

5.4. Modbus TCP I/O Expansion Unit

• Introduction

Modbus is a communication protocol developed by Modicon in 1979 for linking devices with Modicon PLCs using a master/slave relationship. Different versions of Modbus today include Modbus RTU, Modbus ASCII and Modbus TCP. Where Modbus RTU and ASCII are based on serial communication like RS-232 and RS-485, and Modbus TCP is based on Ethernet communication. It's a standard, truly open and widely used in industrial automation field.

The iP-8000-MTCP series is an I/O unit with Modbus protocol. It supports most of high profile I-8K and I-87K series I/O modules. SCADA and HMI software can easily access variant I/O signals via the iP-8000-MTCP.

• Features

- Modbus TCP on two independent LAN ports
- Modbus RTU/ASCII on COM ports



Modbus TCP

• I/O Slots for high profile I-8K and I-87K series I/O modules

Auto Configuration

The configurations of I/O modules are backed up in the EEPROM of the iP-8000-MTCP. The iP-8000-MTCP automatically checks and restores the configurations to each I/O modules during booting procedure. If one I/O module fails, the operator just needs to replace it with another one. And then check the LED indicators to know whether the auto configuration is performed correctly.



• Firmware Programmable

The iP-8000-MTCP is not just an I/O unit but also a programmable controller. Programmers can use the Modbus SDK to customize the firmware in C language.

Modbus Utility

The Modbus Utility package is for Windows 98/2K/XP/7. It includes

• Modbus Utility

- 1. Configure I/O Modules and COM ports
 - 2. Generate Modbus register mapping table of I/O modules
 - 3. Online monitor
 - Control/Monitor I/O module
 - With trend line and table viewing
 - Automatically log I/O value to a .txt file



MBRTU

• Modbus RTU client (with source code in VB6) to diagnostic Modbus RTU slave devices.

MBTCP

Modbus TCP client (with source code in VB6) to diagnostic Modbus TCP slave devices.



Modbus SDK

We provide Modbus SDK to users. You can use it to integrate several serial devices.

	Modbus lib	nModbus dll	
Platform	MiniOS7	Windows 2k/XP/7	WinCE 5.0/6.0
Development Language	Borland C, Turbo C	C# .NET 2005/2008 VB .NET 2005/2008	
Purpose	To customize the firmware of iP-8000-MTCP	To develop a program on PC based controllers to access the iP-8000-MTCP	
Feature	Modbus RTU/ASCII: Master/Slave Modbus TCP/UDP: Master/Slave		



Introduction ____

iP-8000-MTCP series is a Modbus TCP I/O expansion unit to expand I-8K and I-87K series I/O modules over the Ethernet for industrial monitoring and controlling applications. There are more than 50 I/O modules supported with the unit, including analog input/output, digital input/output, counter, frequency I/O modules.

It is designed to be used in harsh and noisy environment, so the hardware is manufactured with wide power input range ($10 \sim 30 \text{ Voc}$), isolated power input and can operate under wide temperature ($-25 \sim +75^{\circ}$ C). To simplify installation and maintenance of I/O modules, it provides many useful features, such as: auto configuration, LED indicators for fault detection, dual watchdog to keep alive, programmable power on and safe values for safety.

Modbus is a very wide known protocol in the industrial manufacturing and environment monitoring fields. Many SCADA software, HMI and PLC has builtin driver to support Modbus devices. Besides, we also provide SDK on different platforms, such as Windows XP, Window CE 5.0/6.0, Linux, MiniOS7. Therefore, it is very easy to integrate remote I/O to customer's applications.

Further more, the iP-8000-MTCP is also a c language based programmable controller that equipped a DOS-like OS (MiniOS7). Programmers can use C compilers that can create 16 bit executable file (*.exe) to customize the Modbus firmware which preinstalled in the iP-8000-MTCP. The SDK provides rich functions for Modbus communication, such as Modbus TCP master/slave, Modbus RTU master/slave, Modbus ASCII master/slave, etc.

Applications ____



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Specifications _____

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EthernetR)-45 x 2, 10/100 Base-TX (Auto negotiating, Auto MDI/MDI-X, LED indicators)COM 0Internal communication with the high phoTD Ava and SNDI/MDI-X, LED indicators)COM 1RS-822 (to update firmware) (RAC) TXD and GND); non-isolatedCOM 2RS-845 (O2+, D2; and CAD) and GND); non-isolatedCOM 3RS-232 (Ro Update firmware) (RAC) and GND); non-isolatedCOM 4RS-232 (RAC) TXD, CTS, RTS and GND for RS-232, Data+ and Data- for RS-485); non-isolatedCOM 4RS-232 (RAC) TXD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolatedSMMIELED DisplayLED DisplayYes, 5-DigitProgrammable LED Indicators3Rush Buttons4BuzzerYesI/O Expansion Slots3Slot Number4Slot Number8Address Bus Range2 K for each slotMechanical231 mm x 132 mm x 111 mmDimensions (W x L x H)231 mm x 132 mm x 111 mmInstallationDIN-Rail or Wall MountingEnvironmental-25 ~ +75°CStorage Temperature-30 ~ +80°CAnbient Relative Humidity10 ~ 90% RH (non-condensing)Power-10 ~ +30 VicIsolation1kVRedundant Power InputsYes, with one power relay (1 A @ 24 Vic) for alarmCapacity30 W30 W		Modbus TCP to RTU Gateway		
COM 0 Internal communication with the high profile I-87K series modules in slots COM 1 RS-232 (to update firmware) (Ro.D, TXD and GND); non-isolated COM 2 RS-485 (D2+, D2; self-tuner ASIC Inside); 3000 Voc. Isolation COM 4 RS-232/RS-485 (RAD, TXO, CTS, RTS and GND for RS-232, Data+ and Data- for RS-485); non-isolated COM 4 RS-232 (RxD, TXD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolated SMMI LED Display Yes, S-Digit Programmable LED Indicators 3 Push Buttons 4 Buzzer Yes I/O Expansion Slots 4 Slot Number 8 Address Bus Range 2 K for each slot Mechanical 21/9 K modules only Dimensions (W x L x H) 231 mm x 132 mm x 111 mm Instantial Information DIN-Rai or Wall Mounting Environmental -25 ~ +75°C Storage Temperature -30 ~ +80°C Ambient Relative Humidity 10 ~ 90% RF (non-condensing) Power -10 ~ +30 Voc Isolation 1/1 ~ +30 Voc Isolation 1/1 ~ +30 Voc Isolation -11 ~ +30 Voc	Ethernet	RJ-45 x 2, 10/100 Base-TX (Auto negotiating, Auto MDI/MDI-X, LED indicators)		
COM 1 RS-232 (to update firmware) (RxD, TxD and GND); non-isolated COM 2 RS-485 (C2+, p.2-; self-tuner ASC inside); 300 V vcc [solation COM 3 RS-232/RS-485 (RxD, TxD, CTS, RTS and GND for RS-232, Data+ and Data- for RS-485); non-isolated COM 4 RS-232 (RxD, TxD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolated SMMI RS-232 (RxD, TxD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolated SMMI Status LED Display Yes, 5-Digit Programmable LED Indicators 3 Push Buttons 4 Buzzer Yes JO Expansion Slots 4 Slot Number 8 Address Bus Range 2 K for each slot Mechanical Dimensions (W x L x H) Dimensions (W x L x H) 231 mm x 132 mm x 111 mm Installation DIN-Rail or Wall Mounting Environmental -25 ~ +75°C Storage Temperature -30 ~ +80°C Ambient Relative Humilty 10 ~ 90% RH (non-condensing) Power 10 ~ 90% RH non-condensing) Power Yes, with one power relay (1 A @ 24 Voc) for alarm Capacity 30 W Consumption 6.7 W	COM 0	Internal communication with the high profile I-87K series modules in slots		
COM 2RS-485 (D2+, D2-; self-tuner ASIC inside); 3000 Voc IsolationCOM 3RS-232/RS-485 (RxD, TxD, CTS, RTS and GND for RS-232, Data+ and Data- for RS-485); non-isolatedCOM 4RS-232 (RxD, TxD, CTS, RTS, DR, DTR, CD, RI and GND); non-isolatedSMMIILED DisplayLED DisplayYes, 5-DigitProgrammable LED Indicators3Push Buttons4BuzerYesI/O Expansion Slots4Slot Number8Slot Number4Buse8/16 bitsAddress Bus Range2 K for each slotImensions (W x L x H)231 mm x 132 mm x 111 mmInstallationDIN-Rail or WallSlot Rumertal-25 ~ +75°CStorage Temperature-30 ~ + 80°CAmbient Relative Humidity10 ~ 90% RH (non-condensing)Power1/0 ~ +30 VocIsolation1 kVRedundant Power InputsYes, with one power relay (1A @ 24 Voc) for alarmCapacity30 WConsumption6.7 WConsumption6.7 WConsumption6.7 WConsumption6.7 WConsumption6.7 WConsumption	COM 1	RS-232 (to update firmware) (RxD, TxD and GND); non-isolated		
COM 3 RS-232/RS-485 (RxD, TxD, CTS, RTS and GND for RS-232, Data+ and Data- for RS-485); non-isolated COM 4 RS-232 (RxD, TxD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolated SMMI LED Display Yes, 5-Digit Programmable LED Indicators 3 Push Buttons 4 Buzzer Yes I/O Expansion Slots Yes Slot Number 4 Slot Number 8 ID data Bus 8/16 bits Address Bus Range 2 K for each slot Mechanical Dimensions (W x L x H) Dimensions (W x L x H) 231 mm x 132 mm x 111 mm Installation DIN-Rail or Vall Mounting Environmental -25 ~ +75°C Storage Temperature -30 ~ +80°C Ambient Relative Humidity 10 ~ 90% RH (non-condensing) Power 10 ~ 430 Vxc Isolation 1 kV Redundant Power Inputs Yes, with one power relay (1 A @ 24 Vxc) for alarm Capacity 30 W Goresurption 6.7 W	COM 2	RS-485 (D2+, D2-; self-tuner ASIC inside); 3000 V _{DC} Isolation		
COM 4RS-232 (RxD, TxD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolatedSHMILED DisplayYes, 5-DigitProgrammable LED Indicators3Push Buttons4BuzzerYesI/O Expansion Slots8Slot Number8Address Bus Range8Mechanical8Dimensions (W x L x H)231 mm x 132 mm x 111 mmInstallationDIN-Rail or Wall MountingEnvironmental	COM 3	RS-232/RS-485 (RxD, TxD, CTS, RTS and GND for	RS-232, Data+ and Data- for RS-485); non-isolated	
SMMILED DisplayYes, 5-DigitProgrammable LED Indicators3Push Buttons4BuzzerYesI/O Expansion SlotsI/O Expansion SlotsJOE NumberA8A8I/O Expansion SlotsI/O Expansion SlotsI/O Expansion SlotsJOE NumberA8A8A8ABAABAABAABAABAABABADIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEDIMENSION EXAMPLEOperating Temperature-25 ~+75°CStorage Temperature	COM 4	RS-232 (RxD, TxD, CTS, RTS, DSR,	RS-232 (RxD, TxD, CTS, RTS, DSR, DTR, CD, RI and GND); non-isolated	
LED Display Yes, 5-Digit Programmable LED Indicators 3 Push Buttons 4 Buzzer Yes I/O Expansion Slots Add Base Add Address Bus Range O Expansion Slots Mechanical Dimensions (W x L x H) DIM 231 mm x 132 mm x 111 mm Installation Operating Temperature Operating Temperature Operating Temperature Operating Temperature Ambient Relative Humidity Input Range Input Range Input Range Input Range Input Range Icop Sol W Operating Sol W <td co<="" td=""><td>SMMI</td><td></td><td></td></td>	<td>SMMI</td> <td></td> <td></td>	SMMI		
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Push Buttons4BuzzerYesI/O Expansion SlotsI/O Expansion SlotsYesI/O Expansion Slots8Slot Number8Slot Number8Obta Bus8/16 bitsAddress Bus Range2 K for each slotMechanical10Dimensions (W x L x H)231 mm x 132 mm x 111 mmInstallationDIN-Rail or Wall MountingEnvironmental-25 ~ +75°COperating Temperature-25 ~ +75°CStorage Temperature-30 ~ +80°CAmbient Relative Humidity10 ~ 90% RH (non-condensing)Power-10 ~ +30 VocInput Range+10 ~ +30 VocIsolation1 kVRedundant Power InputsYes, with one power relay (1 A @ 24 Voc) for alarmCapacity30 W30 WConsumption6.7 W7.2 W	Programmable LED Indicators	3		
Buzzer Yes I/O Expansion Slots Slot Number 4 8 Slot Number Slot Number 4 8 Note: For High Profile 1-8K and 1-87K Modules Only Data Bus 8/16 bits Address Bus Range 2 K for each slot Mechanical Dimensions (W x L x H) 231 mm x 132 mm x 111 mm 355 mm x 132 mm x 111 mm Installation DIN-Rail or Wall Mounting Environmental Operating Temperature -25 ~ +75°C Storage Temperature -30 ~ +80°C Ambient Relative Humidity 10 ~ 90% RH (non-condensing) Power Input Range Isolation +10 ~ +30 Voc Isolation 1 kV Redundant Power Inputs Yes, with one power relay (1 A @ 24 Voc) for alarm Capacity 30 W 30 W Consumption 6.7 W 7.2 W	Push Buttons	4		
I/O Expansion Slots Slot Number 4 8 Slot Number Note: For High Profile I-8K and I-87K Modules Only Data Bus 8/16 bits Address Bus Range 2 K for each slot Mechanical 2 Dimensions (W x L x H) 231 mm x 132 mm x 111 mm Installation DIN-Rail or Wall Mounting Environmental 0 Operating Temperature -25 ~ +75°C Storage Temperature -30 ~ +80°C Ambient Relative Humidity 10 ~ 90% RH (non-condensing) Power - Input Range +10 ~ +30 Voc Isolation 1kV Redundant Power Inputs Yes, with one power relay (1 A @ 24 Voc) for alarm Capacity 30 W 30 W Consumption 6.7 W 7.2 W	Buzzer	Yes		
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Slot Number Note: For High Profile I-8K and I-87K Modules Only Data Bus 8/16 bits Address Bus Range 2 K for each slot Mechanical Strome and s		4	8	
Data Bus8/16 bitsAddress Bus Range2 K for each slotMechanical355 mm x 132 mm x 111 mmDimensions (W x L x H)231 mm x 132 mm x 111 mmInstallationDIN-Rail or Wall MountingEnvironmental-25 ~ +75 °COperating Temperature-25 ~ +75 °CStorage Temperature-30 ~ +80 °CAmbient Relative Humidity10 ~ 90% RH (non-condensing)Power	Slot Number	Note: For High Profile I-8K and I-87K Modules Only		
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Dimensions (W × L × H)231 mm x 132 mm x 111 mm355 mm x 132 mm x 111 mmInstallationDIN-Rail or Wall MountingEnvironmentalOperating Temperature-25 ~ +75 °CStorage Temperature-30 ~ +80 °CAmbient Relative Humidity00 ~ 90% RH (nor-condensing)PowerInput Range+10 ~ +30 VbcIsolation1kVRedundant Power InputsYes, with one power relay (1 A @ 24 Vbc) for alarmCapacity30 W30 W30 W	Mechanical			
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Storage Temperature -30 ~ +80°C Ambient Relative Humidity 10 ~ 90% RH (non-condensing) Power 10 ~ +30 Vbc Input Range +10 ~ +30 Vbc Isolation 1 kV Redundant Power Inputs Yes, with one power relay (1 A @ 24 Vbc) for alarm Capacity 30 W 30 W Consumption 6.7 W 7.2 W	Operating Temperature	-25 ~ +75°C		
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Input Range +10 ~ +30 Voc Isolation 1 kV Redundant Power Inputs Yes, with one power relay (1 A @ 24 Voc) for alarm Capacity 30 W Consumption 6.7 W	Power			
Isolation 1 kV Redundant Power Inputs Yes, with one power relay (1 A @ 24 Vbc) for alarm Capacity 30 W 30 W Consumption 6.7 W 7.2 W	Input Range	+10 ~ +30 Vpc		
Redundant Power Inputs Yes, with one power relay (1 A @ 24 Vbc) for alarm Capacity 30 W 30 W Consumption 6.7 W 7.2 W	Isolation	1 kV		
Capacity 30 W 30 W Consumption 6.7 W 7.2 W	Redundant Power Inputs	Yes, with one power relay (1 A @ 24 Vbc) for alarm		
Consumption 6.7 W 7.2 W	Capacity	30 W	30 W	
	Consumption	6.7 W	7.2 W	

Ordering Information ______

iP-8411-MTCP	4 slots I/O Expansion Unit with Modbus TCP protocol		
iP-8841-MTCP	8 slots I/O Expansion Unit with Modbus TCP protocol		

Accessories _____

DP-660	24 $V_{\text{DC}}/2.5$ A, 60 W and 5 $V_{\text{DC}}/0.5$ A, 2.5 W Power Supply with DIN-Rail Mounting
DP-665	24 Vbc/2.7 A, 65 W Power Supply with DIN-Rail Mounting
I-7560 CR	USB to RS-232 Converter (RoHS)
3LMSD-2000 CR	2 GB microSD card (RoHS)