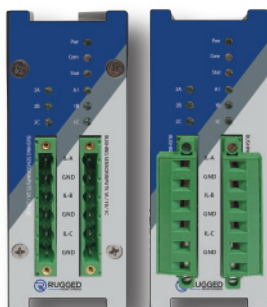


# BM201

## Advanced Bushing Monitoring Module for Industry Applications



**Rugged Monitoring BM201 is an online bushing monitoring module designed compactly to monitor real time condition of the Bushings.**

Rugged Monitoring's BM201 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 BM201 combines accuracy and easy to use software which can further be expanded to additional transformers. It is available as a stand-alone 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) reflect subtle shifts in power factor, providing insight into insulation deterioration.

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

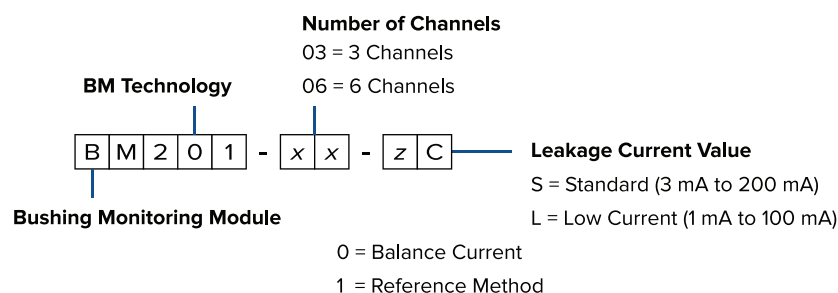
## » Features

- More than 45 + customizable bushing tap adaptors
- Highly accurate measurement for Tan  $\delta$  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 Specifications

|                                     |                                   |  |
|-------------------------------------|-----------------------------------|--|
| <b>ELECTRICAL SPECIFICATIONS</b>    | Measurement Range Leakage Current | 1mA to 200mA, with minimum resolution of 0.1mA               |
|                                     | Sampling Rate                     | 3kS/s  |
|                                     | Bandwidth                         | 2-90Hz   |
|                                     | Resolution                        | 16 bits  |
|                                     | <b>Measurement Accuracy</b>       |  |
|                                     | - 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     | $0.05^\circ$   |
|                                     | Scan Rate                         | 1 sec/channel  |
| <b>COMMUNICATION</b>                | Power Input                       | 12 - 24V DC (Default)  |
|                                     | # of Relays Outputs               | 01 x Fail Safe Relay for System Failure                      |
| <b>ENVIRONMENTAL SPECIFICATIONS</b> | Measured Parameter                | Operating Voltage, Overvoltage, Leakage Current, Overcurrent |
|                                     | Serial Port                       | RS-485 with Modbus RTU                                       |
|                                     | Configuration Port                | USB (to use with Rugged Connect windows software)            |
| <b>MECHANICAL SPECIFICATIONS</b>    | Operating Temperature             | -25 °C to + 75 °C  |
|                                     | Storage Temperature               | -40 °C to + 85 °C  |
|                                     | Humidity                          | 95% Non-Condensing   |
|                                     | Dimensions                        | 4.92" x 4.92" x 1.89" (125mm x 125mm x 48mm)                 |
|                                     | Number of input Channels          | 3 or 6 channels  |

## » Ordering Code



### CERTIFICATIONS



**Canada**

1415 Frank-Carrel, Sulte , 230, Quebec, QC-G1N , 4N7, CANADA

Asia Pacific | China | India | Middle East & Africa | Europe | North America | Latin America

+1-418-767-0111

info@ruggedmonitoring.com

www.ruggedmonitoring.com