

Quick Start Guide for tM-DA1P1R1

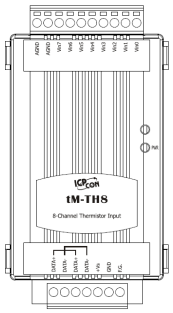
April. 2014, Version 1.20

Congratulations!

Congratulations on purchasing the tM-DA1P1R1 the most popular automation solution for remote monitoring and control applications. This Quick Start Guide will provide information needed to get started with the tM-DA1P1R1. Please also consult the User Manual for detailed information on the setup and use of the tM-DA1P1R1.

What's in the shipping box?

In addition to this guide, the shipping box includes the following items:



tM-DA1P1R1

Technical Support

- **ICP DAS Website**
  http://www.icpdas.com/

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1 Understanding the Hardware Specifications and Wiring Diagrams

Before installing the hardware, you should have a basic understanding of hardware specification and the wiring diagrams.

System Specifications：

Communication	
Interface	RS-485
Format	(N, 8, 1), (N, 8, 2), (O, 8, 1), (E, 8, 1)
Baud Rate	1200 ~ 115200 bps
Protocol	DCON, Modbus/RTU, Modbus/ASCII
Watchdog	Communication (Programmable)
LED Indicators	
Power	1 LED as Power Indicator
Isolation	
Intra-module Isolation, Filed-to-Logic	2500 VDC
EMS Protection	
ESD (IEC 61000-4-2)	±4 kV contact for Each Terminal
	±8 kV Air for Random Point
EFT (IEC 61000-4-4)	±4 kV for Power Line
Power	
Reverse Polarity Protection	Yes
Input Range	10 ~ 30 VDC
Consumption	1.8 W max.
Mechanical	
Dimensions (W x L x H)	52 mm x 98 mm x 27 mm
Installation	DIN-Rail Mounting
Environment	
Operating Temperature	-25 ~ +75 ℃
Storage Temperature	-30 ~ +80 ℃
Humidity	10 ~ 95% RH, Non-condensing

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I/O Specifications：

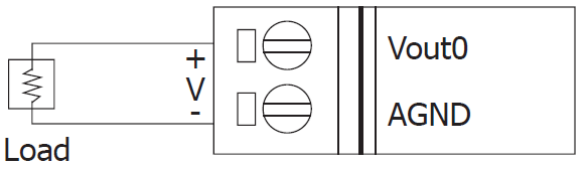
Analog Output		
Channel		1
Type		0~10V, 0~20mA, 4~20mA
Resolution		12-bit
Accuracy		±0.1% of FSR
DA Output Response Time		10 ms
Voltage Output Capability		20 mA
Current Load Resistance		500 Ω
Digital Input/Counter		
Channel		1
Type		Dry
On Voltage Level		Close to GND
Off Voltage Level		Open
Counters	**Max. Counts**	65536 (16-bit)
	Max. Input Frequency	100 Hz
	Min. Pulse Width	5 ms
Input Impedance		10 KΩ
Relay Output		
Channel		1
Type		Power Relay, Form C
Operating Load Voltage Range		250 V_{AC} or 30 V_{DC}
Max. Load Current		NO : 10 A @250 V_{AC} NC : 6 A @250 V_{AC}
Operate Time		15 ms max.
Release Time		5 ms max.
Mechanical Endurance		1 X 10^7 OPS
Electrical Endurance		5 X 10^4 OPS
Power On and Safe Value		Yes, Programmable

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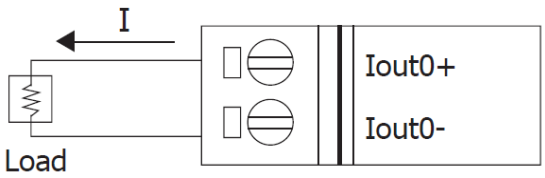
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Wire Connection :

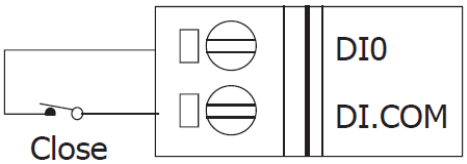
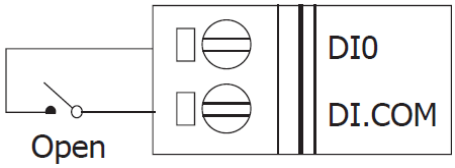
Voltage Output



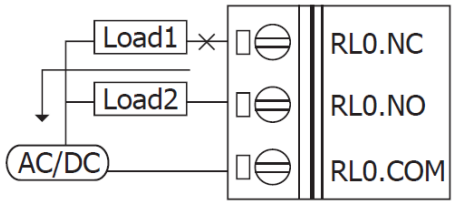
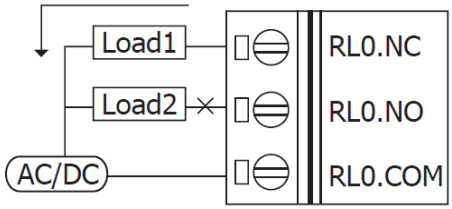
Current Output



Digital Input/Counter

ON State Readback as 1	OFF State Readback as 0
	

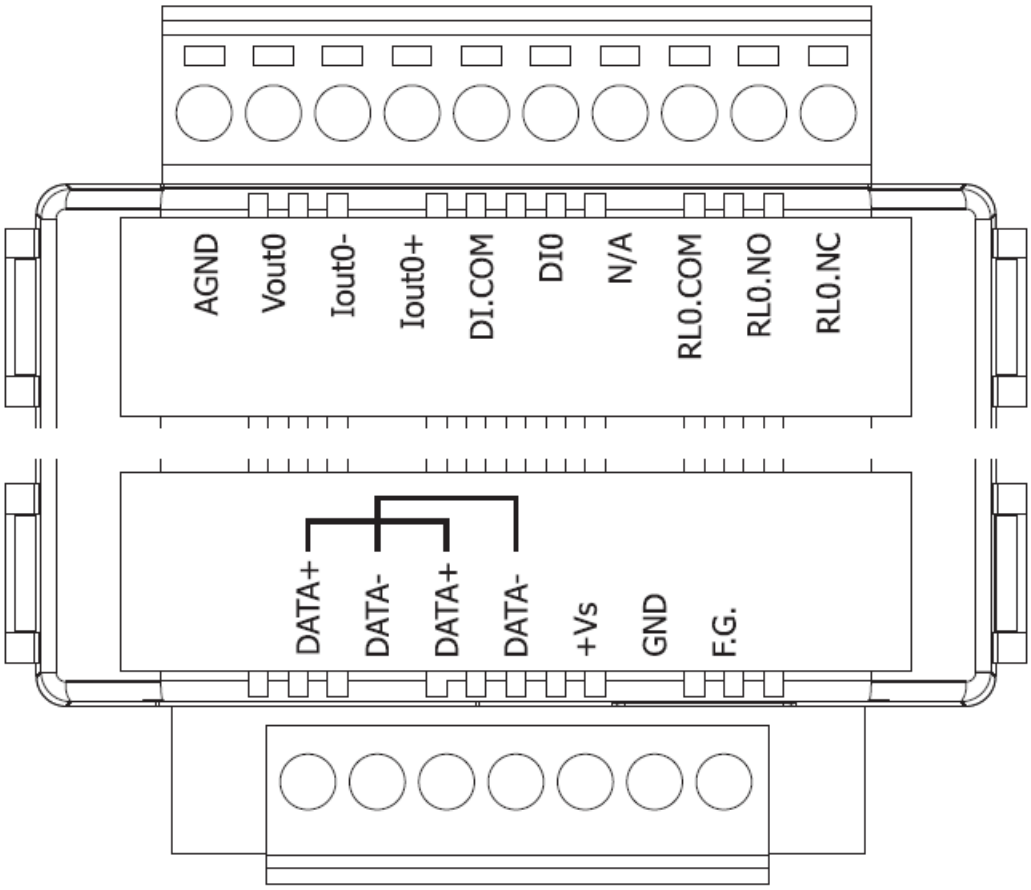
Relay Output

ON State	OFF State
	

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Pin Assignment：





2 Booting the tM-Series in Init Mode

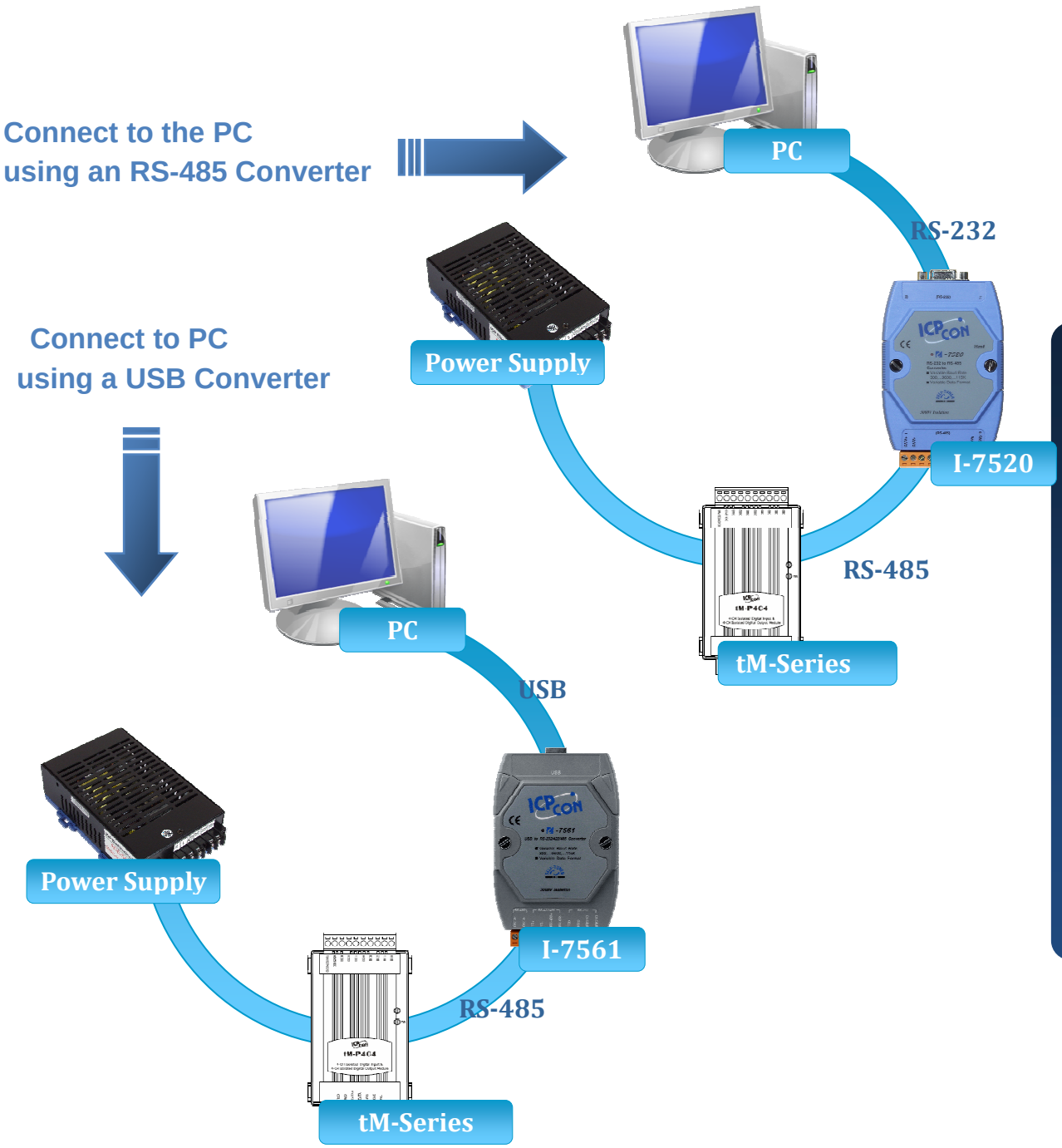
Make sure the switch placed in the “Init” position.

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3 Connecting to the PC and the Power Supply

The tM-Series series is equipped with an RS-485 port for connection to a 232/USB converter to PC



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4 Installing the DCON Utility

The DCON Utility is an easy-to-use tool designed to enable simple configuration of I/O modules that use the DCON protocol.

Step 1: Locate the DCON Utility

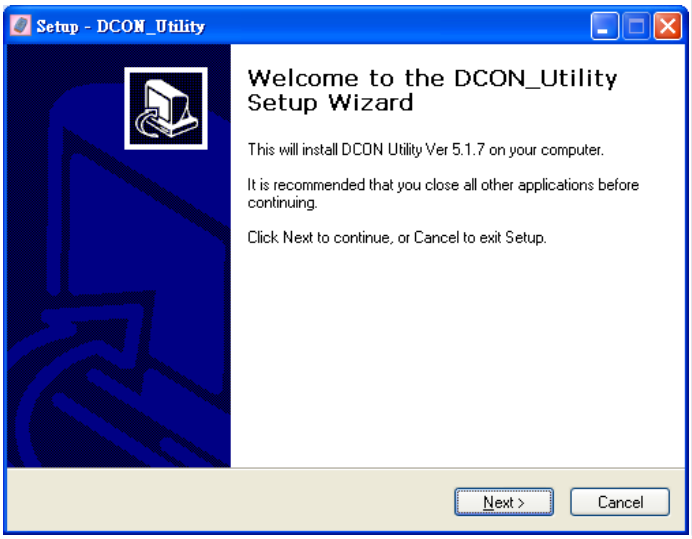


The DCON Utility can be obtained from the companion CD or from the ICPDAS FTP site:
CD:\Napdos\8000\NAPDOS\Driver\DCON_Utility\setup\
http://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/

Step 2: Follow the prompts to complete the installation



After the installation has been completed, there will be a new shortcut to the DCON Utility on the desktop.



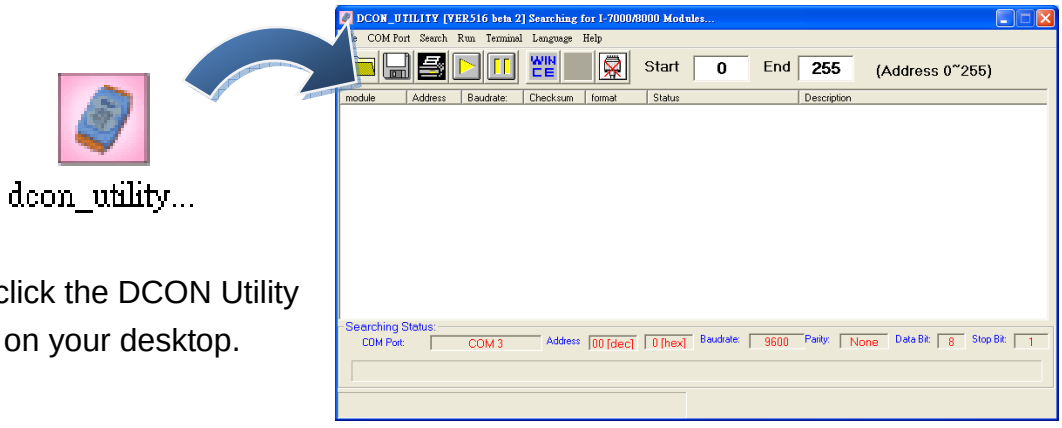
5 Using the DCON Utility to Initialize the tM-Series Module

The tM-Series is an I/O module based on the DCON protocol, meaning that you can use the DCON Utility to easily initialize it.

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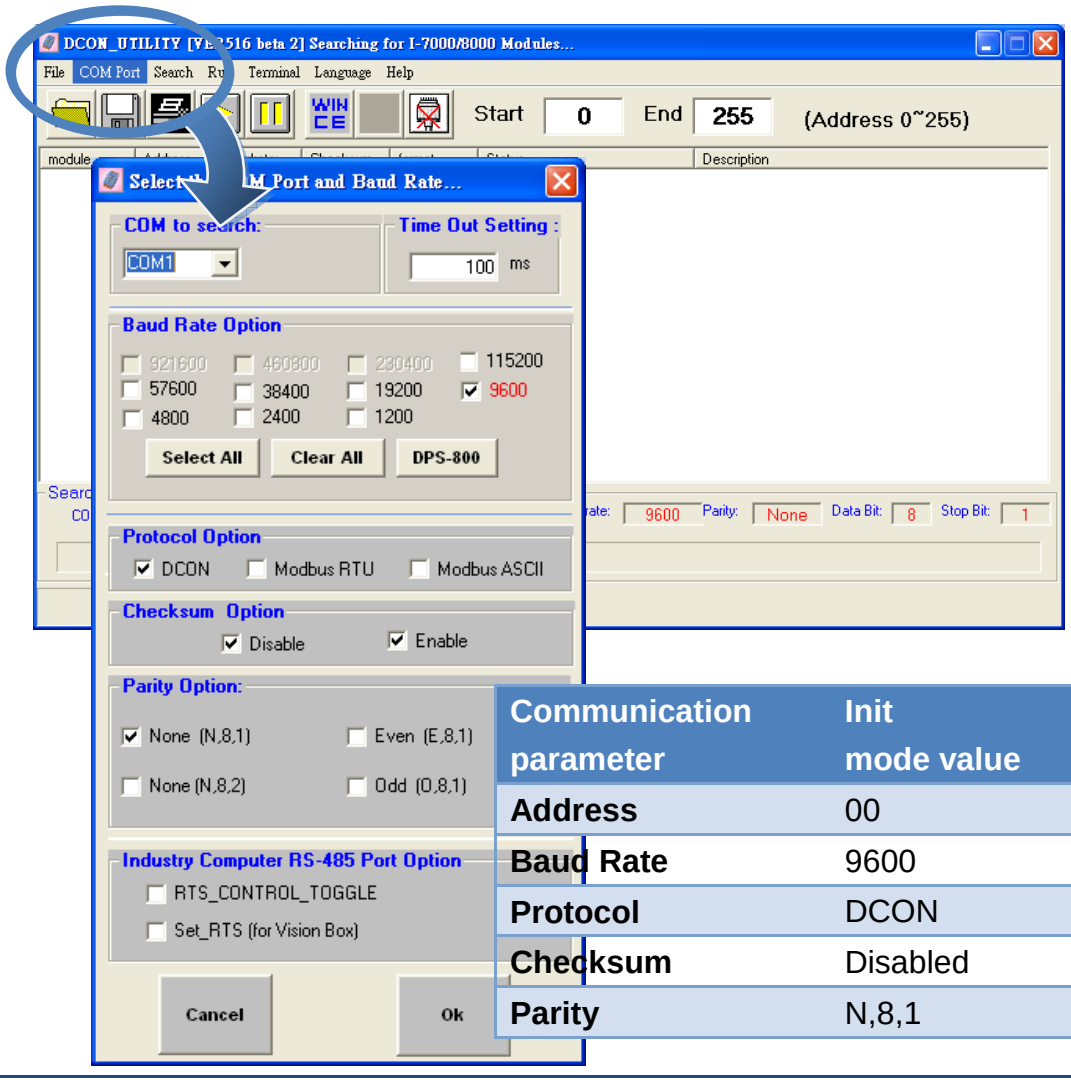
Step 1: Run the DCON Utility



Double-click the DCON Utility shortcut on your desktop.

Step 2: Use the COM1 port to communicate with the tM-Series

Click the “COM Port” option from the menu and a dialog box will be displayed that will allow you to set the communication parameters as described in the table below.



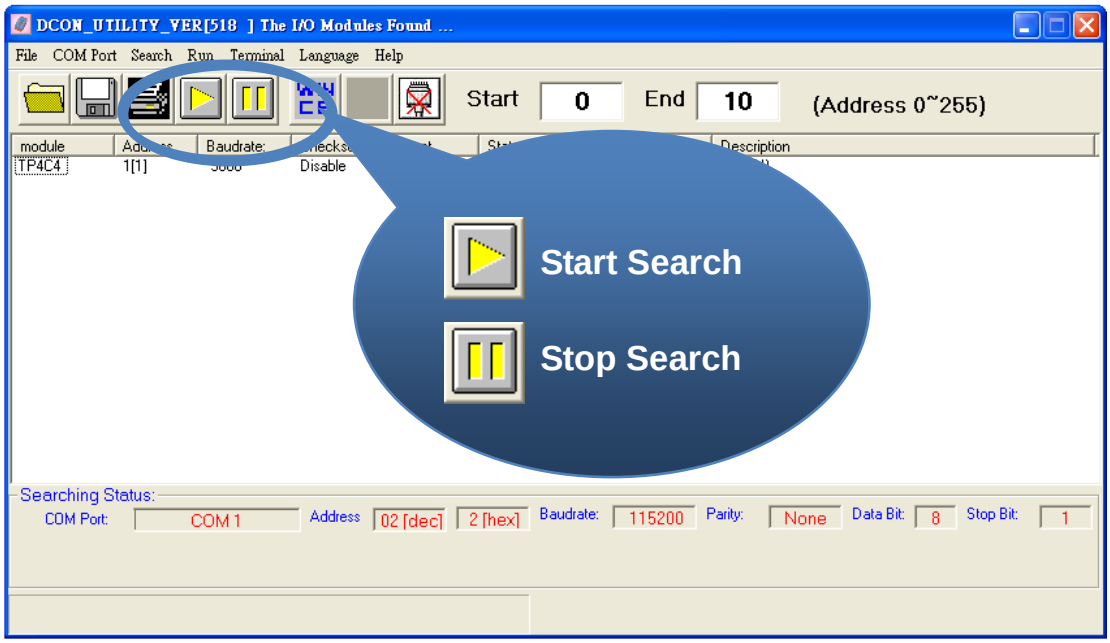
Communication parameter	Init mode value
Address	00
Baud Rate	9600
Protocol	DCON
Checksum	Disabled
Parity	N,8,1

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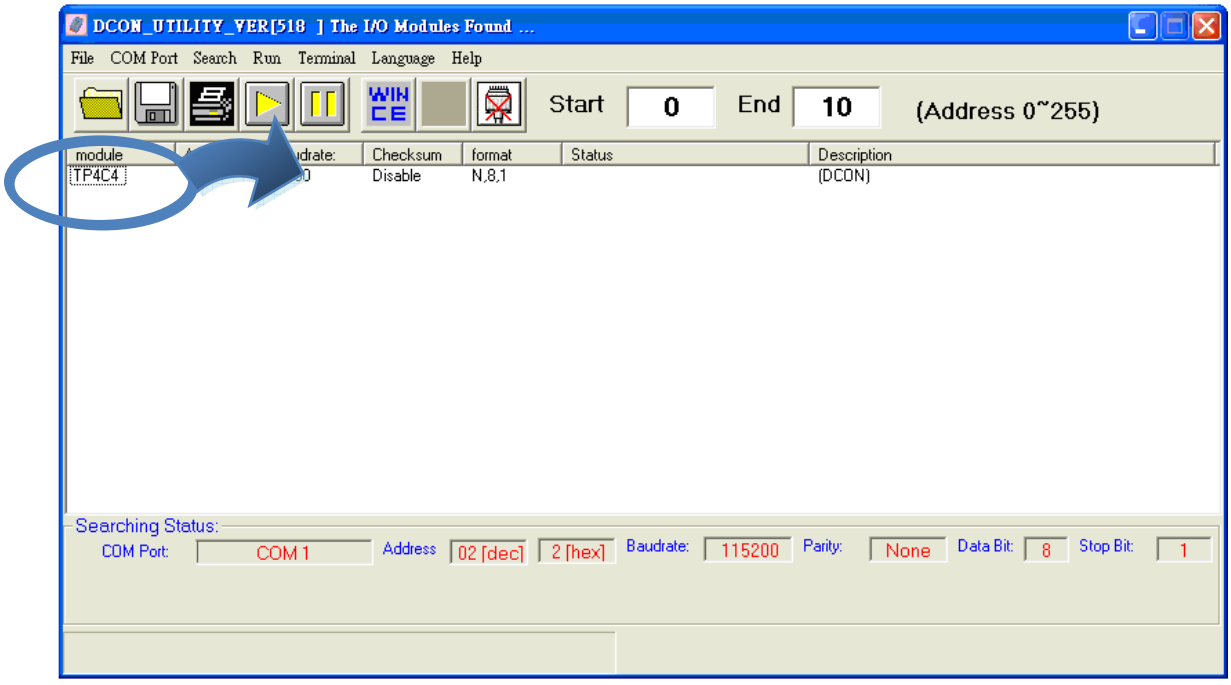
Step 3: Search for the tM-Series module

Click “Start Search” button from the toolbox to search for the tM-Series module. After the tM-Series module is displayed in the list, click “Stop Search” button.



Step 4: Connect to the tM-Series

After clicking on the name of the module in the list, a dialog box will be displayed.

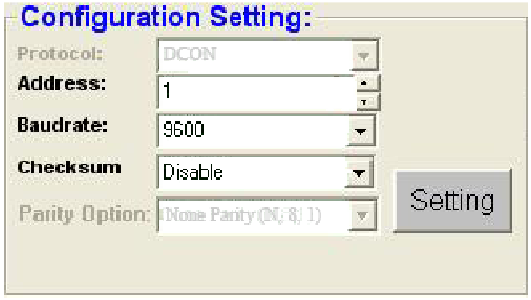


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Step 5: Initialize the tM-Series module

Set the “Address” field in the dialog box to 1 and then click “Setting” button to save the settings.



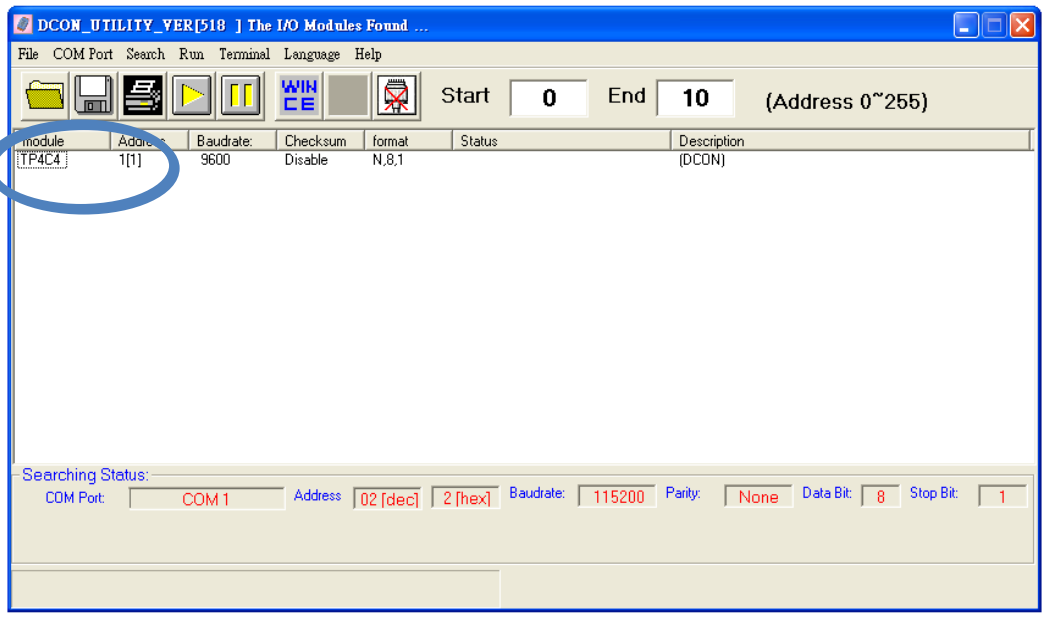


6 Rebooting the tM-Series Module in Normal Mode

Make sure the INIT switch is placed in the “Normal” position.

7 Starting the Module Operation

After rebooting the tM-Series module, search for the module to make sure the settings have been changed. You can double click on the name of the module in the list to open the configuration dialog box.



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8 DCON Command Sets

Command	Description
$AAF	read firmware version
$AAI	read INIT status response: !AA0 -> INIT short to GND !AA1 -> else
$AAM	read module name
$AAP	Read Modbus RTU/DCON protocol response: !AA0 -> DCON !AA1 -> Modbus RTU
$AAPN	Set Modbus RTU/DCON protocol N-> 0: DCON, 1: Modbus RTU
$AA00	channel 0 AO zero calibration
$AA10	channel 0 AO span calibration
$AA2	read configuration
$AA30VV	trim the channel 0 analog output, VV in hex, 01-7F to increase, FF-80 to decrease
$AA40	set current analog output as power on value of channel 0
$AA5	read reset status !AA1 first after power on, !AA0 others
$AA60	read back the last analog output value set by the analog output command of channel 0
$AA70	read the power on value of the analog output channel 0
$AA80	read back the current analog output value of channel 0
$AA90	read the type code and slew rate of analog output channel 0
$AA90TS	set the type code (T) and slew rate (S) of analog output channel 0
#AA0(data)	set analog output value of channel 0
%AANNTTCCFF	set configuration, NN: new address, TT = 00, CC: new baud rate FF: data format
@AACEC0	clear DI counter 0

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Command	Description
@AADI	read DIO response !AA00O0I
@AADO0V	set DO, V-> 0: off, 1: on
@AAREC0	read event counter of channel 0
~**	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
~AA4	read DO power on and safe value
~AA40	read analog output channel 0 safe value
~AA50P0S	set DO power on and safe value P-> 0: power on value off, 1: power on value on S-> 0: safe value off, 1: safe value on
~AAO(name)	set module name
~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 Setting (CC)

Bits 5:0

Baud rate, 0x03 ~ 0x0A

Code	0x03	0x04	0x05	0x06
Baud	1200	2400	4800	9600
Code	0x07	0x08	0x09	0x0A
Baud	19200	38400	57600	115200

Bits 7:6

00: no parity, 1 stop bit

01: no parity, 2 stop bits

10: even parity, 1 stop bit

11: odd parity, 1 stop bit

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Data Format Setting (FF)

Bits 1:0

00: engineering format

01: percent format

10: hex format

Bits 6

0: checksum disabled

0: checksum enabled

Type Code Setting (T)

Type Code	Output Range	Data Format	Max	Min
0	0 ~ 20 mA	Engineering	+20.000	+00.000
		Percent	+100.00	+000.00
		Hexadecimal	FFFFh	0000h
1	4 ~ 20 mA	Engineering	+20.000	+04.000
		Percent	+100.00	+000.00
		Hexadecimal	FFFFh	0000h
2	0 ~ 10 V	Engineering	+10.000	+00.000
		Percent	+100.00	+000.00
		Hexadecimal	FFFFh	0000h
4	0 ~ 5 V	Engineering	+05.000	+00.000
		Percent	+100.00	+000.00
		Hexadecimal	FFFFh	0000h

Slew Rate Setting (S)

S	V/s	mA/s	S	V/s	mA/s
0	Immediate	Immediate	8	8.0	16.0
1	0.0625	0.125	9	16.0	32.0
2	0.125	0.25	A	32.0	64.0
3	0.25	0.5	B	64.0	128.0
4	0.5	1.0	C	128.0	256.0
5	1.0	2.0	D	256.0	512.0
6	2.0	4.0	E	512.0	1024.0
7	4.0	8.0			

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9 Modbus Address Mapping

Address	Description	Attribute
10097	Low latched values of DI	R
10105	Low latched values of DO	R
00001	Digital output value of channel 0	R/W
00033	Digital input value of channel 0	R
00065	High latched values of DI	R
00073	High latched values of DO	R
00097	Low latched values of DI	R
00105	Low latched values of DO	R
00129	Safe value of digital output channel 0	R/W
00161	Power on value of digital output channel 0	R/W
00193	Counter update trigger edge of channel 0	R/W
00513	Write 1 to clear counter value of channel 0	W
00257	Protocol, 0: DCON, 1: Modbus RTU	R/W
00258	0: Modbus RTU, 1: Modbus ASCII	R/W
00260	Modbus host watchdog mode 0: same as I-7000 1: can use AO and DO command to clear host watchdog timeout status	R/W
00261	1: enable, 0: disable host watchdog	R/W
00264	Write 1 to clear latched DIO	W
00265	DI active state, 0: normal, 1: inverse	R/W
00266	DO active state, 0: normal, 1:inverse	R/W
00269	Modbus data format, 0: hex, 1: engineering	R/W
00270	Host watch dog timeout status, write 1 to clear host watch dog timeout status	R/W
00273	Reset status, 1: first read after powered on, 0: not the first read after powered on	R
30065	Analog output read back	R
30129	Counter value of digital input	R
40033	Analog output value	R/W
40097	Safe analog output value	R/W
40193	Power on analog output value	R/W

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<table>
<tr><th>Address</th><th>Description</th><th>Attribute</th></tr>
<tr><td>40289</td><td>Analog output slew rate</td><td>R/W</td></tr>
<tr><td>40417</td><td>Analog output type code</td><td>R/W</td></tr>
<tr><td>40481</td><td>Firmware version (low word)</td><td>R</td></tr>
<tr><td>40482</td><td>Firmware version (high word)</td><td>R</td></tr>
<tr><td>40483</td><td>Module name (low word)</td><td>R</td></tr>
<tr><td>40484</td><td>Module name (high word)</td><td>R</td></tr>
<tr><td>40485</td><td>Module address, valid range: 1 ~ 247</td><td>R/W</td></tr>
<tr><td>40486</td><td>Bits 5:0
Baud rate, 0x03 ~ 0x0A
<table>
<tr><td>Code</td><td>0x03</td><td>0x04</td><td>0x05</td><td>0x06</td></tr>
<tr><td>Baud</td><td>1200</td><td>2400</td><td>4800</td><td>9600</td></tr>
<tr><td>Code</td><td>0x07</td><td>0x08</td><td>0x09</td><td>0x0A</td></tr>
<tr><td>Baud</td><td>19200</td><td>38400</td><td>57600</td><td>115200</td></tr>
</table>
Bits 7:6
00: no parity, 1 stop bit
01: no parity, 2 stop bits
10: even parity, 1 stop bit
11: odd parity, 1 stop bit</td><td>R/W</td></tr>
<tr><td>40488</td><td>Modbus response delay time in ms, valid range: 0 ~ 30</td><td>R/W</td></tr>
<tr><td>40489</td><td>Host watchdog timeout value, 0 ~ 255, in 0.1s</td><td>R/W</td></tr>
<tr><td>40492</td><td>Host watchdog timeout count, write 0 to clear</td><td>R/W</td></tr>
<tr><td>10033</td><td>Digital input value of channel 0</td><td>R</td></tr>
<tr><td>10065</td><td>High latched values of DI</td><td>R</td></tr>
<tr><td>10073</td><td>High latched values of DO</td><td>R</td></tr>
</table>

Type Code	Output Range	Data Format	Max	Min
0	0 ~ 20 mA	Engineering	20000	0
		Hexadecimal	FFFFh	0000h
1	4 ~ 20 mA	Engineering	20000	4000
		Hexadecimal	FFFFh	0000h
2	0 ~ 10 V	Engineering	10000	0
		Hexadecimal	FFFFh	0000h
4	0 ~ 5 V	Engineering	5000	0
		Hexadecimal	FFFFh	0000h

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