

Development review request form

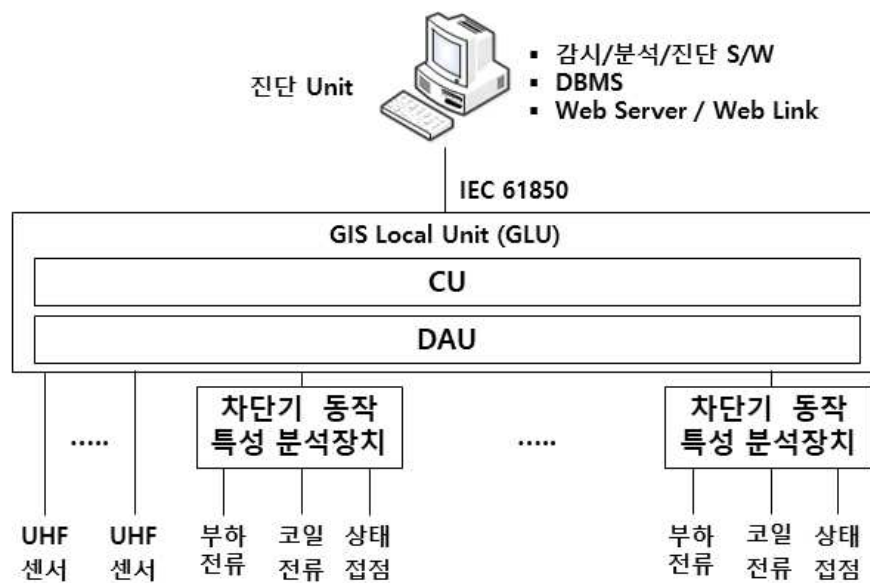
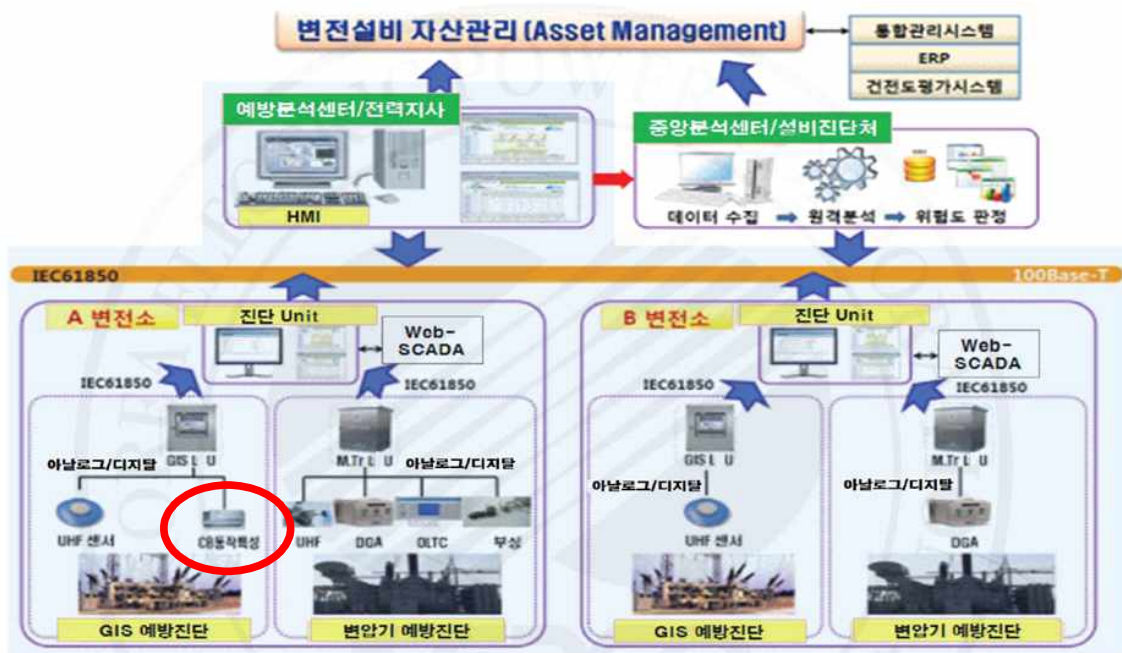
2021. 6. 10. Senion Co., Ltd.

1. Development product name

Circuit Breaker Analysis Monitoring Device

2. Overview

The composition of the comprehensive substation preventive diagnosis system is shown in the figure below.



The details defined in the KEPCO standard for the circuit breaker operation characteristic analysis device applied to the comprehensive substation preventive diagnosis system are as follows.

Justice

A device that acquires waveforms including circuit breaker trip/close coil operating current, AC load current, and circuit breaker opening/closing contact signals and transmits them to the local unit

Performance

üDevices with ADC, DSP, memory, non-volatile memory, etc.

üMeasure the time between the operation of the circuit breaker A contact and B contact, and measure the current of the trip/close coil of the circuit breaker
measure and store the corresponding current waveform

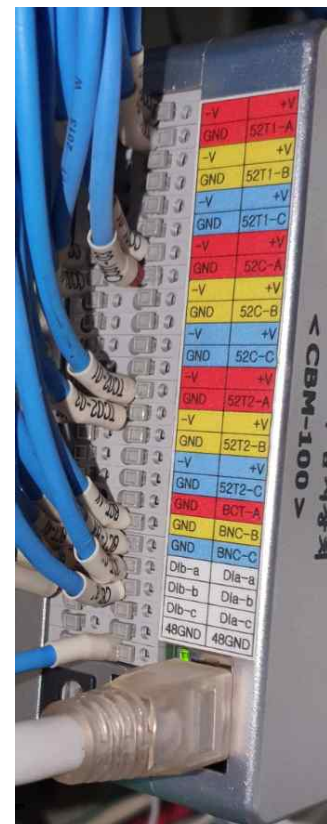
üTransmit data to local unit via Power over Ethernet (PoE) (device input power DC 48V)
üData acquisition cycle is 128samples/cycle
üResolution is 16 bits or more

üThe expressed time is linked to the GPS time synchronizer.

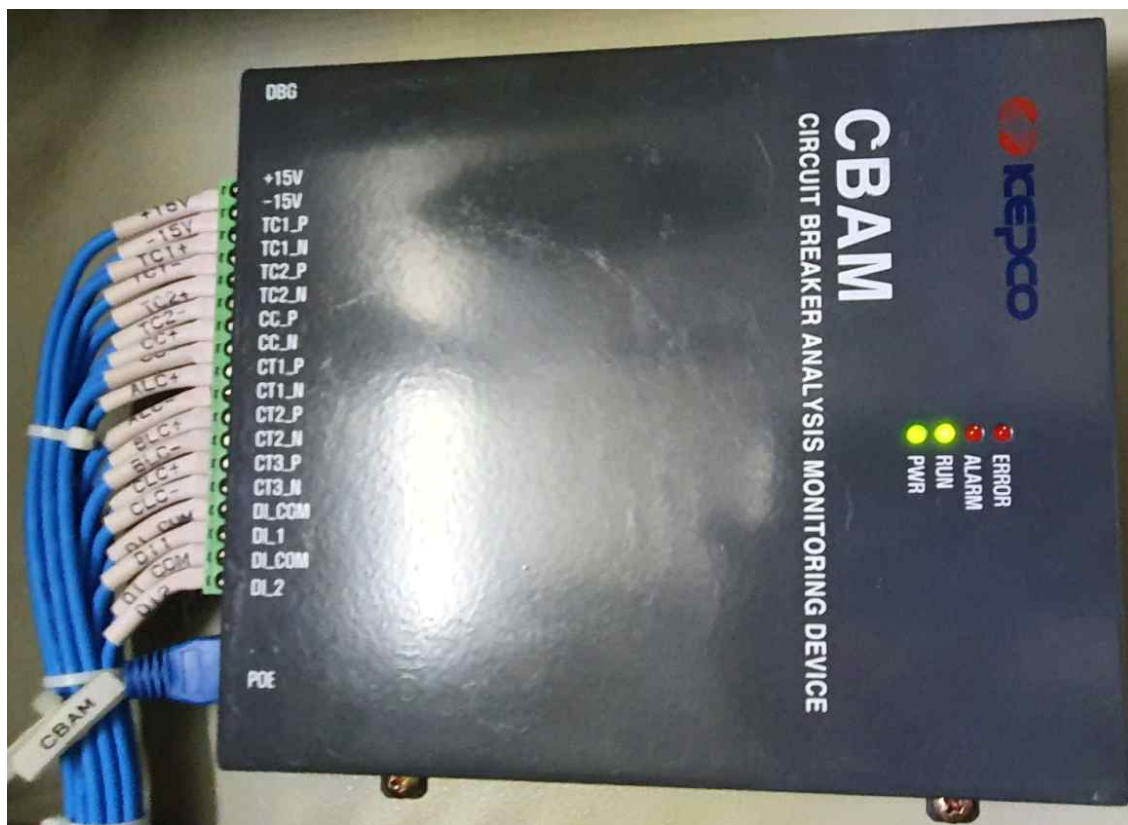
üStores the measurement data of the circuit breaker's operating characteristics for the last 10 or more times (waveform)

3. Photos of third-party products

Third party product 1 (Hanbit EDS)



Other company's product 2 (Yuho Electric Industry)



4. Scope of development and specifications presented

division	item	specification	note
conditions of use	ambient temperature	- 25°C ~ +55°C	
	relative humidity	10% to 90%	
	elevation	1,500 m or less	
Rating	frequency	60Hz	
	Voltage	110/- V ⁻	
	load current	AC 1.66mA	AC 5A
	Coil current (DC)	±4V	DC 0~30A
	everyone	DC 48V (PoE)	
H/W	Voltage	1 channel	
	load current	3 channels	
	Coil current (DC)	3 channels	
	DI	2 channels	CB A contact, B contact
	Ethernet	100Base-T/PoE	Communication with local unit
	RS-232C	D-SUB 9pin	Operation/Maintenance
	LED	4 (Power, Run, Alarm, Error)	
	battery	delete	
	Time	RTC	
function	Instrumentation	128samples/cycle	see 4.1

division	item	specification	note
		Voltage and load current phasor calculation temperature measurement battery voltage measurement Information display via Ethernet and RS-232C	
	save event	Event storage when contact A or contact B of CB changes from 1 to 0 (20) - event number - Event occurrence time - Event details	see 4.2
		Save Self-monitoring events (100) - Power failure - ADC error occurs	
	save waveform	Waveform save when event is saved (20) CB Waveform save trigger when contact A or contact B changes from 1 to 0 Trigger standard variation can be set (console) per waveform 300ms save Waveform saving time before trigger is user setting: 10ms~100ms / default value is 50ms Waveform save time after trigger is (300 ms - waveform storage time before trigger)	see 4.3
	send	Transmit to local unit via Ethernet - Measurement information - Event + Waveform Information	Send/receive I/F is separate Decided in consultation
	Operation/Maintenance	Self-monitoring function - Power monitoring - ADC monitoring LED on - Alarm LED turns on when the battery voltage drops below a certain level - Error LED turns on when an error occurs in power monitoring and ADC monitoring console interface - Ethernet and RS-232C provided - Set trigger criteria - Display current measurement value - Display event list - Display device self-monitoring results - F/W update function	
	visual motive	Time synchronization function through local unit	The method is discussed separately

4.1. Metrology details

item	type	size (byte)	explanation	CBAMD Whether or not to use
V_mag	float	4	voltage size	0
V_ang	float	4	voltage phase angle	0
IA_mag	float	4	Phase A current size	0
IA_ang	float	4	A-phase current phase angle	0
IB_mag	float	4	Phase B current size	0
IB_ang	float	4	Phase B current phase angle	0
IC_mag	float	4	C-phase current size	0
IC_ang	float	4	Phase C current phase angle	0
temperature	float	4	temperature	0
Sum		36		

4.2. Event details

item	type	size (byte)	explanation	CBAMD Whether or not to use
Event type	uint8	One	Trip=0x55 / close=0xAA	0
Event time 1	uint32	4	Event occurrence time (Year Month Date Hour Minute Second)	0
Event time 2	uint32	4	Event occurrence time (value in ms unit)	0
alert level	uint8	One	Cause of alarm (enumeration value)	X
Contact duty A	float	4	Breaking current (A phase)	0
Contact duty B	float	4	Breaking current (B phase)	0
Contact duty C	float	4	Breaking current (C phase)	0
Accumulated contact duty A	float	4	Cumulative breaking current (A phase)	X
Accumulated contact duty B	float	4	Cumulative breaking current (B phase)	X
Accumulated contact duty C	float	4	Cumulative breaking current (C phase)	X
Trip coil 1 profile area	float	4	Trip coil 1 coil integral value - - - - -	0
Trip coil 1 peak current	float	4	Trip coil 1 max current	0
Trip coil 1 current flow	float	4	Trip coil 1 woman time Time from woman start to end point	0
Trip coil 2 profile area	float	4	Trip coil 2 coil integral value - - - - -	0
Trip coil 2 peak current	float	4	Trip coil 2 max current	0
Trip coil 2 current flow	float	4	Trip coil 2 woman time Time from start to end of woman	0
Close coil profile area	float	4	Close coil coil integral value - - - - -	0
Close coil peak current	float	4	Close coil maximum current	0
Close coil current flow	float	4	Close coil woman time Time from woman start to end point	0
A contact operating time	float	4	Time from excitation time to point A change	0
B contact operating time	float	4	Time from excitation time to B contact change	0

item	type	size (byte)	explanation	CBAMD Whether or not to use
Phase A blocking/closing time	float	4	Value in msec	0
Phase B blocking/closing time	float	4	Value in msec null if applied to a single phase breaker	0
Phase C cut-off/make time	float	4	Value in msec null if applied to a single phase breaker	0
Circuit Breaker Trip Operation Counter	uint32	4	Close coil current max.	X
Sampling per Cycle	uint16	2	128 (fixed value)	0
number of cycles	uint16	2	18 (fixed value)	0
Sum		98		

4.3. Waveform Details

item	type	size (byte)	explanation								CBAMD Whether or not to use
TripCoil1_Current	uint16	4608	Trip coil 1 current waveform data								0
TripCoil2_Current	uint16	4608	Trip coil 2 current waveform data								0
CloseCoilCurrent	uint16	4608	Close coil current waveform data								0
PhaseCurrent A	uint16	4608	A-phase current waveform data								0
PhaseCurrent B	uint16	4608	B-phase current waveform data								0
PhaseCurrent C	uint16	4608	C-phase current waveform data								0
InitiateAndContact	uint8	2304	Circuit breaker A contact and B contact waveform data (on=1, off=0)								0
			bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit One	bit 0	
			-	-	-	-	-	-	B contact	A contact	
Sum		29952									

※ sizeof(uint16) × 128samples/cycle × 18cycles(300ms) = 4608 ※

sizeof(uint8) × 128samples/cycle × 18cycles(300ms) = 2304

5. Reliability test

Test Items	test standard	test standard
1. Electrical test		
Insulation resistance measurement	IEC 60255-27 Section 10.6.4.4	DC 500 V, 10MΩ or more (between electric circuits and ground) DC 500 V, 5MΩ or more (between electric circuits)
Power frequency withstand voltage test	IEC 60947-5-2 Section 8.3.3.4	AC 2kV, 1 minute (between electric circuit and ground, between electric circuits) AC 1kV, 1 minute (between contacts)
2. EMC test		
electromagnetic discharge immunity test	IEC 61000-4-2 (Level : 2)	Air Discharge: 2, 4kV Contact Discharge: 2, 4kV
electromagnetic radiation immunity test	IEC 61000-4-3 (Level : 2)	Sweep : 3 V/m, 80MHz~1GHz, 1.4GHz~2.7GHz Spot : 3 V/m, 80, 160, 380, 450, 900, 1850, 2150 MHz
electrical fast transient immunity test	IEC 61000-4-4 (Level : 3)	2kV, 5kHz
Surge immunity test	IEC 61000-4-5 (Level : 3)	Common mode: 0.5, 1, 2kV, 1.2/50μs Differential mode: 0.5, 1kV, 1.2/50μs
radio frequency conduction immunity test	IEC 61000-4-6 (Level : 2)	Sweep: 3 V, 0.15 to 80 MHz Spot: 3 V, 27 MHz, 68 MHz
power frequency Magnetic field immunity test	IEC 61000-4-8 (Level : 4)	30 A/m: continuous 300 A/m: 3 seconds
Control power failure test	IEC 61000-4-11 (Level : 2)	Voltage drop resistance: 0% (1/2~1 cycle), 70% (30 cycle) momentary power failure resistance: 300 cycle Power supply change tolerance: 70% of rated voltage
3. Environmental test		
Vibration (response/endurance) test	IEC 60068-2-6	Test Fc: Vibration (sinusoidal))
Temperature performance test	IEC 60068-2-1 IEC 60068-2-2	cold resistance Storage: -40°C, Operation: -25°C Heat resistance Storage: +70°C, Operation: +55°C
Temperature × humidity performance test	IEC 60068-2-30	Heat resistance and moisture resistance cycle Temperature: +25°C ~ +55°C, Humidity: 93% ~ 97%, 6 days

In case of control power failure test, if the device is reset and then restored to normal, there is no problem.

6. Other

IFunctional requirements may be added or changed during the KEPCO product registration process.

IFunctions may change due to future KEPCO standard revisions

IEstimated quantity: about 100 units per year

IThere are companies that want to introduce our products after we register them as items.