KOGANEI

Koganei Desktop Robot
Creceed Cell Master

DTHB-AS/AL/CS
DTHKB-ASL/CSL

Owner's Manual Ver.1.0

Read This First

■ Differences from the Former Cell Master (DTH, DTHK)

The new type robots (DTHB, DTHKB) differ from the former type robots (DTH, DTHK) in the following functions, which have been added or changed.

Item	Description
Missed steps detector added	Axis stops when missed steps occur
PRM040 added	Motor energizing ON/OFF setting when missed steps occur
PRM048, 057, 066, 075 added	Missed steps detection/no detection setting for X, Y, Z, and R axes
Direct teaching	Point registration using manual axis movement
Communication connector changed	Change from female to male connector

■ Differences from the Former Programming Box

The new programming box (DTHBP-PB) has enhanced capabilities to handle the functions added to DTHB and DTHKB. If connected to the former type programming box (DTHP-PB), you cannot use these added functions.

Contents

Chapter 1 Precautions

1-1 Safety Labels ····10
1-2 Safety Precautions ····10
1-3 Precautions on Transporting and Handling ····13
1-4 Precautions on the Main Unit ····13
1-5 Installation Environment ····14
1-6 Warranty ····14

Chapter 2 Overview

2-1 Cell Master's Features ····16
2-2 Accessories ····17
2-3 Options ····18

Chapter 3 Parts and Connections

3-1 Major Parts and Functions ····20
3-1-1 DTHB ····20
3-1-2 DTHKB ····21
3-2 Wiring Connection (for DTHB) ····22
3-3 Connections ····23
3-3-1 Connecting the Power Supply ····23
3-3-2 X, Y, Z, and R axis Connectors ····23
3-3-3 Connecting the Programming Box ····23
3-3-4 Connecting the Operation Box ····23
3-3-5 Connecting the I/O cable ····23

Chapter 4 I/O Interface

4-1 I/O Basic Specifications ····26
4-2 Input Circuit and External Connection Examples ····26
4-2-1 Input Circuit ····26
4-2-2 External Connection Examples ····26
4-3 Output Circuit and External Connection Examples ····27
4-3-1 Output Circuit ····27
4-3-2 External Connection Examples ····28
4-4 I/O Connector Signal Table ····29
4-4-1 DTHBP-CTA (Loose End Cable) ····29
4-4-2 DTHBP-CTB (with Screw Terminal Block) ····30
4-4-3 Input/Output Signal Details ····31
4-5 I/O Connection Examples ····32
4-5-1 When DTHBP-CTA (Loose End Cable) Is Used ····32
4-5-2 When DTHBP-CTB (with Screw Terminal Block) Is Used ····33

Contents

4-6 Timing Chart ····· 34
4-6-1 When the Power Is Turned on ····· 34
4-6-2 When the Custom Input AUTO-RUN Is Entered ····· 34
4-6-3 When the Custom Input EMG Is Entered ····· 34
4-6-4 When the Custom Input RESET Is Entered ····· 34
4-6-5 When an Alarm Is Issued ····· 34
4-6-6 When the General-purpose Input DI Is Entered ····· 34

Chapter 5 Programming Box Operations

5-1 Overview ····· 36
5-2 Key Layout and Functions ····· 36
5-3 Power On Conditions ····· 38
5-4 Basic Information on Key Control ····· 38
5-5 How to View the Screen ····· 39
5-5-1 Program Executing Screen ····· 39
5-5-2 Program Editing Screen ····· 39
5-5-3 Point Editing Screen (Manual Editing) ····· 39
5-5-4 Point Editing Screen (Teaching Editing) ····· 40
5-5-5 Parameter Editing Screen ····· 40
5-5-6 DIO Monitor Screen ····· 40
5-6 Menu Hierarchy ····· 40

Chapter 6 Parameters

6-1 Setting Parameters ····· 42
6-2 Description of Parameters ····· 43
6-3 Parameter List ····· 76

Chapter 7 Programming

7-1 Basic Information ····· 84
7-1-1 Robot Language and Point Data Relationships ····· 84
7-1-2 Using the Programming Box to Input Robot Language ····· 84
7-1-3 Using the Support Software for Programming ····· 84
7-1-4 Program Specifications ····· 84
7-2 Program Editing ····· 85
7-2-1 Creating a New Program ····· 85
7-2-2 Adding Steps ····· 87
7-2-3 Correcting Steps ····· 88
7-2-4 Deleting Steps ····· 89
7-3 Program Utilities ····· 90
7-3-1 Copying the Program Units ····· 90
7-3-2 Deleting the Program Units ····· 91

Contents

Chapter 8 Point Data Editing

8-1 Manual Data In ····· 94
8-2 Teaching Data In ····· 95
8-3 Direct Teaching ····· 96
8-4 Manual Control of General-purpose Output ····· 97
8-5 Pallet Data Editing ····· 98
8-6 Point Trace ····· 100

Chapter 9 Robot Language

9-1 Robot Language List ····· 102
9-2 Robot Language Syntax Rules ····· 105
9-2-1 Command Statement Form ····· 105
9-2-2 Variables ····· 105
9-2-3 Specified Axis ····· 105
9-3 Program Functions ····· 106
9-3-1 Multitasks ····· 106
9-4 Robot Language Description ····· 107
9-4-1 ORG ····· 107
9-4-2 ORGM ····· 107
9-4-3 MOVD ····· 107
9-4-4 MOVA ····· 108
9-4-5 MOVI ····· 108
9-4-6 MOVF ····· 108
9-4-7 DRVD ····· 109
9-4-8 DRVA ····· 109
9-4-9 DRVI ····· 109
9-4-10 DRVF ····· 110
9-4-11 DO ····· 110
9-4-12 WAIT ····· 110
9-4-13 TIMR ····· 111
9-4-14 MAT ····· 111
9-4-15 SHFT ····· 111
9-4-16 SHFR ····· 112
9-4-17 ?POS ····· 112
9-4-18 MDO ····· 112
9-4-19 P ····· 113
9-4-20 P＋ ····· 113
9-4-21 P－ ····· 113
9-4-22 C ····· 114
9-4-23 C＋ ····· 114
9-4-24 C－ ····· 114
9-4-25 TON ····· 115

Contents

9-4-26 TOFF ····· 115
9-4-27 JMPC ····· 115
9-4-28 VCHG ····· 116
9-4-29 STOP ····· 116
9-4-30 END ····· 116
9-4-31 ACHA ····· 117
9-4-32 ACHI ····· 118
9-4-33 MOLA ····· 119
9-4-34 MOLI ····· 119
9-4-35 MOLF ····· 120
9-4-36 MOLD ····· 121
9-4-37 COLA ····· 121
9-4-38 COLI ····· 122
9-4-39 COLF ····· 122
9-4-40 PALP ····· 123
9-4-41 PALL ····· 124
9-4-42 L ····· 124
9-4-43 CALL ····· 124
9-4-44 JMP ····· 125
9-4-45 DSET ····· 125
9-4-46 DVEN ····· 125
9-4-47 SET ····· 125
9-4-48 ADD ····· 126
9-4-49 SUB ····· 126
9-4-50 AND ····· 126
9-4-51 OR ····· 127
9-4-52 JMPB ····· 127
9-4-53 TOS ····· 128
9-4-54 TOC ····· 128
9-4-55 TOE ····· 128
9-4-56 SRVO ····· 128
9-4-57 ACK ····· 128
9-5 Sample Programs ····· 129
9-5-1 Moving between two points ····· 129
9-5-2 Palletizing ····· 129
9-5-3 Circular Interpolation ····· 129
9-5-4 Multitask ····· 130
9-5-5 Continuous Interpolation ····· 131
9-5-6 VCHG Movement ····· 131
9-5-7 Arched Movement ····· 132
9-5-8 Jump in External I/O Input as Binary Value ····· 132
9-5-9 Binary Input Jump Using DSET ····· 133
9-5-10 Binary Input Jump Using DSET ····· 133

Contents

9-5-11 Point Movement Using DSET ····· 133
9-5-12 Turning DO to ON/OFF at a Specified Position during Continuous Interpolation ····· 134

Chapter 10 Operating

10-1 Operation Using the Operation Box ····· 136
10-1-1 Key Layout and Functions ····· 136
10-1-2 How to Execute Return to Origin ····· 136
10-1-3 How to Perform Automatic Operation ····· 136
10-1-4 How to Temporarily Stop the Operation ····· 136
10-1-5 Emergency Stop ····· 137
10-1-6 Error Codes ····· 137
10-2 Operation Using the Programming Box ····· 138
10-2-1 How to Execute Return to Origin ····· 138
10-2-2 How to Execute Step Operation ····· 139
10-2-3 How to Execute Automatic Operation ····· 140
10-2-4 How to Start Operation from the Alarm State ····· 141
10-2-5 Emergency Stop ····· 141
10-2-6 I/O Monitor Display ····· 142

Chapter 11 Control by Personal Computer

11-1 Communication Interface Specifications ····· 144
11-2 Communication Cable Specifications ····· 144
11-2-1 When PC/Device Has 25-pin D-sub Connectors ····· 144
11-2-2 When PC/Device Has 9-pin D-sub Connectors ····· 145
11-3 Setting Parameters ····· 145
11-4 List of Communication Commands ····· 146
11-5 Communication Command Format ····· 151
11-5-1 Communication Sequence and Command Execution Timing ····· 151
11-5-2 Data Format ····· 151
11-6 Communication Commands Syntax Rules ····· 152
11-6-1 Command Statement Form ····· 152
11-6-2 Variables ····· 152
11-6-3 Specified Axis ····· 153
11-6-4 Response Display ····· 153
11-7 Details of Communication Commands ····· 154
11-7-1 000 (ORG) ····· 154
11-7-2 001 (ORGM) ····· 154
11-7-3 002 (RESET) ····· 154
11-7-4 003 (RUN) ····· 154
11-7-5 004 (SRUN) ····· 155
11-7-6 005 (LRUN) ····· 155
11-7-7 006 (X＋) ····· 155

Contents

11-7-8 007 (X−) ····155
11-7-9 008 (Y+) ····156
11-7-10 009 (Y−) ····156
11-7-11 010 (Z+) ····156
11-7-12 011 (Z−) ····156
11-7-13 012 (R+) ····156
11-7-14 013 (R−) ····157
11-7-15 014 (X++) ····157
11-7-16 015 (X−−) ····157
11-7-17 016 (Y++) ····157
11-7-18 017 (Y−−) ····157
11-7-19 018 (Z++) ····158
11-7-20 019 (Z−−) ····158
11-7-21 020 (R++) ····158
11-7-22 021 (R−−) ····158
11-7-23 022 (MOVD) ····159
11-7-24 023 (MOVA) ····159
11-7-25 024 (MOVI) ····159
11-7-26 025 (MOVF) ····160
11-7-27 028 (DRVD) ····160
11-7-28 029 (DRVA) ····161
11-7-29 030 (DRVI) ····161
11-7-30 031 (DRVF) ····162
11-7-31 032 (DO) ····162
11-7-32 033 (WAIT) ····162
11-7-33 035 (MAT) ····163
11-7-34 036 (SHFT) ····163
11-7-35 037 (SHFR) ····163
11-7-36 039 (?POS) ····164
11-7-37 040 (?NO) ····164
11-7-38 041 (?SNO) ····165
11-7-39 043 (?PNO) ····165
11-7-40 044 (?STP) ····165
11-7-41 045 (?MEM) ····166
11-7-42 046 (?VER) ····166
11-7-43 047 (?CRE) ····166
11-7-44 048 (?CLK) ····167
11-7-45 049 (?ALM) ····167
11-7-46 050 (?EMG) ····167
11-7-47 051 (?SRV) ····167
11-7-48 052 (?MAT) ····168

Contents

11-7-49 053 (?DI) ····168
11-7-50 054 (?DO) ····168
11-7-51 055 (RPRM) ····169
11-7-52 056 (RPGM) ····169
11-7-53 057 (RPNT) ····170
11-7-54 058 (?DRV) ····170
11-7-55 060 (WPRM) ····170
11-7-56 061 (WPGM) ····171
11-7-57 062 (WPNT) ····171
11-7-58 063 (WEPT) ····171
11-7-59 064 (IPRM) ····172
11-7-60 066 (MDO) ····172
11-7-61 069 (P) ····172
11-7-62 070 (P＋) ····173
11-7-63 071 (P－) ····173
11-7-64 072 (C) ····173
11-7-65 073 (C＋) ····174
11-7-66 074 (C－) ····174
11-7-67 075 (?P) ····174
11-7-68 076 (?C) ····175
11-7-69 077 (TON) ····175
11-7-70 078 (TOFF) ····175
11-7-71 080 (VCHG) ····176
11-7-72 083 (STOP) ····176
11-7-73 084 (PSTOP) ····176
11-7-74 089 (MOLA) ····177
11-7-75 090 (MOLI) ····177
11-7-76 091 (MOLF) ····178
11-7-77 092 (MOLD) ····178
11-7-78 093 (COLA) ····179
11-7-79 094 (COLI) ····180
11-7-80 095 (COLF) ····181
11-7-81 096 (PALP) ····182
11-7-82 097 (PALL) ····182
11-7-83 102 (DSET) ····183
11-7-84 103 (DVEN) ····183
11-7-85 104 (SET) ····183
11-7-86 105 (ADD) ····184
11-7-87 106 (SUB) ····184
11-7-88 110 (AND) ····184
11-7-89 111 (OR) ····185
11-7-90 115 (EMG) ····185

Contents

11-7-91 152 (COPY) ····185
11-7-92 236 (SRVO) ····186
11-7-93 237 (WAITDRV) ····186
11-7-94 240 (ACK) ····186
11-8 Sample Programs ····187
11-8-1 Move between Two Points ····187
11-8-2 Palletizing ····187
11-8-3 Move by Circular Interpolation ····187

Chapter 12 Troubleshooting
12-1 If a Problem Occurs ····190
12-2 LED Indicators ····190
12-3 List of Error Codes ····191
12-4 Other Problems and Remedies ····192
12-4-1 Cell Master Main Unit Operating Abnormally ····192
12-4-2 Input/Output Signal Abnormality ····192

Chapter 13 Specifications
13-1 Main Unit ····194
13-1-1 Main Unit Specifications ····194
13-1-2 Dimensions ····196
13-2 Programming Box ····200
13-2-1 Programming Box Specifications ····200
13-2-2 Dimensions ····200
13-3 Operation Box ····201
13-3-1 Operation Box Specifications ····201
13-3-2 Dimensions ····201
13-4 I/O Cable ····202

Chapter 14 DTHKB Axis Position Adjustment
14-1 Adjusting the Axis Position for the Gantry Type DTHKB-ASL3 ····204
14-1-1 Adjusting the Y Axis Unit Position ····204
14-1-2 Adjusting the Vertical Stand Position ····205
14-1-3 Adjusting the X Axis Unit Position ····206
14-1-4 Changing the Z Axis Unit Mounting Position ····207
14-2 Adjusting the Axis Position for the Cartesian Type DTHKB-CSL3 ····208
14-2-1 Adjusting the Vertical Stand Position ····208
14-2-2 Moving and Adjusting the Cartesian X Axis Unit ····209
14-2-3 Moving and Adjusting the Cartesian Y Axis Unit ····209
14-2-4 Changing the Z Axis Unit Mounting Position ····210

Chapter 1 Precautions

Thank you for purchasing Koganei's Cell Master.
This manual explains the product's features and how to properly use the unit.
Please read the manual carefully and make sure to always handle and operate the product properly.
Also, please keep this manual in an easily accessible place, so that you can refer to it whenever necessary.
In addition, customers purchasing the units and PC support software should refer to the Owner's Manuals.

1-1 Safety Labels

This section provides information about safety, using the marks shown below, to avoid personal injury or damage to equipment. Read and understand the described material carefully before trying to operate the equipment.

The directions are ranked according to degree of potential danger or damage:
"DANGER!", "WARNING!", "CAUTION!", and "ATTENTION!"

⚠ **DANGER**	Expresses situations that can be clearly predicted as dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ **WARNING**	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in death or serious injury. It could also result in damage or destruction of assets.
⚠ **CAUTION**	Expresses situations that, while not immediately dangerous, could become dangerous. If the noted danger is not avoided, it could result in light or semi-serious injury. It could also result in damage or destruction of assets.
⚠ **ATTENTION**	While there is little chance of injury, this content refers to points that should be observed for appropriate use of the product.

General Items

- This product was designed and manufactured as parts for use in General Industrial Machinery.
- In the selection and handling of the equipment, the system designer or other person with fully adequate knowledge and experience should always read the Safety Precautions, Catalog, Owner's Manual and other literature before commencing operation. Making mistakes in handling is dangerous.
- The customer should take responsibility to verify that the product is compatible with the customer's systems. Use the product based on your good judgment.
- After reading the Owner's Manual, Catalog, etc., always place them where they can be easily available for reference to users of this product.
- If transferring or lending the product to another person, always attach the Owner's Manual, Catalog, etc., to the product where they are easily visible, to ensure that the new user can use the product safely and properly.
- The danger, warning, and caution items listed under these "Safety Precautions" do not cover all possible cases. Read the Catalog and Owner's Manual carefully, and always keep safety first.

1-2 Safety Precautions

⚠ DANGER

- Do not use the product for the purposes listed below:
  1. Medical equipment related to maintenance or management of human lives or bodies.
  2. Mechanical devices or equipment designed for the purpose of moving or transporting people.
  3. Critical safety components in mechanical devices.
     This product has not been planned or designed for purposes that require advanced stages of safety. It could cause injury to human life.
- Do not use the product in locations with or near dangerous substances such as flammable or ignitable substances.
  It could ignite or burst into flames.
- Do not enter the machine's operating area while the product is in operation, or in an operation-ready state. The actuator can move suddenly, possibly resulting in injury.
- Persons who use a pacemaker, etc., should keep a distance of at least 1 meter away from the product. There is a possibility that the pacemaker will malfunction due to the strong magnet built into the product.
- Always place the main unit on a flat, level, and sturdy surface and ensure there is adequate working space around it. Dropping or falling of the product or improper operation could result in injury.
- Never attempt to remodel the product. It could result in abnormal operation leading to injury, electric shock, fire, etc.

- Never attempt inappropriate disassembly, or assembly of the product relating to its basic inner construction, or to its performance or functions. It could result in injury, electric shock, fire, etc.
- Do not splash water on the product. Spraying it with water, washing it, or using it underwater could result in malfunction of the product leading to injury, electric shock, fire, etc.

⚠ WARNING

- Do not use the product in excess of its specification range. Such use could result in product breakdowns, function stop, damage, or drastically reduce the operating life.
- Design safety circuits and equipment systems so as to avoid equipment damage or personal injury when the machine is shut down due to an emergency stop, power outages, or other system abnormalities.
- Always implement D-class grounding work (ground resistance 100Ω or less).
  Current leakage could cause electric shock or erratic operation.
- Before supplying electricity to the device and before starting operation, always conduct a safety check of the area of machine operation. Unintentional supply of electricity could possibly result in electric shock, or in injury caused by contact with moving parts.
- Do not touch the terminals and the miscellaneous switches, etc., while the device is powered on. There is a possibility of electric shock and abnormal operation.
- Avoid scratching the cords of cables, etc.
  Letting the cords be subject to scratching, excessive bending, pulling, rolling up, or being placed under heavy objects or squeezed between two objects, may result in current leaks or defective continuity that could lead to fire, electric shock, or abnormal operation.
- If abnormal noise occurs or vibrations are excessive, immediately cease operation. Continued use in this condition may result in abnormal operation or runaway that could lead to product damage or destruction.
- Do not throw the product into fire.
  The product could explode and/or release toxic gases.
- Do not sit on the product, place your foot on it, or place other objects on it.
  Accidents such as falling and tripping over could result in injury. Dropping or toppling the product may result in injury, or it might also damage or break it, resulting in abnormal or erratic operation, runaway, etc.
- For inspection, maintenance, replacement, or other kinds of operations related to the product, always completely turn off the power supply before beginning.
- Operate within the recommended loads and specified speeds.
- Always unplug the power cord before making adjustments to the unit or performing maintenance/ inspection work. Failing to heed this warning may result in injuries and electrical shock due to contact with moving parts.
- You can do the following things to prevent someone else from carelessly turning on the power.
  1. Display a sign or other such message stating what is being done in an easy-to-see location.
  2. Reel the power cord in closer to the person performing the work.
  3. Lock the power plug and outlet and leave the key with the person performing the work, or provide a safety plug.

⚠ CAUTION

- When transporting or installing the product, support it securely with a lift or support tool, and avoid injuries by having multiple people, etc., do the work.
- Do not use the product in locations that are subject to direct sunlight (ultraviolet rays), dust, salt, iron powder, high humidity, or in the media and/or the ambient atmospheres that include organic solvents, phosphate ester type hydraulic oil, sulphur dioxide, chlorine gas, acids, etc. It could lead to an early shutdown of some functions or a sudden degradation of performance, and result in a reduced operating life.
- Do not use the product in atmospheres subject to corrosive gases, flammable gases, flammable liquids, etc. It could lead to a decrease in strength due to rust, or to a risk of the motor igniting or the product exploding.

- If using the product in the locations listed below, implement adequate shielding measures.
  Failure to take these measures may lead to erratic operation:
  1. Locations subject to large electric current or magnetic fields
  2. Locations subject to noise due to static electricity, etc.
  3. Locations with the possibility of exposure to radiation
- Do not bring magnetic media, etc., within 1 meter of the product. There is a possibility that the data in the magnetic media will be destroyed due to the magnetism of the magnet built into the product.
- Install the main unit in locations with as little dust or dirt as possible. Installation in locations subject to lots of dust or dirt can lead to erratic operation.
- Do not install the product in locations subject to heavy vibrations ($4.9m/s^2$ [0.5G] or more). Transmission of heavy vibrations to the product could lead to erratic operation.
- When installing the product, leave room for adequate working space around it. Failure to ensure adequate working space will make it more difficult to conduct daily inspections or maintenance, which could eventually lead to system shutdown or damage to the product.
- Do not scratch, dent, or deform the driving portion by climbing on the product, using it as a scaffold, or placing objects on it. It could lead to damaged or broken products that result in operation shutdown or degraded performance.
- Always post an “operations in progress” sign for installations, adjustments, or other operations, to avoid unintentional supplying of electrical power, etc. Such accidental supplies may cause electrical shock, or sudden activation of the actuator that could result in physical injury.

⚠ ATTENTION

- When considering the possibility of using this product in situations or environments not specifically noted in the Catalog or Owner’s Manual, or in applications where safety is an important requirement such as in an airplane facility, combustion equipment, leisure equipment, safety equipment, and other places where human life or assets may be greatly affected, take adequate safety precautions such as an application with enough margins for ratings and performance or fail-safe measure.
  Be sure to consult us about such applications.
- Use a protective cover, etc., to ensure that the operating portions of mechanical devices, etc., are isolated and do not come into direct contact with human bodies.
- Do not control the product in a way that would cause a workpiece to fall during a power failure.
  Take control measures so that they prevent the table and the workpiece, etc., from falling during a power failure or an emergency stop of the mechanical devices.
- Always check the Owner’s Manual and other reference materials for product wiring.
- When handling the product, wear protective gloves, safety glasses, safety shoes, etc., to keep safety.
- When the product can no longer be used, or is no longer necessary, dispose of it appropriately as industrial waste.
- For inquiries about the product, consult Koganei Overseas Department. The telephone number is shown on the back cover of this owner’s manual.

⚠ OTHERS

- Always observe the following items.
  1. When using this product into systems, always use genuine KOGANEI parts or compatible parts (recommended parts).
     When conducting maintenance and repairs, always use genuine KOGANEI parts or compatible parts (recommended parts).
     Always observe the required methods and procedure.
  2. Never attempt inappropriate disassembly or assembly of the product relating to basic construction, or its performance or functions.

Koganei cannot be responsible if these items are not properly observed.

1-3 Precautions on Transporting and Handling

To avoid damaging the product's function and performance, be aware of the following points.

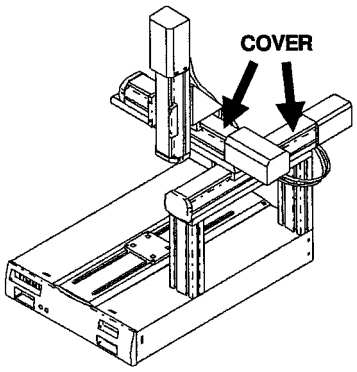
⚠ ATTENTION

(1) Handling while product is in a shipping carton

- When the product is packed for shipping, use care to avoid bumping it too hard, or dropping it.
- Always place it horizontally when left at rest.
- Do not climb on top of the shipping carton.
- Do not place heavy objects or objects with a concentrated load on top of the carton or product.

(2) Handling after unpacking the product

- The cover may get bent when unpacking the unit. So do not grasp it at the locations indicated by the arrows in the following illustration when taking it out. Hold the base portion when carrying it.
- Be careful not to bump the unit against anything when moving it. Care should be taken to the arm portion and motor cover portion.
- When opening the shipping carton, use care to avoid letting it slip and fall out of your hands.
- Contact us immediately if the unit was damaged during shipping or any accessories are missing.



1-4 Precautions on the Main Unit

- The main unit will cause missed steps if tools or workpiece cannot be centered on the mounting surface.
- Resolution is not indicating absolute positional accuracy. It is a theoretical movement distance per pulse that is calculated based on the main unit's construction.
- Set the speed and acceleration time according to the payload and installation conditions. Failing to do this will result in the main unit's missed steps.

1-5 Installation Environment

(1) Specifications

Item	Specification
Operating temperature	0～40 [°C]
Operating humidity	35～85 [%] (no condensation)
Storage temperature	−10～50 [°C]
Storage humidity	20～90 [%] (no condensation)
Others	• Do not expose to direct sunlight. • Avoid locations where the unit may come in contact with water or cutting oil. • Choose a location with little or no dust or dirt. • Choose a vibration-free location. • Do not expose to strong electromagnetic waves or UV radiation. • Do not expose to radiant heat from large heat sources, such as heat treatment equipment. • Do not expose to corrosive gases, such as sulfuric acid or hydrochloric acid.

(2) Location

Install the main unit on a sturdy and rattle-free, level workbench.

1-6 Warranty

Koganei offers the following warranty in the event the Cell Master you purchased proves defective.

Coverage: We shall repair the Cell Master free of charge in the event of defects in material and/or workmanship in the original parts comprising the main unit. (This shall be referred to as “warranty repairs” from hereon.)
The warranty repairs refer to repair of the delivered product, and does not include any liability for direct, indirect or consequential damage.

Warranty period: The warranty period shall end when any of the following conditions exists:

1) Eighteen months have passed from the time of shipment.
2) One year has passed since installation.
3) The unit has been operated for over 2400 hours.

Warranty exclusions: The following items are excluded from the warranty.

1) Defects arising from changes over time or wear from usage.
(Includes natural color fading of painting and plating, and the deterioration of expendables.)
2) Barely perceptible events that have no effect on the actuator’s quality or functionality.
(Includes motor and sliding screw sound.)
3) When moving by linear interpolation and continuous interpolation (also known as MOLA, MOLI, MOLF, and MOLD commands) or by circular interpolation (COLA, COLI, and COLF commands), you may think there is a strange sound, but it is just the characteristic sound of the motor and is completely normal.
4) We do not guarantee absolute precision for the unit palletizing function. As a result, the pallet size and positioning pallet movement points may not be aligned.
5) If the customer has changed the mounting position of the X or Y axis in the DTHKB series, we cannot be responsible for problems that may arise due to the change in the mounting position. (Axis twisting or distortion, or cable interference, disconnection, etc.)
6) Equipment breakdowns due to mishandling.

We will not provide warranty repairs for defects caused by the following:

1) Natural disasters, including but not limited to earthquakes, typhoons, water damage, and lightning strikes, as well as accidents and fires.
2) Modifications or alterations not approved by Koganei.
3) Use of a non-genuine part or lubricating grease other than the type we designated.
4) Poor maintenance/inspections or other mistakes.
5) Maintenance was performed by someone other than the designated distributor.

Chapter 2 Overview

This chapter describes the Cell Master's features and introduces its options. It also lists the product's accessories, so please kindly check that they are all included.

2-1 Cell Master's Features

Koganei's Cell Master is so light and compact that it can be placed in the corner of your desk. An expanded application unit has been added to the gantry type and Cartesian type with two or three axes, allowing you to build versatile systems suited to your purpose and to broaden your creative horizons.

(1) Compactness
The main unit for the DTHB series has an A4 footprint, at 210 ×300mm (W×D), while the main unit for the DTHKB series has an A3 footprint, at 310×506mm (W×D), allowing it to be set up almost anywhere. It is suitable for work environments where space is at a premium, including one-man cell production in which a single worker operates multiple cells as well as full-fledged cell production. Furthermore, it employs precision sliding screws, enabling precise movement with a repeatability of ±0.02mm, and it is lightweight (DTHB:5.9kg, DTHKB:14kg), which makes it easy to carry and move.

(2) Simple operation and detailed programming
The programming box uses a teaching function with simple operation that enables you directly input operating points and parameters. No technical training is required. This allows even beginners to easily use the unit and ensures stable quality.
Moreover, you can program by steps, to build up detailed operations.
You can register up to a maximum of 1000 programs. (The number of steps per program multiplied by the number of programs cannot exceed 10000.)

(3) Wide range of applications
The main unit is capable of three-dimensional linear interpolation, two-dimensional circular interpolation, and continuous interpolation, and thanks to its easy support for complex work, it enables effective automation and labor saving at a cost lower than systems configured from separate components.

(4) Point registration and parameter registration
You can register up to a maximum of 10000 coordinates as point numbers.
You can set and register all kinds of parameters in great detail, by type of actuator, etc.

(5) Operation using communication commands
You can input communication commands via a serial communication port (RS232C) to implement the operations you want. This means that you can control it from a personal computer or other external devices, and can operate it together with other equipment for an advanced degree of control.

(6) Variable X and Y axes mounting position (DTHKB series)
You can use the T slot to adjust the X axis X direction, the X axis Y direction, and the Y axis Y direction mounting positions.

(7) A free slot on the workpiece (DTHKB series)
You can use the T slot in the horizontal mounting stand to freely mount the workpiece or fixture in any direction.

(8) Missed steps detection
If missed steps occur, it is detected as an error and operation is stopped.

(9) Direct teaching function
You can manually move the axis to register a position as a point.

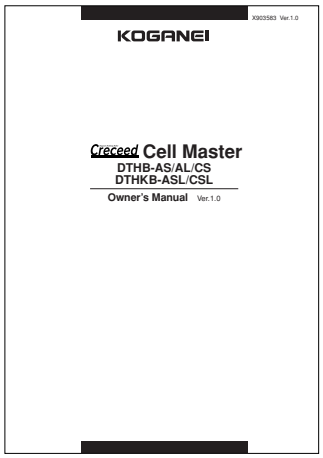
(10) Editor function added
A comment column has been added to the program and point.
You can perform continuous sending and receiving of programs, saving all programs at once, and reading.

2-2 Accessories

The Cell Master comes with the following accessories. Please check that they are all included at the time of unpacking.

(1) Operation box 1 piece (for both DTHB and DTHKB)
DTHBM-OB

(2) Owner's Manual CD-R 1 disk (for both DTHB and DTHKB)



(3) AC100V power cable
(Cable length 2m) Note: Included in the DTHKB series only.

Caution: The DTHB series is not provided with a DC power supply device. The customer will need to provide your own.

The power supply specifications required for connecting to the Cell Master are as shown below.
If connecting an external load to the I/O, extra capacity equal to that load will be required.

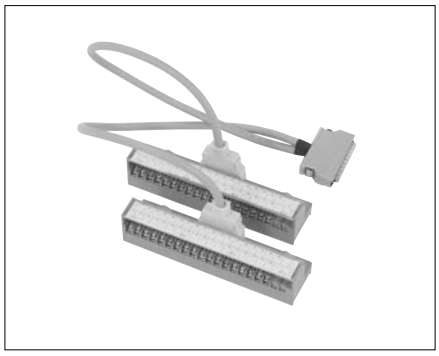
Power supply specification:	24VDC 3A (75W) or higher

Recommended power supply model
Made by Cosel Co., Ltd.: P100-24-N

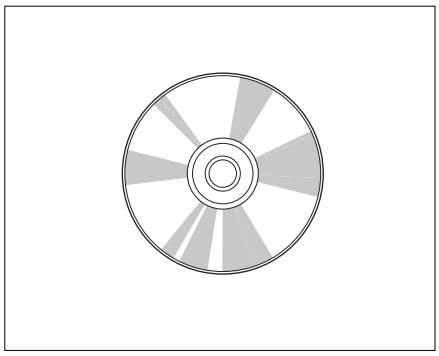
2-3 Options

(1) Programming box (for both DTHB and DTHKB)
DTHBP-PB (connecting cable included)

(2) I/O cable (for both DTHB and DTHKB)
DTHBP-CTA (loose end cable)
DTHBP-CTB (with screw terminal block)



(3) Support software DTHB Editor (for both DTHB and DTHKB)
DTHBP-SW-HTA (English)

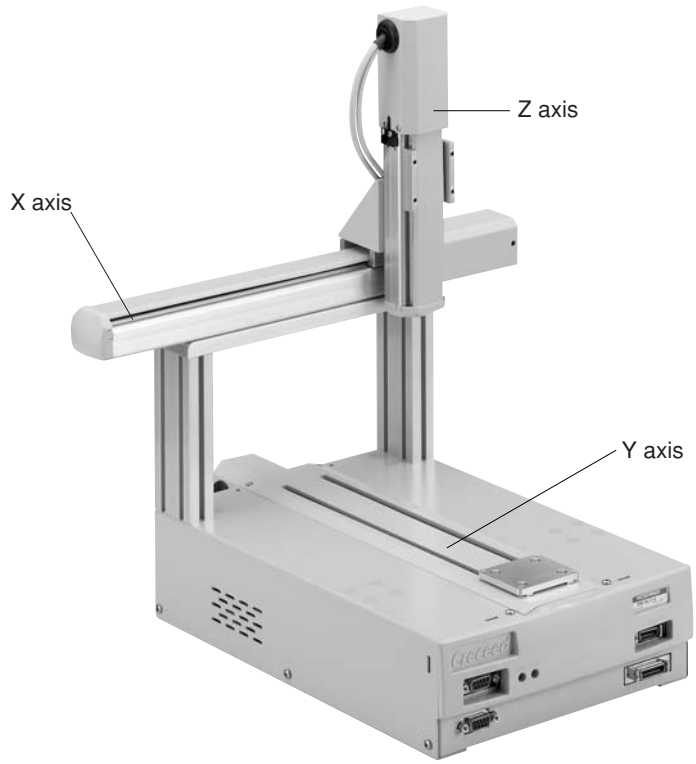


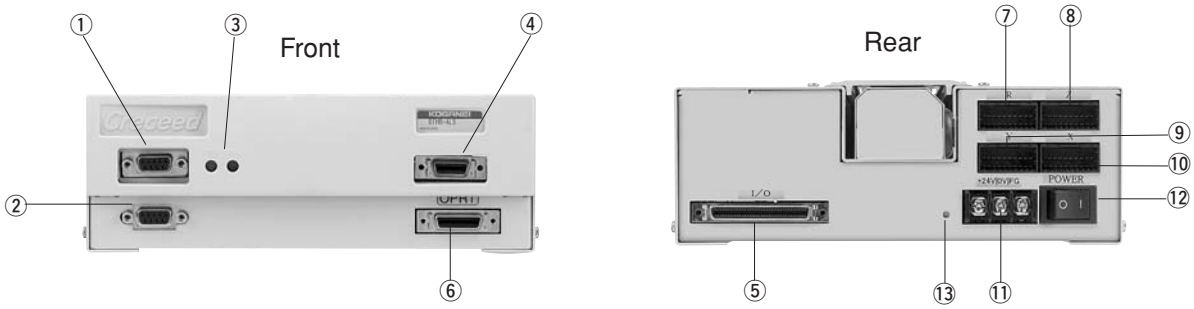
Chapter 3 Parts and Connections

This chapter describes the names, functions, and wiring of the unit's terminals and connectors.

3-1 Major Parts and Functions

3-1-1 DTHB

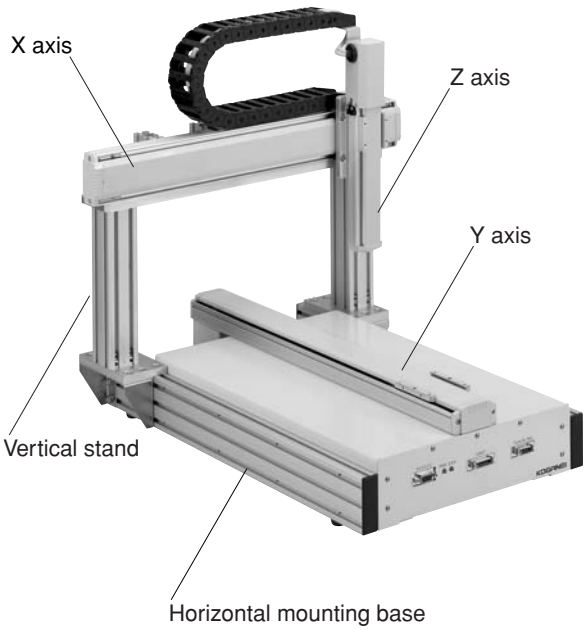


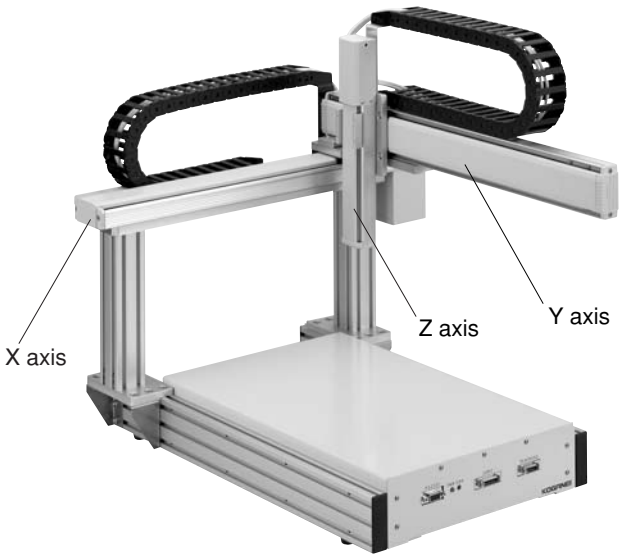


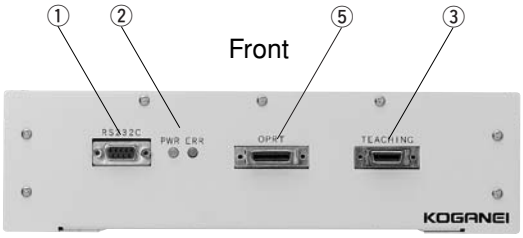
① RS232C connector 1:	Connector for performing serial communication. This connector connects to the DTHB Editor which is loaded in the personal computer.
② RS232C connector 2:	Connector for performing serial communication. You can also use this to connect to a personal computer or other external devices which control the Cell Master using communication commands.
③ LED indicators:	Display the unit's state.
④ Programming box connector:	Connects to the programming box.
⑤ I/O connector:	Connects to an input/output connector.
⑥ Operation box connector:	Connects to the operation box.
⑦ R axis connector:	Connects a cable for the R axis actuator.
⑧ Z axis connector:	Connects the cable for the Z axis actuator.
⑨ Y axis connector:	Connects the cable for the Y axis actuator.
⑩ X axis connector:	Connects the cable for the X axis actuator.
⑪ Power supply connection terminal:	Connects to a +24V power supply and ground.
⑫ Power supply switch:	Switch for turning the power supply on and off.
⑬ Reset switch:	Switch for resetting.

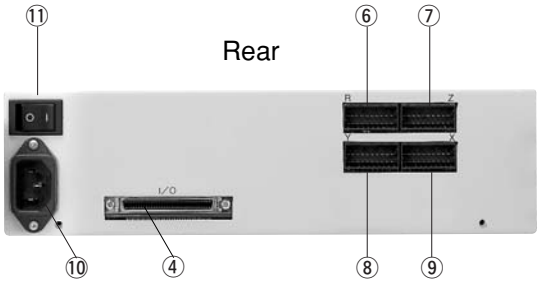
3-1-2 DTHKB

You can use the T slots to adjust the X axis X direction, the X axis Y direction, and the Y axis Y direction mounting positions.



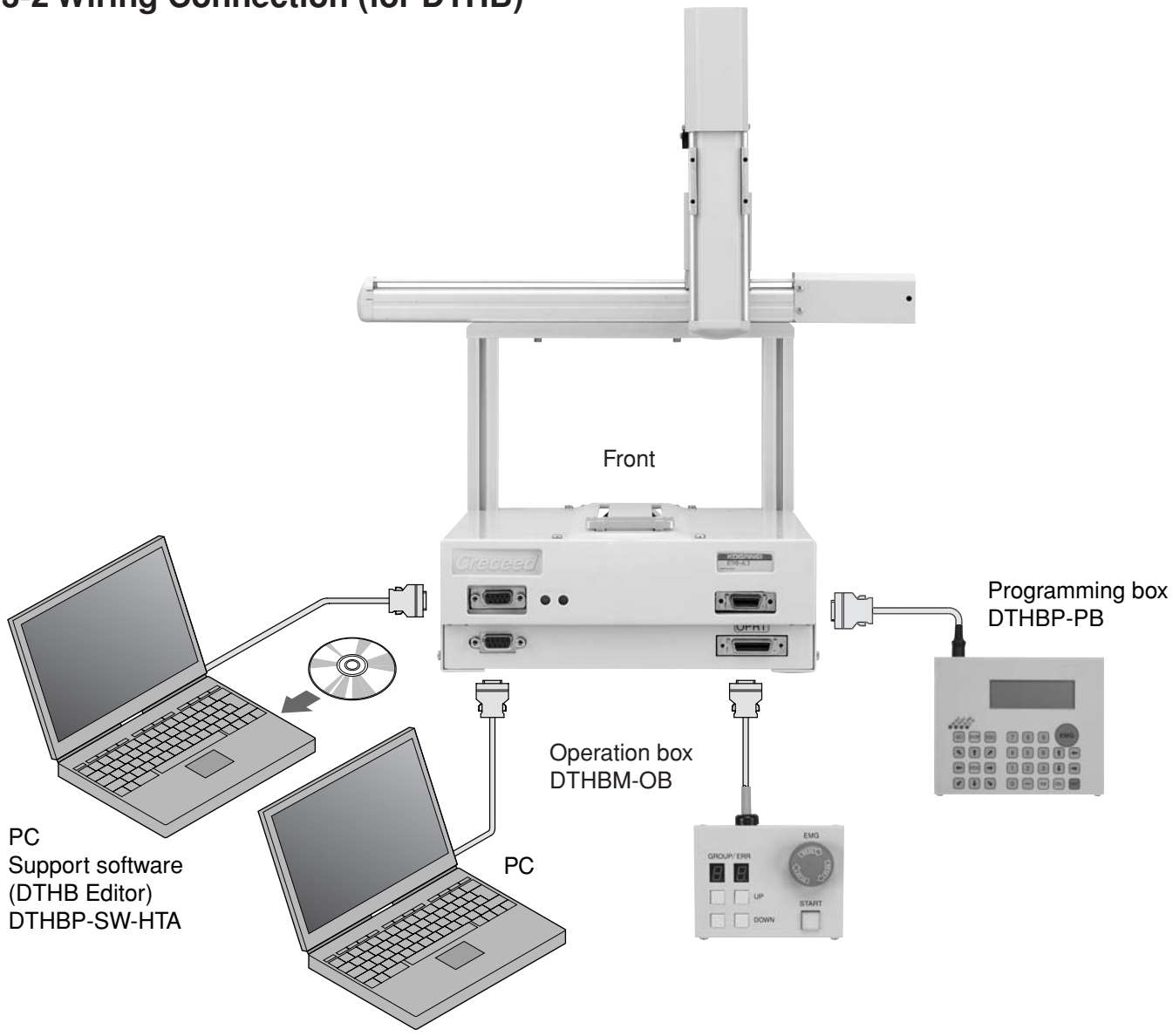


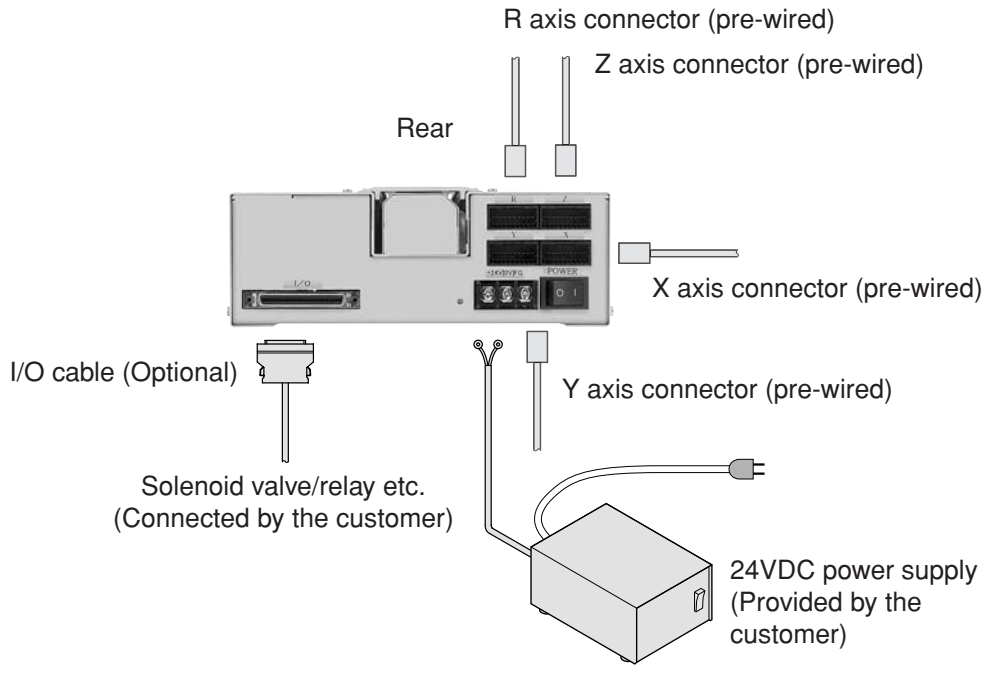




① RS232C connector:	Connector for performing serial communication. This connector connects to the DTHB Editor which is loaded in the personal computer. You can also use this to connect to a personal computer or other external devices which control the Cell Master using communication commands.
② LED indicators:	Display the unit's state. (For details, see p.190, 12-2 LED Indicators.)
③ Programming box connector:	Connects to the programming box.
④ I/O connector:	Connects an input/output connector.
⑤ Operation box connector:	Connects to the operation box.
⑥ R axis connector:	Connects a cable for the R axis actuator.
⑦ Z axis connector:	Connects the cable for the Z axis actuator.
⑧ Y axis connector:	Connects the cable for the Y axis actuator.
⑨ X axis connector:	Connects the cable for the X axis actuator.
⑩ Power supply inlet:	Connects the power supply cable provided (100VAC).
⑪ Power supply switch:	Switch for turning the power supply on and off.

3-2 Wiring Connection (for DTHB)





3-3 Connections

3-3-1 Connecting the Power Supply

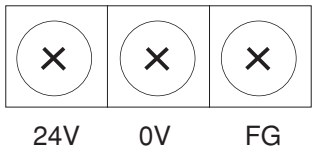
(1) DTHB series

Connect the unit to a 24VDC power supply provided by you—the customer.

The power supply is connected by attaching the wires onto the screw terminal block. Use crimp terminals suited to the terminal of the block to securely connect the wires.

Terminal block screw size: M4

Terminal display	Description
24V	+24V
0V	0V
FG	Ground



(2) DTHKB series

Connect the AC power supply cable to the inlet, and plug the opposite end into the outlet. For safety, use an outlet with a third hole for the ground, and ensure that the ground is firmly grounded.

3-3-2 X, Y, Z, and R axis Connectors

These are connected at time of shipping.

3-3-3 Connecting the Programming Box

The programming box can be connected/disconnected regardless of whether the main unit's power is ON/OFF.

3-3-4 Connecting the Operation Box

(1) Connecting the operation box

Connect the operation box before powering on the main unit.

Connecting it after the main unit is powered on results in the emergency stop state.

(2) Disconnecting the operation box

Always disconnect the operation box when operations are ended or when an emergency stop has occurred. Disconnecting during operation results in the emergency stop state.

3-3-5 Connecting the I/O Cable

Use the optional I/O cable to connect with an external control device.

Types of cables include a loose end type (connected by the customer to a control device connector, etc.) and a screw terminal block type.

The meaning and operation of the signals allocated to pins are described in detail in the next chapter.

See the table below of a list of possible connectors for the I/O connector.

Connector rating: IEEE1284

Connector manufacturer	Plug part	Cover product name
HIROSE ELECTRIC CO., LTD.	DX30AM-68P	DX30M-68-CV
Japan Aviation Electronics Industry, Ltd.	TX10-68P-D2P1-D1	TX10-68M
Tyco Electronics AMP K.K.	175677-8	175755-8
DDK Ltd.	DHA-PC68-1G	DHA-HPD68-11
Fujitsu Limited	FCN247R068-G/E	FCN240C068-A/S

Memo

Chapter 4 I/O Interface

The Cell Master is equipped with an I/O interface with 24 general-purpose input points (of which 5 points are for custom input and exclusive use) and 24 general-purpose output points (of which 4 points are for custom output and exclusive use).
Through this interface, commands are exchanged between the Cell Master and external equipment, and devices such as solenoid valves and relays are controlled.
This chapter describes the names, functions, and connection methods of the unit's terminals and connectors.

4-1 I/O Basic Specifications

Input

Insulation method	Photo-coupler isolation
Input pin	For connecting a relay contact or an NPN open collector transistor between input terminal and 0V terminal
Input response	5ms or less
Input current	10mA (Typ.)

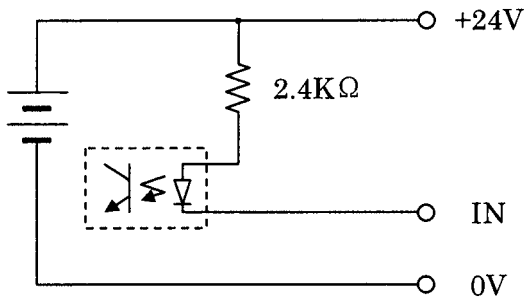
Output

Insulation method	Photo-coupler isolation
Output pin	0V terminal common NPN open collector transistor output
Output response	1ms or less
Max. output current per output	200mA (depending on the current protection element)
Maximum output total current	3A※

※Do not exceed 1A in units OUT0 to OUT7, OUT8 to OUT15, and OUT16 to OUT23.

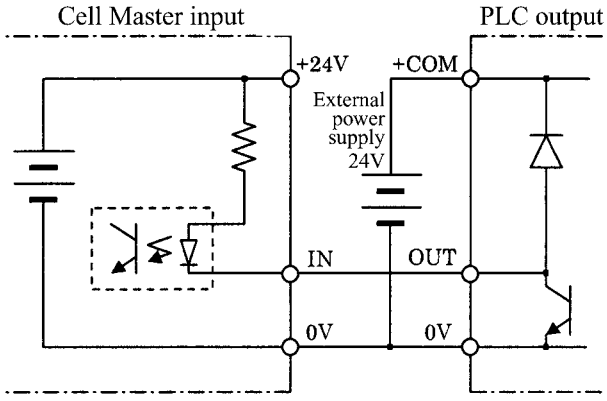
4-2 Input Circuit and External Connection Examples

4-2-1 Input Circuit



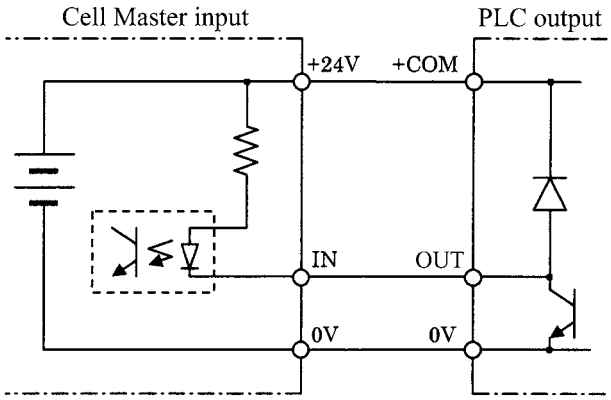
4-2-2 External Connection Examples

Example 1: Using an external power supply for PLC input power

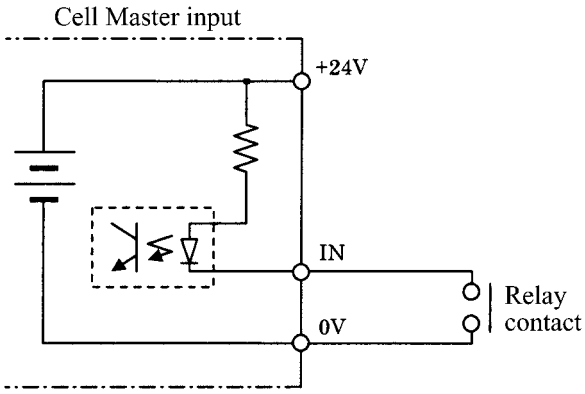


Caution: Always use 24VDC when using an external DC power supply.

Example 2: Using the Cell Master internal power supply for PLC input power

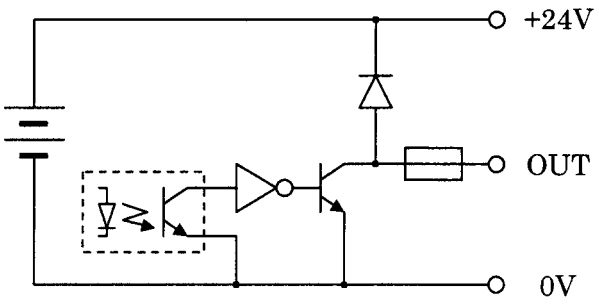


Example 3: Connecting a relay



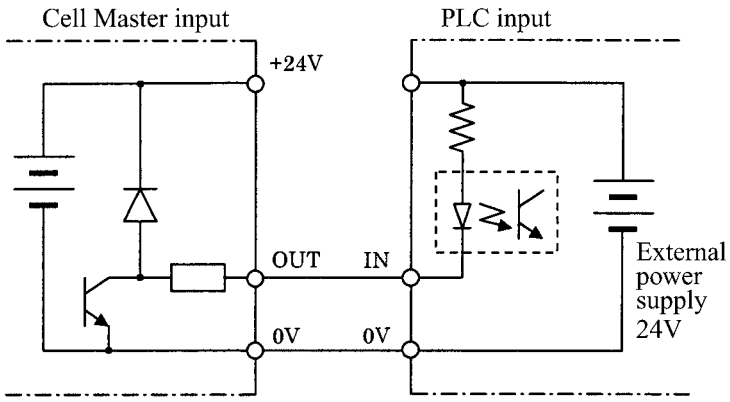
4-3 Output Circuit and External Connection Examples

4-3-1 Output Circuit



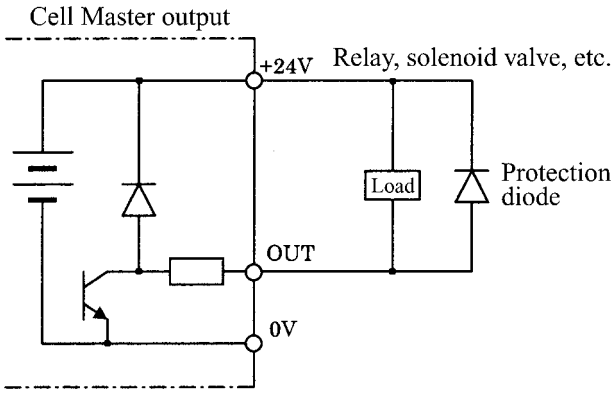
4-3-2 External Connection Examples

Example 1: When PLC input, etc., is used.



Caution: Always use 24VDC when using an external DC power supply. Failure to do so could result in erratic operation by the protective diode inside the Cell Master.

Example 2: Connecting a relay or other load



Caution: When using the Cell Master's internal power supply to drive a relay, solenoid valve, or other induction load, always connect a protection diode and the load in parallel.

Caution: When using the Cell Master's internal power supply to connect multiple inputs and outputs, use a power supply that will have an adequate margin of capacity when supplying power to the Cell Master.

4-4 I/O Connector Signal Table

4-4-1 DTHBP-CTA (Loose End Cable)

Connector Pin No.	Wire color code identification	Signal name I/O No.	Description	Connector Pin No.	Wire color code identification	Signal name I/O No.	Description
1	Orange/Black dot	+24V	+24V output	35	Orange/Red dot	+24V	+24V output
2	Gray/Black dot	IN0	General-purpose input	36	Gray/Red dot	OUT0	General-purpose output
3	White/Black dot	IN1	General-purpose input	37	White/Red dot	OUT1	General-purpose output
4	Yellow/Black dot	IN2	General-purpose input	38	Yellow/Red dot	OUT2	General-purpose output
5	Pink/Black dot	IN3	General-purpose input	39	Pink/Red dot	OUT3	General-purpose output
6	Orange/2 black dots	IN4	General-purpose input	40	Orange/2 red dots	OUT4	General-purpose output
7	Gray/2 black dots	IN5	General-purpose input	41	Gray/2 red dots	OUT5	General-purpose output
8	White/2 black dots	IN6	General-purpose input	42	White/2 red dots	OUT6	General-purpose output
9	Yellow/2 black dots	IN7	General-purpose input	43	Yellow/2 red dots	OUT7	General-purpose output
10	Pink/2 black dots	0V	0V	44	Pink/2 red dots	0V	0V
11	Orange/2 black dots	+24V	+24V output	45	Orange/3 red dots	+24V	+24V output
12	Gray/2 black dots	IN8	General-purpose input	46	Gray/3 red dots	OUT8	General-purpose output
13	White/3 black dots	IN9	General-purpose input	47	White/3 red dots	OUT9	General-purpose output
14	Yellow/3 black dots	IN10	General-purpose input	48	Yellow/3 red dots	OUT10	General-purpose output
15	Pink/3 black dots	IN11	General-purpose input	49	Pink/3 red dots	OUT11	General-purpose output
16	Orange/4 black dots	IN12	General-purpose input	50	Orange/4 red dots	OUT12	General-purpose output
17	Gray/4 black dots	IN13	General-purpose input	51	Gray/4 red dots	OUT13	General-purpose output
18	White/4 black dots	IN14	General-purpose input	52	White/4 red dots	OUT14	General-purpose output
19	Yellow/4 black dots	IN15	General-purpose input	53	Yellow/4 red dots	OUT15	General-purpose output
20	Pink/4 black dots	0V	0V	54	Pink/4 red dots	0V	0V
21	Orange/ Black dots	+24V	+24V output	55	Orange/ Red solid stripe	+24V	+24V output
22	Gray/ Black dots	IN16	General-purpose input	56	Gray/ Red solid stripe	OUT16	General-purpose output
23	White/ Black dots	IN17	General-purpose input	57	White/ Red solid stripe	OUT17	General-purpose output
24	Yellow/ Black dots	IN18	General-purpose input	58	Yellow/ Red solid stripe	OUT18	General-purpose output
25	Pink/ Black dots	IN19	General-purpose input	59	Pink/ Red solid stripe	OUT19	General-purpose output
26	Orange/ Black dash	IN20	General-purpose input	60	Orange/ Black dash & red dot	OUT20	General-purpose output
27	Gray/ Black dash	IN21	General-purpose input	61	Gray/ Black dash & red dot	OUT21	General-purpose output
28	White/ Black dash	IN22	General-purpose input	62	White/ Black dash & red dot	OUT22	General-purpose output
29	Yellow/ Black dash	IN23	General-purpose input	63	Yellow/ Black dash & red dot	OUT23	General-purpose output
30	Pink/ Black dash	0V	0V	64	Pink/ Black dash & red dot	0V	0V
31	Orange/ 2 black dashes	N.C.	Not used	65	Orange/ Black dash & 2 red dots	FG	Ground
32	Gray/ 2 black dashes	N.C.	Not used	66	Gray/ Black dash & 2 red dots	FG	Ground
33	White/ 2 black dashes	N.C.	Not used	67	White/ Black dash & 2 red dots	FG	Ground
34	Yellow/ 2 black dashes	N.C.	Not used	68	Yellow/ Black dash & 2 red dots	FG	Ground

4-4-2 DTHBP-CTB (with Screw Terminal Block)

Terminal block Terminal No.	Signal name I/O No.	Description	Terminal block Terminal No.	Signal name I/O No.	Description
1	+24V	+24V output	1	+24V	+24V output
2	IN0	General-purpose input	2	OUT0	General-purpose output
3	IN1	General-purpose input	3	OUT1	General-purpose output
4	IN2	General-purpose input	4	OUT2	General-purpose output
5	IN3	General-purpose input	5	OUT3	General-purpose output
6	IN4	General-purpose input	6	OUT4	General-purpose output
7	IN5	General-purpose input	7	OUT5	General-purpose output
8	IN6	General-purpose input	8	OUT6	General-purpose output
9	IN7	General-purpose input	9	OUT7	General-purpose output
10	0V	0V	10	0V	0V
11	+24V	+24V output	11	+24V	+24V output
12	IN8	General-purpose input	12	OUT8	General-purpose output
13	IN9	General-purpose input	13	OUT9	General-purpose output
14	IN10	General-purpose input	14	OUT10	General-purpose output
15	IN11	General-purpose input	15	OUT11	General-purpose output
16	IN12	General-purpose input	16	OUT12	General-purpose output
17	IN13	General-purpose input	17	OUT13	General-purpose output
18	IN14	General-purpose input	18	OUT14	General-purpose output
19	IN15	General-purpose input	19	OUT15	General-purpose output
20	0V	0V	20	0V	0V
21	+24V	+24V output	21	+24V	+24V output
22	IN16	General-purpose input	22	OUT16	General-purpose output
23	IN17	General-purpose input	23	OUT17	General-purpose output
24	IN18	General-purpose input	24	OUT18	General-purpose output
25	IN19	General-purpose input	25	OUT19	General-purpose output
26	IN20	General-purpose input	26	OUT20	General-purpose output
27	IN21	General-purpose input	27	OUT21	General-purpose output
28	IN22	General-purpose input	28	OUT22	General-purpose output
29	IN23	General-purpose input	29	OUT23	General-purpose output
30	0V	0V	30	0V	0V
31	N.C.	Not used	31	FG	Ground
32	N.C.	Not used	32	FG	Ground
33	N.C.	Not used	33	FG	Ground
34	N.C.	Not used	34	FG	Ground
35	N.C.	Not used	35	N.C.	Not used
36	N.C.	Not used	36	N.C.	Not used

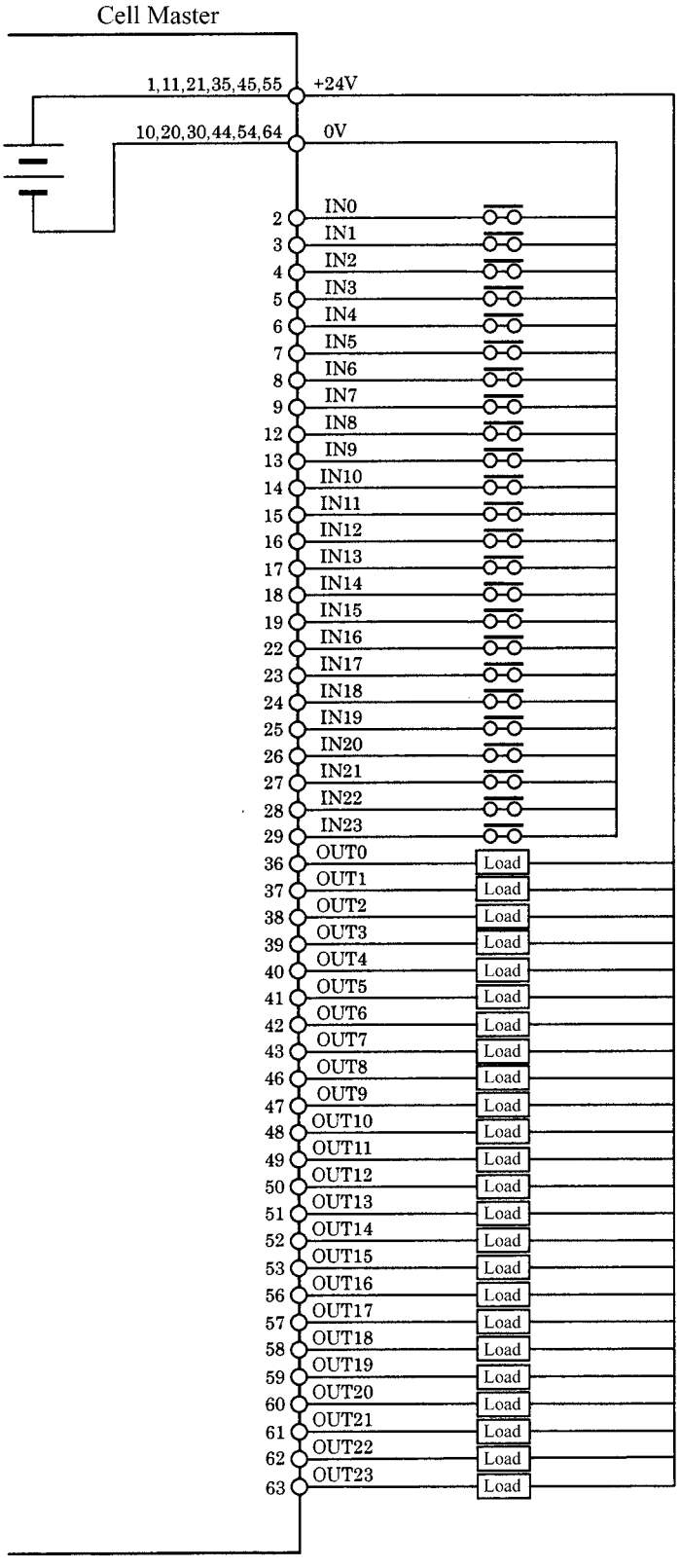
4-4-3 Input/Output Signal Details

1) General-purpose input (IN0 to IN23) 24 points
   These are inputs that allow you to freely use as data during the program. To use, connect to output of the cylinder sensor switch(es) or other control device(s).
   In addition, you can use 5 of these input points as custom inputs, to be explained below.
2) General-purpose output (OUT0 to OUT23) 24 points
   These are outputs that allow you to freely switch them on and off during the program. To use, connect them to input of other control devices.
   In addition, you can use 4 of these output points as custom outputs, to be explained below.
3) Custom input 5 points
   (a) Counter reset input
      Returns all counter values that were used during the program to 0.
   (b) AUTO-RUN input
      Starts or pause a program when this input is received. This is the same function as the start switch button on the operation box.
   (c) RESET input
      Sets all the DO outputs to OFF when this input is received.
   (d) ORG-START input
      Executes return to origin when this input is received.
   (e) EMG input
      Executes emergency stop of the program currently in operation when this input is received. This is the same function as the emergency switch button on the operation box.
      You can use a parameter (PRM343) to reverse the input logic of this signal. PRM343 = 0 sets the A contact input, while PRM343 = 1 sets the B contact input.
4) Custom output 5 points
   (a) READY output
      When the Cell Master is operating normally, this output is ON. It is OFF during an emergency stop, return to origin, or alarms.
   (b) BUSY output
      This output is ON when the motor is running.
   (c) END output
      This output is OFF while a program is being executed.
   (d) Origin return complete output
      This output is ON when return to origin is completed. It is OFF during an emergency stop or return to origin.
   (e) ALM output
      This output is ON during an emergency stop or when an error has occurred.

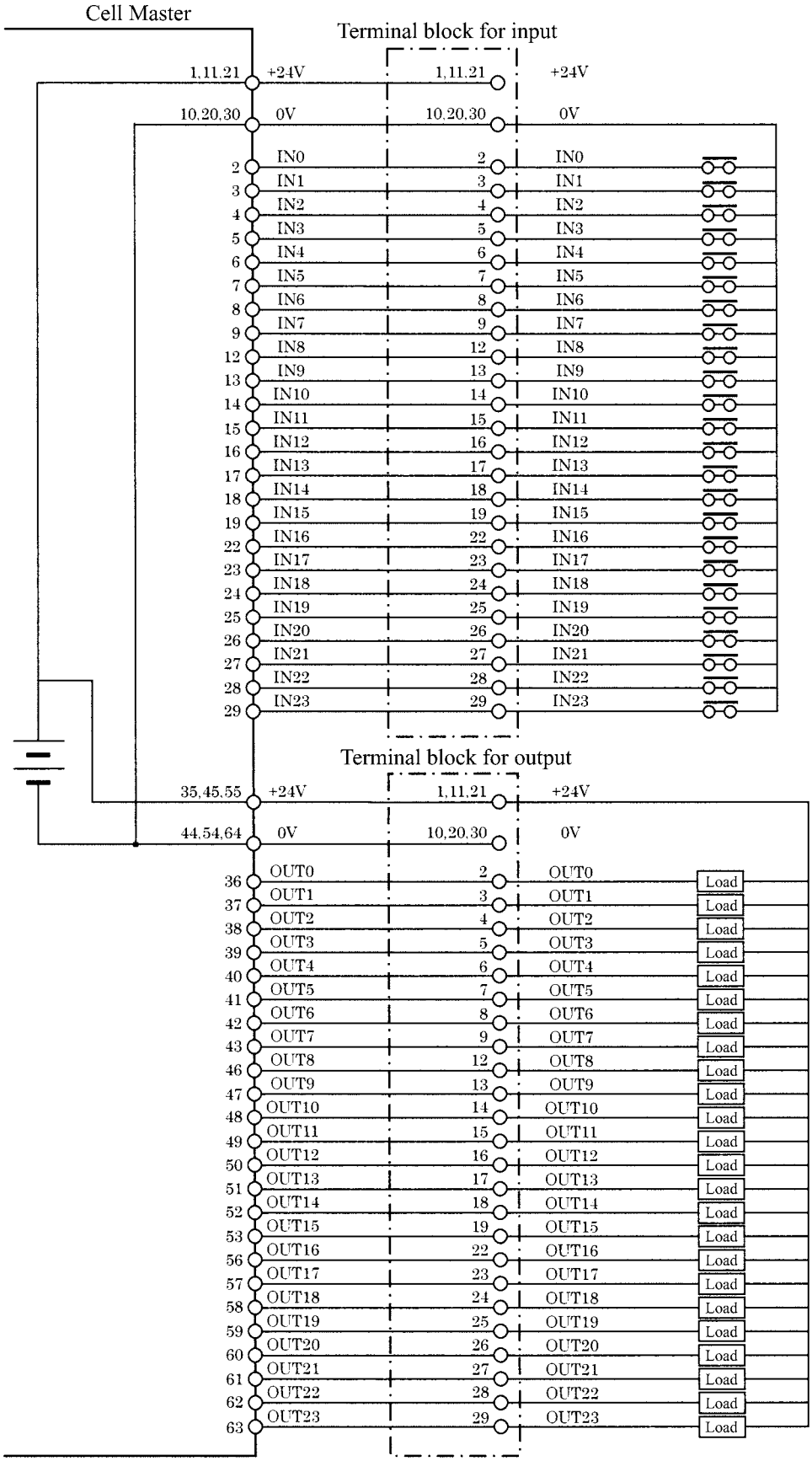
※ When using custom inputs or custom outputs, you will need to use the support software (DTHBP-SW-HTA) to change the parameter settings.

4-5 I/O Connection Examples

4-5-1 When DTHBP-CTA (Loose End Cable) Is Used

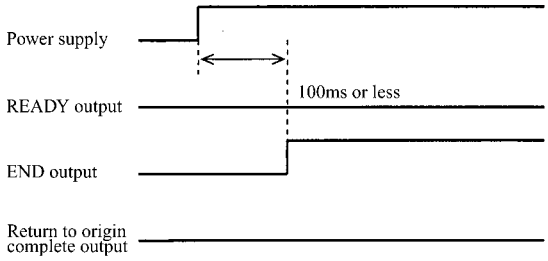


4-5-2 When DTHBP-CTB (with Screw Terminal Block) Is Used

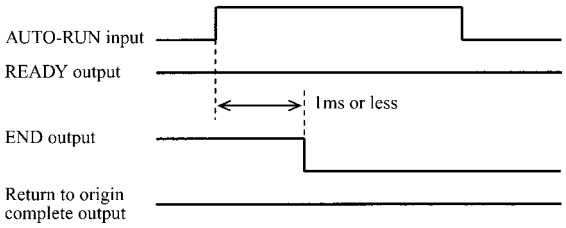


4-6 Timing Chart

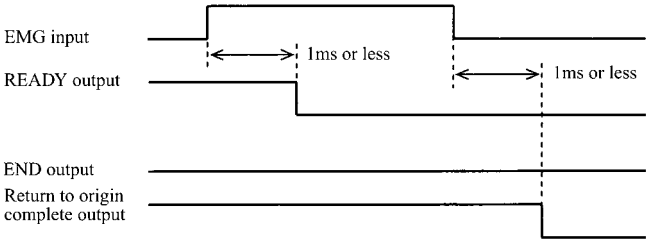
4-6-1 When the Power Is Turned on



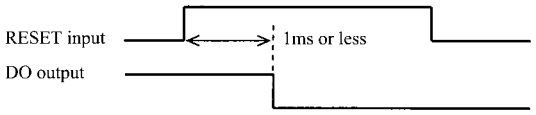
4-6-2 When the Custom Input AUTO-RUN Is Entered



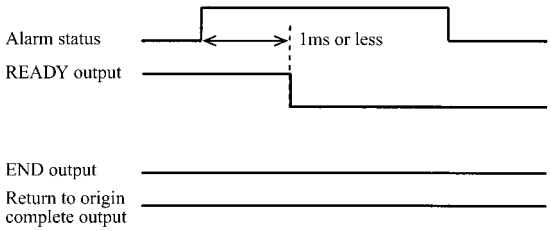
4-6-3 When the Custom Input EMG Is Entered



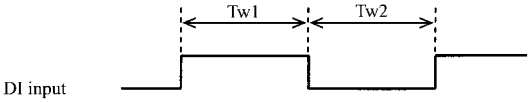
4-6-4 When the Custom Input RESET Is Entered



4-6-5 When an Alarm Is Issued



4-6-6 When the General-purpose Input DI Is Entered



Tw1: PRM036 setting value (10ms to 30ms) or more
Tw2: PRM037 setting value (10ms to 30ms) or more

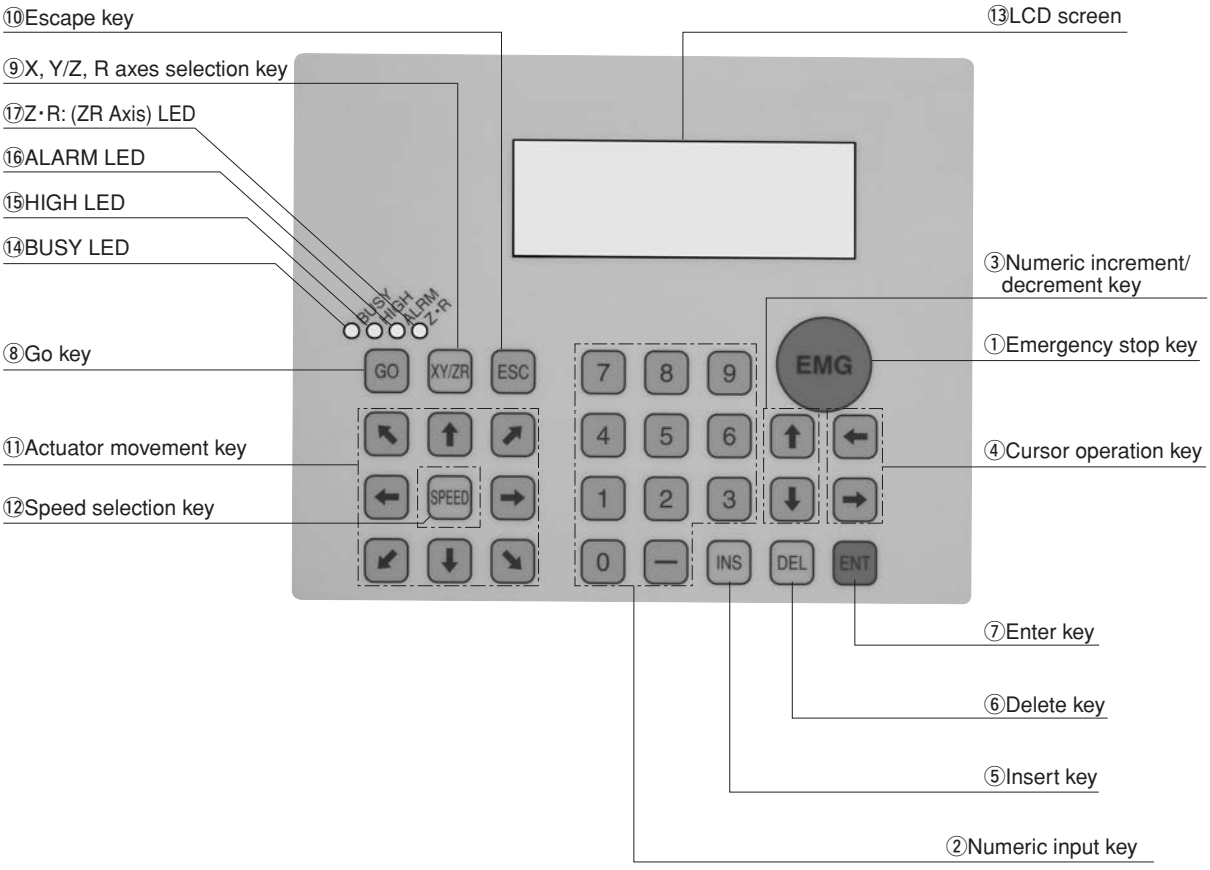
Chapter 5 Programming Box Operations

This chapter describes the programming box functions and operation methods.

5-1 Overview

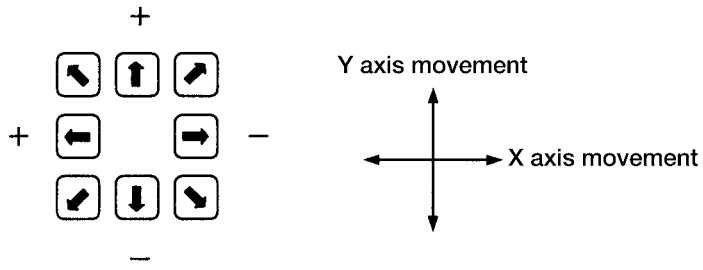
1. You can use the programming box to input and edit all kinds of items, shown below, that can be registered in the main unit.
   1) 1000 automatic operating programs (maximum of 10000 steps)
   2) 10000 point data
   3) 42 parameters (all kinds of setting items)
2. You can transfer these registration items via the RS232C serial port.
3. You can enter the actual points by teaching as well as by using coordinate values.

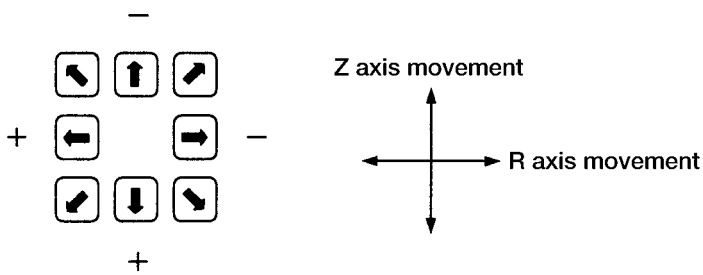
5-2 Key Layout and Functions



① Emergency stop key	: Pressing this switch causes an emergency stop, terminating operations.
② Numeric input key	: Used for numeric input of coordinates, speed, etc.
③ Numeric increment/decrement key	: Used when incrementing or decrementing numeric coordinates, speed, etc.
④ Cursor operation key	: Used when moving the cursor for selection of menu items, or for changing the numeric increment or decrement.
⑤ Insert key	: Used for insertions.
⑥ Delete key	: Used for deletions.
⑦ Enter key	: Used for confirming an input.
⑧ Go key	: Used for moving the axis to an already registered point.
⑨ X, Y/Z, R axes selection key	: Used to switch between the X, Y and Z, R input axes being moved for teaching.
⑩ Escape key	: Used in the menu for returning to the previous item, or to delete the last input.
⑪ Actuator movement key	: Used to move the actuator when teaching.
⑫ Speed selection key	: Used to switch the actuator movement speed between two levels, low and high, for teaching.
⑬ LCD screen	: A screen with 20 digits and 4 rows.
⑭ BUSY LED	: Blinks when communication is in progress.
⑮ HIGH LED	: Lights up when the actuator movement speed is in high-speed mode when teaching.
⑯ ALARM LED	: Lights up when abnormal operation occurs, or during an emergency stop.
⑰ Z･R (ZR Axis) LED	: Lights up when the actuator movement axis is on the ZR axis for teaching.

The relationship between the actuator movement key and movement axis is as shown below.

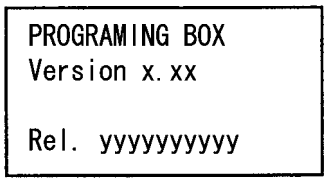




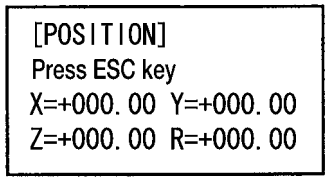
5-3 Power On Conditions

Connect the programming box, and switch on the power to the Cell Master main unit.

The programming box LED displays light up in the order of BUSY, HIGH, ALRM, and Z-R. Lastly, all four light up at once. In addition, the display at right appears while the LEDs are lighting up in order.
The display contents of x, xx, and yyyyyyyyyy will vary, depending on the version shipped.

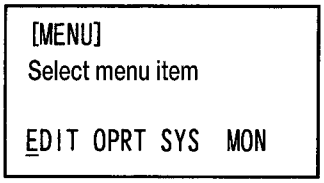


Next, the BUSY LED turns on, and communication with the Cell Master main unit starts. The LCD screen appears as shown at right.

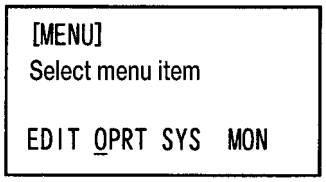


5-4 Basic Information on Key Control

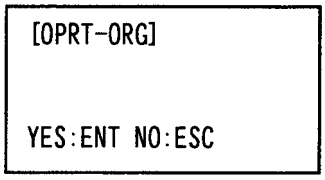
1. On the 4th line of the LCD screen, items that can be selected at that time are displayed.
   An underline displayed under the first character in the item is the current cursor display.
   Use the cursor operation keys ← and → to move the cursor.



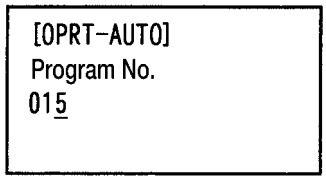
2. Press the ENT key along with the cursor to move to the target item.



3. As shown in the figure at right, for selection of YES or NO on the 4th line, press the ENT key to confirm and the ESC key to cancel.



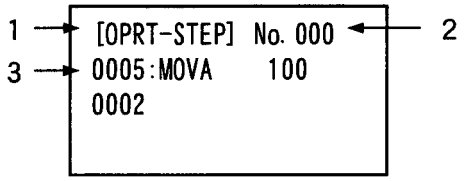
4. As shown in the figure at right, to perform numeric input, either use the numeric key for direct input, or the increment/decrement keys ↑ and ↓ to set the number.



5-5 How to View the Screen

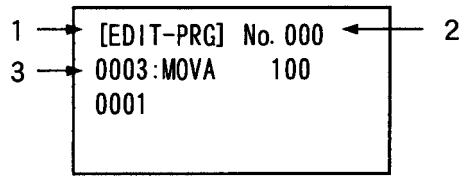
This section describes a basic screen display example, and explanation of its meaning.

5-5-1 Program Executing Screen



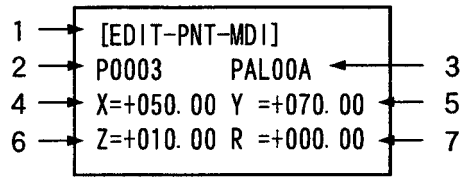
1. Current mode
2. Program number being executed
3. Step number being executed, and command information

5-5-2 Program Editing Screen



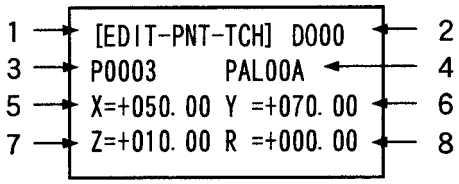
1. Current mode
2. Program number being edited
3. Step number being edited, and command information

5-5-3 Point Editing Screen (Manual Editing)



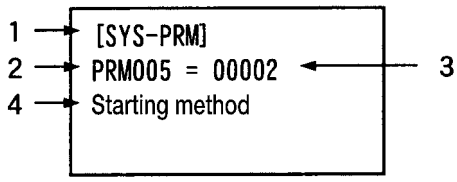
1. Current mode
2. Edit point number
3. Pallet number
4. Edit X axis coordinate
5. Edit Y axis coordinate
6. Edit Z axis coordinate
7. Edit R axis coordinate

5-5-4 Point Editing Screen (Teaching Editing)



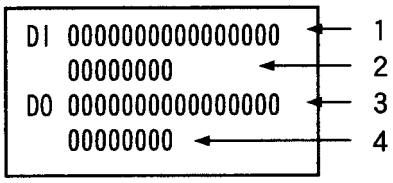
1. Current mode
2. DO number
3. Edit point number
4. Pallet number
5. Current X axis coordinate
6. Current Y axis coordinate
7. Current Z axis coordinate
8. Current R axis coordinate

5-5-5 Parameter Editing Screen



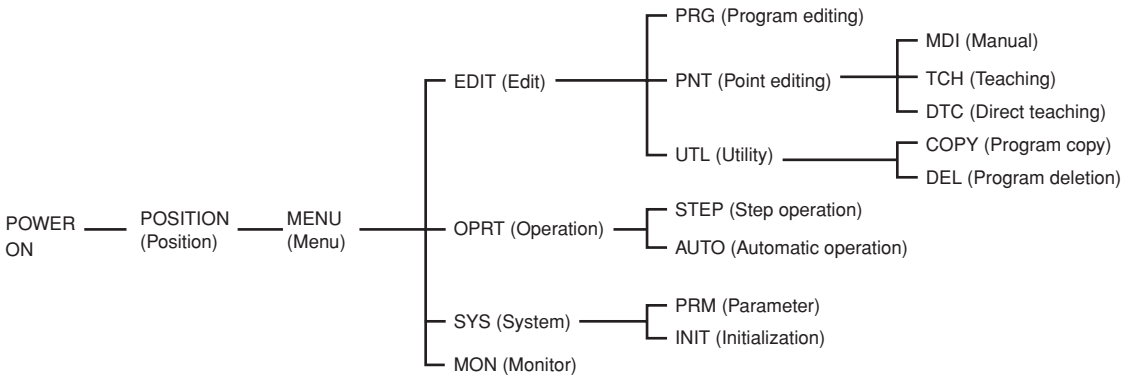
1. Current mode
2. Edit parameter number
3. Parameter setting value
4. Parameter name

5-5-6 DIO Monitor Screen



1. General-purpose input : from left IN23 ～ IN8
2. General-purpose input : from left IN7 ～ IN0
3. General-purpose output : from left OUT23 ～ OUT8
4. General-purpose output : from left OUT7 ～ OUT0

5-6 Menu Hierarchy



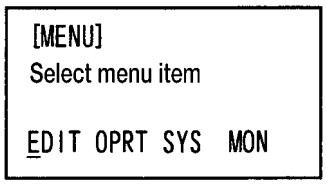
Chapter 6 Parameters

A parameter setting method is used to set in detail the actuator axis length, lead pitch, and motor speed, etc., in the Cell Master.
This chapter explains the parameter types and their meanings.

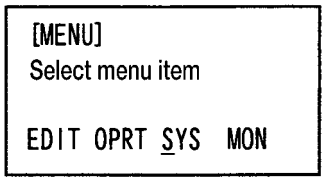
Note: The parameter settings at the time of shipment from the factory are set in accordance with the main unit type. If the customer wants to change the parameters, have an engineer with knowledge of the equipment perform appropriate settings. Mis-setting of parameters could result in error operation of the equipment, and may also lead to equipment damage.

6-1 Setting Parameters

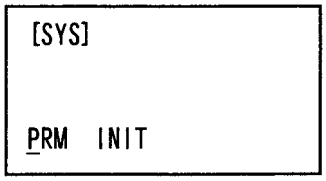
1) In the initial screen, press the ESC key to go to the menu screen.



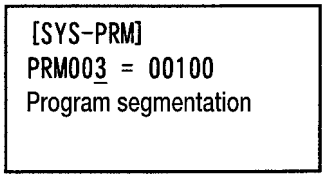
2) Place the cursor at SYS, and press the ENT key.



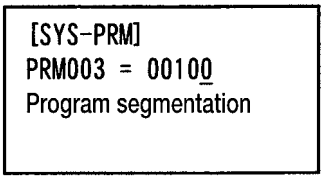
3) Place the cursor at PRM, and press the ENT key.



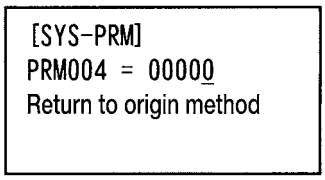
4) The parameter numbers available for setting, the current setting values, and the parameter names, will be displayed on the screen.
Use the numeric input keys 0 to 9 or increment/decrement keys ↑ and ↓ to display the parameter number to be changed.



5) Press the cursor operation keys → or ← to move the cursor to the setting value item, and use the numeric input keys 0 to 9 or increment/decrement keys ↑ and ↓ to display the setting value to be changed.



6) Press the ENT key to confirm and end the numeric change, and the next parameter number screen will appear.



7) Repeat steps 4) and 5) until all the required parameter changes are performed.

6-2 Description of Parameters

There are parameters for the initial setting, X axis setting, Y axis setting, Z axis setting, R axis setting, and I/O setting. These parameters are described in order by number sequence.

Note: The parameter settings at the time of shipment from the factory are set in accordance with the main unit type. If the customer wants to change the parameters, have an engineer with knowledge of the equipment perform appropriate settings.
Mis-setting of parameters could result in error operation of the equipment, and may also lead to equipment damage.

PRM000: Version information

This is the firm software version number for the Cell Master main unit.
This parameter is read-only, and cannot be overwritten or changed.
(Example) 300: Version 3.00

PRM001: Cell Master type setting

Sets the type of the Cell Master main unit.
This parameter is read-only, and cannot be overwritten or changed.
Setting description 0: A4 type
1: A3 type

PRM002: Cell Master classification setting

Shows the classification of the Cell Master main unit.
Setting description 0: Standard
1: Special

PRM003: Number of programs to be registered

Specifies the number of operating programs to be registered in the Cell Master main unit.
While the total number of program steps that can be registered in the Cell Master is 10000 steps, the maximum number of steps in a single program is obtained 10000 divided by this parameter.
(Formula) Maximum number of steps in 1 program = 10000/(PRM003)
Input range 1 ～ 1000
Initial value 100
In the initial value, a 100-step program can be registered as 100 units.

PRM005: Startup method

Specifies the input destination for starting automatic operation or return to origin.
Input range 0 ～ 15
Setting description 0: Operation box
1: I/O input AUTO-RUN
2: Programming box, communication command
3 ～ 15: Not defined
Initial value 0
Since the default is the operation box, the setting value must be changed to 2 when executing return to origin or operation startup from the programming box.

※ When specifying I/O input, an extension parameter enabling the I/O input must be set. Extension parameter settings are set from a personal computer, using optional support software.

PRM006: Startup program number

Specifies the startup program number when using I/O input for startup (PRM005=1).

Input range 0 ～ 999

Setting description 0 ～ 999: Program 0 ～ 999

Initial value 0

※ When specifying I/O input, an extension parameter enabling the I/O input must be set. Extension parameter settings are set from a personal computer, using optional support software.

PRM007: Output status at emergency stop

Sets the I/O output status at emergency stop.

Input range 0 ～ 15

Setting description 0: Maintain output status

1: Output reset (all OFF)

2 ～ 15: Not defined

Initial value 0

PRM008: Motor condition at emergency stop

Sets the motor conditions at emergency stop.

Input range 0 ～ 15

Setting description 0: Motor stopped, excitation ON

1: Motor stopped, excitation OFF

2 ～ 15: Not defined

Initial value 1

PRM011: Program lock setting

Sets program writing to enable/disable.

Input range 0 ～ 1

Setting description 0: Writing enabled

1: Writing disabled

Initial value 0

PRM012: Communication speed

Sets the PC program writing speed to 384.

Setting description 384: 38400 bit/s

Initial value 384

PRM016: ID No.

Sets the ID number for the Cell Master main unit. When selecting controls among multiple Cell Masters, ID numbers can be allocated to differentiate between them.

Input range 0 ～ 9, A, B, C, D, E

Setting description 0 ～ 9, A, B, C, D, E: Individual number

Initial value 0

PRM035: Multitask scan time

Sets the multitask switchover time. Unit is 100 μs.

Input range	1 ～ 100
Setting description	1 ～ 100: 100 μs ～ 10 ms
Initial value	1

PRM036: IN/ON input recognition time

Set the time for judging if the general-purpose input is ON. If the ON state is maintained during the set time period, input is judged to be ON.

Input range	10 ～ 30
Setting description	10 ～ 30: 10 ～ 30 ms
Initial value	20

PRM037: IN/OFF input recognition time

Set the time for judging if the general-purpose input is OFF. If the OFF state is maintained during the set time period, input is judged to be OFF.

Input range	10 ～ 30
Setting description	10 ～ 30: 10 ～ 30 ms
Initial value	20

PRM038: Factory shipping date

Factory shipping date information

This parameter is read-only, and the customer cannot overwrite it.

PRM039: Initialization date

Initialization date information

This parameter is read-only, and the customer cannot overwrite it.

PRM040: Motor condition during step-out error

Sets the motor condition when step-out error occurs.

Input range	0 ～ 1
Setting description	0: Excitation ON 1: Excitation OFF
Initial value	0

PRM041: X axis motor specifications

Sets the pulse number (P/R) for the X axis motor. (P/R: Pulse/Revolution)

Input range	1 ～ 3000
Setting description	1 ～ 3000: 1 ～ 3000 P/R
Initial value	200

PRM043: X axis rated current

Sets the rated current for the X axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	A4 type: 1000 A3 type: 1200

PRM044: X axis maximum starting pulse rate

Sets the maximum starting pulse rate for the X axis motor.

Input range	1 ~ 65535
Setting description	1 ~ 65535: 1 ~ 65535 pps (pps: pulse per second)
Initial value	A4 type: 1350
	A3 type: 1500

PRM045: X axis maximum continuous pulse rate

Sets the maximum continuous pulse rate for the X axis motor.

Input range	1 ~ 65535
Setting description	1 ~ 65535: 1 ~ 65535 pps
Initial value	A4 type: 18000
	A3 type: 2100

PRM046: X axis lead pitch

Sets the lead pitch for the X axis motor.

Input range	1 ~ 100
Setting description	1 ~ 100: 1 ~ 100 mm/R (Revolution)
Initial value	A4 type: 6
	A3 type: 48

PRM047: X axis S-shape operation setting

Sets the X axis motor start and stop operation so that the movement is smooth (S-shape operation).

Input range	0, 1
Setting description	0: No S-shape operation
	1: With S-shape operation
Initial value	0

※ Separate settings for acceleration and deceleration are not available. Cannot execute interpolation operation.

PRM048: X axis step-out detection

Sets the set X axis step-out error detection.

Input range	0, 1
Setting description	0: No step-out detection
	1: With step-out detection
Initial value	1

PRM050: Y axis motor specifications

Sets the pulse number (P/R) for the Y axis motor.

Input range	1 ~ 3000
Setting description	1 ~ 3000: 1 ~ 3000 P/R
Initial value	200

PRM052: Y axis rated current

Sets the rated current for the Y axis motor.

Input range	1 ~ 1200
Setting description	1 ~ 1200: 1 ~ 1200 mA
Initial value	A4 type: 1000
	A3 type: 1200

PRM053: Y axis maximum starting pulse rate

Sets the maximum starting pulse rate for the Y axis motor.

Input range	1 ～ 65535
Setting description	1 ～ 65535: 1 ～ 65535 pps
Initial value	A4 type: 1350
	A3 type: 1500

PRM054: Y axis maximum continuous pulse rate

Sets the maximum continuous pulse rate for the Y axis motor.

Input range	1 ～ 65535
Setting description	1 ～ 65535: 1 ～ 65535 pps
Initial value	A4 type: 18000
	A3 type: 2100

PRM055: Y axis lead pitch

Sets the lead pitch for the Y axis motor.

Input range	1 ～ 100
Setting description	1 ～ 100: 1 ～ 100 mm/R
Initial value	A4 type: 6
	A3 type: 48

PRM056: Y axis S-shape operation setting

Sets the Y axis motor start and stop operation so that the movement is smooth (S-shape operation).

Input range	0, 1
Setting description	0: No S-shape operation
	1: With S-shape operation
Initial value	0

※ Separate settings for acceleration and deceleration are not available. Cannot execute interpolation operation.

PRM057: Y axis step-out detection

Sets the set Y axis step-out error detection.

Input range	0, 1
Setting description	0: No step-out detection
	1: With step-out detection
Initial value	1

PRM059: Z axis motor specifications

Sets the pulse number (P/R) for the Z axis motor.

Input range	1 ～ 3000
Setting description	1 ～ 3000: 1 ～ 3000 P/R
Initial value	200

PRM061: Z axis rated current

Sets the rated current for the Z axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	1000

PRM062: Z axis maximum starting pulse rate

Sets the maximum starting pulse rate for the Z axis motor.

Input range	1 ～ 65535
Setting description	1 ～ 65535: 1 ～ 65535 pps
Initial value	1350

PRM063: Z axis maximum continuous pulse rate

Sets the maximum continuous pulse rate for the Z axis motor.

Input range 1 ~ 65535

Setting description 1 ~ 65535: 1 ~ 65535 pps

Initial value 18000

PRM064: Z axis lead pitch

Sets the lead pitch for the Z axis motor.

Input range 1 ~ 100

Setting description 1 ~ 100 : 1 ~ 100 mm/R

Initial value 6

PRM065: Z axis S-shape operation setting

Sets the Z axis motor start and stop operation so that the movement is smooth (S-shape operation).

Input range 0, 1

Setting description 0: No S-shape operation

1: With S-shape operation

Initial value 0

※ Separate settings for acceleration and deceleration are not available. Cannot execute interpolation operation.

PRM066: Z axis step-out detection

Sets the set Z axis step-out error detection.

Input range 0, 1

Setting description 0: No step-out detection

1: With step-out detection

Initial value 1

PRM068: R axis motor specifications

Sets the pulse number (P/R) for the R axis motor.

Input range 1 ~ 3000

Setting description 1 ~ 3000: 0 ~ 3000 P/R

Initial value 200

PRM070: R axis rated current

Sets the rated current for the R axis motor.

Input range 1 ~ 1200

Setting description 1 ~ 1200 : 0 ~ 1200 mA

Initial value 1000

PRM071: R axis maximum starting pulse rate

Sets the maximum starting pulse rate for the R axis motor.

Input range 1 ~ 65535

Setting description 1 ~ 65535: 1 ~ 65535 pps

Initial value 1350

PRM072: R axis maximum continuous pulse rate

Sets the maximum continuous pulse rate for the R axis motor.

Input range 1 ~ 65535

Setting description 1 ~ 65535: 1 ~ 65535 pps

Initial value 18000

PRM073: R axis lead pitch

Sets the lead pitch for the R axis motor.

Input range 1 ～ 100

Setting description 1 ～ 100: 1 ～ 100 mm/R

Initial value 6

PRM074: R axis S-shape operation setting

Sets the R axis motor start and stop operation so that the movement is smooth (S-shape operation).

Input range 0, 1

Setting description 0: No S-shape operation

1: With S-shape operation

Initial value 0

※ Separate settings for acceleration and deceleration are not available. Cannot execute interpolation operation.

PRM075: R axis step-out detection

Sets the set R axis step-out error detection.

Input range 0, 1

Setting description 0: No step-out detection

1: With step-out detection

Initial value 0

PRM076: X axis holding current

Sets the holding current for the X axis motor.

Input range 1 ～ 1200

Setting description 1 ～ 1200 : 1 ～ 1200 mA

Initial value 600

PRM077: X axis driving current

Sets the driving current for the X axis motor.

Input range 1 ～ 1200

Setting description 1 ～ 1200 : 1 ～ 1200 mA

Initial value A4 type: 1000

A3 type: 1200

PRM078: X axis microstep setting

Set the number of microsteps for the X axis motor.

Input range 1 , 2, 4, 8, 16

Setting description 1 , 2, 4, 8, 16 : 1/1, 1/2, 1/4, 1/8, 1/16

Initial value A4 type: 8

A3 type: 16

PRM079: Y axis holding current

Sets the holding current for the Y axis motor.

Input range 1 ～ 1200

Setting description 1 ～ 1200: 1 ～ 1200 mA

Initial value 600

PRM080: Y axis driving current

Sets the driving current for the Y axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	A4 type: 1000
	A3 type: 1200

PRM081: Y axis microstep setting

Set the number of microsteps for the Y axis motor.

Input range	1 , 2, 4, 8, 16
Setting description	1 , 2, 4, 8, 16: 1/1, 1/2, 1/4, 1/8, 1/16
Initial value	A4 type: 8
	A3 type: 16

PRM082: Z axis holding current

Sets the holding current for the Z axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	600

PRM083: Z axis driving current

Sets the driving current for the Z axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	1000

PRM084: Z axis microstep setting

Set the number of microsteps for the Z axis motor.

Input range	1 , 2, 4, 8, 16
Setting description	1 , 2, 4, 8, 16: 1/1, 1/2, 1/4, 1/8, 1/16
Initial value	8

PRM085: R axis holding current

Sets the holding current for the R axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	600

PRM086: R axis driving current

Sets the driving current for the R axis motor.

Input range	1 ～ 1200
Setting description	1 ～ 1200: 1 ～ 1200 mA
Initial value	1000

PRM087: R axis microstep setting

Set the number of microsteps for the R axis motor.

Input range	1 , 2, 4, 8, 16
Setting description	1 , 2, 4, 8, 16: 1/1, 1/2, 1/4, 1/8, 1/16
Initial value	8

PRM088: X axis origin return sequence

Sets the return to origin sequence for the X axis actuator.

Input range 0 ～ 4

Setting description 0: No return to origin
1: 1st
2: 2nd
3: 3rd
4: 4th

Initial value 2

※While 0 means that return to origin is not executed, be aware that the position data is [+000.00].

PRM089: Y axis origin return sequence

Sets the return to origin sequence for the Y axis actuator.

Input range 0 ～ 4

Setting description 0: No return to origin
1: 1st
2: 2nd
3: 3rd
4: 4th

Initial value 2

※While 0 means that return to origin is not executed, be aware that the position data is [+000.00].

PRM090: Z axis origin return sequence

Sets the return to origin sequence for the Z axis actuator.

Input range 0 ～ 4

Setting description 0: No return to origin
1: 1st
2: 2nd
3: 3rd
4: 4th

Initial value 1

※While 0 means that return to origin is not executed, be aware that the position data is [+000.00].

PRM091: R axis origin return sequence

Sets the return to origin sequence for the R axis actuator.

Input range 0 ～ 4

Setting description 0: No return to origin
1: 1st
2: 2nd
3: 3rd
4: 4th

Initial value 0

※While 0 means that return to origin is not executed, be aware that the position data is [+000.00].

PRM096: X axis origin return speed

Sets the return to origin speed for the X axis actuator. Unit is mm/s.

Input range 1 ～ 100

Setting description 1 ～ 100: 1 ～ 100 mm/s

Initial value A4 type: 10
A3 type: 20

※Although the input range is from 1 to 100, do not set the value for A4 type higher than 10 (initial value). For A3 type, do not set the value higher than 20 (initial value).

PRM097: Y axis origin return speed

Sets the return to origin speed for the Y axis actuator. Unit is mm/s.

Input range 1 ～ 100
Setting description 1 ～ 100: 1 ～ 100 mm/s
Initial value A4 type: 10
A3 type: 20

※ Although the input range is from 1 to 100, do not set the value for A4 type higher than 10 (initial value). For A3 type, do not set the value higher than 20 (initial value).

PRM098: Z axis origin return speed

Sets the return to origin speed for the Z axis actuator. Unit is mm/s.

Input range 1 ～ 100
Setting description 1 ～ 100: 1 ～ 100 mm/s
Initial value 5

※ Although the input range is from 1 to 100, do not set the value higher than 5 (initial value).

PRM099: R axis origin return speed

Sets the return to origin speed for the R axis actuator. Unit is mm/s.

Input range 1 ～ 100
Setting description 1 ～ 100: 1 ～ 100 mm/s
Initial value 10

※ Although the input range is from 1 to 100, do not set the value higher than 10 (initial value).

PRM100: X axis origin reverse speed

Sets the pulse rate for moving from the negative position of the X axis actuator's origin sensor to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 400

PRM101: Y axis origin reverse speed

Sets the pulse rate for moving from the negative position of the Y axis actuator's origin sensor to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 400

PRM102: Z axis origin reverse speed

Sets the pulse rate for moving from the negative position of the Z axis actuator's origin sensor to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 200

PRM103: R axis origin reverse speed

Sets the pulse rate for moving from the negative position of the R axis actuator's origin sensor to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 400

PRM104: X axis origin positioning speed

Sets the pulse rate for the X axis actuator after it has moved in reverse and then back again to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 100

PRM105: Y axis origin positioning speed

Sets the pulse rate for the Y axis actuator after it has moved in reverse and then back again to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 100

PRM106: Z axis origin positioning speed

Sets the pulse rate for the Z axis actuator after it has moved in reverse and then back again to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 50

PRM107: R axis origin positioning speed

Sets the pulse rate for the R axis actuator after it has moved in reverse and then back again to the origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 100

PRM108: X axis origin positioning completion speed

After setting of X axis actuator origin position, sets the pulse rate for moving to the phase energizing origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 4

PRM109: Y axis origin positioning completion speed

After setting of Y axis actuator origin position, sets the pulse rate for moving to the phase energizing origin. Unit is pps.

Input range 1 ～ 1000
Setting description 1 ～ 1000: 1 ～ 1000 pps
Initial value 4

PRM110: Z axis origin positioning completion speed

After setting of Z axis actuator origin position, sets the pulse rate for moving to the phase energizing origin. Unit is pps.

Input range 1 ~ 1000
Setting description 1 ~ 1000: 1 ~ 1000 pps
Initial value 2

PRM111: R axis origin positioning completion speed

After setting of R axis actuator origin position, sets the pulse rate for moving to the phase energizing origin. Unit is pps.

Input range 1 ~ 1000
Setting description 1 ~ 1000: 1 ~ 1000 pps
Initial value 4

PRM116: X axis origin positioning for enabling output pulse

Sets the number of enabling pulses for the X axis actuator moving to the origin. Unit is number of pulses.

Input range 1 ~ 65535
Setting description 1 ~ 65535: 1 ~ 65535 pulses
Initial value 20000

PRM117: Y axis origin positioning for enabling output pulse

Sets the number of enabling pulses for the Y axis actuator moving to the origin. Unit is number of pulses.

Input range 1 ~ 65535
Setting description 1 ~ 65535: 1 ~ 65535 pulses
Initial value 20000

PRM118: Z axis origin positioning for enabling output pulse

Sets the number of enabling pulses for the Z axis actuator moving to the origin. Unit is number of pulses.

Input range 1 ~ 65535
Setting description 1 ~ 65535: 1 ~ 65535 pulses
Initial value 20000

PRM119: R axis origin positioning for enabling output pulse

Sets the number of enabling pulses for the R axis actuator moving to the origin. Unit is number of pulses.

Input range 1 ~ 65535
Setting description 1 ~ 65535: 1 ~ 65535 pulses
Initial value 20000

PRM122: X axis software limit (negative-side margin)

Sets the negative-side limit error position for the X axis actuator. Unit is mm.

Input range 0 ~ 2000
Setting description 0 ~ 2000: 0 ~ 2000 mm
Initial value 3

PRM123: X axis software positive-side limit

Sets the range of movement on the positive side of the X axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0: No limit

1 ～ 2000: 1 ～ 2000 mm

Initial value 200

※ If the axis moves beyond the set range, an error occurs.

PRM125: X axis maximum acceleration

Sets the maximum acceleration for the X axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM126: X axis maximum deceleration

Sets the maximum deceleration for the X axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM127: X axis maximum speed

Sets the maximum speed for the X axis actuator. Unit is mm/s.

Input range 1 ～ 2000

Setting description 1 ～ 2000: 1 ～ 2000 mm/s

Initial value A4 type: 200

A3 type: 500

PRM128: X and Y axes maximum interpolation speed

Sets the maximum speed when executing interpolation operation for the X and Y axis actuators. Unit is mm/s.

Input range 1 ～ 600

Setting description 1 ～ 600: 1 ～ 600 mm/s

Initial value 60

PRM131: Y axis software limit (negative-side margin)

Sets the negative-side limit error position for the Y axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0 ～ 2000: 0 ～ 2000 mm

Initial value 10

PRM132: Y axis software positive-side limit

Sets the range of movement on the positive side of the Y axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0: No limit

1 ～ 2000: 1 ～ 2000 mm

Initial value 200

※ If the axis moves beyond the set range, an error occurs.

PRM134: Y axis maximum acceleration

Sets the maximum acceleration for the Y axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM135: Y axis maximum deceleration

Sets the maximum deceleration for the Y axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM136: Y axis maximum speed

Sets the maximum speed for the Y axis actuator. Unit is mm/s.

Input range 1 ～ 2000

Setting description 1 ～ 2000: 1 ～ 2000 mm/s

Initial value A4 type: 200

A3 type: 500

PRM139: Z axis software limit (negative-side margin)

Sets the negative-side limit error position for the Z axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0 ～ 2000: 0 ～ 2000 mm

Initial value 3

PRM140: Z axis software positive-side limit

Sets the range of movement on the positive side of the Z axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0: No limit

1 ～ 2000: 1 ～ 2000 mm

Initial value 50

※ If the axis moves beyond the set range, an error occurs.

PRM142: Z axis maximum acceleration

Sets the maximum acceleration for the Z axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM143: Z axis maximum deceleration

Sets the maximum deceleration for the Z axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM144: Z axis maximum speed

Sets the maximum speed for the Z axis actuator. Unit is mm/s.

Input range 1 ～ 2000

Setting description 1 ～ 2000: 1 ～ 2000 mm/s

Initial value 200

PRM145: Z and R axes maximum interpolation speed

Sets the maximum speed when executing interpolation operation for the Z and R axis actuators. Unit is mm/s.

Input range 1 ～ 600

Setting description 1 ～ 600: 1 ～ 600 mm/s

Initial value 60

PRM148: R axis software limit (negative-side margin)

Sets the negative-side limit error position for the R axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0 ～ 2000: 0 ～ 2000 mm

Initial value 3

PRM149: R axis software positive-side limit

Sets the range of movement on the positive side of the R axis actuator. Unit is mm.

Input range 0 ～ 2000

Setting description 0: No limit

1 ～ 2000: 1 ～ 2000 mm

Initial value 300

※ If the axis moves beyond the set range, an error occurs.

PRM151: R axis maximum acceleration

Sets the maximum acceleration for the R axis actuator. Unit is mm/s^2.

Input range 1 ～ 15000

Setting description 1 ～ 15000: 1 ～ 15000 mm/s^2

Initial value 2000

PRM152: R axis maximum deceleration

Sets the maximum deceleration for the R axis actuator. Unit is mm/s^2.

Input range	1 ～ 15000
Setting description	1 ～ 15000: 1 ～ 15000 mm/s^2
Initial value	2000

PRM153: R axis maximum speed

Sets the maximum speed for the R axis actuator. Unit is mm/s.

Input range	1 ～ 2000
Setting description	1 ～ 2000: 1 ～ 2000 mm/s
Initial value	60

PRM226: X axis JOG SPEED1

Sets the low teaching movement speed for the X axis actuator. Unit is mm/s.

Input range	1 ～ 100
Setting description	1 ～ 100: 1 ～ 100 mm/s
Initial value	1

PRM227: X axis JOG SPEED2

Sets the low teaching movement speed for the X axis actuator. Unit is mm/s.

Input range	1 ～ 100
Setting description	1 ～ 100: 1 ～ 100 mm/s
Initial value	10

PRM228: Y axis JOG SPEED1

Sets the low teaching movement speed for the Y axis actuator. Unit is mm/s.

Input range	1 ～ 100
Setting description	1 ～ 100: 1 ～ 100 mm/s
Initial value	1

PRM229: Y axis JOG SPEED2

Sets the low teaching movement speed for the Y axis actuator. Unit is mm/s.

Input range	1 ～ 100
Setting description	1 ～ 100: 1 ～ 100 mm/s
Initial value	10

PRM230: Z axis JOG SPEED1

Sets the low teaching movement speed for the Z axis actuator. Unit is mm/s.

Input range	1 ～ 100
Setting description	1 ～ 100: 1 ～ 100 mm/s
Initial value	1

PRM231: Z axis JOG SPEED2

Sets the low teaching movement speed for the X axis actuator. Unit is mm/s.

Input range 1 ～ 100

Setting description 1 ～ 100: 1 ～ 100 mm/s

Initial value 10

※For lead 2, set the value to 3. (It is set to 3 at the time of shipping.)

PRM232: R axis JOG SPEED1

Sets the low teaching movement speed for the R axis actuator. Unit is mm/s.

Input range 1 ～ 100

Setting description 1 ～ 100: 1 ～ 100 mm/s

Initial value 1

PRM233: R axis JOG SPEED2

Sets the low teaching movement speed for the R axis actuator. Unit is mm/s.

Input range 1 ～ 100

Setting description 1 ～ 100: 1 ～ 100 mm/s

Initial value 10

PRM234: Terminal allocation for output port 0

Sets allocation for the connection terminal signal name of output port 0.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 0

PRM235: Terminal allocation for output port 1

Sets allocation for the connection terminal signal name of output port 1.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 1

PRM236: Terminal allocation for output port 2

Sets allocation for the connection terminal signal name of output port 2.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 2

PRM237: Terminal allocation for output port 3

Sets allocation for the connection terminal signal name of output port 3.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 3

PRM238: Terminal allocation for output port 4

Sets allocation for the connection terminal signal name of output port 4.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 4

PRM239: Terminal allocation for output port 5

Sets allocation for the connection terminal signal name of output port 5.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 5

PRM240: Terminal allocation for output port 6

Sets allocation for the connection terminal signal name of output port 6.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 6

PRM241: Terminal allocation for output port 7

Sets allocation for the connection terminal signal name of output port 7.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 7

PRM242: Terminal allocation for output port 8

Sets allocation for the connection terminal signal name of output port 8.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 8

PRM243: Terminal allocation for output port 9

Sets allocation for the connection terminal signal name of output port 9.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 9

PRM244: Terminal allocation for output port 10

Sets allocation for the connection terminal signal name of output port 10.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 10

PRM245: Terminal allocation for output port 11

Sets allocation for the connection terminal signal name of output port 11.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 11

PRM246: Terminal allocation for output port 12

Sets allocation for the connection terminal signal name of output port 12.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 12

PRM247: Terminal allocation for output port 13

Sets allocation for the connection terminal signal name of output port 13.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 13

PRM248: Terminal allocation for output port 14

Sets allocation for the connection terminal signal name of output port 14.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 14

PRM249: Terminal allocation for output port 15

Sets allocation for the connection terminal signal name of output port 15.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 15

PRM250: Terminal allocation for output port 16

Sets allocation for the connection terminal signal name of output port 16.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 16

PRM251: Terminal allocation for output port 17

Sets allocation for the connection terminal signal name of output port 17.

Input range 0 ～ 24

Setting description 0 ～ 23 : OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 17

PRM252: Terminal allocation for output port 18

Sets allocation for the connection terminal signal name of output port 18.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 18

PRM253: Terminal allocation for output port 19

Sets allocation for the connection terminal signal name of output port 19.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 19

PRM254: Terminal allocation for output port 20

Sets allocation for the connection terminal signal name of output port 20.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 20

PRM255: Terminal allocation for output port 21

Sets allocation for the connection terminal signal name of output port 21.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 21

PRM256: Terminal allocation for output port 22

Sets allocation for the connection terminal signal name of output port 22.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 22

PRM257: Terminal allocation for output port 23

Sets allocation for the connection terminal signal name of output port 23.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 23

PRM258: Terminal allocation for starting forced output 0

Sets allocation for the connection terminal signal name for starting forced output 0.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM259: Terminal allocation for starting forced output 1

Sets allocation for the connection terminal signal name for starting forced output 1.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM260: Terminal allocation for starting forced output 2

Sets allocation for the connection terminal signal name for starting forced output 2.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM261: Terminal allocation for starting forced output 3

Sets allocation for the connection terminal signal name for starting forced output 3.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM262: Terminal allocation for starting forced output 4

Sets allocation for the connection terminal signal name for starting forced output 4.

Input range 0 ～ 24

Setting description 0 ～ 23:OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM263: Terminal allocation for starting forced output 5

Sets allocation for the connection terminal signal name for starting forced output 5.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM264: Terminal allocation for starting forced output 6

Sets allocation for the connection terminal signal name for starting forced output 6.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM265: Terminal allocation for starting forced output 7

Sets allocation for the connection terminal signal name for starting forced output 7.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM266: Terminal allocation for starting forced output 8

Sets allocation for the connection terminal signal name for starting forced output 8.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM267: Terminal allocation for starting forced output 9

Sets allocation for the connection terminal signal name for starting forced output 9.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM268: Terminal allocation for starting forced output 10

Sets allocation for the connection terminal signal name for starting forced output 10.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM269: Terminal allocation for starting forced output 11

Sets allocation for the connection terminal signal name for starting forced output 11.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM270: Terminal allocation for starting forced output 12

Sets allocation for the connection terminal signal name for starting forced output 12.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM271: Terminal allocation for starting forced output 13

Sets allocation for the connection terminal signal name for starting forced output 13.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM272: Terminal allocation for starting forced output 14

Sets allocation for the connection terminal signal name for starting forced output 14.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM273: Terminal allocation for starting forced output 15

Sets allocation for the connection terminal signal name for starting forced output 15.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM274: Terminal allocation for starting forced output 16

Sets allocation for the connection terminal signal name for starting forced output 16.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM275: Terminal allocation for starting forced output 17

Sets allocation for the connection terminal signal name for starting forced output 17.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM276: Terminal allocation for starting forced output 18

Sets allocation for the connection terminal signal name for starting forced output 18.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM277: Terminal allocation for starting forced output 19

Sets allocation for the connection terminal signal name for starting forced output 19.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM278: Terminal allocation for starting forced output 20

Sets allocation for the connection terminal signal name for starting forced output 20.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM279: Terminal allocation for starting forced output 21

Sets allocation for the connection terminal signal name for starting forced output 21.

Input range 0 ～ 24

Setting description 0 ～ 23: OUT 0 ～ OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM280: Terminal allocation for starting forced output 22

Sets allocation for the connection terminal signal name for starting forced output 22.

Input range	0 ～ 24
Setting description	0 ～ 23: OUT 0 ～ OUT 23
	24: Specifies when no allocation is made to any terminal
Initial value	24

PRM281: Terminal allocation for starting forced output 23

Sets allocation for the connection terminal signal name for starting forced output 23.

Input range	0 ～ 24
Setting description	0 ～ 23: OUT 0 ～ OUT 23
	24: Specifies when no allocation is made to any terminal
Initial value	24

PRM282: Terminal allocation for starting one-pulse 0

Sets allocation for the connection terminal signal name for starting one-pulse 0.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	24

PRM283: Terminal allocation for starting one-pulse 1

Sets allocation for the connection terminal signal name for starting one-pulse 1.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	24

PRM284: Terminal allocation for starting one-pulse 2

Sets allocation for the connection terminal signal name for starting one-pulse 2.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	24

PRM285: Terminal allocation for starting one-pulse 3

Sets allocation for the connection terminal signal name for starting one-pulse 3.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	24

PRM286: Terminal allocation for starting one-pulse 4

Sets allocation for the connection terminal signal name for starting one-pulse 4.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM287: Terminal allocation for starting one-pulse 5

Sets allocation for the connection terminal signal name for starting one-pulse 5.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM288: Terminal allocation for starting one-pulse 6

Sets allocation for the connection terminal signal name for starting one-pulse 6.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM289: Terminal allocation for starting one-pulse 7

Sets allocation for the connection terminal signal name for starting one-pulse 7.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM290: Terminal allocation for starting one-pulse 8

Sets allocation for the connection terminal signal name for starting one-pulse 8.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM291: Terminal allocation for starting one-pulse 9

Sets allocation for the connection terminal signal name for starting one-pulse 9.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM292: Terminal allocation for starting one-pulse 10

Sets allocation for the connection terminal signal name for starting one-pulse 10.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM293: Terminal allocation for starting one-pulse 11

Sets allocation for the connection terminal signal name for starting one-pulse 11.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM294: Terminal allocation for starting one-pulse 12

Sets allocation for the connection terminal signal name for starting one-pulse 12.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM295: Terminal allocation for starting one-pulse 13

Sets allocation for the connection terminal signal name for starting one-pulse 13.

Input range 0 ～ 24

Setting description 0 ～ 23:IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM296: Terminal allocation for starting one-pulse 14

Sets allocation for the connection terminal signal name for starting one-pulse 14.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM297: Terminal allocation for starting one-pulse 15

Sets allocation for the connection terminal signal name for starting one-pulse 15.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM298: Terminal allocation for starting one-pulse 16

Sets allocation for the connection terminal signal name for starting one-pulse 16.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM299: Terminal allocation for starting one-pulse 17

Sets allocation for the connection terminal signal name for starting one-pulse 17.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM300: Terminal allocation for starting one-pulse 18

Sets allocation for the connection terminal signal name for starting one-pulse 18.

Input range 0 ～ 24

Setting description 0 ～ 23:IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM301: Terminal allocation for starting one-pulse 19

Sets allocation for the connection terminal signal name for starting one-pulse 19.

Input range 0 ～ 24

Setting description 0 ～ 23:IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM302: Terminal allocation for starting one-pulse 20

Sets allocation for the connection terminal signal name for starting one-pulse 20.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM303: Terminal allocation for starting one-pulse 21

Sets allocation for the connection terminal signal name for starting one-pulse 21.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM304: Terminal allocation for starting one-pulse 22

Sets allocation for the connection terminal signal name for starting one-pulse 22.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM305: Terminal allocation for starting one-pulse 23

Sets allocation for the connection terminal signal name for starting one-pulse 23.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM306: Terminal allocation for input port 0

Sets allocation for the connection terminal signal name of input port 0.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 0

PRM307: Terminal allocation for input port 1

Sets allocation for the connection terminal signal name of input port 1.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	1

PRM308: Terminal allocation for input port 2

Sets allocation for the connection terminal signal name of input port 2.

Input range	0 ～ 24
Setting description	0 ～ 23:IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	2

PRM309: Terminal allocation for input port 3

Sets allocation for the connection terminal signal name of input port 3.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	3

PRM310: Terminal allocation for input port 4

Sets allocation for the connection terminal signal name of input port 4.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	4

PRM311: Terminal allocation for input port 5

Sets allocation for the connection terminal signal name of input port 5.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	5

PRM312: Terminal allocation for input port 6

Sets allocation for the connection terminal signal name of input port 6.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	6

PRM313: Terminal allocation for input port 7

Sets allocation for the connection terminal signal name of input port 7.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	7

PRM314: Terminal allocation for input port 8

Sets allocation for the connection terminal signal name of input port 8.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	8

PRM315: Terminal allocation for input port 9

Sets allocation for the connection terminal signal name of input port 9.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	9

PRM316: Terminal allocation for input port 10

Sets allocation for the connection terminal signal name of input port 10.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	10

PRM317: Terminal allocation for input port 11

Sets allocation for the connection terminal signal name of input port 11.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	11

PRM318: Terminal allocation for input port 12

Sets allocation for the connection terminal signal name of input port 12.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	12

PRM319: Terminal allocation for input port 13

Sets allocation for the connection terminal signal name of input port 13.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	13

PRM320: Terminal allocation for input port 14

Sets allocation for the connection terminal signal name of input port 14.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	14

PRM321: Terminal allocation for input port 15

Sets allocation for the connection terminal signal name of input port 15.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	15

PRM322: Terminal allocation for input port 16

Sets allocation for the connection terminal signal name of input port 16.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	16

PRM323: Terminal allocation for input port 17

Sets allocation for the connection terminal signal name of input port 17.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	17

PRM324: Terminal allocation for input port 18

Sets allocation for the connection terminal signal name of input port 18.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	18

PRM325: Terminal allocation for input port 19

Sets allocation for the connection terminal signal name of input port 19.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	19

PRM326: Terminal allocation for input port 20

Sets allocation for the connection terminal signal name of input port 20.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	20

PRM327: Terminal allocation for input port 21

Sets allocation for the connection terminal signal name of input port 21.

Input range	0 ～ 24
Setting description	0 ～ 23: IN 0 ～ IN 23
	24: Specifies when no allocation is made to any terminal
Initial value	21

PRM328: Terminal allocation for input port 22

Sets allocation for the connection terminal signal name of input port 22.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 22

PRM329: Terminal allocation for input port 23

Sets allocation for the connection terminal signal name of input port 23.

Input range 0 ～ 24

Setting description 0 ～ 23: IN 0 ～ IN 23

24: Specifies when no allocation is made to any terminal

Initial value 23

PRM330: Terminal allocation number for counter reset input

Allocates counter reset input to general-purpose input number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers IN 0 to IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM332: Terminal allocation number for the AUTO-RUN input

Allocates the AUTO-RUN input to general-purpose input number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers IN 0 to IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM333: Terminal allocation number for the RESET input

Allocates the RESET input to general-purpose input number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers IN 0 to IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM334: Terminal allocation number for the ORG-START input

Allocates the ORG-START input to general-purpose input number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers IN 0 to IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM335: Terminal allocation number for the EMG input

Allocates the EMG input to general-purpose input number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers IN 0 to IN 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM336: Terminal allocation number for the READY output

Allocates the READY output to general-purpose output number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers OUT 0 to OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM337: Terminal allocation number for the BUSY output

Allocates the BUSY output to general-purpose output number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers OUT 0 to OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM338: Terminal allocation number for the END output

Allocates the END output to general-purpose output number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers OUT 0 to OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM339: Terminal allocation number for the ORIGIN RETURN COMPLETED output

Allocates the ORIGIN RETURN COMPLETED output to general-purpose output number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers OUT 0 to OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM340: Terminal allocation number for the ALM output

Allocates the ALM output to general-purpose output number.

Input range 0 ～ 24

Setting description 0 ～ 23: Terminal numbers OUT 0 to OUT 23

24: Specifies when no allocation is made to any terminal

Initial value 24

PRM341: EMG input logic

Sets the EMG input logic.

Input range 0 , 1

Setting description 0: A contact input

1: B contact input

Initial value 0

PRM342: Main task time

Sets the main task time in multitask operations. Unit is 100 μs.

Input range 1 ~ 100

Setting description 1 ~ 100: 100 μs ~ 10ms

Initial value 5

PRM343: Non-use of the operation box

Sets the use/non-use of the operation box.

Input range 0 , 1

Setting description 0: Operation box used

1: Operation box not used

Initial value 0

※ A combination of this parameter and the startup method parameter (PRM005) will determine the operation box's function when not connected. These operations are displayed below.

PRM343	PRM005	Operation box	Operation
0	0	Not connected	Error 006 stopped
0	0	Connected	Normal operation
0	1 or 2	Not connected	Error 006 stopped
0	1 or 2	Connected	Normal operation
1	0	Not connected	Error 006 stopped
1	0	Connected	Normal operation
1	1 or 2	Not connected	Normal operation
1	1 or 2	Connected	Normal operation

6-3 Parameter List

No.	Initial value	Description
PRM000	XXX	Version information
PRM001	X	Cell Master type setting
PRM002	X	Cell Master classification setting
PRM003	100	Number of programs to be registered
PRM005	0	Startup method
PRM006	0	Startup program number
PRM007	0	Output status at emergency stop
PRM008	1	Motor condition at emergency stop
PRM011	0	Program lock setting
PRM012	384	Communication speed
PRM016	0	ID No.
PRM035	1	Multitask scan time
PRM036	20	IN/ON input recognition time
PRM037	20	IN/OFF input recognition time
PRM038	XXXXX	Factory shipping date
PRM039	XXXXX	Initialization date
PRM040	0	Motor condition during step-out error
PRM041	200	X axis motor specifications
PRM043	1000 / 1200 ※1	X axis rated current
PRM044	1350 / 1500 ※1	X axis maximum starting pulse rate
PRM045	18000 / 2100 ※1	X axis maximum continuous pulse rate
PRM046	6 / 48 ※1	X axis lead pitch
PRM047	0	X axis S-shape operation setting
PRM048	1	X axis step-out detection
PRM050	200	Y axis motor specifications
PRM052	1000 / 1200 ※1	Y axis rated current
PRM053	1350 / 1500 ※1	Y axis maximum starting pulse rate
PRM054	18000 / 2100 ※1	Y axis maximum continuous pulse rate
PRM055	6 / 48 ※1	Y axis lead pitch
PRM056	0	Y axis S-shape operation setting
PRM057	1	Y axis step-out detection
PRM059	200	Z axis motor specifications
PRM061	1000	Z axis rated current
PRM062	1350	Z axis maximum starting pulse rate
PRM063	18000	Z axis maximum continuous pulse rate
PRM064	6 ※2	Z axis lead pitch
PRM065	0	Z axis S-shape operation setting
PRM066	1	Z axis step-out detection
PRM068	200	R axis motor specifications
PRM070	1000	R axis rated current
PRM071	1350	R axis maximum starting pulse rate
PRM072	18000	R axis maximum continuous pulse rate
PRM073	6	R axis lead pitch
PRM074	0	R axis S-shape operation setting
PRM075	0	R axis step-out detection

No.	Initial value	Description
PRM076	600	X axis holding current
PRM077	1000 / 1200 ※1	X axis driving current
PRM078	8 / 16 ※1	X axis microstep setting
PRM079	600	Y axis holding current
PRM080	1000 / 1200 ※1	Y axis driving current
PRM081	8 / 16 ※1	Y axis microstep setting
PRM082	600	Z axis holding current
PRM083	1000	Z axis driving current
PRM084	8	Z axis microstep setting
PRM085	600	R axis holding current
PRM086	1000	R axis driving current
PRM087	8	R axis microstep setting
PRM088	2	X axis origin return sequence
PRM089	2	Y axis origin return sequence
PRM090	1	Z axis origin return sequence
PRM091	0	R axis origin return sequence
PRM096	10 / 20 ※1	X axis origin return speed
PRM097	10 / 20 ※1	Y axis origin return speed
PRM098	5	Z axis origin return speed
PRM099	10	R axis origin return speed
PRM100	400	X axis origin reverse speed
PRM101	400	Y axis origin reverse speed
PRM102	200	Z axis origin reverse speed
PRM103	400	R axis origin reverse speed
PRM104	100	X axis origin positioning speed
PRM105	100	Y axis origin positioning speed
PRM106	50	Z axis origin positioning speed
PRM107	100	R axis origin positioning speed
PRM108	4	X axis origin positioning completion speed
PRM109	4	Y axis origin positioning completion speed
PRM110	2	Z axis origin positioning completion speed
PRM111	4	R axis origin positioning completion speed
PRM116	20000	X axis origin positioning for enabling output pulse
PRM117	20000	Y axis origin positioning for enabling output pulse
PRM118	20000	Z axis origin positioning for enabling output pulse
PRM119	20000	R axis origin positioning for enabling output pulse
PRM122	3	X axis software limit (negative-side margin)
PRM123	200 ※2	X axis software positive-side limit
PRM125	2000	X axis maximum acceleration
PRM126	2000	X axis maximum deceleration
PRM127	200 / 500 ※1	X axis maximum speed
PRM128	60	X and Y axes maximum interpolation speed
PRM131	3	Y axis software limit (negative-side margin)
PRM132	200 ※1	Y axis software positive-side limit
PRM134	2000	Y axis maximum acceleration
PRM135	2000	Y axis maximum deceleration
PRM136	200 / 500 ※1	Y axis maximum speed

No.	Initial value	Description
PRM139	3	Z axis software limit (negative-side margin)
PRM140	50 ※2	Z axis software positive-side limit
PRM142	2000	Z axis maximum acceleration
PRM143	2000	Z axis maximum deceleration
PRM144	200	Z axis maximum speed
PRM145	60	Z and R axes maximum interpolation speed
PRM148	3	R axis software limit (negative-side margin)
PRM149	300 ※2	R axis software positive-side limit
PRM151	2000	R axis maximum acceleration
PRM152	2000	R axis maximum deceleration
PRM153	60	R axis maximum speed
PRM226	1	X axis JOG SPEED1
PRM227	10	X axis JOG SPEED2
PRM228	1	Y axis JOG SPEED1
PRM229	10	Y axis JOG SPEED2
PRM230	1	Z axis JOG SPEED1
PRM231	10	Z axis JOG SPEED2
PRM232	1	R axis JOG SPEED1
PRM233	10	R axis JOG SPEED2
PRM234	0	Terminal allocation for output port 0
PRM235	1	Terminal allocation for output port 1
PRM236	2	Terminal allocation for output port 2
PRM237	3	Terminal allocation for output port 3
PRM238	4	Terminal allocation for output port 4
PRM239	5	Terminal allocation for output port 5
PRM240	6	Terminal allocation for output port 6
PRM241	7	Terminal allocation for output port 7
PRM242	8	Terminal allocation for output port 8
PRM243	9	Terminal allocation for output port 9
PRM244	10	Terminal allocation for output port 10
PRM245	11	Terminal allocation for output port 11
PRM246	12	Terminal allocation for output port 12
PRM247	13	Terminal allocation for output port 13
PRM248	14	Terminal allocation for output port 14
PRM249	15	Terminal allocation for output port 15
PRM250	16	Terminal allocation for output port 16
PRM251	17	Terminal allocation for output port 17
PRM252	18	Terminal allocation for output port 18
PRM253	19	Terminal allocation for output port 19
PRM254	20	Terminal allocation for output port 20
PRM255	21	Terminal allocation for output port 21
PRM256	22	Terminal allocation for output port 22
PRM257	23	Terminal allocation for output port 23

No.	Initial value	Description
PRM258	24	Terminal allocation for starting forced output 0
PRM259	24	Terminal allocation for starting forced output 1
PRM260	24	Terminal allocation for starting forced output 2
PRM261	24	Terminal allocation for starting forced output 3
PRM262	24	Terminal allocation for starting forced output 4
PRM263	24	Terminal allocation for starting forced output 5
PRM264	24	Terminal allocation for starting forced output 6
PRM265	24	Terminal allocation for starting forced output 7
PRM266	24	Terminal allocation for starting forced output 8
PRM267	24	Terminal allocation for starting forced output 9
PRM268	24	Terminal allocation for starting forced output 10
PRM269	24	Terminal allocation for starting forced output 11
PRM270	24	Terminal allocation for starting forced output 12
PRM271	24	Terminal allocation for starting forced output 13
PRM272	24	Terminal allocation for starting forced output 14
PRM273	24	Terminal allocation for starting forced output 15
PRM274	24	Terminal allocation for starting forced output 16
PRM275	24	Terminal allocation for starting forced output 17
PRM276	24	Terminal allocation for starting forced output 18
PRM277	24	Terminal allocation for starting forced output 19
PRM278	24	Terminal allocation for starting forced output 20
PRM279	24	Terminal allocation for starting forced output 21
PRM280	24	Terminal allocation for starting forced output 22
PRM281	24	Terminal allocation for starting forced output 23
PRM282	24	Terminal allocation for starting one-pulse 0
PRM283	24	Terminal allocation for starting one-pulse 1
PRM284	24	Terminal allocation for starting one-pulse 2
PRM285	24	Terminal allocation for starting one-pulse 3
PRM286	24	Terminal allocation for starting one-pulse 4
PRM287	24	Terminal allocation for starting one-pulse 5
PRM288	24	Terminal allocation for starting one-pulse 6
PRM289	24	Terminal allocation for starting one-pulse 7
PRM290	24	Terminal allocation for starting one-pulse 8
PRM291	24	Terminal allocation for starting one-pulse 9
PRM292	24	Terminal allocation for starting one-pulse 10
PRM293	24	Terminal allocation for starting one-pulse 11
PRM294	24	Terminal allocation for starting one-pulse 12
PRM295	24	Terminal allocation for starting one-pulse 13
PRM296	24	Terminal allocation for starting one-pulse 14
PRM297	24	Terminal allocation for starting one-pulse 15
PRM298	24	Terminal allocation for starting one-pulse 16
PRM299	24	Terminal allocation for starting one-pulse 17
PRM300	24	Terminal allocation for starting one-pulse 18
PRM301	24	Terminal allocation for starting one-pulse 19
PRM302	24	Terminal allocation for starting one-pulse 20
PRM303	24	Terminal allocation for starting one-pulse 21
PRM304	24	Terminal allocation for starting one-pulse 22
PRM305	24	Terminal allocation for starting one-pulse 23

No.	Initial value	Description
PRM306	0	Terminal allocation for input port 0
PRM307	1	Terminal allocation for input port 1
PRM308	2	Terminal allocation for input port 2
PRM309	3	Terminal allocation for input port 3
PRM310	4	Terminal allocation for input port 4
PRM311	5	Terminal allocation for input port 5
PRM312	6	Terminal allocation for input port 6
PRM313	7	Terminal allocation for input port 7
PRM314	8	Terminal allocation for input port 8
PRM315	9	Terminal allocation for input port 9
PRM316	10	Terminal allocation for input port 10
PRM317	11	Terminal allocation for input port 11
PRM318	12	Terminal allocation for input port 12
PRM319	13	Terminal allocation for input port 13
PRM320	14	Terminal allocation for input port 14
PRM321	15	Terminal allocation for input port 15
PRM322	16	Terminal allocation for input port 16
PRM323	17	Terminal allocation for input port 17
PRM324	18	Terminal allocation for input port 18
PRM325	19	Terminal allocation for input port 19
PRM326	20	Terminal allocation for input port 20
PRM327	21	Terminal allocation for input port 21
PRM328	22	Terminal allocation for input port 22
PRM329	23	Terminal allocation for input port 23
PRM330	24	Terminal allocation number for counter reset input
PRM332	24	Terminal allocation number for the AUTO-RUN input
PRM333	24	Terminal allocation number for the RESET input
PRM334	24	Terminal allocation number for the ORG-START input
PRM335	24	Terminal allocation number for the EMG input
PRM336	24	Terminal allocation number for the READY output
PRM337	24	Terminal allocation number for the BUSY output
PRM338	24	Terminal allocation number for the END output
PRM339	24	Terminal allocation number for the ORIGIN RETURN COMPLETED output
PRM340	24	Terminal allocation number for the ALM output
PRM341	0	EMG input logic
PRM342	5	Main task time
PRM343	0	Non-use of the operation box

※1: Belt drive axis setting value for DTHKB series (A3 type)

※2: The setting values need to be changed in order to match with the axis stroke and lead pitch.

Note: The support software can be used to read the parameter files for each model and send it to the Cell Master, to easily set suitable values.

Parameter File Name List

Model	File name
DTHB-AS2	AS2.prm
DTHB-AS3	AS3.prm
DTHB-ASL3	ASL3.prm
DTHB-AL2	AL2.prm
DTHB-AL3	AL3.prm
DTHB-ALL3	ALL3.prm
DTHB-CS2	CS2.prm
DTHB-CS3	CS3.prm
DTHB-CSL3	CSL3.prm
DTHKB-ASL3	KASL3.prm
DTHKB-CSL3	KCSL3.prm

Memo

Chapter 7 Programming

This chapter describes the types of programming commands, and their meanings and methods of use.

7-1 Basic Information

7-1-1 Robot Language and Point Data Relationships

Cell Master uses BASIC-like language for easy creation of programs. In this robot language, information regarding the actuator position (absolute position, amount of movement) can be expressed directly by numbers within the program, or expressed indirectly using point numbers. Point numbers, and their corresponding position information, are recorded separately from the program as point data. As a result, if you just want to change the position within the same program, you can do so by editing the point data only.

7-1-2 Using the Programming Box to Input Robot Language

When using the programming box to edit programs in the Cell Master, use the numeric increment/decrement keys ↑ and ↓ to select commands. Operands may need to be input depending on the command type. In this case, move the cursor to the operand area, and then use either the numeric input keys or the numeric increment/decrement keys to input the operands.

7-1-3 Using the Support Software for Programming

In the Cell Master, use the optional support software, DTHB Editor, to create programs offline on a personal computer.

Refer to the Creceed Cell Master Support Software Owner's Manual for information on how to use the DTHB Editor.

7-1-4 Program Specifications

The Cell Master program capacity is as follows.

Maximum number of steps: 10000 steps

Number of programs: 1 to 1000※

Maximum number of steps per program: 10 to 10000※

Total number of points: 10000

※ This value can vary depending on the parameter to define the number of programs to be registered. The relationship between the maximum number of steps per program and the number of programs is as follows.

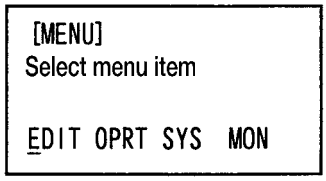
Maximum number of steps per program = (Maximum number of total steps) /(Number of programs)

7-2 Program Editing

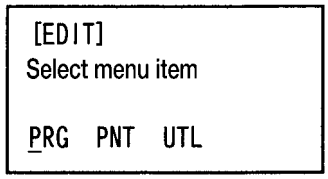
Program editing refers to such operations as new creation, partial changes to already registered programs, program deletion, and program copying. Here follows specific descriptions of program editing methods using the programming box.

7-2-1 Creating a New Program

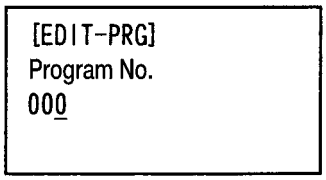
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



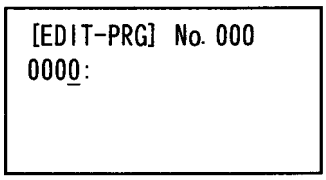
2) The EDIT screen appears. Place the cursor on PRG and press the ENT key.



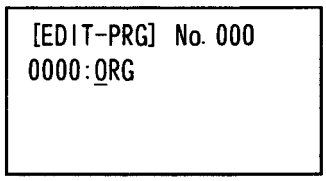
3) The program number selection screen appears. Input the program number to be created, and press the ENT key.



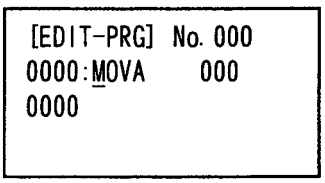
4) The step input screen appears, and step number 0000 is displayed on the left side of the second line. Press the cursor movement key → to go to the command area.



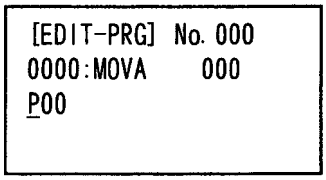
5) Use the numeric increment/decrement keys ↑ and ↓ to reach the desired command.



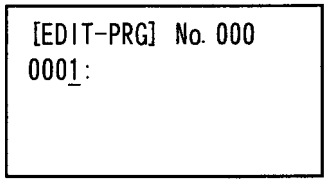
6) Some command types require input of operand data. To do this, move the cursor to the operand area, input the appropriate values, and press the ENT key to confirm.



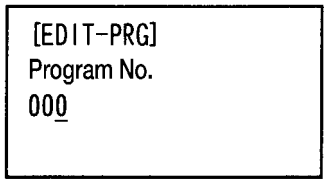
7) For some command types you can also input variables to the operand data. To do this, move the cursor to the left side of the data that you want to use as a variable, as shown in the figure at right, and press the INS key to switch the input.



8) The cursor automatically moves to the next step number. Repeat steps 4) to 6) above to complete the program.

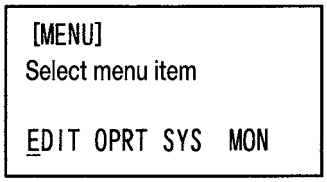


9) To start creating other programs, press the ESC key to return to one upper level above (to the program number selection screen), and then enter a program number.

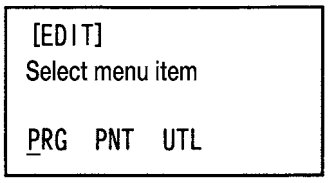


7-2-2 Adding Steps

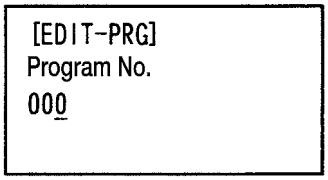
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



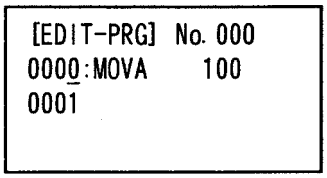
2) The EDIT screen appears. Place the cursor on PRG and press the ENT key.



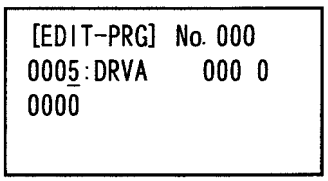
3) The program number selection screen appears. Input the program number to be edited, and press the ENT key.



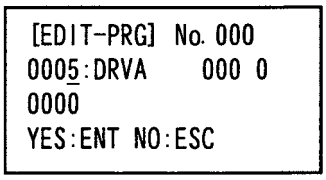
4) The step edit screen appears, and step number 0000 is displayed on the left side of the second line. Input the number of the step that you want to add, to display the command.



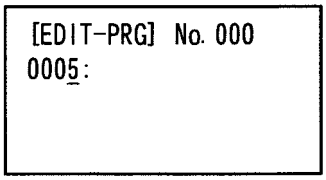
5) Press the INS key.



6) If adding a step, press the ENT key.
If you decide not to add it after all, press the ESC key.

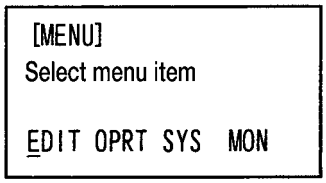


7) Use steps 4) to 6) in “7-2-1 Creating a New Program” to write new commands.
All steps later than the newly inserted step will automatically drop down one line.

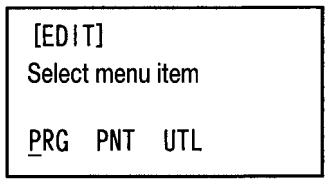


7-2-3 Correcting Steps

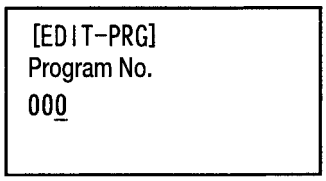
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



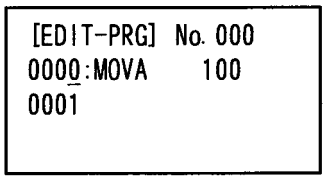
2) The EDIT screen appears. Place the cursor on PRG and press the ENT key.



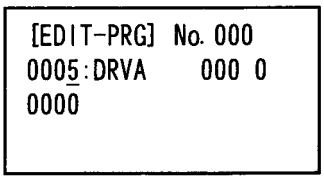
3) The program number selection screen appears. Input the program number to be edited, and press the ENT key.



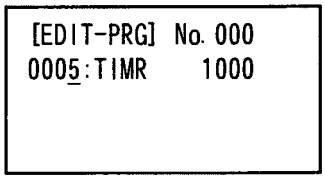
4) The step edit screen appears, and step number 0000 is displayed on the left side of the second line. Input the number of the step that you want to correct, to display the command.



5) Press the cursor movement key → to move to the command area, and perform the necessary corrections. You may also need to correct the operands.

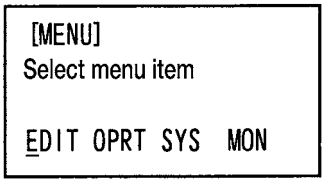


6) When you have completed the corrections, press the ENT key to confirm.

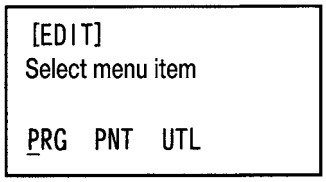


7-2-4 Deleting Steps

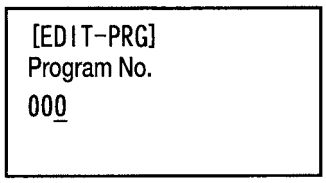
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



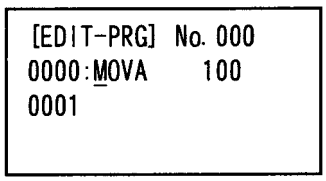
2) The EDIT screen appears. Place the cursor on PRG and press the ENT key.



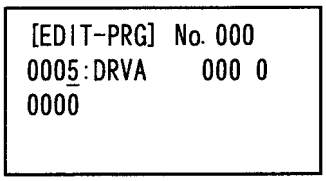
3) The program number selection screen appears. Input the program number to be edited, and press the ENT key.



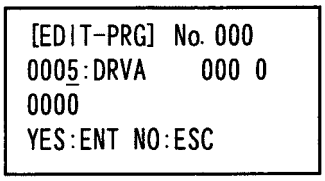
4) The step edit screen appears, and step number 0000 is displayed on the left side of the second line. Input the number of the step that you want to delete, to display the command.



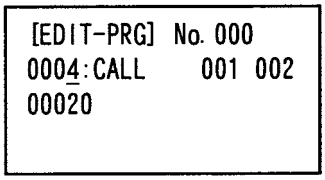
5) Press the DEL key.



6) If deleting a step, press the ENT key.
If you decide not to delete it after all, press the ESC key.



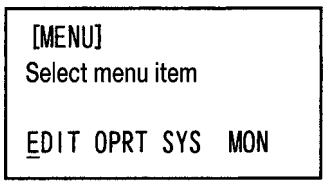
7) All steps later than the deleted step will automatically move up one line.



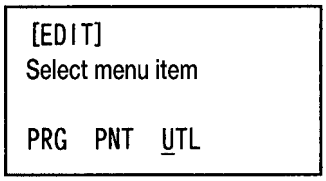
7-3 Program Utilities

7-3-1 Copying the Program Units

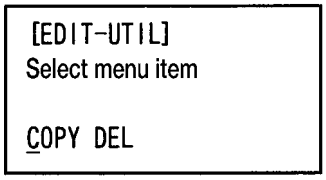
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



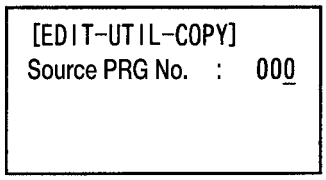
2) The EDIT screen appears. Place the cursor on UTL and press the ENT key.



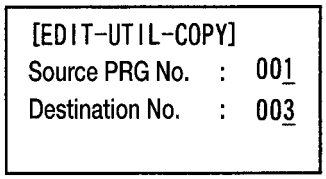
3) The utility selection screen appears. Place the cursor on COPY, and press the ENT key.



4) The program copy screen appears, and the setting of the original program number to be copied is requested on the second line. Input the number, and press the ENT key.

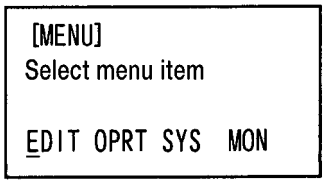


5) The setting of the program number where the copy is to be sent is requested on the third line. Input the number, and press the ENT key.

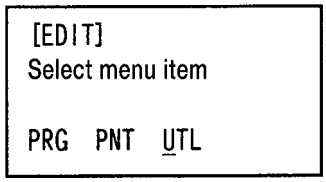


7-3-2 Deleting the Program Units

1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.

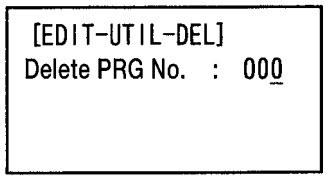


2) The EDIT screen appears. Place the cursor on UTL and press the ENT key.

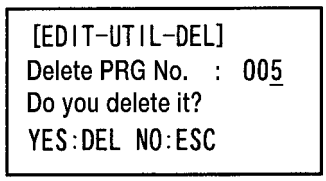


3) The utility selection screen appears. Place the cursor on DEL, and press the ENT key.

4) The program delete screen appears, and the setting of the program number to be deleted is requested on the second line. Input the number, and press the ENT key.



5) If deleting a program, press the DEL key.
If you decide not to delete it after all, press the ESC key.



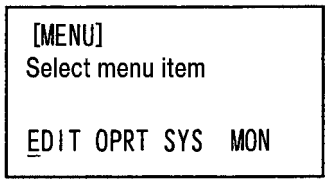
Memo

Chapter 8 Point Data Editing

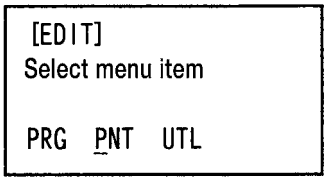
You can register up to 10000 points of point data in the Cell Master.
There are two methods for inputting point data, Manual Data In and Teaching Data In.
For the Manual Data In method, you can use the programming box's numeric input keys or the numeric increment/decrement keys to directly input coordinate values.
For the Teaching Data In method, you can use manual operation to move to the desired position and input that position as point data.
You can use 32 sets of points within the point data for registration of pallet data. Pallet data editing is also explained in this chapter.

8-1 Manual Data In

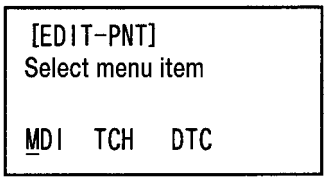
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



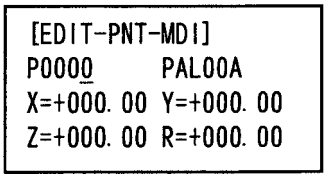
2) The EDIT screen appears. Place the cursor on PNT and press the ENT key.



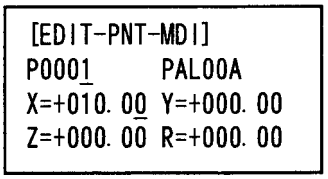
3) The point input method selection screen appears. Place the cursor on MDI and press the ENT key.



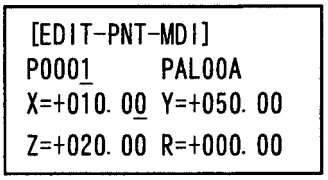
4) The point Manual Data In screen appears, and point number P0000 is displayed on the left side of the second line. Input the point number that you want to register.



5) Use the cursor movement keys ← and → to move to X axis point area, and input the coordinate value.

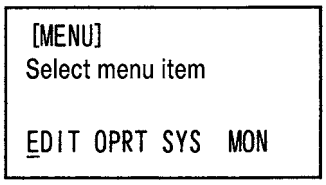


6) Use the same operation to input the coordinate values for the other axes, and press the ENT key to confirm.

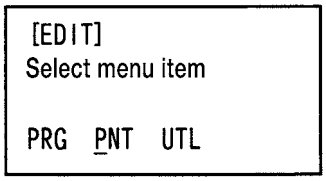


8-2 Teaching Data In

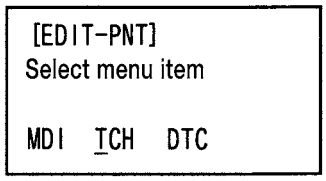
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



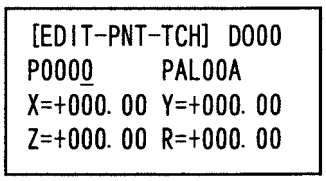
2) The EDIT screen appears. Place the cursor on PNT and press the ENT key.



3) The point input method selection screen appears. Place the cursor on TCH and press the ENT key.

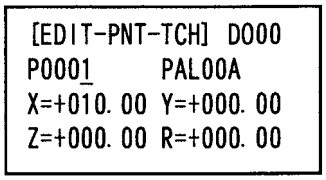


4) The point Teaching Data In screen appears, and point number P0000 is displayed on the left side of the second line. Input the point number that you want to register.
Note that pressing the ENT key while in this state will not confirm the point data.

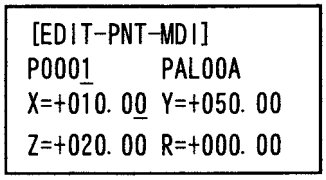


5) You can press the SPEED key to switch the actuator movement speed between high and low speed levels. When the actuator is in high speed, the HIGH-LED lights up.

6) Use the actuator movement key to move to the point that you want to set.
The point coordinates are displayed on the screen.

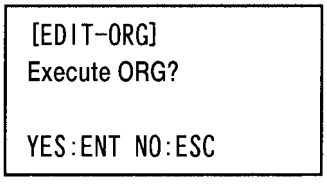


7) Press the ENT key to confirm.



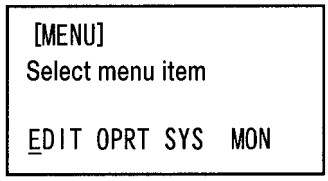
8) In the point input screen, pressing the RUN key will move the actuator to the currently registered point. You can use this operation to check that the point position setting is correct.

Note: Attempting to perform teaching while the system is in emergency stop, origin incomplete, or error stop states, causes the system to revert to the return to origin screen. Press the ENT key to complete the return to origin operation.

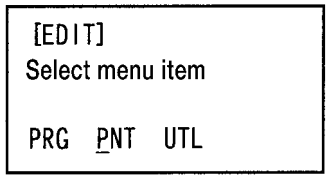


8-3 Direct Teaching

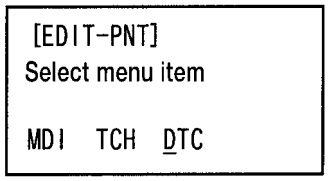
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



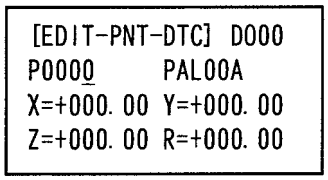
2) The EDIT screen appears. Place the cursor on PNT and press the ENT key.



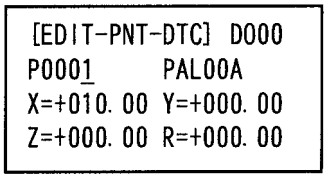
3) The point input method selection screen appears. Place the cursor on DTC and press the ENT key.



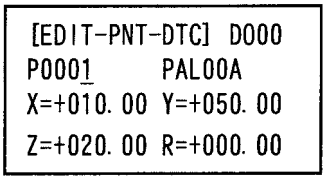
4) The direct teaching point input screen appears, and point number P0000 is displayed on the left side of the second line. Input the point number that you want to register.



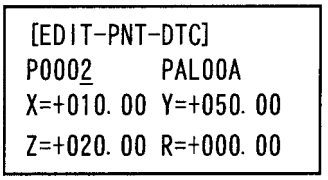
5) Manually move to the point where you want to set the actuator table.
The point coordinates are displayed on the screen.



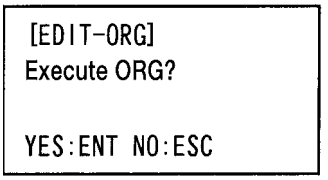
6) Press the ENT key to confirm.



7) When confirmed, switch to the next point number input screen.



Note: Attempting to perform direct teaching while the system is in emergency stop, origin incomplete, or error stop states, causes the system to revert to the return to origin screen. Press the ENT key to complete the return to origin operation.

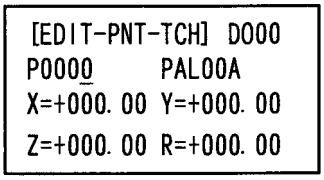


8-4 Manual Control of General-purpose Output

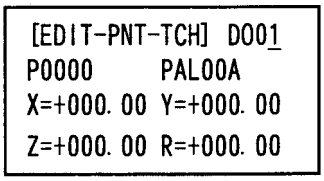
In systems where the general-purpose output of I/O interfaces are used to operate air grippers and other workpiece handling devices, there may be times when executing Teaching Data In where you will want to actually move the workpiece and check the position.

For such situations, in the Cell Master you can use the programming box to perform manual control of general-purpose output.

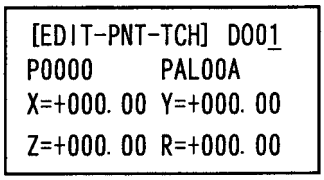
1) During Teaching Data In operations, temporarily pause the operation at the position where you want to perform general-purpose output operations. Press the cursor movement key to move the cursor to the DO number setting area.



2) You can either use the numeric input keys to perform direct input, or the increment/decrement keys ↑ and ↓ to set the I/O output number.



3) Output remains ON only while the ENT key is pressed down.
Note that pressing the ENT key on this screen cannot be used to confirm the point data.



8-5 Pallet Data Editing

You can use the matrix coordinate definition for the palletizing program. Since inputting the pallet number of the matrix to be set automatically switches the point, this is convenient when editing pallet data.

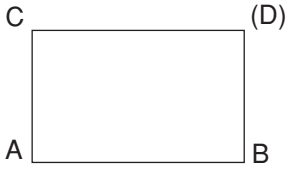
Points showing the pallet corner points share 10000 points of point data that can be registered. As a result, if you used pallets, be careful to avoid registering points as normal point data in pallet point data areas.

If you are not using pallets, you can use the pallet data areas for normal point data.

The relationship between the point numbers used to input the three matrix corner coordinate values that share the same pallet number is shown in the table below.

Pallet No.	Point A point No.	Point B point No.	Point C point No.
00	9872	9873	9874
01	9876	9877	9878
02	9880	9881	9882
03	9874	9885	9886
04	9888	9889	9890
05	9892	9893	9894
06	9896	9897	9898
07	9900	9901	9902
08	9904	9905	9906
09	9908	9909	9910
10	9912	9913	9914
11	9916	9917	9918
12	9920	9921	9922
13	9924	9925	9926
14	9928	9929	9930
15	9932	9933	9934
16	9936	9937	9938
17	9940	9941	9942
18	9944	9945	9946
19	9948	9949	9950
20	9952	9953	9954
21	9956	9957	9958
22	9960	9961	9962
23	9964	9965	9966
24	9968	9969	9970
25	9972	9973	9974
26	9976	9977	9978
27	9980	9981	9982
28	9984	9985	9986
29	9988	9989	9990
30	9992	9993	9994
31	9996	9997	9998

Position relationships for the three pallet corners are shown in the figure below.



Pallet Data In methods use the same procedures as for manual and teaching.
Here follows a description based on the screen when Manual Data In is used.

1) In the point input screen, press the INS key.

```
[EDIT-PNT-MDI]
P0000      PAL00A
X=+000.00 Y=+000.00
Z=+000.00 R=+000.00
```

2) The cursor moves to the numeric digits on the right side of the second line. Set the pallet number that you want to register.
The point number automatically changes to the number corresponding to the pallet number.

```
[EDIT-PNT-MDI]
P9872      PAL00A
X=+000.00 Y=+000.00
Z=+000.00 R=+000.00
```

3) Press the INS key to move the cursor to the alphabet position on the right side of the pallet number, then use the increment/decrement keys ↑and ↓to move to point A.
Here, A, B, and C represent the coordinate points for the three pallet corners.

```
[EDIT-PNT-MDI]
P9872      PAL00A
X=+000.00 Y=+000.00
Z=+000.00 R=+000.00
```

4) You can use either the DEL key or the cursor movement keys ← and → to move to the point area for each axis, and input the coordinate values.
※For Teaching Data In, move the actuator and perform input.

```
[EDIT-PNT-MDI]
P9872      PAL00A
X=+010.00 Y=+010.00
Z=+000.00 R=+000.00
```

5) Press the ENT key to confirm.

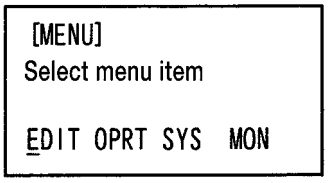
6) Use steps 1) to 5) to set the points for the B and C corners, and then input the coordinate values for each axis.
There is no need to set point D.

```
[EDIT-PNT-MDI]
P9874      PAL00C
X=+050.00 Y=+050.00
Z=+000.00 R=+000.00
```

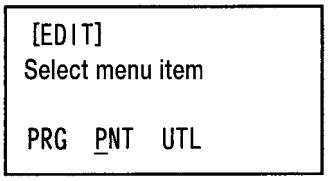
8-6 Point Trace

You can move the actuator to the registered point data position. In other words, you can actually move the main unit to confirm the input data.

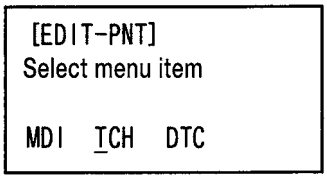
1) In the MENU selection screen, place the cursor on EDIT and press the ENT key.



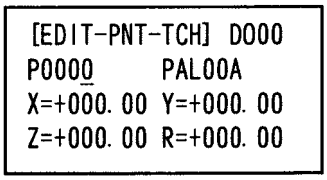
2) The EDIT screen appears. Place the cursor on PNT and press the ENT key.



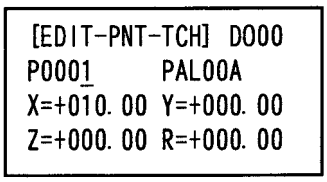
3) The point input method selection screen appears. Place the cursor on TCH and press the ENT key.



4) The point Teaching Data In screen appears, and point number P0000 is displayed on the left side of the second line. Input the point number that you want to trace.



5) Press the GO key to move the actuator to the currently registered point.
(It moves in an arch operation to avoid collision with the Z axis.)



Chapter 9 Robot Language

This chapter describes what kinds of commands can be found in the robot language, and what definitions they have.
The Cell Master uses easy-to-understand BASIC-like language. As a result, even novice users can easily create programs that control complex operations.

9-1 Robot Language List

No.	Command (Operation code)	Description and Operand Format
000	ORG	Executes return to origin.
001	ORGM	Specifies the speed and sequence when executing return to origin. <speed>, <X axis sequence>, <Y axis sequence>, <Z axis sequence>, <R axis sequence>
022	MOVD	Moves to the direct coordinate entry position. <speed>, <X position data>, <Y position data>, <Z position data>, <R position data>
023	MOVA	Moves to the absolute point data position. <speed>, <point No.>
024	MOVI	Moves to the relative point data position. <speed>, <point No.>
025	MOVF	Moves until the specified DI matches the state. <speed>, <point No.> ,<DI No.>, <DI state>
028	DRVD	Moves to the coordinate specified position on the specified axis. <speed>, <specified axis>, <position data>, [<position data>], [<position data>]
029	DRVA	Moves to the absolute point data position on the specified axis. <speed>, <specified axis>, <point No.>
030	DRVI	Moves to the relative point data position on the specified axis. <speed>, <specified axis>, <point No.>
031	DRVF	Moves until the specified DI matches the state on the specified axis. <speed>, <specified axis>, <point No.>, <DI No.>, <DI state>
032	DO	Turns DO output on and off. <DO No.>, <DO state>
033	WAIT	Waits for DI input. <DI No.>, <DI state>
034	TIMR	Waits for the specified time. <time>
035	MAT	Defines the matrix. <pallet No.>, <row (Y)>, <column (X)>
036	SHFT	Shifts the position data. <point No.>
037	SHFR	Resets the position data shift.
039	?POS	Substitutes current position data into the specified point. <point No.>
066	MDO	Turns DO output during movement. <point No.>, <range>, <pass count>, <DO No.>, <DO state>
069	P	Sets a point variable. <point variable No.>, <point No.>
070	P＋	Adds to the point variable. <point variable No.>, <data>

No.	Command (Operation code)	Description and Operand Format
071	P—	Subtracts from the point variable. <point variable No.>, <data>
072	C	Sets a counter variable. <counter variable No.>, <data>
073	C+	Adds to the counter variable. <counter variable No.>, <data>
074	C—	Subtracts from the counter variable. <counter variable No.>, <data>
077	TON	Starts multitask program. <task No.>, <program No.>, <start type>
078	TOFF	Stops multitask program. <task No.>
079	JMPC	Counter jump. <program No.>, <label No.>, <counter No.>, <data>
080	VCHG	Changes the speed. <speed>, <point No.>, <axis pattern>
083	STOP	Stops all axes.
086	END	Ends program.
087	ACHA	Executes arched movement by the absolute point data. <speed>, <point No.>, <avoid position>, <interpolation start position>, <X>, <Y>, <Z>, <R>
088	ACHI	Executes arched movement by the relative point data. <speed>, <point No.>, <avoid position>, <interpolation start position>, <X>, <Y>, <Z>, <R>
089	MOLA	Moves by linear interpolation to the absolute point data position (4 axes). <speed>, <point No.>, <specified axis>
090	MOLI	Moves by linear interpolation to the relative point data position (4 axes). <speed>, <point No.>, <specified axis>
091	MOLF	Moves by linear interpolation until the specified DI matches the state (4 axes). <speed>, <point No.>, <DI No.>, <DI state>, <specified axis>
092	MOLD	Moves by linear interpolation to the coordinate specified position (4 axes). <speed>, <X>, <Y>, <Z>, <R>, <specified axis>
093	COLA	Moves around the circular interpolation defined by the absolute point data positions (2 axes). <speed>, <center point No.>, <start point No.>, <end point No.>, <direction>, <specified axis>
094	COLI	Moves around the circular interpolation defined by the relative point data positions (2 axes). <speed>, <center point No.>, <start point No.>, <end point No.>, <direction>, <specified axis>
095	COLF	Moves around the circular interpolation until the specified DI matches the state (2 axes). <speed>, <center point No.>, <start point No.>, <end point No.>, <direction>, <specified axis>, <DI No.>, <DI state>

No.	Command (Operation code)	Description and Operand Format
096	PALP	Moves the pallet. <speed>, <pallet No.>, <matrix No.>
097	PALL	Executes linear interpolation movement of the pallet. <speed>, <pallet No.>, <matrix No.>
099	L	Defines the label. <label No.>
100	CALL	Calls another program. <program No.>, <label No.>, <count>
101	JMP	Jumps to a specified program. <program No.>, <label No.>
102	DSET	Sets DI to a variable. <variable No.>, <bit No.>
103	DVEN	Energizes a specified axis. <specified axis>, <driver current/hold current>
104	SET	Sets variable. <variable No.>,<data>
105	ADD	Adds variable. <variable No.>,<data>
106	SUB	Subtracts variable. <variable No.>,<data>
110	AND	Executes logic product of the variables. <variable No.>,<data>
111	OR	Executes logic sum of the variables. <variable No.>,<data>
112	JMPB	Jumps when DI input matches the specified DI state. <program No.>, <label No.>, <DI No.>, <DI state>
120	TOS	Starts a continuous interpolation. <specified axis>
121	TOC	Continues the continuous interpolation. <specified axis>
122	TOE	Ends the continuous interpolation. <specified axis>
236	SRVO	Turns the driver output ON/OFF. <X>, <Y>, <Z>, <R>
240	ACK	Responds to communication. <port No.>

9-2 Robot Language Syntax Rules

9-2-1 Command Statement Form

The command statement form for the Cell Master is as shown below.
When you use the programming box to create a program, the operand input area is displayed on selection of an operation code, and is designed to make it harder to input the wrong operand.

<Operation code> [<Operand1>] [<Operand 2>] ..... [<Operand8>]
※The brackets [ ] refer to items that can be omitted.

- Commands are composed of operation codes and operands. Depending on the command, either no operand is used or up to a maximum of 8 operands are used.
- Items with the < > mark (angle brackets) in the operand should be specified by you. Check the details of each robot language, and enter the appropriate data.
  See “9-4 Robot Language Description.”

9-2-2 Variables

Variables are locations for storing data that you can use during programming. In the Cell Master, you can use variables to perform data calculations, and use condition jumps based on the calculation results to achieve advanced programs. In the Cell Master, you can use the following variables.

- Point Variables P00 to P31
  Point variables are variables that can contain point numbers. Use movement commands such as MOVA or MOVI in place of directly specifying the point numbers. Use of point variables can sometimes let you shorten the number of program steps.
  You can use the SET, P＋, P－, ADD, SUB, AND, and OR commands to perform calculations. While the variable value range for calculations is 0 to 65535, the values specified for point movement are limited to 0 to 9999.
  If you specify a value exceeding 9999 to perform point movement, the variable value will be implemented as 9999.

- Counter Variables C00 to C31
  Counter variables are variables that contain counter values. Use it to specify the pallet work position number (matrix number) in the palletizing program, or for counting the number of time a command is executed.
  You can use the SET, C＋, C－, ADD, SUB, AND, and OR commands to perform calculations with this variable, and the JMPC command to perform conditional jumps. You can also use the PALP and PALL commands for pallet movement.
  The numeric values available for counter variables range from 0 to 65535.

9-2-3 Specified Axis

Specified axis is a requirement in the operands used for the DRVA and DRVI in the specified axis point movement commands, and in the MOLA, MOLI, COLA, and COLI interpolation movement commands. The specified axis is specified by numeric values shown in the correspondence table below.

Specified axis	Numeric value
No change	0
X	1
Y	2
Z	3
R	4
XY	21
ZR	22
XYZ	31
XYZR	41

※ Specified axis parameter settings for two or more axes (speed, acceleration, deceleration, etc.) are prioritized in the order of X, Y, Z, and R.

9-3 Program Functions

9-3-1 Multitasks

Multitasks are a function that allows you to simultaneously execute multiple programs (tasks). In the Cell Master, you can execute up to a maximum of 10 programs at once.
Since the multitask function can be used to execute multiple programs at the same time, you can perform operations like the ones described below.

- You can perform another process while the actuator is in motion.
  You can use the general-purpose output ON/OFF while MOVA, MOVI, or other movement commands are being executed. This can shorten your operation cycle.
- While X and Y axes are engaged in a complex operation, you can set the Z axis to perform intermittent operations over a specified period of time.

The method for describing multitask programs is exactly the same as for normal programs.
Insert the TON task startup command into the middle of the main program, and register the program as a subtask under a separate program number. While the program is executing the TON command, the subtask starts up, resulting in a multitask state. The subtask ends when the final step of subtask (a step using the END command) is executed, or when the TOFF command is executed in the program.

The relationship between tasks and the various kinds of data is as follows.
The point variables P00 to P31 and counter variables C00 to C31 are common to all tasks. The amounts of coordinate shift set by the SHFT command are independent of each task.

Caution:

In general, multitask is explained as a function for simultaneous execution of multiple programs (tasks), in reality, for the case of a single CPU multiple programs are run serially, switching back and forth over such short time periods that they appear to be operating simultaneously.
The Cell Master multitask function operates in the same way, switching between programs over extremely short periods of time (the factory setting is 100 μs) to execute multitasks. As a result, when 10 tasks being executed it means that a single task is running for 100 μs and then pausing for 900 μs, so that the process is not actually executing for 90% of the time.
As a result, when using the multitask function, you need to take the above information into consideration when designing your system.

9-4 Robot Language Description

9-4-1 ORG

Function Executes return to origin.

Format ORG

Example ORG

Explanation Moves all axes to the origin sensor detecting position.
The position is hereafter treated as the absolute coordinates (0, 0, 0, 0).
The movement axis sequence uses the sequence set at parameters PRM88 to PRM91.
Any position differential information previously changed with the SHFT command is reset.

9-4-2 ORGM

Function Executes return to origin at the specified speed and sequence.

Format ORGM <speed>, <X axis sequence>, <Y axis sequence>, <Z axis sequence>, <R axis sequence>

Example ORGM 050, 1, 1, 2, 0
Executes return to origin at speed 50 in the sequence of XY → Z.

Explanation Same as the ORG command, other than able to specify the return speed and sequence.

1) Speed: 001 ～ 100
   Speed is a shared value for all axes, and is specified by a percentage (%) of the return to origin speed set in the parameters.
   Do not specify a speed value of less than 1mm/s. Movement speed will drop to zero, and return to origin will fail to be completed.
2) X axis sequence: 0 ～ 9
3) Y axis sequence: 0 ～ 9
4) Z axis sequence: 0 ～ 9
5) R axis sequence: 0 ～ 9
   You can specify the axis movement sequence from 0 to 9, and movement will be in the sequence of lower numbers first. If set to the same value, they move simultaneously. With specification of zero, however, return to origin is not executed. In this case, return to origin ends without any axis movement.

9-4-3 MOVD

Function Moves to the absolute position specified by the coordinate values that were entered.

Format MOVD <speed>, <X position data>, <Y position data>, <Z position data>, <R position data>

Example MOVD 100, 030.00, 050.00, 010.50, 000.00
Moves at speed 100 to coordinates (030.00, 050.00, 010.50, 000.00).

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to coordinates specified in 0.01mm units in relation to the X, Y, Z, and R axes.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) X position data: −999.99 ～ +999.99 (mm)
3) Y position data: −999.99 ～ +999.99 (mm)
4) Z position data: −999.99 ～ +999.99 (mm)
5) R position data: −999.99 ～ +999.99 (mm)
   If you set to position data a value in excess of the software limit set in the parameters, a program error will occur. If the SHFT command is executed, however, no error will occur as long as the value added to the shift position coordinate does not exceed the software limit.

9-4-4 MOVA

Function Moves to the absolute position specified by the point number.
Format MOVA <speed>, <point No.>
Example MOVA 100, 0005
Moves at speed 100 to point 0005.
Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to the specified point.
1) Speed: 001 ～ 100
Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

9-4-5 MOVI

Function Moves to a relative position specified by the point number.
Format MOVI <speed>, <point No.>
Example MOVI 100, 0010
Moves by 0010 point data at speed 100 from the current position.
Explanation This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).
Moves at specified speed to the specified point.
After movement, the absolute position is the current position with the point offset added on.
1) Speed: 001 ～ 100
Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

9-4-6 MOVF

Function Moves at specified speed to the absolute position specified by the point number, until the specified DI No. input matches the specified DI state.
Format MOVF <speed>, <point No.>, <DI No.>, <DI state>
Example MOVF 100, 0001, 7, 1
Moves at speed 100 from the current position to point 0001.
Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to the specified point while the DI input remains disabled. Stops when the DI input becomes enabled, and move to the next command.
1) Speed: 001 ～ 100
Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) DI No.: 00 ～ 23
Specify one number from input 0 to input 23.
4) DI state: 0, 1
0 is enabled when it is OFF, 1 is enabled when it is ON.
※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.
※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.

9-4-7 DRVD

Function Moves to the absolute position specified by the coordinate values that were entered on the specified axis only.

Format DRVD <speed>, <specified axis>, <position data>

Example DRVD 100, 1, 050.00

Moves X axis at speed 100 to the X coordinate (050.00), without any other axis moving.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves to the specified position at specified speed to specified coordinate, in 0.01mm units.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Position data: ＋000.00 ～ ＋999.99 (mm)
   The number of specified position data varies depending on the number of specified axes.
   If you select 31 for the specified axes, 3 position data points must be specified. In this case, the position data is specified X, Y, Z in the order.

If you set to position data a value in excess of the software limit set in the parameters, a program error will occur.

9-4-8 DRVA

Function Moves to the absolute position specified by the point number, on the specified axis only.

Format DRVA <speed>, <specified axis>, <point No.>

Example DRVA 050, 2, 0002

Moves at speed 050 to the Y coordinate of point 0002, without any other axis moving.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves specified axis at specified speed to the specified point.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

9-4-9 DRVI

Function Moves to a relative position specified by the point number, on the specified axis only.

Format DRVI <speed>, <specified axis>, <point No.>

Example DRVI 100, 2, 0003

Moves the Y axis at speed 100 by the amount of point 0003 data from the current position.

Explanation This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).

Moves specified axis at specified speed to the specified point.

After movement, the absolute position is the current position with the point offset added on.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

9-4-10 DRVF

Function: Moves at specified speed to the absolute position specified by the point number, on the specified axis only, until the specified of DI No. matches the specified DI state.

Format: DRVF <speed>, <specified axis>, <point No.>, <DI number>, <DI state>

Example: DRVF 100, 3, 0001, 7, 1

Moves at speed 100 to the Z coordinate of point 0001, without any other axis moving.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves the specified axis at specified speed to the specified point while DI input remains invalid. Stops when DI input becomes valid, and move to the next command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
4) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
5) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.

※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.

9-4-11 DO

Function: Sets the state specifying output of the specified DO number.

Format: DO <DO No.>, <DO state>

Example: DO 07, 1

Turns on general-purpose output OUT07.

Explanation: General-purpose output command for controlling external devices.

The output state is retained until a different state is output. (Latch operation)

1) DO No.: 00 ～ 23
   Specify one number from output 0 to output 23.
2) DO state: 0, 1
   0 turns the output OFF, 1 turns it ON.

9-4-12 WAIT

Function: Waits until the specified DI No. input matches the specified state.

Format: WAIT <DI No.>, <DI state>

Example: WAIT 05, 1

Waits until general-purpose input IN05 is ON.

Explanation: Command for synchronizing the timing to general-purpose input from external devices, etc.

When the specified input state appears, moves to the next step.

1) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
2) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

9-4-13 TIMR

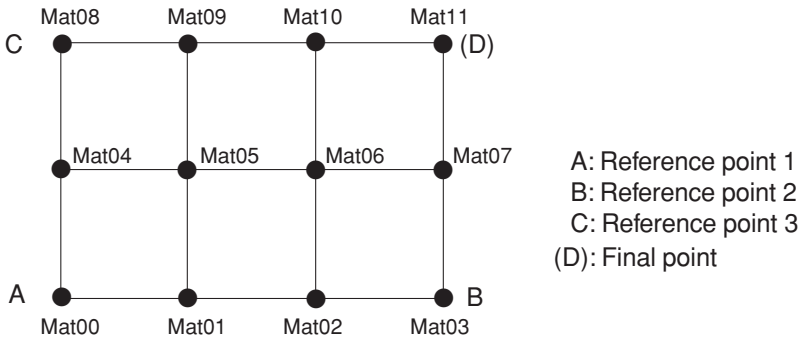
Function Waits for the specified time.
Format TIMR <time>
Example TIMR 01000
Waits 10 seconds.
Explanation This command is used in the program when a time adjustment is required.
Time: 00001 ～ 65535
You can specify in 10ms units. In other words, you can set from 0.01 second to 655.35 seconds.

9-4-14 MAT

Function Defines the number of rows and columns in a matrix.
Format MAT <pallet No.>, <row>, <column>
Example MAT 04, 010, 005
Specifies in pallet 04 a matrix of 10 rows and 5 columns.
Explanation This command defines the matrix for executing palletizing operation. You can use this command in combination with the PALP and PALL commands to simplify the creation of a palletizing program.

1) Pallet No.: 00 ～ 31
   The pallet number is a particular number designated to previously registered coordinate data out of a maximum 32 pallets, with 00 to 31 available for use.
2) Rows: 001 ～ 255
   Specifies the matrix number in the Y axis direction.
3) Columns: 001 ～ 255
   Specifies the matrix number in the X axis direction.

The pallet matrix numbers defined as 3 rows and 4 columns are as shown below.



Palletizing operations can only be executed in the XY plane.

9-4-15 SHFT

Function Shifts the position data.
Format SHFT <point No.>
Example SHFT 0003
Sets point 0003 to the coordinate origin.
Explanation After execution of the SHFT command, the origin information is in a shifted state for all following steps until the ORG, ORGM, or SHFR command is executed.

1) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

9-4-16 SHFR

Function Resets the position data shift.
Format SHFR
Example SHFR
Returns the origin to its initial value.
Explanation Activating the return to origin switch returns the coordinate to its original position.

9-4-17 ?POS

Function Substitutes the current position into the specified point number.
Format ?POS <point No.>
Example ?POS 0100
Substitutes the current position coordinates into point 00100.
Explanation Rewrites the registered data for the specified point number to the current position coordinates.

1) Point No.: 0000 ~ 9999
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.

9-4-18 MDO

Function Issues DO output when the axis in motion passes the specified point for the specified number of times.
Format MDO <pass point No.>, <range>, <pass count>, <DO No.>, <DO state>
Example MDO 0003, 0100, 1, 00, 1
MOVA 100, 0006
Sets DO00 to ON when point 0003 position is first passed while in moving to point 0006. The pass point judgment range is ±1mm.
Explanation DO is displayed when a specified XY coordinate point has been passed a specified number of times within a specified error range while moving to the next step command. The Z axis coordinate is ignored.
This command must be described immediately before the DO output movement command.
You can specify continuous interpolation movement in the movement command. In such a case, specify this command in the line immediately before the TOS command line.
If the movement command for the next step does not pass the specified point, this command is invalid.
You can specify this command up to 8 times for a series of movement commands. This command is valid only for continuous interpolation.

1) Point No.: 0000 ~ 9999, P00 ~ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   The variables P00 to P31 can be specified in place of the point numbers. The range of variable values is 0 to 9999.
2) Range: 0001 ~ 9999 00.01mm ~ 99.99mm
   In specifying the pass point, specify the error range of the coordinate position in ±mm units.
3) Pass count: 1 ~ 8
4) DO No.: 00 ~ 23
   Specify one number from output 0 to 23.
5) DO state: 0, 1
   0 turns the output OFF, 1 turns it ON.

9-4-19 P

Function Sets the point number at point variable P.
Format P <point variable No.>,<point No.>
Example P 03, 0008
Sets point number 0008 at point variable 03.
Explanation

1) Point variable No.: 00 ～ 31
The point variable is for storing the point number, with 32 available for use from P00 to P31. You can use the P＋ and P－ commands to perform calculations on the variable. The variable value range is 0 to 9999.
2) Point No.: 0000 ～ 9999
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.

9-4-20 P＋

Function Adds a numeric value to point variable P.
Format P＋ <point variable No.>, <data>
Example P＋ 05, 0014
Adds 0014 to the numeric value stored in point variable 05.
Explanation Adds data (directly specified numeric values) to numeric values stored in the point variable, and stores it in the same point variable.

1) Point variable No.: 00 ～ 31
The point variable is for storing the point number, with 32 available for use from P00 to P31. The variable value range is 0 to 9999.
2) Data: 0000 ～ 9999
Data is the directly specified numeric value, and the calculation result becomes the point number.

The relationship between the point variable and the point number, as described using commands, is as shown below.

P 05, 0001: P05=0001
P＋ 05, 0010: P05=0011

9-4-21 P－

Function Subtracts a numeric value from point variable P.
Format P－ <point variable No.>, <data>
Example P－ 07, 0001
Subtracts 0001 from the numeric value stored in point variable 07.
Explanation Subtracts data (directly specified numeric values) from numeric values stored in the point variable, and stores it in the same point variable.

1) Point variable No.: 00 ～ 31
The point variable is for storing the point number, with 32 available for use from P00 to P31. The variable value range is 0 to 9999.
2) Data: 0000 ～ 9999
Data is the directly specified numeric value, and the calculation result becomes the point number.

The relationship between the point variable and the point number, as described using commands, is as shown below.

P 07, 0010: P07=0010
P－ 07, 0001: P07=0009

9-4-22 C

Function Sets a numeric value into counter number C.
Format C <counter variable No.>, <data>
Example C 02, 0006
Sets 0006 into the counter variable 02.
Explanation Stores numeric data (directly specified numeric value) in the counter variable.
1) Counter variable No.: 00 ～ 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. You can use the C＋ and C－ commands to perform calculations on the variable. The variable value range is 0 to 65535.
2) Data: 00000 ～ 65535
Data is the directly specified numeric value.

9-4-23 C＋

Function Adds a numeric value to the counter variable C.
Format C＋ <counter variable No.>, <data>
Example C＋ 09, 0004
Adds 0004 to the numeric value stored in the counter variable 09.
Explanation Adds data (directly specified numeric values) to numeric values stored in the counter variable, and stores it in the same counter variable.
1) Counter variable No.: 00 ～ 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. The variable value range is 0 to 65535.
2) Data: 00000 ～ 65535
Data is the directly specified numeric value, and the calculation result is the counter value.

9-4-24 C－

Function Subtracts a numeric value from the counter variable C.
Format C－ <counter variable No.>, <data>
Example C－ 01, 0001
Subtracts 0001 from the numeric value stored in C01.
Explanation Subtracts data (directly specified numeric values) from numeric values stored in the counter variable, and stores it in the same counter variable.
1) Counter variable No.: 00 ～ 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. The variable value range is 0 to 65535.
2) Data: 00000 ～ 65535
Data is the directly specified numeric value, and the calculation result is the counter value.

9-4-25 TON

Function Starts up a specified task.
Format TON <task No.>, <program No.>, <startup type>
Example TON 02, 001, 0
Newly starts up program number 001 as task 02.
Explanation Use this command when you want to execute another program at the same time while the program currently being executed.
(For details, see “9-3-1 Multitasks.”)
1) Task No.: 02 ～ 10
Since the first program that was started is task 01, and up to a total of 10 tasks can be simultaneously started, additional tasks are numbered 02 to 10.
There is no priority in task numbers.
You can not specify a task number that has already been started.
2) Program No.: 000 ～ 999
Specifies program numbers that have already been registered.
3) Startup type: 0, 1
0 specifies execution of a new task, 1 restarts a task that is currently stopped.

9-4-26 TOFF

Function Stops a specified task.
Format TOFF <task No. >
Example TOFF 03
Stops a program executed as task 03.
Explanation Use this command when you want to stop a specific task.
1) Task No.: 02 ～ 10
Since the first program that was started is task 01, and up to a total of 10 tasks can be simultaneously started, additional tasks are numbered 02 to 10.

9-4-27 JMPC

Function Counter jump
Format JMPC <program No.>, <label No.>, <counter variable No.>, <data>
Example JMPC 003, 005, 04, 00030
If the value of counter 04 is 00030, jumps to label 005 of program 003.
Explanation Jumps when the numeric value specified in the counter number matches the numeric value of the data.
1) Program No.: 000 ～ 999
Specifies program numbers that have already been registered.
2) Label No.: 001 ～ 999
The label is the number specifying the step position of the jump target. (For details, see “9-4-42 L.”)
3) Counter variable No.: 00 ～ 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. The variable value range is 0 to 65535.
4) Data: 00000 ～ 65535, C00 ～ C31
You can specify the data as either a directly specified number or a counter variable.

9-4-28 VCHG

Function Changes the speed.
Format VCHG <speed>, <point No.>, <axis pattern>
Example VCHG 040, 0003, 12
Changes the X axis and Y axis speed to 040 from the point 0003 position.
Explanation Use this command when changing the movement speed in the middle of an operation. You can specify the axis where the speed is to be changed.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Axis pattern: See below.

Axis	Axis pattern
X	1
Y	2
Z	3
R	4
XY	12
XZ	13
XR	14
YZ	23
YR	24
ZR	34
XYZ	123
XYR	124
XZR	134
YZR	234
XYZR	1234

※ This command cannot be used with interpolation movement commands (MOLA, COLA, etc.).
※ It cannot be used for individual acceleration and deceleration settings, or S-shape settings.

9-4-29 STOP

Function Stops all axes.
Format STOP
Example STOP
Explanation Stops the movement of all axes. Even axes currently in motion due to axis movement commands are immediately stopped. However, an axis currently in a return to origin movement completes the return to origin without stopping.

9-4-30 END

Function Program end
Format END
Example END
Explanation Ends execution of the program.
Input this command as the final step in the program. In the @45 (?MEM) communication command, any steps occurring after the END command are judged to be blank steps.

9-4-31 ACHA

Function Arched movement to the absolute position specified by the point number. Specification of the avoided position is the distance from the origin on the avoided axis.

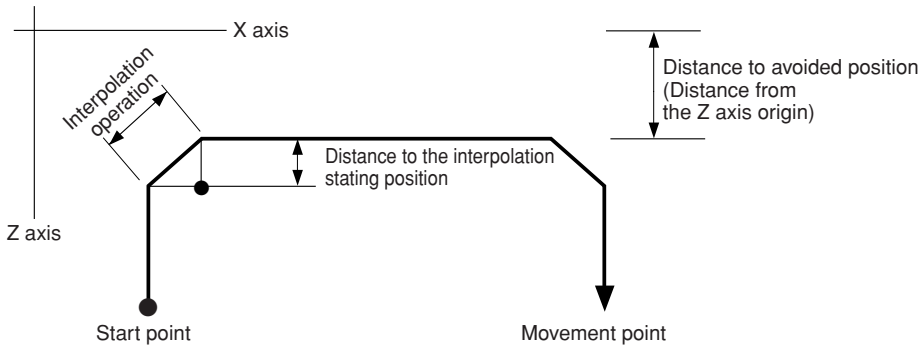
Format ACHA <speed>,<point No.>, <avoided position>, <interpolation start position>, <X axis>, <Y axis>, <Z axis>, <R axis>

Example ACHA 040, 0006, 010, 005, 2, 0, 1, 0
With the movement to avoid the Z axis direction at a distance of 10mm from the Z axis origin. The speed to point 0006 position in the X axis direction is 040. The interpolation distance in the avoided operation is 5mm.

Explanation This command is an arched motion specifying the avoided direction and avoided position.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Avoided position: 0 ～ 999
   At the axis specified as 1 in the axis setting item, specify the distance from the origin in mm units.
4) Interpolation start position: 0 ～ 999
   When executing an arched motion operation, specify the distance between the avoided position and the interpolated movement start position in mm units.
5) X axis: 0, 1, 2, 3
6) Y axis: 0, 1, 2, 3
7) Z axis: 0, 1, 2, 3
8) R axis: 0, 1, 2, 3
   In the axis setting item, 0 specifies no use (not related to movement direction), 1 specifies the avoided direction, 2 specifies the movement direction, and 3 specifies the movement direction in two dimensions.
   If the movement direction is in two dimensions, specify 2 for the axis with the larger movement in different coordinates.
   When Start point = Movement point, nothing happens.

Relationship between ACHA operation path and setting values



9-4-32 ACHI

Function Arched movement to the absolute position specified by the point number. Specification of the avoided position is the relative position from the start point.

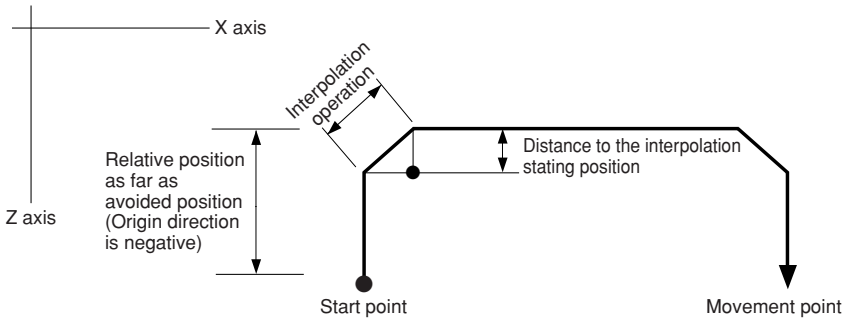
Format ACHI <speed>, <point No.>, <avoided position>, <interpolation start position>, <X axis>, <Y axis>, <Z axis>, <R axis>

Example ACHI 040, 0002, −008, 003, 2, 3, 1, 0
With the movement to avoid the Z axis direction at a distance of 8mm from the Z axis origin. The speed to point 0002 in the X, Y axes direction is 040. The interpolation distance in the avoided operation is 3mm.

Explanation This command is an arched motion specifying the avoided direction and avoided position.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Avoided position: 0 ～ 999
   At the axis specified as 1 in the axis setting item, specify the relative position from the current position.
   Position specification is in mm units. Use ＋ (positive) or − (negative) to specify the direction. Moving from the current position in the direction of the origin is expressed as − (negative).
4) Interpolation start position: 0 ～ 999
   When executing an arched motion operation, specify the distance between the avoided position and the interpolated movement start position in mm units.
5) X axis: 0, 1, 2, 3
6) Y axis: 0, 1, 2, 3
7) Z axis: 0, 1, 2, 3
8) R axis: 0, 1, 2, 3
   In the axis setting item, 0 specifies no use (not related to movement direction), 1 specifies the avoided direction, 2 specifies the movement direction, and 3 specifies the movement direction in two dimensions.
   If the movement direction is in two dimensions, specify 2 for the axis with the larger movement in different coordinates.
   When Start point = Movement point, nothing happens.

Relationship between ACHI operation path and setting values



9-4-33 MOLA

Function Moves by linear interpolation to the absolute position specified by the point number.

Format MOLA <speed>, <point No.>, <specified axes>

Example MOLA 100, 0005, 21

Moves by linear interpolation at the speed of 100 in X and Y axes direction to point 0005.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves by linear interpolation at specified speed to the specified point. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

- Set the parameter maximum interpolation speed for the 31 (X, Y, and Z axes) according to the PRM128 (X and Y axes maximum interpolation speed).
- Set the parameter maximum interpolation speed for the 41 (X, Y, Z, and R axes) according to the PRM128 (X and Y axes maximum interpolation speed).

9-4-34 MOLI

Function Moves by linear interpolation to a relative position specified by the point number.

Format MOLI <speed>, <point No.>, <specified axes>

Example MOLI 100, 0008, 31

Moves by linear interpolation at the speed of 100 in X, Y, and Z axes direction to point 0008.

Explanation This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).

Moves by linear interpolation at specified speed to the specified point.

After movement, the absolute position is the current position with the offset point added on. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

9-4-35 MOLF

Function Moves by linear interpolation to the absolute position specified by the point number, until the specified DI No. input matches the specified DI state.

Format MOLF <speed>, <point No.>, <DI No.>, <DI state>, <specified axes>

Example MOLF 100, 0008, 06, 1, 31

Moves by linear interpolation at the speed of 100 in X, Y, and Z axes direction to point 0008.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves by linear interpolation at specified speed to the specified point.

Moves at a specified speed to the specified point while the DI input remains invalid. Stops when the DI input becomes valid, and moves to the next command. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
4) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.
5) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.

※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.

- Set the parameter maximum interpolation speed for the 31 (X, Y, and Z axes) according to the PRM128 (X and Y axes maximum interpolation speed).
- Set the parameter maximum interpolation speed for the 41 (X, Y, Z, and R axes) according to the PRM128 (X and Y axes maximum interpolation speed).

9-4-36 MOLD

Function Moves by linear interpolation to the absolute position specified by coordinates.

Format MOLD <speed>, <X>, <Y>, <Z>, <R>, <specified axes>

Example MOLD 100, +010.00, +010.00, +000.00, +000.00, +000.00, 21
Moves by linear interpolation at the speed of 100 in X and Y axes direction to coordinates (010.00, 010.00, 000.00, 000.00).

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by linear interpolation at a specified speed to coordinates specified in 0.01mm units in relation to the X, Y, Z, and R axes. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ~ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) X position data: −999.99 ~ +999.99 (mm)
3) Y position data: −999.99 ~ +999.99 (mm)
4) Z position data: −999.99 ~ +999.99 (mm)
5) R position data: −999.99 ~ +999.99 (mm)
   If you set to position data a value in excess of the software limit set in the parameters, execution of the program will result in error. If the SHFT command being executed, however, no error will occur as long as the value added to the shift position coordinate does not exceed the software limit.
6) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

- Set the parameter maximum interpolation speed for the 31 (X, Y, and Z axes) according to the PRM128 (X and Y axes maximum interpolation speed).
- Set the parameter maximum interpolation speed for the 41 (X, Y, Z, and R axes) according to the PRM128 (X and Y axes maximum interpolation speed).

9-4-37 COLA

Function Moves around the circular interpolation in reference to the point number defined by the absolute positions (start point, end point, and center point).

Format COLA <speed>, <center point No.>, <start point No.>, <end point No.>, <rotation direction>, <specified axes>

Example COLA 050, 0005, 0006, 0007, 1, 21
With circle center on point 0005, moves by circular interpolation at speed 050 in X and Y axes direction, in a positive rotation from point 0006 to point 0007.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by circular interpolation at a specified speed, with a specified center point as the center of the circle. It moves from one specified point to another specified point.

1) Speed: 001 ~ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Center point No.: 0000 ~ 9999, P00 ~ P31
3) Start point No.: 0000 ~ 9999, P00 ~ P31
4) End point No.: 0000 ~ 9999, P00 ~ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
5) Rotation direction: 0, 1
   Specify 0 for negative direction rotation, 1 for positive direction rotation.
6) Specified axes: 21, 22
   Specify 21 for X and Y axes, 22 for Z and R axes.

※ Cannot be used for S-shape settings.

※ Maximum speed for move by circular interpolation should be restricted when the movement distance is short.
   If the movement track for move by circular interpolation is less than 20mm, limit the speed to 60mm/s or less.
   (For the interpolation speed parameter (PRM128) of 200mm/s, this means a speed setting is 30% or less.)

9-4-38 COLI

Function Moves around the circular interpolation in reference to the point number defined by the relative positions (end point, center point).

Format COLI <speed>, <center point No.>, <start point No.>, <end point No.>, <rotation direction>,<specified axes>

Example COLI 050, 0005, 0000, 0007, 1, 21
With circle center on point 0005, moves by circular interpolation to point 0007 at speed 050 in X and Y axes direction in positive rotation. The position data of point 0000 is (0, 0, 0, 0).

Explanation This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).
Moves by circular interpolation at specified speed, with a specified point as the center of the circle. It moves from one specified point to another specified point. After movement, the absolute position is the current position with the point offset amount added on.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Center point No.: 0000 ～ 9999
3) Start point No.: 0000 ～ 9999, P00 ～ P31
   The start point is the current position.
   Coordinate (0, 0, 0, 0) specifies the registered point.
4) End point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
5) Rotation direction: 0, 1
   Specify 0 for negative direction rotation, 1 for positive direction rotation.
6) Specified axes: 21, 22
   Specify 21 for X and Y axes, 22 for Z and R axes.

※ Cannot be used for S-shape settings.

※ Maximum speed for move by circular interpolation should be restricted when the movement distance is short.
   If the movement track for move by circular interpolation is less than 20mm, limit the speed to 60mm/s or less.
   (For the interpolation speed parameter (PRM128) of 200mm/s, this means a speed setting is 30% or less.)

9-4-39 COLF

Function Moves around the circular interpolation in reference to the point number defined by the absolute positions (start point, end point, and center point), until the specified DI No. input matches the specified DI state.

Format COLF <speed>, <center point No.>, <start point No.>, <end point No.>, <rotation direction>, <specified axes>, <DI No.>, <DI state>

Example COLF 050, 0005, 0006, 0007, 1, 21, 09, 0
With circle center on point 0005, moves by circular interpolation at speed 050 in the X and Y axes direction in a positive rotation from point 0006 to point 0007.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by circular interpolation at specified speed, with a specified point as the center of the circle. It moves from one specified point to another specified point.
Moves at specified speed to the specified point while the DI input remains invalid. When the DI input becomes valid, moves to the next command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Center point No.: 0000 ～ 9999
3) Start point No.: 0000 ～ 9999, P00 ～ P31
4) End point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

5) Rotation direction: 0, 1
Specify 0 for negative direction rotation, 1 for positive direction rotation.
6) Specified axes: 21, 22
Specify 21 for X and Y axes, 22 for Z and R axes.
7) DI No.: 0 ～ 23
Specify one number from input 0 to input 23.
8) DI state: 0, 1
0 is enabled when it is OFF, 1 is enabled when it is ON.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.
※ Cannot be used for S-shape settings.
※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.
※ Maximum speed for move by circular interpolation should be restricted when the movement distance is short.
If the movement track for move by circular interpolation is less than 20mm, limit the speed to 60mm/s or less.
(For the interpolation speed parameter (PRM128) of 200mm/s, this means a speed setting is 30% or less.)

9-4-40 PALP

Function Moves to the absolute position specified by the pallet number and matrix number.

Format PALP <speed>, <pallet No.>, <matrix No.>

Example PALP 050, 02, 00007
Moves at speed 050 to matrix 00007 of pallet 02.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to the specified matrix of the specified pallet.
1) Speed: 001 ～ 100
Percentage (%) of the maximum speed specified in the parameters.
2) Pallet No.: 00 ～ 31
The pallet number is a particular number designated to previously registered coordinate data out of a maximum 32 pallets, with 00 to 31 available for use.
3) Matrix No.: 00000 ～ 65535, C00 ～ C31
This is a particular number designated to the matrix point on the pallet.
You can also use it to specify the counter variable. The variable value range is 0000 to 65535.
This range can change depending on the pallet number and the definition of the MAT command. The minimum value is 0, and the maximum value is [(Number of rows) × (Number of columns) −1].

Before executing this command, you must use the MAT command to define the pallet matrix number.

9-4-41 PALL

Function Moves by linear interpolation to the absolute position specified by the pallet number and matrix number.

Format PALL <speed>, <pallet No.>, <matrix No.>

Example PALL 050, 02, 00007
Moves by linear interpolation at speed 050 to matrix 00007 of pallet 02.

Explanation This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by linear interpolation at specified speed to the specified matrix of the specified pallet. If there is an interpolation movement command on the next step, the actuator can move to the next movement without stopping at the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Pallet No.: 00 ～ 31
   The pallet number is a particular number designated to previously registered coordinate data out of a maximum 32 pallets, with 00 to 31 available for use.
3) Matrix No.: 00000 ～ 65535, C00 ～ C31
   This is a particular number designated to the matrix point on the pallet.
   You can also use it to specify the counter variable. The variable value range is 0000 to 65535.
   This range can change depending on the pallet number and the definition of the MAT command. The minimum value is 0, and the maximum value is [(Number of rows)×(Number of columns) −1].

Before executing this command, you must use the MAT command to define the pallet matrix number.

9-4-42 L

Function Defines the label number.

Format L <label No.>

Example L 002
Sets the current step to label number 002.

Explanation This number shows the destination when executing the jump or CALL command.

1) Label No.: 001 ～ 999
   Select any number.

9-4-43 CALL

Function Calls a program as a subroutine.

Format CALL <program No.>, <label No.>, <count>

Example CALL 012, 006, 00005
Calls label 006 of program 012 a total of 5 times.

Explanation Unlike the jump command, you can specify how many times this command will be used. For target programs, this command is required for integrating with the END command.

1) Program No.: 000 ～ 999
   Specify an already registered program number.
2) Label No.: 001 ～ 999
   The label is the number specifying the step position of the call target.
3) Count: 00001 ～ 65535
   Number of calls made.

Maximum nesting (execution layers) of CALL command is 10.

9-4-44 JMP

Function Jumps to a program.
Format JMP <program No.>, <label No.>
Example JMP 018, 002
Jumps to label 002 of program 018.
Explanation
1) Program No. : 000 ～ 999
Specify an already registered program number.
2) Label No.: 001 ～ 999
The label is the number specifying the step position of the call target.

9-4-45 DSET

Function Substitutes the DI input into variable as binary value.
Format DSET <variable 1>, <bit No.>
Example DSET C01, 0004
Substitutes the 4-bit numeric value of the DI input into counter variable C01.
In this case, if the DI input is DI0=0, DI1=1, DI2=0, DI3=1
(1010 in binary = 10 in decimal system), the value substituted into C01 is 10.
Explanation Substitutes DI input into a variable as a binary value.
1) Variable 1: P00 ～ P31, C00 ～ C31
You can use variable 1 to specify either the point variable or the counter variable.
2) Bit No.: 01 ～ 16
The bit number specifies the number of bits that enable DI input. For example, if 4 is specified for the bit number, DI0 to DI3 are enabled, and the range of numeric values is 0 to 15.

9-4-46 DVEN

Function Specifies the axis and switches the energized current.
Format DVEN <specified axis>, <current>
Example DVEN 1, 1
Uses drive current to energize the X axis.
Explanation
1) Specified axis: 1, 2, 3, 4
Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis.
2) Current: 0, 1
Specify 0 for holding current (PRM076, 079, 082, 085), 1 for driving current (PRM077, 080, 083, 086).
When the axis is stopped, you can use this command to switch from the driving current state to the holding current state.

9-4-47 SET

Function Substitutes data into variable.
Format SET <variable 1>, <data>
Example SET P03, 0008
Substitutes 0008 to point variable P03. In this case, it is equivalent to P 003, 0008.
SET P04, P03
Substitutes P03 value into point variable P04.
Explanation You can specify data either as a directly specified numeric value or as a variable.
Substitutes either numeric data or variable data into variable 1.
1) Variable 1: P00 ～ P31, C00 ～ C31
You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ～ 65535, P00 ～ P31, C00 ～ C31
You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

9-4-48 ADD

Function Adds either a numeric value or a variable to the variable.

Format ADD <variable 1>, <data>

Example ADD P04, 0006

Adds 0006 to point variable P04. In this case, it is equivalent to P+ 004, 0006.

ADD P02, C04

Adds C04 value to point variable P02.

Explanation Adds either numeric data or variable data to variable 1.

The calculation result is substituted into variable 1.

1) Variable 1: P00 ~ P31, C00 ~ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
   You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

9-4-49 SUB

Function Subtracts either a numeric value or a variable from the variable.

Format SUB <variable 1>, <data>

Example SUB P09, 0005

Subtracts 0005 from point variable P09. In this case, it is equivalent to P- 009, 0005.

SUB P06, C07

Subtracts C07 value from point variable P06.

Explanation Subtracts either numeric data or variable data from variable 1.

The calculation result is substituted into variable 1.

1) Variable 1: P00 ~ P31, C00 ~ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
   You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

9-4-50 AND

Function Performs logic product operation of variable and either a numeric value or a variable.

Format AND <variable 1>, <data>

Example AND P01, 0012

Performs logic product operation of point variable P01 and 0012.

AND P03, C01

Performs logic product operation of point variable P03 and C01.

Explanation Logic product operation of variable 1 and either numeric data or variable data.

The calculation result is substituted into variable 1.

1) Variable 1: P00 ~ P31, C00 ~ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
   You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

9-4-51 OR

Function Performs logic sum operation of variable and either a numeric value or a variable.

Format OR <variable 1>, <data>

Example OR P10, 0030
Performs logic sum operation of point variable P10 and 0030.
OR P04, C05
Performs logic sum operation of point variable P04 and C05.

Explanation Logic sum operation for variable 1 and either numeric data or variable data.
The calculation result is substituted into variable 1.

1) Variable 1: P00 ～ P31, C00 ～ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ～ 65535, P00 ～ P31, C00 ～ C31
   You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

9-4-52 JMPB

Function Jumps to a program, if the DI No. input matches the specified DI state.

Format JMPB <program No.>, <label No.>, <DI No.>, <DI state>

Example JMPB 022, 004, 05, 0
If input 05 is OFF, jumps to the specified program. If it is ON, moves to the next step.

Explanation Jump conditions depend on the general-purpose input state.

1) Program No.: 000 ～ 999
   Specify an already registered program number.
2) Label No.: 001 ～ 999
   The label is the number specifying the step position of the call target.
3) DI state: 0 ～ 23
   Specify one number from input 0 to input 23.
4) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

9-4-53 TOS

Function Starts continuous interpolation.
Format TOS <specified axes>
Example TOS 21
MOLA 100 0005 21
Starts continuous interpolation on X and Y axes.
Explanation
1) Specified axes: 21, 22
Specify 21 for X and Y axes, 22 for Z and R axes.
The interpolation movement command speed that you set in TOS becomes the speed for continuous interpolation.

9-4-54 TOC

Function Continues the continuous interpolation.
Format TOC <specified axes>
Example TOC 22
Continues the continuous interpolation on Z and R axes.
Explanation
1) Specified axes: 21, 22
Specify 21 for X and Y axes, 22 for Z and R axes.

9-4-55 TOE

Function Ends the continuous interpolation.
Format TOE <specified axes>
Example TOE 21
Ends the continuous interpolation on X and Y axes.
Explanation
1) Specified axes: 21, 22
Specify 21 for X and Y axes, 22 for Z and R axes.

9-4-56 SRVO

Function Switches the motor driver ON/OFF.
Format SRVO <X axis>, <Y axis>, <Z axis>, <R axis>
Example SRVO 1, 1, 0, 0
Sets the motor driver for X and Y axes to ON, and for Z and R axes to OFF.
Explanation This simultaneously controls the energized state of all four axes.
1) Axis: 0, 1
0 turns the output OFF, 1 turns it ON.

9-4-57 ACK

Function Returns response to RS232C communication.
Format ACK <port No.>
Example ACK 0
Returns response to the communication port 0.
Explanation This is a command for sending response data to RS232C port. There is no timing or other restrictions for returning a response. So as long as this command is executed, the response data is sent unconditionally.
1) Port No.: 0, 2
Specify 0 for the lower connector port, 2 for the upper connector port.

9-5 Sample Programs

9-5-1 Moving between two points

Step	Command	Operand	Comment
0	MOVA	50 1	Moves to the first point.
1	MOVA	50 2	Moves to the second point.
2	MOVA	100 0	Moves to a standby point.
3	END		End

9-5-2 Palletizing

Step	Command	Operand	Comment
0	MAT	0 5 6	Defines the matrix for pallet 0.
1	C	0 0	Substitutes initial counter value.
2	L	1	Loop positions
3	PALP	80 0 C00	Moves to the n^{th} item in pallet 0.
4	DO	1 1	Picking up operation (DO output)
5	MOVA	5 0 3	Moves to a supply point.
6	DO	1 0	Releasing operation (DO output)
7	JMPC	0 2 0 29	Final judgment
8	C+	0 1	Counter increment
9	JMP	0 1	Repeat
10	L	2	
11	MOVA	100 0	Moves to a standby point.
12	END		End

9-5-3 Circular Interpolation

Step	Command	Operand	Comment
0	MOVA	100 4	Moves to a circle starting point.
1	COLA	100 6 4 5 1 21	Moves by circular interpolation.
2	MOVA	100 0	Moves to a standby point.
3	END		End

9-5-4 Multitask

Execution of this sample program, will cause the general-purpose output 01 to turn ON one second after movement starts, and to turn OFF one second later, until the movement is ended.

Program 000 (Task 1)

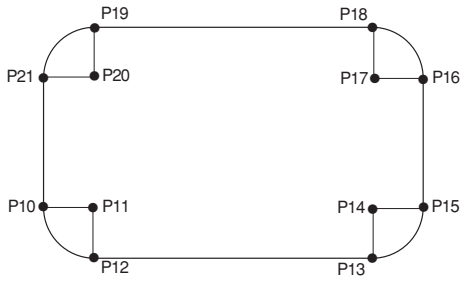
Step	Command	Operand	Comment
0	TON	2 1 0	Starts task 2.
1	MOVA	10 1	Moves to the 1st point.
2	TOFF	2	Stops task 2.
3	TON	2 1 0	Starts task 2.
4	MOVA	10 2	Moves to the 2nd point.
5	TOFF	2	Stops task 2.
6	TON	2 1 0	Starts task 2.
7	MOVA	10 3	Moves to the 3rd point.
8	TOFF	2	Stops task 2.
9	TON	2 1 0	Starts task 2.
10	MOVA	10 4	Moves to the 4th point.
11	TOFF	2	Stops task 2.
12	TON	2 1 0	Starts task 2.
13	MOVA	10 5	Moves to the 5th point.
14	TOFF	2	Stops task 2.
15	TON	2 1 0	Starts task 2.
16	MOVA	10 6	Moves to the 6th point.
17	TOFF	2	Stops task 2.
18	MOVA	100 0	Moves to a standby point.
19	END		End

Program 001 (Task 2)

Step	Command	Operand	Comment
0	TIMR	100	Waits 1 second.
1	DO	1 1	OUT01 turns ON.
2	TIMR	100	Waits 1 second.
3	DO	1 0	OUT01 turns OFF.
4	END		End

9-5-5 Continuous Interpolation

Continuous interpolation executes movement (at speed 60%) on the ground shape track.

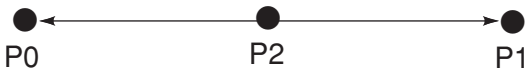


Program 000

Step	Command	Operand	Comment
0	TOS	21	Starts continuous interpolation.
1	MOLA	60 10 21	Moves by linear interpolation.
2	TOC	21	Continues the continuous interpolation.
3	COLA	60 11 10 12 1 21	Moves by circular interpolation.
4	TOC	21	Continues the continuous interpolation.
5	MOLA	60 13 21	Moves by linear interpolation.
6	TOC	21	Continues the continuous interpolation.
7	COLA	60 14 13 15 1 21	Moves by circular interpolation.
8	TOC	21	Continues the continuous interpolation.
9	MOLA	60 16 21	Moves by linear interpolation.
10	TOC	21	Continues the continuous interpolation.
11	COLA	60 17 16 18 1 21	Moves by circular interpolation.
12	TOC	21	Continues the continuous interpolation.
13	MOLA	60 19 21	Moves by linear interpolation.
14	TOC	21	Continues the continuous interpolation.
15	COLA	60 20 19 21 1 21	Moves by circular interpolation.
16	TOE	21	Ends continuous interpolation.
17	MOLA	60 10 21	Moves by linear interpolation.
18	END		End

9-5-6 VCHG Movement

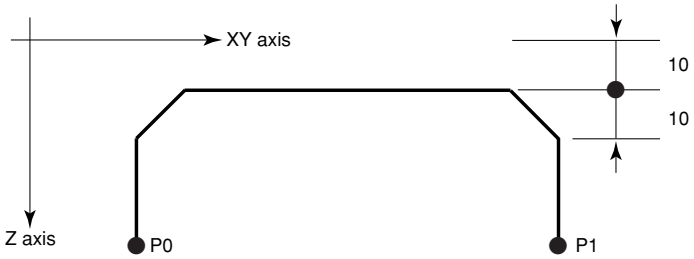
Changes speed at point number P2, midway along the reciprocating movement on Y axis point numbers P0 and P1.



Program 000

Step	Command	Operand	Comment
0	L	1	
1	VCHG	20 2 2	At P2, speed changes to 20%.
2	DRVA	100 2 1	Moves to P1 at 100% speed.
3	VCHG	100 2 2	At P2, speed changes to 100%.
2	DRVA	20 2 0	Moves to P0 at 20% speed.
5	JMP	0 1	
6	END		End

9-5-7 Arched Movement



Program 000

Step	Command	Operand	Comment
0	L	1	
1	MOVA	100 0	Moves to P0
2	TIMR	100	
3	L	2	
4	ACHA	100 1 10 10 3 2 1 0	Avoids moving towards the Z axis direction at a position that is 10mm from the origin, and performs XY operation at P1.
5	TIMR	100	
6	ACHA	100 0 10 10 3 2 1 0	Avoids moving towards the Z axis direction at a position that is 10mm from the origin, and performs XY operation at P0.
7	TIMR	100	
8	JMP	0 2	
9	END		

9-5-8 Jump in External I/O Input as Binary Value

Substitutes external I/O input as binary value into a counter variable.
Based on the counter variable value in this subroutine, use the JMPC command to jump to a binary value in program 000.

Program 000

Step	Command	Operand	Comment
0	L	1	
1	CALL	50 1 1	Subroutine CALL
2	JMPC	1 1 0 0	If I/O input value is 0, jumps to program 1.
3	JMPC	2 1 0 1	If I/O input value is 1, jumps to program 2.
4	JMPC	3 1 0 2	If I/O input value is 2, jumps to program 3.
5	END		End

Program 050

Step	Command	Operand	Comment
0	L	1	
1	C	0 0	Clears counter variable C00.
2	JMPB	50 2 0 0	If IN0 is 1, then adds 1 to C00.
3	C+	0 1	
4	L	2	
5	JMPB	50 3 1 0	If IN1 is 1, then adds 2 to C00.
6	C+	0 2	
7	L	3	
8	JMPB	50 4 2 0	If IN2 is 1, then adds 4 to C00.
9	C+	0 4	
10	L	4	
11	JMPB	50 5 3 0	If IN3 is 1, then adds 8 to C00.
12	C+	0 8	
13	L	5	
14	END		Returns

9-5-9 Binary Input Jump Using DSET

When DI0 to DI3 are input as binary values, those values are then used to jump to another program.

Program 0

Step	Command	Operand	Comment
0	L	1	
1	DSET	C00 4	Substitutes DI00 to DI03 into C00.
2	JMPC	1 1 0 0	If C00 is 0, jumps to program 1.
3	JMPC	2 1 0 1	If C00 is 1, jumps to program 2.
4	JMPC	3 1 0 2	If C00 is 2, jumps to program 3.
5	JMPC	4 1 0 3	If C00 is 3, jumps to program 4.
6	END		End

9-5-10 Binary Input Jump Using DSET

When DI4 to DI7 are input as binary values, those values are then used to jump to another program.

Program 0

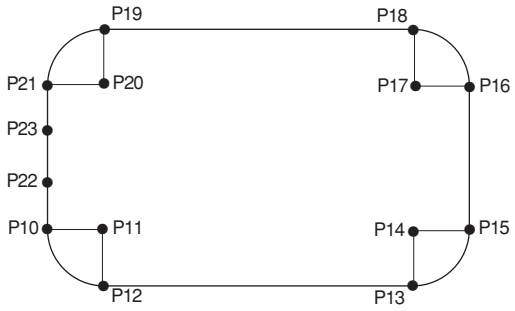
Step	Command	Operand	Comment
0	L	1	
1	DSET	C01 8	Substitutes DI00 to DI07 into C01.
2	AND	C01 240	Drops bottom 4 bits (DI00 to DI03).
3	JMPC	1 1 1 0	If C00 is 0, jumps to program 1.
4	JMPC	2 1 1 16	If C00 is 16, jumps to program 2.
5	JMPC	3 1 1 32	If C00 is 32, jumps to program 3.
6	JMPC	4 1 1 48	If C00 is 48, jumps to program 4.
7	END		End

9-5-11 Point Movement Using DSET

When DI0 to DI3 are input as binary values, those values are then used to move to a point.

Step	Command	Operand	Comment
0	L	1	
1	DSET	P00 4	Substitutes DI00 to DI03 into P00.
2	MOVA	50 P00	Uses binary input to move to the point.
3	END		End

9-5-12 Turning DO to ON/OFF at a Specified Position during Continuous Interpolation



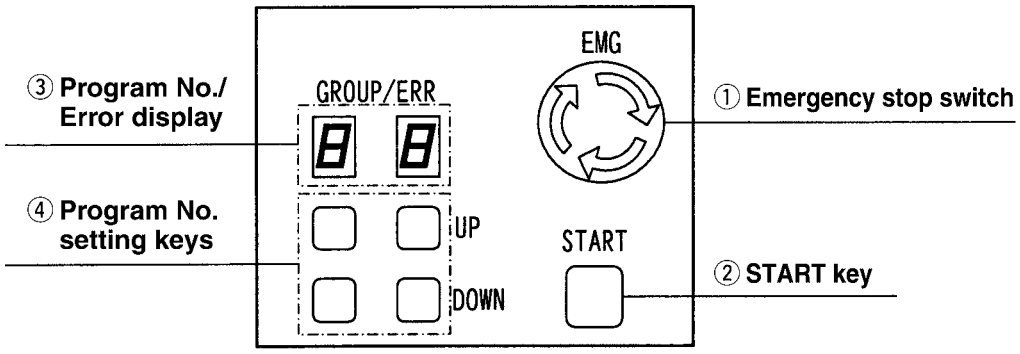
Step	Command	Operand	Comment
0	L	1	
1	MOVA	60 21	Moves to continuous interpolation starting point P21.
2	MDO	22 50 1 0 1	Turns DO00 to ON at point 22.
3	MDO	23 50 2 0 0	Turns DO00 to OFF at point 23.
4	TOS	21	Starts continuous interpolation.
5	MOLA	60 10 21	Moves by linear interpolation.
6	TOC	21	Continues the continuous interpolation.
7	COLA	60 11 10 12 1 21	Moves by circular interpolation.
8	TOC	21	Continues the continuous interpolation.
9	MOLA	60 13 21	Moves by linear interpolation.
10	TOC	21	Continues the continuous interpolation.
11	COLA	60 14 13 15 1 21	Moves by circular interpolation.
12	TOC	21	Continues the continuous interpolation.
13	MOLA	60 16 21	Moves by linear interpolation.
14	TOC	21	Continues the continuous interpolation.
15	COLA	60 17 16 18 1 21	Moves by circular interpolation.
16	TOC	21	Continues the continuous interpolation.
17	MOLA	60 19 21	Moves by linear interpolation.
18	TOC	21	Continues the continuous interpolation.
19	COLA	60 20 19 21 1 21	Moves by circular interpolation.
20	TOE	21	Ends continuous interpolation.
21	MOLA	60 10 21	Moves by linear interpolation.
22	END		End

Chapter 10 Operating

This chapter describes how to operate the Cell Master. Once you have registered a program, you will be able to operate it simply by reading this chapter, which covers automatic operation using the operation box, automatic operation using the programming box, and step operation.

10-1 Operation Using the Operation Box

10-1-1 Key Layout and Functions



① Emergency stop switch:	Pressing this switch causes an emergency stop, halting operations. Turning it to the right clears the emergency stop.
② START key:	After an emergency stop, press this key to execute return to origin. After a return to origin, press this key to start/pause the automatic program operation.
③ Program No./Error display:	Displays the program number during execution of automatic program operation. Also displays the error number when an error occurs.
④ Program No. setting keys:	Use these keys to set the program number for automatic program operation. In each digit, press the UP key to increase the number and the DOWN key to decrease the number.

10-1-2 How to Execute Return to Origin

After switching on the power, or if return to origin remains incomplete (02 displayed), press the START key.

If the program is in operation or temporarily stops, press the EMG switch for the emergency stop and then press the START key.

10-1-3 How to Perform Automatic Operation

1) After return to origin, use the program No. setting keys to display the program number to be started.
2) Press the START key.

10-1-4 How to Temporarily Stop the Operation

During automatic operation, press the START key.

To restart operation, press the START key again.

10-1-5 Emergency Stop

This section describes how to initiate an emergency stop, and how to recover.

Caution: In the Cell Master, there are 4 ways to input an emergency stop, including the emergency stop switch on the operation box, the EMG using I/O input, the emergency stop switch on the programming box, and the EMG using a communication command. Of these 4 EMG, the emergency stop switch on the programming box and the communication command EMG cannot be used to execute an emergency stop during return to origin.

(1) How to initiate an emergency stop

If for some reason you need to immediately stop the actuator during the Cell Master operation, press the emergency stop switch (red button) on the operation box. The switch is locked into the pressed position, and 01 is displayed. To release the lock, rotate the switch to the right whereupon 02 is displayed.

The actuator state during an emergency stop depends on the PRM008 setting.

(2) How to recover from an emergency stop

Check that operations can safely be restarted, and then release the lock of the operation box emergency stop switch.

Next, execute return to origin.

10-1-6 Error Codes

Error No.	Description	Cause	Remedy
001	Emergency stop switch ON state	In an emergency stop state.	Release the emergency stop on the operation box.
002	Return to origin incomplete	Failed to return to origin.	Use the operation box to execute return to origin.
003	Software limit error	During teaching, X axis has exceeded the + or − side limits.	Execute teaching at the position located in + or − direction from where the error occurred.
004	Program selection error	Attempted to execute an unregistered program.	Specify a registered program No.
005	Undefined code used	Wrong code input.	Input the correct code.
006	Operation box disconnection error	Operation box not connected.	Connect the operation box. Or set an unassigned parameter in the operation box to 1.
007	Multitask overlap starting error	Task No. for starting a task already in use.	Use a different task No. to start the task.
008	Return to origin error	Return to origin was not completed. Either the load is excessive, or the origin sensor has broken down.	Lighten the load. Or repair the robot.
010	Pallet data error	Input values for number of X and Y axes, etc., are not correct.	Adjust the setting values within the correct range.
011	Emergency stop ON state by PC	In an emergency stop state.	Press the reset switch on the Cell Master main unit, to release the emergency stop.
012	232C starting error	Not in the 232C starting mode.	Change the starting mode setting parameter to the 232C starting mode.
013	I/O starting error	Not in the I/O starting mode.	Change the starting mode setting parameter to the I/O starting mode.
014	Operation box starting error	Not in the operation box starting mode.	Change the starting mode setting parameter to the operation box starting mode (0).
016	Circular arc initial point error	Starting point is not the current position.	Change the specified starting point to the correct value.
021	X axis missed steps	X axis is in missed steps.	Remove the cause of the missed steps.
022	Y axis missed steps	Y axis is in missed steps.	Remove the cause of the missed steps.
023	Z axis missed steps	Z axis is in missed steps.	Remove the cause of the missed steps.
024	R axis missed steps	R axis is in missed steps.	Remove the cause of the missed steps.
099	Now returning to origin	—	—

10-2 Operation Using the Programming Box

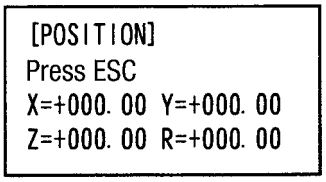
When using the programming box to perform operations, you must change the PRM005 startup method parameter to 2.

10-2-1 How to Execute Return to Origin

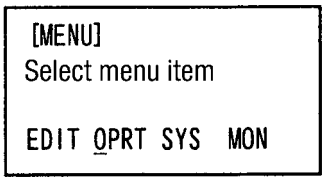
This section describes the return to origin operation.

After switching on the power to the Cell Master and performing an emergency stop, you must always execute return to origin.

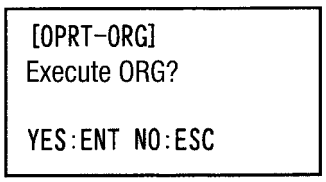
1) In the initial screen, press the ESC key to go to the menu screen.



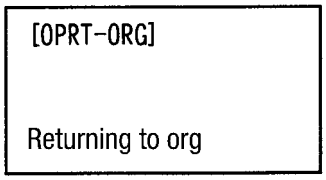
2) Place the cursor at OPRT, and press the ENT key.



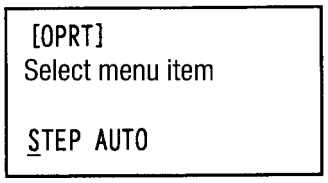
3) Press the ENT key.



4) This screen shows return to origin in progress.



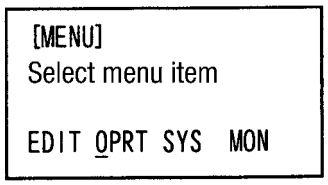
5) After completing return to origin, the system automatically returns to the menu screen.



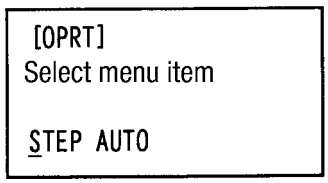
10-2-2 How to Execute Step Operation

This section describes how to perform step operation after return to origin.
When performing multitask programs, only the selected program is executed in step operation.

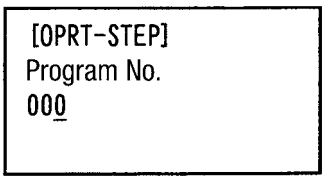
1) Place the cursor at OPRT, and press the ENT key.



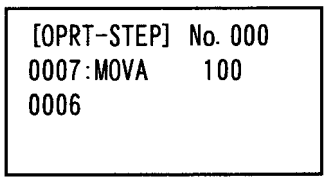
2) Place the cursor at STEP, and press the ENT key.



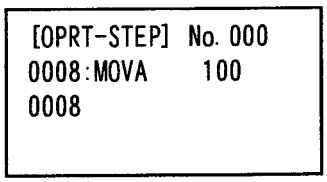
3) Use the UP ↑, DOWN ↓, and numeric keys to select the program No. for the step operation, and press the ENT key.



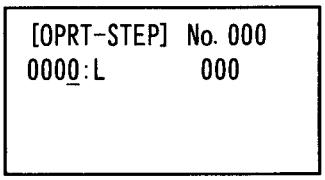
4) The initial address 0000 and the contents of the selected command are displayed.
Use the UP ↑, DOWN ↓, and numeric keys to select the address of the step operation, and press the ENT key.



5) The address and command are displayed. Press the ENT key to execute the displayed step. The address increases by one and the next step is displayed.



6) Each time you press the ENT key, another step is executed.

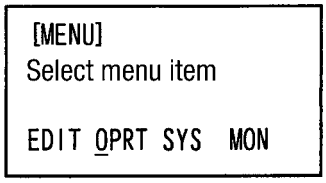


7) If partway through you want to move to a different step, execute step 4) again.

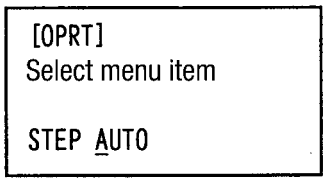
10-2-3 How to Execute Automatic Operation

This section describes how to perform automatic operation after return to origin.
When performing multitask programs, all programs that started are executed in automatic operation.

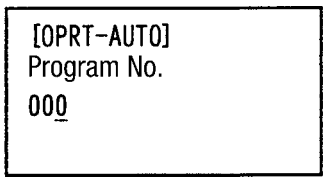
1) Place the cursor at OPRT, and press the ENT key.



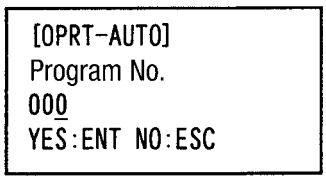
2) Place the cursor at AUTO, and press the ENT key.



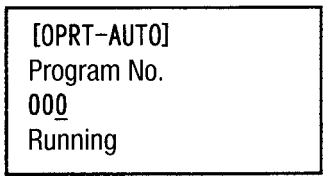
3) Use the UP ↑, DOWN ↓, and numeric keys to select the program No. for the automatic operation, and press the ENT key.



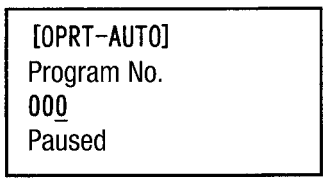
4) Press the ENT key to execute automatic operation. If you want to change the program number, press ESC and return to step 3).



5) This screen shows automatic operation in progress.
To pause the operation during automatic operation, press the ENT key.



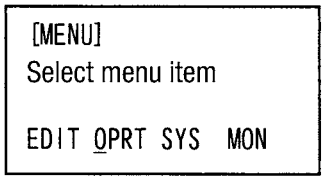
6) Each time you press the ENT key, operation will move back and forth between pause and automatic operation.



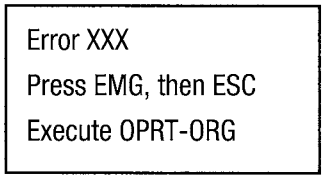
10-2-4 How to Start Operation from the Alarm State

To start operation from the alarm state when the ALRM lamp lights up, press the EMG switch and execute return to origin, then restart operations.
The screens show what happens if you attempt to resume operations without pressing the EMG switch.

1) When the ALRM lamp lights up, place the cursor at OPRT, and press the ENT key.



2) Press the EMG switch, and execute return to origin.
※ XXX represents the error number.



10-2-5 Emergency Stop

This section describes how to initiate an emergency stop, and how to recover.

Caution: In the Cell Master, there are 4 ways to input an emergency stop, including the emergency stop switch on the operation box, the EMG using I/O input, the emergency stop switch on the programming box, and the EMG using a communication command. Of these 4 EMG, the emergency stop switch on the programming box and the communication command EMG cannot be used to execute an emergency stop during return to origin.

(1) How to initiate an emergency stop

If for some reason you need to immediately stop the actuator during the Cell Master operation, press the EMG key on the programming box. The programming box EMG key is not a locking type.
The actuator is therefore in a free state while the system is in the emergency stop status.

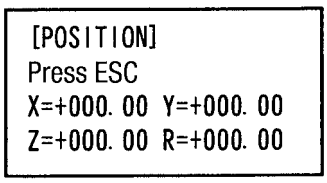
(2) How to recover from an emergency stop

Check that operations can safely be restarted, and then execute return to origin.

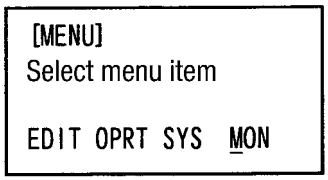
10-2-6 I/O Monitor Display

You can display the current I/O input and output state on the screen.

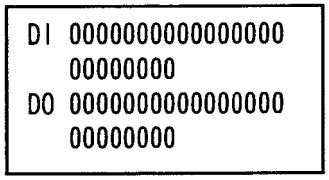
1) In the initial screen, press the ESC key to go to the menu screen.



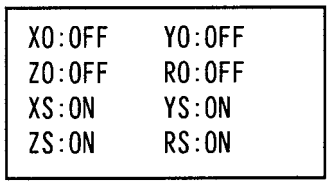
2) Place the cursor at MON, and press the ENT key.



3) The screen displays in order from IN24 to IN0, and from OUT24 to OUT0.



4) Press the ENT key again to display the origin sensor state and motor energizing state for each axis.
XO, YO, ZO, and RO show the origin sensor state, while XS, YS, ZS, and RS display the motor energizing state.



Chapter 11 Control by Personal Computer

This chapter describes the communication commands for controlling the Cell Master from a PC or other host control devices, via a serial port (RS232C).
The communication commands use the same command format as robot language, and are simple enough that you can substitute in your own programs even if you are a first-time user.

11-1 Communication Interface Specifications

Set the communication settings for a personal computer and other external equipment in the following manner. For the setting methods, see the Owner's Manual for each machine.

- ■ Transmission rate 38400 bit/s
- ■ Communication method Full duplex
- ■ Synchronous method Asynchronous method
- ■ Data bit length 8 bits
- ■ Stop bit length 1 bit
- ■ Parity check None
- ■ Flow control None
- ■ Return key transmission CR

11-2 Communication Cable Specifications

11-2-1 When PC/Device Has 25-pin D-sub Connectors

Connector on Cell Master:

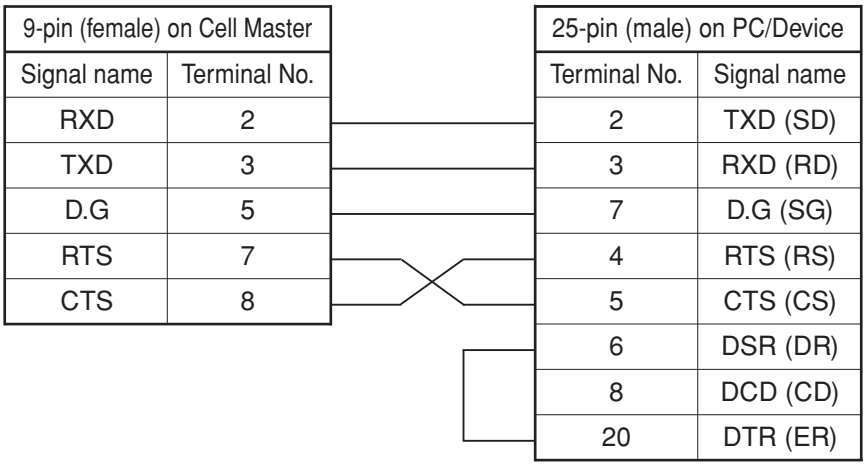
Connector product No.: XM2D-0901 (made by OMRON) or an equivalent product

Cover product No.: XM2S-0911 (made by OMRON) or an equivalent product

Connector on PC/Device

Connector product No.: XM2A-2501 (made by OMRON) or an equivalent product

Cover product No.: XM2S-2511 (made by OMRON) or an equivalent product



9-pin (female) on Cell Master		25-pin (male) on PC/Device	
Signal name	Terminal No.	Terminal No.	Signal name
RXD	2	2	TXD (SD)
TXD	3	3	RXD (RD)
D.G	5	7	D.G (SG)
RTS	7	4	RTS (RS)
CTS	8	5	CTS (CS)
		6	DSR (DR)
		8	DCD (CD)
		20	DTR (ER)

11-2-2 When PC/Device Has 9-pin D-sub Connectors

Connector on Cell Master:

Connector product No.: XM2D-0901 (made by OMRON) or an equivalent product

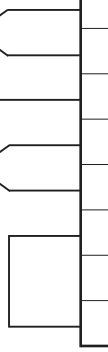
Cover product No.: XM2S-0911 (made by OMRON) or an equivalent product

Connector on PC/Device

Connector product No.: XM2D-0901 (made by OMRON) or an equivalent product

Cover product No.: XM2S-0911 (made by OMRON) or an equivalent product

9-pin (female) on Cell Master		25-pin (male) on PC/Device	
Signal name	Terminal No.	Terminal No.	Signal name
RXD	2	2	RXD(RD)
TXD	3	3	TXD(SD)
D.G	5	5	D.G(SG)
RTS	7	7	RTS(RS)
CTS	8	8	CTS(CS)
		6	DSR(DR)
		1	DCD(CD)
		4	DTR(ER)



Recommended cable type: MISUMI Corporation C06N-09FS-09FS-CROSS

11-3 Setting Parameters

When using communication commands to execute commands related to axis movement (including return to origin), set the PRM005 startup method parameter to 2.

11-4 List of Communication Commands

Command No.	Command (Operation code)	Description and Operand Format
000	ORG	Executes return to origin.
001	ORGM	Specifies the speed and sequence when executing return to origin. <speed>, <X axis sequence>, <Y axis sequence>, <Z axis sequence>, <R axis sequence>
002	RESET	Turns DO output reset.
003	RUN	Starts program-specified automatic operation. <program No.>
004	SRUN	Starts program, step-specified automatic operation. <program No.>, <step No.>
005	LRUN	Starts program, label-specified automatic operation. <program No.>, <label No.>
006	X＋	X axis speed 1, CW movement
007	X－	X axis speed 1, CCW movement
008	Y＋	Y axis speed 1, CW movement
009	Y－	Y axis speed 1, CCW movement
010	Z＋	Z axis speed 1, CW movement
011	Z－	Z axis speed 1, CCW movement
012	R＋	R axis speed 1, CW movement
013	R－	R axis speed 1, CCW movement
014	X＋＋	X axis speed 2, CW movement
015	X－－	X axis speed 2, CCW movement
016	Y＋＋	Y axis speed 2, CW movement
017	Y－－	Y axis speed 2, CCW movement
018	Z＋＋	Z axis speed 2, CW movement

Command No.	Command (Operation code)	Description and Operand Format
019	Z−−	Z axis speed 2, CCW movement
020	R++	R axis speed 2, CW movement
021	R−−	R axis speed 2, CCW movement
022	MOVD	Moves to the direct coordinate entry position. <speed>, <X position data>, <Y position data>, <Z position data>, <R position data>
023	MOVA	Moves to the absolute point data position. <speed>, <point No.>
024	MOVI	Moves to the relative point data position. <speed>, <point No.>
025	MOVF	Moves until the specified DI matches the state. <speed>, <point No.>, <DI No.>, <DI state>
028	DRVD	Moves to the coordinate specified position on the specified axis. <speed>, <specified axis>, <position data>
029	DRVA	Moves to the absolute point data position on the specified axis. <speed>, <specified axis>, <point No.>
030	DRVI	Moves to the relative point data position on the specified axis. <speed>, <specified axis>, <point No.>
031	DRVF	Moves until the specified DI matches the state on the specified axis. <speed>, <specified axis>, <point No.>, <DI No.>, <DI state>
032	DO	Turns DO output on and off. <DO No.>, <DO state>
033	WAIT	Waits for DI input. <DI No.>, <DI state>
035	MAT	Defines the matrix. <pallet No.>, <row (Y)>, <column (X)>
036	SHFT	Shifts the position data. <point No.>
037	SHFR	Resets the position data shift.
039	?POS	Substitutes current position data into the specified point. <point No.>
040	?NO	Reads current program No.
041	?SNO	Reads current step No.

Command No.	Command (Operation code)	Description and Operand Format
043	?PNO	Reads current point No.
044	?STP	Reads all steps in specified program. <program No.>
045	?MEM	Reads number of addable steps in specified program. <program No.>
046	?VER	Reads ROM version.
047	?CRE	Reads the Cell Master type.
048	?CLK	Controller's total startup time
049	?ALM	Reads alarm state.
050	?EMG	Reads emergency stop state.
051	?SRV	Reads energized state.
052	?MAT	Reads defined state for specified pallet. <pallet No.>
053	?DI	Reads DI state. <DI No.>
054	?DO	Reads DO state. <DO No.>
055	RPRM	Reads parameter. <start No.>, <end No.>
056	RPGM	Reads program. <program No.>
057	RPNT	Reads point. <start No.>, <end No.>
058	?DRV	Reads motor drive current state.
060	WPRM	Writes parameter. <parameter No.>, <data>
061	WPGM	Writes program. <program No.>, <line No.>, <language>, <second 1>, <second 2>, <second 3>, <second 4>, <second 5>
062	WPNT	Writes point. <point No.>, <X>, <Y>, <Z>, <R>
063	WEPT	Substitutes current position data by encoder into the specified point. <point No.>
064	IPRM	Initialization
066	MDO	Turns DO output during movement. <point No.>, <range>, <pass count>, <DO No.>, <DO state>

Command No.	Command (Operation code)	Description and Operand Format
069	P	Sets a point variable. <point variable No.>, <point No.>
070	P＋	Adds to the point variable. <point variable No.>, <data>
071	P－	Subtracts from the point variable. <point variable No.>, <data>
072	C	Set a counter variable. <counter variable No.>, <data>
073	C＋	Adds to the counter variable. <counter variable No.>, <data>
074	C－	Subtracts from the counter variable. <counter variable No.>, <data>
075	?P	Reads point No. <matrix No.>
076	?C	Reads counter data. <matrix No.>
077	TON	Starts multitask program. <task No.>, <program No.>, < startup type>
078	TOFF	Stops multitask program. <task No.>
080	VCHG	Changes speed. <speed>, <point No.>, <axis pattern>
083	STOP	Stops all axes.
084	PSTOP	Stops program. <program ON/OFF>
089	MOLA	Moves by linear interpolation to the absolute point data position (4 axes). <speed>, <point No.>, <specified axis>
090	MOLI	Moves by linear interpolation to the relative point data position (4 axes). <speed>, <point No.>, <specified axis>
091	MOLF	Moves by linear interpolation until the specified DI matches the state (4 axes). <speed>, <point No.>, <DI No.>, <DI state>, <specified axis>
092	MOLD	Moves by linear interpolation to the coordinate specified position (4 axes). <speed>, <X>, <Y>, <Z>, <R>, <specified axis>

Command No.	Command (Operation code)	Description and Operand Format
093	COLA	Moves around the circular interpolation defined by the absolute point data position (2 axes). <speed>, <center point No.>, <start point No.>, <end point No.>, <direction>, <specified axis>
094	COLI	Moves around the circular interpolation defined by the relative point data position (2 axes). <speed>, <center point No.>, <start point No.>, <end point No.>, <direction>, <specified axis>
095	COLF	Moves around the circular interpolation until the specified DI matches the state (2 axes). <speed>, <center point No.>, <start point No.>, <end point No.>, <direction>, <specified axis>, <DI No.>, <DI state>
096	PALP	Moves the pallet. <speed>, <pallet No.>, <matrix No.>
097	PALL	Executes linear interpolation movement of the pallet. <speed>, <pallet No.>, <matrix No.>
102	DSET	Sets DI to a variable. <variable No.>, <bit No.>
103	DVEN	Energizes a specified axis. <specified axis>, <drive current/hold current>
104	SET	Sets variable. <variable No.>, <data>
105	ADD	Adds variable. <variable No.>, <data>
106	SUB	Subtracts variable. <variable No.>, <data>
110	AND	Executes logic product of the variables. <variable No.>, <data>
111	OR	Executes logic sum of the variables. <variable No.>, <data>
115	EMG	Emergency stop
152	COPY	Copies program. <copy source program No.>, <copy destination program No.>
236	SRVO	Turns the driver output ON/OFF. <X>, <Y>, <Z>, <R>
237	WAITDRV	Waits for motor drive end. <axis 1>, <axis 2>
240	ACK	Responds to communication. <port No.>

11-5 Communication Command Format

11-5-1 Communication Sequence and Command Execution Timing

There is no specified communication sequence for communication commands sent to the Cell Master.

When you want to execute a command, send the command data to the Cell Master.

The Cell Master immediately executes the received command, and returns the response data when a command response is required (the response data for ?NO or other number readout commands) or if an error has occurred.

The next command is executed immediately upon receipt, even if the Cell Master is still executing a movement command or other command that requires time to complete.

11-5-2 Data Format

The data format for sending communication commands to the Cell Master is shown below. Note that all communication command data is expressed in Ascii code, which is described also in the next selection “11-6 Communication Command Syntax Rules.”

Header	ID No.	Command No.	Operand data 1	・・・・	Operand data n	CR

1) Header (1 byte)
   The header is 40h. In Ascii characters, this is “@”.
2) ID number (2 bytes)
   The ID No. is the ID registered on the Cell Master main unit. You can allot separate numbers to register multiple Cell Masters. The Cell Master receiving the command will only execute the command when the registered ID No. matches the ID No. listed in the command.
   Normally, this number is 3030 (in Ascii characters, this is “00”). To change the ID No., you can use the optional support software provided for changing the parameters.
3) Command number (3 bytes)
   Check the details of each communication command, and enter the appropriate data for command number. (See “11-7 Details of Communication Commands.”)
4) Operand data (0 to 8 bytes)
   The operand data number can change depending on the command. Check the details of each communication command, and enter the appropriate data. (See “11-7 Details of Communication Commands.”)
5) CR (carriage return) (1 byte)
   Shows the end of a command line. CR is 0Dh.

11-6 Communication Command Syntax Rules

11-6-1 Command Statement Form

The communication command statement form for the Cell Master is as shown below.
All transmitted data is in Ascii code, with numbers “0” to “9” and 2 symbols, “@” and “,”.

<Command> [,<Operand 1>] [,<Operand 2>] **. . . . .** [,<Operand 8>] <CR>
※The brackets [ ] refer to items that can be omitted.

- Commands are described by the @ mark followed by 2 digits for the ID number (usually 00) and then by 3 digits for the command No.
- You can allot separate ID Nos. to register multiple Cell Masters. The Cell Master receiving the command will only execute the command when the registered ID No. matches the ID No. listed in the command. Normally, this is 00. To change the ID No., you can use the optional support software provided for changing the parameters.
- Communication commands are specified by the command No. This differs from robot language where commands are specified by the command name.
- Commands are composed of operation codes and operands. Depending on the command, either no operand is used or up to a maximum of 8 operands are used.
- Items with the < > mark (angle brackets) in the operand should be specified by the user. Check the details of each communication command, and enter the appropriate data. Align the digits according to the Format.

(See “11-7 Details of Communication Commands.”)

11-6-2 Variables

Variables are locations for storing data that you can use during programming. In the Cell Master, you can use variables to perform data calculations, and use condition jumps based on the calculation results to achieve advanced programs. In the Cell Master, you can use the following variables.

- Point variables P00 to P31

  Point variables are variables that contain point numbers. Use movement commands such as MOVA or MOVI in place of directly specifying the point numbers. Use of point variables can sometimes let you shorten the number of program steps.
  You can use the SET, P＋, P－, ADD, SUB, AND, OR commands to perform calculations. While the variable value range for calculations is 0000 to 65535, the values specified for point movement are limited to 0 to 9999.
  If you specify a value exceeding 9999 to perform point movement, the variable value will be implemented as 9999.
  Note: If you enter 1 to 65535, it will return to 0.
  If you subtract 1 from 0, 65535 will be obtained.

- Counter variables C00 to C31

  Counter variables are variables that contain counter values. Use them for specification of the pallet work position number (matrix number) in the palletizing program, or for counting the number of time a command is executed.
  You can use the SET, C＋, C－, ADD, SUB, AND, and OR commands to perform calculations with this variable, and the JMPC command to perform condition jumps. You can also use the PALP and PALL commands for pallet movement.
  The numeric values available for counter variables range from 0 to 65535.
  Note: If you enter 1 to 65535, it will return to 0.
  If you subtract 1 from 0, 65535 will be obtained.

11-6-3 Specified Axis

Axis specifications are a requirement in the operands, for drive specification commands, used for the DRVA and DRVI axis specification point movement commands, and in the MOLA, MOLI, COLA, and COLI interpolation movement commands. These axis specifications are specified by the numeric values shown in the correspondence table below.

Specified axis	Numeric value
No change	0
X	1
Y	2
Z	3
R	4
XY	21
ZR	22
XYZ	31
XYZR	41

11-6-4 Response Display

The Cell Master responds to the communication command's readout commands and error information with communication data sent back to the external devices that are connected by RS232C. The table below shows command information in addition to response data.

Returned data	Content of response
@A	ACK
@D	Input/output No. error
@E	Program end
@G	Program not registered
@I	No ID match
@K	Timer command end
@M	Matrix error
@P	Point error
@R	Program read error
@T	Task full
@X	Multitask overlap startup error
@＞	Return to origin completed

11-7 Details of Communication Commands

In this section, the commands are listed by command numbers (command names) for convenience. For this explanation the ID No. is assumed to be 00.
Moreover, remember that the carriage return code “0D” (hexadecimal number) is added at the end of the command line. For simplicity it is omitted from the lists below.

11-7-1 000 (ORG)

Function: Executes return to origin.
Format: @00000
Example: @00000
Response @>
Explanation: Moves all axes to the origin sensor detecting position.
The position is hereafter treated as the absolute coordinates (0, 0, 0, 0).
When return to origin is completed, response “@>” is returned.
The movement axis sequence uses the sequence set at parameters PRM88 to PRM91.
Any position differential information previously changed with the SHFT command is reset.

11-7-2 001 (ORGM)

Function: Executes return to origin at the specified speed and sequence.
Format: @00001, <speed>, <X axis sequence>, <Y axis sequence>, <Z axis sequence>, <R axis sequence>
Example: @00001, 050, 1, 1, 2, 0
Response @>
Executes return to origin at speed 50 in the sequence of XY → Z.
Explanation: Same as the ORG command, other than able to specify the return speed and sequence.

1) Speed: 001 ～ 100
   Speed is a shared value for all axes, and is specified by a percentage (%) of the return to origin speed set in the parameters.
   Do not specify a speed value of less than 1mm/s. Movement speed will drop to zero, and return to origin will fail to be completed.
2) X axis sequence: 0 ～ 9
3) Y axis sequence: 0 ～ 9
4) Z axis sequence: 0 ～ 9
5) R axis sequence: 0 ～ 9
   You can specify the axis movement sequence from 0 to 9, and movement will be in the sequence of lower numbers first. If set to the same value, they move simultaneously. With specification of zero, however, return to origin is not executed. In this case, return to origin ends without any axis movement.

11-7-3 002 (RESET)

Function: Switches all DO output to OFF.
Format: @00002
Example: @00002
Explanation: Sets general-purpose output OUT00 to OUT23 to OFF.

11-7-4 003 (RUN)

Function: Starts automatic operation of the specified program.
Format: @00003, <Program No.>
Example: @00003, 001
Starts automatic operation of program 001.
Explanation:

1) Program No.: 000 ～ 999
   Specify the already registered program number.

11-7-5 004 (SRUN)

Function: Executes the specified step in the specified program.

Format: @00004, <program No.>, <step No.>

Example: @00004, 002, 0005
Executes step 0005 in program 002.

Explanation:

1) Program No.: 000 ～ 999
   Specify the already registered program number.
2) Step No.: 0000 ～ 9999
   Specify the step No. within a previously registered program.

11-7-6 005 (LRUN)

Function: Starts automatic operation from the specified label in the specified program.

Format: @00005, <program No.>, <label No.>

Example: @00005, 003, 0002
Starts automatic operation from label 002 in program 003.

Explanation:

1) Program No.: 000 ～ 999
   Specify the already registered program number.
2) Label No.: 000 ～ 9999
   Specify the label No. within a previously registered program.

11-7-7 006 (X＋)

Function: Moves the X axis in the CW direction at Low teaching speed.

Format: @00006

Example: @00006

Explanation: Moves the X axis in the CW (positive) direction at Low teaching speed (PRM226 X-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the X axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-8 007(X－)

Function: Moves the X axis in the CCW direction at Low teaching speed.

Format: @00007

Example: @00007

Explanation: Moves the X axis in the CCW (negative) direction at Low teaching speed (PRM226 X-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the X axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-9 008 (Y+)

Function Moves the Y axis in the CW direction at Low teaching speed.
Format @00008
Example @00008
Explanation Moves the Y axis in the CW (positive) direction at Low teaching speed (PRM228 Y-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the Y axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-10 009 (Y−)

Function Moves the Y axis in the CCW direction at Low teaching speed.
Format @00009
Example @00009
Explanation Moves the Y axis in the CCW (negative) direction at Low teaching speed (PRM228 Y-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the Y axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-11 010 (Z+)

Function Moves the Z axis in the CW direction at Low teaching speed.
Format @00010
Example @00010
Explanation Moves the Z axis in the CW (positive) direction at Low teaching speed (PRM230 Z-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the Z axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-12 011 (Z−)

Function Moves the Z axis in the CCW direction at Low teaching speed.
Format @00011
Example @00011
Explanation Moves the Z axis in the CCW (negative) direction at Low teaching speed (PRM230 Z-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the Z axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-13 012 (R+)

Function Moves the R axis in the CW direction at Low teaching speed.
Format @00012
Example @00012
Explanation Moves the R axis in the CW (positive) direction at Low teaching speed (PRM232 R-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the R axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-14 013 (R−)

Function Moves the R axis in the CCW direction at Low teaching speed.
Format @00013
Example @00013
Explanation Moves the R axis in the CCW (negative) direction at Low teaching speed (PRM232 R-axis JOGSPEED1).
Use this command when performing teaching operations via communication commands.
Since this command causes the R axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-15 014 (X++)

Function Moves the X axis in the CW direction at High teaching speed.
Format @00014
Example @00014
Explanation Moves the X axis in the CW (positive) direction at High teaching speed (PRM227 X-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the X axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-16 015 (X−−)

Function Moves the X axis in the CCW direction at High teaching speed.
Format @00015
Example @00015
Explanation Moves the X axis in the CCW (negative) direction at High teaching speed (PRM227 X-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the X axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-17 016 (Y++)

Function Moves the Y axis in the CW direction at High teaching speed.
Format @00016
Example @00016
Explanation Moves the Y axis in the CW (positive) direction at High teaching speed (PRM229 Y-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the Y axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-18 017 (Y−−)

Function Moves the Y axis in the CCW direction at High teaching speed.
Format @00017
Example @00017
Explanation Moves the Y axis in the CCW (negative) direction at High teaching speed (PRM229 X-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the Y axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-19 018 (Z＋＋)

Function: Moves the Z axis in the CW direction at High teaching speed.
Format: @00018
Example: @00018
Explanation: Moves the Z axis in the CW (positive) direction at High teaching speed (PRM231 Z-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the Z axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-20 019 (Z－－)

Function: Moves the Z axis in the CCW direction at High teaching speed.
Format: @00019
Example: @00019
Explanation: Moves the Z axis in the CCW (negative) direction at High teaching speed (PRM231 Z-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the Z axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-21 020 (R＋＋)

Function: Moves the R axis in the CW direction at High teaching speed.
Format: @00020
Example: @00020
Explanation: Moves the R axis in the CW (positive) direction at High teaching speed (PRM233 R-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the R axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-22 021 (R－－)

Function: Moves the R axis in the CCW direction at High teaching speed.
Format: @00021
Example: @00021
Explanation: Moves the R axis in the CCW (negative) direction at High teaching speed (PRM233 R-axis JOGSPEED2).
Use this command when performing teaching operations via communication commands.
Since this command causes the R axis to move indefinitely, you will also need to execute the 083 (STOP) command to stop the axis before a limit error occurs.

11-7-23 022 (MOVD)

Function: Moves to the absolute position specified by the coordinate values that were entered.

Format: @00022, <speed>, <X position data>, <Y position data>, <Z position data>, <R position data>

Example: @00022, 100, 030.00, 050.00, 010.50, 000.00
Moves at speed 100 to coordinates (030.00, 050.00, 010.50, 000.00).

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to coordinates specified in 0.01mm units in relation to the X, Y, Z, and R axes.

1) Speed: 001 ～100
   Percentage (%) of the maximum speed specified in the parameters.
2) X position data: －999.99 ～ ＋999.99 (mm)
3) Y position data: －999.99 ～ ＋999.99 (mm)
4) Z position data: －999.99 ～ ＋999.99 (mm)
5) R position data: －999.99 ～ ＋999.99 (mm)
   If you set to position data a value in excess of the software limit set in the parameters, a program error will occur. If the SHFT command is executed, however, no error will occur as long as the value added to the shift position coordinate does not exceed the software limit.

11-7-24 023 (MOVA)

Function: Moves to the absolute position specified by the point number.

Format: @00023, <speed>, <point No.>

Example: @00023, 100, 0005
Moves at speed 100 to point 0005.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to the specified point.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

11-7-25 024 (MOVI)

Function: Moves to a relative position specified by the point number.

Format: @00024, <speed>, <point No.>

Example: @00024, 100, 0010
Moves by 0010 point data at speed 100 from the current position.

Explanation: This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).
Moves at specified speed to the specified point.
After movement, the absolute position is the current position with the point offset added on.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

11-7-26 025 (MOVF)

Function: Moves at specified speed to the absolute position specified by the point number, until the specified DI No. input matches the specified DI state.

Format: @00025, <speed>, <point No.>, <DI number>, <DI state>

Example: @00025, 100, 0001, 7, 1

Moves at speed 100 from the current position to point 0001.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves at specified speed to the specified point while the DI input remains disabled. Stops when the DI input becomes enabled, and move to the next command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
4) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.

※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.

11-7-27 028 (DRVD)

Function: Moves to the absolute position specified by the coordinate values that were entered on the specified axis only.

Format: @00028, <speed>, <specified axis>, <position data>

Example: @00028, 100, 1, 050.00

Moves X axis at speed 100 to the X coordinate (050.00), without any other axis moving.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves to the specified position at specified speed to specified coordinate, in 0.01mm units.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Position data: ＋000.00 ～ ＋999.99 (mm)
   The number of specified position data varies depending on the number of specified axes.
   If you select 31 for the specified axes, 3 position data points must be specified. In this case, the position data is specified X, Y, Z in the order.

If you set to position data a value in excess of the software limit set in the parameters, a program error will occur.

11-7-28 029 (DRVA)

Function: Moves to the absolute position specified by the point number, on the specified axis only.

Format: @00029, <speed>, <specified axis>, <point No.>

Example: @00029, 050, 2, 0002

Moves at speed 050 to the Y coordinate of point 0002, without any other axis moving.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves specified axis at specified speed to the specified point.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

11-7-29 030 (DRVI)

Function: Moves to a relative position specified by the point number, on the specified axis only.

Format: @00030, <speed>, <specified axis>, <point No.>

Example: @00030, 100, 2, 0003

Moves the Y axis at speed 100 by the amount of point 0003 data from the current position.

Explanation: This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).

Moves specified axis at specified speed to the specified point.

After movement, the absolute position is the current position with the point offset added on.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

11-7-30 031 (DRVF)

Function: Moves at specified speed to the absolute position specified by the point number, on the specified axis only, until the specified of DI No. matches the specified DI state.

Format: @00031, <speed>, <specified axis>, <point No.>, <DI No.>, <DI state>

Example: @00031, 100, 3, 0001, 7, 1

Moves at speed 100 to the Z coordinate of point 0001, without any other axis moving.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves the specified axis at specified speed to the specified point while DI input remains invalid. Stops when DI input becomes valid, and move to the next command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Specified axis: 1, 2, 3, 4, 21, 22, 31
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis, 21 for X and Y axes, 22 for Z and R axes, 31 for X, Y and Z axes.
3) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
4) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
5) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.

※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.

11-7-31 032 (DO)

Function: Sets the state specifying output of the specified DO number.

Format: @00032, <DO No.>, <DO state>

Example: @00032, 07, 1

Turns on general-purpose output OUT07.

Explanation: General-purpose output command for controlling external devices.

The output state is retained until a different state is output. (Latch operation)

1) DO No.: 00 ～ 23
   Specify one number from output 0 to output 23.
2) DO state: 0, 1
   0 turns the output OFF, 1 turns it ON.

11-7-32 033 (WAIT)

Function: Waits until the specified DI No. input matches the specified state.

Format: @00033, <DI No.>,<DI state>

Example: @00033, 05, 1

Waits until general-purpose input IN05 is ON.

Explanation: Command for synchronizing the timing to general-purpose input from external devices, etc.

When the specified input state appears, moves to the next step.

1) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
2) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

11-7-33 035 (MAT)

Function: Defines the number of rows and columns in a matrix.

Format: @00035, <pallet No.>, <row>, <column>

Example: @00035, 04, 010, 005

Specifies in pallet 04 a matrix of 10 rows and 5 columns.

Explanation: This command defines the matrix for executing palletizing operation. You can use this command in combination with the PALP and PALL commands to simplify the creation of a palletizing program.

1) Pallet No.: 00 ～ 31
   The pallet number is a particular number designated to previously registered coordinate data out of a maximum 32 pallets, with 00 to 31 available for use.
2) Rows: 001 ～ 255
   Specifies the matrix number in the Y axis direction.
3) Columns: 001 ～ 255
   Specifies the matrix number in the X axis direction.
   Palletizing operations may only be performed in the XY plane.

11-7-34 036 (SHFT)

Function: Shifts the position data.

Format: @00036, <point No.>

Example: @00036, 0003

Sets point 0003 to the coordinate origin.

Explanation: After execution of the SHFT command, the origin information is in a shifted state for all following steps until the ORG, ORGM, or SHFR command is executed.

1) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.

11-7-35 037 (SHFR)

Function: Resets the position data shift.

Format: @00037

Example: @00037

Returns the origin to its initial value.

Explanation: Activating the return to origin switch returns the coordinate to its original position.

11-7-36 039 (?POS)

Function: Reads the current position, and substitutes it into the specified point number.

Format: @00039, <point No.>

Response: @<X axis coordinate>, <Y axis coordinate>, <Z axis coordinate>, <R axis coordinate>

Example: @00039, 0100

Substitutes the current position coordinates into point 00100.

Response @+050.00, +080.00, +010.00, +000.00

Current position coordinates are read out.

Explanation: Rewrites the registered data for the specified point number to the current position coordinates.

1) Point No.: 0000 ~ 9999
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
2) X axis coordinate: +XXX.XX (mm)
   (Response data value assigned to X)
3) Y axis coordinate: +YYY.YY (mm)
   (Response data value assigned to Y)
4) Z axis coordinate: +ZZZ.ZZ (mm)
   (Response data value assigned to Z)
5) R axis coordinate: +RRR.RR (mm)
   (Response data value assigned to R)

11-7-37 040 (?NO)

Function: Reads the program number currently started up.

Format: @00040

Response: @<task 1 program No.>, <task 2 program No.>,
<task 3 program No.>, <task 4 program No.>,
<task 5 program No.>, <task 6 program No.>,
<task 7 program No.>, <task 8 program No.>,
<task 9 program No.>, <task 10 program No.>

Example: @00040

Response @0001,-,-,-,-,-,-,-,-,-

Program 1 is started up as task 1.

Explanation: Ten program numbers corresponding to the task number are read. The first to be read is task 1, while the last one is task 10.

Tasks not started up are displayed as "—".

1) Program No.: 0000 ~ 0999
   These are previously registered program numbers.

11-7-38 041 (?SNO)

Function: Reads the step number of the program currently started up.

Format: @00041

Response: @<task 1 step No.>, <task 2 step No.>,
<task 3 step No.>, <task 4 step No.>,
<task 5 step No.>, <task 6 step No.>,
<task 7 step No.>, <task 8 step No.>,
<task 9 step No.>, <task 10 step No.>

Example: @00041
Response @0016,-,-,-,-,-,-,-,-,-
Step 16 of the program started up as task 1 is currently being executed.

Explanation: Ten current step numbers in the program corresponding to the task number are read. The first to be read is task 1, while the last one is task 10.
Tasks not started up are displayed as "—".
1) Step No.: 0000 ~ 9999
The step number is part of a previously registered program.

11-7-39 043 (?PNO)

Function: Reads the point number of the current position.

Format: @00043

Response: @<X axis point No.>, <Y axis point No.>,
<Z axis point No.>, <R Axis point No.>

Example: @00043
Response @0000, 0002, 0002, 0002, 0002
The current position is X axis point 0000, and Y, Z, R axes point 0002.

Explanation: The specified point number which is used to execute a movement command immediately before is read as a data value. As a result, movement based on direct specification of the coordinates does not mark the current position.
1) Point No.: 0000 ~ 9999
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.

11-7-40 044 (?STP)

Function: Reads the total number of steps in the specified program.

Format: @00044, <program No.>

Response: @<step No.>

Example: @00044, 001
Response @00032
The total number of steps in program 001 is 32 steps.

Explanation:
1) Program No.: 000 ~ 999
These are previously registered program numbers.
2) Step No.: 00000 ~ 99999

11-7-41 045 (?MEM)

Function	Reads the number of addable steps in the specified program.
Format	@00045, <program No.>
Response	@<step No.>
Example	@00045, 001 Response @00068 Program 001 can be added 68 steps.
Explanation	This command is for reading the amount of space left in the program. The command returns a value calculated as the number of steps left in the program after the END command is executed. The maximum number of steps allowed in one program depends on the number of programs to be registered. You will need to change the number of programs to be registered parameter to increase the allowed step capacity. 1) Program No.: 000 ~ 999 These are previously registered program numbers. 2) Step No.: 00000 ~ 99999

11-7-42 046 (?VER)

Function	Reads the Cell Master program version number.
Format	@00046
Response	@<version No.>
Example	@00046 Response @001 The version number is 001.
Explanation	1) Version No.: 000 ~ 999 The value is registered at the time of shipping.

11-7-43 047 (?CRE)

Function	Reads the Cell Master type.
Format	@00047
Response	@<type>
Example	@00047 Response @000 It is Cell Master type 0.
Explanation	1) Cell Master type: 000 ~ 999 Number 0 is A4 type, while number 1 is A3 type. All numbers 2 and up are undefined.

11-7-44 048 (?CLK)

Function	Reads the Cell Master's total startup time (operating hour).
Format	@00048
Response	@<total startup time>
Example	@00048 Response @00046 The total startup time is 46 hours.
Explanation	Reads out a value showing the cumulative total operating time (in 1 hour units). 1) Total startup time: 00000 ～ 99999 (h)

11-7-45 049 (?ALM)

Function	Reads the alarm state.
Format	@00049
Response	@<error No.>
Example	@00049 Response @003 Error 003 has occurred.
Explanation	Reads the current error state. 1) Error No.: 000, 001, 002, 003, 004, 005, 010, 012, 013 ,014, 099 For error details, see "12-3 List of Error Codes."

11-7-46 050 (?EMG)

Function	Reads the emergency stop switch state.
Format	@00050
Response	@<EMG state>
Example	@00050 Response @OFF The emergency stop switch has not been pressed.
Explanation	Reads the current state of the emergency stop switch. 1) EMG state: ON, OFF ON means that emergency stop switch is currently pressed in, while OFF means that it is not pressed in.

11-7-47 051 (?SRV)

Function	Reads the energized state.
Format	@00051
Response	@<X axis energized state>, <Y axis energized state>, <Z axis energized state>, <R axis energized state>
Example	@00051 Response @ON, ON, ON, ON All axes are in energized state.
Explanation	Reads the states of the X, Y, Z, and R axes in that order. 1) Energized state: ON, OFF ON means the axis is in energized state, OFF means that it is not in energized state.

11-7-48 052 (?MAT)

Function Reads the defined state of the specified pallet.
Format @00052, <pallet No.>
Response @<number of rows>, <number of columns>
Example @00052, 001
Response @005, 008
The defined state of pallet 001 is 5 rows and 8 columns.
Explanation
1) Number of rows: 001 ～ 999
Shows the pallet's X direction number.
2) Number of columns: 001 ～ 999
Shows the pallet's Y direction number.

11-7-49 053 (?DI)

Function Reads the state of specified DI.
Format @00053, <DI No.>
Response @<state>
Example @00053, 01
Response @ON
The state of general-purpose input 01 is ON.
Explanation
1) DI No.: 00 ～ 23
Specify one number from input 0 to input 23.
2) DI state: ON, OFF

11-7-50 054 (?DO)

Function Reads the state of specified DO.
Format @00054, <DO No.>
Response @<state>
Example @00054, 03
Response @OFF
The state of general-purpose output 03 is OFF.
Explanation
1) DO number: 00 ～ 23
Specify one number from output 0 to 23.
2) DO state: ON, OFF

11-7-51 055 (RPRM)

Function Reads the parameters for specified number range.

Format @00055, <start No.>, <end No.>

Response @<parameter data 1>
:
@<parameter data n>

Example @00055, 003, 005
Response @0000
@0001
@0001
The content of parameters 003, 004, and 005 is 0000, 0001, and 0001.

Explanation Specifies the parameter number range, and reads the parameters.
1) Start No.: 000 ～ 343
Specify the start number for the parameter being read out.
2) End No.: 000 ～ 343
Specify the end number for the parameter being read out.

11-7-52 056 (RPGM)

Function Reads the program for the specified number.

Format @00056, <program No.>

Response @<step 1 command>, <step 1 operand 1>, ···<step 1 operand n>
:
:
@<step m command>, <step m operand 1>, ···<step m operand n>
@R

Example @00056, 000
Response @023, 008, 0001
@034, 0005
@023, 008, 0002
@086
@R
The content of program 000 is as follows.
MOVA 008, 0001
TIMR 005
MOVA 008, 0002
END

Explanation The response data command is read out as a robot language command number.
For the correlation between numbers and command names, see “9-1 Robot Language List.”
1) Program No.: 000 ～ 999
These are previously registered program numbers.
2) As shown in the example, the command content of the response data is read for each step.
3) Since the response data represents the end of a program step, it ends with @R.

11-7-53 057 (RPNT)

Function: Reads the point data in the specified number range.

Format: @00057, <start No.>, <end No.>

Response: @<X position data 1>, <Y position data 1>, <Z position data 1>, <R position data 1>
:
@<X position data n>, <Y position data n>, <Z position data n>, <R position data n>

Example: @00057, 0000, 0002

Response @+00000, +00000, +00000, +00000
@+03000, +03000, +03000, +00000
@+05000, +05000, +05000, +00000

The content of points 0000, 0001, and 0002 is
(+00000, +00000, +00000, +00000)
(+03000, +03000, +03000, +00000)
(+05000, +05000, +05000, +00000).

Explanation: Specifies the point number range, and reads the points.

1) Start No.: 0000 ~ 9999
Specify the start number for the point being read out.
2) End No.: 0000 ~ 9999
Specify the end number for the point being read out.
3) X position data: −999.99 ~ +999.99 (mm)
4) Y position data: −999.99 ~ +999.99 (mm)
5) Z position data: −999.99 ~ +999.99 (mm)
6) R position data: −999.99 ~ +999.99 (mm)

11-7-54 058 (?DRV)

Function: Reads the motor drive current state.

Format: @00058

Response: @<X axis current state>, <Y axis current state>, <Z axis current state>, <R axis current state>

Example: @00051

Response @1,1,0,0

The X and Y axes are the driving current state, while the Z and R axes are the holding current state.

Explanation: The current state is read out for X, Y, Z, and R axes, in that order.

1) Current state: 0,1
0 is holding current state (PRM076, 079, 082, 086), 1 is driving current state (PRM077, 080, 083, 087).

11-7-55 060 (WPRM)

Function: Writes the specified number parameter.

Format: @00060, <parameter No.>, <data>

Response: @A

Example: @00060, 003, 00100

Writes 00100 to parameter 003.

Explanation:

1) Parameter No.: 000 ~ 343
2) Data: 00000 ~ 65535
For details of parameter numbers and setting values, see “6-2 Description of Parameters.”

11-7-56 061 (WPGM)

Function: Writes a command to the specified step number of the specified program number.

Format: @00061, <program No.>, <step No.>, <command>,
<operand 1>, ·····<operand n>

Response: @A

Example: @00061, 003, 0004, 086
Writes 086 (END) to step 004 in program 003.

Explanation: The specified commands are the robot language command numbers.
For the correlation between the numbers and command names, see "9-1 Robot Language List."

1) Program No.: 000 ～ 999
These are previously registered program numbers.
2) Step No.: 0000 ～ 9999
3) For operands, specify the robot language operand data.
For command numbers., see "9-1 Robot Language List."
For details of the robot language, see "9-4 Robot Language Description."

11-7-57 062 (WPNT)

Function: Writes point data for the specified number.

Format: @00062, <point No.>, <X position data>, <Y position data>,
<Z position data>, <R position data>

Response: @A

Example: @00062, 0004, +02000, +03000, +01000, +00000

Explanation: Specifies the point number, and then writes the coordinate data.

1) Point No.: 0000 ～ 9999
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
2) X position data: −99999 ～ +99999 (10 μm)
3) Y position data: −99999 ～ +99999 (10 μm)
4) Z position data: −99999 ～ +99999 (10 μm)
5) R position data: −99999 ～ +99999 (10 μm)

11-7-58 063 (WEPT)

Function: Writes the current position detected by the encoder at the specified point number.

Format: @00063, <point No.>

Response: @A

Example: @00063, 0006
Response @A
Registers the current coordinate detected by the encoder at point 6.

Explanation: Registers the coordinate data for the current position detected by the encoder at point 0006.

1) Point No.: 0000 ～ 9999
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.

Caution: The encoder for this device is used for step-out detection and its positioning precision cannot be guaranteed. If you use this command to perform position measurement, the position may not be completely accurate.
Moreover, since data is being received over a communication line, using this command while the axes are in motion could lead to a disparity between the point registered position and the position issued by the command, due to communication delays. Always complete return to origin before executing.

11-7-59 064 (IPRM)

Function Returns the parameter setting value to the initial value.
Format @00064
Response @A
Example @00064
Explanation For the parameter initial values, see “6-2 Description of Parameters.”

11-7-60 066 (MDO)

Function Issues DO output when the axis in motion passes the specified point for the specified number of times.
Format @00066, <pass point No.>, <range>, <pass count>, <DO No.>, <DO state>
Example @00066, 0003, 0100, 1, 00, 1
@00023, 100, 0006
Sets DO00 to ON when point 0003 position is first passed while in moving to point 0006. The pass point judgment range is ±1mm.
Explanation DO is displayed when a specified XY coordinate point has been passed a specified number of times within a specified error range while moving to the next step command. The Z axis coordinate is ignored.
This command must be described immediately before the DO output movement command.
You can specify continuous interpolation movement in the movement command. In such a case, specify this command in the line immediately before the TOS command line.
If the movement command for the next step does not pass the specified point, this command is invalid.
You can specify this command up to 8 times for a series of movement commands.

1) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   The variables P00 to P31 can be specified in place of the point numbers. The range of variable values is 0 to 9999.
2) Range: 0001 ～ 9999 (0.01mm ～ 99.99mm)
   In specifying the pass point, specify the error range of the coordinate position in ±mm units.
3) Pass count: 1 ～ 8
4) DO No. : 00 ～ 23
   Specify one number from output 0 to 23.
5) DO state: 0, 1
   0 turns the output OFF, 1 turns it ON.

11-7-61 069 (P)

Function Sets the point number at point variable P.
Format @00069, <point variable No.>, <point No.>
Example @00069, 03, 0008
Sets point number 0008 at point variable 03.
Explanation

1) Point variable No.: 00 ～ 31
   The point variable is for storing the point number, with 32 available for use from P00 to P31. You can use the P＋ and P－ commands to perform calculations on the variable. The variable value range is 0 to 9999.
2) Point No.: 0000 ～ 9999
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.

11-7-62 070 (P＋)

Function Adds a numeric value to point variable P.

Format @00070, <point variable No.>, <data>

Example @00070, 05, 0014

Adds 0014 to the numeric value stored in point variable 05.

Explanation Adds data (directly specified numeric values) to numeric values stored in the point variable, and stores it in the same point variable.

1) Point variable No.: 00 ～ 31
   The point variable is for storing the point number, with 32 available for use from P00 to P31. The variable value range is 0 to 9999.
2) Data: 0000 ～ 9999
   Data is the directly specified numeric value, and the calculation result becomes the point number.

The relationship between the point variable and the point number, as described using commands, is as shown below.

@00069, 05, 0001: P05=0001

@00070, 05, 0010: P05=0011

11-7-63 071 (P－)

Function Subtracts a numeric value from point variable P.

Format @00071, <point variable No.>, <data>

Example @00071, 07, 0001

Subtracts 0001 from the numeric value stored in point variable 07.

Explanation Subtracts data (directly specified numeric values) from numeric values stored in the point variable, and stores it in the same point variable.

1) Point variable No.: 00 ～ 31
   The point variable is for storing the point number, with 32 available for use from P00 to P31. The variable value range is 0 to 9999.
2) Data: 0000 ～ 9999
   Data is the directly specified numeric value, and the calculation result becomes the point number.

The relationship between the point variable and the point number, as described using commands, is as shown below.

@00069, 07, 0010: P05=0010

@00071, 07, 0001: P05=0009

11-7-64 072 (C)

Function Sets a numeric value into counter number C.

Format @00072, <counter variable No.>, <data>

Example @00072, 02, 0006

Sets 0006 into the counter variable 02.

Explanation Stores numeric data (directly specified numeric value) in the counter variable.

1) Counter variable No.: 00 ～ 31
   The counter variable is for storing the counter value, with 32 available for use from C00 to C31. You can use the C＋ and C－ commands to perform calculations on the variable. The variable value range is 0 to 65535.
2) Data: 00000 ～ 65535
   Data is the directly specified numeric value.

11-7-65 073 (C+)

Function Adds a numeric value to the counter variable C.
Format @00073, <counter variable No.>, <data>
Example @00073, 09, 0004
Adds 0004 to the numeric value stored in the counter variable 09.
Explanation Adds data (directly specified numeric values) to numeric values stored in the counter variable, and stores it in the same counter variable.
1) Counter variable No.: 00 ~ 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. The variable value range is 0 to 65535.
2) Data: 00000 ~ 65535
Data is the directly specified numeric value, and the calculation result is the counter value.

11-7-66 074 (C−)

Function Subtracts a numeric value from the counter variable C.
Format @00074, <counter variable No.>, <data>
Example @00074, 01, 0001
Subtracts 0001 from the numeric value stored in C01.
Explanation Subtracts data (directly specified numeric values) from numeric values stored in the counter variable, and stores it in the same counter variable.
1) Counter variable No.: 00 ~ 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. The variable value range is 0 to 65535.
2) Data: 00000 ~ 65535
Data is the directly specified numeric value, and the calculation result is the counter value.

11-7-67 075 (?P)

Function Reads the variable value of the specified point variable number.
Format @00075, <point variable No.>
Response @<point No.>
Example @00075, 03
Response @0008
The point number with a point variable 03 is 0008.
Explanation
1) Point variable number: 00 ~ 31
The point variable is for storing the point number, with 32 available for use from P00 to P31. You can use the P+ and P− commands to perform calculations on the variable. The variable value range is 0 to 9999.
2) Point No.: 0000 ~ 9999
The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.

11-7-68 076 (?C)

Function Reads the variable value of the specified counter variable number.
Format @00076, <counter variable No.>
Response @<data>
Example @00076, 02
Response @0006
The value of counter variable 02 is 0006.
Explanation

1) Counter variable No.: 00 〜 31
The counter variable is for storing the counter value, with 32 available for use from C00 to C31. The variable value range is 0 to 65535.
2) Data: 00000 〜 65535
Data is the directly specified numeric value.

11-7-69 077 (TON)

Function Starts up a specified task.
Format @00077, <task No.>, <program No.>, <startup type>
Example @00077, 02, 001, 0
Newly starts up program number 001 as task 02.
Explanation Use this command when you want to execute another program at the same time while the program currently being executed.
(For details, see “9-3-1 Multitasks.”)
1) Task No.: 02 〜 10
Since the first program that was started is task 01, and up to a total of 10 tasks can be simultaneously started, additional tasks are numbered 02 to 10.
There is no priority in task numbers.
You can not specify a task number that has already been started.
2) Program No.: 000 〜 999
Specifies program numbers that have already been registered.
3) Startup type: 0, 1
0 specifies execution of a new task, 1 restarts a task that is currently stopped.
※ If a task number is specified that is the same as a task already started up, an error (007) occurs.

11-7-70 078 (TOFF)

Function Stops a specified task.
Format @00078, <task No.>
Example @00078, 03
Stops a program executed as task 03.
Explanation Use this command when you want to stop a specific task.
1) Task No.: 02 〜 10
Since the first program that was started is task 01, and up to a total of 10 tasks can be simultaneously started, additional tasks are numbered 02 to 10.

11-7-71 080 (VCHG)

Function: Changes the speed.

Format: @00080, <speed>, <point No.>, <axis pattern>

Example: @00080, 040, 0003, 12

Changes the X axis and Y axis speed to 040 from the point 0003 position.

Explanation: Use this command when changing the movement speed in the middle of an operation. You can specify the axis where the speed is to be changed.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Axis pattern: See below.

Axis	Axis pattern
X	1
Y	2
Z	3
R	4
XY	12
XZ	13
XR	14
YZ	23
YR	24
ZR	34
XYZ	123
XYR	124
XZR	134
YZR	234
XYZR	1234

※ This command cannot be used with interpolation movement commands (MOLA, COLA, etc.).

※ It cannot be used for individual acceleration and deceleration settings, or S-shape settings.

11-7-72 083 (STOP)

Function: Stops all axes.

Format: @00083

Example: @00083

Explanation: Stops the movement of all axes. Even axes currently in motion due to axis movement commands are immediately stopped. However, an axis currently in a return to origin movement completes the return to origin without stopping.

This command is used to stop teaching movement commands 006 to 021.

11-7-73 084 (PSTOP)

Function: Specifies temporary program stop/restart.

Format: @00084 <program ON/OFF>

Example: @00084, 1

Explanation: Temporarily stops the running program. However, a return to origin command will not stop until the return to origin is completed.

1) Program ON/OFF: 0,1
   0: Restarts the program. 1: Temporarily stops the program.

11-7-74 089 (MOLA)

Function: Moves by linear interpolation to the absolute position specified by the point number.

Format: @00089, <speed>, <point No.>, <specified axes>

Example: @00089, 100, 0005, 21

Moves by linear interpolation at the speed of 100 in X and Y axes direction to point 0005.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves by linear interpolation at specified speed to the specified point. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

- Set the parameter maximum interpolation speed for the 31 (X, Y, and Z axes) according to the PRM128 (X and Y axes maximum interpolation speed).
- Set the parameter maximum interpolation speed for the 41 (X, Y, Z, and R axes) according to the PRM128 (X and Y axes maximum interpolation speed).

11-7-75 090 (MOLI)

Function: Moves by linear interpolation to a relative position specified by the point number.

Format: @00090, <speed>, <point No.>, <specified axes>

Example: @00090, 100, 0008, 31

Moves by linear interpolation at the speed of 100 in X, Y, and Z axes direction to point 0008.

Explanation: This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).

Moves by linear interpolation at specified speed to the specified point.

After movement, the absolute position is the current position with the offset point added on. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

11-7-76 091 (MOLF)

Function: Moves by linear interpolation to the absolute position specified by the point number, until the specified DI No. input matches the specified DI state.

Format: @00091, <speed>, <point No.>, <DI No.>, <DI state>, <specified axes>

Example: @00091, 100, 0008, 06, 1, 31
Moves by linear interpolation at the speed of 100 in X, Y, and Z axes direction to point 0008.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by linear interpolation at specified speed to the specified point.
Moves at a specified speed to the specified point while the DI input remains invalid. Stops when the DI input becomes valid, and moves to the next command. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
3) DI No.: 00 ～ 23
   Specify one number from input 0 to input 23.
4) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.
5) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.

※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.

- Set the parameter maximum interpolation speed for the 31 (X, Y, and Z axes) according to the PRM128 (X and Y axes maximum interpolation speed).
- Set the parameter maximum interpolation speed for the 41 (X, Y, Z, and R axes) according to the PRM128 (X and Y axes maximum interpolation speed).

11-7-77 092 (MOLD)

Function: Moves by linear interpolation to the absolute position specified by coordinates.

Format: @00092, <speed>, <X>, <Y>, <Z>, <R>, <specified axes>

Example: @00092, 100, +010.00, +010.00, +000.00, +000.00, +000.00, 21
Moves by linear interpolation at the speed of 100 in X and Y axes direction to coordinates (010.00, 010.00, 000.00, 000.00).

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by linear interpolation at a specified speed to coordinates specified in 0.01mm units in relation to the X, Y, Z, and R axes. If there is an interpolation movement on the next step, the actuator can move to the next movement without performing deceleration before the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) X position data: −999.99 ～ +999.99 (mm)
3) Y position data: −999.99 ～ +999.99 (mm)
4) Z position data: −999.99 ～ +999.99 (mm)
5) R position data: −999.99 ～ +999.99 (mm)
   If you set to position data a value in excess of the software limit set in the parameters, execution of the program will result in error. If the SHFT command being executed, however, no error will occur as long as the value added to the shift position coordinate does not exceed the software limit.
6) Specified axes: 21, 31, 41
   Specify 21 for X and Y axes, 31 for X, Y, and Z axes, 41 for X, Y, Z, and R axes.

11-7-78 093 (COLA)

Function: Moves around the circular interpolation in reference to the point number defined by the absolute positions (start point, end point, and center point).

Format: @00093, <speed>, <center point No.>, <start point No.>, <end point No.>, <rotation direction>, <specified axes>

Example: @00093, 050, 0005, 0006, 0007, 1, 21

With circle center on point 0005, moves by circular interpolation at speed 050 in X and Y axes direction, in a positive rotation from point 0006 to point 0007.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).

Moves by circular interpolation at a specified speed, with a specified center point as the center of the circle. It moves from one specified point to another specified point.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Center point No.: 0000 ～ 9999, P00 ～ P31
3) Start point No.: 0000 ～ 9999, P00 ～ P31
4) End point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
5) Rotation direction: 0, 1
   Specify 0 for negative direction rotation, 1 for positive direction rotation.
6) Specified axes: 21, 22
   Specify 21 for X and Y axes, 22 for Z and R axes.

※ Cannot be used for S-shape settings.

※ Maximum speed for move by circular interpolation should be restricted when the movement distance is short.
   If the movement track for move by circular interpolation is less than 20mm, limit the speed to 60mm/s or less.
   (For the interpolation speed parameter (PRM128) of 200mm/s, this means a speed setting is 30% or less.)

11-7-79 094 (COLI)

Function: Moves around the circular interpolation in reference to the point number defined by the relative positions (end point, center point).

Format: @00094, <speed>, <center point No.>, <start point No.>, <end point No.>, <rotation direction>, <specified axes>

Example: @00094, 050, 0005, 0000, 0007, 1, 21
With circle center on point 0005, moves by circular interpolation to point 0007 at speed 050 in X and Y axes direction in positive rotation. The position data of point 0000 is (0, 0, 0, 0).

Explanation: This is a movement command that is set in the relative coordinates for the current position as (0, 0, 0, 0).
Moves by circular interpolation at specified speed, with a specified point as the center of the circle. It moves from one specified point to another specified point. After movement, the absolute position is the current position with the point offset amount added on.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Center point No.: 0000 ～ 9999
3) Start point No.: 0000 ～ 9999, P00 ～ P31
   The start point is the current position.
   Coordinate (0, 0, 0, 0) specifies the registered point.
4) End point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
5) Rotation direction: 0, 1
   Specify 0 for negative direction rotation, 1 for positive direction rotation.
6) Specified axes: 21, 22
   Specify 21 for X and Y axes, 22 for Z and R axes.

※ Cannot be used for S-shape settings.
※ Maximum speed for move by circular interpolation should be restricted when the movement distance is short.
   If the movement track for move by circular interpolation is less than 20mm, limit the speed to 60mm/s or less.
   (For the interpolation speed parameter (PRM128) of 200mm/s, this means a speed setting is 30% or less.)

11-7-80 095 (COLF)

Function: Moves around the circular interpolation in reference to the point number defined by the absolute positions (start point, end point, and center point), until the specified DI No. input matches the specified DI state.

Format: @00095, <speed>, <center point No.>, <start point No.>,<end point No.>, <rotation direction>, <specified axes>, <DI No.>, <DI state>

Example: @00095, 050, 0005, 0006, 0007, 1, 21, 09, 0
With circle center on point 0005, moves by circular interpolation at speed 050 in the X and Y axes direction in a positive rotation from point 0006 to point 0007.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by circular interpolation at specified speed, with a specified point as the center of the circle. It moves from one specified point to another specified point.
Moves at specified speed to the specified point while the DI input remains invalid. When the DI input becomes valid, moves to the next command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Center point No.: 0000 ～ 9999
3) Start point No.: 0000 ～ 9999, P00 ～ P31
4) End point No.: 0000 ～ 9999, P00 ～ P31
   The point number is a particular number designated to previously registered coordinate data out of a maximum 10000 points, with 0000 to 9999 available for use.
   You can also use it to specify the point variable. The range of variable values is 0000 to 9999.
5) Rotation direction: 0, 1
   Specify 0 for negative direction rotation, 1 for positive direction rotation.
6) Specified axes: 21, 22
   Specify 21 for X and Y axes, 22 for Z and R axes.
7) DI No.: 0 ～ 23
   Specify one number from input 0 to input 23.
8) DI state: 0, 1
   0 is enabled when it is OFF, 1 is enabled when it is ON.

※ An axial stop with DI input is not the same as a decelerated stop. Use caution when setting the speed so that the position will not deviate when stopping while carrying a heavy load.
※ Cannot be used for S-shape settings.
※ The DI input ON and OFF judgment time is determined by parameters PRM036 and PRM037. Be sure to set the input DI pulse width so that it exceeds the time set by the parameters.
※ Maximum speed for move by circular interpolation should be restricted when the movement distance is short.
   If the movement track for move by circular interpolation is less than 20mm, limit the speed to 60mm/s or less.
   (For the interpolation speed parameter (PRM128) of 200mm/s, this means a speed setting is 30% or less.)

11-7-81 096 (PALP)

Function: Moves to the absolute position specified by the pallet number and matrix number.

Format: @00096, <speed>, <pallet No.>, <matrix No.>

Example: @00096, 050, 02, 00007
Moves at speed 050 to matrix 00007 of pallet 02.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves at specified speed to the specified matrix of the specified pallet.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Pallet No.: 00 ～ 31
   The pallet number is a particular number designated to previously registered coordinate data out of a maximum 32 pallets, with 00 to 31 available for use.
3) Matrix No.: 00000 ～ 65535, C00 ～ C31
   This is a particular number designated to the matrix point on the pallet.
   You can also use it to specify the counter variable. The variable value range is 0000 to 65535.
   This range can change depending on the pallet number and the definition of the MAT command. The minimum value is 0, and the maximum value is [(Number of rows) × (Number of columns) −1].

Before executing this command, you must use the MAT command to define the pallet matrix number.

11-7-82 097 (PALL)

Function: Moves by linear interpolation to the absolute position specified by the pallet number and matrix number.

Format: @00097, <speed>, <pallet No.>, <matrix No.>

Example: @00097, 050, 02, 00007
Moves by linear interpolation at speed 050 to matrix 00007 of pallet 02.

Explanation: This is a movement command that is set in the absolute coordinates for the origin position (0, 0, 0, 0).
Moves by linear interpolation at specified speed to the specified matrix of the specified pallet. If there is an interpolation movement command on the next step, the actuator can move to the next movement without stopping at the movement destination in this command.

1) Speed: 001 ～ 100
   Percentage (%) of the maximum speed specified in the parameters.
2) Pallet No.: 00 ～ 31
   The pallet number is a particular number designated to previously registered coordinate data out of a maximum 32 pallets, with 00 to 31 available for use.
3) Matrix No.: 00000 ～ 65535, C00 ～ C31
   This is a particular number designated to the matrix point on the pallet.
   You can also use it to specify the counter variable. The variable value range is 0000 to 65535.
   This range can change depending on the pallet number and the definition of the MAT command. The minimum value is 0, and the maximum value is [(Number of rows) × (Number of columns) −1].

Before executing this command, you must use the MAT command to define the pallet matrix number.

11-7-83 102 (DSET)

Function: Substitutes the DI input into variable as binary value.

Format: @00102, <variable 1>, <bit No.>

Example: @00102, C01, 0004

Substitutes the 4-bit numeric value of the DI input into counter variable C01.
In this case, if the DI input is DI0=0, DI1=1, DI2=0, DI3=1
(1010 in binary = 10 in decimal system), the value substituted into C01 is 10.

Explanation: Substitutes DI input into a variable as a binary value.

1) Variable 1: P00 ~ P31, C00 ~ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Bit No.: 01 ~ 16
   The bit number specifies the number of bits that enable DI input. For example, if 4 is specified for the bit number, DI0 to DI3 are enabled, and the range of numeric values is 0 to 15.

11-7-84 103 (DVEN)

Function: Specifies the axis and switches the energized current.

Format: @00103, <specified axis>, <current>

Example: @00103, 1, 1

Uses drive current to energize the X axis.

Explanation

1) Specified axis: 1, 2, 3, 4
   Specify 1 for X axis, 2 for Y axis, 3 for Z axis, 4 for R axis.
2) Current: 0, 1
   Specify 0 for holding current (PRM076, 079, 082, 085), 1 for driving current (PRM077, 080, 083, 086).
   When the axis is stopped, you can use this command to switch from the driving current state to the holding current state.

11-7-85 104 (SET)

Function: Substitutes data into variable.

Format: @00104 <variable 1>, <data>

Example: @00104 P03, 0008

Substitutes 0008 to point variable P03. In this case, it is equivalent to @00069, 003, 0008.

@00104 P04, P03

Substitutes P03 value into point variable P04.

Explanation: You can specify data either as a directly specified numeric value or as a variable.

Substitutes either numeric data or variable data into variable 1.

1) Variable 1: P00 ~ P31, C00 ~ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
   You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

11-7-86 105 (ADD)

Function: Adds either a numeric value or a variable to the variable.

Format: @00105, <variable 1>, <data>

Example:
@00105, P04, 0006
Adds 0006 to point variable P04. In this case, it is equivalent to @00070, 004, 0006.
@00105, P02, C04
Adds C04 value to point variable P02.

Explanation: Adds either numeric data or variable data to variable 1.
The calculation result is substituted into variable 1.
1) Variable 1: P00 ~ P31, C00 ~ C31
You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

11-7-87 106 (SUB)

Function: Subtracts either a numeric value or a variable from the variable.

Format: @00106, <variable 1>, <data>

Example:
@00106, P09, 0005
Subtracts 0005 from point variable P09. In this case, it is equivalent to @00071, 009, 0005.
@00106, P06, C07
Subtracts C07 value from point variable P06.

Explanation: Subtracts either numeric data or variable data from variable 1.
The calculation result is substituted into variable 1.
1) Variable 1: P00 ~ P31, C00 ~ C31
You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

11-7-88 110 (AND)

Function: Performs logic product operation of variable and either a numeric value or a variable.

Format: @00107, <variable 1>, <data>

Example:
@00107, P01, 0012
Performs logic product operation of point variable P01 and 0012.
@00107, P03, C01
Performs logic product operation of point variable P03 and C01.

Explanation: Logic product operation of variable 1 and either numeric data or variable data.
The calculation result is substituted into variable 1.
1) Variable 1: P00 ~ P31, C00 ~ C31
You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

11-7-89 111 (OR)

Function: Performs logic sum operation of variable and either a numeric value or a variable.

Format: @00108, <variable 1>, <data>

Example:
@00108, P10, 0030
Performs logic sum operation of point variable P10 and 0030.
@00108, P04, C05
Performs logic sum operation of point variable P04 and C05.

Explanation: Logic sum operation for variable 1 and either numeric data or variable data.
The calculation result is substituted into variable 1.

1) Variable 1: P00 ~ P31, C00 ~ C31
   You can use variable 1 to specify either the point variable or the counter variable.
2) Data: 0000 ~ 65535, P00 ~ P31, C00 ~ C31
   You can specify data as either a directly specified numeric value, a point variable, or as a counter variable.

11-7-90 115 (EMG)

Function: Executes an emergency stop.

Format: @00115

Example: @00115

Explanation: Stops all axes, and moves to de-energized state.

11-7-91 152 (COPY)

Function: Copies the program at specified number.

Format: @00068, <copy source program No.>, <copy destination program No.>

Example:
@00068, 003, 053
Copy the contents of program 003 to program 053.

11-7-92 236 (SRVO)

Function: Switches the motor driver ON/OFF.

Format: @00236, <X axis>, <Y axis>, <Z axis>, <R axis>

Example: @00236, 1, 1, 0, 0

Sets the motor driver for X and Y axes to ON, and for Z and R axes to OFF.

Explanation: This simultaneously controls the energized state of all four axes.

1) Axis: 0, 1
   0 turns the output OFF, 1 turns it ON.

11-7-93 237 (WAITDRV)

Function: Waits for completion of motor drive.

Format: @00237, <axis 1> <axis 2>

Example: @00237, 1, 1

Response @A

Sends response when the X axis movement is completed.

Explanation: Sends an ACK response when the specified axis reaches its movement destination.

If movement commands are being executed simultaneously for multiple axes, the movement operation for an individual axis is deemed to be complete when an ACK response is received for that particular axis.

1) Axis 1, axis 2: The specified axis is determined by combinations of axis 1 and axis 2.
   1, 1: X axis
   1, 2: Y axis
   2, 1: Z axis
   2, 2: R axis

11-7-94 240 (ACK)

Function: Returns response to RS232C communication.

Format: ACK <port No.>

Response: @A

Example: ACK 0

Returns response to the communication port 0.

Explanation: This is a command for sending response data to RS232C port. There is no timing or other restrictions for returning a response. So as long as this command is executed, the response data is sent unconditionally.

1) Port No.: 0, 2
   Specify 0 for the lower connector port, 2 for the upper connector port.

11-8 Sample Programs

11-8-1 Move between Two Points

Command, operand	Comment
@00023, 50, 0001	Moves to the first point.
@00023, 50, 0002	Moves to the second point.
@00023, 100, 0000	Moves to a standby point.

11-8-2 Palletizing

This case is when a loop is required in the program prepared by the customer.

Command, operand	Comment
@00035, 00, 0005, 0006	Matrix definition for pallet 0
@00072, 00, 00000	Substitutes counter initial value.
@00069, 00, 00000	Substitutes point variable initial value.
※1 Jump position for loop in the customer program	
@00096, 080, 00, C00	Moves to the n^{th} item on pallet 0.
@00032, 01, 1	Picking up operation (DO output)
@00023, 50, 0003	Moves to a supply point.
@00032, 01, 0	Releasing operation (DO output)
@00076	Reads counter value.
※2 If counter value from the customer program is 29, jumps to final step.	
@00073, 00, 0001	Increment counter
@00070, 00, 0001	Increment point variable
※3 Based on the customer program, jumps to ※1.	
@00023, 100, 0000	Moves to a standby point.

11-8-3 Move by Circular Interpolation

Command, operand	Comment
@00023, 100, 0004	Moves to circle starting point.
@00093,100,0006,0004,0005,1,21	XY circular interpolation movement
@00023, 100, 0000	Moves to a standby point.

Memo

Chapter 12 Troubleshooting

If the Cell Master has a problem, read this chapter for what to do and things to check before calling in for repair.

12-1 If a Problem Occurs

This section describes how to take corrective action if the alarm signal appears on the Cell Master's front panel and also in cases where there are other problems apart from those indicated by the alarm signal.
When informing Koganei of a certain problem, please provide as much detailed information as possible about the following items.

Item	Description (Example)
Product	☐ Product name ☐ Serial No. ☐ Time of purchases
Location of problem	☐ Cell Master main unit ☐ Actuator ☐ Operation box ☐ Programming box
Under what conditions?	☐ During automatic operation ☐ During communication command operation ☐ During program creation
What happened?	☐ Motor will not enter an energized state. ☐ Cannot execute return to origin. ☐ Error (No. xx) was displayed. ☐ A point disappeared. ☐ Strange sound coming from the motor
How frequently?	☐ All the time ☐ About once an hour ☐ About once a day ☐ Cannot be reproduced.

12-2 LED Indicators

You can check control information on the main unit by the state of LED indicators on the Cell Master's front panel.

Left LED	Right LED	Description
Orange	Orange	Lights up for about 1 second when power is switched on (display test).
Green	Red	Initial state after power is switched on; origin return is not completed; return to origin in progress
Red	Green	Emergency stop state
Green	Green	Operation preparation complete, operating, and programs can be sent/received.
Red	Red	Error occurred. (Connect the programming box and check the details.)

※ When an error occurs, you can use the programming box to display the error number in the operation screen (in the Menu, select OPRT).
You can also use the communication command to send "?ALM" (049). The error number will be returned in response.

12-3 List of Error Codes

When an error occurs, the LED indicators on the Cell Master's front panel will light up in red. Whenever you get an error, connect the operating box, check the error number, and do what is necessary to eliminate the error.

Error No.	Description	Cause	Remedy
001	Emergency stop switch ON state	In an emergency stop state.	Release the emergency stop on the operation box.
002	Return to origin incomplete	Failed to return to origin.	Use the operation box to execute return to origin.
003	Software limit error	During teaching, X axis has exceeded the + or − side limits.	Execute teaching at the position located in + or − direction from where the error occurred.
004	Program selection error	Attempted to execute an unregistered program.	Specify a registered program No.
005	Undefined code used	Wrong code input.	Input the correct code.
006	Operation box disconnection error	Operation box not connected.	Connect the operation box. Or set an unassigned parameter in the operation box to 1.
007	Multitask overlap starting error	Task No. for starting a task already in use.	Use a different task No. to start the task.
008	Return to origin error	Return to origin was not completed. Either the load is excessive, or the origin sensor has broken down.	Lighten the load. Or repair the robot.
010	Pallet data error	Input values for number of X and Y axes, etc., are not correct.	Adjust the setting values within the correct range.
011	Emergency stop ON state by PC	In an emergency stop state.	Press the reset switch on the Cell Master main unit, to release the emergency stop.
012	232C starting error	Not in the 232C starting mode.	Change the starting mode setting parameter to the 232C starting mode.
013	I/O starting error	Not in the I/O starting mode.	Change the starting mode setting parameter to the I/O starting mode.
014	Operation box starting error	Not in the operation box starting mode.	Change the starting mode setting parameter to the operation box starting mode (0).
016	Circular arc initial point error	Starting point is not the current position.	Change the specified starting point to the correct value.
021	X axis missed steps	X axis is in missed steps.	Remove the cause of the missed steps.
022	Y axis missed steps	Y axis is in missed steps.	Remove the cause of the missed steps.
023	Z axis missed steps	Z axis is in missed steps.	Remove the cause of the missed steps.
024	R axis missed steps	R axis is in missed steps.	Remove the cause of the missed steps.
099	Now returning to origin	—	—

12-4 Other Problems and Remedies

If a problem occurs while using the Cell Master, take the appropriate remedy as described hereafter. Note that if the problem is not resolved even after taking such remedies, please contact Koganei immediately.

12-4-1 Cell Master Main Unit Operating Abnormally

No.	Symptom	Possible cause	What to check	Remedy
1	Actuator motor remains in free state even after power is turned on.	Return to origin not executed.	Check the operation box.	Execute the return to origin.
		No power is being supplied.	Check the voltage of the power supply terminals.	Supply power.
		The connector for the motor cable is disconnected.	Check the connection of the connector for the motor cable.	Connect properly.
2	A position offset occurs. Even after executing return to origin, the position offsets again.	The actuator is improperly mounted.	Inspect whether the actuator is in loose mounted.	—
		The motor is missed steps.	Check whether too heavy a load was set.	Recheck the actual payload.
		Circuit board is defective.	Try to operate another Cell Master main unit by using the circuit board.	When the main unit is restored to the correct position, replace the Cell Master's board. (Contact Koganei.)
3	A position offset occurs. After executing return to origin, the offset position is corrected.	Motor cable is defective.	Check each wire with a multimeter etc.	Defective cable or bad connector needs to be repaired/ replaced.
4	A collision occurs at the stroke end when executing return to origin.	The origin sensor is defective.	Remove the cover and check sensor operation with the LED. Blocked: Unlit Not blocked: Lit	The origin sensor must be replaced if it is not normal.
		The robot I/O is defective.	Check each wire with a multimeter etc.	

12-4-2 Input/Output Signal Abnormality

No.	Symptom	Possible cause	What to check	Remedy
1	Output signal cannot be controlled.	Improper outside wiring.	Inspect whether a mistake was made when wiring.	Make the proper connection by referring to the connection diagrams in this manual.
		Internal photocoupler is damaged.	When output is ON, the correct voltage between the +24V terminal and the OUT terminal is about 24V.	Replace the Cell Master's board. (Contact Koganei.)
2	No response even when a signal is input.	Programs cannot be run.	Connect the teaching box and check the status.	—
		The signal's pulse width is too narrow.	Check the signal's pulse width.	Set the signal's pulse width to 50 ms or more.

Chapter 13 Specifications

13-1 Main Unit

13-1-1 Main Unit Specifications

DTHB series (A4)

Main unit models		DTHB-AS2	DTHB-AS3	DTHB-ASL3	DTHB-AL2	DTHB-AL3	DTHB-ALL3	DTHB-CS2	DTHB-CS3	DTHB-CSL3
Operating range (mm)	X	150			200			100		
	Y	200			200			200		
	Z	—	50	50	—	50	50	—	50	50
Drive method	X/Y/Z	2-phase stepping motor (micro-step control) and encoder								
Drive mechanism	X/Y/Z	Sliding screw								
Maximum speed (mm/s)	X/Y	200			200			200		
	Z	—	200	70	—	200	70	—	200	70
Repeatability (mm)	X/Y	±0.02								
	Z	—	±0.02		—	±0.02		—	±0.02	
Maximum payload (kg)	Y	2							—	
	Z	—	1	2	—	1	2	—	1 Note 1	1 Note 1
Lead (mm)	X/Y	6								
	Z	—	6	2	—	6	2	—	6	2
Interpolation speed (Constant speed) (mm/s)	Linear	1～200		1～200 Note 2	1～200		1～200 Note 2	1～200		1～200 Note 2
	Circular	1～200		1～200 Note 2	1～200		1～200 Note 2	1～200		1～200 Note 2
	Continuous	1～200		1～200 Note 2	1～200		1～200 Note 2	1～200		1～200 Note 2
Axis control method	Number of control axes	Simultaneous 4-axis control								
	Position setting unit	Set in millimeters (mm)								
	Operating method	PTP operation and CP operation								
	Interpolation functions	4-axis linear interpolation, 2-axis circular interpolation Note 3, and 2-axis continuous interpolation Note 3								
	Position control	Open loop and missed steps detection								
	Speed setting	Robot language operand 1 setting, parameter setting								
	Acceleration setting	Setting according to acceleration/deceleration parameter								
Program	Programming method	Robot language								
	Multitask function	10 tasks								
	Number of programs	1-1000 (Number of programs changes depending on the parameter.) Note 4								
	Number of steps in a program	Number of total steps 10000 steps								
	Number of points	10000 points								
	Point input method	Manual data input (coordinate input) using the programming box, teaching playback, direct teaching and offline programming using a PC								
Input/output	General-purpose I/O	IN24 points, OUT24 points (In the parameter settings, pin No. allocation, custom input/output allocation, custom input 5 points Note 5, custom output 5 points Note 6)								
	External connection	RS232C (1ch), programming box connector, operation box connector, I/O connector								
	COM port (transmission rate)	RS232C (38.4kbps)								
General specifications	Power supply	24VDC ±10% (No DC power supply is provided. A 24VDC 3A 75W or more external power supply is required.)								
	Operating temperature	0～40°C								
	Operating humidity	35～85% (no condensation)								
	Storage temperature	–10～50°C								
	Mass	Approx. 5.9kg	Approx. 6.4kg	Approx. 6.4kg	Approx. 6.1kg	Approx. 6.6kg	Approx. 6.6kg	Approx. 6.3kg	Approx. 6.8kg	Approx. 6.8kg

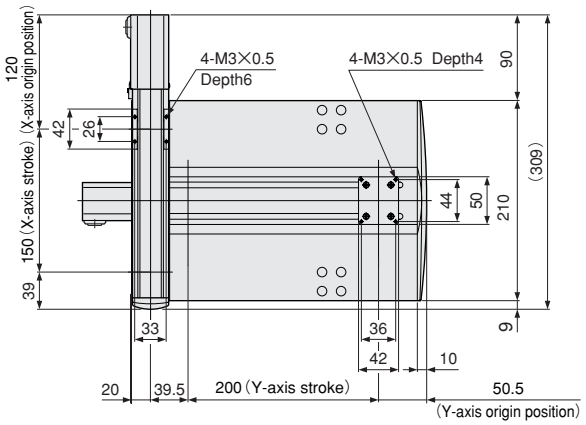
Notes: 1. Point settings that take into consideration the deflection at the end of the Y axis are required.
2. Interpolation speed when the Z axis is used, 1 to 70mm/s.
3. These are XY axes and ZR axes combinations.
4. Program selection from the operation box is 0 to 99.
5. COUNTER RESET, AUTO-RUN, RESET, ORG-START, EMG
6. READY, BUSY, END, RETURN TO ORIGIN COMPLETE OUTPUT, ALM OUTPUT

DTHKB series (A3)

Main unit models		DTHKB-ASL3	DTHKB-CSL3
Operating range (mm)	X	300	300
	Y	350	300
	Z	100	100
Drive method	X/Y/Z	2-phase stepping motor (micro-step control) and encoder	
Drive mechanism	X/Y	Timing belt drive	
	Z	Sliding screw	
Maximum speed (mm/s)	X/Y	500	500
	Z	70	70
Repeatability (mm)	X/Y	±0.05	±0.05
	Z	±0.02	±0.02
Maximum payload (kg)	Y	5	—
	Z	2	2 Note 1
Lead (mm)	X/Y	48	48
	Z	2	2
Interpolation speed (Constant speed) (mm/s)	Linear	1～200 Note 2	1～200 Note 2
	Circular	1～200 Note 2	1～200 Note 2
	Continuous	1～200 Note 2	1～200 Note 2
Axis control method	Number of control axes	Simultaneous 4-axis control	
	Position setting unit	Set in millimeters (mm)	
	Operating method	PTP operation and CP operation	
	Interpolation functions	4-axis linear interpolation, 2-axis circular interpolation Note 3, and 2-axis continuous interpolation Note 3	
	Position control	Open loop and missed steps detection	
	Speed setting	Robot language operand 1 setting, parameter setting	
	Acceleration setting	Setting according to acceleration/deceleration parameter	
Program	Programming method	Robot language	
	Multitask function	10 tasks	
	Number of programs	1-1000 (Number of programs changes depending on the parameter.) Note 4	
	Number of steps in a program	Number of total steps 10000 steps	
	Number of points	10000 points	
	Point input method	Manual data input (coordinate input) using the programming box, teaching playback, direct teaching and offline programming using a PC	
Input/ output	General-purpose I/O	IN24 points, OUT24 points (In the parameter settings, pin No. allocation, custom input/output allocation, custom input 5 points Note 5, custom output 5 points Note 6)	
	External connection	RS232C (1ch), programming box connector, operation box connector, I/O connector	
	COM port (transmission rate)	RS232C (38.4kbps)	
General specifications	Power supply	100～240V AC 50/60Hz Note7	
	Operating temperature	0～40°C	
	Operating humidity	35～85% (no condensation)	
	Storage temperature	–10～50°C	
	Mass	Approx. 14kg	Approx. 15kg

Notes: 1. Point settings that take into consideration the deflection at the end of the Y axis are required.
2. Interpolation speed when the Z axis is used, 1 to 70mm/s.
3. These are XY axes and ZR axes combinations.
4. Program selection from the operation box is 0 to 99.
5. COUNTER RESET, AUTO-RUN, RESET, ORG-START, EMG
6. READY, BUSY, END, RETURN TO ORIGIN COMPLETE OUTPUT, ALM OUTPUT
7. The power cord provided is for 100VAC.

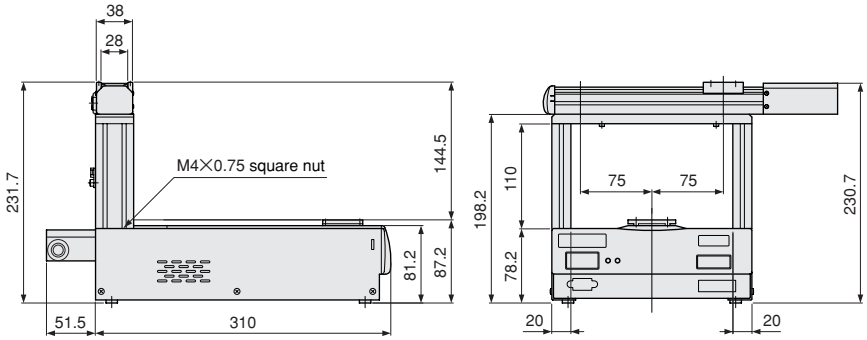
13-1-2 Dimensions Unit: mm

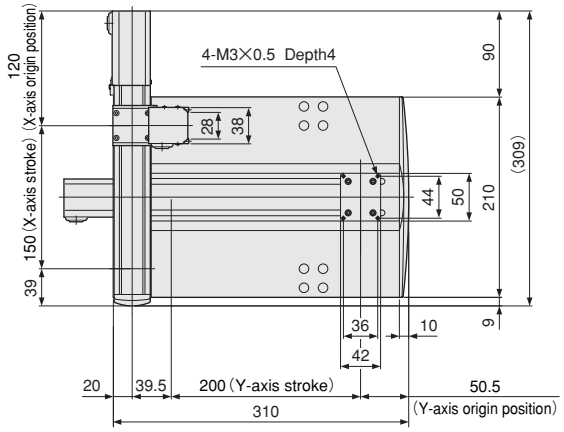


Gantry 2-axis

DTHB-AS2

X axis: 150mm

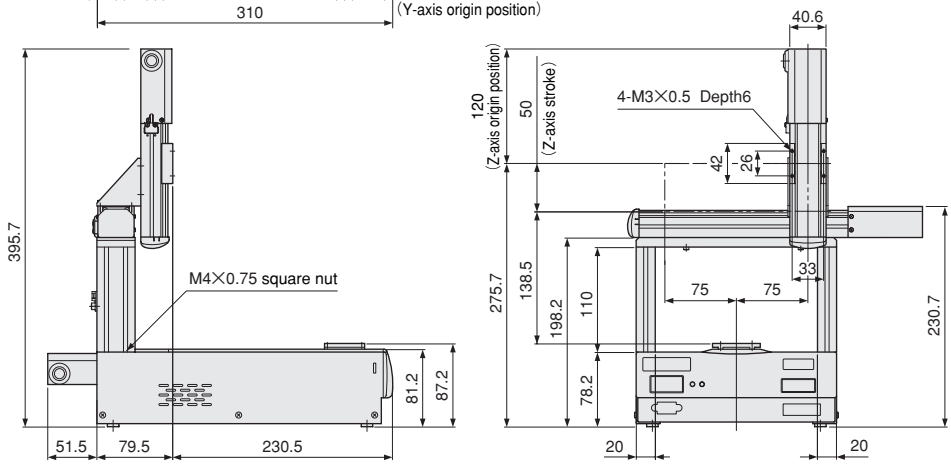


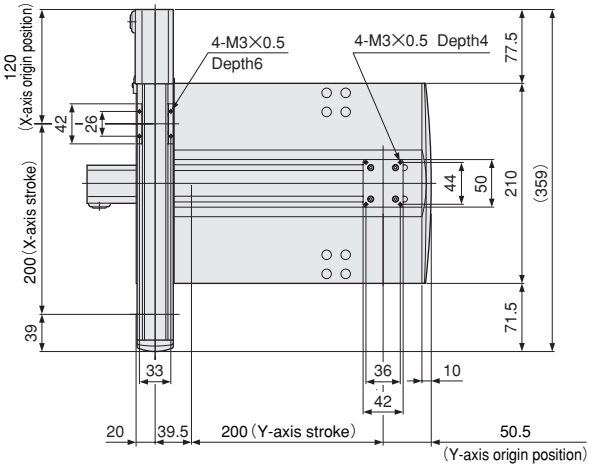


Gantry 3-axis

DTHB-AS3
DTHB-ASL3 (Z axis lead 2mm specification)

X axis: 150mm

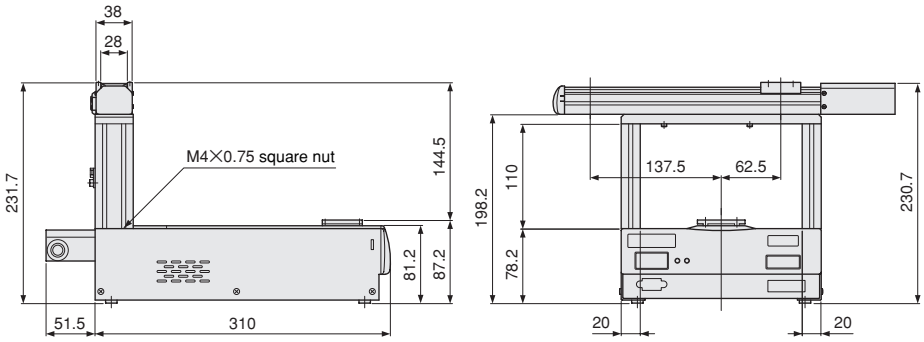


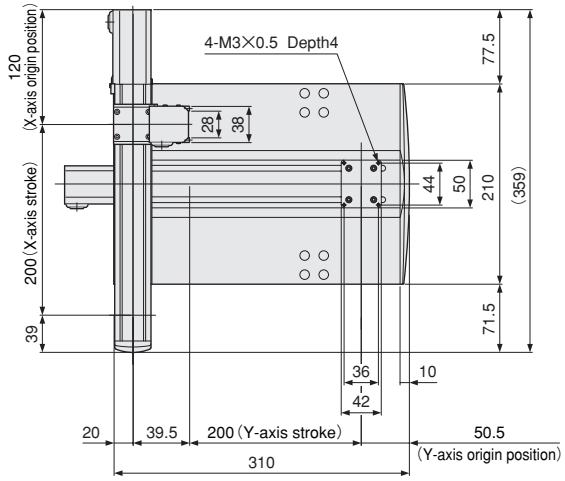


Gantry 2-axis

DTHB-AL2

X axis: 200mm

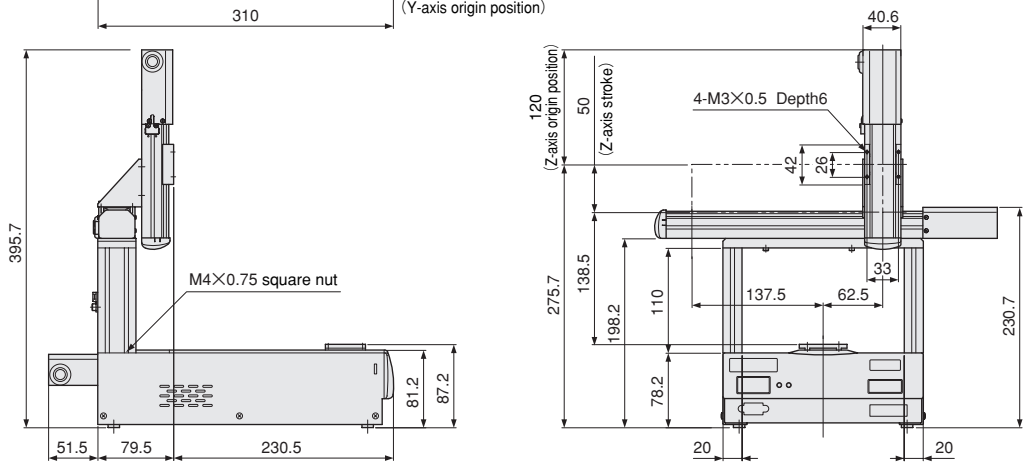


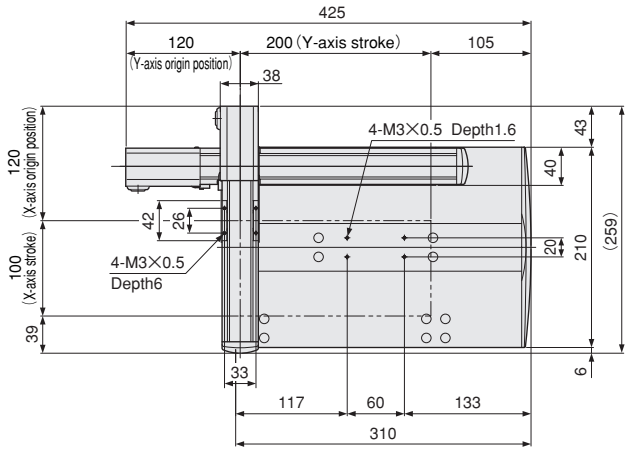


Gantry 3-axis

DTHB-AL3
DTHB-ALL3 (Z axis lead 2mm specification)

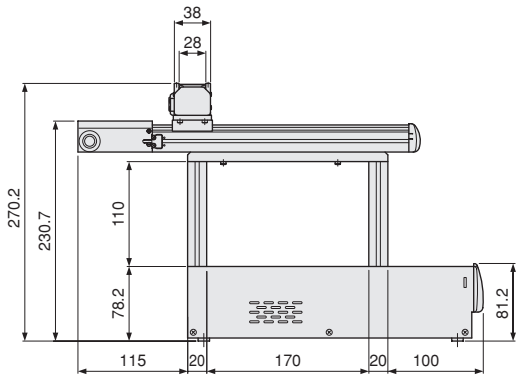
X axis: 200mm

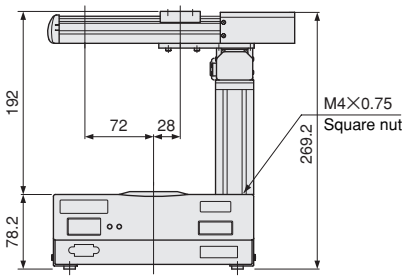


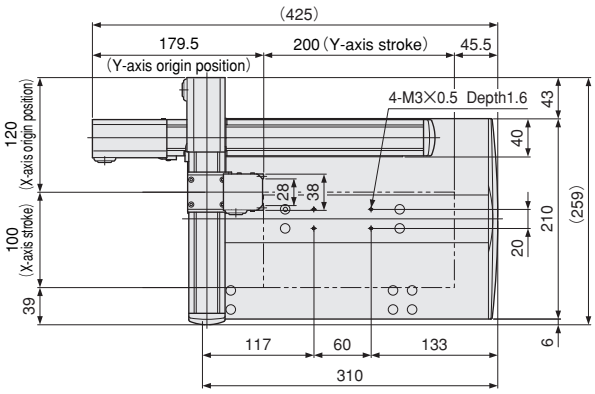


Cartesian 2-axis

DTHB-CS2



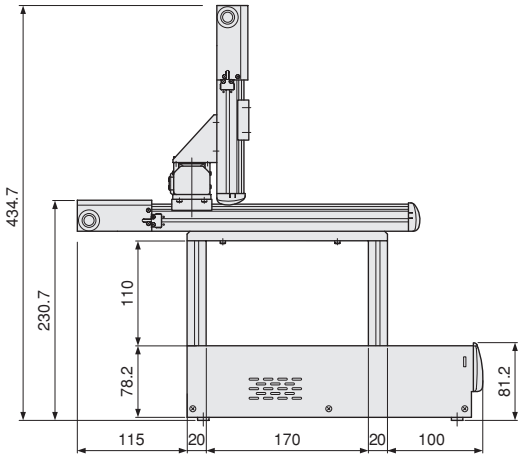


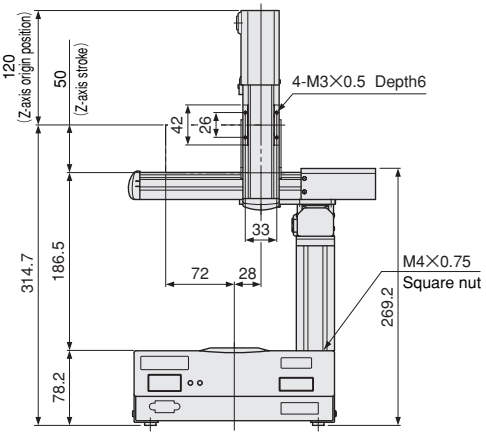


Cartesian 3-axis

DTHB-CS3

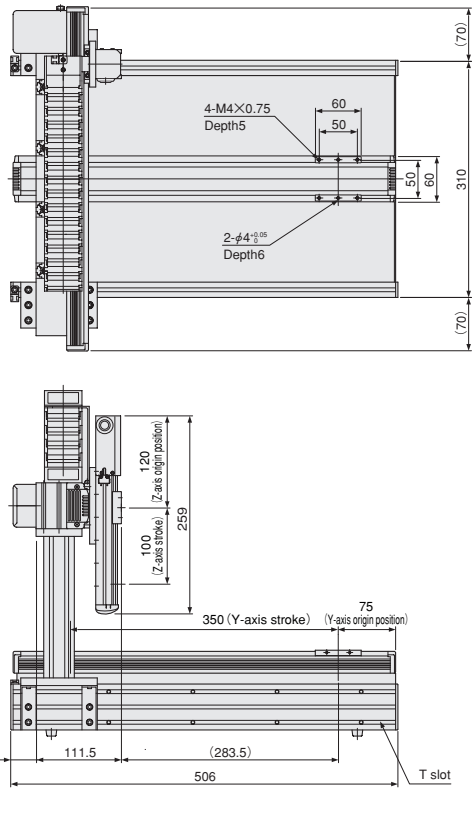
DTHB-CSL3 (Z axis lead 2mm specification)





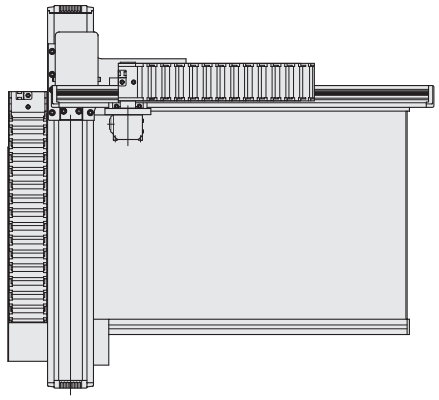
Gantry 3-axis

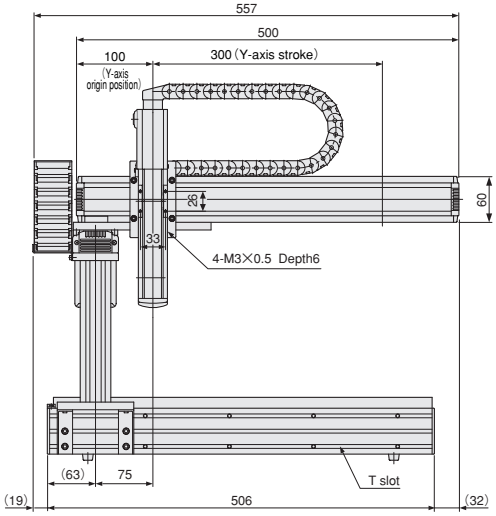
DTHKB-ASL3

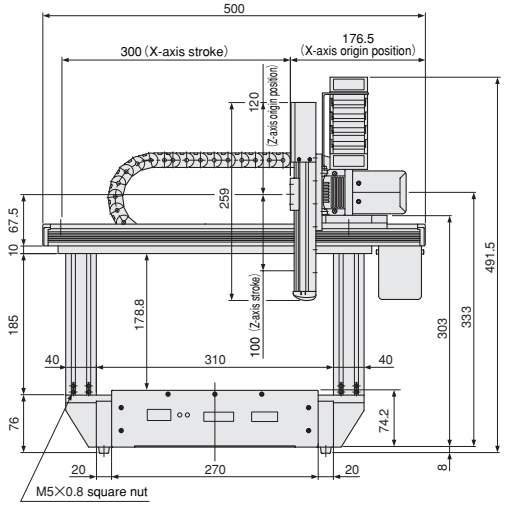


Cartesian 3-axis

DTHKB-CSL3





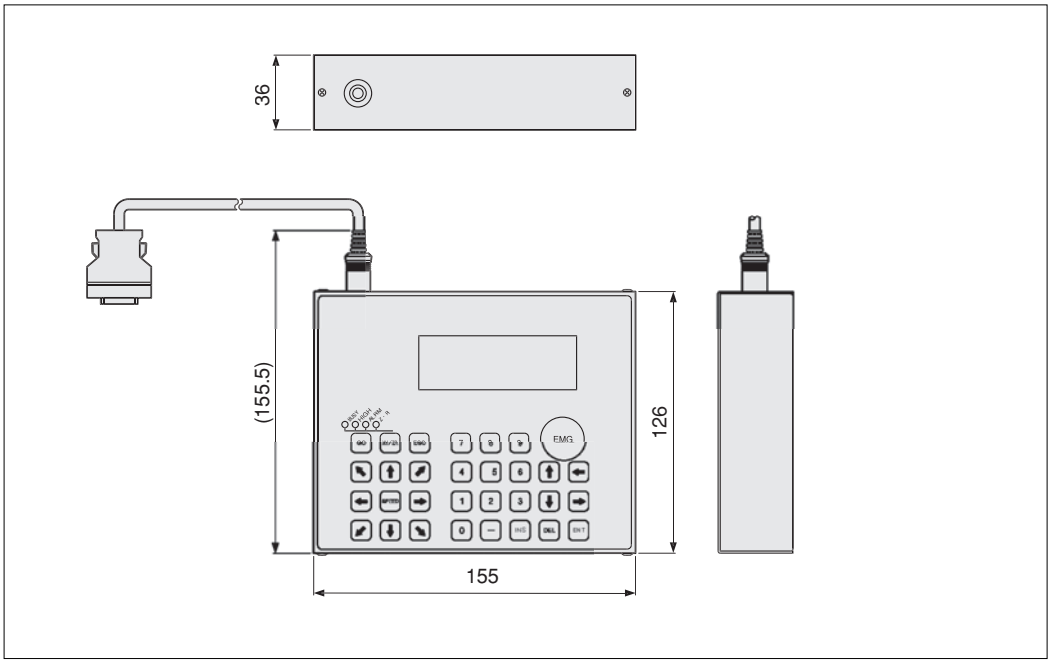


13-2 Programming Box

13-2-1 Programming Box Specifications

Item	Specification
Display	“20×4” liquid crystal display, LED indicator×4 (BUSY, HIGHT, ALARM, Z/R)
Operation panel	Sheet key×31
Dimensions	(W) 155mm×(D)126mm×(H) 36mm
Painting color	Munsell N8.0 (Ivory)
Functions	Teaching, program edit and registration, point edit and registration, parameter registration, I/O monitor

13-2-2 Dimensions

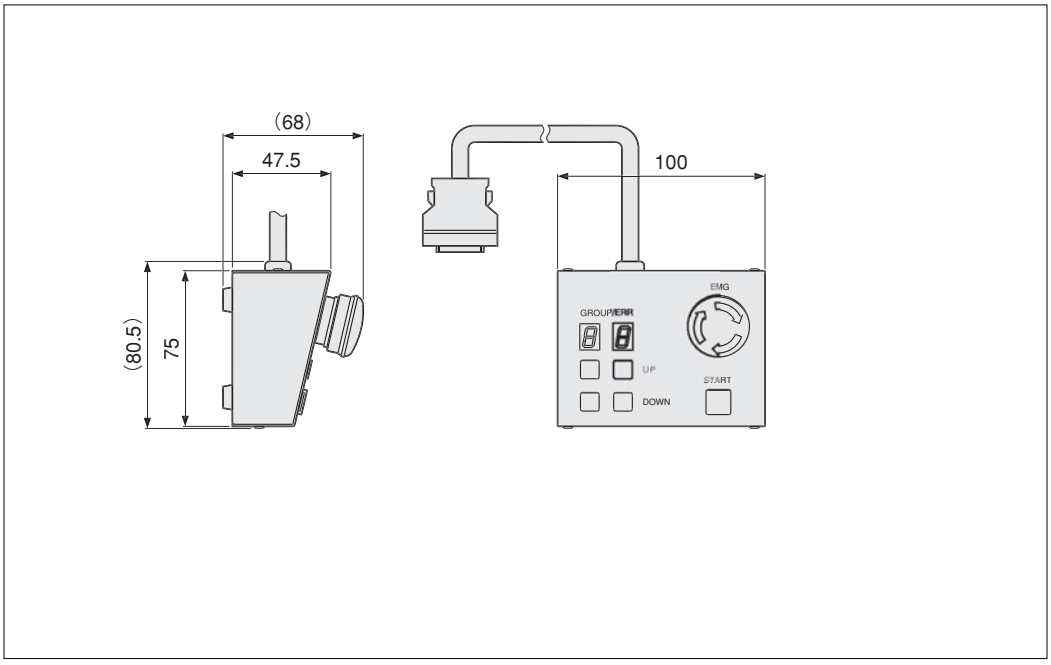


13-3 Operation Box

13-3-1 Operation Box Specifications

Item	Specification
Display	2-digit display LED LED indicator×1
Operation panel	Flat key switch×5 EMG switch with lock×1
Dimensions	(W) 100mm×(D) 75mm×(H) 47.5mm
Painting color	Munsell N8.0 (Ivory)

13-3-2 Dimensions

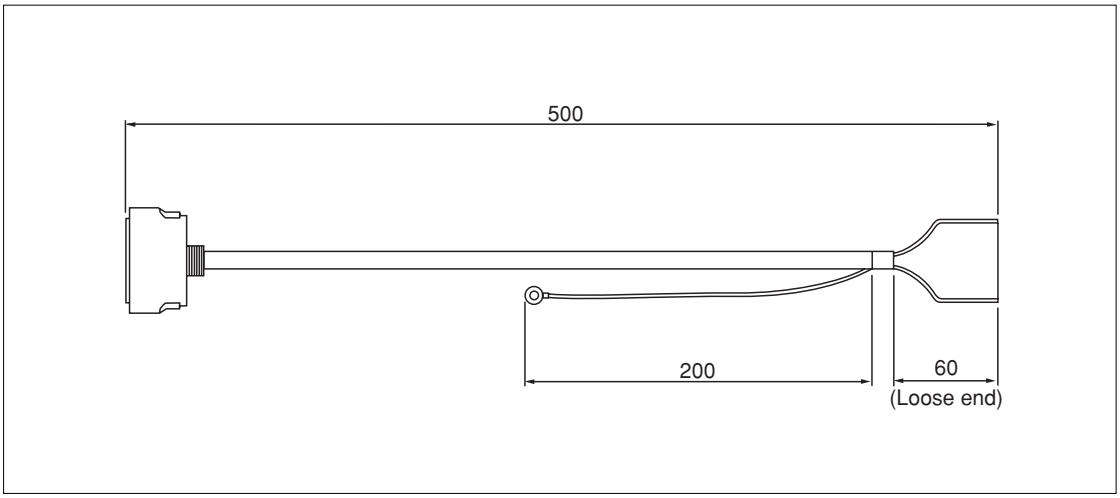


13-4 I/O Cable

Dimensions

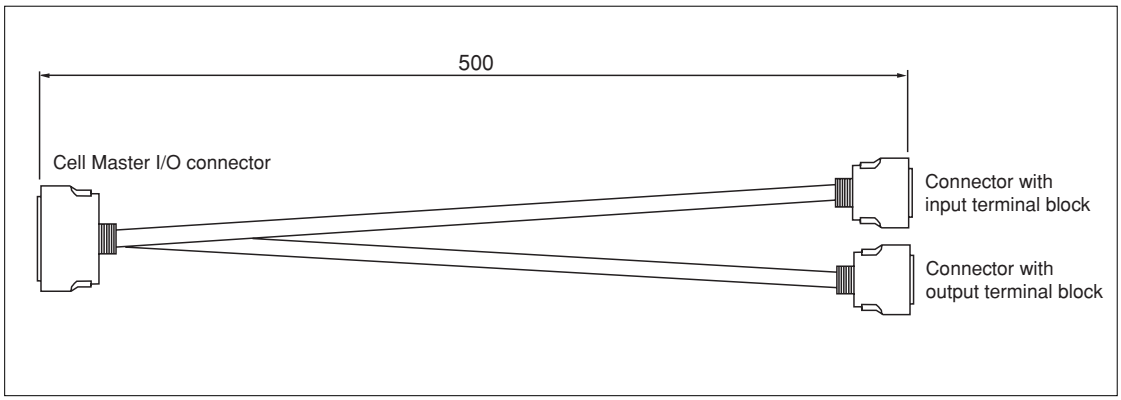
·Loose end cable

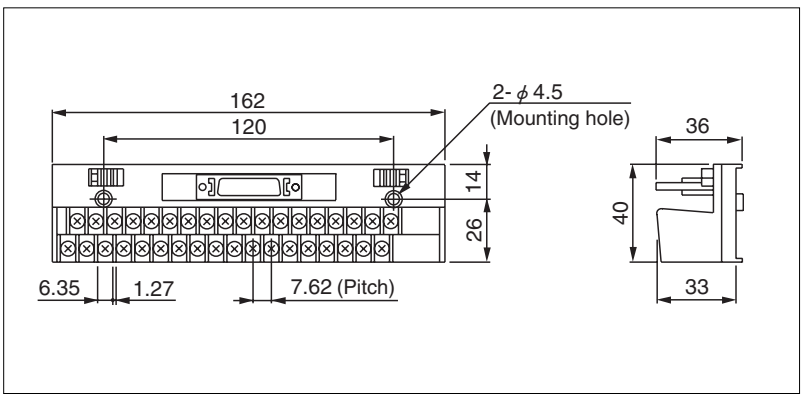
DTHBP-CTA



·With screw terminal block

DTHBP-CTB





Chapter 14 DTHKB Axis Position Adjustment

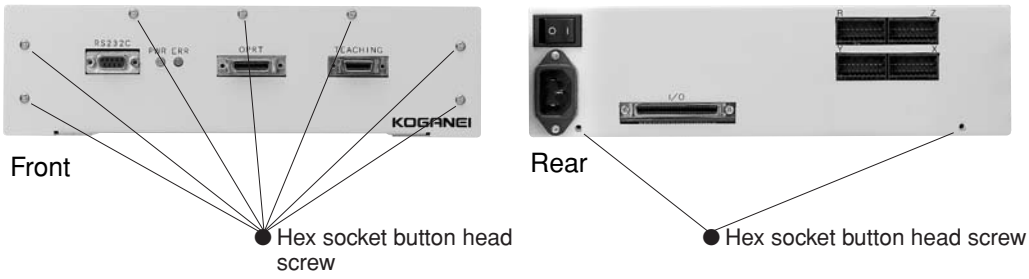
Cell Master DTHKB (A3 type) uses a structure that allows you to change the axis mounting position.
This chapter describes the method for moving the axis position.

Caution: Koganei performs assembly inspection before shipment, and cannot provide guarantees or repairs for problems that may arise from the customer's axis mounting work. Moreover, changing the mounting may result in a case where the provided cable is not long enough, and you will need to separately purchase a longer cable. In such a case, consult Koganei directly.

14-1 Adjusting the Axis Position for the Gantry Type DTHKB-ASL3

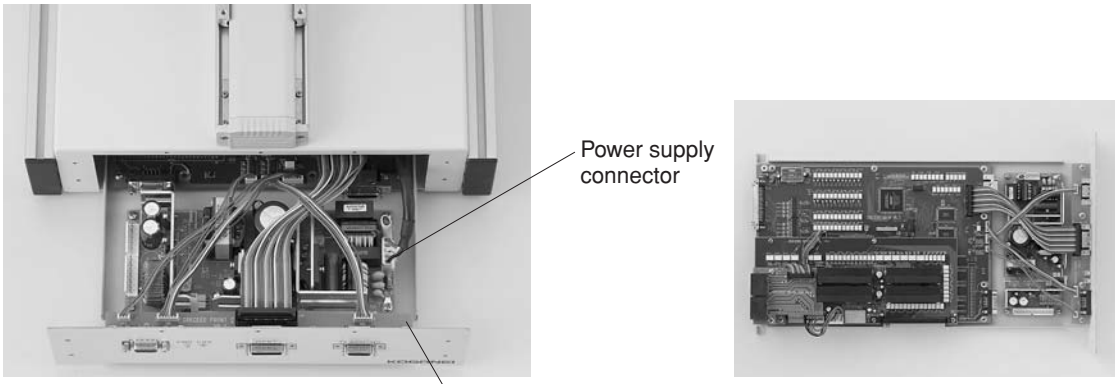
14-1-1 Adjusting the Y Axis Unit Position

(1) Remove the hex socket button head screws (M3) at 7 locations on the front of the main unit, and 2 locations on the rear of the main unit.



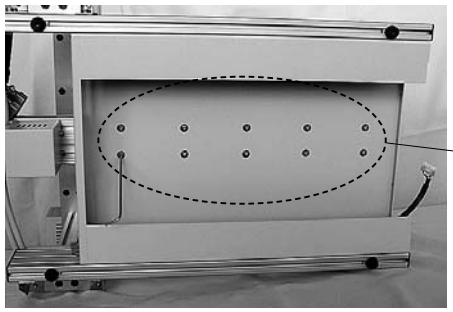
(2) From the front of the gantry type A3 main unit, pull out the A3 board unit until the DC power supply unit inside the unit is half-visible, with due attention to preserving the power harness, etc.

(3) Disconnect the connector from the power supply connector, and remove the A3 board unit from the gantry type A3 main unit.



(4) Evenly loosen (about 3 rotations) the 10 M4×8 bolts located on the center back of the gantry type A3 main unit just enough that the Y axis unit can be moved. Move and adjust the Y axis so that it is parallel in a suitable position, and tighten the screws.
Recommended tightening torque: 9.8N・m

※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.



Back side of gantry type A3 main unit

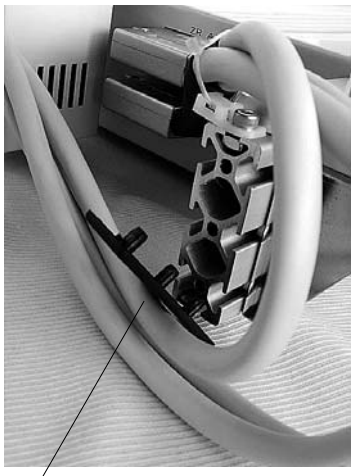
(5) From the front of the gantry type A3 main unit, insert the A3 board unit until the DC power supply inside the unit is about halfway inside, with due attention to preserving the power harness, etc.

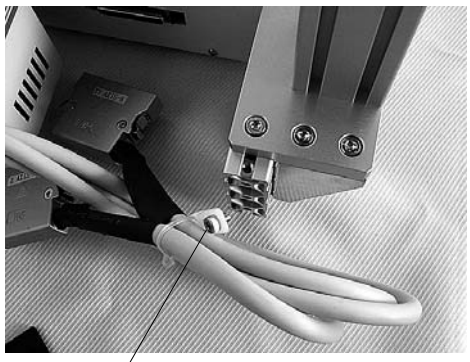
(6) Plug the power harness connector into the DC power supply in the A3 board unit, and insert the board into the gantry type A3 main unit case, aligning the I/O sockets, etc., in the A3 board unit to the various sockets on the rear of the case.

(7) Tighten the M3×6 button head screws at 7 locations in the front and 2 locations in the rear.

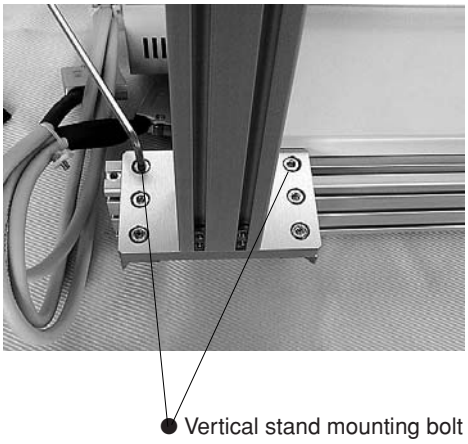
14-1-2 Adjusting the Vertical Stand Position

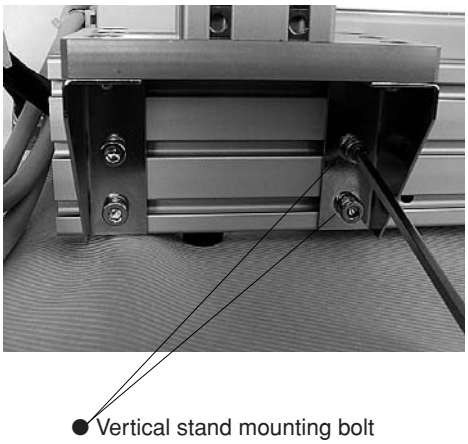
(1) Remove the end cap and anchor mount bolts (M4) attached to the horizontal mounting stand on both sides of the rear of the main unit.





(2) Evenly loosen (about 2 and one-half rotations) the vertical stand mounting bolts (M5) at 6 locations just enough that the vertical stand can be moved along the T groove.





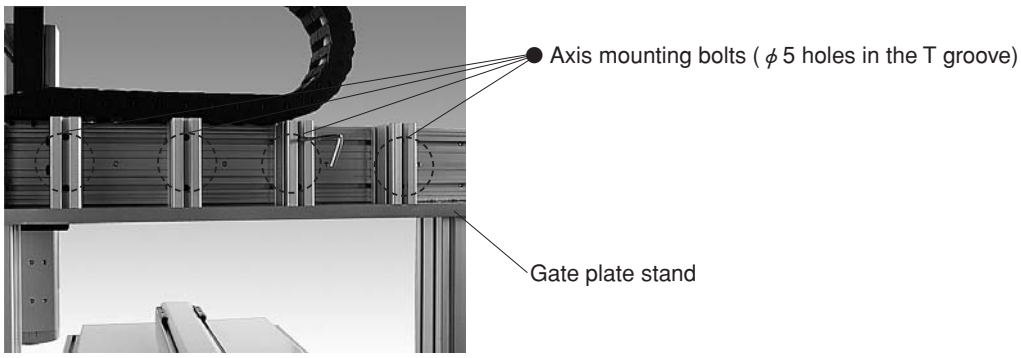
(3) While holding down both sides of the vertical stand, move and adjust the central support until it is parallel in a suitable position.

(4) After moving, retighten the mounting bolts.
Recommended tightening torque: 14.7N・m

※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

14-1-3 Adjusting the X Axis Unit Position

(1) Evenly loosen (about 3 rotations) the mounting bolts (M4 hex socket button head screws) in a total of 8 locations on the back of the X axis just enough that the axis can be moved.

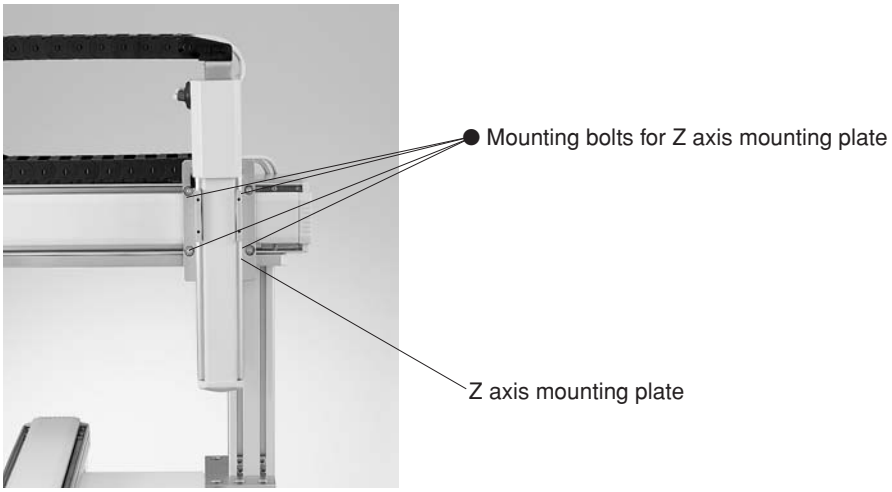


(2) Move and adjust the X axis so that it is parallel in a suitable position, and tighten the button head screws.
Recommended tightening torque: 9.8N・m

※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

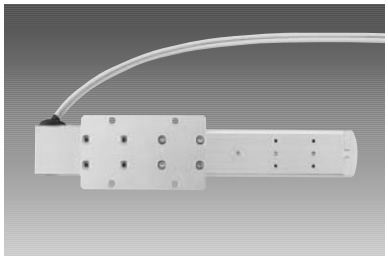
14-1-4 Changing the Z Axis Unit Mounting Position

(1) Loosen the 4 mounting bolts (M4), remove the Z axis cable connector, and remove the Z axis unit and Z axis mounting plate from the slide table on the X axis unit.

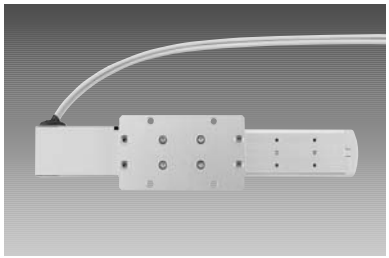


(2) The Z axis unit can be installed in steps of 30mm onto the Z axis mounting plate.
Select from the 6 patterns below to assemble it into the desired 3 axis combination.

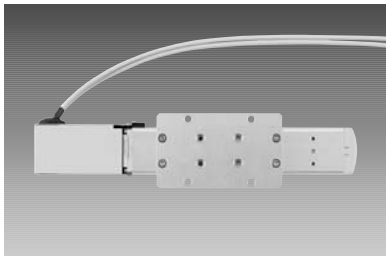
Pattern 1 (30mm down)



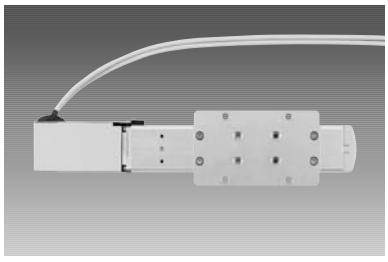
Pattern 2 (standard)



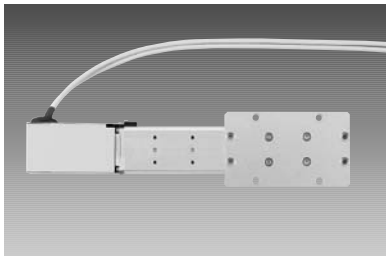
Pattern 3 (30mm up)



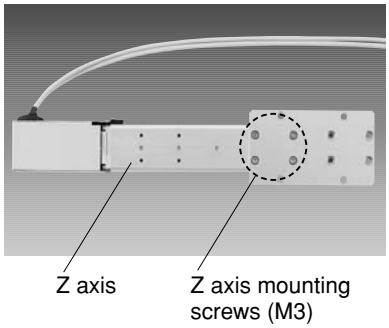
Pattern 4 (60mm up)



Pattern 5 (90mm up)



Pattern 6 (120mm up)



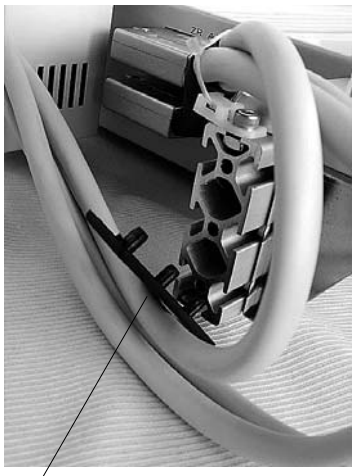
(3) Align the mounted unit to the gantry type X axis slide table, mount it perpendicularly to the axis, and tighten the bolts (M4) at 4 locations.
Recommended tightening torque: 9.8N・m

※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

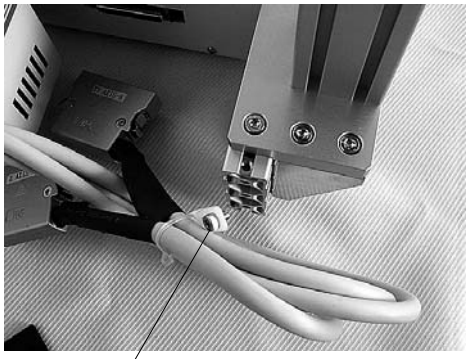
14-2 Adjusting the Axis Position for the Cartesian Type DTHKB-CSL3

14-2-1 Adjusting the Vertical Stand Position

(1) Remove the end cap and anchor mount bolts (M4) attached to the horizontal mounting stand on both sides of the rear of the main unit.

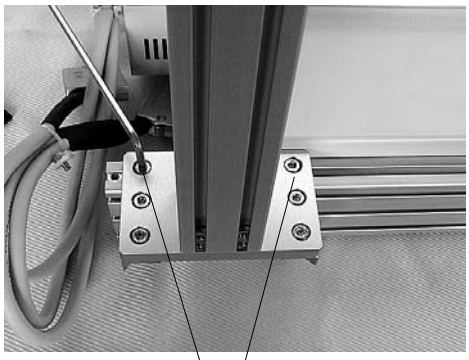


End cap

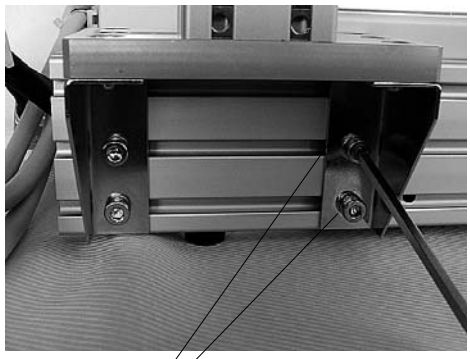


Anchor mount

(2) Evenly loosen (about 2 and one-half rotations) the vertical stand mounting bolts (M5) at 6 locations just enough that the vertical stand can be moved along the T groove.



Vertical stand mounting bolt



Vertical stand mounting bolt

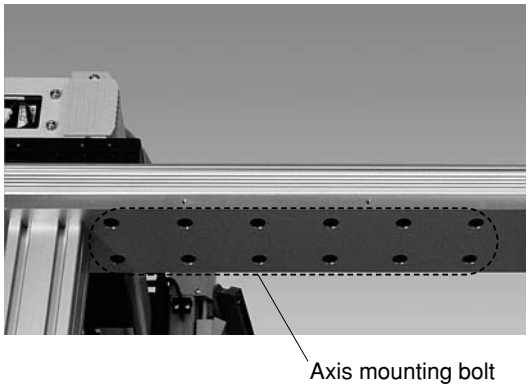
(3) While holding down both sides of the vertical stand, move and adjust the central support until it is parallel in a suitable position.

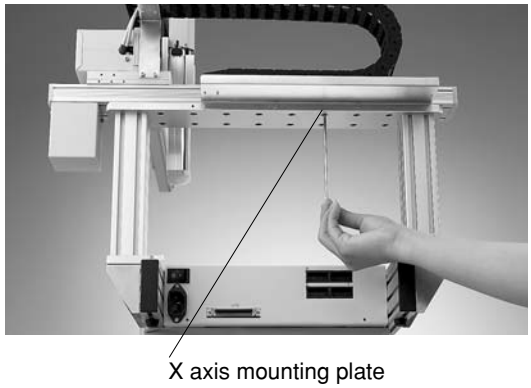
(4) After moving, retighten the mounting bolts.
Recommended tightening torque: 14.7N・m

※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

14-2-2 Moving and Adjusting the Cartesian X Axis Unit

(1) Evenly loosen (about 3 rotations) the mounting bolts (M4) at 16 locations on the back of the X axis mounting plate just enough that the axis unit can be moved.



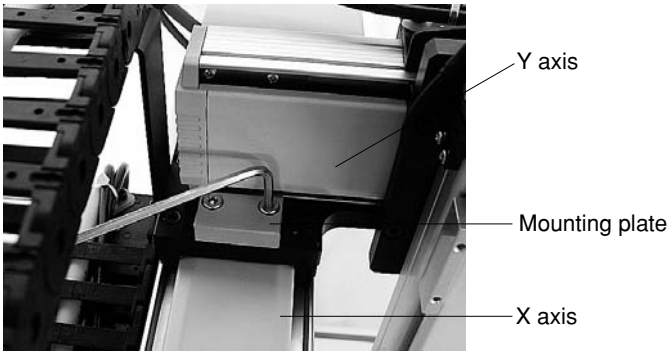


(2) Move and adjust the X axis unit so that it is parallel in a suitable position, and tighten the bolts at 16 locations.
Recommended tightening torque: 9.8N・m

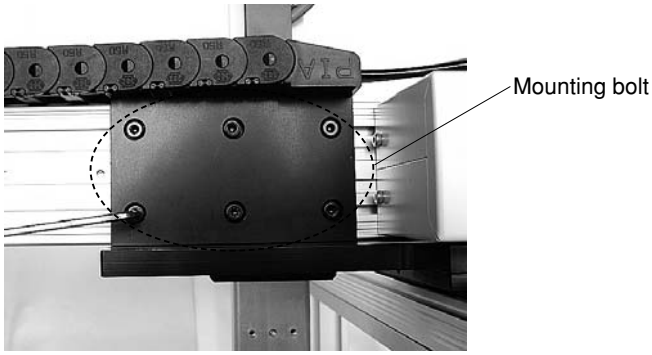
※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

14-2-3 Moving and Adjusting the Cartesian Y Axis Unit

(1) Loosen the mounting bolts (M4) at 2 locations on the mounting plate holding down the frame of the Y axis unit.



(2) Evenly loosen (about 3 rotations) the mounting bolts (M4) at 6 locations on the back of the Y axis unit just enough that the axis can be moved.



(3) Move and adjust the Y axis unit so that it is parallel in a suitable position, and then tighten the mounting bolts at 6 locations and the mounting plate at 2 locations.
Recommended tightening torque: 9.8N・m

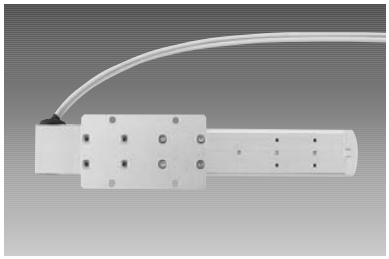
※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

14-2-4 Changing the Z Axis Unit Mounting Position

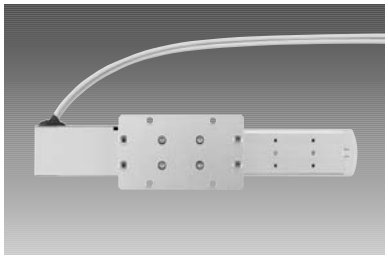
(1) Loosen the 4 mounting bolts (M4), remove the Z axis cable connector, and remove the Z axis unit and Z axis mounting plate from the slide table on the Y axis unit.

(2) The Z axis unit can be installed in steps of 30mm onto the Z axis mounting plate.
Select from the 6 patterns below to assemble it into the desired 3 axis combination.

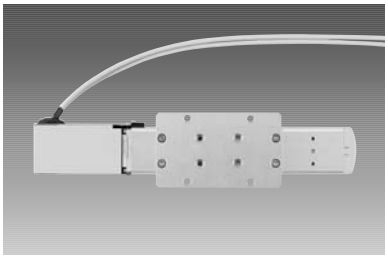
Pattern 1 (30mm down)



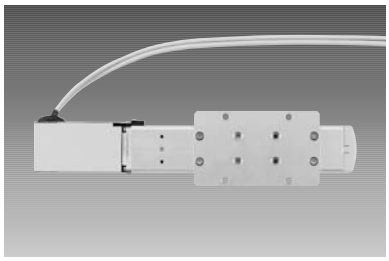
Pattern 2 (standard)



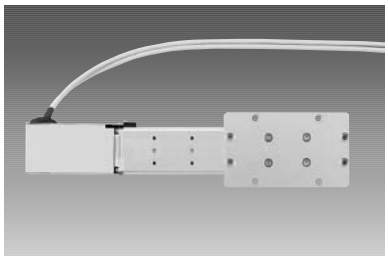
Pattern 3 (30mm up)



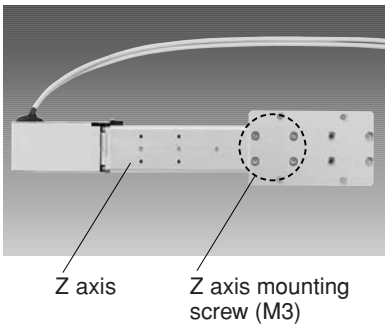
Pattern 4 (60mm up)



Pattern 5 (90mm up)



Pattern 6 (120mm up)



(3) Align the mounted unit to the Cartesian type Y axis slide table, mount it perpendicularly to the axis, and tighten the bolts (M4) at 4 locations.
Recommended tightening torque: 9.8N・m

※ Koganei cannot provide guarantees for problems that arise due to assembly accuracy. Koganei asks that the customer take responsibility for ensuring position accuracy.

If you have questions about the contents of this manual, or
about other technical issues, please consult the OVERSEAS DEPARTMENT
at the address and telephone number shown below.

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Cell Master

DTHB-AS/AL/CS
DTHKB-ASL/CSL

Owner's Manual

March 2007, Ver.1.0 X903726

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