

POWERTRON

Creating an innovative vision for emergency power
battery diagnosis & monitoring technologies

IBwatch IBEX-series

New Leader in Future Technology

 **POWERTRON**
POWERTRON ENGINEERING CO., LTD.

driving innovation in power control, quality, and next-generation technologies.

The company has grown to become a global leader in battery management, validation, diagnosis & power line quality monitoring technologies.



Powertron's power control

INDUSTRY MANUFACTURERS, SERVICE PROVIDERS, and CUSTOMERS select Powertron's power control, quality, and next-generation technologies. With two decades of experience, and thousands of installed systems currently in operation around the world, Powertron has an enormous Asia/Pacific network and an ever-expanding global agent.

Powertronの電力制御

産業用製造業社、サービス供給業社、そしてお客様たちはPowertronの電力制御、品質及び発展に関する技術を選択します。20余年間のField経験とあちこちに設置された1000余台システムを通じて国際的なNetwork網を持った代理店を持ちます。



Experienced sales professionals

Powertron's world-class production and testing facilities, along with an ISO-certified quality system, provide a basis for supplying the best products the market has to offer. Industry-leading manufacturers and world-best service resellers have partnered with Powertron to help with satisfying our customers in any commercial, industrial, or utility environment.

プロ化された長年の経験。

ISO認証品質保証システムによって生産されるPowertronの生産品は顧客が望む最高の品質を充分にご提供致します。Powertronは産業を導いていく企業及びサービス提供社たちとの緊密な協働を通じて、すべての顧客により多くの助けをご提供しようといつも努力します。

Innovative technology leader

Powertron's products provide the highest quality, the most appropriate pricing structures, and the most effective services by collaborative R&D efforts with leading universities and world famous research institutes. Powertron is continually developing new markets through innovative technology and R&D.

革新的な技術発展

Powertronは権威のある大学及び世界的な研究機関との協力的な研究開発を通じて最上の品質、適切な価格、そして効果的なサービスを提供しています。顧客の要求に応じる革新的な技術開発を通じてPowertronは新しい市場を創造して発展させています。

Customer side services

Our Technical Services engineers make it easy for you to fully exploit our system capabilities, saving your time and money. They can implement the most appropriate solutions for your needs, revise system configurations, and troubleshoot questions over dial-up modem or the internet. Long-term support packages ensure that feature enhancements are always available through software and firmware upgrades.

顧客中心のサービス

技術支援エンジニアたちによって提供される最上の品質監視システムが顧客の不必要な時間と金銭的な無駄使いを最小化します。エンジニアたちは一番相応しいソリューションをご提供できるし、モデムやインターネットを通じてシステム構成及び故障質問に対する早い解決策をご提示致します。長期間維持補修パッケージは定期的なソフトウェアとファームウェアアップグレードを通じて性能の強化を保障致します。

● iPQMS/BDS/BMS

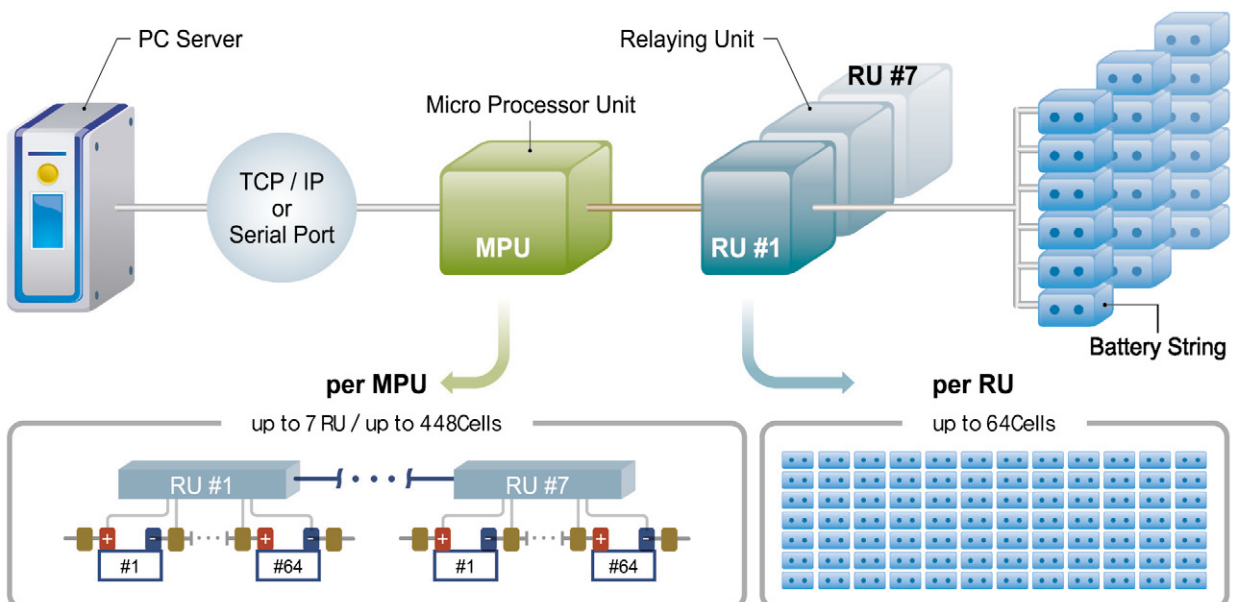
IBwatch, iPQMS/BDS/BMS monitors and analyzes the aging status of stationary battery system such as charging and discharging DC voltage and current, cell voltage, temperature, internal ohmic impedance, and voltage waveform of emergency power supply power lines with the high accuracy in 24 hours of 365 days and TCP/IP environment, using any communication methods selected by the customer, as well as the early deterioration signs using impedance measurements with any backup batteries in most critical applications. It is an “intelligent Power Quality Monitoring Systems” to ensure the integrity of your power backup system and offers the most comprehensive diagnosis software and reporting package. We are sure that **IBwatch** exactly meets all IEEE standard. recommendations and will be the most reliable systems for diagnosis and monitoring of all stationary applications.



● BMS i-com

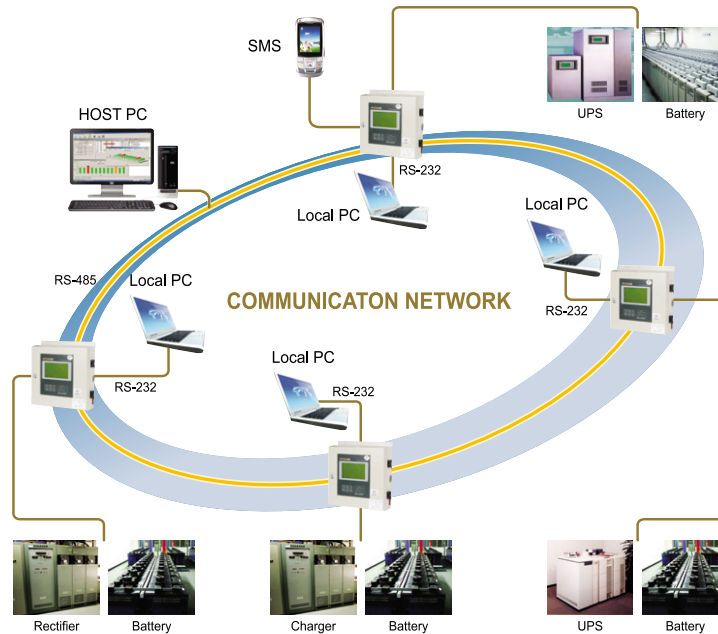
An economical system is available to detect appropriate timing of replacement and abnormality of the battery in time. This is done by monitoring the characteristic data of 12V battery cell and 2V-6 jars serial connected battery string as well as the charging/discharging current of the string. Available to measure from 4 cells to 8 cells, and easily connected with any other supervisory systems, such as SCADA.

● System Composition

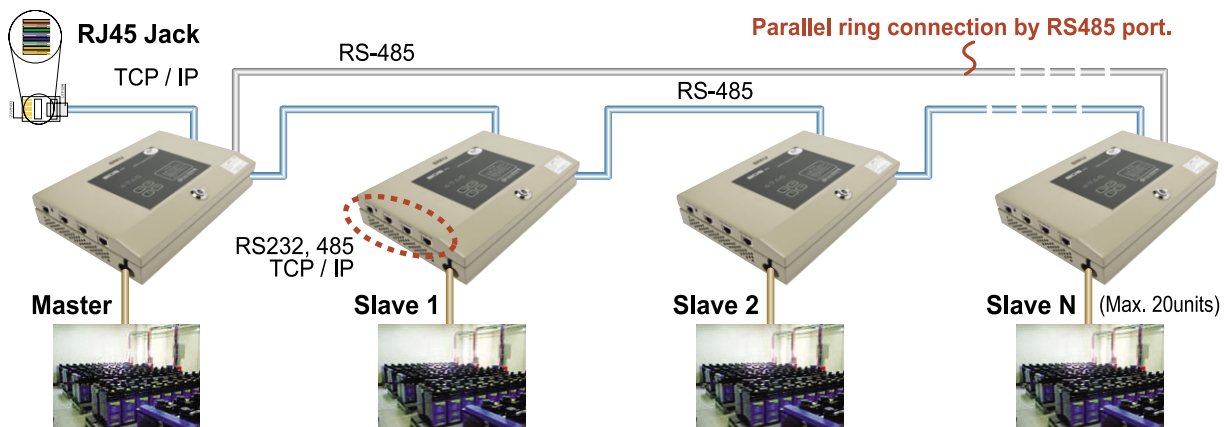


iQMS/BDS/BMS Advantages

- ➔ iQMS/BDS/BMS utilizes patented technology to identify early deterioration signs with all stationary applications by alarm, with enough time in advance to replace the failing batteries.
- ➔ Adopting the world's first ripple-removing algorithm, USA patent: US 7,567,085B2, the system precisely measures the RMS ohmic impedance value and the real properties of stationary batteries during floating charge with the precision of $\pm 2.0\%$.
- ➔ With a flexible expanding system, this system can supervise an emergency power supply lines and up to 448 cells of battery strings in real time with one monitoring/control unit. This reformative expansion capacity allows the user to arrange and install the whole system with ease, thus saving a great amount of installation expenses.
- ➔ iQMS/BDS/BMS can directly transmit the data that are measured by intelligent instruments and communication software through TCP/IP ethernet and etc. as well as internet.
- ➔ When a voltage sag or power failure of emergency power lines occurs or the preset limits are exceeded, the event is transmitted to the administrator via SMS through a remote communication network.
- ➔ iQMS/BDS/BMS offers the most comprehensive diagnosis software and reporting package.
- ➔ iQMS/BDS/BMS exactly meets and exceeds all IEEE standard recommendations for all the stationary battery systems.



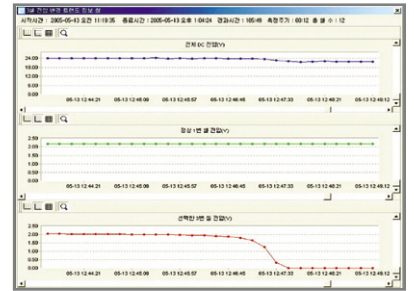
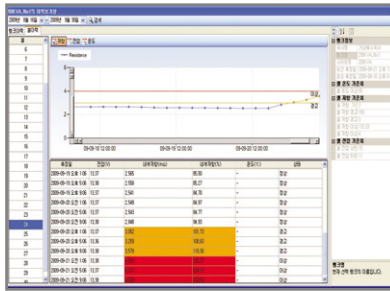
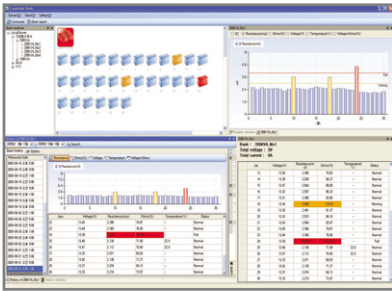
BDS/pro multi-communication



Installation Pictures



Remote Monitoring Software - Centroid Web / Centroid Snet



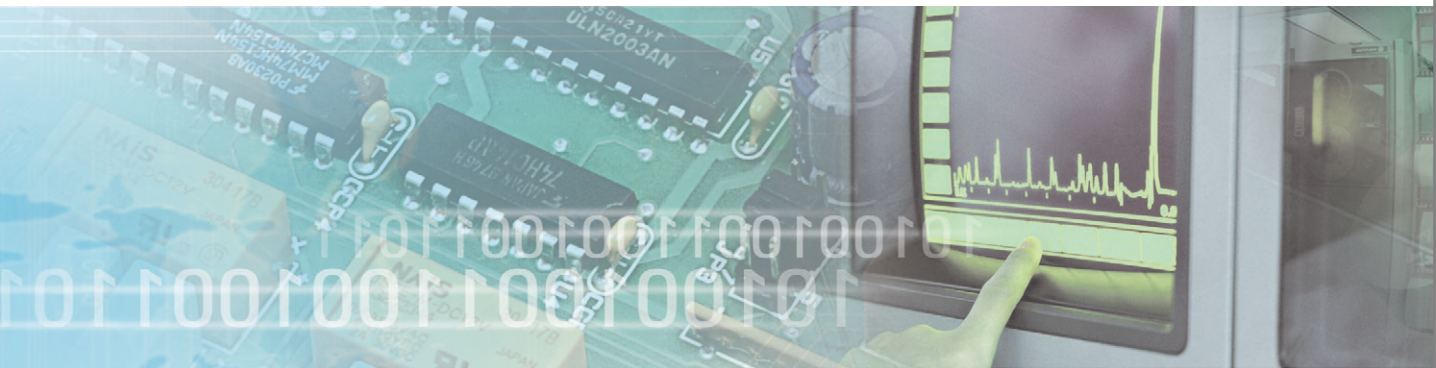
- Display of voltage and impedance of each cell.
- Display of recorded each cell voltage during discharge.
- Display of bad cell voltage, how fast go down under voltage failure.
- Display of UPS/voltage of charger/current.
- Display of trended voltage data of string DC voltage, normal cell voltage and selected cell voltage.

Model Specifications

Model	iPQMS/BDS	BDS/pro	BMS i-com
Measuring Cells	Max. 448 cells per Unit (Display menu)	24(48) cells per Unit	4(8) cells per Unit
Measuring Range	AC Voltage / AC Current: 0V ~ 600V / 999.9A (Current Transformer)	AC Voltage / AC Current: 0V ~ 600V / 999.9A (Current Transformer)	AC Current: 0V ~ 999.9A
Capacity Range	10Ah ~ 6,000Ah Max.	10Ah ~ 3,000Ah Max. 2V / 12V	5Ah ~ 6V / 12V
Resolution	AC Voltage / Current : 0.1V / 0.1A	AC Voltage / Current : 0.1V / 0.1A	AC Current : 0.1A
Dimension	280W × 310H × 88.5D	270W × 200H × 55D	137W × 121H × 47D
RS 485 multi-connection	N / A	Max. 20 units	Max. 50 units
Remarks	iPQMS / BDS / BMS i-com XXC-10-2 → Battery Voltage → Control Power → No. of cells (or Jars)		

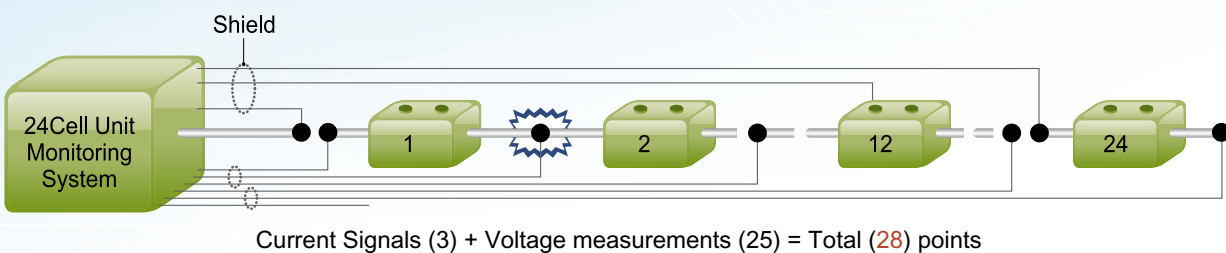
Specification

- | | |
|---|--|
| <ul style="list-style-type: none"> ▶ Measurement Range <ul style="list-style-type: none"> - For Sealed/lead acid, Ni-Cd batteries - Cell or Unit Voltage : 0.1 Volts ~ 16.0 Volts - String DC Voltage/Current : ~ 999.9V, ~ 999.9A ▶ Measurement Accuracy <ul style="list-style-type: none"> - Cell or Unit Internal Resistance : $\pm 2\%$ - DC Voltage/Current : Voltage $\pm 0.5\%$/Current $\pm 1\%$ (full scale range) - Temperature : $\pm 2\%$ (full scale range) ▶ Resolution <ul style="list-style-type: none"> - Internal Resistance : 0.001mΩ - Cell Voltage : 10mV - String DC Voltage/Current : 0.1V / 0.1A - Cell Temperature : 0.5$^{\circ}$C ▶ Measuring Interval :
30 minutes ~ 1 day (adjustable) | <ul style="list-style-type: none"> ▶ Measuring Speed : 3 or 4 sec/per cell ▶ Data Transfer :
RS232/485, TCP/IP, SMS with server & optional service ▶ Other available functions <ul style="list-style-type: none"> - Auto Scaling functions - Exclusion of ripple voltage in floating charge - Measuring channel number selection ▶ User Programmable Functions <ul style="list-style-type: none"> - Preset values for up to 448(960) cells - Over/Under alarm setting :
voltage, current and internal resistance - Year/Date/Time setting ▶ Operating Environmental Range <ul style="list-style-type: none"> - Temperature : 0$^{\circ}$C ~ 50$^{\circ}$C - Humidity : under 80% RH |
|---|--|

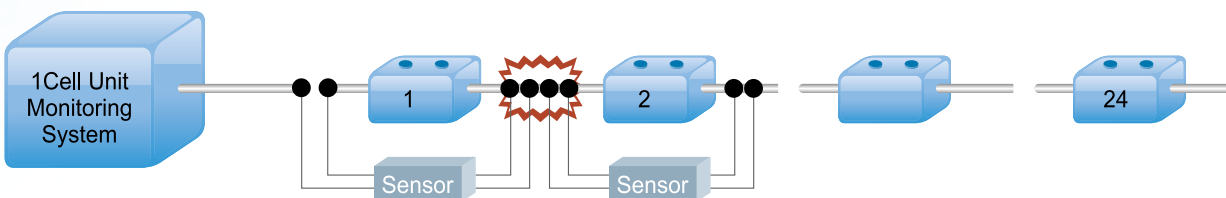


Comparison of Connection Point between Powertron BMS and the others.

Powertron Connection Points (28ea)



Other Product Connection Points (96ea)



[Current Signals (2) + Voltage measurements (2)] \times 24cells = Total (96) points
 Many Connection Points will have possibility of connection point troubles.
 Therefore, Powertron will be free from maintenance problem.



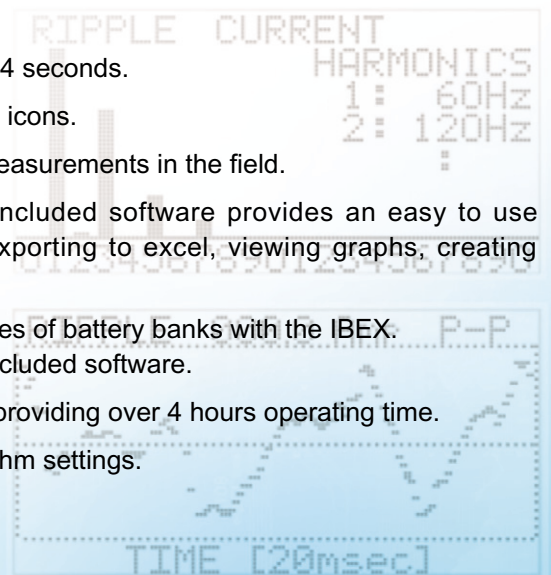
Introduction

IBEX is a cutting-edge digital battery quality diagnostic tester by all IEEE Std. recommendations for all the stationary applications such as telecommunication's backup power, utility switching power, uninterruptible power systems (UPS), etc. and can measure the accurate internal ohmic resistance (R), voltage (V), temperature (°C) with the world's first ripple-removing algorithm, USA patent: US 7,567,085B2, within a short time(3 seconds or less) during floating charge.

Actually, we have provided them to Korea Telecom, SK Telecom, Korea Electric Power Corporation, Korea Railway Corporation, Storage Battery System in the US, KingCable in China and others with their utmost satisfaction and reliability of IBEX has been verified reliability verification tests of end-users, such as Korea Telecom Providers.

IBEX-Advantages

- ➔ IEEE Recommended : Meets IEEE Std. 1188-1996 and 2005 "Recommended Practice for Maintenance, Testing, and Replacement for Stationary Applications."
- ➔ Accurately Measures Numerous Battery Properties : Internal Ohmic Resistance (R) or Conductance (Siemens), Jar Voltage (V), Ripple Current (with Ultra), Temperature (°C/°F) and Strap Resistance.
- ➔ Precise & Repeatable : Utilizing the world's first ripple removing algorithm, the IBEX identifies problematic or failing cells.
- ➔ On-line Tester : Test batteries while they are in service.
- ➔ Fast : Automatically measures and stores data in just 3-4 seconds.
- ➔ User-Friendly : Menu options displayed with easy to use icons.
- ➔ Compact Size : Fits in the palm of your hand for easy measurements in the field.
- ➔ Comprehensive Battery Diagnostic Software : The included software provides an easy to use interface for data management, trending analysis, exporting to excel, viewing graphs, creating reports.
- ➔ Battery Bank Management : Manage 15-30 different types of battery banks with the IBEX. All necessary battery banks can be managed with the included software.
- ➔ Maximum Operating Time : Uses a Lithium-ion battery, providing over 4 hours operating time.
- ➔ Multiple Settings : Built-in & automatic measuring algorithm settings.
- ➔ Charging ripple current analysis(%) for IBEX-Ultra.



IBEX- α MAX

A sealed type battery is vulnerable to high temperatures. It can explode and even cause a fire when it is overcharged and/or internal resistance is exceedingly increased because of the Thermal Runaway phenomenon. The IBEX- α MAX model is designed to detect the thermal runaway phenomenon of VRLA battery to prevent battery accidents in early stage. It also measures and calculates such factors as electrochemical resistance relating to pasted plate aging, resistance at the straps and posts, and exhausting level of electrolyte to analyze and check State of Health, SOH, more accurately.



Characteristic advantages

- ➔ User-friendly design applying 3.2" TFT LCD
- ➔ Slim design, the first of its kind in the world
- ➔ Multi-user & full compatibility for battery management with Exmons Pro Ultra⁺
- ➔ Triple frequency algorithms for internal thermal runaway analysis
- ➔ Integrated data storage with USB serial port
- ➔ Wide measuring range to 60V string voltage
- ➔ Integrated outdoor battery temperature measurement: -20 ~ +80°C

Specifications

<ul style="list-style-type: none"> ▶ Exterior size and weight (Except the measuring lead) <ul style="list-style-type: none"> - 95W × 175H × 42D, less than 650g (including internal battery) - 105W × 185H × 34D : IBEX - αMAX ▶ Measurement ranges <ul style="list-style-type: none"> - 10 Ah~ 6000 Ah max, 0.1 Volt ~ 60.0 Volt DC ▶ Measurement Accuracy <ul style="list-style-type: none"> - Voltage : ± 0.5 class - Temperature : ± 2 class (-20°C ~ +80°C) - Ohmic impedance : $\pm 1.0\%$ rdg. ± 8dgt (3milli ohm full-scale) across test range ▶ Resolution <ul style="list-style-type: none"> - Ohmic impedance : 0.001mΩ - DC voltage : 10mV - Temperature : 0.5°C ▶ User Programmable <ul style="list-style-type: none"> - Over/Under Voltage alarm setting - Fail/Warning Impedance alarm setting - Over Temperature alarm setting - Display menu 	<ul style="list-style-type: none"> ▶ Other available functions <ul style="list-style-type: none"> - Auto scaling function - Zero point adjustment function - USB serial port - Measured data storage capacity : Choose from 15 different modes including ▶ Exmons Pro 2005/ Ultra⁺ <ul style="list-style-type: none"> - User friendly integrated diagnostic software - Database construction and control by site/bank/cell - 2D graph display of changes against basic value - 3D graph display of changes by period - Printing of data and analysis report including graph - Prohibition of data modification ▶ Communication Protocol : Binary or Standard ASCII Text ▶ Data Format : Excel 2000/2002 and Windows 98/2000/XP/Vista Compatible ▶ Built-in Battery : Li-ion Battery (2,200mAh, 11.1V) ▶ Charging Ripple Current percent(%) analysis
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IBEX-evic

Equipped with Cold Cranking Amperes functions which can measure battery performance in an extreme environment, IBEX-evic provides easy validation of 12V vehicle batteries to ensure safe vehicle management. In addition, it is available to manage Li-ion batteries.

Characteristic advantages

- ➔ Designed exclusively for 12V vehicle batteries
- ➔ Ohmic test or optional Cold Cranking Amperes, CCA
- ➔ Test probes separate from body
- ➔ Fast measurement time: 3 seconds
- ➔ Battery data sheet generation through USB serial port
- ➔ Ability to set up to 80 alarms
- ➔ Measurement accuracy
 - Ohmic impedance : $\pm 2\%$
 - Voltage : $\pm 0.5\%$
 - Temperature : $\pm 2\%$
- ➔ Resolution
 - Ohmic impedance : $0.001\text{m}\Omega$
 - Voltage : 10mV
 - Temperature : 0.1°C ($-20^\circ\text{C} \sim +80^\circ\text{C}$)
 - CCA : 1A





HISTORY OF POWERTRON

- 1984. 01 Established POWERTRON ENGINEERING Company in Seoul
- 1997. 12 Certificated for Superior Manufacturings and exportings
- 1998. 05 Approved as a venture company -
Small and Medium Business Administration of Korea
- 1999. 02 Developed a Q class power supply for the nuclear power plant
and acquired a Certificate of authentication
- 1999. 12 Registered on research institute - Korea Industrial Technology Association
- 2000. 09 Attained KT mark in charging technology for cycle charger
- 2000. 10 Developed battery aging diagnostic algorithm with KT
- 2001. 03 Acquired CE certificate of conformity in PAB series automatic cycle chargers
- 2004. 09 Acquired K.T Mark in a new computing algorithm of battery impedance
- 2005. 12 Started to export Battery Quality Tester to USA, Japan, China, England, Malaysia,
Turkey and etc.
- 2005. 12 Certificated NeP - New Excellent Product, by Ministry of Knowledge Economy
- Battery Quality Diagnostic Equipment
- 2006. 08 Certificated CE - IBEX-1000 / IBEX-1000P
- 2006. 12 Certificated CE - BDS/pro
- 2008. 01 Certificated ISO9001:2000
- 2008. 11 Certificated NeP, New Excellent Product, by Ministry of Knowledge Economy
- Battery Diagnostic System
- 2008. 12 Authorized 'Korean World Class Product Award 2008' by Minister of
Knowledge Economy
- 2009. 06 Patent registered 'Diagnosis for expected life of emergency power apparatus' in USA & China
- Registration No. US 7,567,085B2 / ZL 2004 8 006211.0
- 2009. 10 Patent registered 'Battery Cell Voltage and Impedance measuring Circuit' in USA & China

New Leader in Future Technology



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