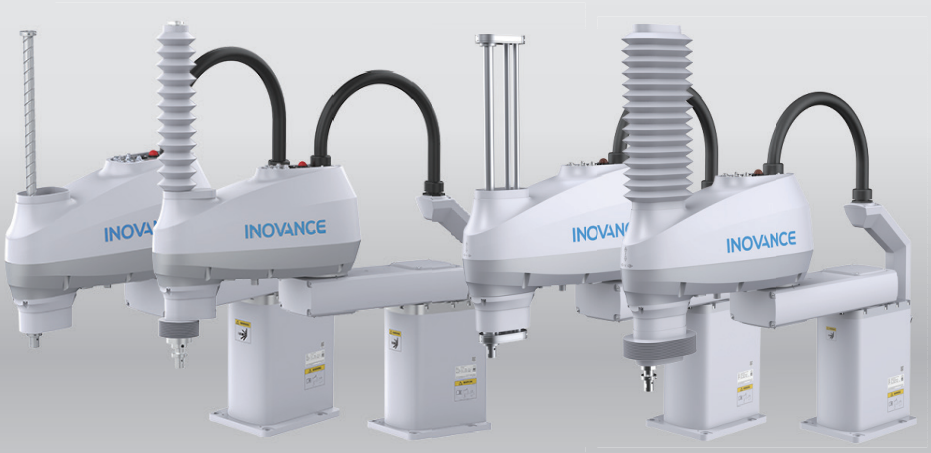
INOVANCE

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IR-S25&S35-INT Series SCARA Robot

User Guide - Manipulator

Industrial Automation | New Energy Vehicle | Intelligent Elevator | Intelligent Robot | Digital Energy | Rail Transit

Data code PS00021730A02

Legal Information

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Disclaimer of Liability

Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

The contents are subject to change without notice due to product upgrade.

Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

The IR-S25&S35 series robots are the medium-payload platform products within Inovance Technology's SCARA robot lineup. The IR-S25 series robot features a maximum payload of 25 kg and a Z-axis stroke of 420 mm (360 mm for cleanroom model). The IR-S35 series robot features a maximum payload of 35 kg and a Z-axis stroke of 420 mm (350 mm for cleanroom model), with its J3 axis equipped with two plain shafts. The J4 axis of the entire IR-S25&S35 series robots is driven by a harmonic reducer to enhance the rigidity of Z-axis in the overturning direction when moving up and down under the operating conditions involving maximum stroke and large eccentric loads. The robot offers high inertia, strong rigidity and high precision.

This guide describes the basic specifications, installation, and maintenance of the product.

More Data

Data name	Data code	Description
IRCB501-INT Series Robot Controller User Guide	19012937	Describes the specifications, installation, and wiring of the IRCB501 series international version controller.
IR-TP200 Series Industrial Robot Teach Pendant User Guide	19012798	Describes the software-related operations of the IR-TP200 series teach pendant.
IR-S25&S35-INT SCARA Robot User Guide - Manipulator (this guide)	PS00021730	Describes the basic specifications, installation, and maintenance of the product.

Revision History

Revision Date	Version	Revision
2026-04	A02	Added related information about cleanroom models. • Updated *"5.2.1 Packaging Posture" on page 42*. • Updated *"5.2.2 Packaging Procedure" on page 44*. • Updated *"6.6 Wiring and Tubing" on page 57*.
2026-01	A01	Added related information about IR-S25 series models. • Updated *"2.1 Model and Nameplate" on page 16*. • Updated *"2.3 Outline Dimensions" on page 19*. • Updated *"2.4 Technical Specifications" on page 23*. • Updated *"3.4 Installation Space Requirements" on page 30*. • Updated *"5.2.1 Packaging Posture" on page 42*. • Updated *"6.3 Installing an End Effector" on page 49*. • Updated *"7.4 Standard Motion Range of J3" on page 63*. • Updated *"8.5.3 Zero Point Position of Each Joint" on page 84*.
2025-11	A00	Initial release

Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following ways:

- Visit *https://www.inovance.com/global*, choose Service&Support > Support > Documentation Download.
- Scan the QR code on the product with your smart phone.
- Scan the QR code below to install My Inovance app, where you can search for and download user guides.

Warranty Disclaimer

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is caused by proper operation of the user. Maintenance will be charged after the warranty period expires.

Within the warranty period, maintenance will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or unusual voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (such as natural disaster, earthquake, and lightning strike)

The maintenance is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see Product Warranty Card.

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1 Fundamental Safety Instructions

1.1 Safety Precautions

Safety Disclaimer

- This chapter presents essential safety instructions for a proper use of the equipment. Before operating the equipment, read through the guide and comprehend all the safety instructions. Failure to observe the safety instructions may result in death, severe personal injuries, or equipment damage.
- "DANGER", "WARNING", and "CAUTION" items in this guide do not indicate all safety precautions that need to be followed; instead, they just supplement the safety precautions.
- Use this product according to designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injuries or property damage caused by improper usage.

Safety Levels and Definitions



Indicates that failure to comply with the notice will result in severe personal injuries or even death.



Indicates that failure to comply with the notice may result in severe personal injuries or even death.



Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

Safety Precautions

- Drawings in the guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions.
- Operators must take mechanical precautions to protect personal safety and wear protective equipment, such as safety shoes, safety clothing, safety glasses, protective gloves, and protective sleeves.

Unpacking



- Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage or missing or damaged components upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.



- Before unpacking, check whether the outer package is intact, damaged, wet, damped, or deformed.
- Unpack the package in the correct layered sequence. Do not strike the package violently.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking.
- Check whether the package contents are consistent with the packing list before unpacking.

Storage and Transportation



- Large-scale or heavy equipment must be handled by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injuries or equipment damage.
- Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injuries or equipment damage.
- Never stand or stay below the equipment when the equipment is being hoisted by the hoisting equipment.
- When hoisting the equipment with a steel rope, ensure the equipment is hoisted at a constant speed without suffering from vibration or shock. Do not turn the equipment over or let the equipment stay hanging in the air. Failure to comply may result in personal injuries or equipment damage.



- Handle the product with care and mind your steps to prevent personal injuries or product damage.
- When handling the equipment with bare hands, hold the equipment casing firmly with care to prevent the equipment from falling and impact damage. Failure to comply may result in personal injuries.
- Store and transport the equipment based on the storage and transportation requirements. Failure to comply will result in equipment damage.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the product for more than 3 months. When the product needs to be stored for an extended period, take more strict protection and necessary inspection.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport the equipment with other equipment or materials that may harm or have negative impacts on this equipment.

Installation
 • The equipment can only be operated by professionals with electrical knowledge. Non-professionals are not allowed to operate on the equipment.
 • Read through the guide and safety precautions before installation. • Do not install the equipment in places with strong electric or magnetic fields. • Before installation, check that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards. • Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock. • When installing the equipment (such as controller) in a closed environment (such as a cabinet or casing), use a cooling device (such as a fan or air conditioner) to cool the environment down to the required temperature. Failure to comply may result in equipment over-temperature or a fire. • Do not retrofit the equipment. • Do not loosen the fixing bolts of the product parts and components. • When the equipment (such as controller) is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations. • Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction. • Install the product on an incombustible object such as metal and do not touch or attach the product to combustibles. Failure to comply can result in fire accident.
 • Cover the top of the equipment (such as controller) with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the cloth or paper on top of the equipment to prevent over-temperature caused by poor ventilation due to blocked ventilation holes.

Wiring



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Before wiring, disconnect the power supplies of all equipments. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. Measure the direct voltage of the main circuit and ensure that the voltage is within the safety range. Failure to comply can result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the circuit board with power ON. Failure to comply can result in an electric shock.
- Check that the equipment is grounded properly. Failure to comply can result in an electric shock.



- Do not connect the input power supply to the output side of the equipment. Failure to comply can result in equipment damage or even a fire.
- When connecting a drive to the motor, check that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- Tighten the terminal screws with the tightening torque specified in the user guide. Improper tightening torque may result in overheat, damage to the connecting parts, or a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in electric shock or equipment damage.



- Follow the electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply can result in equipment malfunction.

Power-On
 • Before power-on, check that the equipment is installed properly with reliable wiring and the motor can be restarted. • Check that the power supply meets equipment requirements before power-on to prevent equipment damage or a fire. • Do not open the cabinet door or protective cover of the product, touch any wiring terminal of the product, or remove any part of the product with power on. Failure to comply can result in an electric shock.
 • After the completion of wiring and parameter setting, perform a robot test run to confirm that the robot can operate safely. Failure to comply may result in personal injuries or equipment damage. • Before power-on, check that the rated voltage of the equipment is consistent with that of the power supply. Failure to comply may result in fire accident. • Before power-on, check that no one is near the equipment, motor, or machine. Failure to comply may result in death or personal injuries.

Operation
 • The equipment must be operated only by professionals. Failure to comply can result in death or personal injuries. • Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply can result in an electric shock.
 • Do not touch the equipment enclosure, fan, or resistor with bare hands. Failure to comply may result in burns. • Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage.

Maintenance



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply can result in an electric shock.
- Before maintenance, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.
- When a permanent magnet motor is used, do not touch the motor terminals immediately after power-off because the motor terminals can generate induced voltage during rotation even after the equipment is powered off. Failure to comply can result in an electric shock.



- Perform routine and regular inspection and maintenance on the equipment in accordance with maintenance requirements and keep a record.

Repair



- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply can result in an electric shock.
- Before inspection and repair, cut off all the power supplies of the equipment and wait for at least the time designated on the equipment warning label.



- Submit a request for repair services in accordance with the product warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait for at least the time designated on the equipment warning label before power-on or further operations. Failure to comply may result in death, personal injuries or equipment damage.
- Troubleshooting and repair must be performed by professionals in accordance with the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment in accordance with the replacement instructions.
- Do not operate on damaged equipment. Failure to comply may result in death, personal injuries, or severe equipment damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal
WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in death, personal injuries, or property damage. • Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution.

Safety Label

For safe operation and maintenance, comply with the safety labels on the equipment. Do not damage or remove the safety labels. See the following table for descriptions of the safety labels.

To ensure safe operation, comply with equipment-related safety labels. See the following table for descriptions of the safety labels.

Safety Label	Description
	• Read through the safety instructions before operating the equipment. Failure to comply may result in death, personal injuries, or equipment damage. • Do not touch the terminals or remove the cover with power ON or within 10 min after power-off. Failure to comply can result in an electric shock.

1.2 Industrial Information Security

The product provides an interface to connect to the network and transmits data through the network interface. To protect factories, systems, machines, and networks from cyber attacks and ensure safe operation, a proper industrial information security protection mechanism must be implemented.

The customer is responsible for providing and continuously ensuring a secure connection between the product and the customer network or any other network to prevent unauthorized access to its factories, systems, machines, and networks. The system or machine can be connected to the corporate network or the Internet only when secure connections are ensured and appropriate security measures are taken (for example, anti-virus software or firewall installed).

Inovance continuously develops and improves products and solutions to improve safety. It is strongly recommended that you update the product promptly and always use the latest version.

CAUTION

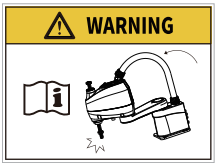
Malware (such as viruses, Trojans, and worms) can put the product in an unsafe running state, which may result in death, serious injuries, and property damage. Observe the following precautions:

- Always use the latest software version. If the product version is no longer supported or the latest version is not used, customers will be exposed to increased risk of cyber attacks.
- Take appropriate protection measures (including but not limited to installing anti-virus software, firewall, WAF, IPS/IDS, and situation awareness system, and applying authentication, data encryption) to prevent files in mobile storage devices from being damaged by malware, and to prevent products, networks, systems, and interfaces from unauthorized access, interference, intrusion, data leakage, or information breach.
- Check all safety-related interfaces and settings after commissioning.

1.3 Safety Signs

The following signs are sticked on the robot body. Pay attention that special dangers exist around the positions sticked with safety signs. For safe equipment operation and maintenance, comply with safety signs on the equipment. Do not damage or remove the safety signs.

The following table lists the safety signs.

Safety sign	Name	Description
	Electric shock hazard	Indicates that ignoring this safety sign may result in serious consequences such as equipment damage, electric shock, or personal injury.
	Crush hazard	Indicates that ignoring this safety sign may result in serious consequences such as equipment impact, damage, personnel injury, or death.
	Tip-over hazard	Indicates that ignoring this safety sign may result in serious consequences such as equipment tipping over, falling down, damage, or personnel injury.

2 产品信息

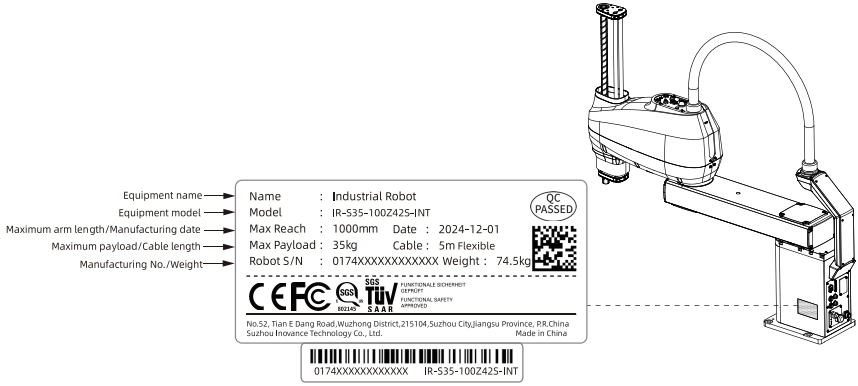
2.1 Model and Nameplate

IR - S 35 - 100 Z42 S - INT
① ② ③ ④ ⑤ ⑥ ⑦

①	**Product family** INOVANCE Robot	④	**Arm length** 80: 800 mm 100: 1000 mm 120: 1200 mm	⑦	**Version** INT: International (with functional safety)
②	**Series** S: SCARA robot CS: Cost-effective SCARA robot GS: High performance SCARA robot	⑤	**Max. Z-axis stroke** Z42: Max. 420 mm stroke	-	
③	**Payload** 25: Max. 25 kg load 35: Max. 35 kg load	⑥	**Installation environment** S: Standard model C: Cleanroom model		

Note

The product information in this guide is the information of standard and cleanroom models. For information about non-standard models, contact the provider.



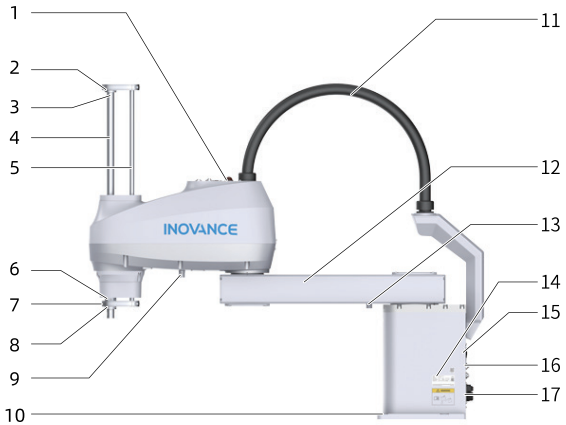
CAUTION

Do not wipe the robot hard with anhydrous ethanol or benzene. Otherwise, the coated surface may lose gloss.

Note

The certification information in the above nameplate is for illustrative purposes only; Refer to the actual product certification for specific details.

2.2 Components



No.	Description
1	Run indicator
2	Upper bearing housing[1]
3	J3 upper mechanical stop
4	Ball screw of J3
5	Plain shaft[1]
6	J3 lower mechanical stop[1]
7	Lower bearing housing[1]
8	Mechanical stop of bearing housing
9	J2 mechanical stop
10	Base

No.	Description
11	Cable unit
12	J1 arm
13	J1 mechanical stop
14	Nameplate
15	User connector (D-Sub, network port)
16	Air tube connector
17	Signal cable (up), power cable (down)

Note

[1]: Only available for the IR-S35 series, not for the IR-S25 series.

2.3 Outline Dimensions

IR-S25 series standard model

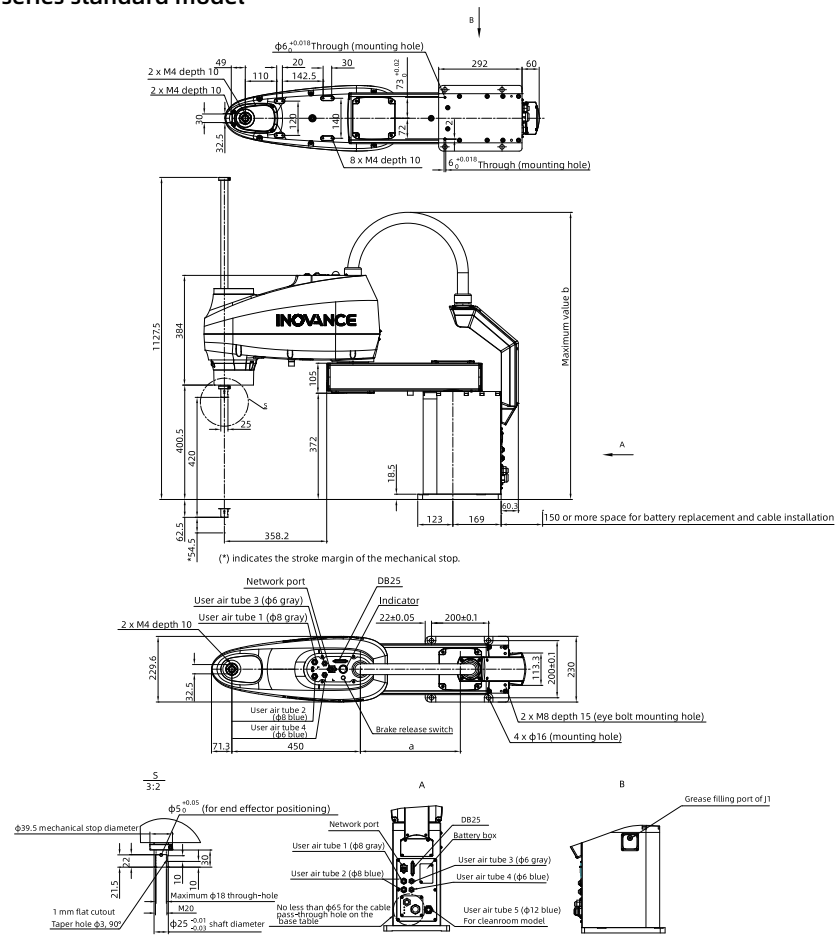


Figure 2-1 Outline dimensions (unit: mm)

Table 2–1 Parameters of IR-S25 series standard robots with different arm lengths

Model	IR-S25-80Z42S-INT	IR-S25-100Z42S-INT	IR-S25-120Z42S-INT
a	350	550	750
b	1040	1140	1240

IR-S25 series cleanroom model

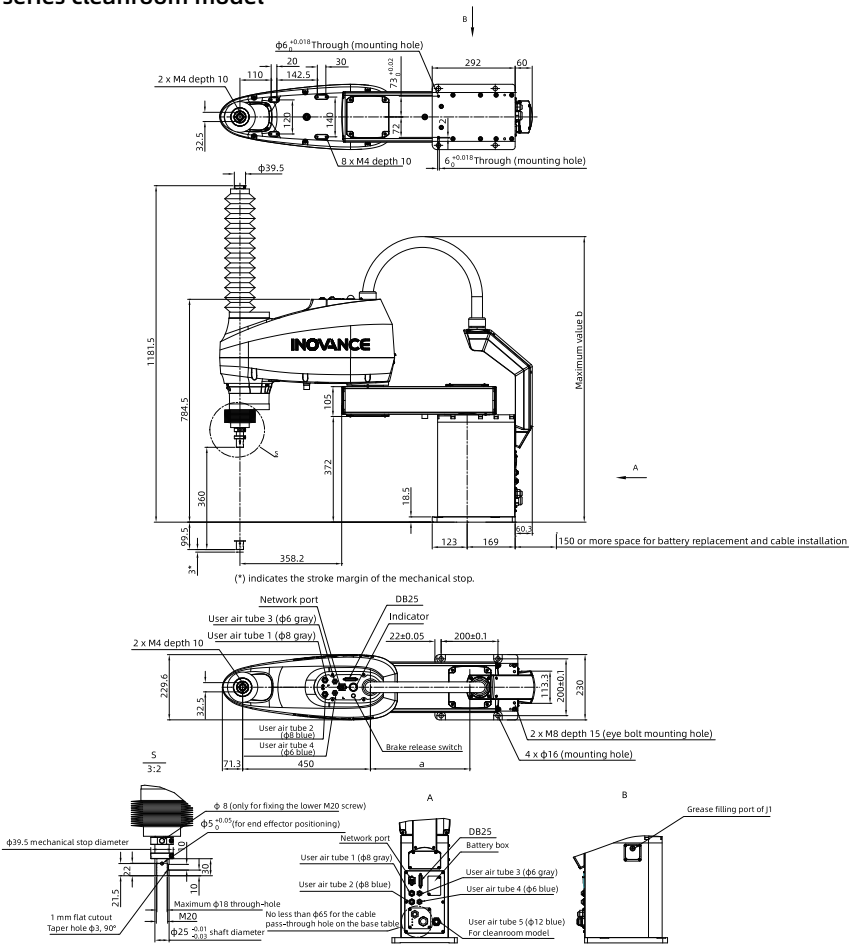


Figure 2-2 Outline dimensions (unit: mm)

Table 2–2 Parameters of IR-S25 series cleanroom robots with different arm lengths

Model	IR-S25-80Z36C-INT	IR-S25-100Z36C-INT
a	350	550
b	1040	1140

IR-S35 series standard model

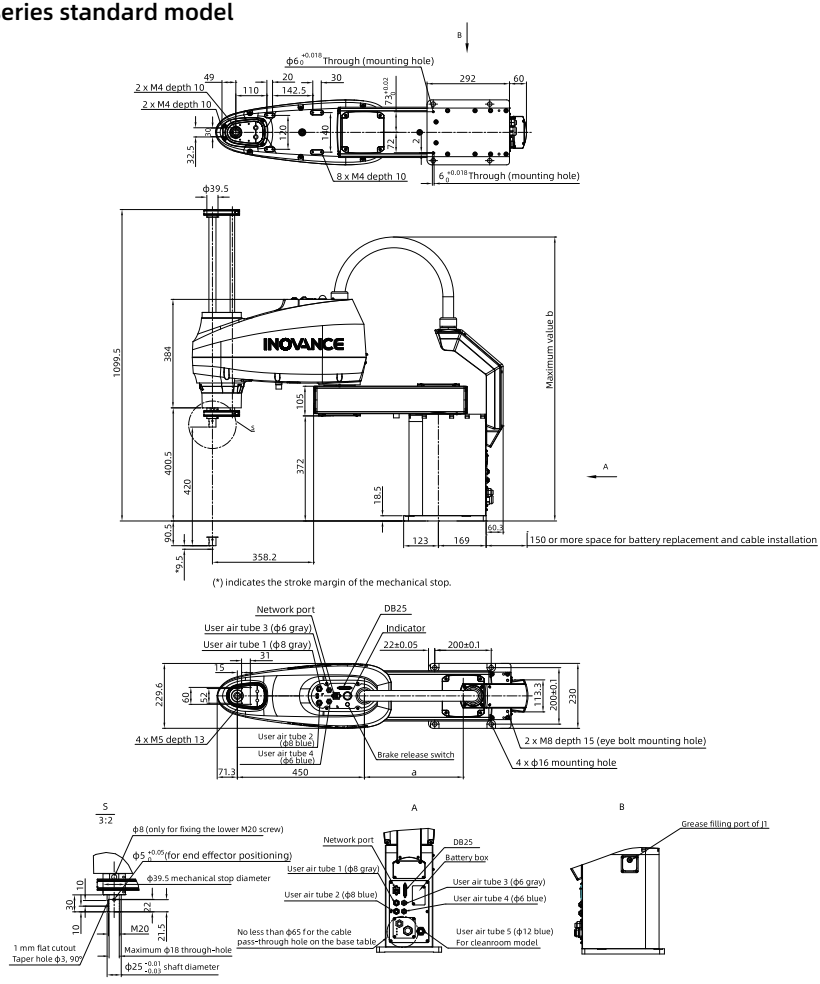


Figure 2-3 Outline dimensions (unit: mm)

Table 2–3 Parameters of IR-S35 series standard robots with different arm lengths

Model	IR-S35-80Z42S-INT	IR-S35-100Z42S-INT	IR-S35-120Z42S-INT
a	350	550	750
b	1040	1140	1240

IR-S35 series cleanroom model

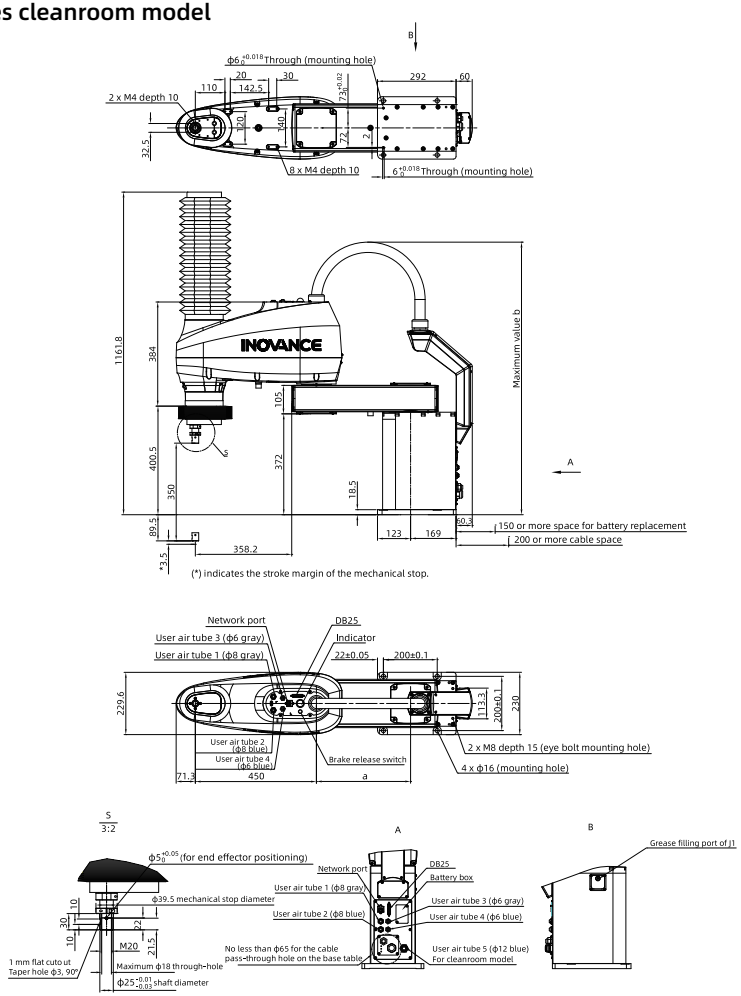


Figure 2-4 Outline dimensions (unit: mm)

Table 2–4 Parameters of IR-S35 series cleanroom robots with different arm lengths

Model	IR-S35-80Z35C-INT	IR-S35-100Z35C-INT
a	350	550
b	1040	1140

Note

View B is the rear view of the product obtained by rotating the product 180° from its front view position.

2.4 Technical Specifications

Table 2–5 Technical specifications of IR-S25 series standard model

Item		IR-S25-80Z42S-INT	IR-S25-100Z42S-INT	IR-S25-120Z42S-INT
Arm length	Arm 1 + Arm 2	800 mm	1000 mm	1200 mm
	Arm 1	350 mm	550 mm	750 mm
	Arm 2	450 mm	450 mm	450 mm
Maximum speed	J1 + J2	8100 mm/s	9400 mm/s	9400 mm/s
	J3	2100 mm/s	2100 mm/s	1200 mm/s
	J4	705°/s	705°/s	705°/s
Repeatability	J1 + J2	±0.05 mm	±0.05 mm	±0.08 mm
	J3	±0.01 mm	±0.01 mm	±0.01 mm
	J4	±0.01°	±0.01°	±0.01°
Handling capacity (load)	Rated	10 kg	10 kg	10 kg
	Max.	25 kg	25 kg	25 kg
Allowable load inertia of J4	Rated	0.5 kg·m²	0.5 kg·m²	0.5 kg·m²
	Max.	1.2 kg·m²	1.2 kg·m²	1.2 kg·m²
Mounting hole	Mounting hole	200 mm x 200 mm (4 x Φ16 mm)	200 mm x 200 mm (4 x Φ16 mm)	200 mm x 200 mm (4 x Φ16 mm)
Manipulator weight (excluding cables)	Manipulator weight (excluding cables)	68.5 kg	72.5 kg	78 kg
Press-in force of J3	Press-in force of J3	250 N	250 N	250 N
Signal line	Wiring	25x signal, 30 V, 0.5 A	25x signal, 30 V, 0.5 A	25x signal, 30 V, 0.5 A
	Network port	CAT5e	CAT5e	CAT5e
User tubing	User tubing	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa
Ambient condition	Operating temperature[1]	5°C to 40°C	5°C to 40°C	5°C to 40°C
	Operating humidity	10%RH to 80%RH	10%RH to 80%RH	10%RH to 80%RH
Noise level	Noise level[2]	L Aeq ≤ 80 dB(A)	L Aeq ≤ 80 dB(A)	L Aeq ≤ 80 dB(A)

Item		IR-S25-80Z42S-INT	IR-S25-100Z42S-INT	IR-S25-120Z42S-INT
Maximum motion range	J1	±139°	±139°	±139°
	J2	±151°	±151°	±151°
	J3	420 mm	420 mm	420 mm
	J4	±360°	±360°	±360°
Cycle time	Cycle time[3]	0.33s	0.35s	0.40s
Input power (average power consumption)	Input power (average power consumption)	2 kVA (0.3 kW)	2 kVA (0.3 kW)	2 kVA (0.3 kW)
Matching controller (Standard)	Matching controller (Standard)	IRCB501-4ED-INT	IRCB501-4ED-INT	IRCB501-4ED-INT
Mounting method	Mounting method	Tabletop	Tabletop	Tabletop
Certification compliance	CE certification, cSGSus certification, FCC certification, and functional safety certification (only supported by "-INT" controller and requires a functional safety expansion card), KCs certification (refer to the certifications for the certified models).			

Table 2–6 Technical specifications of IR-S25 series cleanroom model

Item		IR-S25-80Z36C-INT	IR-S25-100Z36C-INT
Arm length	Arm 1 + Arm 2	800 mm	1000 mm
	Arm 1	350 mm	550 mm
	Arm 2	450 mm	450 mm
Maximum speed	J1 + J2	8100 mm/s	9400 mm/s
	J3	2100 mm/s	2100 mm/s
	J4	705°/s	705°/s
Repeatability	J1 + J2	±0.05 mm	±0.05 mm
	J3	±0.01 mm	±0.01 mm
	J4	±0.01°	±0.01°
Handling capacity (load)	Rated	10 kg	10 kg
	Max.	25 kg	25 kg
Allowable load inertia of J4	Rated	0.5 kg·m²	0.5 kg·m²
	Max.	1.2 kg·m²	1.2 kg·m²
Mounting hole	Mounting hole	200 mm x 200 mm (4 x Φ16 mm)	200 mm x 200 mm (4 x Φ16 mm)
Manipulator weight (excluding cables)	Manipulator weight (excluding cables)	70 kg	74 kg
Press-in force of J3	Press-in force of J3	250 N	250 N
Signal line	Wiring	25x signal, 30 V, 0.5 A	25x signal, 30 V, 0.5 A
	Network port	CAT5e	CAT5e
User tubing	User tubing	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa

Item		IR-S25-80Z36C-INT	IR-S25-100Z36C-INT
Ambient condition	Operating temperature[1]	5°C to 40°C	5°C to 40°C
	Operating humidity	10%RH to 80%RH	10%RH to 80%RH
Noise level	Noise level[2]	L Aeq ≤ 80 dB(A)	L Aeq ≤ 80 dB(A)
Maximum motion range	J1	±139°	±139°
	J2	±151°	±151°
	J3	360 mm	360 mm
	J4	±360°	±360°
Cycle time	Cycle time[3]	0.35s	0.37s
Input power (average power consumption)	Input power (average power consumption)	2 kVA (0.3 kW)	2 kVA (0.3 kW)
Matching controller (Standard)	Matching controller (Standard)	IRCB501-4ED	IRCB501-4ED
Mounting method	Mounting method	Tabletop	Tabletop
Certification compliance	CE certification, cSGSus certification, FCC certification, and functional safety certification (only supported by "-INT" controller and requires a functional safety expansion card), KCs certification (refer to the certifications for the certified models).		

Table 2–7 Technical specifications of IR-S35 series standard model

Item		IR-S35-80Z42S-INT	IR-S35-100Z42S-INT	IR-S35-120Z42S-INT
Arm length	Arm 1 + Arm 2	800 mm	1000 mm	1200 mm
	Arm 1	350 mm	550 mm	750 mm
	Arm 2	450 mm	450 mm	450 mm
Maximum speed	J1 + J2	8100 mm/s	9400 mm/s	9400 mm/s
	J3	2100 mm/s	2100 mm/s	1200 mm/s
	J4	705°/s	705°/s	705°/s
Repeatability	J1 + J2	±0.05 mm	±0.05 mm	±0.08 mm
	J3	±0.01 mm	±0.01 mm	±0.01 mm
	J4	±0.01°	±0.01°	±0.01°
Handling capacity (load)	Rated	20 kg	20 kg	20 kg
	Max.	35 kg	35 kg	35 kg
Allowable load inertia of J4	Rated	0.6 kg·m²	0.6 kg·m²	0.6 kg·m²
	Max.	1.2 kg·m²	1.2 kg·m²	1.2 kg·m²
Mounting hole	Mounting hole	200 mm x 200 mm (4 x Φ16 mm)	200 mm x 200 mm (4 x Φ16 mm)	200 mm x 200 mm (4 x Φ16 mm)
Manipulator weight (excluding cables)	Manipulator weight (excluding cables)	70.5 kg	74.5 kg	80.5 kg
Press-in force of J3	Press-in force of J3	250 N	250 N	250 N
Signal line	Wiring	25x signal, 30 V, 0.5 A	25x signal, 30 V, 0.5 A	25x signal, 30 V, 0.5 A
	Network port	CAT5e	CAT5e	CAT5e

Item		IR-S35-80Z42S-INT	IR-S35-100Z42S-INT	IR-S35-120Z42S-INT
User tubing	User tubing	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa
Ambient condition	Operating temperature[1]	5°C to 40°C	5°C to 40°C	5°C to 40°C
	Operating humidity	10%RH to 80%RH	10%RH to 80%RH	10%RH to 80%RH
Noise level	Noise level[2]	$L_{Aeq} \leq 80$ dB(A)	$L_{Aeq} \leq 80$ dB(A)	$L_{Aeq} \leq 80$ dB(A)
Maximum motion range	J1	±139°	±139°	±139°
	J2	±151°	±151°	±151°
	J3	420 mm	420 mm	420 mm
	J4	±360°	±360°	±360°
Cycle time	Cycle time[3]	0.31s	0.33s	0.42s
Input power (average power consumption)	Input power (average power consumption)	2 kVA (0.3 kW)	2 kVA (0.3 kW)	2 kVA (0.3 kW)
Matching controller (Standard)	Matching controller (Standard)	IRCB501-4ED	IRCB501-4ED	IRCB501-4ED
Mounting method	Mounting method	IRCB501-4ED-INT	IRCB501-4ED-INT	IRCB501-4ED-INT
Certification compliance	CE certification, cSGSus certification, FCC certification, and functional safety certification (only supported by "-INT" controller and requires a functional safety expansion card), KCs certification (refer to the certifications for the certified models).			

Table 2–8 Technical specifications of IR-S35 series cleanroom model

Item		IR-S35-80Z35C-INT	IR-S35-100Z35C-INT
Arm length	Arm 1 + Arm 2	800 mm	1000 mm
	Arm 1	350 mm	550 mm
	Arm 2	450 mm	450 mm
Maximum speed	J1 + J2	8100 mm/s	9400 mm/s
	J3	2100 mm/s	2100 mm/s
	J4	705°/s	705°/s
Repeatability	J1 + J2	±0.05 mm	±0.05 mm
	J3	±0.01 mm	±0.01 mm
	J4	±0.01°	±0.01°
Handling capacity (load)	Rated	20 kg	20 kg
	Max.	35 kg	35 kg
Allowable load inertia of J4	Rated	0.6 kg·m²	0.6 kg·m²
	Max.	1.2 kg·m²	1.2 kg·m²
Mounting hole	Mounting hole	200 mm x 200 mm (4 x Φ16 mm)	200 mm x 200 mm (4 x Φ16 mm)
Manipulator weight (excluding cables)	Manipulator weight (excluding cables)	72.5 kg	76.5 kg
Press-in force of J3	Press-in force of J3	250 N	250 N

Item		IR-S35-80Z35C-INT	IR-S35-100Z35C-INT
Signal line	Wiring	25x signal, 30 V, 0.5 A	25x signal, 30 V, 0.5 A
	Network port	CAT5e	CAT5e
User tubing	User tubing	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa	Air tube: Φ6 mm x 2, Φ8 mm x 2 Pressure resistance: 0.59 MPa
Ambient condition	Operating temperature[1]	5°C to 40°C	5°C to 40°C
	Operating humidity	10%RH to 80%RH	10%RH to 80%RH
Noise level	Noise level[2]	L Aeq ≤ 80 dB(A)	L Aeq ≤ 80 dB(A)
Maximum motion range	J1	±139°	±139°
	J2	±151°	±151°
	J3	350 mm	350 mm
	J4	±360°	±360°
Cycle time	Cycle time[3]	0.33s	0.35s
Input power (average power consumption)	Input power (average power consumption)	2 kVA (0.3 kW)	2 kVA (0.3 kW)
Matching controller (Standard)	Matching controller (Standard)	IRCB501-4ED	IRCB501-4ED
Mounting method	Mounting method	Tabletop	Tabletop
Certification compliance	CE certification, cSGSus certification, FCC certification, and functional safety certification (only supported by "-INT" controller and requires a functional safety expansion card), KCs certification (refer to the certifications for the certified models).		

Note

[1] When used in a low-temperature environment approximating the lowest allowable temperature, or when idle for a long period of time due to holidays and nighttime, it is recommended to warm up the product for 10 minutes before operating it.

[2] Measured in front of the robot at a distance of 1000 mm from its operating area and at least 50 mm above the base mounting surface with four joints operating at 100% speed and acceleration, with a duty cycle of 50%.

[3] Time required for a robot to move a 2 kg payload between two points 300 mm apart at a height of 25 mm.

3 Preparation

3.1 Installation Personnel Requirements

- Ensure that the installation personnel have obtained mechanics knowledge or received mechanics training in advance to understand various dangers and risks in the installation process.
- The installation personnel must be familiar with the installation requirements and relevant technical information.
- Product installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.

3.2 Installation Environment Requirements

General environmental requirements

Set up the robot system in an environment that meets the following conditions to ensure its performance and safe operation.

Table 3–1 Ambient condition

Item	Requirement
Operating temperature/ humidity	• Temperature: 5°C to 40°C • Humidity: 10%RH to 80%RH (without condensation)
Storage temperature/ humidity	• Temperature: -10°C to +55°C • Humidity: ≤ 80% RH (without condensation)
Transportation temperature and humidity	• Temperature: -10°C to +55°C • Humidity: ≤ 80% RH (without condensation)
EFT/B immunity	≤ 2 kV
Static immunity	≤ 6 kV
Environment	• Indoor • Keep away from direct sunlight. • Keep away from dust, oil smoke, salt, iron filings • Keep away from flammable and corrosive liquids and gases • Keep away from water • Avoid places with shocks or vibrations • Keep away from sources of electrical interference

Special environmental requirements

- The surface of the robot provides certain protection. However, contact your provider and confirm in advance if the robot may come into contact with special liquid or gas during use.

- There may be condensation inside the robot if it is used in an environment with large changes in temperature and humidity. Consult your provider.
- If you want to use the robot to handle food directly, consult your provider in advance to avoid contamination of the food by the robot.

Note

- The robot is not suitable for use in harsh environments such as explosive spraying operations. Contact your provider if the robot needs to be used in an environment that does not meet the preceding conditions.
- The EMC test is performed according to IEC 61800-3:2017.



Do not wipe the robot hard with anhydrous ethanol or benzene. Otherwise, the coated surface may lose gloss.

3.3 Installation Base Table Requirements

You need to make a base table to secure the robot. The shape and size of the base table vary depending on the purpose of the robot system. You may refer to the following requirements when designing a base table.

- The base table supports not only the weight of the robot, but also the dynamic forces produced by the robot when it moves at maximum acceleration. Ensure that the base table has sufficient bearing capacity by reinforcing it with materials like connecting beams.
- Consider the following torques and reaction forces produced by movements of the robot:

Maximum torque in horizontal plane (N·m)	Maximum reaction force in horizontal direction (N)	Maximum reaction force in vertical direction (N)
1000	7500	2000

- Use M12 or M14 threaded holes on the base table to mount the robot. Use screws with a strength equivalent to the performance level of Grade 10.9 or 12.9 specified in GB/T 3098.1. For details about the dimensions, see *"2.3 Outline Dimensions" on page 19*.
- The plate for the robot mounting face should be 20 mm thick or more and made of steel to reduce vibration. The surface roughness of the steel plate should be 25 μm or less.

- Secure the base table to the floor or wall to prevent any movement.
- Keep the Z-axis of the robot perpendicular to the horizontal plane during installation.
- The flatness of the robot installation surface should be within 0.5 mm, and the tilt should not exceed 0.5°. If the flatness of the installation surface is insufficient, it can cause damage to the robot base and affect the performance of the robot.
- Reserve enough space for the robot controller in the base table design. For details, see the "IRCB501-INT Series Robot Controller User Guide".

3.4 Installation Space Requirements

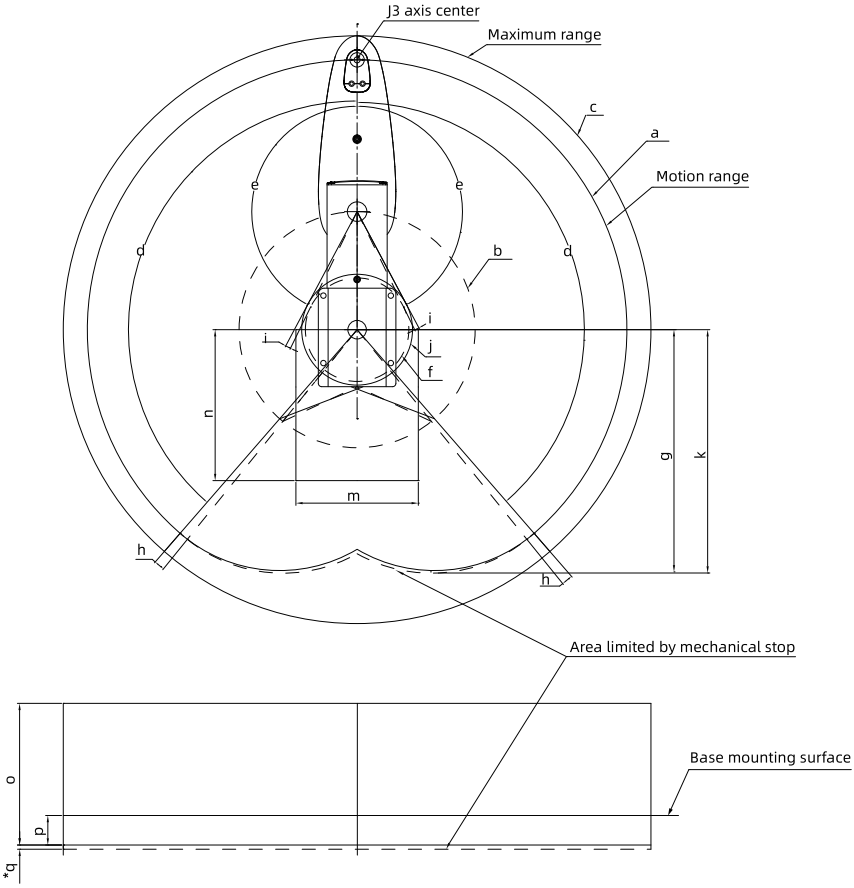


Figure 3-1 Robot motion range

Table 3–2 Motion range of IR-S25 series robot

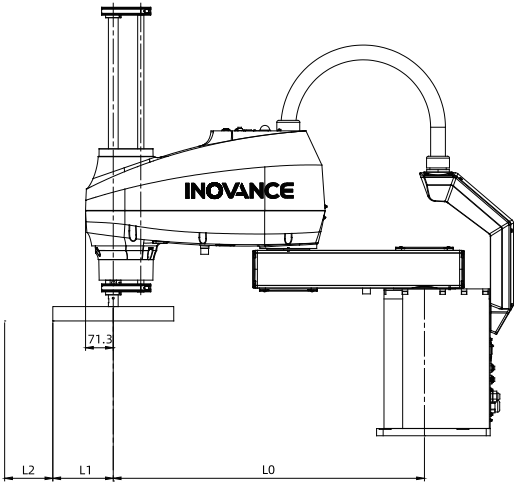
Model	IR-S25-80Z42S-INT	IR-S25-100Z42S-INT	IR-S25-120Z42S-INT	IR-S25-80Z36C-INT	IR-S25-100Z36C-INT
a. Arm length of J1 + J2 (mm)	800	1000	1200	800	1000
b. Arm length of J1 (mm)	350	550	750	350	550
c. Maximum motion range (mm)	871.3	1071.3	1271.3	871.3	1071.3
d. Motion range of J1 (°)	139	139	139	139	139
e. Motion range of J2 (°)	151	151	151	151	151
f. Motion range (mm)	164.3	258.2	417.9	164.3	258.2
g. Rear motion range (mm)	718	865	1016	718	865
h. Angle of mechanical stop position of J1 (°)	2	2	2	2	2
i. Angle of mechanical stop position of J2 (°)	2	2	2	2	2
j. Range of mechanical stop position (mm)	153.4	241.1	404.4	153.4	241.1
k. Range of rear mechanical stop position (mm)	721.4	877.2	1032.9	721.4	877.2
m. Motion range (mm)	363	165	165	363	165
n. Motion range (mm)	447.5	309	309	447.5	309
o. Stroke of J3 (mm)	420	420	420	360	360
p. Distance from the end of the lead screw to the base (mm)	62.5	62.5	62.5	89.5	89.5
q. Stroke margin of mechanical stop (mm)	54.5	54.5	54.5	3	3

Table 3–3 Motion range of IR-S35 series robot

Model	IR-S35-80Z42S-INT	IR-S35-100Z42S-INT	IR-S35-120Z42S-INT	IR-S35-80Z35C-INT	IR-S35-100Z35C-INT
a. Arm length of J1 + J2 (mm)	800	1000	1200	800	1000
b. Arm length of J1 (mm)	350	550	750	350	550
c. Maximum motion range (mm)	871.3	1071.3	1271.3	871.3	1071.3
d. Motion range of J1 (°)	139	139	139	139	139
e. Motion range of J2 (°)	151	151	151	151	151
f. Motion range (mm)	164.3	258.2	417.9	164.3	258.2
g. Rear motion range (mm)	718	865	1016	718	865
h. Angle of mechanical stop position of J1 (°)	2	2	2	2	2
i. Angle of mechanical stop position of J2 (°)	2	2	2	2	2
j. Range of mechanical stop position (mm)	153.4	241.1	404.4	153.4	241.1
k. Range of rear mechanical stop position (mm)	721.4	877.2	1032.9	721.4	877.2
m. Motion range (mm)	363	165	165	363	165
n. Motion range (mm)	447.5	309	309	447.5	309
o. Stroke of J3 (mm)	420	420	420	350	350
p. Distance from the end of the lead screw to the base (mm)	90.5	90.5	90.5	89.5	89.5
q. Stroke margin of mechanical stop (mm)	9.5	9.5	9.5	3.5	3.5

Maximum range

"Maximum range" is the area that contains the farthest reach of the arms. When an end effector with a radius of 71.3 mm or more is mounted, set the maximum range to the length of the two robot arms plus the radius of the end effector.



- L0: length of the robot arms
- L1: radius of the end effector
- L2: safety space
- The safety distance should be greater than L0+L1+L2.

3.5 Installation Tool Requirements

Table 3-4 Installation tools

Tool	Quantity (PCS)
M12 outer hexagon wrench	1
M12 inner hexagon wrench	1
Scissors or utility knife	1
Nail hammer	1
Protective gloves	1
Safety shoes	1
Hoisting sling	1
Forklift	1

4 Unpacking and Handling

4.1 Unpacking

4.1.1 Precautions for Unpacking



- Before unpacking, check that the outer package is intact and free from damage, water soaking, moisture, deformation, or other abnormalities.
- Unpack the package in the correct layered sequence. Do not strike the package violently.
- Check whether there is damage, rust, or injuries on the surface of the equipment and equipment accessories before unpacking.
- Check whether the package contents are consistent with the packing list before unpacking.



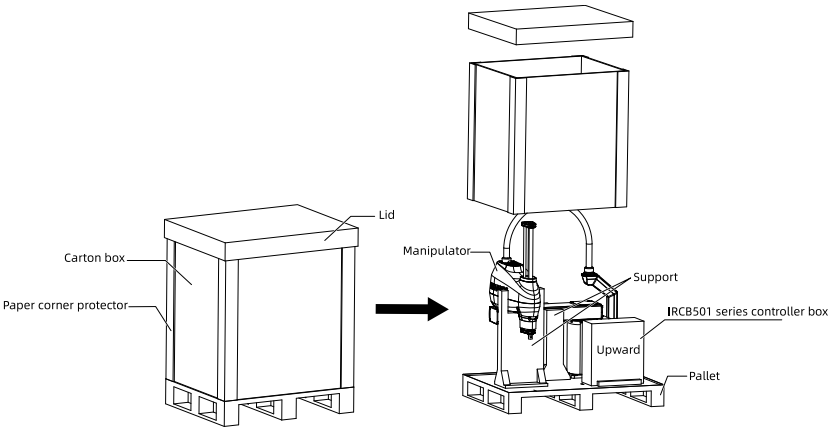
- Do not install the equipment if you find damage, rust, or indications of use on the equipment or accessories upon unpacking.
- Do not install the equipment if you find water seepage, component missing or damage upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.
- Unpack the packing box according to the direction instructed.

4.1.2 Unpacking Procedure

1. Unpack the carton.
   Cut the PET tape using scissors or a utility knife, and remove the lid of the carton and the paper corner protectors. Move the carton from bottom to top and remove it.

CAUTION

Wear gloves to prevent scratches.



2. Unpack the controller.

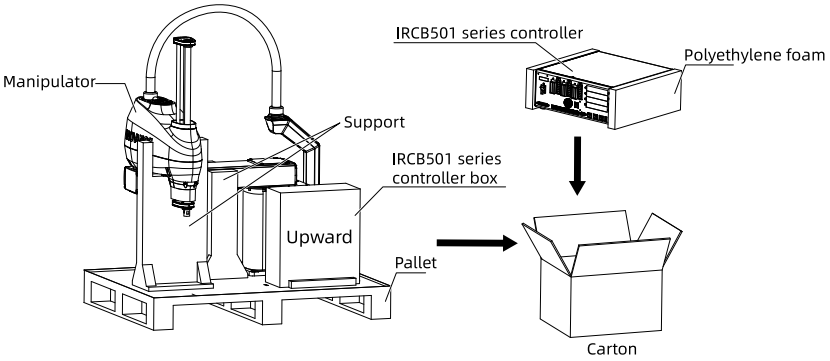
a. Cut off the packing straps that fix the carton for controller.

b. Move the carton to the open ground. Pay attention to the direction indicated on the carton.

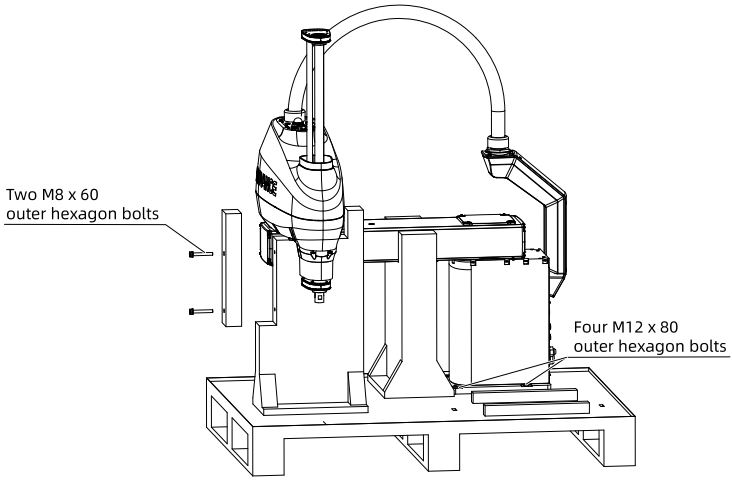
c. Cut the sealing tape on the surface of the carton, and then open the carton.

d. Firmly grasp the hand holes on both sides of the controller or hold the bottom of the controller, take the controller out of the carton and move it to the destination.

Tools: Scissors/Utility knife



3. Use an outer hexagon wrench to remove the two M8 x 60 outer hexagon bolts on the fixing plate of the robot forearm support. Then, remove the fixing plate from the support.
4. Use an outer hexagon wrench to remove the four M12 x 80 outer hexagon bolts that secure the robot base to the pallet.



5. Rotate the robot forearm to the left until it is parallel to the upper arm.
6. Take out the manipulator.

   Take out the robot from bottom to top, move the robot to the destination only after the bottom of the robot does not interfere with the top of the pallet. For details about handling, see *"4.2.3 Handling Procedure" on page 38*.

CAUTION

- Take out the robot carefully to avoid collision.
- Stabilize the manipulator when removing the bolts fixing the manipulator to avoid personal injury or equipment damage caused by titling of the equipment due to unstable center of gravity.
- To repack the robot, reverse the steps above.
- Wear protective gloves to prevent scratches and work carefully to prevent damaging the robot.

4.1.3 Post-Unpacking Inspection

Name	Quantity (PCS)
Manipulator	1
Robot controller	1
Inovance Product Warranty Card	1
Cable accessory kit	1
SEMS hexagon socket head cap screw M12×45-28×2.5	4
M12 Eye bolt (GB/T825)	1
M8 Eye bolt (GB/T825)	2

4.2 Handling

4.2.1 Precautions for Handling

Note

Only qualified personnel are allowed to carry out handling work including rigger operation, hoisting by crane, and forklift driving.

Note

- Keep the equipment in its original package when handling with a hoist or forklift.
- Wear personal protective equipment (PPE) when handling with a hoist or forklift. Prohibit personnel from standing or staying in the handling route.
- Ensure the equipment is balanced when hoisting. Unstable lifting may cause the equipment to fall, resulting in serious personal injury or significant equipment damage.

CAUTION

- Store and transport this equipment based on the storage and transportation requirements for humidity and temperature.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport this equipment with other equipment or materials that may harm or have negative impacts on this equipment.
- If condensation occurs on the equipment during transportation or storage, remove the condensation before turning on the power.

4.2.2 Pre-Handling Preparation

1. Before handling a newly shipped robot, keep it in the factory-set posture. For details about the posture, see *"5.2.1 Packaging Posture" on page 42*.
2. If the robot has been used and needs to be moved to another location, complete the following steps before handling:
   a. Disconnect all power supplies of the equipment.
   b. Disconnect the power and signal cables from the controller.
   c. Remove the bolts fixing the robot to the base and then remove the robot from the installation base.
   d. Secure the robot to the handling equipment.

4.2.3 Handling Procedure

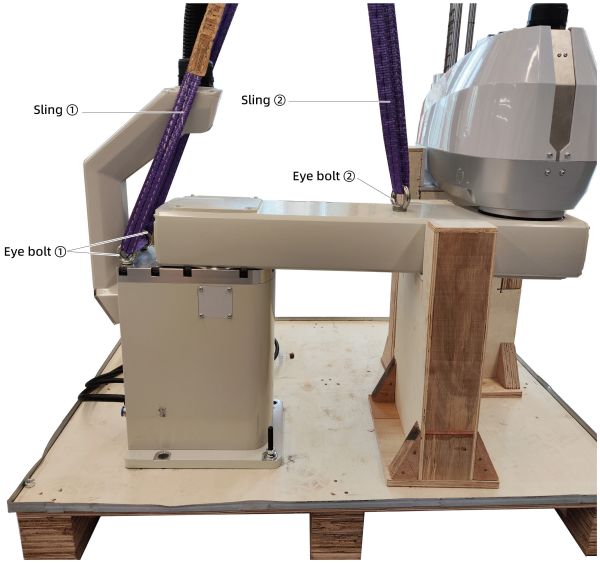
Note

At least two people are required for handling.

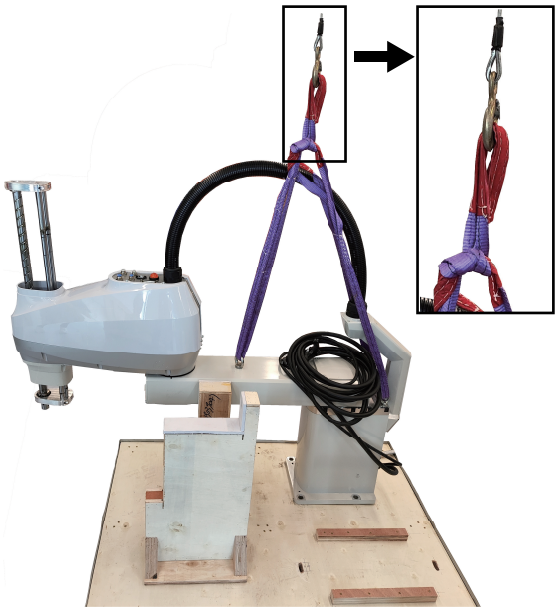
1. Position the robot according to its posture at delivery.
2. Disconnect all power supplies of the equipment.
3. Disconnect the power and signal cables from the controller.
4. Remove the bolts fixing the robot to the base and then remove the robot from the installation base.
5. Secure the robot to the handling equipment.

Move the robot onto the base table by hoisting.

1. There are three eye bolts on the robot body for hoisting and handling. Attach the hoisting sling to the eye bolts on both sides, ensuring the sling is secure, as shown in the figure below.



2. Pass the hoisting sling through the forearm of the robot, then attach both ends of the sling to the anti-loosening hook of the hoisting cable, as shown in the figure below.



Complete the connection of the hoisting sling, as shown in the figure below.



3. Move the robot by two people, with one stabilizing the robot body during transportation, and the other operating the crane to lift the robot body and move it to the base table.

CAUTION

- Do not pull the cables of the robot to prevent damage.
- It is recommended to use a 3 m flat sling. Make sure that the flat sling is intact with a load-bearing capacity of not less than 100 kg.
- Wear protective equipment and ensure that the lifting area is safe enough to prevent collision hazards.

5 Transportation Protection

5.1 Bill of Materials

The recommended bill of materials is as follows:

Name	Material	Dimensions	Quantity	Description
Bolt (individually packaging)	-	M10 x 60	4 PCS	For robot individual packaging. Use original factory-configured bolts.
Bolt (client)	-	M8 x 30 M12 x 30	4 PCS each	For packaging together with the client's automation equipment. Use original factory-configured bolts.
Iron nail	Iron	-	Several	-
Rubber washer	Rubber	-	4 PCS	Use the original factory-configured rubber washers directly.
Desiccant	Montmorillonite/Silica gel desiccant	-	8 packets	30 g/packet
PE bag	LDPE	-	1 PCS	Use the bag based on the product size
Square PE bag	LDPE	-	1 PCS	Use the bag based on the product size
Polyethylene foam	18 kg/m³	50 mm	-	Use polyethylene foam of appropriate height
Bracket	Plywood	-	-	Use original factory-configured brackets for fixation.
Stretch film	LLDPE	80 μm	1 PCS	Same as PE bag
Eye bolt	Cast iron	M10 standard eye bolt	2 PCS	-

Name	Material	Dimensions	Quantity	Description
Nylon tie	NYLON 66	Length: 150 mm	4 PCS	-
Packing strap	PET	Width: 16 mm, thickness: 0.6 mm	8 m to 10 m	-
Industrial tape	BOPP	60 mm	Several	-
Compression-resistant carton	2 A	-	1 PCS	Select size as per equipment packaging requirements.
Carton box	K=K	-	1 PCS	For controller
Wooden pallet	Plywood	-	1 PCS	-
Paper corner protector	Bobbin paper	-	4 PCS	-
Bubble bag	HDPE	-	1 PCS	For packaging cable end connector



Materials such as PE bags must comply with the laws and regulations of the destination country. Inovance packaging materials must meet the REACH certification requirements.

5.2 Packaging Guide

5.2.1 Packaging Posture

Transport Pose

Before transporting the robot, it must be placed in the transport pose. The angle of each joint is as follows:

Robot series	Position	Angle of each joint
IR-S25&S35 series	J1	130°
	J2	150°

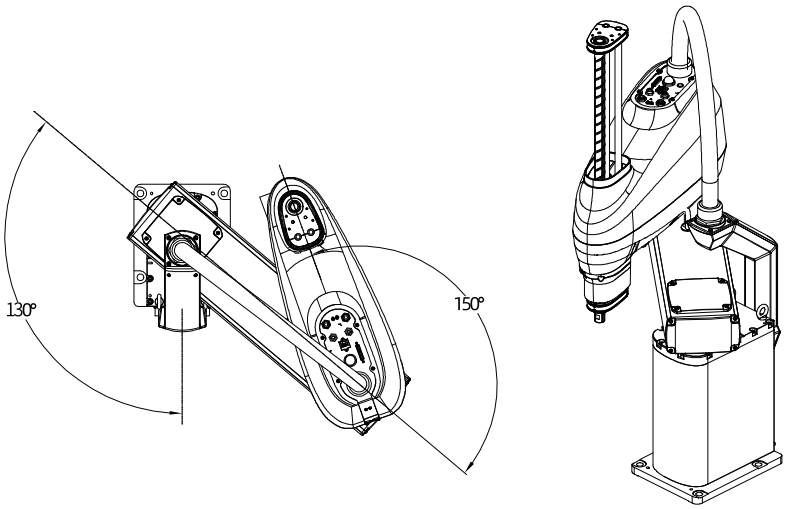


Figure 5-1 IR-S25&S35 series

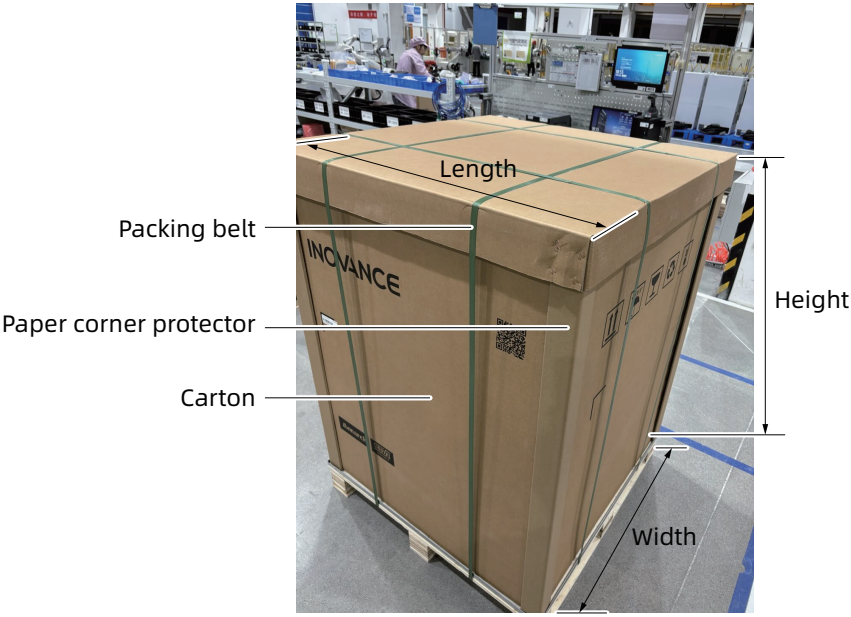
CAUTION

- Before each transportation, adjust the robot to the transport position and ensure it is securely placed.
- When the robot is not secured, always keep the robot in the transport position.
- Before lifting the robot, ensure that it can move freely.
- Remove all transportation securing elements, such as screws and bolts, in advance, and clear any rust or adhesives from the contact surfaces.
- Avoid vibrations or impacts during transportation to prevent damage to the robot.

Package dimensions

Table 5–1 Package dimensions of IR-S25&S35 series SCARA robots (unit: mm)

Robot system	Arm length	Height	Width	Length
IR-S25&S35 series	800/1000	1365	870	1120
	1200	1495	870	1320



Note

The factory dimensions (robot + controller) above are for customer reference only.

5.2.2 Packaging Procedure

Robot individual packaging

1. Before packaging the robot, ensure it is in the factory-set posture. For details, see *"5.2.1 Packaging Posture" on page 42*.
2. Spread a square PE bag flat in the center of the base, and place the manipulator on the PE bag, ensuring that the four holes of the robot base are precisely aligned with the four holes of the pallet. Then, use four M10 x 60 hexagon head screw sets (including flat washer, spring washer, and rubber washer) to securely fasten them one by one.
3. Adjust the upper arm and forearm to the postures at delivery, and secure them to the wooden bracket.
4. Add support structures below the upper arm and forearm to reduce stress on the internal components.
5. Clean the robot and place desiccants on the base.
6. Wrap the zero point information attachment with a PE bag and secure it to the robot with a nylon tie.

7. Completely wrap the equipment with a PE bag, ensuring that the equipment is fully covered.
8. Coil the external cables where they connect to the robot into a loop. Wrap the terminals at the cable ends with bubble wrap and place them inside the PE bag.
9. Place the carton box with packed controller onto the wooden pallet.
10. Secure it by threading packing straps through the pre-set holes in the pallet.
11. Use the wooden blocks on both sides of the pallet to secure the carton box in the length direction, ensuring overall stability.

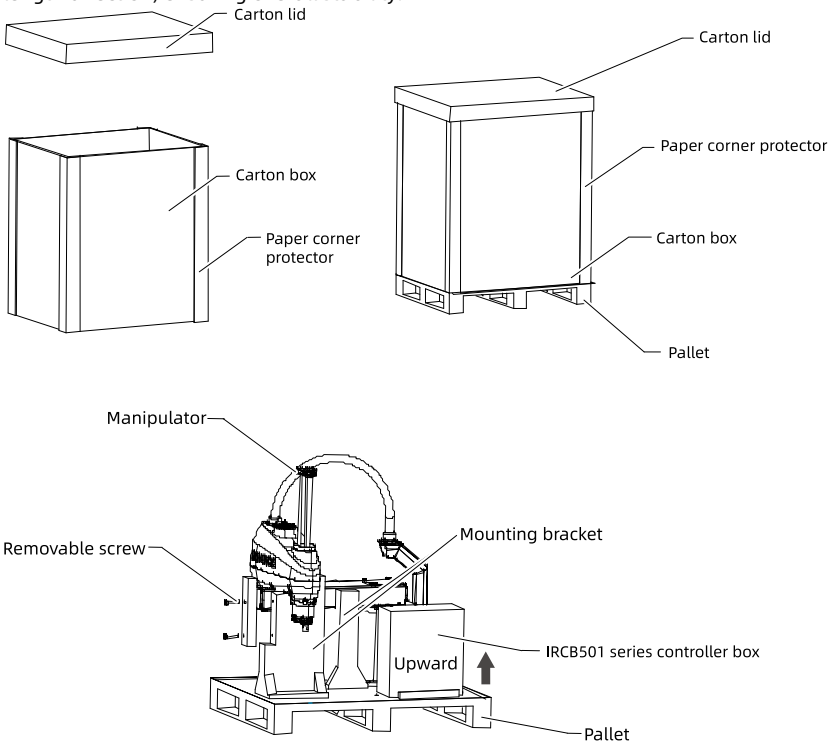


Figure 5-2 IR-S25&S35 series

12. If a teach pendant is to be included, place the carton box for teach pendant on top of the carton box for controller, and secure it with packing straps.
13. Seal the 4 sets of standard bolts in a PE bag.
14. Place the sealed PE bag, two instruction manuals, the warranty card, the complete set of cables, and the baffle plate into the outer PE bag, arranging them in order before sealing.
15. Secure the outer PE bag to the packing straps on the carton box surface using nylon ties to ensure overall stability and reliability.
16. Use nylon ties to secure the coiled external cables to the nearest packing strap.

17. Place the desiccant and packing list inside the square PE bag, and then seal and secure the bag.
18. Fold the carton body according to the standard size, fit it over the product, then put on the carton lid and seal it with transparent adhesive tape. Each carton box contains 1 piece of four-axis robot body and 1 piece of controller.
19. Secure the carton body to the pallet using PET packing straps, applying 4 straps in a grid pattern ("#"-shape).

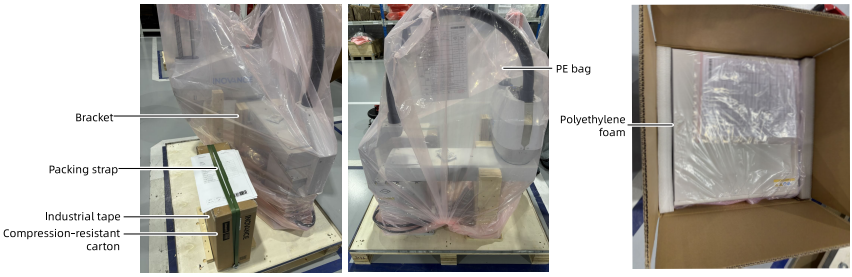


Figure 5-3 Physical packaging

Packaging together with client's automated equipment

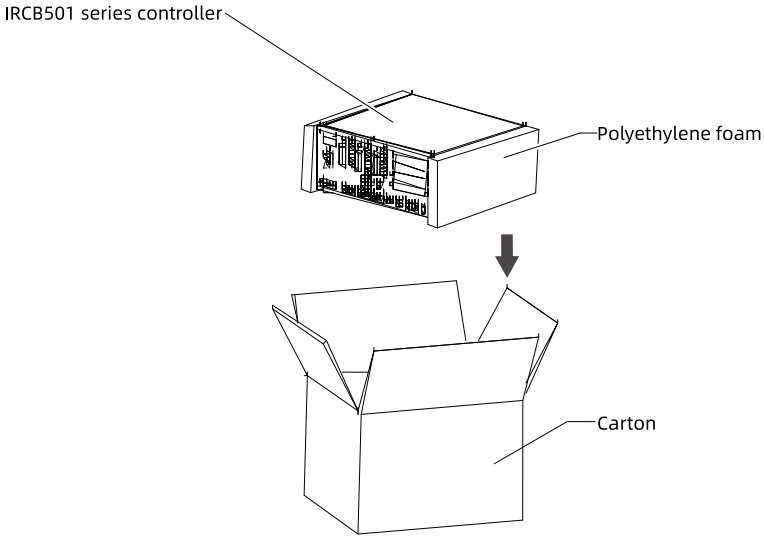
Package the robot together with the client's automated equipment in the following two methods:

Method 1: Package both the manipulator and the controller together with the client's automated equipment.

Method 2: Package the manipulator together with the client's automated equipment, and package the controller separately.

- For method 1, perform the following operations:

1. Secure the carton containing the controller to the base using the packing straps in accordance with Inovance's mounting specifications.
2. Place four packets of desiccant (30 g/packet) beside the manipulator, and confirm that the desiccant packets are intact and the labels are clearly legible.
3. Securely fasten the upper arm and forearm using brackets to ensure they do not interfere with each other or suffer damage due to friction or displacement.
4. After fastening, completely wrap the manipulator with stretch film to protect it from dust and moisture.
5. After wrapping, perform a sealing inspection to ensure the product is protected from moisture and rust.
6. Perform final inspection to ensure that the stretch film surface has no broken straps and that the protective layer extends beyond the outline of the manipulator by at least 20 mm.



- For method 2, perform the following operations:
  - Installing the manipulator:

  1. Secure the manipulator to the base using four M8 x 30 bolts.
  2. Place two packets of desiccant (30 g/packet) beside the manipulator, and confirm that the desiccant packets are intact and the labels are clearly legible.
  3. Securely fasten the upper arm and forearm using brackets to ensure they do not interfere with each other or suffer damage due to friction or displacement.
  4. After fastening, completely wrap the manipulator with stretch film to protect it from dust and moisture.
  5. After wrapping, perform a sealing inspection to ensure the product is protected from moisture and rust.
  6. check that the stretch film surface has no broken straps and that the protective layer extends beyond the outline of the manipulator by at least 20 mm.

  - Installing the controller:

  1. Select a compression-resistant carton box of appropriate size, with cushioning material pre-placed inside (bubble wrap or polyethylene foam is recommended).
  2. After packaging, apply industrial tape in an "H"-shape pattern to seal the carton box.
  3. Secure the packaged controller to the base using bolts at four points (a dedicated mounting bracket is provided at the bottom of the controller).
  4. Check the stability of the center of gravity of the packaging to ensure there is no risk of shifting during transportation.

6 Installation

6.1 Installation Precautions

Note

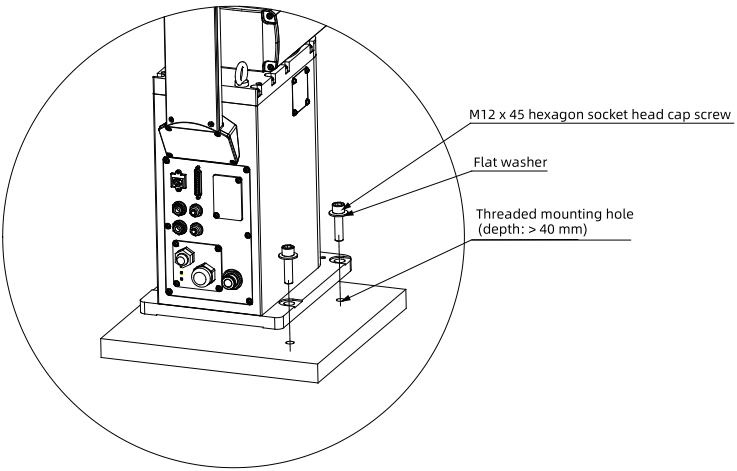
- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Install a safety fence for the system. Failure to comply may result in serious safety issues.
- Reserve sufficient space between the equipment and surrounding buildings, structural parts, and devices. Failure to comply may cause serious injury or major damage.
- Secure the robot body before turning on the power or operating the system. Otherwise, the robot body may fall over and cause serious injury or major damage.



- Do not modify the equipment.
- Do not install this equipment in places with strong electric or magnetic fields.
- When removing the mounting screws of the robot body, hold the robot to prevent it from falling over.
- For the tabletop mounting, at least two people are required for the operation.

6.2 Installing the Robot Body

Secure the robot base to the base table with four M12 x 45 hexagon socket head cap screw conforming to the strength of GB/T 3098.1 class 10.9 or 12.9, as shown below.



Check that the screws are tightened referring to the following recommended torque.

Nominal screw diameter (10.9 or higher)	Installation torque (N·m)
M12	110

6.3 Installing an End Effector

Customers shall prepare end effectors. Observe the following precautions when installing an end effector.

CAUTION

- Perform wiring and air tubing of the chuck only when the power supply is disconnected and the workobject is not placed. If the emergency stop switch is pressed when the power is still connected, the workobject may be released, resulting in damage to the robot system and workobject.
- Pay attention to the interference area of the end effector during system layout design. After the end effector is installed, the end effector or workobject may come into contact with the robot body during motion due to the outer diameter of the end effector, the size of the workobject, or the position of the robot arm, which may cause damage to the robot system and the workobject.

To install the end effector:

1. Install the end effector at the lower end of the screw shaft.

CAUTION

- When using M20 threaded holes with a depth of 22 mm to assist in the installation of end effector, disable the robot before operation to prevent damage to the J4 axis reducer.
- When tightening the M20 screws, insert an auxiliary tooling into the Φ8 process hole to counteract the torque generated during tightening, preventing damage to the lead screw.
- The M20 threaded hole with a depth of 22 mm is used to assist in the installation of the end effector. Do not rely solely on the screws at this location to secure the end effector.

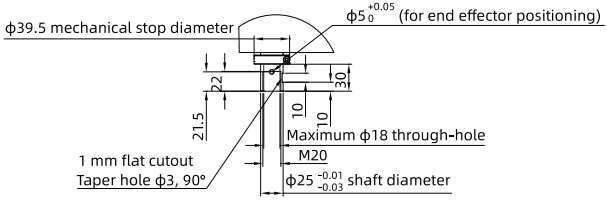


Figure 6-1 Installation position of auxiliary tooling for IR-S25 standard model

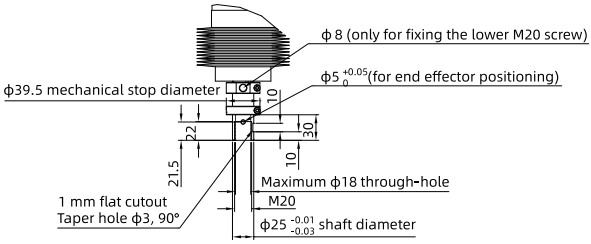


Figure 6-2 Installation position of auxiliary tooling for IR-S25 cleanroom model

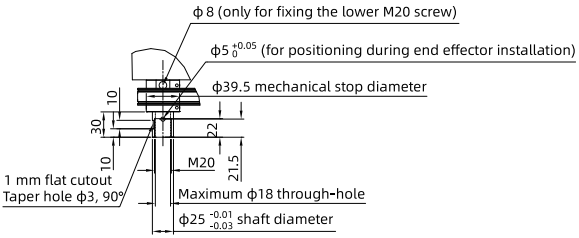


Figure 6-3 Installation position of auxiliary tooling for IR-S35 standard model

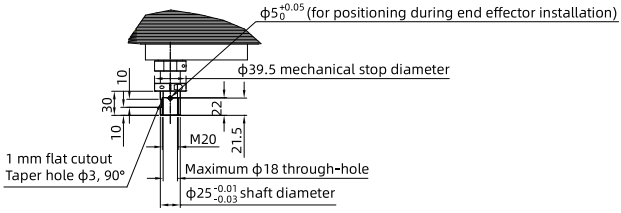


Figure 6-4 Installation position of auxiliary tooling for IR-S35 cleanroom model

2. Install the M20 screws from the bottom of the end effector, and tighten the screws using a torque wrench with a torque of 60 N.m. The weight of the end effector should not exceed 35 kg. When installing the M20 screw, ensure the robot is in a disabled state with dynamic braking turned off. Additionally, apply counterforce measures at the end to prevent damage to the motor brake or reducer. See the figure below:

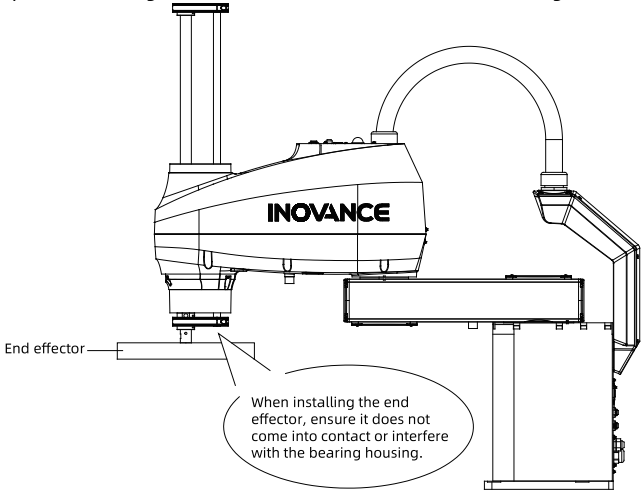


Figure 6-5 Installing the end effector for IR-S25&S35 standard models

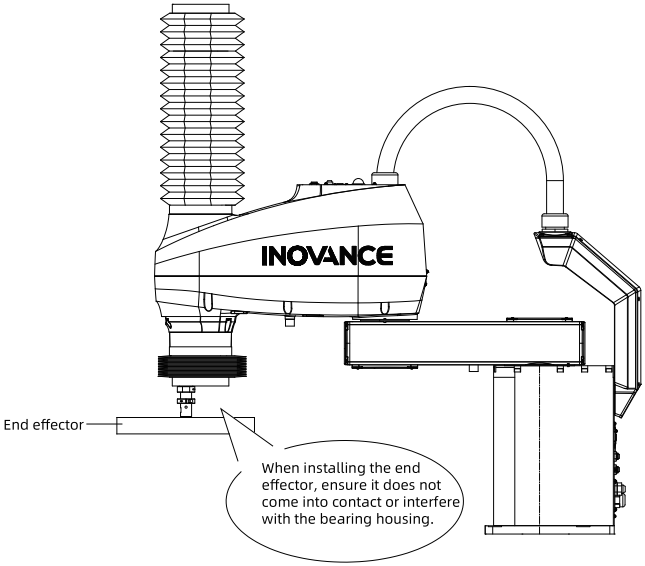


Figure 6-6 Installing the end effector for IR-S25&S35 cleanroom models

Note

- To avoid contact between the end effector and the robot due to the outer diameter of the end effector, the size of the workobject, or the position of the robot arm, stop operating the robot when installing the end effector.
- Pay attention to the interference area of the end effector during system layout design. See the maximum area in *"3.4 Installation Space Requirements" on page 30*.

J3 screw shaft

- Install the end effector at the lower end of the screw shaft.
- For the dimensions of the J3 screw shaft and the overall dimensions of the robot, see *"2.3 Outline Dimensions" on page 19*.
- Do not move the mechanical stop provided at the lower end of the J3 screw shaft. If a "Jump" motion is performed, it may cause the upper limit mechanical stop to collide with the machine due to exceeding the travel distance, resulting in the robot failing to operate normally.
- When installing the end effector on the J3 screw shaft, use a threaded fastening structure of M4 or larger.

Brake release switch

In the power-off state, J3 cannot move up and down, and J4 cannot rotate. This is to prevent the axis from falling and hitting the peripheral equipment due to the weight of

the end effector if the power is disconnected or the motor is not enabled during robot operation.

To move J3 up or down when installing the end effector, turn on the power of the controller and press the brake release switch.

This switch is a momentary type switch that releases the brake only during the time it is pressed.

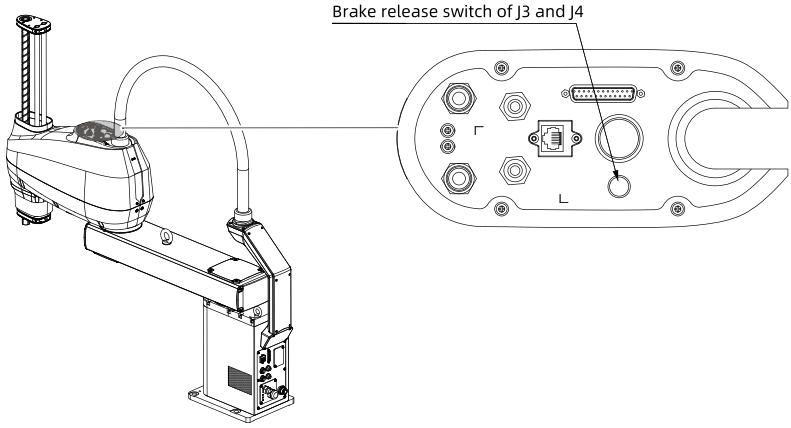


Figure 6-7 Position of brake release switch

CAUTION

Be aware of sagging due to the weight of the end effector during pressing of the brake release switch.

Installation space requirements

If an end effector is installed, the end effector may come into contact with the robot during motion due to the outer diameter of the end effector, the size of the workobject, or the position of the robot arm. Pay attention to the interference area of the end effector during system layout design. For detailed space requirements, see *"2.3 Outline Dimensions" on page 19*.

6.4 Installing Camera and Pneumatic Valve

The IR-S25&S35 series SCARA robot provides mounting holes for the camera and pneumatic valve at the bottom of the second arm, as shown in the figure below.

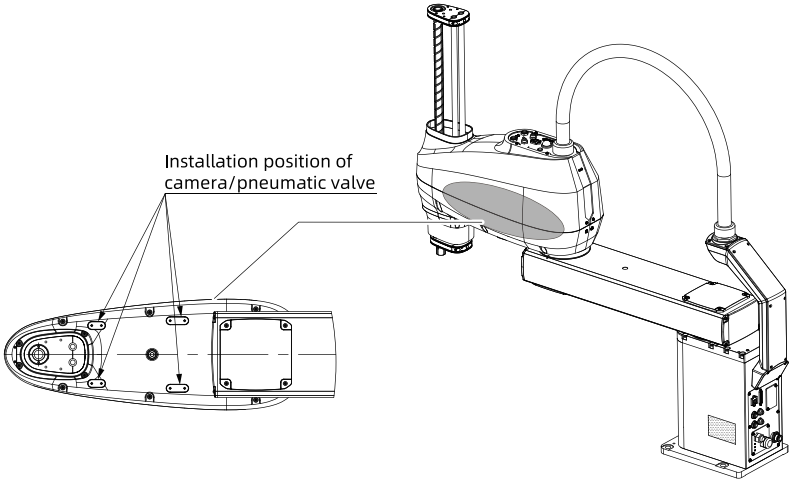


Figure 6-8 Installation position of camera and pneumatic valve

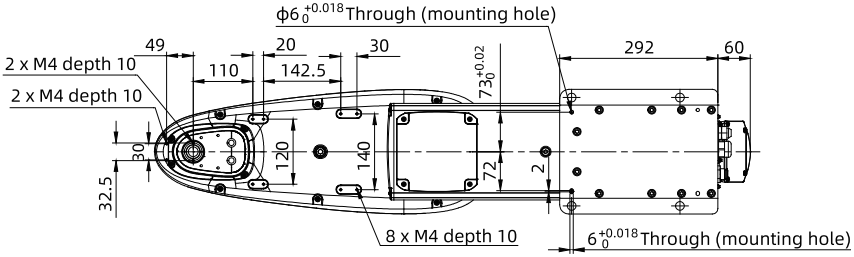


Figure 6-9 Screw size for mounting camera and pneumatic valve (unit: mm)

6.5 Cable Connection

Note

- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Always disconnect the power supply before wiring. Failure to comply will result in electric shock or system fault.
- Before wiring, disconnect the power supplies of all equipments. After disconnecting the power supply, wait for at least 10 minutes before further operations because residual voltage still exists in the internal capacitor even after power-off.
- Ensure that the safety input signals, such as the emergency stop switch and safety door switch are connected correctly before wiring. Otherwise, the safety protection will not work properly in emergency cases, causing serious injury or damage.
- Check that the equipment is grounded properly. Failure to comply may result in an electric shock.
- Follow the electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment internal circuit.



- Connect the cables securely. Do not lay heavy objects on the cables, or bend or pull the cables forcibly. Failure to comply will result in cable damage, wire breaking, or poor contact, causing electric shock or system fault.
- Wiring cables must meet diameter and shielding requirements. The shielding layer of the shielded cable must be reliably grounded at one end.
- Make the connections in correct sequence. Otherwise, the system may not work properly, which may cause safety hazards.
- After wiring, make sure there are no fallen screws and exposed cables inside the equipment.

Connect the power cable and signal cable to the controller.

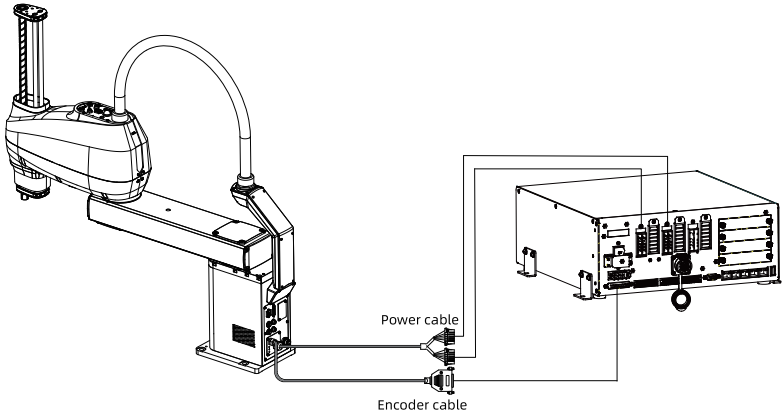
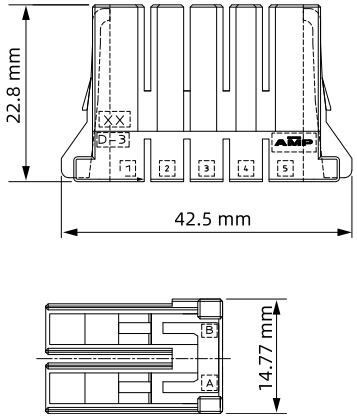
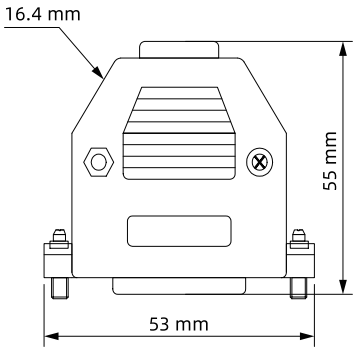
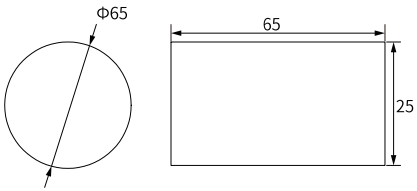
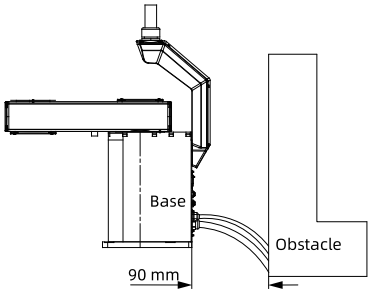


Figure 6-10 Cable connection

Table 6–1 Cable hole dimensions (IRCB501 series robot controller)

Name	Power cable connector (controller side)	Encoder cable connector (controller side)
Dimen-sions	42.5 mm x 22.8 mm x 14.77 mm (L x W x H)	53 mm x 55 mm x 16.4 mm (L x W x H)
Illustra-tion		

Recommended minimum hole dimensions and reserved space for cables are as follows:.

Hole dimensions (round hole and square hole) (unit: mm)	Space reserved for the manipulator cable (Connector dimensions and cable bend radius)
	

6.6 Wiring and Tubing

Note

Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.

Wiring (Cables)

WARNING

Current higher than 0.5 A is not allowed.

Rated voltage	Allowable current	Wires	Nominal sectional area	Remarks
30 VAC/VDC	0.5 A	25	24AWG	Twisted pair

Category	Code
D-Sub backshell (included in the cable accessories kit)	15010084
D-Sub 25-pin connector (included in the cable accessories kit)	15010085

Note

The connectors at both ends of the cable use the same pin numbering. This product only provides the connectors, and you need to wire them according to your actual requirements.

Tubing (Air Tubes)

Pressure resistance	Quantity	Dimensions (outer diameter x inner diameter)
0.59 MPa (5.9 kgf/cm^2)	2	Φ6 mm x Φ4 mm
	2	Φ8 mm x Φ5.7 mm

Note

- Both ends of the air tubes are equipped with quick release couplings for Φ8 mm and Φ6 mm (outer diameter) air tubes.
- The Φ12 mm vacuum tube connector is only available for the IR-S25 & S35 series cleanroom models.

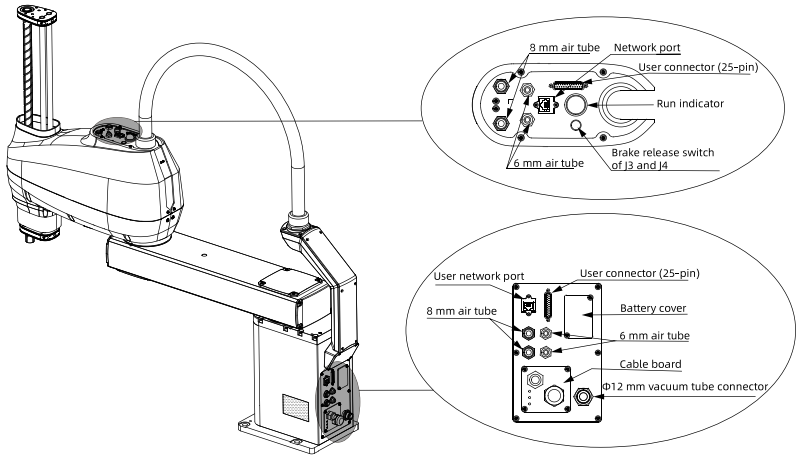


Figure 6-11 Wiring/tubing interfaces

7 Motion Range

7.1 Method for Setting the Motion Range

CAUTION

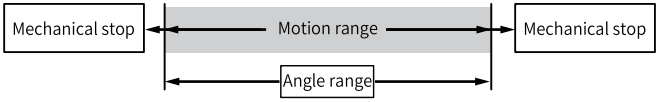
- To prevent premature wear of joint reducer bearings and gears due to insufficient oil film, avoid prolonged repetitive motion of joints within a small angular range of less than 10°.
- If the actual operating conditions require prolonged operation within an angle of less than 10°, it is recommended to cycle the mechanical joint once per hour, moving each joint more than 50° to ensure effective lubrication and extend service life.

Note

The default motion range at delivery is the maximum motion range of the robot.

To improve layout efficiency and to take into account the maximum safe motion range of the robot, the following motion range setting methods are provided:

- Angle range (for J1 to J4)
- Mechanical stop (for J1 to J3)



7.2 Motion Range Setting by Angle Range

7.2.1 Description of Angle Range

The basic unit of robot motion is degree. The motion limit (motion range) of the robot is set based on the angle lower limit and angle upper limit (angle range) of each joint.

The motion angle is determined by the encoder output pulse value of the servo motor, and the angle range must be set within the mechanical stop range.

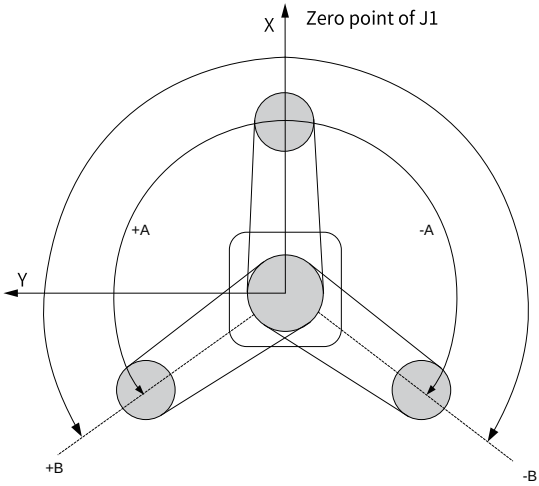
Once the robot receives a motion command, it checks whether the target position specified by the command is within the angle range before initiating the movement. If the target position is beyond the set angle range, an error occurs and the robot does not move.

Note

You can set the angle range by choosing "Set" > "Motion" > "AxisPara" > "AxisLimit" on the teach pendant.

7.2.2 Maximum Angle Range of J1

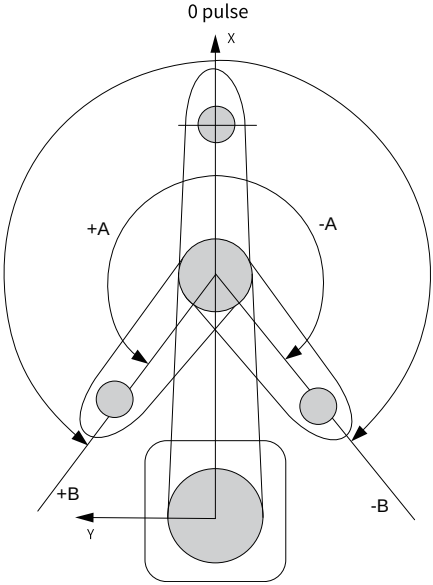
The zero-angle position of J1 refers to the position where the first arm is oriented toward the positive direction of the X coordinate axis. From the 0 pulse position,the clockwise angle is positive (+), and the counterclockwise angle is negative (-).



Model	Maximum motion range
IR-S25&S35 series	±139°

7.2.3 Maximum Angle Range of J2

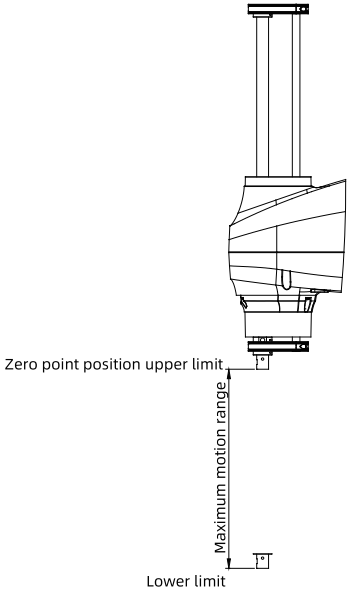
The zero-angle position of J2 refers to the position where the second arm is parallel to the first arm (regardless of the direction of the first arm). From the zero-angle position,the clockwise angle is positive (+), and the counterclockwise angle is negative (-).



Model	Maximum motion range
IR-S25&S35 series	±151°

7.2.4 Maximum Stroke of J3

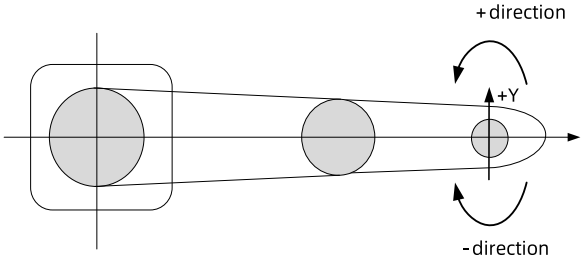
The zero-angle position of J3 is the upper limit position of J3. When J3 descends from the zero-angle position, it will definitely change to a negative angle value.



Model	Maximum motion range
IR-S25&S35 series standard model	420 mm
IR-S25 series cleanroom model	360 mm
IR-S35 series cleanroom model	350 mm

7.2.5 Maximum Angle Range of J4

The zero-angle position of J4 refers to the position where the plane at the top of the axis is oriented toward the direction of the top of the second robot arm (regardless of the direction of the second arm). From the zero-angle position,the clockwise angle is positive (+), and the counterclockwise angle is negative (-).

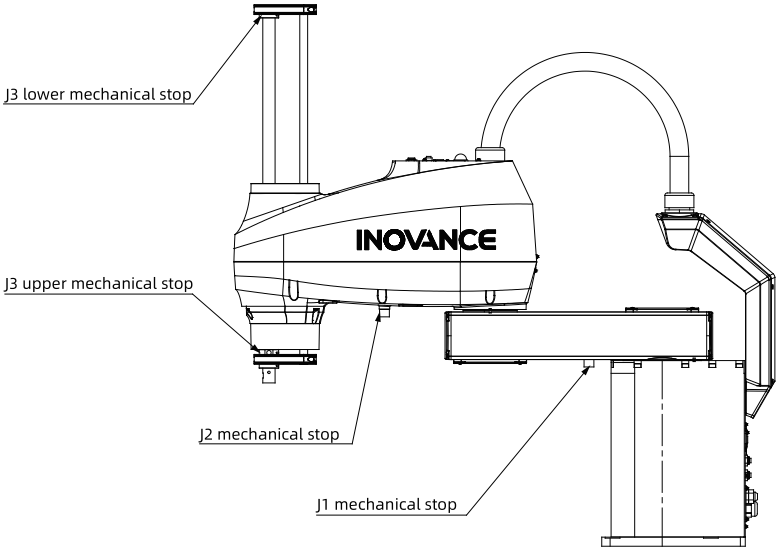


Model	Maximum motion range
IR-S25&S35 series	±360°

7.3 Mechanical Limit Stops

"Mechanical stop" mechanically sets the absolute motion range beyond which motion is not allowed.

The IR-S25&S35 series robots have mechanical limit stops at J1, J2 and J3, except J4, and all these mechanical limit stops are not adjustable. The motion range set by mechanical limit stops at J1 and J2 is the extreme motion range. The up and down motion range set by the mechanical limit stop at J3 is configured by the internal program.



7.4 Standard Motion Range of J3

Name	Description
Motion range	Indicates the situation at the standard (maximum) specifications. When each joint is enabled, the motion range of the lower center of J3 is as follows: IR-S25 standard model: 420 mm, cleanroom model: 360 mm; IR-S35 standard model: 420 mm, cleanroom model: 350 mm
Maximum range	Indicates the area that contains the farthest reach of the arms. When an end effector with a radius of 71.3 mm or more is mounted, set the maximum space to the length of the two robot arms plus the radius of the end effector. For details, see *"3.4 Installation Space Requirements" on page 30*.

The motion range is shown below.

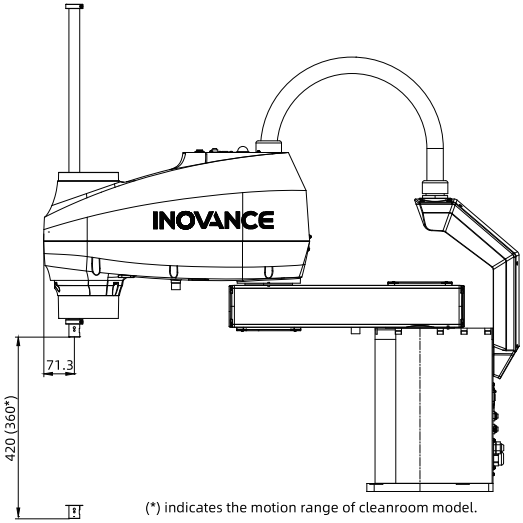


Figure 7-1 Motion range of end effector for IR-S25 series (unit: mm)

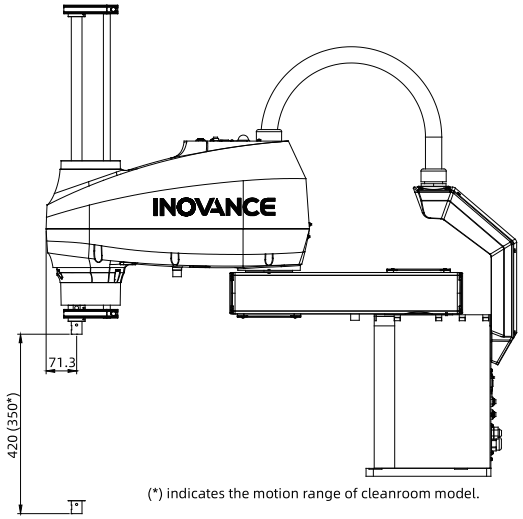


Figure 7-2 Motion range of end effector for IR-S35 series (unit: mm)

8 Inspection and Maintenance

8.1 Maintenance Precautions

Before maintenance, read this guide carefully to fully understand the methods of safe maintenance.

Note

- Equipment installation, wiring, maintenance, inspection, or component replacement must be performed only by professionals.
- Do not maintain the equipment after power-on. Failure to comply will result in an electric shock.
- Do not remove any parts that are not covered in this guide. Follow the maintenance procedure strictly as described in this guide.
- Check the motion of the robot after parts replacement outside the safety fence. Failure to comply may cause severe safety issues due to abnormal movement of the robot.
- Make sure that the emergency stop switch and safety door switch work properly before operation. Otherwise, safety protection function will not work properly in emergency cases, causing serious injury or damage.



- Submit a request for repair services in accordance with the product warranty agreement.
- Perform routine and regular inspection and maintenance on the equipment in accordance with maintenance requirements and keep a record.
- Troubleshooting and repair must be performed by professionals in accordance with the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment according to the replacement guide.
- Prevent foreign objects from entering the equipment and terminals during maintenance.
- Open the equipment cover only when repair and maintenance.
- After the equipment is replaced, perform wiring inspection and parameter settings again.

8.2 Regular Inspection Items

Perform regular inspection on items that are difficult to check during operation. Clear the dust especially metal powders on the surface of the drive to prevent the dust from entering the equipment. Also clear the greasy dirt from the cooling fan of the equipment.

- Inspection while the power is OFF (Robot is not operating)

Inspection item	Inspection place	Daily inspection	Monthly	Quarterly	Biannual	Annual	Maintenance personnel		
							Professionals	Qualified personnel	Manufacturer
Check whether the screws are loose. If yes, tighten them.	End effector mounting screws	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Robot mounting screws	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Screws around each joint	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Screws securing the motor, reducer, etc.	-	-	-	-	Yes	-	Yes	Yes
Check whether the connector is loose. If yes, push it securely or tighten it.	External connectors on the robot (on the connector plate etc.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Robot cable unit	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Inspection item	Inspection place	Daily inspection	Monthly	Quarterly	Biannual	Annual	Maintenance personnel		
							Professionals	Qualified personnel	Manufacturer
Visually check for any external defects and remove any attached dust.	Manipulator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	External cables	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Check for bends or improper location. Repair or place it properly if necessary.	Safe guard etc.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Check tension of the timing belt. Tighten it if necessary.	Inside arm #2	-	-	-	Yes	Yes	Yes	Yes	Yes
Check if the lubricating grease is sufficient for lubrication, and add an appropriate amount of lubricating grease as needed.	Ball screw	-	-	-	Yes	Yes	Yes	Yes	Yes
	Spline	-	-	-	Yes	Yes	Yes	Yes	Yes
	Plain shaft	-	-	-	Yes	Yes	Yes	Yes	Yes

- Inspection while the power is ON (Robot is not operating)

Inspection item	Inspection place	Daily inspection	Monthly	Quarterly	Biannual	Annual	Maintenance personnel		
							Professionals	Qualified personnel	Manufacturer
Shake the cable gently by hand to check for wire breakage.	External cables (including cable units of the robot)	-	-	-	Yes	Yes	-	Yes	Yes
Shake each arm by hand with the servo on to check that the arm is not swinging.	Each joint	-	-	-	-	Yes	-	Yes	Yes

- Inspection while the power is ON (Robot is operating)

Inspection item	Inspection place	Daily inspection	Monthly	Quarterly	Biannual	Annual	Maintenance personnel		
							Professionals	Qualified personnel	Manufacturer
Check the motion range.	Each joint	-	-	-	-	Yes	-	Yes	Yes
Check for abnormal sound or vibration.	Manipulator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Measure the repeatability with a gauge.	Manipulator	-	-	-	-	Yes	-	Yes	Yes

8.3 Component Replacement

Precautions

Note

- Be sure to disconnect the power supply before installing or removing the motor connector; otherwise it may cause abnormal action of the robot or electric shock.
- Prevent foreign objects from entering the equipment and terminals during maintenance.

Replacing the battery (lithium battery)

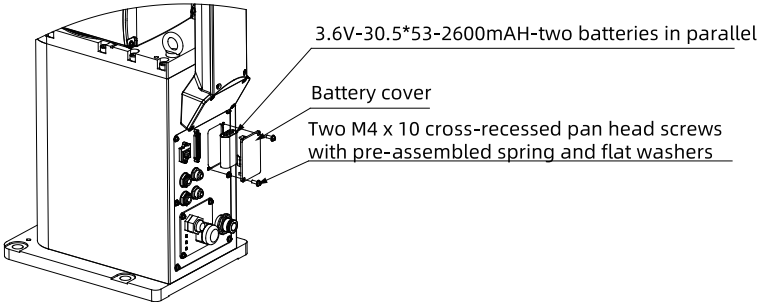


- Do not maintain the equipment after power-on. Failure to comply will result in an electric shock.
- When disposing the battery, consult with the professional disposal services or comply with the local regulation.
- Be sure to use lithium batteries correctly, the wrong way of use may lead to lithium battery heat, leakage, explosion or even fire, resulting in serious damage to personal and property safety.
- Do not charge the lithium battery.
- Do not pressurize or deform the lithium battery.
- Do not disassemble the lithium battery.
- Do not short-circuit or misconnect the lithium battery.
- Do not heat the lithium battery.
- Do not put the lithium battery into fire.
- Do not solder the battery terminals.
- Do not force discharge the lithium battery.

To prevent zero position loss during battery replacement, follow the sequence: first connect the new battery, then remove the old one. Replace the battery based on the following procedure.

1. Remove the two M4 x 10 cross-recessed pan head screws with pre-assembled spring and flat washers from the battery cover on the rear cover sheet metal of the base.
2. Take off the battery cover and remove the old battery from it.
3. Connect the new battery to the empty white 2Pin cable connector, and fix it to the battery cover.
4. Disconnect the 2Pin cable connector of the old battery.

5. Fasten the battery cover to the rear cover sheet metal of the base using the two M4 x 10 cross-recessed pan head screws with pre-assembled spring and flat washers.

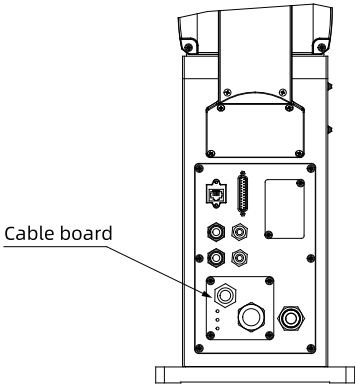


Note

Failure to comply with the procedure described above may cause loss of zero points. For details, see *"8.5.1 Overview" on page 78*.

Replacing the cable board

1. Loosen the fixing screw with a cross wrench, rotate the cable board by a certain angle and then take out the cable board.
2. Replace the damaged cable.
3. Rotate the cable board into the fixing hole and tighten the screw.

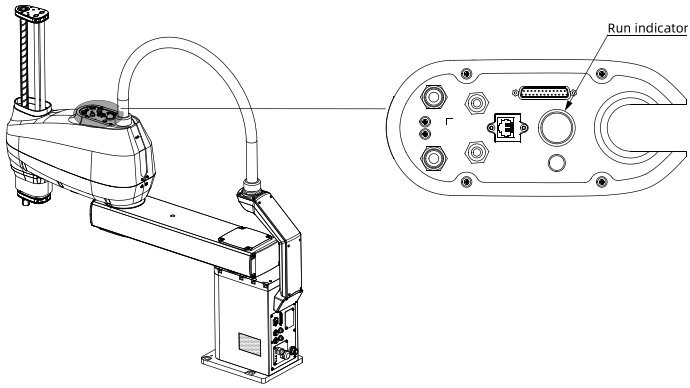


CAUTION

- Do not pull the cable board forcibly. Failure to comply may result in cable damage, wire breaking, or poor contact, causing electric shock or system fault.
- After removing the cable board, ensure that the cables are correctly connected during cable maintenance.

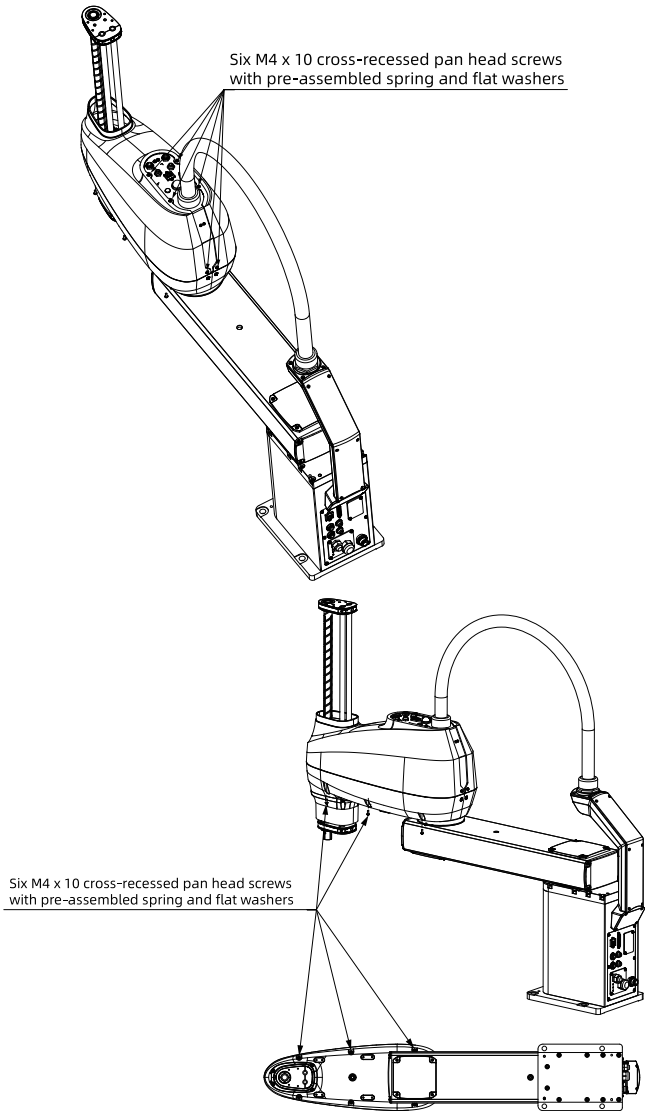
Replacing the indicator lamp

1. Remove the top cover of the robot arm. For the detail steps, see the guide for replacing the cover in this section.
2. Loosen the wiring terminal of the indicator lamp.
3. Rotate the fixing nut counterclockwise to remove it.
4. Remove the indicator lamp from the sheet metal.
5. Connect the removed cable to the new indicator lamp, then fix the new lamp onto the mounting bracket and connect it to the black connector.



Replacing the cover

- Removing the cover of the forearm
  Remove the six M4 x 10 cross-recessed pan head screws with pre-assembled spring and flat washers from the cover and sheet metal, and then remove the six M4 x 10 cross-recessed pan head screws with pre-assembled spring and flat washers used for connecting the cover and the forearm.



- Installing the cover of the forearm

  1. Install the cover onto the forearm. Pay attention to the positioning columns and holes on the mounting surfaces of the cover and the forearm to ensure that the mounting surface of the cover fits seamlessly with the mounting surface of the forearm and sheet metal.

2. Install the six M4 x 10 cross-recessed pan head screws with pre-assembled spring and flat washers onto the cover and the sheet metal, with a torque of 0.6 N·m.
3. Install the six M4 x 10 cross-recessed pan head screws with with pre-assembled spring and flat washers for connecting the cover to the forearm, with a torque of 0.6 N·m.



Before removing and installing the screws connecting the enclosure and the forearm, swing the forearm and upper arm to align on the same line. Additionally, the shank length of the cross screwdriver should be greater than 210 mm.

8.4 Applying Lubricating Grease

Note

- Only apply the original lubricating grease to the reducer.
- Normally, the reducer does not need does not require frequent grease replacement. However, under the extreme conditions (duty cycle, speed, load), the grease needs to be replaced regularly.
- Replacing grease by non-professional personnel is not allowed. If maintenance is needed, contact Inovance after-sales maintenance personnel.
- Before maintenance, prepare the necessary tools and fixtures, lubricating grease, screws and other auxiliary materials in advance.
- During the maintenance, if you encounter special problems, you can take photos for record and contact us for help.
- For special operating conditions, such as those with fast cycle times, such conditions need to be carefully recorded, and regular lubrication maintenance is required. Consult Inovance for specific maintenance cycles.

Before maintenance, it is necessary to clarify the parts configuration of the robot body. The type of lubricating grease used for reducers or ball screws varies from supplier to supplier. The specific types of lubricating grease used and their codes are listed in the table below.

Table 8–1 Grease type

Name	Grease type	Grease code
RV reducer	Reducer grease	24060215
Ball screw and plain shaft	Ball screw grease	24100039

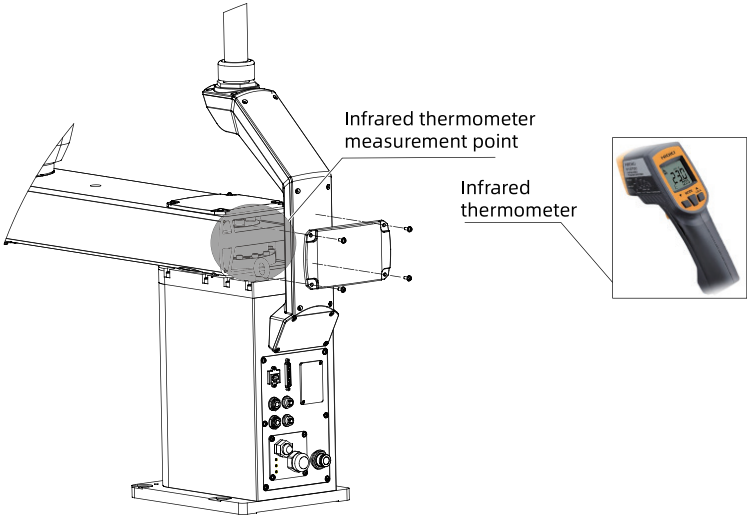
Note

Contact the original manufacturer for the models of lubricating grease.

For the heavy-duty SCARA series robots, due to the aging period of the lubricating grease used in the RV reducers, regular maintenance to replace the lubricating grease is required to ensure the lubrication performance period of the reducers. The lubricating grease replacement period for RV reducers is closely related to the actual application conditions and environment. The lubricating grease replacement period for the RV joints of SCARA robots is shown in the table below:

Application scenario	Lubricating grease replacement period
Reducer enclosure temperature below 40℃	12,000 h
Reducer enclosure temperature 40℃-55℃	8,000 h

The recommended industrial infrared thermometer and temperature rise measurement points for the reducer enclosure temperature detection are as follows:



For RV reducer joint application conditions, pay attention to the enclosure temperature and joint angle requirements to prevent damage and shortened lifespan of the reducer due to temperatures exceeding 60℃ and operation at small angles.

Reducer temperature

Using the reducer under high load and high power conditions may cause it to overheat and exceed the allowable temperature. Ensure that the reducer is in a cooled state to prevent the surface temperature of the reducer from exceeding 60℃. If the surface temperature exceeds 60℃, it may cause damage to the product.

Output rotation angle of the reducer

When the rotation angle is within a small range (less than 10°), the life of the reducer may be shortened due to poor lubrication and concentrated load on internal components. For specific solutions, consult Inovance for details.

For the S25&S35 series robots, see the table below for joints that require regular grease replacement and the amount of grease to be added:

Joint	Amount	Grease code
RV reducer of J1	380±5 mL (340±5 g)	24060215

Note

Contact the original manufacturer for the models of lubricating grease.

Note

See the following precautions for RV reducer grease replacement and filling:

If the greasing operation is not performed properly, the internal pressure of the grease reservoir may suddenly increase. This may damage the sealing part, resulting in leakage of the grease and abnormal actions. Therefore, observe the following when performing greasing operations:

- Before performing greasing operations, always open the grease outlet by removing the screw plug.
- Fill the grease slowly at a rate below 3.6 g/s (4 mL/s). Do not use excessive force. Use a grease gun which can indicate the amount of grease. If such grease gun is not available, check the amount of grease filled by measuring the change in the grease weight before and after filling.
- If the amount of grease filled does not meet the requirement, fill the grease again after discharging air from the grease reservoir with a precision pressure regulator. The air pressure should be controlled below 0.03 MPa using the regulator.
- Use only the specified type of grease. Using non-specified greases may damage the reducer or cause other problems.
- After greasing, release any residual pressure inside the grease reservoir before installing the hexagon socket plug. When installing the plug, ensure the sealing gasket is properly seated to prevent grease leakage at the grease inlet and outlet.
- Check if the exhaust valve is clogged with grease. If grease exists in the exhaust valve, replace the valve with a new one.
- To avoid accidents caused by slipping, remove any excess grease from the ground and robot.

After the robot is put into service, it is necessary to replace the grease for ball screw , spline and plain shaft periodically to ensure the good lubrication. The recommended replacement period of lubricating grease is as follows:

Table 8-2 Recommended replacement period of lubricating grease for ball screw spline

Part	Replacement period
Ball screw, spline and plain shaft	Every 3 months or 100 km of operation

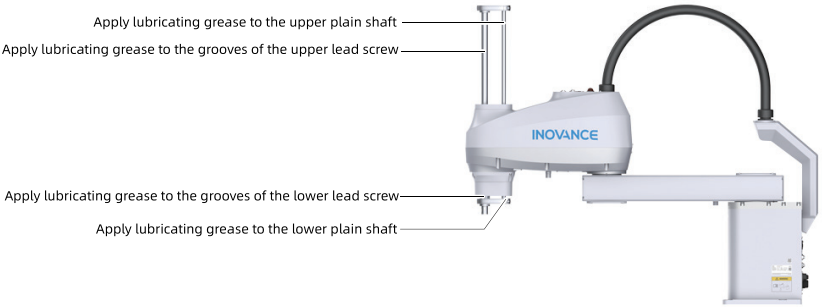


Figure 8-1 Maintenance of lubricating grease for ball screw and plain shaft

The method for replacing the lubricating grease in the ball screw is as follows:

1. Use a clean dust-free cloth to wipe off the old lubricating grease from the ball screw.
2. Apply 1.4 g of lubricating grease into the helical groove and spline groove of the ball screw, ensuring even application within the grooves and avoiding excessive grease buildup on surfaces other than the grooves.

The method for replacing the lubricating grease in the plain shaft is as follows:

1. Use a clean dust-free cloth to wipe off the old lubricating grease from the ball screw.
2. Apply 0.4 g of lubricating grease to the surface of a dust-free cloth (approximately 5 cm^2 application area), and use the grease-coated cloth to evenly coat the two plain shafts.
3. After the plain shaft surface becomes glossy, wipe it with a clean dust-free cloth to ensure there is no accumulation of lubricating grease on the surface.

The application effect on the ball screw is as shown in the figure below:

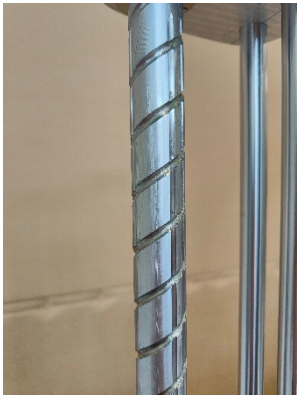


Figure 8-2 Effect after applying lubricating grease

CAUTION

If the grease gets into your eyes, mouth, or on your skin, follow the instructions below.

- If the grease gets into your eyes, flush them thoroughly with clean water, and then see a doctor immediately;
- If the grease gets into your mouth, wash out your mouth with water thoroughly; if swallowed, see a doctor immediately;
- If the grease gets on your skin, wash the area thoroughly with soap and water.

8.5 Zero Point Calibration

8.5.1 Overview

The zero point is the reference point for the operation of the robot. After parts (motors, reducer, synchronous belt, and cables etc.) have been replaced, the robot cannot position properly because a gap exists between the zero point stored in each motor and its corresponding zero point stored in the controller. Therefore, after the parts are replaced, zero point calibration is required.

Note

After the calibration, the absolute accuracy of the robot may deviate from the default absolute accuracy at delivery.

- Install a safety fence for the system to prevent people from entering the motion area of the system. Failure to comply may result in serious safety issues.
- Before operation, check that there is no person inside the safety fence. Do not enter the motion area during system running. Failure to comply may result in serious safety issues.
- Operate the robot system in teaching mode. The motion will be restricted (low speed and low power) to prevent the robot from performing unexpected actions that could result in serious safety issues. This can ensure the safety of personnel to a certain extent.

8.5.2 Zero Point Calibration Procedure

Both the PC-based teach pendant software (InoRobotTP) and the hand-held teach pendant provide an operation interface for zero point calibration. The following describes the zero point calibration operations on the InoRobotTP software. The operations on the hand-held teach pendant are similar.

When calibrating the zero point using the teach pendant, calibrate J3 and J4 at the same time.

1. Log in to the user account.
   a. Click the "User" shortcut key on the main interface of the teach pendant to open the "user mode" setting interface of the PC-based teaching software or the hand-held teach pendant.
   b. Enter the password in the password input box and click "OK" to log in.

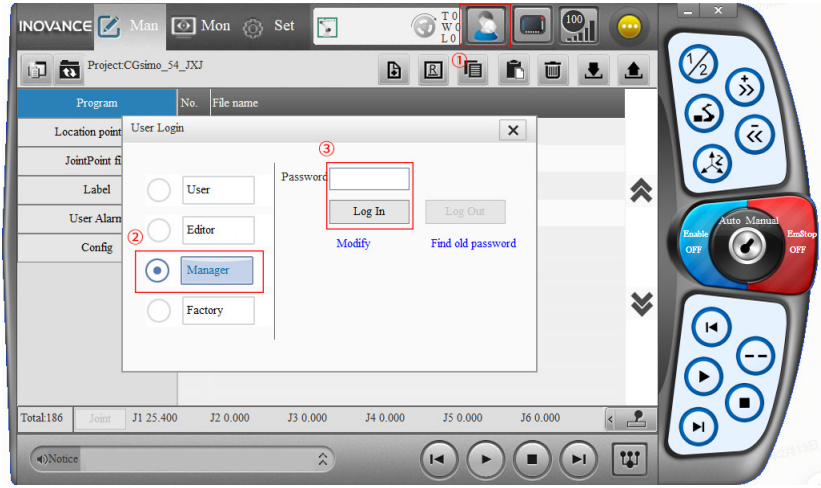


Figure 8-3 IRTP80 series teach pendant

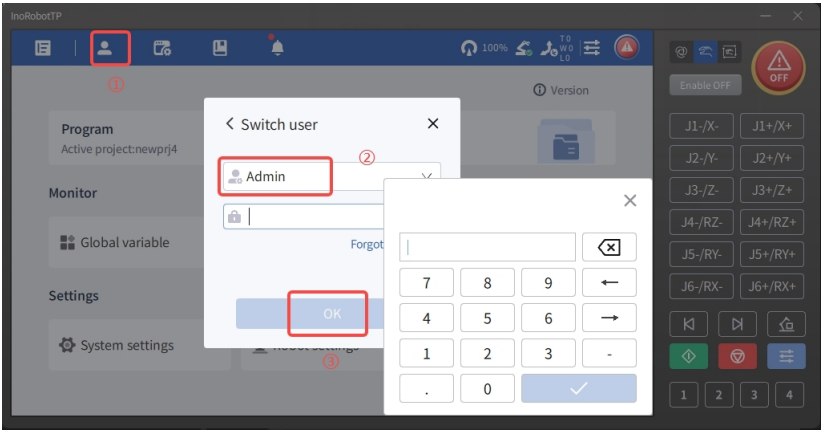


Figure 8-4 IR-TP200 series teach pendant

2. Go to the absolute zero setting interface.
   Choose "Settings" > "Zero point settings" > "Absolute zero" on the main interface of the teaching software or the hand-held teach pendant.

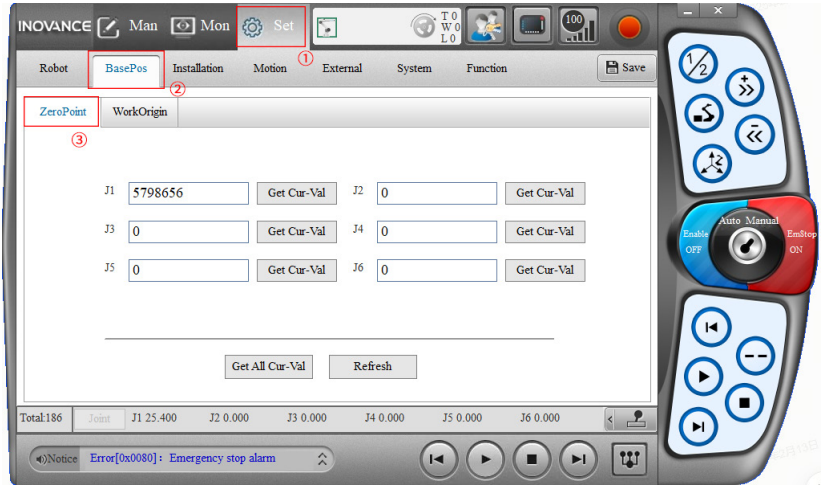


Figure 8-5 IRTP80 series teach pendant

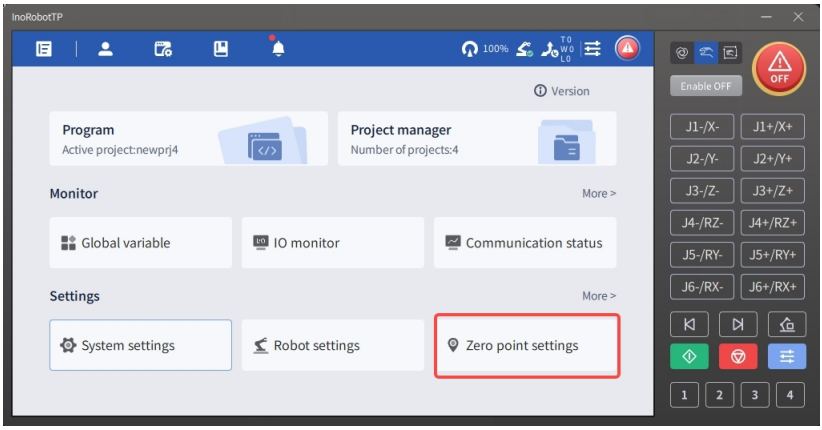


Figure 8-6 IR-TP200 series teach pendant

3. Move each joint of the robot to the position near the zero point.
   a. Move the robot close to the zero point by using the joystick on the hand-held teach pendant or by the operation interface of the teaching software. See the "IR-TP200 Series Industrial Robot Teach Pendant User Guide" or the "InoTeachPad Industrial Robot Teach Pendant User Guide".
   b. For the zero point position of each joint, see *"8.5.3 Zero Point Position of Each Joint" on page 84*. Calibrate the zero point positions using the calibration tool.

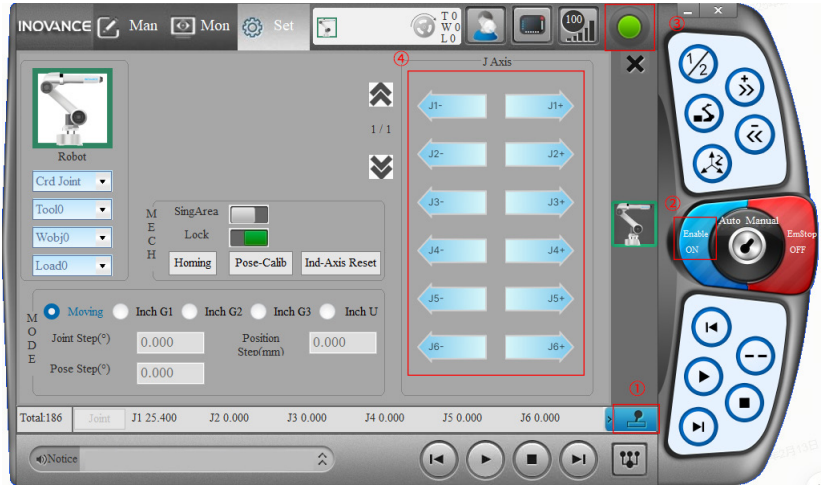


Figure 8-7 IRTP80 series teach pendant

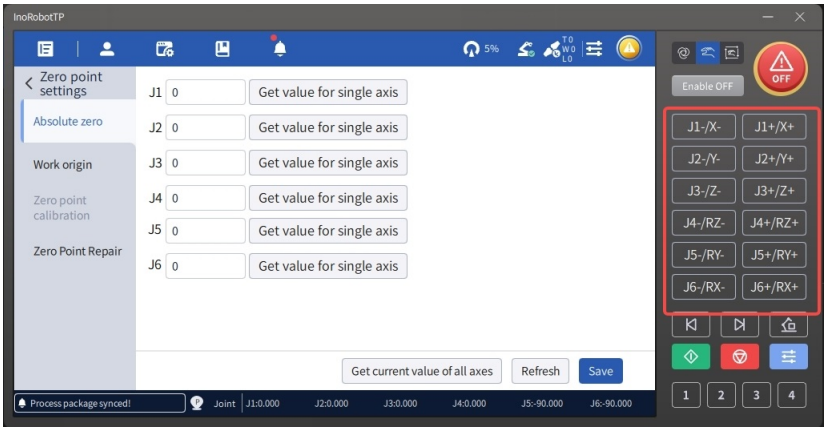


Figure 8-8 IR-TP200 series teach pendant

4. Switch to the emergency stop state.
   a. Click the virtual emergency stop button on the InoRobotTP software or press the red emergency stop button on the hand-held teach pendant.
   b. The status indicator on the upper right corner of the teaching software (or the display of the hand-held teach pendant) shows the emergency stop state (in red).

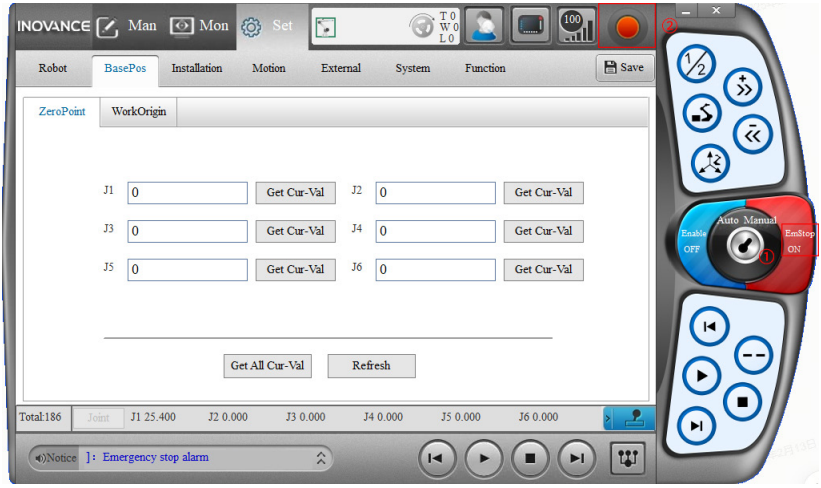


Figure 8-9 IRTP80 series teach pendant

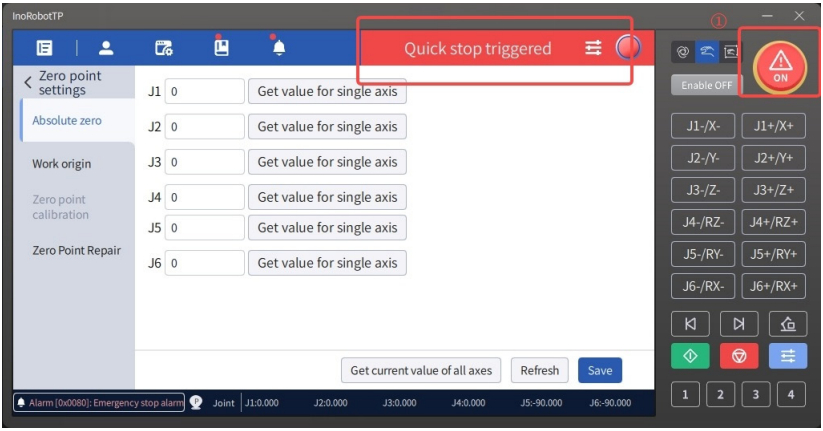


Figure 8-10 IR-TP200 series teach pendant

5. Obtain and save the zero point information.
   a. When the robot is at the zero point position, click the "Get current values for all axes" button to obtain the encoder pulse counts.
   b. Click the "Save" button to complete the zero point calibration.

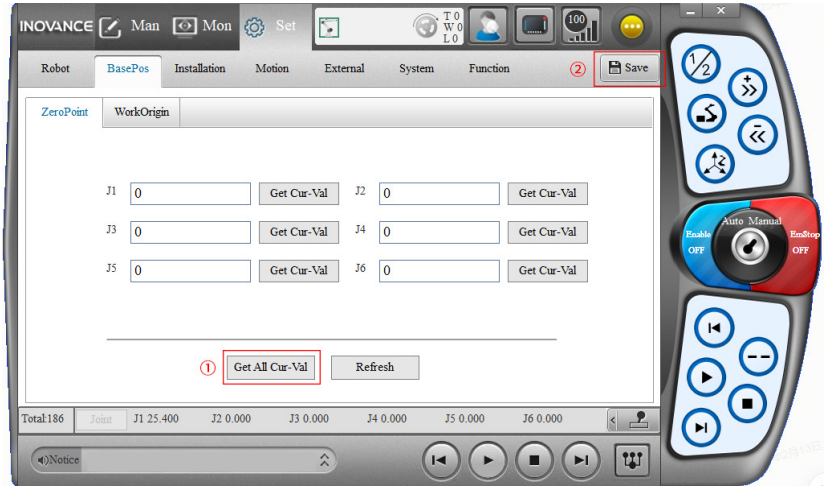


Figure 8-11 IRTP80 series teach pendant

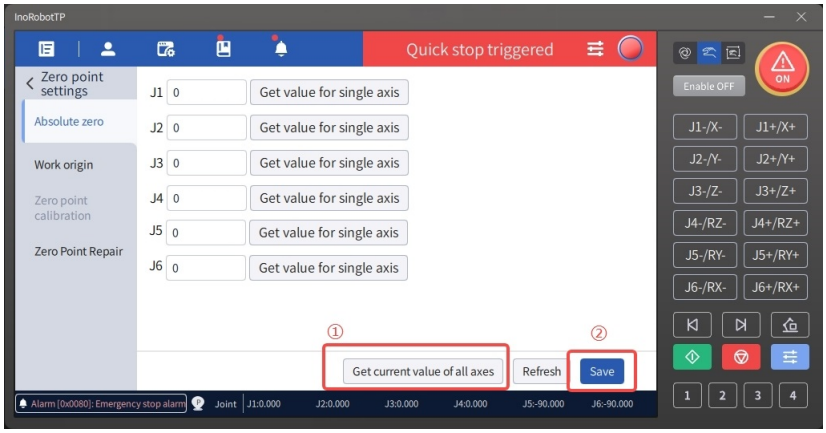


Figure 8-12 IR-TP200 series teach pendant

8.5.3 Zero Point Position of Each Joint

1. Zero point position of J1: The position that overlaps with the X-axis of the robot frame.

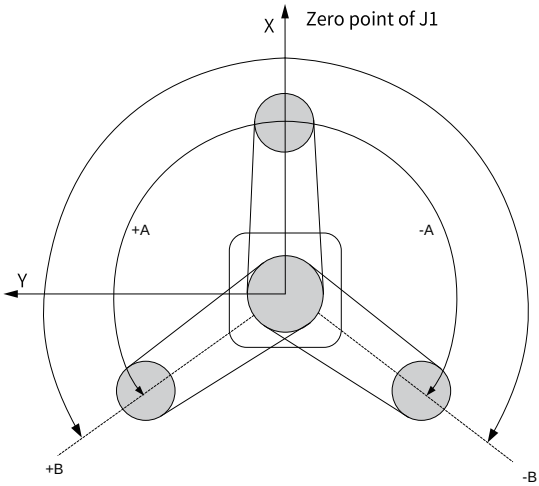


Figure 8-13 Zero point position of J1

2. Zero point position of J2: The position where the forearm is parallel to the upper arm.

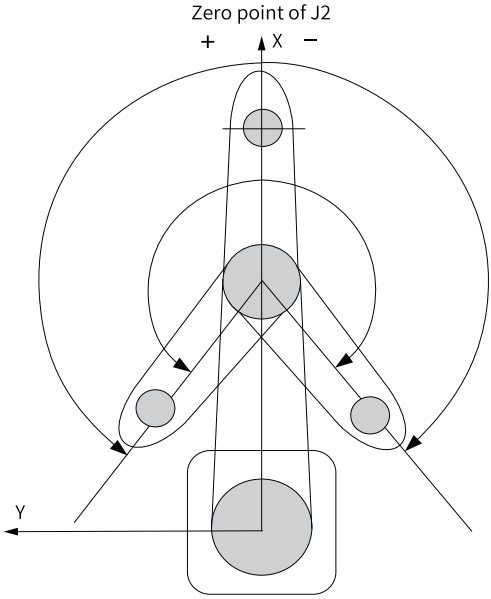


Figure 8-14 Zero point position of J2

3. Zero point position of J3: Upper limit position in motion range.

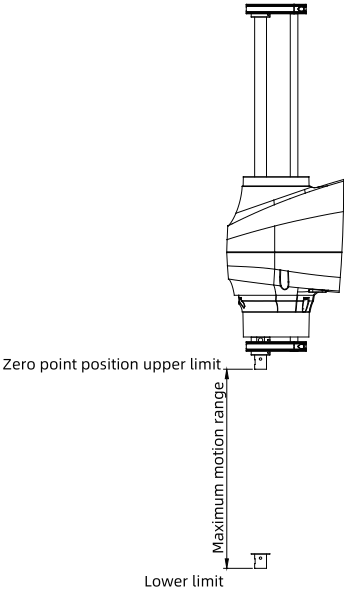


Figure 8-15 Zero point position of J3

The height of the J3 axis varies depending on the robot specifications. The upper limit position of the motion range of J3 is shown in the figure below:

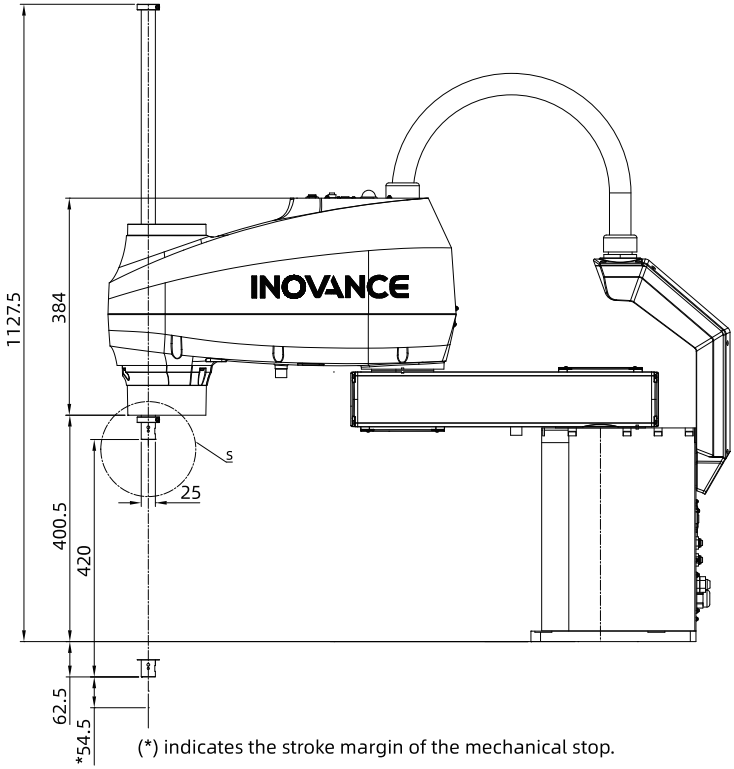
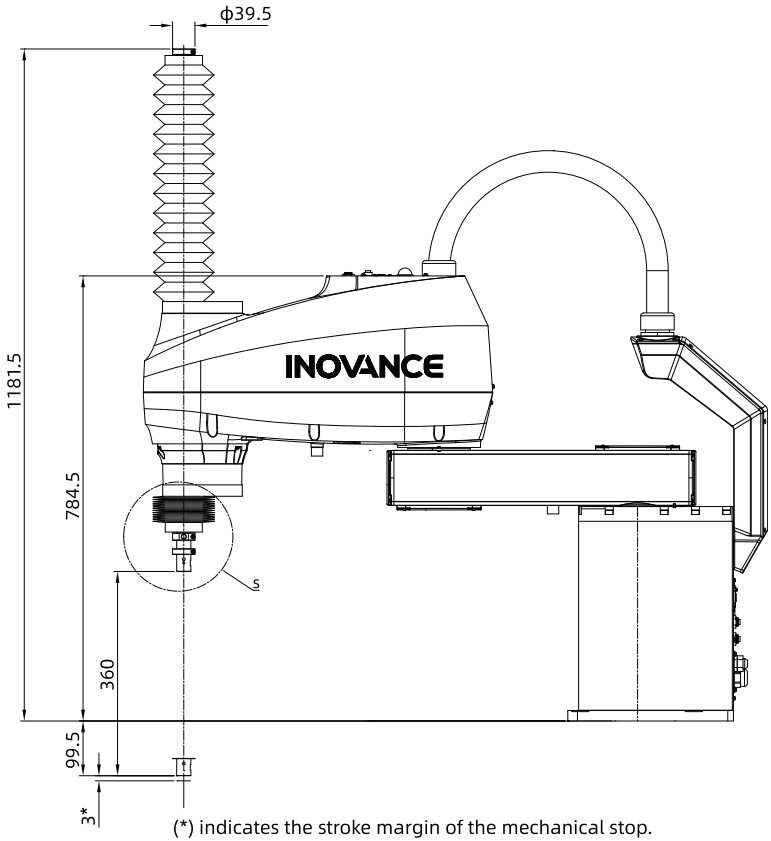


Figure 8-16 Dimension drawing of upper and lower limit positions of J3 axis for IR-S25 standard model (unit: mm)



(*) indicates the stroke margin of the mechanical stop.

Figure 8-17 Dimension drawing of upper and lower limit positions of J3 axis for IR-S25 cleanroom model (unit: mm)

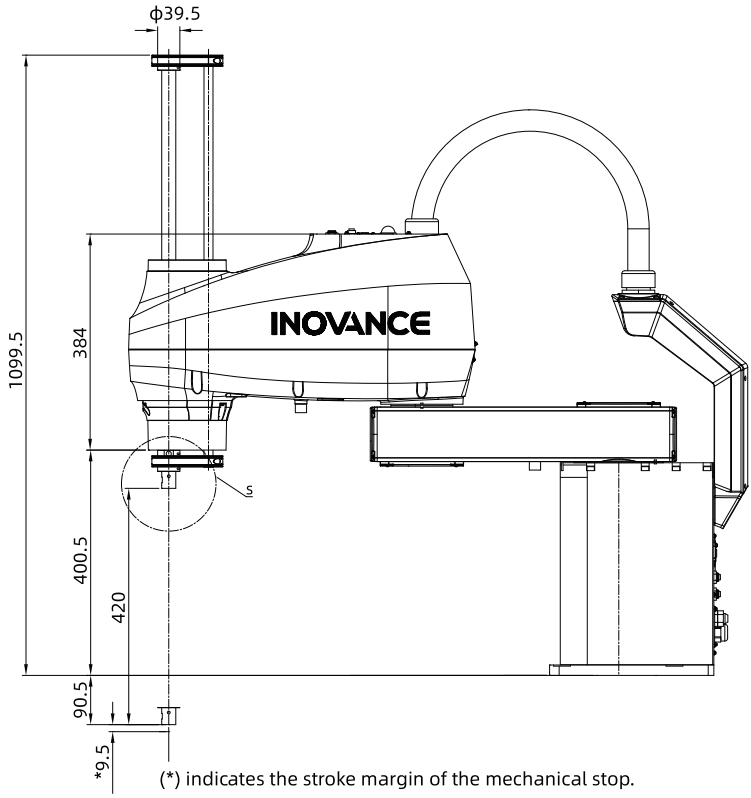


Figure 8-18 Dimension drawing of upper and lower limit positions of J3 axis for IR-S35 standard model (unit: mm)

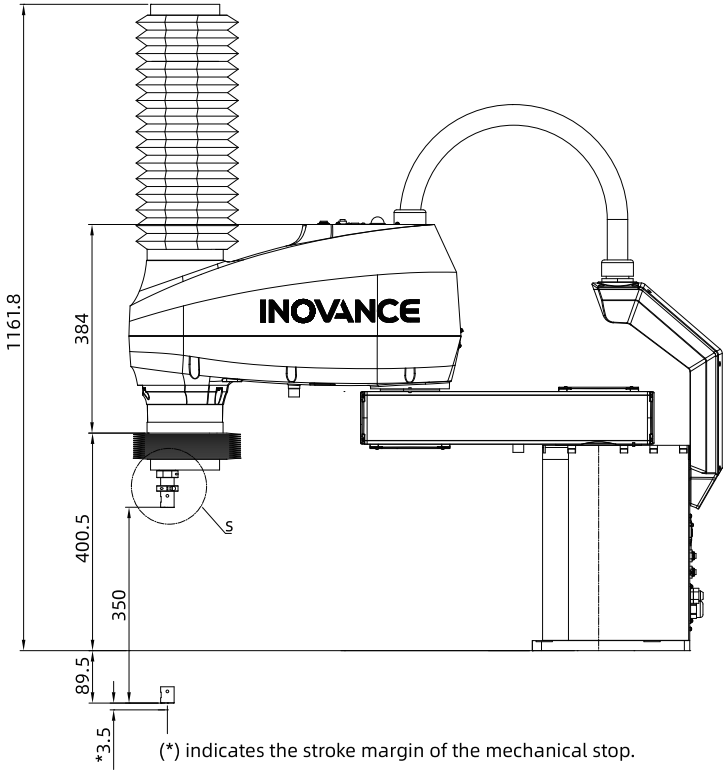


Figure 8-19 Dimension drawing of upper and lower limit positions of J3 axis for IR-S35 cleanroom model (unit: mm)

4. Zero point position of J4: The position where the axis plane (or the notch of the upper/lower mechanical stopper) is oriented toward the tip of arm 2 (forearm).

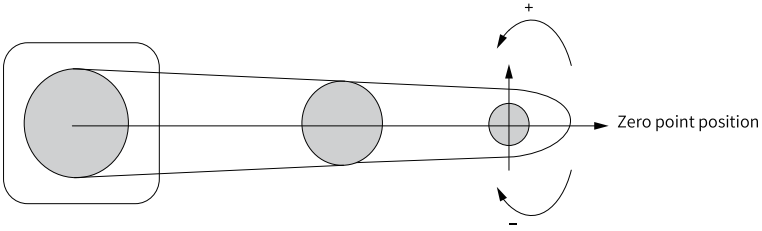


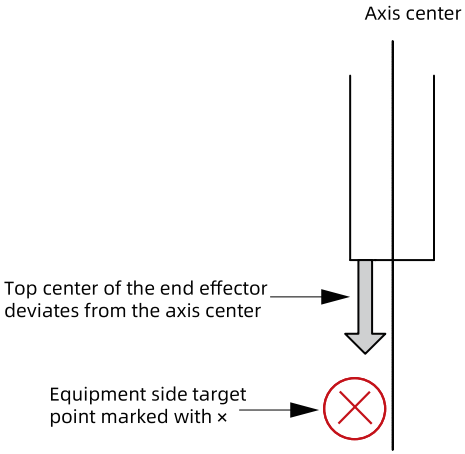
Figure 8-20 Zero point position of J4

8.5.4 Zero Point Calibration of J2

Due to the strong correlation between the coordinates of the SCARA robot's work points and the accuracy of J2, it is necessary to complete the zero point calibration of J2 before calculating the robot coordinates. To calibrate the zero point of J2 through *"8.5.2 Zero Point Calibration Procedure" on page 79*, follow the guidance provided on the teach pendant for zero point calibration using right/left wrist rule.

Zero point calibration procedure of J2

1. Use the center of the ball screw spline shaft as the reference point for zero point calibration.
   When the center of the end effector deviates from the center of the ball screw spline shaft, the zero point calibration can be performed without removing the end effector. Make the position that can be easily recognized when changing the right wrist (or left wrist) pose the target point, and mark the equipment side target point with X.



2. Perform zero point calibration using the left/right wrist rule.
   a. Adjust the robot end to the target point position using the right wrist (or left wrist) pose, and record the robot's Cartesian coordinates P at this time in the point file interface of the teach pendant. On the teach pendant, go to "Settings" > "Zero point settings" > "Absolute zero", click the "Get value for single axis" button, and record the degree of J2 in current state as Enc1.
   b. Change the arm parameters L/R of point P to the other hand system, then execute the motion to point P. Use the left wrist (or right wrist) pose to adjust the robot to a position near the target point. In the axis control panel, teach the robot's X/Y translation so that the end effector precisely points to the target point position. During this process, ensure that the Z and A coordinate values of point P remain unchanged.

c. After teaching, go to "Settings" > "Zero point settings" > "Absolute zero", click the "Get value for single axis" button, and record the degree of J2 in current state as Enc2.

d. On the teach pendant, go to "Settings" > "Zero point settings" > "Absolute zero", click the "Default value" button to get the currently saved zero point information. Calculate (Enc1+Enc2)/2 and fill in the calculation result into the input box of J2, and then click the "Save" button to complete the zero point calibration of J2.

3. Move the robot to the teaching point to verify whether there is a positional gap. If there is a positional gap, fine-tune the installation position of the end effector and teach the point again.

9 Certification and Standard Compliance

Third-party certification

Certification mark	Certification	Description	Directive
	CE	The product complies with the LVD, MD, EMC, and RoHS directives and is labeled with the CE mark.	• EN 60204-1:2018 • EN ISO 10218-1:2011 • EN ISO 12100:2010 • EN 61000-6-2:2019 • EN 61000-6-4:2019 • ISO 13849-1:2023 • EN ISO 13849-1:2015
	SGS-TUV Saar	This product is certified by SGS-TUV Saar for functional safety.	
	cSGSus	This product is certified by SGS North America of Nationally Recognized Test Laboratory (NRTL).	• UL 1740,4th Ed., Jan. 26,2018 • NFPA 79 2021 Edition, Dated Oct. 25, 2020 • CAN/CSA Z434-14 (R2019), Reaffirmed 2019
	FCC	This product has passed the Federal Communications Commission (FCC) EMC testing and carries the FCC mark.	-
	KCs	This product is certified by Korea Occupational Safety and Health Agency (KOSHA) in terms of special equipment, labor protection supplies, and guard devices and carries the KCs mark.	Refer to the certifications for the certified models.

Note

The preceding certification standards only apply to standard models of products. For specific certification information about customized products, consult Inovance technical personnel.

Declaration of conformity with EU directives

Inovance robots have been certified by the following directives and meet basic requirements of the CE-MD, CE-LVD, CE-EMC, and RoHS directives.

Machinery Directive (MD)	2006/42/EC
Low Voltage Directive (LVD)	2014/35/EU
Electromagnetic Compatibility (EMC)	2014/30/EU
ROHS Directive	2011/65/EU Amended by (EU)2015/863
Applicable Harmonized Standards	• EN 60204-1:2018 • EN ISO 10218-1:2011 • EN ISO 12100:2010 • EN 61000-6-2:2019 • EN 61000-6-4:2019 • ISO 13849-1:2023 • EN ISO 13849-1:2015

Service and Support

Should you encounter a safety accident during the use or operation of the product, or face challenges in operating and maintaining the equipment, which remain unresolved after the relevant documentation is consulted, we provide multiple channels to ensure prompt resolution:

- Channel #1: Contact service@inovance.com.
- Channel #2: Visit https://www.inovance.com/global to access document downloads, after-sales support, spare parts ordering, repair applications, and authenticity verification services.
- Channel #3: Download My Inovance app (https://zshc-eu.inovance.com/download-pc/) where you can access products info and documentation, and query product parameters.

We are committed to providing you with quick and professional technical support, and we look forward to your satisfaction and trust.

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