# SMARTLAB
# USB 8 CHANNELS RELAY
# OUTPUT BOARD

# OPERATION MANUAL

**Decision Group Inc.**

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# CHAPTER 1
## INTRODUCTION

USB 8 channels relay output board provides 8 different relay output channels, and one RS232/RS422/RS485 port functions, which allow each relay channel can be used to control ON/OFF of external devices, to drive external power relays, to activate alarms… etc.

USB 8 channels relay output board provides one asynchronous serial communication port (RS232 or RS422 or RS485), which allows users to control the board by COM port.

USB 8 channels relay output board provides Plug and Play (PnP) features, it is a programmable I/O interface board for PC/486, Pentium, or compatibles. The on board high speed 8051 uC provides USB functions run at 12Mbps full speed  or 1.5Mbps low speed.

❖ **The features of USB 8 channels relay output board are:**

- USB2.0 with Plug and Play (PnP) features.
- High speed 8051 uC core.
- Support USB ID selection to identify USB device.
- Support 8 relay output channels
- 8 LED correspond to 8 output ports activation status.
- Allow to connect RS232 or RS422/RS485 extension board with DB9 connector to control.
- Power supplied from external DC +5V.

- Maximum contact rating is 220V/AC, 120V/DC 1AMP, minimum response time is 1ms, maximum contact resistance is 0.1 OHM.
- Suitable for Linux, MS/WINDOWS, ... etc.
- Operating temperature range from 0 to 55º C.
- Relative humidity rage from 0 to 90%.

❖ **PACKAGE CONTENTS:**

- SMARTLAB USB 8 channels relay output board.
- USB cable.
- Decision Studio and User's manual CD.

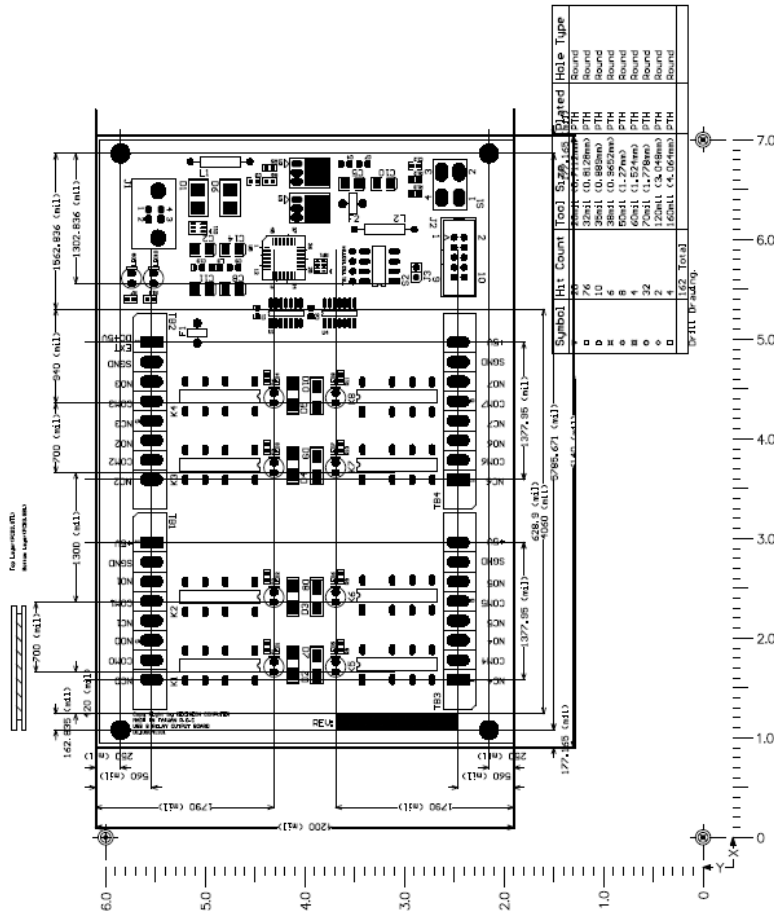- Two Different Connecter Types can be selected:

     Standard: European P.C.B type terminal blocks
     Professional: Pluggable terminal blocks

Optional

- Extension board with DB9 : RS232 or RS422/485
- PCB Carrier

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# CHAPTER 2

## HARDWARE CONFIGURATION

Before you use USB 8 channels relay output board, please ensure that the jumpers and switches setting. The proper jumper and switches settings for the 8 channels relay output board are described in the following.
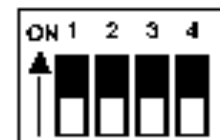
### 2.1 Switch Settings

1.  S1 Reset



The S1 switch is used to reset 8051, the signal assignments are shown in the following.

| Pin | Signals |
|-----|---------|
| 3,4 | Reset SW+ |
| 1,2 | Reset SW- |

2.  S2 USB ID

The S2 switch is used to identify USB board ID. Please set different board ID to each board (do not duplicate ID setting).

| 1 | 2 | 3 | 4 | ID |
|-----|-----|-----|-----|-----|
| ON | ON | ON | ON | -- |
| OFF | ON | ON | ON | 14 |
| ON | OFF | ON | ON | 13 |
| OFF | OFF | ON | ON | 12 |
| ON | ON | OFF | ON | 11 |
| OFF | ON | OFF | ON | 10 |
| ON | OFF | OFF | ON | 9 |
| OFF | OFF | OFF | ON | 8 |
| ON | ON | ON | OFF | 7 |
| OFF | ON | ON | OFF | 6 |
| ON | OFF | ON | OFF | 5 |
| OFF | OFF | ON | OFF | 4 |
| ON | ON | OFF | OFF | 3 |
| OFF | ON | OFF | OFF | 2 |
| ON | OFF | OFF | OFF | 1 |
| OFF | OFF | OFF | OFF | 0 |

3.   Download revised firmware

When the S2 switch is set to ON ON ON ON status, means down load revised firmware. please follow the steps shown in the following:
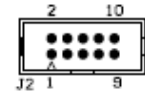
1. Set S2 to ON ON ON ON.
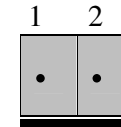2. Run USBBootloader program to down load revised firmware.

**2.2 Jumper Settings**

**Connector and Jumper for Serial Communication (J3)**

To use RS422/RS485/RS232, please connect J2 to extension board by 10 pins flat cable.
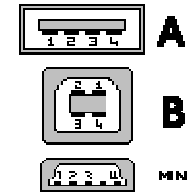
Enable Serial Port (J3)

J3 is used enable serial port communication, when short the J3, means enable serial port, otherwise, when open the J3, the serial port communication is disable.

**2.3 USB Connector**

1.   USB Connector

The USB connector is connected to computer USB port by using USB cable.

**2.4  LED Status**

1.   LED1
The LED1 is an indicator to show the power is supplied normally.

2.   LED2

The LED2 is an indicator to warning the USB link status. When it lights, it means USB connection works normally, otherwise it is fail.

### 2.5 Connector Assignments

The relay output signal pin assignments are shown in the below.

Where (NO0, COM0, NC0) is OUT00, (NO1, COM1, NC1) is OUT01, … etc.

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | NC0 | Relay Ch. 00 - Output |
| 2 | COM0 | Relay Ch. 00 - Output |
| 3 | NO0 | Relay Ch. 00 - Output |
| 4 | NC1 | Relay Ch. 01 - Output |
| 5 | COM1 | Relay Ch. 01 - Output |
| 6 | NO1 | Relay Ch. 01 - Output |
| 7 | SGND | Signal Ground |
| 8 | +5V | +5V |

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | NC2 | Relay Ch. 02 - Output |
| 2 | COM2 | Relay Ch. 02 - Output |
| 3 | NO2 | Relay Ch. 02 - Output |
| 4 | NC3 | Relay Ch. 03 - Output |
| 5 | COM3 | Relay Ch. 03 - Output |
| 6 | NO3 | Relay Ch. 03 - Output |
| 7 | SGND | Signal Ground |
| 8 | EXT+5V | **External DC +5V 3A Power In** |

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | NC4 | Relay Ch. 04 - Output |
| 2 | COM4 | Relay Ch. 04 - Output |
| 3 | NO4 | Relay Ch. 04 - Output |
| 4 | NC5 | Relay Ch. 05 - Output |
| 5 | COM5 | Relay Ch. 05 - Output |
| 6 | NO5 | Relay Ch. 05 – Output |
| 7 | SGND | Signal Ground |
| 8 | +5V | +5V |

| Pin | Signal | Description |
|-----|--------|-------------|
| 1 | NC6 | Relay Ch. 06 - Output |
| 2 | COM6 | Relay Ch. 06 - Output |
| 3 | NO6 | Relay Ch. 06 - Output |
| 4 | NC7 | Relay Ch. 07 - Output |
| 5 | COM7 | Relay Ch. 07 - Output |
| 6 | NO7 | Relay Ch. 07 – Output |
| 7 | SGND | Signal Ground |
| 8 | +5V | +5V |

## CHAPTER 3

## DIAGNOSTIC UNDER WINDOWS

USB Test Program.exe is a diagnostic program to test your USB devices under Windows/XP.

User can get USB Test Program.exe programs from Decision Studio CD.

## CHAPTER 4

## SOFTWARE PROGRAMMING UNDER WINDOWS AND LINUX

Under Windows, we provide function library and dll file for users to program the device in supported language. You can find manual "USBDII_Manual.pdf" and demo code in VB/VC/Delphi from Decision Studio CD.

Under Linux, we provide C source to allow user directly to access device. You can find manual and example in "dcihid-0.5.2.tgz".

## APPENDIX A

## WARRANTY INFORMATION

**A.1 Copyright**
Copyright DECISION COMPUTER INTERNATIONAL CO., LTD./DECISION GROUP INC. All rights reserved. No part of SmartLab software and manual may be produced, transmitted, transcribed, or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of DECISION COMPUTER INTERNATIONAL CO., LTD./DECISION GROUP INC.

Each piece of SmartLab package permits user to use SmartLab only on a single computer, a registered user may use he program on a different computer, but may not use the program on more than one computer at the same time.

Corporate licensing agreements allow duplication and distribution of specific number of copies within the licensed institution. Duplication of multiple copies is not allowed except through execution of a licensing agreement. Welcome call for details.

**A.2 Warranty Information**

SmartLab warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the SmartLab product will be supplied free from defects

in materials and workmanship and be fully functional under normal usage.

In the event of the failure of a SmartLab product within the specified warranty period, SmartLab will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

The purchaser must pay transportation costs for goods returned. Repaired goods will be dispatched at the expense of SmartLab.

To ensure that your SmartLab product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, SmartLab's obligations will be limited to repair or replacement only, of goods found to be defective a specified above during the warranty period. SmartLab is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the SmartLab product. SmartLab reserves the right to determine what constitutes warranty repair or replacement.

Return Authorization: It is necessary that any returned goods are clearly marked with an RA number that has been issued by SmartLab. Goods returned without this authorization will not be attended to.
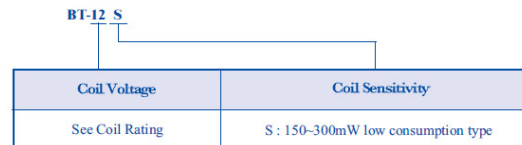
# APPENDIX B
## DATA SHEET

### ■ FEATURES

- 2 Form C Contact
- DIL Pitch Terminals
- High Reliability Bifurcated Contact
- Conforms to FCC Part 68 1500V Surge and Dielectric Strength 1000VAC
- Fully sealed
- UL File No. E147052
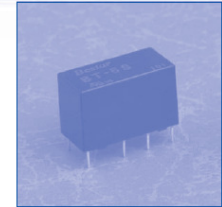
### ■ COIL RATING (at 20 °C)

| Nominal Voltage (VDC) | Coil Resistance (Ω ± 10%) | Nominal Current (mA) | Pick-Up Voltage (VDC) | Drop-Out Voltage (VDC) | Maximum Allowable Voltage(VDC) | Power Consumption (mW) |
|---|---|---|---|---|---|---|
| 5 | 167 | 30 | 3.5 | 0.5 | 6.0 | 150 |
| 6 | 240 | 25 | 4.2 | 0.6 | 7.2 | 150 |
| 9 | 540 | 16.6 | 6.3 | 0.9 | 10.8 | 150 |
| 12 | 960 | 12.5 | 8.4 | 1.2 | 14.4 | 150 |
| 24 | 2880 | 8.3 | 16.8 | 2.4 | 28.8 | 200 |
| 48 | 7680 | 6.25 | 33.6 | 4.8 | 57.6 | 300 |

### ■ ORDERING INFORMATION

**BT-12 S**

| Coil Voltage | Coil Sensitivity |
|---|---|
| See Coil Rating | S : 150~300mW low consumption type |

*Nil : Power Consumption up to 560mW available upon request

■ SPECIFICATIONS

| Model No. | | BT |
|---|---|---|
| Contact Arrangement | | 2 Form C |
| Contact Type | | Bifurcated |
| Contact Material | | AgPd+Au Clad |
| Contact Resistance | | Max. 60mΩ ( initial ) |
| Contact Rating (at Resistive Load) | Max. Switching Voltage | 220VAC, 150VDC |
| | Max. Switching Current | 2A |
| | Max. Switching Power | 30W(DC), 50VA(AC) |
| | Rated Load | 1.25A 24VDC 0.5A 100VAC |
| Dielectric Strength | | |
| Between Coil & Contacts | | 1000VAC(1 minute) |
| Between Contacts | | 1000VAC(1 minute) |
| Surge Strength | | 1500V |
| Operate Time | | Max. 6m Sec |
| Release Time | | Max. 4m Sec |
| Ambient Temperature | | -30°C~+80 °C |
| Insulation Resistance | | Min. 1000MΩ at 500VDC |
| Vibration Resistance | | 1.5mm D.A. 10-55HZ |
| Shock | Functional | 10G |
| | Destruction | 100G |
| Mechanical Life | | $2 \times 10^7$ operations (at no load) |
| Electrical Life (Resistive Load) | | $2 \times 10^6$ operations at 1mA 20m VAC |
| | | $2 \times 10^6$ operations at 20mA 20 VDC |
| | | $1 \times 10^5$ operations at 1.25A 24 VDC |
| | | $1 \times 10^5$ operations at 0.5A 100 VAC |
| Weight | | Approx. 6g |

DIMENSIONS(mm)

WIRING DIAGRAM
(Bottom View)

1    4    6    8

16   13   11   9

PC board pattern (mm)
(Bottom View)

8-Ø1.0

General Tolerance ±0.1

20.2

9.8

12.2

1.15

2-Ø0.5   6-0.6x0.25

7.62  5.08  5.08    7.62

General Tolerance ±0.3

7.62  5.08  5.08
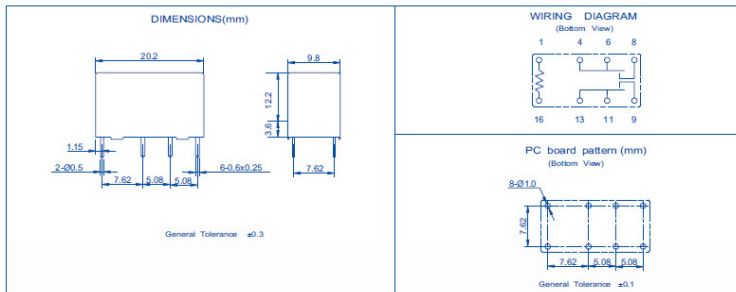
# APPENDIX C
## External Power Installation

*\*\*Optional for Decision Group USB I/O series of items*
*\*\* The materials of the external power for Decision Group*
*USB I/O series items are customer-self-supplied or optional*
*purchase, they are not covered in the standard package of*
*Decision Group USB I/O series items.*

## 1. The Materials of the external power (*customer-self-supplied*)



\* 5V / 1A AC adapter  (*Power plug type is subject to the different varieties in different country.*).
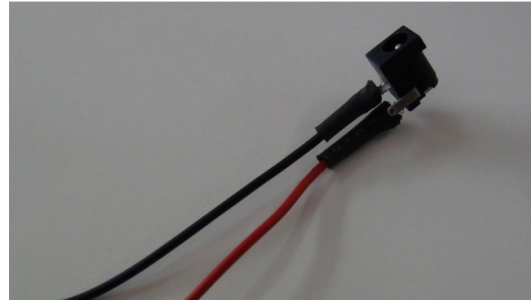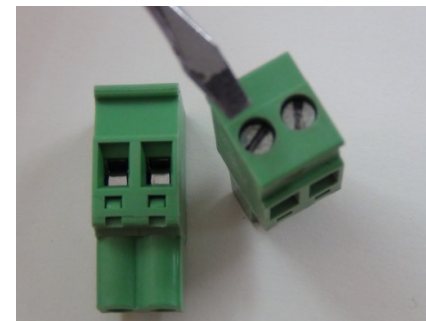
* AC power cord

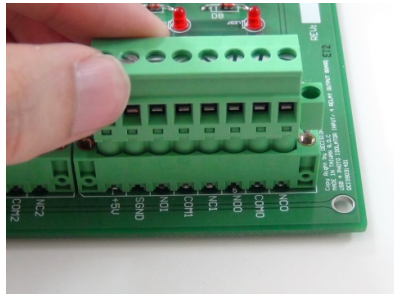## 2. Terminal blocks built-in on Decision Group USB I/O series of Items:



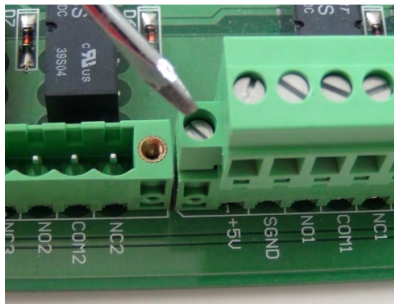e.g. PCB pluggable terminal blocks. (for PRO type only)

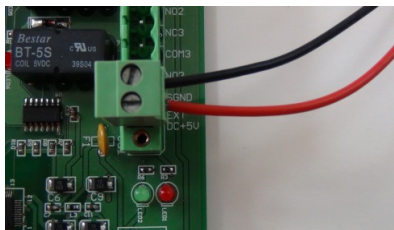## 3. External Power Installation procedure:



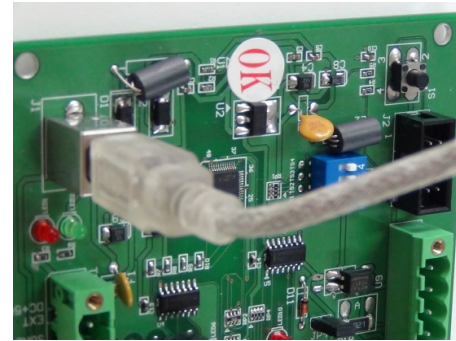To tight / loose the terminal with a minus screwdriver.

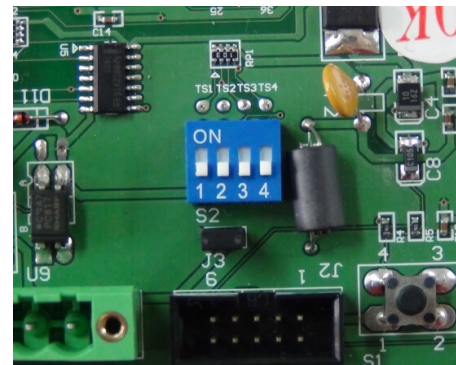Plug the terminal blocks into the socket. (PRO type only)



Fasten both sides of the screws (PRO type only)



Attach the **black** cord to the **SGND** and the **red** cord to the **EXT DC+5V.,** as well as the signals cords

Connect your device to the computer with a USB cable



To confirm all the switches and jumper setting are correct in compliance