Panasonic[®] Hello! GM1 EtherCAT Edition



memo

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\otimes	Indicates an action that is prohibited
•	Indicates an action that must be taken

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! This product has been developed and manufactured for factory use only.

GM1 EtherCAT Positioning Control

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Installation Overview



Operation patterns

After home return is complete, Operation 2) to Operation 4) are performed continuously.

Operation 1) Home return The object moves to its home position (0 mm).

Operation 2) Absolute value positioning The object moves from its home position to target position [1] (200 mm).

- Operation 3) Relative value positioning The object moves from target position [1] to target position [2] (500 mm).
- Operation 4) Relative value positioning The object moves from target position [2] (500 mm) to target position [3] (300 mm).

Operation images



0 Preparation

Installing tool software

Install GM Programmer from the following website: GM Programmer : https://industrial.panasonic.com/ac/j/motor/motion-controller/mc/gm1/index.jsp

INFO

When GM Programmer is installed, PANATERM Lite for GM, Gateway (CODESYS Gateway), and CodeMeter applications are installed at the same time.

- GM Programmer: This is a setup tool for the GM1 controller. Using GM Programmer makes it possible to set positioning data and various positioning parameters, and perform various monitoring operations.
- PANATERM Lite for GM1: This is a setup support tool for the MINAS series servo amplifiers manufactured by Panasonic Corporation. When GM Programmer is installed, PANATERM Lite for GM is also installed at the same time. By using this tool, parameter setup within servo amplifiers, control status monitoring, setup support, machine analysis, and other operations can be executed on a PC.

Before installing GM Programmer on a PC, log on to the PC with Administrator privileges. If other applications are running, be sure to close all the applications before installing GM Programmer.

Column [1]: Installing PANATERM

If a PC on which PANATERM is installed is connected to a MINAS servo amplifier with a USB cable, parameter setup, control status monitoring, setup support, machine analysis, and other operations can be performed easily. If necessary, install PANATERM from the following Panasonic website.

• PANATERM: https://www3.panasonic.biz/ac/j/dl/software/index.jsp?series_cd=3514





No.	Name	Description
(1)	Select Model	This icon is used to select a model when opening a parameter file with the GM1 controller
		unconnected.
(2)	Connect	This icon is used to select and set the method for connecting to the GM1 controller, USB-based
	Amplifier	connection with the servo amplifier (for initial amplifier settings), and other items.
(3)	Axis	This icon is used to open the Axis view.
(4)	Alarm	This icon is used to open the Alarm view.
(5)	Parameters	This icon is used to open the Parameter view.
(6)	Object	This icon is used to open the Object view.
(7)	Monitor	This icon is used to open the Monitor view.
(8)	Axes window	This window is used to select a servo amplifier (connected to the GM1 controller) whose data
		is to be processed. (Data from multiple servo amplifiers cannot be processed at the same time.)

PANATERM Lite for GM (Parameter view)



No.	Name	Description
(1)	Read button	This button is used to load parameters stored on the PC.
(2)	Save button	This button is used to save the displayed parameters on the PC.
(3)	Rcv button	This button is used to receive parameters from the selected servo amplifier.
(4)	Trans button	This button is used to transmit parameters to the selected servo amplifier.
(5)	Copy button	This button is used to copy parameters from the servo amplifier.
(6)	EEP button	This button is used to write parameters to EEPROM from the selected servo amplifier.
(7)	Parameter category	Click this pane to change a parameter category number.
(2)	selection pane	
(8)	Value column	Double-click a value to be changed and write a new value.

1 Basic Setup



1.1 Preparing and Wiring the Required Devices

Prepare the following devices.

No.	Name
(1)	GM1 controller (EtherCAT type)
(2)	Servo amplifier: MINAS A6B series (MADLN11BE is used in this document)
(3)	Servo motor
(4)	PC (on which GM Programmer and PANATERM Lite for GM are already installed)
(5)	LAN cables: 2
(6)	AC power supply
(7)	24 VDC power supply
(8)	USB cable (Mini-B)

Wire each device as shown below.



The PC communicates with the GM1 controller using GM Programmer and LAN ports.

The IP address (default) of LAN port 1 is set as below.

An IP address on the same network that is different from the IP address of LAN port 1 must be set for the PC.

Interface: LAN port 1	
IP address:	192.168.1.5
Subnet mask:	255.255.255.0
Default gateway:	192.168.1.1

Interface: PC

IP address:	192.168.1.10
Subnet mask:	255.255.255.0
Default gateway:	192.168.1.1

Column [3]: Communication using USB ports

USB ports can be set as a communication interface between the GM1 controller and tool software such as GM Programmer or PANATERA Lite for GM, as below.

(1) Select Add USB Port from the Online menu.

(2) The Add USB Port dialog box will be displayed.

(3) Click OK to display a dialog box that restarts the gateway.

(4) Click OK to display the Select Device dialog box.

(5) Select a GM1 controller that you want to connect and click OK.

(6) When a connection is established, USB ports are added as a communication interface between the PC and GM1 controller.

Ş	Add USB Port		Select the network path to the controller:
0ș	Login	Alt+F8	Geteway-1 (scanning) Device Name: Scan Network AGM10SEC16 AGM10SEC16
0ğ	Logout	Ctrl+F8	Wink Wink
	Download		0301.A064
	Online Change		Block driver:
	Status	Alt+F5	COM
	System Data History		Number of channels:
	Reset Warm		T Existence
	Reset Cold		00C08F6202AE
	Reset Origin		Target ID:
	Security	•	16A9 0002 v

* The IP address of the GM1 controller can be checked and set in the main pane displayed by selecting PLC Parameters in the Device tab.

Devices – 🕈 🗙	Device X				
	Communication Settings	Parameter	Туре	Value	Default Value
 一副! Program_Configuration 一〇 Application 	Date and Time and Settings	 A unit error occurred Network setting 	Enumeration of BYTE	Stop operation	Stop operation
🎒 GVL 👘 Library Manager	Applications		STRING	'192.168.1.5'	'192.168.1.5'
MC_PRG (PRG)	Log	 Ø Subnet Mask Ø Default Gateway 	STRING	'255.255.255.0' '192.168.1.1'	'255.255.255.0' '192.168.1.1'
	Users and Groups	E- Ø LAN port2	STRING	'192,168,2,5'	'192, 168, 2, 5'
	Access Rights	Subnet Mask	STRING	255.255.255.0	255.255.255.0
3.System	PLC Shell	Perduit Galeway	STRING	0.0.0.0	0.0.0.0
EtherCAT_Master_SoftMotion	PLC Parameters				

1.2 Setting up Axis

This section explains how to set (register) an axis to be used.

Step 1

Start GM Programmer. Select New Project from the File menu, assign any name, and then click OK.

Device: AGM1CSEC16 (Panasonic Corporation)

Version: Any applicable version

Program in: Ladder Logic Diagram (LD)

Select the above values and click **OK**.

Standard Project		×
Create a Please se	standard project. lect a device and programming language.	
Device(D):	AGM1CSEC16 (Panasonic Corporation)	~
Version(V):	1.2.1.0	~
Program in(P):	Ladder Logic Diagram (LD)	~
	ОК	Cancel

Step 2

Right-click EtherCAT_Master_SoftMotion in the navigation pane and then select Add Device.



The **Add Device** pop-up window will be displayed. Select the connected model and click **Add Device**. (Model "MADLN11BF" is used in this document.)

デバイスの追加	- 0	2
リイス: EtherCAT_Master_SoftMotion		
フルテキスト検索のための文字列	製造者	3
名前 = 111 フィールドバス = Beg EtherCAT	キャプチャ未	<u>ار، ا</u>
= by T スレーブ		
Panasonic Corporation, Applia	nces Company - A5B	
Panasonic Corporation, Autor	iotive & Industrial Systems Company	
AC Serve Driver	Descende Conception Astronation & Industrial Contenue Conception	
MADLNO DE	Panasonic Corporation, Automotive & Industrial Systems Company	7.3
MAD NUMPE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MADUNI SPE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MADLIND IRE	Panasonic Corporation, Automotive & Industrial Systems Company	4.0
MADUND SRE	Panasonic Corporation, Automotive & Industrial Systems Company Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MADINO IRE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MAD NO FRE	Panasonic Corporation, Automotive & Industrial Systems Company	4.2
MADINGSE	Panasonic Corporation, Automotive & Industrial Systems Company Danaconic Corporation, Automotive & Industrial Systems Company	4.6
	Panasonic Corporation, Automotive & Industrial Systems Company	4.0
MADY T11RE	Danaeonic Cornoration Automotiva & Industrial Systems Cornoanu	4.6
A MADI TISRE	Panaconic Comparation, Automotive & Industrial Systems Company	4.0
MADI TO IRE	Panasonic Corporation, Automotive & Industrial Systems Company	40
A MADI TESE	Panasonic Corporation, Automotive & Industrial Systems Company	4.0
MADI TO IRE	Danaconic Comportion, Automotive & Industrial Systems Company	40
MADI TOSRE	Panasonic Comparation, Automotive & Industrial Systems Company	4.0
MBDIN21BE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MBDI N258E	Panasonic Corporation, Automotive & Industrial Systems Company	4.0
MEDI NR 18F	Panasonic Compration, Automotive & Industrial Systems Company	4 0
- I MBDI NR SRF	Panasonic Corporation, Automotive & Industrial Systems Company	4.0
MBDI T21BE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MBDLT25BE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MBDLTR 18F	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MBDLTR SBF	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MCDLN31BE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MCDLN358E	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MCDLNS1BE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MCDLNS 5BE	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
MCDLT31BF	Panasonic Corporation, Automotive & Industrial Systems Company	4.5
		>
カテゴリーによるグループ ロオペてのバージョン	を表示(エキスパートのみ) 期限切れのバージェンを表示	
MADLT11BF_2		_

* Even if you click Add Device, the pop-up window will not close.

After clicking Add Device, click Cancel.

MADLN11BF and SM_Drive_ETC_Panasonic_MINAS_A6B will be added to the navigation pane.



1.3 Setting Station Alias (Node Address of Servo Amplifier)

This section explains how to use the rotary switches on the front panel of the servo amplifier.

Step 1

Set the left and right rotary switches to 0 and 1, respectively, as shown below.



Step 2

Connect the servo amplifier and the PC with a USB cable (Mini-B).

To establish a communication between the GM1 controller and the servo amplifier, set up relevant parameters in PANATERM Lite for GM with the USB cable connected.

Step 3

Open PANATERM Lite for GM.

Select AMP default setting and click OK.



Step 4

The Model confirmation dialog box will be displayed. Check the contents of the dialog box and then click OK.

Model confirmation				>
Driver's software version	Types of driver	Types of motor	AMP Production Sequence Number	Motor Production Sequence Number
Ver.1.9	MADLT11BF	MHMF5AZA1A2	21030002	21060004
				OK Cancel

The Parameter change dialog box will be displayed. Change the respective values of No. 40 and No. 41 in Class 07 to "0".

0 Station Alias setup (high) 1 Station alias selection		0 - 255 0 - 2	
1 Station alias selection		 0 - 2	

Step 6

Turn OFF and then ON the servo amplifier.

The servo amplifier will be restarted and the new settings will take effect.

Step 7

Double-click the servo amplifier ("**MADLT11BF**" in this document) in the navigation pane and open the **General** tab. Select the **Enable expert settings** check box and then select the **Configured station alias (ADD 0x0012)** option and enter "1".

Devices 👻 🕂 🗙	MADLT11BF X	
Hello GM1 Device (AGM1CSEC16)	General	Address Additional
=-∰ Program_Configuration =- © Application	Expert Process Data	AutoIncaddress 0 EtherCAT address 1001 Optional
- 🍻 GVL - 👘 Library Manager - 🕂 MC_PRG (PRG) = 🎉 Task Configuration	Process Data	Distributed Clock
	EtherCAT I/O Mapping	Select DC 🗸
indian 1.Motion	EtherCAT IEC Objects	☑ Enable 1000 Sync unit cycle (µs)
	Status	Sync0:
	Information	Sync unit cycle x 1 ✓ 1000 ↓ Cycle time (µs)
		O User-defined 0 🚔 Shift time (µs)
Hourican paster sourceurs MADLT11BF Morve_ETC_Panasonic_MINAS_A68 SoftWotion General Axis Pool Unit_Configuration Minuteurs LANPort1 Minuteurs LANPort2		Sync1: □ Enable Sync 1 Sync unit cycle x1
		Oconfigured station alias (ADO 0x0012) Value 1 1

INFO

Enter an address that is determined by adding the value set to No. 40 of Class 07 (high order) and the value selected with the rotary switch (low order).

In Step 1, rotary switches COM and LINL are set to 0 and 1, respectively, and in Step 5, No. 40 and No. 41 of Class 07 are set to 0. Therefore, the address should be set to 1.

The settings will be downloaded to the GM1 controller later. Therefore, if the address is not set correctly, the servo amplifier section will be grayed out as shown below.

EtherCAT_Master_SoftMotion

MADLT11BF

MADLT11BF

MADLT1C_Panasonic_MINAS_A6B

 $^{\rm N}$ Column [4]: Setting station aliases without changing the rotary switch settings $^{-}$

Class	No.	Attribute	Parameter name	Setting range	Unit		Function
7	40	R	Station alias setting (high order)	0 to 255	-	Sets the high-	-order 8 bits of station alias
						Specifies a st	ation alias setting method Function
7	7 41 R Station alias 0 to 2	-	0	Sets a station alias using the value selected with the rotary switch on the front panel and the value set to No. 40 of Class 07			
			Selection			1	Sets a station alias using the value set in the SII area (0004h)
				2	Used by the manufacturer (Cannot be set)		

An address is set in two bytes and No. 40 of Class 07 is the high-order byte, so if No. 40 is set to 1, the address will become 256. This is added to the number selected with the rotary switch.

Examples: No. 40 of Class 07 = 0, Rotary switch = 3: 3

No. 40 of Class 07 = 1, Rotary switch = 3: 259

* If the high-order byte set with No. 40 of Class 07 and the rotary switch are both set to "0", the settings will be invalidated and control is performed according to the normal connection sequence (reference to SII).

1.4 Setting up Scaling

Step 1

Double-click the servo amplifier ("SM_Drive_ETC_Panasonic_MINAS_A6B" in this document) in the navigation pane and open the **General** tab. As this document assumes a ball screw, select **Finite**.

Devices 👻 🗸 🗶	R# SM_Drive_ETC_Panasonic_MI	MINAS_A6B X
Hello GM1	General	Axis type and limits
Program_Configuration Application	Scaling/Mapping	Virtual mode Activated Negative [u]: 0.0 Modulo Descritive [u]: 1000.0
GVL Uibrary Manager Mc. pp.c. (pp.c.)	Commissioning SM Drive ETC Panasonic MINAS	Finite Software error reaction
Ime_rkg (rkg) Iask Configuration Ime_ime_ime_ime_ime_ime_ime_ime_ime_ime_i	A6B: I/O Mapping SM_Drive_ETC_Panasonic_MINAS_	Deceleration [u/s ²]: 0 Max. distance [u]: 0
e S MotionTask □-@ MC_PRG	A6B: IEC Objects Status	Dynamic limits
- 2.User - 3.System	Information	Velocity [u/s]: Acceleration [u/s ²] Deceleration [u/s ²] Jerk [u/s ³]: 5 100 100 10000
EtherCAT_Master_SoftMotion		
□ MADLT11BF MA SM_Drive_ETC_Panasonic_MINAS_A6B		

Column [5]: Explanation of Modulo/Finite

 Modulo/Finite:
 The axis type can be specified.

 Modulo:
 The motor rotates infinitely without limiting the travel range (belt drive, rotary shaft, etc.).

 Finite:
 The set value for the commanded position is a finite value (if the movable range of the object such as a ball screw is predetermined).

 Soft limits:
 When the axis type is set to Finite, settings can be specified in the Software limits section.

When **Modulo** is selected, the commanded position value keeps looping between 0 and the modulo value. The maximum settable modulo value is 255 x "units in application".

"units in application" is set in the **Scaling/Mapping** tab.

General	Axis type and limits	
Scaling/Mapping	□ Virtual mode● Modulo	Modulo settings Modulo value [u]: 360.0
Commissioning	○ Finite	
SM_Drive_ETC_Panasonic_MINAS_ A6B: I/O Mapping		Software error reaction Deceleration [u/s ²]: 0
SM_Drive_ETC_Panasonic_MINAS_ A6B: IEC Objects		Max. distance [u]: 0
Status	-Dynamic limits Velocity [u/s]:	Acceleration [11/52] Deceleration [11/52] Jerk [11/52]
Information	5	100 100 10000

Open the Scaling/Mapping tab window.

Select the Linear option, and enter 16#800000 for increments and 10 for units in application.

(This is because, in this example, the ball screw lead is 10 mm (10 mm travel per revolution for a servo motor))



Write the settings to the GM1 controller.

Double-click the Device object in the navigation pane and open the Communication Settings tab.



Step 4

Click Scan Network, select a controller to be connected, and click OK.



Select Device	×
Select the network path to the controller:	Device Name: AGM1CSEC16 Device Address: COMPACT ADDRESS:
	Block driver: UDP Number of
	Serial number: 00C08F6202AE
	OK Cancel

When a connection is completed, the lamps light up in green (●). If the display appears as shown in the figure below, it is OK.

Device X				
Communication Settings	Scan Network Gateway	v ▼ Device ▼		
Date and Time and Settings]			
Applications			± İ =	
Log			—	
Users and Groups		Gateway-1	Gateway	[0301.D005] (active)
Access Rights		IP-Address: localhost		Device Name: AGM1CSEC16
PLC Shell		Port:		Device Address:
PLC Parameters		1217		0301.D005
Task Deployment				16A9 0002
Status				Target Type: 4102
Information				Target Vendor: Panasonic Corporation
				Target Version: 1.2.0.0

Step 5

Select Build from the Build menu to execute build.

Hello GM1.project* - GM Programmer								
File Edit View P	roject	Build	Online	Debug	Tools			
🛅 🚅 🔡 🎒 🗠 ര	- χ ι <mark>ι</mark>	🛗 Bi	uild	F1	1			
•		R	ebuild					
Devices		G	enerate co	de				
Hello GM1		C	ean					
Device (AGM1CS	EC16)	C	lean all					

If the processing is normal, "Compile complete - 0 errors, 0 warnings" will be displayed as shown below.



INFO

When a created program or settings are subject to a build process, objects in the application are compiled. If codes are generated after the build process is executed, an application to be downloaded to the GM1 controller will be generated.

The syntax of all objects is verified when the build process is executed for the first time.

The syntax of only differences is verified when the build process is executed a second time and thereafter. No application code will be generated.

Right-click the Application object and select Login to execute a download.



INFO

The **Device** and **Application** objects are displayed in the green background, indicating that they are in an online (connected) state.

🤣 mark appears on the left side of the **Device** object, indicating that the device is connected to the real machine.

- "Stop" appears on the right side of the Application object, indicating that the application is not running.
- 🤣 mark also appears on the right side of each device that is operating normally.
- A mark appears on the right side of each device that is not connected.



	File	Edit	View	Project	Build	Online	Debug	Tools	Window	Help	
*	1 🚔		🕘 🔊	○ 1	М 🖓	🍋 🚰	用制制	[1]	🏭 - 🎬	OŞ Oğ	•

Right-click the Application [stop] object and select Start.

When the application enters a running state, RUN appears in the status area on the bottom of the GM Programmer window.

Devices	- ₽ X
🖃 🎒 Hello GM1	▼ ∧
🖹 👀 🛐 Device [connected] (AGM1CSEC	16)
Program_Configuration	
Application [stop]	Logout
GVL GVL	Start
MC_PRG (PRG)	Online Change
Task Configuratio	Delete application from device
E S Motion	Unforce All Values of 'Device.Application'
Last build: 😋 0 🕐 0 🛛 Precomp	ile 🗸 🔒 RUN

INFO

At the time of login (connection), there are two states: stopped and run. "Stopped" indicates that the program is not running, and "Run" indicates that the program is running.

1.5 Setting up Amplifier

Step 1

Select PANATERM Lite for GM from the Tools menu to start PANATERM Lite for GM.

Step 2

On the toolbar, click the Open the Parameter view icon. Select Read-out from the driver and click OK.

PANATERM	Selection of parameter to be read X
File View Tools Help	 Read-out from the driver Read from file Read default
	OK Cancel

Step 3

Click Class 4 and then click PinAssign with the page opened.



Change the pin assignment of 07(SI2) and 08(SI3) to "Invalid", as below.

	Position/Full-closed control	Velocity control	Torque control
05(SI1)	SI-MON5_ConnectA	SI-MON5_ConnectA	SI-MON5_ConnectA
07(SI2)	POT_ConnectB	POT_ConnectB	POT_ConnectB
08(SI3)	NOT_ConnectB	NOT_ConnectB	NOT_ConnectB
09(SI4)	HOME_ConnectA	HOME_ConnectA	HOME_ConnectA
10(SI5)	EXT1_ConnectA	EXT1_ConnectA	EXT1_ConnectA
11(SI6)	EXT2_ConnectA	EXT2_ConnectA	EXT2_ConnectA
12(SI7)	SI-MON3_ConnectA	SI-MON3_ConnectA	SI-MON3_ConnectA
13(SI8)	SI-MON4_ConnectA	SI-MON4_ConnectA	SI-MON4_ConnectA
Jutput			
λατράτ			
Pin-No.	Position/Full-closed control	Velocity control	Torque control
Pin-No. 01/02(SO1)	Position/Full-closed control BRK-OFF	Velocity control BRK-OFF	Torque control BRK-OFF
Pin-No. 01/02(SO1) 25/26(SO2)	Position/Full-dosed control BRK-OFF EX-OUT1	Velocity control BRK-OFF EX-OUT1	Torque control BRK-OFF EX-OUT1

Double-click 07(SI2) and 08(SI3) separately in the **Pin-No.** column. Select **Invalid** and click **OK**.

nput function select)
Position/Full-closed cont	rol 🔿 A-Connect	B-Connect	
Velocity control	○ A-Connect	B-Connect	
Torque control	◯ A-Connect	B-Connect	
Position/Full-closed	Velocity control	Torque control	^
Invalid	Invalid	Invalid	
POT	POT	POT	
NOT	NOT	NOT	
-	-	-	
A-CLR	A-CLR	A-CLR	
-	-	-	
-	-	-	1
-	-	-	
-	-	-	
			~
		OK Cancel	

INFO

If limits are set to "B-Connect", a limit error will occur because the behavior differs from the device configuration in this document.

After all settings are complete, click **OK** to write the settings to the servo amplifier.

111110	Position/Full-closed control	Velocity control	Torque control
05(SI1)	SI-MON5_ConnectA	SI-MON5_ConnectA	SI-MON5_ConnectA
07(SI2)	Invalid	Invalid	Invalid
08(SI3)	Invalid	Invalid	Invalid
09(SI4)	HOME_ConnectA	HOME_ConnectA	HOME_ConnectA
10(SI5)	EXT1_ConnectA	EXT1_ConnectA	EXT1_ConnectA
11(SI6)	EXT2_ConnectA	EXT2_ConnectA	EXT2_ConnectA
12(SI7)	SI-MON3_ConnectA	SI-MON3_ConnectA	SI-MON3_ConnectA
13(SI8)	SI-MON4_ConnectA	SI-MON4_ConnectA	SI-MON4_ConnectA
output			
Pin-No.	Position/Full-closed control	Velocity control	Torque control
01/02(SO1)	BRK-OFF	BRK-OFF	BRK-OFF
25 (26 (60 2)	EX-OUT1	EX-OUT1	EX-OUT1
25/26(502)			



Column [7]: List of servo amplifier factory settings

For servo amplifier factory settings, only POT (positive direction over-travel inhibit input) and NOT (negative direction over-travel inhibit input) are factory-set to "**B-Connect**".

For **B-Connect**, if the servo amplifier is used with nothing connected to POT and NOT, it will enter a limit detection state, resulting in a limit error.

Therefore, use the servo amplifier with a limit sensor connected to POT and NOT or, if no limit sensor is used, use the servo amplifier with the settings changed to "**A-Connect**" and "**Invalid**".

	Factory settings								
Pin name	Pin No.	Corresponding parameter	Position/ Full-closed control Signal name		Velocity	/ control	Torque control		
					Signal name	Logic	Signal name	Logic	
SI1	5	Pr4.00	SI-MON5	A-Connect	SI-MON5	A-Connect	SI-MON5	A-Connect	
SI2	7	Pr4.01	POT	B-Connect	POT	B-Connect	POT	B-Connect	
SI3	8	Pr4.02	NOT	B-Connect	NOT	B-Connect	NOT	B-Connect	
SI4	9	Pr4.03	HOME	A-Connect	HOME	A-Connect	HOME	A-Connect	
SI5	10	Pr4.04	EXT1	A-Connect	EXT1	A-Connect	EXT1	A-Connect	
SI6	11	Pr4.05	EXT2	A-Connect	EXT2	A-Connect	EXT2	A-Connect	
SI7	12	Pr4.06	SI-MON3	A-Connect	SI-MON3	A-Connect	SI-MON3	A-Connect	
SI8	13	Pr4.07	SI-MON4	A-Connect	SI-MON4	A-Connect	SI-MON4	A-Connect	

1.6 Setting up Home Return (PANATERM Lite for GM)

To execute home return operation, you must set up objects related to home return on the servo amplifier beforehand. This section explains the setup method using PANATERM Lite for GM.

	Index	Sub-Index	Name	Data	Lead data value	Description	
	INCON	Oub-Index	Hame	size	(Default)	Desciption	
	6040h	00h	Controlword	16bit	0×000E	Sets a control command to the servo amplifier, such as PDS state transition	
	004011	0011	Controlword	TODIC	00000	(Cannot be rewritten using ETC_CO_SdoWrite)	
	6060h	00h	Mode of operation	8bit	0~08	Sets a control mode to the servo amplifier	
	000011	0011		ODIC	0,00	(Cannot be rewritten using ETC_CO_SdoWrite)	
	6098h	00h	Homing method	8bit	0x00	Sets a home return method	
		01h	Speed during search for switch	32bit	0x000D5555	Sets a movement speed to be used until a switch signal is detected	
	6099h	0.26	Crossed during accords for zoro	206#	0.00015555	Sets a movement speed to be used until a home position detection position is	
		020	Speed during search for zero	32Dil	0x00015555	reached	J
	600Ab	00h		30hit	0-00054240	Sets acceleration and deceleration to be used in home return position control	
	009/11	0011		32.01	00000 4240	mode (hm)	
	6072h	00h	Max torque	16bit	0x1388	Sets the maximum motor torque	
	607Fh	00h	Max profile velocity	32bit	0x06400000	Sets a velocity limit value	
ſ		00h				Sets the maximum motor speed (Must be set before home return operation	
	6080h		Max motor speed	32bit	0x00000000	because the default value is 0 and operation cannot be performed with the	
U						value set to 0)	
	60B1h	00h	Velocity offset	32bit	0x00000000	Sets an offset value for velocity command	
	60B2h	00h	Torque offset	32bit	0x00000000	Sets an offset value for torque command	
	60C5h	00h	Max acceleration	32bit	0xFFFFFFFF	Sets the maximum acceleration	
	60C6h	00h	Max deceleration	32bit	0xFFFFFFFF	Sets the maximum deceleration	
						Sets position information so that the index pulse position detected after	
	607Ch	00h	Home offset	32bit	0xFE000000	completion of home return position control mode (hm) execution can be the	
						value of this object	
	607Eb	00h	Polarity	8bit	0~00	Sets polarity (direction of motor rotation) for position command, velocity	
		0011	i Olaniy	ODIL	0,000	command, torque command, or offset	l

The following table shows amplifier objects related to home return (addresses within Object editor).

Step 1

On the toolbar, click the Open the Object view icon. Select Read-out from the driver and click OK.

PAN	ATERM		
File	View	Tools	Help
8x %	🕞	<u>a</u> 📭	13 13
			Open the Object view (Alt+2)

Selection of objects to be read	×
Read-out from the driver	
○ Read from file	
○ Read default	
ОК	Cancel
UK C	uncer

Change the value of 6098h (Homing method) in the Main Index column, as below.

Select **6000h** and double-click the **Value** column corresponding to **Homing method** in the **6098h** row. Change 00h to 05h (method: 5).

🔄 Object (read-out from th	e driver) 🗙									
Read Save Rcv	Trans Copy	EEP	Disp Print	olay Mode: Hex		•				
If ESM state is not Init then, you will not be able to do the send to the driver and changing the setting value. Object value can be changed by set the <value> and press <enter> or leave the selected row. Editing a object value can be cancel by press <esc>. In MINAS-A5B series, object other than the 3000h group can be enabled if you reset the control power after writig the EEPROM.</esc></enter></value>										
All object	Main Index	Sub Index	Object Name		с	ata Type	Attributes	Min	Max	Value
💷 1000h	6092h	00h	Highest sub-inde	x supported	U	8	256	02h	02h	02h
±… 3000h	6092h	01h	Feed		U	32	0	00000001h	FFFFFFFh	0080000h
± 4000h	6092h	02h	Shaft revolutions		U	32	0	00000001h	FFFFFFFh	00000001h
6000h	6098h	00h	Homing method		18	3	0	80h	7Fh	00h

3

Click Trans and then EEP.

Diject (read-out from the driver) 🗙									
🚔 Read		Rcv	Trans	Сору	EEP				

INFO

When the Method is set to 5, the direction of initial movement changes according to the status of the Home Switch at the time of startup. The home position detection position is the first index pulse detection position on the negative or positive side after the status of the Home Switch changes. (See the figure below.) If a home position is unallocated, Homing error = 1 will occur.



A "Check" pop-up window will be displayed. Click **OK** to write the changes to EEPROM.

lainIndex	SubIndex	ObjectName	Before The Change	After The Change	_
4728	0	Homing method	00h	05h	

Step 5

Turn OFF and then ON the servo amplifier. The servo amplifier will be restarted and the new settings will take effect.

Step 6

Check that the ERROR LED on the GM1 controller is blinking because the servo amplifier was turned OFF. (The communication was disrupted when the servo amplifier was turned OFF.)

The icons of the registered servo amplifiers in the navigation pane also indicate that the communication was disrupted.



Select Reset Cold from the Online menu to reset the error.

Onl	ine	Debug	Tools	Window	Н
03	Ad	d USB Port			
QŞ	Log	gin		Alt+F8	
C∛	Log	gout		Ctrl+F8	
	Do	wnload			
	On	line Chang	e		
	Sta	tus		Alt+F5	
	Sys	tem Data H	listory		
	Res	set Warm			
	Res	et Cold			
	Res	set Origin			
	Sim	nulation			

The icon status will change as below.



Step 8

Right-click the Application object. Select Start to change the status from "Stop" to "Start".



The icon status will change as below.

EtherCAT_Master_SoftMotion

MADLT11BF

MADLT10F

MADLT0C_ETC_Panasonic_MINAS_A6B

Step 9

Temporarily log out.

To log out, right-click the Application object and select Logout.

* After logout, the operation mode at the time of logout is taken over when you log in again.



INFO

Alternatively, you can log out by selecting **Logout** from the **Online** menu.



You can also log out using the toolbar.

1.05	Luit	VICVV	Hojeet	build	Onnie	bebug	10013	maga
1	H	a n	C4 🛍	M 🕼	🐴 🐴 I	川利剤	4	💥 C <mark>; O</mark>

Step 10

Return to PANATERM Lite for GM and click Rcv to check whether the changes have been written to EEPROM normally.



Check that the value of 6098h (Homing method) in the Main Index column has been changed to "05h".

🛛 🔄 Object (read-out from	the driver) 🗙									
Read Save Rcv	Trans Copy	EEP	Print Dis	play Mode: H	lex	•				
If ESM state is not Init then, yo Object value can be changed by In MINAS-A5B series, object ot Close TreeView	u will not be able to do t v set the <value> and p her than the 3000h group PDS Condition</value>	the send to the or ress <enter> or o can be enabled on Switch or</enter>	driver and changi leave the selecte d if you reset the n disabled	ing the setting ed row. Editing control powe	g value. g a object v er after writ ndition	value can be ca ig the EEPROM Operational	ncel by press <	Esc>.		
All object	Main Index	Sub Index	Object Name			Data Type	Attributes	Min	Max	Value
1000h	6092h	00h	Highest sub-inde	ex supported		U8	256	02h	02h	02h
± 3000h	6092h	01h	Feed			U32	0	00000001h	FFFFFFFh	00800000h
+ 4000h	6092h	02h	Shaft revolution	S		U32	0	00000001h	FFFFFFFFh	00000001h
6000h	6098	00h	Homing method			I8	0	80h	7Fh	05h

Column [8]: Writing and reading objects using programs

Objects (such as home return methods) can be written and read by using function blocks (FB) from programs. For details on FB, refer to the GM1 Series Reference Manual (Instruction Edition).

- ETC_CO_SdoWrite (write slave parameters)
- This is a function block (FB) that writes EtherCAT slave parameters.

	ETC_CO_S	doWrite_1
	ETC_CO	SdoWrite
-	xExecute	xDone
		xBusy
		xError
-	xAbort	eError
-	usiCom	udiSdoAbort
-	uiDevice	szDataWritten
-	usiChannel	
-	wIndex	
-	bySubindex	
-	udiTimeOut	
_	pBuffer	
-	szSize	
-	eMode	

An example of variable setting is shown below.

* EtherCAT address = uiDevice

	MADLT11BF X			
G E P C C E	General	Address		Additional
	Event Bressen Data	AutoInc address	0	Enable expert settings
	Expert Process Data	EtherCAT address	1001	Optional
	Process Data	Distributed Clock		
	Online	Select DC		~
	EtherCAT I/O Mapping	🖂 Enable	1000 Syr	nc unit cycle (µs)

Туре	Parameter name	Set value (example)	Description		
	Execute	xWrite	Starts execution at the rising edge		
	xAbort FALSE		Cancels execution		
	usiCom	usiCom	Number of ETC Master (fixed at 1 when there is only one master)		
	uiDevice	uiDevice	Station number of ETC Slave (EtherCAT address)		
	usiChannel	Delete "???"	Variable reserved for future expansion		
Input	wIndex	wIndexWrite	Main address of slave unit to be accessed		
	bySubindex	byIndexWrite	Sub-address of slave unit to be accessed		
	udiTimeOut	uTmOut	Timeout period		
	pBuffer	Adr (dwWriteData)	Address of variable to write from		
	szSize	sdoWriteSize	Size of data to be written		
	eMode	Delete "???"			
	Done	Delete "???"	TRUE: Completes execution and shifts to Standstill state		
	Busy	Delete "???"	TRUE: FB operation in progress		
	Error	Delete "???"	TRUE: An error has occurred		
Output	ErrorID Delete "???"		An error ID is output		
	udiSdoAbort Delete "???"		Displays additional information when an error occurs during FB execution		
	szDataWritten	Delete "???"	Size of written data		

• ETC_CO_SdoWrite (read slave parameters) This is a function block (FB) that reads EtherCAT slave parameters.

	ETC_CO_SdoRead_0								
	ETC_CO_SdoRead								
-	xExecute	xDone ·	_						
		xBusy	_						
		xError	_						
_	xAbort	eError	_						
_	usiCom u	diSdoAbort	_						
_	uiDevice	szDataRead	-						
_	usiChannel								
_	wIndex								
_	bySubindex								
_	udiTimeOut								
_	pBuffer								
_	szSize								

Туре	Parameter name	Set value (example)	Description			
	Execute	xRead	Starts execution at the rising edge			
	xAbort	xReadAbort	Cancels execution			
	usiCom	usiCom	Number of ETC Master (fixed at 1 when there is only one			
	usicom	usicom	master)			
	uiDevice	uiDevice	Station number of ETC Slave (EtherCAT address)			
Input	usiChannel	Delete "???"	Variable reserved for future expansion			
	wIndex	wIndexRead	Main address of slave unit to be accessed			
	bySubindex	bySubIndex	Sub-address of slave unit to be accessed			
	udiTimeOut	udiTimeOut	Timeout period			
	pBuffer	Adr (dwReadData)	Address of variable to store data			
	szSize	sdoReadSize	Size of data to be read			
	Done	Delete "???"	TRUE: Completes execution and shifts to Standstill state			
	Busy	Delete "???"	TRUE: FB operation in progress			
	Error	Delete "???"	TRUE: An error has occurred			
Output	ErrorID	Delete "???"	An error ID is output			
	udiSdo∆bort	Delete "???"	Displays additional information when an error occurs during			
	udouoAboit	Delete	FB execution			
	szDataRead	Delete "???"	Size of read data			

2 Commissioning

2.1 Executing Commissioning

Let's operate the motor in commissioning mode.

In commissioning, Servo ON and inching operations can be performed without using a program.

Step 1

Double-click SM_Drive_ETC_Panasonic_MINAS_A6B in the navigation pane and select Commissioning.



Step 2

Select Online Config Mode from the Project menu.



INFO

In online configuration mode, projects for commissioning are downloaded to the GM1 controller. For this reason, programs that have been downloaded to the GM1 controller to date will be erased. A confirmation message will be displayed. Click **Yes**.



If "connected" is displayed in the navigation pane, commissioning can be executed.



Step 3

Click the **Power** icon to set the status to Servo ON.



Click the 🥯 and 🎯 buttons to check whether the direction of inching and the rotational direction of the actual axis match

the servo amplifier settings. Set the following values in the setting fields in the Inch section and perform inching operation.

Distance	Velocity	Acceleration	Deceleration
10	100	50	50

The motor runs one rotation and the object moves 10 mm.

R# SM_Drive_ETC_Panasonic_M	INAS_A6B ×				
General	Online				
	variable	set value	actual value	Status:	SMC_AXIS_STATE.standstill
Scaling/Mapping	Position [u]	-0.01	-0.01	Communication	operational (100)
	Velocity [u/s]	0.00	0.09	Frons	
Commissioning	Acceleration [u/s ²]	0.00	42.92	Axis Error:	
SM_Drive_ETC_Panasonic_MINAS_	Torque [Nm]	0.00	0.00	0 [16#0000000	[00
A6B: I/O Mapping				FB Error:	-
SM_Drive_ETC_Panasonic_MINAS_				SMC_ERROR.S	MC_NO_ERROR
Abb: IEC Objects				uiDriveInterfac	eError:
Status				0	
Information				strDriveInterfa	ceError:
	Power		Error reset		Homing
	Power	0	Reset		Start
	Inch				Read&Write
		Distance:	10		Parameter:
		Velocity:	100		Value:
		Acceleration:	50	(>)	Prepared Value:
		Deceleration:	50		
		Jerk:	0		

INFO

Inching: While one of the arrow buttons is held down, the object moves according to the distance, velocity, and acceleration or deceleration specified in the respective fields. Releasing the button stops the object at the specified deceleration.

If the direction of inching and the rotational direction of the actual axis are different, select the **Scaling/Mapping** tab and select the **Invert direction** check box in the **Scaling** section. The motor will run in the opposite direction.

_	R# SM_Drive_ETC_Panasonic_MINAS_A6B X							
	General	Motor Type	Scaling					
	Scaling/Mapping	Rotary	16#800000					
	Commissioning	Linear						

Check whether home return operation is performed as specified in the "Homing method" object. Click **Start** in the **Homing** section and check home return operation.



Step 4

If you have checked operations in commissioning mode, cancel the commissioning mode, as below. Select **Online Config Mode** from the **Project** menu.



If "connected" disappears from the navigation pane, the commissioning mode has been canceled.



3 Continuous Positioning Operation



3.1 Creating Servo ON Program

Insert the MC_Power instruction to execute Servo ON.

Step 1

Double-click **MC_PRG** in the navigation pane. Right-click the leftmost section of the network (the red section in the figure below) and select **Function Block Guidance**.



Right-click on the new network and select Function Block Guidance.

Expand Single axis control as shown in the figure below, select MC_Power (Servo ON), and click OK.

Variables will be automatically declared for the MC_Power instruction and the **Auto Declare** dialog box will be displayed. Check the contents of the dialog box and then click **OK**.

📳 Function Block Guidance	_				
Search (S):					
Function Block List (F)		+ -			
Name	Description	^			
Single axis control					
Servo ON					
MC_Power Set the axis into servolock status and ① Home Return					
Home Return					
the Stop					
JOG/Inch		Auto Declare			×
Position control		_			_
• Velocity control		Scope		Name	Type
Torque control		VAR	~	MC_Power_0	MC_Power >
Synchronous control		Object		Initialization	Address
Multi-axis control		MC_PRG [A	pplication] ~		
L		Flags		Comment	
Document		CONSTAI	л		
MC Bowen (Source ON)		RETAIN			
MC_Power (Servo ON)		PERSIST	ENT		~
This is a function block (FB) that sets	s the axis to the servo ON sta				
be ready for operation.					
-					OK Cancel
<					
With EN/ENO (W)		1.4-1			
	Op	erand (0) >>			
	ОК	Cancel			

Column [a]: LR	Guidance					
The method for entering vari	ables directly was explained on th	ne previo	us page, but	there is al	so a method for entering	
variables using operands.						
Click Operand, enter neces	sary variables in the Input and O u	utput sec	tions, respe	ctively, and	l click OK .	
Then, delete unnecessary "?	???".					
The Document tab contains	a description of the selected FB	so that v	ou can chec	k it as nece	essarv	
📑 Function Block Guidance					- 0	×
			Name (N):	MC Power 0		- I
Search (S):			itunic (ity)			
Function Block List (E)		+ -	✓ I/O			
			Axis		SM_Drive_ETC_Panasonic_MINAS_A66	в
Name	Description	<u> </u>	✓ Input		TOULE	
Single axis control			Enable bRegulato	rOn	IRUE VServoON	-
Servo ON		_	bDriveStar	t	xServoON	-
MC_Power	Set the axis into servolock status and make	t	✓ Output	-		
Home Return			Status			
Control switch			bRegulato	rRealState		
Stop			bDriveStar	tRealState		_
JOG/Inch			Busy			_
Position control			Error			_
telecity control			Enonio			_
Synchronous control						
		- v				
		_				
Document						
MC Power (Servo ON	D	~				
	7					
This is a function block (FB) th	at sets the axis to the servo ON state to					
be ready for operation.						
		\sim				
<		>				
WITH EN/ENO (W)	Operand	(0) <<				
	OK Can	cel				

Column [10]: Variables

Variable names are assigned as English letters.

Each variable name starts with a prefix that indicates the type and scope of the variable.

A prefix is followed by a meaningful word name. Only the first character of each word name is capitalized. For global variables, the first character is "g".

Examples) BOOL type: xServoON REAL type: rVelocity

BOOL type (Global variable):g_xPowerONREAL type (Global variable):g_rPosition

Space and special characters (such as !, ", \$, %, @, or &) cannot be used and a numeric character cannot be used as the first character.

Underscores cannot be used consecutively.

Data type	Prefix	Remarks		
BOOL	х	"x" is used to distinguish from the identifier ("by") of BYTE data type		
	b			
BYTE	by	Not used for arithmetic operations		
WORD	W	Not used for arithmetic operations		
DWORD	dw	Not used for arithmetic operations		
LWORD	lw	Not used for arithmetic operations		
SINT	si			
USINT	usi			
INT	i			
UINT	ui			
DINT	di			
UDINT	udi			
LINT	li			
ULINT	uli			
REAL	r			
LREAL	lr			
STRING	S			
WSTRING	WS			
TIME	tim			
LTIME	ltim			
TIME_OF_DAY	tod			
DATE_AND_TIME	dt			
DATE	date			
POINTER	р			
ARRAY	а			
ENUM	е			
SCOPE		A prefix to identify the scope of a variable		
VAR_GLOBAL	g_	For global variables. Example: g_uiTest;		
VAR CONSTANT	c_	For local constants. Example: c_uiTest:INT;		
VAR_GLOBAL CONSTANT	gc_	For global constants. Example: gc_uiTest:INT;		

Complete a function block as show below.

(1)		MC_Power_0	
(1)		MC_Power	(4)
M_Drive_ETC_Panasonic_MI	NAS_A6B — Axis	Status	<u> </u>
(2)		bRegulatorRealState	-
TRUE		bDriveStartRealState	-
	Enable	Busy	-
(3)		Error	-
xServoON		ErrorID	-
N II	bRegulator	On	
(3)			
xServoON			
0 0			

	Туре	Parameter name	Set value	Description
(1)	I/O	Axis	SM_Drive_ETC_Panasonic_MINAS_A6B	Specifies the axis
(2)		Enable	TRUE	TRUE: FB executable
(3)	Input	hPagulatarOn	v Son / ONI	TRUE: Servo lock
	input	Diregulatoron		FALSE: Servo lock released
		bDriveStart	xServoON	TRUE: Quick stop disabled
(4)		Status	Delete "???"	TRUE: Axis ready for operation
		bRegulatorRealState	Delete "???"	TRUE: FB executable
		hDriveStartBaalState	Delete "222"	TRUE: Operation not stopped by
	Output	DDIVESIALIREAISIALE	Delete	quick stop
		Busy	Delete "???"	TRUE: FB execution incomplete
		Error	Delete "???"	TRUE: Error has occurred within FB
		ErrorID	Delete "???"	An error ID is output

INFO

For the "Axis" parameter for I/O, specify the axis corresponding to the servo motor.

Example: For SM_Drive_ETC_Panasonic_MINAS_A6B, substitute "SM_Drive_ETC_Panasonic_MINAS_A6B" for the Axis parameter of the MC_Power instruction.



3.2 Creating Home Return Program

Insert the MC_Home instruction to execute home return. (Operation 1)



* For the MINAS A6B series, the home return method is set to the default value (0), so home return will not be performed if the home return method is left unchanged.

Before performing home return operation, be sure to set up parameters for home return.

Step 1

Insert a new network. Right-click in the network and select Insert Network (Below).



Right-click in the new network and select Function Block Guidance. Expand Single axis control as shown in the figure below, select MC_Home (home return), and click OK.

Variables will be automatically declared for the MC_Home instruction and the **Auto Declare** dialog box will be displayed. Check the contents of the dialog box and then click **OK**.

E Function Block Guidance			×				
Search (<u>S</u>):							
Function Block List (E)		+	-				
Name	Description		^				
Single axis control							
Servo ON							
🖻 ···· Home Return							
MC_Home	Perform home return of the axis.						
Control switch							
Stop			Auto Declare				×
JOG/Inch						_	
Position control			<u>S</u> cope		<u>N</u> ame	Type	
Torque control			VAR	~	MC_Home_0	MC_Home	~ >
Synchronous control			Object		Initialization	Address	
Multi-axis control			MC_PRG [Application]	~	_	1	
Description			<u>Flags</u>		Co <u>m</u> ment		
Document							^
MC Home (Home Return	0		PERSISTENT				~
-	,						
This is a function block (FB) that per	forms home return.						
T						OK	Cancel
Icon						UK I	Cancer
With EN/ENO (W)							
	Of	perand (O)>>				
	ОК	Cancel					

Step 3

Complete a function block as show below.



	Туре	Parameter name	Set value	Description		
(1)	I/O	Axis	SM_Drive_ETC_Panasonic_MINAS_A6B	Specifies the axis		
(2)		Evocuto	vHomo	Starts execution at the rising edge		
	loput	Execute	XHOILIE	FALSE: Stops processing		
(3)	input	Position	Doloto "222"	Absolute position upon completion of Z-		
		POSILION		phase search		
(4)		Done	Delete "222"	TRUE: Completes execution and shifts to		
		Done		Standstill state		
		Busy	Delete "???"	TRUE: FB operation in progress		
	Output		Delete "222"	TRUE: An interruption caused by another		
		CommandAborted		FB		
		Error	Delete "???"	TRUE: An error has occurred		
		ErrorID	Delete "???"	An error ID is output		



3.3 Creating Positioning Operation Program (Absolute Value Positioning)

Create a program for absolute value positioning. (MC_MoveAbsolute instruction)



Step 1

Insert a new network. Right-click in the network and select Insert Network (Below).

Step 2

Right-click in the new network and select Function Block Guidance. Expand Single axis control as shown in the figure below, select MC_MoveAbsolute, and click OK.

Variables will be automatically declared for the MC_MoveAbsolute instruction and the **Auto Declare** dialog box will be displayed. Check the contents of the dialog box and then click **OK**.

unction Block List (E)	-	+ -		
Name	Description	^		
Single axis control				
Servo ON				
Home Return				
Control switch				
E Stop				
JOG/Inch				
Position control				
MC_MoveAbsolute	The axis is moved to the position specified by	····		
MC_MoveRelative	The axis is moved to the position specified by	/		
MC_MoveAdditive	Add the relative distance to the target posi	Auto Declare		
MC_MoveSuperImposed	Add the relative distance / speed / accelera			
MC_PositionProfile	The axis moves according to the profile dat	Scope	Name	Type
	· · · ·	VAD	MC MoveAbsolute 0	MC MoveAbsolute
Dogiment		VAR	mc_moveAbsolute_0	
		<u>O</u> bject	<u>Initialization</u>	<u>A</u> ddress
MC MoveAbsolute (Al	solute Value Positioning)	MC PRG [Application]		
_				
This is a function block (FB) that	causes the axis to travel to a position	Flags	Comment	
specified as an absolute position.			1	~
Teen				

Complete a function block as show below.



	Туре	Parameter name	Set value	Description		
(1)	I/O	Axis	SM_Drive_ETC_Panasonic_MINAS_A6B Specifies the axis			
(2)		Execute	xMoveAbs	Starts execution at the rising edge		
(3)		Position	200	Specifies the target position (u)		
		Velocity	50	Specifies the maximum velocity (u/s)		
		Acceleration	5000	Specifies acceleration (u/s ²)		
		Deceleration	5000	Specifies deceleration (u/s ²)		
	Input	Jerk	Delete "???"	Specifies jerk (u/s³)		
	input			Specifies the direction of axis		
				movement.		
		Diraction	Dalata "222"	Direction can be specified only for the		
		Direction		Modulo axis type.		
				For the Finite axis type, the specification		
				is ignored.		
(4)		Done	vDone1	TRUE: Movement by the specified		
		Done		relative distance is complete		
(5)		Busy	Delete "???"	TRUE: FB operation in progress		
	Output		Delete "222"	TRUE: An interruption caused by		
		CommanuAponeu		another FB		
		Error	Delete "???"	TRUE: An error has occurred		
		ErrorID	Delete "???"	An error ID is output		

INFO

How to connect a coil to output "Done"

To insert a coil, select a connection line to "Done" and then click the relevant icon on the toolbar or right-click and select **Insert Coil** from the context-sensitive menu that is displayed.



Column [11]: Assigning numerical variables

In the previous example, fixed value "200" is substituted for the "Position" input parameter, but you can also declare a variable and set "200" as the default value.

Declaring a variable enables you to change the value flexibly.

		Auto Declare		×
SM_Drive_ETC_Panasonic_MINAS_A6B	MC_MoveAbsolute_0 MC_MoveAbsolute Axis	<u>S</u> cope VAR ∨	<u>N</u> ame IrPosition	Type LREAL V >
xMoveAbs	CommandAb Execute Position Er Acceleration Deceleration Jerk Direction	Object MC_PRG [Application] Elags CONSTANT BETAIN PERSISTENT	Initialization Comment	Address

3.4 Creating Positioning Operation Program (Relative Value Positioning)

Create a program for relative value positioning. (MC_MoveRelative instruction)



Step 1

Insert a new network. Right-click in the network and select Insert Network (Below).

Step 2

Select MC_MoveRelative in the same way as MC_MoveAbsolute.

Step 3

Complete a function block as show below.



	Туре	Parameter name	Set value	Description
(1)	I/O	Axis	SM_Drive_ETC_Panasonic_MINAS_A6B	Specifies the axis
(2)		Execute	xDone1	Starts execution at the rising edge
(3)		Distance	300 (500 - 200)	Specifies the relative distance (u)
	lanut	Velocity	150	Specifies the maximum velocity (u/s)
	input	Acceleration	5000	Specifies acceleration (u/s ²)
		Deceleration	5000	Specifies deceleration (u/s ²)
		Jerk	Delete "???"	Specifies jerk (u/s³)
(4)		Done	vDone?	TRUE: Movement by the specified
		Done		relative distance is complete
(5)		Busy	Delete "???"	TRUE: FB operation in progress
	Output	put	Delete "222"	TRUE: An interruption caused by
		CommanuAborteu		another FB
		Error	Delete "???"	TRUE: An error has occurred
		ErrorID	Delete "???"	An error ID is output

Create a second program for relative value positioning. (MC_MoveRelative instruction)



Step 1

Insert a new network. Right-click in the network and select Insert Network (Below).

Step 2

Select MC_MoveRelative in the same way as before.

Step 3

Complete a function block as show below.



	Туре	Parameter name	Set value	Description
(1)	I/O	Axis	SM_Drive_ETC_Panasonic_MINAS_A6B	Specifies the axis
(2)		Execute	xDone2	Starts execution at the rising edge
(3)		Distance	-200	Specifies the relative distance (u)
	loout	Velocity	50	Specifies the maximum velocity (u/s)
	input	Acceleration	5000	Specifies acceleration (u/s ²)
		Deceleration	5000	Specifies deceleration (u/s ²)
		Jerk	Delete "???"	Specifies jerk (u/s³)
(4)		Done	Delete "222"	TRUE: Movement by the specified
		Done		relative distance is complete
		Busy	Delete "???"	TRUE: FB operation in progress
	Output	CommandAborted	Delete "222"	TRUE: An interruption caused by
		CommanuAborteu		another FB
		Error	Delete "???"	TRUE: An error has occurred
		ErrorID	Delete "???"	An error ID is output

Step 4

When creation of the program is completed, execute build and check for any errors.

3.5 Performing Operations from Login through to Home Return

Step 1

Right-click the Application object and select Login to execute a download and login.

Step 2

Right-click the Application [stop] object and select Start.

Step 3

Execute Servo ON.

To execute Servo ON, both **bRegulatorOn** and **bDriveStart** inputs in the **MC_Power** section must be set to TRUE. **xServoON** is set to FALSE by default and the inside of the contact is displayed in white, indicating that the servo is OFF. Double-click the inside of the **xServoON** contact (the portion surrounded by the red frame in the figure below).



Double-clicking the above portion displays the set value (((/ <



To write input status change values such as TRUE and FALSE, **in this state**, **press the F7 key while holding down the Ctrl key**.



When **xServoON** is set to ON, the inside of the contact is displayed in blue, indicating that the servo is ON.

"Status", "bRegulatorRealState", and "bDriveStartRealState" outputs are also set to TRUE, indicating that the servo is ON.

Column [12]: How to write values

After displaying **TRUES** by double-clicking the relevant portion, you can also write values by right-clicking and selecting **Write All Values of 'Device.Application'**.



Step 4

When all parameter settings are complete, perform home return operation as below.

Double-click the startup contact of the MC_Home instruction (home return). When **TRUE>** is displayed, press the Ctrl+F7 keys to execute home return operation.



The motor runs and home return operation is executed.

When the home return operation is completed, **Done** is set to TRUE.

3.6 Performing Continuous Positioning Operation

Step 1

xMoveAbs is reset to TRUE.

After MC_MoveAbsolute_0 operation is complete, xDone1 is set to TRUE and MC_MoveRelative_0 operates. After MC_MoveRelative_0 operation is complete, xDone2 is set to TRUE and MC_MoveRelative_1 operates.





Step 2

Upon completion of operation check, stop the operation and log out.

4 Monitoring



4.1 Axis Parameter List

All axis information can be monitored from the axis parameter list.

Double-click **SM_DRIVE_ETC_Panasonic_MINAS_A6B: IEC Objects** in the navigation pane to open **SM_DRIVE_ETC_Panasonic_MINAS_A6B**.

You can check the current value in the **Value** column. You can also write values by double-clicking in the **Prepared value** column corresponding to the variable of the value to be changed and then pressing the Ctr+F7 keys or right-clicking.

/	/ s#_ SM_Drive_ETC_Panasonic_MINAS_A6B X									
	General	🖶 Add 📝 Edit 🗙 Delete → 🖥 Go to Variable								
:	Scaling/Mapping	Expression	Туре	Value	Prepared value	Address				
	Commissioning	WAxisStructID	WORD	65042						
:	SM_Drive_ETC_Panasonic_MINAS_	NxisState bRegulatorOn	SMC_AXIS_STATE BOOL	power_off FALSE						
ſ	A6B: I/O Mapping SM_Drive_ETC_Panasonic_MINAS_	bDriveStart	BOOL	FALSE						
H	A6B: IEC Objects	wCommunicationState	WORD	100						
		BRegulatorRealState	BOOL	0 FALSE						
	Information	bDriveStartRealState wDriveId	BOOL	FALSE 0						
		No Owner	INT	0						
		* fCycleTimeSpent	LREAL	0						

4.2 Registering in Watch

By registering variables in the watch view, you can perform variable value management such as checking or changing variable values.

Step 1

From the View menu, select Watch and then Watch 1. Watch 1 will be displayed on the bottom of the main window.



The variables to be monitored can be registered in **Watch 1** by dragging and dropping them into the **Watch 1** pane. Register fActPosition (current position) and fAimPosition (target position) by dragging and dropping them into the **Watch 1** pane.

Register xServoON (servo ON), xHome (execute home return), and xMoveAbs (execute positioning operation), as below. Double-click the empty field below **fAimPosition** and click

Click Device, Application, and then MC_PRG, select xServoON, xMoveAbs, and xHome, and click OK.



Expression	Application	Туре	Value	Prepared value	Execution point
SM_Drive_ETC_Panasonic_MINAS_A6B.fActPosition	Device. Application	LREAL	0.000472068786621		Cyclic Monitoring
SM_Drive_ETC_Panasonic_MINAS_A6B.fAimPosition	Device.Application	LREAL	0		Cyclic Monitoring
MC_PRG.xServoON	Device.Application	BOOL	FALSE		Cyclic Monitoring
MC_PRG.xHome	Device. Application	BOOL	FALSE		Cyclic Monitoring
MC_PRG.xMoveAbs	Device.Application	BOOL	FALSE		Cyclic Monitoring

Column [13]	: How to n	nove tab	s					
ne SM_DRIVE_ETC_Pa		S_A6B tab cai	n be moved	d by dragging and	I dropping i	t.		
<pre>## Sm_Drive_ETC_Panasonic_m</pre>		_PRG						
General	🕂 Add 🖉 Edit	🗙 Delete 👌 Go to V	/ariable					
- I: // ·	Expression	Туре	Value	Prepared value	Address	Comment		
Scaling/Mapping	₩ wComm.	WORD	100			Parameter	number: 1013	
Commissioning	🐐 uiDriveI	NINT	0			Drive inte	rface error nur	mber
	🍫 bRegulat	BOOL	FALSE			Parameter	number: 1015	
M_Drive_ETC_Panasonic_MINAS_	bDriveSt	BOOL	FALSE			Parameter	number: 1016	
	🛛 👋 wDriveId	WORD	0			Parameter	number: 1021	
M_Drive_ETC_Panasonic_MINAS_ 6B: IEC Objects	🍫 iOwner	INT	0			Parameter	number: 1022	
	👋 iNoOwner	INT	0			Parameter	number: 1023	
tatus	🍬 fCycleTi	LREAL				Parameter	number: 1024	
e	🍬 fTaskCycle	LREAL	0.00			Parameter	number: 1025	
formation	🍫 bError	BOOL				Parameter	number: 1030	
	🍬 dwErrorID	DWORD		_		Parameter	number: 1031	
	bErrorAc	BOOL	FALS			Parameter	number: 1032	
	bDisable	BOOL	FALSE			Parameter	number: 1036	
	🗉 🍬 fbeFBErroi	ARRAY [0g_SMC						
	🍫 dwRatio	DWORD	1048576			Parameter	number 1051	
	🍫 iRatioTe	DINT	45			Parameter	number 1052	
	🍬 nDirection	MC_DIRECTION	positive			Parameter	number 1053	
	🍫 fScalefac	LREAL	23301.688888	388		Parameter	number 1054	
	🍫 fFactorVel	LREAL	23301.688888	388		Parameter	number 1055	
	🍬 fFactorAcc	LREAL	23301.688888	388		Parameter	number: 1056	
	🍫 fFactorTor	LREAL	6250			Parameter	number: 1057	
	🍫 fFactorJ	LREAL	23301.688888	388		Factor jer	k	
	🍬 fFactorCur	LREAL	1			Parameter	number: 1059	
MC_PRG X				ne SM_Drive_ETC_Panasonic_MIN	AS_A68 X	[™] Dalata [→] ≡ Ga ta V	viable	
ssion	Type Val	ue Prepar Address	Comm ^ 🖳	General	Europeanian Edit	X Delete Go to V	Malua	Descendent
ETC_CO_SdoWrite_0	ETC_C			Scaling/Mapping	wComm	WORD	100 value	Prepared val
usiCom	BOOL FAL	SE		Commissioning	🍫 uiDriveI	UINT	0	
uiDevice	UINT 0			SM_Drive_ETC_Panasonic_MINAS_	bRegulat.	BOOL	FALSE FALSE	
wIndexWrite	WORD 0			A6B: I/O Mapping	👋 wDriveId	WORD	0	
			~	A6B: IEC Objects	No incomer	INT	0	
			^	Status	₩ fCycleTi		0	
	MC_1	Power_0		Information	🏘 fTaskCycl	e LREAL	0.001	
SM Drive ETC Panasonic MINAS	A6B Axis	Power Status	FALSE		 bError dwErrorIF 	BOOL DWORD	FALSE 0	
	-	bRegulatorRealState	FALSE		bErrorAc.	BOOL	FALSE	
TRUE	Enable	DUriveStartRealState Busy	FALSE		bDisable	BOOL	FALSE	
		Error	FALSE		w wRatio	DWORD	1048576	
		ErrorID	SMC_NO_ERR		🏘 iRatioTe	DINT	45	
xServoON	bRegulatorOn				🗉 👘 nDirection	MC_DIRECTION	positive	
xServoON	bRegulatorOn				🍫 fScalefar	. LREAL	23301.68888888	
xServoON	bRegulatorOn				*∳ fScalefac. *∲ fFactorVe	LREAL	23301.688888888 23301.688888888	
xServoON xServoON xServoON	bRegulatorOn bDriveStart				 fScalefac. fFactorVe FFactorAc 	LREAL	23301.688888888 23301.688888888 23301.688888888 23301.688888888	

4.3 Adding Trace

The trace function allows the variable value histories in the GM1 controller to be checked in GM Programmer.

Step 1

Double-click Trace in the navigation pane.



Step 2

Register variables to be traced. You can register and trace global variables and variables within function blocks.

Clicking Add Variable on the top right of the Trace window displays the Trace Configuration dialog box.

Click on the right side of the Variable field to display the Input Assistant dialog box.

* 🕖 indicates required input items. "Variable" is a required input item.

er Trace x			
10			ifiguration d Variable
	Trace Configuration Trace Record Image: marked state Image: marked	Variable settings Variable Graph color Line type Point type Dot Activate minimum warning Critical lower limit Warning minimum color Bladk Activate maximum warning Critical upper limit Warning maximum color	
	Add Variable Delete Variable	Reset Display settings OK Cancel	

evices	× 🧹 🚭	Trace X		
evices Hello GM1 Device (AGM1CSEC16) Application GVL MC_PRG Device (AGM1CSEC16) Comparison GVL MC_PRG Device (AGM1CSEC16) Comparison GVL MC_PRG Device (AGM1CSEC16) Comparison GVL Comparison Co	• • • × • Paste Add Object Add Folder Login Delete application from of the system o	Trace X 10 evice	Cam table CNC program CNC settings DUT External File Global Variable List Interface Persistent Variables POU POU for implicit checks Trace	

In the Input Assistant window, select variables to be traced and click OK, as below. For the first variable to be traced, select IoConfig_Globals, SM_DRIVE_ETC_Panasonic_MINAS_A6B, and then fActPosition.

Input Assistant				>
Text Search Categories				
Trace Variables	▲ Name	Туре	Address	^
Traceable parameters	🕮 🔘 Application	Application		
	🖷 🚯 сом	Library		CAA S
	I FILE	Library		CAA F
	🖶 🎑 IoConfig_Globals	VAR_GLOBAL		
	EtherCAT_Master_SoftMotion	n IoDrvEthercatLib.IOD		Ethera
	🗈 🗇 LANPort1	IoDrvEthernet.IoDrv		
	🗈 🛛 🧳 LANPort2	IoDrvEthernet.IoDrv		
	🗷 🗇 MADLT11BF	IoDrvEthercatLib.ETC		
	🖤 🔌 nIoConfigTaskMapCount	DINT		
	🕀 🔌 pIoConfigTaskMap	POINTER TO IoConfia		
	🖃 🔷 SM_Drive_ETC_Panasonic_M	MINAS SM3_Drive_ETC_Pan		SM_Dr
	🗄 🦘 aCaptDesc	ARRAY [07] OF SM		
	🕮 🤣 acycCom	AcyclicCom_ETC		
	💷 🦘 adatAcyclic	ARRAY [1SMC3_gc		
	🗄 🛷 asdoRead	ARRAY [1ServiceHa		~
	<			>
Structured view				
Documentation		Insert with arguments	Insert with namesp	ace prefix
SM_Drive_ETC_Panasonic SM3_Drive_ETC_Panasoni (VAR_GLOBAL)	_MINAS_A6B: c_MINAS_A6B.AXIS_REF_ETC_Panasi	onic_MINAS_A6B;		~
			OK	Cancel

Step 4

After registering the first variable, click Add Variable. Click in on the right side of the Variable field to add fAimPosition, as below. Select IoConfig_Globals, SM_DRIVE_ETC_Panasonic_MINAS_A6B, and then fAimPosition and click OK.

🔦 Trace Configuration			×
Trace Record	Variable settings Variable	-0	
Trace SM_Drive_ETC_Panasonic_I Presentation (diagrams) Time axis Diagram 1 Y axis Shown variables SM_Drive_ETC_Panason	Variable Graph color Line type Point type Activate minimum warning Critical lower limit Warning minimum color Activate maximum warning Critical upper limit Warning maximum color	Green Line Dot Black Red	
Add Variable	Reset Display set	tings	OK Cancel

Clicking Configuration on the top right of the Trace window displays the Trace Configuration dialog box. Open the drop-down list of Task (required input item) and select MotionTask.

🚭 Trace 🗙		_ _
10-	×	Configuration Add Variable ■ SM_Drive_ETC_Panasonic_MINAS_A6B.fActPosition ▼ ■ SM_Drive_ETC_Panasonic_MINAS_A6B.fAimPosition
Trace Record Trace SM_Drive_ETC_Panasonic_I SM_Drive_ETC_Panasonic_I	Record Settings Enable Trigger Trigger variable Trigger edge Post trigger (samples Trigger Level Task	
Presentation (diagrams) Time axis Diagram 1 Yaxis Shown variables SM_Drive_ETC_Panason SM_Drive_ETC_Panason	Record condition	
Add Variable	Reset Display settings OK Cancel]

Step 6

When a task is selected, Resolution becomes a required input item. Open the drop-down list of Resolution and select µs.

INFO

Task:

When tracing a variable related to motion control, select MotionTask. **Resolution**:

The Motion Task interval is 1 ms. Therefore, if ms (default) is selected in the Resolution drop-down list, a caution message will be output, indicating that sampling resolution is too coarse. As a guide, sampling resolution should be half the interval.

After selecting resolution, click Advanced.

Change the setting of Trace editor buffer size per variable (samples) to 100000.

Trace editor buffer size per variable (samples): Data display area viewed from the horizontal axis (time) of the Trace window

Trace Configuration		×
Trace Record Trace SM_Drive_ETC_Pana SM_Drive_ETC_Pana	Asonic_I Record Settings Enable Trigger Trigger variable Post trigger (samples 0 50ms Trigger Level 0	
Presentation (diagrams) Time axis	Advanced Trace Settings X X	
Diagram 1 Y axis Shown variables	Trace editor buffer size per variable (samples) 100000 1m39s999ms	
SM_Drive_ETC	OK Cancel	
Add Variable	Reset Display settings OK C	Cancel

When **Trace editor buffer size per variable (samples)** is set to 100000, the buffer size becomes 50 times the recommended runtime buffer size.

Data equivalent to 2 s x 50 = approx. 100 s can be displayed in the **Trace** window.

* This buffer size depends on the PC specifications. Therefore, note that if too large buffer size is set, the tool behavior will become sluggish.

INFO

Measure in every n-th cycle	Measurement interval = Set task interval		
Recommended runtime buffer size (samples)	Number of buffers required for the recommended runtime (2 s)		
	To collect trace data precisely, set Measure in every n-th cycle to 1		
	(measurement at every task interval) and prepare buffers equivalent to		
	the recommended size.		
Override runtime buffer size	Specifies the size of data to be overwritten in the number of buffers that		
	is specified above		
	Check box cleared: Leaves histories intact without overwriting data		
	Check box selected: Leaves the amount of data that is specified in the		
	override specification field on the right side		
Trace editor buffer size per variable (samples)	Data display area viewed from the horizontal axis (time) of the Trace		
	window		

Set xServoON registered in Watch previously to TRUE to execute Servo ON.

Change the value in the **Prepared value** column to **_____** and write the setting by pressing the Ctr+F7 keys.

W	atch	1				
Ex	pres	sion	Application	Туре	Value	Prepared value
	*	SM_Drive_ETC_Panasonic_MINAS_A6B.fActPosition	Device. Application	LREAL	0.0006008148193359375	
	*	SM_Drive_ETC_Panasonic_MINAS_A6B.fAimPosition	Device.Application	LREAL	0	
		MC_PRG.xServoON	Device.Application	BOOL	FALSE	TRUE
		MC_PRG.xHome	Device. Application	BOOL	FALSE	
		MC_PRG.xMoveAbs	Device.Application	BOOL	FALSE	

Step 9

Next, change the setting of xHome to TRUE.

Step 10

Before checking trace operation, right-click in the Trace window. Select Download Trace.



When **Download Trace** is selected, waveforms are displayed.



Write **CIRUE>** to xMoveAbs registered in Watch 1.

Check that fAimPosition and fActPosition registered in Watch 1 during positioning operation contain the target value and current value, respectively.



Step 12

After positioning operation is complete, right-click in the Trace window and select Stop Trace.

Blue line: fActPosition (Current position)

Green line: fAimPosition (Target position)



[1] Operation 2) The object moves from the home position to target position [1] (200 mm) (Absolute positioning)
[2] Operation 3) The object moves from target position [1] (200 mm) to target position [2] (500 mm) (Relative positioning)
[3] Operation 4) The object moves from target position [2] (500 mm) to target position [3] (300 mm) (Relative positioning)

INFO

By right-clicking in the Trace window and selecting Save Trace, you can save data in XML, text, or CSV format.

Upload Trace
Configuration
Load Trace
Save Trace
Export symbolic trace config
Statistics

Selecting **Trace file (.trace)** saves the trace setting environment and data without making any changes. This function is convenient when you perform operation checks on devices in remote locations, for example.

Trace file (*.trace)
Trace file (*.trace)
Text file (*.txt)
Trace.csv file (data only) (*.trace.csv)

Memo

Revision History

Date of issue	Manual code	Revision details
April 2022	AIM0006_01	First edition

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