YASKAWA Electric Corporation

SR100 Ethernet

Supported version TOP Design Studio V1.4.4 or higher

CONTENTS

We would like to thank our customers for using M2I's "Touch Operation Panel (M2I TOP) Series". Read this manual and familiarize yourself with the connection method and procedures of the "TOP and external device".

1. System configuration

The system configuration of TOP and "YASKAWA Electric Corporation – SR100" are as follows:

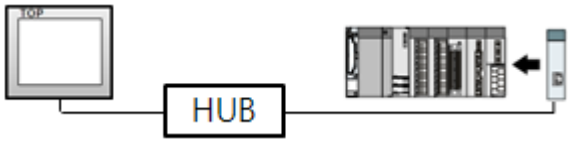
Series	Communication method	Communication setting	Cable
YASKAWA Electric Corporation – SR100	TCP	3. TOP communication setting	Twisted pair Cable*Note 1)

*Note 1) Twisted pair cable

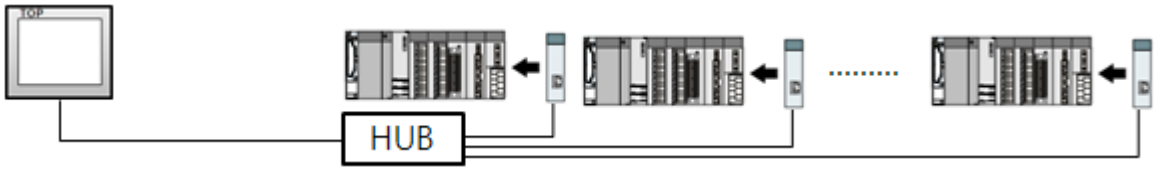
- Refer to STP (Shielded Twisted Pair Cable) or UTP (Unshielded Twisted Pair Cable) Category 3, 4, 5.
- Depending on the network configuration, you can connect to components such as the hub and transceiver, and in this case, use a direct cable.

■ Connectable configuration

• 1:1 connection (one TOP and one external device) connection

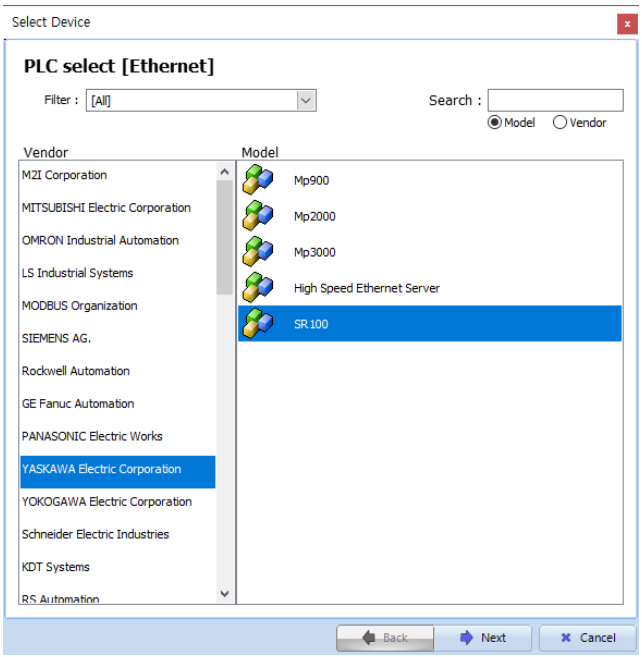


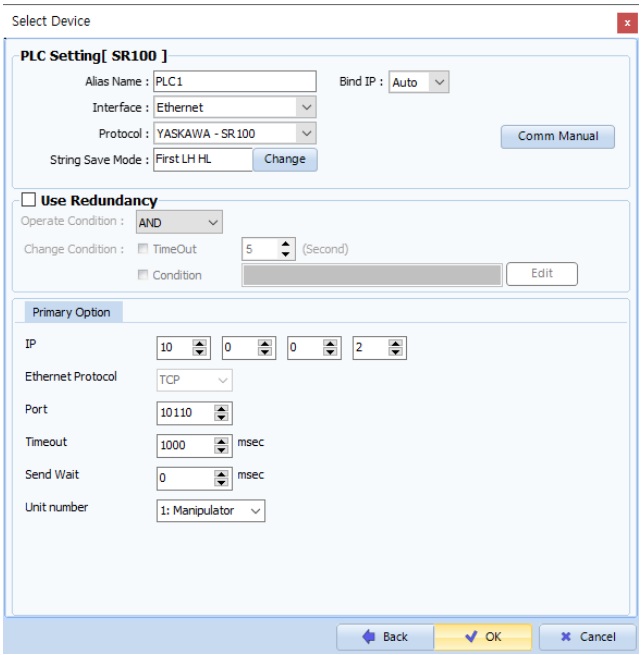
• 1:N connection (one TOP and multiple external devices) connection



2. External device selection

■ Select a TOP model and a port, and then select an external device.





Settings		Contents
TOP	Model	Check the TOP display and process to select the touch model.
External device	Vendor	Select the vendor of the external device to be connected to TOP. Please select "YASKAWA Electric Corporation".
	PLC	Select the external device to be connected to the TOP.

Model	Interface	Protocol
SR100	Ethernet	SR100

Please check the system configuration in Chapter 1 to see if the external device you want to connect is a model whose system can be configured.

3. TOP communication setting

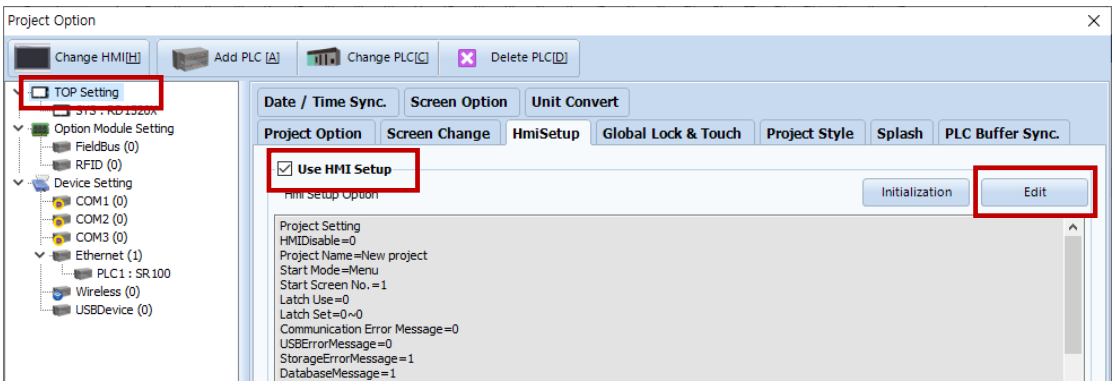
The communication can be set in TOP Design Studio or TOP main menu. The communication should be set in the same way as that of the external device.

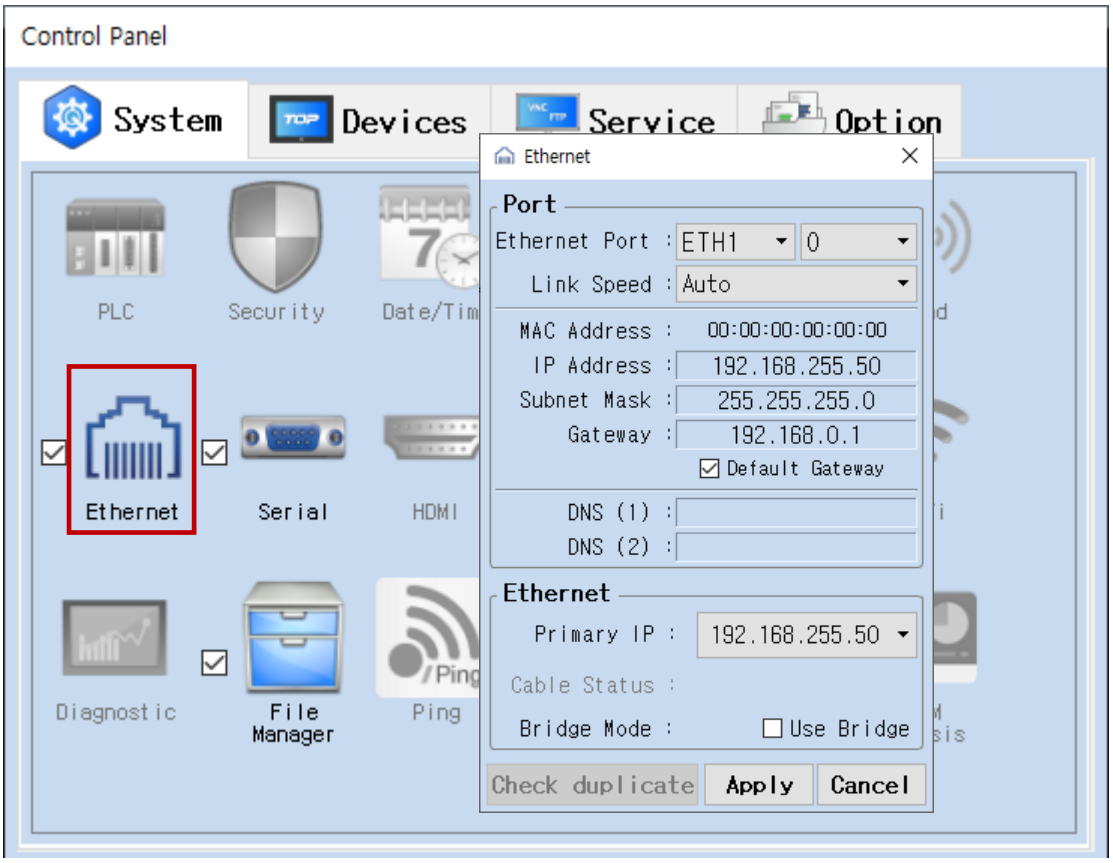
3.1 Communication setting in TOP Design Studio

(1) Communication interface setting

■ [Project > Project Property > TOP Setting] → [Project Option > "Use HMI Setup" Check > Edit > Ethernet]

– Set the TOP communication interface in TOP Design Studio.





Items	TOP	External device	Remarks
IP Address*Note 1) Note 2)	192.168.255.50	192.168.255.1	
Subnet Mask	255.255.255.0	255.255.255.0	
Gateway	192.168.0.1	192.168.0.1	

*Note 1) The network addresses of the TOP and the external device (the first three digits of the IP, 192 . 168 . 0 . 0) should match.

*Note 2) Do not use duplicate IP addresses over the same network.

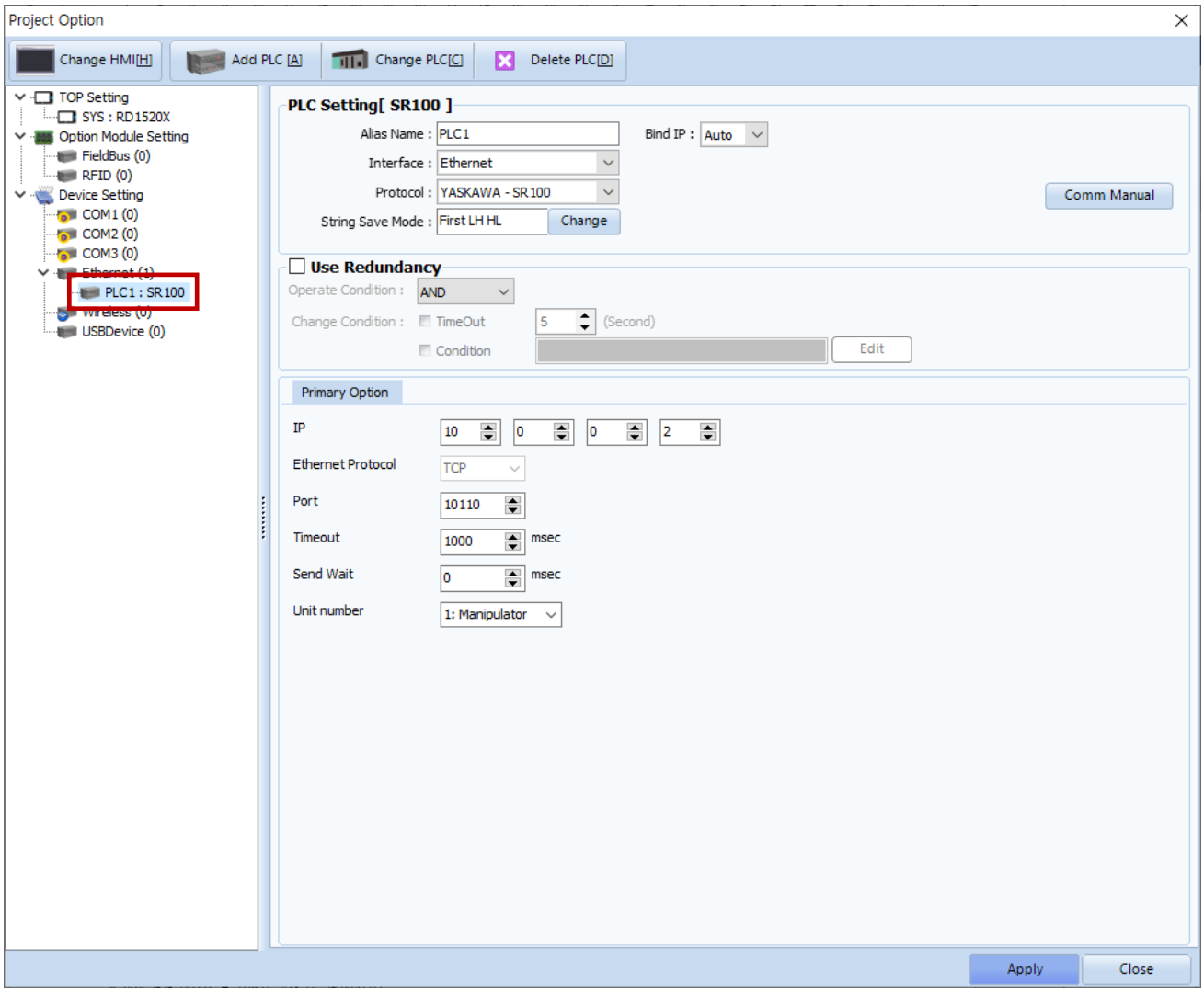
* The above settings are examples recommended by the company.

Items	Description
IP Address	Set an IP address to be used by the TOP to use over the network.
Subnet Mask	Enter the subnet mask of the network.
Gateway	Enter the gateway of the network.

(2) Communication option setting

■ [Project > Project Property > Device Setting > ETHERNET > "PLC1 : SR100"]

– Set the options of the SR100 communication driver in TOP Design Studio.

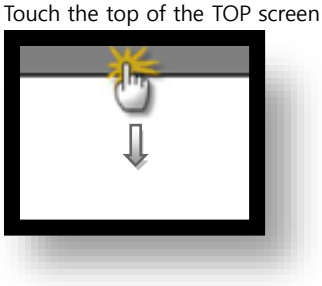


Items	Settings	Remarks
Interface	Select “Ethernet”.	Refer to “2. External device selection”.
Protocol	Select "SR100".	
IP	Enter the IP address of the external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	Fixed
Port	Enter the Ethernet communication port number of an external device.	Fixed
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP’s receiving a response from an external device and sending the next command request.	
Unit number	1: Manipulator, 2: Set the Unit number which corresponds to Pre-aligner.	

3.2. Communication setting in TOP

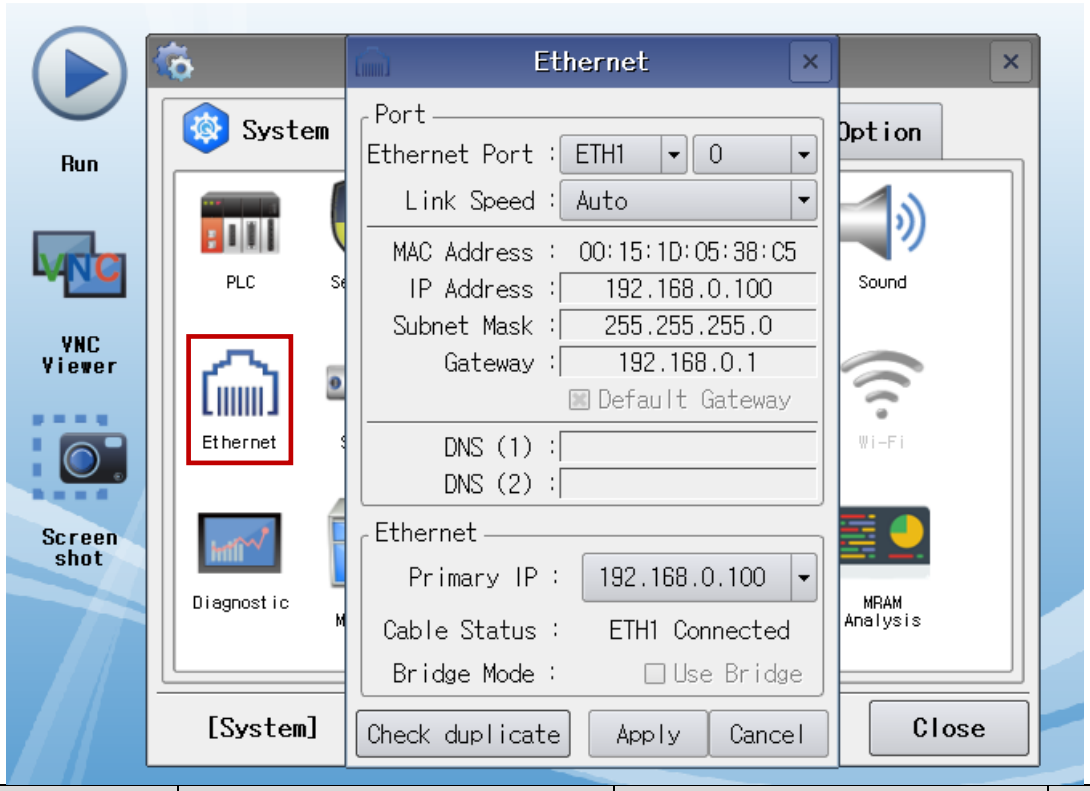
*** This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.**

■ Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.



(1) Communication interface setting

■ [Main Screen > Control Panel > Ethernet]



Items	TOP	External device	Remarks
IP Address*Note 1) Note 2)	192.168.255.50	192.168.255.1	
Subnet Mask	255.255.255.0	255.255.255.0	
Gateway	192.168.0.1	192.168.0.1	

*Note 1) The network addresses of the TOP and the external device (the first three digits of the IP, 192 . 168 . 0 . 0) should match.

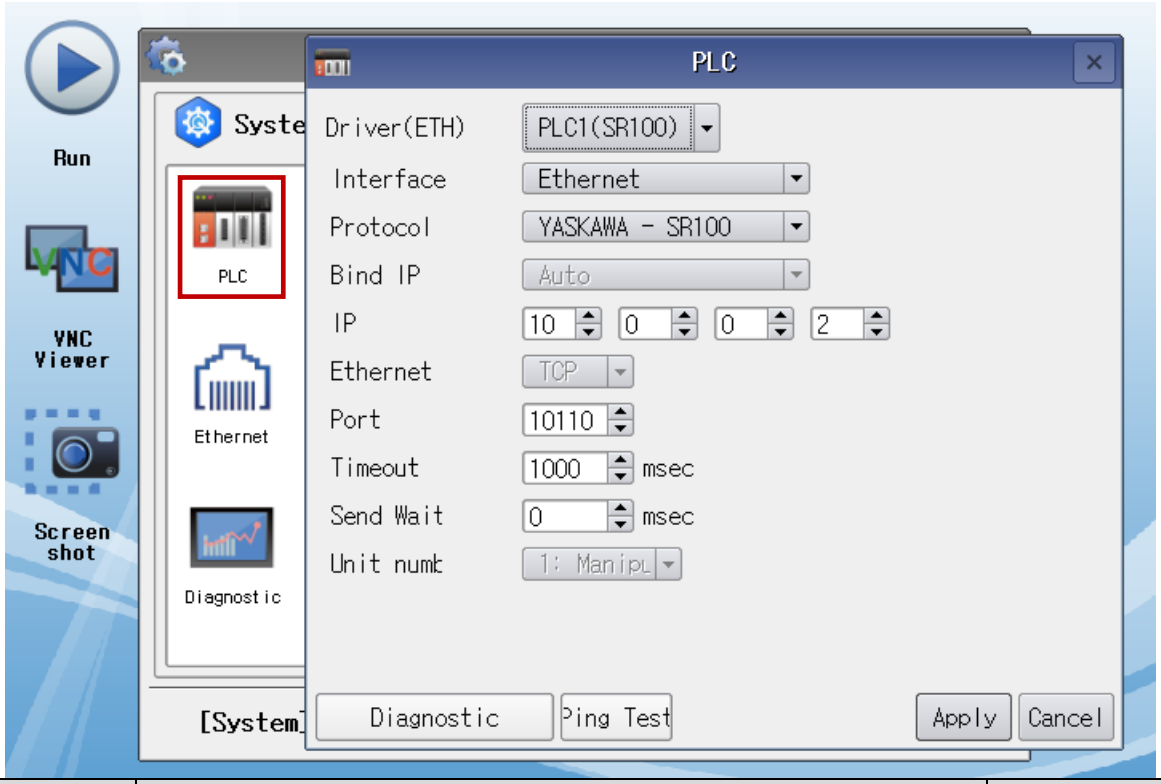
*Note 2) Do not use duplicate IP addresses over the same network.

* The above settings are examples recommended by the company.

Items	Description
IP Address	Set an IP address to be used by the TOP to use over the network.
Subnet Mask	Enter the subnet mask of the network.
Gateway	Enter the gateway of the network.

(2) Communication option setting

■ [Main Screen > Control Panel > PLC]



Items	Settings	Remarks
Interface	Select “Ethernet”.	Refer to “2. External device selection”.
Protocol	Select "SR100".	
IP	Enter the IP address of the external device.	
Ethernet Protocol	Select the Ethernet protocol between the TOP and an external device.	Fixed
Port	Enter the Ethernet communication port number of an external device.	Fixed
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	
SendWait (ms)	Set the waiting time between TOP’s receiving a response from an external device and sending the next command request.	
Unit number	1: Manipulator, 2: Set the Unit number which corresponds to Pre-aligner.	

3.3 Communication diagnostics

■ Check the interface setting status between the TOP and an external device.

- Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.
- Check if the ETH port settings you want to use in [Control Panel > Ethernet] are the same as those of the external device.

■ Diagnosis of whether the port communication is normal or not

- Touch "Communication diagnostics" in [Control Panel > PLC].
- The Diagnostics dialog box pops up on the screen and determines the diagnostic status.

OK	**Communication setting normal**
Time Out Error	**Communication setting abnormal** - Check the cable, TOP, and external device setting status. **(Reference: Communication diagnostics sheet)**

■ Communication diagnostics sheet

- If there is a problem with the communication connection with an external terminal, please check the settings in the sheet below.

Items	Contents		Check		Remarks
System configuration	How to connect the system		OK	NG	1. System configuration
	Connection cable name		OK	NG	
TOP	Version information		OK	NG	2. External device selection 3. Communication setting
	Port in use		OK	NG	
	Driver name		OK	NG	
	Other detailed settings		OK	NG	
	Relative prefix	Project setting	OK	NG	
		Communication diagnostics	OK	NG	
	Ethernet port setting	IP Address	OK	NG	
		Subnet Mask	OK	NG	
		Gateway	OK	NG	
External device	CPU name		OK	NG	4. External device setting
	Communication port name (module name)		OK	NG	
	Protocol (mode)		OK	NG	
	Setup Prefix		OK	NG	
	Other detailed settings		OK	NG	
	Ethernet port setting	IP Address	OK	NG	
		Subnet Mask	OK	NG	
		Gateway	OK	NG	
	Check address range		OK	NG	5. Supported addresses (For details, please refer to the PLC vendor's manual.)

4. Supported addresses

The devices available in TOP are as follows:

The device range (address) may differ depending on the CPU module series/type. The TOP series supports the maximum address range used by the external device series. Please refer to each CPU module user manual and be take caution to not deviate from the address range supported by the device you want to use.

Action Commands

Name	Function	M	P
INIT	Initializes specified unit Initializes specified unit. **• Error clear** **• Servo ON** **• Go to HOME position**	V	V
MTRS	Performs wafer transfer operation (Get operations/Put operations/Exchange operations) **Performs wafer transfer (Get/Put/Exchange) operations for the specified transfer station.**	V	
MPNT	Moves to the specified transfer point. **Moves to the specified transfer point through "MTRS" or "MCTR" command execution.**	V	
MCTR	Continued wafer transfer operation + Transfer operation. **Immediately after the "MTRS" or "MCTR" command, the specified wafer transfer operation continues,** **and once the operation is completed, the wafer transfer operation of the newly specified station is performed.**	V	
MTCH	Moves to the specified position (registered position/ready position). **Moves to the specified location on the specified transfer station.**	V	
MABS	Moves the specified axis to a specified coordinate position. Moves the specified axis to a specified coordinate position.	V	
MREL	Moves the specified axis to the specified relative position. Moves the specified axis to the specified relative position.	V	V
MMAP	Performs the wafer mapping. Performs the wafer mapping in the specified transfer station.	V	
MMCA	Performs the mapping calibration. **Performs the mapping operation for the specified cassette station.**	V	
MALN	Aligns the wafer on the pre-aligner. Aligns the wafer on the pre-aligner.		V
MACA	Performs alignment calibration. Performs alignment calibration for wafer alignment.		V

*** M: Manipulator , P: Pre-aligner**

Control Commands

Name	Function	M	P
CSTP	Applies deceleration/emergency stop to stop the motion. Applies deceleration/emergency stop to stop the motion of the device.	V	V
CRSM	Restarts the motion interrupted by deceleration stop. Restarts the motion interrupted by deceleration stop.	V	V
CSRV	Turns ON/OFF the servo power. **Turns ON/OFF the servo power of the specified unit.**	V	V
CCLR	Clears the current error or error history. Clears the current error or error history of the specified unit.	V	V
CSOL	Performs solenoid operation. **Commands the wafer hold/release signal for the solenoid of the specified unit.**	V	V

*** M: Manipulator , P: Pre-aligner**

Setting Commands

Name	Function	M	P
SSPD	Sets the motion speed. **Sets the motion speed. (furnace-wafer feed rate, wafer feed speed, low feed speed, homing speed, low range speed)**	V	V
SSLV	Selects the transfer speed level. **Set the speed level. (no wafer, intra-wafer transfer rate, low transfer rate,) homing speed, low range speed)**	V	V
SPOS	Registers the current position as the specified transfer station. Registers the current position of the specified unit as the specified transfer station.	V	
SABS	Registers the specified coordinate position as the specified transfer station. Registers the specified coordinate position as the specified transfer station in the specified unit.	V	
SAPS	Modifies the specified transfer station's registered position by the adjustment offset. Modifies the teaching position of the specified transfer station.	V	
SPDL	Deletes the specified transfer station's registered position. **Deletes the specified transfer station's registered position in the specified unit.**	V	
SPSV	Registers the position data in the volatile memory to the non-volatile memory. **Registers the position data in the volatile memory to the non-volatile memory.**	V	
SPLD	Reads the position data in the non-volatile memory into the volatile memory. **Reads the position data in the non-volatile memory into the volatile memory.**	V	
SSTR	Sets the station's information parameters. **Sets the transfer station information.**	V	
SPRM	Changes the parameter values. **Changes the value of the specified parameter in the specified unit.**	V	V
SMSK	Enables or disables the interlock monitoring function. **Enables or disables the interlock signal monitoring function.**	V	V
SSTD	Registers the current position as the manipulator coordinate's reference position. Registers the current position as the manipulator coordinate's reference position. **This command registers the position in non-volatile memory.**	V	
SSTN	Registers the specified number as a reference position. Specify the encoder value in the reference position and record the reference position. **This command registers the position in non-volatile memory.**	V	

*** M: Manipulator , P: Pre-aligner**

Reference Commands

Name	Function	M	P
RSPD	References the motion speed. **Indicates the motion speed settings of the axis in the specified unit. (non-wafer speed, wafer speed,** **low speed, homing speed, low range speed)** **This command indicates the default speed setting for volatile memory.**	V	V
RSLV	References the current transfer speed level. **Refer to speed level of the current set transfer speed. Set (No wafer speed, wafer speed, low speed, homing speed, low range speed).** **Selects the high speed profile when the controller power is cycled (default).**	V	V
RPOS	References the current position. **References the current position in the specified unit.**	V	
RSTP	References the registered position. **References the registered position in the specified unit.**	V	
RSTR	References the station information. **References the stations information.**	V	
RPRM	References the parameter value. **References the parameter value in the specified unit.**	V	V
RSTS	References the units' statuses. **References various statuses.**	V	V
RERR	References the error history. **References the error record of the specified device.**	V	V
RMSK	References the current interlock monitor settings. **References Interlock Monitoring information.**	V	V
RVER	References the software version. **References software version.**	V	V
RMAP	References the specified transfer station's mapping results. **References the specified transfer station's mapping results.**	V	
RMPD	References the mapping data (elevation axis coordinates during sensor edge startup/stopping). References the mapping data (elevation axis coordinates during sensor edge startup/stopping). **Executes the mapping for the specified transport station.**	V	
RMCA	References the mapping caliblation result. **References the mapping calibration result.**	V	
RALN	References the alignment result. **References the alignment result.**		V
RACA	References the calibration results for alignment. **References the calibration results for alignment.**		V
RCCD	References the pre-aligner's light amount and CCD data. **References the pre-aligner's light amount and CCD sensor value.**		V
RLOG	References the log data. **References the specified log data.**	V	V
RSTN	References the reference position record. **References the reference position.**	V	

*** M: Manipulator , P: Pre-aligner**

Status

	Value	Status	Meaning
Sts1 (SYS:1000)	Bit0	Manipulator Battery status	The battery voltage status of the specified absolute encoder 1: Low battery voltage, 0: Normal state
	Bit1	Unit status	The command execution status of a drive/control command of the specified unit 1: Ready, 0: Busy
	Bit2	Servo status	The servo status of the specified unit 1: Servo OFF, 0: Servo ON
	Bit3	Servo status	Error status of the specified unit 1: Error occurrence, 0: No error occurrence
Sts2 (SYS:1001)	Bit0	controller battery status	Low voltage of memory backup battery 1: Battery voltage dropped, 0: Normal status
	Bit1	Wafer presence Status 1	For a manipulator, shows whether there is a wafer on blade 1. For a pre-aligner, shows the wafer presence status from the vacuum sensor. (1: Has wafer, 0: No wafer)
	Bit2	Wafer presence Status 2	For a manipulator, shows whether there is a wafer on blade 2. For a pre-aligner, shows the wafer presence status from the CCD sensor. (1: Has wafer, 0: No wafer)
	Bit3	Reserve	

INIT (Unit initialization)

Initializes specified unit.

[Conditions]

• The specified unit is in ready status.

Address(SYS)	001002	001003	001004
Info	Error clear Yes/No (1 byte) • Error clear	Servo ON Yes/No (1 byte) • Servo ON	Axes that move to home position (1 byte) • Go to HOME position
Type	BIT	BIT	BIT
Value	Bit0 : No error clear. Bit1 : Error clear.	Bit0 : No Servo ON. Bit1 : Servo ON.	<Manipulator> Bit0 : All axes. Bit1 : Arm axes only. Bit2 : No axes move to home position. <Pre-aligner> Bit2 : Fixed value. (Vacuum type pre-aligners do not need to move to the home position)

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected)

Address(PLC)	INIT_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MTRS (Perform wafer transfer operation (Get/Put/Exchange operations))

Performs wafer transfer (Get/Put/Exchange) operations for the specified transfer station.

Each axis moves in the following order:

(1) Check that the wafer exists.

(2) Move the arm to the minimum sweep position through the safe path.

(3) Move to ready position with the specified adjustment offset.

(4) Perform the wafer transfer operation (Get/Put/Exchange) using the specified adjustment offset.

Refer to "(6) Create transfer point and Motion Pass" for the sequence of actions.

Note)

[Conditions]

• The specified unit is in ready status.

• The specified unit is in servo ON status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• The specified transfer station has been registered.

Performs wafer transfer (Get/Put/Exchange) operations for the specified transfer station.

Address(SYS)	001005	001006	001008
Info	Motion mode (1 byte)	Transfer station (3 bytes)	Slot number (2 bytes)
Type	BIT	ASCII	DEC(16Bit)
Value	• Bit0 : Get motion. • Bit1 : Put motion. • Bit2 : Exchange motion.	• "C01" - "C08" : Cassette stage. • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.	<Cassette stage> • "01" - "30" : When cassette stage specified. <Transfer stage, Pre-aligner stage> • "00" : Fixed slot(because this type of station does not have multiple slots.). Note) If value is less than 2 digits, fill the higher digit with '0' so that the field always has 2 digits. Note) If <Hand> is 'F'(Blade 1 + Blade 2), specifies the slot accessed by Blade 1.

Address(SYS)	001009	001010	001011
Info	Arm Posture (1 byte)	Blade (1 byte)	Transfer point (2 bytes)
Type	BIT	BIT	ASCII
Value	• Bit0 : Left elbow. • Bit1 : Right elbow. • Bit2 : Automatic (Automatically selected posture with the proper path).	• Bit0: Blade 1. • Bit1 : Blade 2. • Bit2 : Blade 1 + Blade 2 (WGet/WPut operation). Note) Except for <TrsPnt> is [C01-C08: Cassette stage], 'F'(Blade 1 + Blade 2) cannot be specified. Note) If <Mtn> is 'E'(Exchange motion), 'F'(Blade 1 + Blade 2) cannot be specified.	• "G1" - "G8", "Gb" : Get transfer point. • "P1" - "P8", "Pb" : Put transfer point. Note) If <Mtn> is 'G'(Get motion),"P1"-"P8","Pb"(Put transfer point) cannot be specified. Note) If <Mtn> is 'P'(Put motion), "G1"-"G8", "Gb"(Get transfer point) cannot be specified.

Address(SYS)	1200	1201 – 1206	1207 – 1208
Info	Use/Not Use	XYZ direction offset (None / 8 bytes each, Resolution: 0.001 [mm])	Positioning angle (None / 8 bytes, Resolution: 0.001 [deg])
Type	BIT	DEC(32Bit)	DEC(32Bit)
Value	• Bit0: XYZ direction adjustment offset omitted • Bit1 Positioning angle omitted • Bit2 : Nothing omitted	• OfstX : X direction offset. • OfstY : Y direction offset . • OfstZ : Z direction offset. Note) Specified in the range between "-0009999" and "00009999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) Ignored during Exchange operations. Note) For the XYZ direction adjustment offset, <OfstX>,<OfstY>,<OfstZ> can be omitted together.	Note) Relative angle from the position set by alignment calibration. Note) Specified in the range between "00000000" and "00359999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. Note) Only effective for a Put motion to the pre-aligner stage (Ignored otherwise). If omitted for a Put motion to the pre-aligner stage, the alignment operation will not be performed.

Address(PLC)	MTRS_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MPNT (Motion between Transfer Points)

Moves to the specified transfer point through "MTRS" or "MCTR" command execution.

[Conditions]

• The specified unit is in ready status.

• The specified unit is in servo ON status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• The action command immediately before this command has to be successfully completed "MTRS" command or "MCTR command"/"MPNT command".(The action command immediately before this command is executed is "MTRS" command or "MCTR command"/"MPNT command")

Address(SYS)	001012
Info	Transfer point (2 bytes)
Type	ASCII(2)
Value	• "G1" - "G8", "Gb" : Get transfer point. • "P1" - "P8", "Pb" : Put transfer point. • "AL" : Final point (For Get motion: G4, for Put/Exg motion: P4). • "ST" : Step operation (Move to next transfer point). Note) If <Mtn> is 'G'(Get motion), "P1"-"P8","Pb"(Put transfer point) cannot be specified. Note) If <Mtn> is 'P'(Put motion), "G1"-"G8","Gb"(Get transfer point) cannot be specified.

Address(PLC)	MPNT_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MCTR (Continued wafer transfer operation + Transfer operation)

Immediately after the "MTRS" or "MCTR" command, the specified wafer transfer operation continues, and once the operation is completed, the wafer transfer operation of the newly specified station is performed.

[Conditions]

• The specified unit is in ready status.

• The specified unit is in servo ON status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• The specified transfer station has been registered.

• The action command immediately before this command has to be a successfully completed "MTRS", "MCTR", or "MPNT" command. (The action command immediately before this command is executed should be "MTRS" which has been completed successfully. "MCTR" or "MPNT" command)

Address(SYS)	001013	001014	001016
Info	Motion mode (1 byte)	Transfer station (3 bytes)	Slot number (2 bytes)
Type	BIT	ASCII(3)	DEC(16Bit)
Value	• Bit0 : Get motion. • Bit1 : Put motion. • Bit2 : Exchange motion.	• "C01" - "C08" : Cassette stage. • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.	<Cassette stage> • "01" - "30" : When cassette stage specified. <Transfer stage, Pre-aligner stage> • "00" : Fixed slot(because this type of station does not have multiple slots.). Note) If value is less than 2 digits, fill the higher digit with '0' so that the field always has 2 digits. Note) If <Hand> is 'F'(Blade 1 + Blade 2), specifies the slot accessed by Blade 1.

Address(SYS)	001017	001018	001019
Info	Arm Posture (1 byte)	Blade (1 byte)	Transfer point (2 bytes)
Type	BIT	BIT	ASCII(3)
Value	• Bit0 : Left elbow. • Bit1 : Right elbow. • Bit2 : Automatic (Automatically selected posture with the proper path).	• Bit0 : Blade 1. • Bit1 : Blade 2. • Bit2 : Blade 1 + Blade 2 (WGet/WPut operation). Note) Except for <TrsPnt> is [C01-C08: Cassette stage], 'F'(Blade 1 + Blade 2) cannot be specified. Note) If <Mtn> is 'E'(Exchange motion), 'F'(Blade 1 + Blade 2) cannot be specified.	• "G1" - "G8", "Gb" : Get transfer point. • "P1" - "P8", "Pb" : Put transfer point. Note) If <Mtn> is 'G'(Get motion),"P1"-"P8","Pb"(Put transfer point) cannot be specified. Note) If <Mtn> is 'P'(Put motion), "G1"-"G8", "Gb"(Get transfer point) cannot be specified.

Address(SYS)	1209	1210 – 1215	1216 – 1217
Info	Use/Not Use	XYZ direction offset (None / 8 bytes each, Resolution: 0.001 [mm])	Positioning angle (None / 8 bytes, Resolution: 0.001 [deg])
Type	BIT	DEC(32Bit)	DEC(32Bit)
Value	• Bit0: XYZ direction adjustment offset omitted • Bit1 Positioning angle omitted • Bit2 : Nothing omitted	• OfstX : X direction offset. • OfstY : Y direction offset . • OfstZ : Z direction offset. Note) Specified in the range between "-0009999" and "00009999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) Ignored during Exchange operations. Note) For the XYZ direction adjustment offset, <OfstX>,<OfstY>,<OfstZ> can be omitted together.	Note) Relative angle from the position set by alignment calibration. Note) Specified in the range between "00000000" and "00359999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. Note) Only effective for a Put motion to the pre-aligner stage (Ignored otherwise). If omitted for a Put motion to the pre-aligner stage, the alignment operation will not be performed.

Address(PLC)	MCTR_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MTCH (Move to Registered Position)

Moves to the specified location on the specified transfer station.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).
- The specified transfer station has been registered.

Address(SYS)	001020	001022
Info	Transfer station (3 bytes)	Slot number (2 bytes)
Type	ASCII(3)	DEC(16Bit)
Value	• "C01" - "C08" : Cassette stage. • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.	<Cassette stage> • "01" - "30" : When cassette stage specified. <Transfer stage, Pre-aligner stage> • "00" : Fixed slot(because this type of station does not have multiple slots.). Note) If value is less than 2 digits, fill the higher digit with '0' so that the field always has 2 digits. Note) If <Hand> is 'F'(Blade 1 + Blade 2), specifies the slot accessed by Blade 1.

Address(SYS)	001023	001024
Info	Arm Posture (1 byte)	Blade (1 byte)
Type	BIT	BIT
Comment	• Bit0 : Left elbow. • Bit1 : Right elbow. • Bit2 : Automatic (Automatically selected posture with the proper path).	• Bit0 : Blade 1. • Bit1 : Blade 2. • Bit2 : Blade 1 + Blade 2 (WGet/WPut operation). Note) Except for <TrsPnt> is [C01-C08: Cassette stage], 'F'(Blade 1 + Blade 2) cannot be specified. Note) If <Mtn> is 'E'(Exchange motion), 'F'(Blade 1 + Blade 2) cannot be specified.

Address(SYS)	001025
Info	Position mode (1 byte)
Type	BIT
Comment	• Bit0 : Intermediate position (position with XYZ direction offset value applied). • Bit1 : Ready position (position with XYZ direction offset value applied). • 'Bit2 : Offset position (position with XYZ direction offset values applied). • 'Bit3 : Registered position. • 'Bit4 : Mapping start position. • 'Bit5 : Mapping finish position. Note) For mapping start/finish positions, slot number and blade specifications are ignored. Blades with mapping sensors equipped will operate. Note) The mapping start/finish position is shown in "Figure 6.3 Positions Related to Mapping Operation"

Address(SYS)	1218	1219 – 1225
Info	Use/Not Use	XYZ direction offset (None / 8 bytes each, Resolution: 0.001 [mm])
Type	BIT	DEC(32Bit)
Value	• Bit0: XYZ direction adjustment offset omitted	• OfstX : X direction offset. • OfstY : Y direction offset . • OfstZ : Z direction offset. Note) Specified in the range between "-0009999" and "00009999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) Ignored during Exchange operations. Note) For the XYZ direction adjustment offset, <OfstX>,<OfstY>,<OfstZ> can be omitted together.

Address(PLC)	MTCH_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MABS (Move to Specified Coordinate Position)

Moves the specified axis to a specified coordinate position.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to host mode (if T.P. is connected).

Address(SYS)	001026	001027
Info	Axis (1 byte)	Blade (1 byte)
Type	BIT	BIT
Comment	• Bit0 : Rotation axis. • Bit1 : Extension axis. • Bit2 : Wrist axis 1. • Bit3 : Wrist axis 2. • Bit4 : Elevation axis.	• '1' : Blade 1. • '2' : Blade 2. Note) If the <Axis> specification is "A: Extension axis", specify the access blade. If the <Axis> specification is not "A: Extension axis", specify '1'

Address(SYS)	001028	001029
Info	Passive blade operation mode (1 byte)	Value : Coordinate (8 bytes, Resolution: 0.001 [mm]/[deg])
Type	BIT	DEC(32Bit)
Comment	• Bit0 : Maintain passive blade posture. • Bit1 : Passive blade fixed to wafer center. Note) Valid if the <Axis> specification is "A: Extension axis". If the <Axis> specification is not "A: Extension axis", specify 'C'.	Note) Specified in the range between "-9999999" and "99999999". If value is less than 8 digits, fill the higher digit(s) with '0' so that the field always has 8 digits. A sign is added to the highest digit. Note) If the operation range is exceeded a stroke limit error will be notified.

Address(PLC)	MABS_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MREL (Moves to Specified Relative Position)

Moves the specified axis to the specified relative position.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001031	001032
Info	Axis (1 byte)	Blade (1 byte)
Type	BIT	BIT
Comment	• 'S' : Rotation axis. • 'A' : Extension axis. • 'H' : Wrist axis 1. • 'I' : Wrist axis 2. • 'Z' : Elevation axis.	• '1' : Blade 1. • '2' : Blade 2. Note) If the <Axis> specification is "A: Extension axis", specify the access blade. If the <Axis> specification is not "A: Extension axis", specify '1'

Address(SYS)	001033	001034
Info	Passive blade operation mode (1 byte)	Value : Coordinate (8 bytes, Resolution: 0.001 [mm]/[deg])
Type	BIT	DEC(32Bit)
Comment	• Bit0 : Maintain passive blade posture. • Bit1 : Passive blade fixed to wafer center. Note) Valid if the <Axis> specification is "A: Extension axis". If the <Axis> specification is not "A: Extension axis", specify 'C'.	Note) Specified in the range between "-9999999" and "99999999". If value is less than 8 digits, fill the higher digit(s) with '0' so that the field always has 8 digits. A sign is added to the highest digit. Note) If the operation range is exceeded a stroke limit error will be notified.

Address(PLC)	MREL_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

MMAP (Wafer Mapping)

Performs the wafer mapping in the specified transfer station.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).
- The specified transfer station has been registered.
- The specified transfer station's calibration operation for mapping has been performed.

Address(SYS)	001036	001038
Info	Transfer station (3 bytes)	Slot number (2 bytes)
Type	ASCII(3)	DEC(16Bit)
Value	• "C01" - "C08" : Cassette stage. • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.	<Cassette stage> • "01" - "30" : When cassette stage specified. <Transfer stage, Pre-aligner stage> • "00" : Fixed slot(because this type of station does not have multiple slots.). Note) If value is less than 2 digits, fill the higher digit with '0' so that the field always has 2 digits. Note) If <Hand> is 'F'(Blade 1 + Blade 2), specifies the slot accessed by Blade 1.

Address(SYS)	001039
Info	Specifies wafer protrusion detection operation yes/no (1 byte)
Type	BIT
Value	• Bit0 : No wafer protrusion detection operation. • Bit1 : Wafer protrusion detection operation performed.

Address(PLC)	MMAP_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

Address(SYS)	1320 – 1329
Info	Update values after command execution
Type	ASCII(2)
Value	Mapping result (2 bytes each) • "--" : No wafer detected. • "OK" : Wafer inserted correctly. • "CW" : Wafer inserted incorrectly (inclined). • "DW" : Wafer inserted incorrectly (duplicated). Note) Responds with the number of slots of the specified transfer station.

MMCA (Mapping Calibration)

Performs the mapping operation for the specified cassette station.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).
- The specified transfer station has been registered.
- The wafer needs to be inserted only in the lowest slot and the highest slots of cassette stage.

Address(SYS)	001040	001042
Info	Transfer station (3 bytes)	Specifies wafer protrusion detection operation yes/no (1 byte)
Type	ASCII(3)	Bit
Value	• "C01" - "C08" : Cassette stage.	• Bit0 : No wafer protrusion detection operation. • Bit1 : Wafer protrusion detection operation performed.

Address(PLC)	MMCA_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

Address(SYS)	1330 – 1340
Info	Update values after command execution
Type	DEC(32Bit)
Value	• Value1 : Lowest-slot position (8 bytes, Resolution: 0.001 [mm]) • Value2 : highest-slot position (8 bytes, Resolution: 0.001 [mm]) • Value3 : Wafer width (8 bytes, Resolution: 0.001 [mm]) • Value4 : The threshold value of double insertion (8 bytes, Resolution: 0.001 [mm]) • Value5 : The threshold value of slanting insertion1 (8 bytes, Resolution: 0.001 [mm]) • Value6 : The threshold value of slanting insertion2 (8 bytes, Resolution: 0.001 [mm])

MALN (Wafer alignment)

Aligns the wafer on the pre-aligner.

[Conditions]

• The specified unit is in ready status.

• The specified unit is in servo ON status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• In the case of edge grip pre-aligner, the action command immediately before this command has to be a successfully completed "MTRS" command.

Address(SYS)	001043	001044
Info	Motion mode (1 byte)	Positioning angle (None / 8 bytes each, Resolution: 0.001 [deg])
Type	BIT	DEC(32Bit)
Value	• Bit0 : Sampling operation + Correction operation. • Bit1 : Correction operation. • Bit2 : Sampling operation.	Note) Relative angle from the position set by alignment calibration as the reference point. Note) Specified in the range between "00000000" and "00359999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

Address(PLC)	MALN_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

Address(SYS)	1350 – 1368
Info	Update values after command execution
Type	DEC(32Bit)
Value	• Value1 : Wafer eccentric amount before alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value2 : Wafer eccentric angle direction before alignment operation (8 bytes, Resolution: 0.001 [deg]) • Value3 : Notch/Orientation Flat direction before alignment operation (8 bytes, Resolution: 0.001 [deg]) • Value4 : X direction offset amount before alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value5 : Y direction offset amount before alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value6 : Pre-aligner adjustment angle (8 bytes, Resolution: 0.001 [deg]) • Value7 : Manipulator adjustment amount (8 bytes, Resolution: 0.001 [mm]) • Value8 : Manipulator adjustment angle (8 bytes, Resolution: 0.001 [deg]) • Value9 : X direction offset amount after alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value10 : Y direction offset amount after alignment operation (8 bytes, Resolution: 0.001 [mm]) • If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

MACA (Alignment Calibration)

Performs alignment calibration for wafer alignment.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001046
Info	Motion mode (1 byte)
Type	BIT
Value	• Bit0 : Notch calibration. • Bit1 : Arm calibration.

Address(PLC)	MACA_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

Address(SYS)	1370 – 1374
Info	Update values after command execution
Type	DEC(32Bit)
Value	• Value1 : calibration angle (8 bytes, Resolution: 0.001 [deg]) • Value2 : Manipulator advance angle (8 bytes, Resolution: 0.001 [deg]) • Value3 : Distance between manipulator rotation center and pre-aligner rotation center distance (8 bytes, Resolution: 0.001 [mm])

CSTP (Deceleration/Emergency stop)

Applies deceleration/emergency stop to stop the motion of the device.

[Conditions]

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001047
Info	Stop mode (1 byte)
Type	BIT
Value	• Bit0 : Deceleration to a stop. • Bit1 : Emergency stop.

Address(PLC)	CSTP_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

CRSM (Resume the interrupted motion)

Restarts the motion interrupted by deceleration stop.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).
- The last command is "CSTP" command (deceleration stop).

Address(PLC)	CRSM_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

CSRV (Servo power command)

Turns ON/OFF the servo power of the specified unit.

[Conditions]

- The specified unit is in ready status.
- The specified unit is under servo ON state.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).
- The last command is "CSTP" command(deceleration stop).

Address(SYS)	001048
Info	Servo command (1 byte)
Type	BIT
Value	• Bit0 : Servo OFF. • Bit1 : Servo ON.

Address(PLC)	CSRV_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

CCLR (Clear the error)

Clears the current error or error history of the specified unit.

[Conditions]

< For an error clear >

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

< Clearing the error history >

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• No error is occurring.

Address(SYS)	001049
Info	Clear mode (1 byte)
Type	BIT
Value	• Bit0 : Clears the error status. • Bit1 : Clears the error history (in the volatile memory)..

Address(PLC)	CCLR_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

CSOL (Solenoid control command)

Commands the wafer hold/release signal for the solenoid of the specified unit.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001050	001051	001052
Info	Solenoid control specification (1 byte)	Solenoid command (1 byte)	Wait time (1 byte)
Type	BIT	BIT	BIT
Value	< Manipulator > • Bit0 : Blade 1. • Bit1 : Blade 2. • Bit2 : Blade 1 + Blade 2. < Pre-aligner > • Bit1 : Pre-aligner. •Bit2 : Edge-grip pre-aligner Lifter.	• Bit0 : Wafer release. • Bit1 : Wafer hold.	• Bit0 : No wait time. • Bit1 : With wait time.

Address(PLC)	CSOL_CMD
Info	Execute command after write operation

Message for the End-of-Execution

Address(SYS)	1300 – 1308
Info	Update values after command execution
Type	DEC(32Bit)
Value	Coordinate data Responds with the feedback position at the end of execution. (Resolution: 0.001 [deg] or 0.001 [mm]) • Specified in the range between "-9999999" and "99999999" • If value is less than 8 digits, fill the higher digit with '0' so that the field always has 8 digits. • Responds with the specified unit's axis count part.

Unit	Coordinate data	Axis	Unit
Manipulator	PosData1	Rotation axis	0.001 [deg]
	PosData2	Extension axis	0.001 [mm]
	PosData3	Wrist axis 1	0.001 [deg]
	PosData4	Wrist axis 2	0.001 [deg]
	PosData5	Elevation axis	0.001 [mm]
Pre-aligner	PosData1	Rotation axis (*1)	

(*1) If the specified unit is a pre-aligner, be sure to respond with "00000000".

SSPD (Set Motion Speed)

Sets the motion speed. (furnace-wafer feed rate, wafer feed speed, low feed speed, homing speed, low range speed)

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001053	001054
Info	Transfer speed level (1 byte)	Speed type (1 byte)
Type	BIT	BIT
Value	• Bit0 : Currently set speed level. • Bit1 : Speed level 1. • Bit2 : Speed level 2. • Bit3 : Speed level 3.	• Bit0 : No-wafer transfer speed. • Bit1 : With-wafer transfer speed. • Bit2 : Low speed. • Bit3 (Alphabet. Not zero.) : Home speed. • Bit4 : Speed in low-speed-area.

Address(SYS)	001055	001056
Info	Axis (1 byte)	Speed data (8 bytes)
Type	BIT	DEC(32Bit)
Value	< Manipulator > • Bit0 : Rotation axis. • Bit1 : Extension axis. • Bit2 : Wrist axis1. • Bit3 : Wrist axis2. • Bit4 : Elevation axis. • Bit5 : Linear access motion speed. • Bit6 : All axes (Setting method is % specification only). < Pre-aligner > • Bit0 : Rotation axis. • Bit6 : All axes (Setting method is % specification only).	Note) Specified in the range between "00000001" and "99999999". (Resolution: 0.001 [mm/sec], [deg/sec]) Note) Adding '%' before the first digit sets to the ratio of the specified speed's maximum speed. When specifying a percentage, specify in the range between "%0000001" and "%0001000". (Resolution: 0.1 [%]) Note) If value is less than 8 digits, fill the higher digit(s) with '0' so that the field always has 8 digits.

Address(PLC)	SSPD_CMD
Info	Execute command after write operation

SSLV (Transfer speed level setting)

Set the speed level. (no wafer, intra-wafer transfer rate, low transfer rate,) homing speed, low range speed)

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001058
Info	Transfer speed level (1 byte)
Type	BIT
Value	• Bit0 : Speed level 1. • Bit1 : Speed level 2. • Bit2 : Speed level 3.

Address(PLC)	SSLV_CMD
Info	Execute command after write operation

SPOS (Registration of Current Position)

Registers the current position of the specified unit as the specified transfer station.

[Conditions]

• The specified unit is in ready status.

The specified unit is in servo ON status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001059	001060	001061
Info	Memory specification (1 byte)	Registration mode (1 byte)	Transfer station (3 bytes)
Type	BIT	BIT	ASCII(3)
Comment	• Bit0 : Volatile memory. • Bit1 : Volatile memory and Non-volatile memory.	• Bit0 : Specified position registration. • Bit1 : Master registration.	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.

Address(SYS)	001063
Info	Slot number (2 bytes)
Type	DEC(16Bit)
Value	<Cassette stage> • "01" - "30" : If <TrsSt> is "C01"-"C08"(cassette stage), the slot specified. • "00" : If <TrsSt> is "C01"-"C08"(cassette stage), recognize the lowest-slot. If <TrsSt> is "H01"-"H08"(cassette stage), recognize the highest-slot. <Transfer stage, Pre-aligner stage> • "00" : Fixed value t(because this type of station does not have multiple slots.) Note) If value is less than 2 digits, fill the higher digit with '0' so that the field always has 2 digits. Note) If the slot number is specified, the lowest-slot position or the highest-slot position are calculated by the slot number and the slot pitch, and save it. Note) If the operation range is exceeded a stroke limit error will be notified.

Address(SYS)	001064	001065
Info	Arm Posture (1 byte)	Blade (1 byte)
Type	BIT	BIT
Value	• Bit0 : Left elbow. • Bit1 : Right elbow.	• Bit0 : Blade 1. • Bit1 : Blade 2.

Address(PLC)	SPOS_CMD
Info	Execute command after write operation

SABS (Registration of Coordinate Position)

Registers the specified coordinate position as the specified transfer station in the specified unit.

[Conditions]

• The specified unit is in ready status. • T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001066	001067
Info	Memory specification (1 byte)	Registration mode (1 byte)
Type	BIT	BIT
Value	• Bit0 : Volatile memory. • Bit1 : Volatile memory and Non-volatile memory.	• Bit0 : Specified position registration. • Bit1 : Master registration.

Address(SYS)	001068	001070	001071
Info	Transfer station (3 bytes)	Arm Posture (1 byte)	Blade (1 byte)
Type	ASCII(3)	BIT	BIT
Value	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.	• Bit0 : Left elbow. • Bit1 : Right elbow.	• Bit0 : Blade 1 • Bit1 : Blade 2

Address(SYS)	001072 - 001080
Info	Coordinate (8 bytes each, Resolution: 0.001 [mm]/[deg])
Type	DEC(32Bit)
Value	Note) Specified in the range between "-9999999" and "99999999". If the operation range is exceeded, a stroke limit error is notified. If value is less than 8 digits, fill the higher digit(s) with '0' so that the field always has 8 digits. A sign is added to the highest digit. Note) If the operation range is exceeded a stroke limit error will be notified. Note) The number of "ValueN" depends on the unit type. Set as many axis numbers as the specified unit has.

Address(PLC)	SABS_CMD
Info	Execute command after write operation

SAPS (Registered Position Adjustment)

Modifies the teaching position of the specified transfer station.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001082	001083
Info	Memory specification (1 byte)	Registration mode (1 byte)
Type	BIT	BIT
Value	• Bit0 : Volatile memory. • Bit1 : Volatile memory and Non-volatile memory.	• Bit0 : Specified position registration. • Bit1 : Master registration.

Address	001084	001086
Info	Transfer station (3 bytes)	Arm Posture (1 byte)
Type	ASCII(3)	BIT
Value	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.	• Bit0 : Left elbow. • Bit1 : Right elbow.

Address(SYS)	001087	001088 – 001090
Info	Blade (1 byte)	XYZ direction offset (8 bytes each, Resolution: 0.001 [mm])
Type	BIT	DEC(32Bit)
Value	• Bit0 : Blade 1 • Bit1 : Blade 2	• OfstX : X direction offset • OfstY : Y direction offset • OfstZ : Z direction offset Note) Specified in the range between "-0009999" and "00009999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) If the operation range is exceeded a stroke limit error will be notified.

Address(PLC)	SAPS_CMD
Info	Execute command after write operation

SPDL (Delete Registered Position)

Deletes the specified transfer station's registered position in the specified unit.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001091	001092
Info	Memory specification (1 byte)	Transfer station (3 bytes)
Type	BIT	ASCII(3)
Value	• Bit0 : Only volatile memory deleted. • Bit1 : Delete volatile memory and non-volatile memory.	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage. • "FFF" : All transfer stations.

Address(SYS)	001094	001095
Info	Arm Posture (1 byte)	Blade (1 byte)
Type	BIT	BIT
Value	• Bit0 : Left elbow. • Bit1 : Right elbow. • Bit2 : Both elbow postures (Left elbow, Right elbow).	• Bit0 : Blade 1. • Bit1 : Blade 2. • Bit2 : Both end-effectors (Blade 1, Blade 2).

Address(PLC)	SPDL_CMD
Info	Execute command after write operation

SPSV (Registers the position data in the volatile memory to the non-volatile memory.)

Registers the position data in the volatile memory to the non-volatile memory.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001096	001098
Info	Transfer station (3 bytes)	Arm Posture (1 byte)
Type	ASCII(3)	BIT
Value	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage. • "FFF" : All transfer stations.	• Bit0 : Left elbow. • Bit1 : Right elbow. • Bit2 : Both elbow posture (Left elbow, Right elbow).

Address(SYS)	001099
Info	Blade (1 byte)
Type	BIT
Value	• Bit0 : Blade 1. • Bit1 : Blade 2. • Bit2 : Both end-effector (Blade 1, Blade 2).

Address(PLC)	SPSV_CMD
Info	Execute command after write operation

SPLD (Reads the position data in the non-volatile memory into the volatile memory.)

Reads the position data in the non-volatile memory into the volatile memory.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001100	001102
Info	Transfer station (3 bytes)	Arm Posture (1 byte)
Type	ASCII(3)	BIT
Value	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage. • "FFF" : All transfer stations.	• Bit0 : Left elbow. • Bit1 : Right elbow. • Bit2 : Both elbow posture (Left elbow, Right elbow).

Address(SYS)	001103
Info	Blade (1 byte)
Type	BIT
Value	• Bit0 : Blade 1. • Bit1 : Blade 2. • Bit2 : Both end-effector (Blade 1, Blade 2).

Address(PLC)	SPLD_CMD
Info	Execute command after write operation

SSTR (Set Transfer Station Information)

Sets the transfer station information.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001104	00105
Info	Memory specification (1 byte)	Transfer station (3 bytes)
Type	BIT	ASCII(3)
Value	• Bit0 : Volatile memory. • Bit1 : Volatile memory and Non-volatile memory.	• "C01" - "C08" : Cassette stage. • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.

Address(SYS)	001107	001108
Info	Transfer station information- Item(2 bytes)	Parameter value (8 bytes)
Type	DEC(16bit)	DEC(32Bit)
Value	•See the supplementary explanation. Note) If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit.	

Item	Contents	Unit	Parameter value
"00"	Downward offset	0.001 [mm]	"-9999999" - "99999999"
"01"	Upward offset	0.001 [mm]	"-9999999" - "99999999"
"02"	Grip position offset	0.001 [mm]	"-9999999" - "99999999"
"06"	G2/P3 Offset in the extending direction	0.001 [mm]	"-9999999" - "99999999"
"08"	Put downward offset	0.001 [mm]	"-9999999" - "99999999"
"30"	Get operation Move_grip function yes/no	[-]	"00000000" ~ "00000001"
"31"	Get operation rising pattern	[-]	"00000000" ~ "00000001"
"40"	Put operation Move_grip function yes/no	[-]	"00000000" ~ "00000001"
"41"	Put operation dropping pattern	[-]	"00000000" ~ "00000001"

Address(PLC)	SSTR_CMD
Info	Execute command after write operation

SPRM (Setting of parameter)

Changes the value of the specified parameter in the specified unit.

[Conditions]

- The specified unit is in ready status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).
- The specified unit is in servo OFF status.

Address(SYS)	001110	001112
Info	Parameter type (3 bytes)	Parameter number (4 bytes)
Type	ASCII(3)	DEC(16Bit)
Value	• "CRU" : Common real number parameter. • "CIU" : Common integer parameter. • "URU" : Unit real number parameter. • "UIU" : Unit integer parameter.	Note) Specified in the range between "0000" and "9999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

Address(SYS)	001113
Info	Parameter value (12 bytes, Resolution: 0.0001)
Type	DEC(32Bit)
Value	Note) Specified in the range between "-02147483648" and "002147483647". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit.

Address(PLC)	SPRM_CMD
Info	Execute command after write operation

SMSK (Enable/Disable the Interlock monitoring)

Enables or disables the interlock signal monitoring function.

[Conditions]

• The specified unit is in ready status.

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001115
Info	Interlock information (4 bytes)
Type	BIT
Value	See the supplementary explanation.

< Manipulator >

	Bit #	Contents	Setting
Valid1	Bit0	Wafer presence/absence check on Blade 1	0: Enabled, 1: Disabled
	Bit1	Wafer presence/absence check on Blade 2	
	Bit2	Reserved	
	Bit3	Reserved	
Valid2	Bit4	Pre-aligner operation interlock.	
	Bit5	Pre-aligner wafer status interlock.	
	Bit6	Pre-aligner wafer status interlock. Wafer status checked by CCD sensor.	
	Bit7	Reserved	
Valid3	Bit8	Reserved	
	Bit9	Reserved	
	Bit10	Reserved	
	Bit11	Reserved	
Valid4	Bit12	Reserved	
	Bit13	Reserved	
	Bit14	Reserved	
	Bit15	Reserved	

< Pre-aligner >

	Bit #	Contents	Setting
Valid1	Bit0	Wafer presence/absence check.	0: Enabled, 1: Disabled
	Bit1	Reserved.	
	Bit2	Reserved.	
	Bit3	Reserved.	
Valid2	Bit4	Reserved.	
	Bit5	Reserved.	
	Bit6	Reserved.	
	Bit7	Reserved.	
Valid3	Bit8	Reserved.	
	Bit9	Reserved.	
	Bit10	Reserved.	
	Bit11	Reserved.	
Valid4	Bit12	Manipulator operation interlock. Check if the manipulator is accessing pre-aligner.	
	Bit13	Reserved.	
	Bit14	Reserved.	
	Bit15	Reserved.	

Address(PLC)	SMSK_CMD
Info	Execute command after write operation

SSTD (Reference position record command)

Registers the current position as the manipulator coordinate's reference position.

This command registers the position in non-volatile memory.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode

(if T.P. is connected).

Address(SYS)	001116
Info	Axis (1 byte)
Type	BIT
Value	• Bit0 : Arm section only. • Bit1 : Elevation axis. • Bit2 : All axes

Address(PLC)	SSTD_CMD
Info	Execute command after write operation

SSTN (Reference position record command (for inputting numerical values))

Specify the encoder value in the reference position and record the reference position.

This command registers the position in non-volatile memory.

[Conditions]

- The specified unit is in ready status.
- The specified unit is in servo ON status.
- T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

Address(SYS)	001117 – 0011125
Info	Reference position of the encoder value (12 bytes each)
Type	DEC(32Bit)
Value	• Value1 : Arm1. • Value2 : Arm 2. • Value3 : Wrist axis 1. • Value4 : Wrist axis 2. • Value5 : Elevation axis. Note) Specified in the range between "-02147483648" and "002147483647". If value is less than 12 digits, fill the higher digit(s) with '0' so that the field always has 12 digits. A sign is added to the highest digit. Note) The number of "ValueN" depends on the unit type. Set as many axis numbers as the specified unit has.

Address(PLC)	SSTN_CMD
Info	Execute command after write operation

RSPD (Motion speed reference)

Indicates the motion speed settings of the axis in the specified unit. (non-wafer speed, wafer speed, low speed, homing speed, low range speed)

This command indicates the default speed setting for volatile memory.

[Conditions]

• T.P.'s mode selector switch is set to Host mode.
(if T.P. is connected).

Address(SYS)	001127	001128
Info	Transfer speed level (1 byte)	Speed type (1 byte)
Type	BIT	BIT
Value	• Bit0 : Currently set speed level. • Bit1 : Speed level 1. • Bit2 : Speed level 2. • Bit3 : Speed level 3.	• Bit0 : No-wafer speed. • Bit1 : With-wafer speed. • Bit2 : Low speed. • Bit3 : (Alphabet. Not zero.): home return speed. • Bit4 : Speed in low-speed-area.

Address(SYS)	001129
Info	Axis (1 byte)
Type	BIT
Value	< Manipulator > • Bit0 : Rotation axis. • Bit1 : Extension axis. • Bit2 : Wrist axis 1. • Bit3: Wrist axis 2. • Bit4 : Elevation axis. • Bit5 : Linear access motion speed. < Pre-aligner > • Bit0 : Rotation axis.

Address(SYS)	RSPD_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

Address(SYS)	RSPD0	RDPD1
Info	Speed data (8 bytes)	Maximum speed data of the specified speed type(8 bytes)
Type	DEC(32Bit)	DEC(32Bit)
Value	Note) Specified in the range between "00000001" and "99999999" (Resolution: 0.001 [mm/sec], [deg/sec]). If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.	Note) Specified in the range between "00000001" and "99999999" (Resolution: 0.001 [mm/sec], [deg/sec]). If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

RSLV (Transfer Speed Level Reference)

Refer to speed level of the current set transfer speed. Set (No wafer speed, wafer speed, low speed, homing speed, low range speed).

Selects the high speed profile when the controller power is cycled (default).

[Conditions]

None.

Address(PLC)	RSLV0
Info	Transfer speed level (1 byte)
Type	DEC(16Bit)
Value	• '1' : Speed level 1. • '2' : Speed level 2. • '3' : Speed level 3.

RPOS (Reference Current Position)

References the current position in the specified unit.

[Conditions]

The specified unit is in servo ON status.

Address(SYS)	001130
Info	Position data type (1 byte)
Type	BIT
Value	• Bit0 : Command position. • Bit1 : Feedback position.

Address(PLC)	RPOS0 – RPOS4
Info	Coordinate (8 bytes each, Resolution: 0.001 [mm]/[deg])
Type	DEC(32Bit)
Value	Note) Specified in the range between "-9999999" and "99999999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) Response for all axes of specified unit.

Address(SYS)	RPOS_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RSTP (Reference Registered Position)

References the registered position in the specified unit.

[Conditions]

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• The specified transfer station has been registered.

Address(SYS)	001131	001132
Info	Memory specification (1 byte)	Transfer station (3 bytes)
Type	BIT	ASCII(3)
Value	• Bit0 : Volatile memory. • Bit1 : Non-volatile memory.	• "C01" - "C08" : Cassette stage (the lowest-layer position). • "H01" - "H08" : Cassette stage (the highest-layer position). • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.

Address(SYS)	001134	001135
Info	Slot number (2 bytes)	Arm Posture (1 byte)
Type	DEC(16Bit)	BIT
Value	<Cassette stage> • "01" - "30" : If <TrsSt> is "C01"-"C08"(cassette stage), set the slot. • "00" : If <TrsSt> is "H01"-"H08"(cassette stage), recognize the highest-layer position. <Transfer stage, Pre-aligner stage> • "00" : Fixed value t(because this type of station does not have multiple slots.) Note) If value is less than 2 digits, fill the higher digit with '0' so that the field always has 2 digits.	• Bit0 : Left elbow. • 'Bit1 : Right elbow.

Address(SYS)	001136	001137
Info	Blade (1 byte)	Position type (1 byte)
Type	BIT	BIT
Value	• Bit0 : Blade 1. • Bit1 : Blade 2.	• Bit0 : Registered position. • Bit1 : Ready position. • Bit2 : Intermediate position. • Bit3 : Mapping start position. • 'Bit4: Mapping finish position. Note) For a mapping start/finish position, slot number and blade number specifications are ignored. Note) If <Mem> is N(Non-volatile memory), specified 'S'

Address(PLC)	RSTP0 – RSTP4
Info	Coordinate (8 bytes each, Resolution: 0.001 [mm]/[deg])
Type	DEC(32Bit)
Value	Note) Specified in the range between "-9999999" and "99999999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) Response for all axes of the specified unit

Address(SYS)	RSTP_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RSTR (Reference Transfer station information)

References the stations information.

[Conditions]

None.

Address(SYS)	001138	001139
Info	Memory specification (1 byte)	Transfer station (3 bytes)
Type	BIT	ASCII(3)
Value	• Bit0 : Volatile memory. • Bit1 : Non-volatile memory.	• "C01" - "C08" : Cassette stage. • "S01" - "S12" : Transfer stage. • "P01" : P/A stage.

Address(SYS)	001141
Info	Transfer station information - Item (2 bytes)
Type	DEC(16Bit)
Value	• See the supplementary explanation.

Item	Contents
"00"	Downward offset
"01"	Upward offset
"02"	Grip position offset
"06"	G2/P3 Offset in the extending direction
"08"	Put downward offset
"30"	Get operation Move_grip function yes/no
"31"	Get operation rising pattern
"40"	Put operation Move_grip function yes/no
"41"	Put operation dropping pattern
"10"	Slot numbers
"30"	Slot pitch(Left elbow, Blade1)
"31"	Slot pitch(Left elbow, Blade2)
"32"	Slot pitch(Right elbow, Blade1)
"33"	Slot pitch(Right elbow, Blade2)

Address (PLC)	RSTR
Info	Parameter value (8 bytes)
Type	DEC(32Bit)
Value	

Item	Contents	Unit	Setting Range
"00"	Downward offset	0.001 [mm]	"-9999999" - "99999999"
"01"	Upward offset	0.001 [mm]	"-9999999" - "99999999"
"02"	Grip position offset	0.001 [mm]	"-9999999" - "99999999"
"06"	G2/P3 Offset in the extending direction	0.001 [mm]	"-9999999" - "99999999"
"08"	Put downward offset	0.001 [mm]	"-9999999" - "99999999"
"30"	Get operation Move_grip function yes/no	[-]	"00000000"□"00000001"
"31"	Get operation rising pattern	[-]	"00000000"□"00000001"
"40"	Put operation Move_grip function yes/no	[-]	"00000000"□"00000001"
"41"	Put operation dropping pattern	[-]	"00000000"□"00000001"
"10"	Slot numbers	[-]	"00000001"□"00000030"
"30"	Slot pitch(Left elbow, Blade1)	0.001[mm]	"-9999999"□"99999999"
"31"	Slot pitch(Left elbow, Blade2)	0.001[mm]	"-9999999"□"99999999"
"32"	Slot pitch(Right elbow, Blade1)	0.001[mm]	"-9999999"□"99999999"
"33"	Slot pitch(Right elbow, Blade2)	0.001[mm]	"-9999999"□"99999999"

Note) If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.
A sign is added to the highest digit.

Address(SYS)	RSTR_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RPRM (Reference Parameter)

References the parameter value in the specified unit.

[Conditions]

None.

Address(SYS)	001142	001144
Info	Parameter type (3 bytes)	Parameter number (4 bytes)
Type	ASCII(3)	DEC(16Bit)
Value	• "CRU" : Common real number parameter. • "CIU" : Common integer parameter. • "URU" : Unit real number parameter. • "UIU" : Unit integer parameter.	Note) Specified in the range between "0000" and "9999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

Address(PLC)	RPRM
Info	Parameter value (12 bytes, Resolution: 0.0001)
Type	DEC(32Bit)
Value	Note) The range is between "-02147483648" and "002147483647". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit.

Address(SYS)	RPRM_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RSTS (Reference Status)

References various statuses.

[Conditions]

None.

Address(PLC)	RSTS0
Info	Status information (4 bytes)
Type	BIT
Value	• Refer to the supplementary explanation.

< Manipulator >

	Bit #	Contents		
Status1	Bit0	Wafer presence status on Blade 1	No Wafer	Wafer present
	Bit1	Wafer presence status on Blade 2		
	Bit2	Blade 1 solenoid chucking command status	Wafer grip	Wafer release
	Bit3	Blade 2 solenoid chucking command status		
Status2	Bit4	Interlock 1 signal status (Optional)	Operation prohibited	Operation permitted
	Bit5	Interlock 2 signal status (Optional)		
	Bit6	Interlock 3 signal status (Optional)		
	Bit7	Interlock 4 signal status (Optional)		
Status3	Bit8	Interlock 5 signal status (Optional)		
	Bit9	Interlock 6 signal status (Optional)		
	Bit10	Interlock 7 signal status (Optional)		
	Bit11	Interlock 8 signal status (Optional)		
Status4	Bit12	Reserved	-	-
	Bit13	Reserved		
	Bit14	Reserved		
	Bit15	Reserved		

< Pre-aligner >

	Bit #	Contents		
Status1	Bit0	Vacuum status	No wafer	Wafer present
	Bit1	Wafer presence status (CCD sensor)		
	Bit2	Solenoid chucking command status	Wafer hold	Wafer release
	Bit3	Reserved		
Status2	Bit4	Reserved	-	-
	Bit5	Reserved		
	Bit6	Reserved		
	Bit7	Reserved		
Status3	Bit8	Reserved		
	Bit9	Reserved		
	Bit10	Reserved		
	Bit11	Reserved		
Status4	Bit12	Reserved		
	Bit13	Reserved		
	Bit14	Reserved		
	Bit15	Reserved		

RERR (Reference Error History)

References the error record of the specified device.

[Conditions]

None.

Address(SYS)	001145	001146
Info	Memory (1 byte)	Error history number (3 bytes)
Type	BIT	HEX(16Bit)
Value	• Bit0 : Volatile memory. • Bit1 : Non-volatile memory.	• "FFF" : Notify all error history (latest 32 records notified). • "000" - "127" : Notifies the details of the specified error history number ("000" is the latest error code).

Notify all error history

Address(PLC)	RERR00 – RERR31
Info	Notify all error history-Error code (4 bytes)
Type	DEC(16Bit)
Value	Note) The smaller the value of N, the newer the error code. If no errors have occurred, "0000" is responded.

Notify specified error history number details

Address(PLC)	RERR00 – RERR08
Info	Notify specified error history number details - Error code (4 bytes), Servo error code (3 bytes), Sub-error code (5 bytes), Time occurred (12 bytes)
Type	DEC(16Bit)
Value	Error code (4 bytes) • If no errors have occurred, "0000" is responded. Servo error code (3 bytes) • If no errors have occurred, "0000" is responded. Sub-error code (5 bytes) • If no errors have occurred, "0000" is responded. Time occurred (12 bytes) Note) "Year/Month/Day/Hour/Minute/Second" format responded (2 bytes each). If no errors have occurred, "000000000000" is responded.

Address(SYS)	RERR_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RMSK (Reference Interlock Monitoring Enable/Disable Information)

References Interlock Monitoring information.

[Conditions]

None.

Address(PLC)	RMSK0
Info	Interlock information (4 bytes)
Type	DEC(16Bit)
Value	• See the supplementary explanation.

< Manipulator >

	Bit #	Contents	Setting
Valid1	Bit0	Wafer presence/absence check on Blade 1	0: Enabled, 1: Disabled
	Bit1	Wafer presence/absence check on Blade 2	
	Bit2	Reserved	
	Bit3	Reserved	
Valid2	Bit4	Pre-aligner operation interlock.	
	Bit5	Pre-aligner wafer status interlock.	
	Bit6	Pre-aligner wafer status interlock. Wafer status checked by CCD sensor.	
	Bit7	Reserved	
Valid3	Bit8	Reserved	
	Bit9	Reserved	
	Bit10	Reserved	
	Bit11	Reserved	
Valid4	Bit12	Reserved	
	Bit13	Reserved	
	Bit14	Reserved	
	Bit15	Reserved	

< Pre-aligner >

	Bit #	Contents	Setting
Valid1	Bit0	Wafer presence/absence check.	0: Enabled, 1: Disabled
	Bit1	Reserved.	
	Bit2	Reserved.	
	Bit3	Reserved.	
Valid2	Bit4	Reserved.	
	Bit5	Reserved.	
	Bit6	Reserved.	
	Bit7	Reserved.	
Valid3	Bit8	Reserved.	
	Bit9	Reserved.	
	Bit10	Reserved.	
	Bit11	Reserved.	
Valid4	Bit12	Manipulator operation interlock. Check if the manipulator is accessing pre-aligner.	
	Bit13	Reserved.	
	Bit14	Reserved.	
	Bit15	Reserved.	

RVER (Reference Software Version)

References software version.

[Conditions]

None.

Address(PLC)	RVER0	RVER1
Info	System software version (8 bytes)	Servo software version(8 bytes)
Type	DEC(32Bit)	DEC(32Bit)
Value		

RMAP (Reference Mapping Result)

References the specified transfer station's mapping results.

[Conditions]

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• The mapping operation has completed normally.

Address(PLC)	RMAP0 – RMAPN
Info	Mapping result (2 bytes each)
Type	ASCII(2)
Value	• "--" : No wafer detected. • "OK" : Wafer inserted correctly. • "CW" : Wafer inserted incorrectly (inclined). • "DW" : Wafer inserted incorrectly (duplicated). Note) Responds with the number of slots of the specified transfer station.

Address(SYS)	RMAP_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RMPD (Reference Mapping Data)

(Elevation axis coordinates during sensor edge startup/stopping).

Executes the mapping for the specified transport station.

[Conditions]

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• Mapping operations have completed normally.

Address(PLC)	RMPD_UP00 – RMPD_UP30
Info	Sensor edge startup elevation axis coordinates (8 bytes, Resolution: 0.001 [mm])
Type	DEC(32Bit)
Value	Note) The range is between "-9999999" and "99999999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

Address(PLC)	RMPD_DN00 – RMPD_DN30
Info	Sensor edge stopping elevation axis coordinates (8 bytes, Resolution: 0.001[mm])
Type	DEC(32Bit)
Value	Note) The range is between "-9999999" and "99999999". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. Note) Updata and Dndata always responds with 30 sets of data. Data is responded as it is detected, and if 30 sets are not detected, "00000000" is responded. The slot no. and the data no. may not match.

Address(SYS)	RMPD_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RMCA (Reference Calibration Result for Mapping)

References the mapping calibration result.

[Conditions]

• Calibration operation for mapping has completed normally.

Address(PLC)	RMCA0 – RMCA5
Info	Reference Calibration Result for Mapping
Type	DEC(32Bit)
Value	• Value1 : Lowest-layer slot position (8 bytes, Resolution: 0.001 [mm]) • Value2 : Highest-layer slot position (8 bytes, Resolution: 0.001 [mm]) • Value3 : Wafer width (8 bytes, Resolution: 0.001 [mm]) • Value4 : The threshold value of double insertion (8 bytes, Resolution: 0.001 [mm]) • Value5 : The threshold value of slanting insertion1 (8 bytes, Resolution: 0.001 [mm]) • Value6 : The threshold value of slanting insertion2 (8 bytes, Resolution: 0.001 [mm]) Note) The range is between "-9999999" and "99999999". If value is less than 8 digits, fill the higher digit(s) with '0' so that the field always has 8 digits.

Address(SYS)	RMCA_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RALN (Reference Alignment Result)

References the alignment result.

[Conditions]

• T.P.'s mode selector switch is set to Host mode (if T.P. is connected).

• Alignment has been completed normally.

Address(PLC)	RALN0 – RALN9
Info	Reference Alignment Result
Type	DEC(32Bit)
Value	• Value1 : Wafer eccentricity before alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value2 : Wafer eccentricity direction before alignment operation (8 bytes, Resolution: 0.001 [deg]) • Value3 : Notch/Orientation Flat direction before alignment operation (8 bytes, Resolution: 0.001 [deg]) • Value4 : X direction offset amount before alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value5 : Y direction offset amount before alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value6 : Pre-aligner adjustment angle (8 bytes, Resolution: 0.001 [deg]) • Value7 : Manipulator adjustment amount (8 bytes, Resolution: 0.001 [mm]) • Value8 : Manipulator adjustment angle (8 bytes, Resolution: 0.001 [deg]) • Value9 : X direction offset amount after alignment operation (8 bytes, Resolution: 0.001 [mm]) • Value10 : Y direction offset amount after alignment operation (8 bytes, Resolution: 0.001 [mm]) • Refer to the Supplementary Explanation Note) If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

RACA (Reference Calibration Result for Alignment)

References the calibration results for alignment.

[Conditions]

Calibration for alignment has finished normally.

Address(PLC)	RACA0 – RACA2
Info	Reference Calibration Result for Alignment
Type	DEC(32Bit)
Value	• Value1 : Calibration angle (8 bytes, Resolution: 0.001 [deg]) • Value2 : Manipulator advance angle (8 bytes, Resolution: 0.001 [deg]) • Value3 : Manipulator swivel center to pre-aligner swivel center distance (8 bytes, Resolution: 0.001 [mm]) Note) If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits.

RCCD (Reference Light Amount and CCD Sensor Values)

References the pre-aligner's light amount and CCD sensor value.

[Conditions]

None.

Address(PLC)	RCCD0	RCCD1
Info	Light amount value (5 bytes)	CCD sensor value (5 bytes)
Type	DEC(32Bit)	DEC(32Bit)
Value	Note) Specified in the range between “00000” and “99999”. If a value is less than the specified digits, fill the higher digit(s) with ‘0’ so that the field always has specified digits.	Note) Specified in the range between “00000” and “99999”. If a value is less than the specified digits, fill the higher digit(s) with ‘0’ so that the field always has specified digits.

RLOG (Reference Log Information)

References the specified log data.

[Conditions]

None

Address(PLC)	RLOG0
Info	Log data (Variable byte)
Type	DEC(32Bit)
Value	• Refer to the supplementary explanation.

Log Number (LogNo)	Contents	Log Data (LogDat)
"00"	Power On times (6 bytes) (Accumulated no. of times)	• Specified in the range between "000000" and "999999".
"01"	Servo On times (6 bytes) (Accumulated no. of times)	• Specified in the range between "000000" and "999999".
"02"	Brake times (6 bytes) (Accumulated no. of times)	• Specified in the range between "000000" and "999999".

Address(SYS)	RLOG_SET
Info	Read after parameter setting
Type	BIT
Value	• Bit0 = ON(READ) • Bit0 = OFF(STOP)

RSTN (Reference the Reference Position)

References the reference position.

[Conditions]

None

Address(PLC)	RSTN0 – RSTN5
Info	Reference position of the encoder value (12 bytes each)
Type	DEC(32Bit)
Value	• Value1 : Arm 1. • Value2 : Arm 2. • Value3 : Wrist axis 1. • Value4 : Wrist axis 2. • Value5 : Elevation axis. Note) Specified in the range between "-02147483648" and "002147483647". If a value is less than the specified digits, fill the higher digit(s) with '0' so that the field always has specified digits. A sign is added to the highest digit. Note) The number of "ValueN" depends on the unit type. Set as many axis numbers as the specified unit has.