

LC-101H/LC-102H

使用手冊



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1. 產品介紹

LC-101H 和 LC-102H 是專為智能家居應用設計的燈控模組，前者為單迴路，後者為雙迴路，均具備交流負載電流測量功能。兩款模組不僅能有效控制燈控迴路，還能實時監測負載電流，提供使用者對燈具運行狀態的直觀了解。

由於燈控迴路中使用的燈具通常為電感性負載，開關切換時會產生強大瞬間電流（約工作電流的 10 至 20 倍），這可能會損壞模組內的繼電器。LC-101H 和 LC-102H 配備耐 Inrush Current 的大功率繼電器，能抵抗這種瞬間電流，延長使用壽命，減少維修需求。

當使用者開啟或關閉燈具時，模組透過量測負載電流，可以檢測到繼電器的開關狀態，確保燈控系統的正常運行，及時發現問題。此外，這些模組的燈控迴路繼電器採用 Form C 設計，支持實體開關的雙切迴路配置，為用戶提供更大的靈活性和便利性。此外，電流測量功能可幫助使用者監控負載電流，並檢查繼電器的開關狀態，確保負載在燈控迴路中正常工作，避免繼電器卡住。

LC 系列照明控制模組易於使用，無需專業技能即可安裝和操作，也無需軟件亦可控制燈控通道。當需要藉由軟體控制時，可由 Modbus RTU 通信協議進行編程，另外 Modbus RTU 通信位址可以由硬體設置。

產品特色

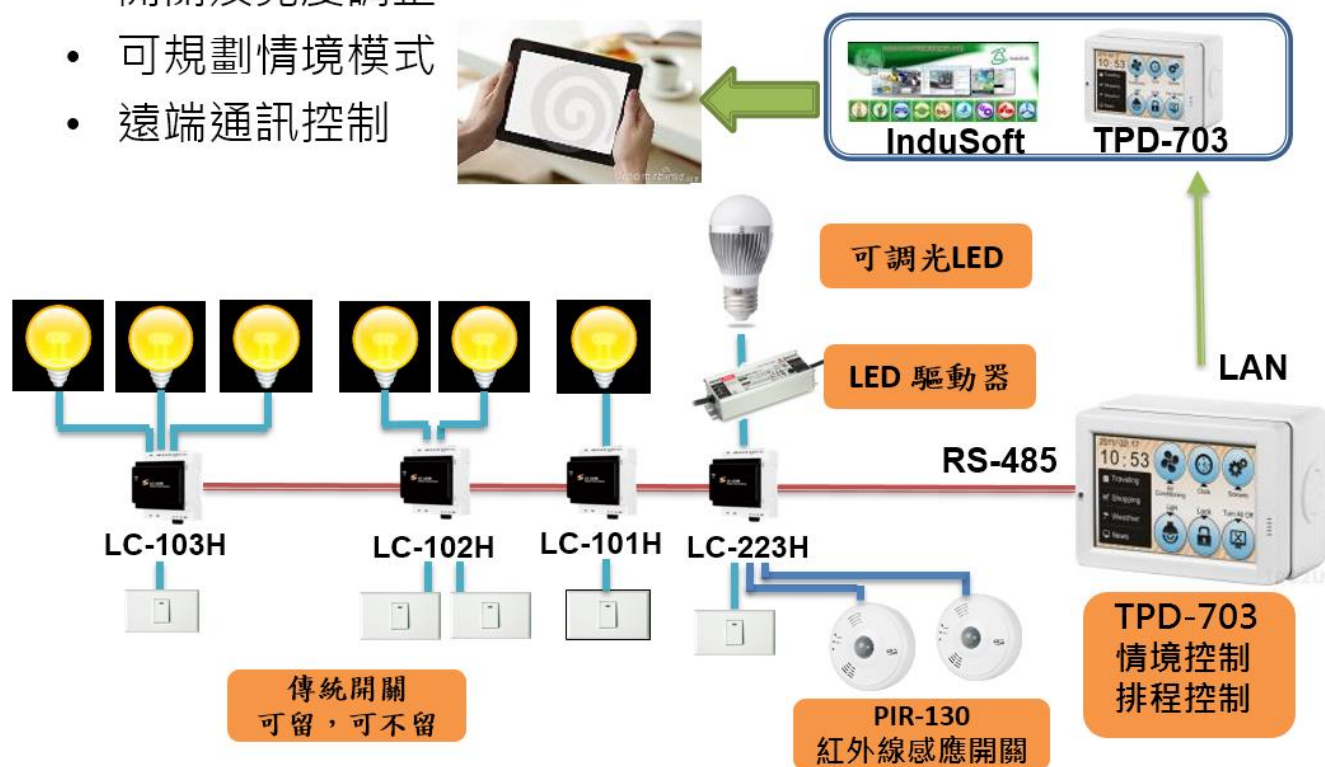
- ▶ 可以透過 RS-485 通訊控制每一個燈控迴路的[亮/暗]
- ▶ 可以透過實體開關，對每個燈控迴路控制[亮/暗]
- ▶ 通訊遠端控制與實體開關可以分開使用，也可以合併使用
- ▶ 燈控迴路輸出繼電器為 Form C，可以搭配實體開關設計雙切迴路
- ▶ 可以由 RS-485 通訊讀回燈控迴路上的電流值，判斷迴路上電燈是否故障，以及雙切迴路上的電燈為[亮 or 暗]
- ▶ 燈控迴路上電流值，其範圍從 0 到 5 A
- ▶ 建議可連接燈具數量：

白熾燈：40 W/220 VAC * 5 顆

LED（電子整流器）：40 W/ 220 VAC *8 組

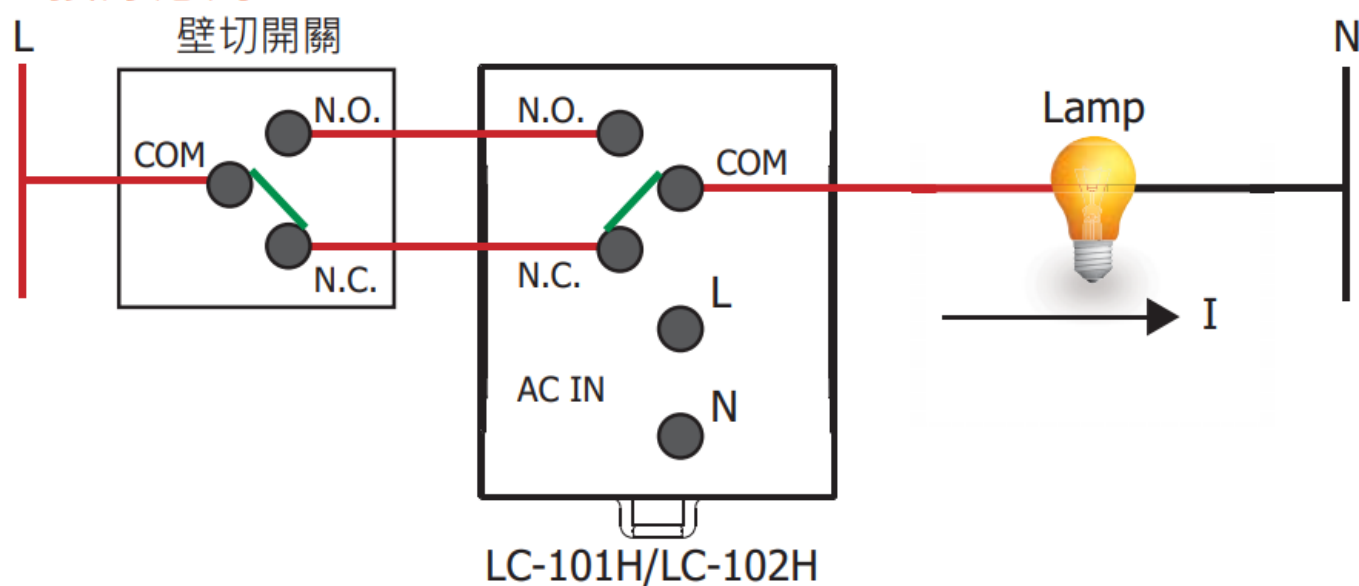
燈光控制

- 開關及亮度調整
- 可規劃情境模式
- 遠端通訊控制



(例如:正常接 10 盞燈時，電流為 2.2A，當讀到小於 2.2A 時，可以判斷有燈故障，需派人維修)

接線應用



2. 硬體

2.1 規格

Module	LC-101H	LC-102H
通訊		
Ports	1 x RS-485	
Data Format	N,8,1/O,8,1/E,8,1/N,8,2	
Baud Rate	Hardware Configuration: Fixed 9600 bps Software Configuration: 1200 to 115200 bps	
通訊協議	Modbus RTU / DCON	
軟體		
功能	Local and Remote Direct Control Relay ON/OFF and Remote Status Monitoring	
節點位址	32 to 63 for hardware configuration	
LED 燈		
狀態	1 LED as Power Indicator	
EMS 防護		
ESD (IEC 61000-4-2)	±4 kV Contact for each Terminal	
EFT (IEC61000-4-4)	±4 kV for Power	
SURGE(IEC 61000-4-5)	±2 kV for Power	
電源		
反極性保護	Yes	
端子供電	10 ~ 30 VDC	
功耗	1.9 W Max.	2.8 W Max.
機構		
尺寸(W x L x H)	72 mm x 95 mm x 57 mm	
安裝	DIN-Rail	
環境		
工作溫度	-25 to +75°C	
儲存溫度	-30 to +80°C	
濕度	10 to 95% RH, Non-condensing	

I/O 規格

Module	LC-101H	LC-102H
數位輸入		
通道數	1	2
類型	Wet Contact, 90 ~ 240 V _{AC}	
On 電壓準位	65 VAC	
Off 電壓準位	56 VAC	
輸入阻抗	68 KΩ, 2W	
隔離	3000 VDC	
繼電器輸出帶電流量測		
通道數	1	2
類型	Power Relay, Form C (SPDT N.O+N.C..)	
觸點規格	30 A @ 250 VAC	
Max. Inrush Current	112A /1ms	
Number of lighting fixtures	(1).Incandescent Lamp: 40W/ 220VAC * 5 Sets (2).LED(Electronic ballast): 40W/ 220VAC *8 Sets	
作動時間	15 ms Max	
釋放時間	22 ms Max.	
電氣耐久性	100,000 ops.	
機械耐久性	10,000,000 ops	
交流電負載電流測量	Yes, 0 ~ 5 A range with 3% of FSR Accuracy.	
上電值	Yes	
安全值	Yes	

2.2 外觀



LED 指示燈

► 電源：電源/通訊指示燈

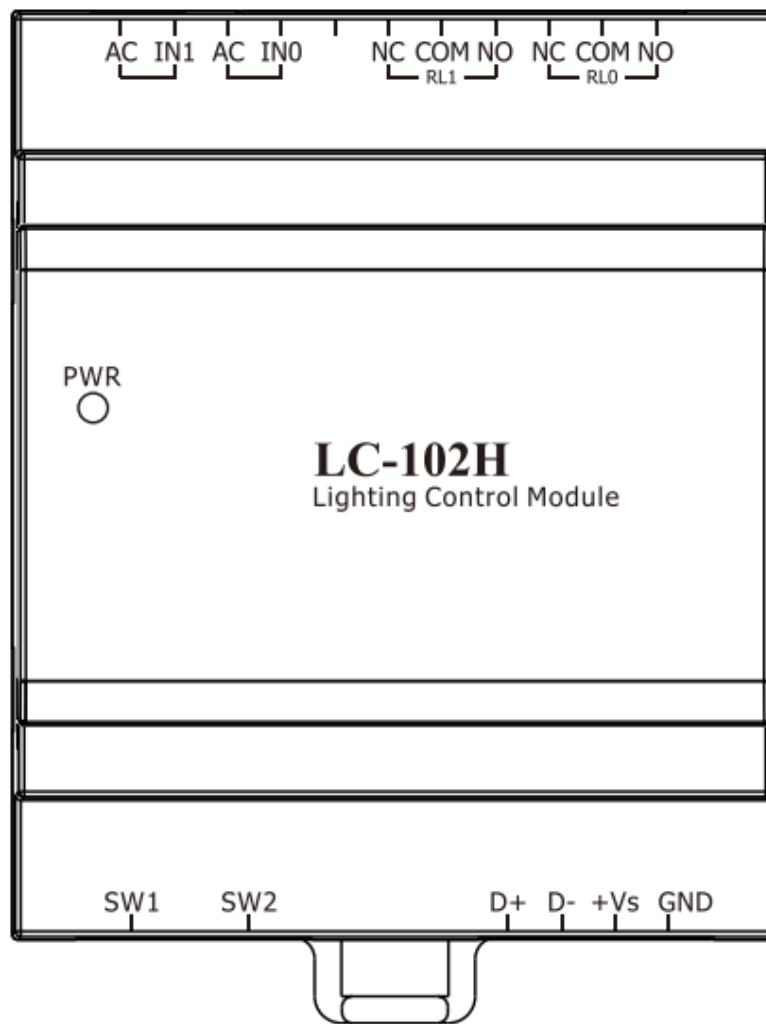
開關 (SW1)

SW1	ON DIP	0 to F for Address 32-47 (Node Address - Low)
	ON DIP	0 to F for Address 48 -63 (Node Address - High)

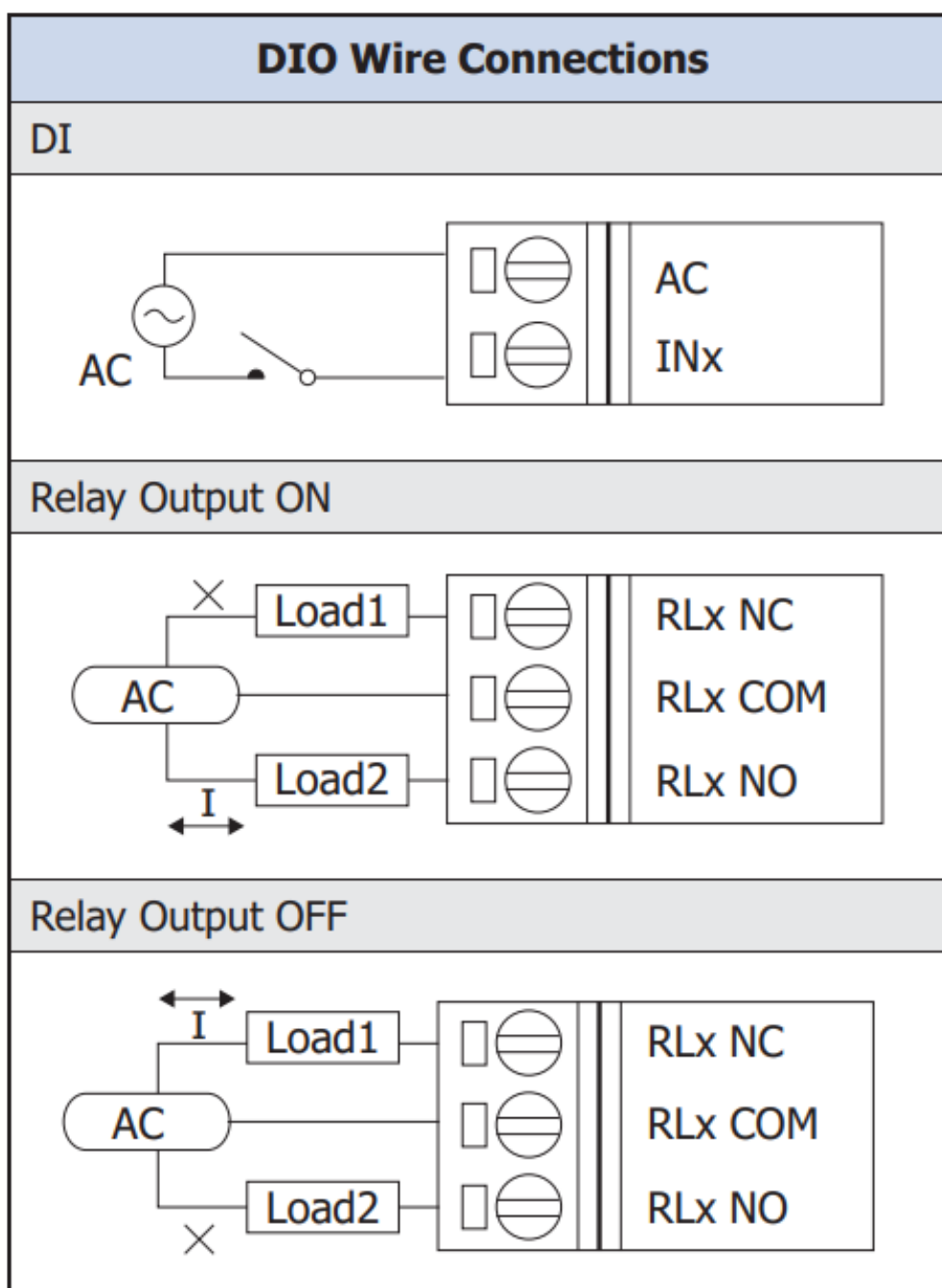
開關 (SW2)

SW2	1	ON	DCON Protocol
		OFF	Modbus RTU Protocol
	2	ON	Software Configuration
		OFF	Hardware Configuration
	3	ON	Node Address (High)
		OFF	Node Address (Low)
	4	ON	INIT Mode
		OFF	Normal Mode

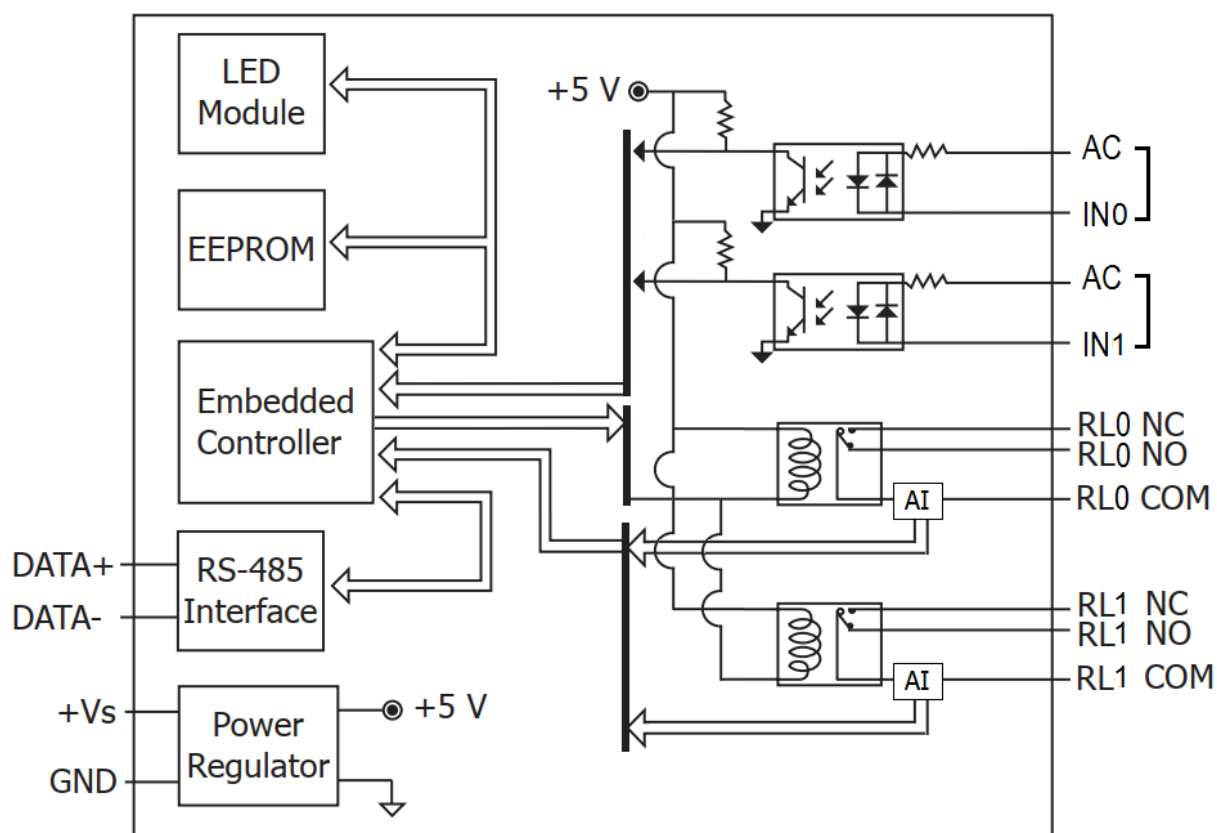
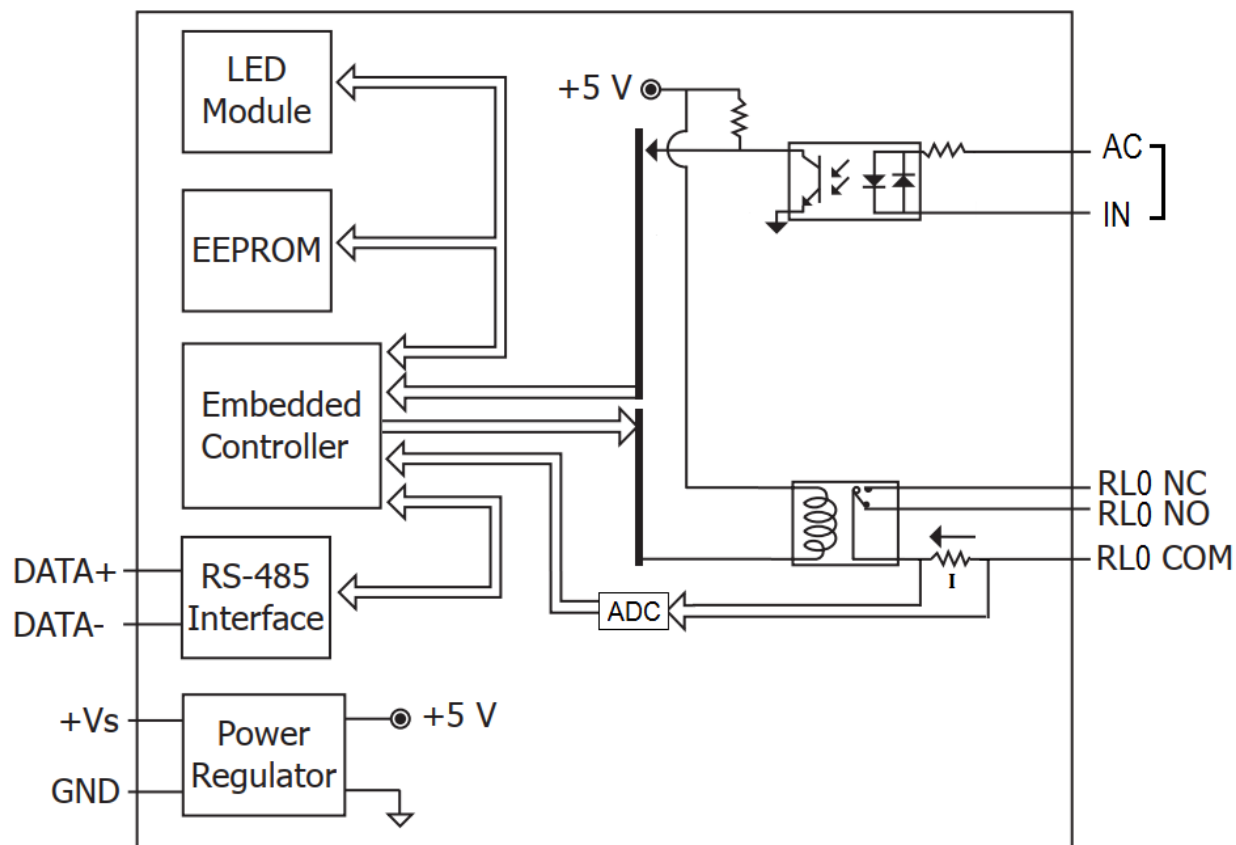
2.3 腳位配置



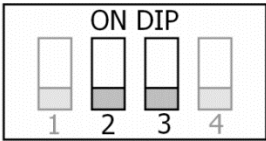
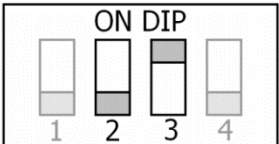
2.4 腳位配線



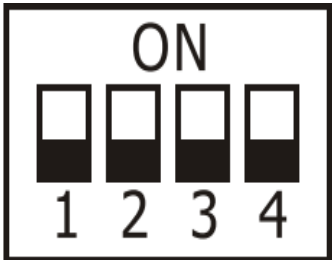
2.5 内部 I/O 結構



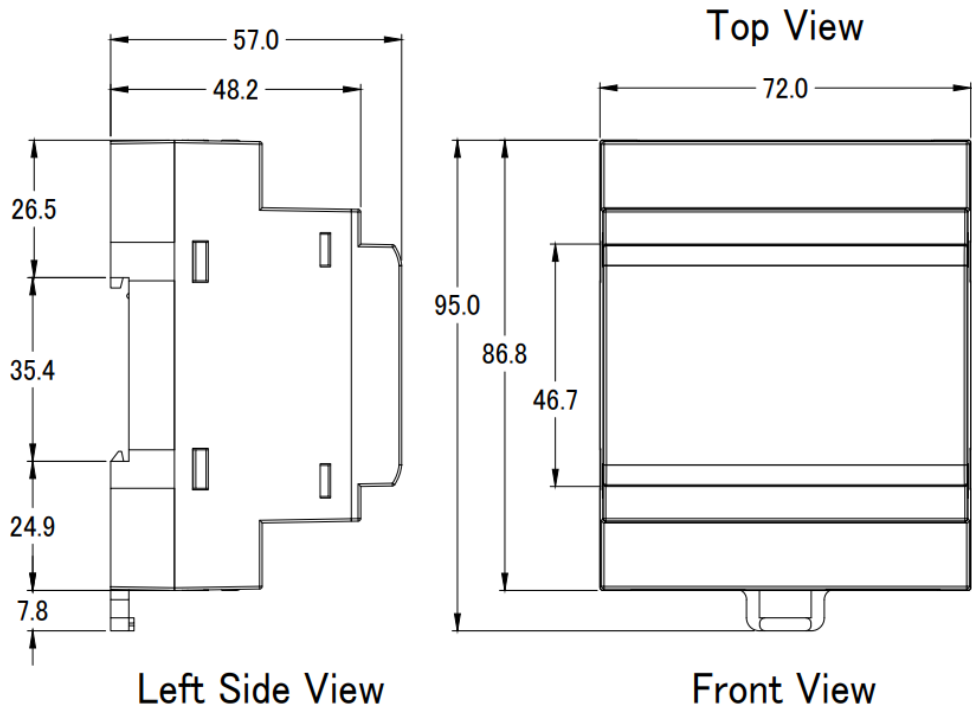
2.6 開關 (SW1)

SW1 	ON DIP 	0 to F for Address 32-47 (Node Address - Low)
	ON DIP 	0 to F for Address 48 -63 (Node Address - High)

2.61 開關 (SW2)

SW2 	1	ON	DCON Protocol
		OFF	Modbus RTU Protocol
	2	ON	Software Configuration
		OFF	Hardware Configuration
	3	ON	Node Address (High)
		OFF	Node Address (Low)
	4	ON	INIT Mode
		OFF	Normal Mode

2.7 尺寸 (unit: mm)



3. 通過 RS-485 通訊進行配置

➤ RS-485 通訊的出廠默認設置

- 位址: 1
- 通訊協定: Modbus RTU / DCON
- Baud rate: Hardware Configuration: Fixed 9600 bps
Software Configuration: 1200 to 115200 bps
- Data Format: N,8,1/O,8,1/E,8,1/N,8,2

註釋

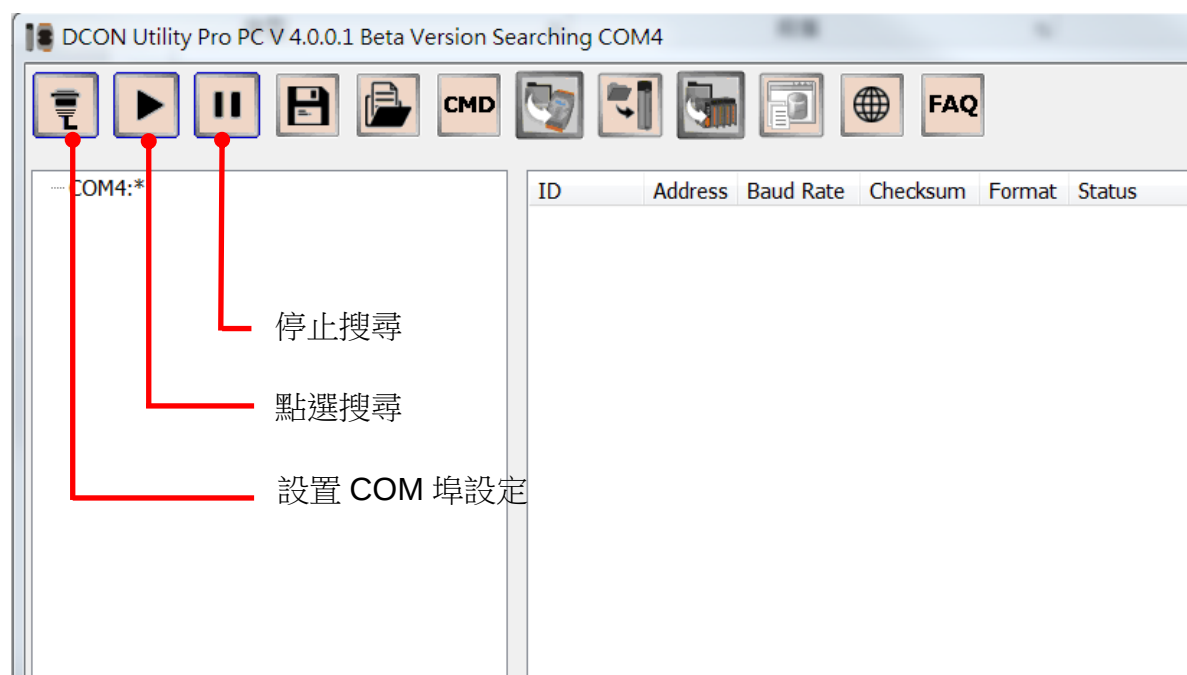
如果有多個 LC-101H/LC-102H 連接到同一個 RS-485 網絡，則需要為每個模塊設置一個唯一的 RS-485 位址。如多個模塊具有相同位址會導致通訊失敗。

➤ RS-485 通訊

1. 下載位置 DCON Utility Pro

泓格科技官方網站: https://www.icpdas.com/en/download/DCON_Utility_Pro

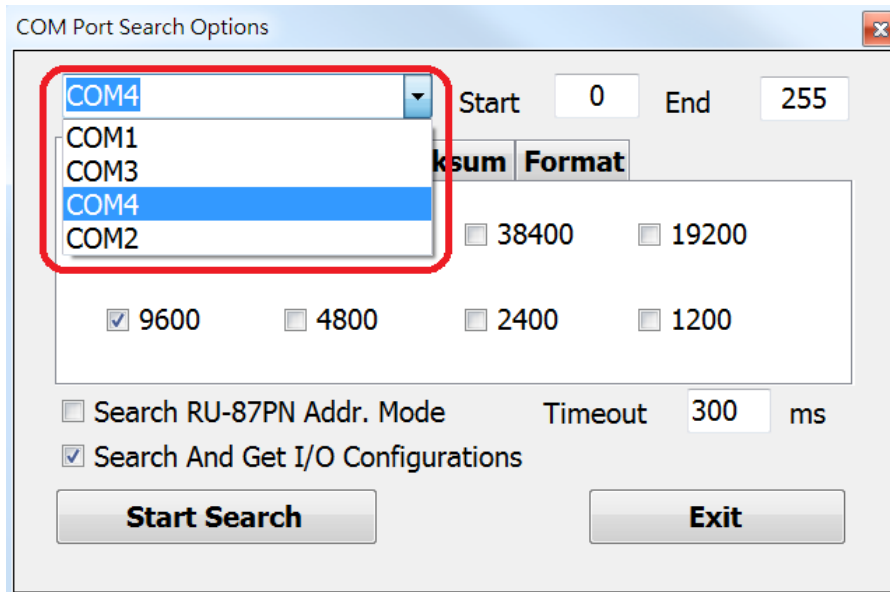
2. 點選開啟 DCON_Utility_Pro.exe.



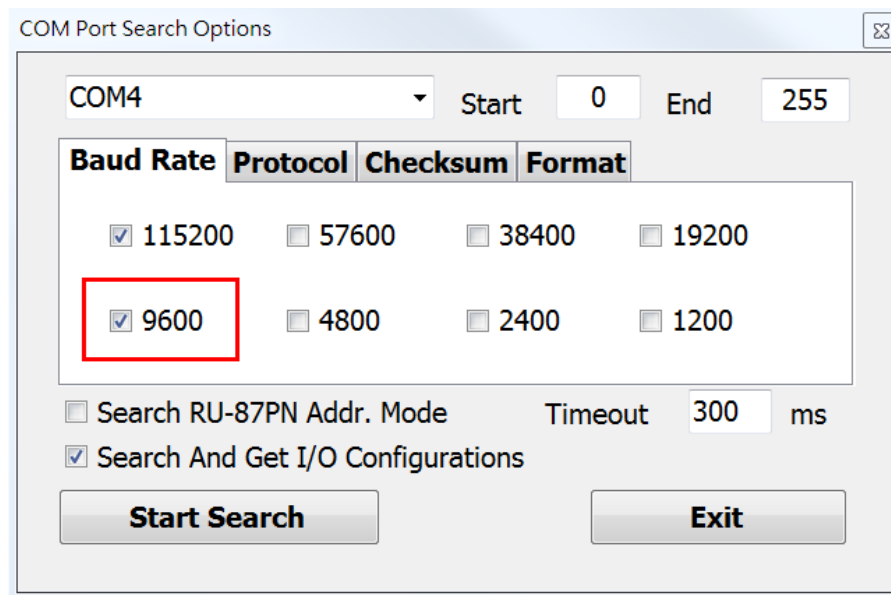
3. 點擊圖標 設定選擇 COM 埠



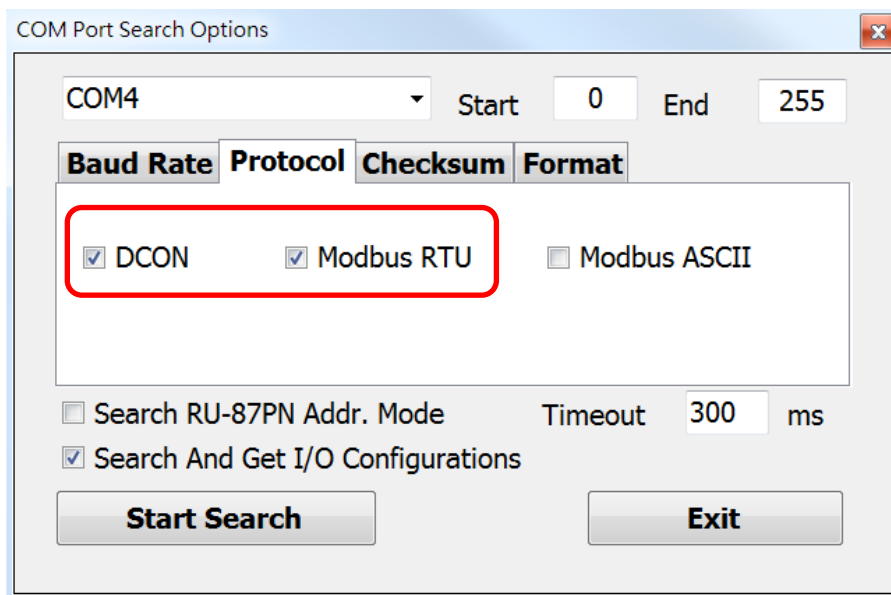
4. 選擇 COM 埠編號，連接 LC-101H/LC-102H 記錄器。



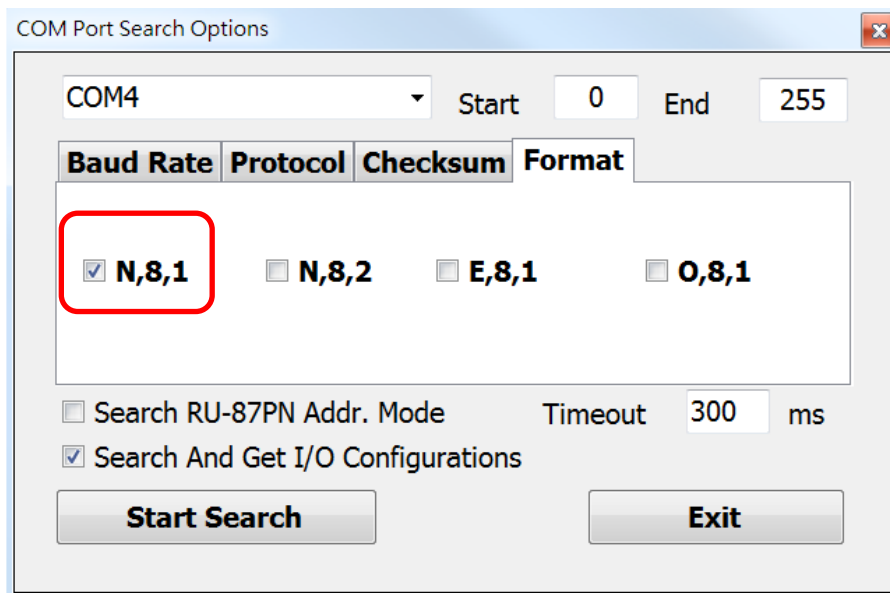
5. Baud Rate 出廠默認 9600 bps。



6. 選擇通訊協議



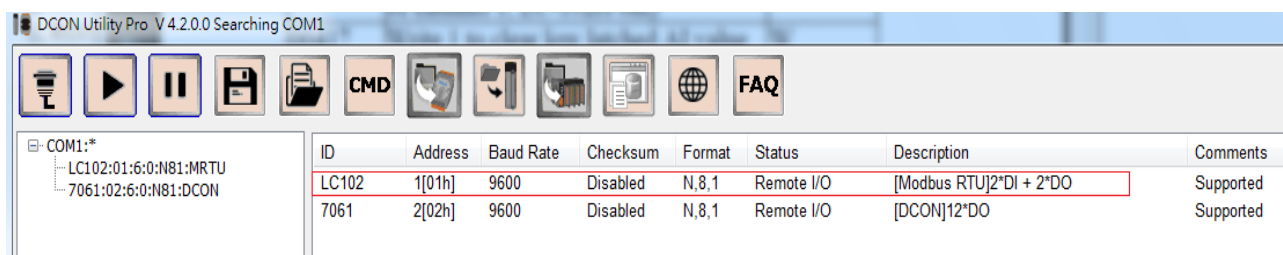
7. 選擇格式選項



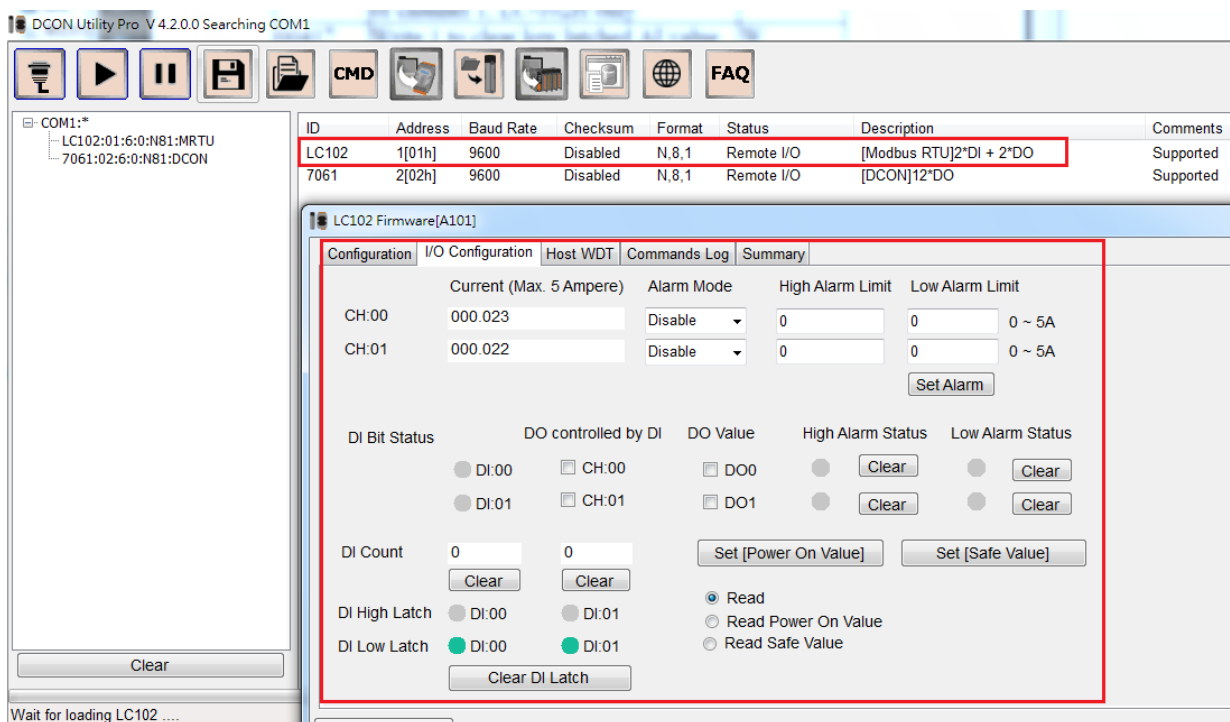
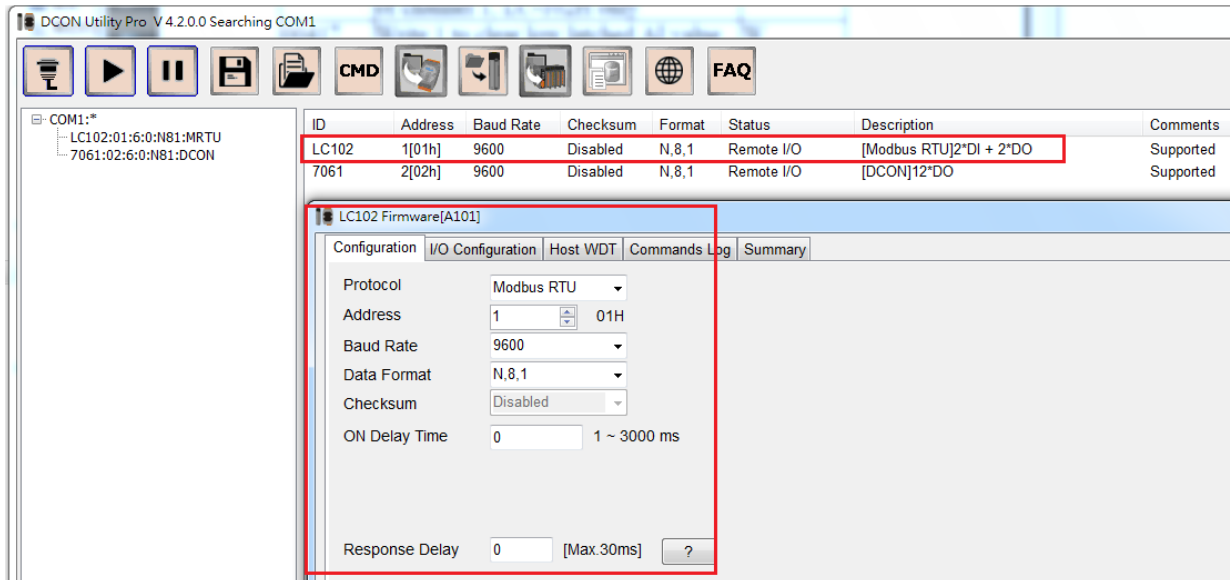
8. 點擊開始搜尋圖標。



9. 搜尋到 LC-101H 或 LC-102H 記錄器



10. 點擊模組名稱後即可設定記錄器。



註釋

當需要修改通訊協議/Baud Rate/Parity/Checksum 其中任何項目時，需要將引腳 4.INIT 設置在 ON 位置並重啟記錄器，然後進行修改該項目。

設置完成後，將引腳 4.INIT 設置回 OFF 位置，並重新上電記錄器即設置生效。

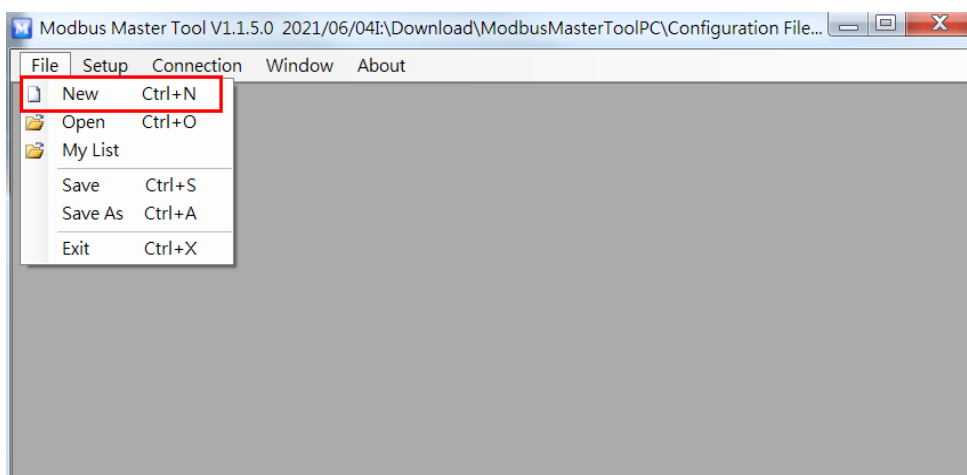
附錄 A: Modbus Master Tool PC

Modbus Master Tool PC 是一款免費、易用的 Modbus 通訊和接線診斷工具。

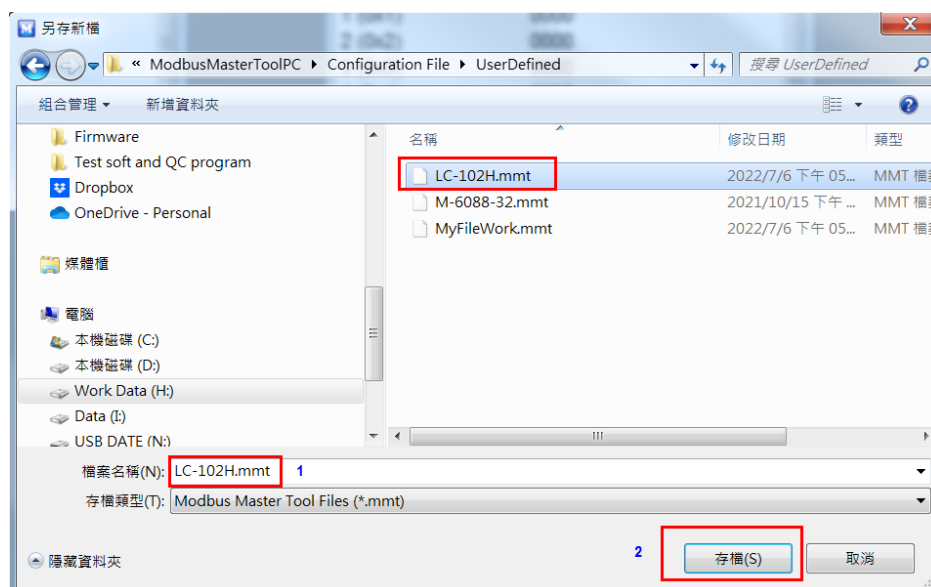
檔案下載連結 : <https://www.icpdas.com/en/download/ModbusMasterToolPC>

本章節指導使用 LC-101H/LC-102H 記錄器創建 Modbus 通信的步驟。

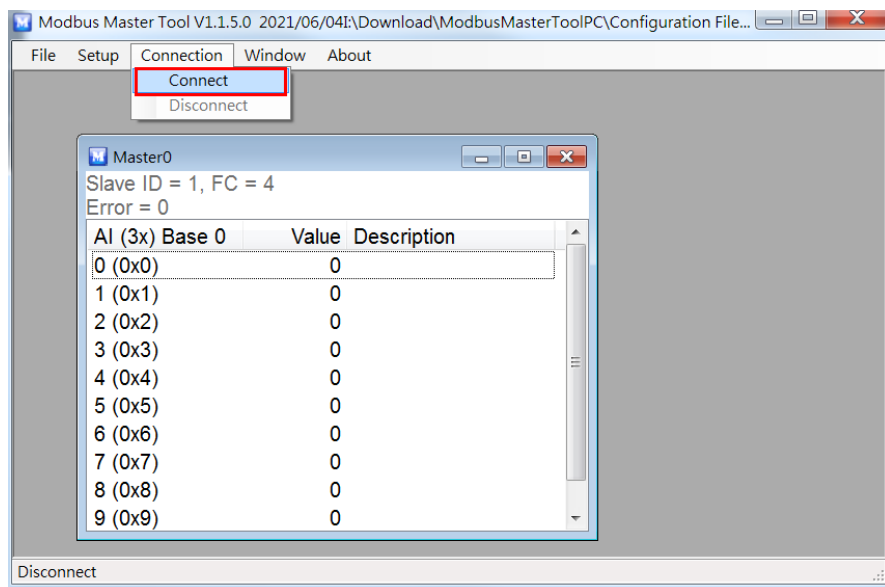
1. 點擊 ModbusMasterToolPC.exe.
2. 在主選單中選擇新建。



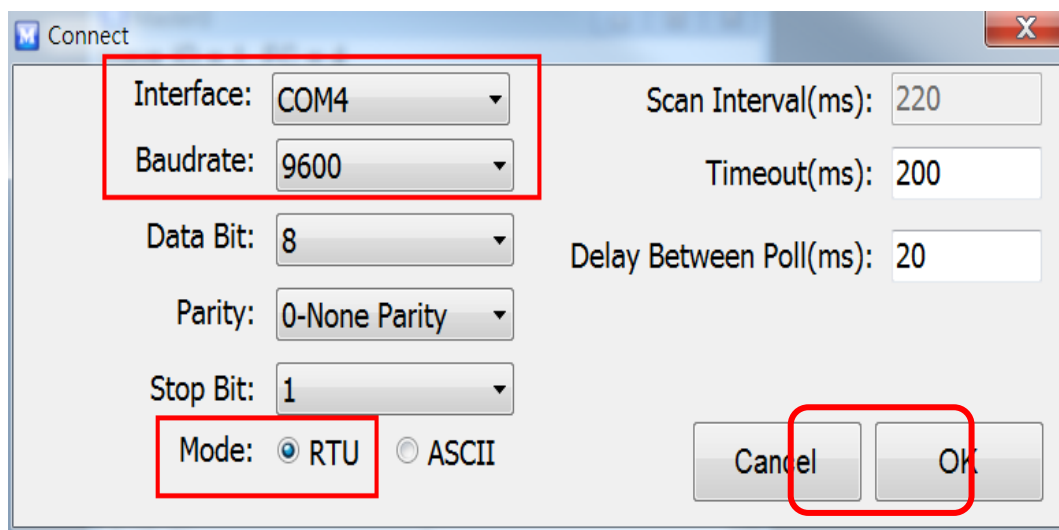
3. 輸入模組名稱，然後點擊“保存”按鈕。



4. 在主選單中選擇連接。

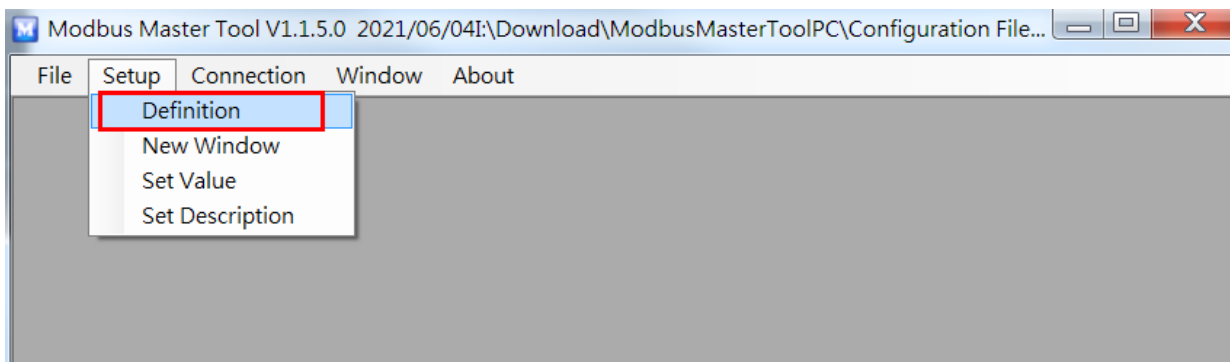


5. 選擇通訊介面。



使用 RS-485 作為通訊介面時，選擇 COM 埠，勾選 RTU 模式，點擊 OK 按鈕。

6. 在設置選單中選擇定義。



7. 選擇 Modbus 功能碼，輸入起始位址和長度，點擊 OK 按鈕。

Definition

Slave ID: 1

Type: Read Coils Status (0xxxx) for DO

Addresses: ☐ Base 0 ☒ Base 1

Address: 1

Length: 32 00001 to 00032

Format: Singed Int16

Descriptions: ☐ Clear All Descriptions

OK Cancel

8. 讀取數據。

Modbus Master Tool V1.1.5.0 2021/06/04I:\Download\ModbusMasterToolPC\Configuration File...

File Setup Connection Window About

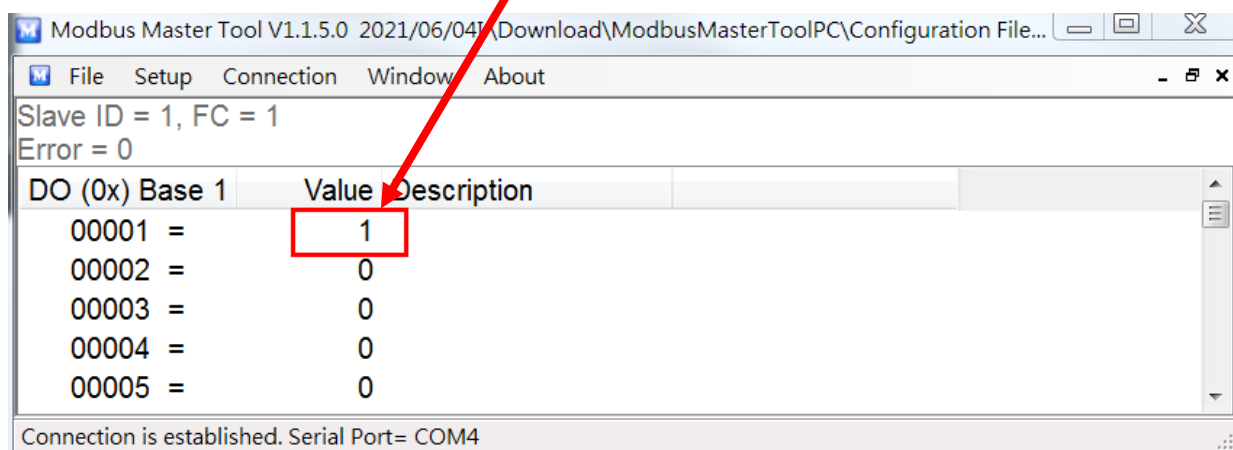
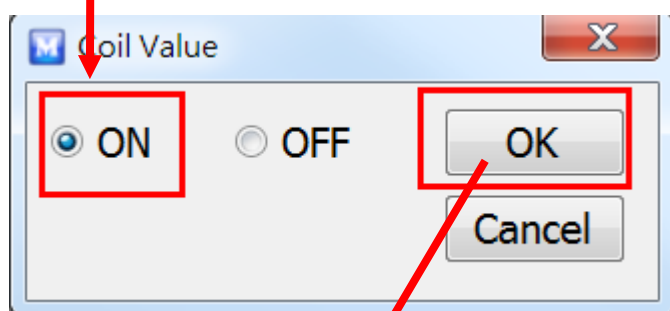
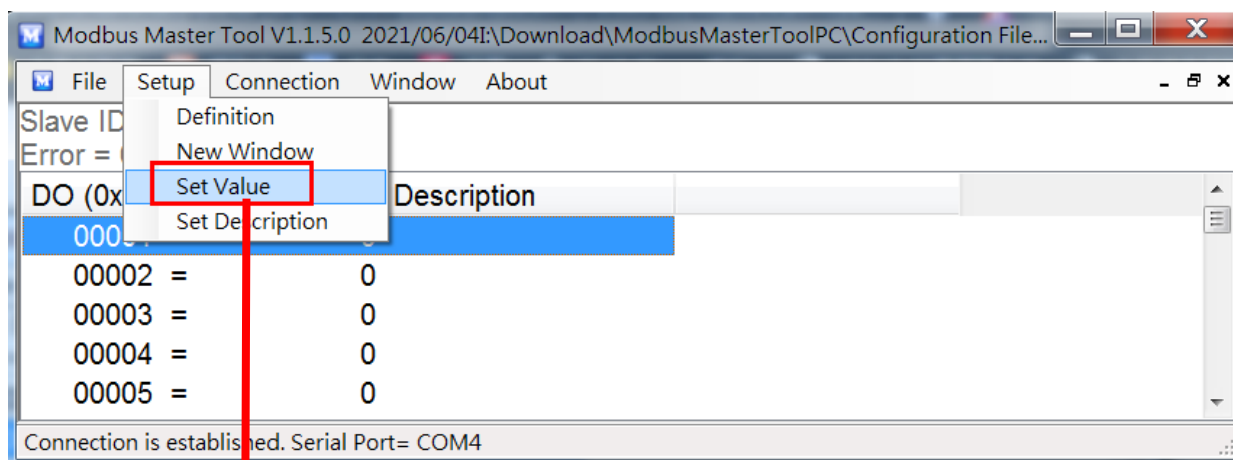
Slave ID = 1, FC = 1
Error = 0

DO (0x) Base 1	Value	Description
00001 =	1	
00002 =	0	
00003 =	0	
00004 =	0	
00005 =	0	
00006 =	0	
00007 =	0	
00008 =	0	
00022 =	0	
00023 =	0	
00024 =	0	
00025 =	0	
00026 =	0	
00027 =	0	
00028 =	0	
00029 =	0	
00030 =	0	
00031 =	1	
00032 =	1	

Connection is established. Serial Port= COM4

9. 寫入數據保持寄存器或線圈狀態

1. 列表中選擇 0001 選項
2. 在設置選單中選擇設定值
3. 在設定值框中輸入數據，然後點擊 OK 按鈕



附錄 B: Modbus 位址表

LC-101H/LC-102H Modbus Address Mappings (Base 1)

Address	Description	Attribute
30001 40001	Counter value of digital input channel 0	R
30002 40002	Counter value of digital input channel 1, LC-102H only	R
30033 40033	Current input value of channel 0 in mA	R
30034 40034	Current input value of channel 1 in mA, LC-102H only	R
30225 40225	High alarm limit of current input value of channel 0 in mA	R/W
30226 40226	High alarm limit of current input value of channel 1 in mA, LC-102H only	R/W
30233 40233	Low alarm limit of current input value of channel 0 in mA	R/W
30234	Low alarm limit of current input	R/W

40234	value of channel 1 in mA, LC-102H only	
40481	Firmware version (low word)	R
40482	Firmware version (high word)	R
40483	Module name (low word)	R
40484	Module name (high word)	R
40485	RS-485 module address, 1 to 247	R/W
40486	RS-485 baud rate and parity settings Bits 5:0 Baud rate, valid range: 3 ~ 10 Bits 7:6 00: no parity, 1 stop bit 01: no parity, 2 stop bit 10: even parity, 1 stop bit 11: odd parity , 1 stop bit	R/W
40488	RS-485 response delay time in ms, valid range, 0 ~ 30	R/W
40489	Host watchdog timeout value, 0 to	R/W

	255, in 0.1s	
Address	Description	Attribute
40492	RS-485 host watchdog timeout count, write 0 to clear	R/W
40498	DO silent time on power-on in ms, 0 to 5000	R/W
30513 40513	High latched current input value of channel 0 in mA	R
30514 40514	High latched current input value of channel 1 in mA, LC-102H only	R
30545 40545	Low latched current input value of channel 0 in mA	R
30546 40546	Low latched current input value of channel 1 in mA, LC-102H only	R
00001	Digital output channel 0	R/W
00002	Digital output channel 1, LC-102H only	R/W
00033 10033	Digital input status of channel 0	R

00034 10034	Digital input status of channel 1, LC-102H only	R
00065 10065	Latched high of digital input status of channel 0	R
00066 10066	Latched high of digital input status of channel 1, LC-102H only	R
00069 10069	Latched high of digital output status of channel 0	R
00070 10070	Latched high of digital output status of channel 1, LC-102H only	R
00097 10097	Latched low of digital input status of channel 0	R
00098 10098	Latched low of digital input status of channel 1, LC-102H only	R
00101 10101	Latched low of digital output status of channel 0	R
00102 10102	Latched low of digital output status of channel 1, LC-102H only	R

Address	Description	Attribute
00129	Safe value of digital output channel 0	R/W
00130	Safe value of digital output channel 1, LC-102H only	R/W
00161	Power on value of digital output channel 0	R/W
00162	Power on value of digital output channel 1, LC-102H only	R/W
00193	Counter trigger edge of digital input channel 0 0: updated on falling edge 1: updated on rising edge	R/W
00194	Counter trigger edge of digital input channel 1 0: updated on falling edge 1: updated on rising edge LC-102H only	R/W
00257	Protocol, 0: DCON, 1: Modbus	R/W

	RTU	
00260	Modbus Host Watchdog mode 0: The same as I-7000 series modules 1: The DO command will clear Host Watchdog timeout status	R/W
00261	Host Watchdog 0: Disabled 1: Enabled	R/W
00264	Write 1 to clear the latched digital input and output status	W
00266	Inverse the digital output level 0: No inverse 1: Inverse	R/W
00270	Host Watchdog timeout status, write 1 to clear the Host Watchdog timeout status	R/W
00272	Write 1 to reload calibration parameters	W

Address	Description	Attribute
00273 10273	Reset status, 1: first read after powered on, 0: not the first read after powered on	R
00274	DO0 is controlled by DI0 0: disable 1: enable	R/W
00275	DO1 is controlled by DI1 0: disable 1: enable LC-102H only	R/W
00280	Write 1 to clear all high latched AI values	W
00281	Write 1 to clear all low latched AI values	W
00289	Low alarm status of channel 0, write 1 to clear latched alarm status	R/W
00290	Low alarm status of channel 1, write 1 to clear latched alarm	R/W

	status, LC-102H only	
00305	High alarm status of channel 0, write 1 to clear latched alarm status	R/W
00306	High alarm status of channel 1, write 1 to clear latched alarm status, LC-102H only	R/W
00321	Alarm mode of channel 0 0: disabled 1: enabled	R/W
00322	Alarm mode of channel 1 0: disabled 1: enabled LC-102H only	R/W
00337	Alarm type of channel 0 0: momentary 1: latched	R/W
Address	Description	Attribute
00338	Alarm type of channel 0 0: momentary	R/W

	1: latched LC-102H only	
00385	Write 1 to clear high latched AI value of channel 0	W
00386	Write 1 to clear high latched AI value of channel 1, LC-102H only	W
00417	Write 1 to clear low latched AI value of channel 0	W
00418	Write 1 to clear low latched AI value of channel 1, LC-102H only	W
00513	Write 1 to clear counter value of digital input channel 0	W
00514	Write 1 to clear counter value of digital input channel 1, LC-102H only	W

附錄 C: DCON 指令表

Command	Description
\$AA0CN	Span calibration of an analog input channel, N is 0 for LC-101H and 0 or 1 for LC-102H. Span calibration current is 5A.
\$AA1CN	Zero calibration of an analog input channel, N is 0 for LC-101H and 0 or 1 for LC-102H. Zero calibration current is 0.1A.
\$AA2	read configuration
\$AA4	Read the synchronized data that was retrieved by the last #** command. response > SOI0000, S is 1 for the first read and 0 for not the first read
\$AA5	read reset status !AA1 first after power on, !AA0 others
\$AA6	Read the digital output and input status response > 000I00, where O is digital output and I is digital input
\$AAC	Clear the status of the latched digital input and output channels.
\$AACN	Clear the counter value of a digital input channel, N is 0 for LC-101H and 0 or 1 for LC-102H.
\$AAF	read firmware version
\$AAI	read INIT status response: !AA0 -> INIT short to GND !AA1 -> else
\$AALS	Read the status of the latched digital output and input channels, S is 0 to read the low latched status and 1 to read the high latched status. response: !000I00
\$AALC0h	Specify the dependency of the digital output channel on the digital input channel, h is a hexadecimal value, where bit 0

	corresponds to channel 0 and bit 1 corresponds to channel 1. Channel 1 is only for LC-102H. For each bit, 0 denotes no dependency and 1 for dependency.
\$AALC1	Read the dependency of the digital output channel on the digital input channel. response: !AAh
\$AALC2hhhh	Set the no operation time on power-on of the digital output channels, where hhhh is four digit hexadecimal value in ms.
\$AALC3	Read the no operation time on power-on of the digital output channels. response: !AAhhhh
\$AAM	read module name

Command	Description
\$AAP	Read Modbus RTU/DCON protocol response: !AA0 -> DCON !AA1 -> Modbus RTU
\$AAPN	Set Modbus RTU/DCON protocol N-> 0: DCON, 1: Modbus RTU
\$AAS1	Reload factory calibration parameters.
#**	Instruct the module to read digital input/output data and store the data to be retrieved by the \$AA4 command.
#AA	Read all analog inputs response > (channel 0 current) for LC-101H > (channel 0 current)(channel 1 current) for LC-102H Data format SDD.DDD, where S is sign '+' or '-' and D is decimal digit
#AAN	Read digital input counter value of a channel N = 0 for LC-101H, 0 and 1 for LC-102H response !AAddddd

#AA000h	Set the digital output values, h is a hexadecimal value, where bit 0 corresponds to DO0 and bit 1 corresponds to DO1. DO1 is only for LC-102H.
#AA0A0h	Set the digital output values, h is a hexadecimal value, where bit 0 corresponds to DO0 and bit 1 corresponds to DO1. DO1 is only for LC-102H.
#AA1c0b	Set a single digital output channel, c specifies the channel 0 or 1, b is 0 for off and 1 for on. Channel 1 is only for LC-102H.
#AAAc0b	Set a single digital output channel, c specifies the channel 0 or 1, b is 0 for off and 1 for on. Channel 1 is only for LC-102H.
%AANNTTCCFF	set configuration, NN: new address, TT = 00, CC: new baud rate FF: new data format
@AA	read the status of digital output and input channels response >00OI, O is digital output status and I is digital input status
@AAh	set digital output values, h is a hexadecimal value, where bit 0 corresponds to DO0 and bit 1 corresponds to DO1. DO1 is only for LC-102H.
@AACH	Clear all high latched analog inputs to the current values
@AACHN	Clear channel high latched analog input to the current value, N = 0 for LC-101H, and 0 or 1 for LC-102H.
@AACHCN	Clear high latched alarm of a channel, N = 0 for LC-101H, and 0 or 1 for LC-102H.
@AACL	Clear all low latched analog inputs to the current values
@AACLN	Clear channel low latched analog input to the current value, N = 0 for LC-101H, and 0 or 1 for LC-102H.

Command	Description
@AACLN	Clear low latched alarm of a channel, N = 0 for LC-101H, and 0 or 1 for LC-102H.
@AADACN	Disable analog input alarm of a channel, N = 0 for LC-101H, and 0 or 1 for LC-102H.
@AAEATCN	Enable analog input alarm of a channel, N = 0 for LC-101H, and 0 or 1 for LC-102H.

	T->M: momentary alarm, L: latched alarm
@AAHI(data)CN	Set high alarm limit of an analog input channel, N = 0 for LC-101H, and 0 or 1 for LC-102H.
@AALO(data)CN	Set low alarm limit of an analog input channel, N = 0 for LC-101H, and 0 or 1 for LC-102H.
@AARACN	Read analog input alarm enabled/disabled status of a channel response !AAN, N->0: disabled, 1: momentary, 2: latched
@AARAO	Read analog input alarm status response !AAHLL
@AARH	Read all high latched values of analog input channels
@AARHN	Read channel high latched value of analog input
@AARHCN	Read high alarm limit of an AI channel
@AARL	Read all low latched values of analog input channels
@AARLN	Read channel low latched value of analog input
@AARLCN	Read low alarm limit of an AI channel
~**	clear host watchdog timeout counter
~AA0	read host watchdog status
~AA1	clear host watchdog timeout status
~AA2	read host watchdog enable/disable status and timeout value
~AA3ETT	enable/disable host watchdog and set timeout value E-> 0: disable host watchdog, 1: enable host watchdog TT: host watchdog timeout in 0.1s in hex format
~AA4V	read digital output power on or safe value, V is P for power on and S for safe.
~AA5V	set the current digital output value as power on or safe value, V is P for power on and S for safe
~AAD	Read the miscellaneous settings of a module response !AAhh, hh: bit 0 for invert digital input channels and bit 1 for invert digital output channels.
~AADVV	Set the miscellaneous settings of a module, where VV is a two digital hexadecimal value, bit 0 for invert digital input channels and bit 1 for invert digital output channels.
~AAEV	Enable/disable module calibration, V is 0 to disable and 1

	to enable.
~AARD	read response delay time in ms in hex format
~AARDVV	set response delay time in ms, VV in hex format, 00 - 1E

Baud Rate Settings (CC)

Code	03	04	05	06	07	08	09	0A
Baud Rate	1200	2400	4800	9600	19200	38400	57600	115200

Data Format Settings (FF)

7	6	5	4	3	2	1	0
CU	CS	Reserved					

Key	Description
CS	Checksum Settings 0: Disabled 1: Enabled
CU	Counter Update: 0: The counter is updated when there is a falling edge in the input signal. 1: The counter is updated when there is a rising edge in the input signal.

Note: All Reserved bits should be zero.

DIP 撥碼開關設置表

1	Protocol	ON: DCON, OFF: Modbus RTU
2	Configuration	ON: by software, OFF: by hardware
3	Address	ON: added by 16, OFF: added by 0
4	INIT mode	ON: INIT, OFF: Normal

Base address: 32 (0x20)