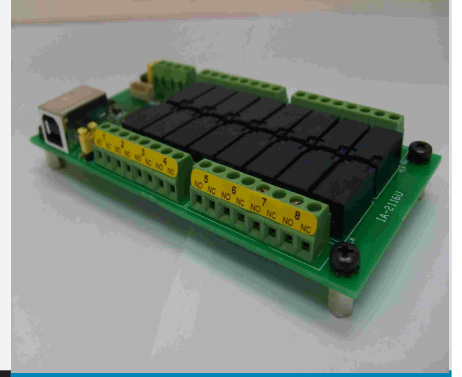


# User Manual



## IA-2116-U

16 Relays  
USB Controlled Module

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## Warning

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.

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## Introduction

The IA-2116-U is a tiny and intelligent 16 Relays module. powered and controlled by any USB port. The IA-2116-U provides both NO an NC (Normally Open and Normally Close) channels, while the relays Common line line is shared between 8 or 16 relays, to ease its wiring efforts.

The IA-2116-U is one of the IA-21xx Tiny Modules Series, providing 16 Form C (SPDT) Kind Relays, with a power handling capability of 1 Amp @30VDC. The module has special features as a LED and an extra Jumper for user's special definition, and it is software compatible to other IA series.



## Pin Assignment

LD1- User general use LED

JP1 - User general use Jumper

JP2 - OPEN: TB5\_1-8: Relays 1 to 8 common pin.

TB5\_9-16: Relays 9 to 16 common pin.

CLOSE: TB5\_1-8/TB5\_9-16: Relays 1 to 16 common pin.

## Ordering Information

IA - 2 1 1 6 - U

Tiny 16 Relays, USB powered & Controlled

## Specifications

### Control Port

Communication Method.....	USB
Default BR.....	19200,8,1,N

### Communication

Relay Type.....	SPDT Form C
Contact Rating.....	1A @ 30 VDC
Relay ON Time.....	5 ms
Relay OFF Time.....	5 ms
Channels.....	16

### General

Supply Voltage.....	USB Powered
Environment.....	0-60°C
Dimensions.....	110x52x20
Weight.....	85 gr
Dimensions for DIN RAIL.....	114x56x40
Weight for DIN RAIL.....	125gr

## Software Installation

### USB Port setup

1. Connect USB A/B Cable between the IA-2116-U to the host computer.
2. The computer informs on locating a new USB device, and asks for S/W drivers.
3. Kindly choose the USB-Drivers directory on the IA-3000 CD and complete the task by pressing 'Next' and 'Finish' while asked for.
4. Job done will be accomplished by a steady lighting of the USB led on the IA-2116-U unit, and by a creation of new Serial COM that can be easily found on the Device Manager screen.
5. At this stage you can easily control the IA-2116-U relays by either any serial control software, or by the IA-3000 Utility, provided in the IA-3000 CD.

### Locating the new COM port

1. 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).
2. 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)'.
3. This line inform us that we should refer to COM4, in this case, in order to control the IA-2116-U while connected to this computer through its USB port.

### Setup IA-3000 Utility

1. Install the IA-3000 Utility in your computer by clicking on the 'Start' icon in the 'IA-Utility' directory, on the IA-3000 CD.

### Handling IA-3000 Utility

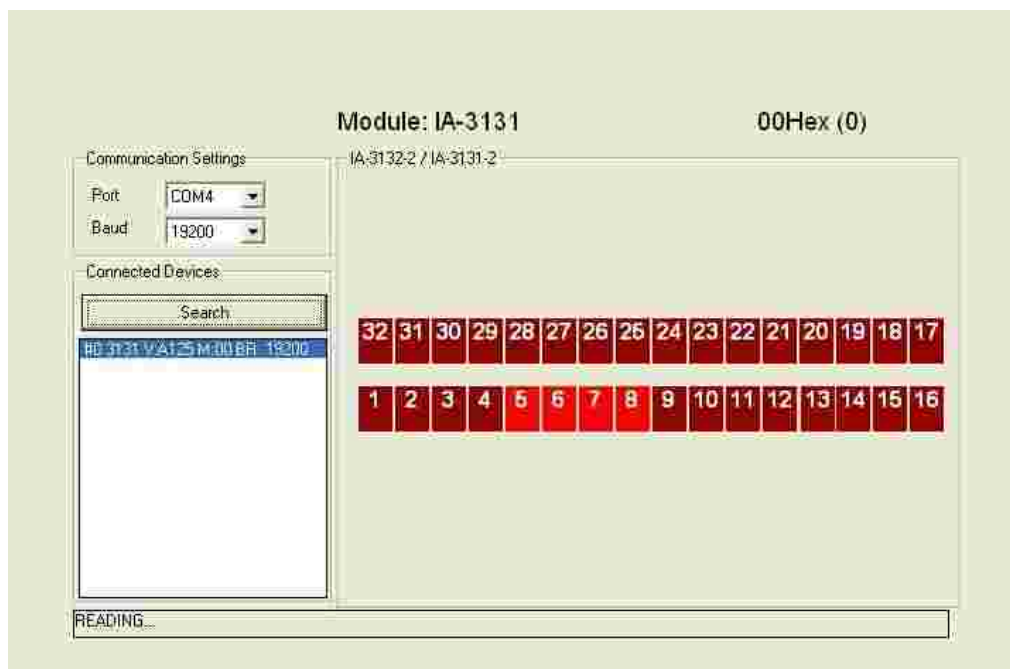
1. Start the IA-3000 Utility by pressing 'Start' on the computer's main screen, select 'All Programs', and finally 'IA-3000'.
2. Select 'COM4' to fit into the right of the 'Port' label (in case that this is the COM shown on item 2 of 'Locating the new COM port', earlier at this page).
3. Select '19200' to fit into the right of the 'Baud' label (in case that the IA-2116-U 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 disactivate the appropriate relay.



## Software Installation

### Address Configuration

1. Start IA-3000 Utility.
2. Search then Select the desired IA-2116-U 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 indicates '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-2116U , A host computer / PLC may control the IA-2116 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 return character. All commands must use UPPER CASE characters

Command	Description
? a a 0 .....	Get Device Name
? a a 1 .....	Get Device Firmware Version
? a a 2 .....	Get Relays status
? a a 5 .....	Get Device Mode
? a a S .....	Get Jumper & LED status
! a a 2 D D D D .....	Set Relays Status
! a a 3 D D .....	Activate Relay N
! a a 4 D D .....	De Activate Relay N
! a a 5 D D .....	Set Device Mode
! a a 6 B B .....	Set Baud Rate
! a a 7 A A .....	Set Module's Address
! a a E D D D D .....	Set Initial State
! a a S 0 D .....	Set LED Status

## ?aa0(cr)

<b>Function</b>	Get Device Name
<b>Description</b>	Request the Device model name. Can be used to identify the connected module type at the specified address.
<b>Syntax</b>	?aa0(cr) ?     Delimiter character aa    Hexadecimal address of the device 0     Get device Model command (cr)  Carriage Return - End of command
<b>Response</b>	_NNNN(cr) if the command was valid  _       Response delimiter NNNN  A string containing the device name (cr)   Carriage Return - end of response
<b>Example</b>	Command: ?010(cr) Response: _2116(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-2116

## ?aa1(cr)

**Function** 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: \_A104(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 (cr)

<b>Function</b>	Get relays status
<b>Description</b>	Read relays present status.
<b>Syntax</b>	?aa2(cr) ? Delimiter character aa Hexadecimal address of the device 2 Read relays status (cr) Carriage Return - End of command
<b>Response</b>	_DDDD(cr) If the command was valid  _ Delimiter character D Output Command: 8 Nibbles in hex format each nibble represents 4 relays. Most left nibble is the most significant one. Most right is the least significant one.
<b>Example</b>	Command: ?002(cr) Response: _0001 (cr)  All relays are off except #1.

## ?aa5(cr)

**Function** Get Device Mode

**Description** This command reads the module operation mode

**Syntax** ?aa5(cr)

- ? Delimiter character
- aa Hexadecimal address of the device
- 5 System Mode command
- (cr) Carriage Return - End of command

**Response** \_dd(cr) if the command was valid

**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.

## ?aaS(cr)

<b>Function</b>	Get Jumper & LED Status
<b>Description</b>	This command reads the status of JP1 and the LED.
<b>Syntax</b>	?aaS(cr) ? Delimiter character aa Hexadecimal address of the device S Read Jumper & LED Status (cr) Carriage Return - End of command
<b>Response</b>	_DD(cr) if the command was valid, where D is:  _ Delimiter character D Output Digits: The right D is: 1 when the LED is ON. 0 when the LED is OFF. The left D is: 1 when JP1 is close. 0 when JP1 is open.
<b>Example</b>	Command: ?00S(cr) Response: _11 (cr)

The LED is ON and JP1 is close.

## **!aa2DDDD(cr)**

<b>Function</b>	Set relays status
<b>Description</b>	This command define's module's output state. !aa2DDDD (cr)
<b>Syntax</b>	! 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
<b>Response</b>	DDDD(cr) if the command was valid and if FB messages are enabled.
<b>Example</b>	Command: !0021111(cr) Response:   1111(cr)  This command will activate relay #1, #5, #9, #13



## **!aa3DD(cr)**

**Function**            Activate relay N

**Description**        This command activate a single relay.

**Syntax**              !aa3DD(cr)  
!            Delimiter character  
aa          Hexadecimal address of the module  
3            Single relay activation command  
DD         N Relay ID in hex format  
(cr)        Carriage Return - End of command

**Response**            |SDD(cr) if the command valid

**Example**              Command: !00302(cr)  
                          Response: |S02(cr)

This command will activate relay #3 only (!) all other relays will be not changed.

## !aa4DD(cr)

**Function** De activate relay N

**Description** This command De activate a single relay.

**Syntax** !aa4DD(cr)  
! Delimiter character  
aa Hexadecimal address of the module  
4 De activate relay N command  
DD Relay ID hex format  
(cr) Carriage Return - End of command

**Response** |CDD(cr) if the command valid

**Example** Command: !00402(cr)  
Response: |C02(cr)

This command will De activate relay #3 only (!) all other relays status will be not changed.

## !aa5DD(cr)

<b>Function</b>	Set Device Mode								
<b>Description</b>	This command sets the power-up mode and enables/disables error messages								
<b>Syntax</b>	<p>!aa5DD(cr)</p> <p>!     Delimiter character</p> <p>aa    Hexadecimal address of the device</p> <p>5     System Mode command</p> <p>DD    8 mode control bits (00-FF)</p> <table><thead><tr><th>Bit#</th><th>Function</th></tr></thead><tbody><tr><td>1</td><td>Enable Error Messages</td></tr><tr><td>6</td><td>Disable Feedback messages on “!AA2” &amp; “!AAM” Commands if BIT 7 is cleared.</td></tr><tr><td>7</td><td>Enable BR change</td></tr></tbody></table> <p>(cr)   Carriage Return - End of command</p>	Bit#	Function	1	Enable Error Messages	6	Disable Feedback messages on “!AA2” & “!AAM” Commands if BIT 7 is cleared.	7	Enable BR change
Bit#	Function								
1	Enable Error Messages								
6	Disable Feedback messages on “!AA2” & “!AAM” Commands if BIT 7 is cleared.								
7	Enable BR change								
<b>Response</b>	DD EE OK if the command was valid								
<b>Example</b>	Command: !00502 (cr) Response:  02 EE OK								

This command will enable the device error messages (error messages are sent in response to invalid commands) and will disable baud rate by mistake.

## !aa6BB(cr)

**Function** Set Baud Rate

**Description** For compatibility with existing devices the IA-2116 can be set to other standard baud rates

**Syntax** !aa6BB(cr)

- ! Delimiter character
- aa Hexadecimal address of the device
- 6 Change device baud rate command
- BB Two characters representing the desired baud rate:
  - 12 1200
  - 24 2400
  - 48 4800
  - 96 9600
  - 19 19200 (default)
- (cr) Carriage Return - End of command

**Response** |BB(cr) if the command was valid

- | Response delimiter
- BB 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

**Notes:**

1. BIT 7 of the device mode must be set first.
2. Changes will take effect after the next power up.

## **!aa7AA(cr)**

<b>Function</b>	Set module's address
<b>Description</b>	Each device must have a unique network address. This command defines a module's address. Factory default is 00Hex.
<b>Syntax</b>	<code>!aa7AA(cr)</code> !      Delimiter character aa     Hexadecimal address of the device 7      Get device Version command AA     New Hexadecimal address (cr)   Carriage Return - End of command
<b>Response</b>	AA(cr) if the command was valid
<b>Example</b>	Command: <code>!00701(cr)</code> Response: <code>  01(cr)</code>

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

**NOTE:** Factory default address is "00" and it should be change before instolling it into a present operation net.  
Kindly make sure that each module is set to a different address!

## **!aaEDDDD(cr)**

<b>Function</b>	Set initiate state
<b>Description</b>	This command defines relays state on power-up.
<b>Syntax</b>	<code>!aaEDDDD(cr)</code> !     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
<b>Response</b>	EDDDD (cr) if the command was valid
<b>Example</b>	Command: <code>!00E1000(cr)</code> Response: <code> E1000(cr)</code>  This command will define the initiate state of all relays and will activate them for user's verification.

## !aaS0D(cr)

**Function** Set LED Status

**Description** This command turns ON or turns OFF the LED

**Syntax** !aaSDD(cr)  
! Delimiter character  
aa Hexadecimal address of the device  
S Set LED Status  
D LED Status:  
1 On  
0 Off  
(cr) Carriage Return - End of command

**Response** |0D if the command was valid

**Example** Command: !00S01 (cr)  
Response: |01

This command will turn on the LED.

**Note:**  
The default LED status is ON.