ekoXense

Edge AI Module

Specification Sheet

產品簡介 (Product Introduction)

eK PdM是一款專為電力監測與設備健康管理設計的高精度智慧電表。它採用先進的電流感測技術，提供精確的電力數據，能夠同時精確量測複數設備電氣參數，為工業、商業及住宅應用提供可靠的電力數據採集解決方案，同時透過高頻電流頻譜分析技術，實現馬達等設備預知保養。
本產品具備體積小巧、安裝便捷的優勢，並提供多重保護設計，確保設備穩定可靠運行。

產品特色 (Key Features)

- **設備健康管理：**支援高頻電流頻譜分析，有助於精確評估設備運行狀態。
- **高精確度：**功率精確度高達 >99%，電流線性度優異 (積和非線性 < 8ppm)，確保數據可靠性。
- **多參數監測：**可量測電壓(V)、電流 (I)、功率因數 (PF)、波峰因數 (CF)、視在功率 (VA)、有效功率 (W)、頻率 (Hz) 等多種電氣參數。
- **緊湊輕巧設計：**體積小巧、重量輕，方便攜帶與安裝，特別適用於空間受限的環境。
- **便捷安裝：**支援標準工業導軌安裝，大幅簡化施工流程，節省設置成本。
- **高密度監測能力：**相較於傳統電表，能以更少的設備監測更多迴路。
- **抗干擾能力：**True RMS Level 計算具備抗諧波干擾，確保數據穩定性。
- **即時通訊：** 採用 Web Socket 通訊協議，反應時間小於 1 秒，實現即時數據傳輸。
- **規格自由搭配：**可配合多種不同規格之 CT 使用，根據狀況搭配選擇。

功能說明 (Functional Description)

- **高頻電流頻譜分析：**支援高頻率電流與電壓數據讀取，精準還原完整原始波形，提供深度電力分析基礎。
- **馬達健康度分析：**擷取即時電流波形並傳送至雲端平台，進行深度健康度診斷與設備預知保養分析。
- **多迴路電力監測：**支援多路電流互感器 (CT) 輸入，可同時監測多個單相或三相電力迴路。
- **即時數據傳輸：**電壓、電流、功率、頻率、功率因數等即時數據。
- **數據分析與顯示：**搭配網頁提供直觀的數據顯示介面，方便用戶監控電力使用情況。
- **遠端通訊：**透過 Ethernet 介面和 WebSocket 協議，實現遠端數據傳輸與系統整合。

技術規格 (Technical Specifications)

通用規格 (GENERAL)	
模型名稱 (Model Name)	eK PdM
尺寸 (Dimensions)	160 x 90 x 58 mm
操作溫度 (Op. Temp.)	-20°C 至 +65°C，R.H. < 90% (非凝結)
指示燈 (Indicators)	LED 指示燈號
電源供應 (Power Supply)	DC 9-24V / 250 mA，漣波 < 150 mV
電流感測方式 (Current Measuring)	扣環式
電壓感測方式(Voltage Measuring)	接線式 (單相及三相)、需斷電接線
架設方式 (Installation)	導軌式

通訊規格 (COMMUNICATION)	
通訊介面 (Interface)	IEEE 802.3 Ethernet
頻寬 (Bandwidth)	100 Mbps
通訊協議 (Protocol)	Web Socket，反應時間 < 1 秒

技術規格 (Technical Specifications)

量測能力 (MEASUREMENT CAPABILITIES)	
適用電壓 (Voltage Range)	AC 90 ~ 600V
電流範圍 (Current Range)	0.25A ~ 600A (標準) 600A ~ 3000A (特規)
電流頻率 (Current Freq.)	50/60 Hz
頻率解析度 (Freq. Resolution)	0.01Hz
量測頻率 (Sampling Rate)	7812.5 Hz
電流線性度 (Current Linearity)	積和非線性 (Integral Nonlinearity) < 8ppm
CT 二次電流 & 電壓 (CT Secondary)	≤500mV
功率因數 (Power Factor)	-1.000 ~ +1.000
功率因數解析度 (PF Resolution)	0.001
瓩時範圍 (kWh Range)	0 ~ 1,000,000 kWh
瓩時解析度 (kWh Resolution)	0.1 kWh
準確率 (Accuracy)	>99% (電流 I, 電壓 V, 有效功率 kW)
量測項目 (Measured Items)	A, PF, CF, VA, W, kW, V, Hz

保護設計 (PROTECTION DESIGN)	
類比輸入 ESD	1.5kV, 300V
其他保護 (Other Protection)	極性錯誤保護, 突波保護

Product Introduction

eK PdM is a compact, high-precision smart meter designed for power monitoring and equipment health diagnostics. With advanced current-sensing technology and high-frequency spectrum analysis, it captures accurate electrical data and enables predictive maintenance for motors and critical equipment.

Its small size, easy installation, and built-in protection features make it suitable for industrial, commercial, and residential applications.

Key Features

- **Equipment Health Management：**Supports high-frequency current spectrum analysis to accurately assess equipment operating conditions.
- **High-Precision Measurement：**Power accuracy exceeds >99%, with excellent current linearity (integral and differential nonlinearity < 8 ppm), ensuring data reliability.
- **Multi-Parameter Monitoring：**Measures multiple electrical parameters, including voltage (V), current (I), power factor (PF), crest factor (CF), apparent power (VA), active power (W), and frequency (Hz).
- **Compact and Lightweight Design：** Small form factor and lightweight construction allow easy installation and portability, particularly suitable for space-constrained environments.
- **Easy Installation：**Supports standard industrial DIN-rail mounting, greatly simplifying installation and reducing setup costs.
- **High-Density Monitoring Capability：**Monitors more circuits with fewer devices compared to conventional power meters.
- **Harmonic Immunity:**Features True RMS calculation. Built-in harmonic interference rejection ensures high data stability and accuracy.
- **Real-Time Communication：** Uses WebSocket communication protocol with a response time of less than 1 second for real-time data transmission.
- **Flexible Specification Options：**Compatible with various CT specifications, allowing flexible configuration based on application needs.

Functional Description

- **High-Frequency Spectrum Acquisition：** Supports high-frequency current and voltage data sampling, accurately reconstructing full raw waveforms to enable advanced power analysis.
- **Motor Health Analysis：** Captures real-time current waveforms and transmits them to the cloud platform for in-depth health diagnostics and predictive maintenance analysis.
- **Multi-Circuit Power Monitoring：** Supports multiple CT inputs, enabling simultaneous monitoring of multiple single-phase or three-phase circuits.
- **Real-Time Data Acquisition：** Provides real-time measurements of voltage, current, power, frequency, power factor, and other key electrical parameters.
- **Data Analysis & Visualization：** Integrates with a web interface that displays intuitive charts and analytics, allowing users to easily monitor power usage trends.
- **Remote Communication：** Uses Ethernet and the WebSocket protocol to achieve remote data transmission and seamless system integration.

Technical Specifications

GENERAL	
Model Name	eK PdM
Dimensions	160 x 90 x 58 mm
Op. Temp.	-20°C to +65°C, RH <90% non-condensing
Indicators	LED status indication
Power Supply	DC 9-24V / 250 mA, ripple <150 mV
Current Measuring	Clamp Type
Voltage Measuring	DIN-rail terminal wiring (single/three-phase)
Installation	DIN-Rail Type

COMMUNICATION	
Interface	IEEE 802.3 Ethernet
Bandwidth	100 Mbps
Protocol	WebSocket : Response time < 1 second.

Technical Specifications

MEASUREMENT CAPABILITIES	
Voltage Range	AC 90 ~ 600V
Current Range	0.25A ~ 600A (standard) 600A ~ 3000A (custom)
Current Freq.	50/60 Hz
Freq. Resolution	0.01Hz
Sampling Rate	7812.5 Hz
Current Linearity	Integral Nonlinearity < 8ppm
CT Secondary	≤500mV
Power Factor	-1.000 ~ +1.000
PF Resolution	0.001
kWh Range	0 ~ 1,000,000 kWh
kWh Resolution	0.1 kWh
Accuracy	>99% (I, V, kW)
Measured Items	A, PF, CF, VA, W, kW, V, Hz

PROTECTION DESIGN	
Analog Input ESD Protection	1.5kV, 300V
Other Protection	Reverse Polarity Protection