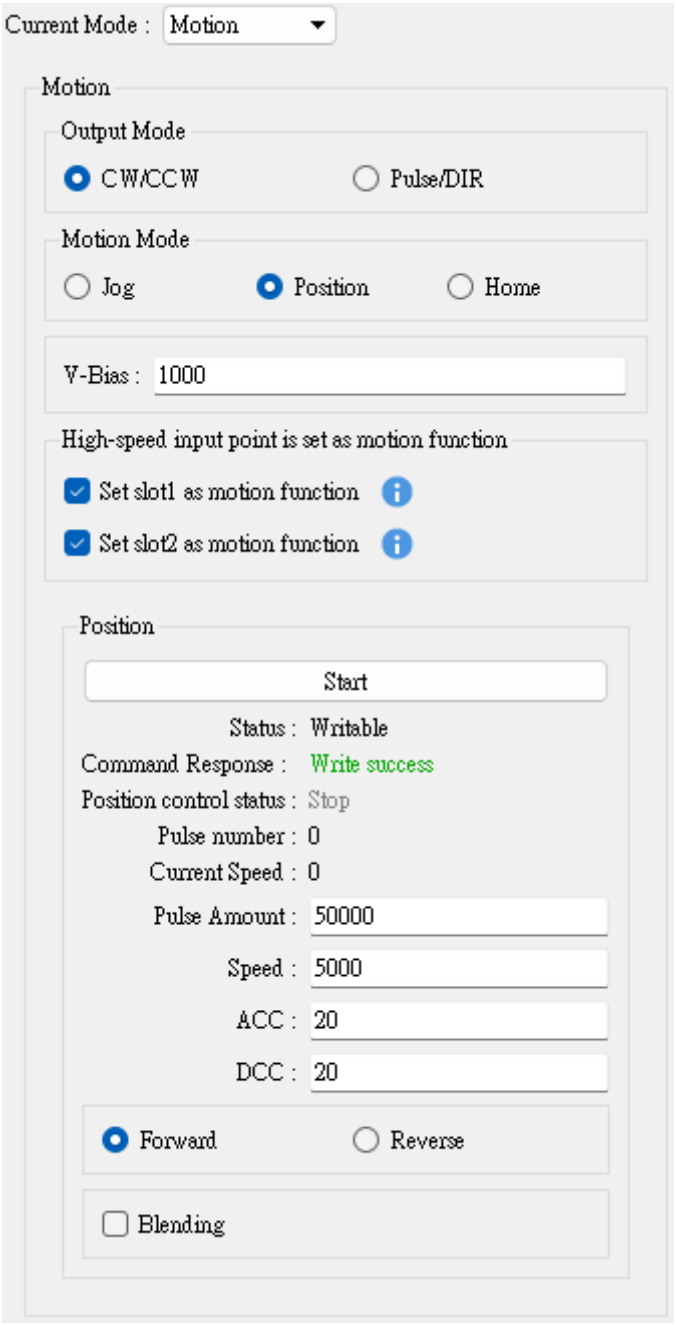
- Digital Mode (4x8010):



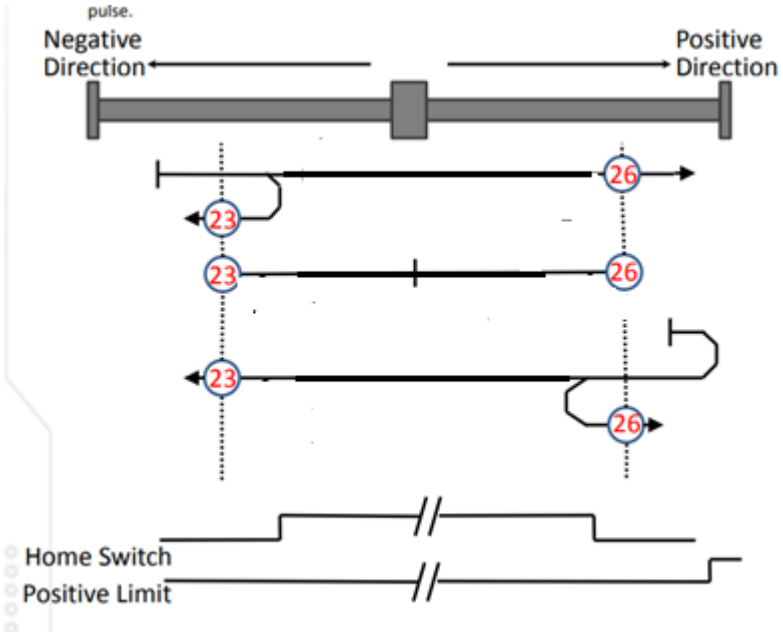
- PWM Mode (4x8020~4x8029):



- Motion Mode (4x8100~4x8610):


Current Mode : Motion
Motion
Output Mode
CW/CCW
Pulse/DIR
Motion Mode
Jog
Position
Home
V-Bias : 1000
High-speed input point is set as motion function
Set slot1 as motion function
Set slot2 as motion function
Position
Start
Status : Writable
Command Response : Write success
Position control status : Stop
Pulse number : 0
Current Speed : 0
Pulse Amount : 50000
Speed : 5000
ACC : 20
DCC : 20
Forward
Reverse
Blending

Appendix A. Homing Methods



- **Homing Method 23: Home motion completed at the negative side of the home sensor**

Scenario One:

The home sensor starts as Low. Move in the positive direction at the homing speed until it becomes High, then decelerate to V-Bias speed and reverse to complete homing at the negative side of the home sensor.

Scenario Two:

The home sensor starts as High. Reverse at V-Bias speed until it becomes Low to complete homing at the negative side of the home sensor.

Scenario Three:

The home sensor starts as Low. Move in the positive direction at the homing speed until triggering the right limit, then reverse until triggering the home sensor as High, and decelerate to V-Bias speed to complete homing on the negative side.

- **Homing Method 26: Home motion completed at the positive side of the home sensor**

Scenario One:

The home sensor starts as Low. Move in the positive direction at the homing speed until it becomes High, then decelerate to V-Bias speed to complete homing at the positive side of the home sensor.

Scenario Two:

The home sensor starts as High. Rotate at V-Bias speed until it becomes Low to complete homing at the positive side of the home sensor.

Scenario Three:

The home sensor starts as Low. Move in the positive direction at the homing speed until triggering the right limit, then reverse until triggering the home sensor as High, and decelerate to V-Bias speed to complete homing at the right side of the home sensor.