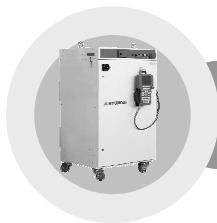




WARNING



**THE INSTALLATION SHALL BE
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Hi4a Controller Function Manual

MODBUS



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1

Overview



1. Overview

MODBUS

1.1. Prior necessary information

Prior information as following is needed to understand this manual.

- Hi4a robot controller operation knowledge
- Hi4a embedded PLC relay knowledge
- Modbus protocol knowledge

1.2. Hi4a Robot Controller Modbus Function

Hi4a robot controller is supporting the slave function of Modbus.

- MODBUS transmission mode
 - ① ASCII mode
 - ② RTU(binary) mode
- Supported function
 - ① 01 : read coils (bits)
 - ② 02 : read discrete inputs (bits)
 - ③ 03 : read holding registers (multiple)
 - ④ 04 : read input registers (multiple)
 - ⑤ 05 : write single coil (bit)
 - ⑥ 06 : write single holding register
 - ⑦ 15 : write coils (multiple bits)
 - ⑧ 16 : write holding registers (multiple)
- Slave address setting
 - ① Slave address : 1~247
 - ② When the slave address of instruction is 0, all slave without relations with address that is setting support the Broadcasting function which operates.
- Medium of communication
 - ① CNSIO : RS232 → Support only 1:1
 - ② OPSIO : Use of RS232/RS422 selection → Support only 1:1
 - ③ RS485 is needed to support the 1:N communication, it can't be used at BD412 that is the improvement board, of current BD411.
- Use condition
 - ① To use Relay of Embedded PLC as the MODBUS function, set up the embedded PLC as valid (DIP4=ON) and it has be in Run condition.
 - ② If embedded PLC is invalid, it doesn't support to write at Relay of embedded PLC. However, it can read entire register or coil.
- Example of MODBUS virtual use
 - ① Control board function
This is cheap GP(Graphic Panel) supporting MODBUS, and it can be used as connecting to RS485 of multi-robot.
 - ② PLC communication
Provide the communication between the PLC with the function of MODBUS Master with cheap solution.
 - ③ PC robot operation system
Using serial port of PC, monitor in/out signal of robot or can build the operation system of robot.

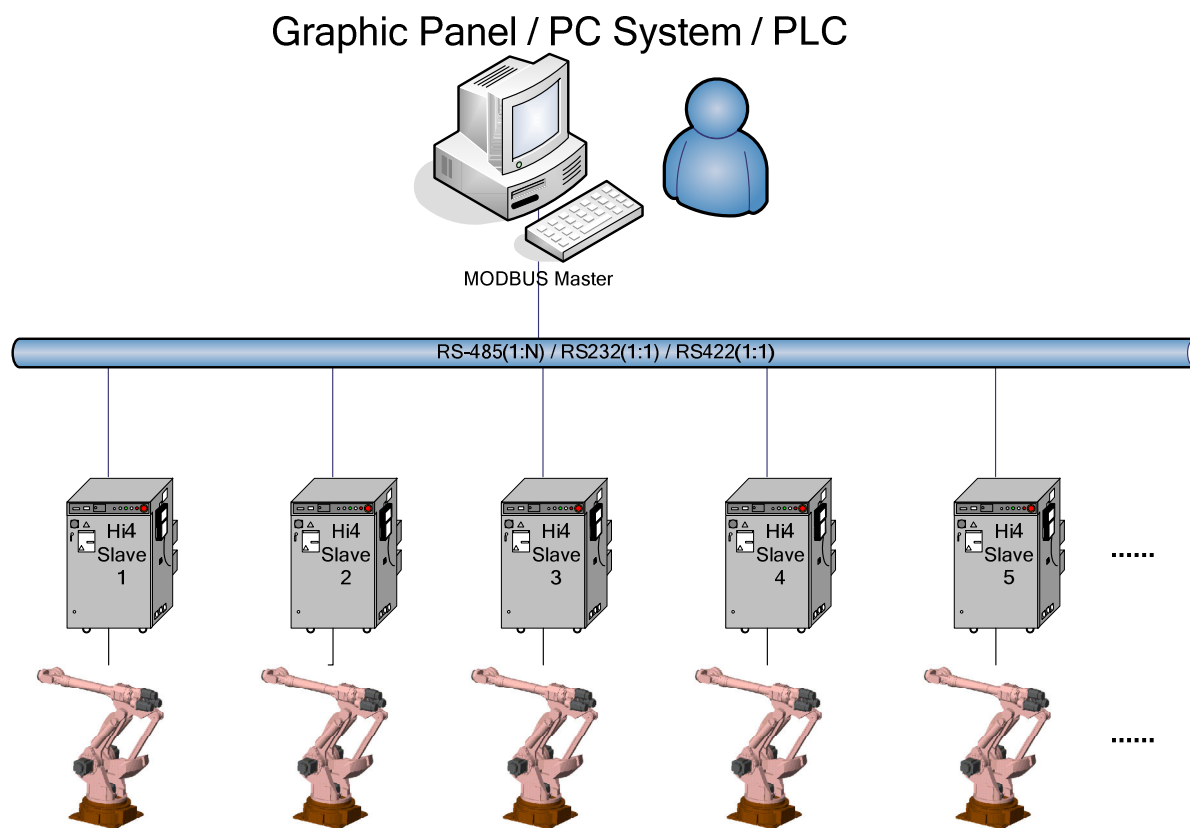


Fig. 1.1 Example of MODBUS virtual use

1. Overview

- Hi4a relay mapping

Table 1-1 Relay mapping

Modbus Data Model	Relay mapping : Refer to Hi4a relay configuration & I/O data flow					Fuction
	Relay name	Bits	Local Add.	Registers	Local Addr.	
Input Discrete Add: 0x0000~0xffff Quantity: 1~2000(bit) Input Registers Add: 0x0000~0xffff Quantity: 1~125	External Input	X1~256	0001~0256	XW1~16	001~016	Read only 02: read discrete Inputs (bits) 04: read input registers (multiple)
	PLC Input	DO1~256	1001~1256	DOW1~16	101~116	
	Fieldbus Input #1	FB1.X1~960	2001~2960	FB1.XW1~60	201~260	
	Fieldbus Input #2	FB2.X1~960	3001~3960	FB2.XW1~60	301~360	
	Fieldbus Input #3	FB3.X1~960	4001~4960	FB3.XW1~60	401~460	
	Fieldbus Input #4	FB4.X1~960	5001~5960	FB4.XW1~60	501~560	
	Timer	T1~256	6001~6256	TW1~256	1001~1256	
	Counter	C1~256	7001~7256	CW1~256	1501~1756	
Coils Add: 0x0000~0xffff Quantity: 1~2000(bit) Holding Registers Add: 0x0000~0xffff Quantity: 1~125	External Output	Y1~256	0001~0256	YW1~16	001~016	Read 01: read coils (bits) 03: read holding registers (multiple) Write 05: write single coil (bit) 15: write coils (multiple bits) 06: write single holding register 16: write holding registers (multiple)
	PLC Output	DI1~256	1001~1256	DIW1~16	101~116	
	Fieldbus Output #1	FB1.Y1~960	2001~2960	FB1.YW1~60	201~260	
	Fieldbus Output #2	FB2.Y1~960	3001~3960	FB2.YW1~60	301~360	
	Fieldbus Output #3	B3.Y1~960	4001~4960	FB3.YW1~60	401~460	
	Fieldbus Output #4	FB4.Y1~960	5001~5960	FB4.YW1~60	501~560	
	Special	SP1~32	6001~6032	SPW1~2	601~602	
	Auxiliary	R1~1024	6501~7524	RW1~64	701~764	
	Keep	K1~1024	8001~9024	KW1~64	801~864	
	Timer			TW1~256	1001~1256	
	Counter			CW1~256	1501~1756	
	System Memory			SW1~256	2001~2256	
Shared Registers	Data Memory			MW1~5000	3001~8000	Data range: 0~255
HRBASIC	HRBASIC V% variable			V%[1~400]	8001~8400	
	RN Register for M-code			RN1~16	8501~8516	
	HRBASIC V\$ variable			V\$[1~40]	9001~9720	36 bytes/V\$ → 40 x 36/2 = 720

Oversized idographic number of above table is the relay group used at GP and shade control portion (gray) is reserved.

- Relay composition of Hi4a controller

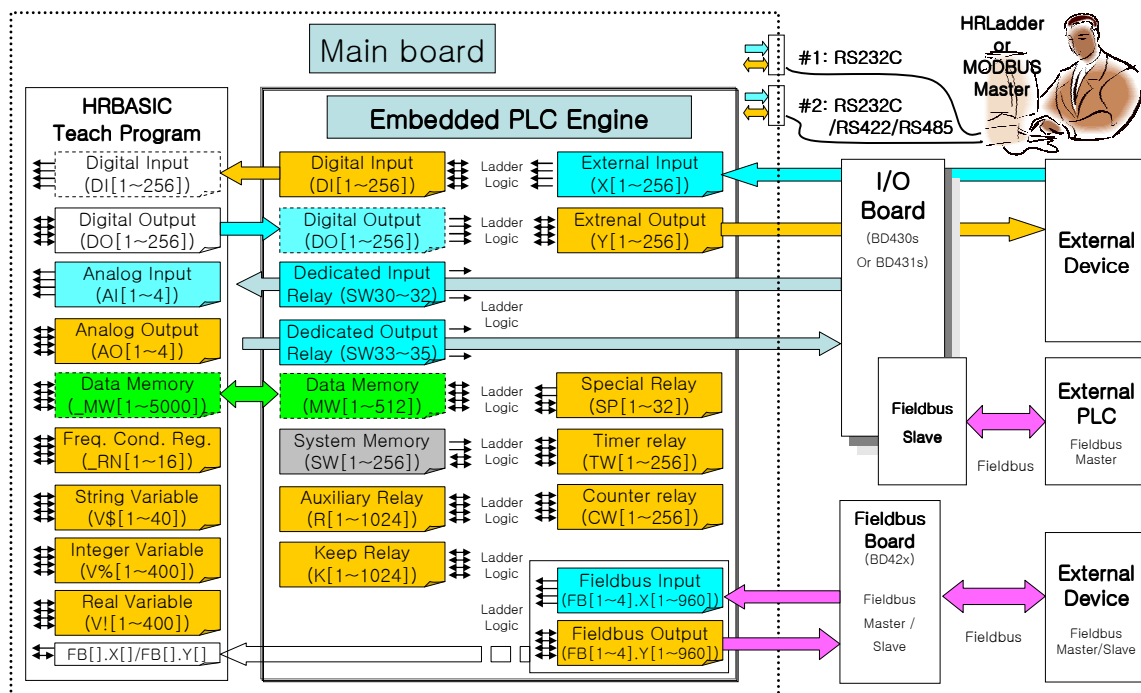


Fig. 1.2 Relay composition of Hi4a controller

- In-out data flow of Hi4a controller

In/Out Data Flow

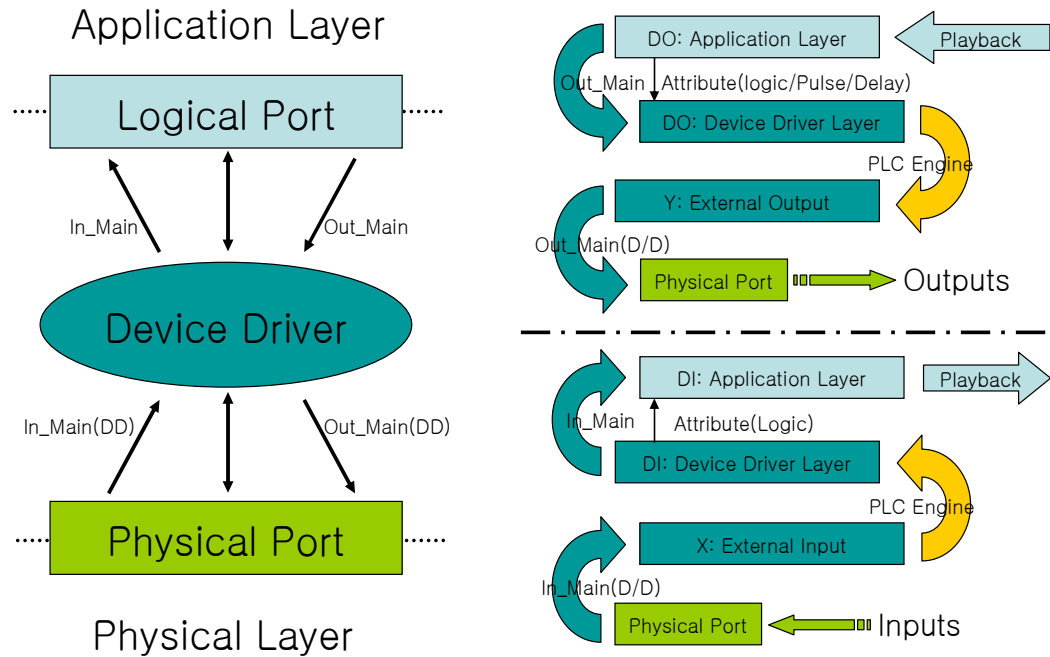


Fig. 1.3 Input/output data flow of Hi4a controller

DI/DO is entirely the application layer is refer to the input-output monitoring or the HRBASIC, and DI/DO is entirely the device layer to refer PLC and Modbus. Setting can be different in attribute (logic/pulse/delay) between two.



2

Modbus Setting of Hi4a Controller



2.1. Serial Port Usage Setting

- (1) Set up at 『[PF2]: System』 → 『2: Controller parameter』 → 『2: Serial ports』 → 『3: Serial Port #1(CNSIO)』 or 『4: Serial port#2(OPSIO)』.

```
01:33:02 *** Serial port 1 *** A:0 S:8
Baudrate = <-,19200,38400,57600,115200>
Character length = <7,8> bit
Stop bit      = <1,2> bit
Parity bit    = <Disable,Odd,Even>
Echo         = <Disable,Enable>
Port usage   = <FileMng,Sens,LVS,MODBUS>

Press [SHIFT]+[<-] [→] Key.
>
COM Test      Complete
```

- (2) If setting up serial port #1 and #2 as MODBUS, MODBUS slave module refers only serial #1.

2.2. MODBUS Environment Setting

- (1) Choose 『[PF2]: System』 『2: Controller parameter』 → 『18: Modbus environment setting』.

```
01:35:06 *** MODBUS Setting *** A:0 S:8
Transmission mode = <ASCII,RTU>
Slave Address     = [ 1]

Press [SHIFT]+[<-] [→] Key.
>
Complete
```



- **Head Office**

Tel. 82-52-202-7901 / Fax. 82-52-202-7900
1, Jeonha-dong, Dong-gu, Ulsan, Korea

- **A/S Center**

Tel. 82-52-202-5041 / Fax. 82-52-202-7960

- **Seoul Office**

Tel. 82-2-746-4711 / Fax. 82-2-746-4720
140-2, Gye-dong, Jongno-gu, Seoul, Korea

- **Ansan Office**

Tel. 82-31-409-4945 / Fax. 82-31-409-4946
1431-2, Sa-dong, Sangnok-gu, Ansan-si, Gyeonggi-do, Korea

- **Cheonan Office**

Tel. 82-41-576-4294 / Fax. 82-41-576-4296
355-15, Daga-dong, Cheonan-si, Chungcheongnam-do, Korea

- **Daegu Office**

Tel. 82-53-746-6232 / Fax. 82-53-746-6231
223-5, Beomeo 2-dong, Suseong-gu, Daegu, Korea

- **Gwangju Office**

Tel. 82-62-363-5272 / Fax. 82-62-363-5273
415-2, Nongseong-dong, Seo-gu, Gwangju, Korea

- **본사**

Tel. 052-202-7901 / Fax. 052-202-7900
울산광역시 동구 전하동 1번지

- **A/S 센터**

Tel. 82-52-202-5041 / Fax. 82-52-202-7960

- **서울 사무소**

Tel. 02-746-4711 / Fax. 02-746-4720
서울특별시 종로구 계동 140-2번지

- **안산 사무소**

Tel. 031-409-4959 / Fax. 031-409-4946
경기도 안산시 상록구 사동 1431-2번지

- **천안 사무소**

Tel. 041-576-4294 / Fax. 041-576-4296
충남 천안시 다가동 355-15번지

- **대구 사무소**

Tel. 053-746-6232 / Fax. 053-746-6231
대구광역시 수성구 범어 2동 223-5번지

- **광주 사무소**

Tel. 062-363-5272 / Fax. 062-363-5273
광주광역시 서구 농성동 415-2번지