

Arshanold Modular Battery Monitoring Systems

1 Introduction

BM (Rack mount system), Arshanold and Sentry are 3 series of Kokii product to cover wide range variety of battery applications. Along with Kokii's cutting edge software and networking technologies, we provide the reliable and competitive monitoring solutions to both backup and deep cycle battery power.

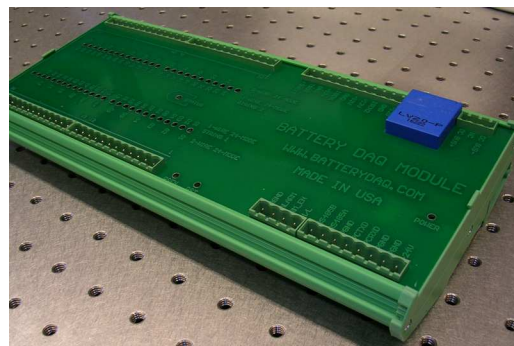
Arshanold is designed to significantly reduce the installation cost. Unlike rack mount systems which require wiring from each battery to distant rack, the compact Arshanold TM module (UL 94-V0 flame retardant housing) can be installed next to battery rack or cabinet. The 3rd generation technology has powered the module for the challenging applications, such as high common voltage, large number of cells, extreme low internal resistance, etc. All excellent performances come in a rigid, 2/3 book size compact module.



Arshanold monitoring system can be flexibly constructed with TM module(s), RM module(s) and communication optional parts for large scale up to several thousands batteries per system.

2 Features

- Advanced precise IR (Internal Resistance) measurement technology
- Separate ohmic value for connection resistance between batteries (2-wire mode)
- +/-20V for each channel with +/-400V protection at any battery input terminal
- Up to 400VDC (600V for TM-40 high voltage version) super wide voltage range for whole string
- 16-bit high resolution data acquisition
- No mechanical scanning relays, high reliability for industrial application
- High noise immunity for high ripple application
- System on board design, no need for other controller
- Industry standard communication: Modbus/RTU.
- ESD protected RS-232C and RS-485 interface
- Dual-color LEDs for each channel for scanning and battery condition indication
- Easy DIN-rail or wall mount installation



3 TM Modules

Product Number	2-wire Mode	1-wire Mode	Typical Application
TM-24	24 batteries	48 batteries (or 2 X 24)	48V Telecom
TM-30	30 batteries	60 batteries	120, 220VDC Electric Utility DC
TM-40 High Voltage	N/A	40 batteries	Up to 600V UPS

4 RM Modules

For the application which requires internal resistance monitoring, RM module will be selected to work with TM module. Our wavelet digital IR technology provides unsurpassable accuracy.

RM modules are factory set upon battery type, string voltage and battery capacity.

String Voltage	L (<200Ah)	M (200 to 800Ah)	H (800 to 3000Ah)
48V	RM-48-L	RM-48-M	RM-48-H
110V	RM-110-L	RM-110-M	RM-110-H
220V	RM-220-L	RM-220-M	N/A
400V	RM-400-L	RM-400-M	N/A

5 Applications

- UPS (Uninterruptible Power Supply, 10 to 500kW)
- Telecommunication Central Office or Site
- Electric Power Generation or Utility DC Power
- Solar Hybrid Power System
- Electric Hybrid Public Transportation
- Battery Development & Test Lab
- Battery Manufacture Formation and Test
- Battery discharge test for maintenance or capacity validation
- **Other systems which may have many batteries ...**



RM Module

Battery Type: Valve Regulated Lead Acid, Flood Lead Acid, Ni-Cad, Ni-MH, Li-ion and LiFePO4.

6 Specifications

6.1 Simple Power Supply

Voltage	+12VDC (Universal AC or DC adapter available)
Maximum Power Consumption	< 10W per module
Isolation	500VDC@1min to battery string, 1,000VDC@1min for high voltage version

6.2 Current Input

Current Sensor	Support 2 LEM current sensor (1 sensor for TM-40) (Close loop sensor is suggested for high accuracy) Mode A: for 1 string of batteries, high current sensor for charge/discharge, low current sensor for floating current. Mode B: for 2 strings, 2 high current sensors
Accuracy	0.1% + sensor accuracy

6.3 Temperature Measurement

Temperature Sensor	Digital high precision sensor
Range	-20 to 60°C
Accuracy	1 °C

6.4 Battery Voltage Channel

Valid Input Range	+/- 20V
Protected input	+/- 400V at any voltage input terminal
Accuracy	0.1%
Input Wiring	2-wire or 1-wire for each battery

6.5 String Voltage

Sensor	1 separate Channel for string voltage
Range	0 to 400V (0 to 600V for TM-40)
Accuracy	0.1%

6.6 Internal Resistance Measurement

Please provide battery capacity for RM module selection. RM module is not included in DAQ module.

Range	0 to 30mΩ
2-wire mode	Separate value for Internal Resistance of each battery and Connection Resistance between adjacent batteries.
1-wire mode	Total value of Internal + Connection resistance.

6.7 Communication

Serial Port	Isolated RS-232C and RS-485 interface, Serial to network adapter optional
Isolation protection	500VDC to battery
Protocol	MODBUS
Transmission Mode	RTU
Connection Mode	Mode 1: One-to-One. 1 port to 1 module through RS-232 Mode 2: All modules link through RS-485
Transmission speed	Default 9600 (14400/19200/28800/57600 selectable)
Maximum capacity per system	1 to 30 modules for MODBUS system
Wireless GPRS	GSM mobile data plan (AT&T SIM validated) GSM 900/1800MHz GSM 850/1900MHz
Virtual GPRS module	Through regular land network, 10/100Mbps, no SIM

6.8 LED Indication and Alarm Output

- Dual-color LEDs for each channel
- Green LEDs indicate dynamic scanning
- Red LEDs indicate battery condition alarm.
- Alarm output. (DIN-rail relay optional)
- Programmable alarm condition.

7 Software and Database

A. Configuration software

- Configure the channels and working mode
- Calibrate and save in onboard EEPROM

B. Battery Analyzer Software with SQL Server

Battery Analyzer software has been validated on 32 or 64-bit computer with any OS of:

- 1) Windows XP + SP2
- 2) Windows Vista
- 3) Windows 7
- 4) Windows Server 2003 or 2008

C. MyBattery.Info platform compatible

See MyBattery.Info white paper for details. Test Server: www.kokiidemo.com login: test/test

Production Server: www.MyBattery.Info or www.batterydatacenter.com for subscribers.

8 Ordering Information

Please download Product Selection Questionnaire from our website. We will discuss with you to select correct product to best fit your application and budget.

Example 1: Remote electric utility site

- 120V DC power with 2V500Ah cells, 2 strings, each has 60 cells, total 120 cells.
- No existing land network
- Mobile phone coverage, GPRS links site to office or MyBattery.Info platform

Item	Part/Rev/Description/Details	Unit	Quantity	Note
1	TM-30 Arshanold DAQ Module 60 channels at 1-wire mode	Each	2	Each module monitors 60 cells at 1-wire mode.
2	RM-120-M IR module, for 120V up to 800Ah	Each	2	Each string utilizes 1 RM module.
3	CM65-GT-01 HMI, 5V adapter, RS232	Each	1	For engineer to set and check field data/alarm
4	CN-30 Connection plugs, temperature sensor	Kit	2	Each string has a temperature sensor for ambient or pilot data.
5	GPRS Module (RS485)	Each	1	Buyer provides SIM card with AT&T data plan
6	12V Power Supply	Each	1	110AC or 120VDC input
7	O-ring Lead with Fuse	Each	130	Buyer prepares wire from batteries to modules.
8	Current Sensor	Each	2	Current range and installation method need to be specified.
9	PC Software License	Site	1	Software can manage multiple remote sites.

Example 2: UPS

- High power UPS, 1 string, 32 or 33 batteries of 12V170Ah
- Windows Server with COM port on site

Item	Part/Rev/Description/Details	Unit	Quantity	Note
1	TM-40 High Voltage Module 40 channels at 1-wire mode	Each	1	Each module monitors up to 40 batteries at 1-wire mode.
2	RM-400-M IR module, for 400V up to 300Ah	Each	1	Each string utilizes 1 RM module.
3	CM65-GT-01 HMI, RS232	Each	1	Direct link to TM-40 (19" rack HMI panel available)
4	CN-40 Connection plugs, temperature sensor	Kit	1	TM-40 supports 2 sensors for ambient and pilot temperature.
5	12V Power Supply	Each	1	100 – 240VAC input
6	O-ring lead with fuse	Each	50	Buyer prepares wire from batteries to modules.
7	Current Sensor	Each	1	Current range and installation method need to be specified.
8	PC Software License	Site	1	Each site needs 1 license

Example 3: Telecom

- 48V DC system with 2V1500Ah cells, 2 strings, each string has 24 cells, total 48 cells in 1 site.
- Land network available
- Centralized management for remote sites

Item	Part/Rev/Description/Details	Unit	Quantity	Note
1	TM-24 Arshanold DAQ Module 24 channels at 2-wire mode	Each	2	Each module monitors 24 cells at 2-wire mode for very low internal resistance.
2	RM-48-H IR Module, for 48V up to 3000Ah	Each	2	Each string utilizes 1 RM module.
3	CM65-GT-01 HMI, 5V Adapter, RS232	Each	1	As engineering tool to set and check field data/alarm
4	CN-24 Connection plugs, temperature sensor	Kit	2	Each string has a temperature sensor for ambient or pilot data.
5	Network Adapter (RS485)	Each	1	Each site needs 1 adapter Communicate between site and management center within same network
6	12V Power Supply	Each	1	36 to 72VDC input (100 – 240VAC adapter available)
7	O-ring lead with fuse	Each	100	Buyer prepares wire from batteries to modules.
8	Current Sensor	Each	1	Current range and installation method need to be specified. Split-core sensor available
9	PC Software License	Site	1	Each site needs 1 license

References

1. USABC website: Battery testing procedure and terminology.
2. IEEE Std 1188 (1996) IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid(VRLA) Batteries for Stationary Applications
3. IEEE Std 1491 (2005) IEEE Guide for Selection and Use of Battery Monitoring Equipment in Stationary Application

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