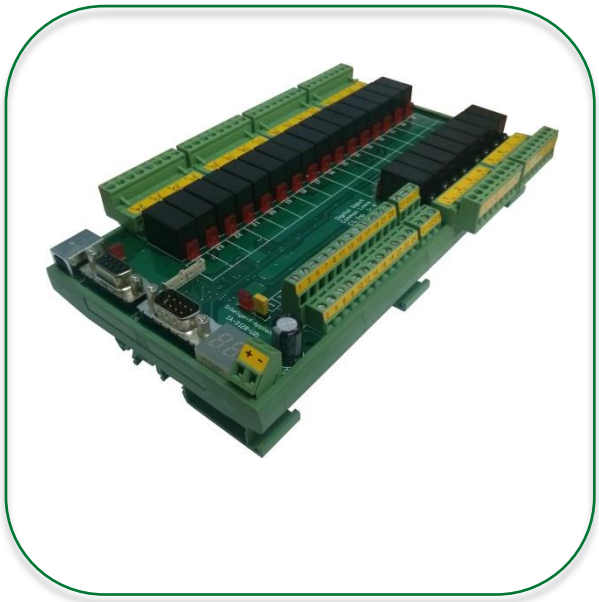
User Manual

IA-3128S-U2i

24-ch Relay, 24-ch Isolated Digital Input
USB or RS-232 Relay Controller
with Contact Protection on all Relays



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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-3128S-U2i is an Industrial Relay Board with 24-ch Relay, 24-ch Isolated Digital Inputs, Isolated USB Port and transparent Daisy-Chain facility based on buffered RS-232 Interface ports. In addition to the Isolated Digital Inputs there is software based Digital Filter with a variable frequency cut point to best fit customer need.

Two 24bit Event Counter channels were implemented into the card's facility, connected to the two last Digital Inputs ch-23 and ch-24, with a 500Hz maximum counting frequency, that equals 30,000 RPM in case of a pulse per revolution.

The IA-3128S-U2i is CE and FCC approved, with contact rating of 5Amp at 30VDC and 250VAC.

The software support package includes DOT.net Library, Open Source software examples and Configuration and Operation utilities for fast software implementation.

Features

- 24-ch Relay
- 24-ch Isolated Digital Input
- 2-ch Event Counter
- Isolated USB Port
- USB and RS-232 Controlled
- Digitally Filtered Inputs
- Inductive Load Protection on each output
- Dual Watchdog Protection
- Each Input is Solely wired
- DIN-Rail mounting ready
- Easy Chaining

Specifications

Relay	
Channel	24
Relay type	SPST Form A
Contact Raiting	5 Amp @ 30VDC
	5 Amp @ 250VAC *(IA-3128-2 Only)*
Operation Time	8mS
Release Time	5mS
Isolated Digital Inputs	
Channels	24
Isolation	Optic, 2500 Volt
Wiring	Solely, 2 Wires each
Active Range	6-30 VDC
Non-Active Range	0-3 VDC
Alternative Range	Available upon request
Event Counters	
Channels	2 (Digital IN #23, #24)
Maximum Freq.	500Hz (30,000RPM @ 1 PPR)
Communication Ports	
USB Port	Isolated
RS-232 Port	Buffered
Default Parameters	19200, n, 8, 1, 1
BR Range	1200 – 115200
USB Wiring	A/B Cable, included
RS-232 Wiring	M/F, Direct, p2p, 3 wires
General	
Power Consumption	24VDC, 14W
Dimensions	265x115x45 mm
Weight	522gr

Ordering Information

- **IA-3128S-U2i-P:**

  USB or RS-232 Controlled,

  24-Ch Relay, 24-Ch Isolated DI

  USB Cable, 1m **included**

- **IA-3128S-2:**

  RS-232 Controlled,

  24-Ch Relay, 24-Ch Isolated DI

  DB9 Cable, 1m **included**

⚠ Warning & Safety

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

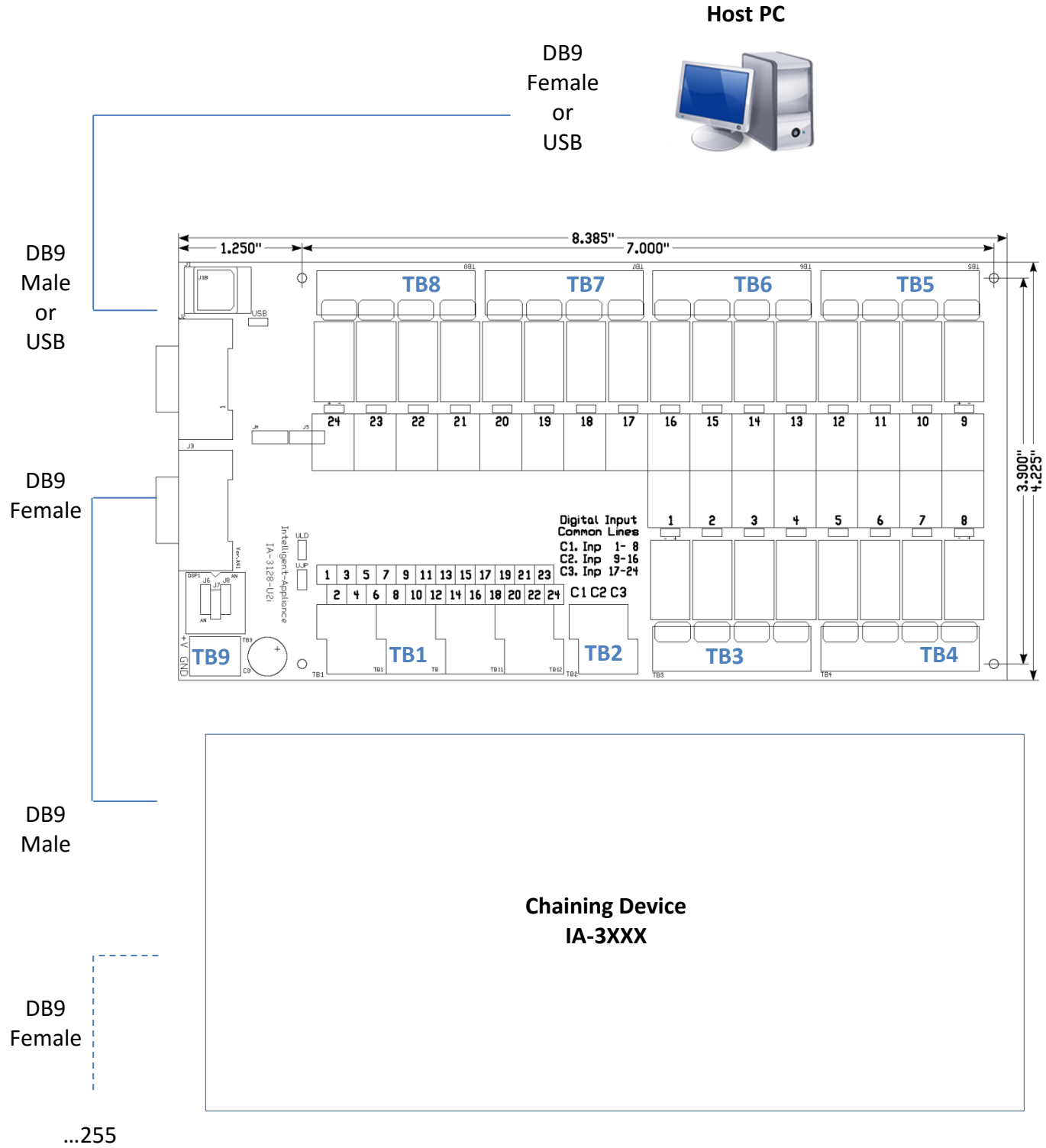
Do not operate the device in a manner not specified in the documentation. Misuse of the device may result in injury and/or damage equipment.

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



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 – Isolated Digital input signals

TB2 – Isolated Digital input Common lines

TB3 to **TB8** – Relay #1 to Relay #24 – SPST Form A (C, NO contact)

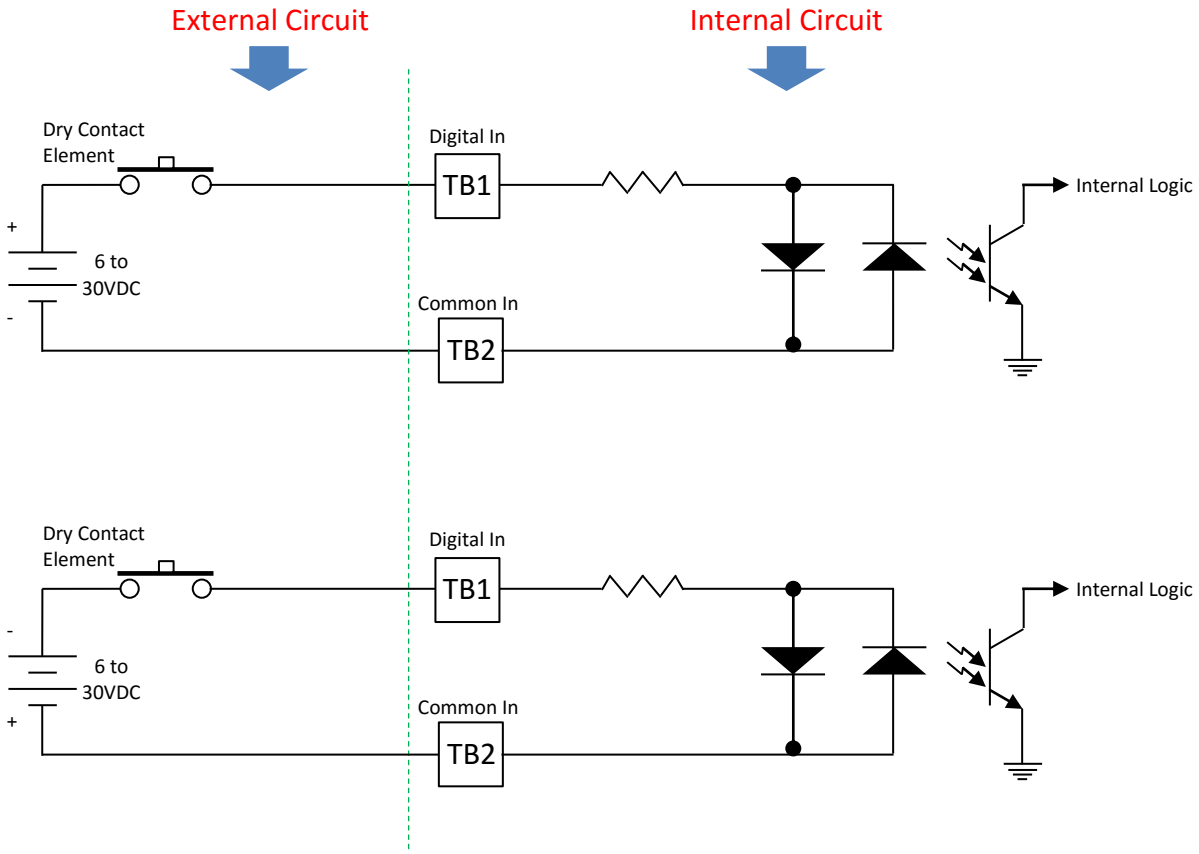
TB9 – Power supply input terminal

User Defined Jumpers & Led

SJP Jumper – User defined jumper

SLD Led – User defined led

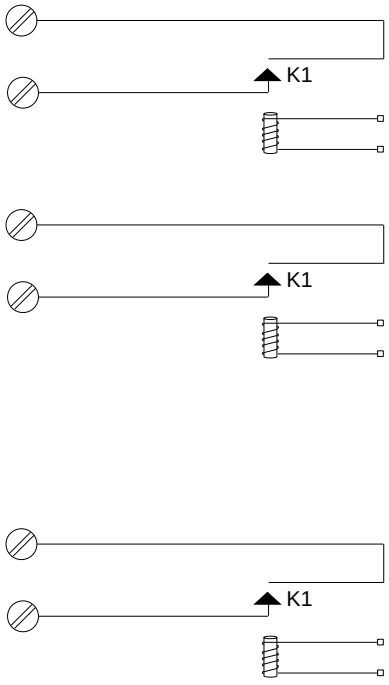
Isolated Inputs



Relay Layout

SPST, Form A, Channels 5-16

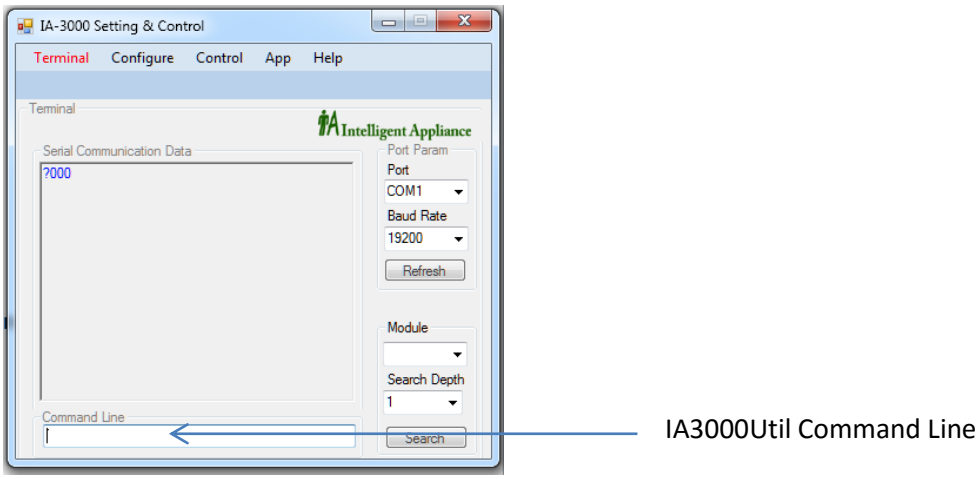
Terminal	Pin #	
TB3	1	A
TB3	1	B
TB3	2	A
TB3	2	B
	•	
	•	
	•	
TB8	24	A
TB8	24	B



Software Installation

USB Port setup

Connect USB A/B Cable between the IA-3128-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-3128-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-3128-U2i I/O's by either any serial control software, or by the IA3000Util Utility, provided in the IA-3000 CD (see next page).



Locating the new COM port

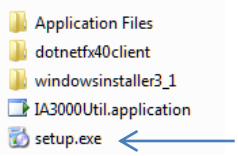
Start the 'Device Manager' utility. (Usually by selecting 'My Computer', Right Clicking the mouse button, choosing manage, Left Clicking and then double Left clicking on the Device Manager will list hardware items).

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-3128-U2i while connected to this computer through its USB port.

IA-3000 Utility

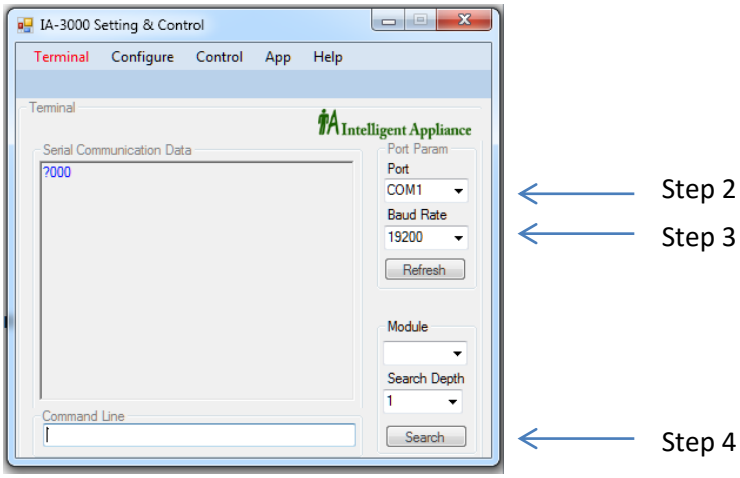
Install the IA3000Util Utility in your computer by clicking on the 'Setup' icon in the 'IA-Utility' directory, on the IA-3000 CD.



Or download it from our online Knowledge Base. (www.intelligent-appliance.com)

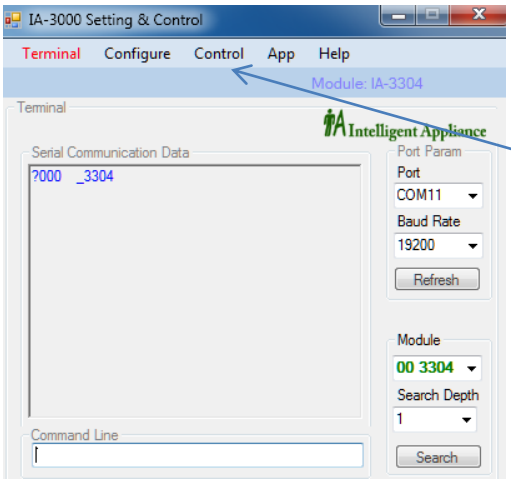
Handling IA-3000 Utility

1. Start the IA3000Util Utility by pressing 'Start Manu' on the computer's main screen, select 'All Programs', and finally 'IA3000Util'.
2. Select the appropriate COM

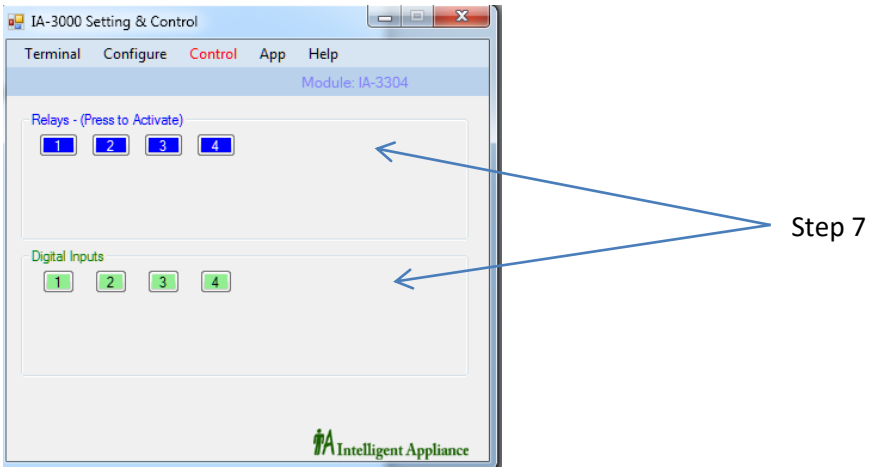


3. Select '19200' to fit into the right of the 'Baud' label (in case that the IA-3128-U2i is at its default setting stage).
4. Press the 'Search' button and wait for the utility to list all chained items.
5. Select the desired device out of the Module list that appears above the 'Search' button.

6. Once the device is selected, its form will be shown on the control panel label.



7. Left clicking the buttons will activate or dis-activate the appropriate I/O.



Command Set

The following table is a quick reference table for the IA-3128S-U2i, A host computer / PLC may control the IA-3128S-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: _3128<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-3128S-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: _u158<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 u1.58

?aa2 – Get Inputs and Outputs status

Description Read digital inputs and Digital Outputs 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 _ABCDEFGH<CR> if the command was valid

A	1st Input nibble
B	2nd Input nibble
C	3rd Input nibble
D	4th Input nibble
E	5th Input nibble
F	6th Input nibble
G	1st Output nibble
H	2nd Output nibble
I	3rd Output nibble
J	4th Output nibble
K	5th Output nibble
L	6th Output nibble

Input

Digital Input	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	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
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
Nibble	A				B				C				D				E				F			

Output

Relay	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	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
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
Nibble	G				H				I				J				K				L			

Example Command: ?002<CR>
Response: _000001008001<CR>

Input #1 is Active and both Relays #1 and #16 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)

82	Enable BR change	Bit 7 & Bit 1
40	Eliminate Response	Bit 6
20	Add device Address to response	Bit 5
02	Report on command errors	Bit 1
00	Normal	

<CR> Carriage Return - End of command

Example Command: ?0050<CR>
Response: _82<CR>

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

?aa51 – Get Device mode (Register #51)

Description This command reads the device mode register #51 data.

Syntax ?aa51<CR>

?	Delimiter character
aa	Hexadecimal address of the device
51	Mode register #51 command
<CR>	Carriage Return - End of command

bit	**Value** (dd)	**Function**	
		WD2 - Host communication watchdog:	
2	04	1	Enabled
	00	0	Disabled

Response _dd<CR> if the command was valid

dd	Mode register #51
<CR>	Carriage Return - End of command

Example Command: ?0051<CR>
Response: _04<CR>

In this example watchdog 2 is enabled.
This host communication protection watchdog, will force all relays to their WD2 special Relay Pattern state.
In case that no communication will take place to this card for over the time defined in command !aaWDTdd<CR>

?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 jumper & led status

Description This command reads the status of JP1 and the LED.

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

0	0	0	UJP	0	0	0	ULD
D7	D6	D5	D4	D3	D2	D1	D0
A				B			

ULD=1 LED is ON

UJP=1 Jumper is CLOSED

Example Command: ?00S<CR>

Response: _11<CR>

In this example the LED is ON and UJP is CLOSED

?aaWDT – Get WD2 Count-down value

Description This command reads the System Communication Watchdog, WD2, Counter Count-down value and sets its value to the Preset value.

Syntax ?aaWDT<CR>

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

Response _dd<CR> if the command was valid

_	Delimiter character
dd	Output digits in HEX format

Example Command: ?00WDT<CR>

Response: _12<CR> ***In case that WD2 is Activated!***
Response: _20 WD2 ERR<CR> ***In case that WD2 is Not Activated!***

In this example WD2 Count-down value is 18 Seconds.

NOTE 1: **This command reads the WD2 Counter value. Not the WDT Preset value that is defined by the "!aaWDTdd<CR>" command.**

NOTE 2: **In case that WD2 is not operated, this command will yield an error and it will show WDT predefined value.**

NOTE 3: **This command, in addition to reading WD2 Counter value, sets the WD2 Counter value to its Preset value.**

NOTE 4: **Each reading might yield a different value as it is depended on the time elapse since previous reading and presetting.**

!aa2dddddd – Set relay status

Description This command defines module's output state.

Syntax !aa2dddddd <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 |dddddd
if the command was valid and if FB messages are enabled

Example 1 *(Normal)*	Command: !002111111<CR> Response: |111111<CR> This command will activate relay #1, #5, #9, #13, #17, #21
Example 2 *(REG 50, bit 5 Set)* *!aa5020*	Command: !002111111<CR> Response: |00111111<CR> This command will activate relay #1, #5, #9, #13, #17, #21 And includes the device address 00
Example 3 *(REG 50, bit 6 Set)* *!aa5040*	Command: !002111111<CR> Response: null This command will activate relay #1, #5, #9, #13, #17, #21 And no response will be received

!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: !00302<CR>
Response: |S02<CR>

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

Relay	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DATA (dd)	17	16	15	14	13	12	11	10	0F	0E	0D	0C	0B	0A	09	08	07	06	05	04	03	02	01	00

!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	N Relay ID in hex format
<CR>	Carriage Return - End of command

Response |Cdd if the command was valid

Example Command: !00402<CR>
Response: |C02<CR>

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

Relay	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DATA (dd)	17	16	15	14	13	12	11	10	0F	0E	0D	0C	0B	0A	09	08	07	06	05	04	03	02	01	00

!aa50dd – Set device mode

Description This command sets the power-up mode and enables/disables error messages, Address, Baud Rate and Register #51 values change.

Syntax !aa50dd <CR>

! Delimiter character

aa Hexadecimal address of the device

50 System mode command

dd Mode (00-FF)

82	Enable BR change	Bit 7 & Bit 1
40	Eliminate Response	Bit 6 *
20	Add device Address to response	Bit 5 *
02	Report on command errors	Bit 1
00	Normal	

<CR> Carriage Return - End of command

Response |dd EE OK if the command was valid

Example Command: !005082<CR>
Response: |82 EE OK

This command will enable Address and BR changing and enable the device error messages.
(error messages are sent in response to invalid commands) and will disable Address and baud rate changed by mistake.
Make sure setting a normal mode like '00' or '02'' right after changing the BR to disable mistakenly done BR change.

NOTE! * See command !aa2dddddd<CR> for more details about bits 5 & 6

!aa51dd – Set device mode Register #51 value

Description This command changes relay operation mode and enables/disables WD2.

Note
- One must set the device mode register #50 value to '82' to enable setting of device mode register #51 value.

Syntax !aa51dd <CR>

! Delimiter character
aa Hexadecimal address of the device
51 System mode command
dd Mode register #51

bit	**Value** (dd)	**Function**		
		WD2 - Host communication watchdog:		
2	04		1	Enabled
	00		0	Disabled

<CR> Carriage Return - End of command

Response |dd EE OK if the command was valid

Example
Command: !005104<CR>
Response: |04 EE OK

This command will activate System Communication Watchdog WD2

NOTE!
- Activating WD2 should be accomplished by polling the device repeatedly in a time period that will not exceed the WD2 time set.
- Exceeding this value will set all relays to WD2 special Relay Pattern, '8000': Relay #32 is activated, all other relays are deactivated.

!aa6dd – Set baud rate

Description For compatibility with existing devices the IA-3128S-U2i 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

Note

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 the module's address.
Mode REG #50 must be set to '82' in order to make use of this command

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. Mode REG 50 must be set to '82' in order to make use of this command !aa5082<CR>
2. Factory default is 00Hex
3. In products chained system, each product must be set to a unique address.
4. The updated address is displayed on the boards 7 segment led display.

!aaEdddddd – Set Relays' initial state

Description This command defines the relays state at POWER-UP
Usually defined to '000000' – Deactivate all relays'

Syntax !aaEdddddd <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 |Edddddd<CR> if the command was valid

Example Command: !00E000000<CR>
Response: |E 000000 EE OK <CR>

Default state is !00E000000 (All relays are OFF at power up)

!aaE – Set the Relays to their initial state

Description This command force all relays to their initiate state

Syntax !aaE <CR>

!	Delimiter character
aa	Hexadecimal address of the device
E	System control command
<CR>	Carriage Return - End of command

Response |E DN <CR> if the command was valid

Example Command: !00E<CR>
Response: |E DN <CR>

This command will force all relays to their initiate state

!aaSdd – Set user defined led

Description This command turns ON or turns OFF the ULD 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.

!aaWDTdd – Set WD2 Time value.

Description This command Set WD2 Time value

Syntax !aaWDTdd<CR>

!	Delimiter character
aa	Hexadecimal address of the device
WDT	Set WD2 Relays Status
dd	2 Hex characters defines 10 to 256 Seconds.
<CR>	Carriage Return - End of command

Response |dd<CR> if the command was valid

Example Command: !00WDT20<CR>
Response: |20<CR>

This command will activate WD2 relays pattern within 32 Seconds.

Note

- The default WD2 time set is “20”.
  WD2 is NOT Active.
- It is recommended to set each chained device to a different value in order to receive its message.
- Exceeding this value will set all relays to WD2 special Relay Pattern, ‘800000’: Relay #24 is activated, all other relays are deactivated.

^^E – Force initial state at all modules

Description This command forces all modules on present chain into their pre-defined initiate state.

Syntax ^^E<CR>

^^	Delimiter character
E	System control command
<CR>	Carriage Return - End of command

Response No Response massage

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