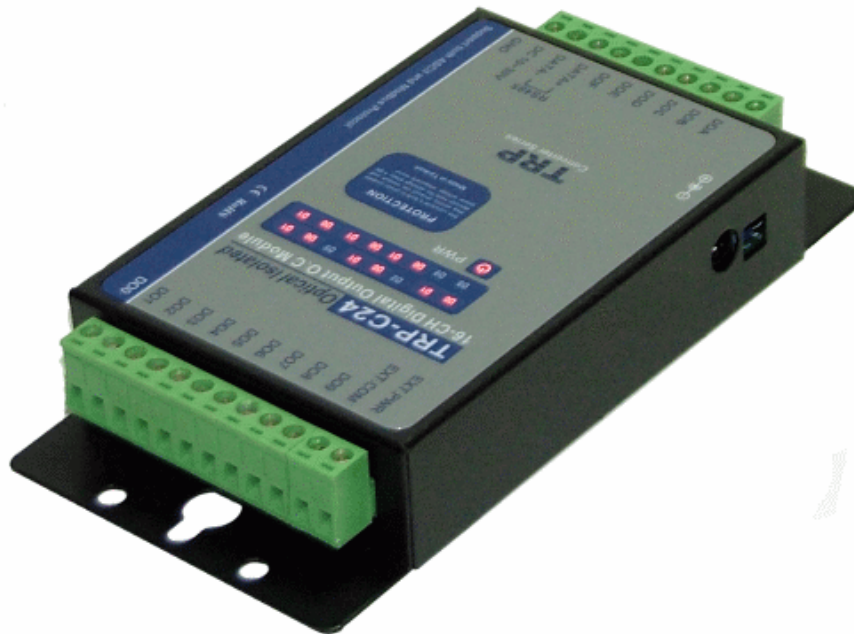


# TRP-C24

**16 channels digital output Isolated RS-485 Module, open collector.  
Support ASCII and Modbus RTU protocol**



## User's Manual

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# 1.Introduction

The TRP-C24, an isolated output open collector RS-485 module, provides 16 digital outputs channels that allow you output open collector signal (100mA) to driven your devices on RS-485 network. All channels feature screw terminals for convenient connection of field signals as well as LED's to indicate channel working status. All outputs are equipped with photo-couplers to protect the module against high voltage spikes, as well as ground potential differences. For easy user access, TRP-C24 can enter configuration mode and self-test mode with outer dip-switch. TRP-C24 support both ASCII and Modbus protocol, with a full set of command, dual watch-dog, and auto reset function the module can be remote controlled by PC in ASCII or Modbus RTU protocol.

## 1-1.Features

- Wide input range DC power supply.
- Support ASCII and Modbus RTU protocol.
- Supports baud rates from 1.2Kbps to 115.2 Kbps.
- Digital output signal with 3750Vrms isolation protection.
- Dual watchdog: Module's firmware, host computer traffic.
- LED for each channels working status.
- DIN-Rail and panel mount support.
- Configured and self-test by external dip-switch.
- Support screw terminal and external DC power adaptor.

## 1-2.Specifications

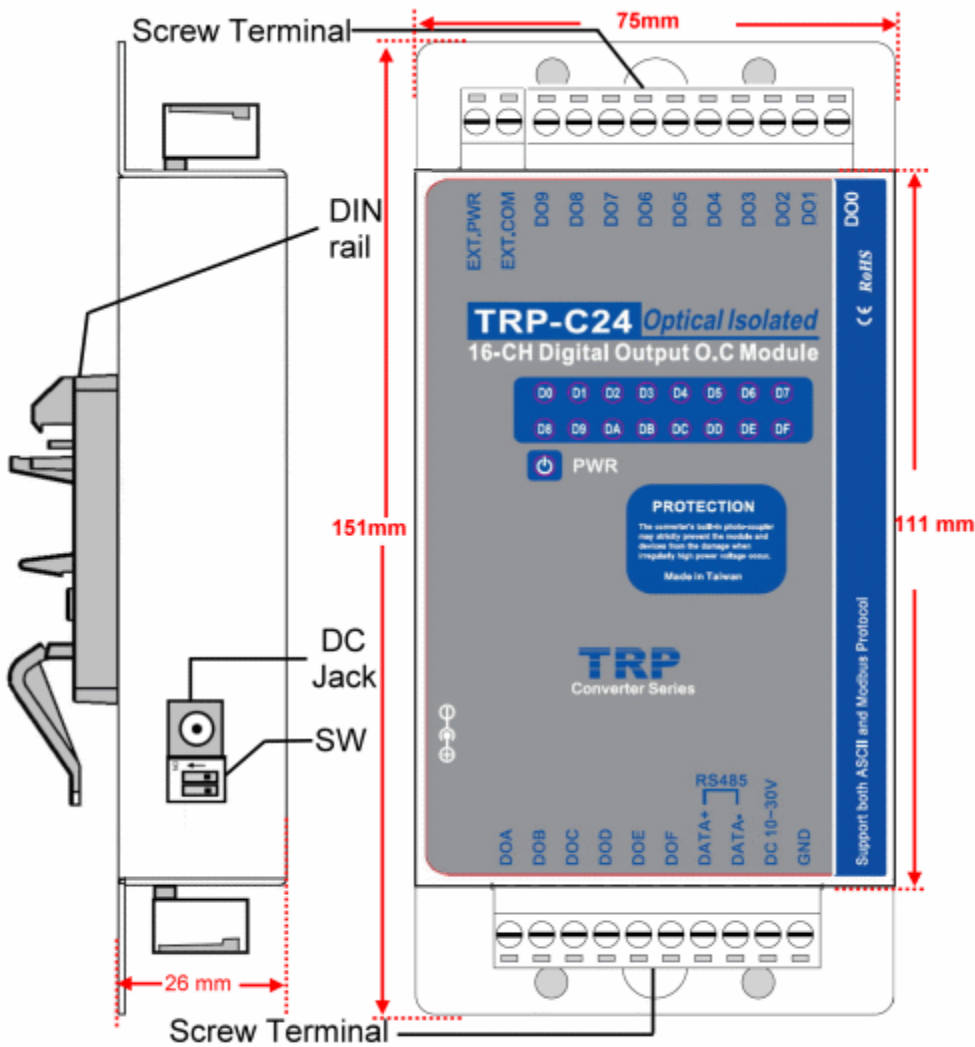
- Power Input Voltage DC +10V to +30V.
- Protocol: ASCII and Modbus RTU.
- Output channel: 16 digital output channels (open collector).
- Digital output isolation: 3750Vrms.
- Communication interface: RS-485 differential 2 half/duplex wires.
- Communication speed form 1.2Kbps to 115.2Kbps auto-switching.
- Data format: Data bit: 8, Parity Check: None, Stop Bit: 1.
- Distance: up to 4000ft (1200M).
- Connection type: Screw terminal for maximum AWG# 12~30 wire.
- Signal LED: Power, and all output channels.
- Power supply: Screw terminal, or external DC adapter.
- Power consumption 1.5W.
- Operating environment: 0 to 65C.
- Storage temperature: -20 to 65C.
- Humidity: 10~90% Non-condensing.
- Dimension: 151mm X 75mm X 26mm.

➤ Weight: 395g.

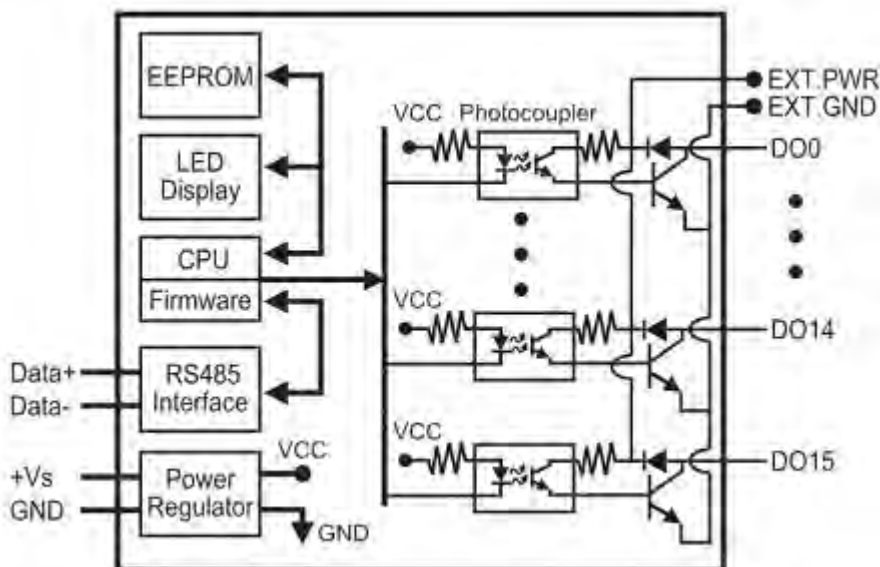
➤

## 2. TRP-C24 Hardware Description

### 2-1. Panel Layout



### 2-2. Block Diagram

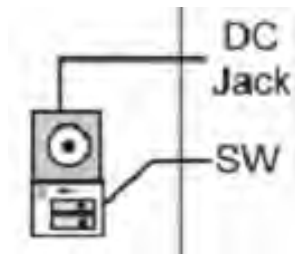


## 2-3. Pin Definitions

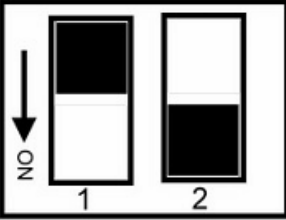
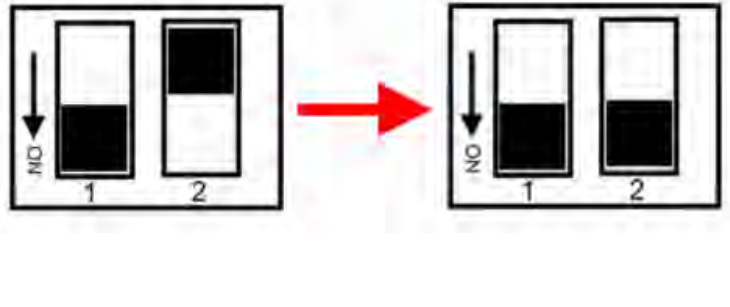
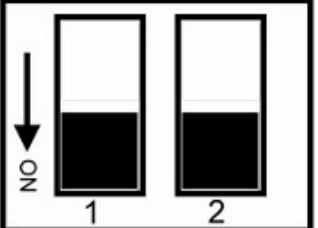
|           |                           |         |  |
|-----------|---------------------------|---------|--|
|           |                           | EXT.PWR | External power for isolation Max.30V DC  |
|           |                           | EXT.GND | External ground for isolation Max.30V DC |
| DIA       | Digital output Channel 10 | DI9     | Digital output Channel 9                 |
| DIB       | Digital output Channel 11 | DI8     | Digital output Channel 8                 |
| DIC       | Digital output Channel 12 | DI7     | Digital output Channel 7                 |
| DID       | Digital output Channel 13 | DI6     | Digital output Channel 6                 |
| DIE       | Digital output Channel 14 | DI5     | Digital output Channel 5                 |
| DIF       | Digital output Channel 15 | DI4     | Digital output Channel 4                 |
| DATA+     | RS485+                    | DI3     | Digital output Channel 3                 |
| DATA-     | RS485-                    | DI2     | Digital output Channel 2                 |
| DC 10~30V | Input DC 10~30V           | DI1     | Digital output Channel 1                 |
| GND       | DC Ground                 | DI0     | Digital output Channel 0                 |

## 2-4. System Configuration Switch

The TRP-C24 support both Modbus/RTU and ASCII communication protocol which can be selected by a 2-pin dip-switch. The dip-switch also provides “back to initial” function when the configuration stored in EEPROM is missing such as ID (RS-485 Module address), baud rate and data format.



|  |   |
|--|---|
|  | <p><b>Modbus Protocol (Factory)</b><br/>Modbus Communication Protocol.<br/>Adjust the switch to “off off” to “ on” position.</p>                        |
|  | <p><b>Back to INITIAL for Modbus</b><br/>Step1. In power on mode, adjust the switch from “off off” to “on off” position.<br/>.Step2. Reboot TRP-C24</p> |

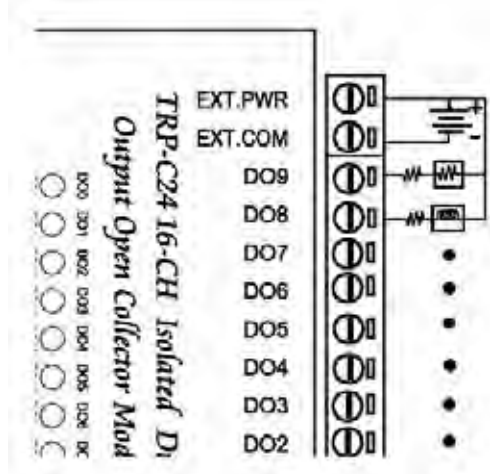
|   |   |
|---|---|
|   | <p><b>ASCII Protocol</b></p> <p>ASCII communication protocol.</p> <p>Adjust the switch to “off on” position.</p>  |
|  | <p><b>Back to INITIAL for ASCII</b></p> <p>Step1. Adjust the switch to “on off” position<br/> Step2. Adjust the switch to “on on” position</p> <p>User may direct adjust the switch In power on status, no system reboot require.</p> |
|  | <p><b>Module self test</b></p> <p>Step1. Adjust the switch to “on on” position<br/> Step2. Reboot.</p>  |

\*INIT: ID=00, Baud-Rate: 9600, Data format: 00.

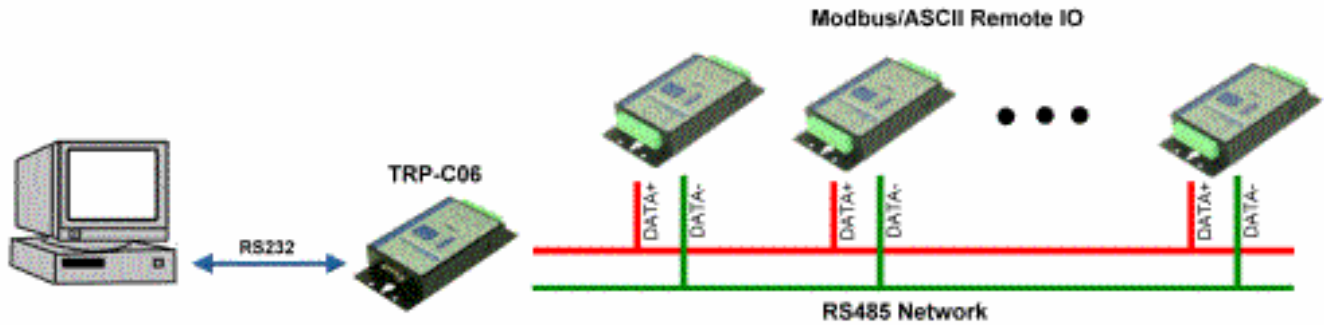
**TRP-C24 Default setting:**

- ID Address :01,
- Baud Rate:9600,
- DIO Mode Type :40,
- Checksum: Disable,
- RS485 Communication data format:N,8,1.

**2-5. Wire Connection for Digital Input**



## 2-6.Communication Wiring



## 3. Function description

**Power on mode:** This is TRP-C24 normal working mode, TRP-C24 can accept the host's command to change the digital output value.

### Dual Watchdog:

TRP-C24 provides Module and Host Watchdog. The module watchdog is a hardware watchdog. The host watchdog is a software watchdog. TRP-C24 watchdog is designed to automatically reset the microprocessor when the module fails. The host watchdog monitors the host controller (PC or PLC). The output of module can go to the safe Value State if the host fails.

**Safe mode:** If watchdog enable on the RS-485 line, the host will send the reset command( "Host Ok!") to drive the watchdog timer re-count before timeout, when the host does not send the command before watchdog timeout, the module go to the safe mode. In safe mode, the digital output will not be changed until the watchdog disable.

## 4.TRPCOM Command Protocol Description

Command Format : "Leading Code"+"ID Address"+"Command"+"CHK"+(cr) .

at : "Leading Code"+"ID Address"+"Data"+"CHK"+(cr) .

## 5. How to calculate the checksum

1. Calculate all characters of the command string to get the ASCII sum, except the character return.
2. Mask the sum of string with 0FFH.

### Example:

Send the command is "\$06M".

Sum of string is "\$"+"0"+"6"+"M"="24H"+"30H"+" 4D"="A1H".....The checksum and [CHK]="A1".

Response string with checksum is : " A1".

## 6. TRPCOM ASCII Command List

| Command List         | Function Description   | Page Index  |
|----------------------|--|-------------|
| %IDNNPPBBDD(CHK)(cr) | <b>Set the module's configuration</b>                              | See 6-1~6-3 |
| #IDPPFD(CHK)(cr)     | <b>Digital Output Data</b>   | See 6-4     |
| \$ID6(CHK)(cr)       | <b>Read digital input/output status</b>                            | See 6-5     |
| \$ID2(CHK)(cr)       | <b>Read the module's configuration</b>                             | See 6-6~6-7 |
| \$IDRS(CHK)(cr)      | <b>Reset the module</b>  | See 6-8     |
| \$IDM(CHK)(cr)       | <b>Read the module's name</b>                                      | See 6-9     |
| \$IDF(CHK)(cr)       | <b>Read the module's firmware version</b>                          | See 6-10    |
| \$ID5(CHK)(cr)       | <b>Read reset states</b>   | See 6-11    |
| ~IDONN(CHK)(cr)      | <b>Change the module's name</b>                                    | See 6-12    |
| ~IDLEDA(CHK)(cr)     | <b>Set the module's LED operating mode</b>                         | See 6-13    |
| ~IDWENN(CHK)(cr)     | <b>Enable watchdog and set the timeout value</b>                   | See 6-14    |
| ~IDWD(CHK)(cr)       | <b>Disable watchdog</b>  | See 6-15    |
| ~IDWR(CHK)(cr)       | <b>Read watchdog timeout value</b>                                 | See 6-16    |
| ~**(CHK)(cr)         | <b>System stand by (Host OK!)</b>                                  | See 6-17    |
| ~ID4V(CHK)(cr)       | <b>Read power on/safe value</b>                                    | See 6-18    |
| ~ID5V(CHK)(cr)       | <b>Save exiting digital output states to power on or safe mode</b> | See 6-19    |
| #**(CHK)(cr)         | <b>Save existing digital input states</b>                          | See 6-20    |
| \$ID4(CHK)(cr)       | <b>Read synchronized data</b>                                      | See 6-21    |

\*User can save the output value by using the command "ID5V"

### 6-1 Set the module's configuration

| Command               | %IDNNPPBBDD(CHK)(cr) |  |
|-----------------------|----------------------|--|
| Syntax<br>Description | %                    | First leading code                       |
|                       | ID                   | Address of setting module 00-FF(HEX)     |
|                       | NN                   | New address of setting from 00-FF(HEX)   |
|                       | PP                   | The Digital I/O module type define to 40 |
|                       | BB                   | Set new baud rate (See 6-2)              |
|                       | DD                   | Data format (See 6-3)                    |
|                       | CHK                  | Checksum                                 |
|                       | (cr)                 | Carriage return                          |
| Response              | !ID(CHK)(cr)         | Command valid                            |
|                       | ?ID(CHK)(cr)         | Command Invalid                          |

## 6-2 Baud rate setting (BB)

|             |      |      |      |      |       |       |       |        |
|-------------|------|------|------|------|-------|-------|-------|--------|
| Code number | 03   | 04   | 05   | 06   | 07    | 08    | 09    | 0A     |
| Baud rate   | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200 |

## 6-3 Data format setting (DD)

|          |   |                                   |   |   |   |   |   |   |
|----------|---|-----------------------------------|---|---|---|---|---|---|
| Bit      | 7 | 6                                 | 5 | 4 | 3 | 2 | 1 | 0 |
| Function | 0 | Checksum<br>0:Disable<br>1:Enable | 0 | 0 | 0 | 0 | 0 | 0 |

### Example:

Send command: " %0001400600 " .If you turn on the system setting switch, the ID will be reset to " 00 " .

New ID is 01 " ,D I/O type is 40 " ,Bard-Rate:9600 ,Checksum setting disable is " 00 " ,  
Response: " !01".

### Example:

Send command:%0003400540 .New ID= " 03 " ,Bard-Rate= " 4800 " ,Checksum=  
" Enable " ,Response: " !03".

## 6-4. Digital Output Data

|                    |                 |   |
|--------------------|-----------------|---|
| Command            | #DPPFD(CHK)(cr) |   |
| Syntax description | #               | First leading code  |
|                    | ID              | Address of setting module 00-FF (HEX)   |
|                    | PP              | D I/O type :0A or 00 low byte data D0-D7 (Multi-Channel)<br>:0B high byte data D8-D15(Multi-Channel)<br>:1L or AL: low byte data D0-D7 (Single-Channel)<br>L=0-7<br>:BL : high byte dataD8-D15(Single-Channel)<br>L=0-7 |
|                    | DD              | DD: Sent the data from 00~FF  |
|                    | CHK             | Checksum  |
|                    | (cr)            | Carriage return   |
|                    | Response        | >(CHK)(cr)  |
|                    | !ID(CHK)(cr)    | Parameter invalid (*Command data error!)  |
|                    | ?ID (CHK)(cr)   | Command Invalid   |

\*Multi-Channel mode (Output control for one Byte)



**Example:**

Send command : " #010A0F".....Data="0F":DO0~DO7="11110000".

Response: " > " . Command valid.

**Example:**

Send command: " #010B26".....Data="26":DO8~DO15="01100100"

Response: " > " . Command valid.

**Example:**

Send command: " #01000G"...Data="0G".....Data error!.

Response: " !01 " .Parameter error!.

**\*Single-Channel mode (Output control for one Bit)**

**Example:**

Send command: " #011001 " ..... Data="01":DO0="1".

Response: " > " . Command valid.

Send command: " #011201 " ..... Data="01":DO2="1".

Response: " > " . Command valid.

Send command:#01B301.....Data="00":DO11="1".

Response: " > " ..Command valid.

**6-5. Read digital input/output status**

|                    |                  |                                       |
|--------------------|------------------|---------------------------------------|
| Command            | \$ID6(CHK)(cr)   |                                       |
| Syntax description | \$               | First leading code                    |
|                    | ID               | Address of setting module 00-FF (HEX) |
|                    | 6                | Read digital output status            |
|                    | CHK              | Checksum                              |
|                    | (cr)             | Carriage return                       |
| Response           | !IDHHLL(CHK)(cr) | HH=DO15~DO8 status, LL=DO7-DO0 status |
|                    | ?ID(CHK) (cr)    | Command Invalid                       |

**Example:**

Send command:\$016 .Read digital output states .

Response: " !01C345".....DO15~DO8="11000011", DO7~DO0="01000101".

## 6-6. Read the module's configuration

|                    |                    |   |
|--------------------|--------------------|---|
| Command            | \$!D2(CHK)(cr)     |   |
| Syntax description | \$                 | First leading code  |
|                    | ID                 | Address of setting module 00-FF (HEX)   |
|                    | 2                  | Read configuration  |
|                    | CHK                | Checksum  |
|                    | (cr)               | Carriage return   |
| Response           | !!DPPBBDD(CHK)(cr) | Command valid PP: Digital I/O type=40<br>BB: Baud rate<br>DD=Data format (See data format table)<br>Module model: BIT 2~0="000" TRP-C28<br>"001" TRP-C24<br>"010" TRP-C26 |
|                    | ?ID(CHK)(cr)       | Command Invalid   |

## 6-7.Data format table

|          |   |                                |   |   |   |   |   |   |
|----------|---|--------------------------------|---|---|---|---|---|---|
| Bit      | 7 | 6                              | 5 | 4 | 3 | 2 | 1 | 0 |
| Function | 0 | Checksum 0:Disable<br>1:Enable | 0 | 0 | 0 | 0 | 0 | 0 |

### Example:

Send command:\$012 Read configuration .

Response: " !01400641" DIO type=40,Baud-Rate=9600 (See 7.2) ,

Data Format=41 ,Checksum= Enable, Module model:1 .TRP-C24 (See 6-7).

## 6-8. Reset the module

|                    |                 |                                       |
|--------------------|-----------------|---------------------------------------|
| Command            | \$!DRS(CHK)(cr) |                                       |
| Syntax description | \$              | First leading code                    |
|                    | ID              | Address of setting module 00-FF (HEX) |
|                    | RS              | Reset the module                      |
|                    | CHK             | Checksum                              |
|                    | (cr)            | Carriage return                       |
| Response           | !!ID(CHK)(cr)   | Command valid                         |
|                    | ?ID(CHK)(cr)    | Command Invalid                       |

### Example:

Send command: " \$01RS " Reset TRP-C24.

Response: " !01 " ..Have been reset.

**\*Reset will clear all digital output states.**

## 6-9. Read the module's name

|                    |                    |                                       |
|--------------------|--------------------|---------------------------------------|
| Command            | \$IDM(CHK)(cr)     |                                       |
| Syntax description | \$                 | First leading code                    |
|                    | ID                 | Address of setting module 00-FF (HEX) |
|                    | M                  | Reading module's name                 |
|                    | CHK                | Checksum                              |
|                    | (cr)               | Carriage return                       |
| Response           | !IDNNNNNN(CHK)(cr) | NNNNNN :The chars from 1 -6 chars     |
|                    | ?ID(CHK)(cr)       | Command Invalid                       |

### Example:

Send command:\$01M Read the TRP-C24 ' s name.

Response:"!01TRPC24"..... The module's name is "TRPC24".

## 6-10. Read the module's firmware version

|                    |                     |  |
|--------------------|---------------------|--|
| Command            | \$IDF(CHK)(cr)      |  |
| Syntax description | \$                  | First leading code   |
|                    | ID                  | Address of setting module 00-FF (HEX)                            |
|                    | F                   | Command for reading module's version                             |
|                    | CHK                 | Checksum   |
|                    | (cr)                | Carriage return  |
| Response           | !IDMODMMYY(CHK)(cr) | MOD : The module's model<br>MM:Release Month<br>YY :Release Year |
|                    | ?ID(CHK)(cr)        | Command Invalid  |

### Example:

Send command:\$01F Read the TRP-C24 ' s version.

Response:"!01C240605"..... The TRP-C24's version date is "06/2005".

## 6-11. Read reset states

| Command            | \$ID5(CHK)(cr) |   |
|--------------------|----------------|---|
| Syntax description | \$             | First leading code                        |
|                    | ID             | Address of setting module 00-FF (HEX)     |
|                    | 5              | Command for reading reset status          |
|                    | CHK            | Checksum                                  |
|                    | (cr)           | Carriage return                           |
| Response           | !IDS(CHK)(cr)  | S =1 has been reset<br>S=0 not been reset |
|                    | ?ID(CHK)(cr)   | Command Invalid                           |

### Example:

Send command:\$015 Read the TRP-C24's reset states .

Response: " !011 " . The TRP-C24 has been reset.

The module will return the flag to " 1 " after system restart.

## 6-12. Change the module's name

| Command            | ~IDONN(CHK)(cr) |                                       |
|--------------------|-----------------|---------------------------------------|
| Syntax description | ~               | First leading code                    |
|                    | ID              | Address of setting module 00-FF (HEX) |
|                    | O               | Command for rename TRP-C24's name     |
|                    | NN              | NN:TRP-C24's name, Max.6 characters   |
|                    | CHK             | Checksum                              |
|                    | (cr)            | Carriage return                       |
| Response           | !ID(CHK)(cr)    | Command valid                         |
|                    | ?ID(CHK)(cr)    | Command Invalid                       |

### Example:

Send command:"~01OTRYCOM"..... Change the TRP-C24's name become to "TRYCOM".

Response:"!01"..... . Command valid.

Then send the command "\$01M"...read the TRP-C24's name.

Response:"!01TRYCOM"... .The TRP-C24's name is "TRYCOM".

### 6-13. Set the module's LED operating mode

|                    |                  |  |
|--------------------|------------------|--|
| Command            | ~IDLEDA(CHK)(cr) |  |
| Syntax description | ~                | First leading code   |
|                    | ID               | Address of setting module 00-FF (HEX)  |
|                    | LED              | Set the module's LED operating mode  |
|                    | A                | A=0 Turn off all LEDS, when logic "1" ON<br>A=1 Turn on all LEDS, when logic "1" OFF |
|                    | CHK              | Checksum   |
|                    | (cr)             | Carriage return  |
| Response           | !ID(CHK)(cr)     | Command valid  |
|                    | ?ID(CHK)(cr)     | Command Invalid  |

#### Example:

Send command: " ~01LED0 " .. Turn off all LED, when logic " 1 " ON.

Response: " !01 " .. Command valid.

### 6-14. Enable watchdog and set the timeout value

|                    |                  |   |
|--------------------|------------------|---|
| Command            | ~IDWENN(CHK)(cr) |   |
| Syntax description | ~                | First leading code  |
|                    | ID               | Address of setting module 00-FF (HEX)                                 |
|                    | WE               | Watchdog Enable   |
|                    | NN               | Set the watchdog time(NN:00-FF) One Unit=0.1 Sec<br>FF: MAX. 25.5 Sec |
|                    | (cr)             | Carriage return   |
| Response           | !ID(CHK)(cr)     | Command valid   |
|                    | ?ID(CHK)(cr)     | Command Invalid   |

#### Example:

Send Command: " ~01WEFF " ..... Set the watchdog time to 25.5 Sec.

Response: " !01 " .. Command valid, When module count to 25.5 Sec the watchdog will into safe mode ,then PWR LED will flashing, before timeout if host send " ~\*\* " , the watchdog will re-counted!.

\*In safe mode, all commands are invalid , any command sent in safe mode will be made no response but "IDWE", so in safe mode user can not change output states.

\*Reset and power fail will not affect watchdog mode.

## 6-15. Disable watchdog

|                    |                |                                       |
|--------------------|----------------|---------------------------------------|
| Command            | ~IDWD(CHK)(cr) |                                       |
| Syntax description | ~              | First leading code                    |
|                    | ID             | Address of setting module 00-FF (HEX) |
|                    | WD             | Disable watchdog                      |
|                    | (cr)           | Carriage return                       |
| Response           | !ID(CHK)(cr)   | Command valid                         |
|                    | ?ID(CHK)(cr)   | Command Invalid                       |

### Example:

Send Command: "~01WD"..... Watchdog disable!

Response: "!01"..... . Command valid, System LED will stop flashing!

## 6-16 Read watchdog timeout value

|                    |                                    |   |
|--------------------|------------------------------------|---|
| Command            | ~IDWR(CHK)(cr)                     |   |
| Syntax description | ~                                  | First leading code  |
|                    | ID                                 | Address of setting module 00-FF (HEX)   |
|                    | WR                                 | Read watchdog timeout value   |
|                    | CHK                                | Checksum  |
|                    | (cr)                               | Carriage return   |
| Response           | !IDWANN (CHK)(cr)<br>!ID (CHK)(cr) | W: watchdog<br>A=E: watchdog enable<br>D: watchdog disable or safe mode<br>NN: watchdog timeout value |
|                    | ?ID(CHK)(cr)                       | Command Invalid   |

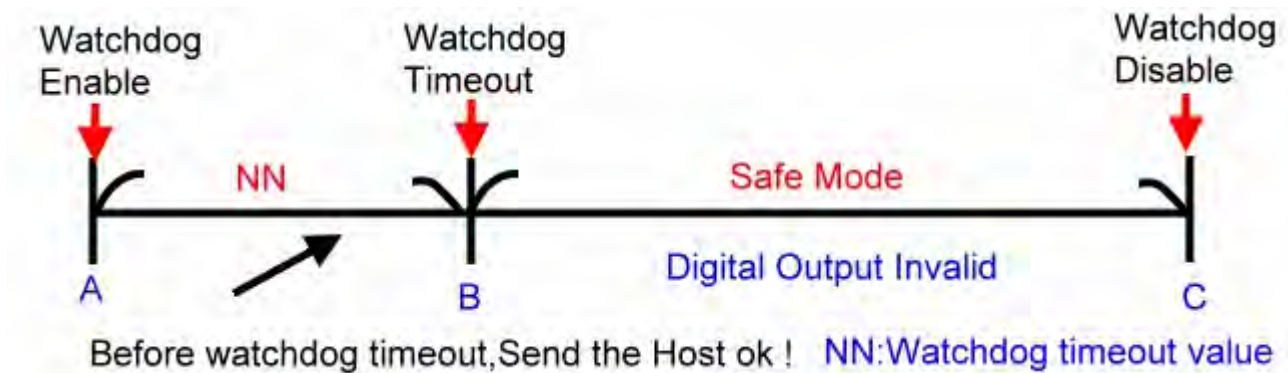
### Example:

Send Command: " ~01WR " . Read watchdog timeout value.

Response: " !01WD0F " . . Command valid, set the watchdog timeout is " 0F " ..1.6 Sec

## 6-17. System stand by (Host OK!)

|                    |              |                    |
|--------------------|--------------|--------------------|
| Command            | ~**(CHK)(cr) |                    |
| Syntax description | ~            | First leading code |
|                    | **           | Host ok!           |
|                    | CHK          | Checksum           |
|                    | (cr)         | Carriage return    |
| Response           | No Response  |                    |



In watchdog enable status, the Host send "Host Ok!" command before watchdog timeout (B) to drive the watchdog timer re-count before timeout, when the host does not send the command before watchdog timeout, the module go to the safe mode. In safe mode, PWR LED will flashing, the digital output will not be changed until the watchdog disable..

## 6-18. Read power on/safe value

|                    |                   |                                       |
|--------------------|-------------------|---------------------------------------|
| Command            | ~ID4V(CHK)(cr)    |                                       |
| Syntax description | ~                 | First leading code                    |
|                    | ID                | Address of setting module 00-FF (HEX) |
|                    | 4                 | Read power on/safe digital IO value   |
|                    | V                 | V=P: Power On<br>V=S: Safe value      |
|                    | CHK               | Checksum                              |
|                    | (cr)              | Carriage return                       |
| Response           | !IDHHLL (CHK)(cr) | HH: DO15~DO8<br>LL: DO7~DO0           |
|                    | ?ID(CHK)(cr)      | Command Invalid                       |

### Example:

Send Command: ~014S .Read safe mode digital output states.

Response: " !01080F"..... . Command valid, safe mode digital output states is "080F".

## 6-19. Save exiting digital output states to power on or safe mode

|                    |                |  |
|--------------------|----------------|--|
| Command            | ~ID5V(CHK)(cr) |  |
| Syntax description | ~              | First leading code                                       |
|                    | ID             | Address of setting module 00-FF (HEX)                    |
|                    | 5              | Save the current digital output is save or power on mode |
|                    | V              | V=P Power On<br>V=S Safe value                           |
|                    | (cr)           | Carriage return  |
| Response           | IID (CHK)(cr)  | Command valid  |
|                    | ?ID(CHK)(cr)   | Command Invalid  |

### Example:

Send Command: "#010A0F"...Digital output DO7~DO0= "0000 1111"

Response: " !01 " . . Command valid!

Then Send Command : " ~015P " .Set the digital output for power on ,.After power fail or reset , the module will load current .

## 6-20. Save existing digital input states

|                    |             |   |
|--------------------|-------------|---|
| Command            | #*(CHK)(cr) |   |
| Syntax description | #           | First leading code                                    |
|                    | **          | Save current digital IO status( All modules on line). |
|                    | CHK         | Checksum  |
|                    | (cr)        | Carriage return                                       |
| Response           | No Response |   |

### Example:

Send Command: " #\*\* " . Save current digital input/output states of all modules on line



## 6-21. Read synchronized data

|                    |                  |  |
|--------------------|------------------|--|
| Command            | \$ID4(CHK)(cr)   |  |
| Syntax description | \$               | First leading code   |
|                    | ID               | Address of setting module 00-FF (HEX)  |
|                    | 4                | Read synchronized data   |
|                    | CHK              | Checksum   |
|                    | (cr)             | Carriage return  |
| Response           | !AHLL00(CHK)(cr) | Command valid A=1:Have been send"###"<br>A=0:Have been read<br>HH: DO15-DO8 output status<br>LL: DO7-DO0 I output status |
|                    | ?ID              | Before send this command do not send the command "###"   |

### Example:

Send Command: " ### " .Save current digital IO states( All modules on line).

Then send command: " \$014 " . Read synchronized data.

Response: " !1010E00 " . " 1 " :Have been send the " ###",the DO states valid is " 010E "

*\*After Read synchronized data, A value is"1", Read again become to"0".*

## 7. Modbus/RTU Command Description

The TRP-C24 support Modbus/RTU protocol, the serial communication data format is

Start bit: 1,

Data bit: 8,

Parity check: None,

Stop bit: 1,

Baud-rate: 1200bps~115200bps.

### Modbus Syntax:

Command Format :ID(HEX)+FC(HEX)+SU(HEX)+DA(HEX) or RC(HEX)+CRC16(HEX).

Response Format : ID(HEX)+FC(HEX)+SU(HEX)+DA(HEX) or RC(HEX)+CRC16(HEX).

Error Format: ID(HEX)+ FC(HEX)+ CRC16(HEX).

ID: RS485 Device Address (HEX).....1~247 1Byte.

FC: Function Code (HEX)...1 Byte.

SU: Sub Function (HEX).....1 Byte.

DA: Data Format....No Limit.

RC: Reserved code...No Limit.

CRC: Cyclic Redundancy Check...2 Byte .

***\*Error Response: If CRC IS mismatches error the response is empty!***

## 7-1. Modbus RTU Command List

| Command List                           | Function Description                        | Index |
|--|---|-------|
| ID 46 00 00 (CRC)                      | Read the module's name                      | 8-1   |
| ID 46 04 IP 00 00 00 (CRC)             | Set up the module's address                 | 8-2   |
| ID 46 05 00 (CRC)                      | Read the module's configuration             | 8-3   |
| ID 46 06 00 BD 00 00 00 00 00 00 (CRC) | Set up the module's configuration           | 8-4   |
| ID 46 07 00 (CRC)                      | Read the module's Firmware                  | 8-5   |
| ID 46 08 00(CRC)                       | Read module reset status                    | 8-6   |
| ID 46 09 00(CRC)                       | Set up the module reset                     | 8-7   |
| ID 46 0B WS 00 (CRC)                   | Set up watchdog timeout value               | 8-8   |
| ID 46 0C 00 (CRC)                      | Read watchdog status                        | 8-9   |
| ID 46 0D 0S 00 (CRC)                   | Set up LED ON/OFF                           | 8-10  |
| ID 46 27 HH LL 00 (CRC)                | Set up power on mode                        | 8-11  |
| ID 46 28 00 (CRC)                      | Read power on mode value                    | 8-12  |
| ID 46 29 HH LL 00 (CRC)                | Set up safe mode value                      | 8-13  |
| ID 46 2A 00 (CRC)                      | Read safe mode value                        | 8-14  |
| ID 05 00 NN DD 00(CRC)                 | Set up single channel digital output status | 8-15  |
| ID 0F 00 00 00 10 02 HH LL(CRC)        | Set up the all digital output status        | 8-16  |
| ID 01 00 00 00 10 (CRC)                | Read digital output status                  | 8-17  |
| ID 02 00 00 00 10 (CRC)                | Read digital output status                  | 8-18  |

## 7-2.Read the module's name

|             |                            |  |
|-------------|----------------------------|--|
| Command     | ID 46 00 00 (CRC)          |  |
| Syntax      | ID                         | Address of setting module 1~247                                    |
|             | 46                         | Function code  |
| Description | 00                         | Read module's name   |
|             | 00                         | Reserved code  |
| Response    | ID 46 00 00 0C 24 00 (CRC) | ID 46 00 00 ....Module command Line<br>0C 24 :Module's Name is C24 |
|             | ID C6 00(CRC)              | ID C6 (CRC) C6:Function Code 00: Reserved code                     |

EX: Send Command: " 01 46 00 00 " .Read the TRP-C24's name.

Response: " 01 46 00 00 0C 24 00 ".....Module's name is C24.

Error Response: "01 C6 00".....Error code.

### 7-3.Set up the module's address

|                       |                            |  |
|-----------------------|----------------------------|--|
| Command               | ID 46 04 IP 00 00 00 (CRC) |  |
| Syntax<br>Description | ID                         | Address of setting module 1~247                |
|                       | 46                         | Function Code                                  |
|                       | 04                         | Set up module's ID                             |
|                       | IP                         | New module's ID                                |
|                       | 00 00 00                   | Reserved code                                  |
| Response              | ID 46 04 00 00 00 00 (CRC) | ID 46 04 00 00 00 00 ....Command valid         |
|                       | ID C6 00(CRC)              | ID C6 (CRC) C6:Function Code 00: Reserved code |

EX: Send Command: " 02 46 04 03 00 00 00 " .Set up the new ID is "03".

Response: " 01 46 04 00 00 00 00 ".....New ID is 03.

Error Response: "01 C6 00".....Error code.

### 7-4.Read the module's configuration

|                       |  |  |
|-----------------------|--|--|
| Command               | ID 46 05 00 (CRC)                          |  |
| Syntax<br>Description | ID   | Address of setting module 1~247  |
|                       | 46   | Function Code  |
|                       | 05   | Read module's configuration  |
|                       | 00   | Reserved code  |
| Response              | ID 46 05 00 <b>BD</b> 00 00 00 00 00 (CRC) | ID 46 05 00 .....Module command Line<br><b>BD</b> :Baud Rate <b>See 6-2</b><br>00 00 00 00 00 00 : Reserved code |
|                       | ID C6 00(CRC)                              | ID C6 (CRC) C6:Function Code 00: Reserved code   |

#### Example:

Send Command: " 01 46 05 00 " .Read TRP-C24's configuration.

Response:"01 46 05 00 **06** 00 00 00 00 00 ".....06:BD=9600...See 8-2 baud rate table.

Error Response: "01 C6 00".....Error code.

## 7-5.Set up the module's configuration

|                       |  |   |
|-----------------------|--|---|
| Command               | ID 46 06 00 BD 00 00 00 00 00 00 (CRC) |   |
| Syntax<br>Description | ID                                     | Address of setting module 1~247   |
|                       | 46                                     | Function Code   |
|                       | 06                                     | Set up module's configuration   |
|                       | 00 <b>BD</b> 00 00 00 00 00 00         | <b>BD</b> : Baud-Rate....See 8-2  |
| Response              | ID 46 06 00 00 00 00 00 00 00 00 (CRC) | ID 46 06 00 .....Module command Line<br>00 00 00 00 00 00 00 00 : Reserved code |
|                       | ID C6 00 (CRC)                         | ID C6 (CRC) C6:Function Code 00: Reserved code                                  |

### Example:

Send Command: " 01 46 06 00 **0A** 00 00 00 00 00 00 " .Set up TRP-C24's configuration.

Response:"01 46 06 00 00 00 00 00 00 00 "....Baud-Rate set to 115200.

Error Response: "01 C6 00".....Error code.

## 7-6.Read the module's Firmware

|                       |                           |   |
|-----------------------|---------------------------|---|
| Command               | ID 46 07 00 (CRC)         |   |
| Syntax<br>Description | ID                        | Address of setting module 1~247   |
|                       | 46                        | Function Code   |
|                       | 07                        | Read module's Firmware  |
|                       | 00                        | Reserved code   |
| Response              | ID 46 07 YY MM DD 00(CRC) | ID 46 07 .....Module command Line<br><b>YY</b> :Year <b>MM</b> :Month <b>DD</b> :Date<br>00 : Reserved code |
|                       | ID C6 00 (CRC)            | ID C6 (CRC) C6:Function Code 00: Reserved code  |

### Example:

Send Command: " 01 46 07 00 " .Set up TRP-C24's configuration.

Response:"01 46 07 07 04 06 00"...APR. 04.2007 TRP-C24 Firmware Version.

Error Response: "01 C6 00".....Error code.

## 7-7.Read module reset status

|                    |                      |  |
|--------------------|----------------------|--|
| Command            | ID 46 08 00(CRC)     |  |
| Syntax Description | ID                   | Address of setting module 1~247                |
|                    | 46                   | Function Code                                  |
|                    | 08                   | Read Module Reset status                       |
|                    | 00                   | Reserved code                                  |
| Response           | ID 46 08 0D 00 (CRC) | D=0 Have been read, D=1 Have been reset        |
|                    | ID C6 00 (CRC)       | ID C6 (CRC) C6:Function Code 00: Reserved code |

### Example:

Send Command: " 01 46 08 00 " ...Read the module's digital input status.

Response:"01 46 08 1 00 ..have been reset.

## 7-8.Set up the module reset

|                    |                   |  |
|--------------------|-------------------|--|
| Command            | ID 46 09 00       |  |
| Syntax Description | ID                | Address of setting module 1~247                |
|                    | 46                | Function Code                                  |
|                    | 09                | Module reset                                   |
|                    | 00                | Reserved code                                  |
| Response           | ID 46 09 00 (CRC) | Command valid                                  |
|                    | ID C6 00 (CRC)    | ID C6 (CRC) C6:Function Code 00: Reserved code |

### Example:

Send Command: " 01 46 09 00 " ...Read the module's digital input status.

Response:"01 46 09 00 ..Command valid.

Error Response: "01 C6 00"...Error code.

## 7-9.Set up watchdog timeout value

|                       |                      |  |
|-----------------------|----------------------|--|
| Command               | ID 46 0B WS 00 (CRC) |  |
| Syntax<br>Description | ID                   | Address of setting module 1~247                                      |
|                       | 46                   | Function Code  |
|                       | 2B                   | Set up power on mode   |
|                       | WS                   | WS=00 Watchdog Disable<br>Watchdog timer from 01~FF (100ms~25.5 Sec) |
|                       | 00                   | Reserved code  |
| Response              | ID 46 0B 00(CRC)     | 00 ID 46 0B 00 .....Command valid                                    |
|                       | ID C6 00 (CRC)       | ID C6 (CRC) C6:Function Code 00: Reserved code                       |

### Example:

Send Command: " 01 46 0B 05 00 " .Set up TRP-C24's watchdog timer=500ms.

Response:"01 46 0B 00"...Command valid.

Error Response: "01 C6 00".....Error code.

## 7-10.Read watchdog status

|                       |                   |   |
|-----------------------|-------------------|---|
| Command               | ID 46 0C 00 (CRC) |   |
| Syntax<br>Description | ID                | Address of setting module 1~247                         |
|                       | 46                | Function Code   |
|                       | 0C                | Read watchdog value                                     |
|                       | 00                | Reserved code   |
| Response              | ID 46 0C WT (CRC) | ID 46 0C .....Module command line<br>WT: Watch dog vale |
|                       | ID C6 00 (CRC)    | ID C6 (CRC) C6:Function Code 00: Reserved code          |

### Example:

Send Command: " 01 46 0C 00 " ...Read TRP-C24's watchdog value.

Response:"01 46 0C 01 .

Error Response: "01 C6 00"...Error code.

## 7-11.Set up LED ON/OFF

|                       |                      |  |
|-----------------------|----------------------|--|
| Command               | ID 46 0D 0S 00 (CRC) |  |
| Syntax<br>Description | ID                   | Address of setting module 1~247  |
|                       | 46                   | Function Code  |
|                       | 0D                   | Set Up LED Status Value  |
|                       | 0S                   | S = 0 Turn on all LED when DIO enable off<br>S = 1 Turn off all LED when DIO enable on |
|                       | 00                   | Reserved code  |
| Response              | ID 46 0D 00 (CRC)    | ID 46 0D .....Command valid  |
|                       | ID C6 00 (CRC)       | ID C6 (CRC) C6:Function Code 00: Reserved code   |

### Example:

Send Command: " 01 46 0D 01 00.

Response:"01 46 0D 00.

Error Response: "01 C6 00"...Error code.

## 7-12.Set up power on mode

|                       |                         |  |
|-----------------------|-------------------------|--|
| Command               | ID 46 27 HH LL 00 (CRC) |  |
| Syntax<br>Description | ID                      | Address of setting module 1~247                |
|                       | 46                      | Function Code                                  |
|                       | 27                      | Set up power on mode                           |
|                       | HH LL                   | HH LL: Power on digital status                 |
|                       | 00                      | Reserved code                                  |
| Response              | ID 46 27 00(CRC)        | 00 ID 46 27 00 .....Command valid              |
|                       | ID C6 00 (CRC)          | ID C6 (CRC) C6:Function Code 00: Reserved code |

### Example:

Send Command: " 01 46 27 01 02 00 " .Set up TRP-C24's power on value.

Response:"01 46 27 00"...Command valid .

Error Response: "01 C6 00".....Error code.

### 7-13.Read power on mode value

|                       |                             |  |
|-----------------------|-----------------------------|--|
| Command               | ID 46 28 00 (CRC)           |  |
| Syntax<br>Description | ID                          | Address of setting module 1~247                            |
|                       | 46                          | Function Code  |
|                       | 28                          | Read power on value  |
|                       | 00                          | Reserved code  |
| Response              | ID 46 28 <b>HH LL</b> (CRC) | 00 46 28 .....Module command line<br>HH LL: Power on value |
|                       | ID C6 00 (CRC)              | ID C6 (CRC) C6:Function Code 00: Reserved code             |

#### Example:

Send Command: " 01 46 28 00 " .Read TRP-C24's power on value.

Response:"01 46 01 02 "...Command valid.

Error Response: "01 C6 00".....Error code.

**\*Power on mode: Digital output states when power on.**

### 7-14.Set up safe mode value

|                       |                         |  |
|-----------------------|-------------------------|--|
| Command               | ID 46 29 HH LL 00 (CRC) |  |
| Syntax<br>Description | ID                      | Address of setting module 1~247                |
|                       | 46                      | Function Code                                  |
|                       | 29                      | Set up safe mode value                         |
|                       | HH LL                   | HH LL: Safe mode digital output value          |
|                       | 00                      | Reserved code                                  |
| Response              | ID 46 29 00(CRC)        | ID 46 29 00 .....Command valid                 |
|                       | ID C6 00 (CRC)          | ID C6 (CRC) C6:Function Code 00: Reserved code |

#### Example:

Send Command: " 01 46 29 00 FF 00 " .Set up TRP-C24's safe mode value.

Response:"01 46 29 00"... Command valid.

Error Response: "01 C6 00".....Error code.

**\*Power on mode: Digital output states when watchdog timeout.**



## 7-15.Read safe mode value

|                       |                      |   |
|-----------------------|----------------------|---|
| Command               | ID 46 2A 00 (CRC)    |   |
| Syntax<br>Description | ID                   | Address of setting module 1~247                             |
|                       | 46                   | Function Code   |
|                       | 2A                   | Read power on mode  |
|                       | 00                   | Reserved code   |
| Response              | ID 46 2A HH LL (CRC) | 00 46 2A .....Module command line<br>HH LL: Safe mode value |
|                       | ID C6 00 (CRC)       | ID C6 (CRC) C6:Function Code 00: Reserved code              |

### Example:

Send Command: " 01 46 2A 00 " .Read TRP-C24's safe mode value.

Response:"01 46 2A 00 FF "...Command valid.

Error Response: "01 C6 00".....Error code.

## 7-16.Set up single channel digital output status

|                       |                         |   |
|-----------------------|-------------------------|---|
| Command               | ID 05 00 NN DD 00(CRC)  |   |
| Syntax<br>Description | ID                      | Address of setting module 1~247   |
|                       | 05                      | Function Code   |
|                       | 00 NN                   | Set up module's digital output channel number<br>NN:00~0F   |
|                       | DD                      | Set up module's digital output value<br>DD=00 OFF, DD=FF ON   |
|                       | 00                      | Reserved code   |
| Response              | ID 05 00 NN DD 00 (CRC) | ID 05 00 NN DD 00.....Command valid   |
|                       | ID 85 FF (CRC)          | Watchdog mode status  |
|                       | ID 85 ER (CRC)          | ID 85 :Function Code ER=00 Syntax error<br>ER=01 Data Format error<br>ER=02 Start channel error<br>ER=03 I/O out of range |

\*Single-Channel mode (Output control for 1 Bit).

**Example:**

Send command : " 01 05 03 00 00".....Set up the DO3 OFF.

Response: " 01 05 00 03 00 00 " ..... Command valid.

Send command : " 01 05 00 08 FF 00".....Set up the DO8 ON.

Response: " 01 05 00 08 FF 00 " ..... Command valid.

**7-17.Set up the digital output status**

|                       |                                  |   |
|-----------------------|----------------------------------|---|
| Command               | ID 0F 00 00 00 0F BC HH LL (CRC) |   |
| Syntax<br>Description | ID                               | Address of setting module 1~247   |
|                       | 0F                               | Function Code   |
|                       | 00 00                            | Start channel number, Start channel is 0  |
|                       | 00 10                            | Output channel number 10(hex)=16 Channel  |
|                       | BC                               | Byte counter =02  |
|                       | HH LL                            | Set up the digital output value   |
| Response              | ID 0F 00 00 00 10 (CRC)          | Command valid   |
|                       | ID 8F FF (CRC)                   | Watchdog mode status  |
|                       | ID 8F ER (CRC)                   | ID 8F :Function Code ER=00 Syntax error<br>ER=01 Data Format error<br>ER=02 Start channel error<br>ER=03 I/O out of range |

\*Multi-Channel mode (Output control for 2 BYTE)

**Example:**

Send command : " 01 0F 00 00 00 10 02 **80 3F** ".....Set up the DO0~5 and D0F ON.

Response: " 01 0F 00 00 00 10 " ..... Command valid.

\*When the module is in safe mode, any digital output command are invalid, you will get the response "ID 8F FF", which means the system is in safe mode, you can't change output status until the watchdog disable.

\*Reset and power fail will not affect watchdog mode.

## 7-18. Read digital output value

|                       |                         |  |
|-----------------------|-------------------------|--|
| Command               | ID 01 00 00 00 10 (CRC) |  |
| Syntax<br>Description | ID                      | Address of setting module 1~247  |
|                       | 01                      | Function Code  |
|                       | 00 00                   | Start channel number, Start channel is 0   |
|                       | 00 10                   | Read output channel number 10(hex)=16 Channel  |
| Response              | ID 01 BC HH LL          | ID 01:Command Line<br>BC: Byte counter<br>HH LL: Digital output read back value  |
|                       | ID 81 ER (CRC)          | ID 81 :Function Code<br>ER=00 Syntax error<br>ER=01 Data Format error<br>ER=02 Start channel error<br>ER=03 I/O out of range |

### Example:

Send command : " 01 01 02 00 10".....Read DO value.

Response: " 01 01 02 00 0F " ..... DO read back value.

## 7-19.Read digital output value

|                       |                        |  |
|-----------------------|------------------------|--|
| Command               | ID 02 00 00 00 10(CRC) |  |
| Syntax<br>Description | ID                     | Address of setting module 1~247  |
|                       | 02                     | Function Code  |
|                       | 00 00                  | Start channel number, Start channel is 0   |
|                       | 00 10                  | Read output channel number 10(hex)=16 Channel  |
| Response              | ID 02 BC HH LL         | ID 02:Command Line<br>BC: Byte counter<br>HH LL: Digital output read back value  |
|                       | ID 82 ER (CRC)         | ID 82 :Function Code<br>ER=00 Syntax error<br>ER=01 Data Format error<br>ER=02 Start channel error<br>ER=03 I/O out of range |

## 8. How to use the utility for windows

The TRPCOM utility can help you to test the module's data transmit and receive, digital input and output communication status. User may download TRPCOM software from TRYCOM web [www.trycom.com.tw](http://www.trycom.com.tw).

1.The "Setting " function is for user to initiate the software to set the Com Port from 1 to 8 and setting the Baud-Rate from 1200 to 19200,Checksum Enable or Disable. See Figure 1

\*The Module Factory Setting is "9600" and "ID" is 01, Checksum is Disable.

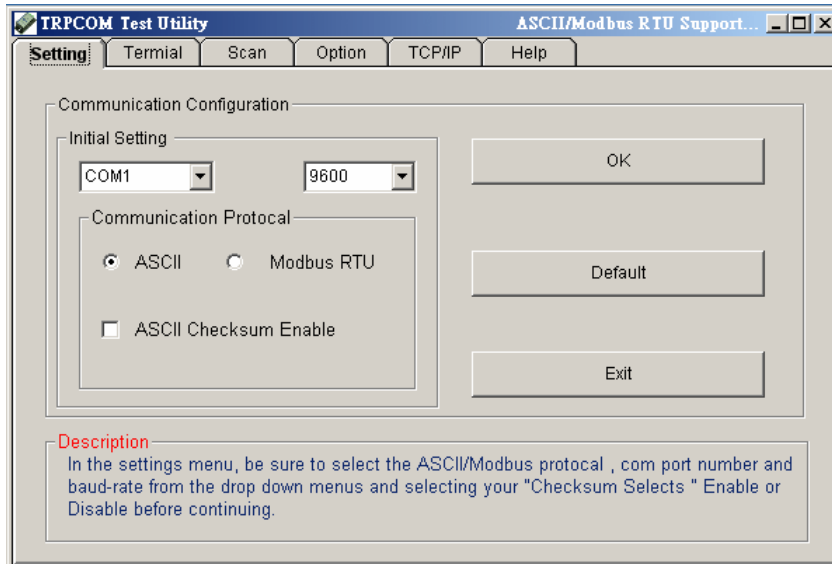


Figure 1

2.The "Terminal" function is for user to input command, user can control all of module's digital input/output status or wait to get module response status See Figure 2.

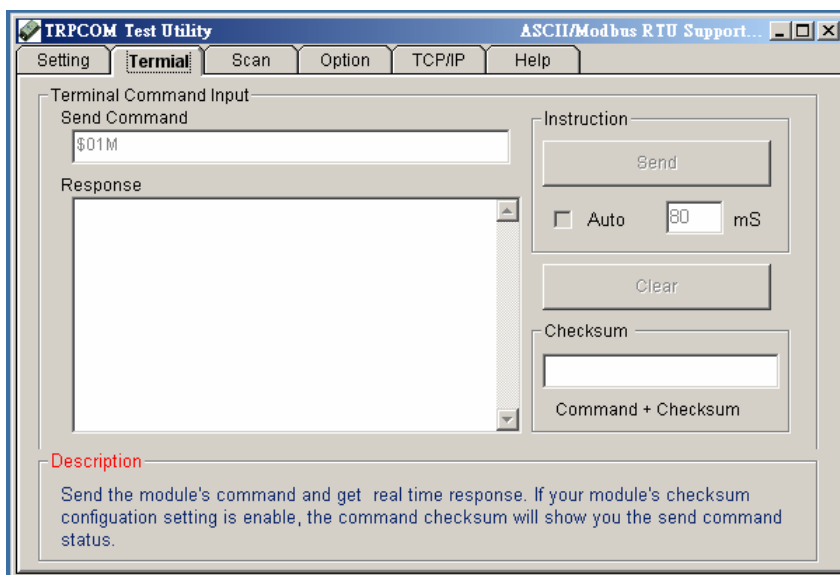


Figure 2

If you don't know the baud-rate, ID or, Checksum you may select "Scan" to find the module's setting.

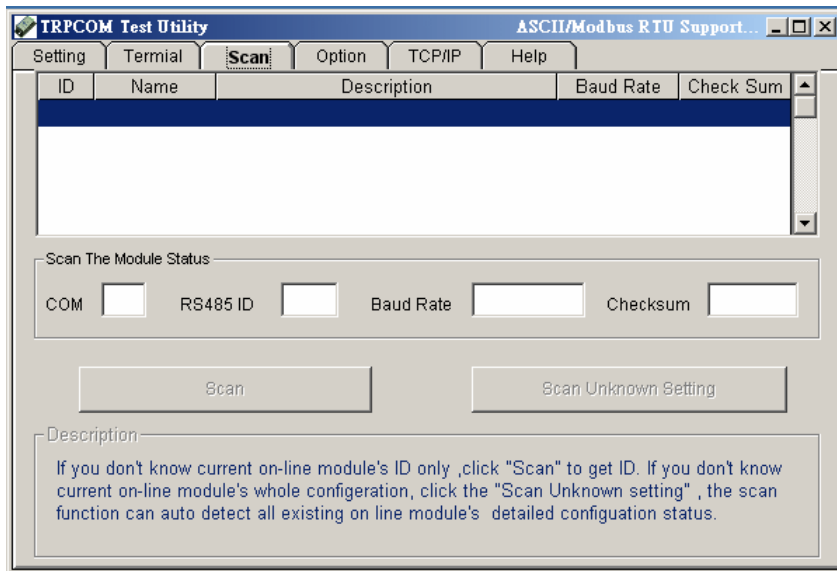


Figure 3

## 9. Application



## 10. Using the Modbus poll for test the TRP-DIO and AIO

The **Modbus poll** is the very popular utility that supports the Modbus RTU/ASCII and Modbus TCP/IP, you can free download that for test the any TRP-DIO and AIO basic Modbus function. The download website is [http://www.modbustools.com/modbus\\_poll.asp](http://www.modbustools.com/modbus_poll.asp).