WELCON

Servo Drive

Hardware Manual

WER-D048/10-FS04F7_V03

welcon
SYSTEMS

2024-04-11

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Precautions

- Please read this manual carefully before installing and commissioning.
- WELCON SYSTEMS assumes no responsibility whatsoever for any loss or damage arising out of use for any purpose.

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Product Name for welcon Drive

WE 2S - D 024 / 01 - FS 0057 - E

Product Type

WE WELCON Standard
****** User Code (only for customized order)

Drive Shape

R Rectangle Type Board
C Circle Type Board
M Miniature Board
2S 2-Axis Slot Type (Backboard necessary)
2A 2-Axis Stand-Alone Type

Power

D DC
A AC

Voltage

024 12~24V
048 12~48V
310 12~310V

Continuous Current

P3 0.3A rms
P5 0.5A rms
01 1A rms
03 3A rms
10 10A rms
25 25A rms

Feedback Sensor (Hexadecimal)

Bit0	Incremental Encoder	**Bit4**	Sin/Cos Encoder	**Bit8**	Potentiometer
Bit1	Dual Incremental Encoder	**Bit5**	BISS/SSI Interface Encoder	**Bit9**	SPI
Bit2	Separated Digital Hall Sensor	**Bit6**	Analog Hall Sensor	**Bit10**	EnDat
Bit3	Shared Digital Hall Sensor	**Bit7**	Tamagawa/Panasonic Encoder	**Bit11**	PWM

Ex) 0057= 0000 0000 0101 0111
Incremental(Bit0) + Dual Incremental (Bit1) + Separated Digital Hall (Bit2) + Sin/Cos (Bit4) + Analog Hall (Bit6)

Communication

E EtherCAT
C CAN
R RS-485

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Question : www.welconsystems.com

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1. Safety Information

- Safety accidents and damage to the product may occur, so be sure to read the safety instructions before use and use it correctly.

⚠ Warnings

- 전원이 켜진 상태에서 서보 드라이브 주 전원을 연결/분리하지 마십시오.
  Do not connect/disconnect the main power of the servo drive while the power is on.
- 전원이 켜진 상태에서 서보 드라이브 엔코더 케이블 및 I/O를 연결/분리하지 마십시오. 모터 및 서보 드라이브의 고장 원인이 될 수 있습니다.
  Do not connect/disconnect the servo drive encoder cable and I/O while the power is on. Motor and servo drive may be damaged.
- 전원 케이블은 모터가 움직이지 않을 때도 고전압을 전달할 수 있습니다.
  The power cable can carry high voltage even when the motor is not moving.
- 서보 드라이브의 메인 전원은 드라이브 사양에 맞춰 정확히 입력되어야 합니다. 드라이브 파손 및 고장의 원인이 될 수 있습니다.
  The main power of the servo drive must be accurately input according to the drive specifications. It may cause damage to the drive
- 서보 드라이브 U, V, W 출력 단자에 전원을 직접 접속하지 마십시오.
  Do not connect power directly to the servo drive U, V, W output terminals.
- 서보 드라이브 전원을 차단한 후 캐패시터가 완전히 방전된 후 전원을 분리해 주십시오.
  After turning off the servo drive power, disconnect the power after the capacitor is completely discharged.

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⚠ Cautions

- U, V, W 케이블과 Encoder 케이블은 반드시 분리하여 배선해 주십시오.
  Be sure to separate U, V, W cables and encoder cables before wiring.
- 전원 차단 후 U, V, W 케이블과 Encoder 케이블 배선작업을 진행하십시오.
  After turning off the power, proceed with wiring the U, V, W cables and encoder cables.
- 떨어뜨리거나 강한 충격을 가하지 마십시오.
  Do not drop it or subject it to strong impact.
- 가연성 물질, 물 근처는 설치를 하지 말아주십시오.
  Do not install near flammable substances or water.
- 서보 드라이브 내부에 피복이나 구리선 등이 들어가지 않도록 해 주십시오.
  Make sure that no sheath or copper wire gets inside the servo drive.
- Encoder 케이블은 쉴드 케이블 사용을 권장합니다.
  It is recommended to use shielded cables for encoder cables.
- EtherCAT 케이블은 CAT.6 이상의 케이블 사용을 권장합니다.
  For EtherCAT cables, it is recommended to use CAT.6 cables.
- 초기 전원 투입 전 모터의 U, V, W 및 Encoder 케이블 등을 확인하여 주십시오.
  Check the U, V, W and encoder cables of the motor before turning on the power.
- 노이즈 방지를 위해 Encoder 케이블 및 U, V, W 및 전원 FG 접속을 권장합니다.
  It is recommended to connect the encoder cable and U, V, W and power FG to prevent noise.
- 케이블 연결 및 연결 해제 시 커넥터가 기판에서 분리되지 않도록 주의하여 주십시오.
  Be careful not to separate the connector from the board when connecting or disconnecting the cable.

Use environment

환경	조건
Operating Temperature	0 °C to 50 °C
Maximum Humidity	90[%] RH
Operating Place	A place free of iron, flammable gas, dust, etc.

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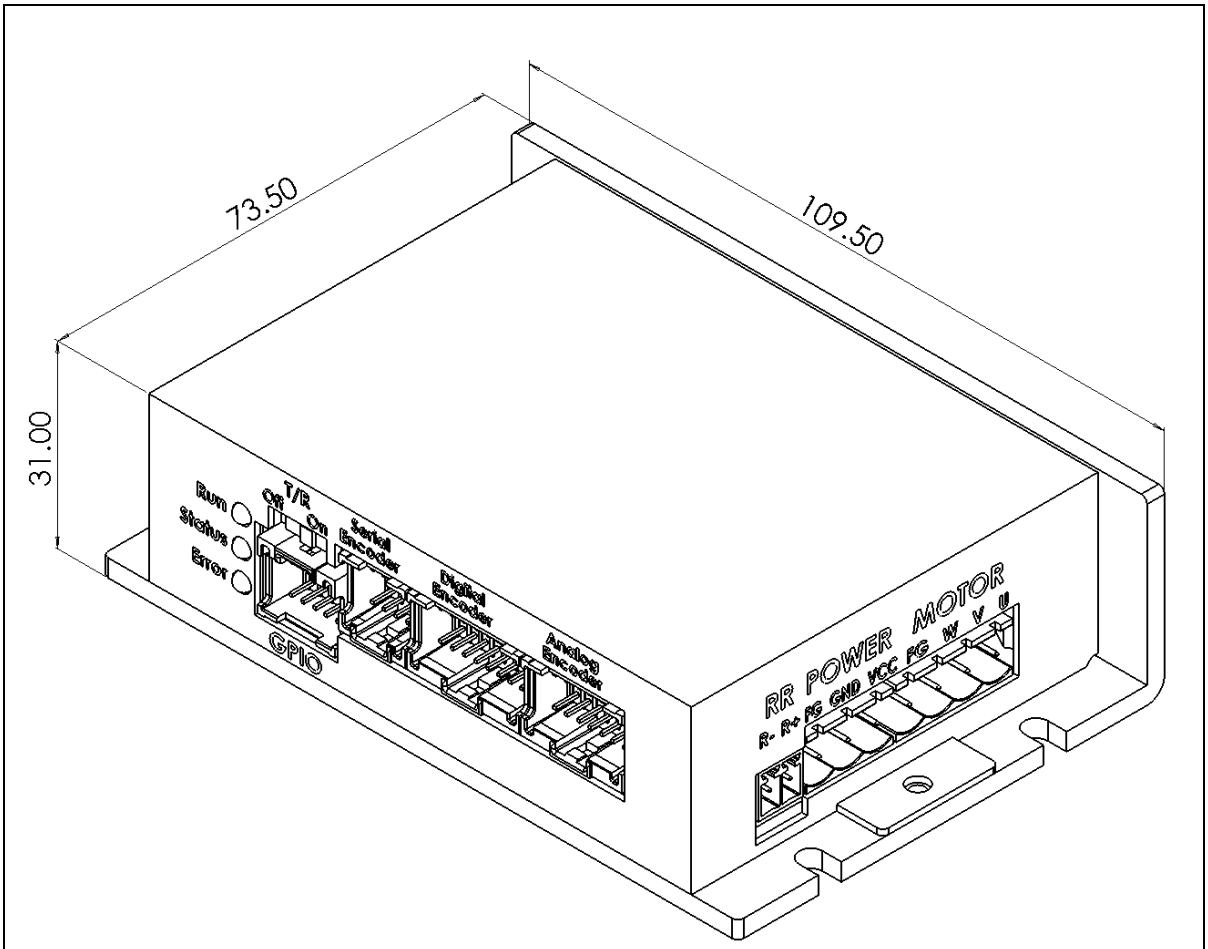
2. Technical Information

2.1. Mechanical Data



Item	Unit	Description
Weight	g	296
SIZE (L x W x H)	mm	109.5 * 73.5 * 31
Fastener	M3	

*For details, please refer to the 3D Modelling on the homepage.

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2.2. Electrical Data

WER-D048/10-FS04F7		
Ratings	**05**	**10**
Continuous Output Current A[rms]	5	10
Peak Output Current A[rms]	10	20

Basic Specifications		
Feature	**Specification**	
Motors	DC/BLDC/PMSM/VCM	Rotary servo motors, Linear servo motors
Current(Torque) Control	Control Periodic	24KHz
	Control Loop	PI + Feed-forward
Velocity & Position Control	Control Periodic	2KHz
	Control Loop	Cascade P/PI + Feed-forward
	Filters	First order low pass filter, Four notch filters, First order adaptive windowing filters
Reference Command	Current/Velocity/Position	USB, CAN(CANopen), EtherCAT(CoE,FoE), RS-485
Auto Tuning	Method	Automatic self-configuration and optimization of motor phasing, wires, current loop, velocity control loop.
GUI	User Interface	WELSS(WelconServoStudio), Setting, Drive, Motor, Feedback, I/O, Motion
Input Voltage	12~48VDC	
Protective Functions	Under- and over-voltage, Over-current, Over-load(with I^2T), Drive over-temperature	
Environment	Ambient temperature: Operation 0~50℃, Storage 0~70℃ Humidity: 10~90%, Vibration: 1.0g	
Compliance Standard	CE	

Communication*	
Feature	**Specification**
USB	Baud rate: up to 3Mbps, Maximum cable length: 3m
CAN*	Bit rate: 125kbps ~ 1Mbps
EtherCAT*	100Mbps Communication cycle time: up to 500μs(CSV, CSP mode), up to 250μs(CST mode)
RS-485*	Baud rate: 9200bps ~ 3Mbps

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I/O		
Feature	**Specification**	
Analog Input	Quantity	1
	Voltage Range	Analog ±10 VDC differential
	Input Resolution	14 bit
Digital Input	Quantity	6
	Signal	Configurable. Opto-isolated
	Voltage	24V
Digital Output	Quantity	2
	Signal	Configurable. Opto-isolated.
	Voltage	24V
	Max. Output Current	40mA
Brake	Use one of digital outputs (40mA)	
Motor Feedback*		
General	Supply Voltage	5VDC
Incremental Encoder	Signal	CH1 : A-quad-B with or without index, RS422, Differential CH2 : A-quad-B with or without index, Single-ended
	A-quad-B Max Input Frequency	10MHz (before quadrature)
Digital Hall Sensor	Signal	Single-ended
	Type	Separated hall sensor
Analog Hall Sensor*	Signal	0~5V, Single-ended
	Sampling Frequency	24KHz
Sin/Cos Encoder*	Signal	-0.7~+0.7V at 2.5V, Differential
	Sampling Frequency	24KHz
Serial Encoder	Type	SSI, BiSS-C, Tamagawa, Panasonic, EnDat2.2
	Bite rate	0.5Mbps, 1Mbps, 2Mbps, 2.5Mbps, 5Mbps

* **Optional (Refer to product code)**

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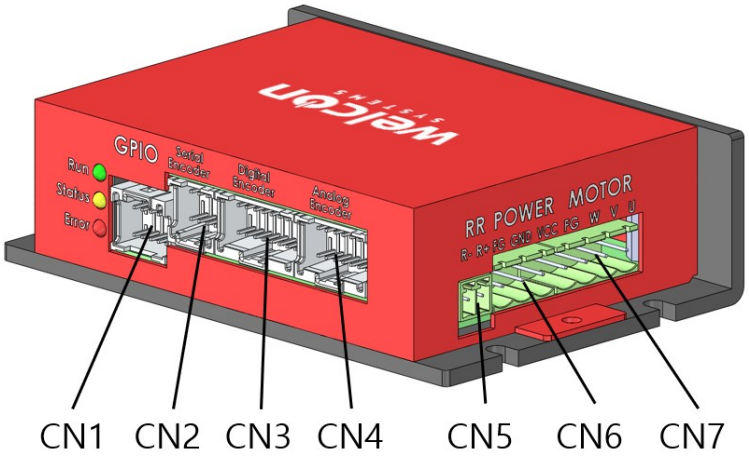
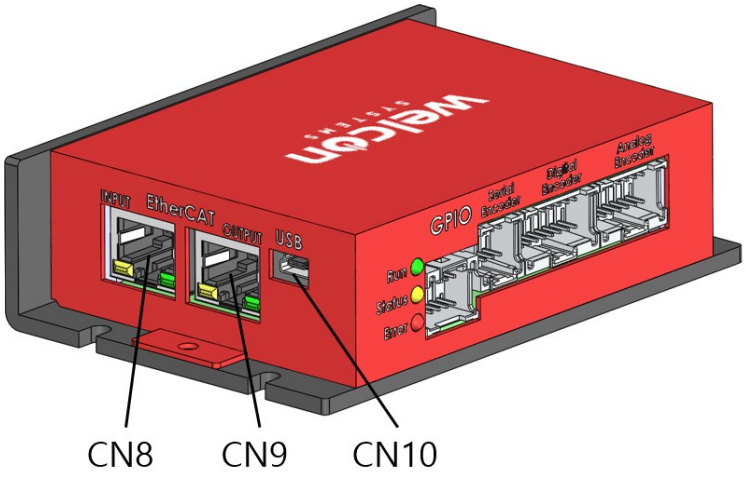
3. Wiring

3.1. Tools

Tool	Manufacturer	Part Number
Hand crimp Tool	MOLEX	63811-6300
Hand crimp Tool	MOLEX	63819-0500

3.2. Connections





Connector	Function	Connector	Function
CN1	GPIO	**CN6**	Main Power
CN2	Serial Encoder	**CN7**	Motor UVW
CN3	Digital Encoder	**CN8**	CAN / RS-485 / EtherCAT IN
CN4	Analog Encoder	**CN9**	CAN / RS-485 / EtherCAT OUT
CN5	Regenerative resistance	**CN10**	USB

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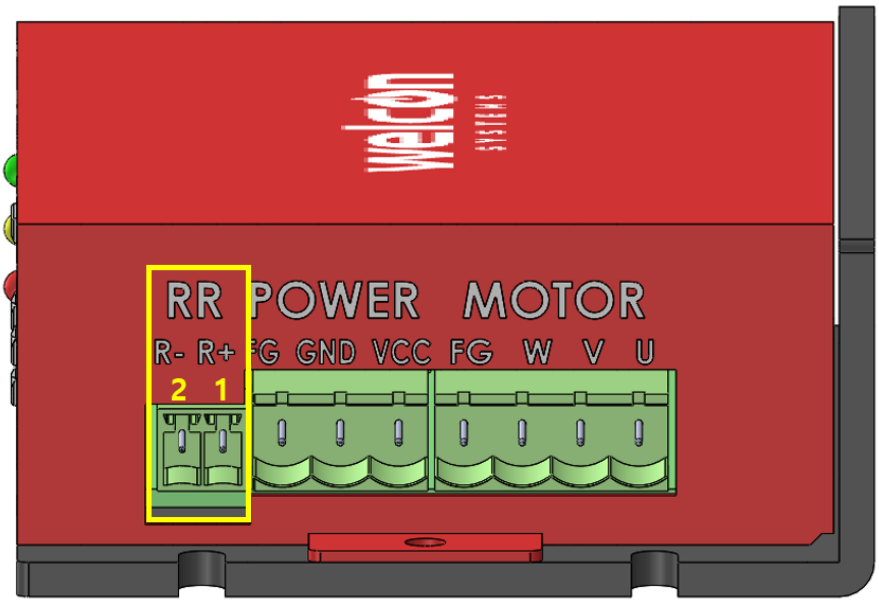
3.3. Regenerative resistance



EC350V-2P

ECH350R-02P	J904
Pin	**Input Power**
1	R+
2	R-

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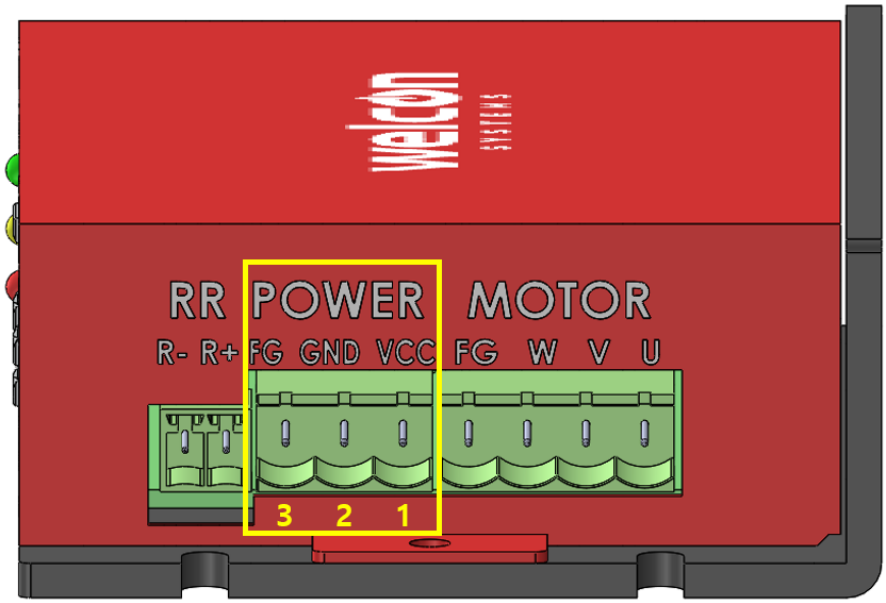
3.4. Main Power



5ESDV-03P

5EHDR-03P		J1
Pin	**Signal**	**Input Power**
1	VCC	12~48VDC
2	GND	GND
3	FG	FG

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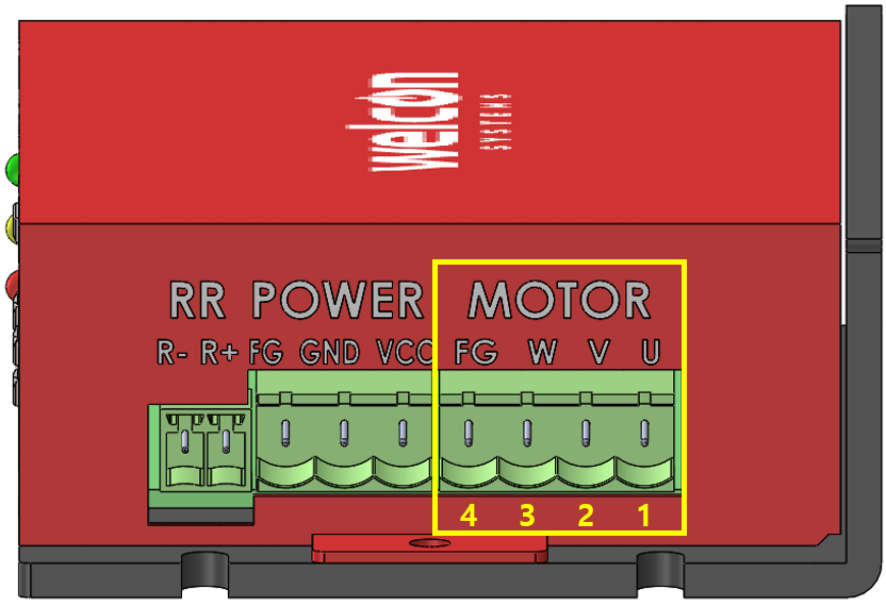
3.5. Motor UVW



5ESDV 04P

5EHDR-04P	J101
Pin	**Signal**
1	U (VCM or DC Motor : +)
2	V (VCM or DC Motor : -)
3	W
4	FG

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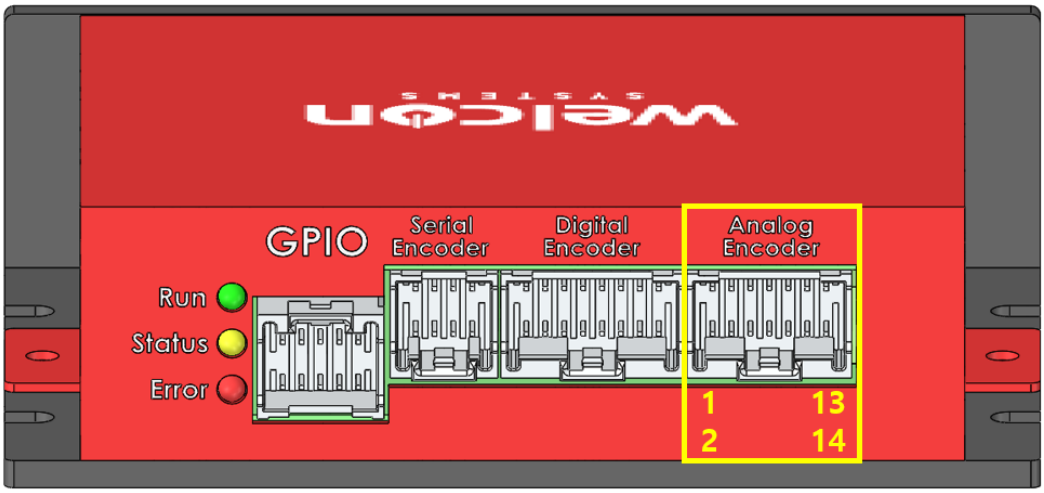
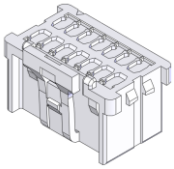
3.6. Analog Encoder





Molex_51353-1400

Molex_56134-9000

Molex 55959-1430	J901
Pin	**Signal**
1	SIN+
2	SIN-
3	COS+
4	COS-
5	REF+
6	REF-
7	5V
8	GND
9	FG
10	Analog Hall U
11	Analog Hall V
12	Analog Hall W
13	Analog Input+
14	Analog Input-

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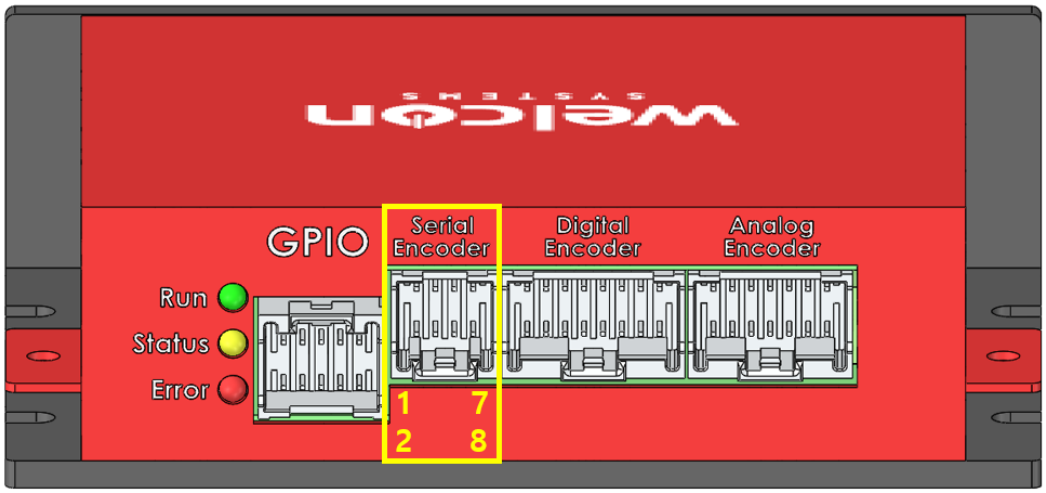
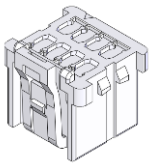
3.7. Serial Encoder





Molex_51353-0800

Molex_56134-9000

Molex 55959-0830	J801
Pin	**Signal**
1	BISS_DATA+ / RS485_RTX+
2	BISS_DATA- / RS485_RTX-
3	BISS_CLK+
4	BISS_CLK-
5	Not Used
6	Not Used
7	5V
8	GND

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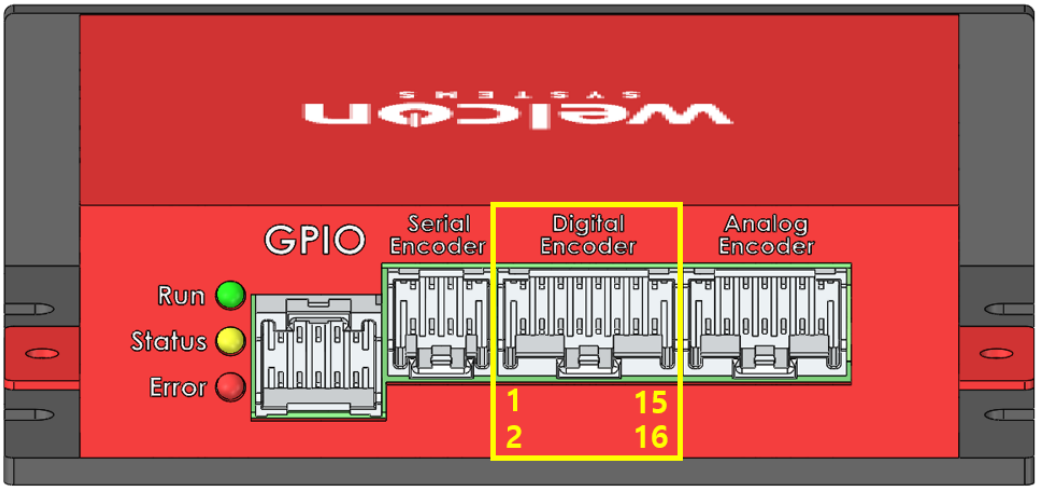
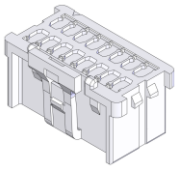
3.8. Digital Encoder (Port A)





Molex_51353-1600

Molex_56134-9000

Molex 55959-1630	J201
Pin	**Signal**
1	5V
2	GND
3	Encoder A+
4	Encoder A-
5	Encoder B+
6	Encoder B-
7	Encoder I+
8	Encoder I-
9	Hall U
10	Not used
11	Hall V
12	Not used
13	Hall W
14	Not used
15	FG
16	GND

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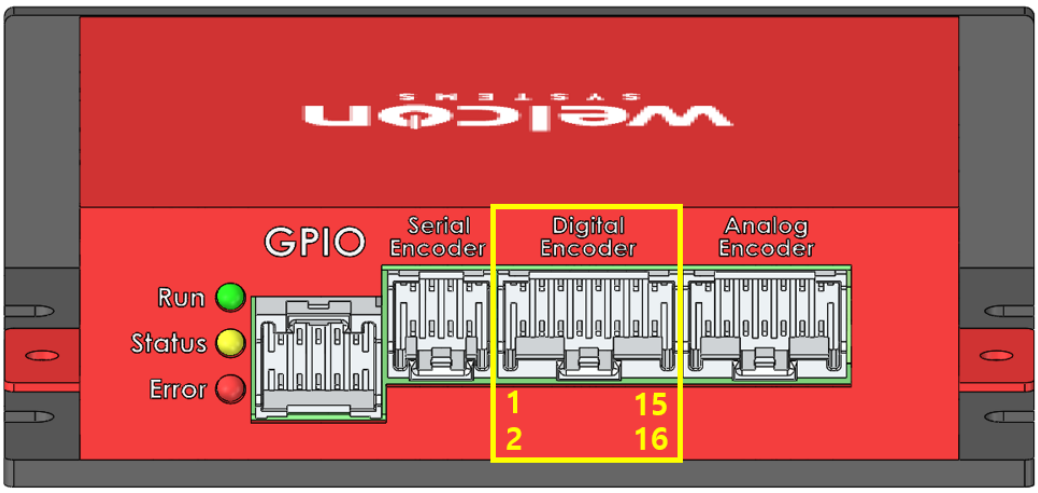
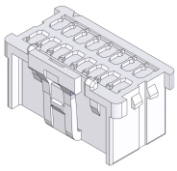
3.9. Digital Encoder (Port B)





Molex_51353-1600

Molex_56134-9000

Molex 55959-1630	J201
Pin	**Signal**
1	5V
2	GND
3	Not Used
4	Not Used
5	Not Used
6	Not Used
7	Not Used
8	Not Used
9	Hall U
10	Encoder A
11	Hall V
12	Encoder B
13	Hall W
14	Encoder I
15	FG
16	GND

* When using Dual Feedback, only Hall Sensor A can be selected in WELSS UI.

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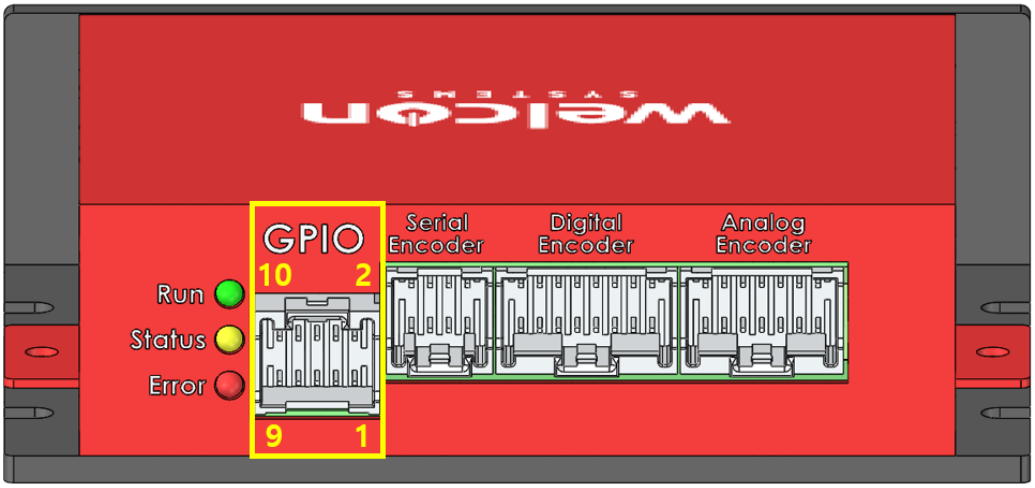
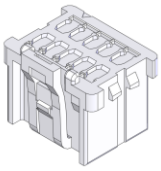
3.10. GPIO





Molex_51353-1000

Molex_56134-9000

Molex 55959-1030	J301
Pin	**Signal**
1	GPI 0
2	GPI 1
3	GPI 2
4	GPI 3
5	GPI 4
6	GPI 5
7	GPI_COMMON
8	GPO 0
9	GPO 1
10	GPO_COMMON

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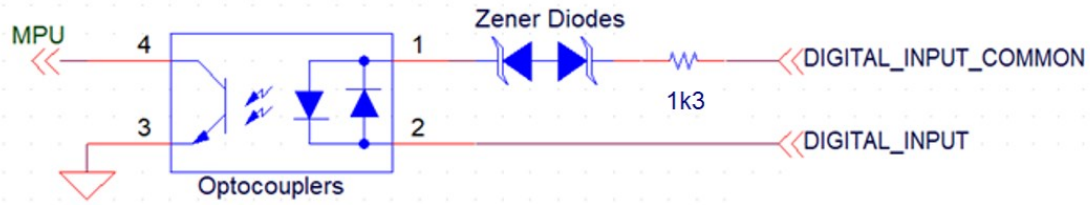
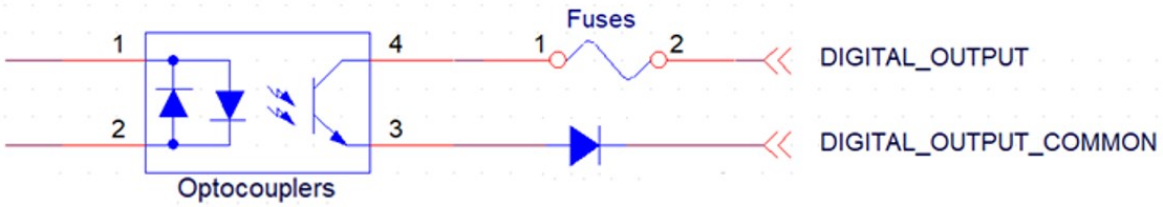


<Digital Input Circuit>



<Digital Output Circuit>

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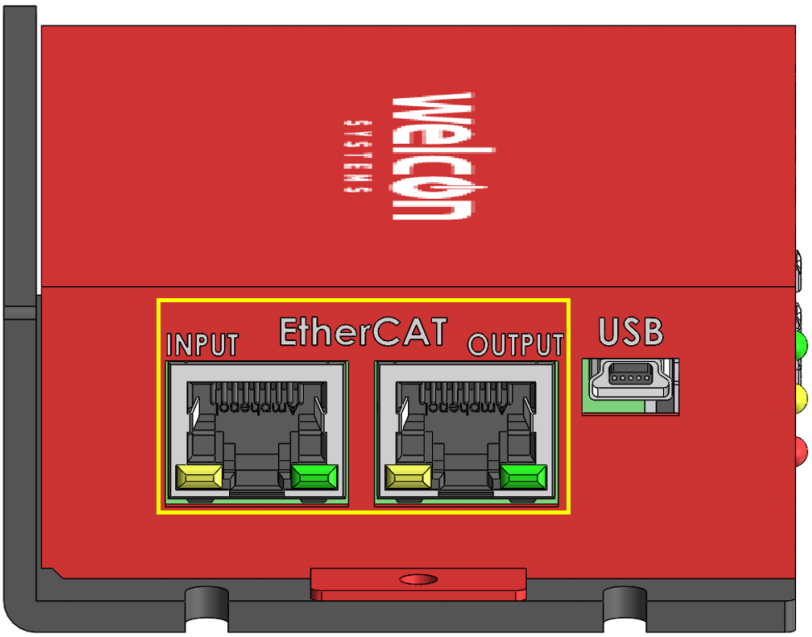
3.11. EtherCAT

Fieldbus Type	Product Number
EtherCAT	WER-D048/10-FS04F7-E



Meritec_N3J11-017-02	J102, J103
Pin	**Signal**
1	EtherCAT Tx+
2	EtherCAT Tx-
3	EtherCAT Rx+
4	NC
5	NC
6	EtherCAT RX-
7	NC
8	NC

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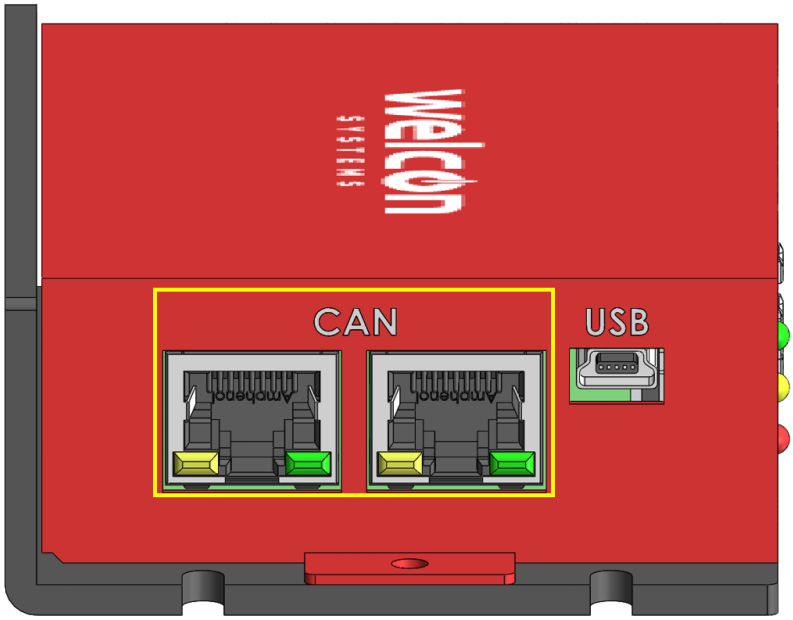
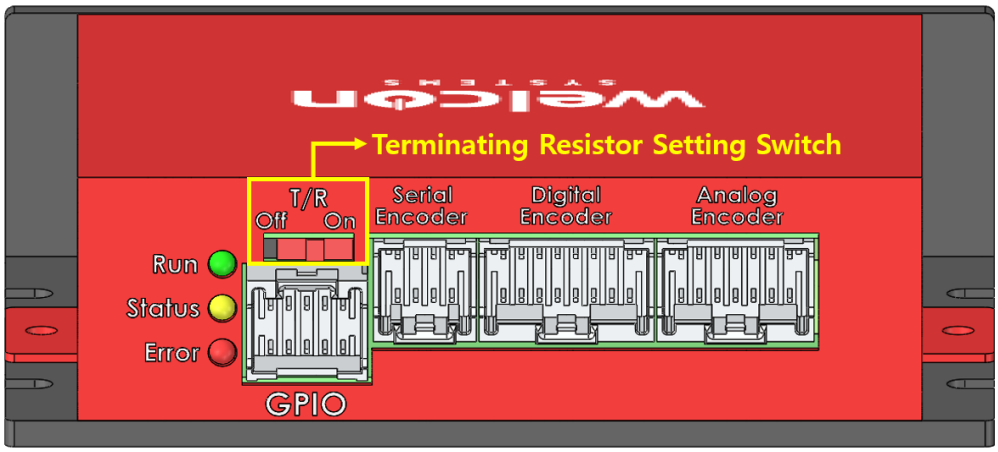
3.12. CAN

Fieldbus Type	Product Number
CAN	WER-D048/10-FS04F7-C





Meritec_N3J11-017-02	J102, J103
Pin	**Signal**
1	HIGH
2	LOW
3	GND
4	NC
5	NC
6	NC
7	NC
8	NC

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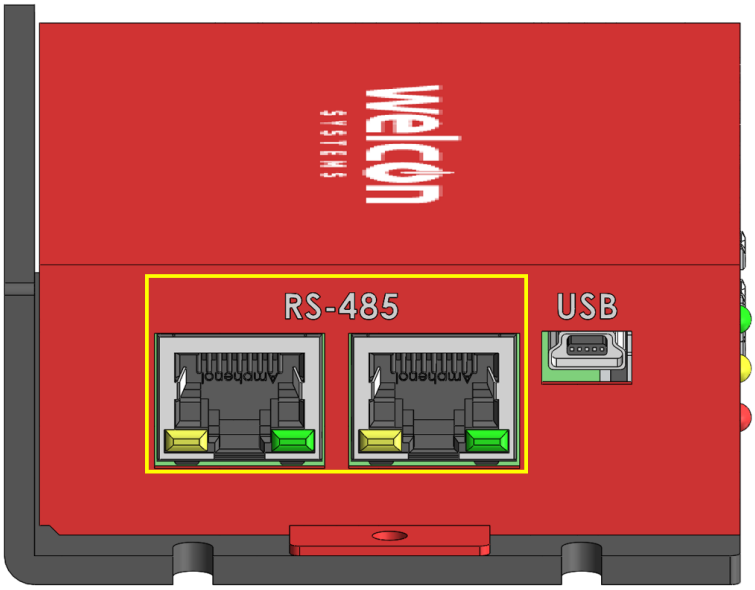
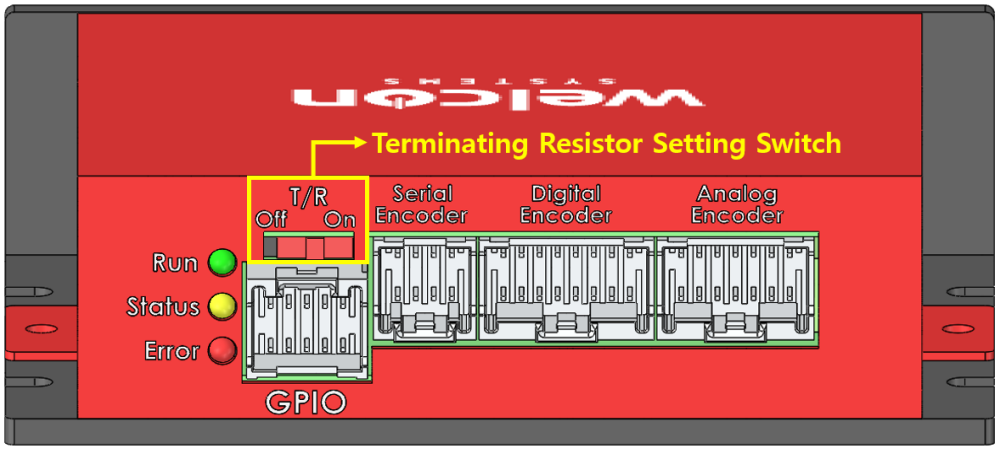
3.13. RS-485

Fieldbus Type	Product Number
RS-485	WER-D048/10-FS04F7-R





Meritec_N3J11-017-02	J102, J103
Pin	**Signal**
1	RTX+
2	NC
3	GND
4	RTX-
5	NC
6	NC
7	NC
8	NC

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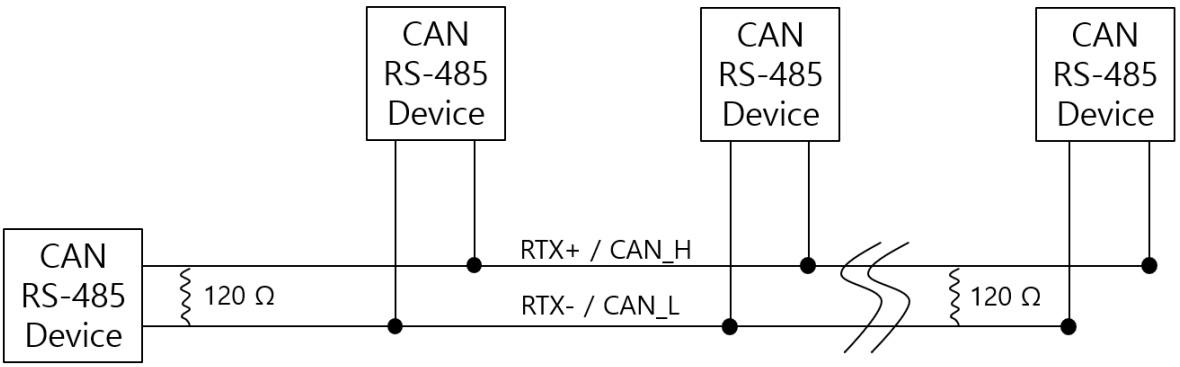
- 종단 저항 설정 스위치를 이용하여 CAN or RS-485 신호선의 양 끝단에 종단 저항 연결
  - Connect the terminating resistor to both ends of the CAN or RS 485 signal line using the terminating resistor setting switch.



[CAN or RS-485 Communication]

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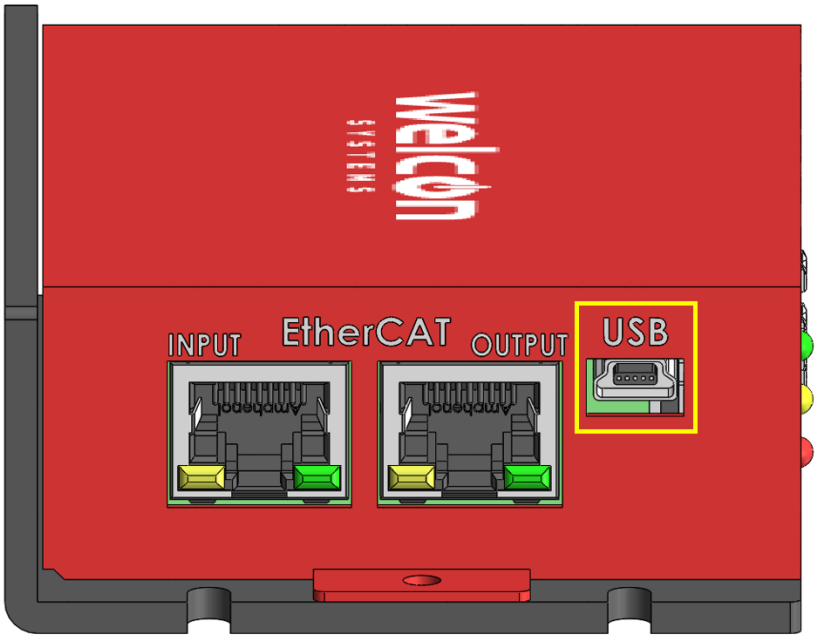
3.14. USB



USB-Mini Type B (Keystone Model:934)	J101
Pin	**Signal**
1	VBUS
2	DM
3	DP
4	ID
5	GND
6	SHIELD

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