



B100 SERIES

TRANSFORMER MONITORING SOLUTIONS



**PQE
POWER SYSTEM
SDN BHD**

TEMPERATURE MONITORING,
COOLING CONTROL,
H₂ AND MOISTURE
MONITORING

RESPONSIVE

ASSET HEALTH SOLUTIONS

RELIABLE. COST-EFFECTIVE. MAINTENANCE-FREE.

TRANSFORMER MONITORING MADE EASY.

The B100 Series Electronic Temperature Monitor (ETM) is a complete monitoring solution for any distribution, transmission or generation transformer. This all-in-one solution replaces transformer analog gauges, provides accurate indication of problems inside the transformer via fault gas detection, and provides remote annunciation of any problems detected.

Reliable

Gauge Replacement

Gauges are known to stick, leaving the transformer unprotected. Worse, when the gauge sticks, there is no indication that alerts someone of the problem. The B100 has a robust design, and in the unlikely event that there is a problem, the device generates an alert, ensuring the problem can be corrected.

Fail Safe Design

Fail safe contacts turn cooling on in the event of a system problem.

Cost-Effective

Best ROI for Transformer Monitoring

Detection of gases in the transformer is the primary method of detecting transformer problems. The B100 with the H₂ sensor option packages temperature and gas monitoring into one simple and low-cost solution. This new product combination integrates all of this functionality at roughly the same cost as discrete gauges.

Maintenance-Free

Time Saving

No calibration is required to maintain accuracy.

Hydrogen Sensor Auto-Calibration

Patented design eliminates the need for on-site calibration.

Cast Aluminum Enclosure

Suitable for coastal applications.

Available in 3 Mounting Options:



IP31 / NEMA-2 Enclosure
Through Panel Mount



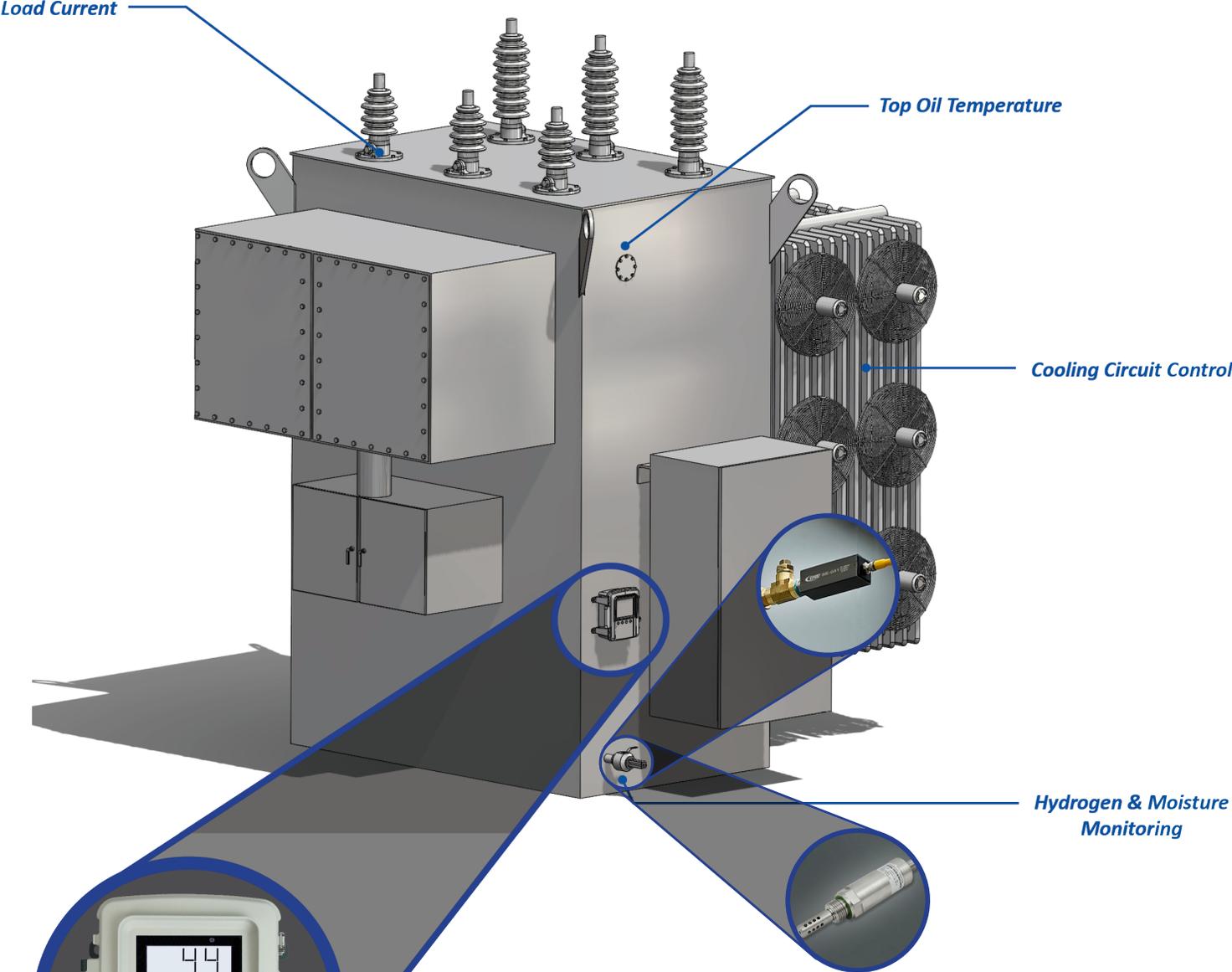
IP66 / NEMA-4 Enclosure



IP31 / NEMA-2 Enclosure
Surface Panel Mount

CAPABILITIES

Temperature, Hydrogen and Moisture Monitoring Functionality



Communication

The B100 provides communication to both SCADA, and built-in webpages accessible from your secure network.

SCADA

Webpages

WEBPAGE FEATURES

B100 Software

Every B100 product comes with a software system to analyze and communicate the data gathered into an easy-to-understand format. This also has the added advantage of making information available at any time, and from a remote location. The dashboard provides all the critical information you need to determine the health of your transformer.

The screenshot shows the B100 software interface with several key features highlighted by callouts:

- Live Temperature Readings:** 4 levels of alarm control for each temperature input. This is shown in the 'Measured Temperatures' section for Top Oil and LTC Tank temperatures.
- Winding Hot Spot Temperatures:** Calculates hot spot values for up to 3 windings. This is shown in the 'Calculated Temperatures' section.
- Load Current Measurements:** Measures up to 3 load currents. This is shown in the 'Measured Current Inputs' section.
- Insulating Aging:** Accumulates the thermal aging in each transformer winding. This is shown in the 'Calculated Insulating Paper Thermal Aging' section.
- LTC Delta T Monitoring:** Compares LTC temperature to top oil temperature. This is shown in the 'Calculated Temperatures' section.
- Output Exercise:** Offers the ability to schedule fan exercises at regular intervals. This is shown in the 'Scheduled Output Exercise' section.
- Current Value:** View live data captured from the hydrogen sensor. This is shown in the 'Dynamic Ratings - Hydrogen in Oil' section.

The dashboard includes a navigation menu (Home, Monitoring, Configuration, Events, Summary, Downloads, Update, Sign Out) and a breadcrumb trail (Overview, Hardware, Dynamic Ratings Hydrogen Sensor). The main content area is titled 'Overview' and 'Transformer ID - Site Name'.

TRANSFORMER MONITORING OPTIONS

Electronic Temperature Monitor



The B100 base model provides exceptional measurement accuracy, asset control and secure communications for any distribution, transmission or generation transformer.

Multiple Gauges in One Device

Top oil plus up to three winding temperatures, cooling circuit control, alarms, relay trips and LTC differential allows the B100 to replace up to five mechanical gauges.

Backlit LCD Screen

The B100's backlit LCD screen is visible from 60 feet (18 meters) and cycles through critical temperature measurements, making it easy to read in low-visibility environments.

Historical Data Storage

Unlike gauges, the B100 stores the long term history of temperature data and alarm activations in real time or for download later.

Easy to Configure

Configuration screens show an image of the terminals along with the matching configuration settings.

Easier Testing

LEDs located beneath each relay makes testing easier.

Easy Installation

Magnetic mount kit for the NEMA-4 instrument and magnetic top oil sensor facilitates quick and easy retrofit installations.

With Hydrogen Sensing



The B100 with the optional hydrogen sensor provides the most cost-effective transformer monitoring solution available, combining all the features of the B100 with the additional features listed below.

Early Fault Indication

Faults within a transformer will generate gases based on the temperature at the location of the fault. Hydrogen is the first fault gas generated, thus providing the earliest indication of a problem. The volume of hydrogen generated will increase as the severity of the fault increases.

Measurement Accuracy

There are two types of hydrogen sensors - fuel cell sensors and thin film sensors. *Fuel cell sensors* consume the hydrogen, and if placed in a small volume of oil, it will eventually degas the oil unless an oil pump or other method of circulation is installed. *Thin film sensors* do not change the concentration of hydrogen in the oil, and therefore will give a more accurate reading.

Two Installation Options

When fault gases are generated in a transformer, they will be dissolved in the oil where sensors will detect the increasing trend and provide a warning of the equipment problem. Because hydrogen takes time to dissolve in oil, it will accumulate in the headspace quickly. While using an in-oil sensor is effective, the use of a gas space sensor will typically provide a faster response. Both in-oil and gas space sensors are available for use with the B100.

With Moisture Sensing



The B100 with the optional moisture sensor provides the ability to monitor temperature values provided by the B100 along with all of the additional features below.

Improved Service Life

Excessive moisture in the insulating paper of the windings will reduce the dielectric strength and also reduce the partial discharge inception voltage. These both will make the transformer more susceptible to faults. By monitoring moisture in addition to other temperature values provided by the B100 ETM, customers can detect problematic conditions within the transformer far before a fault occurs.

Compact Solution

The Dynamic Ratings moisture sensor is a compact solution for monitoring moisture in oil. It is equipped with an RS-485 Modbus output with programmable Baud Rate, and also supports two 4-20mA outputs for Oil Temperature, and Water Activity or Water Content.

Measurement Accuracy

It has a high accuracy of +/- 0.2C (0.36F) @ 20C in oil, and short response time of < 10 min in still oil. The sensor is also rated for oil temperatures from -40 to 80C (-40 to 176F) and ambient temperatures from -40 to 60C (-40 to 140F), and has a common input range of 10-28VDC with <1W consumption @ 24V.

Easy Installation

Its stainless steel IP65 housing makes it suitable for rugged substation environments, and offers simple installation with a 1/2" NPT connection (adaptor fittings available).

ORDERING INFORMATION

How To Order

B100 - - -

Base Unit¹

B100 B100 Base Unit

B100

Ethernet Communications Options

- N** None
- L** 100Base-FX Fiber Ethernet with SC connectors
- S** 100Base-FX Fiber Ethernet with ST connectors
- R** 100Base-T Copper Ethernet with RJ45 connector

N
L
S
R

Expansion Options

- N** None
- 4** Serial Communications via RS-485 SCADA
- F** Serial Communications via Fiber (ST) SCADA
- H** H₂ Monitoring in Headspace
- O** H₂ Monitoring in Oil
- M** Moisture Monitoring in Oil
- 5** Moisture Monitoring in Oil and H₂ Monitoring in Headspace
- 6** Moisture Monitoring in Oil and H₂ Monitoring in Oil

N
4
F
H
O
M
5
6

Mounting Options

- E** IP66 (NEMA-4 Equivalent) Enclosure
- T** IP31 (NEMA-2 Equivalent) Through Panel Mount
- P** IP31 (NEMA-2 Equivalent) Surface Panel Mount

E
T
P

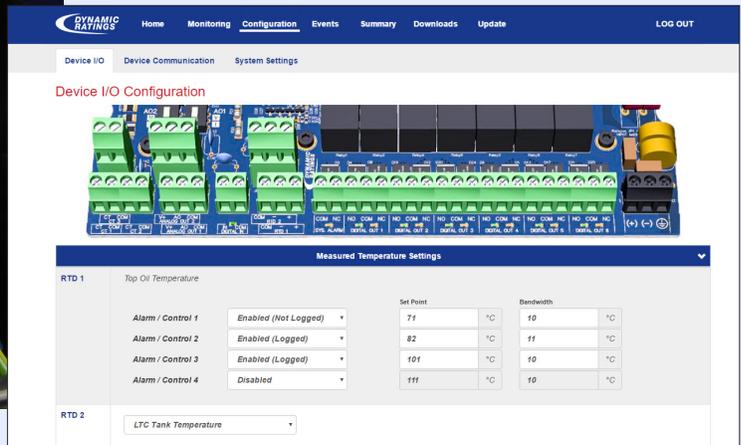
Unit with iBridge Communications²

Consult Factory

Consult Factory

¹ Each B100 Series ETM includes the following I/O: 2 x RTD, 3 x CT, 1 x Digital Input, 6 x Digital Outputs, 2 x Analog Outputs, 1 x System Alarm

² Includes one IND2000N 9 mm inductive coupler (for most power wire sizes). Couplers for other wire sizes available. Requires a new or existing receiving iBridge (CE-520) or Gateway (CE-530) for communications to control room.



ACCESSORIES & SPECIFICATIONS

Sensors & Accessories



Part #	Description
CT-054 ¹	Auxiliary CT: Split Core CT 1000:1 Ratio w/ 5A Primary
CT-055 ¹	Auxiliary CT: Fixed Core CT 1000:1 Ratio w/ 5A Primary
SE-060 ¹	RTD temperature sensor probe for 1/2" NPT Thermal Well
MMTS-3C	Magnetic Mount Temperature Sensor (3 wire PT-100 RTD) *Includes 1/2" NPT conduit connection.*
MMTS-3Wxx	Magnetic Mount Temperature Sensor (3 wire PT-100 RTD) *Includes stainless steel armored cable. Specify length of 25 ft., 50 ft. or 75 ft. (7.62m, 15.24m or 22.86m).
MMK-B100	Magnetic Mounting Kit for B100
CAB-0012	H ₂ Scan Rugged, Twisted pair, Shielded, UV resistant Cable Specify length of 25 ft., 50 ft. or 75 ft. (7.62m, 15.24m or 22.86m).
HDW-107 ²	1" Male x 3/4" Female NTP Stainless Steel DGA Fitting Adapter
HDW-108 ²	2" Male x 3/4" Female NTP Stainless Steel DGA Fitting Adapter

¹ Minimum required: RTD for top oil and one CT for winding temperature.

² Contact factory for additional sizes

B100 Specifications

Parameter	Specification
Power Requirements:	48 - 240 VDC or 110 - 240 VAC (50 - 60 Hz)
Temperature Range:	-40°C to 70°C (-40°F to 158°F)
Communications:	USB, Ethernet, RS485 (optional), Serial Fiber (optional), DNP, Modbus, IEC 61850
Display Info:	Tempered glass with FSTN display technology (black on white), transfective with anti-UV coating

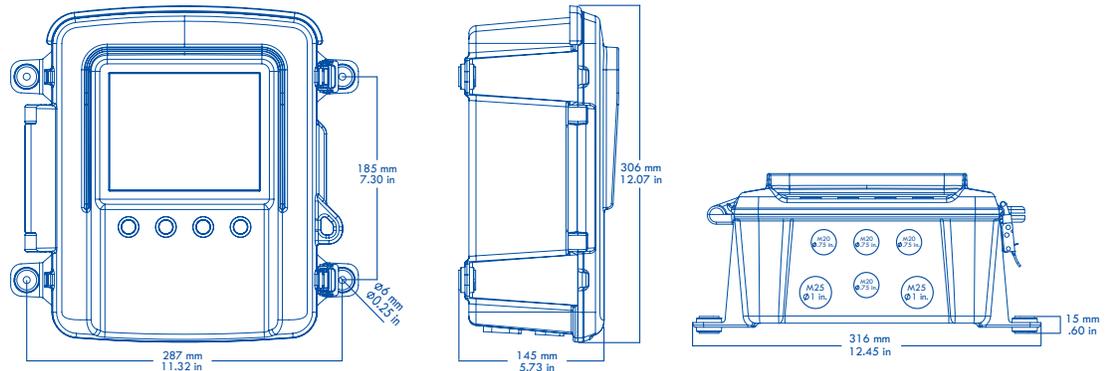
Hydrogen Sensor Specifications

Parameter	Dissolved Hydrogen In-Oil	Hydrogen in Headpace
Measurement Range:	25-5000 ppm	500-100,000 ppm
Accuracy:	20% of reading or 25 ppm, whichever is greater	20% of reading or 500 ppm
Repeatability:	10% of reading or 15 ppm, whichever is greater	10% of reading of 300 ppm
Operating Temp:	-40°C to 70°C (-40°F to 158°F)	-40°C to 70°C (-40°F to 158°F)
Storage Temp:	-40°C to 85°C (-40°F to 185°F)	-40°C to 85°C (-40°F to 185°F)
Oil Temp Range:	-40°C to 105°C (-40°F to 221°F)	N/A
Cross Sensitivity:	< 1%	< 1%

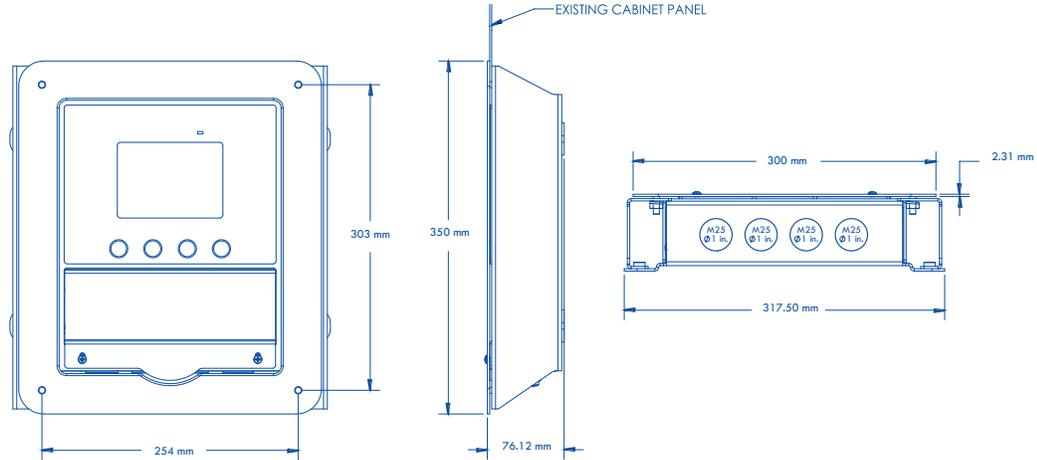
Moisture Sensor Specifications

Parameter	Specification
Measurement Range:	0 to 1 aw
Accuracy at 20°C: ¹	±0.02 aw (0 to 0.9 aw) / ±0.03 aw (0.9 to 1 aw)
Oil Temp Range:	-40 to 80 °C (-40 to 176 °F) / -40 to 100 °C (-40 to 212 °F)
Operating Temp:	-40...60 °C (-40...140 °F) / -40...80 °C (-40...176 °F)
Storage Temp:	-40 to 60 °C (-40 to 140 °F)

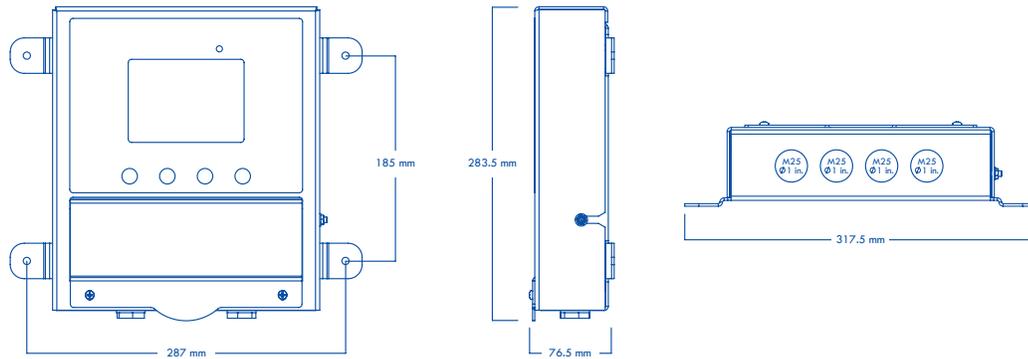
IP66 (NEMA-4)
Enclosure



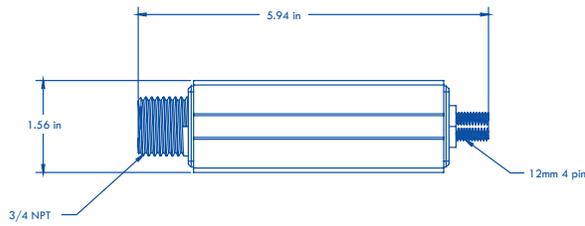
IP31 (NEMA-2)
Through Panel Mount



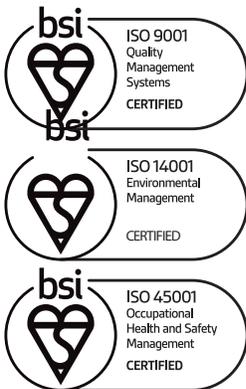
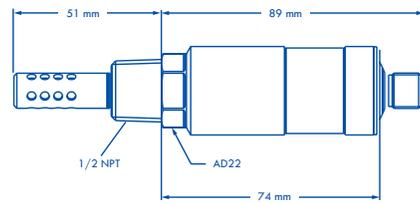
IP31 (NEMA-2)
Surface Panel Mount



Hydrogen Sensor



Moisture Sensor



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