W601 RTU

Contents

1- W601 Controller

Over view

The W601 controller is installed in the control panel switch and is capable of reporting the information to the control center and receiving the commands.

In order to process information such as measurement and fault detection in a fast and accurate way, a 16-bit DSP and a 3-phase parameter measurement specific processor is used to perform the communication with HMI and information transfer.

- Analog data processing, control and monitoring
- Measurement of current, voltage, power (active, reactive, apparent), power factor
- DNP-3.0 communication protocol in distribution network
- LAN port
- USB port
- RS-232c port
- Calibration
- Variable power supply for modem
- Battery test

2- Features (general)

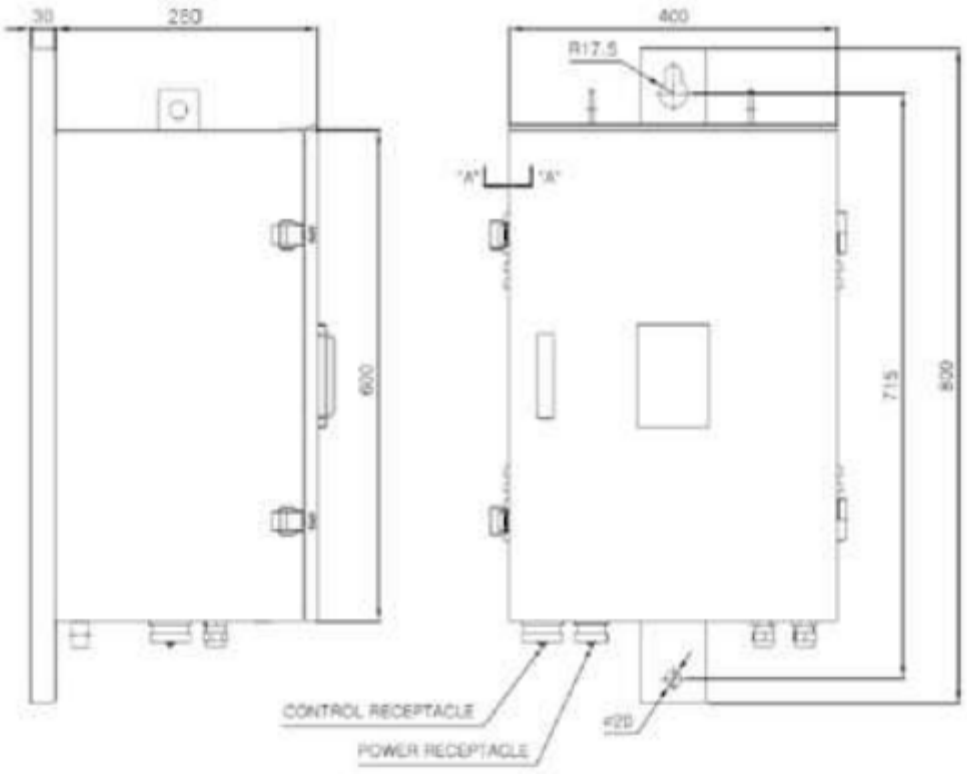
Parameter	Value
Input voltage	220VAC
Battery voltage	24VDC
Power consumption	≈ 15W
Operation temperature	-25°C to 70°C
Humidity	5 – 95 %RH
Panel Size	400×600×206 mm
Panel stand size	800×80×20 mm
Weight	45 KG

Description	Qty.
Analog input (current measurement)	4
Analog input (voltage measurement)	6
Digital output	1
LAN port	1
Serial port	1
USB port for data offload and firmware upgrade	1

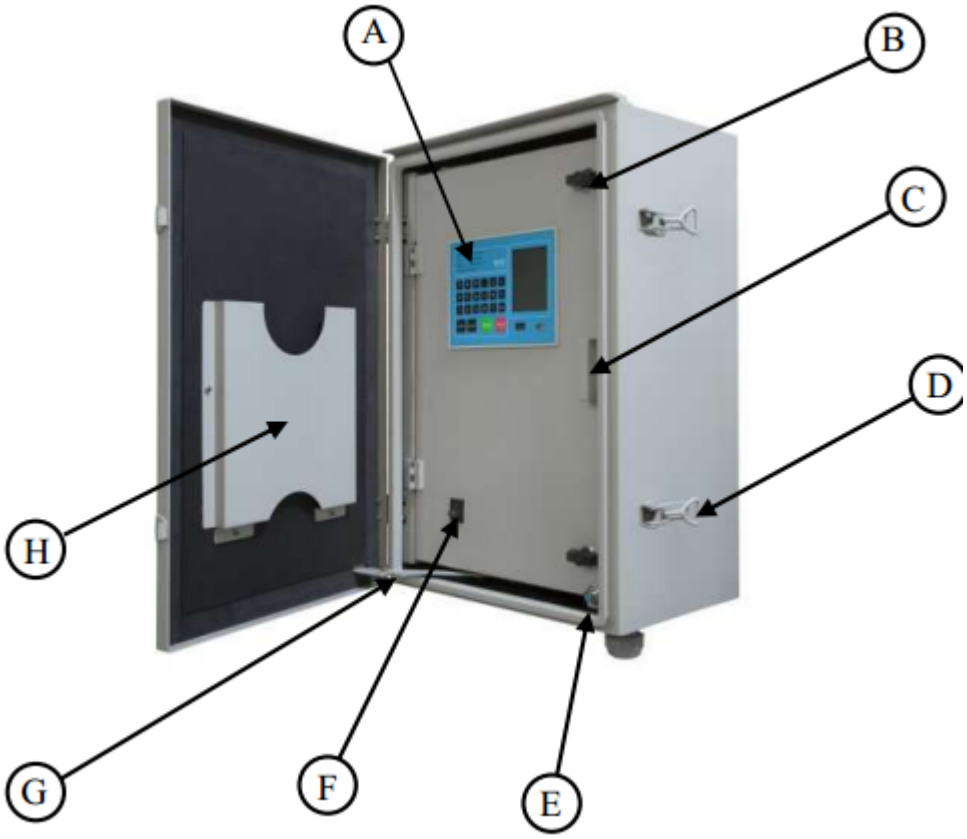
3- Enclosure specification and installation

The enclosure is designed and manufactured in order to protect the function of RTU in improper environments.

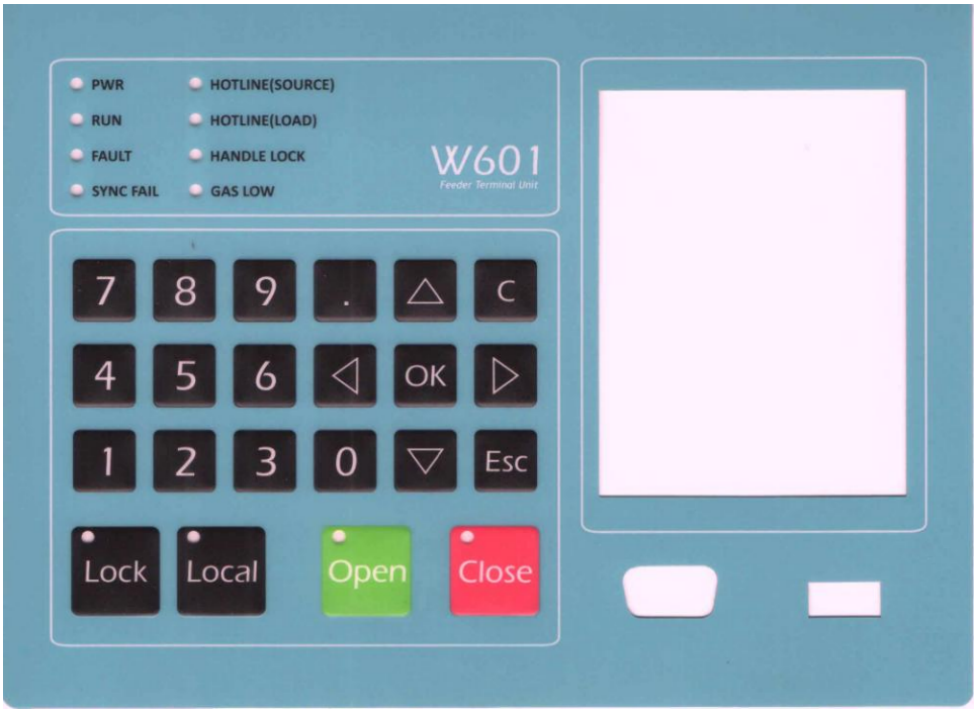
Enclosure view:
The enclosure body is designed so that it could work normally under low or high temperature and humid environment.
The enclosure could ventilate the inside warm environment through the air vents on the back of it.
Both control and power cables should be connected to the sockets under the enclosure correctly, because improper connection would lead to errors in the control systems function.
While the device is going to be stored in the warehouse or not been used for a long time, switch off the key on the panel.



3-1 Enclosure Internal structure



A	**Display and keyboard**
B	**Door lock**
C	**Door latch**
D	**Main door lock**
E	**Door sensor**
F	**Main power key**
G	**Door holder**
H	**Document place**

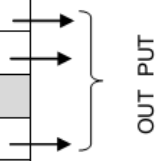


LED Signal	Status	Description
PWR	OFF	AC disconnected
	ON	AC connected
	Blink	AC disconnected and battery discharged - device would be powered off after about 1 min.
RUN		System is normal
FAULT		Error indicator
SYNC FAIL		Phases not synchronized
HOTLINE (SOURCE)		Voltage indicator (source)
HOTLINE (LOAD)		Voltage indicator (load)
HANDLE LOCK		LBS lock is enabled
GAS LOW		Gas pressure low

4- Menu and function

4-1 RS-232C port

Pin	Signal	Description
1	DCD	
2	Rx	
3	Tx	
4	DTR	
5	GND	
6	DSR	
7	RTS	RS-232C communication port with the host to compose a SCADA system
8	CTS	
9		



4-2 Control

Signal	Description	Remark
Open	LBS Open Cantect	
Close	LBS Close Cantect	
Bat Test	Bat Test Output	
Lock	Control Lock Cantect	
Unlock	Control Unlock Cantect	

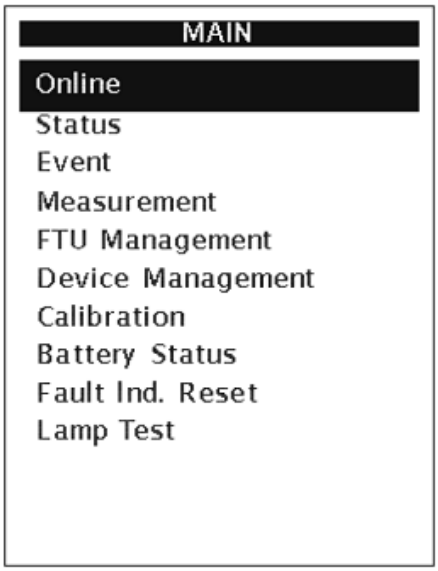
4-3 Voltage signal

Signal	Description	Remark
–	–	–
–	–	–
Phase A	PT A Input	
Phase B	PT B Input	
Phase C	PT C Input	
Ground	PT Ground Input	
Phase A	PT A Input	
Phase B	PT B Input	
Phase C	PT C Input	
Ground	PT Ground Input	

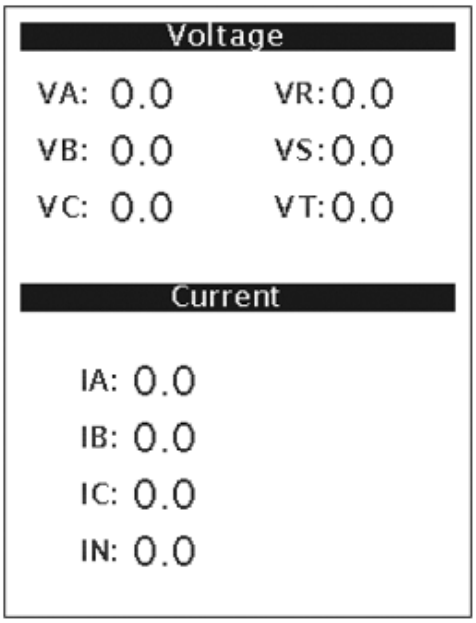
4-4 Current signal

Signal	Description	Remark
Phase A	CT A Input	
Phase B	CT B Input	
Phase C	CT C Input	
Common	CT Common	

4-5 Main



4-5-1 Online



This menu contains 2 sections. In the first section the voltages of both sides of the LBS are displayed, the second section contains the currents, including the neutral current.

4-5-2 Status

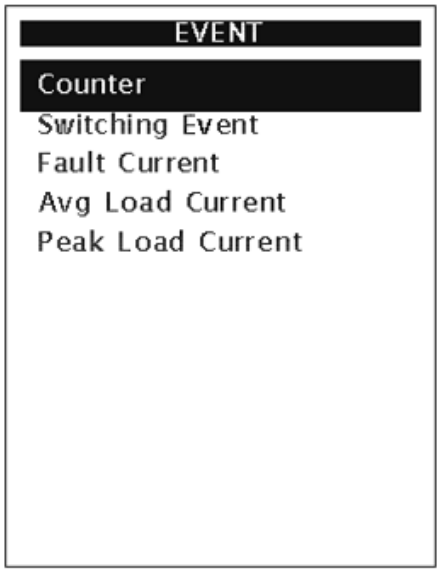
Control: Displays the LBS and control panel status

Power: Displays the external power supply and battery status

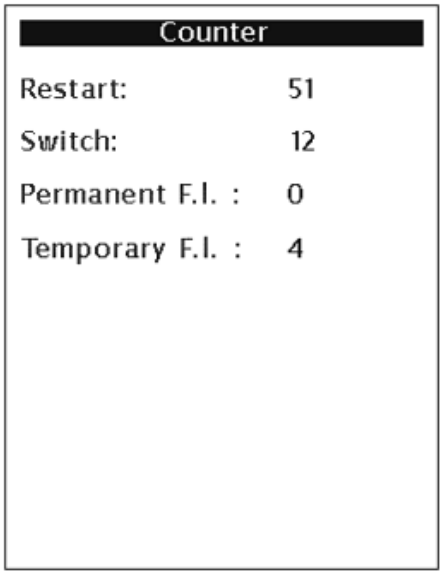
Communication: Displays the communication status

System Info: Displays the control panels serial and firmware version

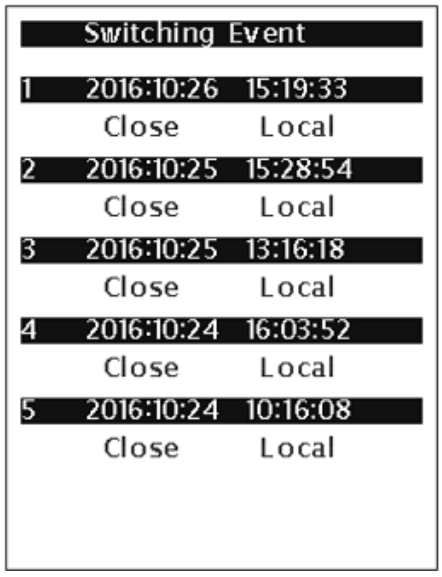
4-5-3 EVENT
In this menu, all events are shown including time of occurrence and description.



4-5-3-1 Counter:
The numbers of resets, number of LBS switches, permanent and temporary current errors are displayed in this menu.

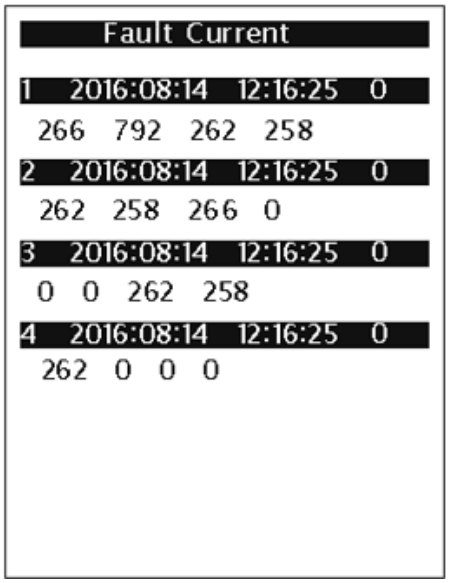


4-5-3-2 Switching Event
The local/remote closing time and date of the switch is displayed in this menu.

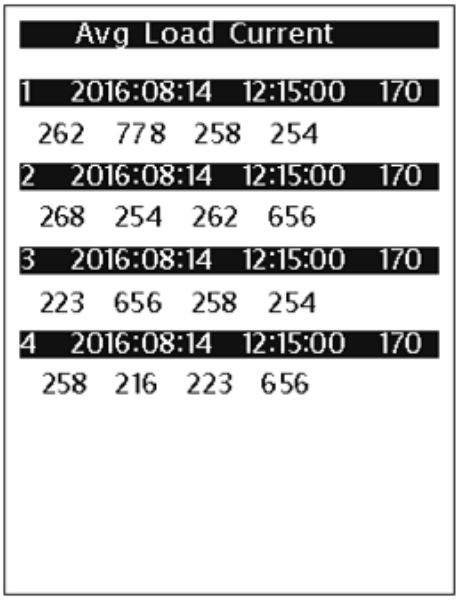


4-5-3-3 Fault current:

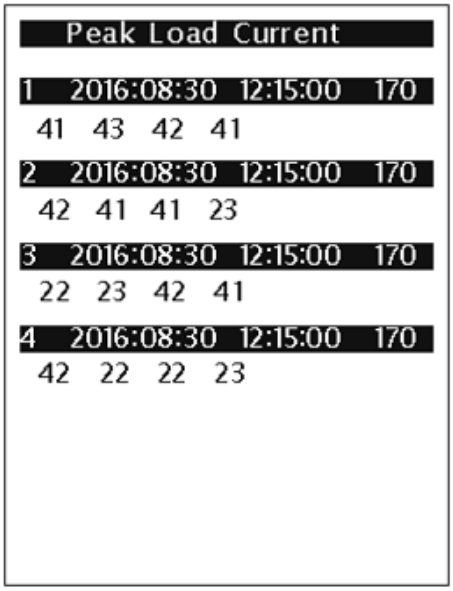
The time and date of current fault is displayed in this menu.



4-5-3-4 AVG Load Current:

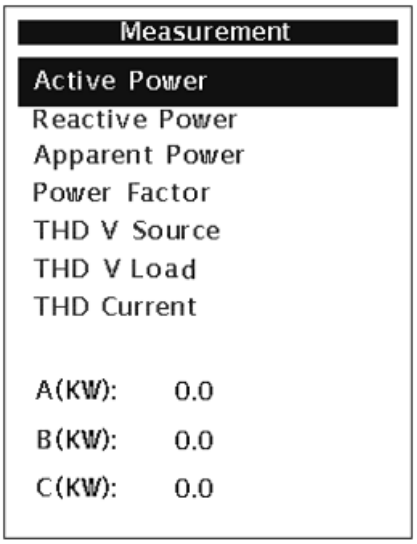


4-5-3-5 Peak Load Current



4-5-4 Measurement

Active power, reactive power, apparent power, PF, voltage THD and current THD are displayed in this menu.



4-5-5 FTU MANAGEMENT

4-5-5-1 Setting

4-5-5-1-1 Fault Report menu

Description	Classification	Default	Ranges	Step
Fault I report	Event Set	No	Yes/No	
	Static Reset	No	Yes/No	

4-5-5-1-2 Delay Time menu

Description	Classification	Default	Ranges	Step
Delay Time	On/Off Level*	4s	0.1s~60s	0.1s
	Phase Diff.	4s	0.1s~60s	0.1s
* Delay time for displaying the On/Off level change				

4-5-5-1-3 Sync. Lock menu

Description	Classification	Default
Synch. Lock	Enable Disable	Enable
Check and change the phase sync. While pressing Open and Close		

4-5-5-1-4 Do On-Time menu

Description	Classification	Default	Ranges	Step

Do On-Time	On-Time	20	10~3000	1ms
Time of motor voltage on				

4-5-5-1-5 Feeding Methods menu

Description	Classification	Default	Ranges	Step
FEEDING METHOD	Phase Reversal	Normal	Normal/Reverse	
	Feeding Factory	Disable	Disable/Enable	
If the Feeding factory is enabled, voltage could be applied from small power plants				

4-5-5-1-6 Phase Pick-Up menu

Description	Classification	Default	Ranges	Step
Pick-Up Current	Phase	200A	120~840A	5A
	Ground	30A	10~420A	5A
Minimum required current to report current error				

4-5-5-1-7 Inrush Time menu

Description	Classification	Default	Ranges	Step
Inrush Time	Phase	1.5s	0.1s~3.0s	0.1s
	Ground	1.5s	0.1s~3.0s	0.1s
The error duration time should be more than Inrush time to be able to report current error				

4-5-5-1-8 On/Off Level menu

Description	Classification	Default	Ranges	Step
Voltage On/Off Level	On Level	80	70~85	5%
	Off Level	50	50~75	5%
The hysteresis amplitude of voltage on/off				

4-5-5-1-9 Phase Difference menu

Description	Classification	Default	Ranges	Step
PHASE DIFF.	Phase Diff.	50D	0~80D	10D
Angle value required for sync. report				

4-5-5-1-10 F.I.Setting Time menu

Description	Classification	Default	Ranges	Step
F.I.Setting Time	Permanent	20	1~180	1s
	Temporary	2	1~180	1s
Suitable time range for reporting current errors				

4-5-5-1-11 V.O.C Set menu

Description	Classification	Default	Ranges	Step
V.O.C	V.O.C	5%	0~50%	1s
	Minimum VOC	100A	0~6030a	1A
Variations which would make an Event (Minimum VOC is the offset and amplitude variations of VOC)				

Communication config menu is used for setting the communication items. These settings include DNP communication protocol and modem setting.

4-5-5-2 Config

Setting Items	Sub Setting Items	Setting Ranges<Step>
Comm. Speed	Speed	2400/4800/9600/19200bps
D/L Confirm	Confirm	Yes/No/Sometime
D/L Setting	Retries	0~2<1>
	Timeout	0s~100s<1s>
A/L Confirm	Confirm	Enable/Disable
A/L Setting	Retries	0-2<1>
	Timeout	0s~100s<1s>
Unsolicited Mode	Unsol. MSG	Enable/Disable
	Unsol. Time	10ms~5000ms<10ms>
Unsolicited Class	Class 0	Enable/Disable
	Class 1	Enable/Disable
	Class 2	Enable/Disable
	Class 3	Enable/Disable
Master Address	Address	0~65534<1>
DNP Address	Address	0~65534<1>
SBO Time	Time	1s~255s<1>
Debounce Time	Debounce	10ms~100ms<5ms>
Multiframe Interval	Interval	100ms~5000ms <10ms >

4-5-5-2-1 Modem and Communication menu

Description	Classification	Default	Ranges	Step
Comm. Mode	Speed	9600	2400/4800/9600/19200bps	
For selecting the communication Baud rate				

4-5-5-2-2 D/L Confirm menu

Description	Classification	Default	Ranges	Step
D/L Confirm	Confirm	Sometime	Yes/No/Sometime	
For selecting and modifying Data Link Confirm				

4-5-5-2-3 D/L menu

Description	Classification	Default	Ranges	Step
D/L Setting	Retries	0	0~2	1
	Timeout	30	0s~100s	1s
For selecting and modifying Data Link Layer				

4-5-5-2-4 A/L Confirm menu

Description	Classification	Default	Ranges	Step
A/L Confirm	Confirm	Enable	Enable/Disable	

4-5-5-2-5 A/L menu

Description	Classification	Default	Ranges	Step
A/L Setting	Retries	0	0~2	1
	Timeout	40	0s~100s	1s

4-5-5-2-6 Unsolicited Mode menu

Description	Classification	Default	Ranges	Step
Unsolicited Mode	Unsol. MSG	Enable	Enable/Disable	
	Unsol. Tirne	5	10ms-5000ms	10ms

4-5-5-2-7 Unsolicited Class menu

Description	Classification	Default	Ranges	Step
Unsolicited Class	Class 0	Disable	Enable/Disable	
	Class 1	Disable	Enable/Disable	
	Class 2	Disable	Enable/Disable	
	Class 3	Disable	Enable/Disable	

4-5-5-2-8 Master Address menu

Description	Classification	Default	Ranges	Step
Master Address	Address	65534	1~ 65534	1

4-5-5-2-9 DNP Address menu

Description	Classification	Default	Ranges	Step
DNP Address	Address	65534	1~ 65534	1

4-5-5-2-10 SBO Time menu

Description	Classification	Default	Ranges	Step
SBO Time	Time	15	1s-255s	1

4-5-5-2-11 Debounce Time menu

Description	Classification	Default	Ranges	Step
Debounce Time	Debounce	20ms	10ms~100ms	5ms

4-5-5-2-12 Multifrane Interval menu

Description	Classification	Default	Ranges	Step
Multifrarne Interval	Interval	100ms	100ms~5000ms	10ms

4-5-5-3 System

4-5-5-3-1 Delay Time AC Supply menu

Description	Classification	Default	Ranges	Step
Delay Time	AC Supply	100ms	100ms~60000ms	100ms

4-5-5-3-2 Change Password menu

Description	Classification	Default	Ranges	Step
Change Password		1111	0000~9999	1

4-5-5-3-3 Ethernet Config menu

Description	Classification	Default	Ranges	Step
Ethernet Config	Ip Address	192.168.1.9		1
	Subnet Mask	255.255.255.0		1
	Default Getway	192.168.1.1		1
	DNS Server	0.0.0.0		1
	Port Number	8080		1

4-5-5-3-4 PT Turn menu

Description	Classification	Default	Ranges	Step
PT Turn		100	100~400	1

4-5-5-3-5 CT Turn menu

Description	Classification	Default	Ranges	Step
CT Turn		1000	100~1000	1

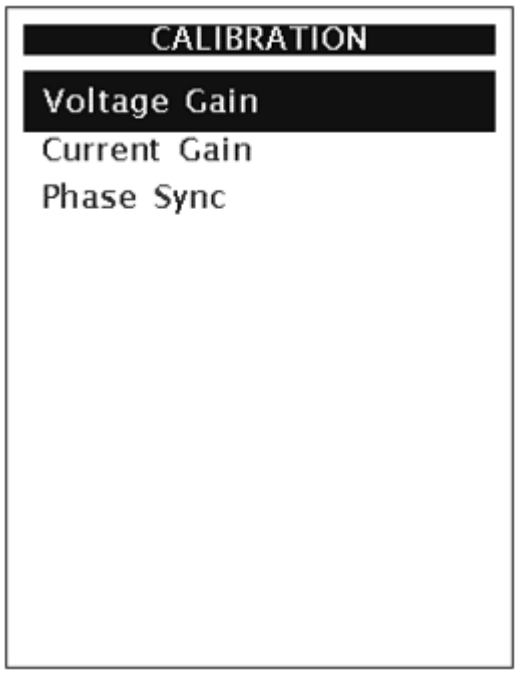
4-5-6 Device Management

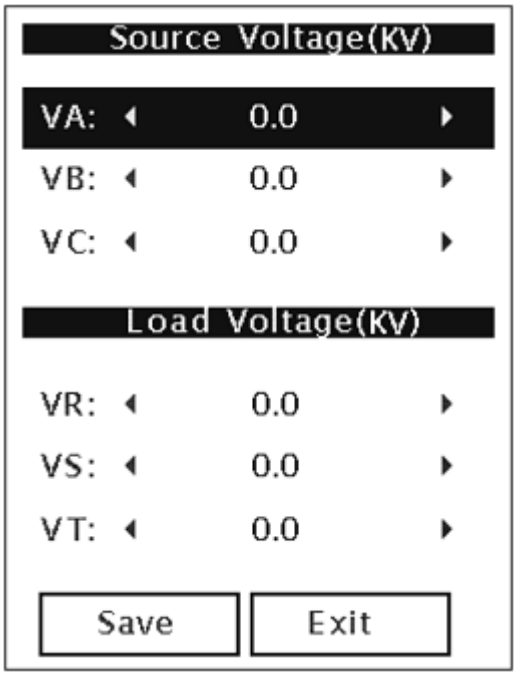
Time Adjust		Adjust Time and date
Update Firmware		Allow upgrade after USB connected
Clear Data		Clear the data
Restore Factory	Restore Config	Restore DNP3 config to default
	Restore Setting	Restore setting config to default

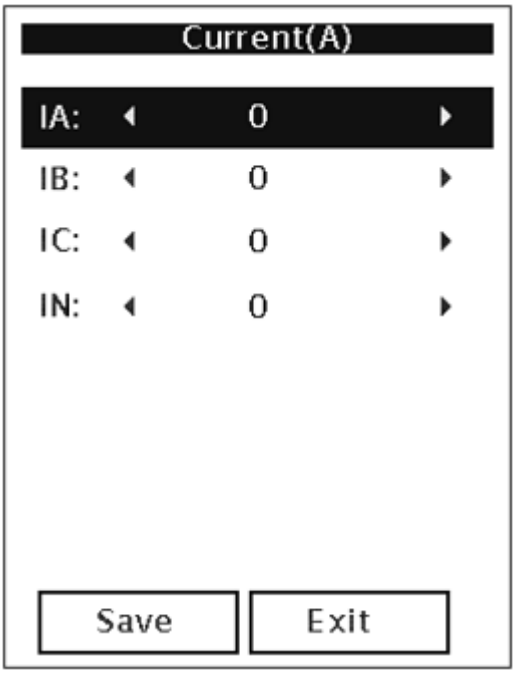
System Info	Device information (serial number, last calibration date and time, last version)

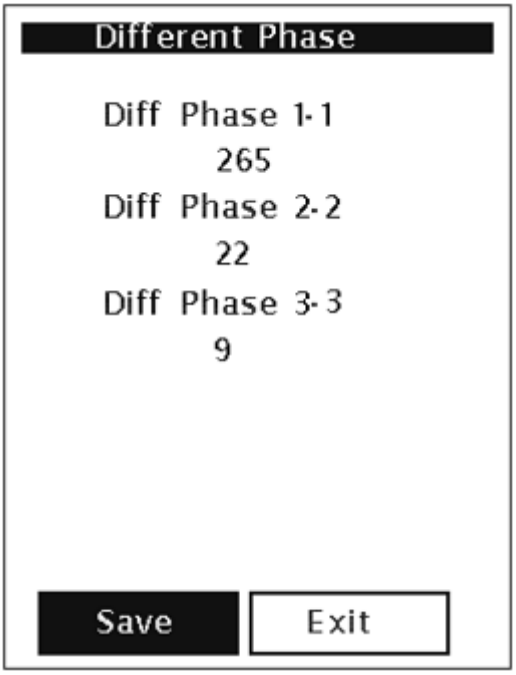
4-5-7 Calibration

Voltage, current and phase could be calibrated in this menu.



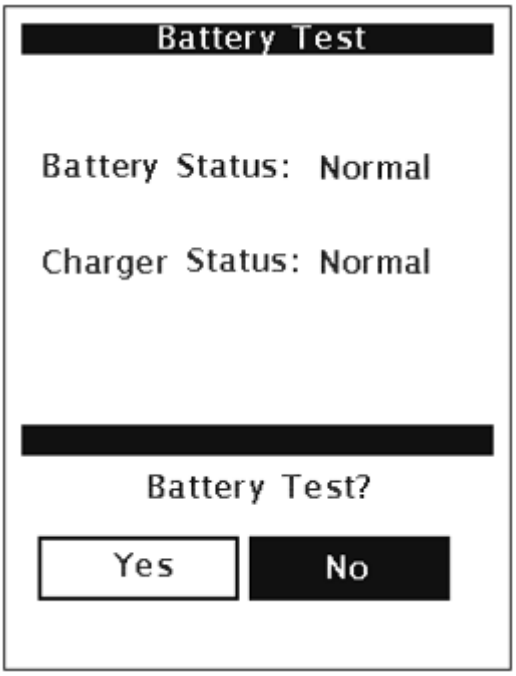






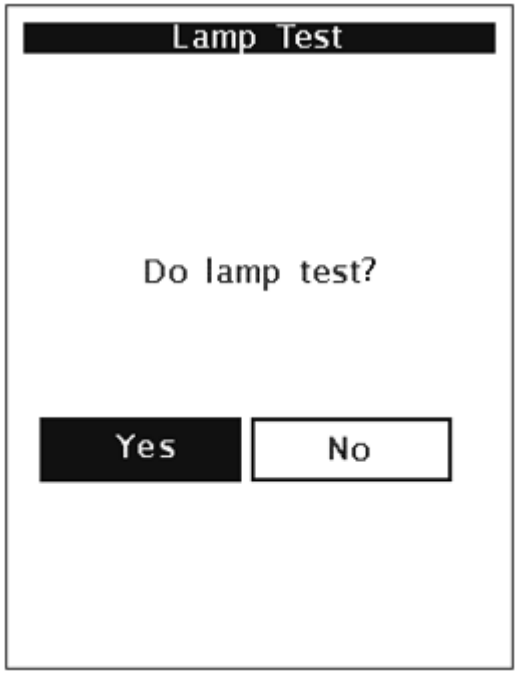
4-5-8 Battery Status

Battery and charger status could be viewed in this menu.



4-5-9 Fault Ind. Reset
The faults could be restarted from this menu.

4-5-10 Lamp Test
The status of the LED and LCD could be checked in this menu.


Lamp Test
Do lamp test?
Yes
No

5- DNP 3.0 profile for remote communication

DNP 3.0 DEVICE PROFLE DOCUMENT				
Requires Apptication Layer Confirmation ☐ Never ■Always ☐ When Reporting Event Data(Slave Devices Only) ☐When Sending Multi-Fragment Reslponses(Slave Devices Only) ☐Sometimes ☐Configurable As:				
Timeouts While Waiting For: Data Link Confim: Complete Appl. Fragment: Application Confirm: Complete Appl. Response: Others:	☐None ■None ☐None ■None	☐Fixed At___ ☐Fixed At___ ☐Fixed At___ ☐Fixed At___	☐Variable ☐Variable ☐Variable ☐Variable	■Configurable ☐Configurable ■Configurable ☐ Configurable
Sends Executes Control Operations:				
WRITE Binary Outputs	☐Never	■Always	☐Sometime	☐Configurable
SELECT/OPERATE	☐Never	■Always	☐Sometime	☐Configurable
DIRECT OPERATE	☐Never	■Always	☐Sometime	☐Configurable
DIRECT OPERATE _NO ACK	☐Never	■Always	☐Sometime	☐Configurable
Coont > 1	■Never	☐Always	☐Sometime	☐Configurable
Pulse On	☐Never	■Always	☐Sometime	☐Configurable
Pulse Off	■Never	☐Always	☐Sometime	☐Configurable
Latch On	■Never	☐Always	☐Sometime	☐Configurable
Latch Off	■Never	☐Always	☐Sometime	☐Configurable
Queue	■Never	☐Always	☐Sometime	☐Configurable
Clear Queue	■Never	☐Always	☐Sometime	☐Configurable
Attach Explanation If 'Sometimes' Or 'Configurable' Was Checked For Any Operation.				
Reports Binary Input Change Events When No Specific Variation Requested: ☐Never ■Only Time-Tagged ☐Only Non-Time-Tagged ☐Configurable				
Reports Time-Tagged Binary Input Change Events When No Specific Variation Requested: ☐Never ■Binary Input Change With Time ☐Binary Input Change With Relative Time ☐Configurable(Attach Explanation)				

DNP 3.0 DEVICE PROALE DOCUMENT	
Sends Unsolicited Responses: ☐Never ☐Configurable ■Only Certain Objects ☐Sometimes(Attach Explanation) ■ENABLE/DISABLE UNSOLICITED Function Codes Supported	Sends Static Data In Unsolicited Rescponses: ☐Never ■When Device Restarts ■When Status Flags Change No Other Options Are Permitted
Default Counter Object/Variation: ☐No Counters Reported ☐Configurable(Attach Explanation) ■Default Object :20 Default Variation :6 ■Point-By-Point List Attached	Counters Roll Over At: ☐No Counters Reported ☐Configurable(Attach Explanation) ■16 Bits ☐32 Bits ☐Other Value:_____ ☐Point-By-Point List Attached
Sends Multi-Fragment Responses: ■Yes ☐No	

6- DNP3 stages:

6-1 Binary input point

Binary Input Point Static (Steady-State) Object Number : 1 Change Event Object Number : 2 Request Function Codes Supponed : L(Read) Static Variation Reported When Variation 0 Requested : 1 Change Event Variation Reported When Variation 0 Requested : 2			
Point Index	Name/Description	Default Change Event Assigned Class (1,2,3, Or None)	Object / Variation
O	Closer/Open	1	01/01,01/02,02/02
1	Local/Remote	2	01/01,01/02,02/01
2	Lock/Unlock	2	01/01,01/02,02/01
3	Gas Pressure Low	2	01/01,01/02,02/01
4	Banery Status	2	01/01,01/02,02/01
5	Battery/ Charger Fail	1	01/01,01/02,02/02
6	FI Permanent(A)	1	01/01,01/02,02/02
7	FI Permanent(B)	1	01/01,01/02,02/02
8	FI Permanent(C)	1	01/01,01/02,02/02
9	FI Permanent(N)	1	01/01,01/02,02/02
10	FI Temporary(A)	1	01/01,01/02,02/02
11	FI T Emporary(B)	1	01/01,01/02,02/02
12	FI T Emporary(C)	1	01/01,01/02,02/02
13	FI T Emporary(N)	1	01/01,01/02,02/02
14	Source Lose Voltage (Vab)	1	01/01,01/02,02/02
15	Source Lose Voltage (Vbc)	1	01/01,01/02,02/02
16	Source Lose Voltage (Vca)	1	01/01,01/02,02/02
17	Load Lose Voltage (Vrs)	1	01/01,01/02,02/02
1B	Load Lose Voltage (Vst)	1	01/01,01/02,02/02
19	Load Lose Voltage (Vtr)	1	01/01,01/02,02/02
20	Mechanisrn Lock	2	01/01,01/02,02/01
21	Door Open	1	01/01,01/02,02/02
22	Ext. AC Power Loss	2	01/01,01/02,02/01
23	Different Phase A-R	2	01/01,01/02,02/01
24	Different Phase B-S	2	01/01,01/02,02/01
25	Different Phase C-T	2	01/01,01/02,02/01
26	Banery Discharged	1	01/01,01/02,02/02
27	Unsolicited Class 1		01/01,01/02
28	Unsolicited Class 2		01/01,01/02
29	Unsolicited Class 3		01/01,01/02
30	Diagoostic Fail	1	01/01,01/02,02/02
31	Preparation1		01/01,01/02

6-2 Binary output point

Binary Output Point Control Relay Output Blocks Object Number : 12 Request Function Codes Supported : 3(Read), 4(Operate), 5(Directoperate), 6(Directoperate, Noack)				
Point Index	Name/Description		Default Change Event Assigned Class (1,2,3, Or None)	Object Variation
0	Close	Pulse ON		12/01
	Open	Pulse ON		
1	Lock	Pulse ON		12/01
	Unlock	Pulse ON		
2	Battery Test	Pulse ON		12/01
3	FI Reset	Pulse ON		12/01
4	Spare	Pulse ON		12/01
		Pulse ON		

6-3 Counters

Binary Counters Static (Steady-State)Object Number : 20 Change Event Object Number: 22 Request Function Codes Supported : 1(Read) Static Variation reported When Variation 0 Requested : 6 Change Event Variation Reported When Variation 0 Requested : 8			
Point Index	Name/Description	Default Change Event Assigned Class (1,2,3, Or None)	Object /Variation
0	Restart Count		20/02,20/06
1	Switch Count		20/02,20/06
2	Permanent FI Count	2	20/02,20/06
3	Temporary FI Count	2	20/02,20/06

6-4 Analog input

Analog Inputs Static (Steady-State)Object Numlber : 30 Change Event Object Numьer : 32 Request Function Codes Supported : 1(Read) Static Variation Reported When Variation 0 Requested : 2 Change Event Variation Reported Wnen Variation 0 Requested : 4			
Point Index	Name/Desctiplion	Defautt Change Event Assigned Class (1,2,3, Or None)	Object /Variation
0	Current (A)		30/2,30/4
1	Current (B)		30/2,30/4
2	Current (C)		30/2,30/4
3	Current (N)		30/2,30/4
4	Pick Current (A)	3	30/2,30/4,32/4
5	Pick Current (B)	3	30/2,30/4,32/4
6	Pick Current (C)	3	30/2,30/4,32/4
7	Pick Current (N)	3	30/2,30/4,32/4
8	Average Current (A)	2	30/2,30/4,32/2
9	Average Current (B)	2	30/2,30/4,32/2
10	Average Current (C)	2	30/2,30/4,32/2
11	Average Current (N)	2	30/2,30/4,32/2
12	Source Voltage (Va)		30/2, 30/4
13	Source Voltage (Vb)		30/2, 30/4
14	Source Voltage (Vc)		30/2, 30/4
15	Current (A)	3	30/2,30/4,32/4
16	Current (B)	3	30/2,30/4,32/4
17	Current (C)	3	30/2,30/4,32/4
18	Current (N)	3	30/2,30/4,32/4
19	Load Voltage (Vr)		30/2, 30/4
20	Load Voltage (Vs)		30/2, 30/4
21	Load Voltage (Vt)		30/2, 30/4
22	Power Factor(A)		30/2, 30/4
23	Power Factor(B)		30/2, 30/4
24	Power Factor(C)		30/2, 30/4
25	Apparent Power (A)		30/2, 30/4
26	Apparent Power (B)		30/2, 30/4
27	Apparent Power (C)		30/2, 30/4
28	Active Power (A)		30/2, 30/4
29	Active Power (B)		30/2, 30/4
30	Active Power (C)		30/2, 30/4

31	Reactive Power (A)		30/2, 30/4
32	Reactive Power (B)		30/2, 30/4
33	Reactive Power (C)		30/2, 30/4
34	Temperature		30/2, 30/4
35	Version		30/2, 30/4

7- Earthing

The control panel is connected to earth by a standard copper cable using the earth terminal at the bottom of the enclosure which is compatible with required standards. Please make sure that the earthing system is connected correctly due to local designing.

8- Control cable and power cable

The control cable is manufactured with sockets at both sides and has a length of 8 meters. In order to prevent shocks due to wind and external pressures which could damage the cable, it should be completely fastened.
The male socket of the control cable (37 pins) should be connected to the switch and the female socket should be connected to the control panel. The female socket of the power cable (3 pins) should be connected to the control panel and the other end of it to the external power supply (voltage transformer or low voltage network). Make sure that all connections are connected correctly.