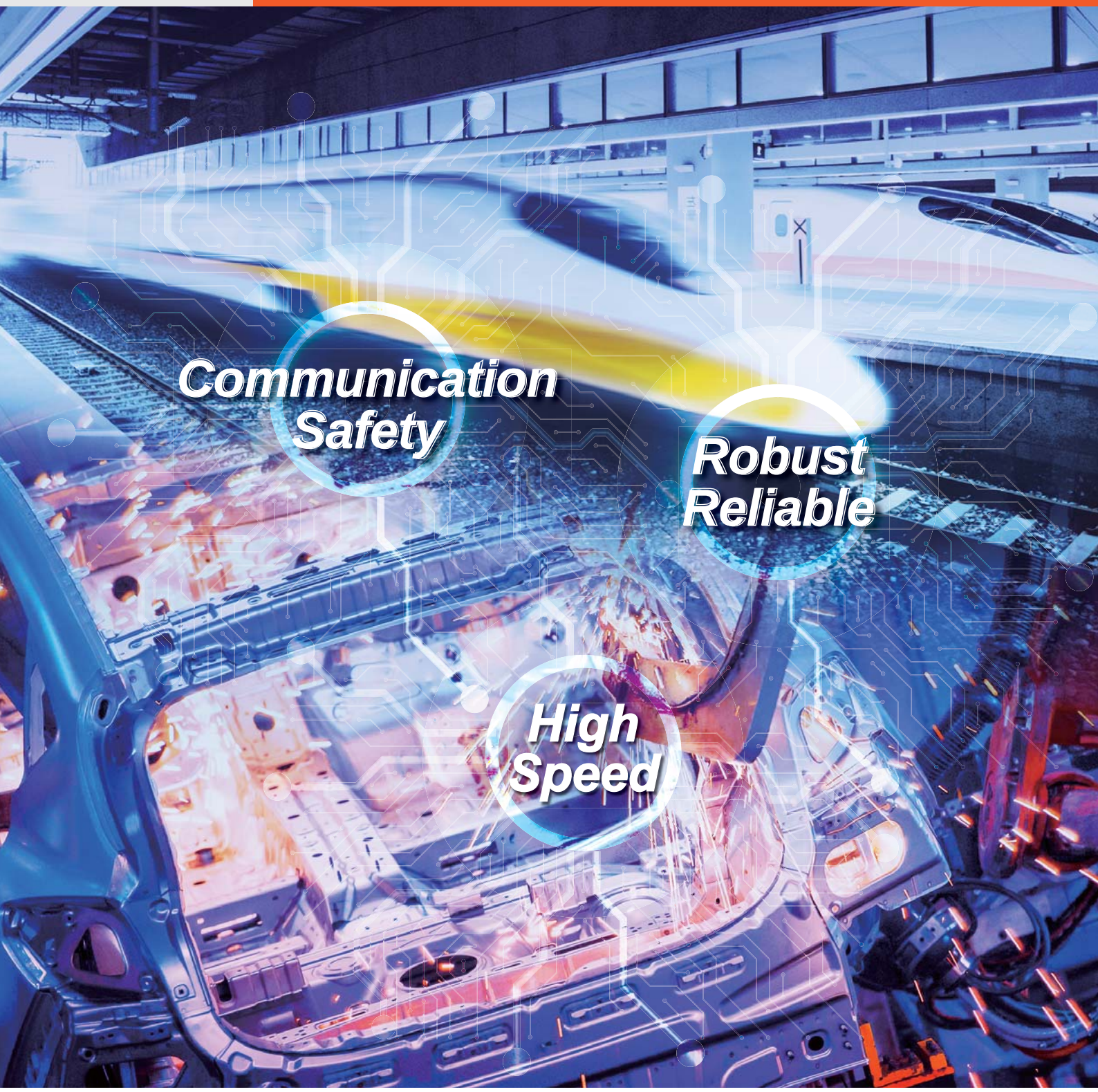
Industrial CAN and CAN FD Communication







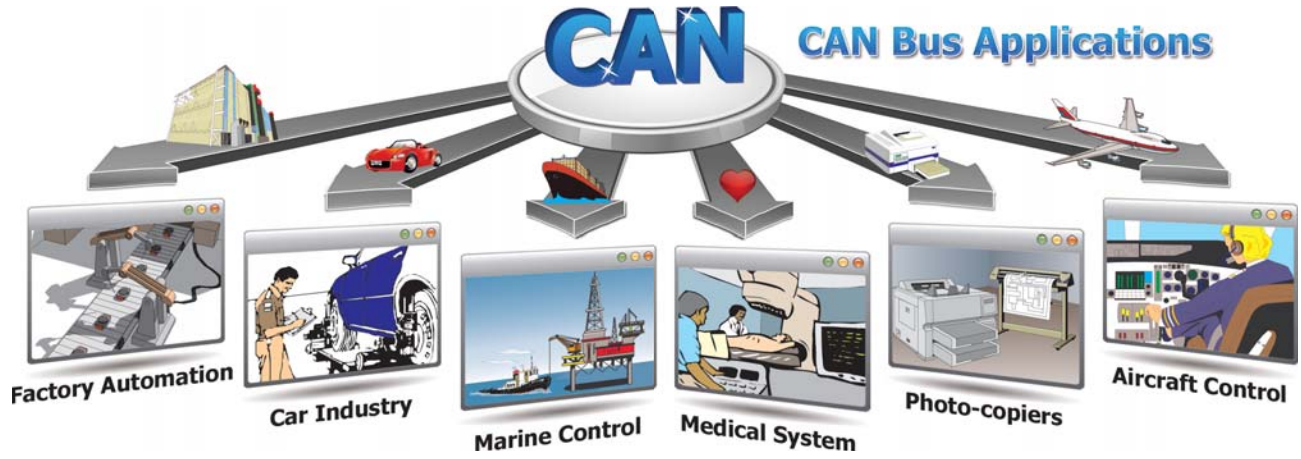

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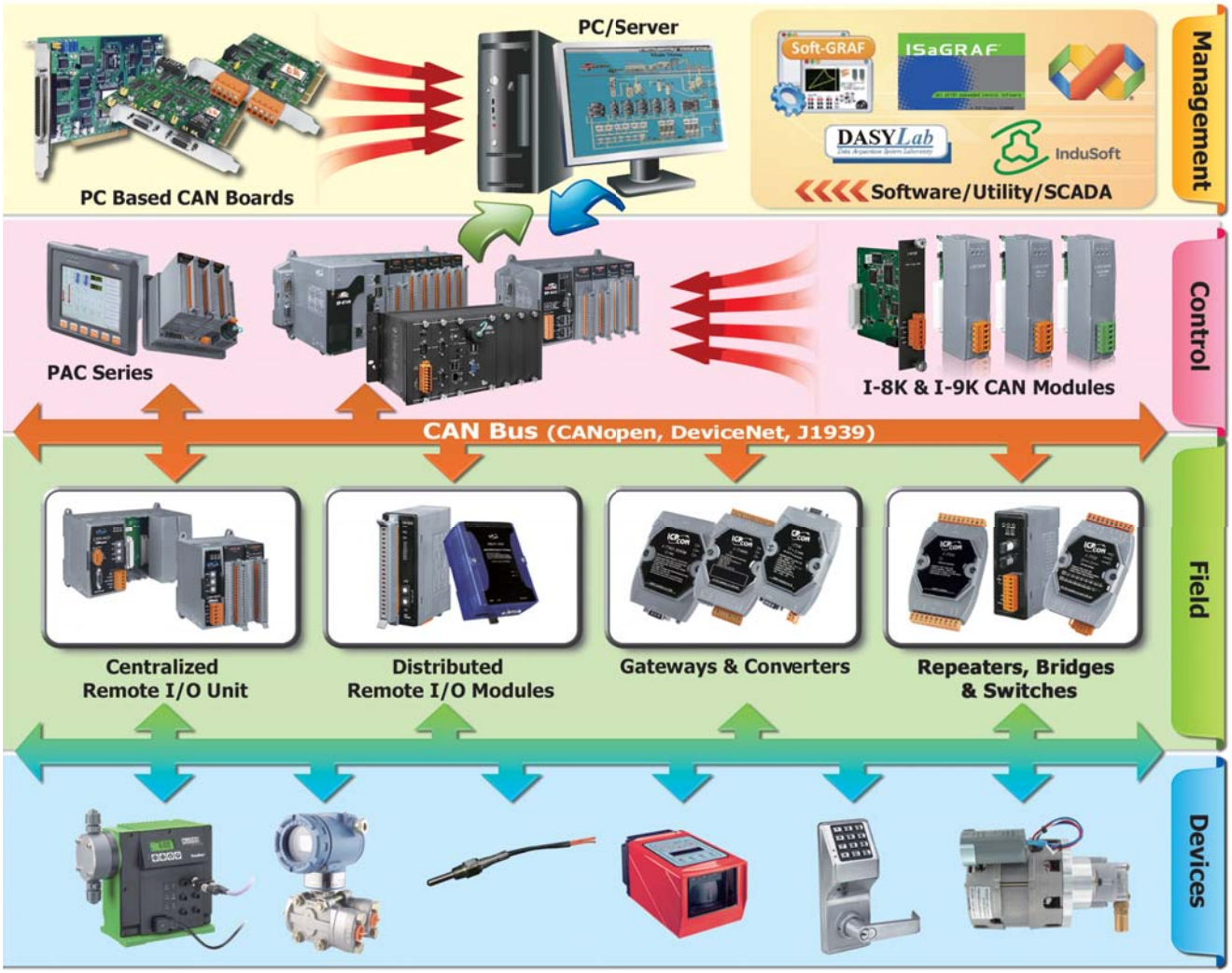
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**1. Overview - - -

1. Overview



ICP DAS has been developing rich **CAN-based/DeviceNet/CANopen/J1939** products for more than 10 years, including PCI interface cards, Fieldbus converters, PACs, gateways and remote I/O modules. We provide complete hardware solutions to satisfy a wide variety of CAN-based applications that can effectively solve issues related of data acquisition and calculation, transmission distance extension, network topology limitations, communication interface transformation, and noise resistance. In addition, ICP DAS supplies a large ranges of software resource, such as utility tools, APIs, demo programs, OPC, ActiveX and third-party drivers, which can help users to develop complex custom control and monitoring systems more easily and quickly. For certain special applications, we can offer flexible OEM/ODM projects to match the different requirements of our customers. Through ICP DAS's efficient and reliable service, you can easily complete your complex CAN-based projects.



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CAN Bus Introduction

ICP DAS has been developing various CAN products for several years, including PCI interface cards, converters, PACs and expansion modules. ICP DAS holds CAN conference, exhibition and training course all of the world. We also help customers to resolve various CAN technology problems. In addition, we can provide CAN Bus solutions for our customers.

CAN Bus Features

- **Multi-master**

  When the CAN Bus is idle, any unit which wants to send a CAN message may start to transmit a message at the same time. Therefore, the multi-master architecture can be realized easily without message conflict. The unit with the message of highest priority to be transmitted gains bus access.

- **Safety**

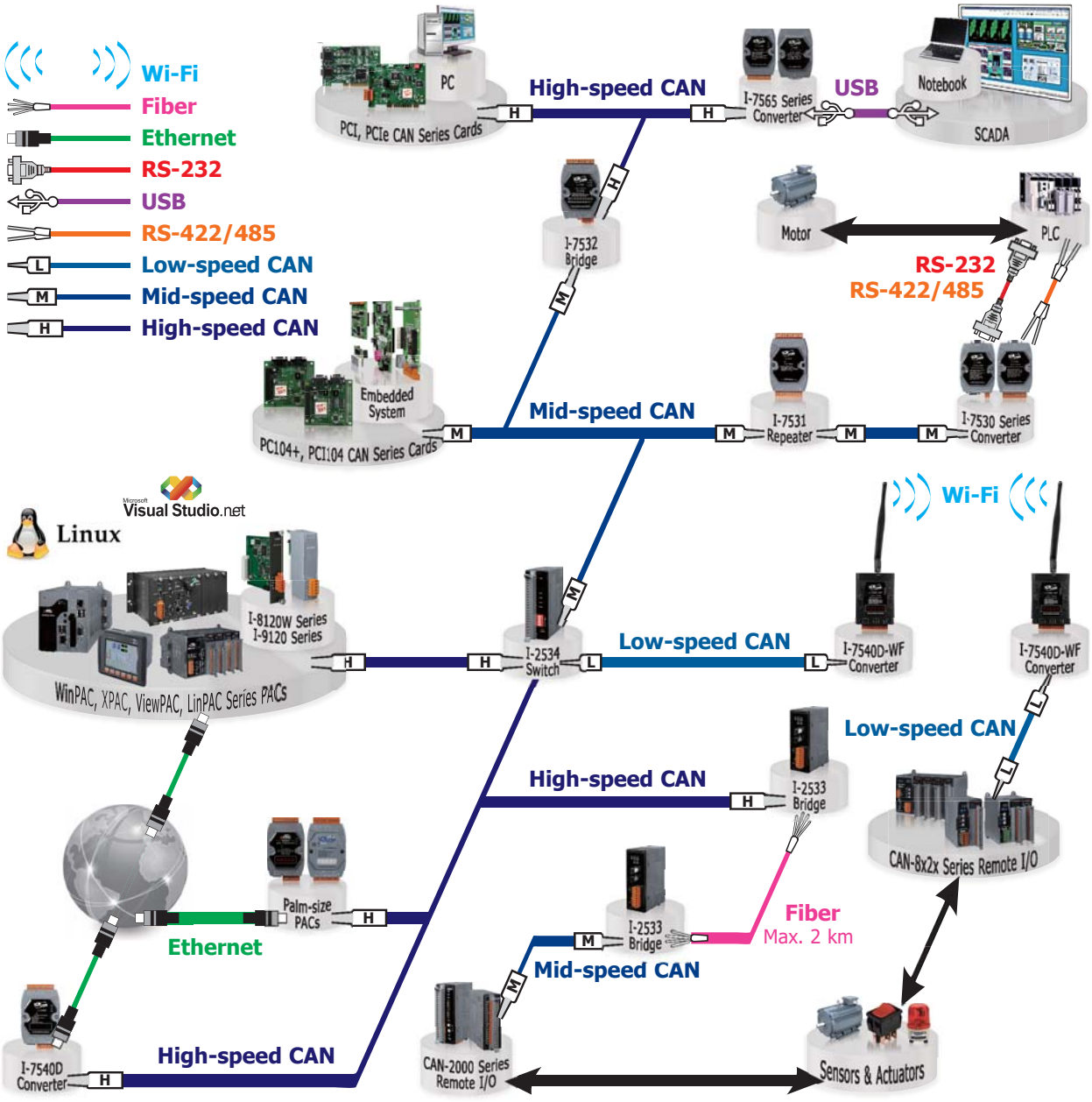
  In order to achieve the utmost safety of data transfer, powerful measures for error detection, signaling and self-checking are implemented in every CAN node.

- **Priorities**

  The CAN IDENTIFIER defines a static message priority during bus access.

- **Arbitration**

  If two or more nodes start transmitting messages at the same time, the arbitration mechanism is applied to guarantee that one of these messages can be sent successfully according to the priority.



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CANopen Introduction

CANopen is a kind of network protocol based on CAN Bus and has been used in various applications, such as vehicles, industrial machines, building automation, medical devices, maritime applications, restaurant appliances, laboratory equipment & research.

ICP DAS has been developing CAN-based CANopen protocol products for several years. Our products include PCI interface boards, gateway modules, CANopen remote I/O and CANopen module for ICP DAS's ViewPAC/WinPAC/XPAC.

We also help customers solving various CANopen network technology problems. In addition, we can provide comprehensive CANopen solutions for users.



DeviceNet Introduction

DeviceNet based on the CAN Bus is one of the world's leading device-level networks for industrial automation. In fact, more than 40% of end users surveyed by independent industry analysis report choose DeviceNet over other networks.

ICP DAS has been developing CAN-based DeviceNet protocol products for several years, include PCI interface boards, gateway modules, DeviceNet remote I/O and DeviceNet modules for ICP DAS's PACs, ViewPAC/WinPAC/XPAC series main control unit. We also help customers resolving various DeviceNet network technology problems. In addition, we can provide DeviceNet solutions for users. ICP DAS also holds DeviceNet conferences, exhibitions and training courses all over the world.



J1939 Introduction

SAE J1939 is the vehicle bus standard for communication and diagnostics among vehicle components, originally by the car and heavy duty truck industry in the United States. Because of the success of applying in vehicles, J1939 has become the accepted industry standard and the vehicle network technology of choice for off-highway machines in applications such as construction, material handling, and forestry machines. It is a higher-layer protocol based on Controller Area Network (CAN), which provides serial data communications between microprocessor systems (ECU) in any kind of heavy duty vehicles. The messages exchanged between these units can be the vehicle road speed, torque control message from the transmission to the engine, oil temperature, and so forth.



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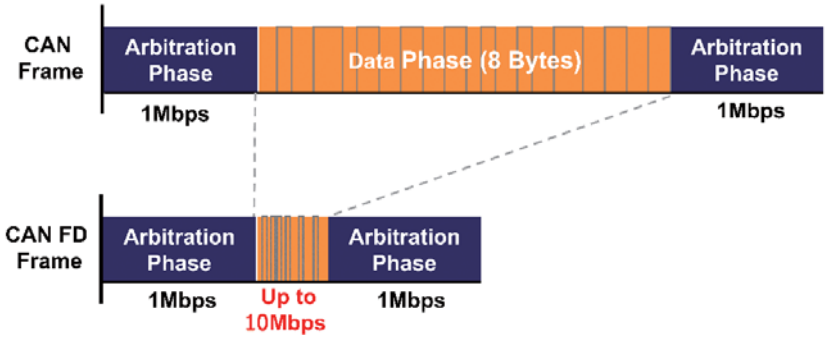
CAN FD Introduction

CAN FD (CAN with Flexible Data-Rate) is a newer extension version of the CAN 2.0 protocol. It was developed by Bosch and was released in 2012. It has been significantly improved during the standardization process and is nowadays in ISO 11898-1:2015. The CAN FD speeds up the data transmission and packs more data into each message.

The CAN FD offers four major benefits:

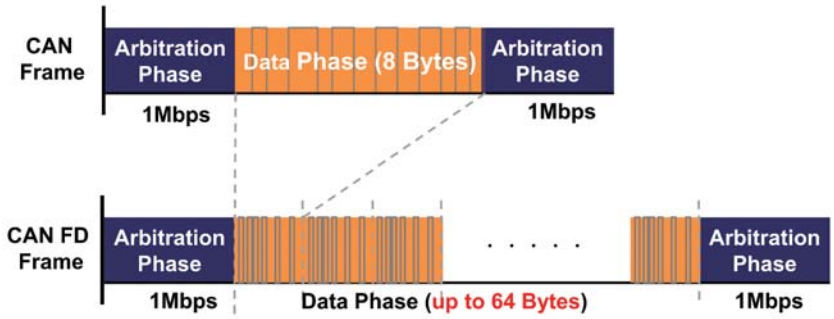
1. Increased Speed

The speed the CAN bus can operate at is determined by the need to complete the message arbitration. So the speed is dependent on the length and topology of the bus. For passenger vehicles the CAN speed is between 500 Kbit/s - 1Mbit/s, while in commercial vehicles, bus speeds of 250 kbit/s are more typical. With CAN FD, the speed of the arbitration remains the same. However at the end of arbitration when only one node is sending, the bus speed can be increased. The CAN FD supports dual bit rates: The nominal (arbitration) bit-rate limited to 1 Mbit/s as given in Classical CAN - and the data bit-rate, which depends on the network topology and transceivers. In practice, data bit-rates up to 10 Mbit/s are achievable.



2. Increased Data Length

The CAN FD provides a higher data bandwidth, but without modification of the cables, connectors, filters and CAN drivers, you should not expect more than 2 to 4 times an increase in bandwidth. To limit the time a CAN frame can occupy the CAN bus, you could expect some restrictions when using CAN frames above 16 bytes. If there is low real-time demand, it is possible to use any data length without any restrictions. A typical scenario is when the system is downloading a software update. The CAN FD supports up to **64 data bytes per data frame** vs. 8 data bytes for Classical CAN. This reduces the protocol overhead and leads to an improved protocol efficiency.



3. Improved Reliability

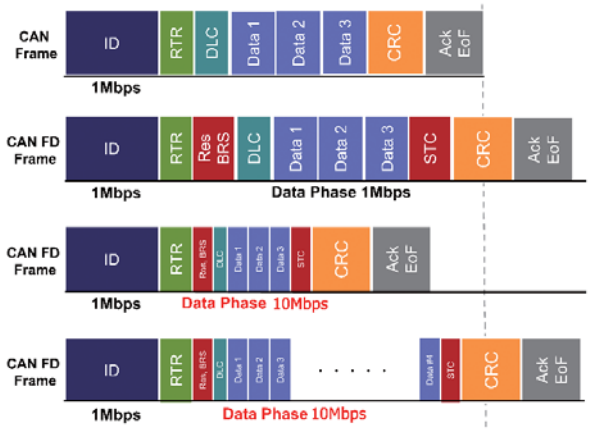
The CRC check sum is done in a different way in CAN FD and as a result, CAN FD has better protection against undetected errors in the data. To get undetected errors demands CAN communication with a high Error-Frame content. The best way to protect the communication is to improve the physical layer to remove any occurrence of Error-Frames. The CAN FD uses an improved cyclic redundancy check (CRC) and the "protected stuff-bit counter", which **lower the risk of undetected errors**. This is very important in safety-critical applications like vehicles and industrial automation.

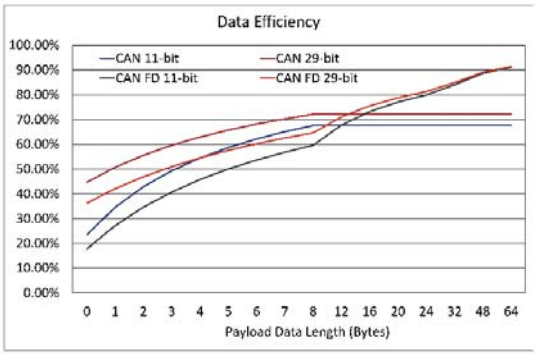


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4. Improved Data Efficiency

The added functionality of CAN FD adds a lot of extra bits vs. Classical CAN - how can this lead to less overhead? See the below visualization of Classical CAN vs. CAN FD for 3 data bytes. In fact, the efficiency of CAN FD does not exceed Classical CAN until crossing 8 data bytes. However, by moving towards 64 data bytes, the efficiency can go from about 50% up towards 90%.





CAN FD Application – LCD manufactory monitoring system

As a result of the liquid-crystal technology changes with each new day, in daily life we also observe the liquid-crystal display (LCD) trail everywhere. Therefore the good rate of the LCD in the production process becomes more important. For this reason in the product manufactory the equipment surveillance and control are asked for higher stability relatively. At any moment, they must guarantee that all remote equipments on the production line can be monitored and collected the status. Therefore it is the future tendency to adopt the stable fast CAN FD system. The CAN FD is a cost effective communication link. It connects most industrial equipment into the network (for example: optical sensor, valve set, the electric motor and HMI). It also reduces the complexity of the control system. This system use the I-7565M-FD module to monitor the working status of all equipment. It can not only monitor the control command but also receive the response CAN FD messages to check the correct decision and control command. With the fast and long payload CAN FD system, the control and monitor system can work stably and safely.



CAN FD Converters

The CAN FD converter is used to integrate the different communication interface. The USB and CAN FD converter is used to be a CAN FD master. The Fiber and CAN FD bridge helps to extend the communication distance of the CAN FD.

Model Name		Description	page
USB Converter	I-7565M-FD 	2-port USB to CAN/CAN FD Converter.	Ch3-2
Fiber Bridge	I-2533CS-FD 	CAN to Single Mode Fiber Bridge.	Ch3-4

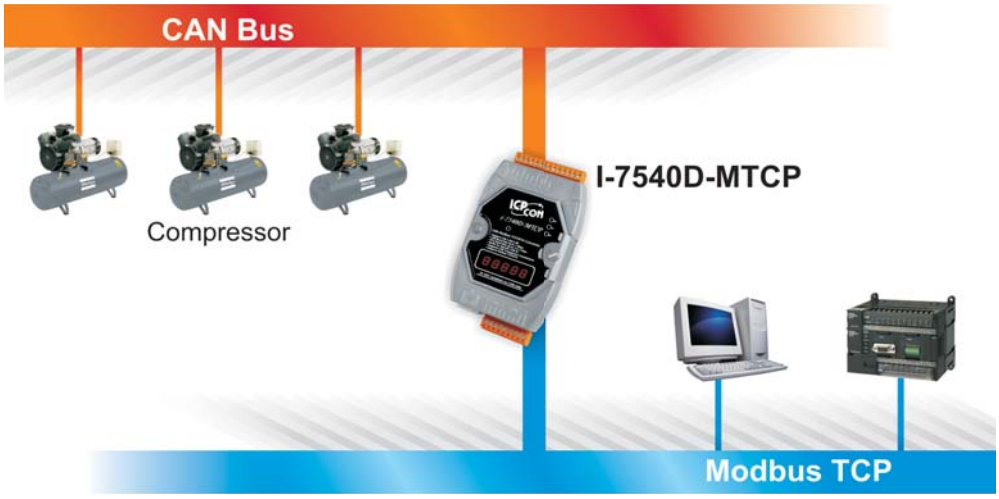
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Overall System Solutions

Vehicle panel inspection – For CAN Converter Series

By using the OBD-II interface, the I-7565-H1 and CANcheck software can be used to diagnose the vehicle. In the usual maintenance, the I-7565-H1 with CANcheck software could help to check vehicle safety systems and sensing components, including airbags, ABS, brake systems, oxygen sensors, and etc.. That will shorten the diagnostic time and make the maintenance become easy. In other CAN-based applications or equipments, the I-7565-H1 and CANcheck software would be the great and friendly tool.





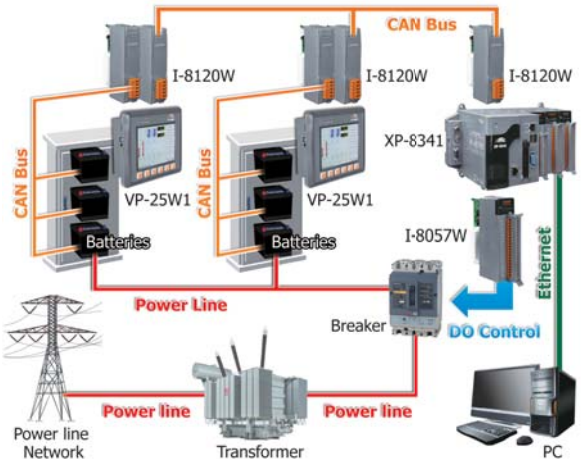
- **Recommend Products**

CAN Converter Series	USB to CAN Converter	I-7565-H1
	Modbus TCP to CAN Converter	I-7540D-MTCP
Software	Software for CAN device detection and diagnosis	CANcheck

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Energy Storage System – For PAC-based CAN Modules

The result of the quantity control of each recipe materialseriously affects the quality of the concrete. In order to adjust each quantity promptly, CAN Bus is applied. In this system, the PISO-CM100U is used to monitor the weight of each material from the load cells, and sends the recipe to the PLC. Meanwhile, the PC updates all the data to the screen. By using the user-defined firmware in the CPU of the PISO-CM100U, the PC loading can be effectively reduced, and the system becomes more smooth and reliable.

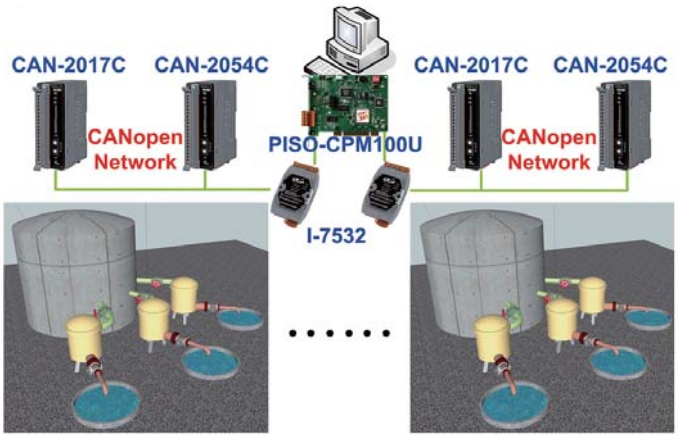


- **Recommend Products**

PAC-base CAN Bus Modules	CAN Communication Module	I-8120W
I/O Series	Analog Input Module	I-8057W
TouchPAD Series	ViewPAC 5.7” HMI Device	VP-25W1
PAC Series	XP-8000 with 0 I/O slot	XP-8341

Oil-Water Separator System - For CANopen Series

This is an oil-water separator system. The crude oil has several impurities and the majority is water. So we need to design a system to dehydrate crude oil. There are several oil-water separators spread around the control center and hundreds meters distance between each equipment. In the control center, PC receives the data that is sent by every oil-water interface detector through PISO-CPM100U and controls the water outlet valve. If the PISO-CPM100U checking the water, the PC will open the water outlet valve until checks the oil. Now this system has worked in some factories.



- **Recommend Products**

PAC-base CAN Bus Modules	CANopen Communication Module	PISO-CPM100U
CAN Bus Bridge Series	Two-channel CAN Bus Isolated Bridge	I-7532
I/O Modules	CANopen I/O Modules	CAN-2017C, CAN-2054C

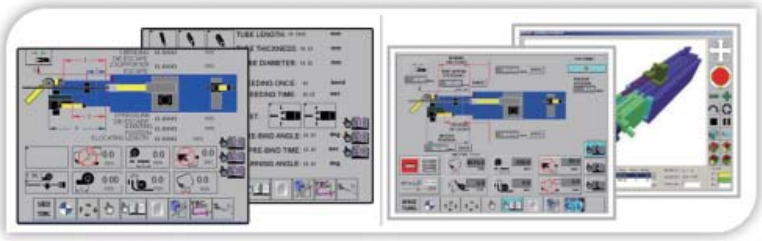
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The Tube Bender Built-in the CANopen Motion Control

Nowadays, the metalworking needs higher precision and less defection. The traditional machines are upgrading to the precision machinery. The design of the tube bender machine is changing including the mechanism, the appearance, and the sensors. The controller of the tube bender machine also changes the PLC to the IPC or embedded PC which built-in friendly HMI and powerful 3D software like 3D preview, mirroring and rotation. The CANopen motion becomes one of the economical remote motion controls.

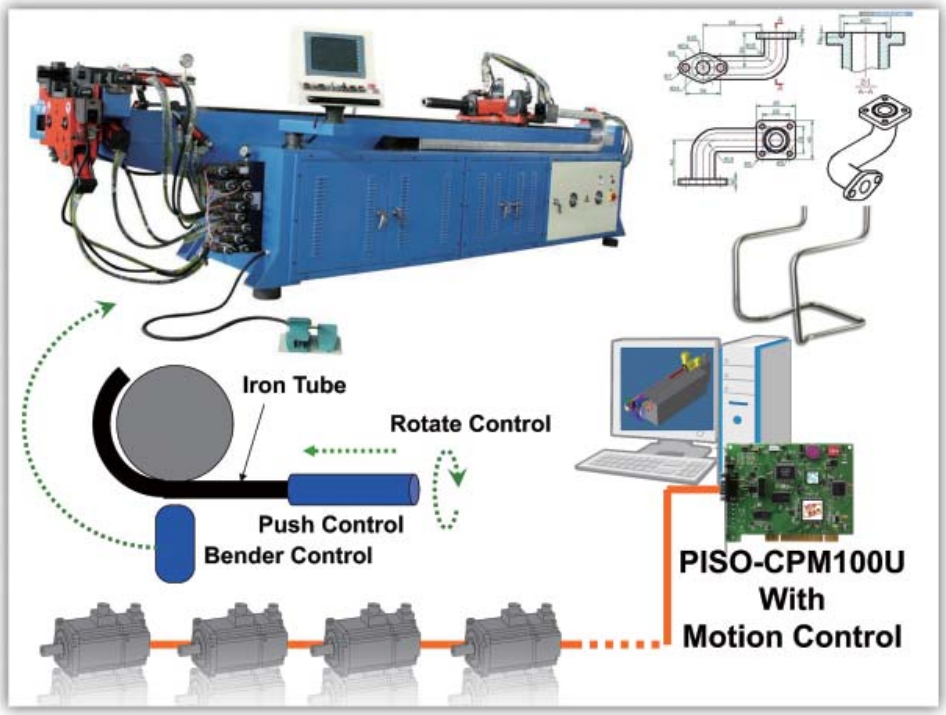
Various Bended Tubes







The CANopen motion library has included the CiA 402 profile. The users need not to care about the CANopen protocol and just focus on the control algorithm. The bender machine equipped the IPC and CANopen master PCI board (PISO-CPM100U). With the PISO-CPM100U and CANopen motion library, you can do various motion control functions, such as position control, velocity control, toque control, and synchronous action without having the background knowledge of the complex and abstruse CANopen protocol.

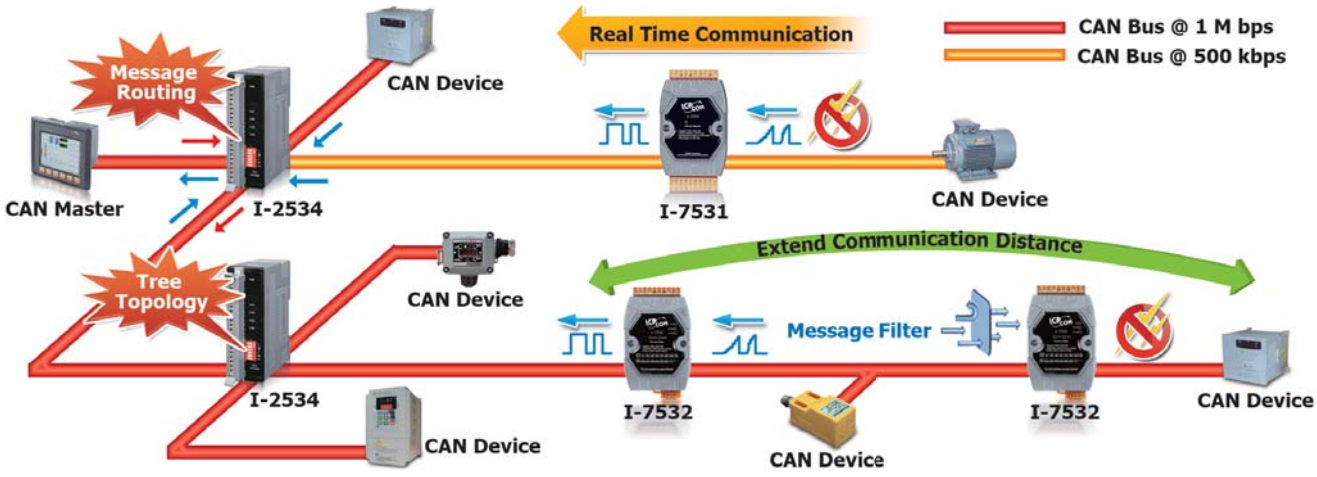


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2. CAN Bus Repeater/Bridge/Switch

The CAN Bus Repeater/Bridge/Switch is used to enhance the signal quality, extend the communication distance, isolate CAN Bus network. ICP DAS provides following products.

Model Name	I-7531	I-7532	I-2534	I-5534-M
Pictures	Isolated CAN Bus Repeater	Isolated Two-channel CAN Bus Bridge	4-Port CAN Bus Switch	4-Port CAN Bus Switch with Metal Casing
				
CAN Interface				
Transceiver	NXP 82C250		NXP TJA1042	
Channel number	2		4	
Connector	3-pin screwed terminal block (CAN_GND, CAN_L, CAN_H)	4-pin screwed terminal block (CAN_GND, CAN_L, CAN_SHLD, CAN_H)	9-pin male D-Sub with CAN_GND, CAN_SHLD, CAN_H, CAN_L	
Transmission speed (bps)	5 k ~ 800 k with auto baud rate detection	5 k ~ 1 M selected by rotary switch or utility tool		
Transmission Distance (m)	Depends on the CAN baud rate	Duplicates the transmission distance depended on the CAN baud rate		
Propagation Delay	Max. 200ns (shortens the transmission distance by ~ 40 m)	Depends on the CAN baud rate (Max. 134 us @ 1 Mbps)	Depends on the CAN baud rate (Max. 440 us @ 1 Mbps)	
Terminator Resistor	Jumper for 120 Ω terminator resistor		DIP switch for the 120 Ω terminator resistor	Jumper for 120 Ω terminator resistor
Isolation	3000 VDC for DC-to-DC, 2500 Vrms for photo-couple			
Specification	ISO 11898-2, CAN 2.0A and CAN 2.0B			
LED				
Round LED	CAN Status LED	PWR LED, Rx LED, ERR LED	PWR LED, CAN1 LED, CAN2 LED, CAN3 LED, CAN4 LED	
Power				
Power supply	Unregulated +10 ~ +30 VDC			
Protection	Power reverse polarity protection, Over-voltage brown-out protection			
Power Consumption	2 W		3 W	
Mechanism				
Installation	DIN-Rail			
Casing	Plastic			Metal
Dimensions (W x L x H)	72 x 118 x 33 (mm)		32.3 x 99 x 77.5 (mm)	116.5 x 127 x 61.3 (mm)
Environment				
Operating Temperature	-25 ~ +75°C			
Storage Temperature	-30 ~ +80°C			
Relative Humidity	10 ~ 90% RH, Non-condensing			



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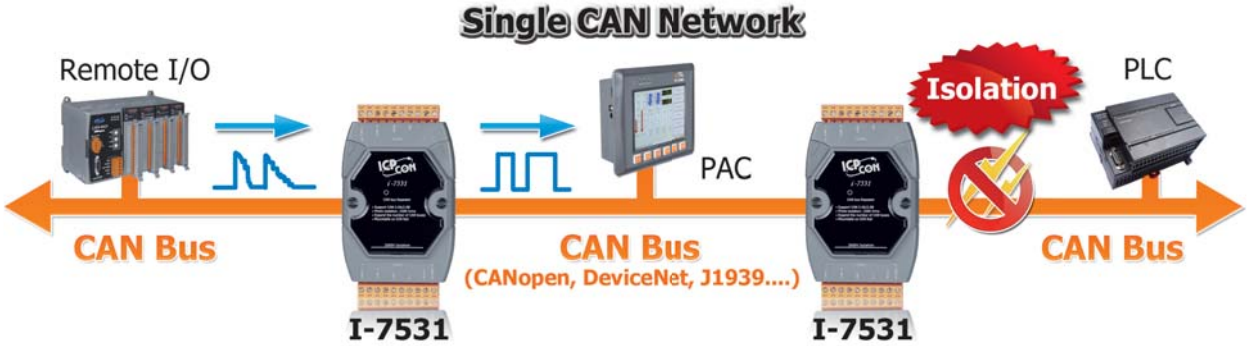
Isolated CAN Bus Repeater

I-7531



The I-7531 is an isolated CAN repeater that can be used to establish a physical coupling of two segments of a CAN Bus system. This module is designed to isolate the noise and disturbance between the two CAN ports of the I-7531. When the CAN signal is decayed because of the rough bus cable or noise, the I-7531 can recover the shape of the CAN signals to the original ones. Tree topologies can be implemented as well as long drop lines using the I-7531. In order to use the I-7531 easily, the module can automatically adjust the baud rate by itself to match the CAN network. Users just connect the I-7531 with the CAN Buses, check the terminator resistor and power it on, subsequently the I-7531 enable to work normally.

- Automatic baud rate detection
- Up to 100 nodes on each CAN port
- Compatible with CAN specification 2.0 parts A and B
- Fully compatible with the ISO 11898-2 standard
- 2500 Vrms photocoupler isolation on the CAN side
- Jumper for the 120 Ω terminator resistor of the CAN Bus
- Supports a wide range of baud rates from 5 kbps ~ 800 kbps
- 3 kV galvanic isolation between the power supply and the two CAN channels



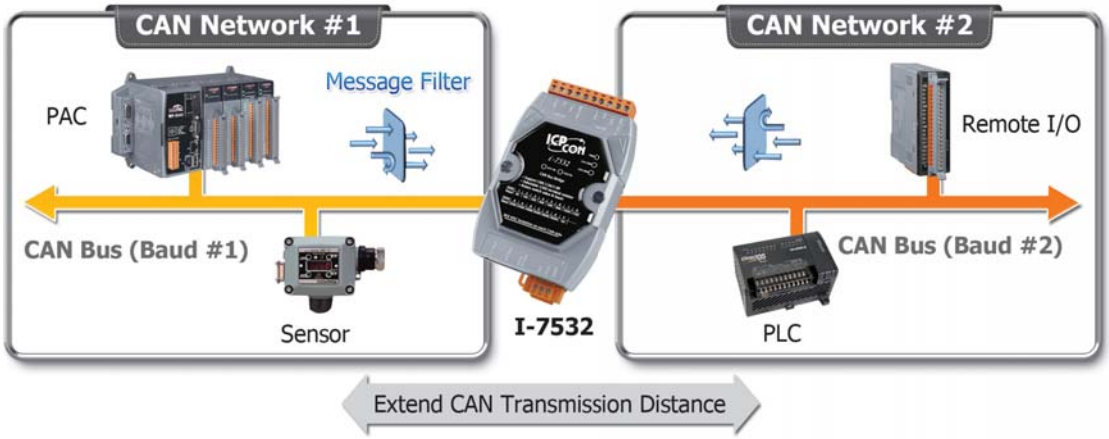
Isolated two-channel CAN Bus Bridge

I-7532



The I-7532 is a CAN Bus bridge that can be used to integrate two CAN networks even they implement different CAN baud rate. Compared with the I-7531, the I-7532 offers more than 3 useful features. First, the transmission distance limitation of the CAN Bus system on each side of the I-7532 is independent, which means the total CAN network distance can be extended. Second, when some errors (e.g. bit error) happened on one CAN port of the I-7532, the other CAN port of the I-7532 will not be affected and can still work correctly. Last, the baud rate and CAN message filter configuration of these two CAN ports on the I-7532 is able to be tuned following users' applications. These features mean that users can design their applications more flexible and efficient.

- Compatible with CAN specification 2.0 parts A and B
- Supports a range of baud rates from 10 kbps ~ 1 Mbps
- Jumper for the 120 Ω terminator resistor of the CAN Bus
- 2500 Vrms photocoupler isolation on the CAN side
- 3 kV galvanic isolation between the two CAN channels
- Fully compatible with the ISO 11898-2 standard
- Two CAN channels
- Extends the CAN transmission distance
- Up to 100 nodes on each CAN port
- Able to configure the CAN baud rate for each channel using a rotary switch



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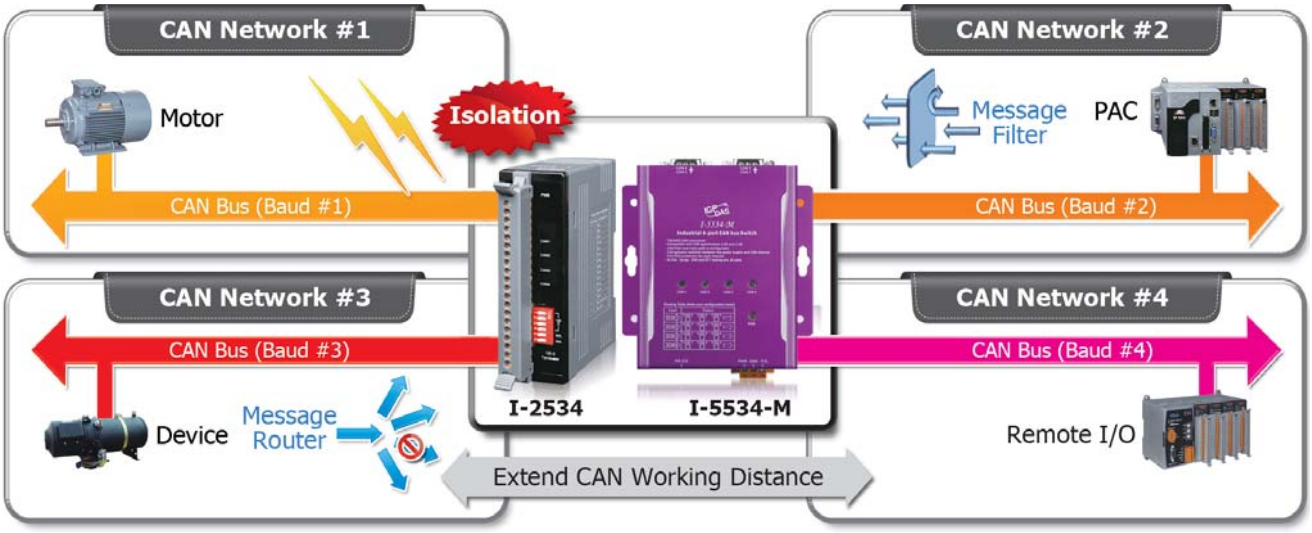
Isolated 4-Port CAN Bus Switch

I-2534 I-5534-M

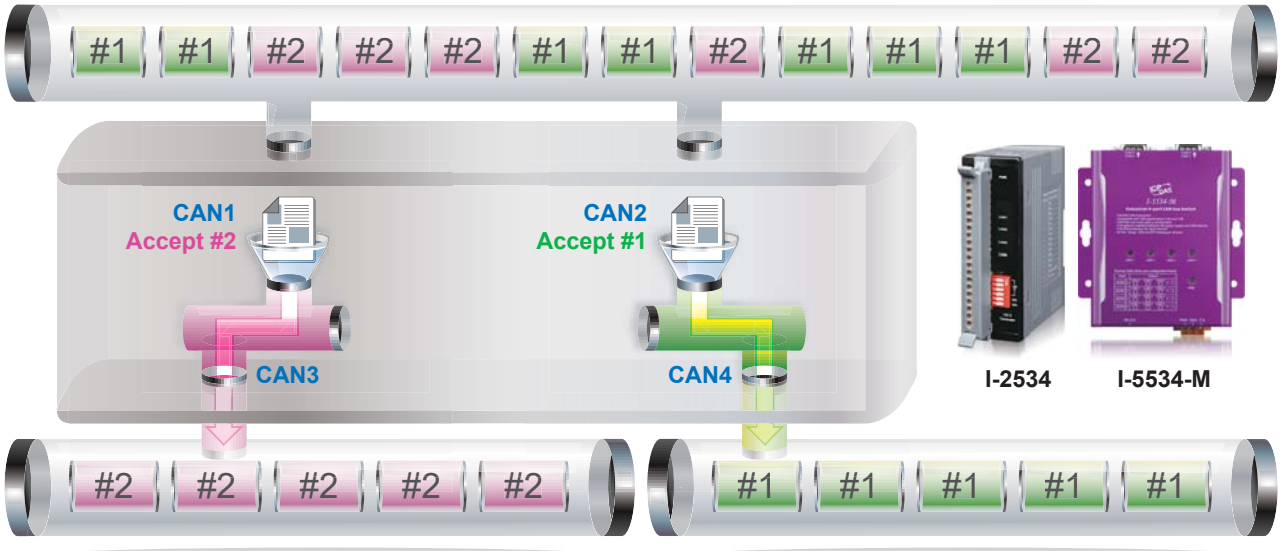


The I-2534/I-5534-M provides 4 isolated independent CAN ports that can be used to link 4 CAN networks. The I-2534/I-5534-M follows the ISO 11898-2 specification which is applied in widely range of CAN-based protocols. In order to fit the industrial application, this module provides the functions of reshaping the CAN signals and isolating the disturbance among 4 CAN ports. When users apply the I-2534/I-5534-M in the CAN networks which use different baud rate, the I-2534/I-5534-M offers the baud rate configuration, CAN message filters, and message router, and effectively help users solve the problems related to network-to-network data exchanging, message filtering and routing, and tree topology for the CAN Bus. The transmission distance limitation for each CAN port of the I-2534/I-5534-M is independent, which means that the total length of the network can be extended.

- 4 CAN communication ports
- 3 kV DC-DC isolation and 2500 Vrms isolation
- Fully compatible with the ISO 11898-2 standard
- The message filter for each CAN port is configurable
- I-5534-M is for the metallic casing
- Power requirements: Unregulated +10 VDC ~ +30 VDC
- Compatible with CAN specification 2.0 parts A and B Supports baud rates from 5 kbps ~ 1 Mbps
- DIP switch for the 120 Ω terminator resistor of the CAN Bus
- Rotary switch used to select the baud rate for each CAN port



CAN bus network (Heavy bus loading)



CAN bus with only #2 message (Light bus loading)

CAN bus with only #1 message (Light bus loading)

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Case Studies: CAN network monitoring

Location: United States

Product: I-7532

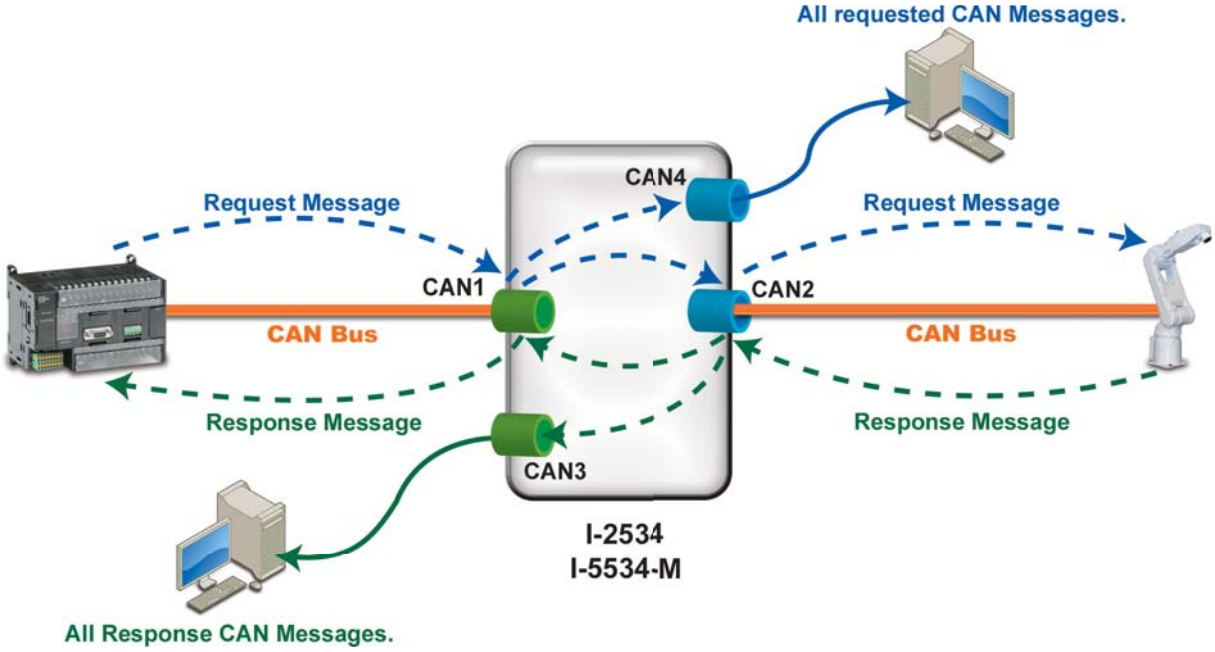
There is a electric vehicle system which works fine with the CAN Bus. The system need extra monitor and extend further functionality. It is important that the newer subsystem should not influence the original system. The user use the I-7532 to isolate these two system. The original system works in the CAN ch.1 of the I-7532 and the newer subsystem will work in the CAN ch.2. After the CAN filter and listen mode has been configured, The newer subsystem could get all the messages which comes from the CAN ch.1 and the original system never receive the messages which comes from the newer subsystem.



Location: Iran

Product: I-2534

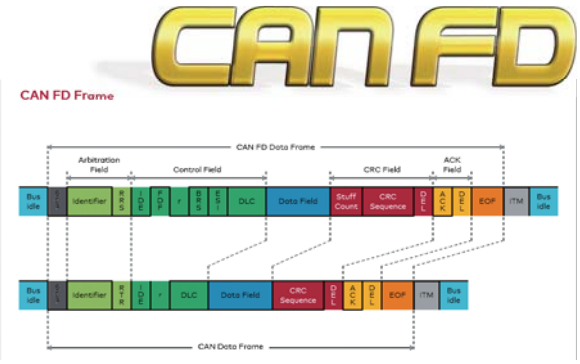
The application is a robot control system. The user need to monitor the CAN messages between the PLC and the robot. The user need separate the requested CAN messages from the replied CAN messages. The user applied the I-2534 in the CAN Bus with specific routing configuration like below. The requested CAN messages has been transmitted to the CAN ch4 and the replied CAN message has been transmitted to the CAN ch3. The user could monitor and record the communication messages between the PLC and the robot.



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2.1 CAN FD Repeater/Bridge/Switch

CAN FD (Controller Area Network Flexible Data-Rate) is a data-communication protocol typically used in the automotive industry. It supports up to 64 data bytes per data frame vs. 8 data bytes for Classical CAN. This reduces the protocol overhead and leads to an improved protocol efficiency. It was developed to meet the need to increase the data transfer rate and with larger frame sizes.CAN FD supports dual bit rates: The nominal (arbitration) bit-rate limited to 1 Mbit/s as given in Classical CAN - and the data bit-rate, which depends on the network topology and transceivers. In practice, data bit-rates up to 10 Mbit/s are achievable.



Isolated two-channel CAN/CAN FD Bridge

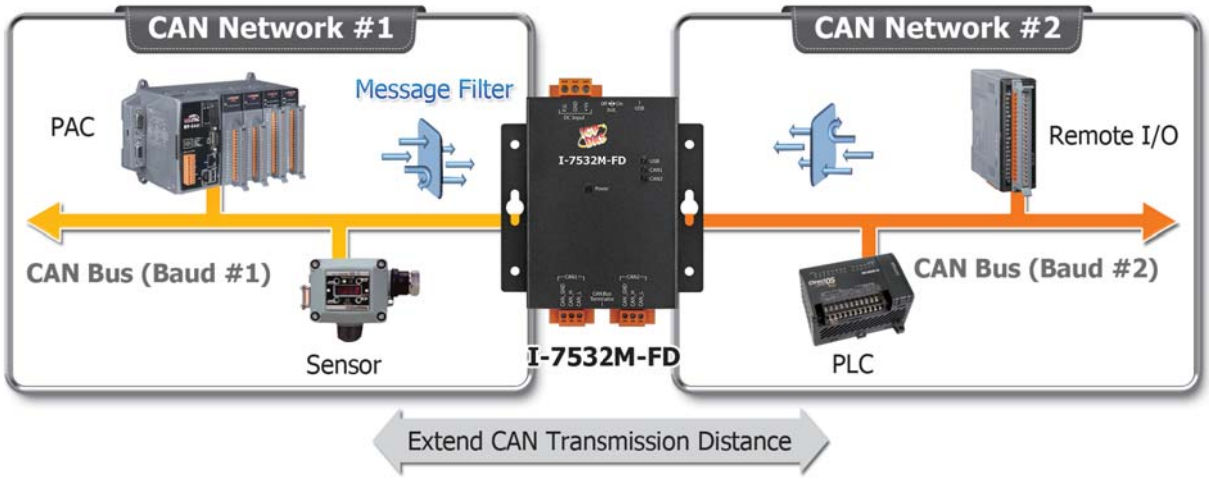
I-7532M-FD



The I-7532M-FD is a CAN/CAN FD bridge that can be used to integrate two CAN/CAN FD networks even they implement different CAN/CAN FD baud rate. Compare with the CAN repeater series, the I-7532M-FD offers more than 3 useful features.

First, the transmission distance limitation of the CAN Bus system on each side of the I-7532M-FD is independent, which means the total CAN network distance can be extended. Second, when some errors (e.g. bit error) happened on one CAN port of the I-7532M-FD, the other CAN port of the I-7532M-FD will not be affected and can still work correctly. Last, the baud rate and CAN/CAN FD message filter configuration of these two CAN ports on the I-7532M-FD is able to be tuned following users' applications. These features mean that users can design their applications more flexible and efficient.

- Compatible with the ISO 11898-2 standard
- Compatible with CAN specification 2.0 A/B and FD
- CAN FD support for ISO and Non-ISO (Bosch) standards switchable
- CAN FD bit rates for data field from 100 kbps to 10 Mbps
- CAN bit rates from 10 kbps to 1000 kbps
- Support CAN Bus message filter configuration
- Support CAN/CAN FD frame forwarding rule, mapping rule, merging rule and splitting rule
- Support CAN network status analysis via Utility tool
- Messaging traffic of each port up to 10,000 fps
- The baud rate of each port can be different for highly flexibility

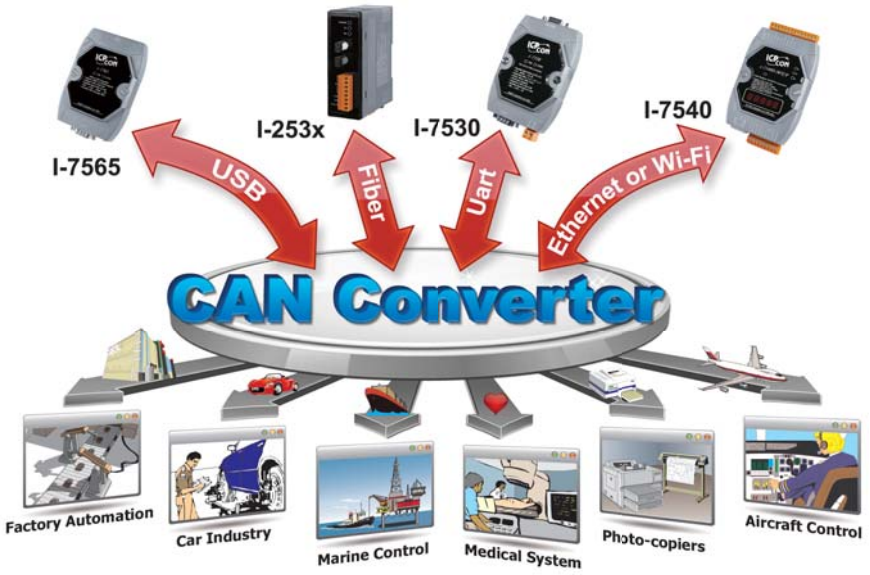


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3. CAN Converters

ICP DAS CAN converters are used to establish a physical coupling of two or more communication interface, and are infrastructure components with which complex network structures can be implemented. They can be used to implement the data conversion between CAN and USB, Uart, Ethernet or Wi-Fi interface.

- CAN to USB: I-7565 series
- CAN to Fiber: I-253x series
- CAN to Ethernet or Wi-Fi: I-7540 series
- CAN to Uart: I-7530 series



3.1 USB to CAN Converters



The I-7565 series is the USB to CAN converter with a maximum of two independent CAN channels that supports CAN protocols 2.0A and 2.0B. It becomes very convenient and easy to access and control the CAN devices via the USB port of the PC.

Model Name	I-7565M-HS	tM-7565	I-7565-H1	I-7565-H2	I-7565-CPM	I-7565-DNM
Pictures	2-Port High Performance USB to CAN Converter	1-Port Cost Effective USB to CAN Converter	1-Port High Performance USB to CAN Converter	2-Port High Performance USB to CAN Converter	Intelligent USB to CANopen Converter	Intelligent USB to DeviceNet Converter
						
USB Interface						
Connector	USB Type B					
Compatibility	USB 1.1 and 2.0 standard					
Compatibility						
Cannel	2	1	1	2	1	1
Transceiver	NXP TJA1042	NXP TJA1042	NXP TJA1042		NXP 82C250	NXP 82C250
Connector	8-pin terminal block	7-pin terminal block	9-pin male D-Sub	10-pin terminal block	9-pin male D-Sub	
Baud Rate	10k, 20k, 50k, 100k, 125k, 250k, 500k, 800k, 1M					125k, 250k, 500k
Isolation	3000 Vrms	2500 Vrms	3000 Vrms		3000 VDC	
Terminator Resistor	Selectable 120 Ω terminator resistor by a jumper					
Protocol	CAN 2.0A/2.0B				CiA 301 V4.02	DeviceNet Volume I ver2.0, Volume II ver2.0
Receive Buffer	512 data frames	256 data frames	256 data frames	128 data frames for each CAN port	1000 data frames	256 data frames
Max. Data Flow	15000 fps for each CAN port	425 fps	3000 fps	1500 fps for each CAN port	-	-
System						
Software Drivers	Windows XP/7/8.1/10					
Software SDK	VB6, VC++ 6.0, C#, VB .NET	N/A	N/A		VB6, VC++ 6.0, C#, VB .NET	VB6, VC++ 6.0, BCB 6.0
Power Consumption	1.5 W				3 W	3 W
Dimensions (W x W x D)	111 mm x 102 mm x 27mm	52mm x 87mm x 27mm	108 mm x 72 mm x 35 mm			

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High Speed USB to 2-port CAN Bus Converter

I-7565M-HS



I-7565M-HS is a high speed USB to CAN converter with two CAN channels. It improves the transformation speed of other I-7565 series, and allows receiving max. 15000 standard 2.0A CAN frames per second. I-7565M-HS support CAN2.0A/2.0B protocol and different baud rates from 10 kbps to 1000 kbps. The important feature of I-7565M-HS is to support the user-defined baud rate function no matter what the baud rate is. When connecting I-7565M-HS to PC, PC will load the relevant device driver automatically (hot plug & play). Therefore, users can make data collection and processing of CAN Bus network easier and quicker by applying I-7565M-HS.

- Compatible with USB 2.0 (High Speed)
- Support both CAN2.0A and CAN2.0B specifications
- No external power supply (powered by USB)
- Programmable CAN Bus baud rate from 10kbps to 1000kbps
- Support CAN Bus message filter configuration
- Timestamp of CAN message with at least ±10us precision
- Built-in dip-switch to select 120 ohm terminal resister for CAN Bus
- Provide utility tool for users module setting and CAN Bus communication testing conveniently
- Provide API library for user program development





1-Port Cost Effective USB to CAN Converter

tM-7565



The tM-7565 is a tiny USB to CAN converter to fit for narrower environment as a result of its small size. Since it has USB interface, it is easily to be used via laptop. It has isolation on power side and on CAN bus side and it has a good performance. The function of tM-7565 can full compatibly with I-7565. In additional, it provides new function such as listen only. User can use this function to listen CAN bus messages and error detection. According to above features, tM-7565 is an economical and practical USB to CAN converter solution.

- Compatible with CAN specification 2.0A and 2.0B
- Fully compatible with ISO 11898-2 standard
- Support various CAN baud rate from 10K bps to 1M bps
- Support user-defined CAN baud rate
- Support various USB baud rate from 110 bps to 230400 bps
- Build-in selectable 120 Ω terminator resistor
- Software configurable CAN and USB communication parameters
- Power, data flow, and error indicator for CAN and USB
- Watchdog inside
- Support pair connection mode
- Software buffer on CAN bus side and USB side
- Support user-defined end of characters on pair connection mode
- Support listen only mode
- Support time stamp response on USB side



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High-performance 1-Port USB to CAN Converter

I-7565-H1



The I-7565-H1 is a high-performance intelligent USB to CAN converter with one CAN port that can help users to make data collection and process on a CAN Bus network easily and quickly. It improves the transformation speed of the I-7565, and allows receiving max. 3000 standard 2.0A CAN frames per second. The powerful CPU of the I-7565-H1 provides the accurately time-stamp for each CAN message that is useful to analysis and diagnostic the CAN network.

- Provides a configuration utility that can be used to transmit/receive CAN messages
- Driver supported for Windows XP/7/10 and Linux
- Max. data flow for a single channel is 3000 fps No external power supply required (powered by the USB port)
- Built-in jumper for the 120 Ω terminal resister
- Programmable CAN Bus baud rate from 5 kbps ~ 1 Mbps
- Compatible with CAN specification 2.0 parts A and B
- 2500 Vrms photocoupler isolation on the CAN side
- Supports CAN Bus acceptance filter configuration
- Fully compatible with the ISO 11898-2 standard
- 3 kV galvanic isolation for the CAN port
- Removable terminal block
- Provides one CAN port



Intelligent USB to CANopen Converter

I-7565-CPM



I-7565-CPM can represent an economic master solution of CANopen application. It follows CiA 301 specification such as, SDO, PDO, NMT, SYNC and so on. Besides, I-7565-CPM support EDS file interpretation, Heartbeat, Guarding, Slave Boot-up detection, and EMCY event functions. It is suited for portable diagnostic tool or main control unit of a CANopen network.

- Support event trigger, such as EMCY event, Guarding event, Heartbeat event, and Slave Boot-up events
- Support baud: 10 Kbps, 20 Kbps, 50 Kbps, 125 Kbps, 250 Kbps, 500 Kbps, 800 Kbps, and 1 Mbps
- Driver supported Windows XP/7/10 and Linux
- Support NMT, PDO, SDO, SYNC and EMCY protocol
- Support VC6, VB6, VB.net, and C# development
- Support Node Guarding and Heartbeat protocol
- Support on-line adding and removing devices
- Fully compliant with USB 1.1/2.0 (Full Speed)
- Support Auto-Search slave device functions
- Allow CiA DS-301 V4.02
- Support EDS File



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Intelligent USB to DeviceNet Converter

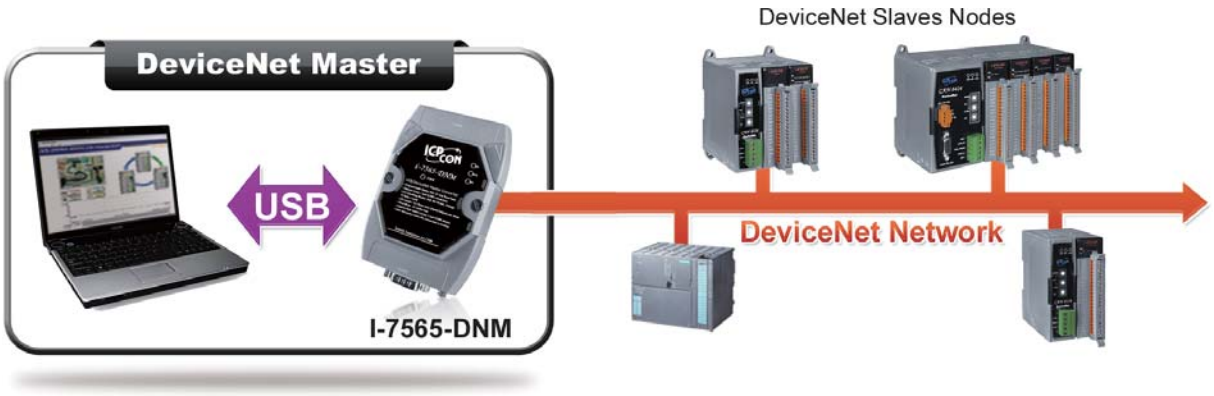
I-7565-DNM

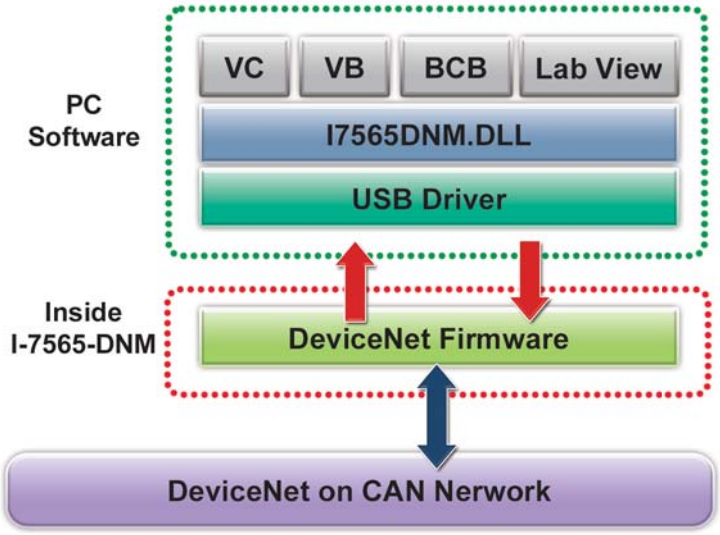


I-7565-DNM can represent an economic master solution of DeviceNet application. It is a "Predefined Master-Slave connection Set". I-7565-DNM supports Group 2 only Server and UCMM functions to communication with slave devices. It has an independent CAN Bus communication port to cover a wide range of DeviceNet applications.

Besides, I-7565-DNM uses the new CAN controller Phillips SJA1000T and transceiver 82C250, which provide bus arbitration, error detection with auto correction and re-transmission function. It can be installed on almost any windows-based system. It is popularly applied in the industrial automation, building automation, vehicle, marine, and embedded control network. In order to expand the DeviceNet functions of ICP DAS products, I-7565-DNM is developed for this purpose.

- Fully compliant with USB 1.1/2.0 (Full Speed)
- DeviceNet Version: Volume I & II, Release 2.0
- Programmable Master MAC ID and Baud Rate
- Support Group 2 and UCMM connection
- Support Auto-Search slave device function
- Support Auto-detect Group 2 and UCMM device
- Status LED: RUN, MS, NS
- Baud Rate: 125k, 250k, 500k
- Slave Node: 63 nodes Max
- Support on-line adding and removing devices
- Auto-Reconnect when the connection is broken
- Free Software development tools for Windows
- I/O Length: 512 Bytes Max. (Input/Output) per slave
- I/O Operating Modes: Poll, Bit-Strobe, Change of State/Cyclic
- Driver supported for Windows XP/ Win7/ Win8/ Win10 32-bit and 64-bit
- No external power supply is required as I-7565 takes it's power from the USB bus



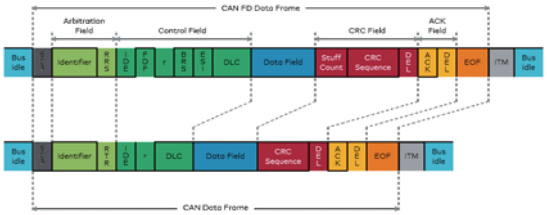


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3.2 USB to CAN FD Converters

CAN FD (Controller Area Network Flexible Data-Rate) is a data-communication protocol typically used in the automotive industry. It supports up to 64 data bytes per data frame vs. 8 data bytes for Classical CAN. This reduces the protocol overhead and leads to an improved protocol efficiency. It was developed to meet the need to increase the data transfer rate and with larger frame sizes.CAN FD supports dual bit rates: The nominal (arbitration) bit-rate limited to 1 Mbit/s as given in Classical CAN - and the data bit-rate, which depends on the network topology and transceivers. In practice, data bit-rates up to 10 Mbit/s are achievable.

CAN FD Frame



USB to 2-port CAN/CAN FD Bus Converter

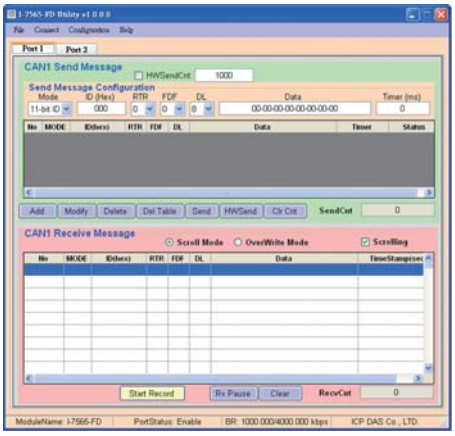
I-7565M-FD



I-7565M-FD is a USB to CAN/CAN FD (CAN with Flexible Data-Rate) converter with two CAN channels. It allows transmitting/receiving CAN/CAN FD frames and supports CAN2.0A/2.0B and CAN FD (ISO/Bosch) specifications and different baud rates for CAN/CAN FD frame. (10 kbps to 1000 kbps for CAN arbitration phase and 100 kbps to 10 Mbps for CAN FD data phase). When connecting I-7565M-FD to PC, PC will load the relevant device driver automatically (hot plug & play). Therefore, users can make data collection and processing of CAN Bus network easier and quicker by applying I-7565M-FD. The application fields can be CAN Bus monitoring, building automation, remote data acquisition, environment control and monitoring, laboratory equipment & research, factory automation, etc.

- Compatible with USB 2.0 (High Speed)
- Compatible with CAN specification 2.0 A/B and FD
- CAN FD support for ISO and Non-ISO (Bosch) standards switchable
- CAN FD bit rates for data field from 100 kbps to 10 Mbps
- CAN bit rates from 10 kbps to 1000 kbps
- Time stamp resolution 1ms.
- Voltage supply via USB
- Watchdog inside
- Built-in dip-switch to select 120 ohm terminal resister for CAN Bus
- Provide API library for user program development

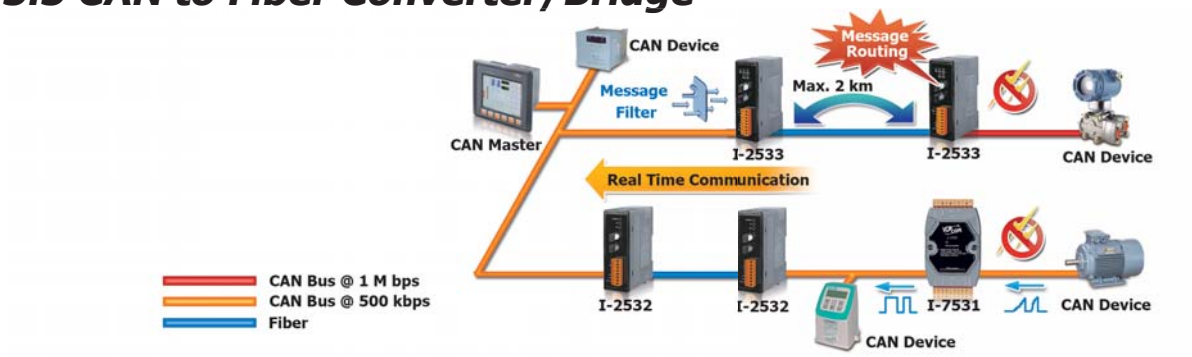






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3.3 CAN to Fiber Converter/Bridge



Models	I-2532	I-2533	I-2533CS	I-2533CS-60	I-2533CS-A/I-2533CS-B
Pictures	CAN to Multi-mode Fiber Converter	CAN to Multi-mode Fiber Bridge	CAN to Single-mode Fiber Bridge		
					
CAN Interface					
Connector	Screwed terminal block (CAN_GND, CAN_L, CAN_H)				
Baud Rate (bps)	10 k ~ 500 k	10 k ~ 1 M			
Transmission Distance (m)	Depends on baud rate				
Propagation Delay	Max 125 ns	Max. 125 μs (depends on the CAN baud rate)			
Terminator Resistor	DIP switch for the 120 Ω terminator resistor				
Isolation	3000 VDC for DC-to-DC, 2500 Vrms for photo-couple				
Specification	ISO 11898-2, CAN 2.0A and CAN 2.0B				
Fiber Interface					
Connector	ST (Multi-mode)		SC Duplex Type		SC type
Wave Length (nm)	850		1300 or 1310		TX: 1310, RX: 1550 for I-2533CS-A TX: 1550, RX: 1310 for I-2533CS-B
Fiber Cable (μm)	Multi-mode 50/125, 62.5/125 or 100/140		Single-mode 8.3/125, 8.7/125, 9/125 or 10/125		
Transmission Distance	Max. 1.4 km	Max. 2 km	Max. 30 km	Max. 60 km	Max. 15 km
UART Interface					
COM1	–	RS-232 (for configuration)			
COM 1 Connector	–	3-pin screwed terminal block (RxD, TxD, GND)			
Transmission Speed (bps)	–	115200			
Data bit	–	8			
Stop bit	–	1			
Parity	–	None			
LED					
Round LED	PWR LED, TD LED, RD LED	PWR LED, CAN_Tx LED, CAN_Rx LED, CAN_Err LED, FB_Err LED	PWR LED, CAN_Tx LED, CAN_Rx LED, CAN_Err LED, FB_Err LED, FB_Ack LED		
Power					
Power Supply	Unregulated +10 VDC ~ +30 VDC				
Protection	Power reverse polarity protection, Over-voltage brown-out protection				
Power Consumption	0.5 W	3 W			
Mechanical					
Installation	DIN-Rail				
Dimensions (W x L x H)	32.3 mm x 107 mm x 102 mm		33.0 mm x 126.8 mm x 104.5 mm		
Environment					
Operating Temperature	-25°C ~ +75°C				
Storage Temperature	-30°C ~ +80°C				
Relative Humidity	10 ~ 90% RH, Non-condensing				

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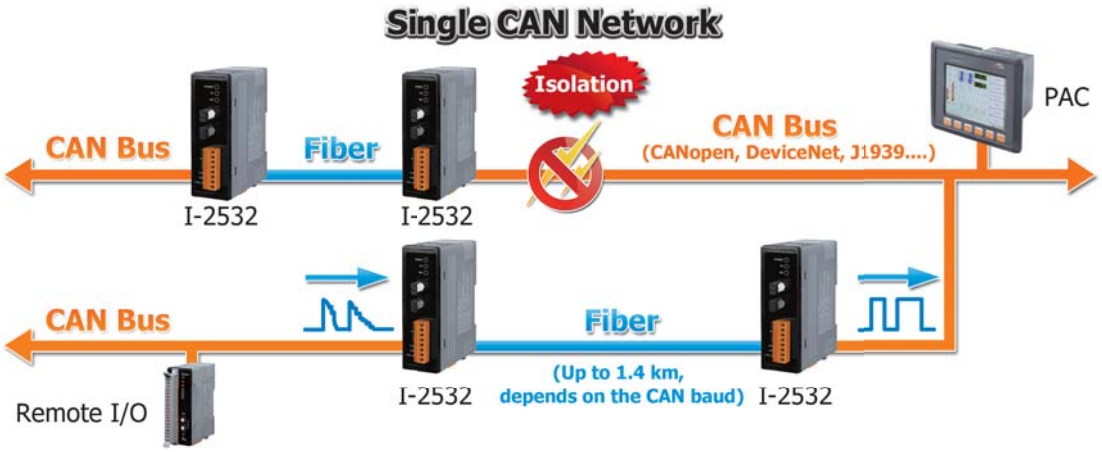
CAN to Multi-mode Fiber Converter

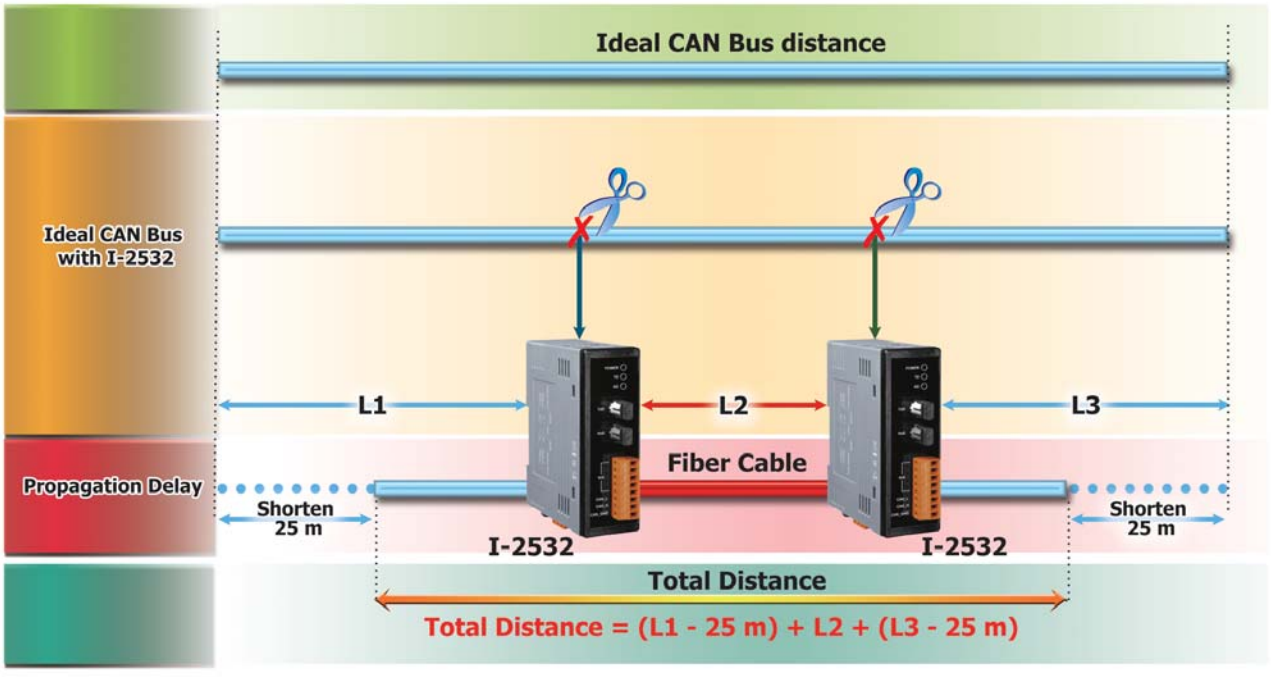
I-2532



The I-2532 is a CAN to fiber optic converter, and fits to various CAN-based applications, such as CANopen, DeviceNet, J1939, and so forth. The module is designed not only to convert CAN Bus signals to optical signals on a fiber optic cable, to reshape the CAN signal to compensate for distortion, but to isolate the bus error due to the wire short or disturbance. With the advantage of fiber optic, the I-2532 enables secure data transmission via fiber optic transmission, and helps the CAN network to prevent the noise from EMS/RFI interference. In order to use the I-2532 easily and conveniently, the converter is designed to automatically tune the baud rate by itself to match the CAN network. Users just connect the I-2532 with the fiber optic cable and CAN Bus and check the terminator resistor and power it on, then the I-2532 enable to work normally.

- Compatible with CAN specification 2.0 parts A and B
- Supports a range of baud rates from 10 kbps ~ 500 kbps
- DIP switch for the 120 Ω terminator resistor of the CAN Bus
- Fiber Port: ST (Multi-mode)
- Fiber Cable: 62.5/125 μm
- Fully compatible with the ISO 11898-2 standard
- 2500 Vrms photocoupler isolation on the CAN side
- 3 kV galvanic isolation
- Wavelength: 850 nm
- One CAN and one fiber channel





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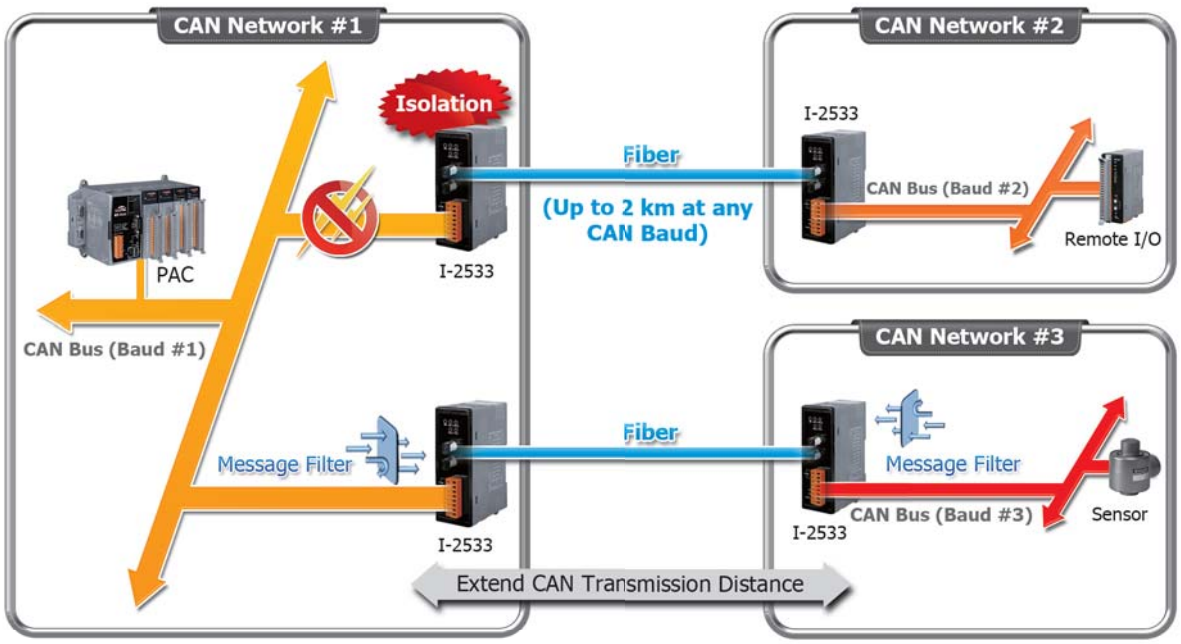
CAN to Multi-mode Fiber Bridge

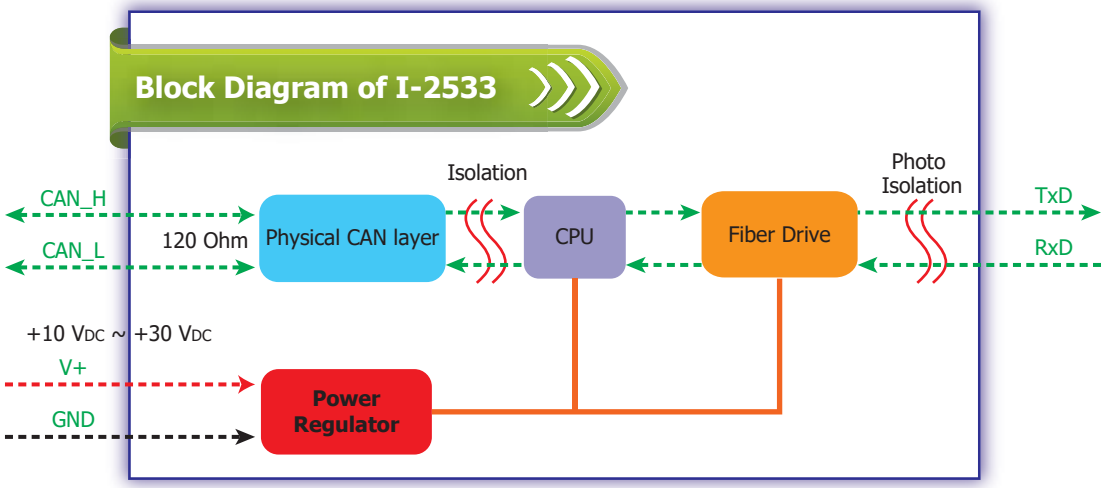
I-2533



The I-2533 is an intelligent CAN bridge that can be used to establish the connection between two CAN Bus systems via fiber optic cable. Similar to the I-2532, the I-2533 can also apply in various CAN-based protocols to convert CAN Bus signals to optical signals and reshape the CAN signals. The difference between the I-2532 and I-2533 is the CAN configuration functions and the distance limitation of CAN communication. The I-2533 offers the functions to configure the CAN baud rate and CAN message filters. These are useful when using the I-2533 to link two CAN networks which may have different baud rates. By using the I-2533, the transmission distance limitation of the CAN Bus system will not be reduced because of the CAN baud rate, which means that the total network length can be extended. This feature means that users can develop the applications more powerful and flexible with the I-2533.

- Fiber Port: ST (Multi-mode)
- Fiber Cable: 62.5/125 μm
- Up to 100 CAN nodes on each channel
- Broken line detection for fiber cable
- Wavelength: 850 nm
- 2500 Vrms iCoupler isolation on the CAN side
- Built-in switch for the 120 Ω terminator resistor
- Rotary switch for CAN baud rate configuration
- Fully compatible with the ISO 11898-2 standard
- Software utility tool for message filter configuration
- Compatible with CAN specification 2.0 parts A and B
- Max. transmission distance of up to 2 km at any CAN baud rate





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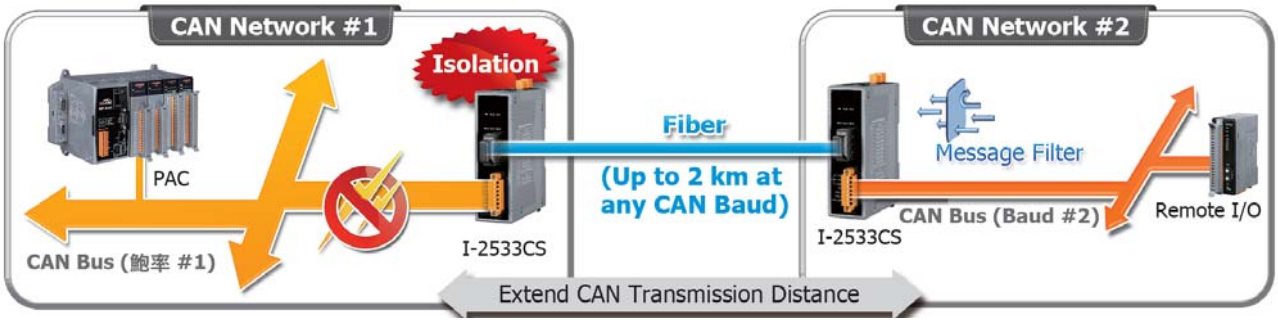
CAN to Single-mode Fiber Bridge

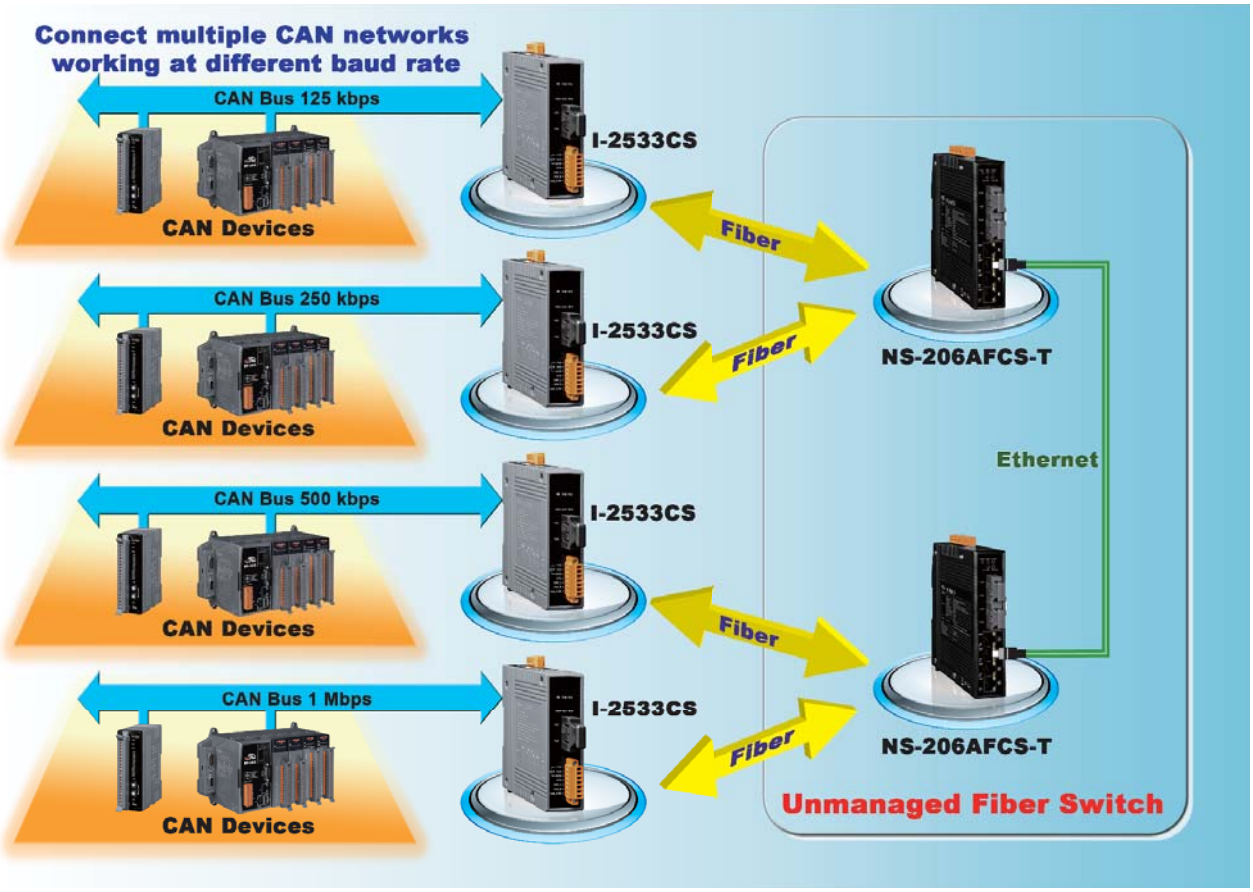
I-2533CS
I-2533CS-60



The I-2533CS series (I-2533CS/I-2533CS-60) is a local CAN bridge used to establish a connection between two CAN Bus systems via single mode fiber transmission medium. In order to solve the problem between CAN and fiber transmission mediums, the I-2533CS series is specially designed for converting the electrical CAN Bus signal to the optical signal- and recover the signal to CAN Bus by using another I-2533CS series. Compared with other CAN/Fiber converters, the I-2533CS series has three more important features. First, the transmission distance limitation of the CAN Bus system will not be reduced due to higher CAN baud rate. No matter what kind of CAN baud rates you use, the data transmission distance of fiber is up to 30 km (60 km for I-2533CS-60). It means that the total network working distance can be extended.

- 4 Fully compatible with the ISO 11898-2 standard
- 4Support both CAN 2.0A and CAN 2.0B
- 4 NXP TJA1042 CAN transceiver
- 4Wave Length: 1310 nm
- 42500 Vrms isolation on the CAN side
- 4 Transmission distance up to 30 km at any CAN baud rate (60km for I-2533CS-60)
- 4 Build-in switch to select 120 Ω terminal resistor
- 4 Fiber Cable: 8.3/125, 8.7/125, 9/125 or 10/125 μm
- 4Allow user-defined CAN baud rate
- 4 3 kV galvanic isolation between the power supply and CAN channel
- 4Rotary switch for CAN baud rate configuration
- 4Utility tool for CAN message filter configuration





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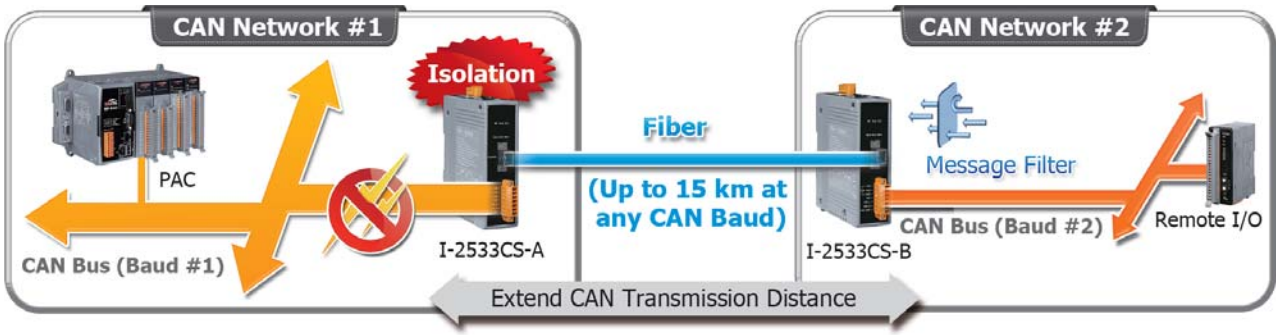
CAN to Multi-mode Fiber Bridge

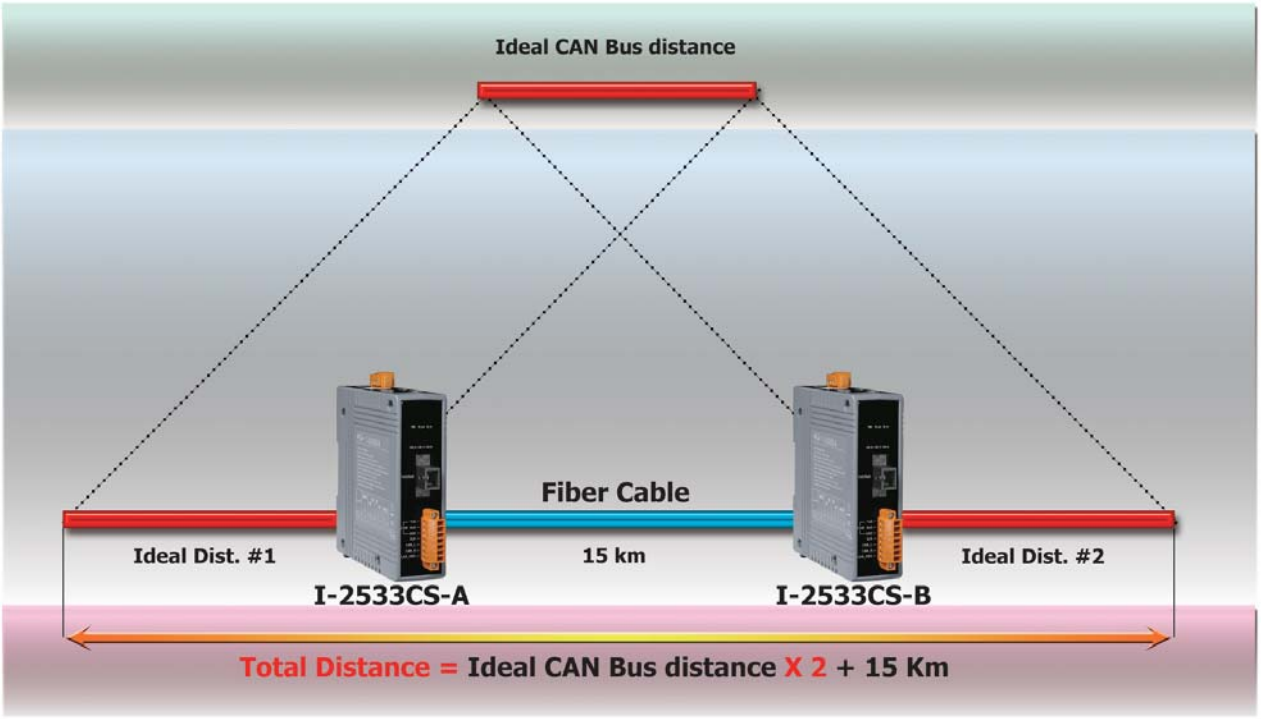
I-2533CS-A
I-2533CS-B



The I-2533CS-A/B is a type of CAN-to-Fiber Bridge that can be used to establish a connection between two CAN networks. It supports Wavelength Division Multiplexing (WDM) technology so that only a single fiber cable is needed for transmitting bi-directional CAN data. As the I-2533CS-A and I-2533CS-B must be paired because of hardware limitations, this means that the cost of deploying fiber cable can be effectively reduced. Compared with other CAN/Fiber converters, the I-2533CS-A/B has three significant features. First, the I-2533CS-A/B can be used to overcome the transmission distance limitations of the CAN Bus. Consequently, the transmission distance can be extended to up to 15 km using fiber cable, regardless of the CAN baud rates used in the system.

- Embedded NXP TJA1042 CAN transceiver
- 2500 Vrms isolation on the CAN side
- 120 Ω terminal resistor selectable via DIP switch
- CAN baud rate configurable via rotary switch
- Fiber Type: SC, Single mode, 100 Base-FX
- Utility for CAN message filter configuration
- Allows user-defined CAN baud ratesl
- Fully compatible with the ISO 11898-2 standard
- Wavelength: • Tx: 1310 nm, Rx: 1550 nm for I-2533CS-A
  • Tx: 1550 nm, Rx: 1310 nm for I-2533CS-B
- Fiber Cable: 8.3/125, 8.7/125, 9/125 or 10/125 μm
- Supports both CAN 2.0A and CAN 2.0B specifications
- Max. transmission distance up to 15 km at any CAN baud rate
- 3 kV galvanic isolation between the power supply and the CAN channel





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3.4 CAN FD to Fiber Converter/Bridge

The fiber is used for galvanic isolation of two segments of a CAN / CAN FD network. The fiber converter separates a defective segment from the rest of the network, allowing the remaining network to continue working. After the fault has been eliminated, the segment is automatically switched back to the network.

CAN/CAN FD to fiber converter series has three more important features. First, the transmission distance limitation of the CAN/CAN FD system will not affected due to the different CAN/CAN FD baud rate. It means that the total CAN/CAN FD bus distance can be extended. Second, the bus error on one CAN/CAN FD network will not affect the operation of another CAN/CAN FD network. Finally, the two CAN/CAN FD network can communication with each other by using different baud rate for highly flexibility.

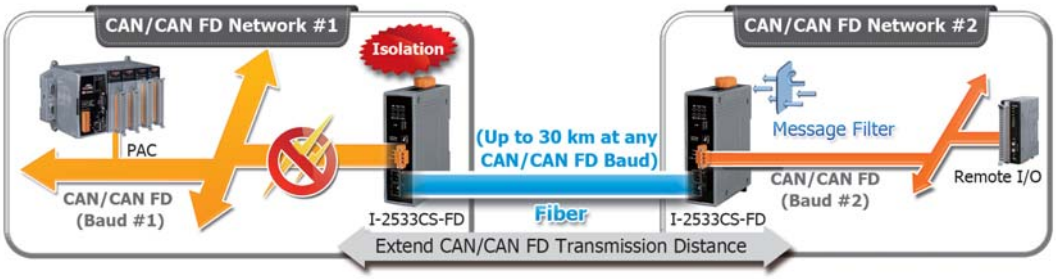
CAN/CAN FD to Single-mode Fiber Bridge

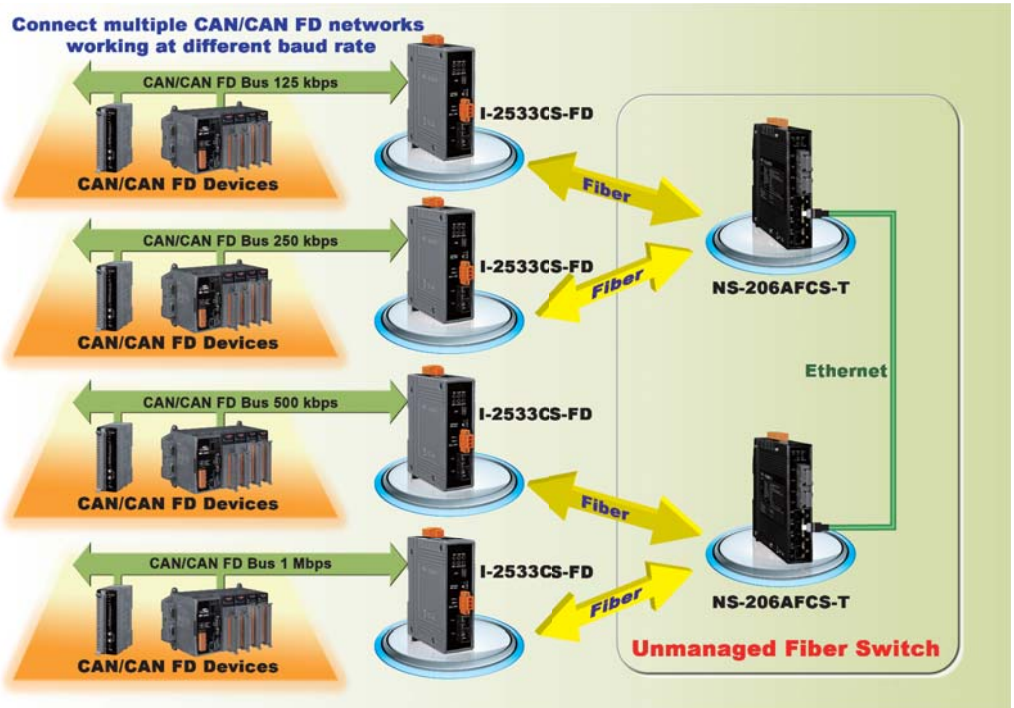
I-2533CS-FD



The I-2533CS-FD is a local CAN FD bridge used to establish a connection between two CAN FD system via single mode fiber optic transmission medium. In order to solve the problem between CAN FD and fiber transmission medium, the I-2533CS-FD is specially designed for converting the electrical CAN FD signal to fiber optic cables.

- Compatible with the ISO 11898-2 standard
- Compatible with CAN specification 2.0 A/B and FD
- CAN FD support for ISO and Non-ISO (Bosch) standards switchable
- CAN FD bit rates for data field from 100 kbps to 10000 kbps
- CAN bit rates from 10 kbps to 1000 kbps
- Fiber broken line detection
- Support CAN Bus message filter configuration
- Support firmware update via USB
- Basic CAN message routing function via Group ID settings.
- Built-in switchable 120 ohm terminal resistor for CAN Bus
- Dip switch for CAN/CAN FD baud rate configuration





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3.5 Ethernet/Wi-Fi to CAN Converters

The Ethernet or Wi-Fi to CAN converters are the solutions that enable CAN networks to be integrated into the Internet/ Ethernet or Wi-Fi, whereby remote monitor and control is possible.

The I-7540D-WF supports the wireless transmission of CAN data between a CAN network and a WLAN network according to the 802.11b/g standard. The I-7540D-WF is highly suitable for connecting mobile (e.g., vehicles or machines) or stationary CAN networks and is often used for short ranges up to 100 m.

The Ethernet or Wi-Fi converters help to implement various Ethernet or wireless transmission applications.

Models	I-7540D	I-7540D-MTCP	ECAN-240	I-7540D-WF
Pictures			New 	
CAN Interface				
Controller	NXP SJA1000T with 16 MHz clock		Microprocessor inside	CAN Controller inside
Transceiver	NXP 82C250		TJA 1042	NXP 82C250
Channel number	1		2	1
Connector	2-pin screwed terminal block (CAN_L, CAN_H)		9-pin male D-Sub for each CAN port	3-pin screwed terminal block (CAN_L, CAN_H, CAN_GND)
Baud Rate (bps)	10 k, 20 k, 50 k, 125 k, 250 k, 500 k, 800 k, 1 M			
Isolation	1000 VDC for DC-to-DC, 2500 Vrms for photo-couple		3000 VDC for DC-to-DC, 2500 Vrms for photo-couple	
Terminator Resistor	Jumper for 120 Ω terminator resistor			
Specification	ISO-11898-2, CAN 2.0A and CAN 2.0B			
UART Interface				
COM 1	RS-232			
COM 1 Connector	5-pin screwed terminal block (TxD, RxD, RTS, CTS, GND)		–	3-pin screwed terminal block (TxD, RxD, GND)
COM 2	RS-485 (Self-Turner inside)		–	–
COM 2 Connector	2-pin screwed terminal block (DATA+, DATA-)		–	–
Baud Rate (bps)	110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200		–	115200
Data bit	7, 8		–	8
Stop bit	1		–	1
Parity	None, Even, Odd		–	None
Protocol	ICP DAS Protocol	Modbus RTU	–	For Configuration
Ethernet Interface				
Controller	10/100Base-TX Ethernet Controller (Auto-negotiating, Auto_MDIX)		10/100Base-TX Ethernet Controller (Auto-negotiating, Auto_MDIX)	–
Connector	RJ-45 with LED indicator		RJ-45 with LED indicator	–
Protocol	ICP DAS Protocol	Modbus TCP	Modbus TCP Server/Client UDP, Http for configuration	–
Wi-Fi Interface				
Antenna	–			5 dBi (Omni-Directional)
Standard Supported	–			IEEE 802.11b/g
Operation Mode	–			Infrastructure & Ad-hoc
Encryption	–			WEP, WPA and WPA2
Frequency Ranges	–			2.412GHz ~ 2.484GHz
Transmission distance	–			Up to 100 meters
Mechanical				
Installation	DIN-Rail			
Dimensions (W x L x H)	72 mm x 122 mm x 33 mm		106.8mm x 146.8mm x 25.9mm	76 mm x 117 mm x 37 mm
Environment				
Operating Temperature	-25°C ~ +75°C			
Storage Temperature	-30°C ~ +80°C			
Relative Humidity	10 ~ 90% RH, Non-condensing			

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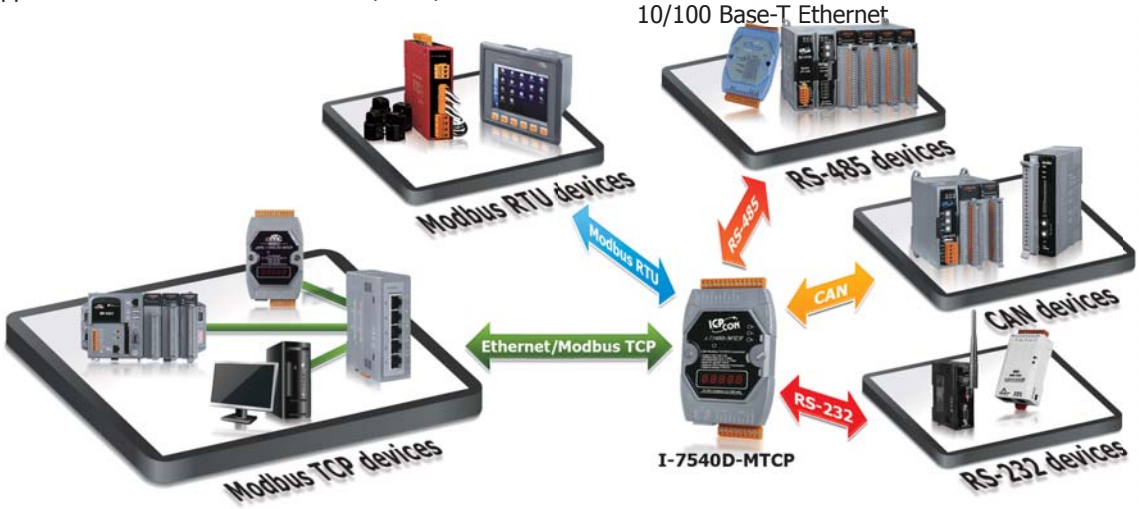
Modbus TCP to CAN Converter

I-7540D-MTCP



Inheriting to the most of all features of the I-7540D, the I-7540D-MTCP enables CAN networks to be combined with the Internet/Ethernet. It can be used to not only access the CAN network via the Ethernet, but can also realize Ethernet transparent transmission on the CAN network. In order to connect the PLCs, HMIs and SCADAs with the CAN devices more easily and conveniently, the I-7540D-MTCP supports the Modbus TCP and Modbus RTU communication protocol. This module can act as a Modbus TCP server, and wait for the commands from the Modbus TCP client. When the controller is a Modbus RTU master, the I-7540D-MTCP is able to be the Modbus RTU slave, and transfer the Modbus RTU commands to the CAN messages. These features mean that users can setup their applications more flexibly and conveniently.

- Built-in watchdog
- 1 kV galvanic isolation
- Compatible with CAN specification 2.0 parts A and B
- Fully compatible with the ISO 11898-2 standard
- Supports a range of baud rates from 10 kbps ~ 1 Mbps
- Jumper for the 120 Ω terminator resistor of the CAN Bus
- Supports Modbus function code: 0x03/0x04/0x10
- 2500 Vrms photocoupler isolation on the CAN side
- Support maximum 24 Ethernet clients connection
- Includes a software utility for monitoring and configuration
- Support 30 specific CAN IDs in the Modbus TCP/RTU mode
- Provide the transparent communication between the CAN devices via Ethernet
- Provides one channel each for CAN, RS-232, RS-485 and 10/100 Base-T Ethernet



NEW

Modbus TCP Client/Server to two CAN ports Converter

ECAN-240



ECAN-240 is a Ethernet to CAN two ports converter. Users can communicate with different CAN networks at the same time. In order to be used more easily in industry, the ECAN-240 supports Modbus TCP client and Modbus TCP server function. Users can choose one of them for fitting their application.
Furthermore, the two CAN ports have different purposes according to their usages. For example: In pair connection mode, the different CAN networks can be communicated with each other via module configuration.





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Ethernet to CAN Converter

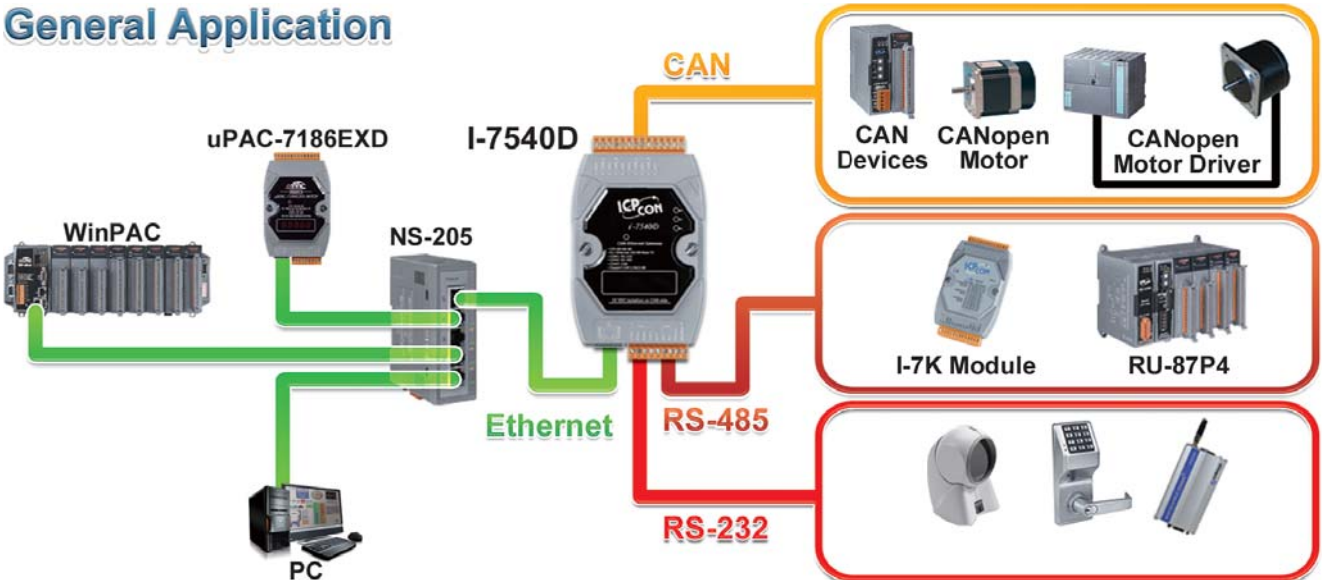
I-7540D



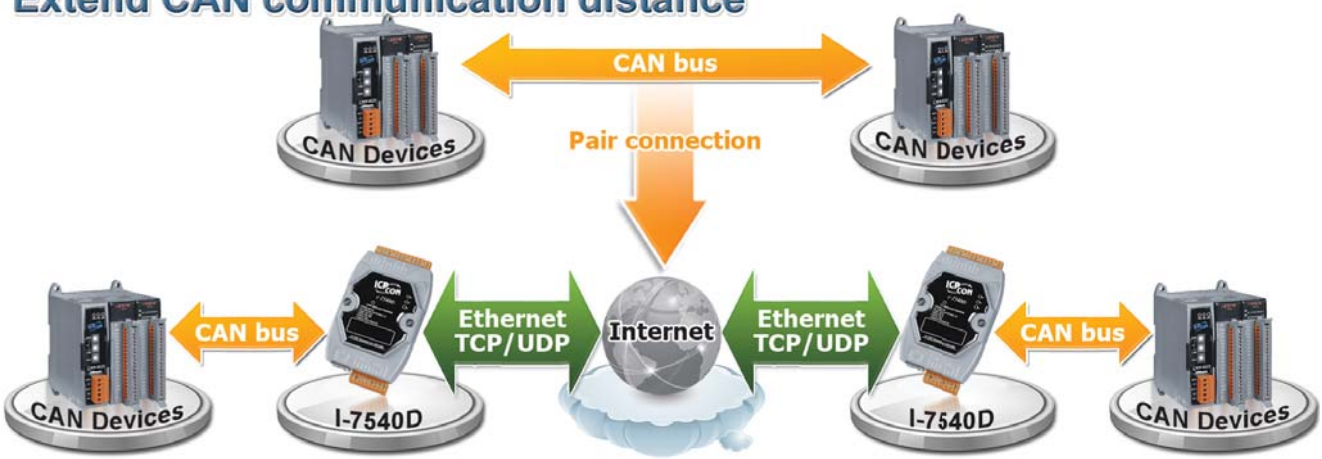
The I-7540D is a CAN to Ethernet converter, and is usually applied as an Ethernet to CAN/RS-232/485 Device Server. It supports socket access functions and virtual COM port technology which helps users to get the CAN, RS-232, RS-485 data via virtual COM port. The I-7540D also provides transparent mode, which enables CAN networks to be coupled together over the Internet/Ethernet, whereby remote monitoring and control is possible. By the features of tiny operating system, protocol independence, small casing and flexibility, it is able to widely fit various RS-232, RS-485 and CAN applications, which may be based on private RS-232 protocol, private CAN protocol, Modbus protocol, CANopen protocol, DeviceNet protocol or J1939 protocol.

- 1 kV galvanic isolation
- 10/100 Base-T Ethernet port
- Supports the Virtual COM technology
- Fully compatible with the ISO 11898-2 standard
- 2500 Vrms photocoupler isolation on the CAN side
- Compatible with CAN specification 2.0 parts A and B
- Supports a range of baud rates from 10 kbps ~ 1 Mbps
- umper for the 120 Ω terminator resistor of the CAN Bus
- Provides connections for a maximum of 25 Ethernet clients
- Provide one channel each for CAN, RS-232, RS-485 and Ethernet
- Provide the transparent communication between the CAN devices via Ethernet

General Application



Extend CAN communication distance



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Wi-Fi to CAN Converter



I-7540D-WF

The I-7540D-WF supports the wireless transmission of CAN data between a CAN network and a WLAN network according to the 802.11b/g standard. It provides CAN to WLAN converter functionality together with wireless transparent transmission on the CAN network. The I-7540D-WF is highly suitable for connecting mobile (e.g., vehicles or machines) or stationary CAN networks and is often used in short ranges up to 100 m. Using an appropriately configured router, CAN data can be determined to pass or filter from the CAN networks to the Ethernet. The wireless connection that is established between two I-7540D-WF units can be used instead of a cable, and enables the connection of CAN networks that would otherwise be difficult to link such as rotational machineries.

- IEEE 802.11 b/g compliant
- Wireless data transmission via WLAN
- Connects CAN networks via a WLAN bridge
- Compatible with CAN specification 2.0 parts A and B
- Wireless transmission distance: up to 100 meters
- Two different operation modes: infrastructure and ad-hoc
- Supports WEP, WPA and WPA2 encryption for wireless LAN
- Point to point or point to multi-point connection via wireless LAN
- Communication efficiency (peak value): one-way is up to 700 fps (client->server, server->client), two-way 350 fps (client<=>server)





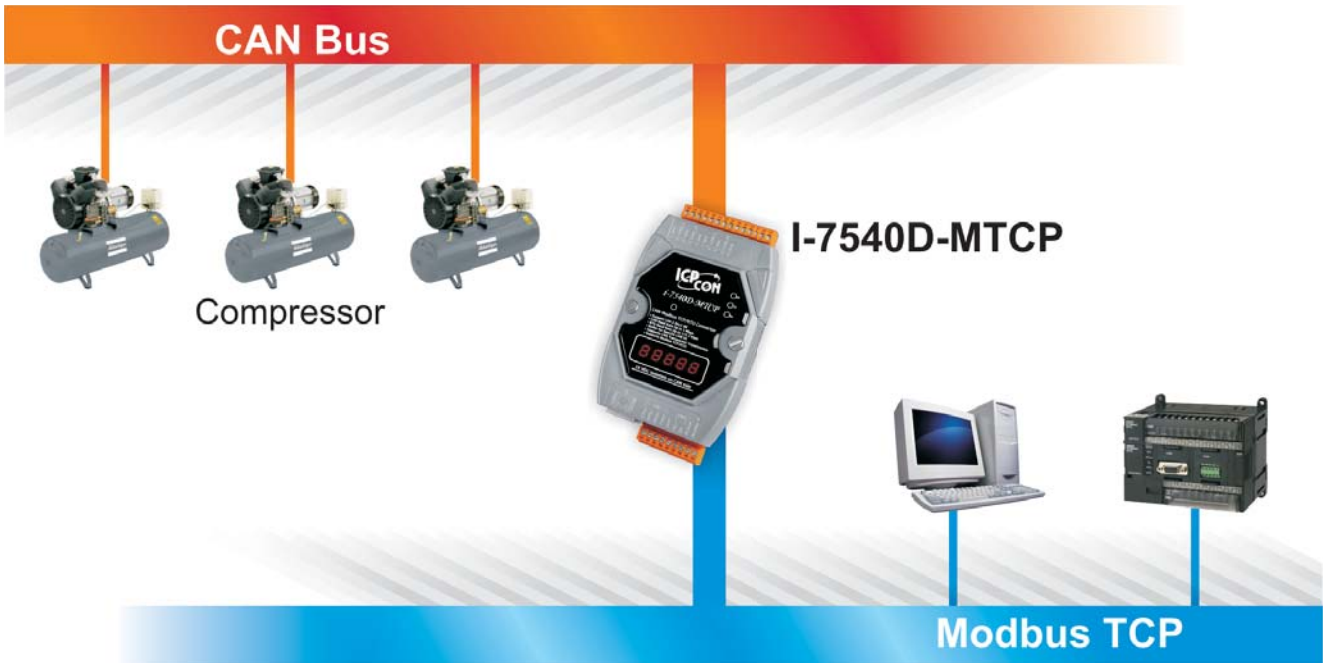
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Case Studies

Modbus TCP to CAN converter

By using the OBD-II interface, the I-7565-H1 and CANcheck software can be used to diagnose the vehicle. In the usual maintenance, the I-7565-H1 with CANcheck software could help to check vehicle safety systems and sensing components, including airbags, ABS, brake systems, oxygen sensors, and etc.. That will shorten the diagnostic time and make the maintenance become easy. In other CAN-based applications or equipments, the I-7565-H1 and CANcheck software would be the great and friendly tool.





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3.6 Uart to CAN Converters



The I-7530 series is the Uart to CAN converter that support CAN protocols 2.0A and 2.0B. The I-7530-FT is designed for the fault tolerance CAN Bus (ISO 11898-3). The I-7530A-MR supports Modbus RTU command especially.



Models	I-7530-FT	I-7530	I-7530T	I-7530A	I-7530A-MR	tM-7530	tM-7530A
Pictures	RS-232 to Fault-Tolerance CAN Converter	RS-232 to CAN Converter		RS-232/422/485 to CAN Converter	Modbus RTU to CAN Converter	Tiny RS-232 to CAN Converter	RS-232/RS-485/ RS-422 to CAN Converter
							
CAN Interface							
Transceiver	AMIS 41682	NXP 82C250	TJA1042	NXP 82C250		NXP TJA1042	
Connector	9-pin male D-sub					3 pin Push-in type terminal block	7-pin terminal block
Baud Rate	10 k, 20 k, 50 k ,125 k bps	10 k, 20 k, 50 k ,125 k, 250 k, 500 k, 800 k, 1 Mbps					
Protocol	ISO 11898-3 (low speed fault tolerance), CAN 2.0A and CAN 2.0B	ISO 11898-2, CAN 2.0A and CAN 2.0B					
Receiver Buffer	1000 data frames					256 data frames	
Isolation	–	3000 VDC for DC-to-DC				1000 VDC for DC-to-DC	
UART Interface							
Type	RS-232			RS-232/422/485		RS-232	RS-232/422/485
Protocol	–				Modbus RTU slave	–	
Connector	9-pin female D-sub			14-pin terminal block		9-pin female D-sub	10-pin terminal block
Baud Rate (bps)	110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200				300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400		
Receiver Buffer	900 data frames					256 bytes	
System							
Power Consumption	1 W						
Power Input	+10 VDC ~ +30 VDC						
Dimensions (W × L × H)	72 × 118 × 33 (mm)					52 x 86 x 32 (mm)	52 × 93 × 27 (mm)
Operating Temperature	-25°C ~ +75°C						
Storage Temperature	-30°C ~ +80°C						

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Performance Table

I-7530, I-7530FT, I-7530A performance table:

The test is the performance which transfer 8 bytes data frame from CAN to RS-232 (for I-7530/I-7530T)								
CAN setting	Transfer frames	Transfer time (ms)	RS-232 setting	Receive frames	Receive time (ms)	The max frames/sec	Data<8 byes/frame	RS-232 command length
2.0A 1 Mbps	1,000	200	115200, n, 8, 1	1,000	2954	338	>=338	22 B
2.0A 1 Mbps	1,000	200	115200, n, 7, 1	1,000	2775	360	>=360	22 B
2.0B 1 Mbps	1,000	200	115200, n, 8, 1	1,000	3580	279	>=279	27 B
2.0B 1 Mbps	1,000	200	115200, n, 7, 1	1,000	3337	299	>=299	27 B

The test is the performance which transfer 8 bytes data frame from RS-232 to CAN (for I-7530/I-7530T)								
CAN setting	Transfer frames	Transfer time (ms)	RS-232 setting	Receive frames	Receive time (ms)	The max frames/sec	Data<8 byes/frame	RS-232 command length
2.0A 1 Mbps	1,000,000	2,612,243	115200, n, 8, 1	1,000,000	2,612,243	382	>=382	22 B
2.0A 1 Mbps	1,000,000	2,441,130	115200, n, 7, 1	1,000,000	2,441,130	409	>=409	22 B
2.0B 1 Mbps	1,000,000	3,142,043	115200, n, 8, 1	1,000,000	3,142,043	318	>=318	27 B
2.0B 1 Mbps	1,000,000	3,142,043	115200, n, 7, 1	1,000,000	2,966,646	337	>=337	27 B

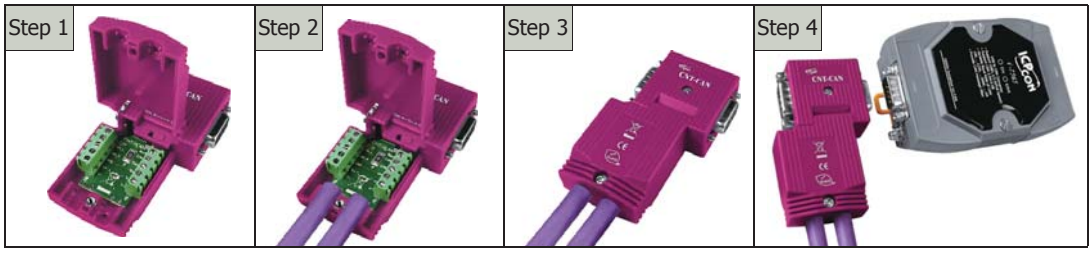
I-7530A-MR performance table:

RS-232/422 full-duplex communication mode			
CAN setting	RS-232/422 setting	RS-232/422 command length	The max frames/sec
2.0B 1 Mbps	115200, n, 8, 1	27 Bytes	370
2.0B 1 Mbps	230400, n, 8, 1	27 Bytes	666
2.0B 1 Mbps	460800, n, 8, 1	27 Bytes	1250

Accessory



Optional CAN Bus connector: CNT-CAN



Installation

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Low-Speed/Fault-Tolerance CAN to RS-232 Converter

I-7530-FT



The I-7530-FT is a low speed but reliable CAN to RS-232 converter. The "FT" stands for "Fault Tolerance". It follows ISO 11898-3 standard, and is suited for the applications which may have a lot of noise in the harsh environment. Generally, the I-7530-FT communicates with other CAN devices by two-line CAN Bus. As one of the CAN Bus lines is malfunction, the I-7530-FT even uses a single line of the CAN Bus to access the CAN devices. The utility tool supports sending or receiving CAN messages, and the configuration of the I-7530-FT. This tool is free, and is helpful to diagnostic the CAN networks.

- Max. transmission speed of up to 125 kbps for CAN and 115.2 kbps for RS-232
- Power, data flow and error indicator for CAN and RS-232 transmission
- Compatible with CAN specification 2.0 parts A and B
- Fully compatible with the ISO 11898-3 standard
- Built-in CAN/RS-232 converter firmware
- Built-in RS-232/CAN FIFO buffers



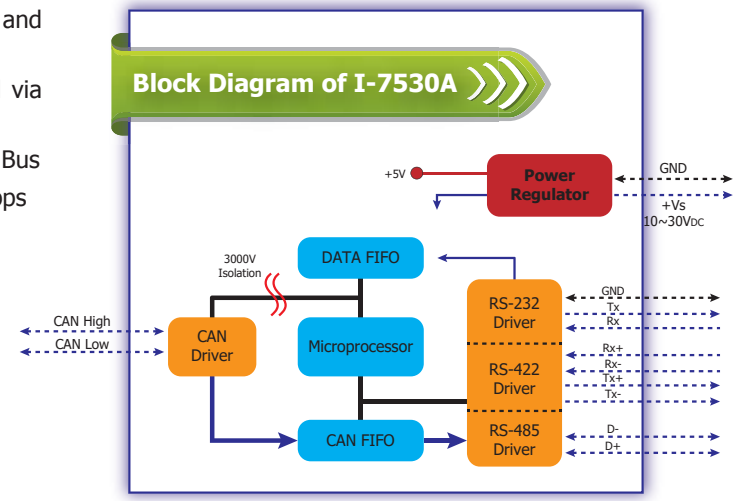
CAN to RS-232/422/485 Converter

I-7530A



The I-7530A is an RS-232/422/485 to CAN converter. It is a member of the I-7530 serial family, and inherits all of the features of the I-7530. The CAN interface of the I-7530A follows ISO 11898-2 specification, the maximum CAN baud is up to 1 Mbps. There is one COM port in the I-7530A. As the I-7530A runs, it only receives the commands from one of these COM interfaces (i.e. from the RS-232, RS-485 or RS-422 interface) at the same time, but the CAN messages will be forwarded to all of these COM interfaces.

- Provides one channel each for CAN, RS-232, RS-422 and RS-485
- CAN and serial COM parameters can be configured via software
- Jumper for the 120 Ω terminator resistor of the CAN Bus
- Supports a range of baud rates from 10 kbps ~ 1 Mbps
- Compatible with CAN specification 2.0 parts A and B
- 2500 Vrms photocoupler isolation on the CAN side
- Fully compatible with the ISO 11898-2 standard
- Supports transparent communication mode
- 3 kV galvanic isolation





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CAN to RS-232 Converter

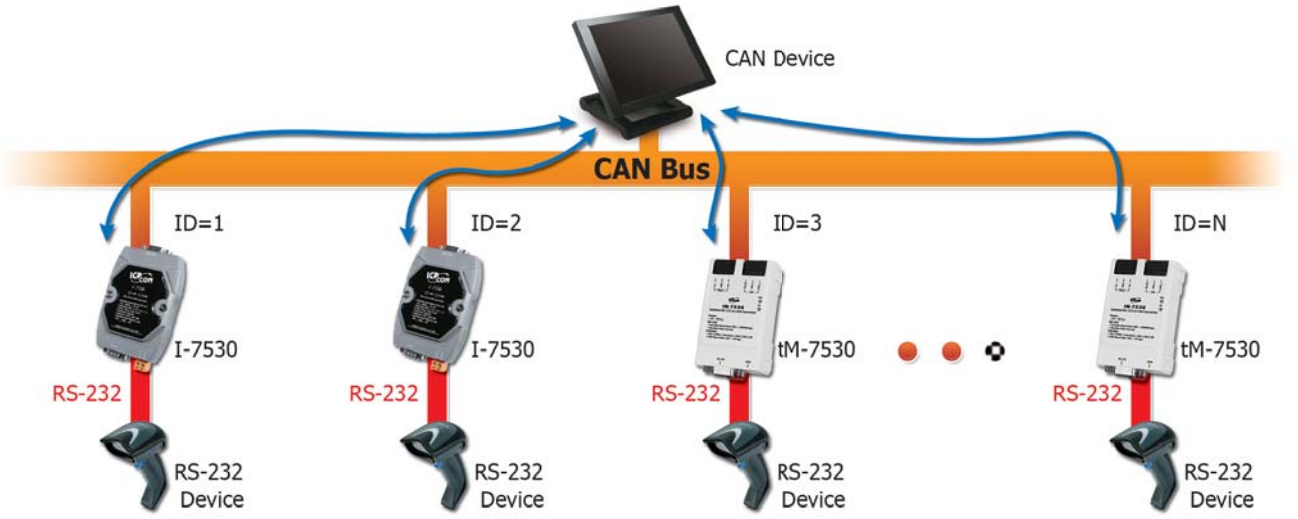
I-7530



The I-7530 is designed for integrating the traditional RS-232 devices into the CAN network. It is a RS-232 to CAN converter which unleashes the power of the CAN Bus via an RS-232 communication interface, converting messages between a CAN network and an RS-232 device. The CAN interface of the I-7530 follows ISO 11898-2 specification, the maximum CAN baud is up to 1 Mbps. Sometimes, users need to control several RS-232 devices at the same time. In this case, the I-7530 provides the station ID for the RS-232 device which is connected with the I-7530. These RS-232 devices can be grouped in a CAN network, and be controlled by one CAN master via setting pair connection mode.

- 3 kV galvanic isolation
- One CAN port and one RS-232 port
- Support transparent communication mode
- Fully compatible with the ISO 11898-2 standard
- 2500 Vrms photocoupler isolation on the CAN side
- Compatible with CAN specification 2.0 parts A and B
- Supports a range of baud rates from 10 kbps ~ 1 Mbps
- Jumper for the 120 Ω terminator resistor of the CAN Bus
- CAN and RS-232 parameters can be configured via software





Tiny CAN to RS-232 Converter

tM-7530



The tM-7530 is a tiny form-factory, cost-efficient, and low consumption module. And it is designed for integrating the traditional RS-232 devices into the CAN network. It is a RS-232 to CAN converter which unleashes the power of the CAN Bus via an RS-232 communication interface, converting messages between a CAN network and an RS-232 device. The CAN interface of the tM-7530 follows ISO 11898-2 specification, the maximum CAN baud is up to 1 Mbps. The functional design of tM-7530 is the same as I-7530 series, including basic communication and pair connection mode. tM-7530 supports RS-232 baud rate up to 230400 bps.

- Compatible with CAN specification 2.0 parts A and B
- Supports a range of baud rates from 10 kbps ~ 1 Mbps
- Option the 120 Ω terminator resistor of the CAN Bus
- 1 kV galvanic isolation
- Fully compatible with the ISO 11898-2 standard
- 2500 Vrms photocouple isolation on the CAN side
- One CAN port and one RS-232 port
- Support transparent communication mode
- CAN and RS-232 parameters can be configured via software
- RS-232 baud rate up to 230400

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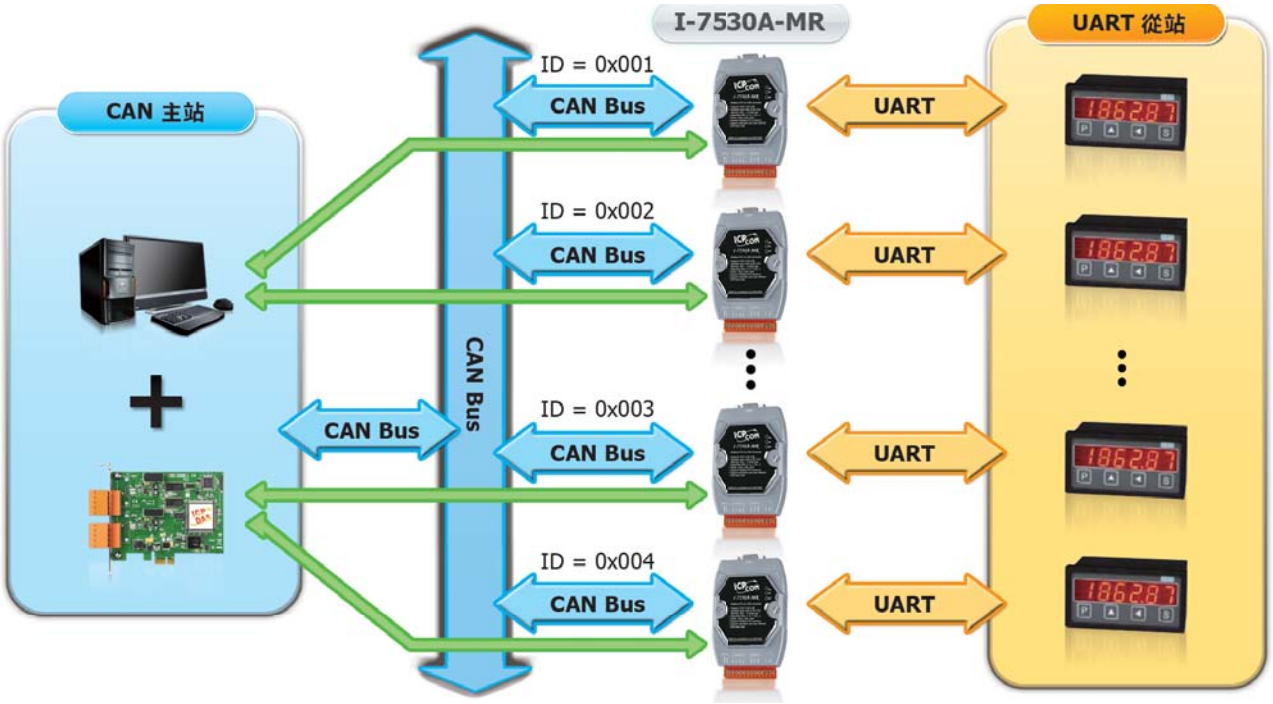
CAN to Modbus RTU Slave Converter

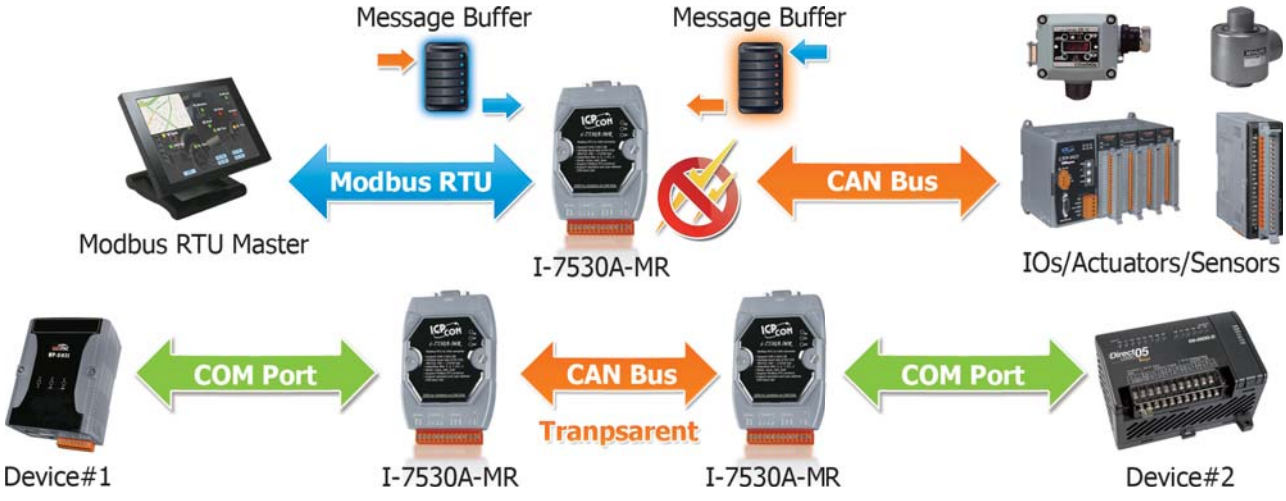
I-7530A-MR



The I-7530A-MR is a CAN Bus to Modbus RTU converter and it allows a Modbus RTU master to communicate with CAN devices on a CAN network. Different from the I-7530A, the I-7530A-MR can be a Modbus RTU slave, and it is more suitable for connecting with the PLC, HMI or SCADA which provide the functions of the Modbus RTU master. Besides, the higher COM baud and full-duplex RS-232/RS-422 transparent communication of the I-7530A-MR solve more difficult problems of applications which may not be touched by the I-7530A. The I-7530A-MR provides three kinds of communication modes, ASCII communication mode, Modbus RTU communication mode, and transparent communication mode.

- Compatible with CAN specification 2.0 parts A and B
- Supports CAN Bus acceptance filter configuration
- Converts CAN messages to specific ASCII command string
- Provides pair-connection communication between RS-232/RS-485/RS-422 devices via the CAN Bus
- Supports Modbus RTU function codes 0x03/0x04/0x10 for reading/writing CAN messages
- Programmable CAN Bus baud rate from 10 kbps ~ 1 Mbps, or a user-defined baud rate
- Include a software utility that enables users to easily configure module settings and test CAN Bus communication





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Case Studies

Cash-in-transit Vehicle

Location: England, United Kingdom
Product: I-7530-FT

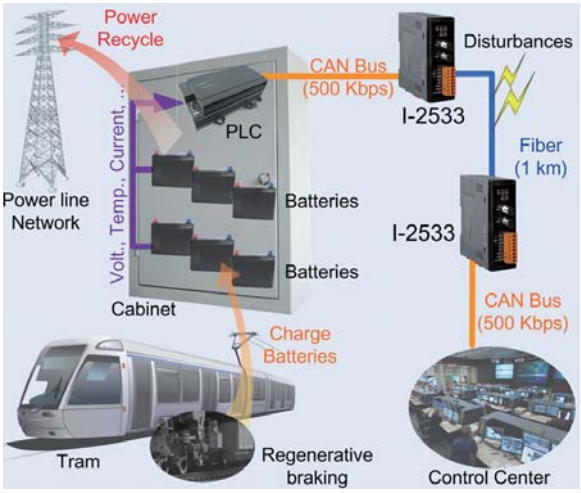
A telematics and vehicle control system need to be closely integrated with each other by some data-exchange interfaces. LSFT (Low-Speed/Fault-Tolerance) CAN is a kind of familiar interfaces in the applications of automotive electronics. An I-7530-FT is specially designed for solving the interface transformation between LSFT CAN and RS-232. Through it, the cash-in-transit of the manufacturer can control the door of the cash safely and monitor the conditions of the back door directly and reliably on the telematics.



Tram Energy Recycle System

Location: Hyogo, Japan
Product: I-2533

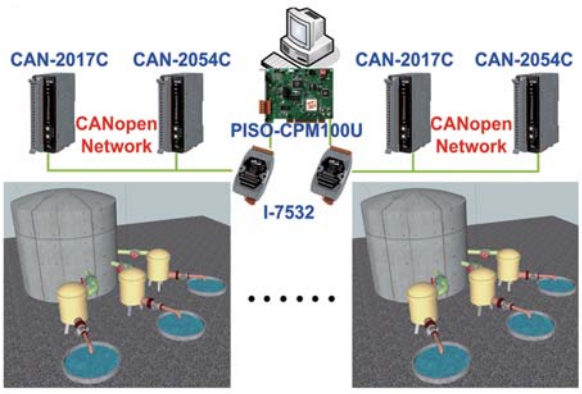
Energy saving and carbon reduction has become what every country has to strive for. Therefore, the customer applies the regenerative braking to recycle the kinetic energy of the tram while it is braking. In order to resistant environment disturbances, extend CAN Bus working distance and provide the higher CAN transmission speed, a couple of I-2533s are used. By means of them, the transmission distance of CAN Bus is extended via 1 km fiber optics while using 500 kbps CAN baud rate.



Oil-Water Separator System

Product: PISO-CPM100U, I-7532, CAN-2017C, CAN-2054C

This is an oil-water separator system. The crude oil has several impurities and the majority is water. So we need to design a system to dehydrate crude oil. There are several oil-water separators spread around the control center and hundreds meters distance between each equipment. In the control center, PC receives the data that is sent by every oil-water interface detector through PISO-CPM100U and controls the water outlet valve. If the PISO-CPM100U checking the water, the PC will open the water outlet valve until checks the oil. Now this system has worked in some factories.



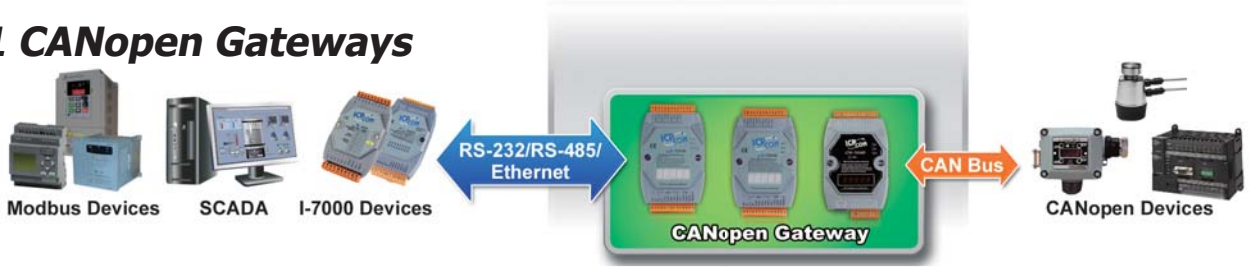
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4. Gateway/Protocol Converters

The stand-alone industrial gateways are designed to connect existing devices to the fieldbus via the serial bus or the Ethernet. Easy to use and setup, no programming required. Following protocols are supported by ICP DAS gateways

- **Modbus RTU**: a kind of protocol based on the RS-232/485 network. The Modbus RTU devices may be a PLC, a Modbus RTU sensor, ICPDAS M-7000 series modules and so forth.
- **Modbus TCP**: a kind of protocol based on the Ethernet. The Modbus TCP devices may be a PLC, a Modbus TCP sensor, ICPDAS ET-7000 series modules and so forth.

4.1 CANopen Gateways



Model Name	I-7232D	GW-7433D	GW-7553-CPM
Pictures	CANopen Slave to Modbus RTU Master Gateway	Modbus TCP/RTU Slave to CANopen Master Gateway	PROFIBUS DP Slave to CANopen Gateway
			
CANopen Interface			
CANopen Interface	1 channel (CAN_H, CAN_L), and the other is for bypass		
CANopen Function	CANopen slave	CANopen master (Supports at least 120 CANopen commands)	CANopen master
CANopen Baud Rate	10 k, 20 k, 50 k, 125 k , 250 kbps , 500 k, 800 k, 1M		
CANopen Version	CiA 301 v 4.02 and CiA 401 v2.01		CiA 301 v 4.02
Guarding Function	Yes		
Heartbeat Function	Heartbeat Producer	Heartbeat Consumer	
Emergency Message	Yes	-	-
UART Interface			
COM1 Connector	RS-232 (TxD, RxD, RTS, CTS, GND) or RS-485 (Data+, Data-), non-isolated	RS-232 (TxD, RxD, RTS, CTS, GND), non-isolated	RS-232 (TxD, RxD, GND), non-isolated
COM1 Function	Only for configuration	Modbus RTU Slave	Only for Configuration
COM2 Connector	RS-485 (Data+, Data-) with internal self-tuner ASIC; non-isolated		-
COM2 Function	Modbus RTU Master (Supports Max. 10 Modbus RTU commands)	Modbus RTU Slave	-
Ethernet Interface			
Ethernet	-	10/100 Base-TX	-
Ethernet Function	-	Configuration or Modbus TCP Server	-
Modbus Function Code	01, 02, 03, 04, 06, 15	01, 02, 03, 04, 05, 06, 15,16	-
PROFIBUS Interface			
Connector	-		9-pin female D-Sub
Baud Rate (bps)	-		9.6 k, 19.2 k, 45.45 k, 93.75 k, 187.5 k, 500 k, 1.5 M, 3 M, 6 M, 12 M
Transmission Distance (m)	-		Depend on baud rate (for example, max. 1200 m at 9.6 kbps)
Protocol	-		DP-V0 Slave
Max. Input/Output Length	-		240/240 bytes
System			
Power Consumption	3 W		2.5 W
Power Input	10 ~ 30 V_{DC}		
Dimension (W x L x H)	72 mm x 122 mm x 33 mm		72 mm x 119 mm x 33 mm
Operating Temperature	-25 ~ +75°C		
Storage Temperature	-30 ~ +80°C		-30 ~ +85°C

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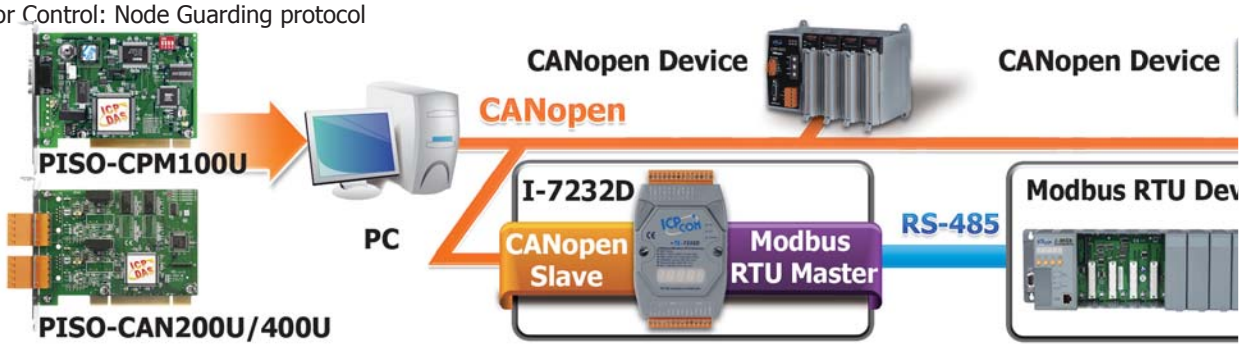
CANopen Slave to Modbus RTU Master Gateway

I-7232D



The I-7232D is a CANopen slave to Modbus RTU master gateway, and allows a CANopen master to have ability to access the Modbus slave devices. In the CANopen network, the I-7232D is a NMT slave, SDO server, PDO producer, and PDO consumer. From the view of the Modbus network, it is a Modbus RTU master which polls all the predefined data of the Modbus RTU slaves, and bypass the CANopen control commands to the Modbus slaves. The I-7232D follows the CANopen specification CiA-301 v4.02 and CiA-401 v2.1, and supplies many features of CANopen protocols, such as dynamic PDO, EMCY object, error output value, SYNC cyclic and acyclic. Like the I-7231D, the EDS file is also provided by the utility tool. Users can easily apply the I-7232D in the standard CANopen master with the EDS file.

- PDO: Event-triggered, RTR, cyclic, acyclic SYNC and dynamic PDO mapping
- CANopen Version: DS-301 v4.02 , DSP-401 v2.1
- Support Max. 10 Modbus RTU commands
- Error Control: Node Guarding protocol
- Product EDS file dynamically by utility
- No of SDOs: 1 server, 0 client
- NMT: Slave



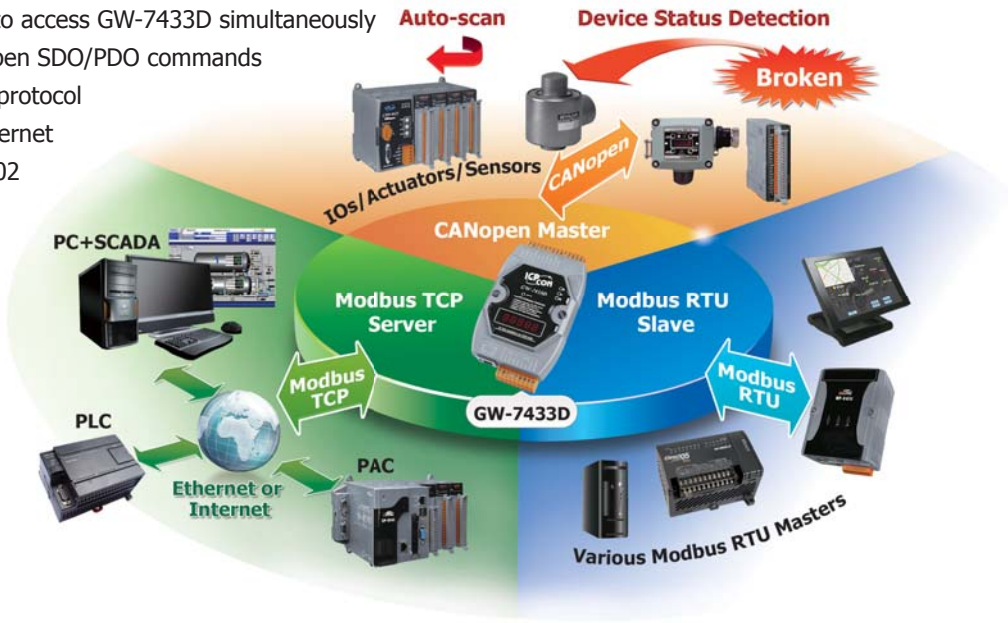
Modbus TCP/RTU Slave to CANopen Master Gateway

GW-7433D



The GW-7433D is an economic Fieldbus solution that provides the communication transformation mechanisms between the Modbus protocol and the CANopen protocol. This module is able to collect the information of the CANopen slaves periodically, and returns these data to the Modbus TCP client or Modbus RTU master while receiving the Modbus commands. When the Modbus TCP client or Modbus RTU master needs to output data to the CANopen slaves, the GW-7433D transfers the received Modbus commands to the CANopen messages to handle the CANopen slaves. Both of the Modbus TCP server and the Modbus RTU slave functions can work on the GW-7433D simultaneously. The GW-7433D also offers the Modbus registers for recording the life statuses of the CANopen slaves. These features mean that users can set up their applications more reliably and flexibly.

- Allow 5 Modbus TCP masters to access GW-7433D simultaneously
- Support more than 120 CANopen SDO/PDO commands
- Error Control: Node Guarding protocol
- Configuration by utility via Ethernet
- CANopen Version: DS-301 v4.02
- PDO: Event-triggered, RTR
- Emergency Message: Yes
- NMT: Master



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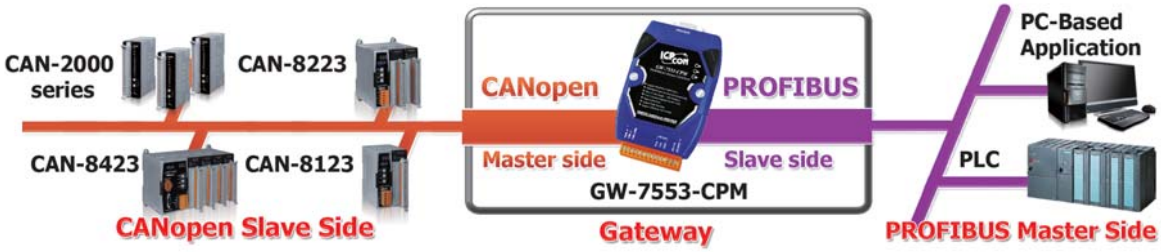
PROFIBUS DP Slave to CANopen Master Gateway

GW-7553-CPM



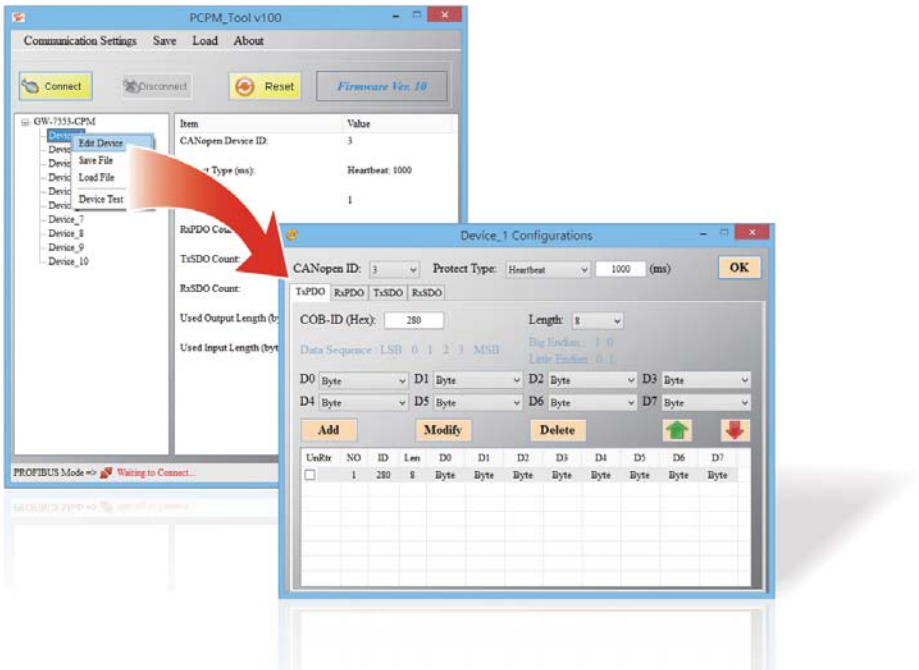
The GW-7553-CPM is designed for the slave device of PROFIBUS DP protocol. It allows PROFIBUS master to access CANopen slave devices. These CANopen slave device may be a sensor, actuators, ICPDAS CAN-2000 series modules and so forth. In addition, we also provide the utility software for users to configure the GW-7553-CPM. By using this module, users can put their CANopen slave devices into PROFIBUS network very easily.

- Protocol: PROFIBUS DP-V0 slave
- 240 bytes Max. input data length
- 240 bytes Max. output data length
- Support Heartbeat function
- Support Node Guarding
- PROFIBUS address 0 ~ 126 set by DIP switch
- Follow the CiA CANopen Standard DS-301 v4.02
- Support 110 CANopen SDO/PDO commands
- 3000 VDC isolation protection on PROFIBUS side
- Network isolation protection: 2500 Vrms high speed iCoupler
- Detect Transmission rate (9.6 to 12000 kbps) on PROFIBUS automatically



Utility Features

- Provide TxPDO, RxPDO, TxSDO, and RxSDO CANopen messages
- Provide Communication Log of CANopen network
- Show PROFIBUS configuration of the gateway
- Provide CANopen test function
- Show diagnostic messages

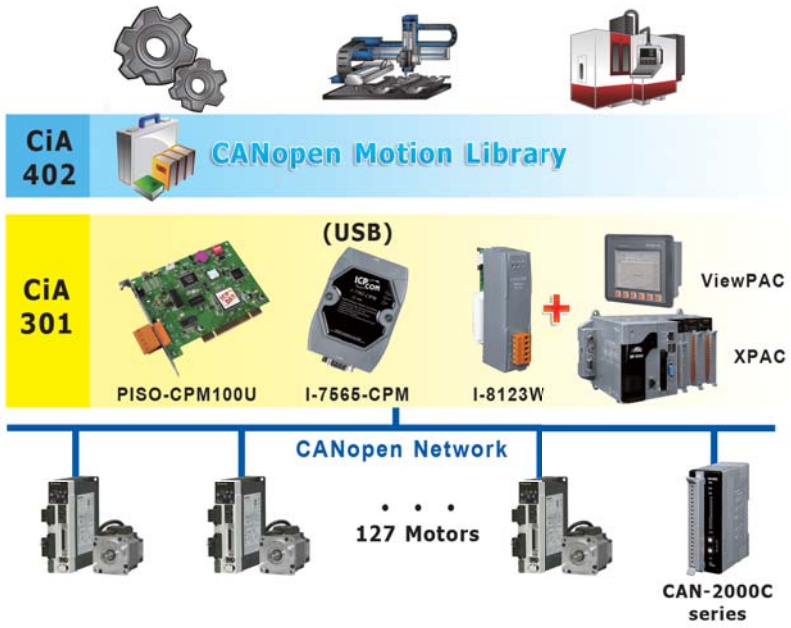


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4.2 CANopen Motion Solution

Introduction ▸▸▸

The CANopen Motion Library is compliant with the CANopen standard CiA 402, and provides a variety of motion control functions, such as position control, velocity control, torque control, synchronous action etc. The CiA 402 is one of the standard CANopen application profiles, and is specially designed for motion control systems. In addition to making the management of the CANopen-based motors easy, the CANopen protocol, which is based on the CAN Bus, can help to reduce the need for wire connections between the controller and the motors, and provides rapid troubleshooting functions. A large number of CANopen-based motors can be linked together so that multi-axis motion control via a single host becomes achievable. While controlling the motors, CANopen-based remote I/O modules that comply with the CiA 402 standard can also be accessed at the same time. Therefore, developing a motion control application becomes easier and more convenient.



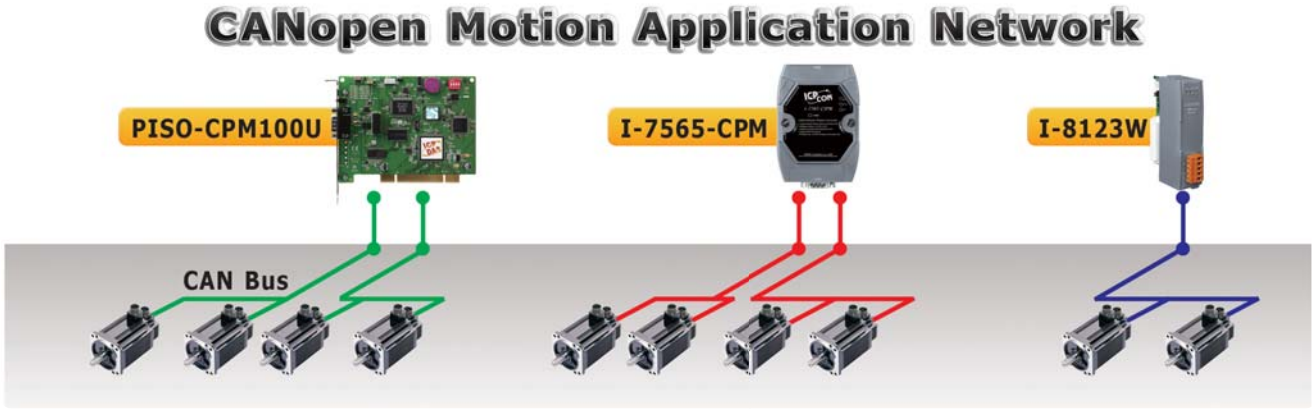
Features ▸▸▸

- Compliant with the CiA 402 v1.1 Standard
- Supports a max. of 127 motors in a single network
- Absolute and relative position control
- Velocity, torque or jog control
- Supports synchronous action for a maximum of 127 motors
- Supports various homing control methods
- Supports torque limitation via CANopen commands
- Supports the node guarding and heartbeat protocols
- Supports dynamic PDO object configuration
- Bus distance ranges between 25 m to 5000 m
- Supports baud rates of 10 Kbps, 20 Kbps, 50 Kbps, 125 Kbps, 250 Kbps, 500 Kbps, 800 Kbps and 1 Mbps

Benefits ▸▸▸

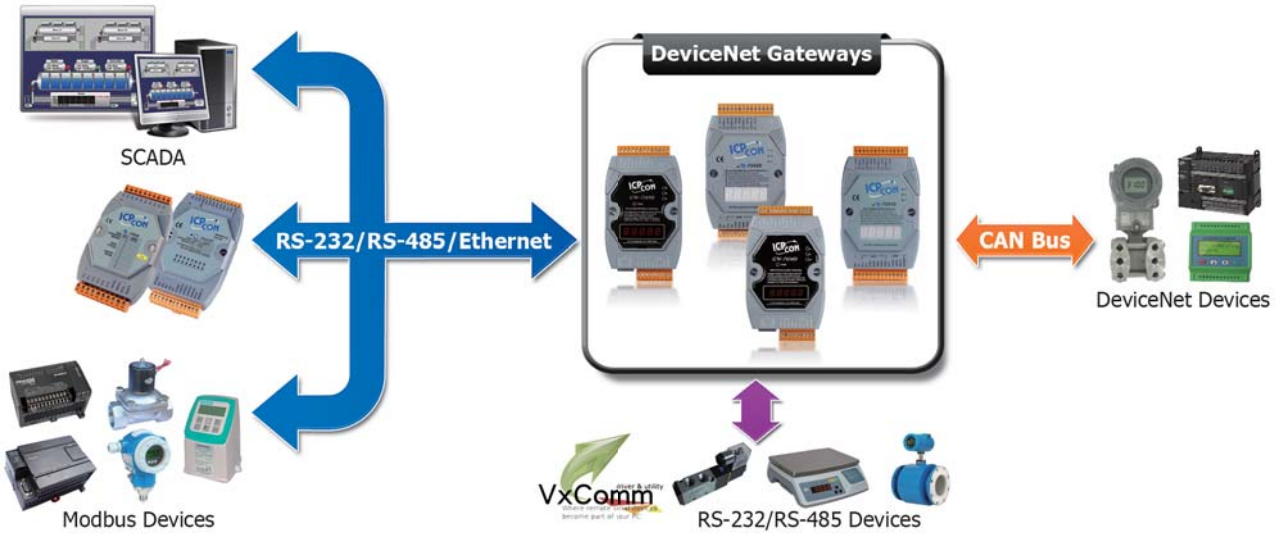
- Suitable for distributed multi-axis motion control systems. E.g., distributed sun tracker systems, conveyer transmission control systems, and so on.
- Reduces the cost of wiring, especially time requirements.
- Choose from a range of motors with no limit on certain types.
- The CAN hardware has a range of error detection and error correction mechanisms, which provides the safest communication bus.
- Able to use different CANopen I/O modules and motors in the same CANopen network.
- The range of the CANopen bus can be extended for long distance applications. For example, for solar or wind farm application systems.
- The CANopen bus can be converted to fiber to protect against high noise interference.

Typical Application Network ▸▸▸



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4.3 DeviceNet Gateways



Model Name	I-7242D	GW-7243D	GW-7434D
Pictures	DeviceNet Slave to Modbus RTU Master Gateway	DeviceNet Slave to Modbus TCP/RTU Master Gateway	Modbus TCP/RTU Slave to DeviceNet Master Gateway
			
DeviceNet Interface			
DeviceNet Connector	1 channel (CAN_H, CAN_L), and the other is for bypass		
DeviceNet Function	DeviceNet slave		DeviceNet master
DeviceNet Baud Rate	125k, 250k, 500k bps		
DeviceNet Specification	DeviceNet specification Volume I/II, Release 2.0		
I/O operating modes	Polling, Bit-Strobe, Change of State/ Cyclic	Polling	Polling, Bit-Strobe, Change of State/ Cyclic
Heartbeat Function	Yes		-
Shutdown Message	Yes		-
COM Interface			
COM1 Connector	RS-232 (TxD, RxD, RTS, CTS, GND) or RS-485 (Data+, Data-), non-isolated	RS-232 (TxD, RxD, RTS, CTS, GND), non-isolated	
COM1 Function	Only for configuration		Modbus RTU Master/Slave, VxComm
COM2 Connector	RS-485 (Data+, Data-) with internal self-tuner ASIC; non-isolated		
COM2 Function	Modbus RTU Master (Supports Max. 10 Modbus RTU commands)	Modbus RTU/ASCII Master	Modbus RTU Master/Slave, VxComm
Ethernet Interface			
Ethernet	-	10/100 Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)	
Ethernet Function	-	Modbus TCP Client	Configuration, Modbus TCP Server, VxComm
Modbus Function Code	0x01, 0x 02, 0x 03, 0x04, 0x0F, 0x10	0x01, 0x 02, 0x 03, 0x04, 0x05, 0x06, 0x0F, 0x10	
System			
WDT	Yes (0.8 second)		
Power Consumption	3 W	2.5 W	
Power Input	10 ~ 30 VDC		
Dimension (W x L x H)	72 mm x 122 mm x 33 mm		
Operating Temperature	-25 ~ +75°C		
Storage Temperature	-30 ~ +80°C		

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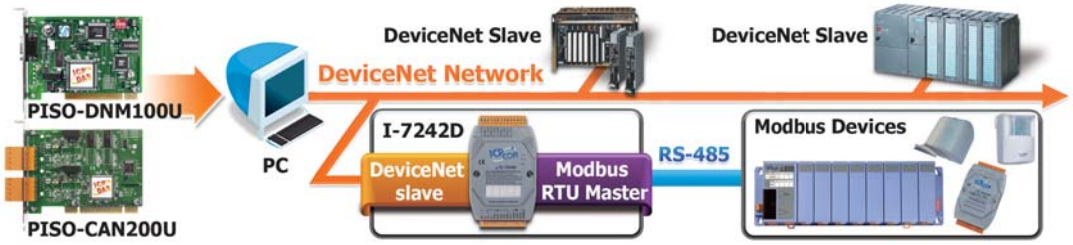
DeviceNet Slave to Modbus RTU Master Gateway

I-7242D



The I-7242D allows a master located on a DeviceNet network to enter into a dialogue with the slaves on a Modbus RTU network. It's a "Group 2 Only Slave" device in the DeviceNet network, and supports "Predefined Master/Slave Connection Set". From the view of the Modbus network, it is a Modbus RTU master which polling all the predefined data of the Modbus RTU slaves, and bypass the DeviceNet control commands to the Modbus slaves. This device is widely used in the application of building automation, remote data acquisition, environment control and monitoring, laboratory equipment & research, factory automation, etc. The I-7242D also has the utility tool which is used to configure the I-7242D's parameters and build the EDS file. Through the EDS file to the I-7241D, it is easy to apply the Modbus RTU devices in DeviceNet applications.

- I/O operating modes: Polling, Bit-Strobe, Change of State/Cyclic
- Support Predefined Master/Slave Connection Set (Group 2 Only Server)
- Comply with DeviceNet specification volume I, release 2.0 & volume II, release 2.0
- Support Offline Connection Set, Device Heartbeat message and Device Shutdown message
- Support Max. 10 Modbus RTU series modules
- Provide dynamic Assembly Objects mapping



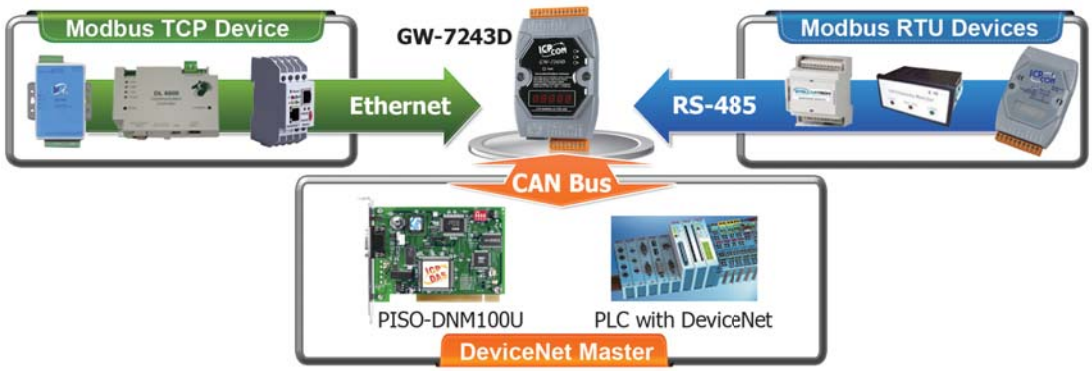
DeviceNet Slave to Modbus TCP/RTU/ASCII Master Gateway

GW-7243D



The GW-7243D offers the DeviceNet slave and Modbus mater functions, and enables the DeviceNet master to access the Modbus slave devices. In the DeviceNet network, the module acts as a Group 2 Only Server device, and waits to build the connection with the DeviceNet master. In the Modbus network, the GW-7243D is a master device, and cyclically sends the commands to access the Modbus slave devices. Both the Modbus TCP client and Modbus RTU/ASCII master interfaces of the GW-7243D can work simultaneously. This feature means that users are able to integrate different kinds of Modbus slave devices together into the DeviceNet network no matter these devices provide Ethernet, RS-232 or RS-485 communication interfaces. In order to simplify the use of the GW-7243D, the GW-7243D Utility tool for configuration and EDS file production is given. This is helpful to build the applications easily and quickly.

- Group 2 Only Server DeviceNet subscriber
- Support Explicit and Poll Connection
- Maximum support 4 Modbus TCP devices
- Maximum support 5 Modbus TCP commands for each Modbus TCP device
- Maximum support 10 Modbus RTU/ASCII commands for each COM port
- Support Modbus function codes: 0x01, 0x02, 0x03, 0x04, 0x05, 0x06, 0x0F and 0x10



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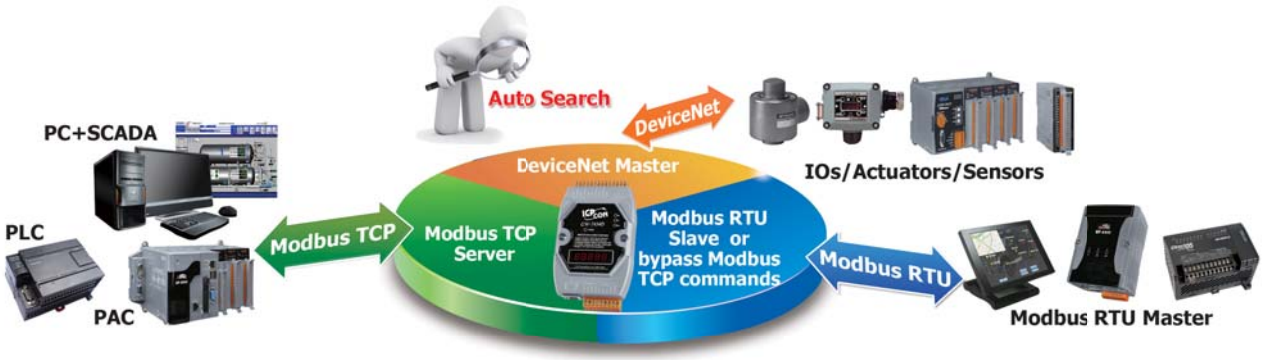
Modbus TCP/RTU/ASCII Slave to DeviceNet Master Gateway

GW-7434D



The GW-7434D is an economic solution that provides a communication protocol transformation between the DeviceNet protocol and the Modbus TCP protocol. This module solves the problem to connect an existing DeviceNet network to the Ethernet-based PLC, HMI or SCADA for setting up a control or monitoring system. Different to the GW-7243D, the GW-7434D offers the Predefined Master connection Set function and Group 2 only Server function as a DeviceNet master, and enables accessing the DeviceNet slaves automatically and cyclically. If the PLC, HMI or SCADA would like to access the DeviceNet slaves and simultaneously communicate with the Modbus slaves or COM-based devices connected with the RS-232 or RS-485 ports of the GW-7434D, the GW-7434D can be the Modbus TCP server or VxComm server to exchange the data with those devices.

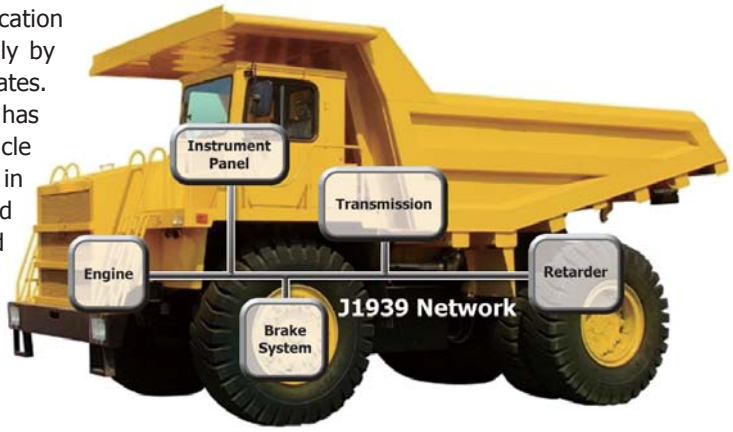
- Support maximum DeviceNet devices up to 63
- Predefined Master/Slave Connection Set
- Support one Poll, one Bit-Strobe, one COS or one Cyclic IO connection for each DeviceNet device
- Convert single Modbus TCP to multi Modbus RTU devices, setting by Utility
- Support VxComm technique for every COM ports of controllers, setting by Utility
- Programmable DeviceNet Master MAC ID
- Programmable DeviceNet transfer-rate 125K, 250K, 500K
- Supports maximum DeviceNet devices up to 63
- Predefined Master/Slave Connection Set
- Devicenet I/O Length: 128 bytes max. (Input/Output) per DeviceNet slave
- Total DeviceNet I/O Length: 1280 bytes max. (Input/Output) for all DeviceNet slaves
- Supports I/O Operation Mode: Poll, Bit-Strobe and Change Of State/Cyclic
- Supports maximum 512 bytes Modbus I/O data for DeviceNet I/O to map
- Supports on-line adding device into and removing device from network
- Converters single Modbus/TCP to multi Modbus/RTU, setting by Utility
- Supports VxComm technique for every COM ports of controllers, setting by Utility
- Allowed multi-client (or master) access simultaneously
- Support "Set/Get Explicit Message" methods via Modbus TCP/RTU command
- Supports Modbus RTU to DeviceNet master, setting by Utility



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4.4 J1939 Gateways

J1939 is the vehicle bus standard used for communication and diagnostics among vehicle components, originally by the car and heavy duty truck industry in the United States. Because of the success of applying in vehicles, J1939 has become the accepted industry standard and the vehicle network technology of choice for off-highway machines in applications such as construction, material handling, and forestry machines. It is a higher-layer protocol based on Controller Area Network (CAN), which provides serial data communications between microprocessor systems (ECU) in any kind of heavy duty vehicles. The messages exchanged between these units can be data such as vehicle road speed, torque control message from the transmission to the engine, oil temperature, and many more.



Models	GW-7228	GW-7238D
Pictures		
Hardware		
J1939 Channels	1	
CAN Interface		
Controller	Microprocessor inside with 96 MHz	NXP SJA1000T with 16 MHz clock
Transceiver	NXP 82C250/NXP TJA1042	
Connector	9-pin D-Sub connector	5-pin screwed terminal block (CAN_L, CAN_H, N/A for others)
Baud Rate (bps)	250 k	
Isolation	3000 VDC for DC-to-DC 2500 Vrms for photo-couple	1000 VDC for DC-to-DC 2500 Vrms for photo-couple
Terminator Resistor	Selectable 120 Ω terminator resistor by jumper	
Specification/Protocol	ISO-11898-2, CAN 2.0A and CAN 2.0B/J1939	
UART Interface		
COM 1/Protocol	RS-232/RS-422/RS-485/Modbus RTU	RS-232/Modbus RTU
COM 1 Connector	14-pin screw terminal connecter RS-232 (TXD, RXD, GND)/ RS-422 (Tx+, Tx-, Rx+, Rx-)/ RS-485 (D+, D-)	5-pin screwed terminal block (TxD, RxD, RTS, CTS, GND)
COM 2/Protocol	–	RS-485 (Self-Turner inside)/Modbus RTU
COM 2 Connector	–	2-pin screwed terminal block (DATA+, DATA-)
Ethernet Interface		
Controller	–	10/100Base-TX Ethernet Controller (Auto-negotiating, Auto_MDIX)
Connector/Protocol	–	RJ-45 with LED indicator/Modbus TCP
Power		
Power Supply	Unregulated +10 VDC ~ +30 VDC	
Protection	Power reverse polarity protection, Over-voltage brown-out protection	
Power Consumption	1.5 W	2 W
Mechanical		
Dimensions (L x W x H)	108 mm x 72 mm x 35 mm	122 mm x 72 mm x 33 mm
Environment		
Operating Temperature	-25°C ~ +75°C	
Storage Temperature	-30°C ~ +80°C	
Relative Humidity	10 ~ 90% RH, Non-condensing	

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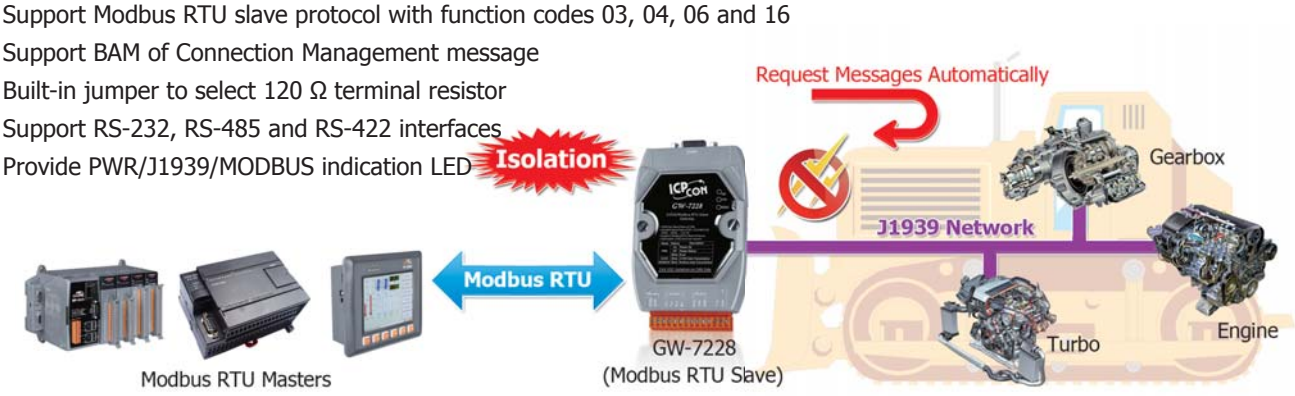
Modbus RTU Slave to J1939 Gateway

GW-7228



The GW-7228 enables the Modbus RTU master to exchange the data with the devices in the J1939 network. This module provides the Modbus slave functions on the RS-232, RS-422, and RS-485 ports so that the Modbus RTU master can easily control and monitor the J1939-based devices. If users use one of the communication ports for application, the other two ports can be used to monitor the Modbus communication situations between the Modbus master and the GW-7228. This feature is helpful for diagnosis while setting up an application system. For J1939 CAN networks, the GW-7228 supports PDU1, PDU2, broadcast and destination specific type of J1939 messages, and is widely applied in the Diesel power-train, in-vehicle networks for trucks and buses or where the Modbus RTU and J1939 protocols transformation is needed.

- Transmission and reception of all types of J1939 messages, including PDU1, PDU2, broadcast and destination specific
- Support Modbus RTU slave protocol with function codes 03, 04, 06 and 16
- Support BAM of Connection Management message
- Built-in jumper to select 120 Ω terminal resistor
- Support RS-232, RS-485 and RS-422 interfaces
- Provide PWR/J1939/MODBUS indication LED



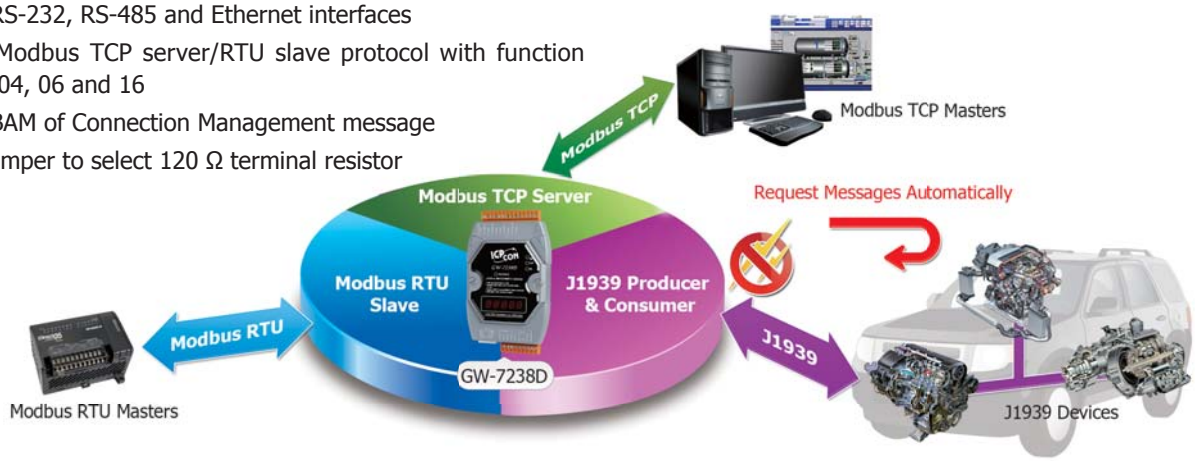
Modbus TCP/RTU Slave to J1939 Gateway

GW-7238D



Similar to the GW-7228, the GW-7238D is a J1939 to Modbus slave gateway. The main difference is that the GW-7238D has an Ethernet port as the Modbus TCP server, and allows connecting with up to 5 Modbus TCP clients. The GW-7238D also offers an RS-232 and RS-485 ports which are the Modbus RTU slaves and enable the Modbus RTU master to exchange the data with the devices in the J1939 network. Both the Modbus TCP server and the Modbus RTU slave functions of the GW-7238D can work simultaneously. This feature means that users can apply the GW-7238D in their applications more flexibly and more economically. For J1939 CAN networks, the GW-7238 supports PDU1, PDU2, broadcast and destination specific type of J1939 messages, and is widely applied in the various J1939-based applications.

- Transmission and reception of all types of J1939 messages, including PDU1, PDU2, broadcast and destination specific
- Provide PWR/J1939/MODBUS/ERR indication LEDs
- Communication support both Modbus TCP/RTU to J1939 at the same time
- Support RS-232, RS-485 and Ethernet interfaces
- Support Modbus TCP server/RTU slave protocol with function code 03, 04, 06 and 16
- Support BAM of Connection Management message
- Built-in jumper to select 120 Ω terminal resistor



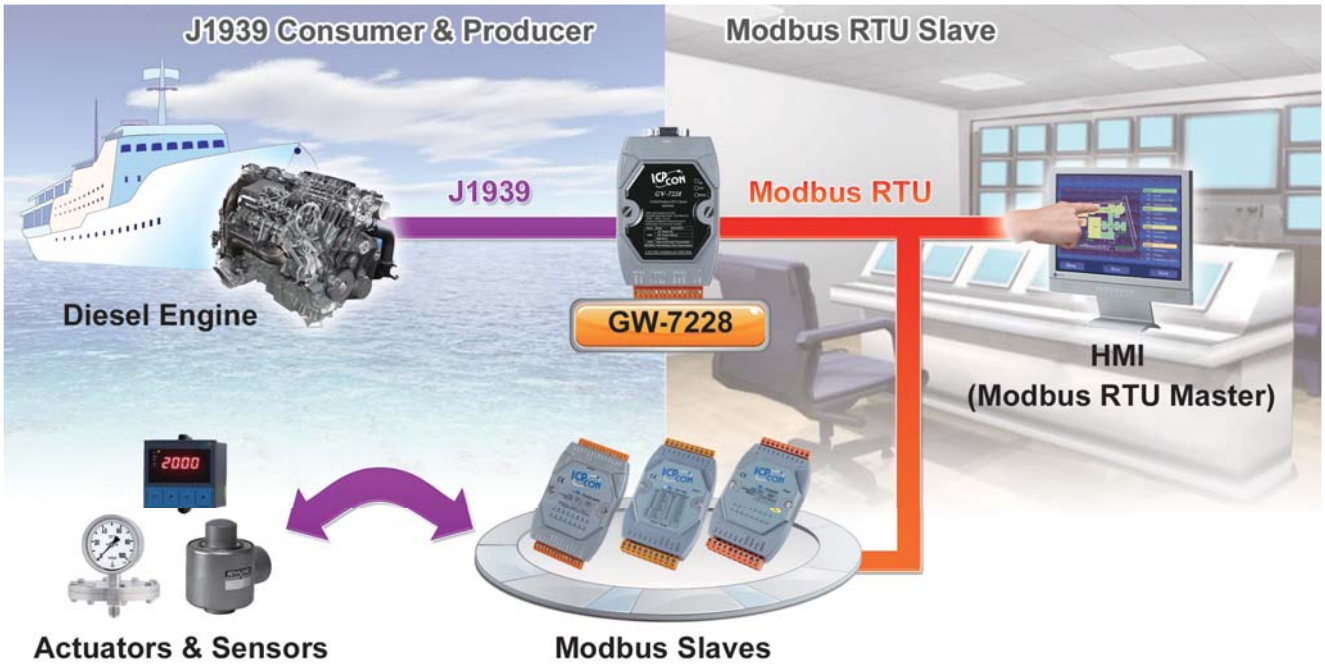
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Case Studies

The user from the vessel power research institute needs to set up an engine test system to adjust the performance of the vessel engines. In this system, the Volvo Penta Diesel engine which offers the J1939 communication interface is used. The user would like to control and monitor the engine parameters, such as the engine oil temperature, the engine coolant temperature, the engine rotational speed, the toque speed and the value of the frequency switch, on the touch screen which provides the RS-485 interface as a Modbus RTU master. In order to overcome the problem of the data exchange between the J1939 network and the Modbus RTU network, the user applies the GW-7228 to resolve this issue. The GW-7228 provides the J1939 interface and the Modbus RTU slave function. In the J1939 network, the GW-7228 listens to the J1939 network and obtains all of the J1939 messages automatically sent from the engine. When receiving the Modbus RTU messages from the touch screen, the GW-7228 returns the data of the engine or commands the engine to change the rotational speed and toque that is corresponding to the content of the Modbus commands.



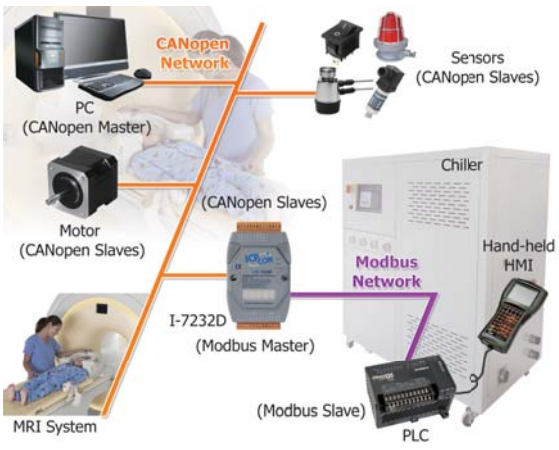


MRI Cooling System

Location: Guangdong, China
Product: I-7232D

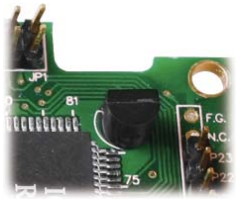
In order to reduce the cost, a MRI manufacturer uses the chiller made in China instead of German product. However, the customer gets into trouble with the different communication interface. By using the I-7232D, this problem is solved. I-7232D can be the Modbus RTU master while talking with the chiller. In the CANopen network, I-7232D is a CANopen slave. Therefore, I-7232D can easy bypass the information of the chiller to the CANopen master, and transfer the CANopen commands to the chiller.



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5. Palm-size Programmable CAN Controllers

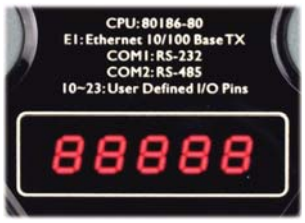
The palm size PACs (Programmable Automation Controller) includes I-7188XBD-CAN, uPAC-7186EXD-CAN and µPAC-5001D-CAN2. With abundant and various peripherals and communication ports, the PAC can integrate different communication interface, like CAN Bus, RS-232, RS-485, Ethernet and so on. In order to increase the modules openness and applications flexibility, the PAC provides MiniOS7, a DOS-like real-time single-task operation system for adapting to all kinds of needs. Users can develop application programs via C/C++ compiler.



Unique 64-bit Hardware Serial Number



Built-in RTC - Real Time Clock



5-Digit 7-Segment LED Display



microSD expansion

Model Name	I-7188XBD-CAN	uPAC-7186EXD-CAN	uPAC-5001D-CAN2
Pictures			
System Software			
OS	MiniOS7 (DOS-like embedded operating system)		
Development Software			
Download Interface	RS-232 (COM1) or Ethernet		
Language	C language		
Compilers	TC++ 1.01, TC 2.01, BC++3.1 ~ 5.2x, MSC 6.0, MSVC++ (before version 1.5.2)		
CPU Module			
CPU	80188, 40 MHz or compatible	80186, 80 MHz or compatible	
SRAM	512 KB	512 KB	512 KB
Flash	512 KB	512 KB	512 KB
microSD Expansion	-		Up to 2 GB
EEPROM	2 KB	16 KB	
NVRAM	31 Bytes (battery backup, data valid up to 10 years)		
RTC (Real Time Clock)	Provide second, minute, hour, date, day of week, month, year		
64-bit Hardware Serial Number	Yes, for Software Copy Protection		
Watchdog Timers	Yes (0.8 second)		
Communication Ports			
Ethernet	-	10/100 Base-TX (Auto-negotiating, Auto MDI/MDI-X, LED indicators)	
COM 1	RS-232 (TxD, RxD, RTS, CTS, GND) or RS-485 (Data+, Data-), non-isolated	RS-232 (TxD, RxD, RTS, CTS, GND), non-isolated	
COM 2	RS-485 (Data+, Data-) with internal self-tuner ASIC; non-isolated		
CAN	1 channel	1 channel	2 channels
LED Indicator			
7-Segment LED	Yes		
Programmable LED Indicators	4		5
Mechanical			
Dimension (W x L x H)	72 mm x 122 mm x 33 mm		91 mm x 123 mm x 52 mm
Installation	DIN-Rail Mounting		
Environmental			
Operating Temperature	-25 ~ +75°C		
Storage Temperature	-30 ~ +80°C		
Ambient Relative Humidity	10 ~ 90% RH (Non-condensing)		
Power			
Input Range	10 ~ 30 VDC		12 ~ 48 VDC
Redundant Power Inputs	-		Yes
Power Consumption	3 W		

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Case Studies

Professional surgical bed and chair with CANopen motion control

There are various surgical needs in modern operating rooms. The ergonomic surgical bed provides patients with the comfort and safety during surgery. In addition to the basic operations, professional surgical bed must provide multi-axis interpolation actions. The embedded CAN controller is needed and will be built-in the surgical bed or chair. The uPAC-7186EXD-CAN provides the efficient CAN API for various applications. When rotating the bed or chair, the uPAC-7186EXD-CAN can perform the smooth and quick control of those CANopen motors. This surgical bed uses the CANopen interpolation technology to synchronize all motors every 20ms period, in the 3D space at a speed of 0.8 degrees of tilting the bed surface per second, and still keep the deviation of the positioning point within 2mm. The CANopen motion of the uPAC-7186EXD-CAN controller can simplify the complexity of design and achieve safe control and precise positioning for the continuously improved medical technology.



6. PC-based CAN Bus Boards

To access the CAN sensors, actuators, and I/O modules we provide communication boards for PC-based solution.

Communication Boards:

The following CAN Bus communication boards are designed for different interface and different CAN port number. The common features are:

1. Compatible with CAN specification 2.0 parts A and B
2. Fully compatible with ISO 11898-2 standard
3. Supports baud rate from 10 kbps to 1 Mbps
4. 2 kV galvanic isolated
5. Direct memory mapping to the CAN controller

Software Support:

For Windows:
- LabView CAN Driver
- DASYLab CAN Driver
- RTX CAN Driver
- PISOCNX Active Object
- NAPOPC.CAN DA Server
- InduSoft Driver

For Linux:
- SocketCAN Device Driver

PC-based CAN Communication Boards

Model Name	PEX-CAN200i	PCM-CAN200	PISO-CAN200U	PISO-CAN400U	PISO-CAN800U
Pictures					
CAN Channel	2	2	2	4	8
Bus Interface	X1 PCI Express	Universal PCI			
Baud Rate	Programmable transfer rate up to 1 Mbps				
Terminator Resistor	Jumper for 120 Ω terminator resistor				
Galvanic Isolation	2 kV				
PC APIs	API for VB, VC, BCB, VB.Net, C#.Net				
RTX Driver	Yes				-
LabVIEW Driver	Yes				
InduSoft Driver	Yes				
OPC Server	Yes				
OCX	Yes				
SocketCAN Driver	Yes				-
Device Driver	Windows XP/7/8.1/10, Linux				

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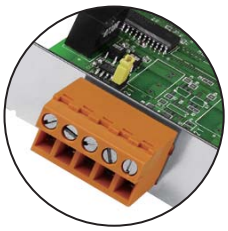
Model Name	PISO-CM100U	PISO-CM200U	PISO-DNM100U	PISO-DNS100U	PISO-CPM100U
Pictures					
CAN Channel	1	2	1		
Bus Interface	Universal PCI		Universal PCI		
On-board CPU	Yes				
On-board CPU OS	MiniOS7	-	MiniOS7		
On-board CPU APIs	C/C++		-		
Default Firmware	CAN 2.0A/2.0B		DeviceNet Master	DeviceNet Slave	CANopen Master
EDS File Support	-			Yes	
Baud Rate	Programmable transfer rate up to 1 Mbps		125 k, 250 k, and 500 kbps		10 k, 20 k, 50 k, 125 k, 250 k, 500 k, 800 k, 1 Mbps
Terminator Resistor	Jumper for 120 Ω terminator resistor				
Galvanic Isolation	2 kV				
PC APIs	API for VB, VC++, BCB, Delphi		API for VB, VC++, VB.Net, C#.Net		
LabVIEW Driver	-		Yes	-	
InduSoft Driver	Yes			-	Yes
Device Driver	Windows XP/7/8.1/10, Linux				

Connector Types: -T/-D

Each CAN Bus board provide two type of connectors, i.e. DB9 and Terminal Block.



PISO-xxxxx-D



PISO-xxxxx-T

Optional Accessory:

Optional Cable for PISO-CAN800U

CA-9-3705:

DB-37 Male (D-sub) to 4-Port DB-9 Male (D-sub) cable. 0.3 M (90°)



CA-9-3715D:

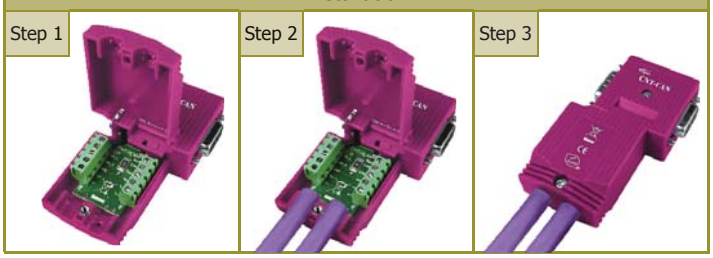
DB-37 Male (D-sub) to 4-Port DB-9 Male (D-sub) cable. 1.5 M (180°)



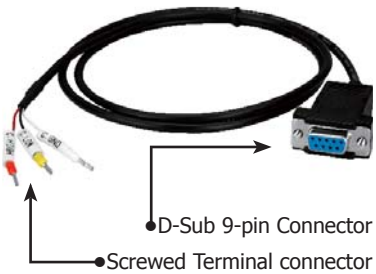
Optional CAN Bus connector: **CNT-CAN**



Installation



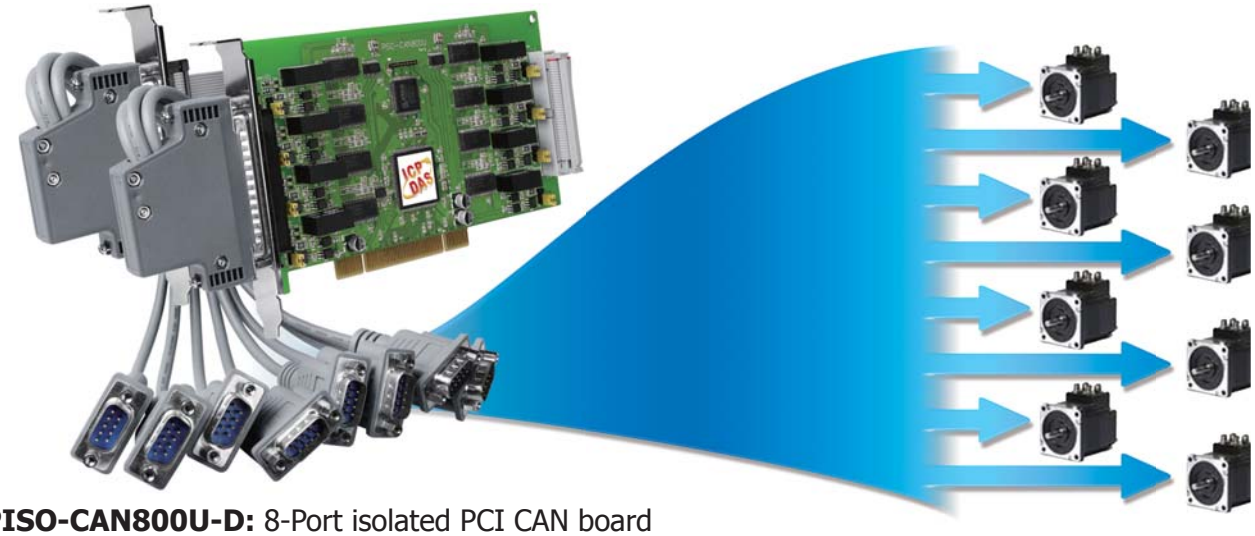
CA-0910-C



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CAN Bus boards

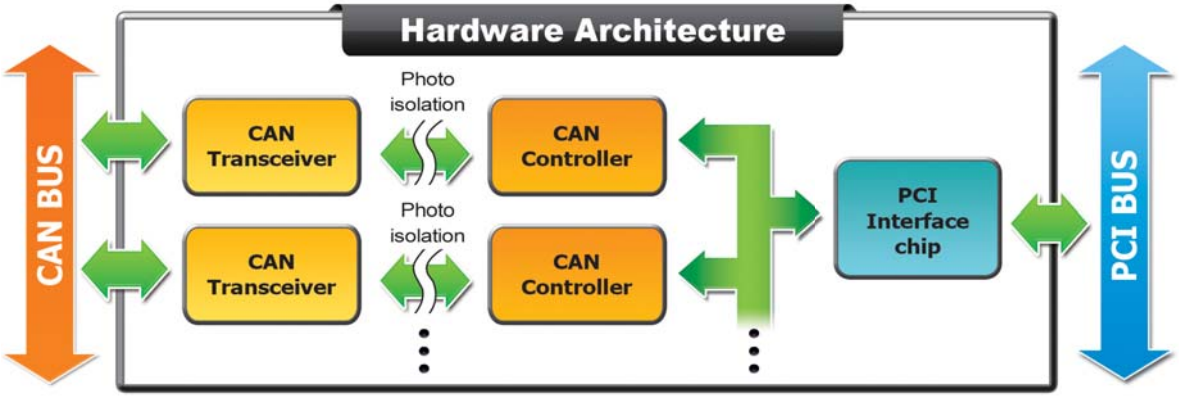
The PCI and PCI Express CAN Bus boards use the new CAN controller Phillips SJA1000T and transceiver TJA1042, which provide bus arbitration, error detection with auto correction and re-transmission function. It can be installed in a 5V or 3.3V PCI slot and supported truly "Plug & play".

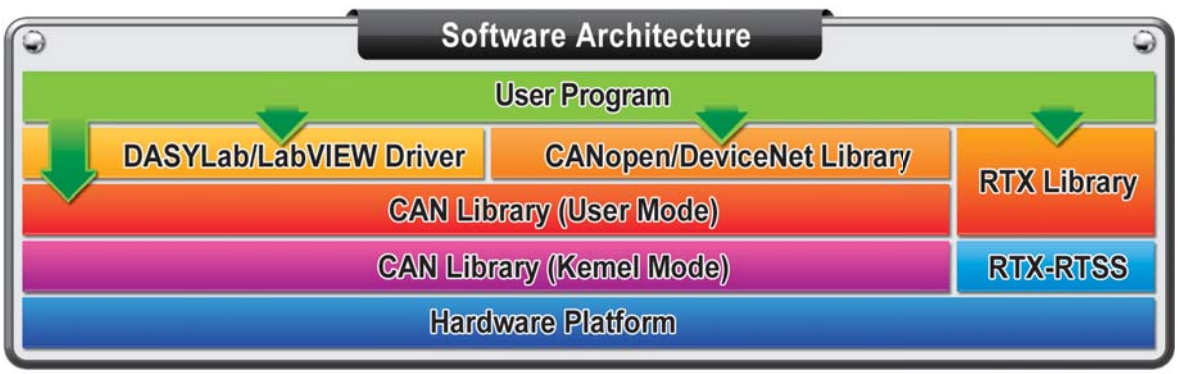


PISO-CAN800U-D: 8-Port isolated PCI CAN board

Features:

- Compatible with CAN specification 2.0 parts A and B
- Support a range of baud rates from 10 kbps ~ 1 Mbps
- 2500 Vrms photocoupler isolation on the CAN side
- VB, VC++, Delphi, and Borland C++ builder demos are provided
- Universal PCI card, supports both the 5 V and the 3.3 V PCI bus
- Built-in jumper for the 120 Ω terminator resistor of the CAN Bus
- Fully compatible with the ISO 11898 -2 standard
- Provide 1/2/4/8 independent CAN channels
- 2 kV galvanic isolation for each CAN port
- Direct memory mapping to the CAN controller
- Supports LabVIEW and DASYLab drivers

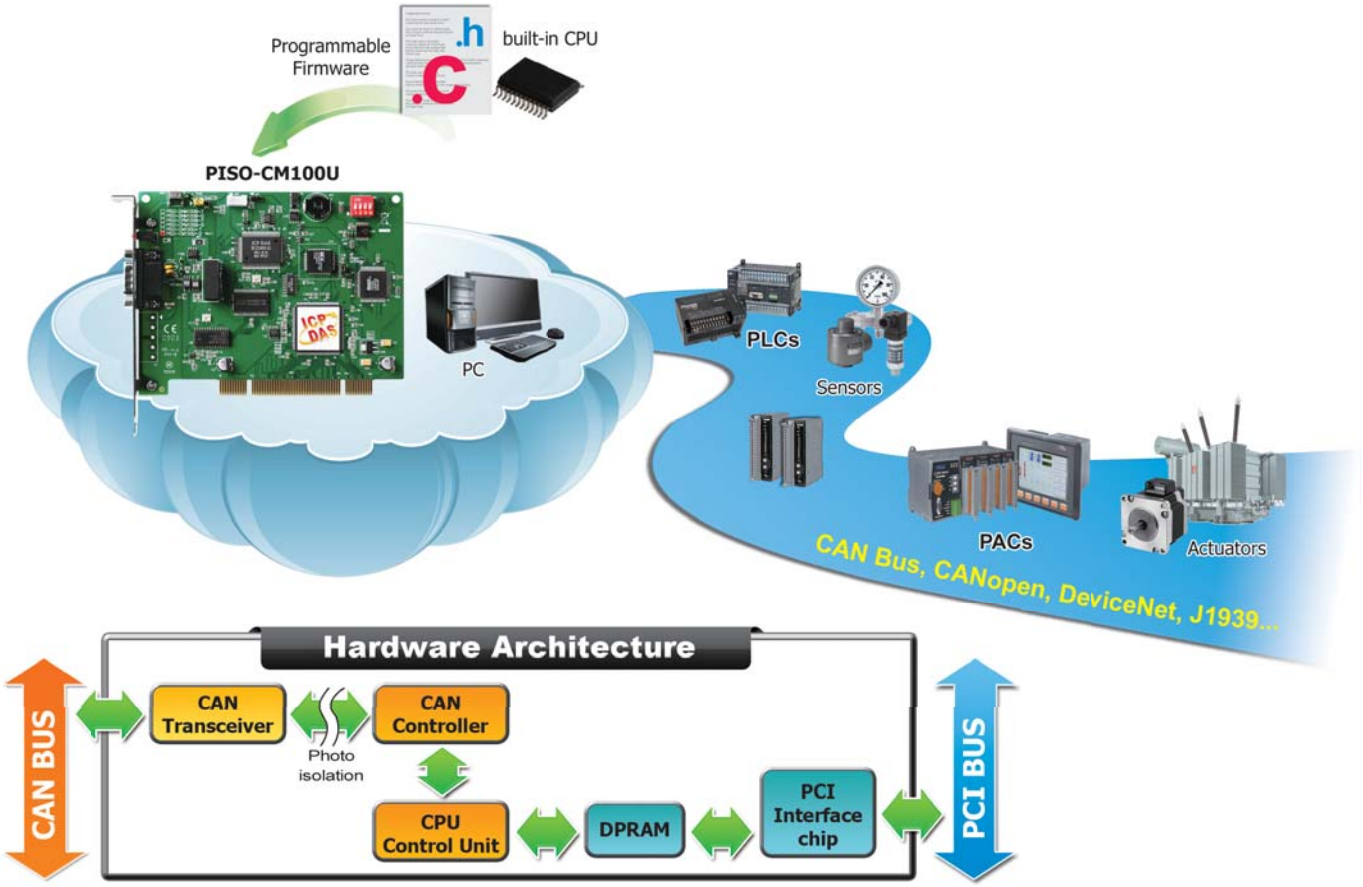




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PISO-CM100U: CAN board with built-in programmable CPU

As a stand-alone CAN controller, the PISO-CM100U represents a powerful and economic solution. It has an internal 16-bit 80186 compactable CPU for the complex protocol interpretations and implementations. Owing to the real-time DOS-like OS, MiniOS7, the PISO-CM100U can cover most of all time-critical CAN-based applications, such as self-defi ne CAN protocol, CANopen, DeviceNet, J1939, and so forth. Therefore, when users develop their projects, the PISO-CM100U is helpful to handle the process of the CAN messages, and share the CPU loading of the PC or embedded system. Besides, the PISO-CM100U allows users designing the fi rmware of the PISO-CM100U. Through the library and demos, it is easy to fi nish the user-defi ned fi rmware to satisfy the users' requirements. easy to fi nish the user-defi ned fi rmware to satisfy the users' requirements.

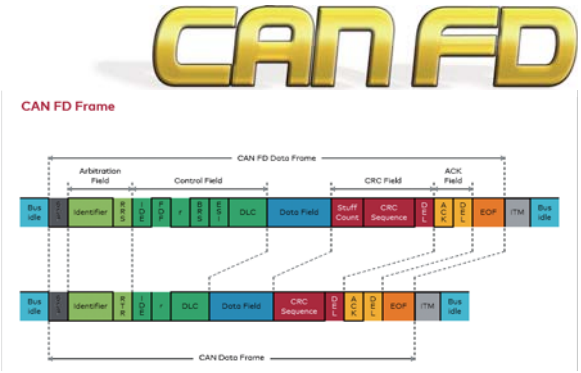


Built-In CPU Specifications

System Software	
OS	MiniOS7 (DOS-like embedded operating system)
Program Download Interface	RS-232 (needs an optional cable: CA-0904)
Programming Language	C language
Compilers to create.exe Files	TC++ 1.01 TC 2.01 BC++3.1 ~ 5.2x MSC 6.0 MSVC++ (before version 1.5.2)
CPU Module	
CPU	80186, 80 MHz
SRAM	512 KB
Flash	512 KB
EEPROM	16 KB
DPRAM	8 KB
NVRAM	31 Bytes (battery backup, data valid up to 10 years)
RTC (Real Time Clock)	Provides second, minute, hour, date, day of week, month, year
Watchdog Timers	Yes (0.8 second)

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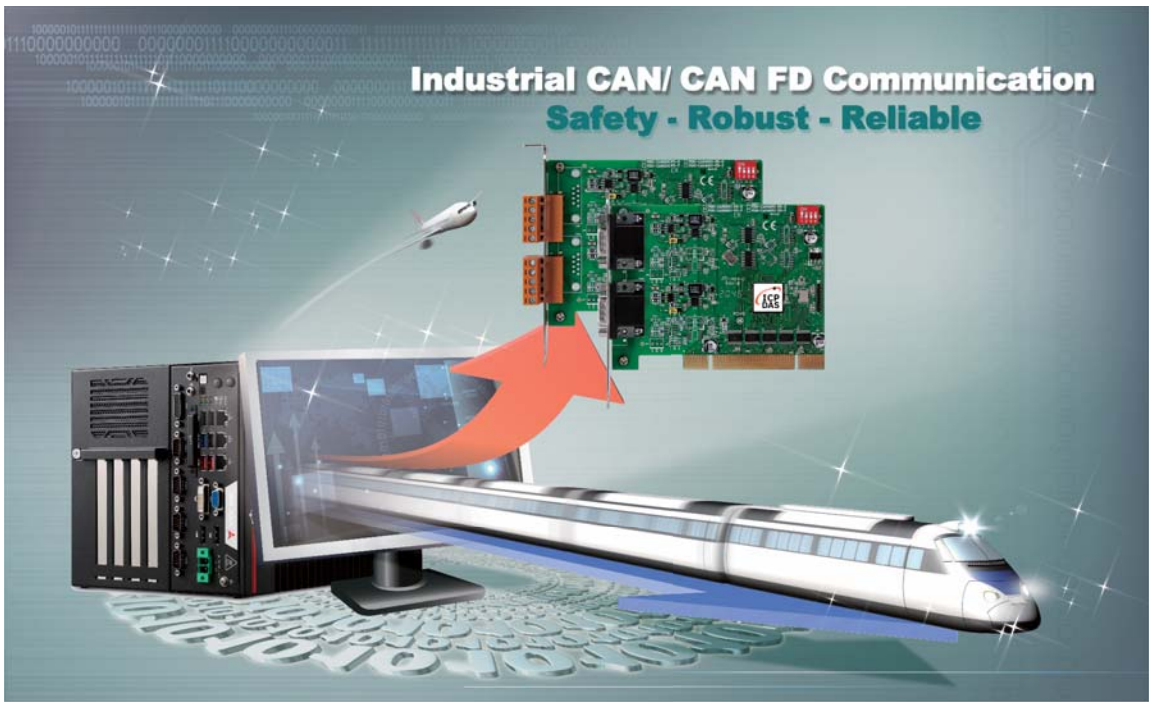
6.1 PC-based CAN FD Boards



CAN FD (Controller Area Network Flexible Data-Rate) is a data-communication protocol typically used in the automotive industry. It supports up to 64 data bytes per data frame vs. 8 data bytes for Classical CAN. This reduces the protocol overhead and leads to an improved protocol efficiency. It was developed to meet the need to increase the data transfer rate and with larger frame sizes.CAN FD supports dual bit rates: The nominal (arbitration) bit-rate limited to 1 Mbit/s as given in Classical CAN - and the data bit-rate, which depends on the network topology and transceivers. In practice, data bit-rates up to 10 Mbit/s are achievable.

CAN / CAN FD boards

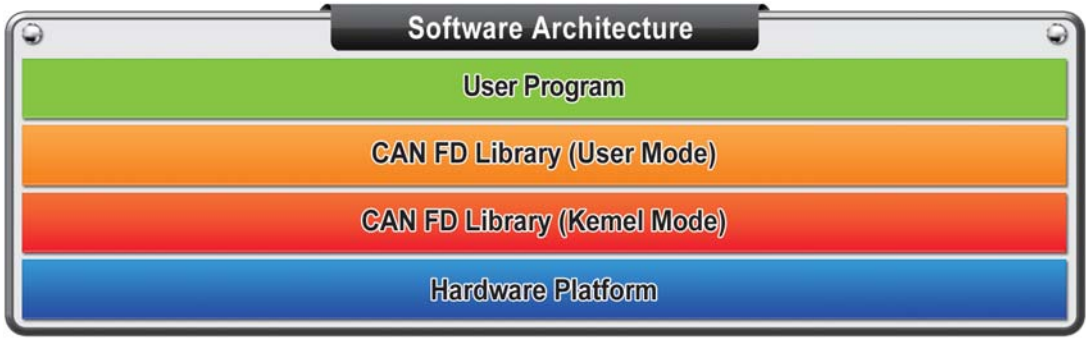
The PCI and PCI Express CAN/CAN FD boards use the new CAN/CAN FD controller, which provide bus arbitration, error detection with auto correction and re-transmission function. The CAN FD bit rates supports from 100 kbps to 10000 kbps within the data field. It can be installed in a 5V or 3.3V PCI slot and supported truly "Plug & play".



PISO-CAN200U-FD / PISO-CAN400U-FD: 2-Port/4-Port Isolated PCI CAN FD board

Features:

- Compatible with CAN specification 2.0 A/B and FD
- CAN FD bit rates for data field from 100 kbps to 10 Mbps
- CAN bit rates from 10 kbps to 1000 kbps
- 2500 Vrms photocoupler isolation on the CAN side
- Various demos are provided
- Universal PCI card, supports both the 5 V and the 3.3 V PCI bus
- Built-in jumper for the 120 Ω terminator resistor of the CAN Bus
- Provide 2/4 independent CAN/CAN FD channels
- 2 kV galvanic isolation for each CAN port
- Independent CAN controllers for each CAN port
- Supports windows drivers



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Software

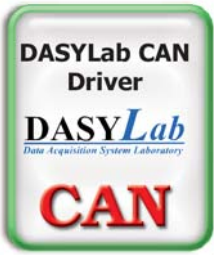
LabVIEW CAN Driver



The LabVIEW driver includes a configuration utility to configure the ICP DAS's DeviceNet hardware in your PC. By means of this driver, you don't need to Study the complex and abstruse technology of the DeviceNet protocol.

- OS environment: Windows 2000/XP
- Supports NI LabVIEW version 8.0 or later
- Supports CAN specification 2.0A and 2.0B
- Provides 3000-record Rx buffer for each CAN port
- Offers functions for directly accessing SJA1000 register
- Supports time-stamp for each received CAN messages

DASYLab CAN Driver



DASYLab CAN driver makes users interactively develop PC-based applications by simply attaching functional icons. DASYLab offers real-time analysis, control, and the ability to create custom graphical user interfaces. Besides, it can require weeks of training to master. This is useful in some application cases.

- OS environment: Windows 2000/XP
- Supports DASYLab version 8.0
- Follows CAN specification 2.0A and 2.0B
- Supports maximum 64 CAN ports and maximum 4096 block size.
- Provides Intel mode and Motorola mode for remote CAN device
- Offers two kinds of languages, German and English

PISOCANX ActiveX Object



PISOCANX uses ActiveX technology to simplify the procedure while developing the application by using PISO-CAN series CAN card. The ActiveX object (OCX) can be not only used in general program development environment, but used in the SCADA software which supports the ActiveX technology.

- OS environment: Windows 2000/XP
- Allows polling mode and interrupt mode
- Provides 3000-record Rx buffer for each CAN port
- Supports functions for directly accessing SJA1000 register
- Allows users to read the card No. and relative information
- Supports time-stamp for each received CAN messages

NAPOPC.CAN DA Server



NAPOPC.CAN DA Server is a CAN OPC server to be as an expert bridge between ICP DAS CAN products and the OPC client of the third party software. Besides, it also provides the easy-to-use integral APIs to access the different CAN ports without through the OPC server.

- OS environment: Windows 2000/XP
- Follows OPC 1.0, OPC 2.0 Data Access Standards
- Configures CAN hardware filter by the APIs of the Virtual CAN Driver
- Provides CAN Engine Utility to monitor the CAN messages
- Collects the data from the different CAN devices in one OPC server
- Provides the CAN devices and the virtual CAN mapping table

VxCAN Utility



The VxCAN Utility, a diagnostic and test software tool, is designed to unleash the power of all CAN products of ICP DAS. It is based on the Virtual CAN technique which creates the virtual CAN ports to match the physical CAN interfaces of the installed products (Users can refer to the web site for details about the Virtual CAN technique

- Integrates all CAN converters in the utility
- Searches all supported CAN products installed in the system automatically
- Provides the basic functions to send and receive CAN messages
- Allows sending a predefined group of CAN messages
- Provides CAN ID filter to sieve out the unnecessary CAN messages

SocketCAN Device Driver



The SocketCAN driver is a kind of device driver based on the Linux operating system with x86 hardware platform.
Users can implement their SocketCAN-based application on the Linux platform by using PISO-CAN series board.

- OS environment: Linux kernel version 2.6.31 ~ 3.2.20 (x86 hardware platform only)
- Provides CANopen/DeviceNet master static library Standard interface for SocketCAN package.
- Supports Virtual CAN interface. Users can map several virtual CAN port into one physical CAN port.
- Provides the RAW socket, CANopen master and DeviceNet master demos

CANcheck



CANcheck is one software which is used to verify the functions of CAN devices from any manufacturers. It provides users to design the test commands and the expected response. When starting the test, the software will go the predefined procedure to send the messages and check if the responses are correct.

- OS environment: Windows XP, Window 7
- Support: ICP DAS CAN board, CAN converter
- No need to write any programs. The graphical interface is ready-made and easy to operate.
- Can be used to operate and diagnose lights, windows, dashboard or other vehicular electronic systems.
- Supports CAN 2.0A and CAN 2.0B specifications.

CAN Test Tool



CAN test tool helps users to test the CAN communication of CAN series of ICP DAS. You can use these devices to be an simple CANopen master/slave, DeviceNet master/slave, J1939 transmitter/receiver to test the DUT (device under test).It can easily and quickly test if the DUT works well or not.

- OS environment: Windows XP, Window 7
- Support: ICP DAS CAN board, CAN converter
- Test Function: Two CAN port test to each other, Test with other CAN device, CANopen Master, CANopen Slave, DeviceNet Master, DeviceNet Slave, J1939 Receiver, J1939 Transmitter
- Auto scan all supported ICP DAS CAN device on your PC
- Three steps, easy to test

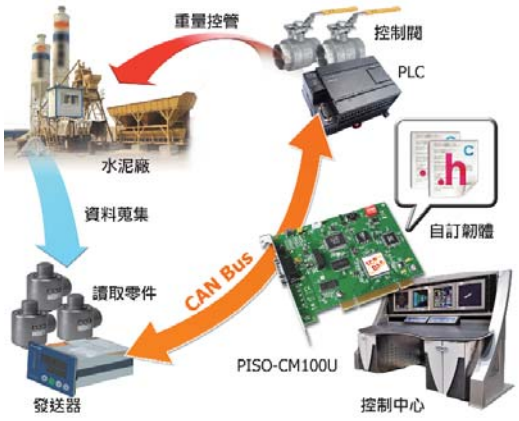
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Case Studies

Concrete Station Monitor & Control System

Location: Hunan, China
Product: PISO-CM100U

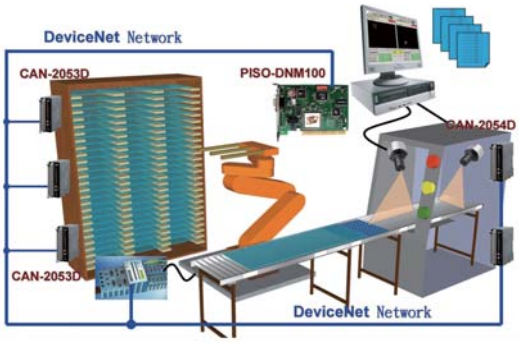
The result of the quantity control of each recipe material seriously affects the quality of the concrete. In order to adjust each quantity promptly, CAN Bus is applied. In this system, the PISO-CM100U is used to monitor the weight of each material from the load cells, and sends the recipe to the PLC. Meanwhile, the PC updates all the data to the screen. By using the user-defined firmware in the CPU of the PISO-CM100U, the PC loading can be effectively reduced, and the system becomes more smooth and reliable.



LCD Glass Inspection System

Product: PISO-DNM100U, CAN-2053D, CAN-2054D

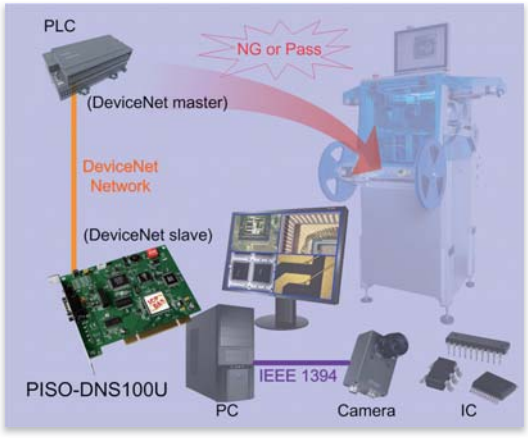
The system is to check that the LCD glass is good or not. Nowadays, the LCD is larger and larger. They need a system to check glass instead of human. There exists a DeviceNet network to control all remote I/O devices. The PC and PISO-DNM100U acts the DeviceNet master and accesses the remote device like sensor, barcode, robot and etc. There exists inspection software in the PC. It would make the robot to load the glass into the equipment. Complete inspecting the glass, the software would record the result of the glass and unload the glass. This system really helps finding defect glass and improving the quality of the product.



IC Inspection Machine

Location: Hsinchu, Taiwan
Product: PISO-DNS100U

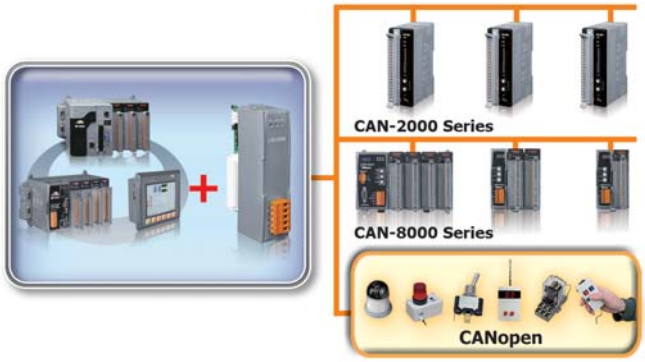
The IC inspection process is necessary for a good quality control. Though the PLC is cheap and stable, the IC inspection is a tough work for a PLC. The customer uses PC+ camera + PISO-DNS100U to do the IC inspection, and uses PLC to control the mechanism for rejecting the defective ICs. After finishing the inspection, the PC writes the result to the PISO-DNS100U. Because the PLC is a DeviceNet master, it can easily get the information from the PISO-DNS100U via DeviceNet network.



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7. PAC-based CAN Modules

These CAN Bus communication modules are the solutions to the various CAN application requirements in PAC family with rich CAN Bus protocols. The I-8123W, I-87123W, I-8124W, and I-87124W separately support CANopen and DeviceNet master protocols. Users can apply them in PAC to connect to CANopen and DeviceNet devices to reach various CANopen/DeviceNet systems easily.



For the especial CAN Bus applications, the I-8120W and I-87120W are designed for users to apply in PAC series. The default firmware of I-8120W and I-87120W provides the transmission and reception of CAN Bus messages in PAC. In addition, users can design the specific firmware in these modules to reduce the loading of the PAC in C language.

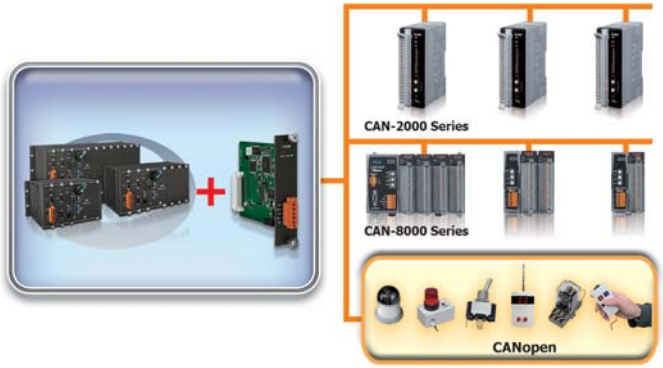
CAN/CANopen/DeviceNet Communication Module (Parallel/Serial Bus)						
Model Name	**I-8120W**	**I-87120**	**I-8123W**	**I-87123**	**I-8124W**	**I-87124**
Pictures						
Communication						
Interface	ISO 11898-2 CAN					
Port	1					
Terminator	120 Ω Selected By Jumper					
Max. Speed (K bps)	1000		1000		500	
Controller Chip	SJA1000T					
Transceiver Chip	82C250					
Protocol	CAN 2.0 A/2.0 B		CANopen CiA 301 ver 4.02, CiA 401 ver 2.1		DeviceNet Volume I ver 2.0, Volume II ver 2.0	
System						
Hot Swap	-	Yes	-	Yes	-	Yes
Data Communication	Parallel Interface	Serial Interface	Parallel Interface	Serial Interface	Parallel Interface	Serial Interface
User-defined Firmware	Yes		-		-	
Isolation	2500 Vrms					
Connector	5-pin Terminal Block					
Optional Accessories	CA-0904 Cable					


CA-0904

Model Name	I-8120W	I-87120	I-8123W	I-87123	I-8124W	I-87124
PAC Driver Support						
I-8000, iP-8000	-	BC, TC	-	BC, TC	-	BC, TC
VP-2111						
WP-8000-CE7	eVC++ 4.0, VB.Net 2005, C#.Net 2005					
VP-2000-CE7 VP-4000-CE7						
XP-8000-WES7	VB.Net 2005, C#.Net 2005, VC 2005					
iPPC Series						
LP-8000	-	GCC	-	GCC	-	GCC

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These CAN Bus communication modules are the solutions to the various CAN application requirements in PAC-9000 family with rich CAN bus protocols. The I-9123 and I-9124 separately support CANopen and DeviceNet master protocols. Users can apply them in PAC-9000 to connect to CANopen and DeviceNet devices to reach various CANopen/DeviceNet systems easily.



For the especial CAN bus applications, the I-9120 are designed for users to apply in PAC-9000 series. The default firmware of I-9120 provides the transmission and reception of CAN bus messages in PAC-9000. In addition, users can design the specific firmware in these modules to reduce the loading of the PAC-9000 in C language.

CAN/CANopen/DeviceNet Communication Module			
Model Name	**I-9120**	**I-9123**	**I-9124**
Pictures			
Communication			
Interface	ISO 11898-2 CAN		
Port	1		
Terminator	120 Ω Selected By Jumper		
Max. Speed (K bps)	1000	1000	500
Controller Chip	SJA1000T		
Transceiver Chip	82C250		
Protocol	CAN 2.0 A/2.0 B	CANopen CiA 301 ver 4.02, CiA 401 ver 2.1	DeviceNet Volume I ver 2.0, Volume II ver 2.0
System			
Data Communication	Parallel Interface		
User-defined Firmware	Yes	-	-
Isolation	2500 V_{rms}		
Connector	5-pin Terminal Block		
Optional Accessories	CA-0904 Cable		
 CA-0904			
Model Name	**I-9120**	**I-9123**	**I-9124**
PAC Driver Support			
WinCE7 PAC	WP-9000-CE7 series VB.Net 2010, C#. Net 2010, VC 2010		
WES7 PAC	XP-9000-WES7 series VB.Net 2010, C#. Net 2010, VC 2010		
Win10 IoT PAC	ALX-9000-IoT and XP-9000-IoT series VB.Net 2010, C#. Net 2010, VC 2010		
Linux PAC	LP-9000 and LX-9000 series GCC		

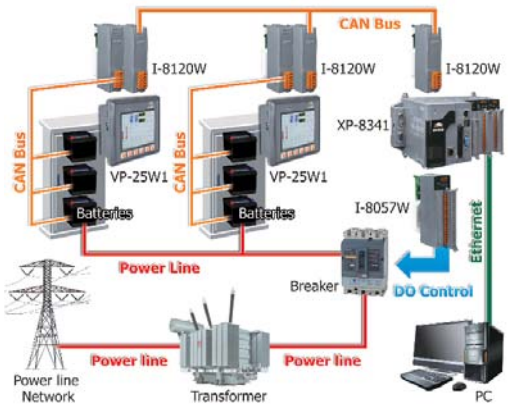
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Case Studies

Energy Storage System

Location: Guangdong, China
Product: I-8120W, I-8057W, VP-25W1, XP-8341

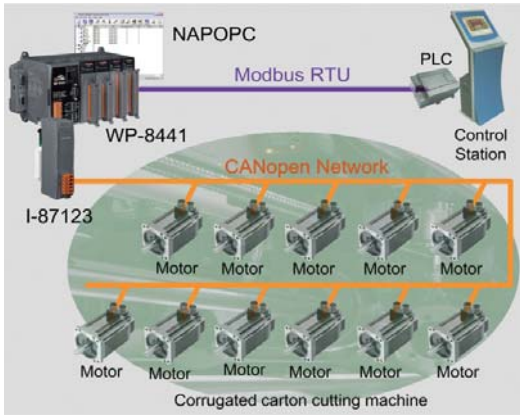
The result of the quantity control of each recipe material seriously affects the quality of the concrete. In order to adjust each quantity promptly, CAN Bus is applied. In this system, the PISO-CM100U is used to monitor the weight of each material from the load cells, and sends the recipe to the PLC. Meanwhile, the PC updates all the data to the screen. By using the user-defined firmware in the CPU of the PISO-CM100U, the PC loading can be effectively reduced, and the system becomes more smooth and reliable.



Corrugated Carton Cutting Machine

Location: Taichung, Taiwan
Product: WP-8441, I-87123

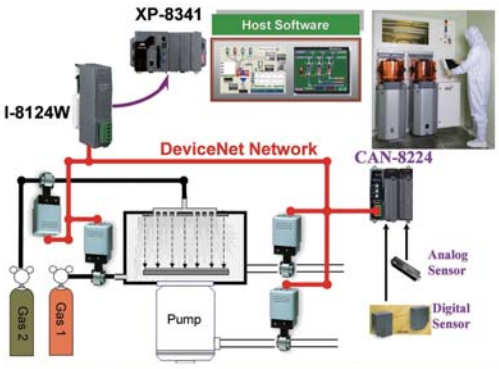
In this case, the orientation and cutting speeds seriously affect the quantity of output. Because all of the cutting knives and rollers must be controlled by 31 motors, the customer selects the CANopen motors to do that. The WP-8441 and I-87123 play the role of a CANopen master to control all of the motors simultaneously by the CANopen features of the synchronization and high speed. By using this architecture, all of the motors can quickly move to the target position at the same time by just sending one command.



CVD/PECVD Semiconductor Machine

Product: I-8124W, CAN-8224, XP-8341

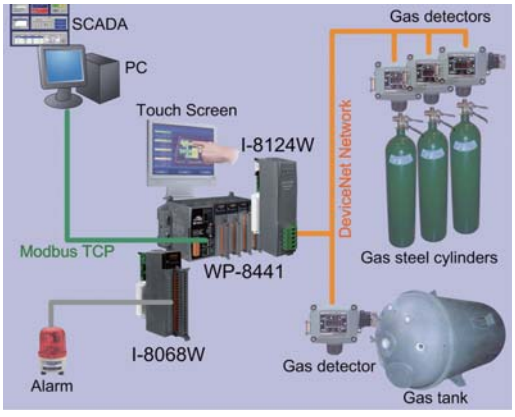
This system utilizes XP-8341 and I-8124W as the controlling center of the remote I/O devices. I-8124W provides DeviceNet master engine to collect the remote I/O data, including pneumatic valve "MKS 683" and Beckhoff DeviceNet I/O. XP-8341 exists an operating program to control the situation in the chamber. It is important to control the reacting time of the wafer in the chamber which have some kind of gas inside. After tuning timing and pressure parameter, this series equipment has been developed successfully and works in some semiconductor factories.



Semiconductor Gas Detection System

Location: Kaohsiung, Taiwan
Product: WP-8441, I-8124W

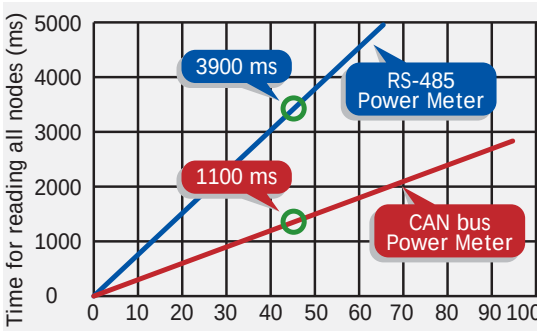
In semiconductor factory, a lot of poison and inflammable gas are widely used in various processes. In order to keep the employees safe, the gas detectors are general applied to detect the concentration of the poison and inflammable gas in the semiconductor. The customer uses WP-8441+I-8124W to be the DeviceNet master for obtaining the concentration information from the gas detectors. Besides, the present employees can immediately understand the air quality via the touch screen of the WP-8441.



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8. Power Meter

ICP DAS brings the most powerful, cost-effective, advanced Smart Power Meters PM-3000-CPS series that gives you access to real-time electric usage for three-phase power measurement. They support CANopen protocols for easy gathering the real-time power consumption information by the CAN interface. It supports not only polling mode, but also Auto-response mode which lets the power meter automatically reply the CAN messages in the predefined time period. This makes the communication more efficient while building a large power monitor system.



The No. of scanned power meters
The Comparison figure of the scan Time

Models	PM-3033-CPS	PM-3133-CPS	PM-3112-CPS	PM-3114-CPS	PM-4324-CPS
Pictures					
AC Power Measurement					
Wiring	1P2W-1CT 1P3W-2CT 3P3W-2CT 3P3W-3CT 3P4W-3CT	1P2W-1CT 1P3W-2CT 3P3W-2CT 3P3W-3CT 3P4W	1P2W-2CT	1P4W-4CT	1P2W-1CT 1P3W-2CT 3P3W-2CT 3P3W-3CT 3P4W
Measurement Voltage	10 ~ 500 V		10 ~ 300 V		10 ~ 500 V
Measurement Current	1A or 5A	CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A); CTØ36 mm (300 A); CTØ36 mm (400 A)	CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A)		CTØ10 mm (60 A); CTØ16 mm (100 A); CTØ24 mm (200 A); CTØ36 mm (300 A); CTØ36 mm (400 A)
Measurement Frequency	50/60 Hz				
W Accuracy	Better than 0.5% (PF=1)		Better than 1% (PF=1)		Better than 0.5% (PF=1)
Power Parameter Measurement	True RMS voltage (Vrms), True RMS current (Irms), Active Power (kW), Active Energy (kWh), Apparent Power (kVA), Apparent Energy (kVAh), Reactive Power (kVAR), Reactive Energy (kVARh), Power Factor (PF), Frequency				
Data Update Rate	1 Second				
Alarm Output					
Power Relay	N/A	Form A (Normal Open) x 2; 5 A @ 250 VAC (47 ~ 63 Hz), 5 A @ 30 VDC			
Power					
Input Range	+12 VDC ~ +48 VDC				+85 VAC~ +264 VAC
Power Consumption	2 W				6 W
Mechanical					
Casing	Plastic				
Module Installation	DIN-Rail Mounting				DIN-Rail Mounting Wall mounting
Environment					
Operating Temperature	-20°C ~ +70°C				
Storage Temperature	-25°C ~ +80°C				
Ambient Relative Humidity	10 ~ 90% RH, Non-condensing				

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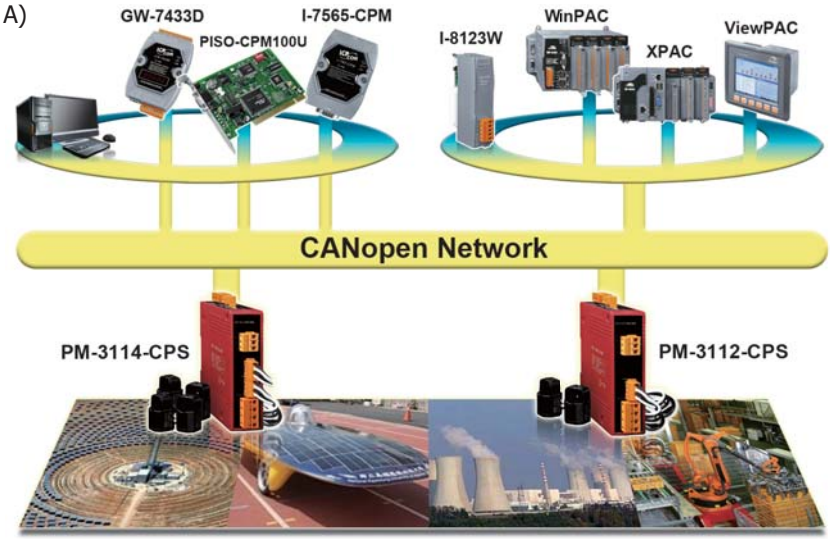
CAN Bus Power Meter

PM-3033-CPS **PM-3112-CPS** **PM-3133-CPS** **PM-3114-CPS**



The Smart Power Meter PM-3000 Series can give you access to real-time electric usage for power management. With its high accuracy (<1%, PF=1), the power meter series can be applied to both low voltage primary side and/or medium/ high voltage secondary side and enables the users to obtain reliable and accurate energy consumption readings from the monitored equipment in real time under operation. These compact size and cost-effective power meters are equipped with revolutionary wired clip-on CT (various types, support input current up to 200 A).

- Current Measurements Up to 200 A with Different CT Ratio
- Supports 2 Power Relay Output (Form A)
- Voltage Measurements Up to 300 V
- W Accuracy Better than 1% (PF=1)
- Energy Analysis for 1P2W, 1P4W
- True RMS Power Measurements
- Clip-on CT for Easy Installation
- Supports CAN Bus Interface
- Supports CANopen Protocol



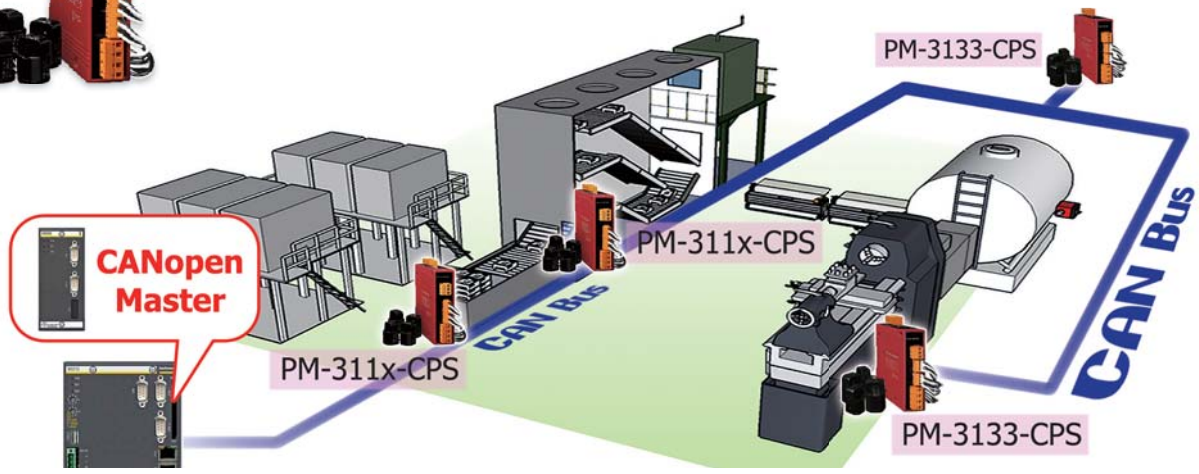
Case Studies: Power Control System of Factory

CAN Bus Power Meter

PM-3114-CPS



In this case, user add several PM-3114-CPS into existing CANopen network for monitoring power system of factory. The PM-3133-CPS and PM-311x-CPS can be accessed by any standard CANopen master. It makes the communication more efficient when collecting a lot of remote power information.



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9. CAN Bus Data Logger

The CAN Bus data logging device serves for logging of communication over the CAN data bus. Each received data packet is given a specific time mark, which shows the precise arrival time of data. The actual time mark is obtained from the internal real time clock (RTC), therefore it is independent of the global system time. Data logging on a common SD card allows further analysis and system monitoring on a PC. The CAN-Logger100/200 device by ICP DAS is the result of extensive CAN Bus testing and CAN Bus programming and is suited for all type of CAN Bus application.



Models	CAN-Logger100	CAN-Logger200
Pictures		
CAN Interface		
Transceiver	NXP TJA1042	
Channel Number	1	2
Connector	5-Pin male M12 x 1 (Pin 1: F.G., Pin 2: +Vs, Pin 3: GND, Pin 4: CAN_H Pin 5: CAN_L)	5-Pin male M12 x 2 (Pin 1: F.G., Pin 2: +Vs, Pin 3: GND, Pin 4: CAN_H Pin 5: CAN_L)
Transmission Speed (bps)	10 k, 20 k, 50 k, 100 k, 125 k, 250 k, 500 k, 800 k, 1 M and user-defined baud rate	
Terminator Resistor	DIP switch for the 120 Ω terminator resistor	
Isolation	3000 V_{DC} for DC-to-DC, 2500 V_{rms} for photocoupler	
Specification	ISO-11898-2, CAN 2.0A and CAN 2.0B	
CAN Filter	Utility tool	
USB Interface		
Connector	USB Type B x 1	
Compatibility	USB 2.0 High Speed	
Max. Data flow	Transmit: 4000 fps ; Receive: 1000 fps	
Software Driver	Windows XP/7/8.1/10	
Data Logger Capability		
Storage Media	SDHC type flash – support 4 to 32 GB	
Recording Format	Binary	
Time Stamp Resolution	10 us	
Configuration	Utility tool	
Trigger	Log continuously	
Data Logger	Maximum message rate, receive: 15000 msgs/s	
LED		
Round LED	Power, MS, SD, CAN1, CAN2, CAN_ST LEDs	Power, MS, SD, CAN_Rx, CAN_Tx, CAN_ST LEDs
Power		
Power Supply	USB power or CAN Bus power (Unregulated +10 ~ +30 V_{DC}) delivery	
Protection	Power reverse polarity protection, Over-voltage brown-out protection	
Power Consumption	0.1A @ 24V	
Mechanical		
Installation	DIN-Rail	
Casing	Metal	
Dimensions (W x L x H)	102.0 mm x 102.0 mm x 44.0 mm (W x L x H)	
Environment		
Operating Temperature	-25°C ~ +75°C	
Storage Temperature	-30°C ~ +80°C	
Relative Humidity	10 ~ 90% RH, Non-condensing	

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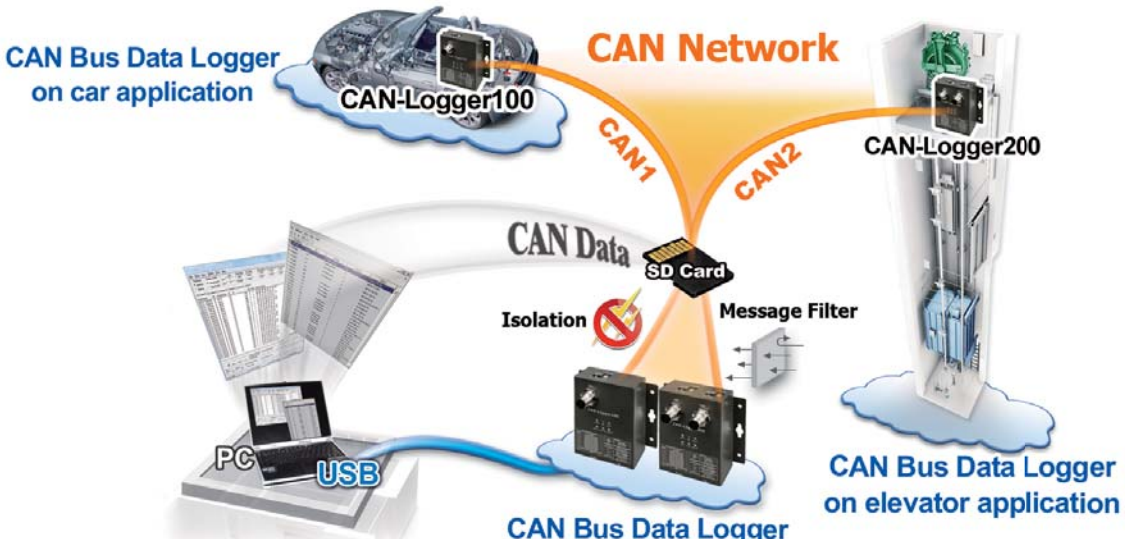
USB to 1/2-port CAN bus data logger device

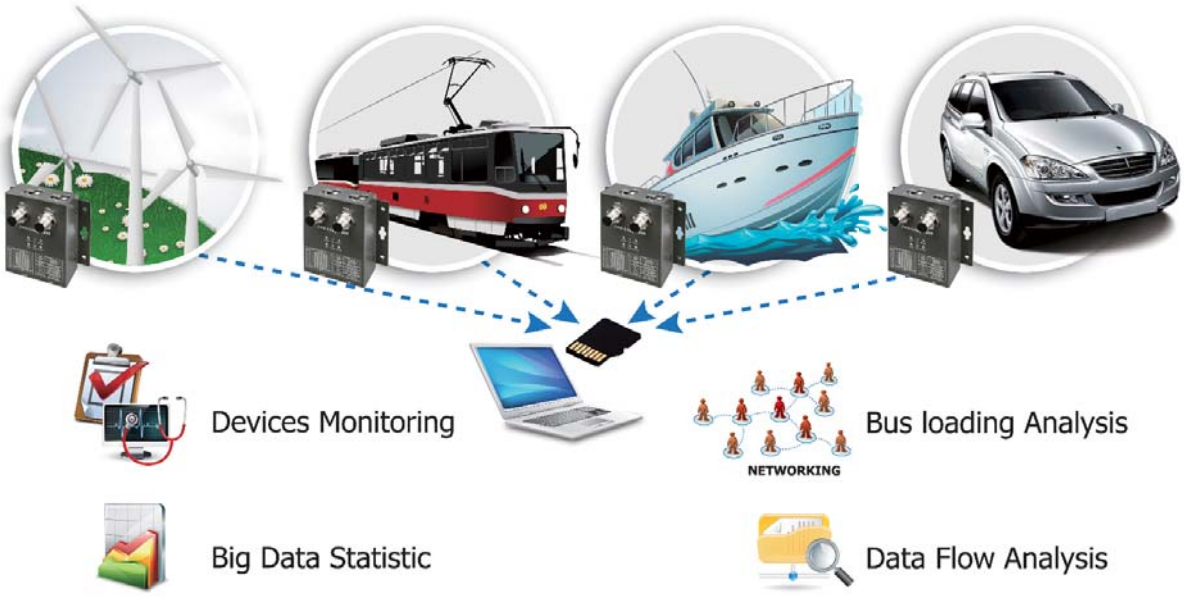
CAN-Logger100
CAN-Logger200



The CAN-Logger series devices (CAN-Logger100 / CAN-Logger200) are high-performance intelligent CAN bus data logger device with one/two CAN port that can help to make data collection and to process on a CAN bus network easier and quicker. The powerful CPU of the CAN-Logger devices provide the accurately time-stamp for each CAN message and supports storage media like SD or SDHC type flash for saving these CAN messages that is useful to analysis and diagnostic the CAN Bus network. In order to enhance the portability of the CAN-Logge, this module is powered by the USB interface or M12 connectors of CAN bus interface. The CAN-Logger devices use the standard USB HID driver of the Windows system.

- CAN-Logger100 provides one CAN port. CAN-Logger200 provides two CAN ports
- Power by the USB port or CAN port
- 3 kV galvanic isolation for the CAN port
- Full compatible with the ISO 11898-2 standard
- 2500 Vrms photocoupler isolation on the CAN side
- Supports CAN bus acceptance filter configuration
- Compatible with CAN specification 2.0 parts A and B
- Programmable CAN bus baud rate from 10 kbps ~ 1 Mbps
- Built-in jumper for the 120 Ω terminal resistor of the CAN side
- Supports 4 to 32 GB SDHC type flash for saving CAN messages
- CAN messages are time-stamped with 10 microseconds resolution
- Provides a configuration utility that can be used to transmit/receive CAN messages





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10. I/O Modules and Units



▲ CAN-2000 series ▲ CAN-8000 series

CAN-2000 series and CAN-8000 series are designed for combining sensors and actuators into CCON, CANopen or DeviceNet network. All of them provide corresponding EDS files for standard CANopen or DeviceNet master interfaces. The mainly differences between CAN-2000 series and CAN-8000 series are the product size and the capabilities of I/O expansion. CAN-2000 series is a palm-size and stand-along slave device. It specially suits for distribution control system, and can be placed in a limited space even in the case of machine. CAN-8000 series is useful for centralizing control system. It provides 1/2/4/8 slots for flexible I/O selections to match various applications. Each slot allows you plugging one I-8000/I-87K series I/O module to expand I/O channels, and hot-swap technique is supported.

With the same hardware, the CAN-2000 series and CAN-8000 series can be installed either of CCON, CANopen or DeviciceNet firmware. The product names are classified as

CANopen: CAN-8x2**3**, CAN-2xxx**C**

DeviceNet: CAN-8x2**4**, CAN-2xxx**D**

Features:

1. Heartbeat Messaging

The heartbeat protocol is generally used to negotiate and monitor the availability of remote I/O devices. It is a message like the heartbeat sent by CANopen/DeviceNet remote I/O modules at a regular time. The users could use this mechanism to indicate the health of the remote I/O. The health information is most important in the industrial applications. All the CANopen/DeviceNet remote I/O series from ICP DAS has the heartbeat protocol to increase the reliability of the remote data.

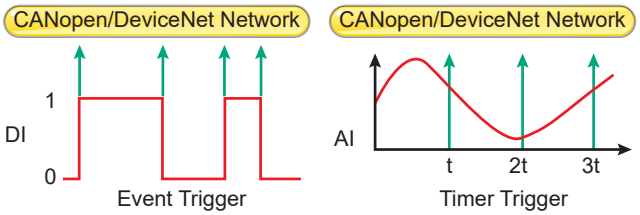


2. Safety & Arbitration

CAN Bus provides five mechanisms for achieving the utmost safety of data transfer. There are powerful for error detection, signaling and self-checking are implemented in every CAN node. If two or more nodes start transmitting messages at the same time, the arbitration mechanism is applied to guarantee that one of these messages can be sent successfully according to the priority.

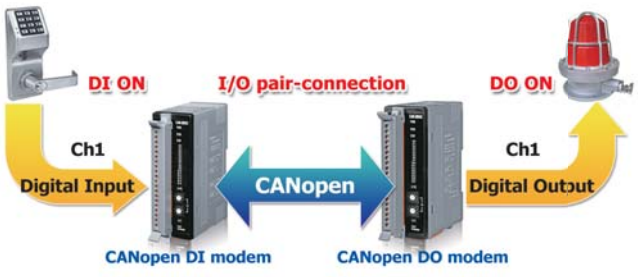
3. Auto Response of Input Data

The input data of CANopen/DeviceNet I/O modules allows to be responded automatically by event trigger or timer trigger. For example, DI data will be responded to the master when the DI data is changed. The AI data can be responded cyclically by predefined time period.



4. CANopen Digital I/O Pair-Connection

CANopen Digital I/O Pair-Connection is a special function for CANopen remote I/O. It can send the DI value that detected by the CANopen DI slave to other CANopen DO slaves through the CANopen network, and then these CANopen DO slaves will output the value. It is useful for users who need to detect a DI signal and output a DO alarm in time.



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Communication:

	CANopen I/O Modules	DeviceNet I/O Modules
Communication		
Connector	5-pin screwed terminal block (CAN_GND, CAN_L, CAN_SHLD, CAN_H, CAN_V+)	5-pin screwed terminal block (CAN_GND, CAN_L, CAN_SHLD, CAN_H, CAN_V+)
Baud Rate (bps)	10 k, 20 k, 50 k, 125 k, 250 k, 500 k, 800 k, 1 M	125 k, 250 k, 500 k
Terminator Resistor	Jumper or Switch for 120 Ω terminator resistor	Jumper or Switch for 120 Ω terminator resistor
Node ID	CAN-2000C series: 1 ~ 99 selected by rotary switch CAN-8x23 series: 1~127 selected by rotary switch	0~63 selected by rotary switch
Protocol	CANopen CiA 301 ver4.02, CiA 401 ver2.1	Volume I, Release 2.0 & Volume II, Release 2.0, Errata 5
No. of PDOs	10 Rx, 10 Tx (support dynamic PDO)	-
PDO Mode	Event Triggered, Remotely requested, Cyclic and acyclic SYNC	-
Error Control	Node Guarding protocol and Heartbeat Producer protocol	-
Emergency Message	Yes	-
DeviceNet subscribe	-	Group 2 Only Server
Explicit Connection	-	Yes
Polled I/O Connection	-	Yes
Bit-Strobe I/O Connection	-	Yes
Heartbeat message	Yes	Yes
Shutdown message	-	Yes

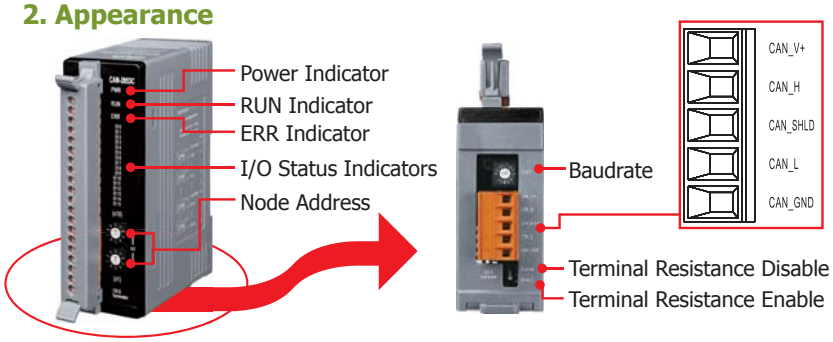
Hardware :

1. Installation

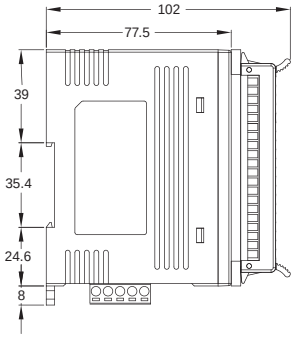


DIN-Rail Mounting

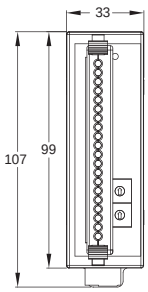
2. Appearance



3. Dimensions (Units: mm)

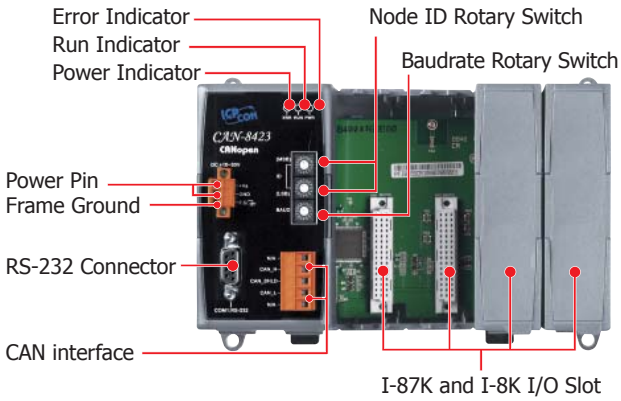


Left View



Front View

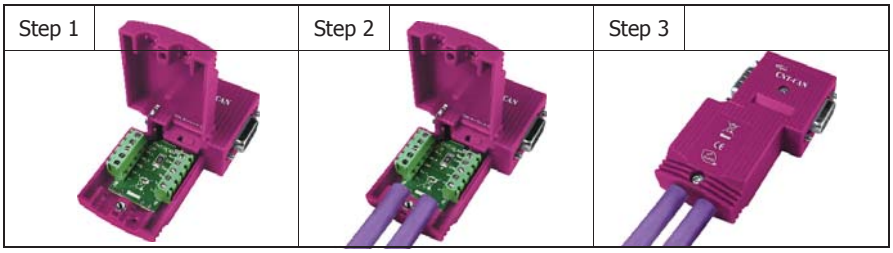
CAN-8423



4. Optional Accessory



Optional CAN Bus connector: CNT-CAN



Installation

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10.1 Analog Input Modules

RTD Introduction ▸▸▸

Resistance Temperature Detectors (RTD), as the name implies, are sensors used to measure temperature by correlating the resistance of the RTD element with temperature. Most RTD elements consist of a length of fine coiled wire wrapped around a ceramic or glass core. The element is usually quite fragile, so it is often placed inside a sheathed probe to protect it. The RTD element is made from a pure material whose resistance at various temperatures has been documented. RTDs are also relatively immune to electrical noise and therefore well suited for temperature measurement in industrial environments, especially around motors, generators and other high voltage equipments.



Thermocouple Introduction ▸▸▸

A thermocouple is a temperature sensor which consists of two wires of different conductors.
Based on the Seebeck effect in thermoelectricity, the temperature difference results voltage difference on the two wires.
Thermocouples are widely used in scientific and industrial applications because they're generally accurate and can operate over wide range of temperature.

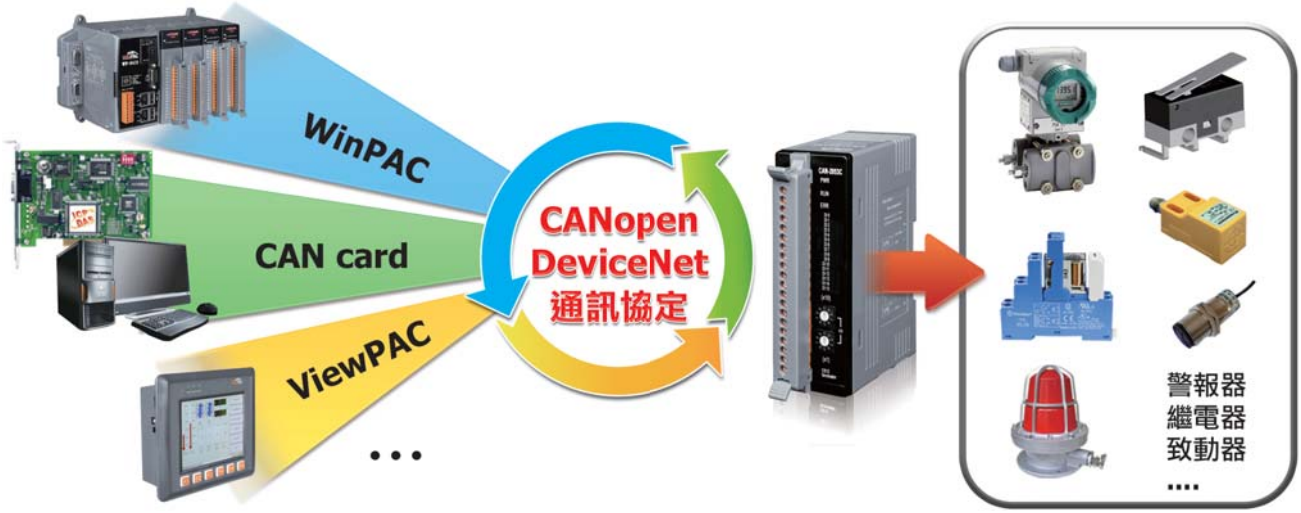


Model Name	CANopen	CAN-2015C	CAN-2017C	CAN-2018C	CAN-2019C
	DeviceNet	Available soon CAN-2015D	CAN-2017D	CAN-2018D	Available soon CAN-2019D
Pictures		8-Ch RTD Input Module	8-Ch AI Module	8-Ch Thermocouple Input Module	10-ch Universal AI Module
					
AI					
Channels		8	8	8	10
Wiring		2/3 wire	Differential	Differential	Differential
Individual Channel		Yes	Yes	Yes	Yes
Sensor Type		**RTD** (Pt100, Pt1000, Ni120, Cu100, Cu1000, JPT100)	-	**Thermocouple** (J, K, T, E. R. S, B, N, C)	**Thermocouple** (J, K, T, E, R, S, B, N, C)
Voltage Input Range		-	±10 V , ±5 V , ±1 V ±500 mV , ±150 mV	±2.5 V , ±1 V , ±500 mV ±100 mV , ±50 mV , ±15 mV	±10 V , ±5V , ±2.5 V ±1 V , ±500 mV , ±100 mV ±50 mV , ±15 mV
Current Input Range		-	±20 mA (Required External 125Ω Resistor)	±20 mA (Required External 125Ω Resistor)	±20 mA (Required External 125Ω Resistor)
Resolution		16-bit	16-bit	16-bit	16-bit
Sampling Rate		10 Hz	10 Hz	10 Hz	10 Hz
Accuracy		±0.05 % of FSR	±0.1 % of FSR	±0.1 % of FSR	±0.1 % of FSR
Zero Drift		±0.5 μV/ °C	±10 μV/ °C	±10 μV/ °C	±10 μV/ °C
Span Drift		±20 μV/ °C	±25 μV/ °C	±25 μV/ °C	±25 μV/ °C
Overvoltage Protection		120 VDC / 110 VAC	240 Vrms	240 Vrms	240 Vrms
Input Impedance		20 MΩ	2 MΩ	400 kΩ	400 kΩ
Common Mode Rejection		150 dB	86 dB	86 dB	86 dB
Normal Mode Rejection		100 dB	100 dB	100 dB	100 dB
System					
ESD Protection		4 kV Contact for each channel			
Isolation		3000 VDC for DC-to-DC, 3000 Vrms for bus-to-logic			
Watchdog		Yes			
Power					
Input range		Unregulated +10 ~ +30 VDC			
Power Consumption		1.5 W	2 W	1.5 W	1.5 W
Mechanism					
Installation		DIN-Rail			
Dimensions (W x L x H)		33 mm x 107 mm x 102 mm			33 mm x 99 mm x 78 mm
Environment					
Operating Temperature		-25 ~ +75°C			
Storage Temperature		-30 ~ +80°C			
Relative Humidity		10 ~ 90% RH, Non-condensing			

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10.2 Analog Output Modules

All of the CAN-2000 modules provide the EDS files for the standard CANopen and DeviceNet master. The analog output has various output ranges, i.e., ±10 V, ±5 V, 0~20 mA, etc. Each channel can be individually configured to the same or different output range. It is very convenient for applying the CAN-2000 modules into the CANopen and DeviceNet network.



Models	CANopen	CAN-2024C	CAN-2026C	Available Soon CAN-2028C
	DeviceNet	CAN-2024D	Available Soon CAN-2026D	Available Soon CAN-2028D
Pictures		4-Ch AO Module	2-Ch AO, 6-Ch AI,1-Ch DO and 2-Ch DI Module	8-Ch AO Module
				
AI				
AO Channels		4	6	8
Wiring		Bipolar/Unipolar	Bipolar/Unipolar	Unipolar
Voltage Output Range		0 ~ +5 V ±5 V 0 ~ +10 V ±10 V	0 ~ +5 V ±5 V 0 ~ +10 V ±10 V	-
Current Output Range		0 ~ 20 mA +4 ~ 20 mA	-	0 ~ 20 mA +4 ~ 20 mA
Resolution		14-bit	12-bit	12-bit
Accuracy		Voltage : ±0.1 % of FSR Current : ±0.2 % of FSR	±0.1 % of FSR	±0.2 % of FSR
Output Capacity		Voltage : 10 V @ 5 mA Current : External +24 V : 1050 Ω	10 V @ 20 mA	External +24 V : 1050 Ω
Power on Value		Yes	Yes	Yes
Safe Value		Yes	Yes	Yes
System				
ESD Protection		4 kV Contact for each channel		
Isolation		3000 V_{DC} for DC-to-DC, 3000 V_{rms} for bus-to-logic		
Watchdog		Yes		
Power				
Input range		Unregulated +10 ~ +30 V_{DC}		
Power Consumption		1.5 W	1.8 W	1.4 W
Mechanism				
Installation		DIN-Rail		
Dimensions (W x L x H)		33 mm x 107 mm x 102 mm		
Environment				
Operating Temperature		-25 ~ +75°C		
Storage Temperature		-30 ~ +80°C		
Relative Humidity		10 ~ 90% RH, Non-condensing		

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10.3 Digital I/O Modules

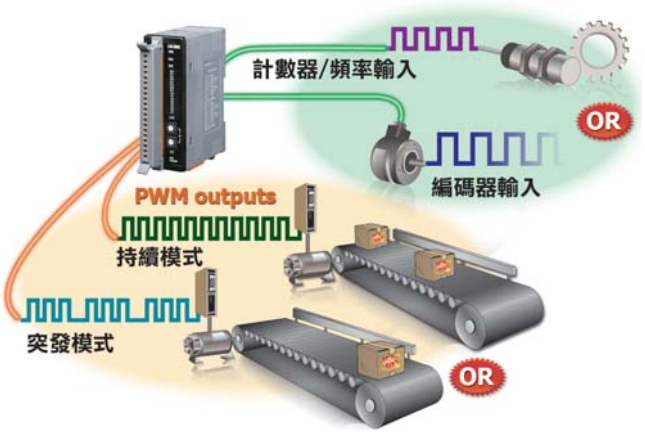
PWM Introduction

PWM (Pulse width modulation) is a powerful technique for controlling analog circuits. It uses digital outputs to generate a waveform with variant duty cycle and frequency to control analog circuits. CAN-2088C and CAN-2088D have 8 PWM output channels and 8 digital inputs. It can be used to implement powerful and cost effective analog control systems.

PWM Features

- Automatic generation of PWM outputs by hardware,without software intervention.
- Software and hardware trigger mode for PWM output
- Individual and synchronous PWM output
- Burst mode PWM operation for standby
- DI channel can be configured as simple digital input channel or hardware trigger source of the PWM output

Applications



Models	CANopen	CAN-2053C	CAN-2054C	CAN-2055C	CAN-2057C	CAN-2060C New	CAN-2088C	CAN-2084C New
	DeviceNet	CAN-2053D	CAN-2054D	CAN-2055D Available Soon	CAN-2057D	CAN-2060D Available Soon	CAN-2088D	CAN-2084D Available Soon
Pictures		16-Ch DI Module	8-Ch DI, 8-Ch DO Module	8-Ch DI, 8-Ch DO Module	16-Ch DO Module	4-Ch DI, 4-Ch Relay Output Module	8-Ch DI, 8-Ch PWM Output Module	4 or 8 channel Counter/ Frequency/ Encoder Module
								
DI								
Channels		16	8			4	8	4/8
Isolation Voltage		3750 Vrms				3750 Vrms	2500 Vrms	1000 Vrms
Contact		Wet				Wet/Dry	Wet	Counter & Frequency
Sink/Source (NPN/PNP)		Sink/Source			-	Sink/Source		
ON Voltage Level		+3.5 ~ +30 VDC				+10 ~ +50 VDC	+5.5 ~ 30 VDC	+4.5 VDC ~ +10 VDC
OFF Voltage Level		+1 VDC Max.				+4 VDC Max.	+3 VDC Max.	+1 VDC Max.
Counter		-				10 kHz	500 kHz Max.	250 kHz Max.
DO								
Channels		-	8	8	16	4	8	-
Isolation Voltage			3750 Vrms	3750 Vrms	3750 Vrms	3750 Vrms	2500 Vrms	-
Type			Open Collector	Open Collector	Open Collector	Form A	PWM, TTL	-
Sink/Source (NPN/PNP)			Sink	Source	Sink	Sink	Sink	-
Load Voltage			+5 ~ +30 VDC	+5 ~ +30 VDC	+5 ~ +30 VDC	+5 ~ +30 VDC	+3.5 ~ +5 VDC	-
Max. Load Current			700 mA/channel	700 mA/channel	100 mA/channel	5A/channel	10 mA/Channel	-
Power on Value			Yes	Yes	Yes	Yes	-	-
Safe Value			Yes	Yes	Yes	Yes	-	-
System								
ESD Protection		4 kV Contact for each channel						4 kV (Contact for each channel)
Isolation		3000 VDC for DC-to-DC, 2500 Vrms for bus-to-logic						
Watchdog		Yes						
Power								
Input range		Unregulated +10 ~ +30 VDC						
Power Consumption		1.5 W	1.5 W	1.7 W	1.5 W	1.5 W	2 W	
Mechanism								
Installation		DIN-Rail						
Dimensions (W x L x H)		33 mm x 107 mm x 102 mm						
Environment								
Operating Temperature		-25 ~ +75°C						
Storage Temperature		-30 ~ +80°C						
Relative Humidity		10 ~ 90% RH, Non-condensing						

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10.4 CANopen I/O Units



CAN-8123 CAN-8423

CAN-8223 CAN-8823

Features

- 80186, 80 MHz CPU
- One ISO 11898-2 High Speed CAN Port
- Hot Swap Allowed
- Auto Configuration
- Standard CANopen LED Indicator
- Rotary Switch For Baud Rate and Node ID
- CANopen DS 301 Ver 4.02 Specification
- CANopen DS 401 Ver 2.1 Specification
- 1/2/4/8 I/O Slots for I-87K and I-8K Series Modules

Specifications

Models	CAN-8123	CAN-8223	CAN-8423	CAN-8823
CAN Interface				
Controller	NXP SJA1000T with 16 MHz clock			
Transceiver	NXP 82C250			
Connector	5-pin screwed terminal block (GND, CAN_L, CAN_SHLD, CAN_H, V+)		5-pin screwed terminal block (N/A, CAN_L, CAN_SHLD, CAN_H, N/A)	9-pin screwed terminal block (N/A, CAN_L, CAN_SHLD, CAN_H, N/A)
Node ID	1~127 (By rotary switch)			
Baud Rate (bps)	10 k, 20 k, 50 k, 125 k, 250 k, 500 k, 800 k, 1 M (By rotary switch)			
Transmission Distance (m)	Depend on baud rate (for example, max. 1000 m at 50 kbps)			
Isolation	1000 VDC for DC-to-DC, 2500 Vrms for photo-couple			
Terminator Resistor	Jumper for 120 Ω terminator resistor			
Specification	ISO 11898-2, CAN 2.0A and CAN 2.0B			
Protocol	CANopen CiA 301 ver4.02, CiA 401 ver2.1			
I/O Expansion Slot				
Hot Swap	Only for I-87K modules			
Auto Configuration	Yes			
Support Module Type	High profile I-87K module, low profile I-87K module and I-8K module			High profile I-8K and I-87K module
Slots Numbers	1	2	4	8
Mechanism				
Dimensions (W x L x H)	64 mm x 119 mm x 91 mm	95 mm x 132 mm x 91 mm	188 mm x 132 mm x 91 mm	312 mm x 132 mm x 91 mm
Installation	DIN-Rail Mounting	DIN-Rail or Wall Mounting		
Environmental				
Operating Temperature	-25 ~ +75°C			
Storage Temperature	-30 ~ +80°C			
Humidity	10 ~ 90% RH (Non-condensing)			
Power				
Input Range	20 W unregulated +10 ~ +30 VDC			
Reverse Polarity Protection	Yes			
Frame Ground	No		Yes	
Consumption	1 W	2 W	2.5 W	3 W
Power Board Driving	20 W			

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10.5 DeviceNet I/O Units



Features

- 80186, 80 MHz CPU
- One ISO 11898-2 High Speed CAN Port
- Hot Swap Allowed
- Auto Configuration
- Standard DeviceNet LED Indicator
- Rotary Switch For Baudrate and Node ID
- DeviceNet Volume I Ver 2.0, Volume II Ver 2.0
- Predefined Master/Slave Connection Set
- 1/2/4/8 I/O Slots for I-87K and I-8K Series Modules

Specifications

Models	CAN-8124	CAN-8224	CAN-8424	CAN-8824
CAN Interface				
Controller	NXP SJA1000T with 16 MHz clock			
Transceiver	NXP 82C250			
Connector	5-pin screwed terminal block (GND, CAN_L, CAN_SHLD, CAN_H, V+)		5-pin screwed terminal block (N/A, CAN_L, CAN_SHLD, CAN_H, N/A)	9-pin screwed terminal block (N/A, CAN_L, CAN_SHLD, CAN_H, N/A)
Node ID	1~63 (By rotary switch)			
Baud Rate (bps)	125 k, 250 k, 500 k (By rotary switch)			
Transmission Distance (m)	Depend on baud rate (for example, max. 500 m at 125 kbps)			
Isolation	1000 VDC for DC-to-DC, 2500 Vrms for photo-couple			
Terminator Resistor	Jumper for 120 Ω terminator resistor			
Specification	ISO 11898-2, CAN 2.0A and CAN 2.0B			
Protocol	DeviceNet Volume I ver2.0, Volume II ver2.0 Predefined Master/Slave Connection set			
I/O Expansion Slot				
Hot Swap	Only for I-87K modules			
Auto Configuration	Yes			
Support Module Type	High profile I-87K module, low profile I-87K module and I-8K module			High profile I-8K and I-87K module
Slots Numbers	1	2	4	8
Mechanism				
Dimensions (W x L x H)	64 mm x 119 mm x 91 mm	95 mm x 132 mm x 91 mm	188 mm x 132 mm x 91 mm	312 mm x 132 mm x 91 mm
Installation	DIN-Rail Mounting	DIN-Rail or Wall Mounting		
Environmental				
Operating Temperature	-25 ~ +75°C			
Storage Temperature	-30 ~ +80°C			
Humidity	10 ~ 90% RH (Non-condensing)			
Power				
Input Range	Unregulated +10 ~ +30 VDC			
Reverse Polarity Protection	Yes			
Frame Ground	No		Yes	
Consumption	1.7 W	2 W	2.5 W	3 W
Power Board Driving	20 W			

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10.6 I/O Module Support List of CAN-8000 Units

Type	I-8K Series I/O	I-87K Series I/O	Type	I-8K Series I/O	I-87K Series I/O
	High Profile	High Profile		High Profile	High Profile
AI module	I-8017HW	I-87005W	DI module	I-8040W	I-87040W
	I-8017HS	I-87013W		I-8040PW	I-87040PW
		I-87015W		I-8046W	I-87046W
		I-87015PW		I-8048W	I-87051W
		I-87016W		I-8051W	I-87052W
		I-87017W		I-8052W	I-87053W
		I-87017W-A5		I-8053W	I-87053PW
		I-87017W-RMS		I-8053PW	I-87053W-A5
		I-87017DW		I-8058W	I-87053W-AC1
		I-87017ZW			I-87053W-E5
		I-87017RW			I-87058W
		I-87017RCW			I-87059W
		I-87018W			
		I-87018PW	AO module	I-8024W	I-87024W
		I-87018RW			I-87024DW
		I-87018ZW			I-87024UW
		I-87019RW			I-87028UW
		I-87019PW			I-87028VW
		I-87019ZW			I-87028VW-20V
DO module	I-8037W	I-87037W			
	I-8041W	I-87041W	DI & DO module	I-8042W	I-87054W
	I-8041AW	I-87057W		I-8050W	I-87055W
	I-8056W	I-87061W		I-8054W	I-87063W
	I-8057W	I-87064W		I-8055W	
	I-8060W	I-87065W		I-8063W	
	I-8064W	I-87066W	Counter module	I-8084W	
	I-8068W	I-87068W	PWM module	I-8088W	
	I-8069W	I-87069W			

Note: CAN-8823 and CAN-8824 only support high profile I-8K and I-87K modules.

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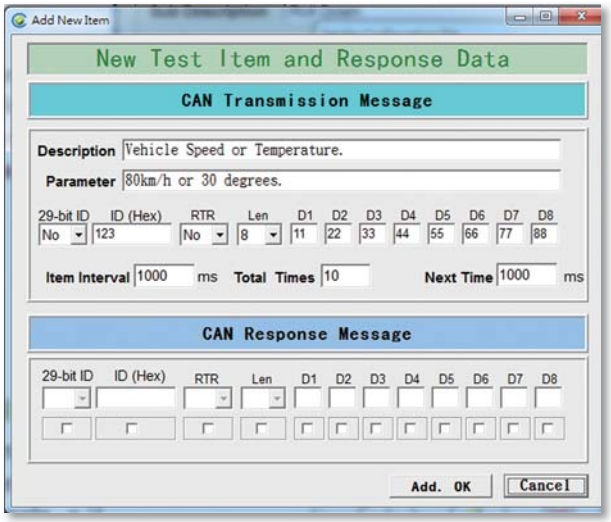
11. CANcheck

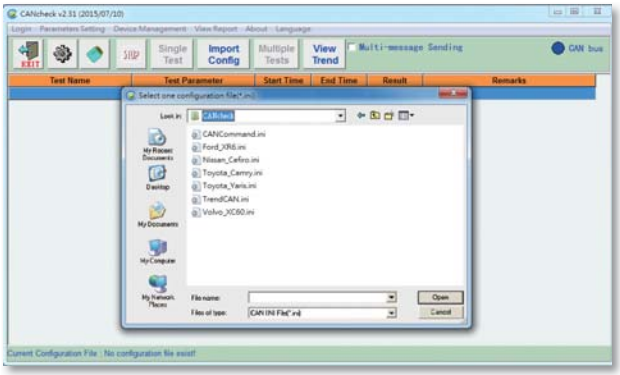
CANcheck – the software is developed by ICP DAS for CAN device detection and diagnosis. It is consisted of seven parts.



• CAN Message Modeling

Users can model the vehicle CAN protocol or other special CAN protocol, set to the CANcheck software, the software will be able to follow the CAN command set and command transfer cycle. Users could provide the meaningful description for each CAN command. This helps to manage and identify all the complex CAN commands.



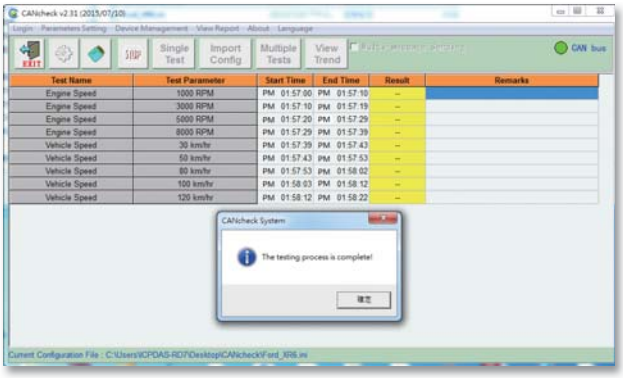


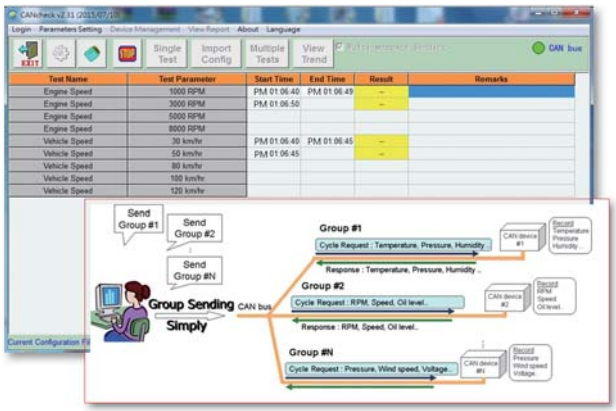
• CAN Message Management

Different CAN message sets can be stored in different configuration files. The user can easily pipe different configuration files for different test cases. For example, a car factory can store several different cars' data in different configuration files, and then call the corresponding one as needed to test each car.

• CAN Message Verification

Different CAN instruments have different command sets; correspondingly, the return messages also differ. CANcheck can be used to perform verification of expected return messages – an easy way of error-checking operations. This feature does away with manual log-checking, and with it human error and tedium.





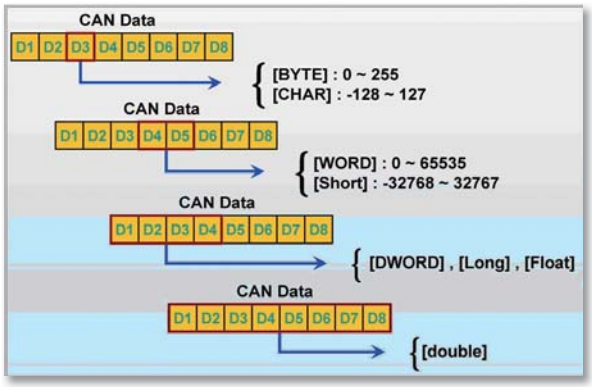
• CAN Message Group

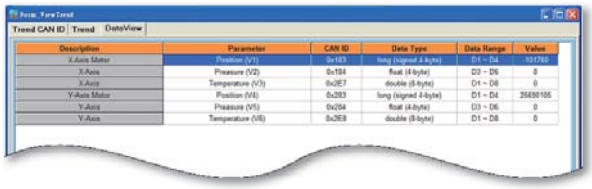
In most of CAN applications, the CAN master sometimes iteratively polls entire remote devices with the sequential CAN commands. In the multi-message sending mode, CAN messages will be divided into groups according to CAN-ID. In single group, the CAN commands will be sent sequentially at specific time interval. Every group could work individually at the same time. It will simplify the CAN application projects and help to manage CAN devices more efficiently.

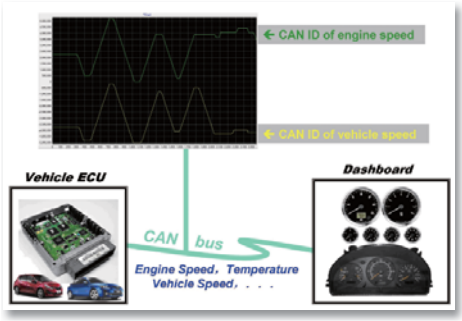
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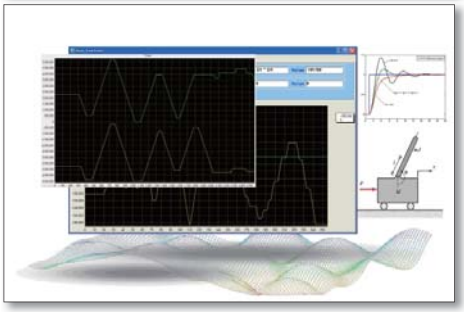
• CAN Data Conversion

The CANcheck software provides the functionality of implementing the conversion of the CAN data. The CAN data of the specific CAN ID could be converted to the value of "long" type, "float" type and etc. When receiving the specific CAN messages, the CAN data will be converted to the specific data type and data value quickly and automatically. The users could focus on those converted value and need not to convert for each raw data manually. This conversion will help the users to deal with the huge raw data more friendly.



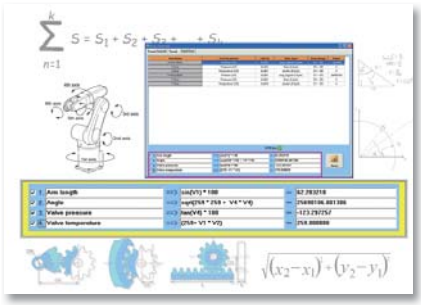






• Trend Chart Functionality

The CAN messages transmitted on the CAN Bus always contains much important information. One part of the information is used to control the system by the host controller, and the other which may not be used by the host controller is interested during the trial run. The CANcheck offers the visualization tool, the trend chart, to monitor the information. It can transfer the raw CAN data into the meaningful and physical information, such as engine speed, vehicle speed and fuel consumption, and show these on the trend chart. Without any modification of the host controller, users can obtain the details change of the system easy and quickly.



• Real-Time Mathematic Functions

In some applications, the meaningful information must be obtained via a serious of complex mathematical calculation from the raw CAN messages. The CANcheck allows users to arrange up to 4 groups of the mathematical formulas which will transfer the raw data to the useful information instantly while the CAN messages are received. Combined with the trend chart, it is a very useful and helpful toolkit for monitoring or debugging the systems.

The detailed features are:

(1) No need to write any programs. The graphical interface is ready-made and easy to operate.
(2) Limited to neither the vehicle nor instrument brand; it's interoperable.
(3) The CAN communication protocol settings file protects against security leaks, ensuring safe operation.
(4) Can set the returned CAN discrimination, eliminating the hassle of wading through logs and manually interpreting results.
(5) Can be used to operate and diagnose lights, windows, dashboard or other vehicular electronic systems and components.
(6) Supports CAN 2.0A and CAN 2.0B specifications.
(7) The test command planning interface to set the test command, the transfer cycle, detecting the reply command and users' description.
(8) Can store commands to the specific file.
(9) Supports both the single- and multi-function tests. In multi-function testing, the software provide multi-message sending option.
(10) Provides time stamps for the beginning and end of each test.
(11) Displays real-time CAN status
(12) Provides the data conversion from the received CAN messages automatically.
(13) Supports two trends to display the real-time waveform which comes from the CAN messages.
(14) Provides four free-edited mathematic functions to transfer the raw data instantly and automatically.
(15) Provides English, Traditional Chinese and Simple Chinese interfaces.

Supported OS: Windows XP, 7, Windows 10
Supported CAN board, converter: PISO-CAN200U, PISO-CAN400U, PISO-CAN-800U, PEX-CAN200i, PCM-CAN200, I-7530, I-7530-FT, I-7530A, I-7530A-MR, I-7540D, I-7540D-MTCP, I-7565, I-7565-H1, I-7565-H2

Ordering Information ▸▸▸

CANcheck	Software for CAN device detection and diagnosis, USB keypro included.

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12. VxCAN Utility

The VxCAN Utility, a configuration, diagnostic and test software tool, is designed to unleash the power of all CAN products of ICP DAS. It is based on the Virtual CAN technique which creates the virtual CAN ports to match the physical CAN interfaces of the installed products.



By means of the VxCAN Utility, it is not necessary to adapt the various utilities or software interface due to the different CAN products. Users just need to focus on the project development and network diagnosis without concerning about what CAN product the system uses.
In order to satisfy in various applications, the VxCAN



Utility provides not only the functions of sending and receiving CAN messages, but the functions for message trigger, group transmission and data record. Users can set some trigger conditions in the VxCAN Utility. If these conditions are reached, it will activate the specific messages, such as stopping the message reception, starting the data log or sending some specific messages. The group transmission function allows users to arrange a group of messages. Users can arrange the CAN messages in advance which must be sent sequentially, and send the group by manual trigger or some specific rules. It is useful when users would like to control or configure the slave devices for testing. The reception messages of the VxCAN Utility are able to be saved in the file after enabling the function of message record. This can help users to know what happen in the system network clearly so that the system problems would be fixed more efficiently and simply.

• Features

Integrates all CAN converters in the utility.

- Searches all supported CAN products installed in the system automatically
- Provides the basic functions to send and receive CAN messages
- Allows sending a predefined group of CAN messages
- Provides CAN ID filter to sieve out the CAN messages which are not interested
- Supports the configuration of the trigger event for starting transmission, stop reception orrecording the messages
- Presents the CAN Bus loading by the trend
- Shows the status of the corresponding CAN controller of the CAN product
- CAN Message log functions

• Applications

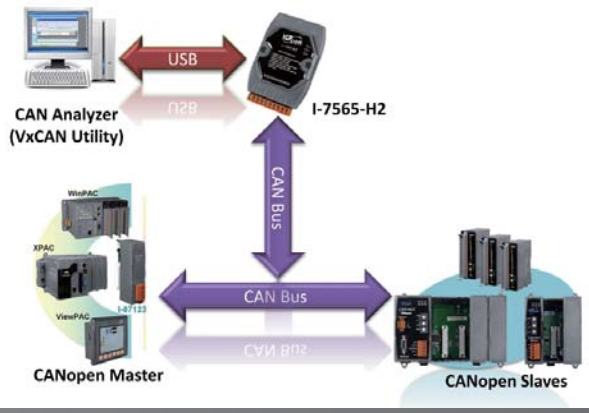
Works as a CAN Master:

The VxCAN Utility provides basic sending and receiving functions. Through these functions, the CAN product, for example the I-7530, can work as a CAN master to control the CAN slave device as the following figure. Users just need to use the VxCAN Utility to send the corresponding commands of the CAN slave devices, the responses from the slave devices are shown in the reception list of the utility. If there are several commands needed to be sent sequentially, users can use the Group Send function with predefined delay time to access the slave devices.



Works as a CAN Analyzer:

The VxCAN Utility could be a compact analyzer. When users would like to diagnostic the CAN network, the VxCAN Utility provides several useful functions, such as event trigger, data log and Bus loading trend. The event trigger can used to trigger the message transmission, data log or stop of messages reception. Users just need to use a CAN product such as I-7565-H2, the utility would be helpful users to monitor the communication of the network, access the CAN nodes, or diagnose the CAN Bus loading.



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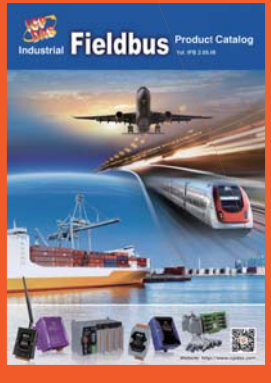
Energy Management Solution

- InduSoft SCADA Software
- Smart Power Meter Concentrator
- Smart Power Meter
- True RMS Input Module
- TouchPAD Devices - VPD Series



IIoT Product

- IoTstar : cloud management software
- UA-5200 : communication server
- WISE series : IIoT host
- iCAM series : IP camera
- MQ-7200M series : MQTT I/O module
- Sensors : temperature, humidity, CO2, PM2.5,...



Industrial Fieldbus

- RS-485
- Industrial Ethernet
- Profinet
- CAN bus
- CANopen
- Devicenet
- J1939
- PROFIBUS
- HART
- Ethernet/IP
- BACnet



IIoT Cloud Solution - UA SERIES : IIoT Communication Server

- Built-in OPC UA Server Service
- Built-in MQTT Broker Service
- Support Logic Control IFTTT
- Support IoT Cloud Platforms Connection and IoTstar Cloud Management
- IIoT Factory Application of MES
- Pumping Station IoT Application
- BA Smart Building IoT Application
- Robotic Arm Co-operation Application



Machine Automation

- Motionnet Solutions
- EtherCAT Motion Control Solutions
- Ethernet Motion Control Solutions
- Serial Communication Motion Control Solutions
- PC-based Motion Control Cards
- PAC Solutions - Motion Modules



Smart Building, Smart Home Automation

- Video Intercom & Access Control
- Touch HMI - TouchPAD Series
- Smart Lighting Control
- Energy Saving - PM/PMC Series
- Environmental - DL/CL Series
- Motion Detector - PIR Series
- Wi-Fi Wireless - WF Series
- Infrared Wireless - IR Series
- ZigBee Wireless - ZT Series
- IIoT Server & Concentrator
- LED Display - iKAN Series



TouchPAD HMI Solutions

- Introduction
- TPD/VPD Products Series
- Video Intercom & Access Control Series
- TPD/VPD Application



PC-based I/O Boards

- PCI Express Bus Data Acquisition Boards
- PCI Bus Data Acquisition Boards
- ISA Bus Data Acquisition Boards

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