AD INSTRUMENTS

AD2028

User manual

Caution Statements:
Please observe the following safety requirements before operating the equipment.

Electrical Shock

Thoroughly check your electrical grounding and comectors prior to powering. Make sure all connectors are of the three prong type to ensure proper grounding.

Whenever the equipment is not used for a prolong period of time, you should disconnect the power cord .

Power Disconnect

Disconnect the power cord under the following conditions :

1.damage on cord and connector

2.equipment get wet or substantial moisture enter the chassis

3.exposure to rain or water

Do Not Open The Equipment

1. Do not try to repair by yourself

2. Do not use unauthorized part for repair

3. Do not open the covers of the equipment without proper factory authorization

Avoid Moisture

Do not use this equipment in high moisture environment .

No Heavy Stacking

Do not stack the equipment back to back to allow proper ventilation .

No Touching with Bare Hands

Do not touch the equipment during heavy lightening condition.

Caution

1.Do not place this equipment on unstable support.

2.Do not place objects on top of the equipment to block up the ventilation opening.

3.Do not place radio active instrument or object on top of adjacent to the equipment.

4.Provide proper room ventilation during operation of this equipment.

5.Verify with the repair engineer or authorized entity after repair is done to be sure the equipment can be put back to operation.

CONTENTS

Chapter 1 Introduction

1.1 OVERVIEW

DMB-2028 DVB-T modulator is designed to meet the most demanding of today's digital terrestrial TV broadcast market, which is applied especially to the medium and small terrestrial digital TV systems and enterprises. It supports DVB-T whole working modes, hierarchical mode as well as VHF and UHF band frequency agile signal output. With high quality RF signal, it directly drives the low power digital TV transmitter, and contains such three test modes as NULL insertion, PRBS sequence, test stream, which supply comprehensive and reliable DVB-T signal source system for R&D company or manufacturer. DMB-2028 DVB-T modulator is the cost-effective modulator.

1.2 MAIN FEATURES

- DVB-T supported
- 2K, 8K modes supported
- Frequency agile 48MHz ~870MHz, in 1Hz step
- 0dBm RF output level,10dB attenuation range, in 0.1dB step
- Bit rate adaptation and PCR re-stamping
- High quality RF modulation
- 3 kinds of TS test modes
- Web browser remote control, SNMP supported

1.3 SPECIFICATIONS

MPEG-TS Input

- comply with ETS 300744 and TS101191
- 1 ASI input, bit rate adaptation
- 188 Bytes supported
- ASI packet modes: burst/byte
- Max effective bit rate: up to 31.67Mbps
- Connector: BNC, 75 ohm

RF Output

- Frequency：48MHz ~ 870MHz, in 1Hz step
- Main Output Level: 0dBm
  - Attenuation: -10dB–0dB in 0.1dB step
  - Monitoring output: -20 dB
  - Return Loss: >15dB
  - Level Stability: ±0.5dB
- I/Q amplitude unbalanced: <0.05%
- I/Q quadrature error: <0.05º
- MER: >40dB
- Spurious: >55dB(related to the whole signal power)
- Connector: N, 50ohm

TS Test Mode

- NULL symbol insertion
- PRBS sequence
- Test stream

Modulation and code

- Supported ETS 300744 standard

- Supported Modes: DVB-T
- FFT: 2K, 8K
- Guard Intervals: 1/4, 1/8, 1/16, 1/32
- FEC: 1/2, 2/3, 3/4, 5/6, 7/8
- Constellations: QPSK, 16QAM, 64QAM
- Inner interleave: Native
- Channel Bandwidth: 6MHz, 7MHz, 8MHz,
- TPS signal: DVB-T

Clock and Synchronization
- Internal reference clock 10MHz (OCXO)

Control
- Front Panel
- Web browser remote control, SNMP supported

Mechanical Parameter
- Voltage: AC 90~260V, 50~60Hz
- Consumption: 40W
- Operating temperature: -10~50℃
- Storage temperature: -20~70℃
- Humidity: 10%-95%
- Dimension: 400mm(L)X430mm(W)X45mm(H)
- Weight: 6kg

1.4 Illustration

1.4.1 Front panel

There are 2x40 character LCD, 3 indicators, 6 buttons in the front panel.
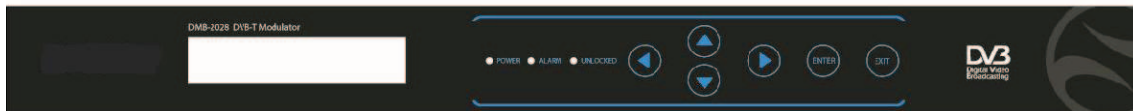
1.4.1.1 Indicator

- Power indicator (green)

If the indicator is light, it means power on.
- Alarm indicator (red)

If the equipment is working abnormal, the indicator will be light.
The alarm indicator will be lit if appear the following one or several cases
None TS input
Input bit rate overload ！
- Lock indicator(red)

LO is unlocked, the indicator will be red.

1.4.1.2 Button

There are 4 cursor keys, 1 Enter key, and 1 Cancel key, which can browse and operate menu system to complete system configuration.

- UP key：（UP）

Move up the cursor key in the status of browsing the menu.
Rotate parameter in the editing status of enumerating parameter

Add parameter in the status of parameter editing

- DOWN key： （DOWN）
Move down the cursor key in the status of browsing the menu.
Rotate parameter in the editing status of enumerating parameter
Reduce parameter in the status of parameter editing

- LEFT key： （LEFT）
Move left the cursor key in the status of browsing the menu.
Move left the cursor key in the status of parameter editing

- RIGHT key： （RIGHT）
Move right the cursor key in the status of browsing the menu.
Move right the cursor key in the status of parameter editing

- ESC key: （ESC）
Return to previous menu in the status of menu browsing
Return to current menu in the status of parameter editing.

- ENTER key： （ENTER）
Enter into the sub-menu which cursor locate in when browse the menu system.
Save the results of amending parameter in the state of editing parameter.

1.4.2 Rear panel

- RF output connector （RF OUT）
N-type connector （50ohm）， output RF signal
- Output monitor connector （RF MONITOR）
BNC connector （50ohm）， monitor RF output
- Input connector （ASI IN）
1 BNC connector （75ohm） ,input ASI
- Output connector （ASI OUT）
1 BNC connector （75ohm） ,output ASI which is same as ASI IN
- RS-232 connector
DB9 （male） connector is for remote control
- 10/100 Base T connector
RJ-45 connector， connect with Ethernet
- Power connector
Power socket, there is ON/OFF switch.

Chapter 2 Installation

2.1 Unpacking

Please unpack the box to check whether all of the following items are included in the packaging：

- DMB-2028 DVB-T Modulator
- User Manual
- Power cord
- BNC cable

2.2 Installation

When users install device, please follow the below steps. The details of installation will be described at the rest part of this chapter. Users can also refer rear panel chart during the installation.

The main content of this chapter including:

- Checking the possible device missing or damage during the transportation
- Preparing relevant environment for installation
- Installing equipment
- Connecting communication port (if it is necessary)

2.2.1 Device's Installation Flow Chart Illustrated as following：

2.2.2 Environment Requirement Item	Requirement
Machine hall space	When user install machine frame array in one machine hall, the distance between 2 row of machine frames should be 1.2~1.5m and the distance to wall should be no less than 0.8m。
Machine hall floor	Electric Isolation, Dust Free
	Grounding current limiting resistance: 1M Floor bearing should be greater than 450Kg/m$_2$
Environment temperature	5~40(C sustainable，0~45(C short time，installing air-conditioning is recommended
Relative temperature	20%~80% sustainable 10%~90% short time
Pressure	86~105KPa。
Door & window	Installing rubber strip for sealing door-gaps and dual level glasses for window
Wall	It can be covered with wallpaper, or brightnessless paint.
Fire protection	Fire alarm system and extinguisher
Power	Requiring device power, air-conditioning power and lighting power are independent to each other. Device power requires AC power 220V 50Hz. Please carefully check before running.

2.2.3 Grounding Requirement

All function modules' good grounding designs are the base of reliability and stability of device. Also, they are the most important guarantee of lightning arresting and interference rejection. Therefore, system must follow this rule.

Coaxial cable's outer conductor and isolation layer should keep sound electric conducting with the metal housing of device.

Grounding conductor must adopt copper conductor in order to reduce high frequency impedance, and the grounding wire must be as thick and short as possible.

The 2 terminals of grounding wire must make sure for well electric conducting, and process for antirust.

It is prohibited that users use other devices as part of grounding wire's electric circuit

The section of the conjunction between grounding wire and device's frame should be equal or greater than 25mm$_2$

2.2.4 Frame Grounding

All the machine frames should connect to protective copper strip. The grounding wire should be as short as possible and avoid circling. The section of the conjunction between grounding wire and grounding strip should be equal or greater than 25mm$_2$

2.2.5 Device Grounding

Connecting the device's grounding rod to frame's grounding strip with copper wire.

Chapter 3 Operation

Power on, the LCD will display following information:

```
-----------------------------------------------------
        Hangzhou DIGICAST
        DVB-T Modulator
-----------------------------------------------------
```

Press ENTER key to enter into main menu(switch menu via UPER/DOWN key, press ENTER to enter)
Display following information:

```
-----------------------------------------------------
Alarm…
TS Info…
General Config…
Detail Config…
System…
-----------------------------------------------------
```

3.1General Config

Move the cursor to General Config, press ENTER key , display following menu:

```
-----------------------------------------------------
Signaling mode：
              DVB-T(*)
-----------------------------------------------------
```

3.2Detail Config

Move cursor to Detail Config, press ENTER, display following menu:：

```
-----------------------------------------------------
Output Config…
Transmission…
-----------------------------------------------------
```

Press UP/DOWN key to browser men, press ENTER key to enter into sub-menu, press EXIT to return previous menu.

3.2.1Output Config

Move cursor to Output Config, press ENTER, display following menu:：

```
-----------------------------------------------------
RF Center Freq：
        720000000Hz（48 － 870M）
RF attenuation：
        1.6dB(0.0 - 10.0dB)
RF Output：
```

**Close
RF Output Delay
2Min（0－5Min）**

All menus can be switched via UP/DOWN keys.
Explain the function of each menu as following:
RF center frequency
range：48～870MHz
default：720 MHz
note：adjustment in 1Hz step
● RF attenuation
range：0 ～ 10dB
default：1.6dB
illustration：adjustment in 0.1dB step
● RF output
range：open/close
default：close illustration：open means RF output is working, close means RF output is prohibited.
● RF output delay
range：0 － 5Min
default：2Min
illustration：power on, system RF will open time delay configuration automatically.

3.2.2.Transmission

Move cursor to Transmission, press ENTER , display the following menu:

Modulation：
          64QAM(*)
Code Rate：
          2/3(*)
Guard Interval
          1/4(*)
FFT Mode
          8K(*)
Channel Bandwidth
          8MHz(*)

Explain the function of each menu as following:
● Channel Bandwidth
range：6 MHz，7 MHz，8 MHz
default：8 MHz
illustration：channel bandwidth
● FFT mode
range：2K，8K
default：8K

illustration： 2K，8K optional

● guard interval

range：1/32，1/16，1/8，1/4

default：1/4

illustration：guard interval

● Modulation

range：64QAM，16QAM，QPSK

default：64QAM

illustration：modulation

● Code rate

range：1/2，2/3，3/4，5/6，7/8

default：2/3

illustration：code rate

3.3 TS Info

Move cursor to menu, press ENTER to display following menu:

Packet Length：

188

TS Input Bit rate：

0.000000Mbps

TS Payload：

0.000000Mbps

3.4 Alarm

Display related alarm information, alarm information include:

1．ASI input missing

illustration：don't find the TS input, check whether the correction is correct.

2．TS overload

illustration：the input TS payload is greater than output bit rate of current system mode.

3．LO unlocked illustration： up-converter LO is unlocked

3.5 System

Move cursor to menu, press ENTER to display following menu:

System Info…

System Config…

Press ENTER to browser menus, press ENTER to enter into sub-menu, press EXIT to return previous menu.

3.5.1 System Info

Unit Name：DVB－T Modulator

HW #： HW-1.0.0.04

SW Version…

3.5.2 System Config

```
--------------------------------------------------------
```
Test Config…
Network…
Time Setup…
Language…
Factory Settings…
Delete Log Info…
```
--------------------------------------------------------
```


3.5.2.1 Test Config

```
--------------------------------------------------------
```
SRRC filter：

　　　　Working(*)

Single Tone：

　　　　disable(*)

TS Test mode：

　　　　disable(*)

Spectrum：

　　　　invert(*)
```
--------------------------------------------------------
```

● SRRC filter
range：bypass， working
default：working
illustration：it should be working under normal condition, otherwise the spectrum shoulder will be very bad; During MER test, if test equipments is none balance, it should be bypassing filter, otherwise MER is not good.
●single tone
range：disable， enable
default：disable
illustration：disable, normal spectrum mode, enable single mode

●TS test mode
range： 1.disable; 2.PRBS; 3.test stream; 4.Null is inserted；
fault：disable
illustration：
0: TS from ASI connector
1: PRBS which is native generated
2: test stream which is native generated
3: MPEG null package which is native generated

● Spectrum invert
range：normal，　invert
default：　invert
illustration
Normal: normal spectrum output
invert: invert spectrum output

3.5.2.2 Network

IP： 192.168.000.118

Mask： 255.255.255.000

Gateway： 192.168.000.001

Press UP/DOWN key to switch for choose, press ENTER to enter into editing status, direction key is for amending, press ENTER to confirm

3.5.2.3 Time Setup

Date： 1999.11.30

Time： 00:43:13

Press UP/DOWN key to switch for choose, press ENTER to enter into editing status, direction key is for amending, press ENTER to confirm。

3.5.2.4 Language

illustration：Chinese/English menu switch
press ENTER to edit, direction key to amend, press ENTER to confirm the amending.

3.5.2.5 Factory Settings

Press ENTER, display following menu:

Factory Settings？

Enter ＝ Yes，Exit ＝ No

illustration：press ENTER, system will return to factory settings.

3.5.2.6 Delete Log Info

Press ENTER, display following menu:

```
---------------------------------------------------------
Delete Log Info?
              Enter ＝ Yes，Exit ＝ No
---------------------------------------------------------
```

illustration：after confirmation, system will cancel the data information(such as alarm information etc)

CHAPTER 4 SNMP

This equipment support remote control system via WEB browser. Check the IP address from front panel, then connect equipment's net port with computer's net port via cross cable; or connect to LAN which equipment locate in via switch. Computer's IP address and equipment's IP address are set into same address segment, for example, computer configuration is as following：

IP address：192.168.0.2

Address mask：255.255.255.0

Equipment's address configuration is as following:

IP address：192.168.0.119

Address mask：255.255.255.0

Open the computer's console window, check whether the network is working smoothly among the equipments via ping tool. If the connection is right, we open the computer's web browser, input equipment's IP address (such as http://192.168.0.119/) in the address bar ,then you can see the following interface :
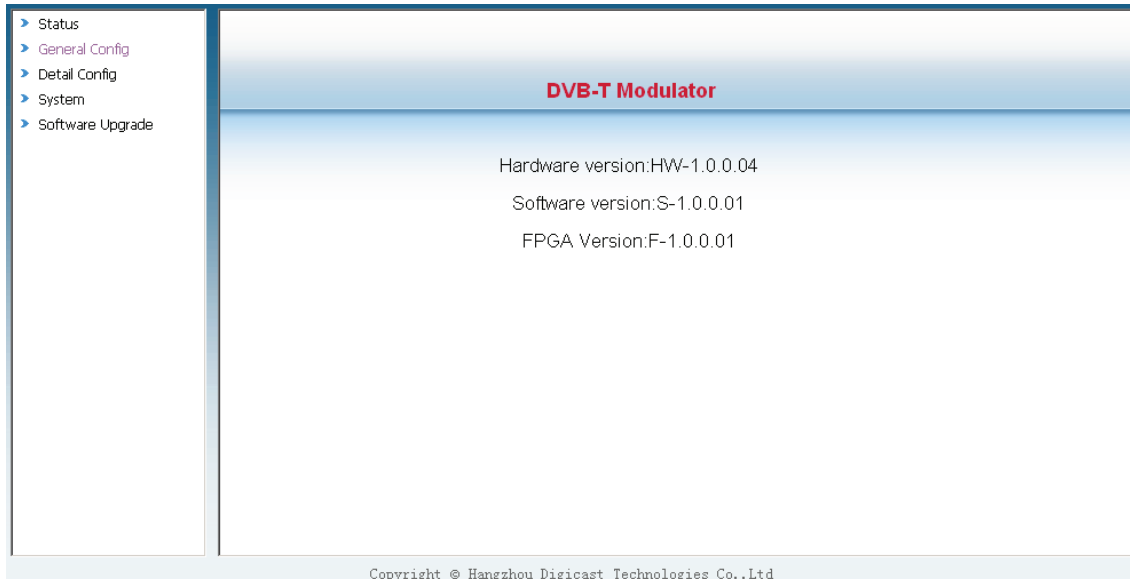
4.1 State information

Click on "state information" menu, the following pages will be shown:

4.1.1 Alarm information

illustration：show the alarm information of current device and record to log, alarm information include: ASI input missing, TS overload, LO unlocked；
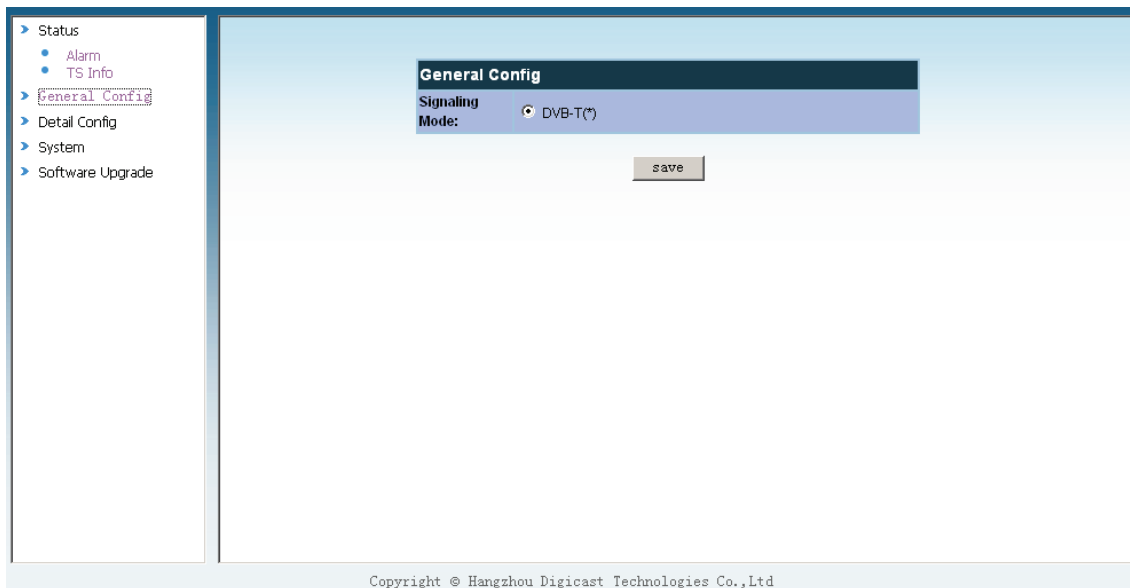
4.1.2 TS information

illustration：show the package depth of current input TS, input bit rate and payload
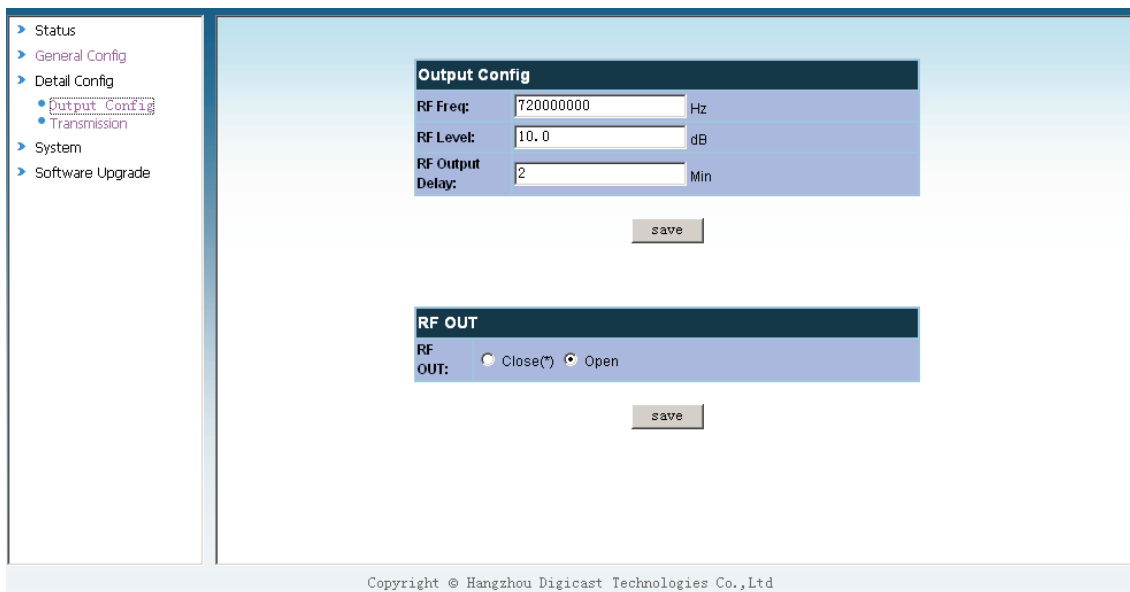
4.2 General configuration

Click on "General configuration" menu, display the following pages, subscriber can make parameter configuration accordingly, finish configuration, press "save" to save them into equipments.
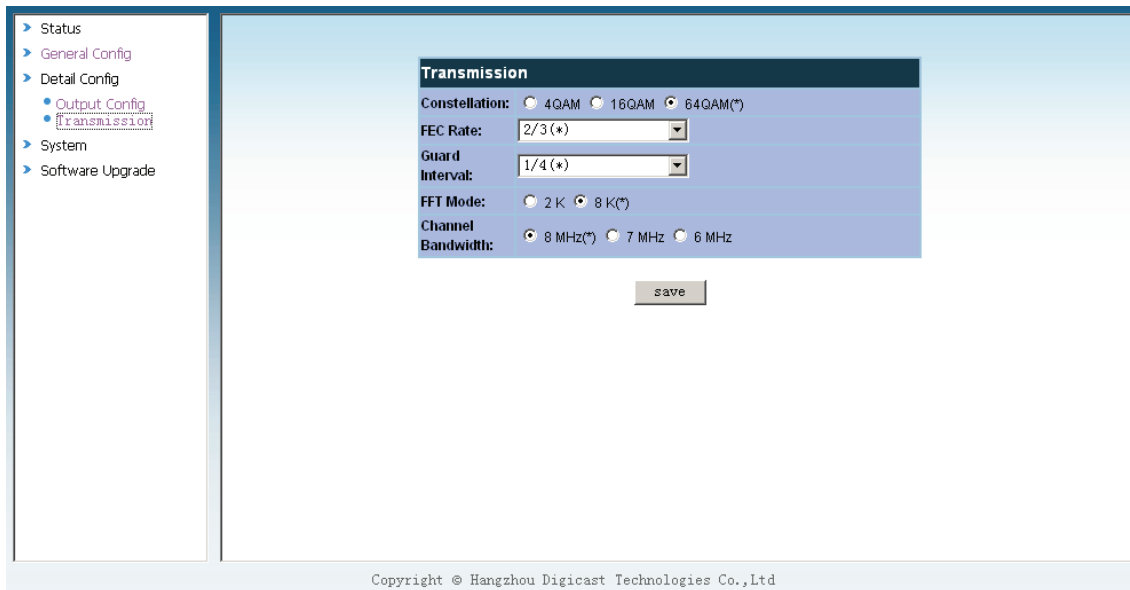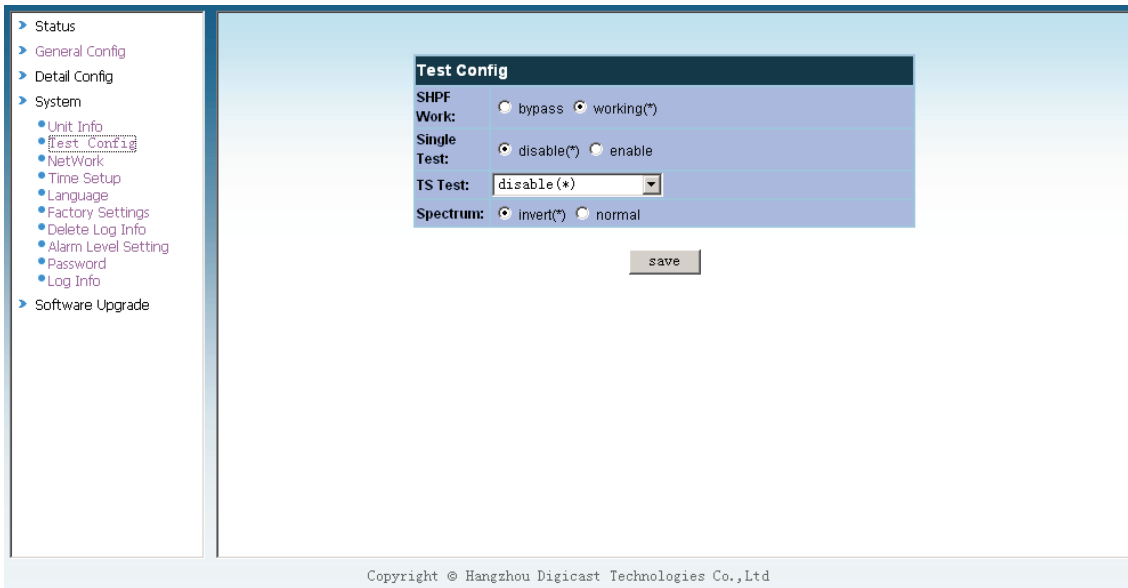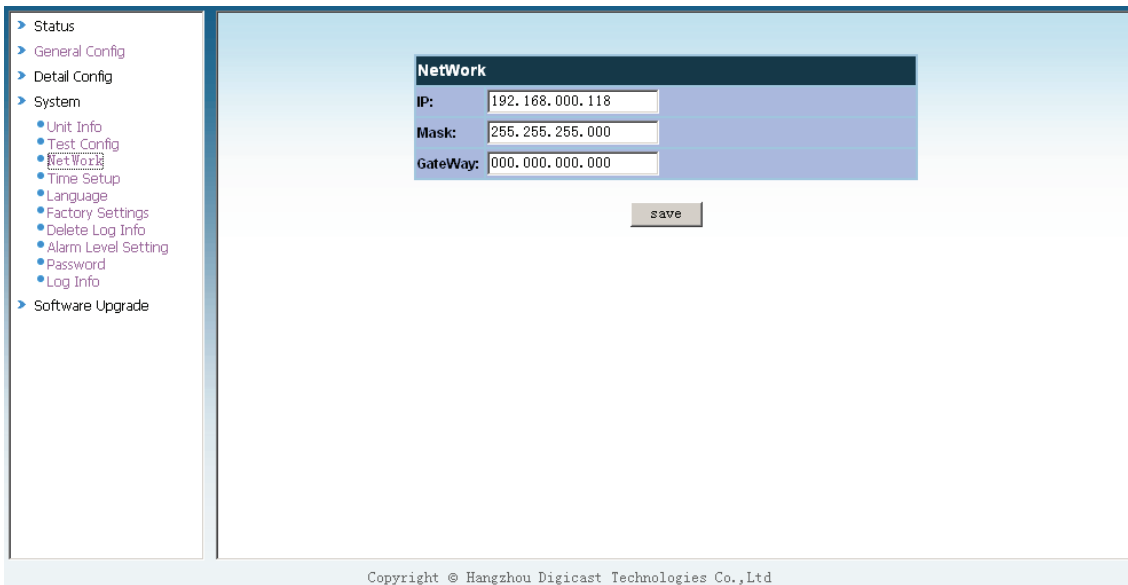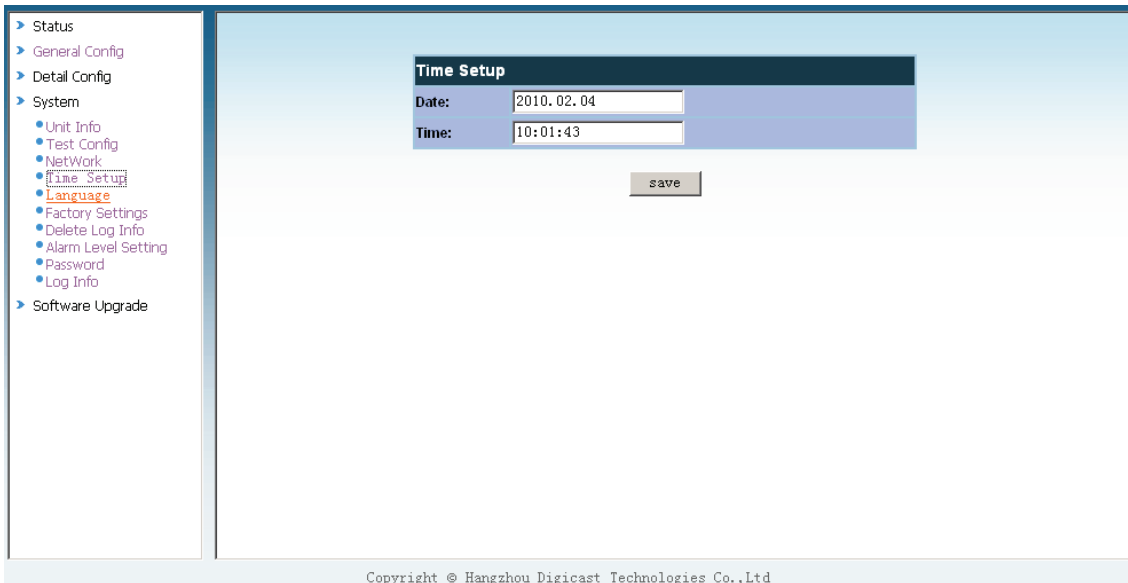
4.3 Detail configuration

4.3.1 output configuration

Click on the sub-menu "output configuration" of "detail configuration" menu, display the following pages, subscriber can make parameter configuration accordingly, finish configuration, press "save" to save them into equipments

4.3.2 Transmitting parameter

4.4 System

Click on "system" menu, display the following pages, subscriber can make parameter configuration accordingly, finish configuration, press "save" to save them into `equipments`

4.4.1 System information
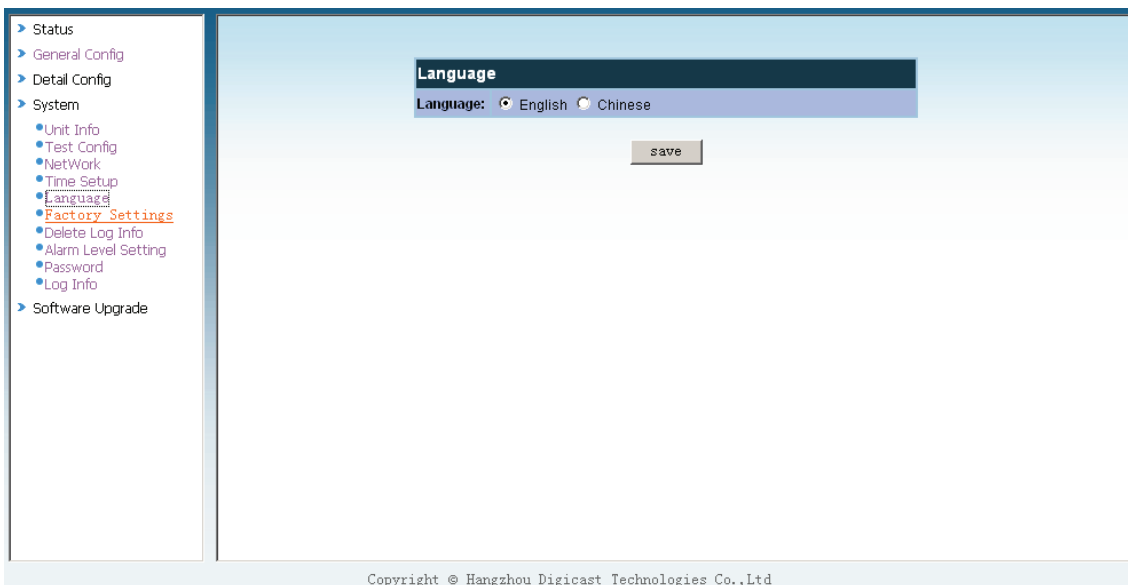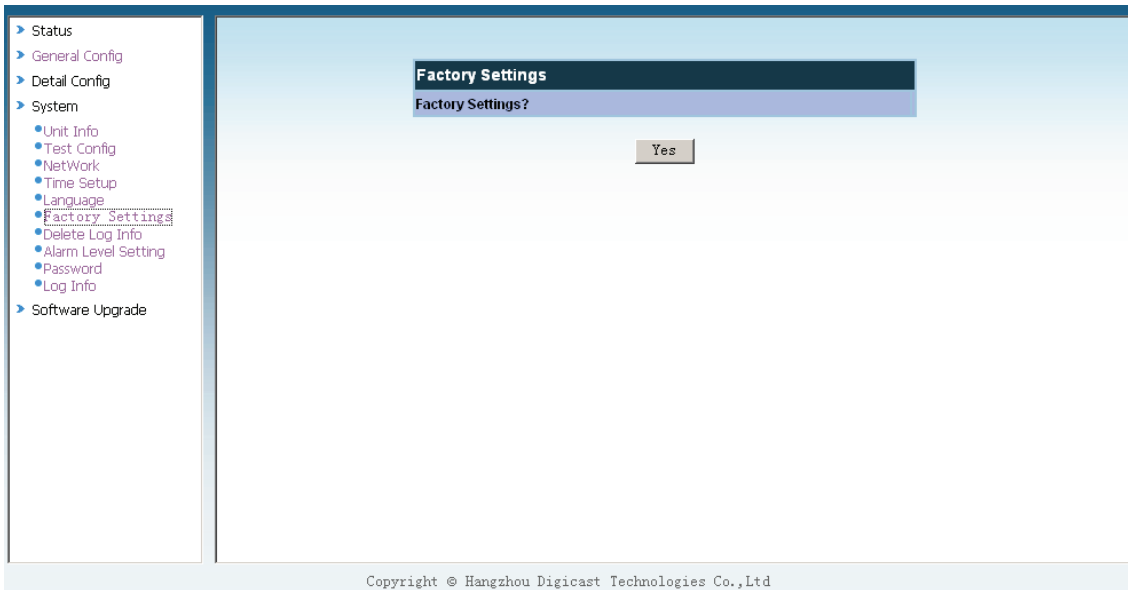
4.4.2 Test configuration
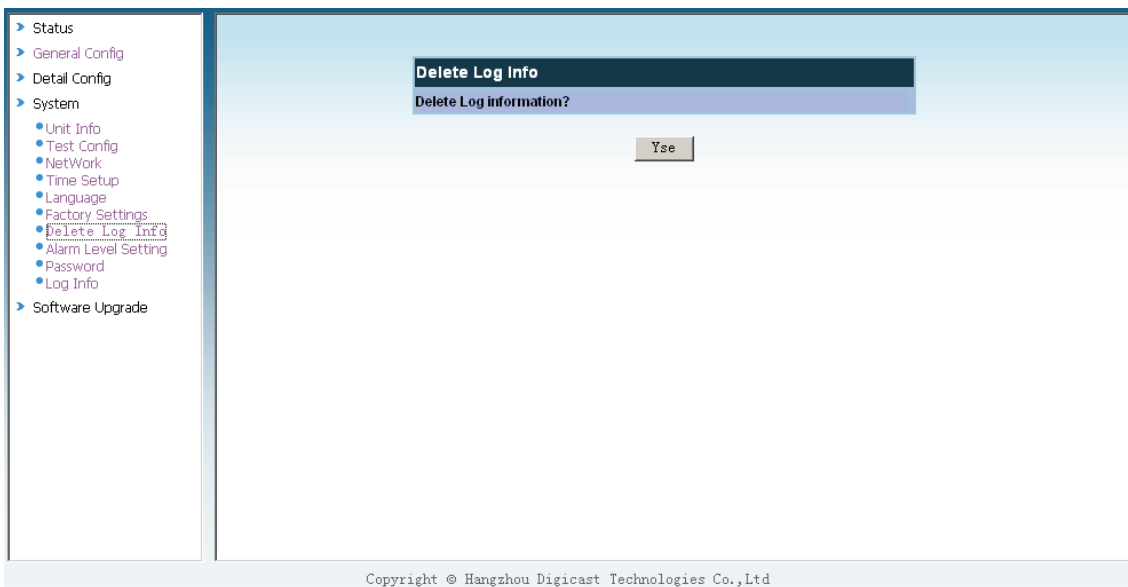
4.4.3 Network address

4.4.4 Time setup

4.4.5 Language

4.4.6 factory setting

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4.4.7 Delete log information

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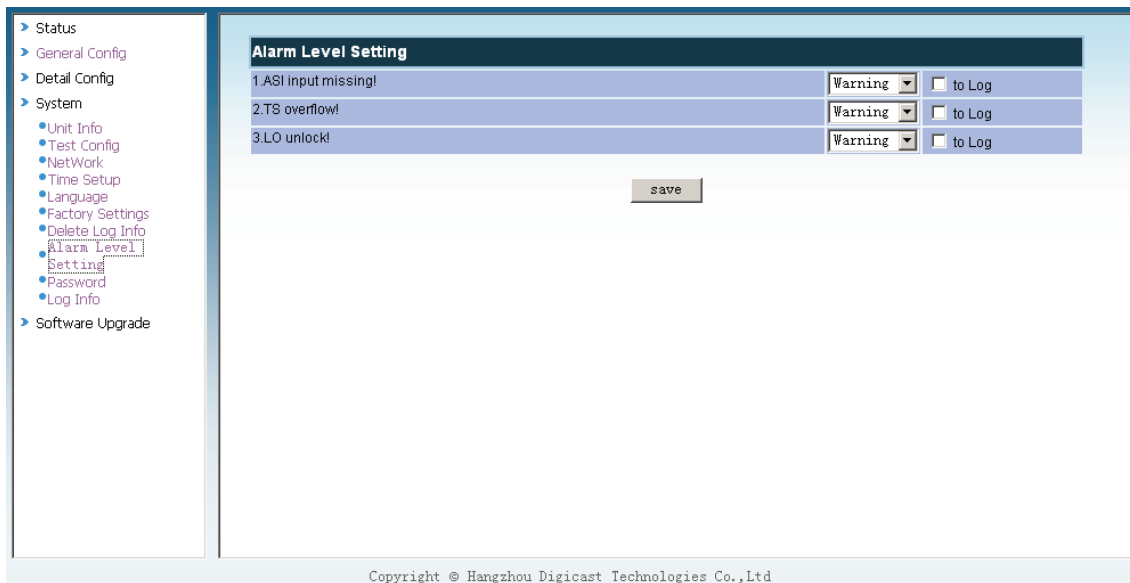
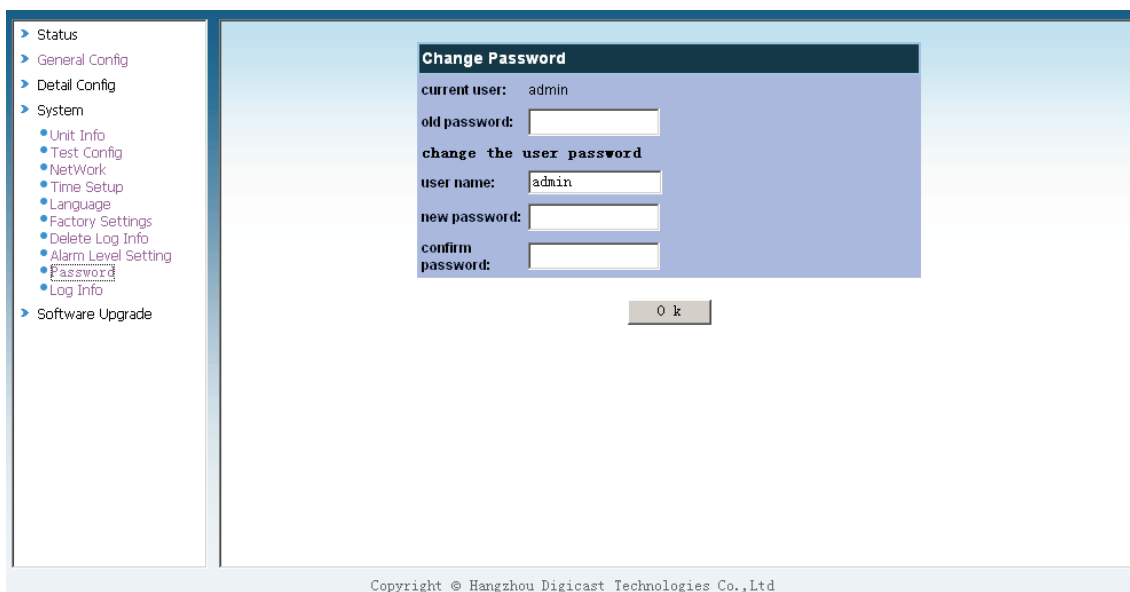## 4.4.8 Alarm configuration

Illustration: configuration need to record alarm to log information

4.4.9 Subscriber management

4.4.10 Log information

- Status
- General Config
- Detail Config
- System
  - Unit Info
  - Test Config
  - NetWork
  - Time Setup
  - Language
  - Factory Settings
  - Delete Log Info
  - Alarm Level Setting
  - Password
  - Log Info
- Software Upgrade

Log Information

Time	Historical events
2010.02.04 09:52:28	成功恢复到工厂设置

1