

Medical and Pharmaceutical Robot

VS-050S2 Series

Contributes to automation of medical product/device manufacturing and drug preparation



Maximum reach	520mm
Maximum payload	4kg
Cycle time	0.35 sec



Resistant to sterile environments

Robot for use in sterilized/clean environments that employ H2O2 gas 35% density(dry/wet), UV exposure, etc.



Resists Contamination

The smooth surface prevents adherence of dust and dirt. The robot arm is constructed without external screws to maintain a high sanitation level.

Cleanness: ISO Class 5

Protection level: Wrist IP67, Unit IP65



Authentication

- Design compliant with GMP* (product management and quality control standards) * GMP Grade A
- cUL certified product (UL standard/Canada CSA standard) also
- Hygiene proven through in testing by the Fraunhofer Institute (Report No. DE 1409-725)



Isolation (Suitability for sealed environments)

Cables and connector panels are positioned on the bottom for installation in sealed and quarantine environments.



Examples of Applications

Automation of cell culture

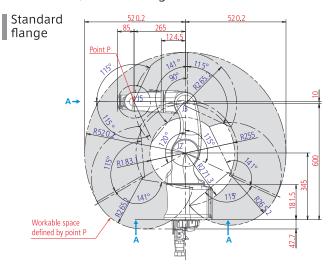
- Robots reproduce the movements of skilled workers accurately to realize the automation of high-quality cell culture without variation in quality caused by multiple workers.
- Use of robots prevents contamination by human workers and eliminates the possibility of workers' exposure to hazards to realize a clean and safe system.
- Human workers' manipulations of general-purpose apparatus, such as pipetting and cap opening, can be reproduced accurately.

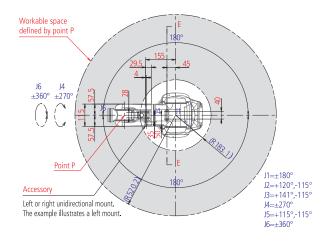






Dimensions / Motion range

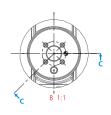


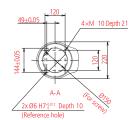


Specifications

Node	specifications		
Axes 6 Position detection method Absolute encoder Drive motor / brake All-axis AC servo motor, all-axis brake provided Total arm length (1st arm + 2nd arm) 520 (255+265) mm Maximum motion area Foint P) Maximum motion radius (Point P) 183.5mm Minimum motion radius (Point P) 183.5mm Maximum motion radius (Point P) 183.5mm Maximum point acquis (Point P) 44 Maximum point acquis (Point P) 44 Maximum point acquis (Point P) 42 Maximum point acquis (Point P) 42 Maximum allowable moment of inertia 43 Maximum allowable moment of inertia 44 Maximum allowable moment of inertia 44 Maximum allowable pressure (Item	Specifications
Position detection method	Model		VS-050S2
All-axis AC servo motor, all-axis brake provided Total arm length (1st arm + 2nd arm) 520 (255+265) mm Maximum motion area (Point P) 520 mm Minimum motion radius (Point P) 183.5mm Motion range J1 (1st axis) ±180*(*3) J2 (2nd axis) +110*, −115* J3 (3rd axis) +111*(*4) J4 (4th axis) ±270° J5 (5th axis) ±360° Maximum payload 4kg Maximum payload 4kg Maximum joint speed J1 425deg/sec J2 283.33deg/sec J3 309.35deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec Cycle time (*1) 0.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J4.J5 0.2kgm² Maximum allowable moment of inertia J6 3.13Nm Signal line/air piping solenoid valve (option) Air piping solenoid valve Solenoid valve (2- position, double-solenoid) × 2	Axes		6
Total arm length (1st arm Point P) 520 (255+265) mm Maximum motion area (Point P) 520 mm Minimum motion radius (Point P) 183.5 mm Motion range J1 (1st axis) ±180° (*3) J2 (2nd axis) +120°, −115° J3 (3rd axis) +141°, −115° J4 (4th axis) ±270° J5 (5th axis) ±360° Maximum payload 4kg Maximum joint speed J1 425deg/sec J2 283.33deg/sec J3 309.35deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec Vcycle time (*1) 0.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J4.J5 0.2kgm² Maximum allowable moment of inertia J6 0.05kgm² Maximum allowable moment of inertia J6 0.05kgm² Maximum allowable moment of inertia J6 0.2c con (7° + 0°) Signal line/air piping solenoid valve (option) J6 3.13Nm	Position detection method		Absolute encoder
Maximum motion area (Point P) 520mm Minimum motion radius (Point P) 183.5mm Minimum motion radius (Point P) 183.5mm Motion range J1 (1st axis) ±180° (*3) Motion range J2 (2nd axis) +1120°, -115° J3 (3rd axis) ±270° J4 (4th axis) ±270° J5 (5th axis) ±360° Maximum payload 4kg Maximum payload J1 425deg/sec J2 283.33deg/sec J3 309.35deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec Cycle time (*1) 0.35sec Postion repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J6 0.2kgrl Maximum allowable moment J6 0.05kgrl Maximum allowable moment J6 3.13Nm Signal line/air piping solenoid valve (repeated) Signal line 10-core (*5, 6) Signal line air piping solenoid valve (repeated) Solenoid valve (2-position, double-sole	Drive motor / brake		All-axis AC servo motor, all-axis brake provided
Minimum motion radius Point P 183.5mm Motion range J1 (1st axis) ±180°(*3) Motion range J2 (2nd axis) +120°, −115° Motion range J3 (3rd axis) ±115°(*4) J4 (4th axis) ±270° J5 (5th axis) ±115°(*4) J6 (6th axis) ±360° Maximum payload 4kg Maximum payload J2 283.33deg/sec J3 309.35deg/sec J3 309.35deg/sec J4 425deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec Cycle time (*1) 0.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J6 0.2kgml Maximum allowable moment of inertia J6 0.05kgml Maximum allowable moment J6 3.13Nm Signal line/air piping solenoid valve (option) Signal line and piping solenoid valve (2- position, double-solenoid) ×2 Electric gripper connection flame Air p	Total arm length (1st ar	m + 2nd arm)	520 (255+265) mm
Motion range J1 (1st axis) ±180° (*3) Motion range J2 (2nd axis) +120°, −115° J3 (3rd axis) +141°, −115° J4 (4th axis) ±270° J5 (5th axis) ±115° (*4) Maximum payload 4kg Maximum joint speed J1 425deg/sec J2 283.33deg/sec J4 425deg/sec J4 425deg/sec J4 425deg/sec J4 425deg/sec J4 425deg/sec J4 272.96deg/sec J6 680deg/sec Maximum allowable moment of inertia J4,J5 0.2kgm² Maximum allowable moment J4,J5 0.2kgm² Maximum allowable moment J6 3.13Nm Signal line 10-core (*5,6) Signal line/solenoid valve (option) Air piping solenoid valve Solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection lange specification-A (option) 25-core (17 + 8) (*6) Air source Maximum allowable pressure 0.20~0.39MPa	Maximum motion area (Point P)		520mm
Motion range J2 (2nd axis) +120°, −115° J3 (3rd axis) +141°, −115° J4 (4th axis) ±270° J5 (5th axis) ±115° (*4) J6 (6th axis) ±360° Maximum payload 4kg 425deg/sec 33.33deg/sec J3 309,35deg/sec J4 425deg/sec J5 272,96deg/sec J6 680deg/sec Cycle time (*1) 0.2kgm² Maximum allowable moment of inertia J4,J5 Maximum allowable moment J6 3.13Nm Signal line/ani piping solenoid	Minimum motion radius (Point P)		183.5mm
Motion range J3 (3rd axis) +141*, −115* J4 (4th axis) ±270° J5 (5th axis) ±115*(*4) J6 (6th axis) ±360° Maximum payload 4kg Maximum point speed J1 425deg/sec J2 2 283,33deg/sec J3 309,35deg/sec J4 4 342deg/sec J4 42deg/sec J5 272,96deg/sec J6 680deg/sec Cycle time (*1) 0.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J6 0.2kgm² Maximum allowable moment of inertia J6 0.05kgm² Maximum allowable moment J6 3.13Nm Signal line/ari rpiping solenoid valve (option) Signal line 10-core (*5,6) Air source Air piping solenoid valve Solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) 25-core (17 + 8) (*6) Air source Maximum allowable pressure 0.20~0.39MPa Noise (A-weighted equivronment 65 dB or lower Environmental resistance Hydrogen peroxide environment 45% Hydrogen peroxide steam (dry		J1 (1st axis)	±180°(*3)
Motion range J4 (4th axis) ±270° J5 (5th axis) ±115°(*4) J6 (6th axis) ±360° Maximum payload 4kg Maximum payload 4kg Maximum point speed J1 425deg/sec J2 283.33deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec Cycle time (*1) 0.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J6 0.2kgml Maximum allowable moment J6 0.05kgml Maximum allowable moment J6 3.13Nm Signal line/air piping solenoid valve (option) J6 3.13Nm Signal line/air piping solenoid valve (option) Signal line and piping solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) 25-core (17 + 8) (*6) Air source Maximum allowable pressure 0.20~0.39MPa Noise (A-weighted equivronment Air piping solenoid valve (2- position, double-solenoid) x 2 Elec		J2 (2nd axis)	+120°, -115°
J4 (4th axis) ±360° Maximum payload	Mation range	J3 (3rd axis)	+141°, -115°
Maximum payload Maximum payload Maximum payload Maximum joint speed Maximum allowable moment of inertia Maximum allowable moment of inertia Maximum allowable moment Maximum allowable pessure Air piping solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) Air source Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Environmental resistance Myrist: IP67, Unit: IP65 Cleanness ISO Class 5	Motion range	J4 (4th axis)	±270°
Maximum payload Maximum joint speed J1		J5 (5th axis)	±115°(*4)
Maximum joint speed J2 283.33deg/sec J3 309.35deg/sec J4 425deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec G80deg/sec G80deg/se		J6 (6th axis)	±360°
Maximum joint speed J2	Maximum payload		4kg
Maximum joint speed J3 309.35deg/sec J4 425deg/sec J5 272.96deg/sec J6 680deg/sec O.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J6 0.05kgm² Maximum allowable moment J6 3.13Nm Signal line/air piping solenoid valve (option) 25 6.66Nm Air piping solenoid valve 2 50lenoid valve (2 - position, double-solenoid) x 2 Electric gripper connection 1 1 1 1 1 1 Air source Operating pressure 0.20~0.39MPa Maximum allowable pressure 0.49MPa Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment 7 7 7 7 7 7 7 Protection level Wrist: IP67, Unit: IP65 Cleanness ISO Class 5		J1	425deg/sec
Maximum joint speed J4		J2	283.33deg/sec
J4 425deg/sec J5 272.96deg/sec J6 680deg/sec Cycle time (*1) 0.35sec Position repeatability (at the center of end-effector mounting face) (*2) ±0.02mm Maximum allowable moment of inertia J6 0.05kgml Maximum allowable moment J6 24, J5 0.2kgml Maximum allowable moment J6 36 3.13Nm Signal line/air piping solenoid valve (option) Air piping solenoid valve (option) Air piping solenoid valve (option) Electric gripper connection flange specification-A (option) 25-core (17 + 8) (*6) Air source Maximum allowable pressure 0.20~0.39MPa Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Protection level Wrist: IP67, Unit: IP65 Cleanness ISO Class 5		J3	309.35deg/sec
Cycle time (*1) Position repeatability (at the center of end-effector mounting face) (*2) Maximum allowable moment of inertia Maximum allowable moment Jeff 14, J5	Maximum joint speed	J4	425deg/sec
Cycle time (*1) Position repeatability (at the center of end-effector mounting face) (*2) Maximum allowable moment of inertia Maximum allowable moment J6 Maximum allowable moment J6 Signal line/air piping solenoid valve (option) Air piping solenoid valve (option) Air source Operating pressure Maximum allowable moment D6 Signal line Signal line Signal line Solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Protection level Cleanness O.35sec ±0.02kgm² 0.2kgm² 0.2kgm² 0.2666Nm 3.13Nm Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- position, double-solenoid) x 2 5olenoid valve (3- position, double-solenoid) x 2 Solenoid valve (3- position, double-solenoid) x 2 Solenoi		J5	272.96deg/sec
Position repeatability (at the center of end-effector mounting face) (*2) Maximum allowable moment of inertia Maximum allowable moment Maximum allowable moment J4,J5 0.2kgm² 0.05kgm² 0.066Nm 10-core (*5, 6) Signal line aline/air piping solenoid valve (2-position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Protection level Vrist: IP67, Unit: IP65 Cleanness Location Loc		J6	680deg/sec
end-effector mounting face) (*2) Maximum allowable moment of inertia Maximum allowable moment of inertia Maximum allowable moment Maximum allowable moment J4,J5 6.66Nm J6 3.13Nm Signal line/air piping solenoid valve (option) Air piping solenoid valve Air piping solenoid valve Air piping solenoid valve Solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) Air source Operating pressure Maximum allowable pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Protection level Nrist: IP67, Unit: IP65 Cleanness Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (3- position, double-solenoid) x 2 Soleno	Cycle time (*1)		0.35sec
moment of inertia Maximum allowable moment Je Signal line/air piping solenoid valve (option) Air piping solenoid valve (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Environmental resistance Maximum allowable pressure Air source Maximum allowable pressure Abyrogen peroxide environment Protection level Cleanness Maximum allowable pressure Assistance Maximum allowable pressure Air source Maximum allowable pressure Asistance Maximum allowable Air piping solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (3- position, double-solenoid) x 2 Solenoid valv			±0.02mm
Maximum allowable moment J4,J5 6.66Nm Signal line/air piping solenoid valve (option) Air piping solenoid valve (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment resistance Protection level Cleanness Ai,J5 6.66Nm 10-core (*5, 6) Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (3- position, double-solenoid) x 2 Solenoid valve		J4,J5	0.2kgm²
moment Signal line/air piping solenoid valve (option) Air piping solenoid valve (2- position, double-solenoid) x 2 Electric gripper connection flange specification-A (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Finvironmental resistance Protection level Cleanness Signal line 10-core (*5, 6) Solenoid valve (2- position, double-solenoid) x 2 25-core (17 + 8) (*6) 0.20~0.39MPa 0.49MPa 65 dB or lower 35% Hydrogen peroxide steam (dry/wet) Wrist: IP67, Unit: IP65 ISO Class 5		J6	0.05kgm²
Signal line/air piping solenoid valve (option) Air piping solenoid valve Electric gripper connection flange specification-A (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Finvironmental resistance Protection level Cleanness Solenoid valve (2- position, double-solenoid) x 2 Solenoid valve (2- pos		J4,J5	6.66Nm
Solenoid valve (option) Air piping solenoid valve Electric gripper connection flange specification-A (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment resistance Protection level Solenoid valve (2- position, double-solenoid) x 2 25-core (17 + 8) (*6) 0.20~0.39MPa 0.49MPa 65 dB or lower 35% Hydrogen peroxide steam (dry/wet) Wrist: IP67, Unit: IP65 ISO Class 5		J6	3.13Nm
Electric gripper connection flange specification-A (option) Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment resistance Protection level Cleanness Startos Wat 2 postativity, deat 2 postativity, dea		Signal line	10-core (*5, 6)
Air source Operating pressure Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment Environmental resistance Protection level Cleanness O.20~0.39MPa 0.49MPa 65 dB or lower 35% Hydrogen peroxide steam (dry/wet) Wrist: IP67, Unit: IP65 ISO Class 5		Air piping solenoid valve	Solenoid valve (2- position, double-solenoid) x 2
Air source Maximum allowable pressure Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment environment Environmental resistance Protection level Cleanness O.49MPa 35% Hydrogen peroxide steam (dry/wet) Wrist: IP67, Unit: IP65 ISO Class 5	Electric gripper connection flange specification-A (option)		25-core (17 + 8) (*6)
Noise (A-weighted equivalent continuous sound pressure level) Hydrogen peroxide environment environment resistance Protection level Cleanness O.49MPa 65 dB or lower 35% Hydrogen peroxide steam (dry/wet) Wrist: IP67, Unit: IP65 ISO Class 5	Air source	Operating pressure	0.20~0.39MPa
Pressure level) Hydrogen peroxide environmental resistance Hydrogen peroxide environment Protection level Cleanness Wrist: IP67, Unit: IP65 ISO Class 5		Maximum allowable pressure	0.49MPa
Environmental resistance Protection level Wrist: IP67, Unit: IP65 Cleanness ISO Class 5			65 dB or lower
resistance Protection level Wrist: IP67, Unit: IP65 Cleanness ISO Class 5	Environmental		35% Hydrogen peroxide steam (dry/wet)
		Protection level	Wrist: IP67, Unit: IP65
Weight Approx. 34 kg		Cleanness	ISO Class 5
	Weight		Approx. 34 kg

Detailed drawing of endeffector mounting face (Standard Flange) (View A) Detailed drawing of base mounting face (Top view)





Options

Electric gripper connection flange specification-A

Internal mount with a gripper cable up to the flange. Suitable for clean environments, eliminates interference with peripherals



External mount battery

Optional external mount battery for improved maintainability and battery replacement



- *1: Time required for a robot to move 1 kg payload between two points 300 mm apart at a height of 25 mm
- *2: Position repeatability is the precision at constant ambient temperature *3: Motion range is limited when mounted to a wall. Inquire for details.

- *4: When electric gripper connection flange specification-A is selected, the J5 motion range is +110, -102.
 *5: This wire (proximity sensor wire and other signal wires) has 4 cores if electric gripper connection flange specification-A is also selected.

*6: Allowable current is limited.

DENSO Products and Services Americas, Inc. 3900 Via Oro Avenue, Long Beach, California, 90810, U.S.A. Phone: +1-888-476-2689 FAX: +1-310-952-7502

DENSO KOREA CORPORATION

131, Seonggogae-ro, Uiwang-si, Gyeonggi-do, Korea 437-120 Phone : +82-31-340-1783 FAX : +82-31-8033-7213

No.525 Sec.2, Mei Su Road, Jui Ping Li, Yang-Mei Town, Taoyuan Hsien, Taiwan Phone : +886 3-482-8001 FAX : +886 3-482-8003

DENSO EUROPE B. V. DENSO Robotics Europe

Waldeckerstrasse 9 D-64546 Moerfelden-Walldorf, Germany Phone: +49-6105-27-35-150 FAX: +49-6105-27-35-180

DENSO (CHINA) INVESTMENT CO., LTD.

No.35 Yuandian Road, Minhang District, Shanghai, CHINA 201108 Phone: +86-21-2350-0093 FAX: +86-21-2350-0179

DENSO SALES (THAILAND) CO.,LTD.

888 Moo 1, Bangna-Trad Rd. Km 27.5, T.Bangbor, A.Bangbor, Samutprakarn, 10560, Thailand Phone: +66-2-315-9500 FAX: +66-2-315-9556

