

DENSO RODOTICS THIRD PARTY PRODUCTS



Maker

Panasonic Industrial Devices SUNX Co., Ltd.

Products / Series Panasonic PV260

Robot calibration instruction guide







1.	In	troduction	3
	1.1.	System configuration	3
	1.2.	Calibration procedure	3
2.	Co	ommunication setting	4
	2.1 N	Network setting of PV260	4
	2.2 (Confirm the Robot to PV260 communication	4
3.	Ro	bot setting on PV260	5
	3.1	Robot Unit setting	5
	3.2 F	Robot Communication	6
4.	Ca	libration setting on PV260	8
	4.1 C	Camera No. to Set	9
	4.2 (Calibration	9
	4.3 C	Calibration No	9
	4.4 S	Setting Method	9
5.	Sp	ecified setting (Semi-Auto (1 point))	10
	5.1 C	Calibration Mark	11
	5.2 F	Robot Position	14
	5.3 F	land-System	14
6.0	Calib	pration	15
	6.1	PV260 settings	15
	6.2	Robot setting	16
	6.3	Perform Calibration	16
	6.4	Calibration result confirmation	16
7.	Refe	erence (sample program)	17
	7.1	Calibration program for Semi-Auto (1 point)	17
	7.2	Pick and Place program for Calibration check	18

Contents

1. Introduction

This is an instruction guide for robot calibration with Panasonic vision system PV260. For details about PV260 operation, please refer to the instruction manual of PV260.

1.1. System configuration

The following shows the system configuration at the robot calibration.



The following products and conditions are used in this manual as a sample.

Robot model

- : SCARA robot (HM4060)
- Camera mount position
- : Second axis (1 camera)
- IP address of PV260 : 192.168.0.62
- Setting method for Calibration : Semi-Auto (1 point)

1.2. Calibration procedure

Calibration is performed in the following steps.

- 1. Preparation on PV260
 - (1) Communication setting
 - (2) Robot setting
 - (3) Calibration setting
- 2. Calibration

2. Communication setting

Configure the network setting of PV260 and confirm the communication with a robot.

2.1 Network setting of PV260

Configure TCP/IP for Ethernet as the following shows.

- 1. From [TOOL] tab, press [General], press [Network].
- 2. Enter [IP Address], [Subnet Mask], and [Default Gateway].
- 3. Press [Set].



2.2 Confirm the Robot to PV260 communication

Confirm the communication between robot and PV260. Send ping to PV260 from the robot controller and check if PV260 receives the reply correctly.

To send ping, use a teach pendant. Perform the following steps.

- 1. From the main window, press [F6: Setting] [F5: Communication and Token] [F7: Ping].
- 2. Enter IP address of PV260, press [Ping].
- 3. When the screen displays both [Successfully completed] and [Reply], communication is opened.

💥 ያ 🔳 🍷 🏒	 EMG AUTO EN 	● PRTCT ● D SW	HM-40	0601 A	Joint WOTO 1%
Communicatic 1	Ping				
	192	. 168	. 0	. 6 3	Result Pinging 192,168,0,62
Executable Network					[1]:Successfully completed. [2]:Successfully completed. [3]:Successfully completed.
Token Permiss F1 F2	7	8	9	CLR	(4):Successfully completed. Reply
	4	5	6	BS	
Ping F7	1	2	3	•	
Check the network	0	Ca 2	Pi	ng	
				A. "	
					Shortcut
SHIFT					

3. Robot setting on PV260

This chapter describes the robot setting on PV260 required for calibration.

3.1 Robot Unit setting

Set the robot unit used at the calibration. From [Environment], press [Input/Output/Robot], and press [Robot Unit].

Set the following items.

- Camera attachment
- Robot unit setting
- Robot coordinates setting

OPERATION ENVIRO	NMENT TYPE	INSPECTION	SAVE/READ	TOOL	SETUP MENU	
System Settings	Input/Output/	Robot	Camera		fransparence	⇒
Robot UnitRobot CommunicationPLC CommunicationParallel I/OParallel I/OParallel I/O OutputSerialGeneral OutputImage OutputSave Image MemoryPrint ScreenSD Card Setting	Camera attach Camera No.0 Camera No.1 Robot unit set Robot type 1st-Arm Lee 2nd-Arm Lee Robot Coordin Rotation dire Base Angle a	iment tings ngth ates Setting action of the R-J xis	2nd-Axis Fixed (dow Fixed (up) 2nd-Axis R axis Axis CW X axis bas	wnward) ward) 250.000 350.000	 	
Data Updated! TRIG						

3.1.1 Camera Attachment

Specify how the camera is mounted in the robot.

In this sample, from [Camera No.0], select [2nd-Axis].

Note: Because only one camera is used in this instruction guide, leave the [Camera No.1] as-is.

Camera attachment Camera No.0	2nd-Axis	J
Camera No. 1	Fixed (downward) Fixed (upward)	'
Robot unit settings	2nd-Axis	
Robot type	Raxis	

3.1.2 Robot unit setting

Set the calibration target robot information as follows.

1. On [Robot type], press [SCARA].

Robot unit settings	
Robot type	SCARA 🗾
1st-Arm Length	SCARA
2nd-Arm Length	Cartesian(Table Top)

2. Enter values for [1st-Arm Length] and [2nd-Arm Length].

Robot unit settings Robot type	SCARA 🗸
1st-Arm Length	250.000
2nd-Arm Length	350.000

You can check the 1st- and 2nd-Arm Length of your robot from the content "HM (Floor-mount, Standard type) (ID:4594)" of the DENSO ROBOT USER MANUALS.

Туре	Α	В	С	D	F
HM-4060*, HM-4A60*	600	250	350	213	286°
HM-4070*, HM-4A70*	700	350	350	199	294°
HM-4085*, HM-4A85*	850	350	500	281	294°
HM-40A0*, HM-4AA0*	1000	500	500	284	294°

3.1.3 Robot coordinates setting

Set the calibration target robot coordinate system as follows.

1. On [Robot coordinates setting], from [Rotation direction of the R-Axis], press [CCW].

F	Robot Coordinates Setting					
	Rotation direction of the R-Axis	CCW	•			
	Base Angle axis	Xaxis base	-			

2. On [Robot coordinates setting], from [Base Angle Axis], press [X axis base].

Robot Coordinates Setting				
Rotation direction of the R-Axis	ccw	•		
Base Angle axis	X axis base	-		

3.2 Robot Communication

Set the robot communication used in the calibration. From [Environment], press [Input/Output/Robot], and press [Robot Communication].

Set the following items

- Maker
- Coordinate Format

OPERATION ENVIRON	MENT TYPE INSPECTION S	AVE/READ TOOL	SETUP MENU
System Settings	Input/Output/Robot 0	Iamera	Transparence 📫
Robot Unit Robot Communication PLC Communication Parallel I/O Parallel I/O Parallel I/O Output Serial General Output Image Output Save Image Memory Print Screen SD Card Setting	Maker Communication Setting Coordinate Format Robot Control Command Protocol Communication type Robot Control Command Format	DENSO Set Set General Com.	
Data Updated! TRIG :	Run Test FUNC : Pop-u Image Menu F2 :Seler	p Menu OP/ t Menu ER	SET: To RUN Menu HidePatterns

3.2.1 Maker

Specify the manufacturer of robot that connects with PV260.

From [Maker], select [DENSO].

Maker	DENSO	-
Communication Setting	Set	
Coordinate Format	Set	

3.2.2 Coordinate Format

Specify the coordinate format of robot that connects with PV260 as follows.

1. On [Coordinate Format], press [Set].

Maker	DENSO	-
Communication Setting	Set	
Coordinate Format	Set	

2. On [Hand-System], enter values in [Right-Hand], [Left-Hand], and [NONE(Cartesian)]. Enter "0" in [Right-Hand], "1" in [Left-Hand], and "-1" in [NONE (Cartesian)].

Delimiter	Spa ce 🔽
Hand-System Right-Hand Left-Hand NONE(Cartesian)	0
Coordinate Format	Set

4. Calibration setting on PV260

This chapter describes the calibration settings on PV260, such as camera number, calibration method. On the [TYPE] tab, press [Robot], press [Calibration].

Set the following items.

- Camera No. to Set
- Calibration
- Calibration No.
- Setting Method
- Specified setting

For details about Specified setting, see 5. Specified setting (Semi-Auto (1 point)).

OPERATION EI	NVIRONMENT TYPE	INSPECTION	SAVE/READ	TOOL	SETUP MENU	
Select Type	Type Setting	Robot	Marker D	isplay	Data R/W	
Calibration Object detection	Common Setting		No (Inc	dividual)		ms
Out. Robot Coor.	Camera No. to Set		0		_	
TOOL	Calibration		Trans	formation	of robot coord. 💌	
Teaching Support	Calibration No.		0		<u>-</u>	
	Comment					
	Setting Method		Semi-A	Auto(1 poi	nt) 🗾	
	Specified setting	9		Set		
	Method for auto ca DELAY(ms) for Re	alibration obot Control Co	mmand	100	0	
	Robot Coordinate	s Acknowledge	d Method Absoli	ute coordir	nates 🔻	
	Saving the image	s to SD	No		<u> </u>	
					-	
Data Updated!	TRIG : Run Test	FUNC : Po	p-up Menu	OP/SE	ET: To RUN Menu	
Change Battery!	F1 : Image Menu	F2 : Se		F3	HidePatterns	

4.1 Camera No. to Set

Select a camera number to perform calibration.

From [Camera No. to Set], select a desired camera number.

In this sample, "Camera number 0" is selected.

-
-
—
-

4.2 Calibration

Select a calibration method from No, X/Y, and Transformation of robot coordinate. From [Calibration], select a desired calibration method.

In this sample, "Transformation of robot coordinate" is selected.

Camera No. to Set	0 -
Calibration	Transformation of robot coord. 🗾
Calibration No.	0 _
Comment	
Setting Method	Semi-Auto(1 point)
Specified setting	Set

4.3 Calibration No.

Select a calibration number..

From [Calibration No.], select a desired calibration number.

In this sample, "Calibration number 0" is selected.

Camera No. to Set	0 🗾				
Calibration	Transformation of robot coord. 🔻				
Calibration No.	0				
Comment					
Comment Setting Method	Semi-Auto(1 point)				

4.4 Setting Method

Select a calibration setting method.

From [Setting Method], select a desired method from Manual (3 point), Semi-Auto (1 point), and Auto (1 point).

In this sample, Semi-Auto (1 point) is selected.

Camera No. to Set	0 _	
Calibration	Transformation of robot coord.	
Calibration No.	0 🔽	
Comment		
Setting Method	Semi-Auto(1 point) 🗾	

5. Specified setting (Semi-Auto (1 point))

This chapter describes the detailed calibration settings of Setting Method (see 4.4 Setting Method). Note that the following settings are available only when Semi-Auto (1 point) is selected in Setting Method. On the [TYPE] tab, press [Robot], press [Calibration], from [Specified setting], press the [Set] button.

OPERATION	ENVI	RONMENT	TYPE	INSPECTIO	N SA	AVE/READ	TOOL	SETUP MENU	
Select Type		Type Set	ting	Robot		Marker (Display	Data R/W	
Calibration Object detection	on	Common	Setting			No (Ir	ndividual)		ms
Out. Robot Coo	or.	Camera N	lo. to Set			0		<u>-</u>	
TOOL		Calibrat	tion			Tran	sformation	of robot coord. 💌	
Teaching Suppo	ort	Calibrat	tion No.			0		<u>-</u>	
		Comme	ent						
		Setting	g Method			Serni	-Auto(1 poi	nt) 🔽	
		Specifi	ied setting	1			Set		
		Method fo	or auto ca	libration				_	
		DELAY(r	ms) for Ro	obot Control	l C om ma	and	100	10	
		Robot G	oordinate	s Acknowled	dged Me	thod Abso	lute coordi	nates 💌	
		Saving f	the image	s to SD		No		<u>·</u>	
Data Updated!	TRI	G: Run T	Test						
Change Battery	! F1	: Imag	e Menu				F3	: HidePatterns	

Once the [Set] button is pressed, the [Specified setting] window appears.

No.0 -	Camera detected coordinate
Calibration Mark	X Y
	Pos. 0
Camera Robot coordinate Set rX rY	Pos. 1
D Register 0.000 0.000	Pos. 2
	Screen C0(Gray:0.3M Quad-speed) Live/Gray Scale 60%
Robot Position	
rX rY R	
0.000 0.000	
100.000 0.000	
Hand-System Right-Hand	
Z-Coordinates 0.000	
Speed 10	
Robot Position Move Check	
Auto.calib. start(TO RUNMENU)	
Data Updated! TRIG : Run Test	FUNC : Pop-up Menu OP/SET: To RUN Menu
Change Battery! F1 : Image Menu	F2 : Select Menu F3 : HidePatterns

Set the following items.

- Calibration Mark
- Robot Position
- Hand-System
- 5.1 Calibration Mark

Set a calibration mark as follows.

1. From [Calibration Mark], on [Camera Set], press [Register]. Select a desired Base Checker. In this sample, select [Smart Matching] as a Base Checker.

Calibrati	on N	/lark		
Carnei Set	ra	Robot coo rX	ordinate rY	
0 Regist	er	0.000	0.000	
	Sm	hart Matching		
Contour Matching				
	Feature Extraction			

- 2. Register a template for Smart Matching as follows.
 - 2-1 From the [Smart Matching] window, press [Area Setting]. From [Template], press the [Set] button. The [Template setting] window appears.

Smart Matching						
Area Setting	l i	Select Color I		Conv	ostad Cray Iroa	I
Inspection Condi	tion	percer conor r		Conv	erted Gray Inig. 💌	
Sequence					Set	
Judgement	NG	Template Search Area			Set	
No. of Objects Time (ms)	0.00	Search Area			Set	
,,						
	_					
No. Template No.	Correlatio	n X	Y	Angle	Max. Subtr. Subt	r. Num.
						1
		1	1	1		<u> </u>
		<u> </u>				
Data Updated! T	RIG : RL	un Test	FUNC :	Pop-up Men	u OP/SET:	To RUN Menu
channe Battanut E	1 · In	nage Menu			F3 :	HidePatterns

2-2 Anywhere on the [Template setting] window, press [TRIG] button of the keypad for test shoot. Press the [ENTER] button of the keypad in order to save the test image.

Template setting		
	Template No.:00	
	2-3 Register	
With a keypad, press [TRIG] button for	Show this many:	
a test shoot, press [ENTER] button to	16 🔽	
save the test image.		
No. Template No. Correlation X	Y Angle Max. Subtr. Subtr. Num.	
		-
		_
	1 1 1	<u></u> ⊥
Data Updated! TRIG : Run Test FUN	IC : Pop-up Menu OP/SET: To RUI	V Menu
Change Battery F1 : Image Menu F2	: Select Menu F3 : HidePa	atterns
· · ·		



2-3 On the [Template setting] window, press [Register]. The [Area Setting] window appears.

2-4 On the [Area Setting] window, adjust an area frame (rectangle) so that it encloses a calibration mark (circle). Press [Change] to move the area frame. Adjust the frame position and then press [ENTER] to confirm. Once the frame position is confirmed, you are allowed to adjust the frame size. Adjust the frame size, and press [ENTER] to confirm.



2-5 Press [CANCEL] until the [Specified setting] window appears.

3. On [Robot coordinate], enter the robot coordinates that are used at the calibration ([rX], [rY]). With a teach pendant, move the robot tool end position to the calibration mark. Check the X /Y coordinates on the teach pendant, and then enter the values in [Robot coordinate rX / rY] with a keypad.



5.2 Robot Position

Set the robot positions for calibration.

In this sample, robot coordinates ([rX], [rY]) for three points are determined. The robot moves to the three points at the calibration.

With a teach pendant, move the robot until the calibration mark appears on the camera's field of view. Once the mark appears, check the X/Y coordinates on the teach pendant screen, and then enter these values into the robot coordinate ([rX], [rY]). Do this step for different three field.

Note that the robot coordinates ([rX], [rY]) shall meet the following conditions.

- These three points can create a plane (All three points shall not aligned on a linear line.)
- **I** The position of calibration marks on the three fields shall be different (see the figure below).

[Example of robot position on Semi-Auto (1 point)]







____:Field of view 🗱:Calibration mark

[[rX], [rY] input window]

Robot Position

гХ	٢Y	R
0.000	0.000	
100.000	0.000	
0.000	100.000	

5.3 Hand-System

From [Hand-System], select a shoulder figure of the robot at the calibration. Select [Right-Hand] for RIGHTY.

Select [Left-Hand] for LEFTY.

Hand-System	Right-Hand 🗾
Z-Coordinates	0.000
Speed	10
Robot Position	Move Check



[Hand-System (Left-Hand, Right-Hand)]

6. Calibration

For calibration, run the calibration program from the robot.

The following shows the calibration procedure.

- 1. Set PV260 to RUN menu.
- 2. Turn ON the robot motor.
- 3. Perform calibration.
- 4. Check the calibration result.

6.1 PV260 settings

On the [TYPE] tab, press [Robot], press [Calibration], from [Specific setting], press [Set] button. On the [Specific setting] window, press [Auto Calib.Start (TO RUNMENU)] to display [RUN MENU].

	Connect detected connection to
NO.0 -	
Calibration Mark	X Y
1	Pos. 0
Camera Robot coordinate	Pos. 1
Set rX rY	Pos. 2
D Register 0.000 0.000	
	Screen C0(Gray:0.3M Quad-speed) Live/Gray Scale 60%
Robot Position	
0.000 0.000	
100.000 0.000	
0.000 100.000	
Hand-System Right-Hand 🔻	
7 Coordinator	
Speed 10	
Robot Position	Press [Auto. Calib. Start(TO RUNMENU)]
Move check	to diaplay [DUNIMENIU]
Auto Calib. Start/TO RUNNAENU)	to display [RON MENU].
Auto.carib. start(TO KONMEND)	
Data Updated! TRIG : Run Test	FUNC : Pop-up Menu OP/SET: To RUN Menu
Change Battery E1 : Image Menu	E2 : Select Menu E3 : HidePatterns

OPERATION	VIEW	LAYOUT	TOOL				RUN MENU
No.00		Scre	en0_C0(Gray	y:0.3M)	Quad-speed) Liv	e/Gray Scale	70%
Type No.000							
Layout No.00 Main							
Change Ba	attery!						
READY STRO	6 RE	ND ROR					
01234	567	3					
Inspection Time	0.0	10 ms					
Data Updated!	TRIG :	Start	FL	JNC :	Pop-up Menu	OP/SE	T: To SETUP Menu
Change Battery!	F1 :	Select W	ind <mark>ow</mark> F2	2 :	Switch Layout		

6.2 Robot setting

Set the robot to the Auto mode and turn ON the motor.

6.3 Perform Calibration

Run the calibration program. Once the program starts, the robot start moving according to the program. (For about program details, see 7.1 Calibration program for Semi-Auto (1 point).)

Before starting the program, check the following points.

- For the first time of calibration, run the robot with low speed because the robot starts moving as the program starts.
- Step-start causes a time-out error. Also, if the robot speed is too slow, a time-out error occurs.

6.4 Calibration result confirmation

Check the calibration result by running Pick and Place program.

(For about program details, see 7.2 Pick and Place program for Calibration check.)

Before starting the program, check the following points.

When the robot is on the initial position (POS_HOME), a workpiece shall be displayed on the camera's field of view.

7. Reference (sample program)

7.1 Calibration program for Semi-Auto (1 point)

This program executes the robot motion and Semi-Auto (1 point) calibration based on the information

```
specified by PV260.
```

```
'!TITLE "Sample Calibration.pcs"
'This script executes the robot motion and robot calibration automatically
' based on the information specified by PV260
#include "Variant.h"
'Items specified by user
#define ADDRESS "192.168.0.62"
                                            'IP address of PV260
#define CAL NO 0
                                            'Calibration No.
Sub Main
    takearm
    Dim objPV as Object
    Dim vntVal as Variant
    Dim li as long
    Dim IpBase as Position
    Dim IpMove(3) as Position
    IpBase = CurPos
    'Specify options for robot calibration and establish connection.
    set objPV = cao.AddController("pv", "CaoProv.Panasonic.PV", "", " PV260=1,Conn=eth:" & ADDRESS)
    'Start of the calibration auto-setting
    call objPV.Execute("CalibrationStart", CAL_NO)
    'Get three points
    for Ii = 0 to 2
        'From PV260, receive robot coordinates where robot visits at the calibration.
        vntVal = objPV.Execute("GetMovePoint")
        'Copy the base position
        lpMove(li) = lpBase
        'Set the coordinate data
        if (vartype(vntVal) And VT_ARRAY) then
            LETX IpMove(Ii) = vntVal(0)
            LETY IpMove(li) = vntVal(1)
            LETRZ IpMove(Ii) = vntVal(2)
            LETF lpMove(li) = vntVal(3)
            Move P, @E lpMove(li)
            delay 500
        end if
        'Notify the robot motion completion to PV260
        ' PV260 shoots test image and performs Base Checker
        call objPV.Execute("MoveEnd")
        delay 1000
    next
```

'Notify the calibration auto-setting completion and receive the reply.

THIRD PARTY PRODUCTS

```
call objPV.Execute("CalibrationEnd")
```

givearm

End Sub

7.2 Pick and Place program for Calibration check

This is a program for the Pick and Place operation after the calibration.

Perform teaching for P[321] (place position) beforehand.

```
'!TITLE "Pick and Place template"
'Approach length 30mm
'Depart length 30mm
'Picking position
                         P[311]
'Place position P[321]
#Include "Variant.h"
'Items specified by user
#Define ADDRESS "192.168.0.62"
                                  'IP address of PV260
#define CAL NO 0
                                  'Calibration No.
#Define LEN APPLOACH 30
                                  'Approach length
#Define LEN DEPART 30
                                  'Depart length
#Define POS_HOME 310
                                  'Initial position
#Define POS_PICK 311
                                  'Picking position (Workpiece detection position)
                                  'Place position
#Define POS PLACE 321
#Define CHACKED 0
                                  'Hold
#Define UNCHACKED 1
                                  'Release
Sub Main
        TakeArm
        Dim objPV As Object
        Dim vntRet As Variant
        Dim vntPos As Variant
        Dim li As Long
        'Write Chuck or Unchuck motion here, if necessary.
        Chuck UNCHUCKED
        'Move to the initial position.
        Move P, @E P[POS HOME]
        Set objPV = Cao.AddController( "pv", "CaoProv.Panasonic.PV", "", "PV260=1,Conn=eth:" &
ADDRESS )
        'Inform robot coordinates ( "%P= " command)
        Call objPV.SetPoint( VarChangeType( CurPos, VT_R4 + VT_ARRAY ) )
        'Workpiece detected
        vntRet = objPV.Calibrate( CAL_NO )
        'Repeat the processing up to the number of workpieces detected
```

```
If UBound( vntRet ) >= 0 Then
```

For I i = 0 To UBound(vntRet) 'Set the initial position $P[POS_PICK + Ii] = P[POS_HOME]$ vntPos = vntRet(li) 'Set the coordinate data if (vartype(vntPos) And VT_ARRAY) then Let X P[POS_PICK + Ii] = vntPos(0) Let $Y P[POS_PICK + Ii] = vntPos(1)$ LetRz $P[POS_PICK + Ii] = vntPos(2)$ LetF P[POS_PICK + Ii] = vntPos(3) end if 'Robot motion processing Call MoveRobot(li) Next End If 'Move to the start position Move P, @E P[POS_HOME] GiveArm End Sub 'Pick and Place Sub MoveRobot(ByVal ICnt As Long) TakeArm Keep = 0'----- Robot motion at the picking position -----'Approach motion: Approach to above the picking position Approach P, P[POS_PICK + ICnt], @O LEN_APPLOACH 'Descending: Go down to the picking position Move L, @O P[POS_PICK + ICnt] 'Write Chuck or Unchuck motion here, if necessary. Delay 300 Chack CHACKED Delay 300 'Ascending Depart L, @O LEN_DEPART '----- Robot motion at the place position -----'Approach motion: Approach to above the place position Approach P, P[POS_PLACE], @O LEN_APPLOACH 'Descending: Go down to the place position Move L, @O P[POS_PLACE] 'Write Chuck or Unchuck motion here, if necessary. Delay 300 Chack UNCHACKED Delay 300

'Ascending Depart L, @O LEN_DEPART End Sub 'Write Chuck or Unchuck motion here, if necessary. 'Chuck motion: Turning ON/OFF of IO Sub Chack(ByVal bVal As Long) If bVal = CHACKED Then IO64 = Off IO65 = On Else IO64 = On IO65 = Off End If End If

Revision History

DENSO Robot Provider User's Manual

Panasonic Industrial Devices SUNX Vision Sensor Robot calibration instruction guide

Version	Supported RC8	Content
Ver.1.0.0	Ver.1.13.0	First version

DENSO WAVE INCORPORATED

No part of this manual may be duplicated or reproduced without permission.

The contents of this manual are subject to change without notice.

Every effort has been made to ensure that the information in this manual is accurate. However, should any unclear point, error or omission be found, please contact us.

Please note that we will not be responsible for any effects resulted from the use of this manual regardless of the above clauses.

DENSO RODOTICS THIRD PARTY PRODUCTS

DENSO WAVE INCORPORATED