User Manual

IA-3131-U2i

32-ch Relay
USB or RS-232 Controlled

Version 0814
www.intelligent-appliance.com

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To provide customers with easy to use and 24/7 technical support. Intelligent-Appliance delivers services via the internet. The dedicated website offers large knowledgebase database that include full information for Development Engineers, Installers in the field and for Software Engineers. This KNOWLEDGE BASE Include: Data sheets, User Manuals, FAQ, Wiring Diagram, Selector Guide and Software section.

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-3131-U2i is an Industrial, 32-ch, Relay Controller Board with either standard or pluggable industrial terminals. The board is supported by the rich Series-3000 commands list, with single, eight and 32 relays control commands, as well as several boards global control commands, that can set the status of several hundred relay at the same time. The IA-3131-U2i Relay Controller supports a Daisy-Chain operation. It includes a buffered output port communication method, enabling a simple and a transparent control over a massive amount of boards. The IA-3131-U2i is being widely supported by Microsoft Studio Class Library, by National-Instruments Labview Drivers and by various open code software examples. for fast and easy product implementation.

Features

- Pluggable connectors (IA-3131-U2i-P Version)
- USB & RS-232 Controlled
- 32 Relays
- 2A @ 30VDC, 1A @ 125VAC
- Isolated USB Port
- Highly Featured Command List
- Local and Global Commands
- Open Source Code Samples
- Setup & Operation Utilities
- Watchdog Protection
- Simple Transparent Chaining
- DIN-Rail mounting ready

Specifications

Relays		
Channels	32	
Contact current	2 Amp @ 30 VDC	
	1 Amp @ 125 VAC	
Contact method	SPST, form A	
Operation Time	7mS	
Release Time	4mS	
Mechanical Endurance	$1x10^8$	
2A@30VDC Endurance	$1x10^5$	
1A@30VDC Endurance	$3x10^5$	
Communication		
Main COM	Isolated USB or RS-232, DB9 Female	
Expansion Port	Buffered RS-232, DB9 Male	
Factory Defaults	Baud Rate	19.2bps
	Data bits	8
	Parity	None
	Stop bits	1
Baud Rate Range	1200-115Kbps	
Host USB Cable	USB A/B, Included	
Host RS-232 Cable	DB9 M/F Straight Through	
Expansion RS-232 Cable	DB9 M/F Straight Through	
	Pin-to-Pin 3 wires, pin 2, 3 and 5	
	Up to 15m Long	
General		
Power supply	24VDC, 0.6Amp	
Module Size	220x115x45 mm	
Mounting	Din-Rail Ready	
Weight	485 gr	

Ordering Information

- IA-3131-U2i

  32-ch SPST Relay Board,

  USB or RS-232 controlled,

  Multi-Drop Expandable.

  USB Cable and installation CD Included
- IA-3131-2

  32-ch SPST Relay Board, RS-232 controlled,

  Multi-Drop Expandable.

  DB9 M/F Cable and installation CD Included
- IA-3131-XXX-P

  Pluggable Version

⚠ 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.

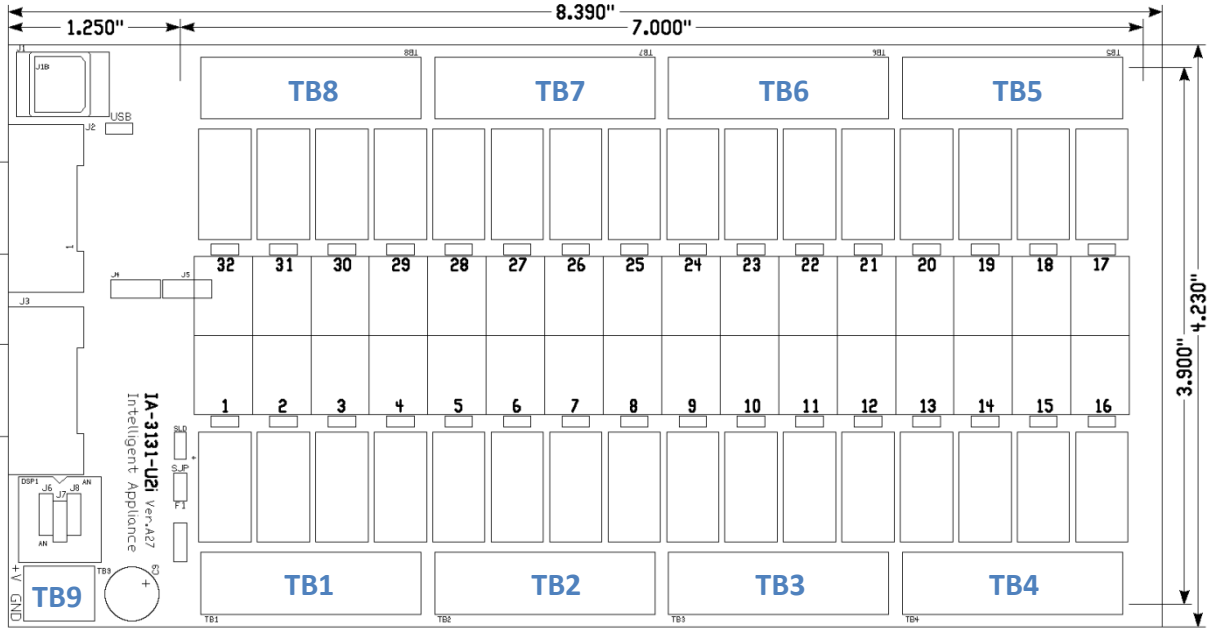
System Wiring

Host PC

DB9 Female or USB

DB9 Male or USB

DB9 Female



DB9 Male

Chaining Device
IA-3XXX

DB9 Female

...255

Pin Assignment

J1 – Main Port (USB)

J2 - Secondary Port (RS-232, DB9 Female)

Pin	Function
#2	Tx
#3	Rx
#5	GND

J3 – Expansion Port (RS-232, DB9 Male)

Pin	Function
#2	Rx
#3	Tx
#5	GND

TB1 to TB8 – Relay #1 to Relay #32

TB9 – Power supply input terminal

User Defined Jumpers & Led

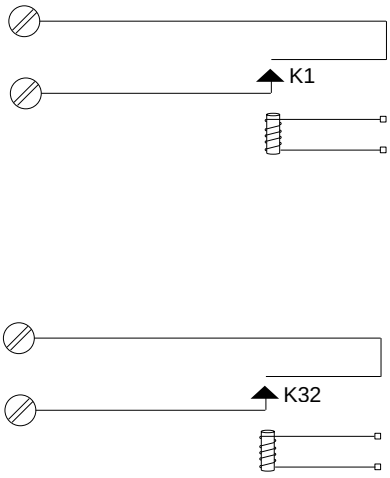
SJP Jumper – User defined jumper

SLD Led – User defined led

Relay Layout

SPDT, Form A, Channels 1-32

Terminal	Relay#	Pin#
TB1	1	C
TB1	1	NO
	•	
	•	
	•	
TB8	32	C
TB8	32	NO



Software Installation

USB Port setup

Connect a 24 VDC, power supply, to TB9 on the IA-3131-U2i.

Turn on the 24 VDC power supply.

The IA-3131-U2i address is shown on the dual character led display on the IA-3131-U2i unit.

Connect USB A/B Cable between the IA-3131-U2i to the host computer.

The computer informs on locating a new USB device, and asks for S/W drivers.

Kindly choose the USB-Drivers directory on the IA-3000 CD or from our website: www.intelligent-appliance.com, and complete the task by pressing 'Next' and 'Finish' while asked for.

Job done will be accomplished by a steady lilting of the USB led on the IA-3131-U2i unit, and by a creation of new Serial COM that can be easily found on the Device Manager screen.

At this stage you can easily control the IA-3131-U2i relays by either any serial control software, or by the IA-3000 Utility, provided in the IA-3000 CD.

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-3131-U2i 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-3131-U2i 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-3131-U2i , A host computer / PLC may control the IA-3131-U2i 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.

?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: _3131<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-3131-U2i

?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 A1.25

!aa2ddddddddd – Set relay status

Description This command defines module's relay state.

Syntax !aa2ddddddddd <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 |dddddddd
if the command was valid and if FB messages are enabled

Example Command: !00280008000 <CR>
Response: | 80008000 <CR>

This command will activate relay #16 and #32

Data Stricture

Value	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
Bit	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
Relay	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Nibble	1				2				3				4				5				6				7				8			

Examples Table

Description	Syntax
Activating relay #1	**!002**00000001**<CR>**
Activating relay #32	**!002**80000000**<CR>**
Activating relay #19	**!002**00040000**<CR>**
Activating relay #9, #10, #11	**!002**00000700**<CR>**
Activating relay #26, #28	**!002**A0000000**<CR>**
Activating relay #2, #6, #15, #16	**!002**0000C022**<CR>**

HEX / DEC Conversion Table

DEC	HEX	8	4	2	1
15	F	1	1	1	1
14	E	1	1	1	0
13	D	1	1	0	1
12	C	1	1	0	0
11	B	1	1	1	1
10	A	1	1	1	0
9	9	1	0	0	1

!aa3dd – Activate relay N

Description This command activates a single relay.

Syntax !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

Response |Sdd if the command was valid

Example Command: !0031F<CR>
Response: |S1F<CR>

This command will activate relay #32 only (!) all other relays will be not changed.

Data Stricture

Location	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Relay	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

HEX / DEC Conversion Table

DEC	HEX	8	4	2	1
15	F	1	1	1	1
14	E	1	1	1	0
13	D	1	1	0	1
12	C	1	1	0	0
11	B	1	1	1	1
10	A	1	1	1	0
9	9	1	0	0	1

Examples Table

Description	Syntax
Activating relay #1	**!00300<CR>**
Activating relay #32	**!0031F<CR>**
Activating relay #19	**!00312<CR>**

!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	De activate relay N command
dd	Relay ID hex format
<CR>	Carriage Return - End of command

Response |Cdd if the command was valid

Example Command: !0041F<CR>
Response: |C1F<CR>

This command will De activate relay #32 only (!) all other relays status will be not changed.

Data Stricture

Location	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Relay	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

HEX / DEC Conversion Table

DEC	HEX	8	4	2	1
15	F	1	1	1	1
14	E	1	1	1	0
13	D	1	1	0	1
12	C	1	1	0	0
11	B	1	1	1	1
10	A	1	1	1	0
9	9	1	0	0	1

Examples Table

Description	Syntax
De-Activating relay #1	**!00400<CR>**
De-Activating relay #32	**!0041F<CR>**
De-Activating relay #19	**!00412<CR>**

!aa5dd – Set device mode

Description This command sets the power-up mode and enables/disables error messages

Syntax !aa5dd <CR>

!	Delimiter character
aa	Hexadecimal address of the device
5	System Mode command
dd	8 mode control bits (00-FF)

Bit#	Function
1	Enable Error Messages
6	Disable Feedback messages on “!AA2” & “!AAM” Commands if BIT 7 is cleared.
7	Enable BR change
	*Other bits are for future use

<CR> Carriage Return - End of command

Response |dd EE OK<CR> if the command was valid

Example Command: !00502<CR>
Response: |02 EE OK<CR>

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

!aa6dd – Set baud rate

Description For compatibility with existing devices the IA-4131-U2i-P 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

!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.

!aaBndd – Set Relays Status at Level

Description This command sets the status of 8 relays at a time.

Syntax !aaBndd <CR>

!	Delimiter character
aa	Hexadecimal address of the device
B	Change Byte Level command
n	#Byte to be set. 'n' is in the range of 0-3
dd	Byte data in hex format.
<CR>	Carriage Return - End of command

Response |n dd<CR> if the command was valid

Example Command: !00B124<CR>
Response: |1 24<CR>

This command will activate relays #10 and #15(!) all other relays will be not changed.

Data Stricture

Value	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1
Bit	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0	3	2	1	0
Relay	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
n	3								2								1								0							

HEX / DEC Conversion Table

DEC	HEX	8	4	2	1
15	F	1	1	1	1
14	E	1	1	1	0
13	D	1	1	0	1
12	C	1	1	0	0
11	B	1	1	1	1
10	A	1	1	1	0
9	9	1	0	0	1

Examples Table

Description	Syntax
Activating relay #1	**!00B001<CR>**
Activating relay #32 and #28	**!00B388<CR>**
Activating relay #17, #18, #19, #23	**!00B247<CR>**
Activating relay #9 - #16	**!00B1FF<CR>**

!aaEddddddddd – Set initial state

Description This command defines relays state at POWER-UP

Syntax !aaEddddddddd <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 |Eddddddddd<CR> if the command was valid

Example Command: !00E10001000<CR>
Response: |E10001000<CR>

This command will define the initiate state of relays #13 and #29 as "No Active".

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

!aaMddddddddd – Set Temporary Memory State

Description This command defines the temporary memory state

Syntax !aaMddddddddd <CR>

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

Response |Mddddddddd<CR> if the command was valid

Example 1 Command: ! 00500<CR> (Enable FB message)
Command: !00M80008000<CR>
Response: |M80000080<CR>
This command will set relay #32 and #16 in memory only.

Example 2 Command: ! 00540<CR> (Disable FB message)
Command: !00M80008000<CR>
Response: No FB message
This command will set relay #32 and #16 in memory only.

!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.
For LD1 deactivation the command should be !00S00<CR>

^^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 massage

Example 1 Command: ^^E<CR>
Response: No FB massage

Example 2

Command:	**Relay status:**
!00E12345678<CR>	12345678
!00200000000<CR>	00000000
^^E	12345678

Example 3

Command:	**Relay status:**
!00E00000000<CR>	00000000
!002FFFFFFFF<CR>	FFFFFFFF
^^E	00000000

^^M – Activate Relays per Memory Status

Description This command forces Activate Relays per Memory Status.

Syntax ^^M<CR>

^^	Delimiter character
M	Activate Relays per Memory Status
<CR>	Carriage Return - End of command

Response Relay state is set to memory state, no feedback message is returned.

Example 1 Command: ^^M<CR>
Response: No FB massage

!00M10000001 <CR>	Sets memory - no change in relay's state
^^M	Actives relays #29 and #1.

Example 2

Command	**Relay status**
!00200000000<CR>	00000000
!00M12345678<CR>	00000000
^^M	12345678