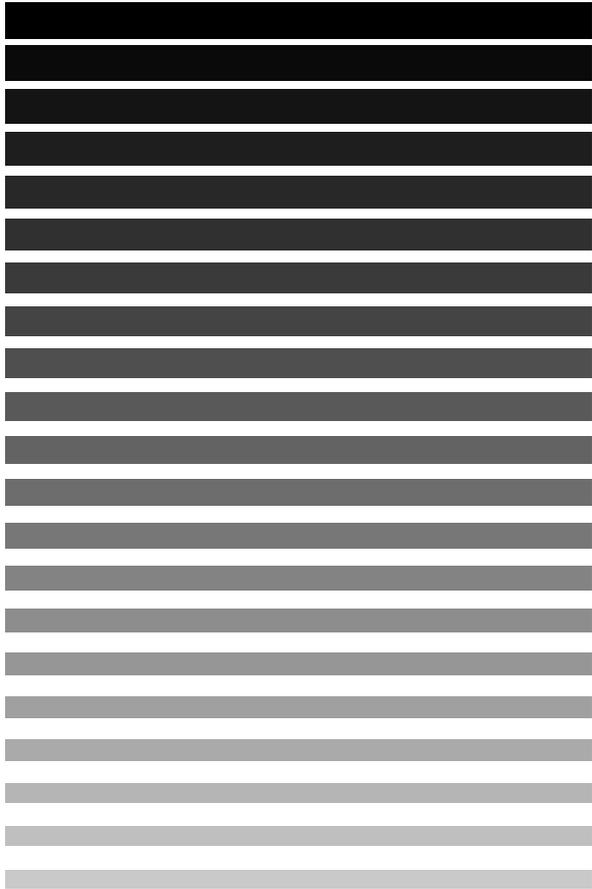


DENSO



VS-E/G Series
Cleanroom Type Robot
(Class 100)

DENSO ROBOT

Vertical articulated

VS-65E/G-*P100**

INSTALLATION & MAINTENANCE GUIDE
(SUPPLEMENT)

Preface

This robot unit (except the controller) is the cleanroom type (class 100).

This manual describes about the cleanroom type robot for VS-E series.

This book is a supplement to the “VS-E or VS-G SERIES MANUALS”. Use this supplement together with the “VS-E or VS-G SERIES MANUALS”.

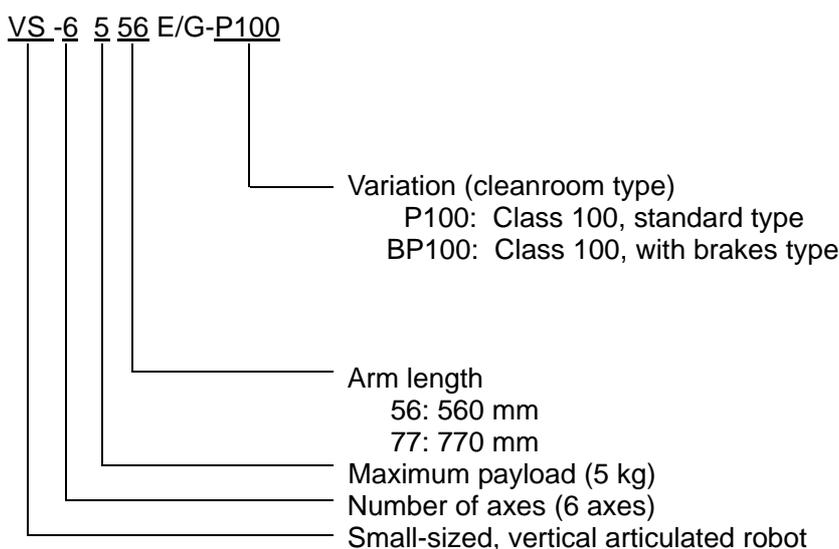
Before use, read this manual carefully together with related manuals to safely get the maximum benefit from your robot in your assembling operations.

Robot models covered by this manual

Small-sized, vertical articulated VS-E/G series (Class 100 for cleanroom type)

VS-6556E/G-P100	VS-6556E/G-BP100
VS-6577E/G-P100	VS-6577E/G-BP100

Coding of the set model:



Contents

1	Robot Unit Specifications.....	1
	(1) VS-6556E/G-P100, VS-6556E/G-BP100	1
	(2) VS-6577E/G-P100, VS-6577E/G-BP100	2
2	Outer Dimensions and Workable Space of the Robot Unit	3
	(1) VS-6556E/G-P100	3
	(2) VS-6556E/G-BP100	4
	(3) VS-6577E/G-P100	5
	(4) VS-6577E/G-BP100	6
3	Air Piping and Signal Wiring	7
4	5-axis or 6-axis CALSET Procedure	8
5	Notes when Handling the Cleanroom Type.....	9

1 Robot Unit Specifications

Following tables list the robot unit specifications of the VS-65**E/G-*P100 series.

(1) VS-6556E/G-P100, VS-6556E/G-BP100

VS-6556E/G-P100 & VS-6556E/G-BP100 Specifications

Item	Specifications	
	Standard type	With brakes
Model name of robot set (Note 1)	VS-6556E/G-P100	VS-6556E/G-BP100
Model name of robot unit	VS-6556E/GM-P100	VS-6556E/GM-BP100
Overall arm length	270 (first arm) + 295 (second arm) = 565 mm	
Arm offset	J1 (swing): 75 mm, J3 (front arm): 90 mm	
Maximum motion area	R = 733 mm (end-effector mounting face) R = 653 mm (Point P: J4, J5, J6 center)	
Motion range	J1 : $\pm 170^\circ$, J2 : $+135^\circ, -100^\circ$, J3 : $+166^\circ, -119^\circ$ J4 : $\pm 190^\circ$, J5 : $\pm 120^\circ$, J6 : $\pm 360^\circ$	
Maximum payload	5 kg	
Maximum composite speed	8200 mm/s (at the center of an end-effector mounting face)	
Position repeatability (Note 2)	In each of X, Y and Z directions: ± 0.02 mm	
Maximum allowable inertia moment	Around J4 and J5: 0.295 kgm^2 Around J6: 0.045 kgm^2	
Position detection	Absolute encoder	
Drive motor and brake	AC servomotors for all joints, Brakes for joints J2 to J4	AC servomotors for all joints, Brakes for joints J2 to J6
User air piping (Note 3)	6 systems ($\phi 4 \times 6$), 3 solenoid valves (2-position, double solenoid) contained.	
User signal line	10 (for proximity sensor signals, etc.)	
Air source	Operating pressure	$1.0 \times 10^5 \text{ Pa}$ to $3.9 \times 10^5 \text{ Pa}$
	Maximum allowable pressure	$4.9 \times 10^5 \text{ Pa}$
Weight	Approx. 28 kg	
Clean class for cleanroom type	Class 100 (0.3μ) at use points	
<p>Note 1: The model name of robot set refers to the model name of a complete set including a robot unit and robot controller.</p> <p>Note 2: Position repeatability is the value at constant ambient temperature.</p>		

(2) VS-6577E/G-P100, VS-6577E/G-BP100

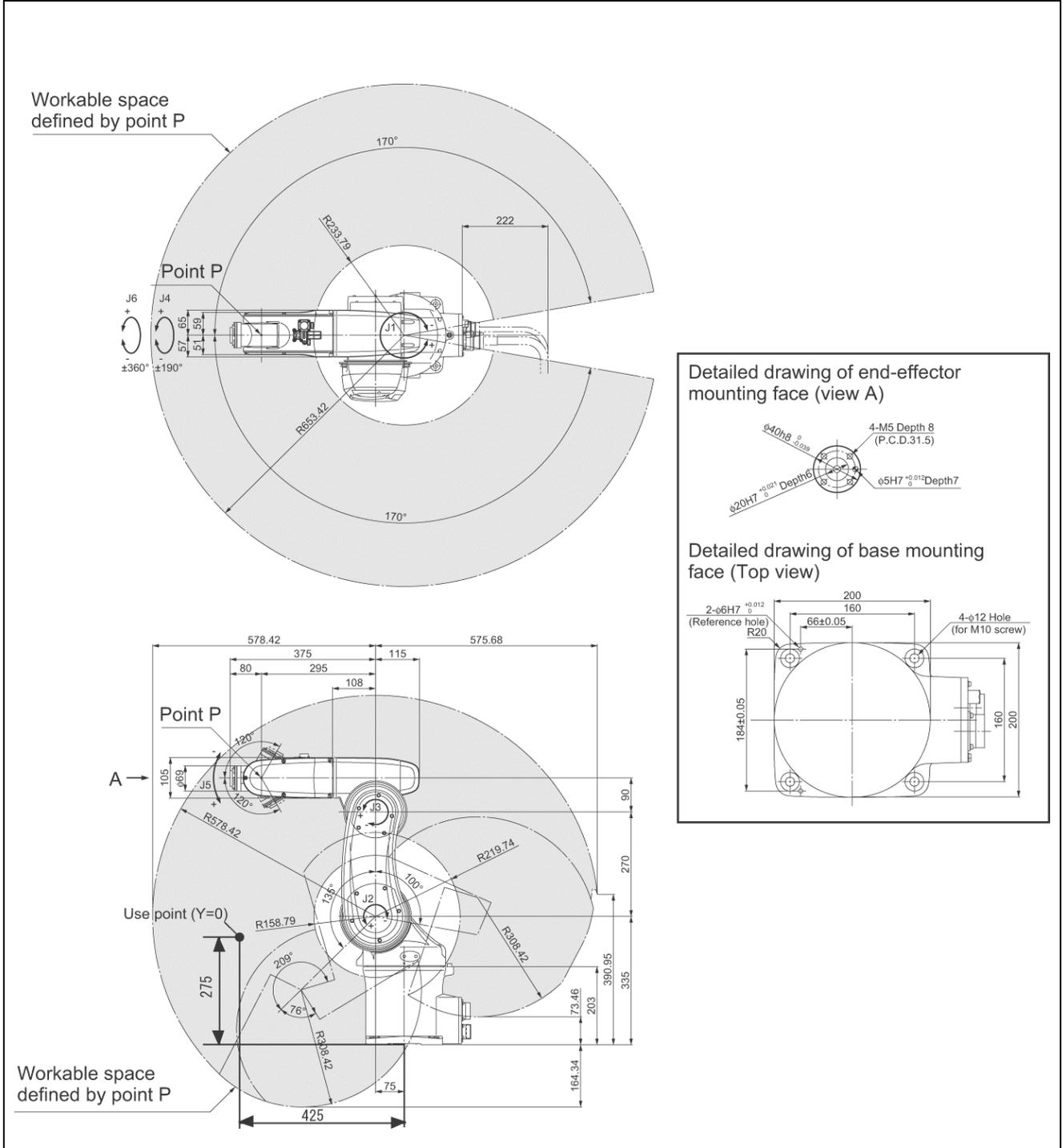
VS-6577E/G-P100 & VS-6577E/G-BP100 Specifications

Item	Specifications	
	Standard type	With brakes
Model of robot system (Note 1)	VS-6577E/G-P100	VS-6577E/G-BP100
Model of robot unit	VS-6577E/GM-P100	VS-6577E/GM-BP100
Overall arm length	365 (first arm) + 405 (second arm) = 770 mm	
Arm offset	J1 (swing): 75 mm, J3 (front arm): 90 mm	
Maximum motion area	R = 934 mm (end-effector mounting face) R = 854 mm (Point P: J4, J5, J6 center)	
Motion range	J1 : ±170°, J2 : +135°, -100°, J3 : +169°, -119° J4 : ±190°, J5 : ±120°, J6 : ±360°	
Maximum payload	5 kg	
Maximum composite speed	7600 mm/s (at the center of an end-effector mounting face)	
Position repeatability (Note 2)	In each of X, Y and Z directions: ±0.03 mm	
Maximum allowable inertia moment	Around J4 and J5: 0.295 kgm ² Around J6: 0.045 kgm ²	
Position detection	Absolute encoder	
Drive motor and brake	AC servomotors for all joints, Brakes for joints J2 to J4	AC servomotors for all joints, Brakes for joints J2 to J6
User air piping (Note 3)	6 systems (φ4x6), 3 solenoid valves (2-position, double solenoid) contained.	
User signal line	10 (for proximity sensor signals, etc.)	
Air source	Operating pressure	1.0 × 10 ⁵ Pa to 3.9 × 10 ⁵ Pa
	Maximum allowable pressure	4.9 × 10 ⁵ Pa
Weight	Approx. 29 kg	
Clean class for cleanroom type	Class 100 (0.3 μ) at use points	
Note 1: The model name of robot set refers to the model of a complete set including a robot unit and robot controller.		
Note 2: Position repeatability is the value at constant ambient temperature.		

2 Outer Dimensions and Workable Space of the Robot Unit

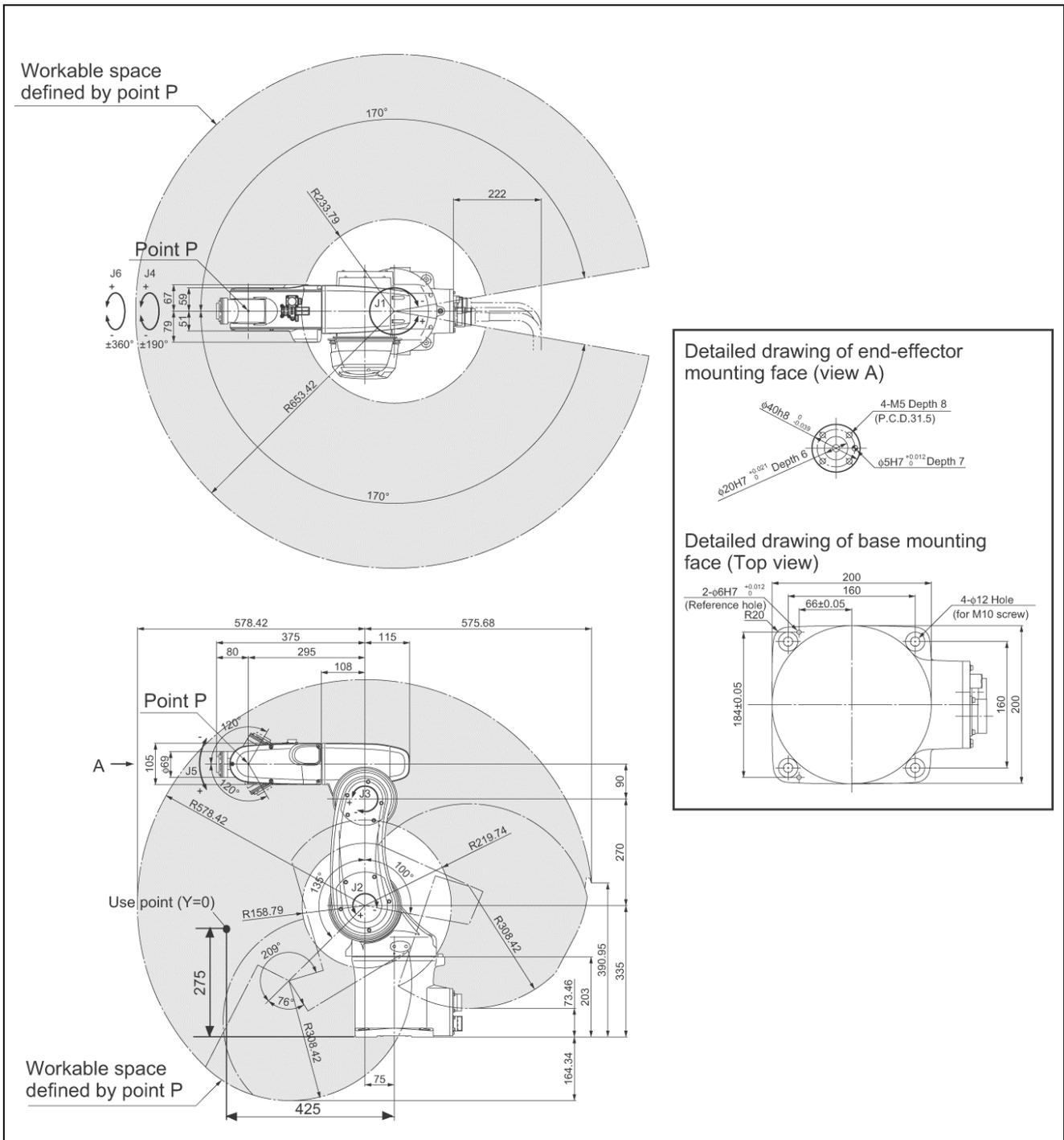
Following figures show the outer dimensions and workable space of the robot.

(1) VS-6556E/G-P100



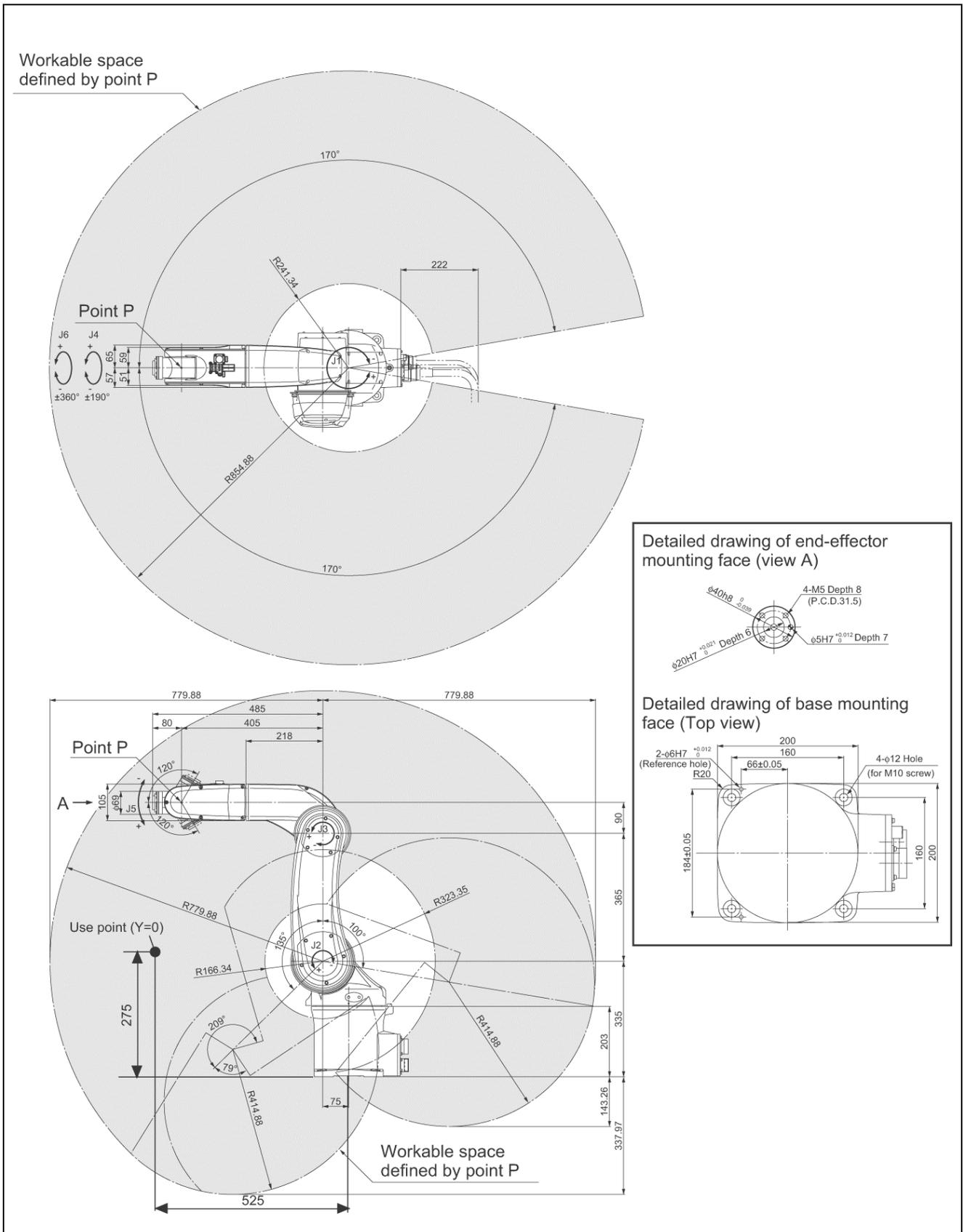
Outer dimensions and workable space (VS-6556E/G-P100)

(2) VS-6556E/G-BP100



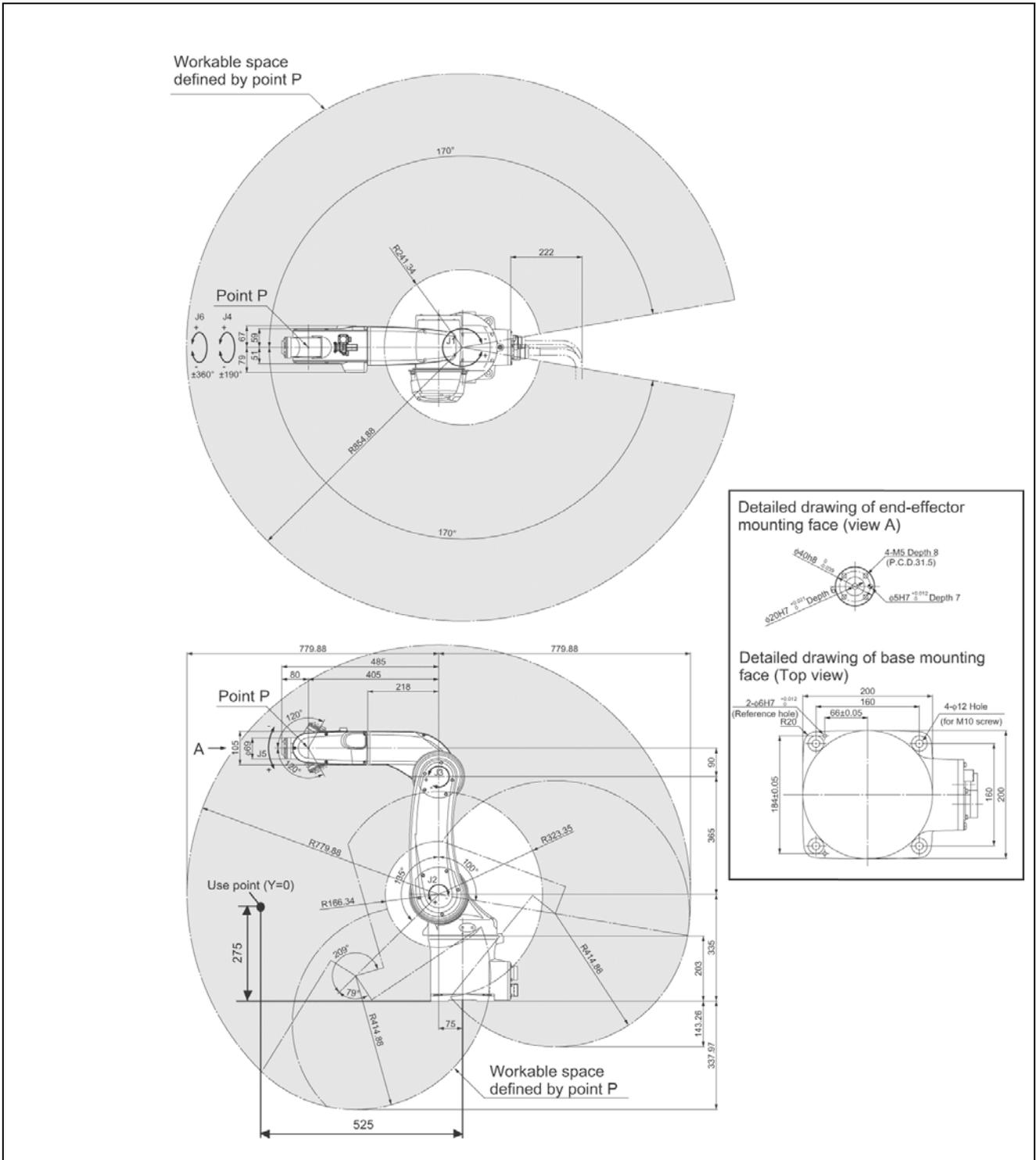
Outer dimensions and workable space (VS-6556E/G-BP100)

(3) VS-6577E/G-P100



Outer dimensions and workable space (VS-6577E/G-P100)

(4) VS-6577E/G-BP100



Outer dimensions and workable space (VS-6577E/G-BP100)

3 Air Piping and Signal Wiring

The VS-65**E/G-*P100 series is equipped with 6 air pipes for air chuck, 10 signal lines, and 3 solenoid valves in it. The air piping and signal wiring is shown in the figure below.

View (A)

CN21 pin layout

Connector (CN21) for end-effector control signal wires

Air piping joint (M5)

View (B)

VALVE IN
Air piping joint (PT1/4)

VALVE OUT
Air piping joint (PT1/4)

Grounding terminal (M5)

Connector (CN20) for end-effector signal/valve control wires

CN20 pin layout

Valve Symbols and Air Intake/Exhaust States
(1A and 1B are piping joint symbols.)

Air piping joint	Valve signal		
	Solenoid valve	Solenoid	
		A	B
AIR1	Air intake	Exhaust	
	1A	1B	1
	1B	1A	1
	2A	2B	2
	2B	2A	2
	3A	3B	3
3B	3A	3	
AIR2	Not used for cleanroom type		

CN20 Pin Assignment
For controller I/O unit, NPN type (source IN, sink OUT)

CN20 pin No.	Used for:
M	+24V
N	solenoid 1A (solenoid valve 1)
P	Solenoid 1B (solenoid valve 1)
R	Solenoid 2A (solenoid valve 2)
S	Solenoid 2B (solenoid valve 2)
T	Solenoid 3A (solenoid valve 3)
U	Solenoid 3B (solenoid valve 3)

For controller I/O unit, PNP type (sink IN, source OUT)

CN20 pin No.	Used for:
M	0V
N	Solenoid 1A (solenoid valve 1)
P	Solenoid 1B (solenoid valve 1)
R	Solenoid 2A (solenoid valve 2)
S	Solenoid 2B (solenoid valve 2)
T	Solenoid 3A (solenoid valve 3)
U	Solenoid 3B (solenoid valve 3)

Note 1 : Pins A to K on CN20 and pins #1 to #10 on CN21 are connected with each other as shown below. The allowable current per line is 1 A.

CN20	A	B	C	D	E	F	G	H	J	K
CN21	1	2	3	4	5	6	7	8	9	10

Note 2 : Use the attached connector sets for CN20 and CN21.

Connector set part No.	Part No.	Model and part name	Appearance
410889-0010	410877-0120 (for CN20)	H/M3106A22-14S (straight plug) (HIROSE ELECTRIC CO., LTD.)	
	410877-0130 (for CN20)	H/MS3057-12A (cord clamp) (HIROSE ELECTRIC CO., LTD.)	Applicable wire diameter φ11.4 to 15.9
	410877-0140 (for CN20)	H/MS3057-12A1 (cord clamp) (HIROSE ELECTRIC CO., LTD.)	Applicable wire diameter φ8 to 11.6
	410877-0070 (for CN21)	EBLP1610M (L type plug connector) (DDK Electronics, Inc.)	

Air Piping and Signal Wiring

4 5-axis or 6-axis CALSET Procedure

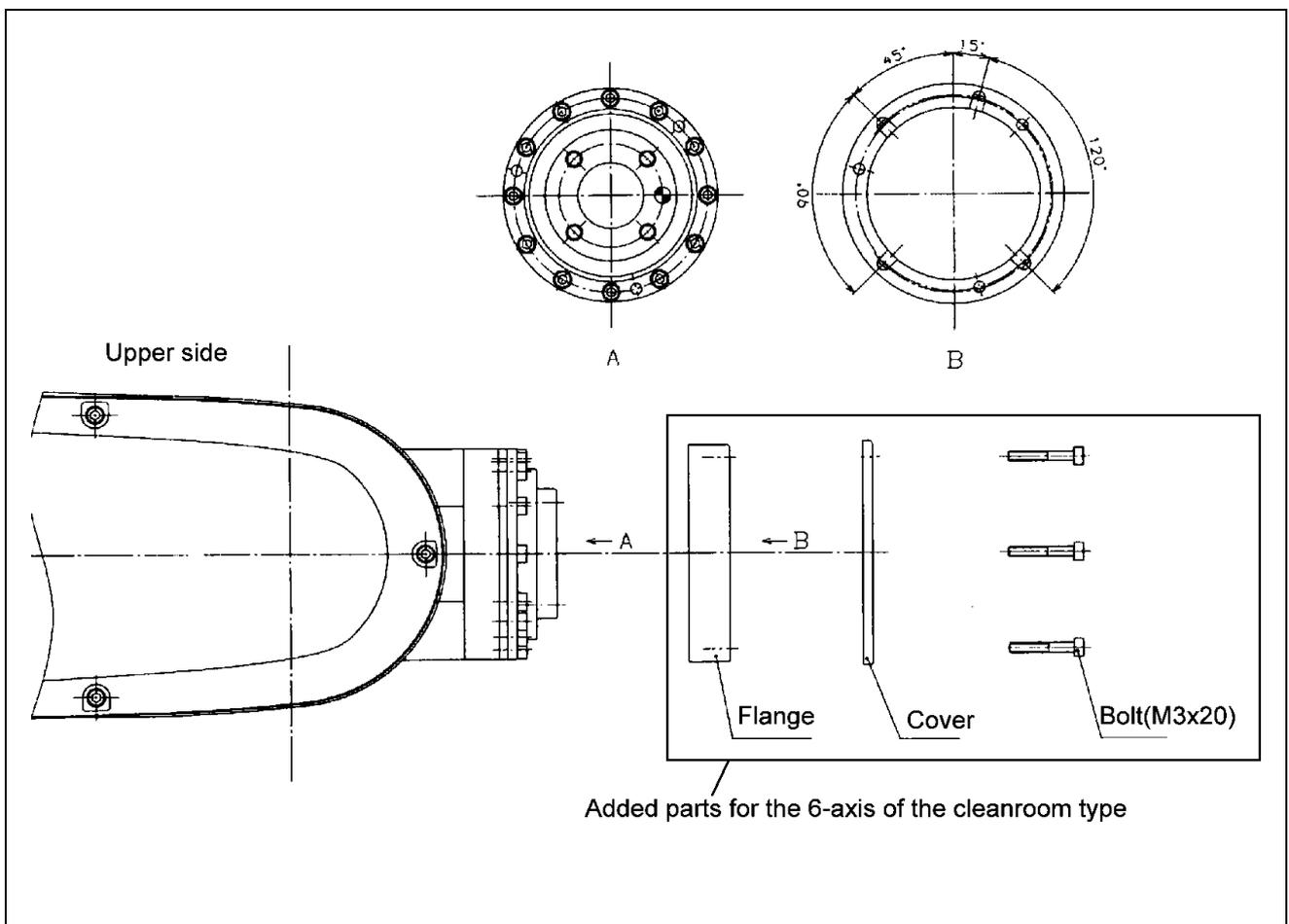
The flange and cover described are originally attached to the 6-axis of the cleanroom type robot as shown in Figure below. Therefore, perform 5-axis or 6-axis CALSET as follows.

- (1) Before performing 5-axis or 6-axis CALSET, remove the flange and cover.

Caution: When removing the flange and cover, dusts inside robot may be splashed.

- (2) Perform 5-axis or 6-axis CALSET according to the CALSET procedure described on "VS-E or VS-G SERIES INSTALLATION & MAINTENANCE GUIDE".
- (3) Re install the flange and cover using three bolts.

Bolt fixing torque: $1.57 \text{ Nm} \pm 20\%$



6-axis of VS-65**E/G-*P100

5 Notes when Handling the Cleanroom Type

The cleanroom type of the VS-65**E/G-*P100 series robot satisfies Clean Class 100 (0.3 μ); however, the robot controller does not.

When carrying out installation, maintenance or inspection jobs of the cleanroom type in your clean room, be sure to follow your dust-proof job rules. If you remove the covers from the robot controller or robot unit, even the cleanroom type may scatter worn belt dust, piping grease, dust or dirt accumulating inside.

Jobs requiring special care

- CALSET
- Cleaning of cooling fan filters in the robot controller
- Replacement of encoder backup batteries
- Replacement of controller memory backup batteries
- Inspection of timing belts
- Replacement of controller fuses
- Replacement of controller output ICs
- Greasing

**VS-E/G Series
Cleanroom Type Robot (Class 100)**

**OWNER'S MANUAL
(SUPPLEMENT)**

First Edition July 2002
Second Edition September 2002
Third Edition September 2005

DENSO WAVE INCORPORATED
Factory Automation Division

9G

The purpose of this manual is to provide accurate information in the handling and operating of the robot. Please feel free to send your comments regarding any errors or omissions you may have found, or any suggestions you may have for generally improving the manual.

In no event will DENSO WAVE INCORPORATED be liable for any direct or indirect damages resulting from the application of the information in this manual.

DENSO WAVE INCORPORATED

Factory Automation Division

410002-6320-R3