



# I/O Expansion Board for LinPAC-5000 User's Manual

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## Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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# 1. Introduction

## 1.1 What's the I/O Expansion Bus?

The LinPAC-5000 series all support I/O expansion buses. The I/O expansion bus can be used to implement various I/O functions such as D/I, D/O, A/D, D/A, Timer/Counter, UART, flash memory, battery backup SRAM & other I/O functions. Nearly all kinds of I/O functions can be implemented on this bus.

Model	CPU	Flash	SDRAM	Ethernet	VGA Resolution	USB	I/O Slot	Audio Port
LP-5131	PXA270 520 MHz	64 MB	128 MB	1	800 x 600	2	I/O expansion board optional	None
LP-5231					1024 x 768			None
LP-5331					None			Yes
LP-5431					800 x 600			Yes
LP-5531					1024 x 768			Yes
LP-5141	PXA270 520 MHz	64 MB	128 MB	2	800 x 600	1	I/O expansion board optional	None
LP-5241					1024 x 768			None
LP-5341					None			Yes
LP-5441					800 x 600			Yes
LP-5541					1024 x 768			Yes

## 1.2 Library-libxboard.a

In LinPAC-500 SDK, ICP DAS provides the library file — **libxboard.a** which includes all the functions from the I/O expansion buses which are used in the LinPAC-5000 Embedded Controller.

The libxboard.a is designed specially for the I/O expansion buses on the Linux platform for use in the LinPAC-5000 which can be used to implement various I/O functions. Users can easily develop applications in the LinPAC-5000 by using either C or Java Language.

## 1.3 Demo program

Download the demo programs of I/O expansion buses into LinPAC-5000 controller from LinPAC-5000 SDK, all of the demo programs are in <C:\cygwin\LinCon8k\examples\xboard\>.

## 2. Wire Connection

### 2.1 Digital Input Wire Connection

Input Type	ON State DI value as 0	OFF State DI value as 1
Relay Contact		
TTL/CMOS Logic		
Open Collector		

### 2.2 Digital Output Wire Connection

Output Type	ON State DO value as 0	OFF State DO value as 1
Drive Relay		
Resistance Load		

### 2.3 Voltage Input Wire Connection

Input Type	
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### 2.4 Voltage Output Wire Connection

Output Type	
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## 3. XW-1xx I/O Expansion Boards

### 3.1 XW-107 : DI \* 8 + DO \* 8

#### 3.1.1 Specifications

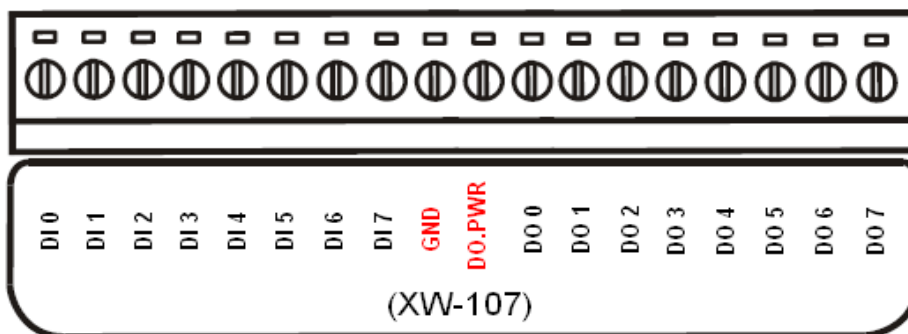
##### Digital Input:

- Channels: 8  
Input Range/ Type: Logic high level (3.5V~30V)  
Logic low level (0V~1V)
- Isolated: none

##### Digital Output:

- Channels: 8  
Open-collector Output: 100 mA / 30V
- Isolated: none

#### 3.1.2 Pin Assignment



Note: There is no need to use GND and DO.PWR in XW-107(non-isolated), the GND and DO.PWR is only for XW-107I(isolated).

### 3.1.3 Programming

#### ➤ XW107\_Init

**Description:**

This function is used to initialize the XW-107.

**Syntax:**

```
int XW107_Init() [C]
```

**Parameter:**

None

#### ➤ XW107\_Read\_All\_DI

**Description:**

This function is used to obtain all digital input value.

**Syntax:**

```
int XW107_Read_All_DI(void) [C]
```

**Parameter:**

None

**Return Value:**

data : 0x00~0xFF

1 : open

0 : close to GND

**➤ XW107\_Read\_One\_DI****Description:**

This function is used to obtain each digital input value.

**Syntax:**

```
int XW107_Read_One_DI(int iChannel) [C]
```

**Parameter:**

iChannel : The digital input channel No.

**Return Value:**

1 : open  
0 : close to GND

**➤ XW107\_Write\_All\_DO****Description:**

This function is used to set the digital output value for all channel.

**Syntax:**

```
void XW107_Write_All_DO(int iOutValue) [C]
```

**Parameter:**

iOutValue: The digital output value. Range: 0x00~ 0xFF

**Return Value:**

None

**➤ XW107\_Write\_One\_DO****Description:**

This function is used to set the digital output value of the specific digital output channel No. of the XW-107. The output value is only for “0” or “1”.

**Syntax:**

```
void XW107_Write_One_DO(int iChannel, int iStatus) [C]
```

**Parameter:**

iChannel : The digital output channel No.

iStatus =1 , Status is ON

iStatus =0 , Status is OFF

**Return Value:**

None

**➤ XW107\_Read\_All\_DO****Description:**

This function is used to obtain digital output readback All channels.

**Syntax:**

```
int XW107_Read_All_DO(void) [C]
```

**Parameter:**

None

**Return Value:**

0x00 ~ 0xFF



**➤ XW107\_Read\_One\_DO****Description:**

This function is used to obtain digital output readback one channels.

**Syntax:**

```
int XW107_Read_One_DO(int iChannel) [C]
```

**Parameter:**

iChannel : The digital output channel No.

**Return Value:**

1 : ON

0 : OFF

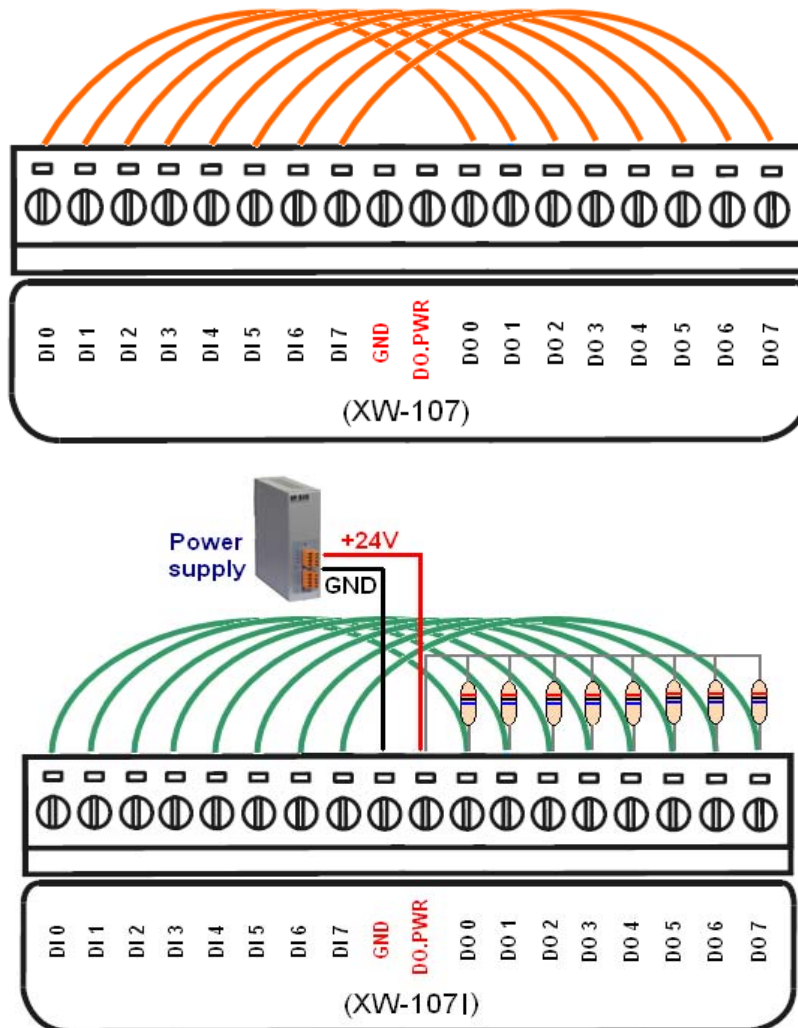
### 3.1.4 Demo for XW-107

#### ➤ Location

To install LinPAC-5000 SDK first from LinPAC-5000's CD or FTP site of ICP DAS, and user can refer to C:\cygwin\LinCon8k\examples\lboard\xw107.c

#### ➤ Wire Connection

Connect to DI and DO as below:



Note: There is no need to use GND and DO.PWR in XW-107(non-isolated), the GND and DO.PWR is only for XW-107I (isolated).

#### ➤ Run

Step1: Download xw107.exe in LinPAC-5000.

Step2: Changes the permission of a file as below:

```
# chmod 755 xw107.exe
```

Step3: Running program.

```
# ./xw107.exe
```



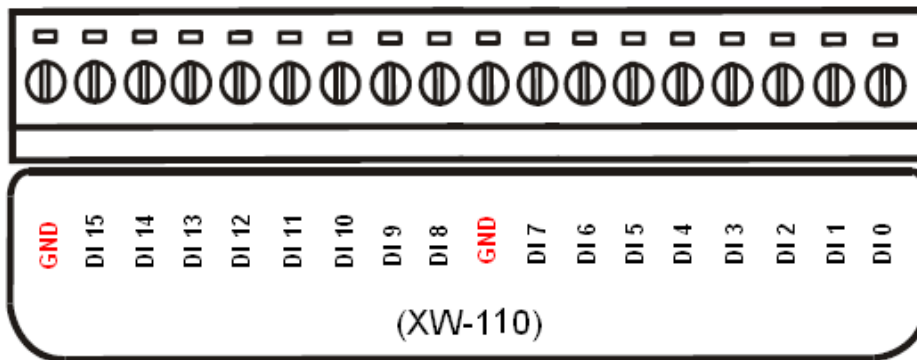
## 3.2 XW-110 : DI \* 16

### 3.2.1 Specifications

#### Digital Input:

- ➔ Channels: 16  
Input Range/ Type: Logic high level (3.5V~30V)  
Logic low level (0V~1V)
- ➔ Isolated: none

### 3.2.2 Pin Assignment



### 3.2.3 Programming

#### ➔ XW110\_Init

#### Description:

This function is used to initialize the XW-110.

#### Syntax:

```
int XW110_Init() [C]
```

#### Parameter:

None

**➤ XW110\_Read\_All\_DI****Description:**

This function is used to obtain all digital input value.

**Syntax:**

```
int XW110_Read_All_DI(void) [C]
```

**Parameter:**

None

**Return Value:**

data : 0x0000~0xffff

1 : open

0 : close to GND

**➤ XW110\_Read\_One\_DI****Description:**

This function is used to obtain each digital input value.

**Syntax:**

```
int XW110_Read_One_DI(int iChannel) [C]
```

**Parameter:**

iChannel : The digital input channel No.

**Return Value:**

1 : open

0 : close to GND

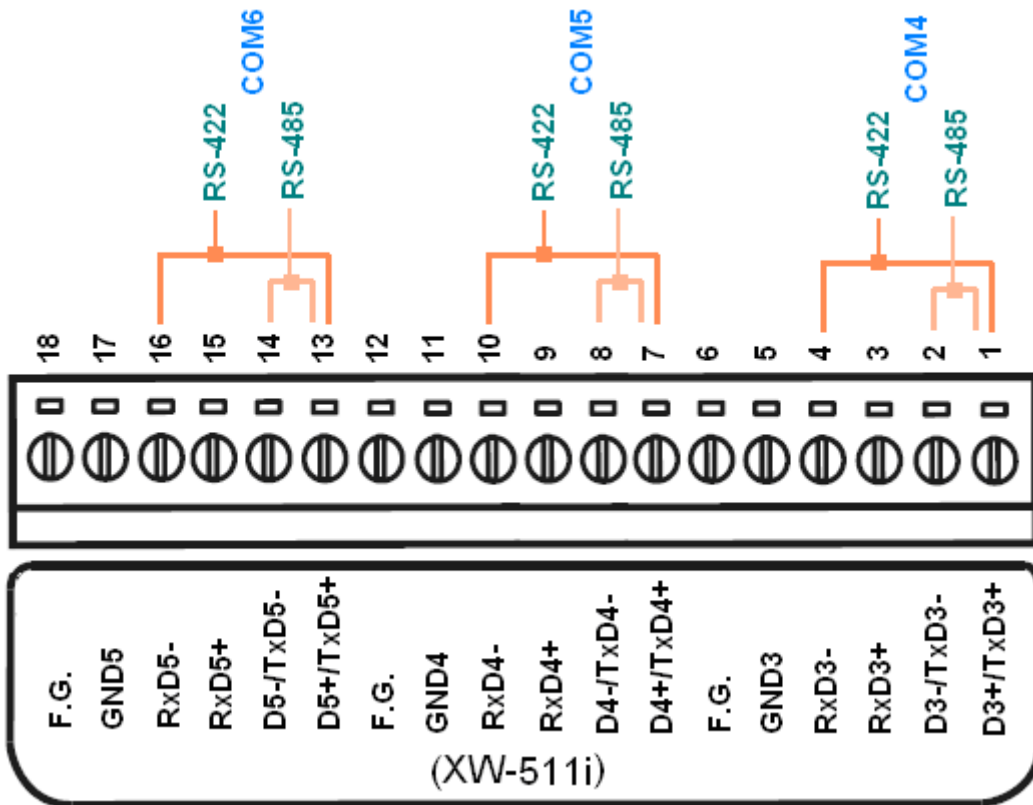
### 3.3 XW-511i : RS-422/485 \* 3

#### 3.3.1 Specifications

**Parallel I/O:**

- RS-422 \*3
- RS-485 \*3
- 16954 compatible
- Internal FIFO: 16 bytes
- Transmission speed: 1152.K BPS max.
- Isolated: Yes

#### 3.3.2 Pin Assignment



COM port	Definitions in LP-5K SDK	Device name	Default baudrate
4 (RS-422/485)	COM4	ttyS2	9600
5 (RS-422/485)	COM5	ttyS3	9600
6 (RS-422/485)	COM6	ttyS4	9600

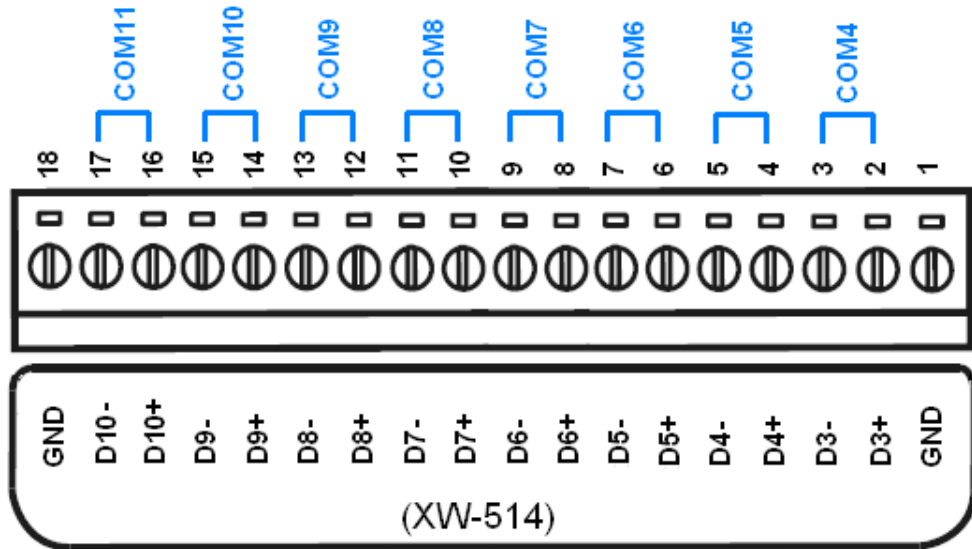
## 3.4 XW-514 : RS-485 \* 8

### 3.4.1 Specifications

**Parallel I/O:**

- RS-485 \*8
- 16954 compatible
- Internal FIFO: 16 bytes
- Transmission speed: 1152.K BPS max.
- Isolated: none

### 3.4.2 Pin Assignment



COM port	Definitions in LP-5K SDK	Device name	Default baudrate
4	COM4	ttyS2	9600
5	COM5	ttyS3	9600
6	COM6	ttyS4	9600
7	COM7	ttyS5	9600
8	COM8	ttyS6	9600
9	COM9	ttyS7	9600
10	COM10	ttyS8	9600
11	COM11	ttyS9	9600