

SCARA Robot Controller

User Manual





Multi Axis Robot

- Pick-and-place / Assembly / Array and packaging / Semiconductor / Electro-Optical industry / Automotive industry / Food industry
- Articulated Robot
 - Delta Robot
 - SCARA Robot
 - Wafer Robot
 - Electric Gripper
 - Integrated Electric Gripper
 - Rotary Joint



Single Axis Robot

- Precision / Semiconductor / Medical / FPD
- KK, SK
 - KS, KA
 - KU, KE, KC



Direct Drive Rotary Table

- Aerospace / Medical / Automotive industry / Machine tools / Machinery industry
- RAB Series
 - RAS Series
 - RCV Series
 - RCH Series



Ballscrew

- Precision Ground / Rolled
- Super S series
 - Super T series
 - Mini Roller
 - Ecological & Economical lubrication Module E2
 - Rotating Nut (R1)
 - Energy-Saving & Thermal-Controlling (C1)
 - Heavy Load Series (RD)
 - Ball Spline



Linear Guideway

- Automation / Semiconductor / Medical
- Ball Type--HG, EG, WE, MG, CG
 - Quiet Type--QH, QE, QW, QR
 - Other--RG, E2, PG, SE, RC



Medical Equipment

- Hospital / Rehabilitation centers / Nursing homes
- Robotic Gait Training System
 - Hygiene System
 - Robotic Endoscope Holder



Bearing

- Machine tools / Robot
- Crossed Roller Bearings
 - Ball Screw Bearings
 - Linear Bearing
 - Support Unit



AC Servo Motor & Drive

- Semiconductor / Packaging machine / SMT / Food industry / LCD
- Drives-D1, D1-N, D2
 - Motors-50W-2000W



Driven Tool Holders

- All kinds of turret
- VDI Systems
 - Radial Series, Axial Series, MT
 - BMT Systems
 - DS, NM, GW, FO, MT, OM, MS



Linear Motor

- Automated transport / AOI application / Precision / Semiconductor
- Iron-core Linear Motor
 - Coreless Linear Motor
 - Linear Turbo Motor LMT
 - Planar Servo Motor
 - Air Bearing Platform
 - X-Y Stage
 - Gantry Systems



Torque Motor (Direct Drive Motor)

- Inspection / Testing equipment / Machine tools / Robot
- Rotary Tables-TMS,TMY,TMN
 - TMRW Series
 - TMRI Series

Revision History

Version	Date	Remark
V1.0	2017/08/23	First issuance
V1.1	2017/11/23	Added the corresponding pins of I/O 25P to 15P for the robot body

Hardware Manual for SCARA Robot

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1. Important Notice

1.1 Important Notice Prior to Operation

Please carefully read this manual prior to operating the product. For those who don't follow the installation notices, we should not take any responsibilities for damage, accident or injury.

- ◆ Don't disassemble or modify this product by yourself. Because our products are designed with the structural calculation, computer simulation and physical test, they can't be disassembled or modified without engineer's permission. If the accident or loss is caused by the disassembly or modification, we should not take responsibility.
- ◆ Before this product is installed or operated, please check the appearance. If there are any damages, please immediately contact us or an agent.
- ◆ Please carefully read the product label or the specifications on the shipment document prior to the operation; and indeed install it according to the installation description.
- ◆ Please read the specifications and the power supply on the label before operating this product, and confirm the power supply complies with the requirements. If the product damage or the person injury is caused by the incorrect power, we should not take responsibility.
- ◆ Don't operate this product over the rated load. If there is the loss or damage, we should not take responsibility.
- ◆ Don't operate this product under the impact environment. If there is failure, accident or injury, we should not take responsibility.
- ◆ Don't handle this product by yourself if it fails. It must be repaired by the qualified technician only.

1.2 Safety Notice

- ◆ Please carefully read this manual prior to the installation, transportation, maintenance or check, and correctly operate the product.
- ◆ A user must be familiar with electric knowledge, safety information and all notices prior to the operation.

<p>◆ Notice</p>	<p>When the power is connected, there is electric shock if you touch the terminal and inside.</p> <p>Don't scratch the cables or put heavy objects on them.</p> <p>Don't clip the cable between two objects to cause electric shock or a fire.</p>
<p>◆ Transportation</p>	<p>Please pay attention during the transportation. Otherwise, the product will be damaged.</p> <p>Pay attention to the transportation method because the box can't suffer from the excessive force.</p> <p>Don't stack each other to collapse.</p>
<p>◆ Setup Place</p>	<p>Don't set up a place with high temperature and moisture, or dust, iron and cutting powder.</p> <p>Please set up at a place in the range of temperature where complies with the manual. If the high temperature exists, please install a cooling fan.</p> <p>Don't set up at a place with direct sunlight.</p> <p>The product has no waterproof structure. Don't operate it outdoors or at the place where there is water or other liquid.</p> <p>Please set up a place with less vibration.</p> <p>When a motor is continuously operated, heat will be generated due to the operating frequency. Please cool down with a fan.</p> <p>Please select the stand-by status when a motor stops, so that the ambient temperature will not exceed the regulations.</p>
<p>◆ Installation</p>	<p>Don't put the heavy object on the product to avoid injury.</p> <p>There is a fire when the objects are put into the product.</p> <p>Please observe the installation steps. Otherwise, there is a fire.</p> <p>Please prevent the failure or injury from the strong impact.</p> <p>The body weight must be taken into account when it is installed. The improper installation will cause damage or injury.</p> <p>The product is installed on the nonflammable objects. Otherwise, there is a fire.</p>

◆ Connection	Please select the wires with reliable ground. Otherwise, a motor will be out of control or burned to cause injury or a fire.
◆ Operation and Transportation	Please confirm the power specification is correct. Otherwise, it will cause injury or a fire. After the power supply is instantaneously recovered, the sudden operation could take place. Don't get close to the machine. There is an external emergency circuit, so that can immediately stop and disconnect the power.
◆ Maintenance	Don't disassemble or modify the product by yourself. Don't handle the product if it fails. Please repair it by our engineer.

1.3. Component List

RS403-400-150-N

No.	Description	Part Number	Quantity	Remark
1	Power Cable	HE00EEX00100	1	3m for standard
2	Relay Cable	HE00EE X00200	1	3m for standard
3	Emergency Stop Switch	HE00EEX00300	1	3m for standard
4	Robot I/O Cable	HE00EEX00400	1	3m for standard
5	Teaching Pendant	TP2000	1	3m for standard
6	RCS406	HMCEEEXEA100	1	
7	SCARA	RS403-400-150-N	1	
8	Accessory Pack		1	

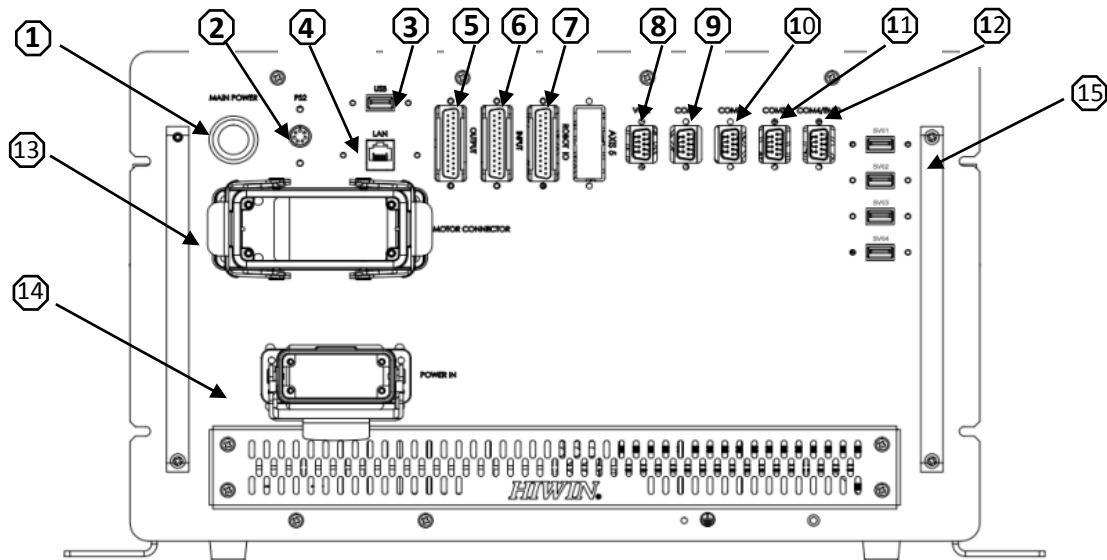
RS406-601S-H-B

No.	Description	Part Number	Quantity	Remark
1	Power Cable	HE00EEX00100	1	3m for standard
2	Relay Cable	HE00EE X00200	1	3m for standard
3	Emergency Stop Switch	HE00EEX00300	1	3m for standard
4	Robot I/O Cable	HE00EEX00400	1	3m for standard
5	Teaching Pendant	TP2000	1	3m for standard
6	RCS406	HMCEEEXEA100	1	
7	SCARA	RS406-601S-S-B	1	
8	Accessory Pack		1	

※If you have problems, please contact HIWIN from the name of component table and specification.

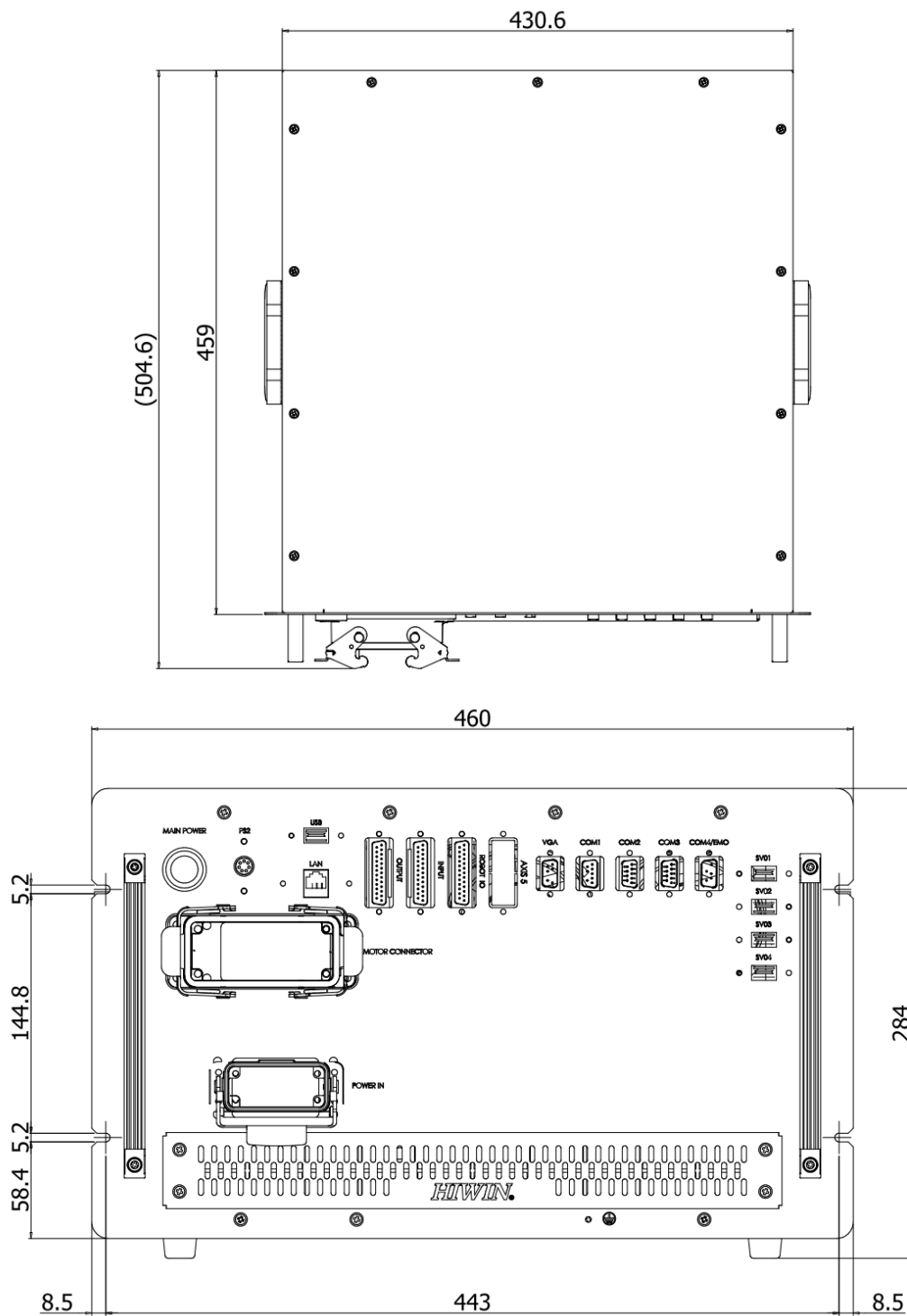
2. Control Panel

2.1. Interface Description



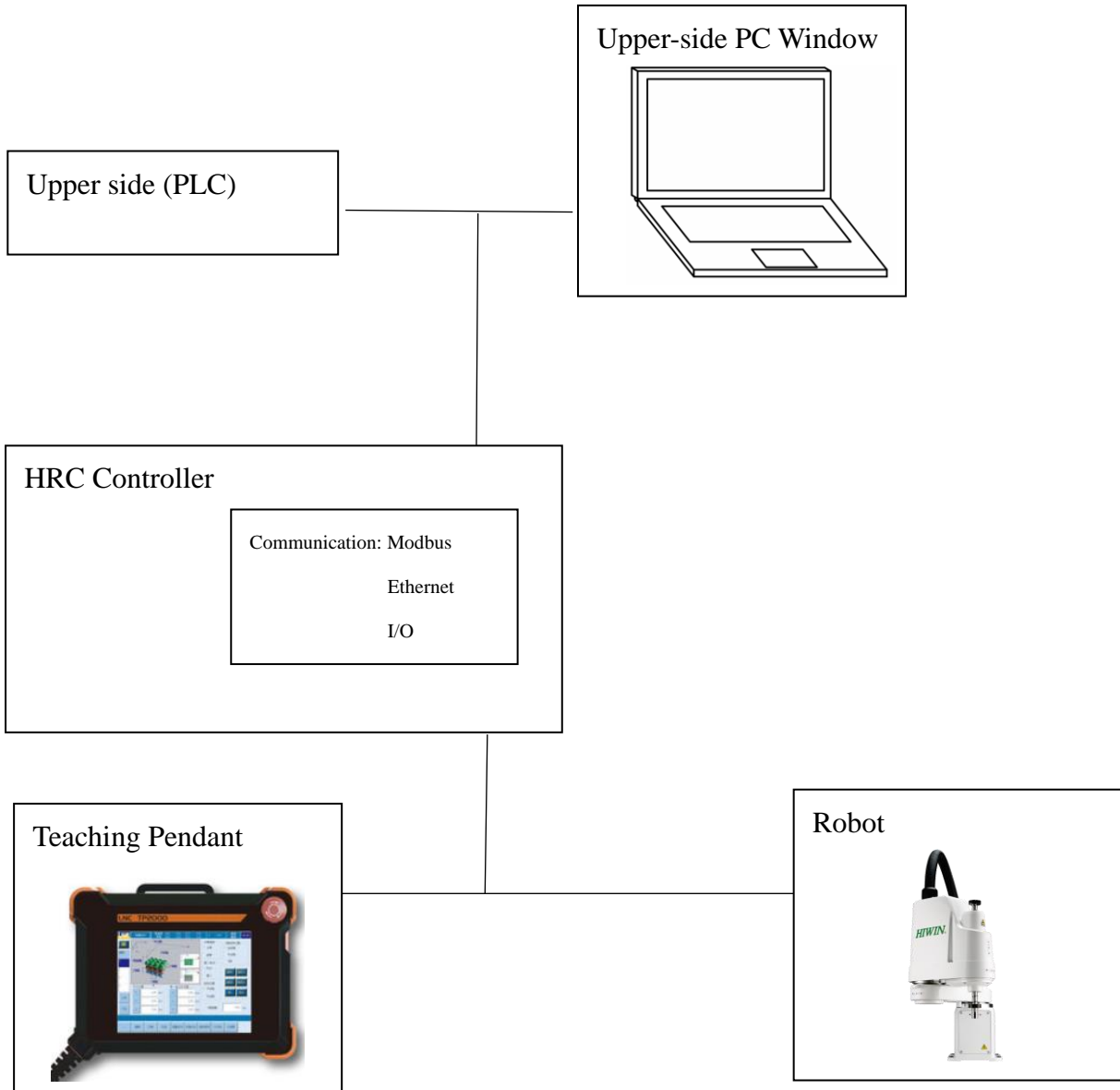
No.	Interface	Description
1	Main Power	Main power of control panel (light up in white when activating)
2	PS2	Provide the communication protocol at customer side (support mouse and keyboard)
3	USB	USB(2.0)
4	LAN	Ethernet
5	Output	Used by customer
6	Input	Used by customer
7	Robot IO	Connect to the Robot
8	VGA	For Teaching Pendant
9	COM1	For Teaching Pendant
10	COM2	Modbus
11	COM3	For Teaching Pendant
12	EMO	Emergency stop switch (including cables)
13	Motor Connector	Connect to the Robot
14	Power In	Power connector for control panel, 1P AC200~240V 50/60Hz for power input
15	SV 01~04	For repair (※required for professional operator)

2.2. Dimensions



3. Installation

3.1. System Structure and Layout



3.2. Hardware Specifications

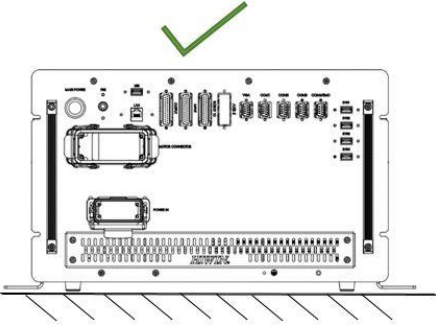
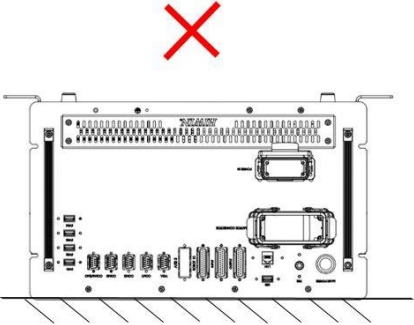
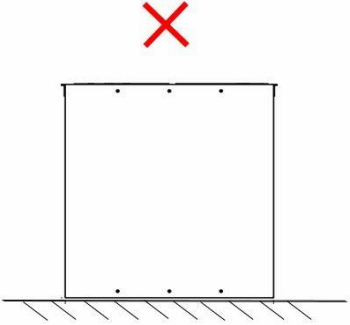
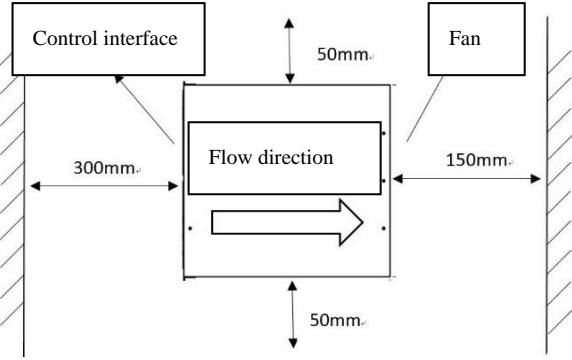
RS403-400-150-N

Item	Specifications					
Control panel dimensions	Length	459			mm	
	Width	460				
	Height	281				
Control panel	HRC-S410					
	External connector				EMO	1
					COM1 (connected to Teaching Pendant)	1
					COM3 (connected to Teaching Pendant)	1
					VGA (connected to Teaching Pendant)	1
External I/O signal (standard)	Arm I/O	Input	3	Control panel I/O	Input	8
		Output	3		Output	8
Communication port (standard)	USB(2.0)			1		
	Ethernet			1		
	Modbus			1		
Arm pipe layout	Φ4			1		
	Φ6			2		
Power	Voltage	1P AC		200~240	V	
	Frequency	50/60			Hz	
Maximum Power Consumption	2.2 (subject to customer environment)			kW		
Rating ambient temperature	0 ~ 40			°C		
Rating relative humidity	20 ~ 80			%		
Weight of control panel	35			Kg		

RS406-601S-H-B

Item	Specifications					
Control panel dimensions	Length	459			mm	
	Width	460				
	Height	281				
Control panel	HRC-S410					
	External connector				EMO	1
					COM1 (connected to Teaching Pendant)	1
					COM3 (connected to Teaching Pendant)	1
VGA (connected to Teaching Pendant)					1	
External I/O signal (standard)	Arm I/O	Input	3	Control panel	Input	8
		Output	3		I/O	Output
Communication port (standard)	USB(2.0)			1		
	Ethernet			1		
	Modbus			1		
Arm pipe layout	Φ4			2		
	Φ6			2		
Power	Voltage	1P AC		200~240	V	
	Frequency	50/60			Hz	
Maximum Power Consumption	2.2 (subject to customer environment)			kW		
Rating ambient temperature	0 ~ 40			°C		
Rating relative humidity	20 ~ 80			%		
Weight of control panel	35			Kg		

3.3. Layout Notice

Item	Figure	Description
1		<p>Correctly install the control panel, vertical and parallel to the ground</p>
2		<p>Incorrectly install the control panel, placed upside down</p>
3		<p>Incorrectly install the control panel, placed side down</p>
4		<p>Minimum clearance between the control panel and the surrounding</p>

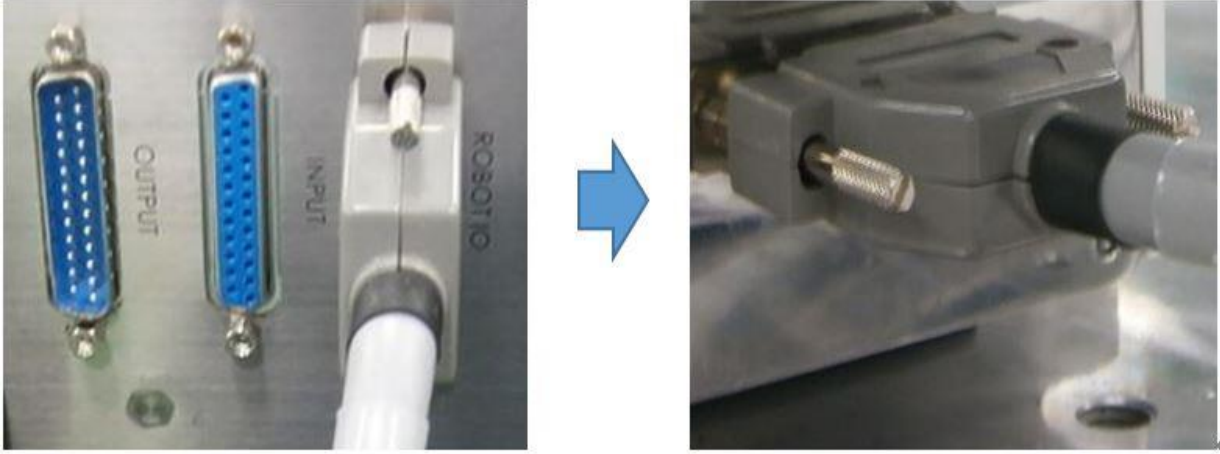
3.4. Specification and Installation of Teaching Pendant




Model Number	TP2000
Dimensions	290*230*80 mm
Weight	1.44 Kg
Display	8" touch panel
Physical Button	Emergency Stop Switch
Cable Length	3 m

Installation of Teaching Pendant	Figure	Description
		<p>Install three connectors on the control panel interface, which are:</p> <ol style="list-style-type: none"> 1. VGA 2. COM1 3. COM3

3.5. Installation of I/O Cable

Type	Figure
Lower fixture	

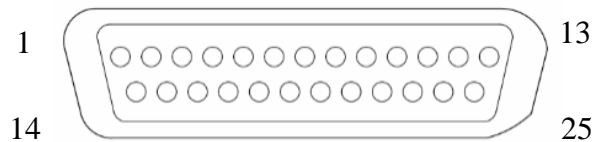
3.6. Installation of Relay Cable

Type	Figure
Lower fixture	

4. Definition of Interface Pin

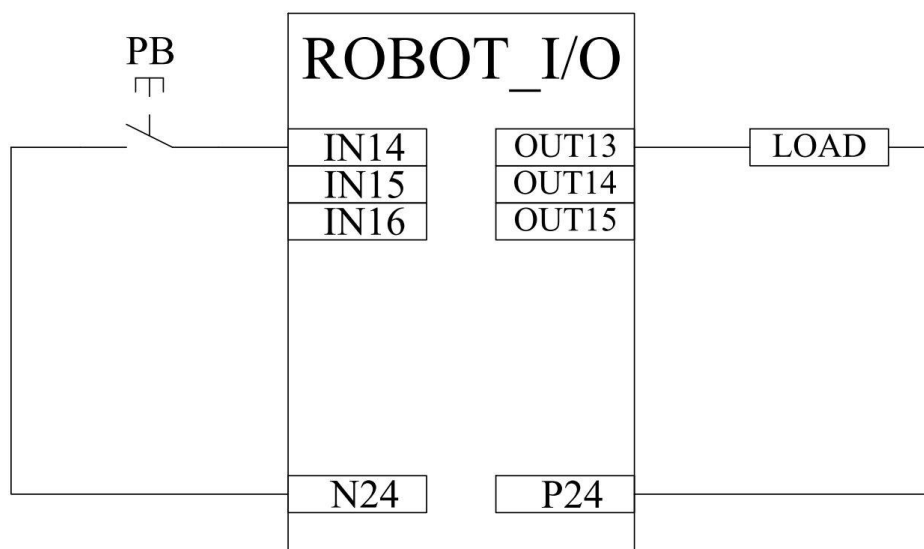
4.1. Description of Robot (I/O) Pin (D-Sub 25Pin)

1	IN14	6		11		16	OUT15	21	
2	IN15	7		12		17		22	
3	IN16	8		13		18		23	
4		9		14	OUT13	19		24	P24
5		10		15	OUT14	20		25	N24



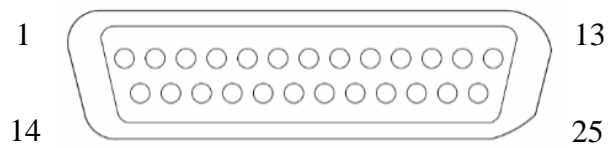
Note: P24 and N24 are supplied from the internal power panel, not external. The single-point current is 100mA.

Example:



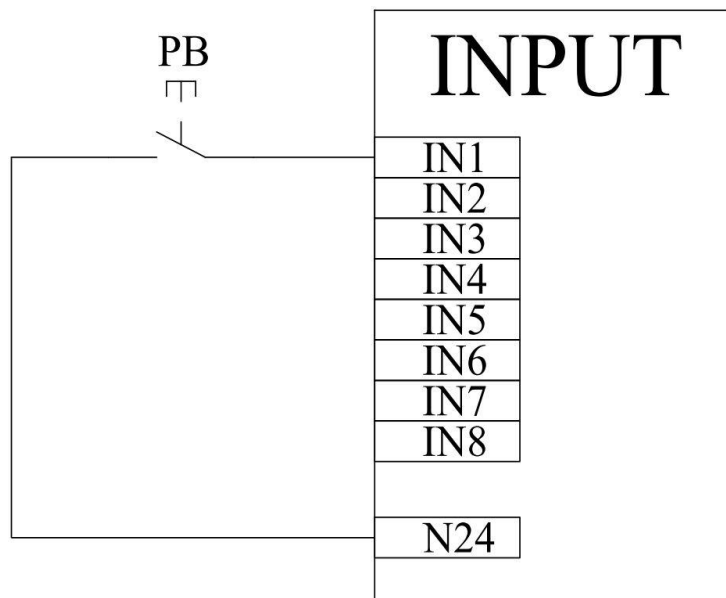
4.2. Description of IN Pin (D-Sub 25Pin)

1	IN1	6	IN6	11		16		21	
2	IN2	7	IN7	12		17		22	
3	IN3	8	IN8	13		18		23	
4	IN4	9		14		19		24	
5	IN5	10		15		20		25	N24



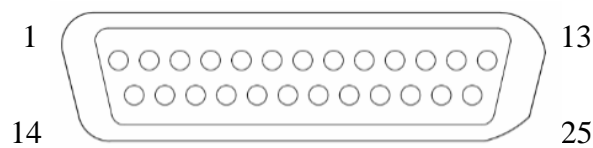
Note: P24 and N24 are supplied from the internal power panel, not external. The single-point current is 100mA.

Example:



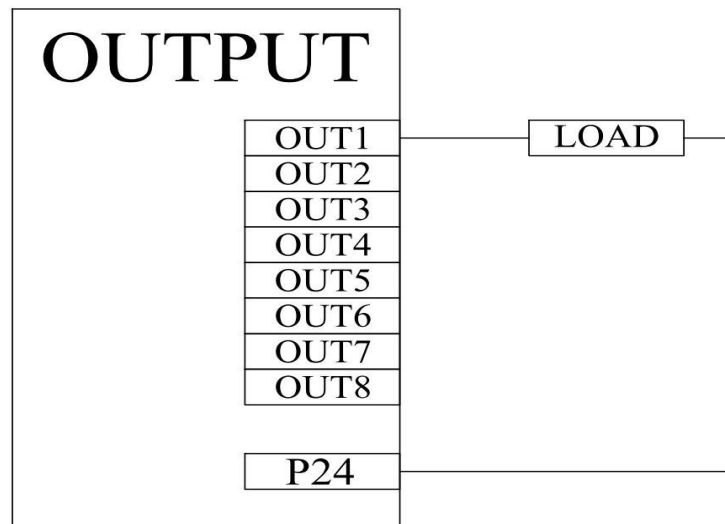
4.3. Description of OUT Pin (D-Sub 25Pin)

1	OUT1	6	OUT6	11		16		21	
2	OUT2	7	OUT7	12		17		22	
3	OUT3	8	OUT8	13		18		23	
4	OUT4	9		14		19		24	
5	OUT5	10		15		20		25	P24



Note: P24 and N24 are supplied from the internal power panel, not external. The single-point current is 100mA.

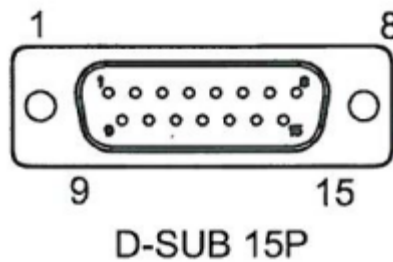
Example:



4.4. Description of Robot Body Pin

RS403-400-150-N (D-Sub 25Pin to D-Sub 15Pin)

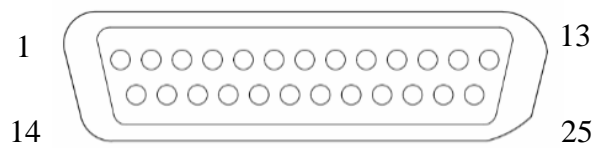
D-SUB 15P					
1	IN14	6		11	OUT15
2	IN15	7		12	
3	IN16	8		13	
4		9	OUT13	14	P24
5		10	OUT14	15	N24



D-SUB (25P)	D-SUB (15P)	D-SUB (25P)	D-SUB (15P)
1	1	16	11
2	2	17	12
3	3	18	13
4	N/A	19	N/A
5		20	
6		21	
7		22	
8		23	
9	4	24	14
10	5	25	15
11	6		
12	7		
13	8		
14	9		
15	10		

RS406-601S-H-B (D-Sub 25Pin to D-Sub 25Pin)

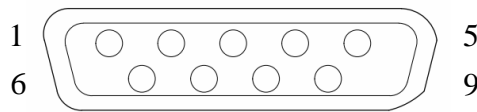
D-SUB 25P									
1	IN14	6		11		16	OUT15	21	
2	IN15	7		12		17		22	
3	IN16	8		13		18		23	
4		9		14	OUT13	19		24	OUT13
5		10		15	OUT14	20		25	OUT14



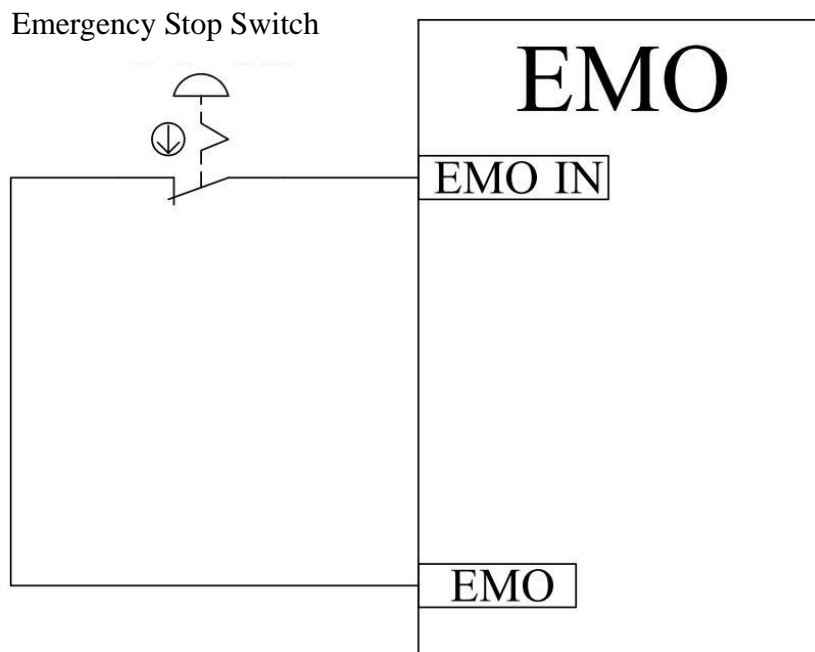
D-SUB (25P)	D-SUB (25P)	D-SUB (25P)	D-SUB (25P)
1	1	16	16
2	2	17	17
3	3	18	18
4	4	19	19
5	5	20	20
6	6	21	21
7	7	22	22
8	8	23	23
9	9	24	24
10	10	25	25
11	11		
12	12		
13	13		
14	14		
15	15		

4.5. Description of EMO Pin (D-Sub 9Pin)

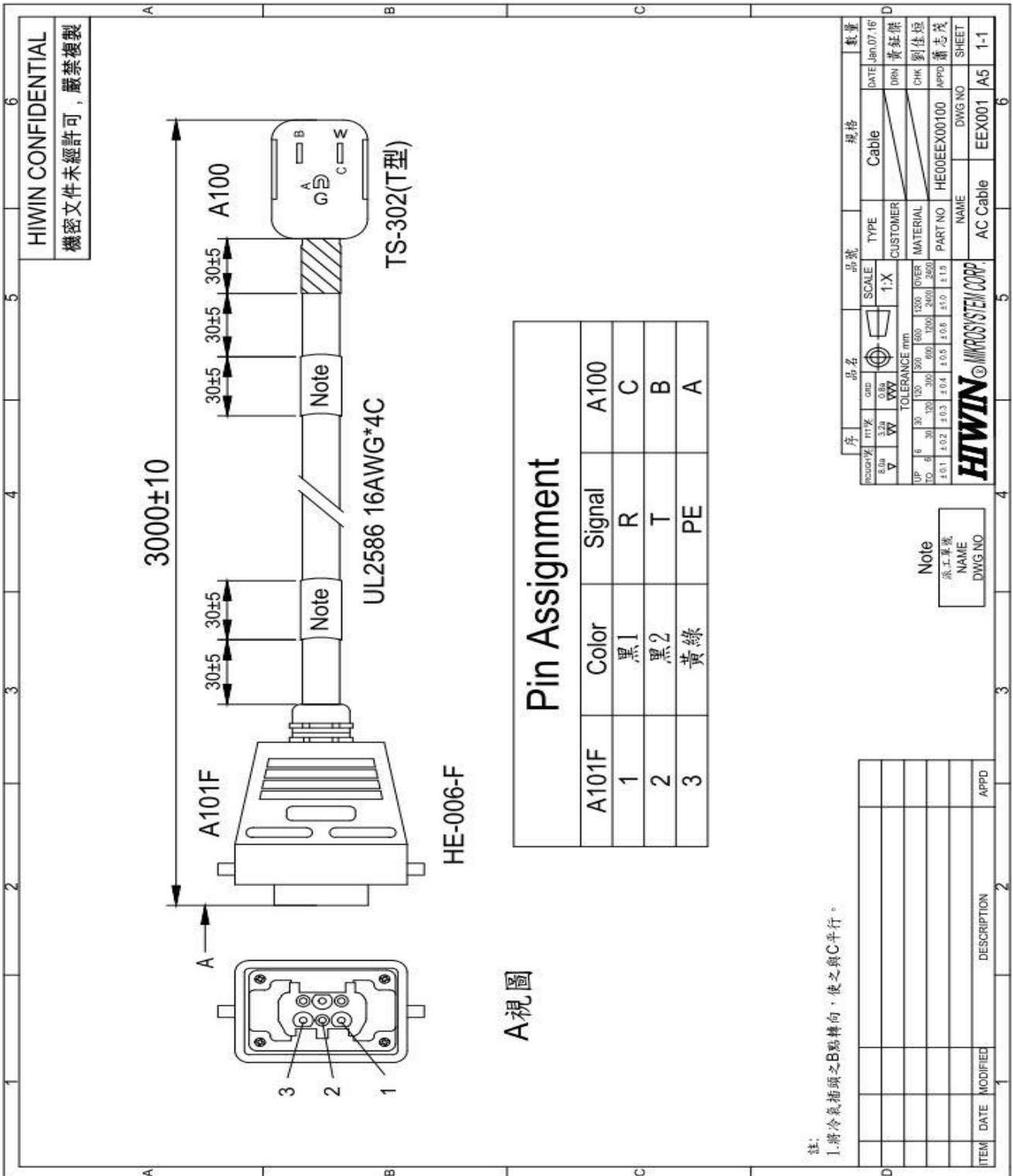
1		6	EMO-IN
2		7	EMO
3		8	
4		9	
5			



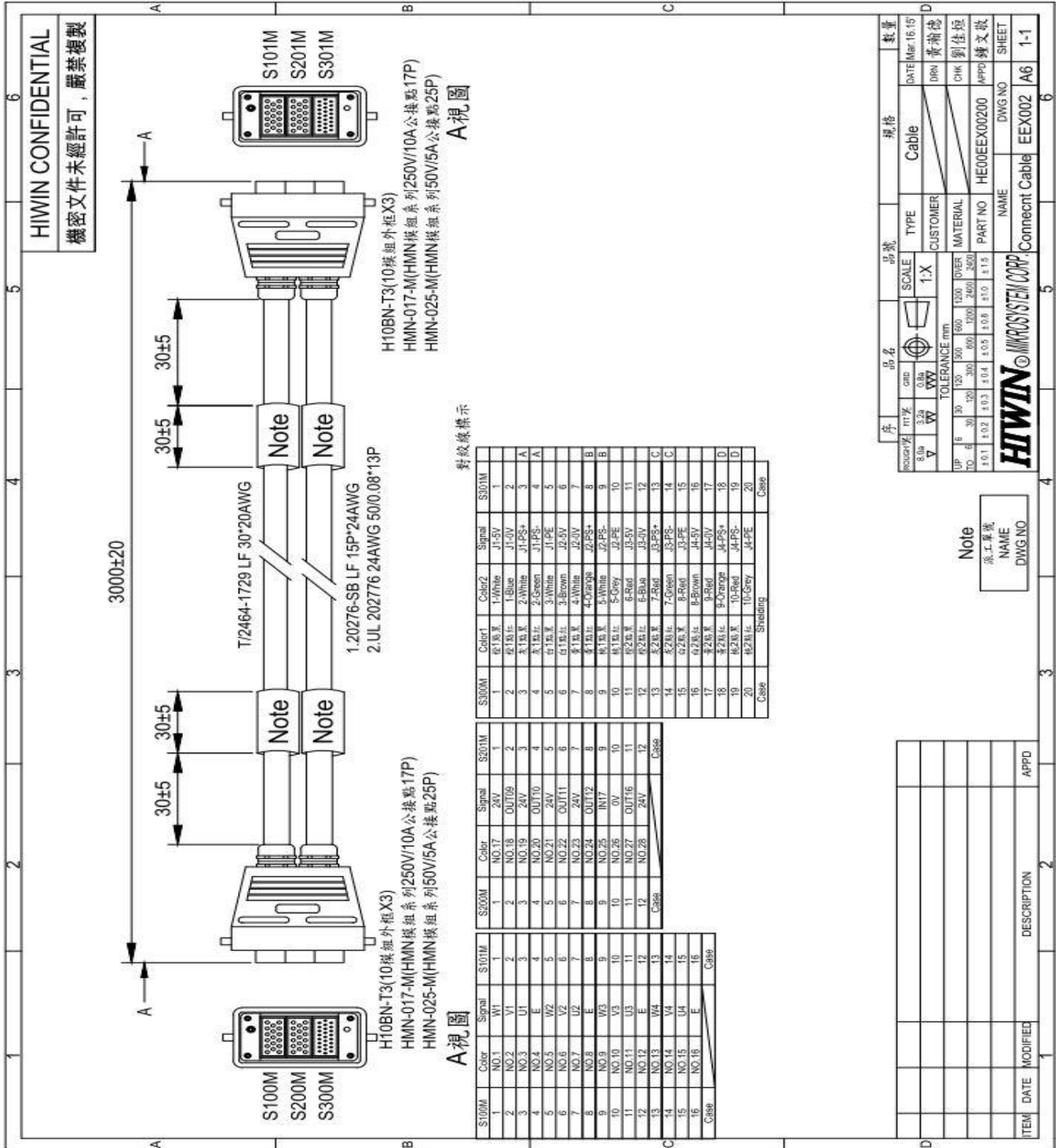
Example:



Appendix 1: Power Cable



Appendix 2: Relay Cable



序	品名	品號	規格	數量
1	Cable		Cable	1

revision	date	drawn	checked	approved
1.0	15/05/2018	W	W	
2.0	15/05/2018	W	W	
3.0	15/05/2018	W	W	
4.0	15/05/2018	W	W	

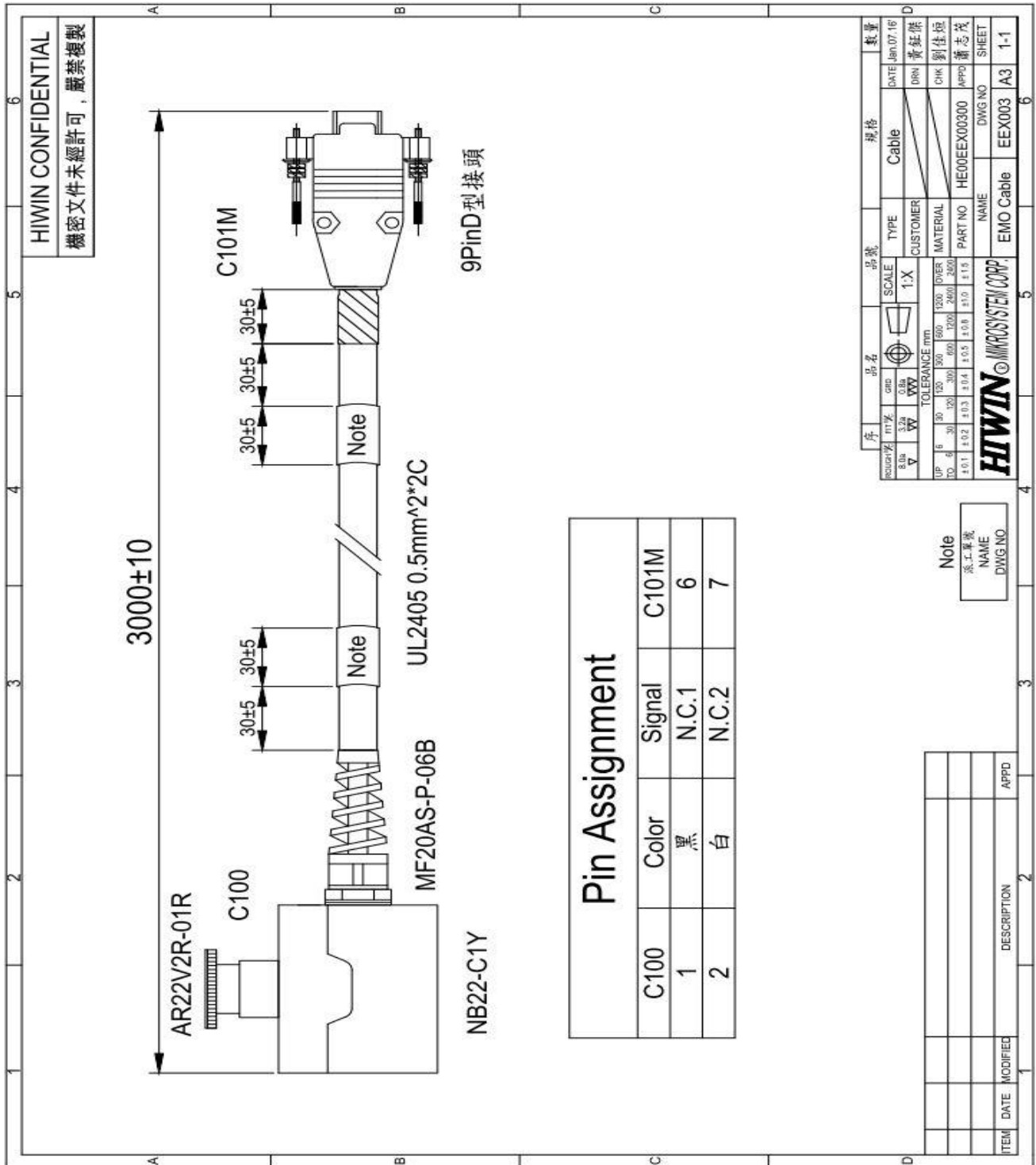
TYPE	CUSTOMER	MATERIAL	PART NO.	NAME
1:1	HIWIN	HE00EEX00200	HE00EEX00200	Connect Cable

ITEM	DATE	MODIFIED	DESCRIPTION	APPD
1				
2				
3				
4				
5				
6				

DATE	DESCRIPTION	APPD
15/05/2018	Drawn	W
15/05/2018	Checked	W
15/05/2018	Approved	

ITEM	DATE	MODIFIED	DESCRIPTION	APPD
1				
2				
3				
4				
5				
6				

Appendix 3: Emergency Stop Switch



Appendix 4: I/O Cable

J100M

25PinD型接頭(公)

J101M

25PinD型接頭(公)

Pin Assignment

J100M	Color	J101M	Color	J101M
1	白	1	棕-綠	14
2	棕	2	白-棕	15
3	綠	3	黃-棕	16
4	黃	4	白-灰	17
5	灰	5	灰-棕	18
6	粉	6	白-粉	19
7	藍	7	粉-棕	20
8	紅	8	白-藍	21
9	黑	9	棕-藍	22
10	紫	10	白-紅	23
11	灰-粉	11	棕-紅	24
12	紅-藍	12	白-黑	25
13	白-綠	13	Case	Case

<p style="text-align: center;">Note</p> <p style="text-align: center;">派工單號 NAME DWG NO</p>	
--	--

ITEM	DATE	MODIFIED	DESCRIPTION	APPD

序	品名	品號	規格	數量

DATE Jan.11.16	DATE	DIRN	黃鈺傑
CHK	陳幸丞	APPRO	蕭志茂
PART NO	HE00EE00400	NAME	Robot I/O
DWG NO	EEX004	SHEET	1-1

Appendix 5: HIWIN MOTOR 100W

1.509353 2 100007478 2015/10/02 5 6 7 8 9

HIWIN CONFIDENTIAL
機密文件未經許可，嚴禁複製

Power Pin Assignment

Signal	Molex	Color
U	3	Red
V	2	White
W	1	Black
⊕	4	Green
B+	5	Black
B-	6	Black

Connector A

Encoder Pin Assignment

Function	Signal	AMP-1	Color
Power	5V	1	Red
Incremental Signal	0V	2	Black
SD +	+	7	Blue
SD -	-	8	Blue/Black
shielding	shielding	9	Black
Battery	VB	5	Brown
	GND	6	Brown/Black

Connector B

Rate Power : 100W
 Driver Input Voltage : 220V
 Rated Torque : 0.32N-m
 Rated Speed : 3000 rpm
 Rated Current : 0.9A(Arms)
 Encoder : 17-bit Absolute
 Brake : Yes
 Shaft : Key, Center tap
 Oil seal : No

料號 465400KV (1)

劉向倫 10/2

NAME	DWG NO	SHEET	TYPE	DATE
AC SERVO MOTOR	ACS2045 A1	1-1	CUSTOMER	10/2/2015.09.24
		SCALE	1 : X	REV
		PART NO	FRMS102B4003	CHK
				APP

HIWIN® MICROSYSTEM CORP.

Appendix 6: HIWIN MOTOR 200W

123456789

HIWIN CONFIDENTIAL

機密文件未經許可，嚴禁複製

Torque(N·m)

Speed(rpm)

Encoder Pin Assignment		
Function	Signal	AMP-1-172169-9 Color
Power	5V	1 Red
	0V	2 Black
Incremental Signal	SD +	7 Blue
	SD -	8 Blue/Black
Shielding	Shielding	9 Black
	VB	5 Brown
Battery	GND	6 Brown/Black

Connector A

Power Pin Assignment		
Signal	Molex 5557-06R-210	Color
U	3	Red
V	2	White
W	1	Black
⊕	4	Green
B+	5	Black
B-	6	Black

Connector B

Encoder Pin Assignment		
Function	Signal	AMP-1-172169-9 Color
Power	5V	1 Red
	0V	2 Black
Incremental Signal	SD +	7 Blue
	SD -	8 Blue/Black
Shielding	Shielding	9 Black
	VB	5 Brown
Battery	GND	6 Brown/Black

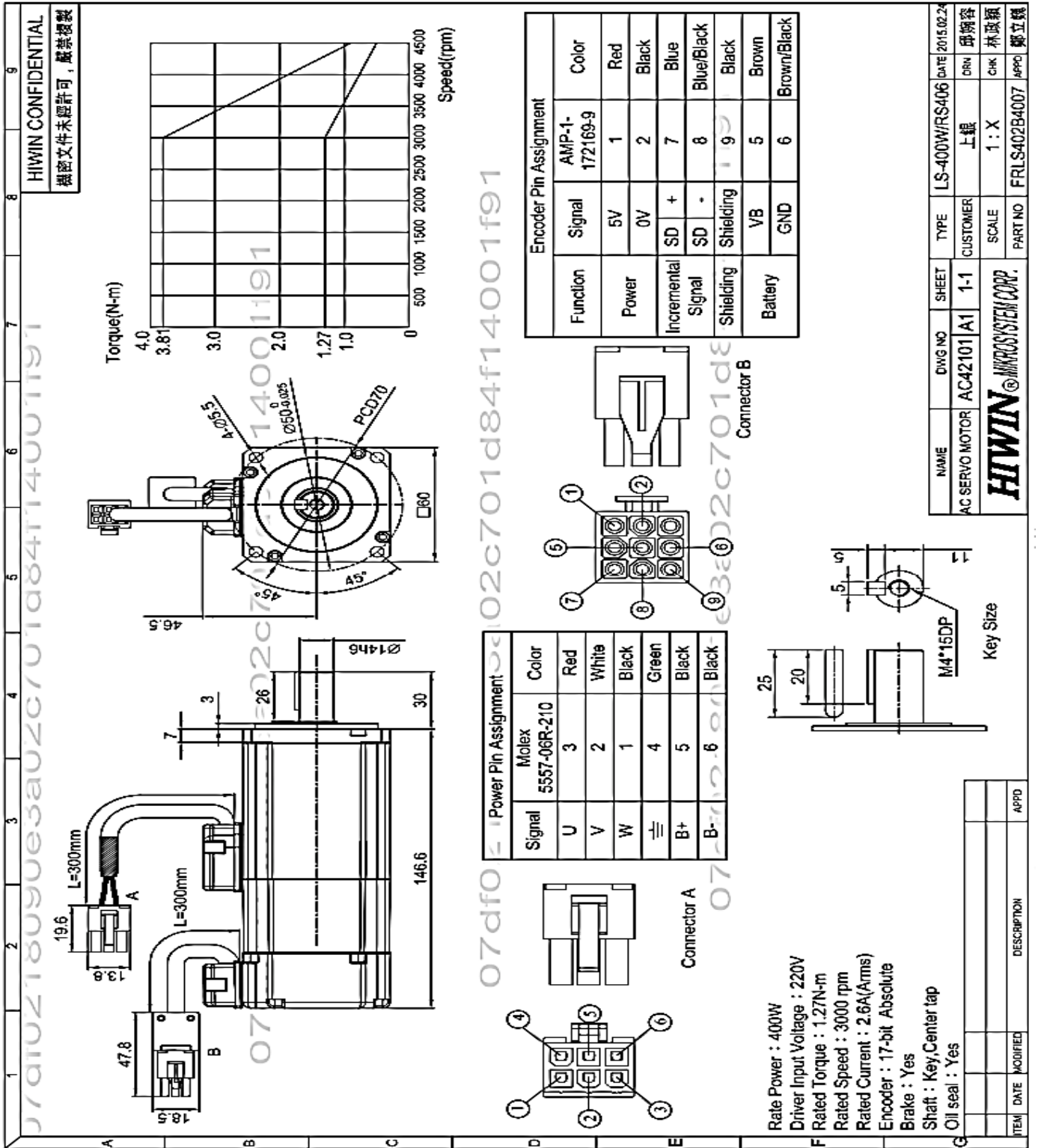
Key Size

Rate Power : 200W
 Driver Input Voltage : 220V
 Rated Torque : 0.64N·m
 Rated Speed : 3000 rpm
 Rated Current : 1.7A(Arms)
 Encoder : 17-bit Absolute
 Brake : Yes
 Shaft : Key,Center tap
 Oil seal : No

ITEM	DATE	MODIFIED	DESCRIPTION	APPD

NAME	DWG NO	SHEET	TYPE	DATE
AC SERVO MOTOR	AC42100 A1	1-1	LS-200W/RS406	2015.01.21
CUSTOMER			SCALE	DRN
			1 : X	林廷翰
PART NO			APPRO	CHK
FRLS202B4008			1 : X	郭立霖
				江新安

Appendix 7: HIWIN MOTOR 400W



SCARA Robot Controller User Manual

Publication Date : March 2018, first edition

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