DENSO

VS-E/G Series Cleanroom Type Robot (Class 10)

DENSO ROBOT

Vertical articulated

VS-65E/G-*P10**

INSTALLATION & MAINTENANCE GUIDE

(SUPPLEMENT)

Preface

This robot unit (except the controller) is the cleanroom type (class 10).

This manual describes about the cleanroom type robot for VS-E/G 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”.

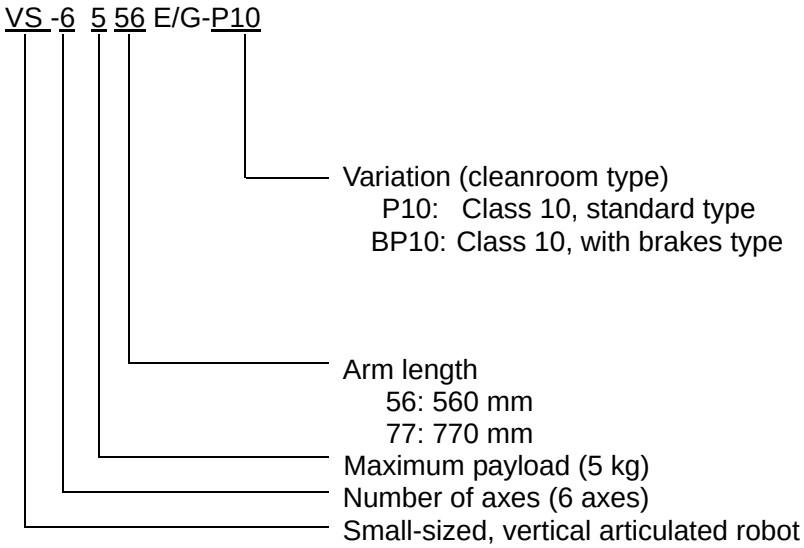
Before use, read this manual carefully together with related manuals to safely get the maximum benefit from your robot in your assembling operations.

Robot models covered by this manual

Small-sized, vertical articulated VS-E/G series (Class 10 for cleanroom type)

VS-6556E/G-P10	VS-6556E/G-BP10
VS-6577E/G-P10	VS-6577E/G-BP10

Coding of the set model:



Contents

1 Robot Unit Specifications

Following tables list the robot unit specifications of the VS-65**E/G-*P10 series.

(1) VS-6556E/G-P10, VS-6556E/G-BP10

VS-6556E/G-P10 & VS-6556E/G-BP10 Specifications

Item		Specifications	
		Standard type	With brakes
Model name of robot set **(Note 1)**		VS-6556E/G-P10	VS-6556E/G-BP10
Model name of robot unit		VS-6556E/GM-P10	VS-6556E/GM-BP10
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 : ±170°, J2 : +135°, -100°, J3 : +166°, -119° J4 : ±190°, J5 : ±120°, J6 : ±360°	
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 (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. 28 kg	
Clean class for cleanroom type		Class 10 (0.1 μ) at use points	

Note 1: The model name of robot set refers to the model name of a complete set including a robot unit and robot controller.

Note 2: Position repeatability is the value at constant ambient temperature.

(2) VS-6577E/G-P10, VS-6577E/G-BP10

VS-6577E/G-P & VS-6577E/G-BP Specifications

Item		Specifications	
		Standard type	With brakes
Model of robot system **(Note 1)**		VS-6577E/G-P10	VS-6577E/G-BP10
Model of robot unit		VS-6577E/GM-P10	VS-6577E/GM-BP10
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 10 (0.1 μ) at use points	

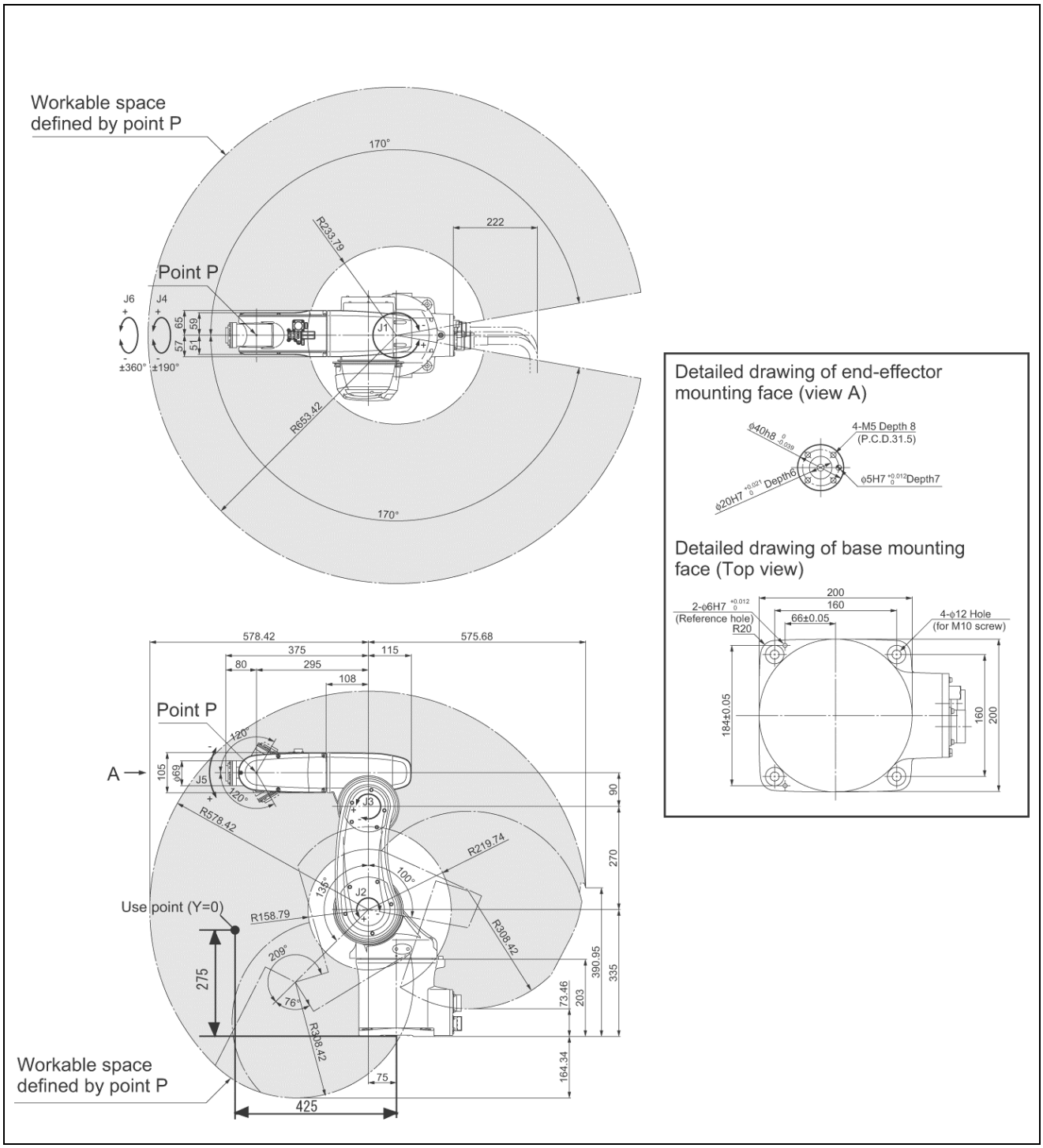
Note 1: The model name of robot set refers to the model of a complete set including a robot unit and robot controller.

Note 2: Position repeatability is the value at constant ambient temperature.

2 Outer Dimensions and Workable Space of the Robot Unit

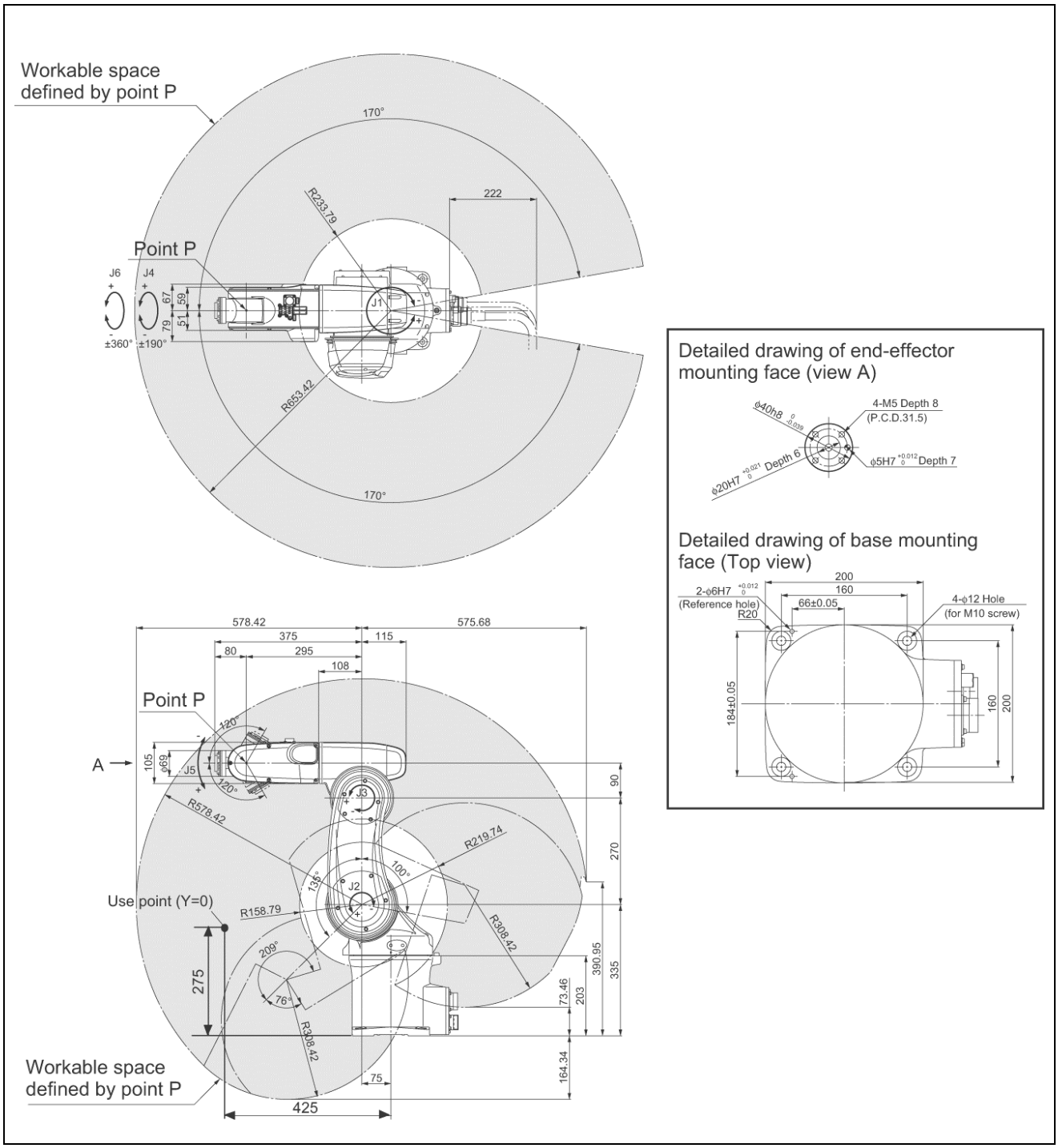
Following figures show the outer dimensions and workable space of the robot.

(1) VS-6556E/G-P10



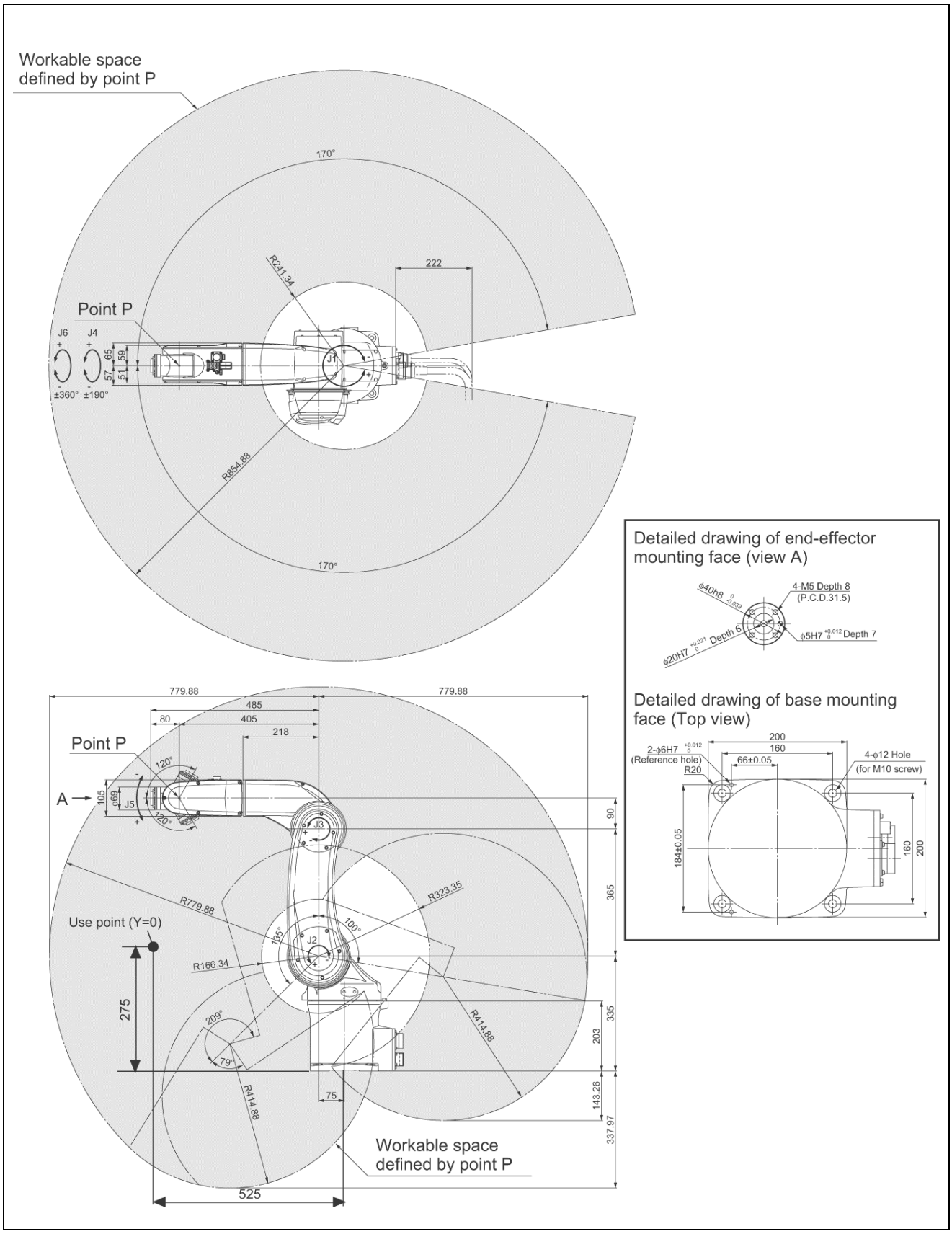
Outer dimensions and workable space (VS-6556E/G-P10)

(2) VS-6556E/G-BP10



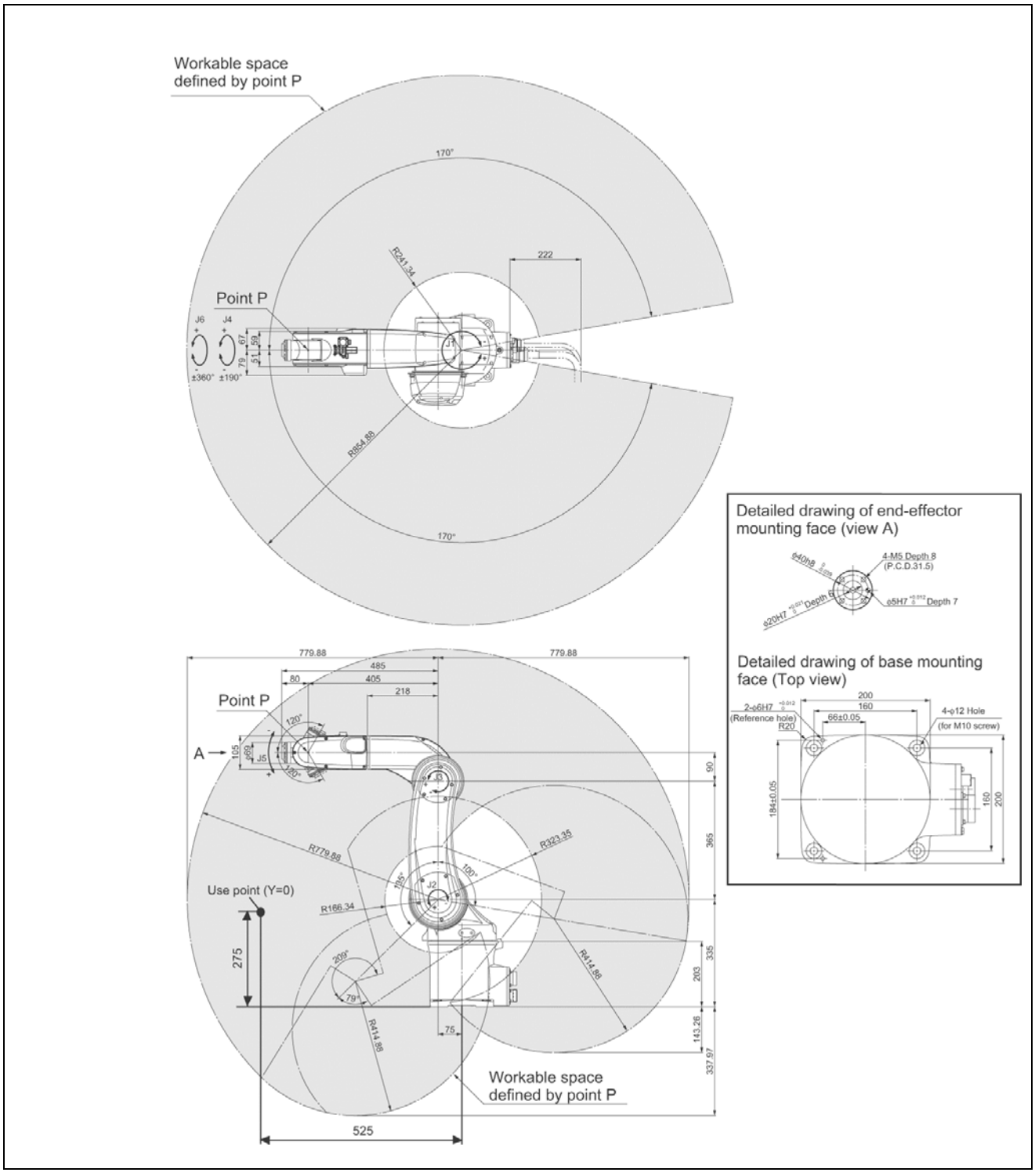
Outer dimensions and workable space (VS-6556E/G-BP10)

(3) VS-6577E/G-P10



Outer dimensions and workable space (VS-6577E/G-P10)

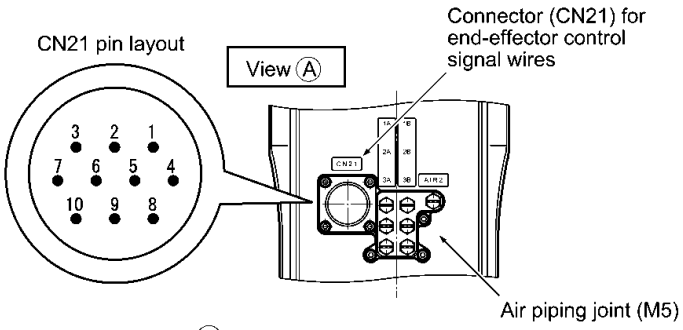
(4) VS-6577E/G-BP10

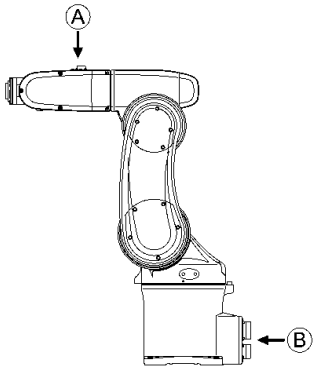


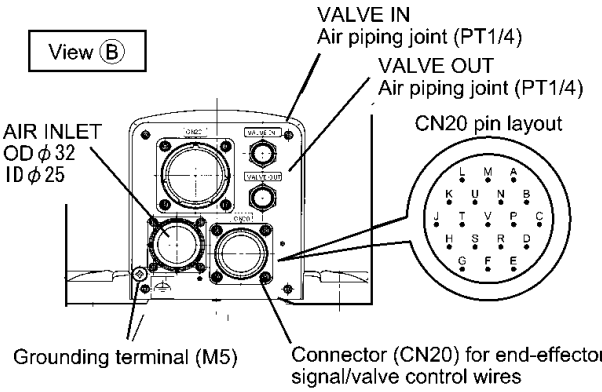
Outer dimensions and workable space (VS-6577E/G-BP10)

3 Air Piping and Signal Wiring

The VS-65**E/G-*P10 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.







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

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

Note for cleanroom type
Recommended air inlet volume: 130 liters/min.
The cleanroom type requires ventilation inside the robot. Exhaust air from the air vent provided in the bottom of the robot base.

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)

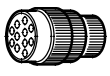
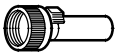
For controller I/O unit, PNP type (sink IN, source OUT)

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

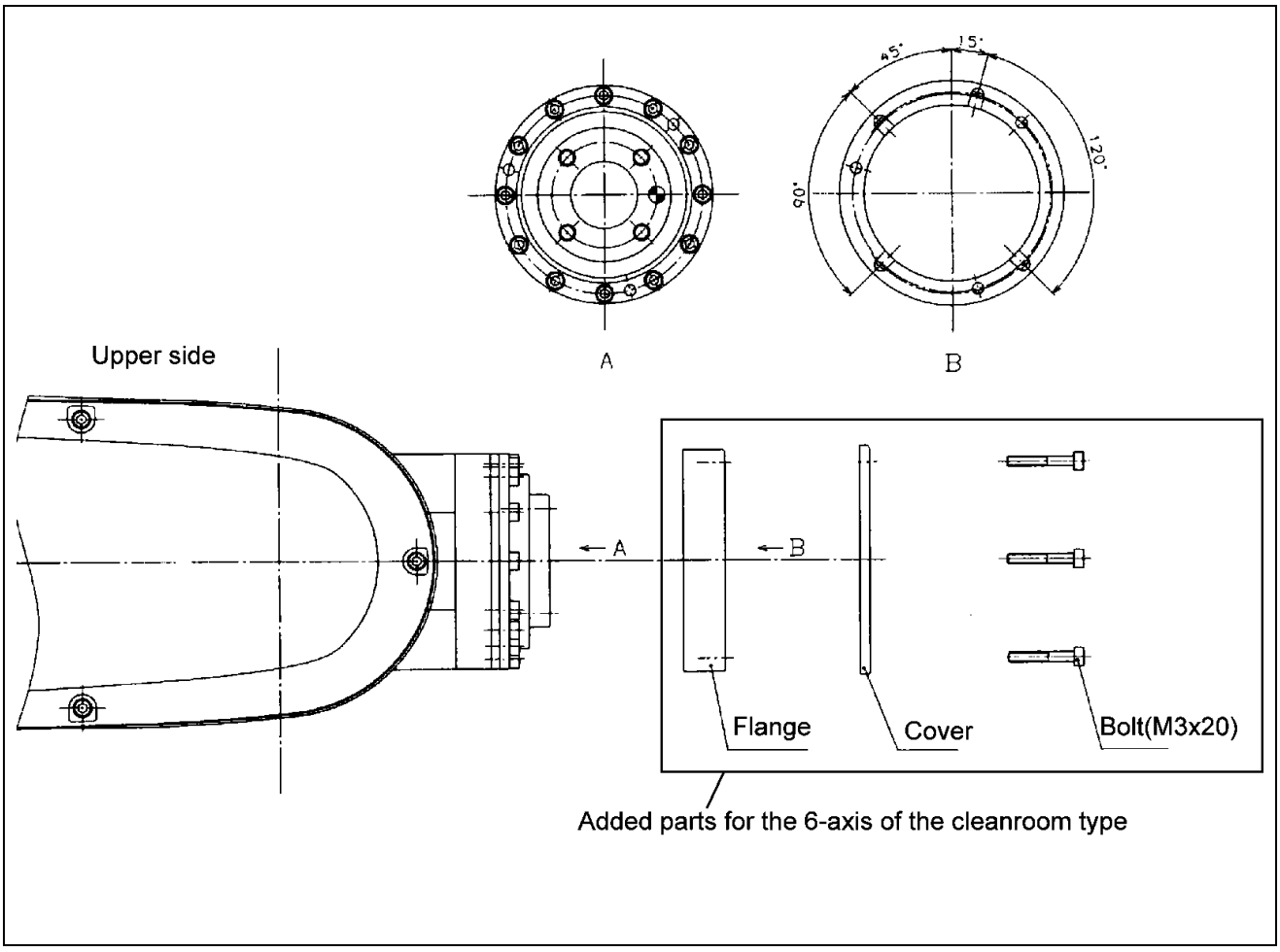
The flange and cover described are originally attached to the 6-axis of the cleanroom type robot as shown in Figure below. Therefore, perform 5-axis or 6-axis CALSET as follows.

(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 & MAINTEANACE GUIDE".
(3) Re install the flange and cover using three bolts.

Bolt fixing torque: 1.57 Nm±20%



6-axis of VS-65E/G-*P10**

5 Notes when Handling the Cleanroom Type

The cleanroom type of the VS-65**E/G-*P10 series robot satisfies Clean Class 10 (0.1 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 10)

OWNER'S MANUAL
(SUPPLEMENT)

First Edition June 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.

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