

User Manual

IA-2216-2

16-ch Relay

RS-232 Controlled



Version 0118

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Feedback

We at Intelligent-Appliance highly value your opinion. Please feel free to contact us with your impression on any subject, or with any question or comment you may have.

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Introduction

The IA-2216-2 is an Industrial Grade, low cost, RS-232 controlled Relay Controller.

This Industrial Relay Controller is equipped with 16 SPDT relays with a contact rating of 10Amp @ 28VDC and 10Amp @ 277VAC.

The IA-2216-2-P version, controller, includes Pluggable Terminal Blocks, for quick and easy installation, and Transient Suppressors to protect the system from EMI/RFI noise and to ensure relay's long operation life time.

Both IA-2216-2 and IA-2216-P versions are 24VDC source power, operated, while an addition of “-12V” suffix defines a 12VDC operated version.

The IA-2216-2 Relay Controller is an Intelligent-Appliance, Series-3000, software compatible, supported both by LabView drivers and by Microsoft Dot.net DLL.

Its software support package includes operation utilities and open source software examples, for quick and easy system integration.

The IA-2216-2 is CE and FCC Approved, and ROHS compliant.

Features

- 16-ch SPDT Relay board
- RS-232 Controlled
- 12V or 24VDC Power Source
- Pluggable Terminals Blocks
- Transient Suppressors
- Din-Rail mounting
- CE & FCC Approved

Specifications

Relays

Channels	16
Method	SPDT Form C
Contact Rating	10Amp @ 277VAC 10Amp @ 28VDC
Operate Time	10 ms
Release Time	5 ms

Communication

COM Port	RS-232, DB9, Female
Default BR	19200, 8, n, 1
Communication Rate	1200-115200 bps

General

Power Consumption	0.3Amp @ 24VDC
(P/N) -12V version	0.6Amp @ 12VDC
Operation Temperature	0 - 60° C (32 - 140° F)
Dimensions	178 x 109 mm (7" x 4.3")
Weight	430gr

Ordering Information

24VDC Source Power devices

- **IA-2216-2:**
16-ch, SPDT, 10Amp Relay, RS-232 controlled
Interface cable, DB9, M/F, Included.
- **IA-2216-2-P:**
16-ch, SPDT, 10Amp Relay, RS-232 controlled
Transient Suppressors
Pluggable Terminal Blocks
Interface cable, DB9, M/F, Included.

12VDC Source Power devices

- **IA-2216-2-12V:**
16-ch, SPDT, 10Amp Relay, RS-232 controlled
Interface cable, DB9, M/F, Included.
- **IA-2216-2-P-12V:**
16-ch, SPDT, 10Amp Relay, RS-232 controlled
Transient Suppressors
Pluggable Terminal Blocks
Interface cable, DB9, M/F, Included.

Warning & Safety

Intelligent Appliance products are NOT authorized for use as components in life support devices or systems.

Do not operate the device in a manner not specified in the documentation. Misuse of the device may result in injury and/or damage equipment.

When wiring the device disconnect it from the power source and turn OFF all connected devices.

Not doing so may result in electric shock, injury and/or damage your equipment.

Installation

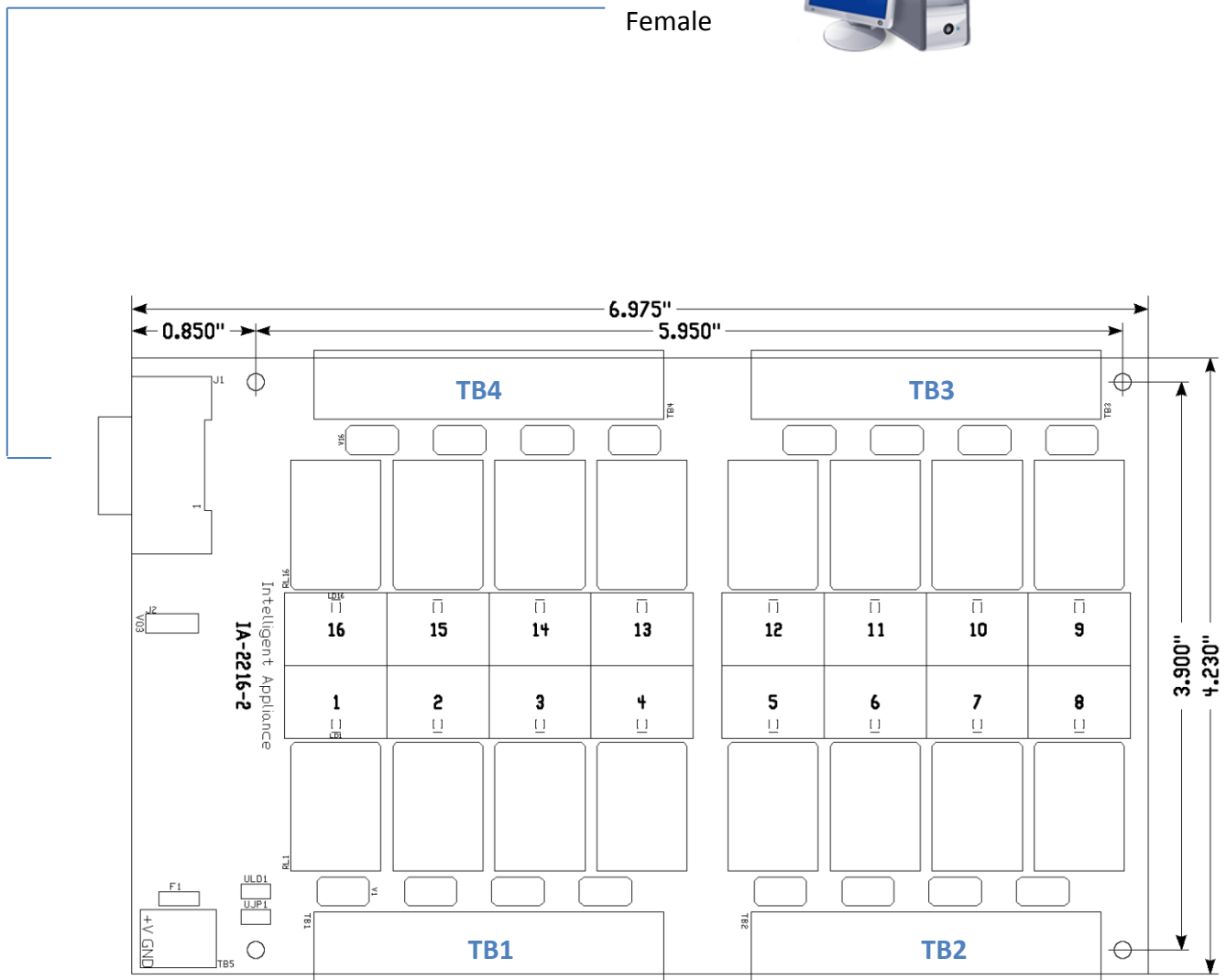
System Wiring

Host PC



DB9
Female

DB9
Male



Pin Assignment

J1 – Main Port (RS-232, DB9)

Pin	Function
#2	Tx
#3	Rx
#5	GND

TB1 to TB4 – Relay #1 to Relay #16

TB5 – Power supply input terminal

User Defined Jumpers & Led

UJP Jumper – User defined jumper

ULD Led – User defined led

Fuse Details

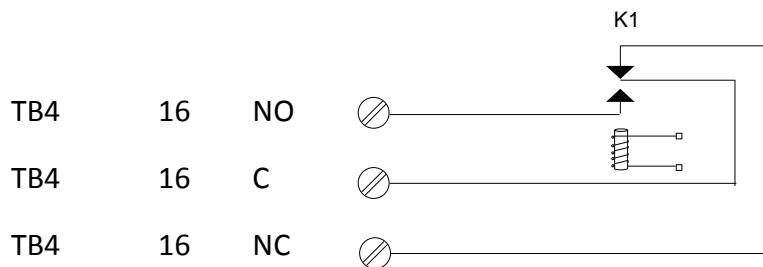
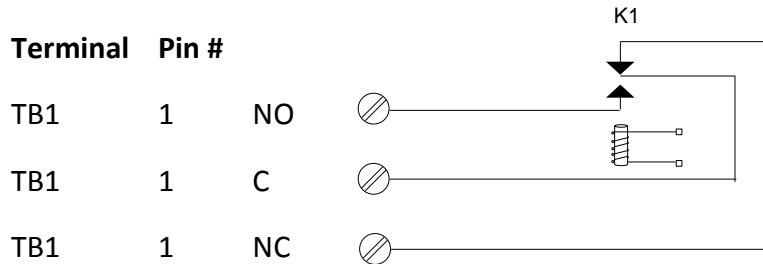
Manufacturer: LittleFuse Inc.

Part Number: 025101.5MRT1L

Description: FUSE PICO FAST 1.5A 125V AXIAL

Relay Layout

SPDT, Form C, Channels 1-16



Software Installation

Locating the new COM port

Start the 'Device Manager' utility. (Usually by selecting 'My Computer', Right Clicking the mouse button, choosing manage, Left Clicking and then double Left clicking on the Device Manager will list hardware items).

Select the '+' character to the left of the 'Ports (COM&LPT)', and you'll get a line that will define for example: 'USB Serial Port (COM4)'.

This line informs us that we should refer to COM4, in this case, in order to control the IA-2216-2 while connected to this computer through its USB port.

IA-3000 Utility

Install the IA-3000 Utility in your computer by clicking on the 'Setup icon in the 'IA-Utility' directory, on the IA-3000 CD. Or download it from our online Knowledge Base.

Handling IA-3000 Utility

1. Start the IA-3000 Utility by pressing 'Start' on the computer's main screen, select 'All Programs', and finally 'IA-3000'.
2. Select the appropriate COM
3. Select '19200' to fit into the right of the 'Baud' label (in case that the IA-2216-2 is at its default setting stage).
4. Press the 'Search' button and wait for the utility to list all chained items.
5. As soon as all items are listed, you may press the 'Stop Search' button, or you can let the software finish its search by itself.
6. Select the desired device out of the items list that appears beneath the 'Search' button.
7. Once the device is selected, its form will be shown in the right hand of the screen.
8. Left clicking the buttons will activate or dis-activate the appropriate relay.

Address Configuration



Warning

Note!

In case of operating two or more devices in a single chain,
One must make sure that each device has its own unique address!
Never install two devices, of the same address, in the same chain

Note!

All items are set to same default address ('00') while delivered

1. Start IA-3000 Utility.
2. Press Search and then Select the desired IA module.
3. Choose 'Config' at the upper left screen location.
4. Define the desired address right to the 'Address' label.
5. Update the module using the 'Update' button.
6. 'Update OK' message indicates a successful updating
(Old software versions indicate 'Fail' while successfully updating the module).
7. Check the updated address by closing the 'Configuration' screen, and running a new 'Search'.

Command Set

The following table is a quick reference table for the IA-2216-2 , A host computer / PLC may control the IA-2216-2 by simply sending ASCII commands though a standard COM port. Each command is structured from a delimiter character, modules address, command character, data if any carriage returns character. All commands must use UPPER CASE characters.

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?AA1 – GET DEVICE FIRMWARE VERSION	14
?AA2 – GET OUTPUTS STATUS.....	15
?AA50 – GET DEVICE MODE (REGISTER #50).....	16
?AAID – GET MODULE’S ID NUMBER	17
?AAS – GET USER JUMPER AND LED STATUS	18
!AA2DDDD – SET RELAY STATUS	19
!AA3DD – ACTIVATE RELAY N	20
!AA4DD – DE ACTIVATE RELAY N	21
!AA50DD – SET DEVICE MODE REGISTER #50 VALUE.....	22
!AA6DD – SET BAUD RATE.....	23
!AA7DD – SET MODULE’S ADDRESS.....	24
!AAEDDDD – SET INITIAL STATE	25
!AASDD – SET USER DEFINED LED	26
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?aa0 – Get device name

Description Request the Device model name. Can be used to identify the connected module type at the specified address.

Syntax ?aa0<CR>
? Delimiter character
aa Hexadecimal address of the device
0 Get device Model command
<CR> Carriage Return - End of command

Response _nnnn<CR> if the command was valid
_ Response delimiter
nnnn A string containing the device name
<CR> Carriage Return - end of response

Example Command: ?010<CR>
Response: _2216<CR>

Request the device at address 01Hex to send its model name.
The response indicates that the command was successful and that the device at this address is IA-2216

?aa1 – Get device firmware version

Description Request the Device version

Syntax ?aa1<CR>
? Delimiter character
aa Hexadecimal address of the device
1 Get device Version command
<CR> Carriage Return - End of command

Response _nnnn<CR> if the command was valid
_ Response delimiter
nnnn A string containing the device version
<CR> Carriage Return - end of response

Example Command: ?001<CR>
Response: _A125<CR>

Request the device at address 00 Hex to send its version.
The response indicates that the command was successful and that the device version at this address is A1.04

?aa2 – Get Outputs status

Description Read digital inputs and relays present status

Syntax ?aa2<CR>
? Delimiter character
aa Hexadecimal address of the device
2 Read I/O status
<CR> Carriage Return - End of command

Response _dddd<CR>

Examples Command: ?002<CR>
Response: _1002<CR>
Relay #13 and #2 are activated

?aa50 – Get Device mode (Register #50)

Description This command reads the module operation mode

Syntax ?aa50<CR>
? Delimiter character
aa Hexadecimal address of the device
50 System Mode command
<CR> Carriage Return - End of command

Response _dd<CR> if the command was valid
dd Mode (00-FF)
80 Enable BR change
02 Report on command errors
00 Normal
<CR> Carriage Return - End of command

Example Command: ?005<CR>
Response: _82<CR>

In this example the module operation mode enables baud rate change. It will also send error messages for invalid commands.

?aaID – Get module's ID number

Description This command reads the Device ID

Syntax ?aaID<CR>
? Delimiter character
aa Hexadecimal address of the device
ID Command for read ID
<CR> Carriage Return - End of command

Response _ID nnnnnnnn

Example Command: ?00ID<CR>
Response: _ID 00412534<CR>

In this example we read S/N of device #00

?aaS – Get User jumper and led status

Description This command reads the status of UJP (User Jumper) and ULD (User Led) status.

Syntax ?aaS<CR>
 ? Delimiter character
 aa Hexadecimal address of the device
 S Read jumper & led status
 <CR> Carriage Return - End of command

Response _dd<CR> if the command was valid
 _ Delimiter character
 dd Output digits
 A 1st Input nibble
 B 2nd Input nibble

			UJP				ULD
8	4	2	1	8	4	2	1
D7	D6	D5	D4	D3	D2	D1	D0
A				B			

ULD=1 LED is ON

UJP=1 UJP jumper is CLOSED

Example Command: ?00S<CR>
 Response: _11<CR>

In this example the LED is ON and JP1 is CLOSE

!aa2dddd – Set relay status

Description This command defines module's relay state.

Syntax !aa2dddd <CR>
! Delimiter character
aa Hexadecimal address of the device
2 System control command
d Relay output activation command data for each nibble in hex format
<CR> Carriage Return - End of command

Response |dddd
if the command was valid and if FB messages are enabled

Example Command: !0028008 <CR>
Response: | 8008 <CR>

This command will activate relay #16 an #4

!aa3dd – Activate relay N

Description	This command activates a single relay.
Syntax	<pre>!aa3dd <CR> ! Delimiter character aa Hexadecimal address of the device 3 Single relay activation command dd N Relay ID in hex format <CR> Carriage Return - End of command</pre>
Response	Sdd if the command was valid
Operation method	The !aa3dd<CR> command activate a single relay in the range of “00” to “0F”.
Example	Command: !00305<CR> Response: S05<CR> Relay #6 will be activated.

!aa4dd – De activate relay N

Description	This command De activates a single relay.
Syntax	!aa4dd <CR> ! Delimiter character aa Hexadecimal address of the device 4 Single relay De activation command dd N Relay ID in hex format <CR> Carriage Return - End of command
Response	Sdd if the command was valid
Operation method	The !aa4dd<CR> command De activate a single relay in the range of “00” to “0F”.
Example	Command: !00405<CR> Response: S05<CR> Relay #6 will be De activated.

!aa50dd – Set device mode Register #50 value

Description This command defines the device operation mode

Syntax !aa50dd <CR>

! Delimiter character
aa Hexadecimal address of the device
50 System mode command
dd Mode Register #50 (00-FF)

82	Enable Board Rate change, ETC
02	Report on command errors
00	Normal

<CR> Carriage Return - End of command

Response |dd EE OK if the command was valid

Example Command: !00582<CR>
Response: |82 EE OK

This command will:

- Enables Baud Rate setting,
- Enables the device error messages.
(error messages are sent in response to invalid commands)

Make sure setting a normal mode like '00' or '02' right after making the changes.

!aa6dd – Set baud rate

Description For compatibility with existing devices the IA-2216-2 can be set to other standard baud rates

Syntax !aa6dd <CR>
! Delimiter character
aa Hexadecimal address of the device
6 Change device baud rate command
dd Two characters representing the desired baud rate:
12 1200
24 2400
48 4800
96 9600
19 19200 (default)
38 38400
57 57600
11 115200
<CR> Carriage Return - End of command

Response |dd<CR> if the command was valid
| Response delimiter
dd New baud rate
<CR> Carriage Return - End of response

Example Command: !01696<CR>
Response: |96<CR>

Change the baud rate of the device at address 01Hex to 9600



1. Mode must be set to “82” first. (!00582)
2. Changes will take effect after the next power up. (Power off)
3. Make sure setting the mode back to normal right after changing the BR.

!aa7dd – Set module's address

Description Each device must have a unique network address. This command defines a module's address.

Syntax !aa7dd <CR>
! Delimiter character
aa Hexadecimal address of the device
7 Change device baud rate command
dd New Hexadecimal address
<CR> Carriage Return - End of command

Response |dd<CR> if the command was valid

Example Command: !00701<CR>
Response: |01<CR>

Change the address of the device at address 0(Hex) to 1(Hex)



Note

1. Factory default is 00Hex
2. In products chained system, each product must be set to a unique address.
3. The updated address is displayed on the boards 7 segment led display.

!aaEdddd – Set initial state

Description	This command defines relays state at POWER-UP
Syntax	!aaEdddd <CR> ! Delimiter character aa Hexadecimal address of the device E System control command d Relay output activation command data for each nibble in hex format <CR> Carriage Return - End of command
Response	Edddd<CR> if the command was valid
Example	Command: !00E1001<CR> Response: E1001<CR> This command will define the initiate state of relays #13 and #1 as “No Active”.



Note

Default state is !00E00000000 (All relays are OFF at power up)

!aaSdd – Set user defined led

Description This command turns ON or turns OFF the SLD LED

Syntax !aaSdd <CR>
! Delimiter character
aa Hexadecimal address of the device
S Set Led status
0d LED status:
01 On
00 Off
<CR> Carriage Return - End of command

Response |0d<CR> if the command was valid

Example Command: !00S01<CR>
Response: |01<CR>

This command will turn on the LED



Note

The default LED status is ON.

^^E – Force initial state at all modules

Description	This command forces all modules of this net into their pre-defined initiate state.
Syntax	^^E<CR> ^^ Delimiter character E Hexadecimal address of the device <CR> Carriage Return - End of command
Response	No FB message
Example	Command: ^^E<CR> Response: No FB message

The IA-2216-2 is CE and FCC Approved, Industrial Grade, low cost Relay Controller, equipped with 16 SPDT Relays with a contact rating of 10 Amp at 250VAC.

It is an RS-232 Controlled Relay Controller that can be easily modified into WIFI or Ethernet unit, by simply attaching an appropriate IA adaptor.

The IA-2216-2 is Intelligent-Appliance Series-3000 software compatible, powered by either 12VDC or 24VDC, source power, version depended.

Its software support package includes both Labview and Microsoft Dot.Net libraries, operation utilities and open source software examples for fast and easy system implementation.