

ADAM-4525

Isolated RS-232 to CAN Converter

Introduction

Most industrial computer systems come with standard RS-232 serial ports. Though widely accepted, RS-232 has limited transmission speed and networking capabilities. CAN (Controller Area Network) is a serial bus system with multi-master and real-time capability. It is a cost effective fieldbus for device networking in manufacturing plants. The ADAM-4525 isolated converter lets you take advantage of CAN on systems equipped with RS-232. It transparently converts signals between your PC and a CAN network. The ADAM-4525 lets you easily build a real-time communication system with standard PC hardware.

Controller Area Network

CAN (Controller Area Network) is a serial bus system especially suited for networking "intelligent" I/O devices as well as sensors and actuators within a machine or plant. Characterized by its multi-master protocol, real-time capability, error correction, high noise immunity, and the existence of many different silicon components, the CAN serial bus system, originally developed by Bosch for use in automobiles, is increasingly being used in industrial automation.

Built-in Intelligence

ADAM-4525 is equipped with a built-in microprocessor, which uses one UART/CAN controller and automatically processes data before transmitting it to the RS-232 connected device. This enables ADAM-4525 to utilize different baud rates between the RS-232 and the CAN network. The microprocessor also handles the setting of communication rates for both RS-232 and CAN.

Features

- Built-in microprocessor
- Software configurable communication speeds for both RS-232 and CAN
- Expands the usable applications for CAN-Bus systems
- Allows operation at higher speeds for specific distances
- Allows speeds up to 1 Mbps for CAN and 9600-115.2 Kbps for RS-232
- Speeds set independently; different speeds allowed for CAN and RS-232
- Network communication distances up to 1000m
- Reserved space for terminal resistors
- Power and data flow indicator for trouble shooting
- Power requirement : +10 to +30 V_{DC}
- Mounts easily on DIN-rail or panel
- Supports CAN 2.0A

Specifications

• Power requirement

Unregulated +10 to +30 V_{DC} with protection from power reversals

• Case: ABS with captive mounting

• Accessories (Supplied):

ABS_769 DIN-rail Mounting Adapter
SECC Panel Mounting Bracket

• Plug-in screw terminal wiring:

Accepts AWG 1-#12 to #22 (0.5 to 2.5mm²) wires

• Buffer size: 20 K (on CAN side)

• Software filter: six bytes

• Hardware filter: four bytes

• Address selection:

• Bus connection:

RS-232: Male DB-9 connector

CAN-bus: 5-contact plug (female) 2.5/5-ST-5.08/AU (included)

• Status indicators:

Module Status: green/red bi-color LED

Network Status: green/red bi-color LED

• Maximum power:

Voltage: +10 to 30 V_{DC}

Power consumption: 2 W

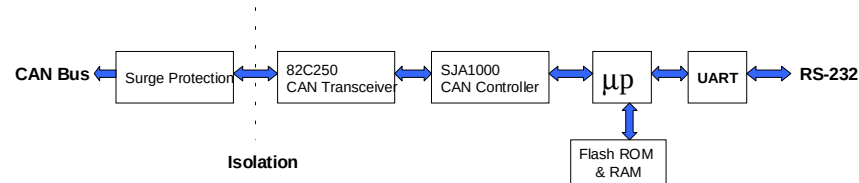
• Isolation voltage: 3000 V_{DC}

• Operating Temperature:

-10°C to 70 °C (14°F to 158°F)

• Dimensions: 60mm x 120mm (2.36" x 4.41")

Function Diagram



Installation

Initial inspection

We carefully inspect all ADAM-4525 modules both mechanically and electrically before shipping. They should be free of marks and scratches and in perfect order on receipt.

As you unpack the modules, check them for signs of shipping damage (i.e., damaged box, scratches, dents, etc.) If the module is damaged or fails to meet our specifications, notify our service department or your local sales representative immediately and retain the shipping carton and packing material for inspection by the carrier. We will then make arrangements to repair or replace the unit.

Power Supply

For ease of use in industrial environments, ADAM modules are designed to accept industry standard +24 V_{DC} power. Operation is guaranteed when using any power supply between +10 and +30V_{DC}. Power ripples must be limited to 5 V peak to peak, and the voltage in all cases must be maintained between +10 and +30 V_{DC}. All power supply specifications are referenced at the module connector.

The power cables should be selected according to the number of modules connected and the length of the power lines. When making a long power cable connection, we advise the use of thicker wire to limit the line voltage drop. In addition to serious voltage drops, long power lines can also cause interference with communication wires.

We advise that the following standard colors (as indicated on the modules) be used for power lines:

+Vs $\longleftrightarrow$ (R) Red
GND $\longleftrightarrow$ (B) Black

Software Configuration

The ADAM-4525 comes with a utility disk containing software with the following capabilities:

- CAN configuration: Baud rate and base address configuration
- RS-232 configuration: Baud rate configuration
- CAN transmission monitoring
- Terminal emulation

Note: Before configuring an ADAM-4525, make sure it is connected to your host through an RS-232 line.

The main screen in the utility configuration software consists of a menu bar at the top and a status field which displays information about the connected modules. When you first start the program, it automatically scans for any connected modules and displays their data. The status field lists module characteristics and configuration parameters.

Utility Installation

Each ADAM-4525 unit comes with a utility disk containing the utility installation software (setup.exe). The user should run setup.exe in the utility disk before working with the utility software.

Initial

Local Initialization

This function provides a direct way to :

1. Loop-back: This function can be used as a diagnostic test for the ADAM-4525.
2. Transfer: This function enables ADAM-4525 to convert signals between an RS-232 device and a CAN network.



The parameters below need to be configured for an RS-232 device.

RS-232 COM

Port: Select the port you want to configure.

RS-232 Baud

Rate: The baud rate must be coordinated with the RS-232 network. Select the appropriate rate from the list of baud rates.

Note:

The pin INIT (pin5) should be grounded while*

you power on the ADAM-4525 for <Initial> and <Configuration>.

The parameters below need to be configured for each CAN object.

Base Address: the base address (address segment) of the CAN object is normally adjusted during the installation process. The selection of the address segment needs to be the same as that of the hardware configuration.

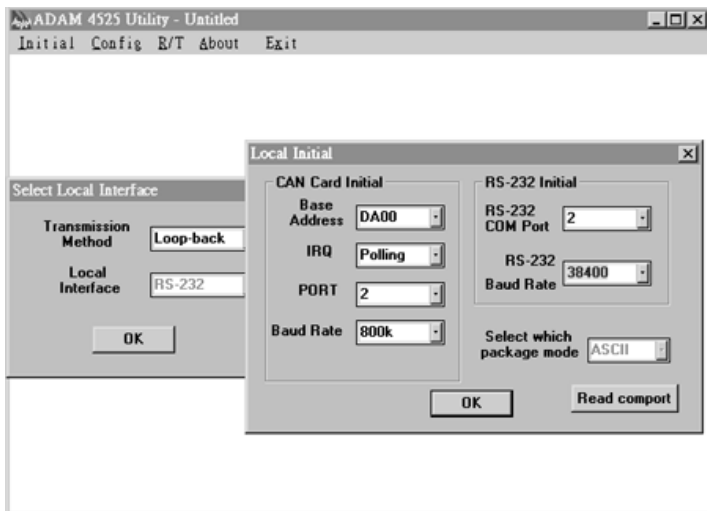
Port: Select the port you want to configure.

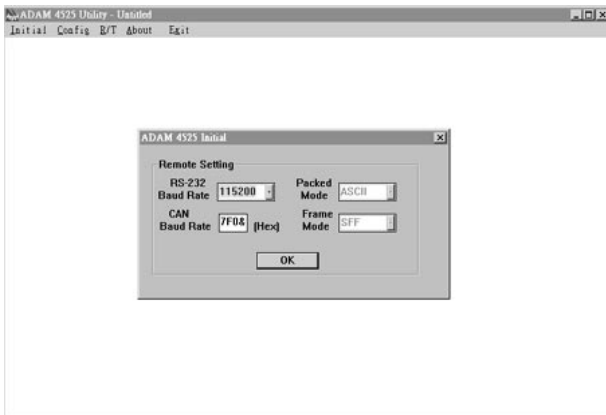
Baud Rate: The baud rate must be coordinated with the CAN network. Select the appropriate rate from the list of baud rates.

IRQ: Set the IRQ for the CAN port. A CAN port accepts values between IRQ3 and IRQ15, except 8, 13 and 14. You can also choose polling and skip setting the IRQ.

Configuration

Before you transmit signals between a CAN object and an RS-232 port, you must configure the ports and objects by selecting the <Config> menu with





the cursor keys and pressing <Enter>. The module's current functions will offer three options: remote initial, module reading, acceptance and filter.

Remote initial:

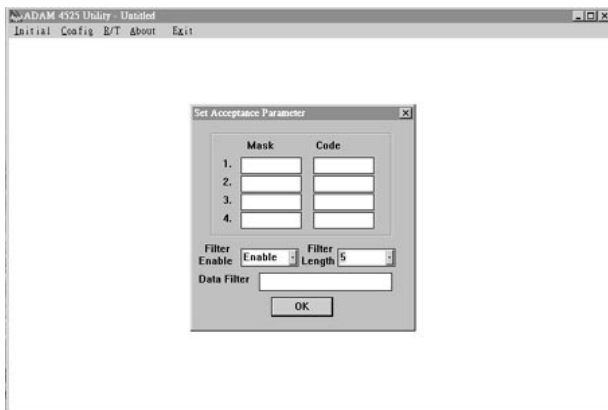
RS-232 Baud Rate: The baud rate must be coordinated with the RS-232 network. Select the appropriate rate from the list of baud rates.

CAN Baud Rate: The baud rate must be coordinated with the CAN network. Select the baud rate by HEX format.

Acceptance and Filter

The acceptance and filter screen displays the following information: acceptance code, acceptance mask, filter enable, filter length, and data filter.

Baud Rate	HEX code	Baud Rate	HEX code
10K	7F1F	200K	1603
16K	7F13	250K	1C01
20K	7F0F	320K	7F00
32K	7F09	400K	1601
40K	7F07	500K	1C00
50K	160F	666K	1800
80K	7F03	800K	1600
100K	1607	1M	1400
125K	1C03		



Acceptance code: Specifies the value of the 8 most significant bits of the identifier (D10...ID3)

Acceptance mask: Specifies the bit positions which are "relevant" for the acceptance filter.

Note: The acceptance code and acceptance mask are configured through eight digits (1 digit per bit) using 0 or 1.

Value Definition

- | | |
|---|--|
| 0 | This bit position will accept only a "relevant" message. |
| 1 | This bit position will not screen message. |

Example: Ace Code = 11111111
Ace Mask = 11111111

Filter

The filter enable configuration screen allows you to selectively enable/disable the filter function. During the normal configuration and communication process, select the disable mode. In the enable mode, you can select an appropriate filter length (1 to 6) from the list of filter lengths, and set the specific data filter. The data filter is defined as the screen of the register data in the process of transmission. A high transfer rate indicates a faster signal change for this module.

R/T (Receive and Transmission)

This function provides a direct way to:

- 1. Send data between the CAN and RS-232 networks.
- 2. Test CAN and RS-232 transmissions.

Select<terminal> from the menu bar for the following screen:

To transmit data, the ADAM-4525 must be connected to an RS-232 and a CAN network with at least one node, and configuration for the module must be complete.

First, select R&T to edit the data. Enter the object ID and data bytes as hexadecimal values. Press <Send> to begin data transmission. If the CAN converter is configured correctly and the transmission has been successfully completed, every CAN and RS-232 object will be listed in the lower part of the screen.

Note: Disconnect INIT pin from the ground pin while you power on the ADAM-4525 for <Acceptance and filter>.*

Command Set

To avoid communication conflicts when several devices try to send data at the same time, all actions are instigated by the host computer. The basic format is a command/response protocol with the host initiating the sequence.

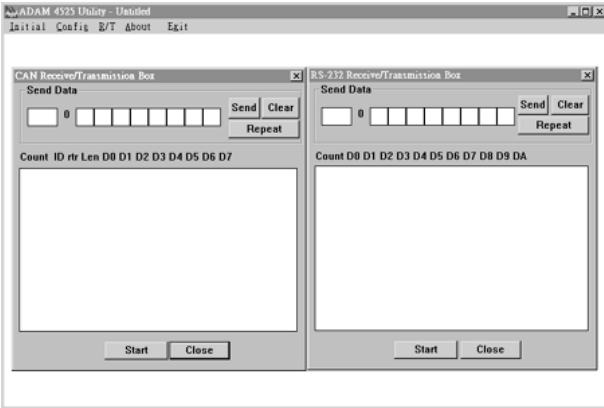
When modules are not transmitting, they are in listen mode. The host issues a command to a module with a specified address and waits a certain amount of time for the module to respond. If no response arrives, a time-out aborts the sequence and returns control to the host.

Syntax

[delimiter character][address][command][data]
[carriage return]

Every command begins with a delimiter character. The first four commands can use a dollar sign \$ or a percentage sign %, but the Data Pass command uses one of eight special characters, as described on the following page.

The delimiter character is followed by a two-character address (hexadecimal) that specifies the target module. The actual two-character



command follows the address. Depending on the command, an optional data segment follows the command string. Every command is terminated by a carriage return (cr).

Quick reference table

The following table lists the available functions and their corresponding descriptions

Command functions		
Function	Command	Description
1	#00Cbpcann	Set Configuration
2	\$00C	Read Configuration
3	#00Awxxxyzz	Set Acceptance Code
4	\$00A	Read Acceptance Code
5	#00Booppqrr	Set Acceptance Mask
6	\$00B	Read Acceptance Mask
7	\$001	Read Filter Enable/Disable

Complete Command Description

Command 1

Set Configuration

Command #00Cbpcann
Argument b : RS-232 Baud Rate A=115200bps
 9=57600bps
 8=38400bps
 7=19200bps
 6=9600bps
 p : Package Mode 0=ASCII
 1=Hex
 c : Always equal to 0
 aa : CAN Baud Rate High Byte
 nn : CAN Baud Rate Low Byte
 (refer to page 4 Table)

Response !00

Command 2

Read Configuration

Command \$00C
Response !00bpcann

LED Operation

LED status	Module status	Meaning
OFF	No power	There is no power through ADAM-4525
Green	Power On	ADAM-4525 is operating normally
Flashing Green	Module is Operating	Data flow from Network RS-232 to CAN
Flashing Red	Module is Operating	Data flow from Network CAN to RS-232

Command 3

Set Acceptance Code

Command #00Awwxxyzz
Argument ww : Acceptance Code (high byte)
 xx : Acceptance Code (mid byte)
 yy : Acceptance Code (mid byte)
 zz : Acceptance Code (low byte)
Response !00

Command 4

Read Acceptance Code

Command \$00A
Response !00wwxxyzz

Command 5

Set Acceptance Mask

Command #00Booppqrr
Argument oo : Acceptance Mask (high byte)
 pp : Acceptance Mask (mid byte)
 qq : Acceptance Mask (mid byte)
 rr : Acceptance Mask (low byte)
Response !00

Command 6

Read Acceptance Mask

Command \$00B
Response !00ooppqrr

Command 7

Set Filter Enable/Disable

Command #001st
Argument s = 0 Filter Disable
 = 1 Filter Enable
 t : Filter Length (0-6)
Response !00

Command 8

Read Filter Enable/Disable

Command \$001
Response !00st