



Transformer Bushing Monitor

PNX-BM

PNX-BM bushing monitor detects insulation deterioration and other faults early on, ensuring accuracy and dependability in high-voltage substation environments. It measures power factor/tan delta and capacitance for precise early fault analysis, reducing transformer outages caused by bushing failures.



Providing a comprehensive view of the transformers bushing conditions PNX-BM combines accuracy and easy to use software which can further be expanded to additional transformers. It is available as a standalone or comprehensive system integrated with other transformer monitoring solutions and can stably monitor maximum upto 6 bushings.

Using custom-made adapters connected at the bushing test taps, the BM201 employs a balanced-current (Sum-of-Currents) method to monitor leakage currents across all three phases. It continuously measures:

- The variation in leakage current relative to baseline values derived from the bushing's nameplate data, enabling detection of changes in capacitance or insulation condition (i.e., $\tan \delta$).
- The Phase-angle differences between the leakage currents of the three bushing phases (i.e. the timing discrepancies)

These key measurements (leakage current magnitude changes and inter-phase phase angle shifts) are used to infer early-stage bushing faults. The BM201 then transmits the calculated parameters ($\tan \delta$ rate-of-change, capacitance, and voltage metrics) to third-party systems via Modbus RTU over RS-485 for real-time monitoring. The BM201 also captures the hourly average of the $\tan \delta$, Capacitance, and Voltage (absolute and rate of change). It has the capability for data integration across multiple monitoring platforms

Benefits

- Minimize asset outages due to bushing failure
- Efficient to avoid most dangerous catastrophic failures of bushings
- Optimize bushing replacement planning: RoC of $\tan \delta$ and capacitance.
- Cost optimized solution for different types of electrical asset
- Faster integration with SCADA or Cloud

Applications

- Monitoring of condensing/ capacitive type bushings
- Monitoring of Transformer Bushings

Features

- More than 45+ customizable bushing tap adapters
- Highly accurate measurement of Tan δ and Capacitance
- Double protection for earthing link breakage
- Easy to install and commission
- Support for multiple technologies of bushing monitoring Sum of Current Method (Balance Current method) and Reference Method

Technical Specification

ELECTRICAL SPECIFICATIONS	Measurement Range Leakage Current	1 to 280 mA, with minimum resolution of 0.1 mA
	Sampling Rate	3 kS/s
	Bandwidth	2-90Hz
	Resolution	16 bits
	Measurement Accuracy	
	- Leakage Current	$\pm 0.5\%$
	- Tan Delta/ Power Factor	$\pm 0.1\%$
	- Capacitance	$\pm 0.5\%$
	- Voltage	$\pm 0.5\%$
	Amplitude Measurement error	$\pm 0.5\%$
	Phase angle measurement error	0.05°
	Scan Rate	1 sec/channel
	Power Input	24V (Default) or 48V
Number of relays output	01 x Fail safe Relay for System Failure	
COMMUNICATION	Serial Port	RS-485 with ModBus RTU
	Configuration Port	USB
ENVIRONMENTAL SPECIFICATIONS	Operating Temperature	-25 °C to 75 °C
	Storage Temperature	-40 °C to 85 °C
	Humidity	95% Non Condensing
MECHANICAL SPECIFICATIONS	Dimentions	4.92" x 4.92" x 1.89" (125mm x 125mm 48mm)
	Number of Input Channels	3 or 6 Channels