

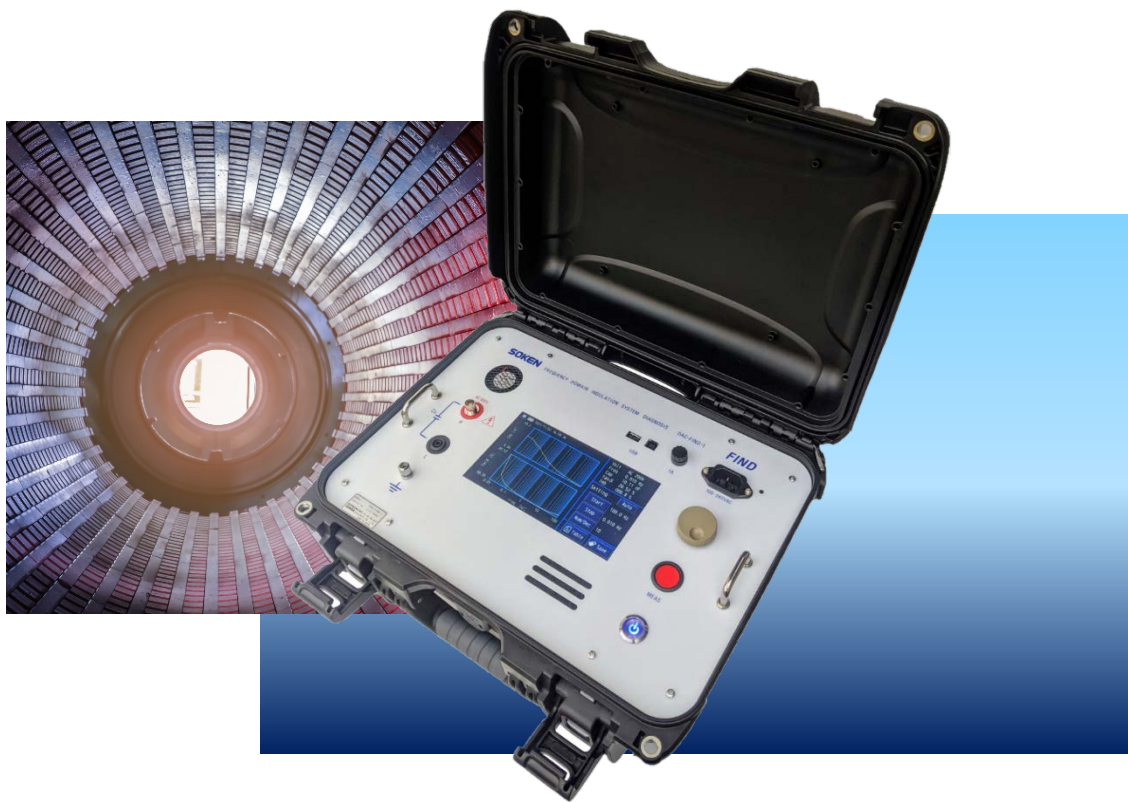
**NEW**

**SOKEN**

## FREQUENCY DOMAIN INSULATION SYSTEM DIAGNOSIS

# ***FIND***

- Evaluation of moisture absorption, degradation, and contamination of Power Transformers.
- Insulation evaluation of High Voltage Rotating Machines.
- Electrical Characteristics and degradation evaluation of Lubricants.



- **Single measurement enables evaluation of insulation.**  
No need to compare past data to analyze insulation degradation factors.
- **Compact • Light weight • Battery-powered.**  
Easy on-site measurement with a single unit.
- **No specialized expertise is required.**  
The state of insulation is clearly analyzed.



## APPLICATION :

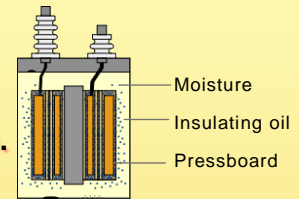
Diagnosis of moisture absorption, deterioration, and contaminants of HV transformers

# Electrical Analysis of Moisture in Power Transformers

## Why analyze moisture?

- Ground fault of transformers due to breakdown occurs when the dielectric strength decreases. One of the cause of reducing the dielectric strength is **Water**.
- **Water** is present in oil, either emulsified or bound to the pressboard.
- **Most of the water** in the power transformer is present in the press board.

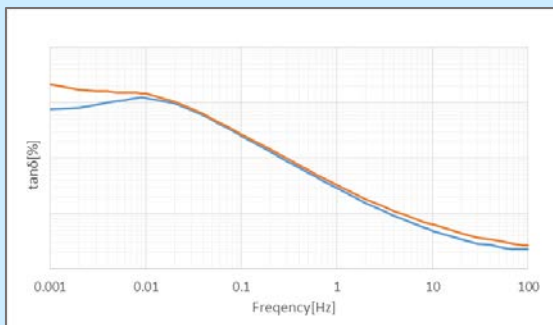
- Analyzing the moisture content of pressboard is important for assessing the risk of dielectric breakdown.
- Estimate the moisture content of pressboard by electrically measuring between the windings.



## Frequency Response Trends due to degradation factors.

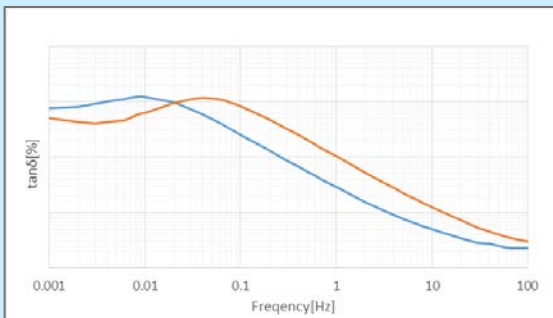
### 【Tendency of moisture absorption】

When moisture content increases,  $\tan \delta$  increases in the low frequency band.



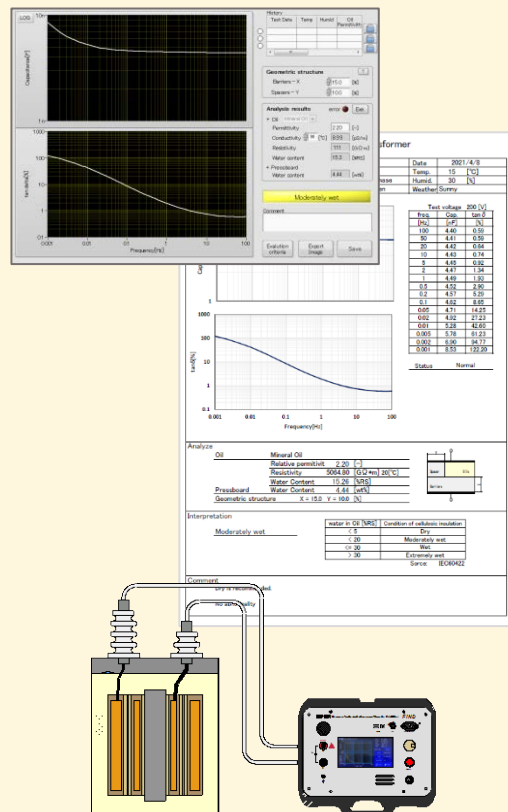
### 【Tendency of oil deterioration/contamination】

The steep curve shifts towards higher frequency band.



Excerpt from IEEE std C57.152-2013

**FIND** analyzes the measurement data and creates a diagnosis report.



## APPLICATION :

# Insulation diagnosis of High Voltage Rotating Machines

## Determine the deterioration state in a single test.

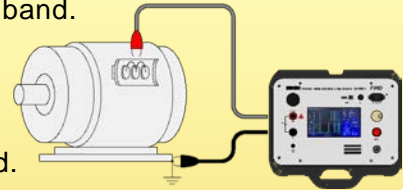
### ■ Frequency Response Trends due to degradation factors.

#### [In a state with moisture absorption]

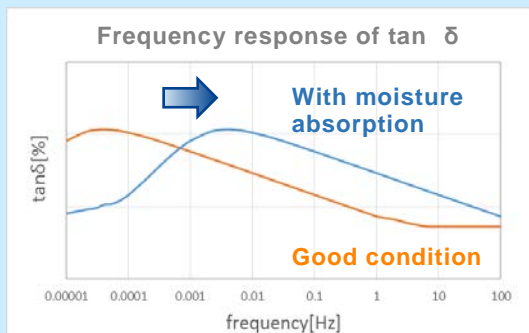
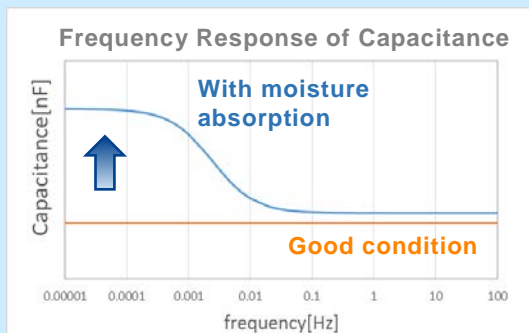
- Capacitance increases at lower frequency band.
- The maximum value of  $\tan \delta$  shifts to higher frequency band.

#### [In a state with Surface Contamination]

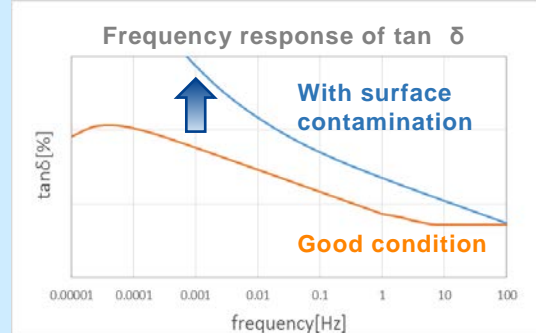
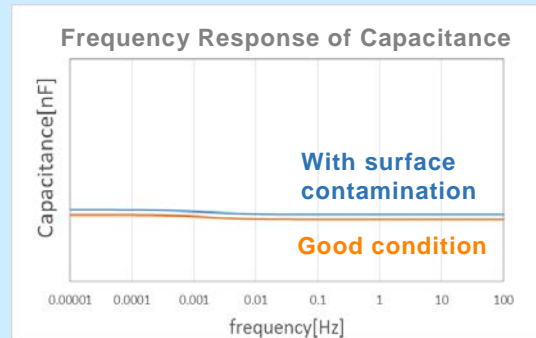
- Capacitance does not change with frequency.
- The slope of  $\tan \delta$  becomes  $1/\omega$  at low frequency band.



### Moisture absorption



### Surface contamination



## APPLICATION :

# Evaluation of Dielectric/Insulating properties of Lubricants

## Electrical evaluation of lubricants for Hybrids and EVs.

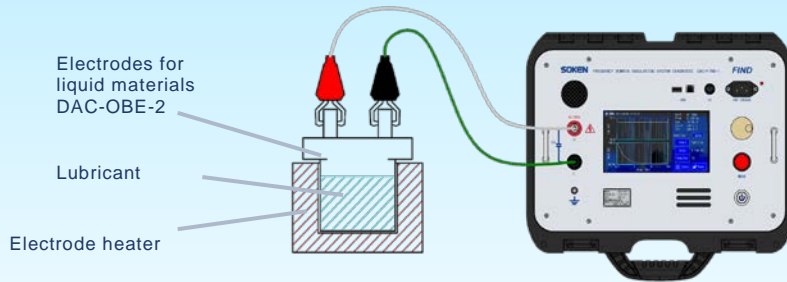
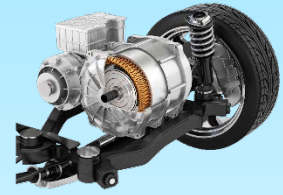
### ■ Electrical properties required for lubricants.

- Low dielectric constant, high volume resistivity and high withstand voltage are required.
- Stable electrical characteristics over a wide temperature range is required.



## ■ Advantage of measuring Lubricants with *FIND*.

- With test voltage as high as 200Vrms, *FIND* can evaluate dielectric and insulation properties in a state close to the operating conditions.
- *FIND* supports  $\tan \delta$  up to about 1000%, enabling temperature testing of Lubricating oil.
- Designed for motor measurement, *FIND* can evaluate the insulation structure of a motor containing lubricating oil.



## SPECIFICATIONS

**NAME** : Frequency Domain Insulation System Diagnosis

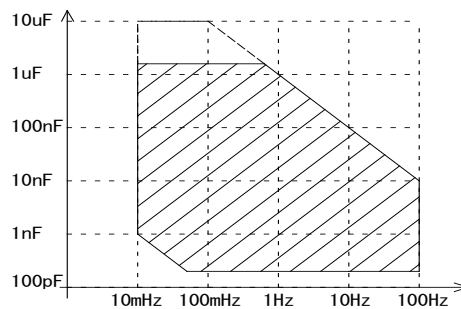
**MODEL** : DAC-FIND-1

Capacitance	Measurement range	300pF to 2 $\mu$ F
	Display	4 digits
$\tan \delta$	Measurement range	0.01 to 999.9%
	Minimum resolution	0.01%
Test power	Frequency	10mHz to 100Hz
	Voltage	200Vrms
Input power	Battery	Ni-MH 12V 4200mAh 4 hours continuous drive
	AC adaptor	AC100 to 240V
Size and weight	W394 x D307 x H173 (mm) about 7kg	



### Measurement range

Frequency	Capacitance
10mHz	1nF – 2 $\mu$ F
100mHz	300pF - 2 $\mu$ F
1Hz	300pF – 1 $\mu$ F
10Hz	300pF – 100nF
100Hz	300pF – 10nF



ISO9001:2015  
HEAD OFFICE/FACTORY

**SOKEN** SOKEN ELECTRIC CO., LTD.  
[www.soken-jp.com/en](http://www.soken-jp.com/en)

1-34-22, Tobitakyu, Chofu Tokyo 182-0036, JAPAN  
TEL 81 42 490 6929 (Export dept.) FAX 81 42 490 6806