

# **MC series driver-compliant application MTLParam manual**

**Compliant firm Ver.2.15 (MC-120) or later**

**Ver.3.00.03 (MC-200) or later**

**Compliant application MTLParam 2.2 or later**



**Microtech Laboratory Inc.**

**8-1-46 Honcho, Kamitsuruma Sagami-hara-shi, Kanagawa 252-0318, Japan**

**TEL: 042-746-0123**

**FAX: 042-746-0960**

**URL: <https://motor.mtl.co.jp/>**

**E-mail: [motor@mtl.co.jp](mailto:motor@mtl.co.jp)**

## Revision history

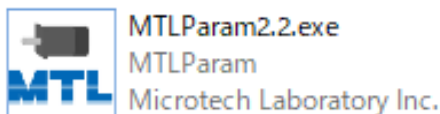
<b>Version</b>	<b>Date of issue</b>	<b>Revised content</b>	<b>Person in Charge</b>
Ver1.0	July 12th 2017	1st edition	I.Suzuki
Ver1.1	July 2nd 2018	Revised due to application version update (MTLPARAM1.1.8)	I.Suzuki
Ver1.2	March 12th 2019	Changed screen explanation (MTLParam 1.1.10) Addition (COM screen: MODEL setting screen migration check ON/OFF)	I.Suzuki
Ver2.0	December 9th 2019	MC-200 series-compliant	I.Suzuki
Ver2.1	June 11th 2020	Added Model screen function (7P)	I.Suzuki

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# 【1】 Starting software

① Start “MTLParam 2.2.exe” in the “Software set.ZIP” downloaded on our website.



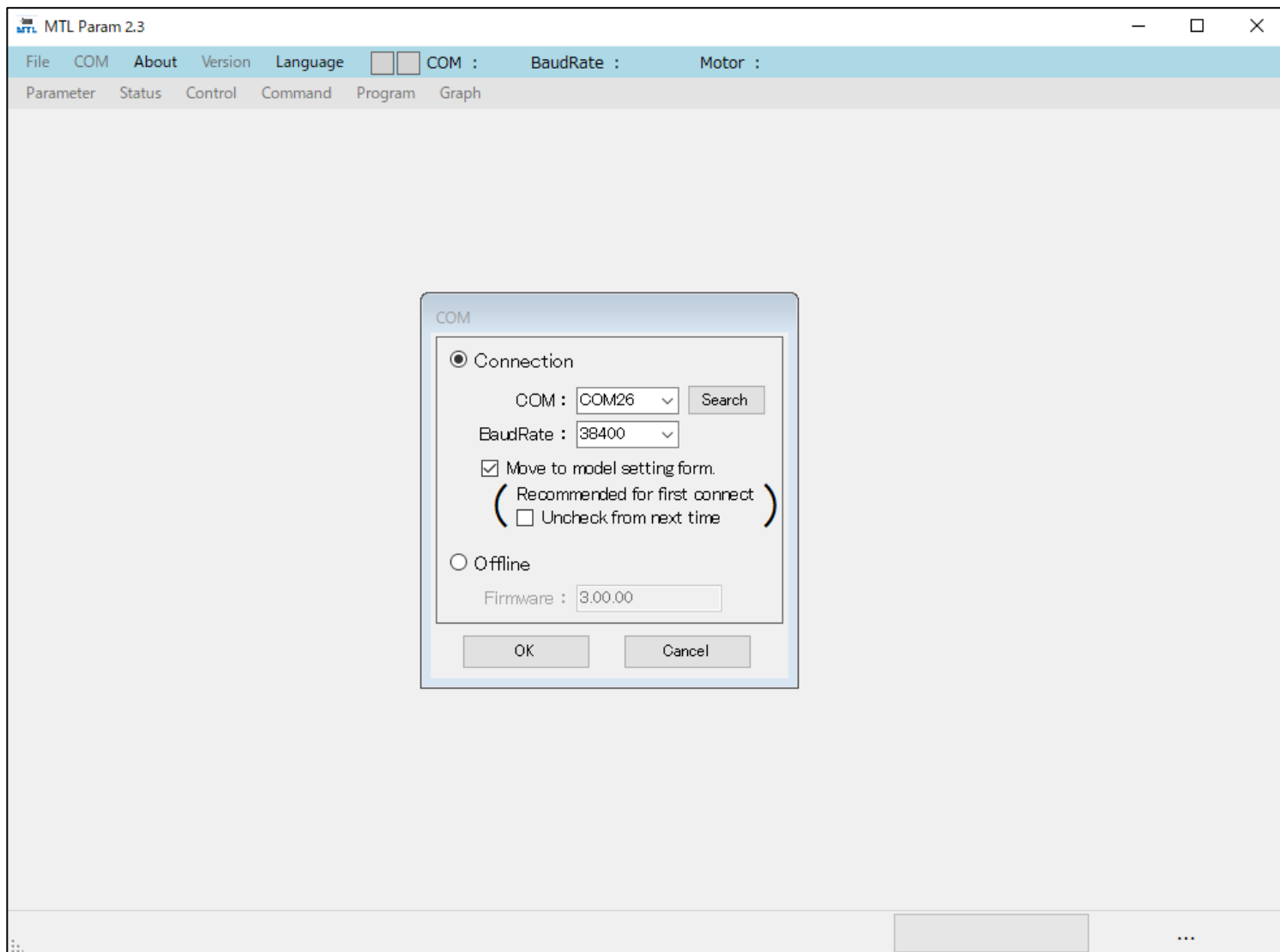
\* If you use MC-110 series, please install “CP210x\_VCPInstaller\_x64(x86).exe” (v6.7.4) beforehand from the URL below. (For MC-200, it is not necessary)

URL : <https://motor.mtl.co.jp/> (MTL download)

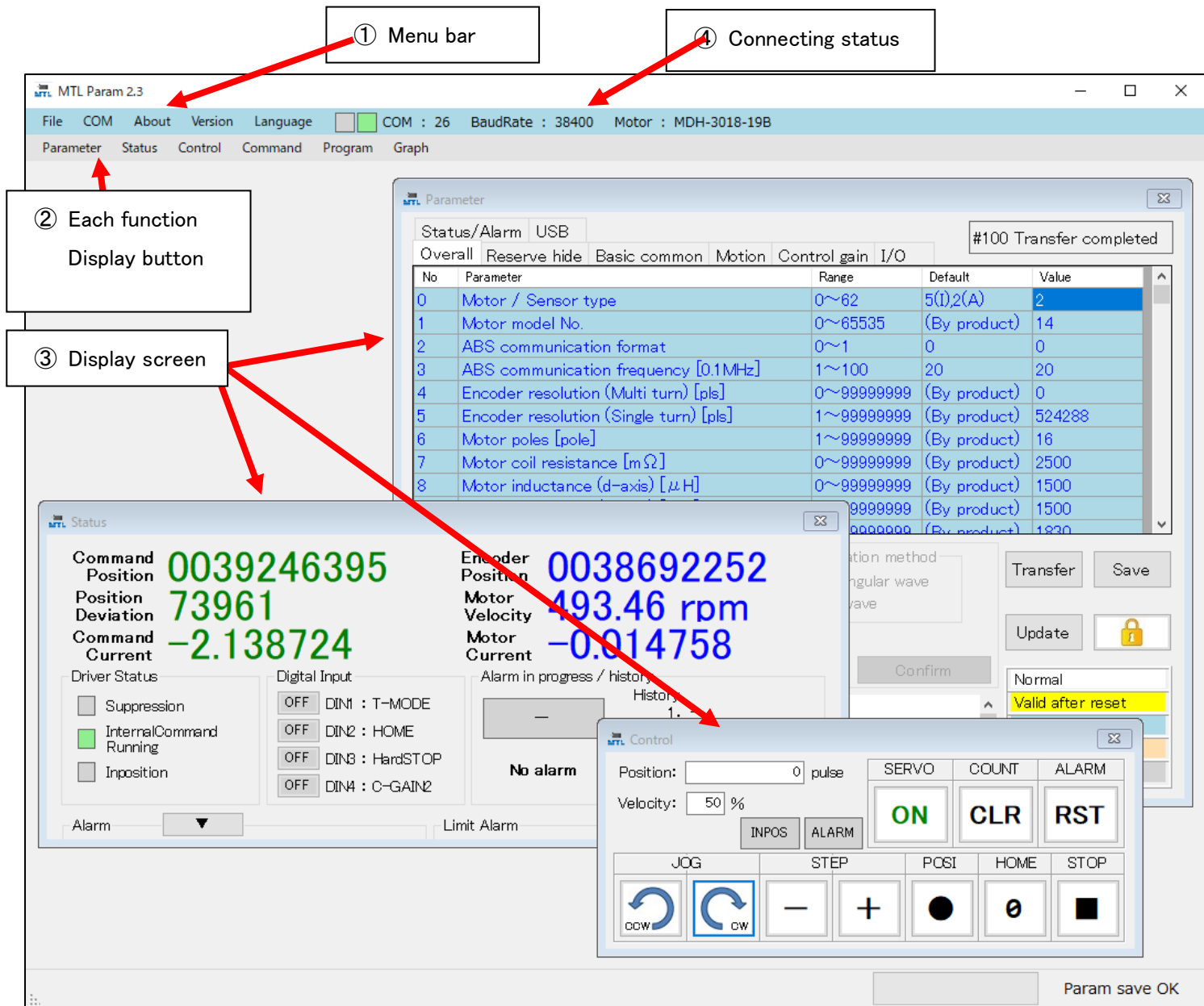
URL: <http://jp.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcps-drivers> (Silicon Labs)

② Once you start this application, you will see COM screen and it will start communication setting with the driver. After the communication setting with the driver, you can set each parameter and take simple action.

Please refer to **【3】 Each function** for the detail of COM screen and other functions.



## 【2】 Screen structure



### ① Menu bar

[File]: Save and load parameter and program file.

At parameter file loading, parameter will be transferred automatically but not saved.

Load Parameter ... load parameter file

Save Parameter ... save parameter file

Load Program ... load program file

Save Program ... save program file

Firm Update ... update firm

[COM]: Display COM selecting screen.

[About]: Display application version.

[Version]: Display firm version of driver.

② Each function display button

[Parameter]: Parameter setting screen

It's a screen to set driver's parameter.

[Status]: Status display screen

It's a screen to verify driver position, speed and status etc.

[Control]: Control BOX screen

It's a screen where you can verify motor action

[Command]: Command send screen

It's a screen where you can send command to driver.

[Program]: Simple action program setting screen

It's a screen where you can set and execute continuous motor action.

[Graph]: Graph screen

It's a screen to capture position and change of speed while motor action and draw it in graph.

③ Display screen

Screen that corresponds to ② will be displayed.

For detail, please refer to [3] Each function part.

④ Connecting status

[COM]: Displays connected Comport number.

[BaudRate]: Displays communication speed.

[Motor]: Displays motor connection setting of the driver. Content depends on parameter #77.

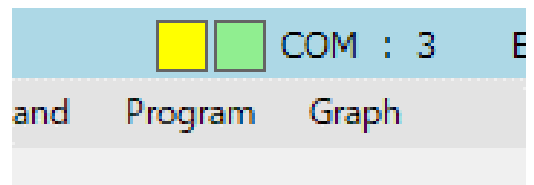
Left box of [COM]:

- Left box indicates whether it requires power reset or not.

In case parameter that turns effective at power reset was transferred and saved, this box turns yellow to indicate power reset is necessary.

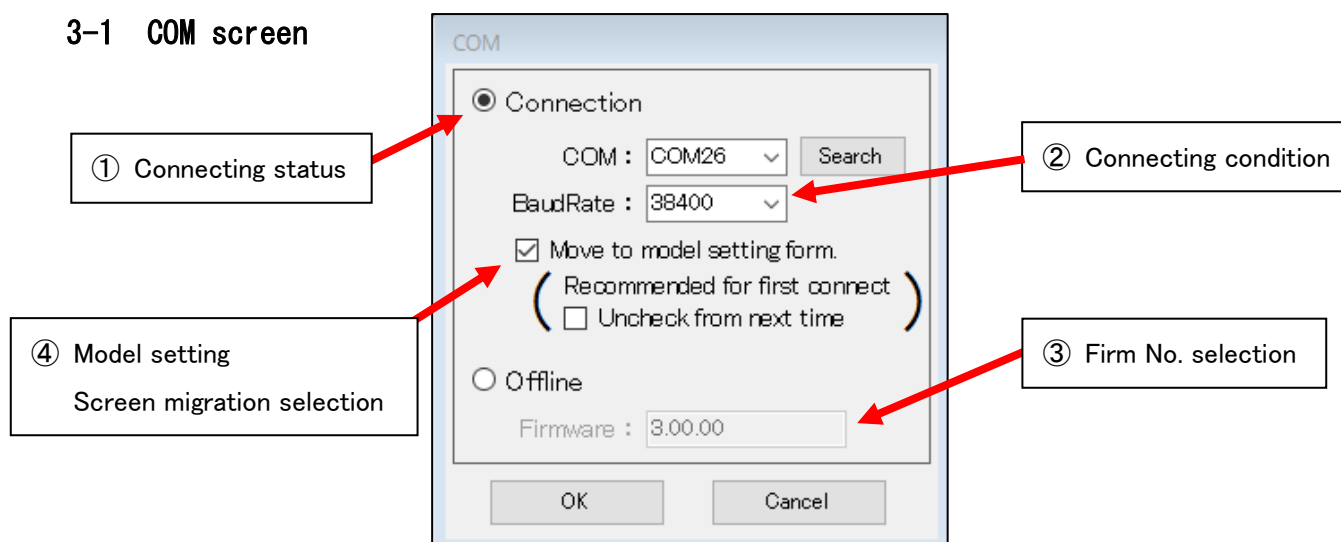
- The right box indicates USB communication status.

If the box is green, USB communication is normal and if gray, the USB connection with the driver is intercepted.



## 【3】 Each function

### 3-1 COM screen



#### ① Connecting status

[Driver connection]: Start connecting the driver.

[Not connected]: Start in offline status.

#### ② Connecting condition

[COM]: Comport selection

[BaudRate]: Communication speed selection

You can select to change USB port from dropdown list at connection condition setting.

Currently connected COM number will be automatically recognized and can be selected.

COM number with “\_SL” at the end indicates that it’s our company’s driver (SiliconLabs devise driver).

In case you can’t find the USB port, you can search again with “Re-recognize” button.

#### ③ Firm No. selection

You can input provisory firm number for controlling application in offline status.

Corresponding parameter display will change depending on then firm number input.

#### ④ Model setting screen migration selection

The screenshot shows a 'Model' dialog box with the following settings:

- Driver settings:**
  - Driver: MC-200-7220
  - Spec: ShortSPI(Position)
  - External: External
  - Pos-ctrl: Pos-ctrl
  - Model: MC-200-7220D**
- Motor settings:**
  - Motor: MDH-30, 18
  - Resol.: 524288, Pulse
  - Type:  Incremental,  Absolute
  - Model: MDH-3018-19B**
- Electrical parameters:**
  - Poles: 16, Pole: Pole, Elec-limit: 8.875 A
  - Maximum vel.: 1000 rpm, Danger vel.: 1100 rpm
  - Elec-thermal: Continuous 1.9 A, 10 sec 3.7 A, 3 sec 5.2 A, Maximum 7.1 A
  - Electronic Thermal time: 60 sec
- Setting param:**  All (initialize),  Basic parameters only
- Buttons: OK, Cancel

The above screen appears when you push “OK” button while checking “Model setting screen migration” on COM screen.

In model screen, you can set driver setting (higher-level interface, command method, control method) and motor setting (motor size, resolution and type). Once you push “OK” button, corresponding magnetic pole number and electronic thermal parameter value will be automatically set.

In case you start while putting check in “ALL (initialization)” in the setting parameter at the bottom of the screen, not only magnetic pole number and electronic thermal but also all parameter will be initialized.

In case you start while putting check in “basic parameter only”, basic parameter such as magnetic pole number and electronic thermal on Model screen will be set but not other parameter values.

※ As a default, checking is ON at the start of MTLParam.

If you want to turn check OFF at start, please check “remove check from the next time” and push “OK” button.



### 3-2. Param screen

① Parameter display designation      ② Parameter name      ③ Parameter setting range      ④ Parameter input box

⑤ Parameter Simple setting box

⑥ Parameter explanation

⑦ Parameter transfer / save / update button

No	Parameter	Range	Default	Value
0	Motor / Sensor type	0~62	5(I),2(A)	2
1	Motor model No.	0~65535	(By product)	14
2	ABS communication format	0~1	0	0
3	ABS communication frequency [0.1MHz]	1~100	20	20
4	Encoder resolution (Multi turn) [pls]	0~99999999	(By product)	0
5	Encoder resolution (Single turn) [pls]	1~99999999	(By product)	524288
6	Motor poles [pole]	1~99999999	(By product)	16
7	Motor coil resistance [ $m\Omega$ ]	0~99999999	(By product)	2500
8	Motor inductance (d-axis) [ $\mu H$ ]	0~99999999	(By product)	1500
9	Motor inductance (q-axis) [ $\mu H$ ]	0~99999999	(By product)	1500
10	Motor load moment of inertia	0~99999999	(By product)	1830

Motor type 1:  BrushlessDC,  DC  
 Motor type 2:  Linear,  Rotary  
 Sensor type 1:  Encoder less,  Incremental,  Absolute  
 Sensor type 2:  Hall sensor less,  Hall sensor  
 Commutation method:  Rectangular wave,  Sine wave

#0 Specify the motor and sensor type. If both bit1 and bit0 are set to 0, it operates as if there is an encoder inside the driver. When DC motor is selected, the settings of bit3, bit2 and bit0 are invalid and are treated as encoder only.

Transfer Save Update

Normal Valid after reset Basic Read only Reserve

#### ① Parameter display designation

Designate parameter content to be displayed on screen.

[All]: Displays all parameter.

[Except manufacturer usage]: Displays parameter other than manufacturer usage.

[Control gain]: Displays control gain setting.

[Status (positioning, alarm) setting]: Displays output setting of action situation.

[Basic information setting]: Displays basic information setting of motor and encoder.

[Current gain]: Displays current gain setting.

[Action related etc.] Displays basic action setting and basic driver information.

[Driver status, electronic thermal etc.]: Displays alarm content and electronic thermal.

[General input / output setting etc.]: displays general input / output and graph setting.

② Parameter name

Name of parameter. The color of each parameter corresponds to the content at the right side of the screen.

Blue-colored parameters are those that have risk of motor failure if changed, so basically, you can't change them. In case you need to change these parameters for particular reason, you can click the key icon to unlock and change it.

③ Parameter setting range

Parameter setting range is displayed.

④ Parameter input box

You can input parameter setting value and edit.

Refer to ②, ⑥ or "Parameter setting manual" for parameter content.

⑤ Parameter simple setting box

You can do simple setting of parameter.

**\* In case you change using parameter simple setting box, the change will be reflected after you pushed "confirm" button.**

⑥ Parameter explanation

Explanation of parameter content is displayed.

Refer to "Parameter setting manual" for detail.

⑦ Parameter transfer / save / update button

It's a button to transfer / save / update parameter.

[Transfer]: Transfer changed parameter to the driver on RAM.

Parameter transfer doesn't mean saving to drive. Parameter change that has not been saved will be undone at power shutdown and alarm occurrence.

For parameter with white background color, transfer is also valid at servo ON.

※ By pressing Enter key while selecting items you want to change, you can transfer only selected parameter. (There will be a message box so select "OK")

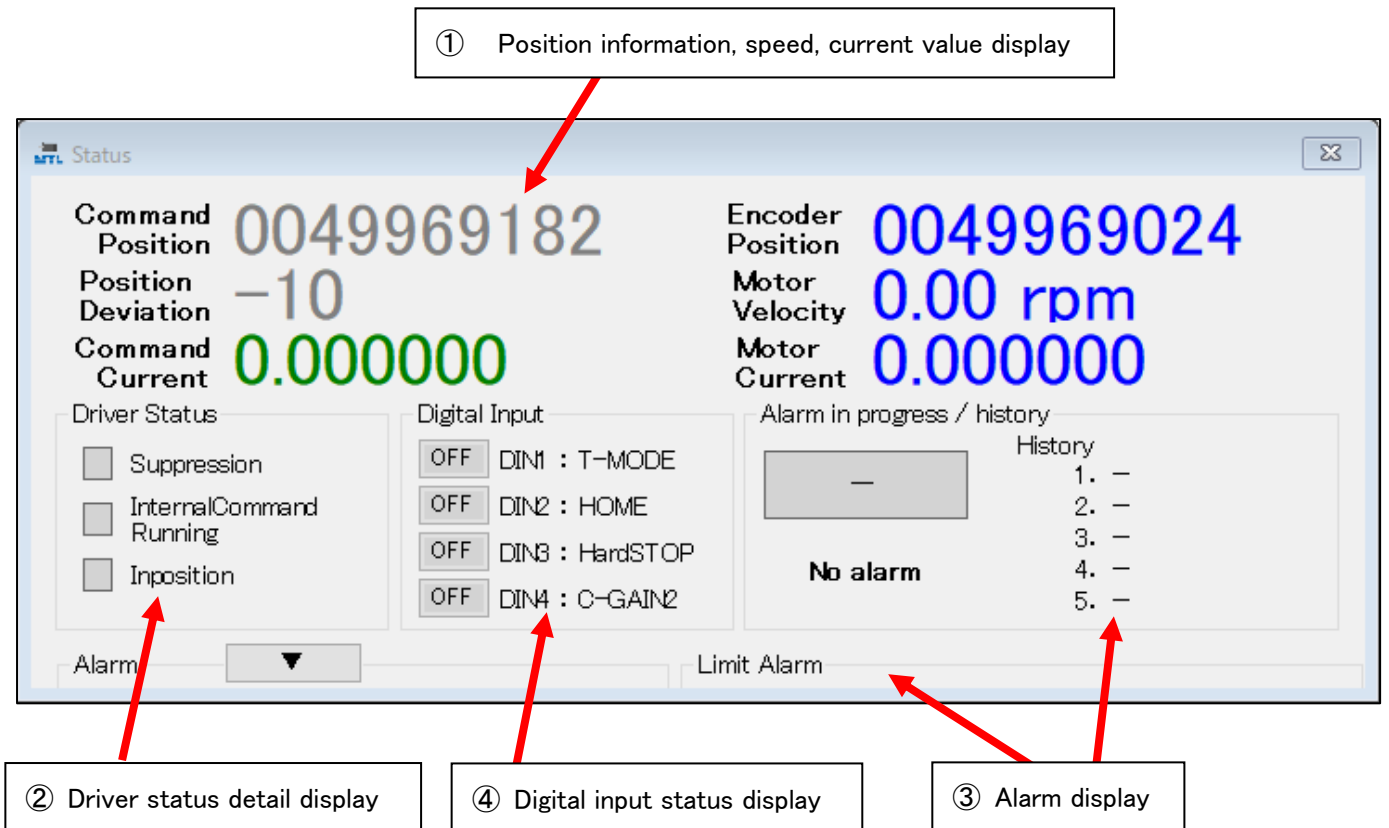
Transfer result will be displayed in parameter history at the top right.

[Save]: Save transferred parameter value in driver ROM (nonvolatile memory).

Yellow-colored parameter will be valid once you save it and reset power.

[Update]: Re-read parameter transferred to Driver RAM.

### 3-3 Status screen



#### ① Position, speed display

[Command position]: Displays command position for motor with encoder pulse conversion.

[Current position]: Displays current position of motor with encoder pulse conversion.

[Position deviation]: Displays the difference between command position and current position with encoder pulse conversion.

[Current speed]: Displays in rpm.

**\* Command position, current position and position deviation is only at incremental, and encoder resolution is only at 4 multiplied reading.**

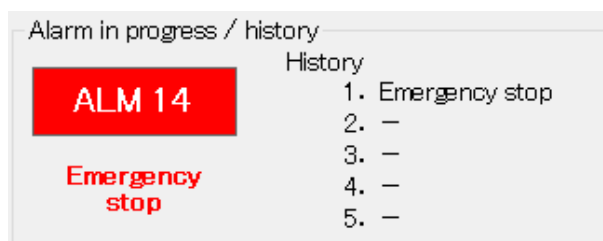
#### ② Driver status detail display

Matching driver status content will be lightened in green.

Refer to “Parameter setting manual” for detail.

### ③ Alarm display

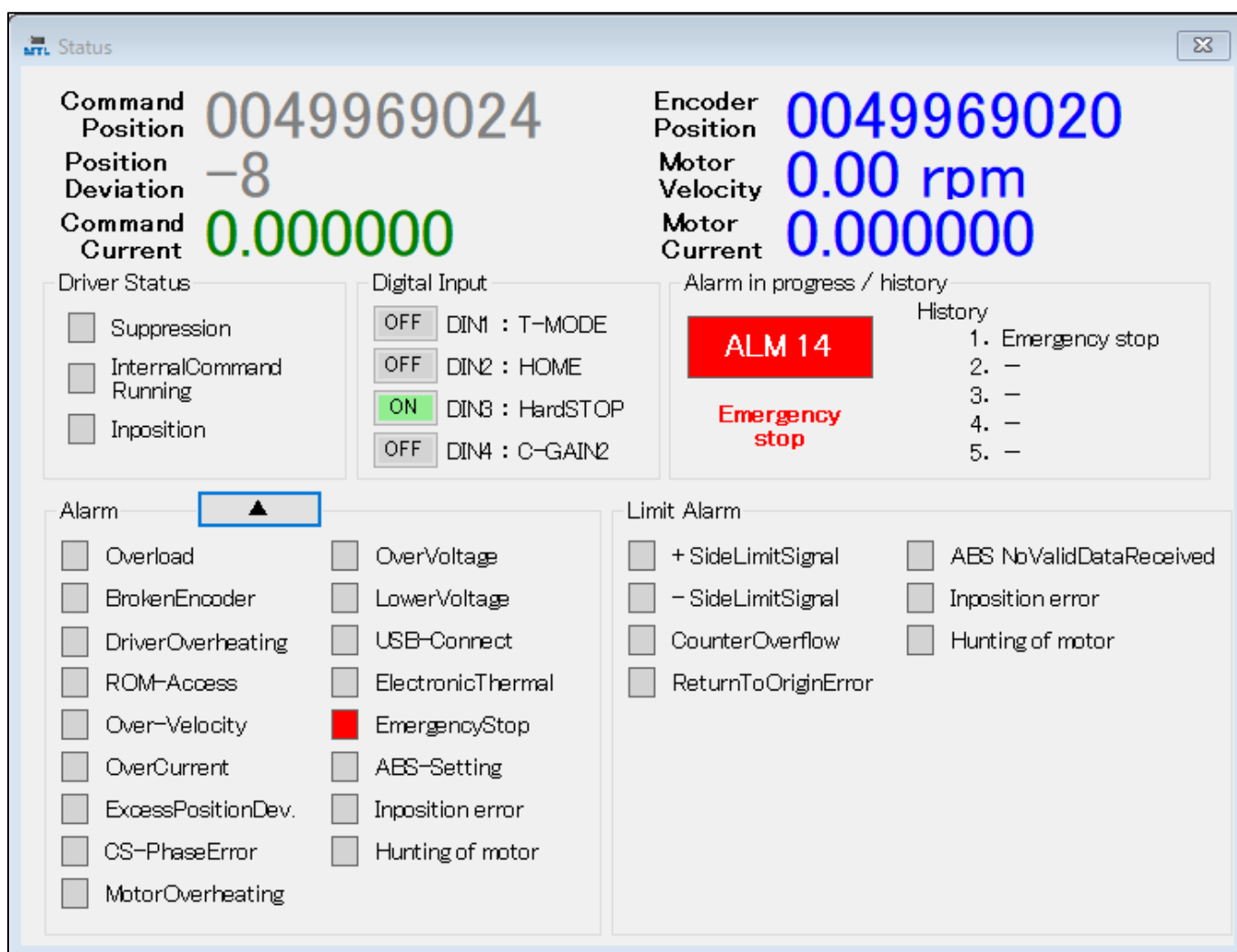
At alarm and limit alarm, corresponding alarm content will be displayed. Also, last 5 alarm history will be displayed at the right side of the alarm screen.



With “▼” button, alarm detail screen will appear.

In detail screen, when there is alarm and limit alarm, corresponding alarm content will flash in red.

Please refer to “Parameter setting manual” for detail.

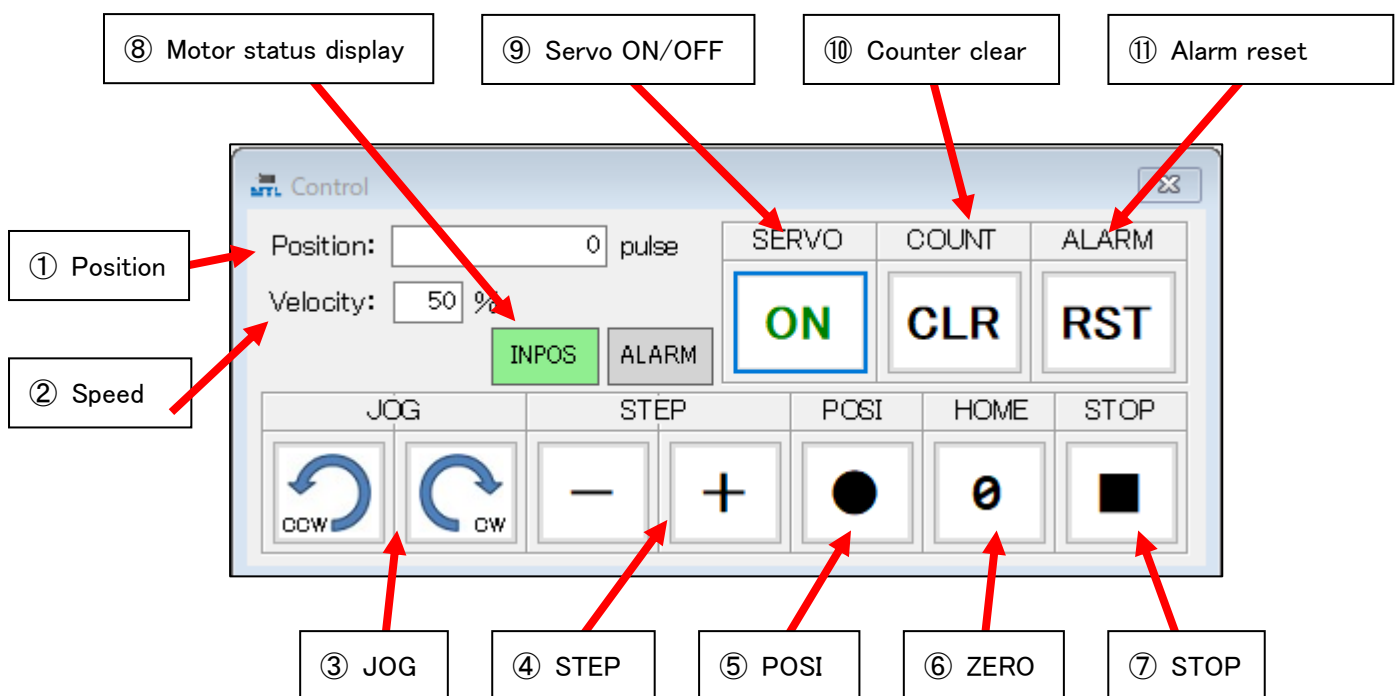


#### ④ Digital input (DIN) display

Displays external digital input (DIN) status.  
Also, you can change status using “ON / OFF” button.  
(In case there is input signal from exterior,  
external signal will have the priority)  
For switching DIN status,  
OFF from ON is also possible at servo OFF but  
ON from OFF is only possible at servo ON.

Digital Input	
OFF	DIN1 : T-MODE
OFF	DIN2 : HOME
ON	DIN3 : HardSTOP
OFF	DIN4 : C-GAIN2

### 3-4 Control screen



#### ① Position

Designates motor action quantity applied at ④ and ⑤.

#### ② Speed

Decides speed at action based on the speed [rpm] value at #62program.  
It rotates at the speed written in #62program speed [rpm] at 100%.

#### ③ JOG

① JOG operation will be done at input speed [%].

While you push the button, it continues the action on the selected direction.

Shortcut key: [Ctrl]+[Shift]+[→](CW)

[Ctrl]+[Shift]+[←](CCW)

④ STEP

It will operate from the current position for the pulse quantity input in ② at the input speed [%] at ①.  
(Relative position action)

Shortcut key: [Ctrl]+[Shift]+[+](CW)  
[Ctrl]+[Shift]+[-](CCW)

⑤ POSI

It will operate from the current position to the input pulse address ② at the input speed [%] ①.  
(Absolute position action)

Shortcut key: [Ctrl]+[Shift]+[p]

⑥ ZERO

At incremental, it will operate to the position of power source ON or the position of counter reset.  
(Return-to-origin)

At absolute, it will operate to absolute address.

Action mode will operate the action designated in #61 original operation mode.

Action speed will be 1/10 of the input parameter in #65 original speed.

Shortcut key: [Ctrl]+[Shift]+[z]

⑦ STOP

Stop motor action.

Shortcut key: [Ctrl]+[Shift]+[p] Shortcut key: [Ctrl]+[Shift]+[s]

⑧ Motor status display

Displays motor status.

[INPOS]: Display turns green when motor is within the #20 in-position range.

[ALARM]: At alarm, it turns red.

Please refer to **3-3 Status screen** in the previous page for alarm detail.

⑨ Servo ON/OFF

Control ON/OFF of servo.

Shortcut key: [Ctrl]+[Shift]+[o] (Servo ON)  
[Ctrl]+[Shift]+[f] (Servo OFF)

⑩ Counter clear

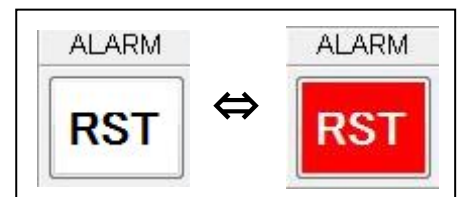
Clear current position.

Shortcut key: [Ctrl]+[Shift]+[c]

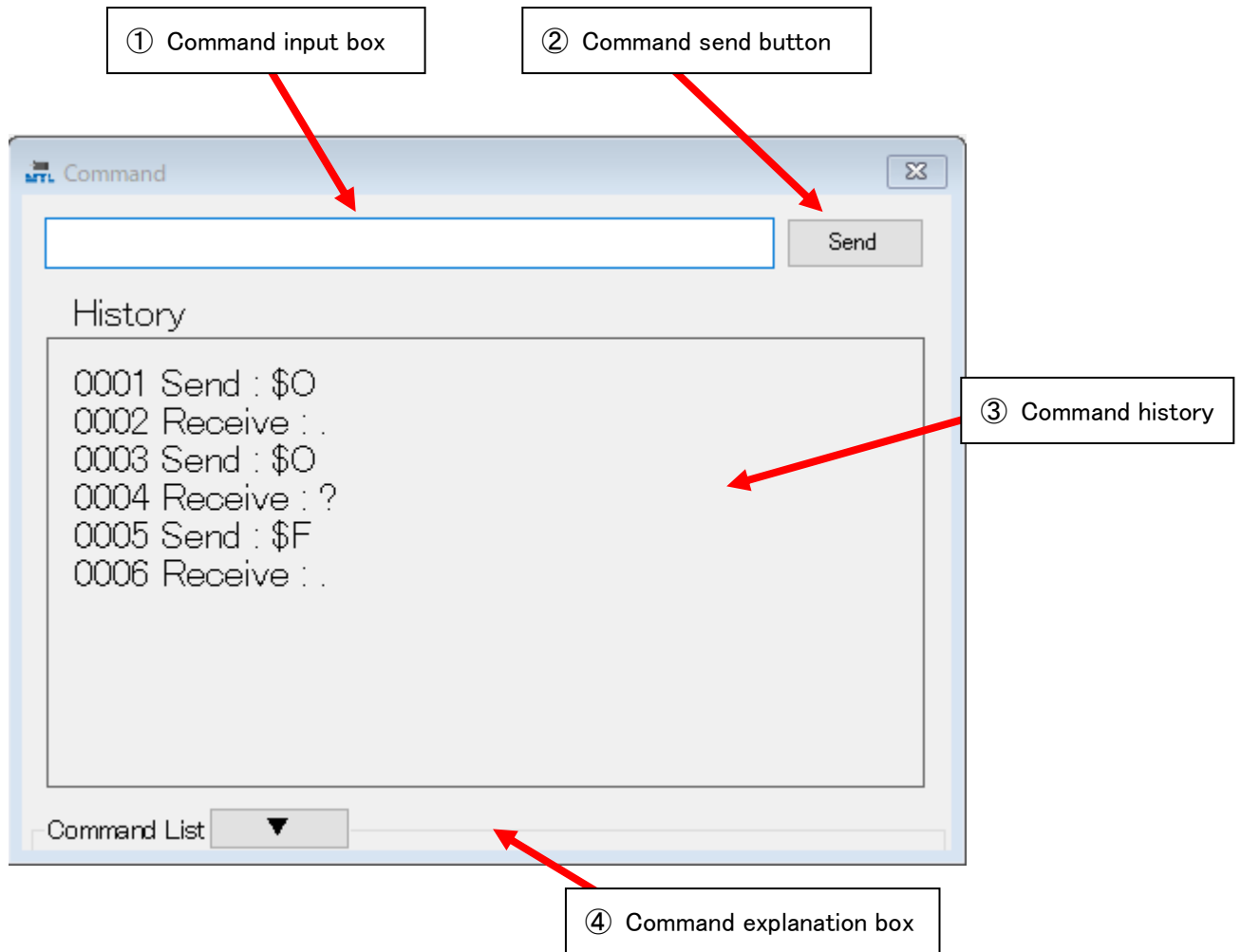
⑪ Alarm reset

At alarm, it flashes changing red ↔ white. You can reset alarm by clicking button.

Shortcut key: [Ctrl]+[Shift]+[r]



### 3-5. Command



① Command input box

Input the command to transfer.

For content, please refer to ④ or command manual.

② Command send button

Execute command transfer.

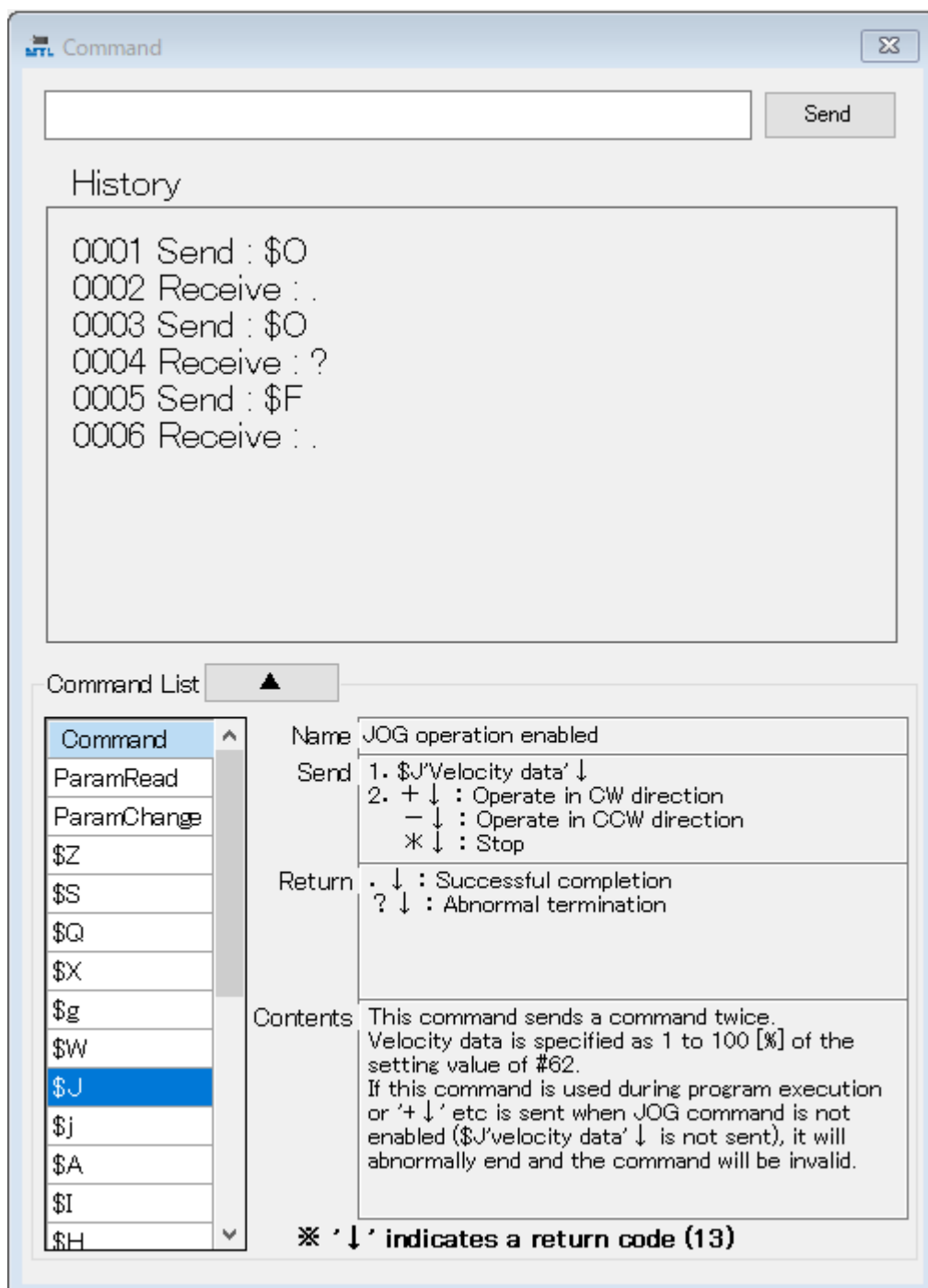
You can also transfer using Enter key.

③ Command history

Displays history of transferred command and received code content.

④ Command explanation box

With “▼” button, you can see the explanation screen of transfer command.





### 3-6. Program screen

The screenshot shows a 'Program' window with a table on the left and control panels on the right. Red arrows point from numbered callouts to specific elements:

- ① No. points to the 'No.' column header.
- ② Mode points to the 'Mode' column header.
- ③ Position/Command points to the 'Position / Command' column header.
- ④ Speed points to the 'Velocity' column header.
- ⑤ Finish points to the 'Fin.' column header.
- ⑥ Action range points to the 'Range' input field.
- ⑦ Number of execution points to the 'Number of times' input field.
- ⑧ Interval points to the 'Interval' input field.
- ⑨ In-position range points to the 'Inposition Range' input field.
- ⑩ Speed unit points to the 'Velocity unit' radio buttons.
- ⑪ Execution button points to the 'Start' button.
- ⑫ Current situation display points to the 'Step' and 'Times' displays.
- ⑬ Display driver status control button points to the 'OFF', 'CLR', and 'RST' buttons.

No.	Mode	Position / Command	Velocity	Fin.
1	#	\$J+50	///	Time
2	#	\$J+100	///	Time
3	#	\$J+50	///	Time
4	#	\$J-50	///	Time
5	#	\$J-100	///	Time
6	#	\$J-50	///	Time
7	#	\$J+50	///	Time
8	#	\$J+100	///	Time
9	#	\$J-50	///	Time
10	#	\$J+50	///	Time
11	#	\$J-50	///	Time
12	#	\$J-100	///	Time
13	#	\$J+50	///	Time
14	A	0	100	Inpos
15				Inpos
16				Inpos
17				Inpos

Control Panel Settings:

- Range: 1 ~ 14
- Number of times: 10
- Infinite repetition
- Interval: 100 ms
- Inposition Range: 0
- Velocity unit:  %  rpm
- Step: 0
- Times: 0
- Buttons: INPOS, ALARM, OFF, CLR, RST

① No.

It represents the line of program action. It will be applied to action range of ⑤.

② Mode

Input action mode. In case this content is not designated, other items of the same number cannot be set.

“I”: Incremental action (relative positioning action)

“A”: Absolute action (absolute positioning action)

“#”: Command action of Position / Command input.

③ Position / Command

Put absolute position or relative pulse quantity when Mode is “A” or “I”. (Input range:  $\pm 2147483648$ )

Put command when Mode is “#”.

④ Speed

Designate rotation speed when Mode is “A” or “I”.

When Mode is “#”, it will automatically display “///” indicating unable to input.

⑤ Finish

Designate the trigger content to proceed to the next command action from current command action.

“Inpos”: After command completion, proceed to the next action once it entered within the in-position range

“Tim”: After command completion, proceed to the next action after a certain amount of time

⑥ Action range

Input the line range you want to execute.

Input range: 1~200

⑦ Number of executions

Input the number of repetitions you want to execute.

In case you want it to repeat endlessly, check “infinite repetition” box.

Input range: 1~10000

⑧ Interval

This is the time interval between the command completion and the start of the next action.

Command completion is decided by #20 in-position range.

Input range: 1~30000

※ **It's a measurement time by timer in PC.**

⑨ In-position range

Set #20 In-position range.

※ **Action that is set “Inpos” in Finish will not be completed until it enters within the designated in-position range, and it won't proceed to the next line No. action.**

⑩ Speed unit

Designate speed unit.

“%”: Maximum rotation speed of parameter  $\times$  Speed[%] will be the rotation speed.

“rpm”: Input Speed value will be the rotation speed.

⑪ Execute / Stop button

Push the button to stop action.

At action execution, #20 in-position range set in ⑧ will be automatically transferred to driver.

It will change to “stop” during action and you can stop action by pushing this button again.

Once the action is stopped, the button display will return to “execute”.

⑫ Current situation

Current step displays the line No, of ongoing action.

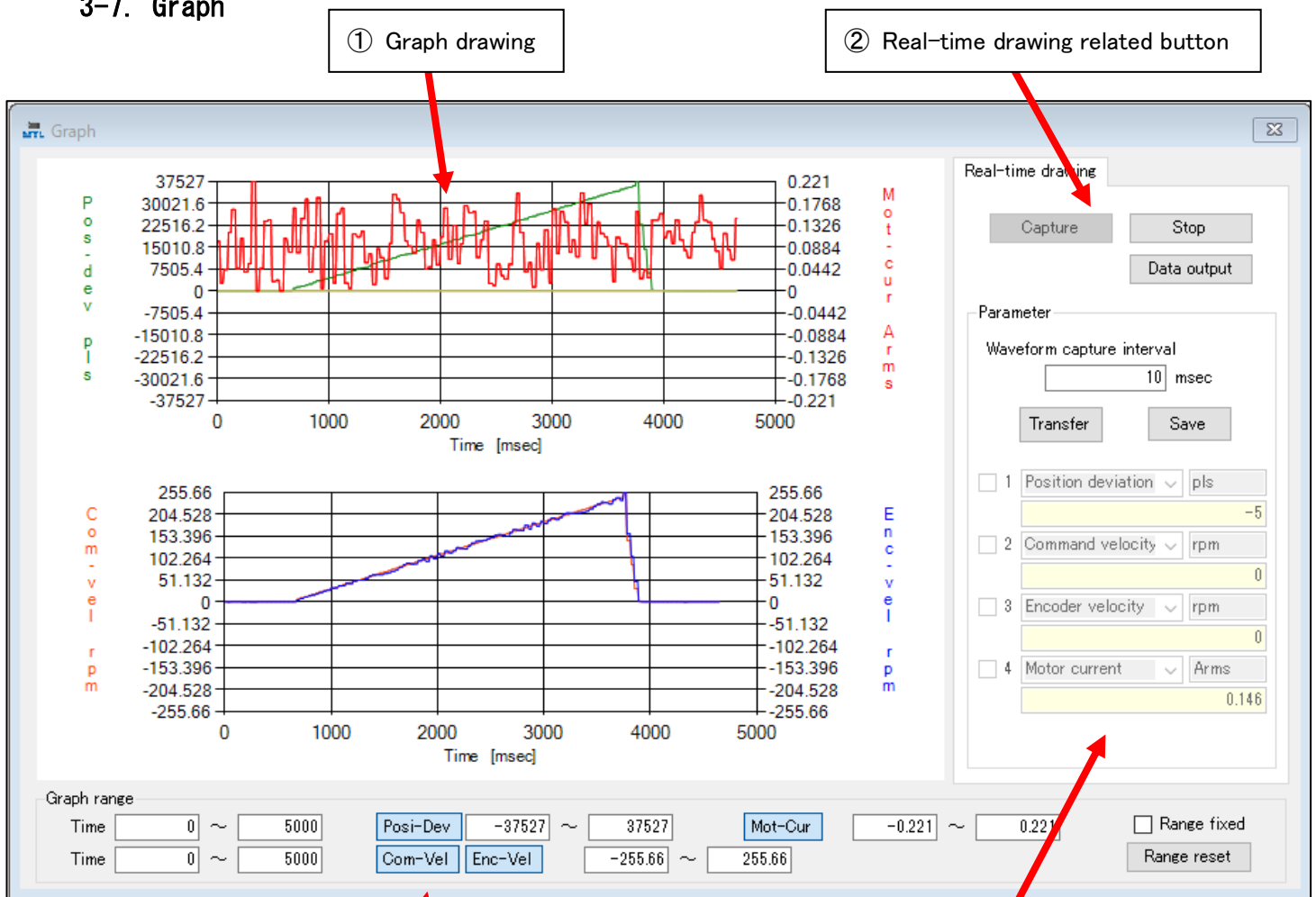
Current frequency displays the number of times a series of action was repeated.

⑬ Driver status display, control button

It's a button for driver status display and control.

Please refer to **3-4 Control screen** in the previous page for detail.

3-7. Graph



① Graph drawing

② Real-time drawing related button

④ Graph range setting

③ Graph related parameter setting / Graph value display

① Graph drawing

It draws graph of position difference, motor current, command speed and encoder speed.

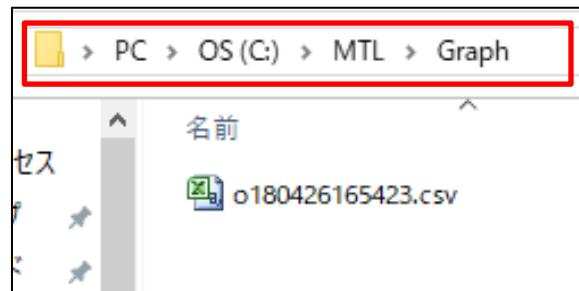
Y axis range of the graph will be automatically updated depending on the maximum value of each data.

## ② Real-time drawing related button

[Start / Stop]: Start / stop real-time graph drawing

[Data export]: Exports numerical data of the graph on screen in CSV format.

CSV data will be automatically generated in C drive, saved in folder and then it will automatically display containing folder.



## ③ Graph related parameter setting / graph value display

[Waveform sampling time]: Sets time interval between capture. (time interval = set value msec)

In case parameter value is less than 1, graph drawing won't start.

[Transfer]: Transfer graph related parameter to the driver.

[Save]: Save transferred parameter value in driver nonvolatile memory.

\* Obtained value of each graph will be displayed for yellow text in decimal number.

## ④ Graph range setting

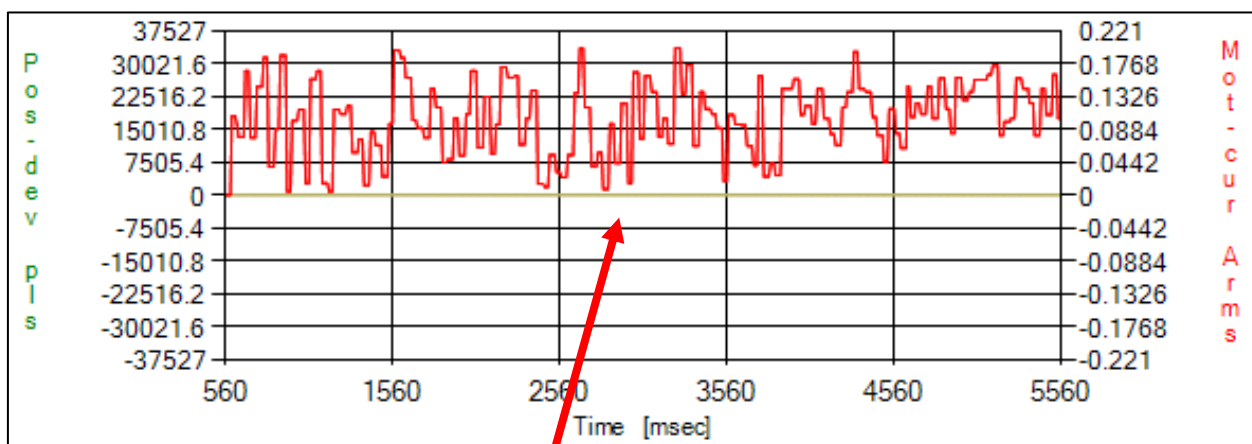
· By checking "Range fixation" button, you can turn OFF graph range automatic update mode.

If you uncheck, graph range automatic update mode will restart.

· By putting number in textbox, you can switch graph drawing range.

\* You can't switch in automatic update mode.

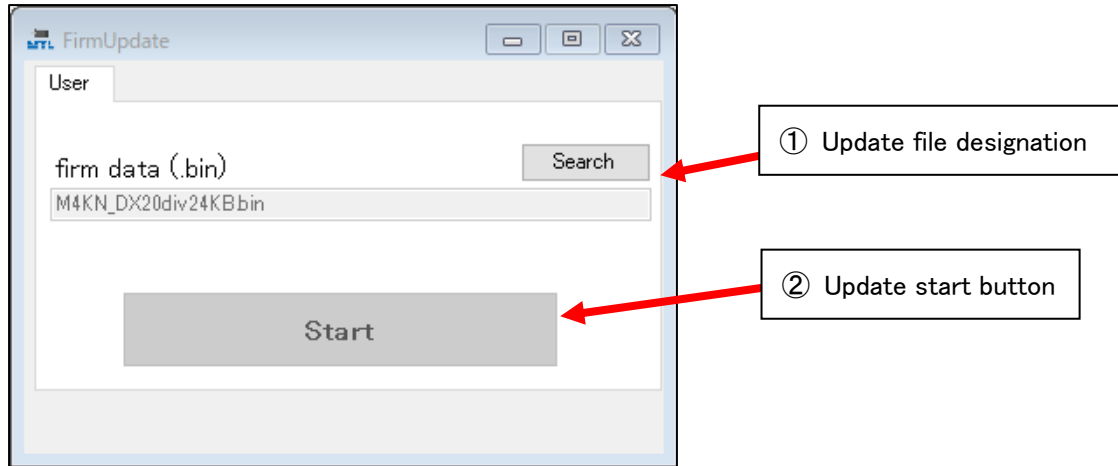
· By switching ON / OFF of position difference, motor current, command speed and encoder speed, you can switch ON / OFF of corresponding graph.



Graph range	
Time	560 ~ 5560
	<input checked="" type="checkbox"/> Posi-Dev -37527 ~ 37527
	<input checked="" type="checkbox"/> Mot-Cur -0.221 ~ 0.221
Time	560 ~ 5560
	<input checked="" type="checkbox"/> Com-Vel -255.66 ~ 255.66
	<input checked="" type="checkbox"/> Enc-Vel -255.66 ~ 255.66

### 3-8 Firm Update screen

\* This is compliant only to MC200 series.



#### ① Update file designation (File extension:.bin)

Push “Search” button and select update file.

Once you select the file, the address of the designated update file will be displayed in textbox.

#### ② Update start button

You can't update firm at start.

Once you select update file and if there is no problem in the designated file, you will be able to push “Start” button.

With “Start” button, firm update will start. At firm update, it may be required to power reset in message box. Please reset the power manually in such case.