HYOSUNG
VADAL
Welding Controller

Supported version   TOP Design Studio   V1.4.9.52 or higher

CONTENTS

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

1. System configuration

The system configuration of TOP and "VADAL Welding Controller" is as follows.

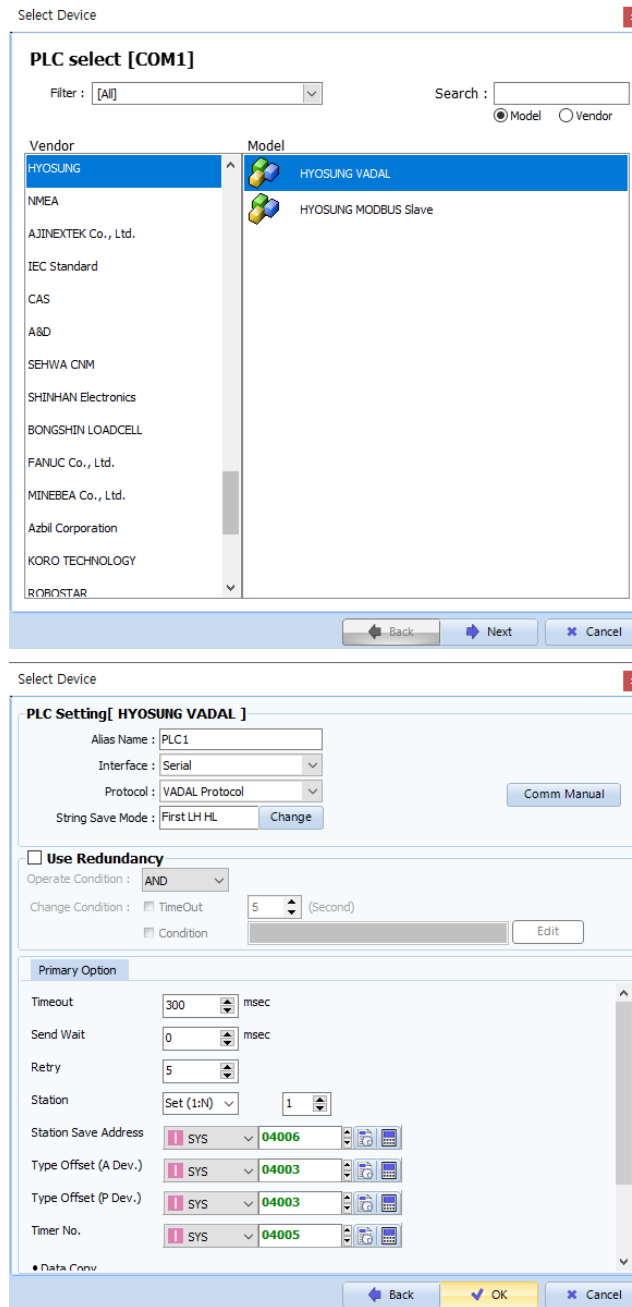| Series	CPU	Link I/F	Communication method	System setting	Cable
VADAL		RS-485 Port on the board	RS–485	3. TOP communication setting 4. External device setting	5. Cable table

■ Connectable configuration

・1:1 connection

・1:N connection

2. External device selection

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

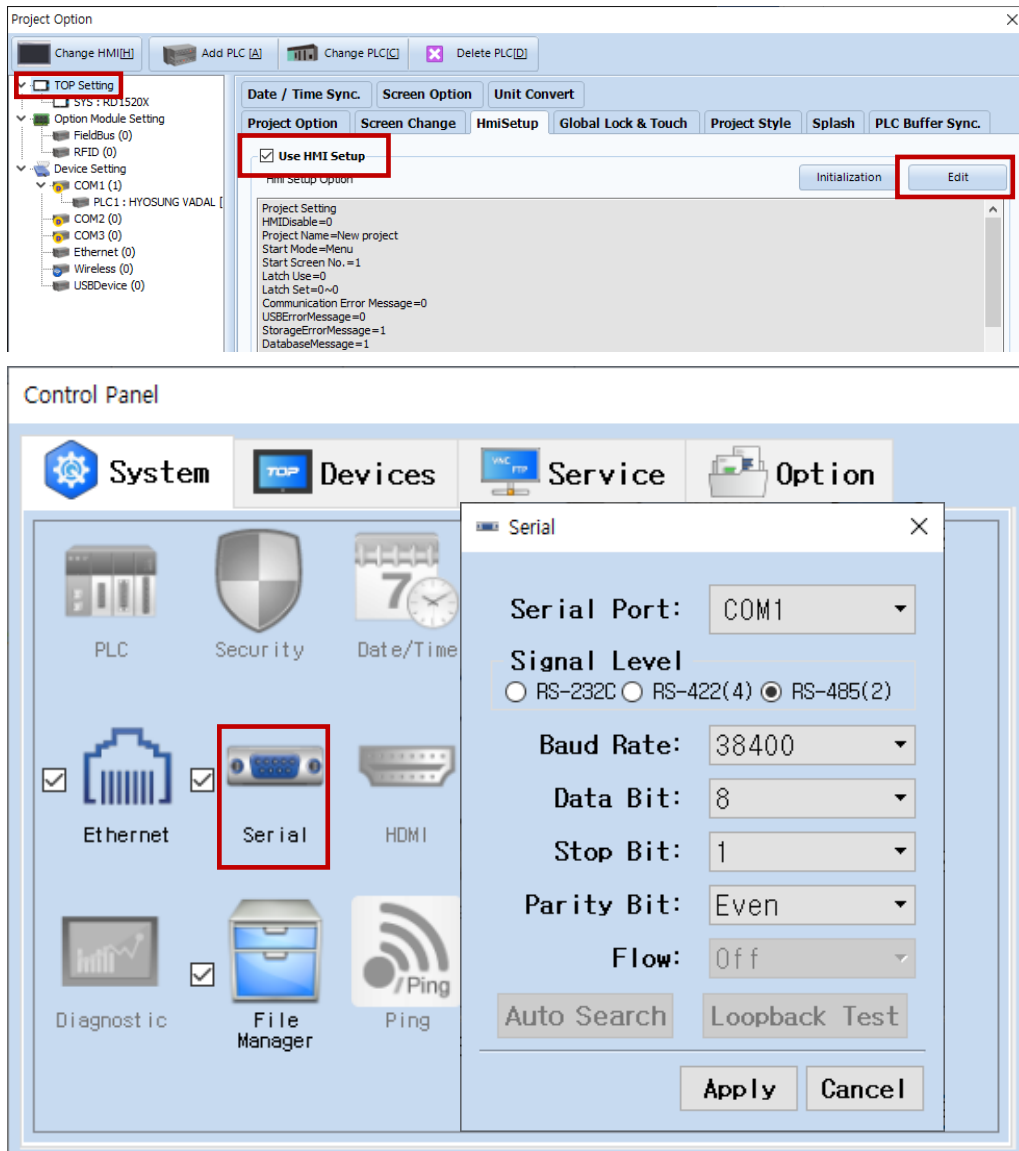| Settings		Contents
TOP	Model	Select the TOP model.
External device	Vendor	Select the vendor of the external device to be connected to the TOP. Select "HYOSUNG".
	PLC	Select the external device to be connected to the TOP. **Model** / **Interface** / **Protocol** HYOSUNG VADAL / Serial / VADAL Protocol 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-R 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] → [Property] → [TOP Setting] → [HMI Setup] → [Use HMI Setup Check] → [Edit] → [Serial]

– Set the TOP communication interface in TOP Design Studio.

Items	TOP	External device	Remarks
Signal Level	RS-485	RS-485	
Baud Rate	38400		
Data Bit	8		
Stop Bit	1		
Parity Bit	Even		

* 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.
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

■ [Project] → [Project properties] → [PLC settings > COM > PLC1 : HYOSUNG VADAL]
  – Set the options of the communication driver of HYOSUNG VADAL in TOP Design Studio.

Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select the communication protocol between the TOP and an external device.	
String Save Mode	Set the byte order of data when entering the string data.	
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.	
Retry	Set the number of request retries when the data request result is no response/negative response.	
Station	Set (1:N): Request data with the entered station number. Search (1:1): Search for external devices. It sends "QV" command from 1 to 15, and when it receives a response, it stops searching and starts data communication.	
Stataion Save Address	Set the TOP internal address where the station number of the external device is saved. If you select the Station item as Search (1:1), you can change the value of this internal address to change the station number of the external device during the Run.	
Type Offset (A Dev.)	Set the TOP internal address that sets the series number when requesting data (welder data) for address A.	*Note 1)
Type Offset (P Dev.)	Set the TOP internal address that sets the series number when requesting data (welder data) for address P.	*Note 1)
Timer No.	Set the TOP internal address that sets the timer no. when sending a timer no change command ('N') that uses the address N.	*Note 2)
Data Copy	Setting for address C operation	
Src No.	Set the TOP internal address to enter the source series number.	
Dst No. Begin	Set the TOP internal address to enter the destination starting series number	
Dst No. End	Set the TOP internal address to enter the destination end series number	

*Note 1) Command composition method: X[TOP internal address value] Y[Address] QB

*Note 2) Command composition method: N[TOP internal address value]
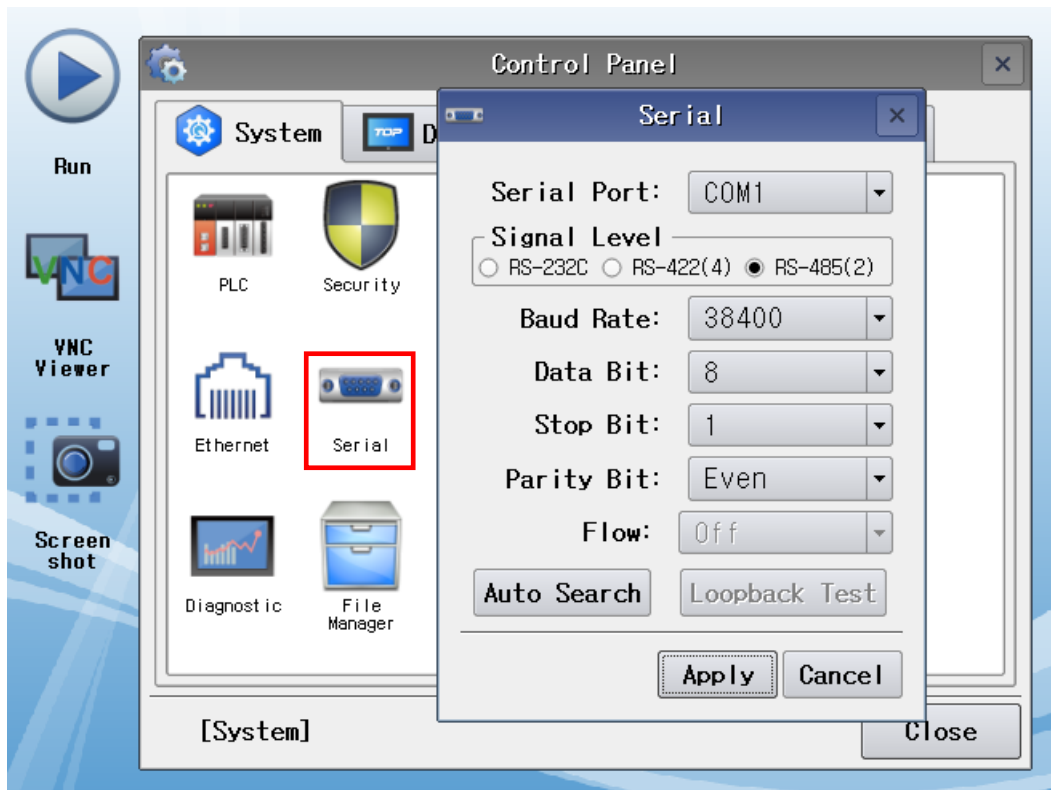
3.2. Communication setting in TOP

* 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 <u>drag</u> it down. Touch "EXIT" in the pop-up window to go to the main screen.

(1) Communication interface setting

■ [Control Panel] → [Serial]

Items	TOP	External device	Remarks
Signal Level	RS-485	RS-485	
Baud Rate	38400		
Data Bit	8		
Stop Bit	1		
Parity Bit	Even		

    * The above settings are <u>examples</u> recommended by the company.

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device.
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

■ [Control Panel] → [PLC]

Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select the communication protocol between the TOP and an external device.	
String Save Mode	Set the byte order of data when entering the string data.	
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.	
Retry	Set the number of request retries when the data request result is no response/negative response.	
Station	Set (1:N): Request data with the entered station number. Search (1:1): Search for external devices. It sends "QV" command from 1 to 15, and when it receives a response, it stops searching and starts data communication.	
Stataion Save Address	Set the TOP internal address where the station number of the external device is saved. If you select the Station item as Search (1:1), you can change the value of this internal address to change the station number of the external device during the Run.	
Type Offset (A Dev.)	Set the TOP internal address that sets the series number when requesting data (welder data) for address A.	*Note 1)
Type Offset (P Dev.)	Set the TOP internal address that sets the series number when requesting data (welder data) for address P.	*Note 1)
Timer No.	Set the TOP internal address that sets the timer no. when sending a timer no change command ('N') that uses the address N.	*Note 2)
Data Copy	**Setting for address C operation**	
Src No.	Set the TOP internal address to enter the source series number.	
Dst No. Begin	Set the TOP internal address to enter the destination starting series number.	
Dst No. End	Set the TOP internal address to enter the destination end series number.	

*Note 1) Command composition method: X[TOP internal address value] Y[Address] QB

*Note 2) Command composition method: N[TOP internal address value]

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 that the settings of the connected ports in [Control Panel] → [Serial] are the same as the settings of the external device.

■ Diagnosis of whether the port communication is normal or not

- Touch "Communication diagnostics" in [Control Panel] → [PLC].

- Check whether communication is connected or not.

Communication diagnostics succeeded	Communication setting normal
Error message	**Communication setting abnormal** - Check the cable, TOP, and external device settings. (Refer to 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.

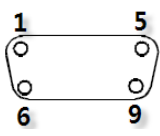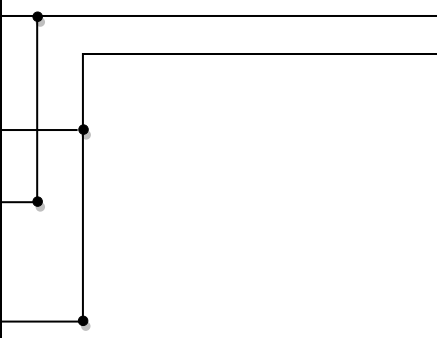| Items	Contents		Check		Remarks
System configuration	How to connect the system		OK	NG	1. System configuration
	Cable		OK	NG	
TOP	Version		OK	NG	
	Communication port		OK	NG	
	Communication driver and protocol		OK	NG	
	Other detailed settings		OK	NG	
	Relative prefix	Project setting	OK	NG	
		Communication diagnostics	OK	NG	2. External device selection 3. Communication setting
	Serial Parameter	Transmission Speed	OK	NG	
		Data Bit	OK	NG	
		Stop Bit	OK	NG	
		Parity Bit	OK	NG	
External device	CPU		OK	NG	
	Communication port		OK	NG	
	Protocol		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	5. Supported addresses (For details, please refer to the PLC vendor's manual.)

4. External device setting

Refer to the vendor's user manual to identically configure the communication settings of the external device to that of the TOP.
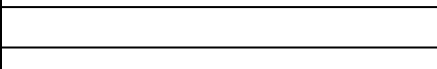
5. Cable table

This chapter introduces a cable diagram for normal communication between the TOP and the corresponding device.

(The cable diagrams in this section may differ from the external device vendor's recommendations.)
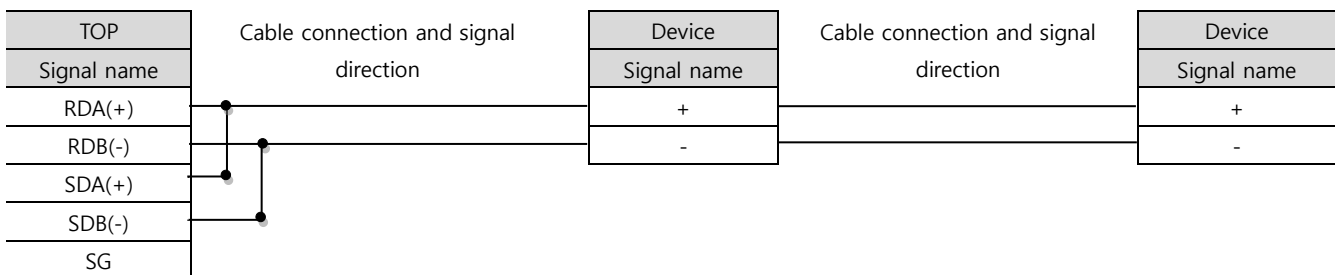
■ RS-485 (1:1 connection)

COM			Cable connection	External device	
Pin arrangement*Note 1)	Signal name	Pin number		Signal name	
	RDA(+)	1		+	
		2		-	
		3			
Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	RDB(-)	4			
	SG	5			
	SDA(+)	6			
		7			
		8			
	SDB(-)	9			

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

■ RS-485 (1:1 connection)

COM		Cable connection	External device	
Pin arrangement	Signal name		Signal name	
	+		+	
	-		-	
	SG			

■ RS-485 (1:N connection)

TOP	Cable connection and signal direction	Device	Cable connection and signal direction	Device
Signal name		Signal name		Signal name
RDA(+)		+		+
RDB(-)		-		-
SDA(+)				
SDB(-)				
SG				

6. 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.

Device	Description	Bit	Word	Read/Write	Remarks
D	Welder data	D000:00.00 ~ D255:99.15	D000:00 ~ D255:99	R/W	*Note 1)
A	Welder data	A00.00 ~ A99.15	A00 ~ A99	R/W	*Note 2)
P	Welder data	P00.00 ~ P99.15	P00 ~ P99	R/W	*Note 3)
T	Welding mode	T0.00 ~ T0.15	T0	R/W	*Note 4)
V	Version	-	V0 ~ V1	R	*Note 5)
G	Welding in progress Operation startng series number	-	G0	R	
HX	When data errors Series number	-	HX0	R	
HY	When data errors Item number	-	HY0	R	
ZI	Input signal	ZI0.00 ~ ZI0.15	ZI0	R	
ZO	Output signal	ZO0.00 ~ ZO0.15	ZO0	R	
E	Error code	-	E0 ~ E4	R	
Q	Data change flag	-	Q0	R	
S	Welder status	S0.00 ~ S0.15	S0	R	*Note 6)
C	Series data copy	C0.00	C0	W	*Note 7
N	Timer No. change	N0.00	N0	W	*Note 8
I	Welding condition initialization	I0.00	I0	W	
R	Status reset	-	R0	W	

*Note 1) D[Series]:[Item]

*Note 2) The address of the A device enters the items of the welder data, and the value of the TOP internal address set in the communication option 'Type Offset (A Dev.)' is applied as a series.

*Note 3) The address of the P device enters the items of the welder data, and the value of the TOP internal address set in the communication option 'Type Offset (P Dev.)' is applied as a series.

*Note 4)

Value	Status
0	Welding mode
1	Test mode
3	Pressurized mode

*Note 5)

Address	Data
0	Version
1	Software number

*Note 6)

Bit	15~4	3	2	1	0
Status	Reserved area	Stepper done	Number of hitting point done	Alarm	Abnormal

*Note 7) Transmit the series data copy command ('C') when Writing operation of data to the C device. Parameters required for command transmission are applied as the value of TOP internal address set in the communication option 'Data Copy'.

*Note 8) Transmit the timer no change command ('N') when Writing operation of data to the N device. Transmitted timer no. is applied as the value of TOP internal address set in the communication option 'Timer No.'.