DONGDO TECH.
E.Micrometer
ML Series

CONTENTS

We want to thank our customers who use the Touch Operation Panel.

1. System configuration

The system configuration of TOP and "DONGDO TECH – ML Series" is as follows.

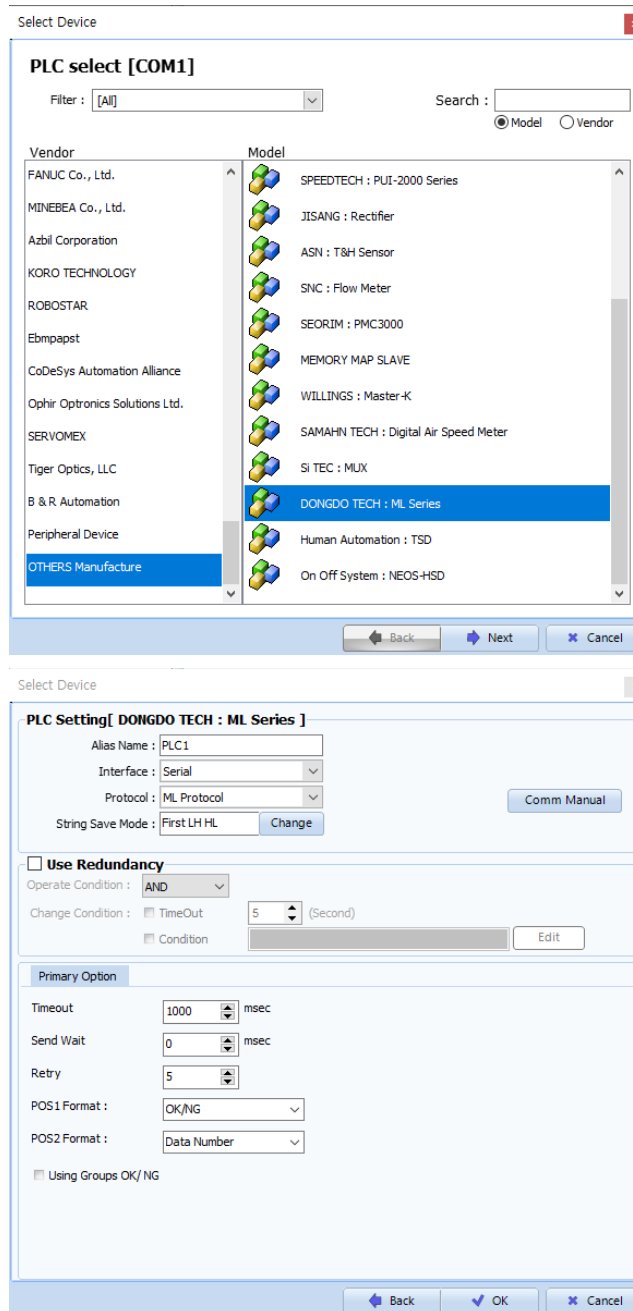| Series	Link I/F	Communication method	System setting	Cable
ML Series	Serial Port	RS-232C	3. TOP communication setting 4. External device setting	5. Cable table

■ **Connection configuration**

・1:1 (one TOP and one external device) connection – configuration which is possible in RS232C communication.

2. External device selection

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

Settings		Contents
TOP	Model	Check the display and process of TOP to select the touch model.
External device	Vendor	Select the vendor of the external device to be connected to TOP. Select "OTHERS Manufacture".
	PLC	Select an external device to connect to TOP.

| Model	Interface	Protocol
DONGDO TECH : ML Series	Serial	ML Protocol

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 properties > TOP settings] → [Project option > Check "Use HMI settings" > Edit > Serial]

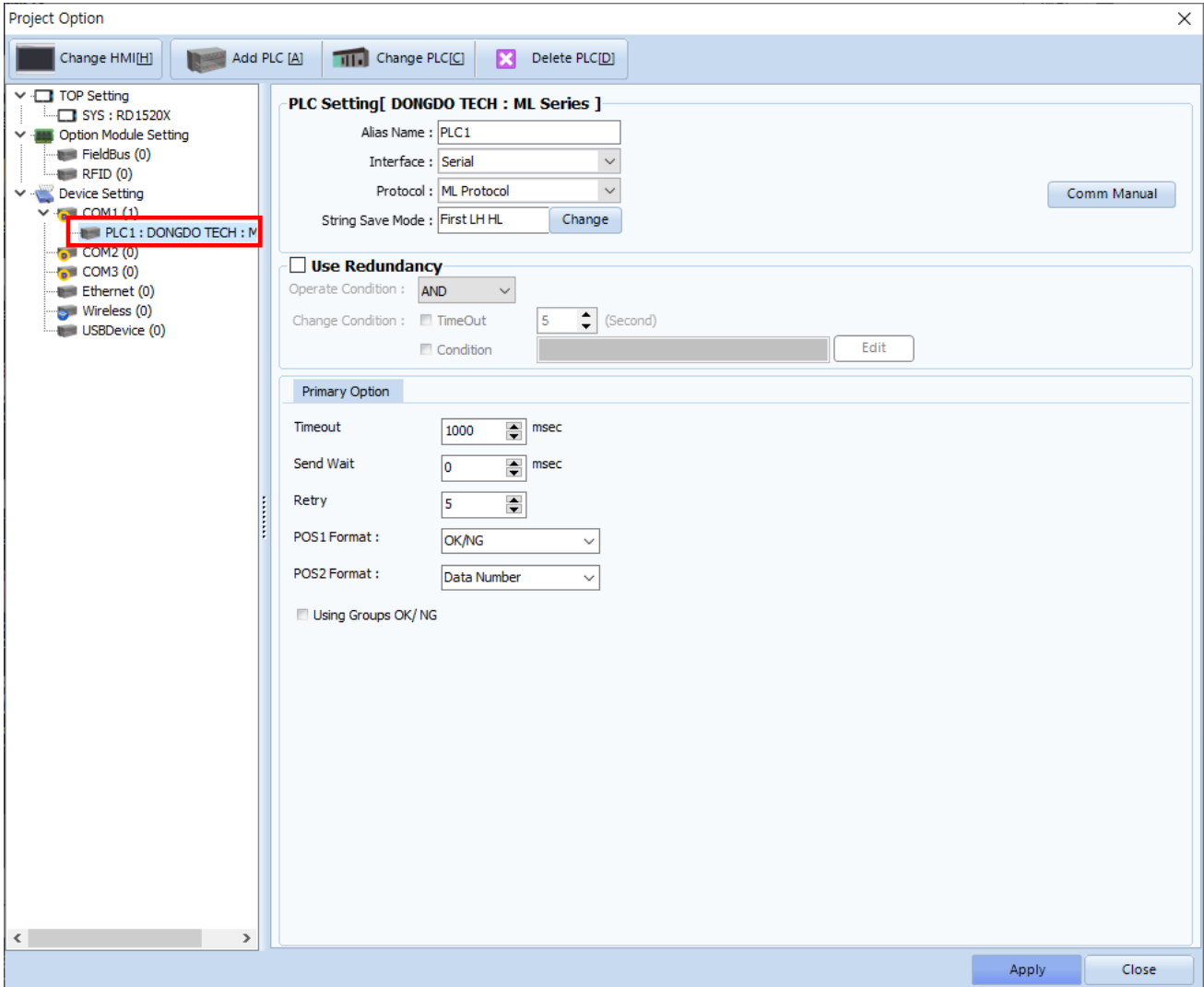– Set the TOP communication interface in TOP Design Studio.
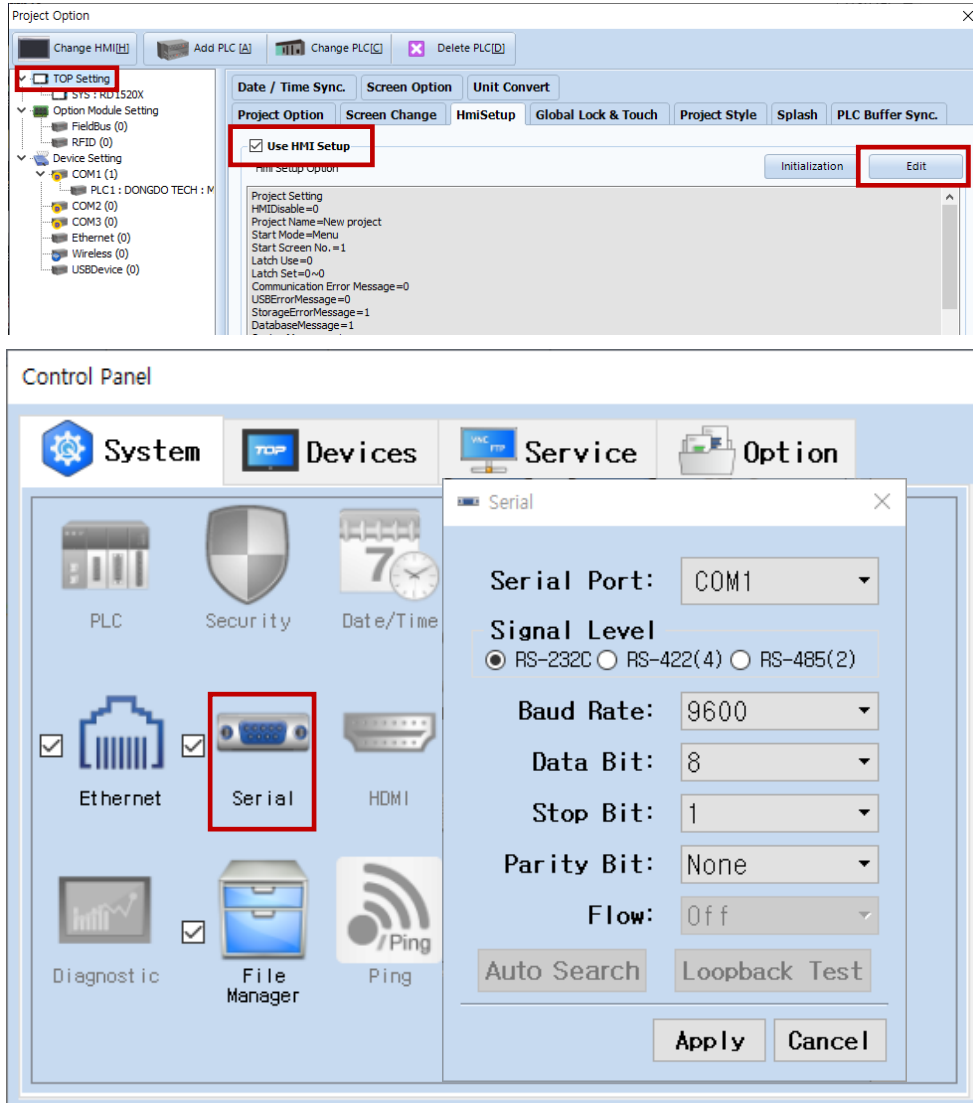
Items	TOP	External device	Remarks
Signal Level (port)	RS-232	RS-232	
Baud Rate	9600		
Data Bit	8		
Stop Bit	1		
Parity Bit	None.		

* The above settings are examples recommended by the company.

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device. (COM3 supports only RS-485.)
Baud Rate	Select the serial communication setion speed between the TOP and an external device.
Data Bit	Select the serial communication data bit between the TOP and an external device.
Stop Bit	Select the serial communication stop bit between the TOP and an external device.
Parity Bit	Select the serial communication parity bit check method between the TOP and an external device.

(2) Communication option setting

■ [Project > Project properties > PLC settings > COM1 > "PLC1 : DONGDO TECH : ML Series"]
   – Set the options of the communication driver of ML Series in TOP Design Studio.

Project Option

Change HMI[H]   Add PLC [A]   Change PLC[C]   Delete PLC[D]

- TOP Setting
  - SYS : RD1520X
- Option Module Setting
  - FieldBus (0)
  - RFID (0)
- Device Setting
  - COM1 (1)
    - **PLC1 : DONGDO TECH : M**
  - COM2 (0)
  - COM3 (0)
  - Ethernet (0)
  - Wireless (0)
  - USBDevice (0)

PLC Setting[DONGDO TECH : ML Series]

Alias Name : PLC1
Interface : Serial
Protocol : ML Protocol
String Save Mode : First LH HL   Change

Comm Manual

☐ **Use Redundancy**

Operate Condition : AND
Change Condition : ☐ TimeOut   5   (Second)
                  ☐ Condition   Edit

Primary Option

Timeout   1000   msec
Send Wait   0   msec
Retry   5
POS1 Format :   OK/NG
POS2 Format :   Data Number
☐ Using Groups OK/ NG

Apply   Close

Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select "ML Protocol".	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	*Note 1)
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Retry	Set the number of retries in case of communication failure.	
POS1 Format	Set the POS1 format configured in ML Series.	
POS2 Format	Set the POS2 format configured in ML Series.	
Using Groups OK/NG	Check when using Group OK/NG in ML Series.	

*Note 1)   Set it longer than ML Series의 [Probe Stable Time] + [Output Hold Time] of ML Series.
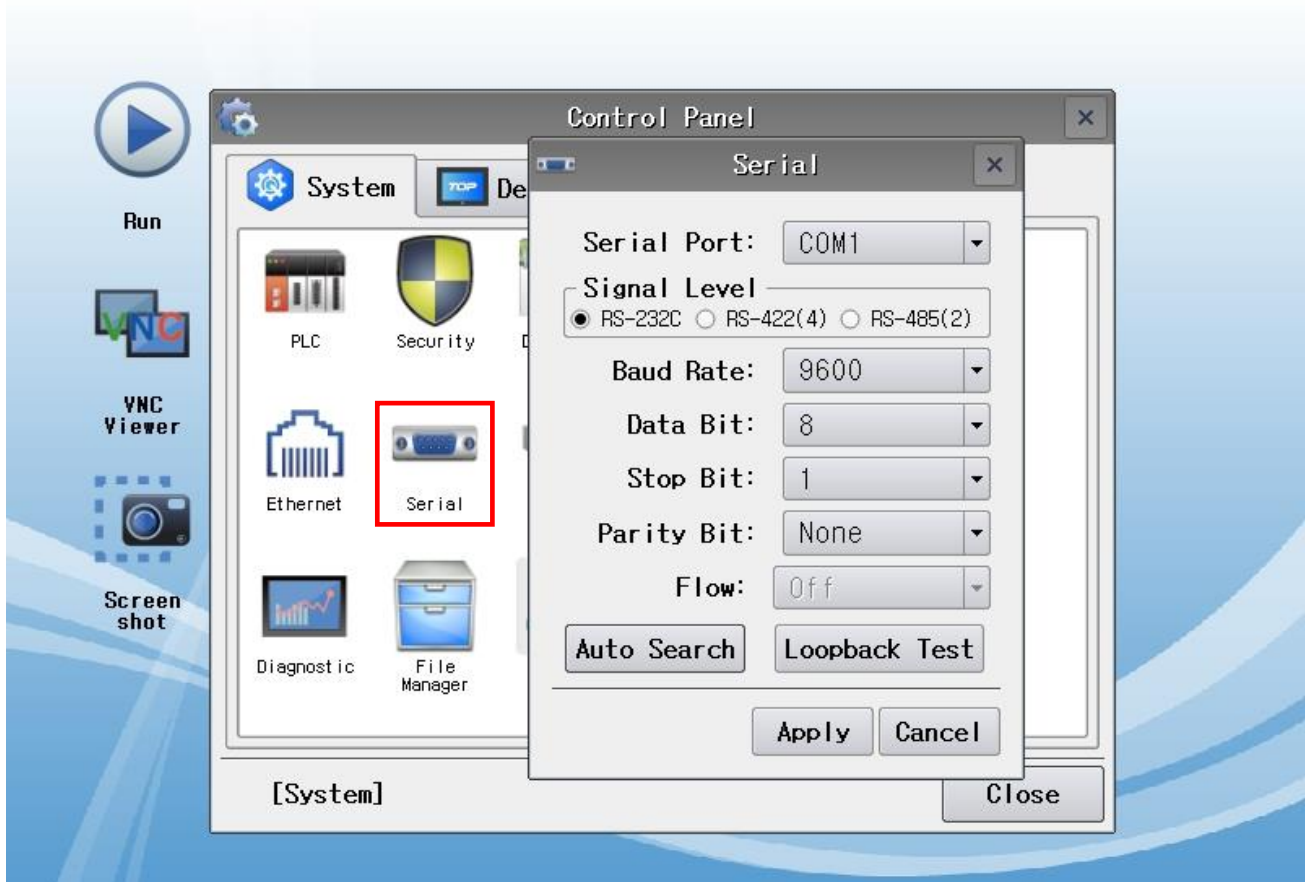
* This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.

■ Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.
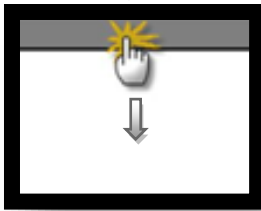
(1) Communication interface setting
■ [Main screen > Control panel > Serial]

Items	TOP	External device	Remarks
Signal Level (port)	RS-232	RS-232	
Baud Rate	9600		
Data Bit	8		
Stop Bit	1		
Parity Bit	None.		

* The above settings are setting examples recommended by the company.

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device. (COM3 supports only RS-485.)
Baud Rate	Select the serial communication speed between the TOP and an external device.
Data Bit	Select the serial communication data bit between the TOP and an external device.
Stop Bit	Select the serial communication stop bit between the TOP and an external device.
Parity Bit	Select the serial communication parity bit check method between the TOP and an external device.

(2) Communication option setting

■ [Main screen > Control panel > PLC]

Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select "ML Protocol".	
TimeOut (ms)	Set the time for the TOP to wait for a response from an external device.	*Note 1)
SendWait (ms)	Set the waiting time between TOP's receiving a response from an external device and sending the next command request.	
Retry	Set the number of retries in case of communication failure.	
POS1 Format	Set the POS1 format configured in ML Series.	
POS2 Format	Set the POS2 format configured in ML Series.	
Using Groups OK/NG	Check when using Group OK/NG in ML Series.	

*Note 1)   Set it longer than ML Series의 [Probe Stable Time] + [Output Hold Time] of ML Series.

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 whether the port (COM1/COM2/COM3) settings you want to use are the same as those of the external device in [Control Panel > Serial].

■ 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	
	Serial Parameter	Transmission Speed	OK	NG	
		Data Bit	OK	NG	
		Stop Bit	OK	NG	
		Parity Bit	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	
	Serial Parameter	Transmission Speed	OK	NG	
		Data Bit	OK	NG	
		Stop Bit	OK	NG	
		Parity Bit	OK	NG	
	Check address range		OK	NG	6. Supported address (For details, refer to the PLC manufacturer's manual.)

4. Externaldevice setting

Refer to the manufacturer's user manual.
This manual was written based on ML-CP.

ML-CP menu screen
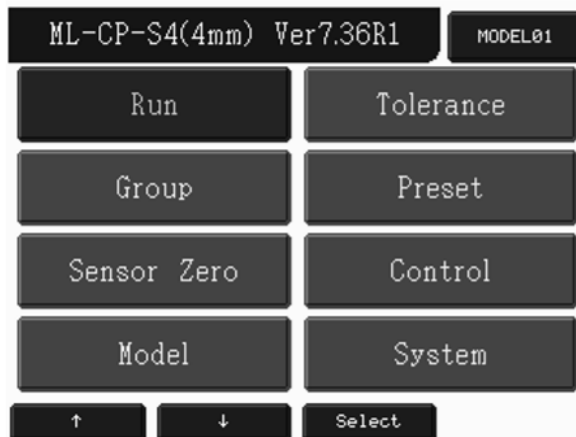
(1) Group setting

■ [Group] – [Group Use]
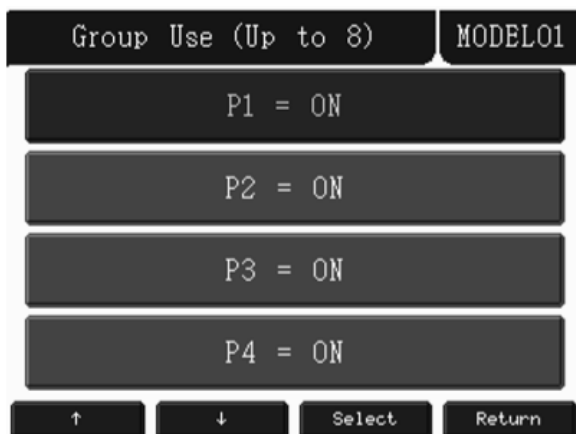
- ON: Activated on the measurement screen
- OFF: Deactivated on the measurement screen
-

There is a difference in Group Address according to ON/OFF settings. Remark Group Address
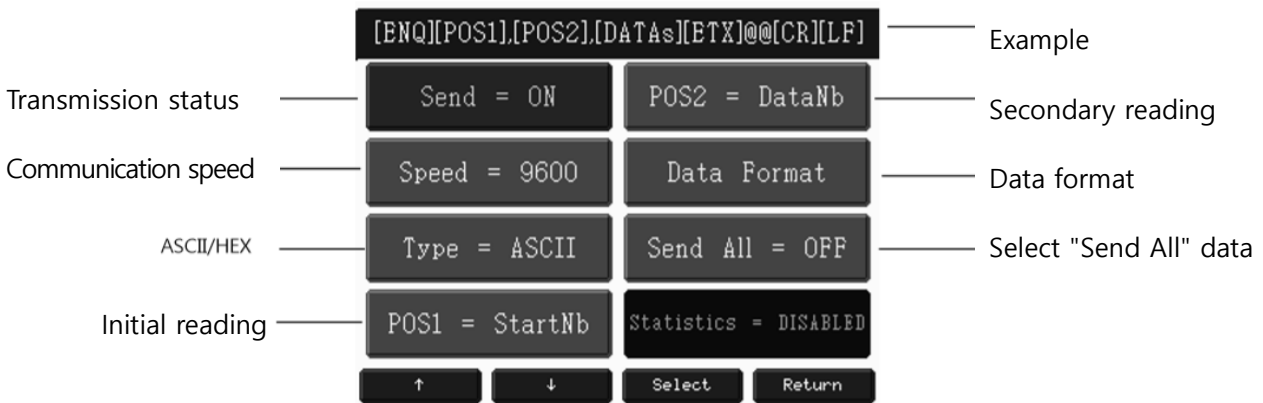
(2) Start Method setting

■ [Control] – [Start Method]

- Set Start = Auto.

It only supports the Start Method Auto mode.

(3) Serial setting

■ [Control] – [Serial]

Send = ON

Speed = Serial communication speed to communicate with TOP

Type = ASCII   Only supports ACSII>

POS1, POS2 = Specifies items to be displayed.

   - Start Number = basic 01

   - OK/NG = Displays judgment value

   - Data Number = Number of data displayed on the screen

   - Model Number = Model1,2….

   - Model Name = Corresponding model name

Items specified in POS1 and POS2 must be set identically to the TOP POS1 and POS2 settings.

Data Format

 - Point = Use of decimal point

 - Preset = Preset input value display

 - Int.Length = Digits of the integral number

 - Group OK/NG = Whether OK/NG of individual data is displayed or not (If used, also check to use in TOP setting.)

Send All

-    When set to ON, communication is arranged including the maximum group data of ML Series.

-    When set to OFF, communication is arranged including only group data displayed on the screen.
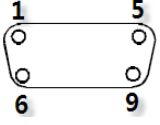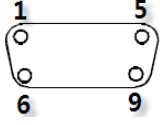
There is a difference in Group Address according to whether it is used or not. Remark Group Address

Commands

-    Commands = ON fixed (When set to OFF, TOP communication diagnosis and command address is not available.)

-    Use Device ID = OFF fixed (When set to OFF, TOP communication diagnosis and command address is not available.)

5. Cable table

This chapter introduces a cable diagram for normal communication between the TOP and the corresponding device.
(The cable diagram described in this section may differ from the recommendations of "DONGDO TECH ML Series".)

TOP			Cable connection	PLC		
Pin arrangement*Note 1)	Signal name	Pin number		Pin number	Signal name	Pin arrangement*Note 1)
Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	CD	1		1	CD	Based on communication cable connector front, D-SUB 9 Pin male (male, convex)
	RD	2		2	RD	
	SD	3		3	SD	
	DTR	4		4	DTR	
	SG	5		5	SG	
	DSR	6		6	DSR	
	RTS	7		7	RTS	
	CTS	8		8	CTS	
		9		9		

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

6. Supportedaddress

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.

POS address	Bit	Word	Size (Bit)	Read/Write	Remarks
POS1_START_NUMBER	-	POS1_START_NUMBER	16	Read	
POS1_OK/NG	POS1_OK/NG.0 ~ POS1_OK/NG.1	POS1_OK/NG	16	Read	*Note 1)
POS1_DATA_NUMBER	-	POS1_DATA_NUMBER	16	Read	
POS1_MODEL_NUMBER	-	POS1_MODEL_NUMBER	16	Read	
POS1_MODEL_NAME	-	POS1_MODEL_NAME	16	Read	*Note 2)
POS2_START_NUMBER	-	POS2_START_NUMBER	16	Read	
POS2_OK/NG	POS2_OK/NG.0 ~ POS2_OK/NG.1	POS2_OK/NG	16	Read	*Note 1)
POS2_DATA_NUMBER	-	POS2_DATA_NUMBER	16	Read	
POS2_MODEL_NUMBER	-	POS2_MODEL_NUMBER	16	Read	
POS2_MODEL_NAME	-	POS2_MODEL_NAME	16	Read	*Note 2)

*Note 1)

When bit address is used, the result judged to OK = POS_OK/NG.0 NG = POS_OK/NG.1 address is set.

Ex) When judging OK, POS_OK/NG.0 = 1, POS_OK/NG.1 = 0

When judging NG, POS_OK/NG.0 = 0, POS_OK/NG.1 = 1

When word address is used, OK = 1, NG = 2 is output to the address.

Ex) When OK is judged, data 1 is output to POS_OK/NG address.

When NG is judged, data 2 is output to POS_OK/NG address.

*Note 2) MODEL NAME data is string.

n= 1~8

Group address	Bit	Word	Size (Bit)	Read/Write	Remarks
GROUP[n]_DATA	-	GROUP[n]_DATA	32	Read	*Note *Note 2)
GROUP[n]_OK/NG	GROUP[n]_OK/NG.0 ~ GROUP[n]_OK/NG.1	GROUP[n]_OK/NG	16	Read	*Note 1) *Note 3)

*Note 1) Remark Group Address

*Note 2)

As Group Data value has a decimal point and a sign, set the data type to DEC, and set the decimal pont length to be the same as that of ML Series in use.

Ex) If Group Data of ML Series = + 0.001, set the data type of GROUP[n]_DATA address object to DEC, decimal point length to 3.

If the data type is set to a type other than DEC, the correct measurement value is not output.

*Note 3)

When bit address is used, the result judged to OK = GROUP[n]_OK/NG.0 NG = GROUP[n]_OK/NG.1 address is set.

Ex) When judging OK, GROUP[n]_OK/NG.0 = 1, GROUP[n]_OK/NG.1 = 0

Ex) When judging NG, GROUP[n]_OK/NG.0 = 0, GROUP[n]_OK/NG.1 = 1

When word address is used, OK = 1, NG = 2 is output to the address.

Ex) When OK is judged, data 1 is output to GROUP[n]_OK/NG address.

When NG is judged, data 2 is output to GROUP[n]_OK/NG address.

COMMAND address	Description	Bit	Word	Read/Write	Remarks
RESET	Reset the measurement screen.	RESET	RESET	Write	How to use Command
MCLEAR	Cancel the zero point.	MCLEAR	MCLEAR	Write	How to use Command
MZERO	Zero setting	MZERO	MZERO	Write	How to use Command

※ Group Address

As for the Group Address, the output address varies according to the group setting of the ML Series in use.
It is mapped in alphabetical order of the group being used in ML Serial in TOP Group Address.

When ML Series has 8 groups from A to H,
Ex) Group Use setting
A = ON
B = OFF
C = OFF
D = ON
E = OFF
F = ON
G = ON
H = OFF

ML Series Group (Setting)	Mapping	TOP Group Address
Group A (ON)		GROUP1_DATA, GROUP1_OKNG
Group B (OFF)		GROUP2_DATA, GROUP2_OKNG
Group C (OFF)		GROUP3_DATA, GROUP3_OKNG
Group D (ON)		GROUP4_DATA, GROUP4_OKNG
Group E (OFF)		
Group F (ON)		
Group G (ON)		
Group H (OFF)		

If group addresses more than groups being used in ML Series are registered on the TOP screen, an error occurs.
In the above case, an error occurs when the address higher than GROUP5 is registered.

※ When Send All = ON is set in the Serial setting

ML Series Group (setting)	Mapping	TOP Group Address
Group A (ON)		GROUP1_DATA, GROUP1_OKNG
Group B (OFF)		GROUP2_DATA, GROUP2_OKNG
Group C (OFF)		GROUP3_DATA, GROUP3_OKNG
Group D (ON)		GROUP4_DATA, GROUP4_OKNG
Group E (OFF)		GROUP5_DATA, GROUP5_OKNG
Group F (ON)		GROUP6_DATA, GROUP6_OKNG
Group G (ON)		GROUP7_DATA, GROUP7_OKNG
Group H (OFF)		GROUP8_DATA, GROUP8_OKNG

When Send All = ON is set, no error occurs even though group addresses more than Groups being used in ML Series is registered on the TOP screen.

Ex) Group Use setting

A = ON

B = ON

C = ON

D = ON

E = OFF

F = OFF

G = OFF

H = OFF

ML Series Group (setting)	Mapping	TOP Group Address
Group A (ON)	→	GROUP1_DATA, GROUP1_OKNG
Group B (ON)	→	GROUP2_DATA, GROUP2_OKNG
Group C (ON)	→	GROUP3_DATA, GROUP3_OKNG
Group D (ON)	→	GROUP4_DATA, GROUP4_OKNG
Group E (OFF)		
Group F (OFF)		
Group G (OFF)		
Group H (OFF)		

If group addresses more than groups being used in ML Series are registered on the TOP screen, an error occurs.

In the above case, an error occurs when the address higher than GROUP5 is registered.

※ When Send All = ON is set in the Serial setting

ML Series Group (setting)	Mapping	TOP Group Address
Group A (ON)	→	GROUP1_DATA, GROUP1_OKNG
Group B (ON)	→	GROUP2_DATA, GROUP2_OKNG
Group C (ON)	→	GROUP3_DATA, GROUP3_OKNG
Group D (ON)	→	GROUP4_DATA, GROUP4_OKNG
Group E (OFF)	→	GROUP5_DATA, GROUP5_OKNG
Group F (OFF)	→	GROUP6_DATA, GROUP6_OKNG
Group G (OFF)	→	GROUP7_DATA, GROUP7_OKNG
Group H (OFF)	→	GROUP8_DATA, GROUP8_OKNG

When Send All = ON is set, no error occurs even though group addresses more than Groups being used in ML Series is registered on the TOP screen.

※ How to use the Command address

The Command address is write-only and can be used by turning the bit of the corresponding address ON or OFF, or registering to enter an arbitrary value for the operation of the object.

Ex) Send Command [Reset] command by touching a square object.

1. After registering the square object, set "Condition" in "Effects and Actions" to [Event > Touch down].

2. Set the action to [Bit > RESET address input > ON].

   (Set the maximum number of runs to 1, set the cycle, and set the delay to zero.)

3. When touching a squre object, send COMMAND RESET to connected ML Series.