

GENERAL DESCRIPTION

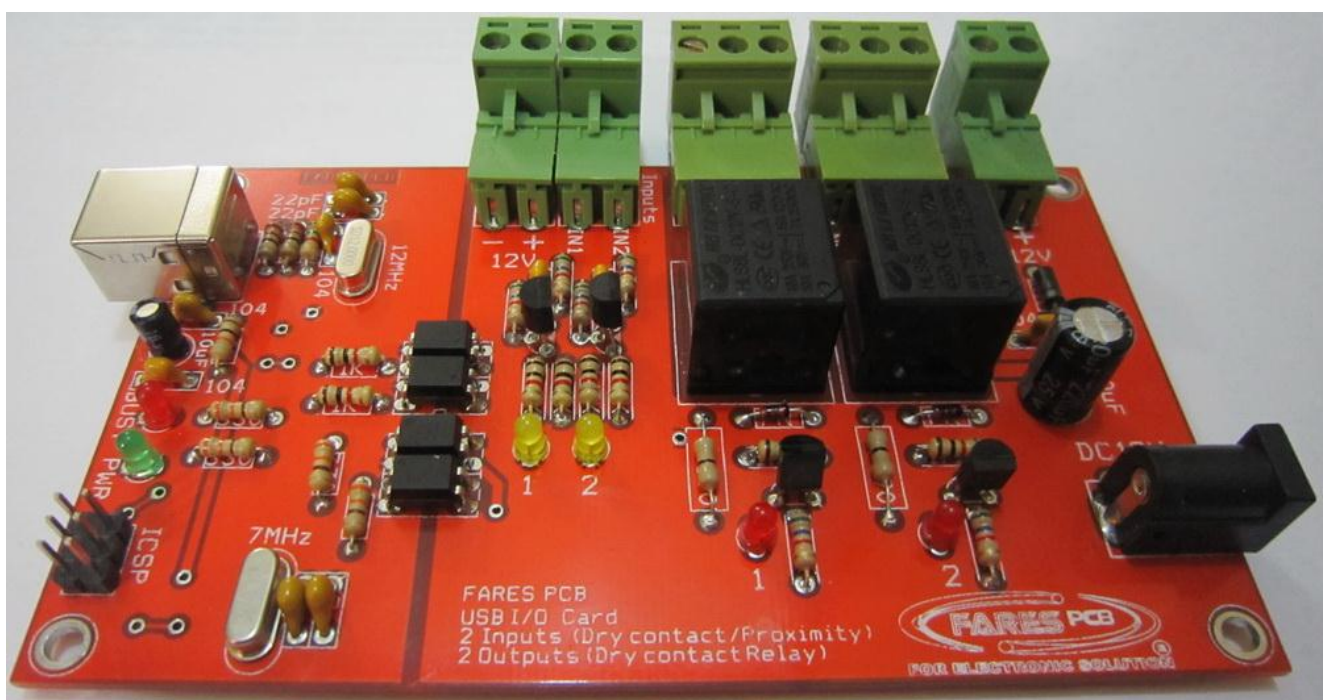
URK22 is a simple cheap USB-controlled data acquisition card. It supports two output relays and two inputs. Output relays can be used to control electrical devices remotely from a PC over a USB link such as lamps, motors, locks. Inputs could be used to monitor external events and signals as a feedback for process.

Some of the possible applications

- Home Automation
- Lighting Control
- Garden Equipment Control
- Industrial Automation

All outputs and inputs are opto-isolated to ensure safety in industrial applications.

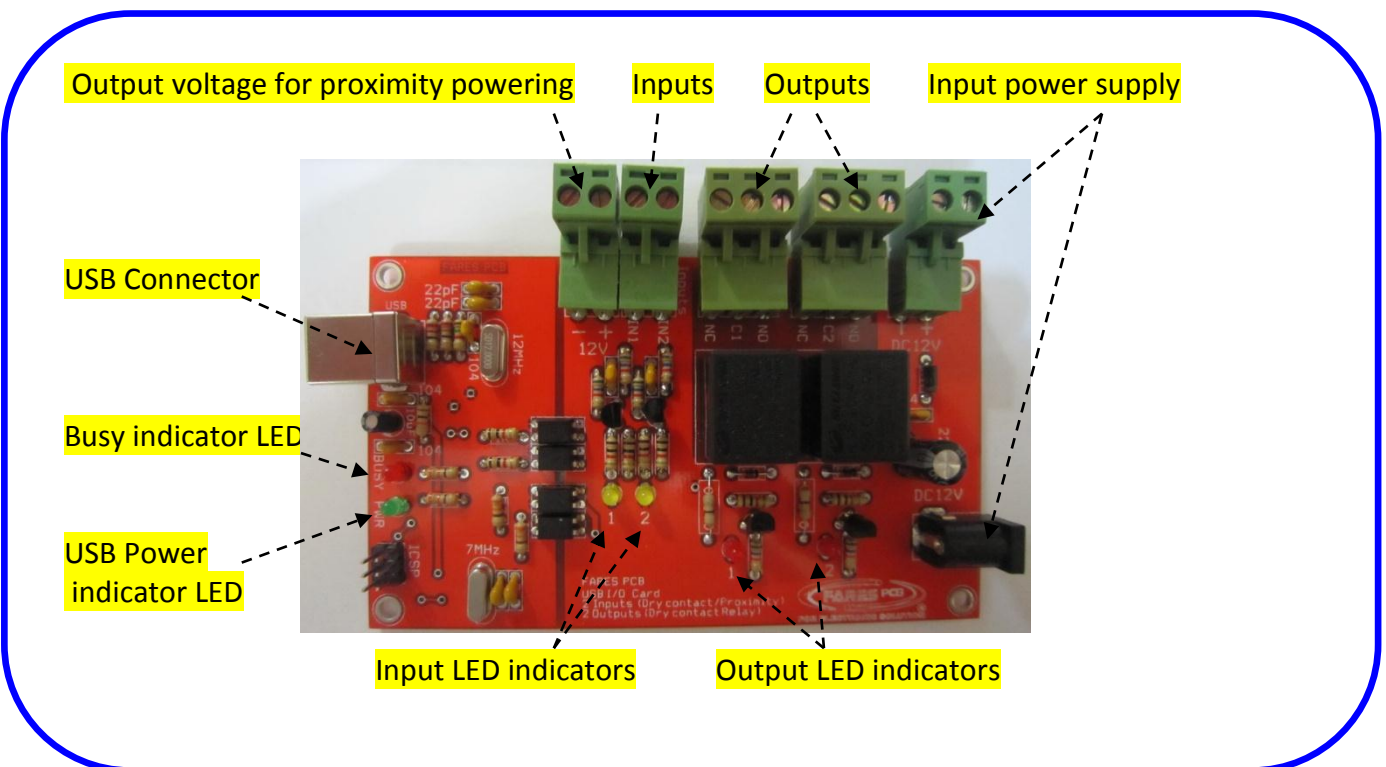
The module communicates with host PC over full speed USB link. When connected to PC, the module will appear as a serial port in Windows Device Manager.



URK22 features

- 1- Two output relays 12V coil / 5A contacts (resistive load).
- 2- Normally open and normally closed contacts are available.
- 3- LED indicator for each relay status.
- 4- All output relays are opto-isolated.
- 5- Two external inputs (Dry contact or proximity sensor).
- 6- LED indicator for each input status.
- 7- All inputs are opto-isolated.
- 8- Required supply 12V/200mA for relay circuit driving.
- 9- **URK22** kit is protected against reversed polarity of power.
- 10 - Simple control instructions.
- 11 - Dimension: 124 x 82 x 18 mm.

URK22 Layout



Power Supply

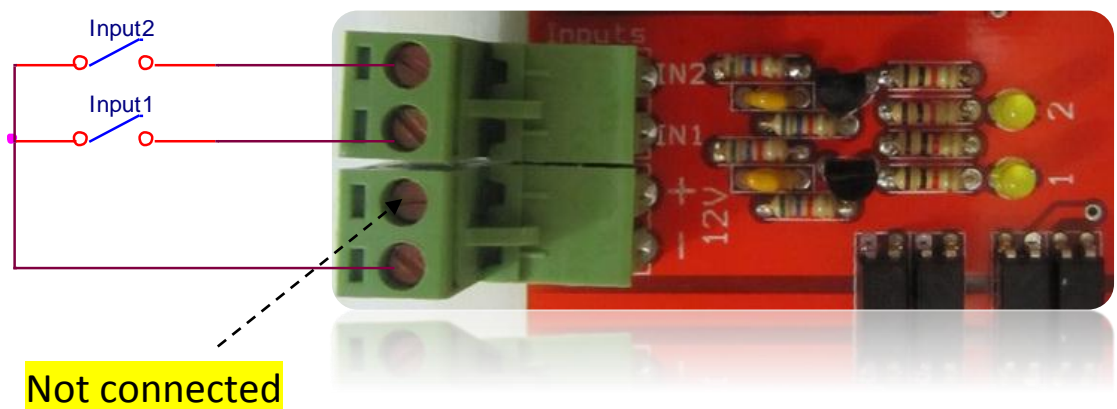
URK22 Card is powered from +5V supply from USB and requires only one external +12V supply for relay coils and proximity input powering, the relay will not switch without this supply.

+12V may be supplied via DC wall wart adaptor or screw clamp terminal. The card is protected against reversed polarity of power. Don't try to connect two power supplies at the same time.

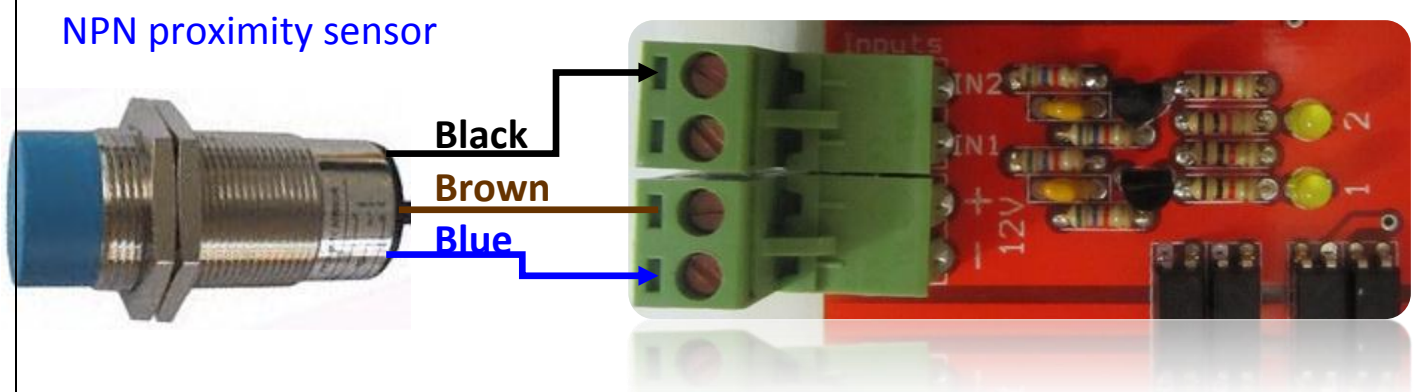
Inputs

URK22 has two inputs that may be configured as two dry contact inputs or proximity inputs. Only NPN proximity sensor type is supported. A LED indicator for each input status is included. The inputs are opto-isolated from USB power for safety in industrial applications. The far distance between switch and input terminals may not exceed 10 meters.

Dry contact inputs connection diagram



Proximity inputs connection diagram



Input Status	LED Status	Binary input
OFF	Turn off	"0"
ON	Turn on	"1"

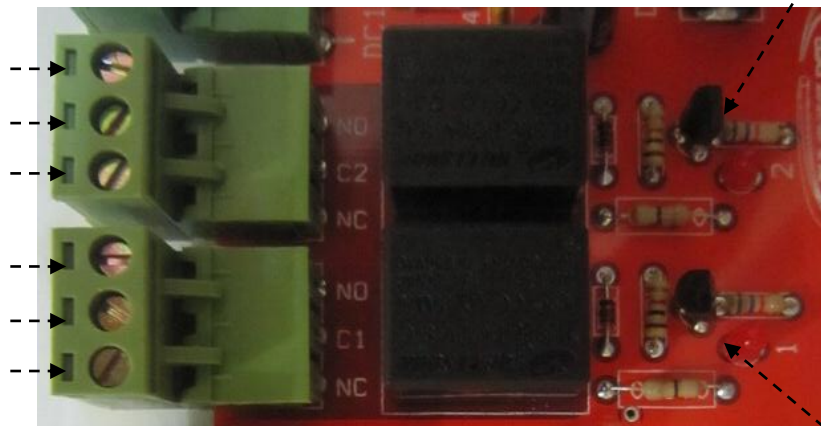
Outputs

URK22 has two output relays. The relay dry contact is suitable for AC and DC switching applications such as driving lamps, motors, heaters and so on. Each relay has its own LED indicator for status. Both normally open and normally close contacts are provided for flexibility.

LED indicator for Relay2

Normally open
Common (REL2)
Normally close

Normally open
Common (REL1)
Normally close



LED indicator for Relay1

Relay State	NO – Common	NC – Common	LED Status
OFF	Open	Close	Turn off
ON	Close	Open	Turn on

Using URK22 card with inductive loads

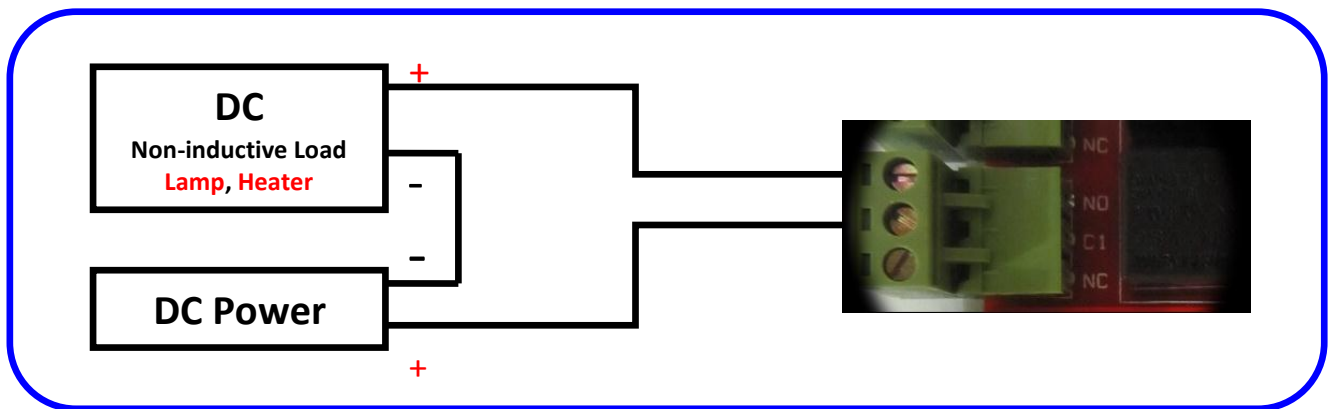
It is important to take additional care when using relays with inductive loads. An inductive load is simply any coil and works based on magnetic principles like Motors, Solenoids and transformers. Inductive loads produce back emf when the magnitude of the load current changes. The back emf can be in the order of tens or even hundreds of voltage. This effect is most severe when power is disconnected from inductive load because the rate of change of current is maximum at that point.

Even though the back emf lives only for a very short time (a few milliseconds) it can cause sparks between the relay contacts and can deteriorate the contact quality over time and reduce the life span.

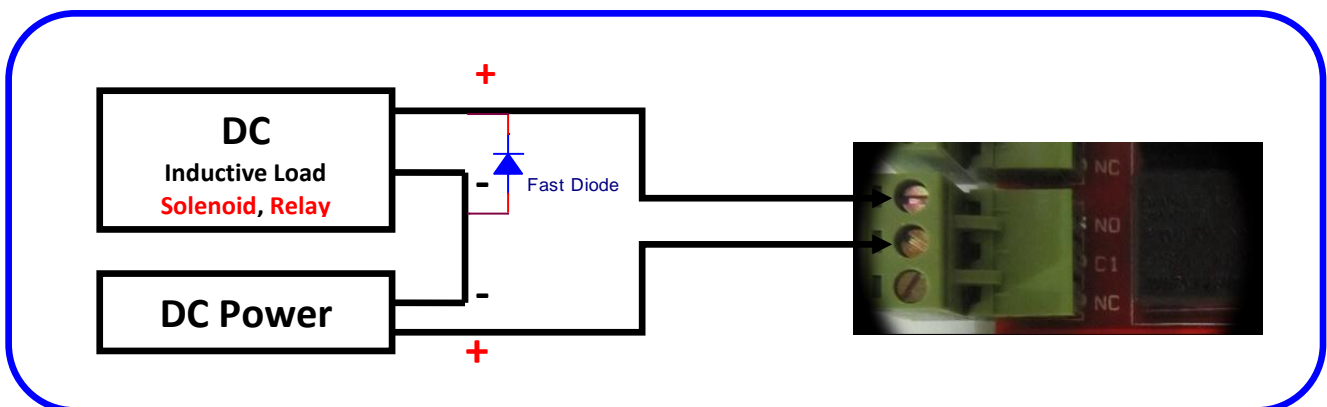
So it is important to suppress the back emf to acceptable levels to protect relay contacts. Usually this requires connecting electronic devices in parallel with the load such that they absorb the high voltage components generated by the load. For DC inductive loads such as solenoids and contactors, connecting a diode (fast switching diode is recommended) in parallel to the load (in reverse direction to the load current) is very effective. A diode used for this purpose is usually called a freewheeling diode.

For AC inductive loads such as motors, connecting a proper capacitor in series with a resistor all in parallel to the relay contact is very effective. This circuit called snubber circuit.

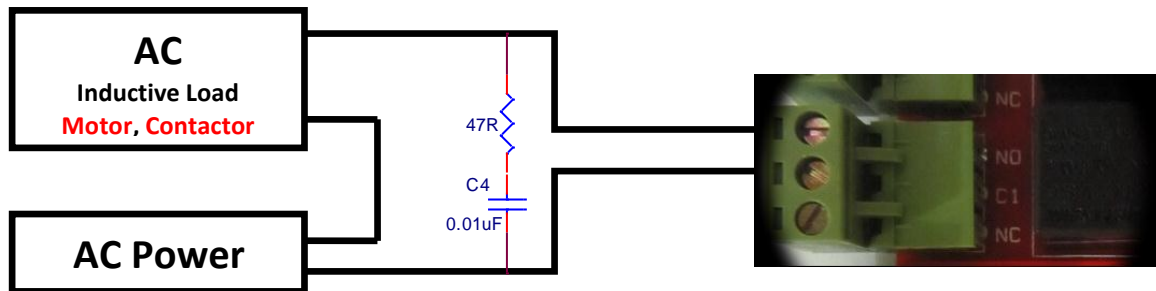
DC/AC non-inductive load connection diagram



DC inductive load connection diagram

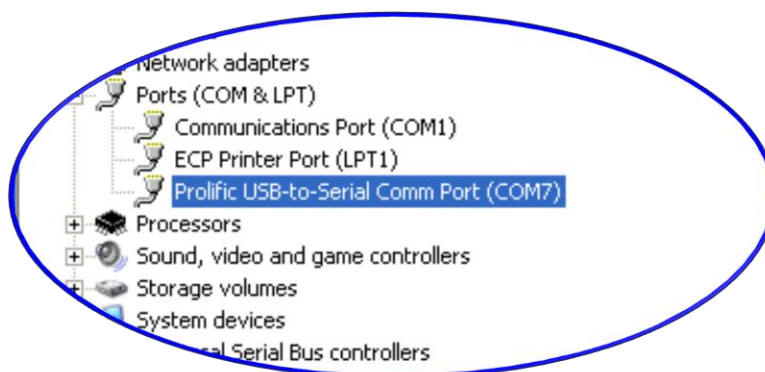


AC inductive load connection diagram



Driver Installation

This product requires a driver to be installed for proper functioning when used with Windows. The driver package can be downloaded from the product page. To install the driver, unzip the contents of the downloaded driver package to a folder. Attach USB cable to the PC and when asked by Windows device installation wizard, point to the folder where driver files are present. When driver installation is complete, the module should appear in Windows Device Manager as a serial port as seen in figure



Sending Commands

One of the most powerful features of this module is the simple easy to use command protocol it supports. All instruction Commands consists of just two characters. Supported commands allow read inputs individually or wholly, turn on/off output relays individually or wholly, reverse output relay status individually or wholly, in addition to read Product name and version and also getting or setting a specific user ID number for card.

PC always starts communication by sending a command and waits a response from URK22 card. Any respond from URK22 is in character mode followed by carriage return ("CT") and line feed ("LF") ASCII characters.

Examples:

To read the product name of card

1. PC sends two characters "GP".
2. PC receives eight characters represent the product name "FIPURK22"

Fares Industrial Products USB Relay Kit 2 inputs 2 outputs.

To read the user ID number of URK22

1. PC sends two characters "GM".
2. PC receives eight characters represent the manufacturer name "FARESPCB"

To read the firmware version of URK22

1. PC sends two characters "GV".
2. PC receives two characters represent the firmware version such as "01"

To read the user ID number of URK22

1. PC sends two characters "GI".
2. PC receives eight characters represent the ID number such as "00000026"
3. The default ID number is "00000000".

User can change it to give a unique number for each card in multi-card control system.

To read the lock state of URK22

1. PC sends two characters "GL".
2. PC receives one of two characters represents the lock state. If PC receives "0" the card is not locked and if PC receives "1" the card is locked.

If the card is locked it cannot execute any other commands that read inputs or write outputs (relays), but all other commands are executed. It should be noted

that the disconnecting of power (USB cable) and reconnecting it will not change the lock state. The only way to unlock the card is sending the Unlock command "SU", will be explained later.

To read the sleep state of URK22

1. PC sends two characters "GS".
2. PC receives one of two characters represents the operating mode. If PC receives "0" the card is not in sleep mode and if PC receives "1" the card is in sleep mode.

If the card is in sleep mode it cannot execute any other commands that read inputs or write outputs (relays), but all other commands are executed. There are two ways to turn to normal mode. First way is hardware, just disconnect the USB cable and reconnect it. This will reset the card to normal mode. The second one is to send Set Normal command "SN", will be explained later.

To Set the lock state of URK22 to (LOCK)

1. PC sends two characters "SL".
2. PC receives one character. If this character is "o" then the card is locked successfully, if this character is "r" then an error is occurred and retry to send the command.

To Set the lock state of URK22 (UNLOCK)

1. PC sends two characters "SU".
2. PC receives one character. If this character is "o" then the card is unlocked successfully, if this character is "r" then an error is occurred and retry to send the command.

To Set the URK22 card in sleep mode

1. PC sends two characters "SS".
2. PC receives one character. If this character is "o" then the card is entered into sleep mode successfully, if this character is "r" then an error is occurred and retry to send the command.

To Set the URK22 card in normal mode

1. PC sends two characters "SN".
2. PC receives one character. If this character is "o" then the card is entered into normal mode successfully, if this character is "r" then an error is occurred and retry to send the command.

To Set the URK22 ID number

1. PC sends two characters "SI" followed by new ID number such as "12345678".
2. PC receives one character. If this character is "o" then the ID number is changed successfully, if this character is "r" then an error is occurred and retry to send the command.

To turn on an output relay

1. PC sends character "N" followed by the relay number to be turned on such as "N1".
2. PC receives one character. If this character is "o" then the relay is turned on successfully, if this character is "r" then an error is occurred and retry to send the command.

To turn off an output relay

1. PC sends character "F" followed by the relay number to be turned off such as "F1".
2. PC receives one character. If this character is "o" then the relay is turned off successfully, if this character is "r" then an error is occurred and retry to send the command.

To reverse an output relay state (Toggle)

1. PC sends character "T" followed by the relay number to be toggled off such as "T1".
2. PC receives one character. If this character is "n" then the relay is toggled successfully and new state is ON, if this character is "f" then the relay is toggled successfully and new state is OFF, if this character is "r" then an error is occurred and retry to send the command.

To turn on all output relays

1. PC sends two characters "AN".
2. PC receives one character. If this character is "o" then all relays are turned on successfully, if this character is "r" then an error is occurred and retry to send the command.

To turn off all output relays

1. PC sends two characters "AF".

2. PC receives one character. If this character is "o" then all relays are turned off successfully, if this character is "r" then an error is occurred and retry to send the command.

To reverse all output relays (Toggle)

1. PC sends two characters "AT".
2. PC receives one character. If this character is "o" then all relays are toggled successfully, if this character is "r" then an error is occurred and retry to send the command.

To read an output relay state

1. PC sends character "R" followed by the relay number required to read its state such as "R1".
2. PC receives one character. If this character is "n" then the relay state is ON, if this character is "f" then the relay state is OFF, if this character is "r" then an error is occurred and retry to send the command.

To read an Input

1. PC sends character "I" followed by the input number required to be read such as "I1".
2. PC receives one character. If this character is "n" then the input is ON, if this character is "f" then the input is OFF, if this character is "r" then an error is occurred and retry to send the command.

To read all Inputs

1. PC sends characters "IA".

PC receives eight characters represents the input states such as "xxxxxxnf". If the character is "n" then the corresponded input is ON (Input2 in example), if this character is "f" then the corresponded input is OFF (Input 1 in example). "x" is don't care.

Please note Input1 state is represented by the least significant character (most right one).

PC Serial command	Command description	URK22 respond
"GP"	Get product name	"FIPURK22"
"GM"	Get manufacturer name	"FARES PCB"
"GV"	Get firmware version	"XX" Two digits represents the firmware version
"GI"	Get ID Number	"XXXXXXXX" Specific user ID number for URK22 card "00000000" is the default
"SI" + "XXXXXXXX"	Set ID Number	"o" --- ID number saved "r" --- Error
"GL"	Get Lock state	"0" --- Card is unlocked "1" --- Card is locked
"GS"	Get Sleep state	"0" --- Card is in normal mode "1" --- Card is in sleep mode
"LK"	Lock URK22 card. Be careful URK22 is stop controlling output relays or reading inputs until receiving "UL" command. URK22 card is still locked even disconnecting USB socket and reconnecting it.	"o" --- URK22 card is Locked "r" --- Error
"UL"	Unlock URK22 card. This command used to resume URK22 card operation.	"o" --- URK22 card is Unlocked "r" --- Error
"SL"	Sleep (lock URK22 card until receiving "wakeup" command or disconnect USB socket and reconnect it)	"o" --- URK22 card is locked temporarily "r" --- Error
"WU"	Wakeup the URK22 card and resume commands execution	"o" --- URK22 card is waked up "r" --- Error
"AN"	Turn on All relays (All On)	"o" --- All relays are turned on "r" --- Error
"AF"	Turn off All relays (All Off)	"o" --- All relays are turned off "r" --- Error
"AT"	Toggle(reverse) all relays status (All Toggle)	"o" --- All relays are Toggled "r" --- Error
"N1"	Turn on Relay1	"o" --- Relay1 is Turn on "r" --- Error
"N2"	Turn on Relay2	"o" --- Relay2 is Turn on "r" --- Error

"F1"	Turn off Relay1	"o" --- Relay1 is Turn off "r" --- Error
"F2"	Turn off Relay2	"o" --- Relay2 is Turn off "r" --- Error
"T1"	Toggle(reverse) Relay1 state	"n" --- Relay1 is Toggled and state is ON. "f" --- Relay1 is Toggled and state is OFF. "r" --- Error.
"T2"	Toggle(reverse) Relay2 status	"n" --- Relay2 is Toggled and state is ON. "f" --- Relay2 is Toggled and state is OFF. "r" --- Error.
"R1"	Get Relay1 state	"n" --- Relay1 state is ON "f" --- Relay1 state is OFF "r" --- Error
"R2"	Get Relay2 state	"n" --- Relay2 state is ON "f" --- Relay2 state is off "r" --- Error
"I1"	Read input1 state	"n" --- Input1 state is ON "f" --- Input1 state is OFF "r" --- Error
"I2"	Read input2 state	"n" --- Input2 state is ON "f" --- Input2 state is OFF "r" --- Error
"IA"	Read all inputs	"0-0-0-0-0-0-I1-I2" Where I1 is Input1 state I2 is Input 2 state Input state = "n" if input is On and "f" if input is Off

How to Install

1- Hardware installation

Connect one end of the USB cable to the USB connector on the URK module, and the other end of the USB cable to a USB port on the PC.

Connect the external 12V supply to the connector on the URK.

2 – Software installation

Insert the CD-ROM into your PC's CD-ROM drive.

Install the USB/RS232 driver.

Install the demo test program (URKTest).

System Requirements

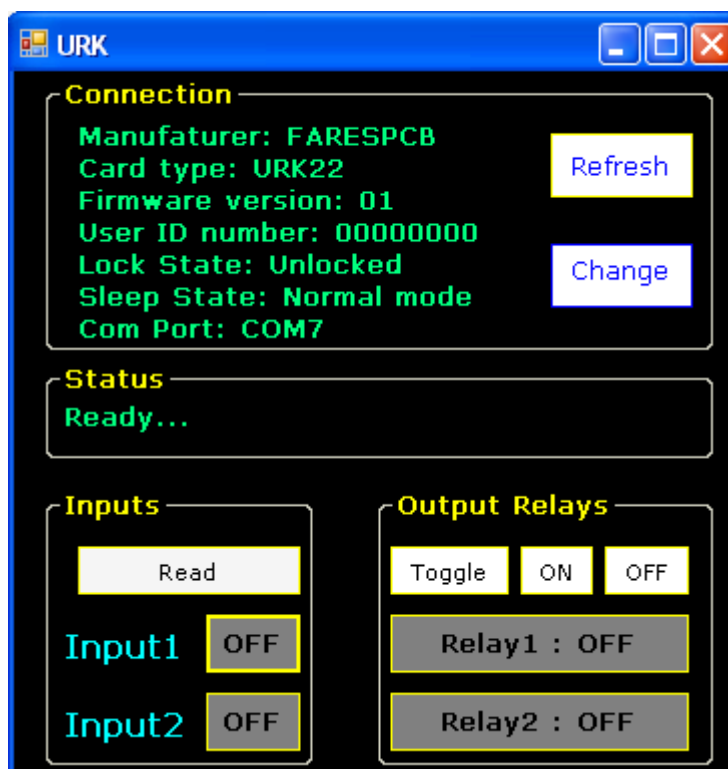
PC running USB compatible windows version.

One available USB port.

64Mb RAM and 20MB free HD space.

Card Test

1 – Run the demo test program from Start → All Programs → URKTest → URK. The main window of the software will be opened as shown.



URK program will auto detect the URK module connected to PC.

URK program is divided into four Partitions. Connection, Status, Inputs and Outputs.

Connection Partition

This partition shows the information of card detected. Manufacturer Name (FARES PCB), Card Name (URK22), Firmware version, URK22 ID number, Lock state, Sleep state, COM port.

Refresh button is required if connection is lost or reset by USB cable unplugging. Change button is used to open the Info window to modify the URK22 card Data. This data are the URK22 ID number, the Lock state and Sleep state. Click Write button to store the new modified data. Ensure that the modified data is stored successfully from the status partition in Info window.

Status partition

This partition displays the present operations and the errors if detected. For example, if Relay1 button is clicked then Status partition displays this message "Relay1 is toggled..."

Inputs partition

This partition displays all input status and allows read all the inputs in one click or individually one by one.

Outputs partition

This partition displays all output status and allows toggling (reverse) all the inputs in one click or individually one by one, in addition to turn on/off all outputs at the same time.

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