

# UMU11

## Battery Backup



Figure 1 - UMU11

User Manual

VOLUME 1.9

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# 1. Introduction

## **About this manual**

This manual was prepared to aid the engineer in the configuration, setup and implementation of the UMU11 in systems with easy to understand terms and procedures.

## **About the UMU11**

The UMU11 is an Intrinsic Safe Uninterruptable Power Supply. Designed and manufactured for the Underground mining environment.

The UMU11 is manufactured to international standards utilizing the best components available. We offer 24/7 toll free technical support, backup service and training.

## **The UMU11 has all the following functions available.**

- 1 x 12VDC 4.5A IS Output
- 1 x 24VDC 4.5A Non IS output
- 1 x 12/24VDC 4.5A Non IS output (Preconfigured)
- 4 x External Inputs
- 2 x C/O (Change over) Voltage free contacts
- RS485 Modbus RTU communication

## 2. UMU11 HMI (human machine interface)

The UMU11 operates as a user friendly device with colour indication. All the measurements and data are available to the network via MODBUS RTU RS485



LED indications on the HMI are as follows

1. Fault – External trip, under voltage, over current, or any other system fault
2. Charge – Charging active
3. On – System OK, no faults present
4. 24VB – 12/24V(preconfigured) non IS Output
5. 24VA – 24V non IS Output
6. 12IS – 12VDC Intrinsic safe Output

## 3. Warranty

The UMU11 carries a one year limited warranty on all parts and labour.  
(Full warranty details available on request)

## 4. Safety information

Dangerous voltages can occur on the connectors, even if the auxiliary voltage has been disconnected.

Only a certified electrician is allowed to carry out the electrical installation.  
Breaking the seal on device will result in loss of warranty.  
Electrical safety regulations must always be followed.

The unit is sealed during the production process and should under no circumstances be opened.

# 5. UMU11 Connections

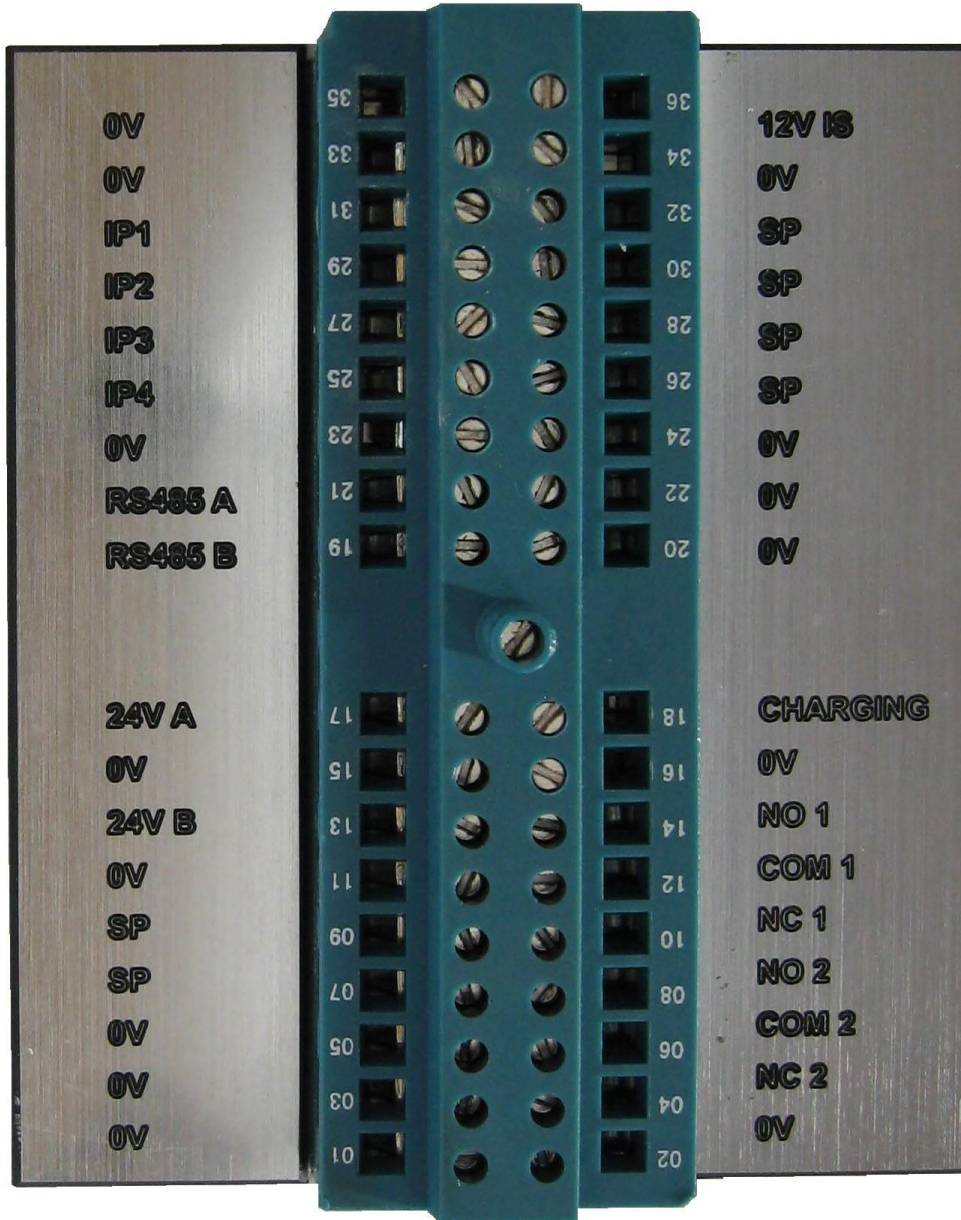


Figure 2 - Connections

Number	Label	Description
1	0V	0V
2	0V	0V
3	0V	0V
4	NC2	Relay 2 normally closed
5	0V	0V
6	COM2	Relay 2 common
7	SP	Spare Do Not Connect
8	NO2	Relay 2 normally open
9	SP	Spare Do Not Connect
10	NC1	Relay 1 normally closed
11	0V	0V
12	COM1	Relay 1 common
13	24VB	12V/24V output B
14	NO1	Relay 1 normally open
15	0V	0V
16	0V	0V
17	24VA	24v output A
18	CHARGING	32V Charging Input
19	RS485B	RS485 Communication B Line
20	0V	0V
21	RS485A	RS485 Communication A Line
22	0V	0V
23	0V	0V
24	0V	0V
25	IP4	Input 4
26	SP	Spare Do Not Connect
27	IP3	Input 3
28	SP	Spare Do Not Connect
29	IP2	Input 2
30	SP	Spare Do Not Connect
31	IP1	Input 1
32	SP	Spare Do Not Connect
33	0V	0V
34	0V	0V
35	0V	0V
36	12VIS	12V Intrinsic Safe Output

Default Input triggers

The following list is the resulting status of the UMU11 for each input if it is unhealthy

	24VA	12/24VB	12VIS	Charging
Input1	OFF	OFF	OFF	OFF
Input2	OFF	ON	ON	OFF
Input3	OFF	OFF	ON	OFF
Input4	OFF	OFF	ON	ON

The Input is healthy if it is connected to the UMU11 0V, if the Input is left unconnected/open the input is unhealthy.



# 6. Communication

About communication

The UMU11 offers RS485 (Modbus RTU) communication.

## Modbus RTU Protocol

The protocol for Modbus RTU consists of a string of bytes. The string starts with the RS485 address, the function required, addresses, data bytes and ends with CRC (cyclic redundancy check).

All input registers are 16 bit in length.

Example – Read Voltage and Current

Example - Slave address = 5

Read request

Slave Address	Function	Start Address Hi	Start Address Lo	No Points Hi	No Points Lo	CRC Lo	CRC Hi
05	04	00	03	00	04	CRC	CRC

Read response

Slave Address	Function	Byte Count	Data Hi	Data Lo	.....	Data Hi	Data Lo	CRC Lo	CRC Hi
05	04	08	XX	XX	XX	XX	XX	XX	XX

# 7. Registers

## COILS

REGISTER	DESCRIPTION	MIN	MAX
00038	Save Settings	0	1

## INPUT STATUS

REGISTER	DESCRIPTION
10001	Inputs

## BITWISE

15 – 4	3	2	1	0
N/A	IP4	IP3	IP2	IP1

The bitwise registers show the Input 1- 4 Status, with a 1 for a healthy input and a 0 for an unhealthy input.

## INPUT REGISTER

REGISTER	DESCRIPTION	MIN	MAX	UNIT
30001	Communication Counter	0	255	Incremental Number
30002	24V Output	0	320	VDC/10
30003	12V IS Output	0	180	VDC/10
30004	24V Current	0	6000	mA
30005	12V Current	0	6000	mA
30006	Charge Voltage	0	320	VDC/10
30007	Charger Output Current	0	18000	mA

## HOLDING REGISTER

REGISTER	DESCRIPTION	MIN	MAX	UNIT	PASSWORD
40001	Serial No. Hi				Read Only
40002	Serial No. Lo				Read Only
40003	Model				Read Only
40004	Version				Read Only
40014	Address ( <i>Default 5</i> )	0	247		Level 1
40503	Password Level 1 = 61600 Level 2 = 57504	0	65535	-	-

# 8. Block Diagram

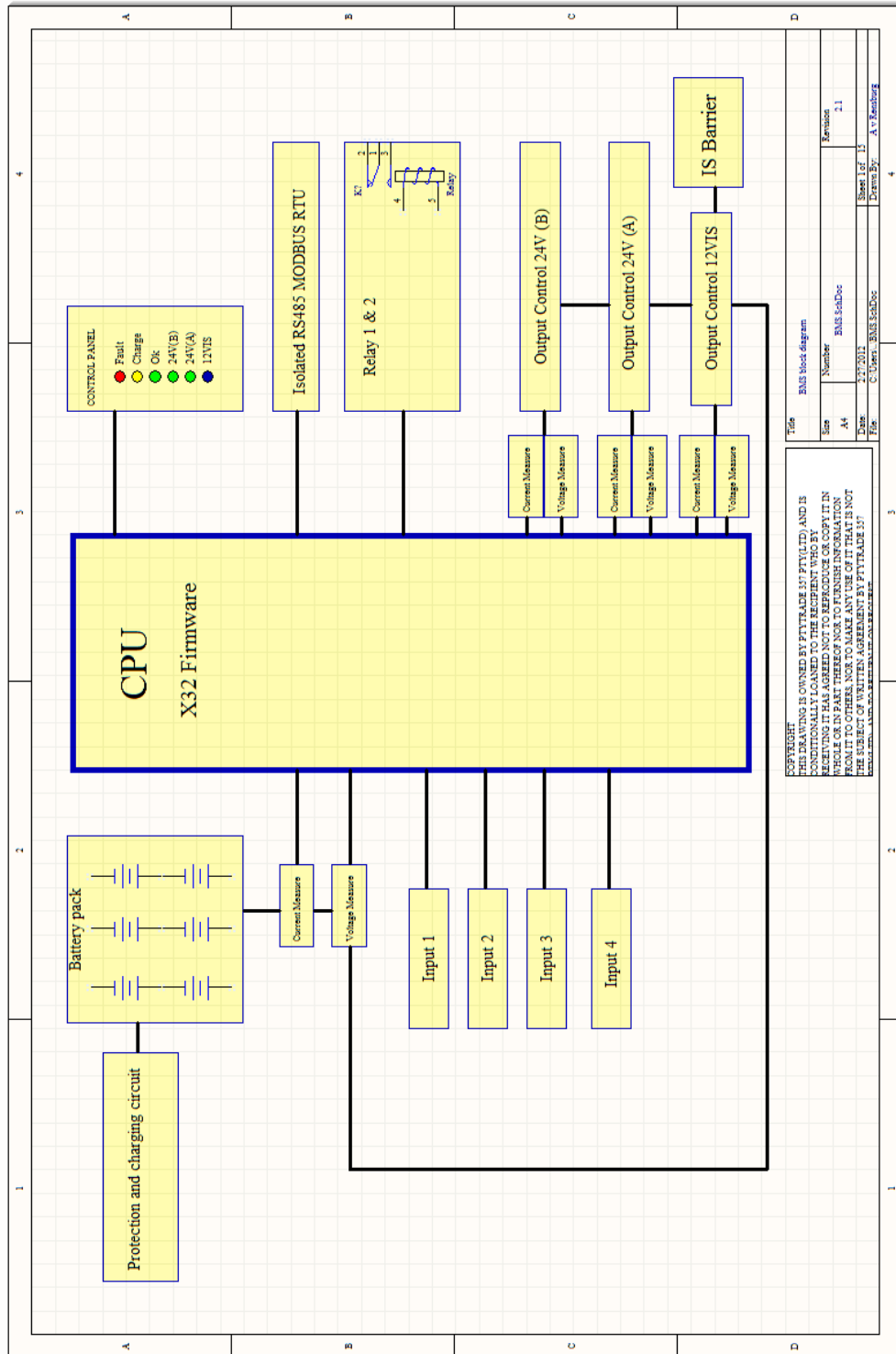


Figure 3 - Block Diagram

# 9. Scada

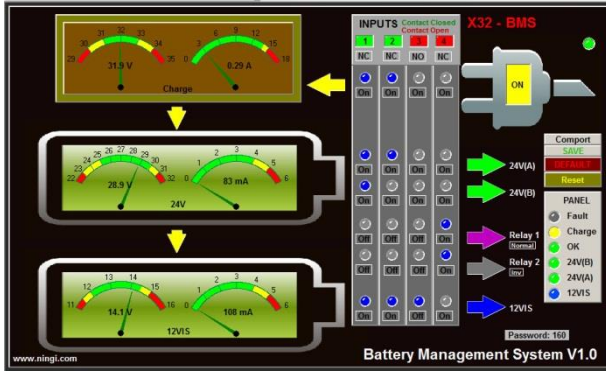


Figure 4 - Overview

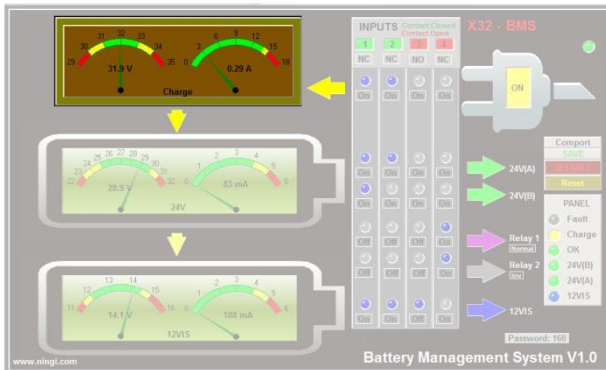


Figure 5 - Charger: Volt and Amp Meters

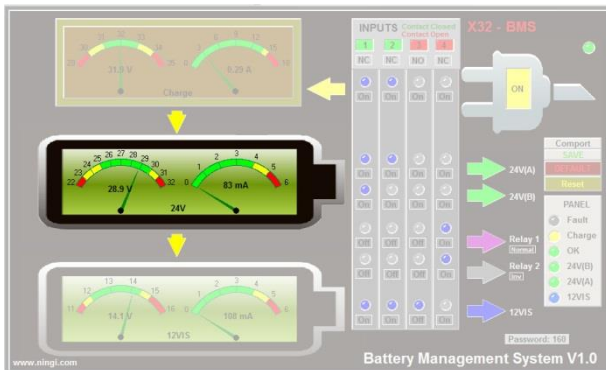


Figure 6 - 24VDC: Volt and Amp Meters

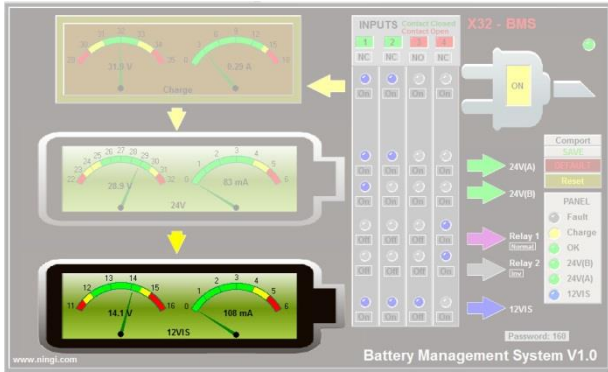


Figure 7 - 12VDC Intrinsic Safe: Volt and Amp Meters

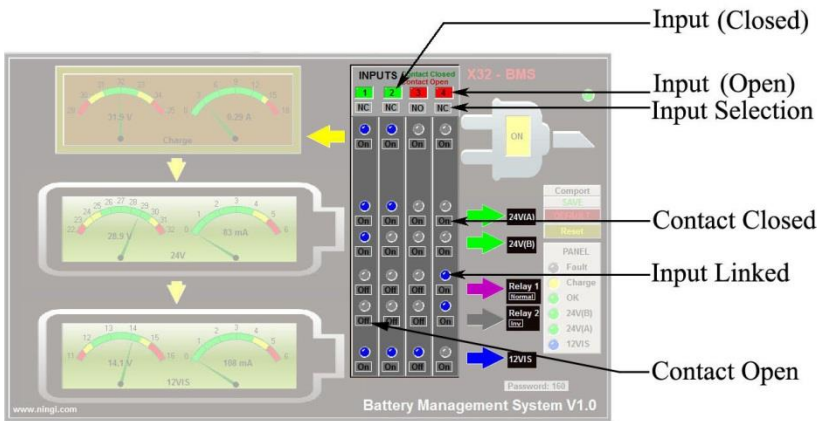


Figure 8 - Input Control

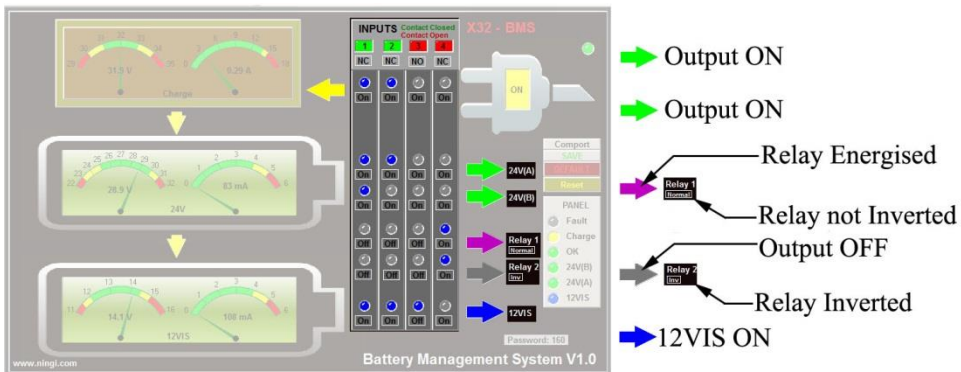


Figure 9 - Input Control

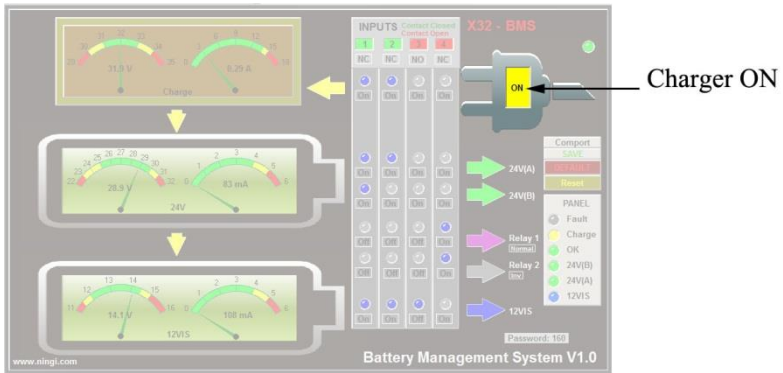


Figure 10 – Charger

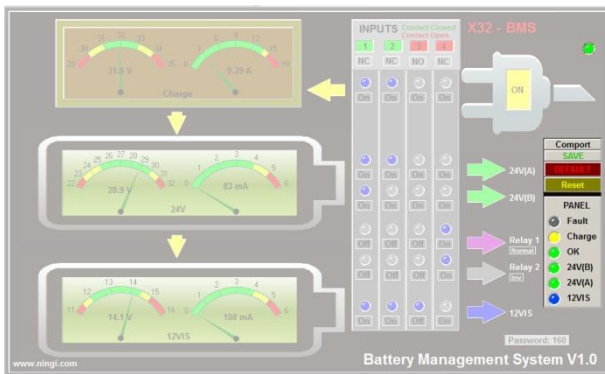


Figure 11 - Navigation

# 10. Approvals and Marking

## MARKING ON MAIN UNIT

Manufacturer NINGI Services

Type: Battery Box BB12-24-25 (Sand filled)

Ex Rating: Ex q [ia] I (-20°C ≤ Tamb ≤ 50°C)

- A barrier / isolator connected to the RS485 interface shall have a 100mA or lower fuse in place, or Po (Power Out) of the barrier / isolator shall not exceed 1,2W.
- The programming connector may only be used outside the hazardous location, with no connected circuits into the hazardous location.

<b>Manufacturer:</b> Ningi <b>Type / Model:</b> Battery Box BB12-24-25 (Sand Filled) <b>Rating:</b> Um = 24V <b>Ex rating:</b> Ex q [ia] I (-20°C ≤ Tamb ≤ 50°C) <b>I.A. No:</b> MASC M/11-387X	
<b>Safety Parameters:</b> <b>RS485</b> <b>UI = 5.88V</b> <b>Uo = 5.88V</b> <b>Ii = 1A</b> <b>Io = 018.98mA</b> <b>Po = 0.81W</b> <b>CI = 138.48uF</b> <b>Co = 881.52uF</b> <b>LI = 0mH</b> <b>Lo = 2.74mH</b>	
<b>I.S. Barrier:</b> Refer to barrier certificate MASC/11-380X for safety parameters	
<b>Warning:</b> Sealed by manufacturer. Do Not Open Static hazard wipe only with a damp cloth	

# 11. Electrical specifications

	Min	Typical	Max	Unit
Charging voltage	30	32	34	VDC
Charging consumption (No load)	44	120	150	W
Communication channel RS485 (MODBUS RTU)		9600		Bps
Relay contacts AC Voltage			250	VAC
Relay contacts DC Voltage			30	VDC
Relay contacts Current Rating			6	A
12V IS Output Current		2	4.5	A
24V Non IS Output Current		2	4.5	A
12V Non IS Output Current		2	4.5	A
Inputs	0		5	V

## Backup Runtime Calculation

The runtime calculation is for the UMU11 when connected to a load and no supply voltage is connected

T – Time

Ia – 24V A channel current

Ib – 12/24V B channel current

Ic – 12V IS channel current

C – UMU11 Capacity

U – 0.85 efficiency factor, allowing for Battery capacity variance and voltage

$$T=C*U/(Ia+Ib+Ic)$$

The charge time for the UMU11 is 12 to 15 hours, dependent on the state of the batteries after the power is restored.



# 12. Care & Maintenance

The UMU11 has no user serviceable parts and is sealed by the factory, please return to your supplier to ensure repairs are conducted by authorised persons.

Some care and maintenance can be conducted by the user.

1. The unit is to only be wiped down with a damp lint free cloth. No solvents or cleaning fluids are to be used on the UMU11.
2. When removing or reinserting the power connector, ensure that it is the correct way around.
3. When removing and reinserting the power connector be careful not to damage the alignment pins.
4. If the power source that supplies the UMU11 with charging voltage is replaced, use only a UMPS11, available from Ningi Services.

# 13. Terms and conditions

## Product Agreement

PTYTRADE377 (PTY) LTD reserves the right to make changes without further notice to any products herein.

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