

# USER'S MANUAL

## **Protech API Package**

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# **Protech API Package User's Manual**

## **Preface**

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# Introduction

Thank you for using Protech API Package.

The API solution provided by Protech Systems is a benefit to users to control the device with ease without having to analyze the hardware. It means that the time-wasting issues happened in general program development process, including trouble dealing with a diversity of hardware systems and catching on individual hardware specifications, control methods and communication protocols in practical applications, and the like can be resolved with Protech API Package.

## **Feature**

The API solution provided by Protech Systems is a benefit to users for the following reasons:

▶ **Speed up product release date:**

The API package helps developers design programs without being familiar with the chipset specifications and driver architecture.

▶ **Reduce workload on programming development items:**

Users can control the device by Protech API package directly – save time to write the hardware drivers from zero.

## **Environment**

- ▶ Windows 32 bit OS + .NET Framework version 2.0 or above

## **Applicable Field**

- ▶ Industrial CPU Board
- ▶ POS PC
- ▶ Applied Computer
- ▶ Panel PC

## **Supported Function**

- ▶ Programmable GPIO
- ▶ Digital IO
- ▶ Watch Dog
- ▶ Cash Drawer
- ▶ Hardware Monitor
- ▶ i-Button
- ▶ UPS

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# Table of Contents

|  |            |
|--|------------|
| <b>Chapter 1 Getting Started .....</b>                   | <b>1-1</b> |
| Section 1 API Package Content .....                      | 1-2        |
| Section 2 Open API Package Program.....                  | 1-4        |
| <b>Chapter 2 Using API.....</b>                          | <b>2-1</b> |
| Section 1 API Procedure .....                            | 2-2        |
| Section 2 Sample Code .....                              | 2-3        |
| <b>Chapter 3 API Package Program .....</b>               | <b>3-1</b> |
| Section 1 IO Control .....                               | 3-2        |
| Section 2 Program GPIO.....                              | 3-4        |
| Section 3 Cash Drawer.....                               | 3-5        |
| Section 4 Watch Dog .....                                | 3-6        |
| Section 5 SMBUS .....                                    | 3-7        |
| Section 6 Hardware Monitor.....                          | 3-8        |
| Section 7 Battery.....                                   | 3-9        |
| Section 8 I-Button .....                                 | 3-10       |
| <b>Chapter 4 Program Developing .....</b>                | <b>4-1</b> |
| Section 1 API Function .....                             | 4-2        |
| Section 2 Digital IO Function .....                      | 4-3        |
| Section 3 GPIO Function .....                            | 4-5        |
| Section 4 Cash Drawer Function .....                     | 4-6        |
| Section 5 Watch Dog Function .....                       | 4-7        |
| Section 6 Hardware Monitor Function.....                 | 4-8        |
| Section 7 SMBUS Function.....                            | 4-10       |
| Section 8 UPS Function .....                             | 4-11       |
| Section 9 I-Button Function .....                        | 4-19       |
| Section 10 I2C Function .....                            | 4-19       |
| <b>Appendix A FAQ.....</b>                               | <b>A-1</b> |
| Section 1 Cannot Open API Program .....                  | A-2        |
| Section 2 Cannot Make Sure XML File Correct or Not ..... | A-2        |
| Section 3 Cannot Find Functions in Support List .....    | A-3        |
| Section 4 Cannot Run Self-developed Program .....        | A-3        |
| Section 5 Cannot Use Demo Project.....                   | A-3        |
| Section 6 Differences between Digital IO and GPIO.....   | A-3        |

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# Chapter 1 Getting Started

In this Chapter, you will have a brief on the API Package functions and content, and be ready to use the API interface.


Sections included:

- Section 1 API Package Content ..... 1-2
- Section 2 Open API Package Program ..... 1-4

## Section 1 API Package Content

Users can find the enclosed API Package files inside the Protech Manual / Driver CD. Depending on machine types, the API Package files may include the following:

| Operation System  | Windows 32 bit + .NET Framework 2.0 or above                    |   |  |
|-------------------|---|---|--|
| Directory         | Contents / File Name  |   | Description                                |
| Document\         | Protech API Package User Guide<br>A01-0000-000-02-xxxxxx_en.pdf |   | User Manual in English                     |
|                   | Protech API Package User Guide<br>A01-0000-000-02-xxxxxx_ch.pdf |   | User Manual in Chinese                     |
|                   | IO Description.pdf  |   | ---  |
|                   | UPS Standard SBS Commands.pdf                                   |   | ---  |
| Function DLL      |   |   |  |
| Directory         | Function  | File Name   | Description                                |
| ProxAPI standard\ | Cash<br>Drawer  | Cash Drawer.dll   | Driver to control Cash<br>Drawer           |
|                   | Digital   | Digital.dll   | Driver to control Digital<br>IO            |
|                   | GPIO  | GPIO.dll<br>WinIo.dll<br>WinIo.lib<br>WinIo.sys<br>WINIO.VXD  | Driver to control GPIO                     |
|                   | SMBUS   | WinIo.dll<br>WinIo.lib<br>WinIo.sys<br>WINIO.VXD<br>SMBUS.dll | Driver to use SMBUS                        |
|                   | WDT   | Watchdog.dll  | Driver to control<br>Watchdog              |
|                   | i-Button  | IButtonAPI.dll<br>IBFS32.dll                                  | Driver to get i-Button                     |
|                   | Hardware<br>Monitor   | Hardware Monitor.dll  | Driver to read hardware<br>data            |
|                   | Battery   | SBS_Battery.dll<br>phymem.sys<br>pmdll.dll                    | Driver to read and control<br>battery data |
|                   | multilangXML.dll  |   | Driver to open XML file                    |
|                   | Initial.xml   |   | XML file to initiate the<br>API Package    |
|                   | ProxAP.exe  |   | API program executable<br>file             |
|                   | XML Files\Model Name*\Initial.xml                               |   | XML file for each model                    |
|                   | Version.ini   |   | Version information                        |

 Model Name is dependent on your machine type.




(continued)

| Sample Program |                                   |                               |
|----------------|-----------------------------------|-------------------------------|
| Directory      | Contents / File Name              | Description                   |
| DEMO PROJECT\  | DEMO PROJECT\GPIO Sample Code     | C# VB6 VB.net Source Code     |
|                | DEMO PROJECT\Digital Sample Code  | C# VB6 VB.net Source Code     |
|                | DEMO PROJECT\Watchdog Sample Code | C# VB6 VB.net MFC Source Code |

## Section 2 Open API Package Program

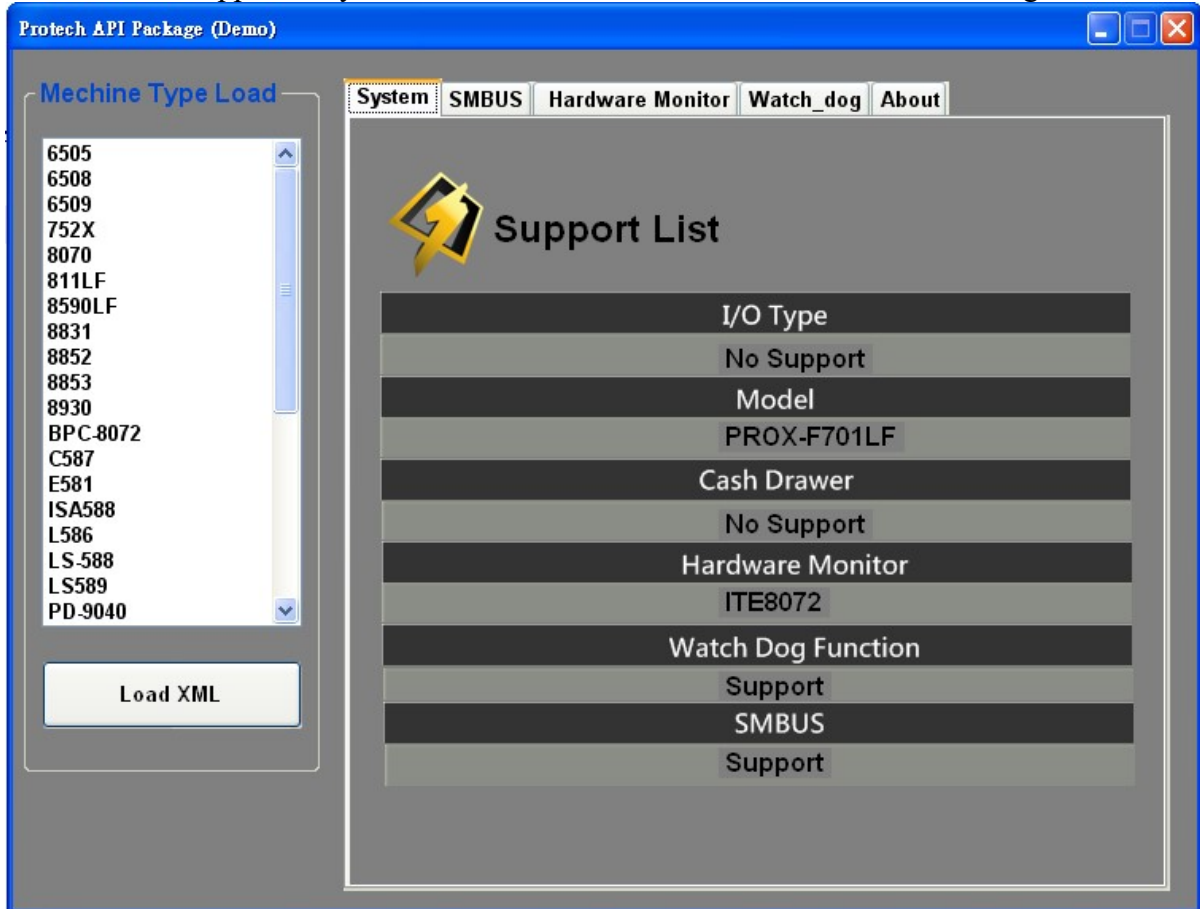
An XML file must be included in the API Package for the API program to be executed normally. Take PS6509 for example, users will need the following files to run API Package:

- ProxAPI standard\Cash Drawer.dll
- ProxAPI standard\multilangXML.dll
- ProxAPI standard\Watch dog.dll
- ProxAPI standard\Hardware Monitor.dll
- ProxAPI standard\XML Files\6509\Initial.xml
- ProxAPI standard\ProxAP.exe

 When developing the program, make sure all necessary files are present in your working directory, including the function DLLs, multilangXML.dll, and Initial.xml.

After executing the API program (ProxAP.exe), the program will display the related tabs based on the machine type selected. That is, on the System tab, select your product model name from the “Machine Type Load” list on the left pane, and then tap **[Load XML]** to get the supported functions displayed in the Support List as shown below:

API functions supported by PROX-F701LF are - Hardware Monitor, Watch Dog and SMBUS.



## Chapter 2 Using API

In this Chapter, you will learn how to use the API procedure in several programming languages.

Sections included:

- Section 1 API Procedure..... 2-2
- Section 2 Sample Code ..... 2-3

## Section 1 API Procedure

Take **VB2005 .NET** for example, first you must declare a function. You may create a module in your project and fill in the function, cash drawer for example.

```
Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean
```

```
Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num_drawer as short) As Boolean
```

Next, create a button to call API Function

1. Call Cash drawer open event:

```
Private Sub cash_btn1_Click (ByVal Sender As System.Object, ByVal e As System.EventArgs) Handles cash_btn1.Click
    CashDrawerOpen(1), "1" specifies the cash drawer 1 port
    CashDrawerOpen(2), "2" specifies the cash drawer 2 port
    Timer1.start
```

2. Detect Cash drawer status:

A timer event can be created.

```
Private Sub Timer1_Tick (ByVal Sender As System.Object,ByVal e As System.EventArgs) Handles Timer1.Tick
    Dim Receive_Status1 as Boolean
    Dim Receive_Status2 as Boolean
    Receive_Status1 = CashDrawerOpen(&H1)
    If Receive_Status1 = true then
        Text1.text = "cash drawer1 open" 'enter text into textbox.
    Else
        Text1.text = "cash drawer1 close" 'enter text into textbox.
    End if
    '=====
    Receive_Status2 = CashDrawerOpen(&H2)
    If Receive_Status2 = true then
        Text2.text = "cash drawer2 open" 'enter text into textbox.
    Else
        Text2.text = "cash drawer2 close" 'enter text into textbox.
    End if
    '=====
End sub
```

## Section 2 Sample Code

### (1) VB Declaration

```
Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num_drawer as short)
As Boolean
```

```
Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num_drawer as short) As
Boolean
```

### (2) Call Function

**Open cash drawer:**

```
CashDrawerOpen(1)
```

**Open cash drawer1**

```
CashDrawerOpen(2)
```

**Open cash drawer2**

**Check cash drawer status:**

```
Dim receive_status as Boolean
```

**Check cash drawer1 status**

```
Receive_Status = CashDrawerOpen(&H1)
```

**Check cash drawer2 status**

```
Receive_Status = CashDrawerOpen(&H2)
```

### (1) C# Declaration Method

```
Public class PortAccess
{
[DllImport("CashDrawer.dll",EntryPoint = "Initial_CashDrawer")]
Public static extern void Initial_CashDrawer();
[DllImport("CashDrawer.dll",EntryPoint= "GetCashDrawerStatus")]
Public static extern bool GetCashDrawerStatus()
[DllImport("CashDrawer.dll",EntryPoint = "CashDrawerOpen")]
Public static extern bool CashDrawerOpen(short num_drawer);
}
```

### (2) Call Function

**Open cash drawer1**

```
PortAccess.CashDrawerOpen(0x01);           //check cash drawer1 status
```

**Open cash drawer2**

```
PortAccess.CashDrawerOpen(0x02);           //check cash drawer2 status
```

```
Bool bstatus;
```

```
bstatus = PortAccess.GetCashDrawerStatus(0x01);
```

```
bstatus = PortAccess.GetCashDrawerStatus(0x02); //Before get cash drawer status, need
to initial cash drawer first
```

**VB.NET extern function:**

Declare Function SetMinSec Lib "WatchDog.dll" (ByVal kind As Short, ByVal delay\_time As Short) As Boolean

Declare Function Stopwatchdog Lib "WatchDog.dll" ( ) As Short

Declare Function Setwatchdog Lib "WatchDog.dll" (ByVal value As Short) As Boolean

'=====

Declare Function Digital\_Initial Lib "Digital.dll" ( ) As Long

Declare Function Digital\_Set Lib "Digital.dll" (ByVal hex\_value As Short) As Long

Declare Function Digital\_Get Lib "Digital.dll" ( ) As Short

'=====

Declare Function GPIO\_Initial Lib "GPIO.dll" ( ) As Long

Declare Function GPIO\_SetPort Lib "GPIO.dll" (ByVal direct As long)

Declare Function GPIO\_Set Lib "GPIO.dll" (ByVal dout\_value As long) As Boolean

Declare Function GPIO\_Get Lib "GPIO.dll" ( ) As Short

'=====

Declare Function GetCashDrawerStatus Lib CashDrawer.dll (ByVal num\_drawer as short) As Boolean

Declare Function CashDrawerOpen Lib CashDrawer.dll (ByVal num\_drawer as short) As Boolean

---

**VB 6 extern function:**

Declare Function CashDrawerOpen Lib "CashDrawer.dll" (ByVal num\_drawer As Integer) As Boolean

Declare Function GetCashDrawerStatus Lib "CashDrawer.dll" (ByVal num\_drawer As Integer) As Boolean

 VB.net short = integer VB6

# Chapter 3 API Package Program


In this Chapter, you will learn to use the API Package program.

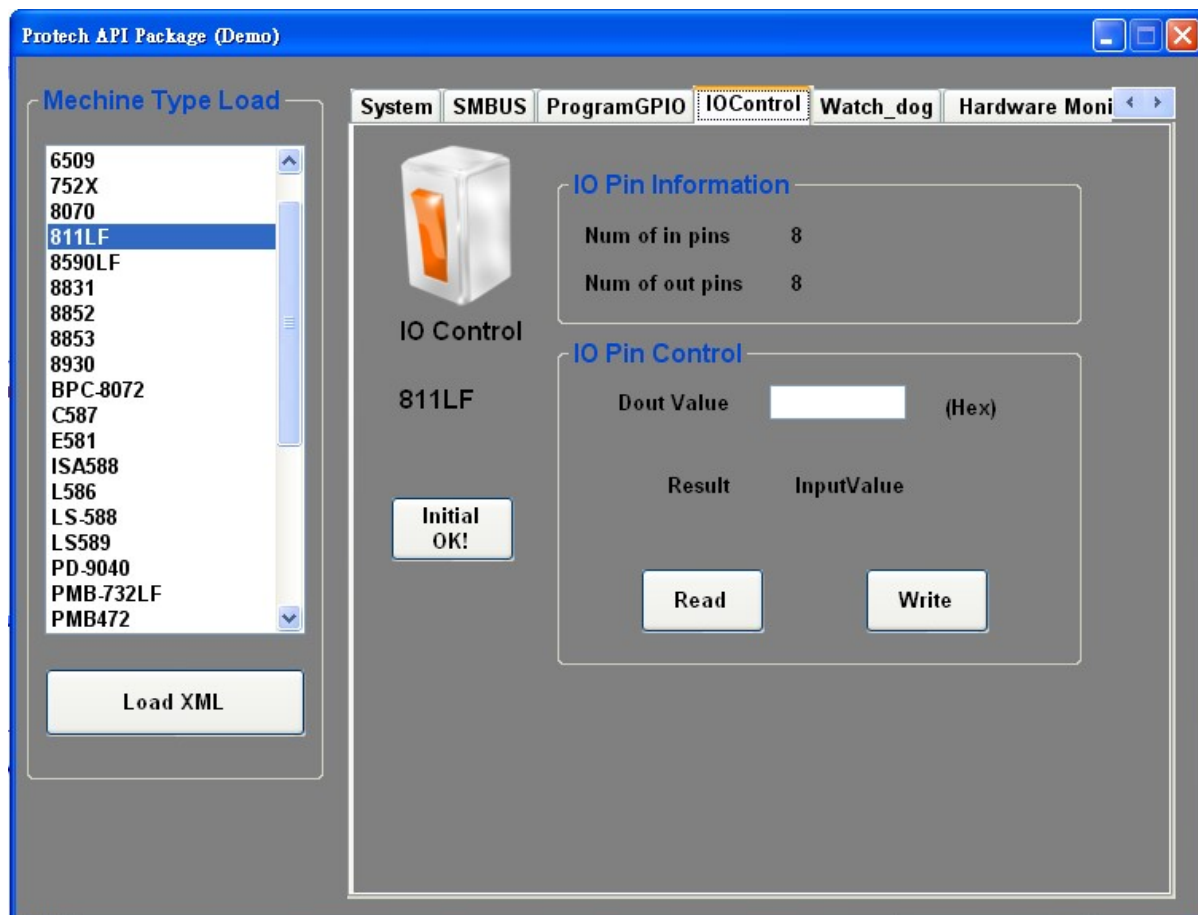
Sections included:

|                                    |      |
|------------------------------------|------|
| ● Section 1 IO Control .....       | 3-2  |
| ● Section 2 Program GPIO .....     | 3-4  |
| ● Section 3 Cash Drawer .....      | 3-5  |
| ● Section 4 Watch Dog .....        | 3-6  |
| ● Section 5 SMBUS .....            | 3-7  |
| ● Section 6 Hardware Monitor ..... | 3-8  |
| ● Section 7 Battery .....          | 3-9  |
| ● Section 8 I-Button .....         | 3-10 |

## Section 1 IO Control

The API Package program demonstrates how to use the API Library in a user's application.

 This program developed by VB.NET requires Microsoft .NET Framework version 2.0 or above.




### [Initial]

Initialize IO Function, and if successful the button will become

**[Initial OK!]** as shown right.



 If **[Initial OK!]** is not displayed, the execution continued may fail.

### IO Pin Information

The input and output pin numbers on this machine type will be displayed.



**IO Pin Control**

► **Dout Value** Input the hex value to send to the IO Port.

Take 811LF for example, by default there are 8 output pins in total. If you want to set all the output pins as “High”, fill “0x00FF” in the **Dout Value** text field.

 The “FF” indicates the 8-bit binary value (11111111) as shown below:

| Bit7(IO7) | Bit6(IO6) | Bit5(IO5) | Bit4(IO4) | Bit3(IO3) | Bit2(IO2) | Bit1(IO1) | Bit0(IO0) |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1         | 1         | 1         | 1         | 1         | 1         | 1         | 1         |

Likewise, if you want to set all the output pins as “Low”, fill “0x0000” in the **Dout Value** text field.

When working with a 4in/ 4out type, fill in “0F”.

(i.e. the later 4 bits indicate the IO pin positions to be controlled)

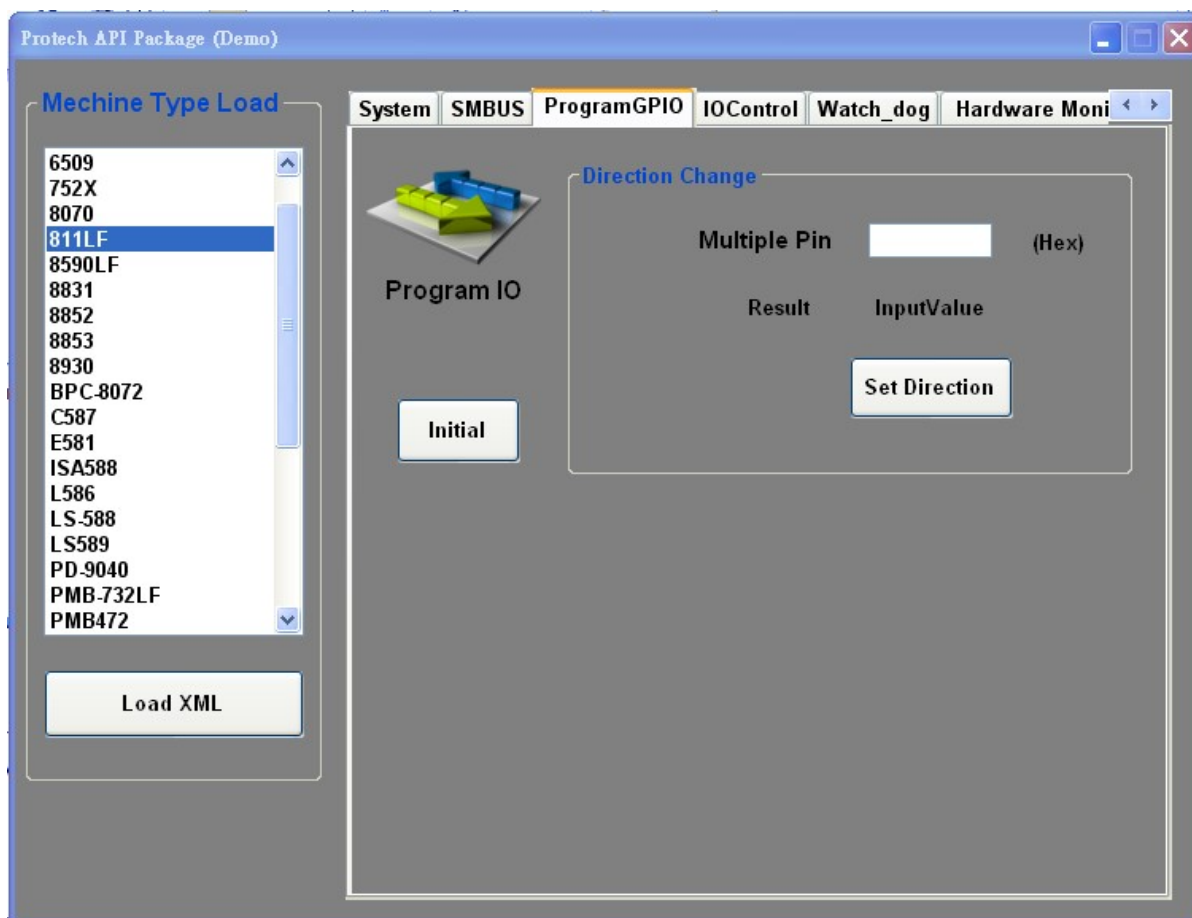
| N/A | N/A | N/A | N/A | Bit3(IO3) | Bit2(IO2) | Bit1(IO1) | Bit0(IO0) |
|-----|-----|-----|-----|-----------|-----------|-----------|-----------|
| 0   | 0   | 0   | 0   | 1         | 1         | 1         | 1         |

► **[Write]** Tap to output the value of **Dout Value** to the hardware.

► **[Read]** Tap to read the input signal value and show the value to the **Result** field.

► **Result** The input signal value will be displayed in hex after **[Read]** is tapped.

## Section 2 Program GPIO



### [Initial]

Initialize IO Function, and if successful the button will become [Initial OK!] as shown right.

If [Initial OK!] is not displayed, the execution continued may fail.

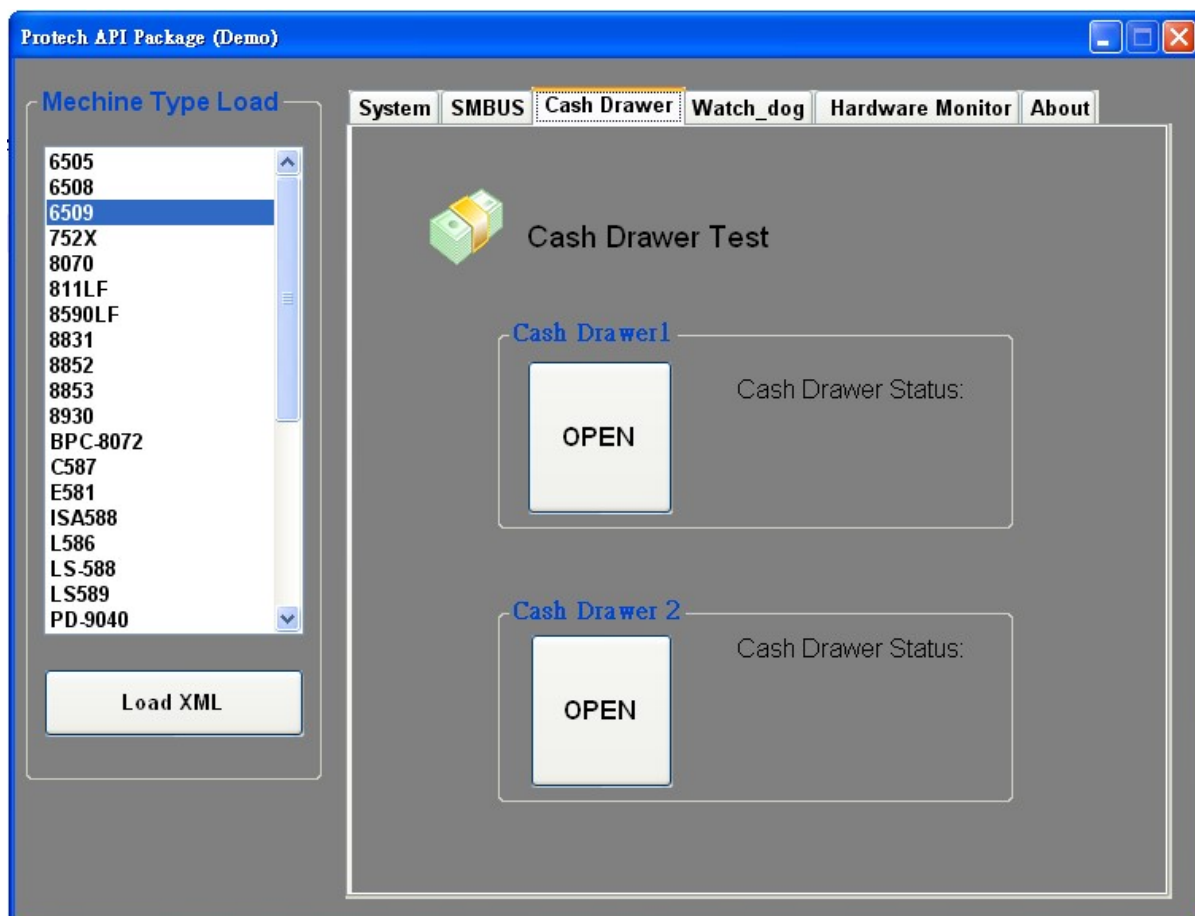


### Direction Change

- **Multiple Pin**      Input the hex value to control pin functions as input or output. For Protech products, the defined output is binary 1, and the defined input is binary 0.

Take 811LF for example, by default it is 8in/ 8out type. Each pin can be configured as input or output. If you want to set all the 16 pins as output, fill “FFFF” in the **Multiple Pin** text field. “FFFF” represents to bit16 ~ bit1 from left (MSB) to right (LSB).  
 To restore factory default, reset the power to the machine.
- **[Set Direction]**      Tap to output the value of **Multiple Pin** to the system IO.
- **Result**                  The returned value, true on success or false on failure, will be displayed after **[Set Direction]** is tapped.

## Section 3 Cash Drawer



### [OPEN]

Tap to open the cash drawer.

### Cash Drawer Status

Cash drawer status will be displayed after [OPEN] is tapped.

- ▶ Cash drawer is closed as shown.


Cash Drawer Status:

**Close**

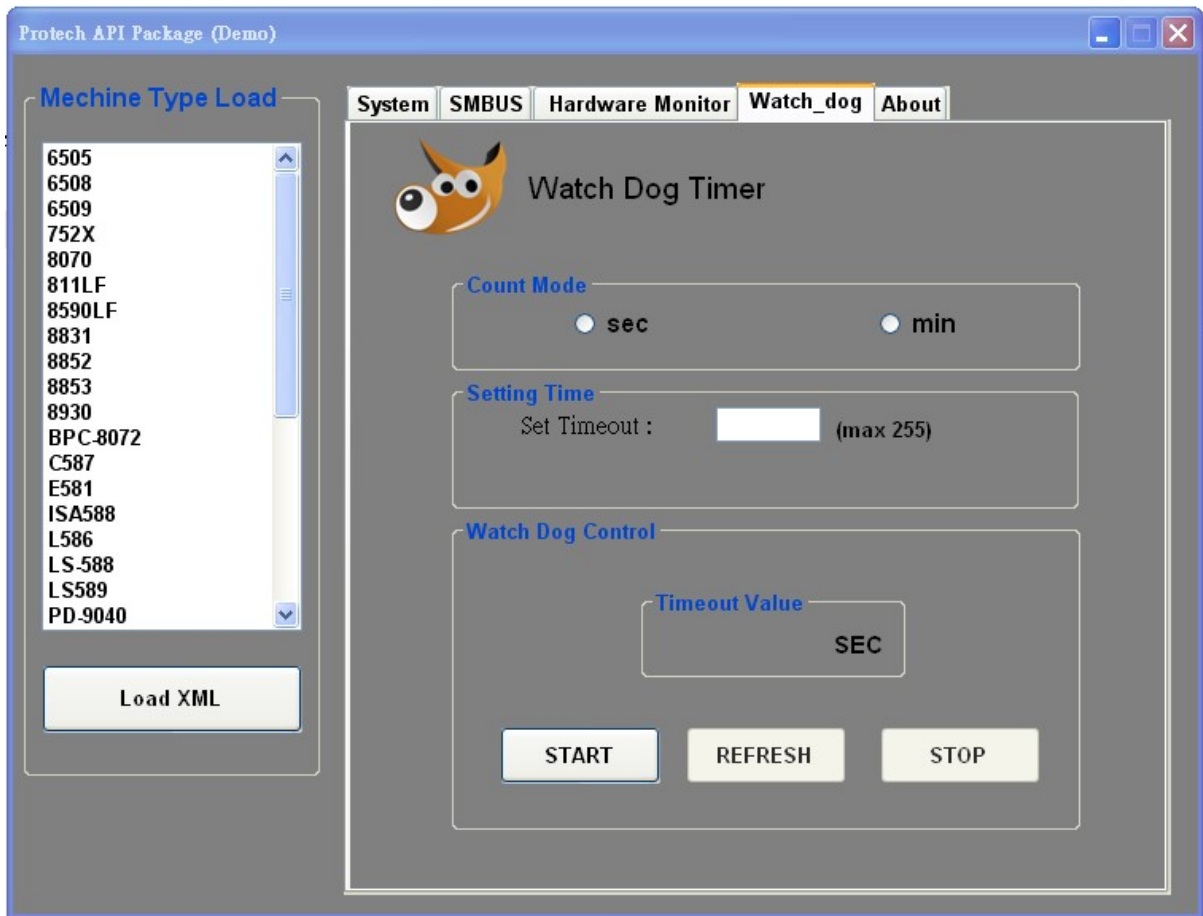
- ▶ Cash drawer is open as shown.

Cash Drawer Status:

**Open**

 For example, PS6509 has two cash drawers, so the API program displays two buttons for each drawer. For a machine with single cash drawer, on the other hand, the API program displays one button, and so does to a machine that supports one cash drawer only.

## Section 4 Watch Dog



### **Count Mode**

Select the unit of time, second or minute, for the watchdog timer.

### **Setting Time**

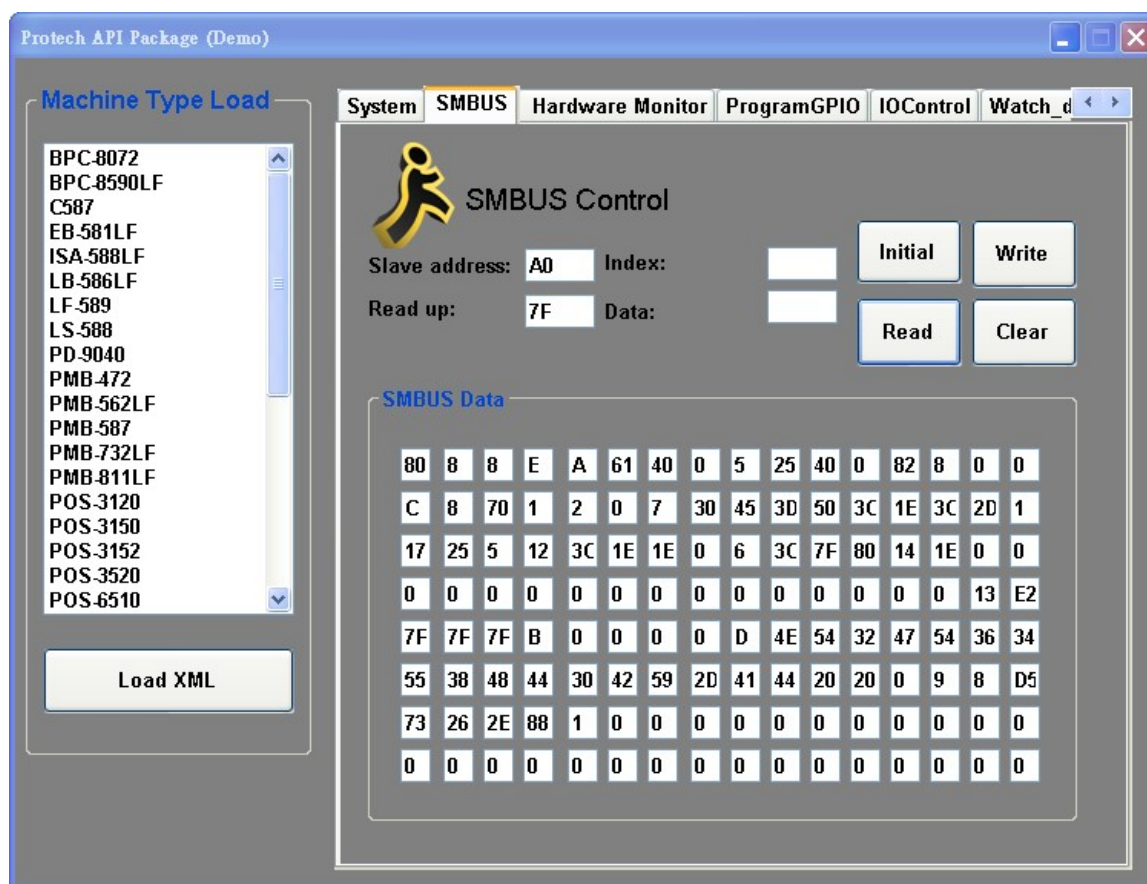
- ▶ **Set Timeout** Set the timeout for the watchdog. The maximum timeout value is 255 seconds or minutes.

### **Watch Dog Control**

- ▶ **Timeout Value** Simulation timer of the API program, the running watchdog timeout will be displayed (in seconds). It is not as accurate as a hardware watchdog clock.
- ▶ **[START]** Tap to start the watchdog timer. Meanwhile the **[REFRESH]** and **[STOP]** buttons will be enabled.
- ▶ **[STOP]** Tap to stop the watchdog timer.
- ▶ **[REFRESH]** Tap to restart the watchdog timer.

## Section 5 SMBUS

Users are able to test peripheral devices through the SMBus controller under this tab.



### [Initial]

Tap to initialize the SMBus API program.

### Slave Address

Set the SMBus position (in hex) to be read or written.

► To read data:

► To write data:

#### Read up

Set the maximum amount (in hex) of data to be read.

#### Index

Set the index position (in hex) for writing data.

#### Data

Set data (in hex) to be written.

#### [Read]

Tap to read data to the text boxes below.

#### [Write]

Tap to write data to the text boxes below.

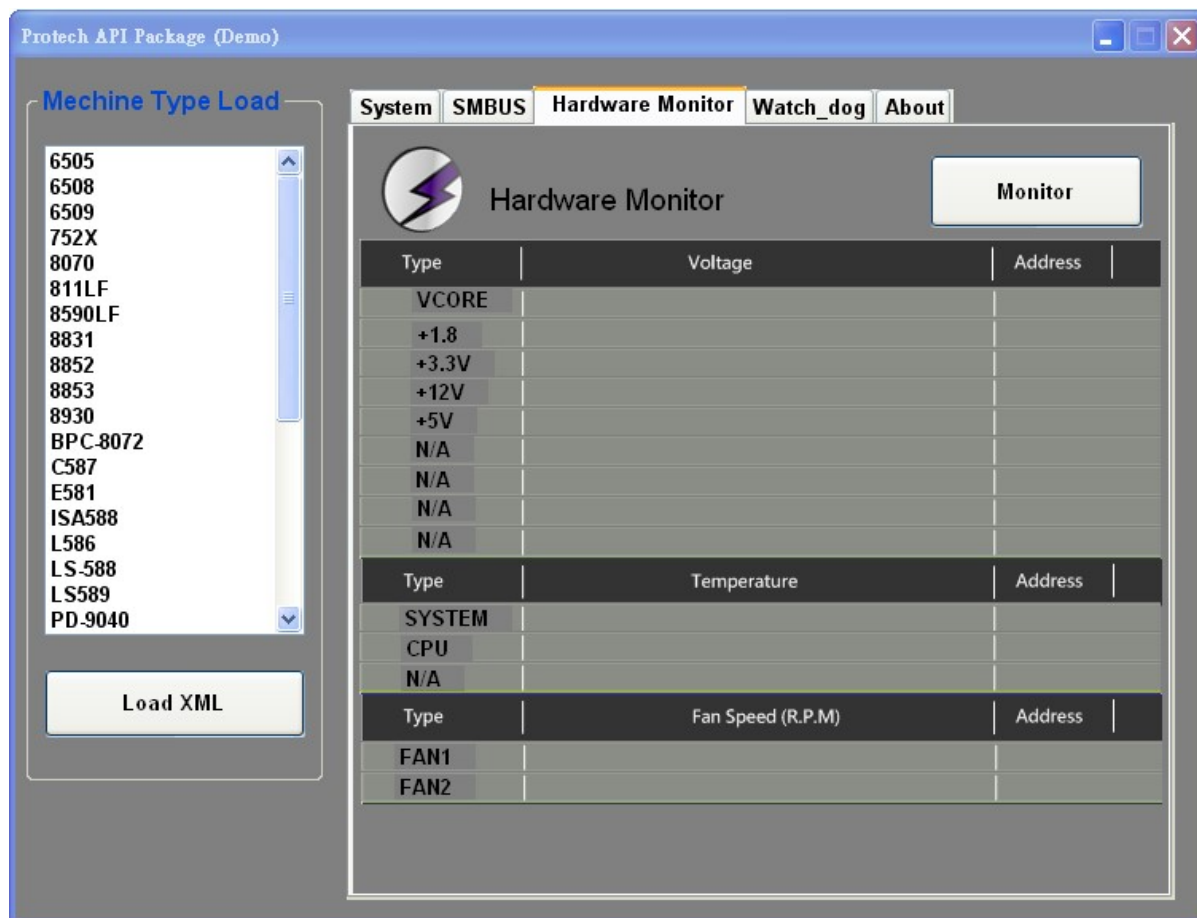
### SMBUS Data

Data being read or written will be displayed in the text boxes below, after [Read] or [Write] is tapped.

### [Clear]

Tap to clear all the text boxes under **SMBUS Data** ready for another entry.

## Section 6 Hardware Monitor

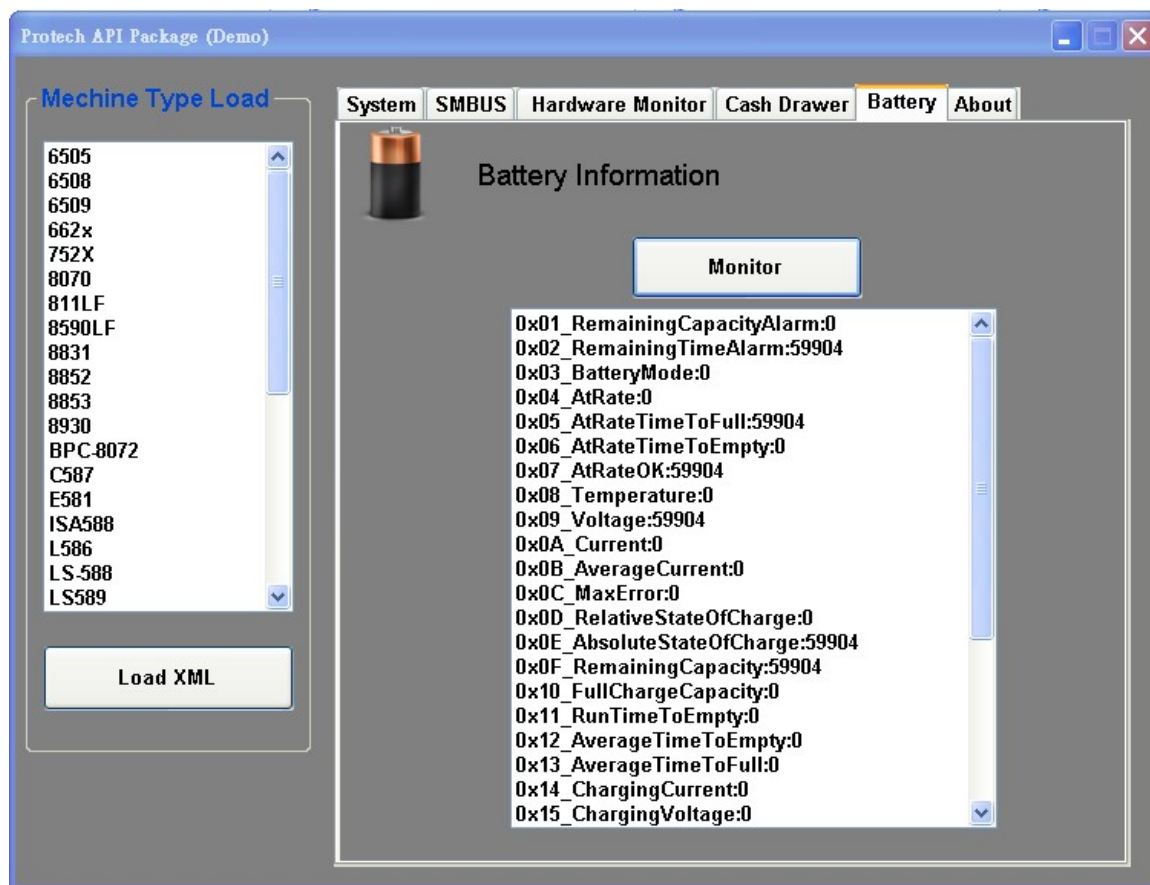


### [Monitor]

Tap to get the hardware monitoring values, such as the voltages, temperatures, and fan speeds (rpm).

It is machine type dependent.

## Section 7 Battery

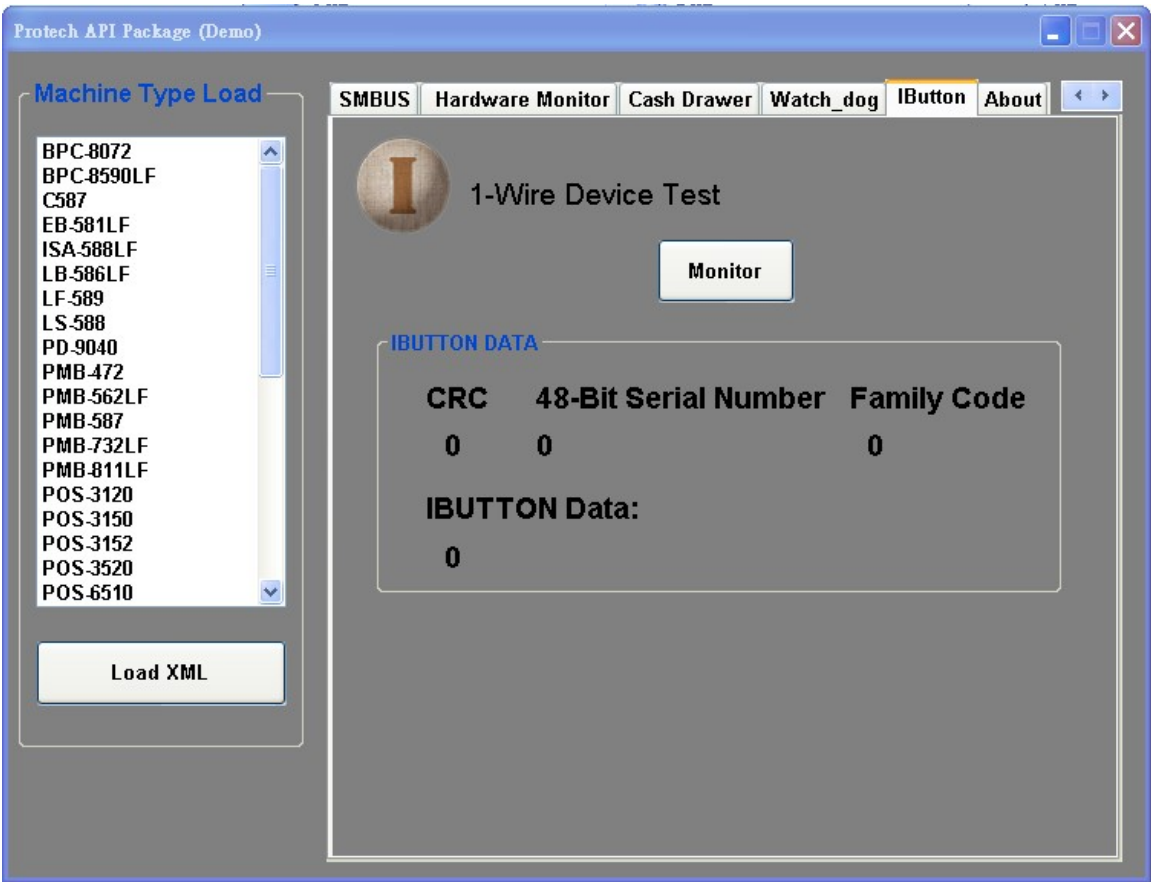


### [Monitor]

Tap to get the UPS values.

It is machine type dependent.

Section 8 I-Button



[Monitor]

Tap to get the i-Button data that will be displayed below the **IBUTTON DATA** field.



# Chapter 4 Program Developing

In this Chapter, you will learn essential functions when developing the program.

Sections included:

- Section 1 API Function ..... 4-2
- Section 2 Digital IO Function ..... 4-3
- Section 3 GPIO Function ..... 4-5
- Section 4 Cash Drawer Function ..... 4-6
- Section 5 Watch Dog Function ..... 4-7
- Section 6 Hardware Monitor Function ..... 4-8
- Section 7 SMBUS Function ..... 4-10
- Section 8 UPS Function ..... 4-11
- Section 9 I-Button Function ..... 4-19

## Section 1 API Function

The API program-related sample programs, developed in VB.Net and C#, are provided for easy use of the API Package. Refer to the main API functions listed as below.

| API Function            |   | DLL              |                      |
|-------------------------|---|------------------|----------------------|
| <b>Digital IO</b>       | Digital_Initial<br>Digital_Set<br>Digital_Get                           | multilangXML.dll | Digital.dll          |
| <b>GPIO (IO)</b>        | GPIO_Initial<br>GPIO_SetPort<br>GPIO_Set<br>GPIO_Get                    |                  | GPIO.dll             |
| <b>Cash Drawer</b>      | CashDrawerOpen<br>GetCashDrawerStatus                                   |                  | CashDrawer.dll       |
| <b>Watchdog (WD)</b>    | Watchdog_Set<br>Watchdog_Stop<br>Watchdog_SetMinSec<br>Watchdog_Recount |                  | WatchDog.dll         |
| <b>Hardware Monitor</b> | HMWVotlage_Get<br>HWMtTemperature_Get<br>HWMFanSpeed_Get                |                  | Hardware Montior.dll |
| <b>SMBUS</b>            | SMBUS_Initialization<br>SMBUS_Write<br>SMBUS_Read                       |                  | SM_Control.dll       |

## Section 2 Digital IO Function


### Digital\_Initial

**bool Digital\_Initial ( ) ;**

**Purpose** Initialize Digital API Package.

**Value** None

**Return** True (1) on success, False (0) on failure

 Before using the API Package, this function should be called to pass XML variables to the DLL.

### Digital\_Set

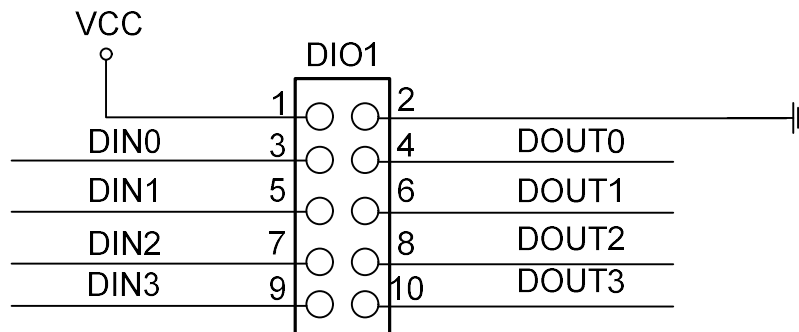
**bool Digital\_Set (short hex\_value);**

**Purpose** Set the digital logic state.

**Value** hex\_value

**Return** True (1) on success, False (0) on failure

For a 4in/ 4out type, as illustrated below:



The 4-bit (bit0 ~ bit3) binary value represents the digital output signal. The binary variable is defined as High (1) and Low (0).

**Example**

```

Digital_Set(0x01);           // Set DOUT0 as High

Digital_Set(0x09);           // 1001, DOUT3 and DOUT0 are High;
                             // DOUT2 and DOUT1 are low

```

|                    |
|--------------------|
| <b>Digital_Get</b> |
|--------------------|

**short Digital\_Get (void);**

Purpose    Get the digital input signal.

Value    None

Return    Digital input pin logic state

Example        Short data;  
                 data = Digital\_Get( );        // DIN data, High/ Low input status

## Section 3 GPIO Function


### GPIO\_Initial

**bool GPIO\_Initial (void);**

**Purpose** Initialize the GPIO API Package.

**Value** None

**Return** True (1) on success, False (0) on failure

 Before using the API Package, this function should be called.

### GPIO\_Set

**bool GPIO\_Set (long dout\_value)**

**Purpose** Set the GPIO logic state.

**Value** dout\_value (in hex)

**Return** True (1) on success, False (0) on failure

### GPIO\_Get

**long GPIO\_Get ()**

**Purpose** Get the GPIO input signal.

**Value** None

**Return** GPIO input pin logic state

 Make sure the GPIO pin is set as input.

### GPIO\_Setport

**bool GPIO\_SetPort (long Directvalue)**

**Purpose** Set the GPIO pin as input/ output.

**Value** DirectValue (in hex)

**Return** True (1) on success, False (0) on failure

For an 8in/ 8out type of Protech products, the binary variable is defined as Output (1) and Input (0).

The 8-bit (bit0 ~ bit7) binary value represents each GPIO Pin.

**Example**            GPIO\_Set(0x11);            // 00010001, GPIO4 and GPIO0 are set to Output; the others are Input

## Section 4 Cash Drawer Function

### CashDrawerOpen

**bool CashDrawerOpen (short num\_drawer);**

Purpose Open the cash drawer API.

Value num\_drawer = 1 (Open the Cash Drawer1)  
2 (Open the Cash Drawer2)

Return True (1) on success, False (0) on failure

Example CashDrawerOpen(0x01); // Open the Cash Drawer1

### GetCashDrawerStatus

**bool GetCashDrawerStatus (short num\_drawer);**

Purpose Get the cash drawer status.

Value num\_drawer = 1 (Get the Cash Drawer1 status)  
2 (Get the Cash Drawer2 status)

Return True (1) on success, False (0) on failure

Example Short data;  
data= GetCashDrawerStatus(0x01); // Get the Cash Drawer1 status  
if (data)  
MsgBox("open1"); // Cash Drawer1 status "Open"  
Else  
MsgBox("close1"); // Cash Drawer1 status "Close"  
Endif

## Section 5 Watch Dog Function

### Watchdog\_Set

**bool Watchdog\_Set (int value)**

Purpose Set the timeout for the watchdog timer.  
 Value value = 0 ~ 255  
 Return True (1) on success, False (0) on failure

### Watchdog\_SetMinSec

**bool Watchdog\_SetMinSec (int kind)**

Purpose Set the unit of time as second/ minute.  
 Value kind = 1 (Measured in unit of second)  
                   2 (Measured in unit of minute)  
 Return True (1) on success, False (0) on failure

### Watchdog\_Stop

**bool Watchdog\_Stop (void)**

Purpose Stop the watchdog timer.  
 Value None  
 Return True (1) on success, False (0) on failure

### Watchdog\_Recount

**bool Watchdog\_Recount (void)**

Purpose Restart the watchdog timer.  
 Value None  
 Return True (1) on success, False (0) on failure

## Section 6 Hardware Monitor Function

### HMWVoltage\_Get

**float HMWVoltage\_Get (short VoltType)**

**Purpose** Get the hardware monitoring voltage value.

**Value**

| VoltType | W83627HF | W83627EHF | SMSC3114 | W83627UHG |
|----------|----------|-----------|----------|-----------|
| 0x01     | VCoreA   | CPU VCore | N/A      | VCore     |
| 0x02     | VCoreB   | VIN0      | +1.5V    | VIN0      |
| 0x03     | +3.3VIN  | AVCC      | N/A      | AVCC      |
| 0x04     | +5VIN    | +3VCC     | +5VIN    | 5VCC      |
| 0x05     | +12VIN   | VIN1      | +12V     | VIN1      |
| 0x06     | -12VIN   | VIN2      | N/A      | VIN2      |
| 0x07     | -5VIN    | VIN3      | N/A      | N/A       |
| VoltType | 81866    |           |          |           |
| 0x01     | VCore    |           |          |           |
| 0x02     | VCC12    |           |          |           |
| 0x03     | VCC5     |           |          |           |
| 0x04     | 5VSB     |           |          |           |
| 0x05     | N/A      |           |          |           |
| 0x06     | N/A      |           |          |           |
| 0x07     | N/A      |           |          |           |

**Return** Float type data on voltage value

### HMWTemperature\_Get

**float HMWTemperature\_Get (short TempType)**

**Purpose** Get the hardware monitoring temperature value.

**Value**

| TempType | W83627HF           | W83627EHF          | SMSC3114        | W83627UHG       |
|----------|--------------------|--------------------|-----------------|-----------------|
| 0x01     | CPU temperature    | System temperature | CPU temperature | CPU temperature |
| 0x02     | N/A                | CPU2 temperature   | N/A             | N/A             |
| 0x03     | N/A                | N/A                | N/A             | N/A             |
| TempType | 81866              |                    |                 |                 |
| 0x01     | CPU temperature    |                    |                 |                 |
| 0x02     | System temperature |                    |                 |                 |
| 0x03     | N/A                |                    |                 |                 |

**Return** Float type data on temperature value



## HMWFanSpeed\_Get

**float HMWFanSpeed\_Get (short FanType)**

**Purpose** Get the hardware monitoring fan speed value.

| Value | FanType | W83627HF | W83627EHF | SMSC3114 | W83627UHG |
|-------|---------|----------|-----------|----------|-----------|
|       | 0x01    | Fan1     | SysFanIN  | FAN1     | FAN1      |
|       | 0x02    | Fan2     | CPUFANIN  | FAN2     | FAN2      |
|       | 0x03    | N/A      | AUXFANIN  | N/A      | N/A       |
|       | FanType | 81866    |           |          |           |
|       | 0x01    | Fan1     |           |          |           |
|       | 0x02    | Fan2     |           |          |           |
|       | 0x03    | N/A      |           |          |           |

**Return** Float type data on fan speed value (rpm)

## Section 7 SMBUS Function

### SMBUS\_Initialization

**bool SMBUS\_Initialization (int Device)**

Purpose    Initialize the SMBus API program and set the SMBus device address.  
Value     None  
Return    True (1) on success, False (0) on failure

### SMBUS\_Read

**int SMBUS\_Read (int Index)**

Purpose    Read the SMBus data.  
Value     Index                (SMBus address to be read)  
Return    A byte Array representing the data

### SMBUS\_Write

**bool SMBUS\_Write (int Index, int data)**

Purpose    Write data into the SMBus.  
Value     Index                (SMBus address to be written)  
            Data                (Data to be written)  
Return    True (1) on success, False (0) on failure

## Section 8 UPS Function

### Initialization

**bool SMBUS\_Initialization (int Devicve)**

Value     Device = 0x16 (The bq20z90/bq20z95 SBS Device Address)  
Return    True (1) on success, False (0) on failure

### RemainingCapacityAlarm

**uint RemainingCapacityAlarm( )**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### RemainingTimeAlarm

**uint RemainingTimeAlarm( )**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### BatteryMode

**byte BatteryMode( )**

Value     None  
Return    Hex value with a range of 0 to 0xe383

### AtRate

**int AtRate( )**

Value     None  
Return    Signed int value with a range of -32768 to 32767

### **AtRateTimeToFull**

**uint AtRateTimeToFull()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

### **AtRateTimeToEmpty**

**uint AtRateTimeToEmpty()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

### **AtRateOK**

**uint AtRateOK()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### **Temperature**

**uint Temperature()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### **Voltage**

**uint Voltage()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

**Current****int Current()**

Value     None

Return    Signed int value with a range of -32768 to 32767

**AverageCurrent****int AverageCurrent()**

Value     None

Return    Signed int value with a range of -32768 to 32767

**MaxError****uint MaxError()**

Value     None

Return    Unsigned int value with a range of 0 to 100

**RelativeStateOfCharge****uint RelativeStateOfCharge()**

Value     None

Return    Unsigned int value with a range of 0 to 100

**AbsoluteStateOfCharge****uint AbsoluteStateOfCharge()**

Value     None

Return    Unsigned int value with a range of 0 to 100

### **RemainingCapacity**

**uint RemainingCapacity()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### **FullChargeCapacity**

**uint FullChargeCapacity()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### **RunTimeToEmpty**

**uint RunTimeToEmpty()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

### **AverageTimeToEmpty**

**uint AverageTimeToEmpty()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

### **AverageTimeToFull**

**uint AverageTimeToFull()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

**ChargingCurrent****uint ChargingCurrent()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

**ChargingVoltage****uint ChargingVoltage()**

Value     None  
Return    Unsigned int value with a range of 0 to 65534

**BatteryStatus****uint BatteryStatus()**

Value     None  
Return    Unsigned int value with a range of 0x0000 to 0xdbff

**CycleCount****uint CycleCount()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

**DesignCapacity****uint DesignCapacity()**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### DesignVoltage

**uint DesignVoltage( )**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### SpecificationInfo

**byte SpecificationInfo( )**

Value     None  
Return    Hex value with a range of 0 to 0xFFFF

### CellBoltage01

**uint CellBoltage01( )**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### CellBoltage02

**uint CellBoltage02( )**

Value     None  
Return    Unsigned int value with a range of 0 to 65535

### CellBoltage03

**uint CellBoltage03( )**

Value     None  
Return    Unsigned int value with a range of 0 to 65535



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**CellBoltage04****uint CellBoltage04( )**

Value     None

Return    Unsigned int value with a range of 0 to 65535

**SBS Command Values**

| <b>Name</b>            | <b>Format</b> | <b>Size in Bytes</b> | <b>Min Value</b> | <b>Max Value</b> | <b>Default Value</b> | <b>Unit</b>  |
|------------------------|---------------|----------------------|------------------|------------------|----------------------|--------------|
| RemainingCapacityAlarm | unsigned int  | 2                    | 0                | 65535            | 300                  | mAh or 10mWh |
| RemainingTimeAlarm     | unsigned int  | 2                    | 0                | 65535            | 10                   | min          |
| BatteryMode            | hex           | 2                    | 0x0000           | 0xe383           | —                    |              |
| AtRate                 | signed int    | 2                    | -32768           | 32767            | —                    | mA or 10mW   |
| AtRateTimeToFull       | unsigned int  | 2                    | 0                | 65534            | —                    | min          |
| AtRateTimeToEmpty      | unsigned int  | 2                    | 0                | 65534            | —                    | min          |
| AtRateOK               | unsigned int  | 2                    | 0                | 65535            | —                    |              |
| Temperature            | unsigned int  | 2                    | 0                | 65535            | —                    | 0.1 K        |
| Voltage                | unsigned int  | 2                    | 0                | 65535            | —                    | mV           |
| Current                | signed int    | 2                    | -32768           | 32767            | —                    | mA           |
| AverageCurrent         | signed int    | 2                    | -32768           | 32767            | —                    | mA           |
| MaxError               | unsigned int  | 1                    | 0                | 100              | —                    | %            |
| RelativeStateOfCharge  | unsigned int  | 1                    | 0                | 100              | —                    | %            |
| AbsoluteStateOfCharge  | unsigned int  | 1                    | 0                | 100+             | —                    | %            |
| RemainingCapacity      | unsigned int  | 2                    | 0                | 65535            | —                    | mAh or 10mWh |
| FullChargeCapacity     | unsigned int  | 2                    | 0                | 65535            | —                    | mAh or 10mWh |

(continued)

| <b>Name</b>        | <b>Format</b> | <b>Size in Bytes</b> | <b>Min Value</b> | <b>Max Value</b> | <b>Default Value</b> | <b>Unit</b>  |
|--------------------|---------------|----------------------|------------------|------------------|----------------------|--------------|
| RunTimeToEmpty     | unsigned int  | 2                    | 0                | 65534            | —                    | min          |
| AverageTimeToEmpty | unsigned int  | 2                    | 0                | 65534            | —                    | min          |
| AverageTimeToFull  | unsigned int  | 2                    | 0                | 65534            | —                    | min          |
| ChargingCurrent    | unsigned int  | 2                    | 0                | 65534            | —                    | mA           |
| ChargingVoltage    | unsigned int  | 2                    | 0                | 65534            | —                    | mV           |
| BatteryStatus      | unsigned int  | 2                    | 0x0000           | 0xdbff           | —                    |              |
| CycleCount         | unsigned int  | 2                    | 0                | 65535            | —                    |              |
| DesignCapacity     | unsigned int  | 2                    | 0                | 65535            | 4400                 | mAh or 10mWh |
| DesignVoltage      | unsigned int  | 2                    | 0                | 65535            | 14400                | mV           |
| SpecificationInfo  | hex           | 2                    | 0x0000           | 0xffff           | 0x0031               |              |
| CellVoltage4       | unsigned int  | 2                    | 0                | 65535            | —                    | mV           |
| CellVoltage3       | unsigned int  | 2                    | 0                | 65535            | —                    | mV           |
| CellVoltage2       | unsigned int  | 2                    | 0                | 65535            | —                    | mV           |
| CellVoltage1       | unsigned int  | 2                    | 0                | 65535            | —                    | mV           |

## Section 9 I-Button Function

### **Decode\_Ibutton\_Process**

**bool Decode\_Ibutton\_Process(short[] **buffer**)**

Purpose    Get the i-Button data.  
Value     Buffer    =   i-Button read will sent to this buffer  
Return    True (1) on success, False (0) on failure

## Section 10 I2C Function

### **Bool I2C\_Initialize()**

**bool I2C\_Initialize()**

Purpose    Initialize I2C Controller.  
Value  
Return    True (1) on success, False (0) on failure

### **Bool I2C\_ReadByte**

**Int I2C\_ReadByte ( int SalveID, int Index)**

Purpose    Get the I2C value.  
Value  
Return    Unsigned int value with a range of 0 to 255

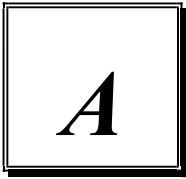
### **Bool I2C\_WriteByte**

**Int I2C\_ReadByte ( int SalveID, int Index, int Data)**

Purpose    Write the I2C value.  
Value  
Return    True (1) on success, False (0) on failure.



# Appendix A FAQ



In this Chapter, frequently asked questions accompanying the API Package will be clarified.

Sections included:

- Section 1 Cannot Open API Program ..... A-2
- Section 2 Cannot Make Sure XML File Correct ..... A-2
- Section 3 Cannot Find Functions in Support List ..... A-3
- Section 4 Cannot Run Self-developed ..... A-3
- Section 5 Cannot Use Demo Project ..... A-3
- Section 6 Differences between Digital IO and GPIO ..... A-3

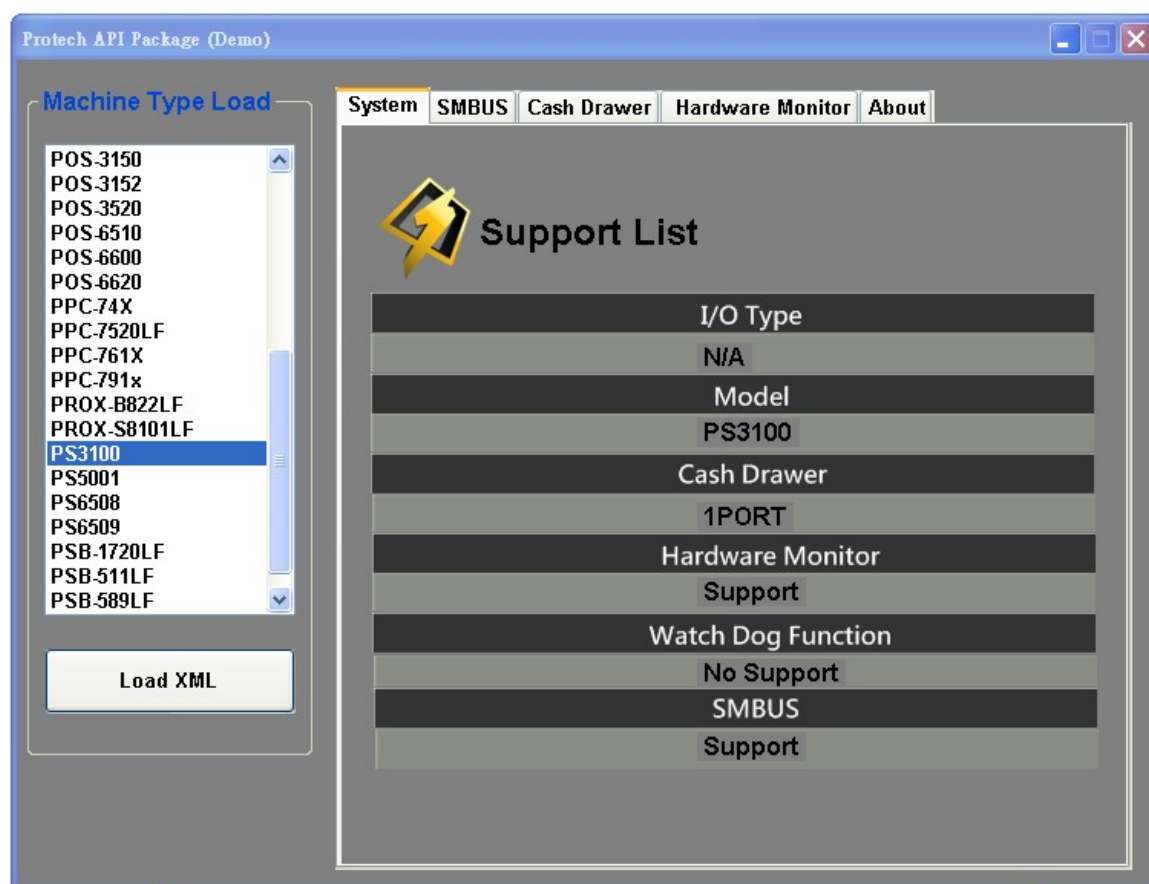
## Section 1 Cannot Open API Program


**Answer:** There are two possible reasons:

- (1) .Net framework 2.0 or above is not installed on the operating system yet.
- (2) Lack of an XML file for the API Package.

## Section 2 Cannot Make Sure XML File Correct or Not

**Answer:** After opening the API program, you can verify whether all functions for this model are presented in the Support List on the **System** tab.



 The Initial.xml file in the ProxAPI standard folder is required to be replaced when using different machine type.

For example, if the PS3100 is desired, replace the XML file by one of the following:

- 1) Manually replace the XML file, by overwriting the old Initial.xml (ProxAPI standard\ ) with the new one (ProxAPI standard\XML Files\PS3100\Initial.xml). Then verify it in the API program.
- 2) In API program, select PS3100 from the “Machine Type Load” list on the left pane, and then tap [Load XML] to have the program replace the Initial.xml automatically.

### Section 3 Cannot Find Functions in Support List

**Answer:** Functions displayed in the Support List are machine type dependent. Take PS3100 for example, the I/O Type field is marked with “N/A” in the Support List and you will be unable to find the **IO Control** tab as the PS3100 does not support Digital I/O.

### Section 4 Cannot Run Self-developed Program

**Answer:** Make sure that all the API Package files are placed in your working directory and all links are already set. Meanwhile, the Initial.xml file has to be in place as well for the functions to work correctly.

### Section 5 Cannot Use Demo Project

**Answer:** When using the Demo Project provided by Protech, you should make sure the Initial.xml file included in the API package corresponds to your developing machine type, to secure the link between files.

### Section 6 Differences between Digital IO and GPIO

**Answer:** Each GPIO pin can be configured to be input or output, while Digital IO cannot. Therefore, you can change the GPIO pin direction from input to output, and vice versa.

By default, a 4in/ 4out type will be provided for developing applications. Note that these changes will be overwritten with default values after restarting the machine.

If the machine type supports GPIO, the additional **Program GPIO** tab will be displayed in the API program.