Electron

GRIDSCAN 6000

High-Precision Monitoring for Transformers with Continuous Measurement of Hydrogen, Humidity, Pressure, and Temperature

Technical Catalog

INDEX

INTRODUCTION

H2scan's **GRIDSCAN 6000** is a state-of-the-art monitor that **integrates multiple sensors** into a single device, enabling **advanced predictive diagnostics** and **continuous monitoring** of electrical transformers.

With its patented solid-state technology, the GRIDSCAN 6000 provides accurate measurements of **hydrogen (H_2)**, **moisture**, **pressure,** and **temperature of the insulating oil**, ensuring **early detection of dielectric failures** and **prevention of catastrophic events**.

The solution allows a **significant reduction in operating costs (OPEX),** eliminating the need for periodic calibration and minimizing maintenance interventions.

MAIN TECHNICAL FEATURES

1. High Precision Hydrogen Sensor

- Measurement range: **25 to 5000 ppm**
- **Accuracy:** ± 20% of reading or ± 25 ppm, whichever is greater
- **Repeatability:** ± 10% of reading or ± 25 ppm
- **Response Time:** < 60 minutes after contacting H_2
- **Low cross-interference**: less than 2% sensitivity to CO, CO_2 and hydrocarbons
- **Patented solid-state technology**: no consumables or recalibration required

2. Continuous Humidity Monitoring

- **Measurement range:** 0 to 95% relative humidity
- **Precision:**
  - ±2% SR in a range of less than 20%
  - ±8% RS between 20-50%
- **Repeatability:** ±2% RS

3. Pressure Measurement with High Reliability

- **Measuring range:** 0 to 205 kPa (0 to 30 psia) absolute
- **Accuracy:** ± 2% FS
- **Repeatability:** ± 0.6 kPa (± 1 PSI)
- **Ability to detect pressure variations associated with leaks and mechanical impacts**

4. Temperature Sensor for Critical Conditions

- **Measuring range:** -40°C to 125°C

- **Accuracy:** ± 0.1°C
- **Repeatability:** ± 2°C

ROBUSTNESS AND OPERATION IN EXTREME ENVIRONMENTS

- **Operating temperature:** -40°C to 70°C
- **Submersion resistance: IP68** (immersion in water up to **7.6 meters for 14 days**)
- **Compatible with insulating oils:** mineral, silicone, natural ester and synthetic
- **Marine resistance: IEC 60068-2-11** compliant (salt spray)
- **Operating pressure at sensor:** 0.9 to 2 bar absolute (1.45 to 30 psi)
- **Operating altitude:** up to 3000 meters above sea level

COMMUNICATION AND INTEGRATION

- **Output Protocol: RS-485, Modbus RTU, DNP3**
- **EHMI and SCADA compatible**
- **Dynamic data storage**
- **Flexible connectivity:** choice of wired or wireless communication

MECHANICAL AND ELECTRICAL SPECIFICATIONS

- **Dimensions:** 19.4 x 8.8 x 6.7 cm (7.63 x 3.47 x 2.65 in)
- **Weight:** 1.82 kg (4.01 lb)
- **Supply voltage: 12 to 30 VDC**
- **Maximum consumption: 10W**

TECHNICAL DATA OPERATING CONDITIONS

Parameter	Minimum	Nominal	Maximum	Units
Environment – Insulating Liquid				
Temperature (operating)	-40		105	**°C**
Temperature (Survival)	-40		135	**°C**
Pressure (operating)	0.7 10.2)	1.0 (14.7)	2.0 (29.0)	**Absolute bar (psia)**
Pressure (Survival)	0.1 (1.5)		3.0 (43.5)	**Absolute bar (psia)**
Insulating Liquid Supported	Mineral oil, silicone, natural ester, synthetic ester			
Environment – Environment				
Operating Temperature	-20	25	70	**°C**
Storage Temperature	-20		85	**°C**
Ingress Protection	**IP68; 25' water for 14 days (IEC 60529)**			
Corrosion resistance	Maritime classification; salt water condensation (IEC 60068-2-11 & DIN EN ISO 12944)			
Operating altitude	Up to 3000 m above sea level			
Mechanic				
Vibration	Three-axis sinusoidal, wideband, and random (IEC 60068-2-6 table C.2, IEC 60068-2-64 paragraph A.2, category No. 2, IEC 61373:2010 Cat 1B section 9)			
Shock	30 g, shock duration 18 ms (IEC 60068-2-27)			
Weight	4.01 lb (1.82 kg) (1.82 kg)			
Electric				
Voltage input	18	24	30	VDC
Power Consumption (for GS6K without pump)		5	7	W

Table 1 – Operating Conditions

TECHNICAL DATA HYDROGEN MEASUREMENT

PARAMETER	VALUE
Measuring range	25–5000 ppm
***Response Time, T90**	<60 minutes
Accuracy	±20% of reading or ±25 ppm, whichever is greater
Repeatability	±10% of reading or ±15 ppm, whichever is greater
Cross-sensitivity	Less than 2% cross-sensitivity to other gases (CO, CO2, hydrocarbons)

Note: Once hydrogen reaches the sensor, the sensor will respond in 60 minutes or less.

Table 2 – Hydrogen measurement specification

TECHNICAL DATA HUMIDITY AND TEMPERATURE MEASUREMENT

ATTRIBUTE	SPECIFICATION
Measuring range (water activity)	0–95 %RS
Temperature accuracy at 20°C (68°F)	±2.5 °C (0.9 °F)
Long-term drift	0.2% SR per typical year
Lower limit of detection	2 ppm
Accuracy	±2% RS to <20% RS ±8% RS to 20–50% RS

NOTE: % of relative water saturation is the activity of water multiplied by 100.

Table 3 – Humidity and Temperature measurement specification

TECHNICAL DATA PRESSURE MEASUREMENT

ATTRIBUTE	SPECIFICATION
Measuring range	**0–200 kPa (0–30 psia) absolute**
Overpressure	**400 kPa (60 psia) absolute**
Burst Pressure	**600 kPa (90 psia) absolute**
Temperature compensated range	**0–70 °C (32–158 °F)**
Static accuracy (in compensated range)	**±0.5 %FSO typical**
Linearity (in compensated range)	**0.1 %FSO typical**
Long-Term Offset Stability	**0.1 %OSF per year**
Long-term stability of OSF	**0.1 %OSF per year**

Table 4 – Pressure measurement specification

GETTING TO KNOW THE GDSCAN 6000

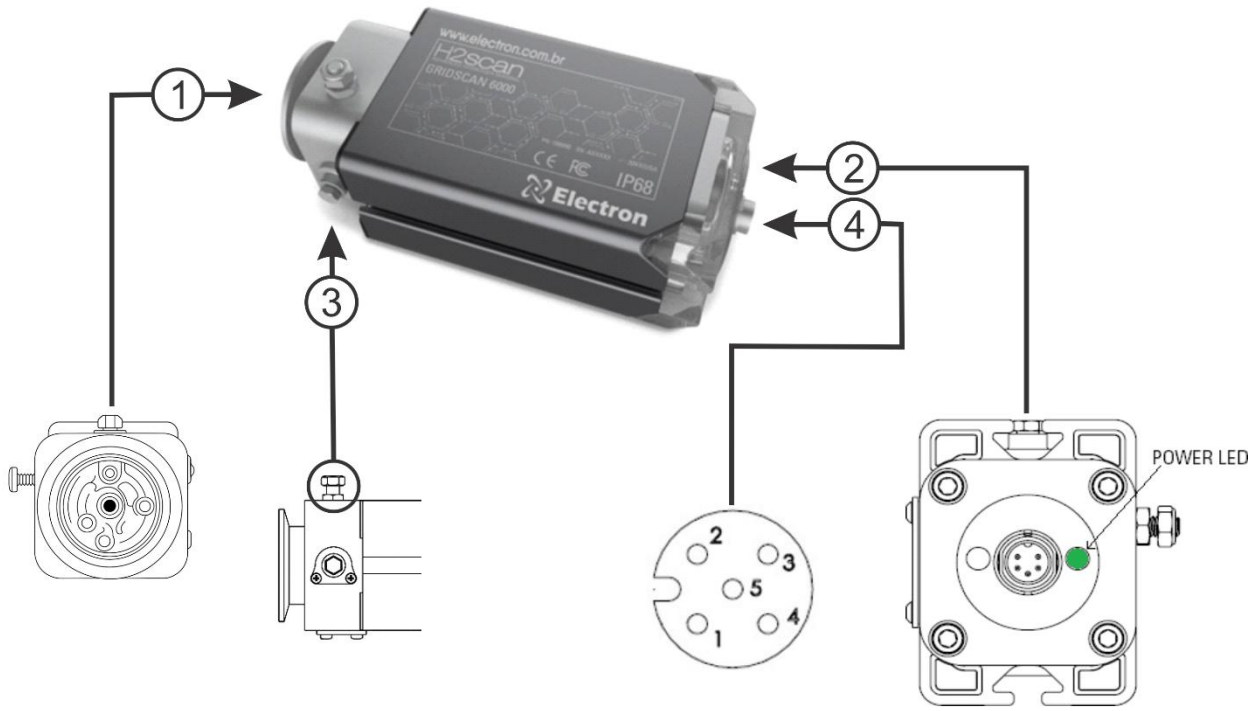


Fig 1 – Getting to know the GDSCAN 6000

1. Oil Inlet
2. LED for power on status indication
3. Bleed Valve
4. Electrical Connections

DIMENSIONS

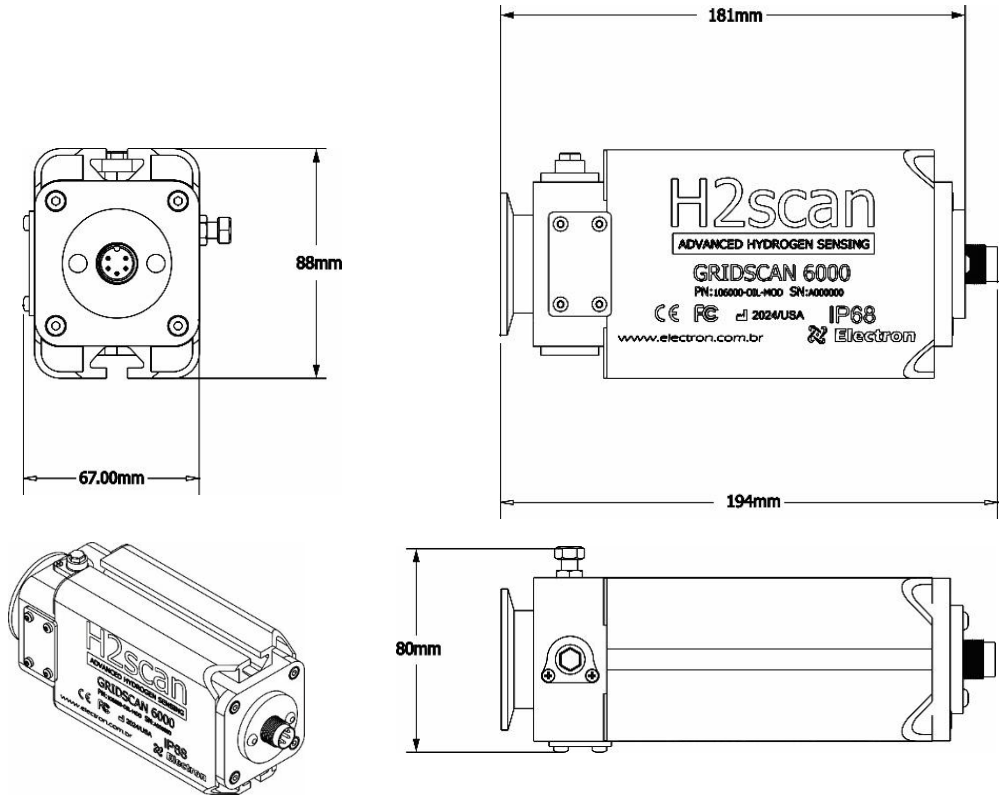
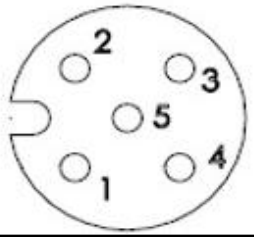


Fig 2 – Dimensions

CONNECTION DIAGRAM

All electrical connections to the GRIDSCAN® 6000 are supplied via a single five-pin M16 connector. The key location (notch) and pin numbers are shown in the table below:



PIN	DESCRIPTION	WIRE COLOR
1	DC Power 12-48 Vdc	**Brown**
2	Grounding DC 12-48 Vdc	**White**
3	RS-485 Terra	**Grey**
4	RS-485 Data+	**Blue**
5	RS-485 Data-	**Black**

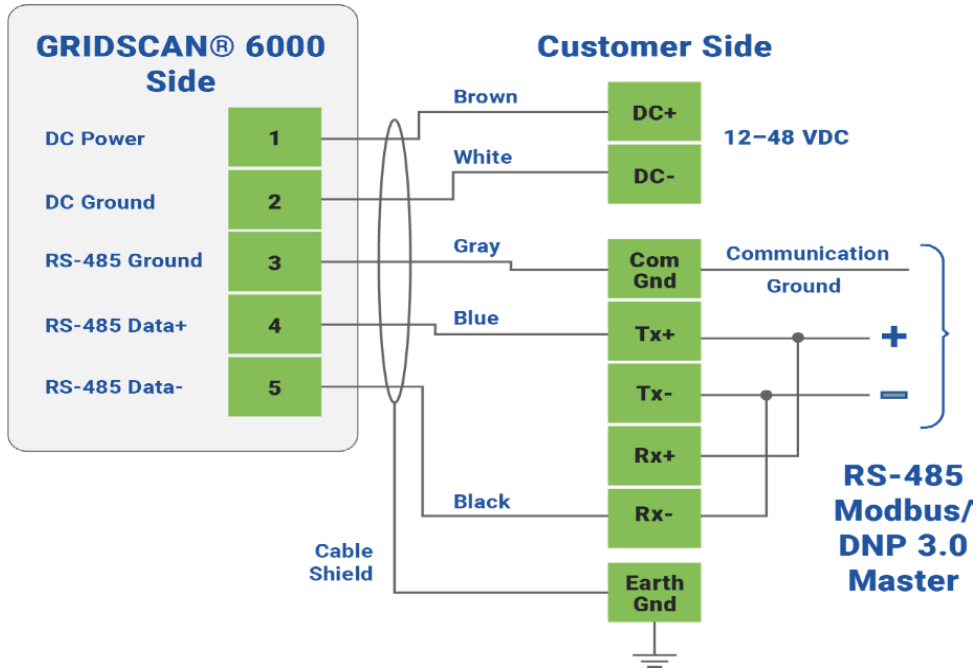


Fig 5 – Connection diagram

ENGINEERING AND MAINTENANCE ADVANTAGES

1. Real-Time Monitoring

- Provides **continuous data** on key transformer operating parameters
- **Predictive analytics** enable failure anticipation and strategic maintenance planning

2. Maintenance-free technology

- **Hydrogen sensor with 10-year warranty** – free of consumables and calibration
- **Rapid deployment and simplified integration**

3. Dielectric and Operational Fault Detection

- **Early indication of** failures associated with leaks, overheating and dielectric degradation
- **Reduced OPEX** with optimized maintenance

4. Advanced Connectivity

- **EHMI and SCADA compatible** for remote management
- **Robust industrial protocols** ensure reliable integration

EXAMPLE APPLICATION WITH EHMI

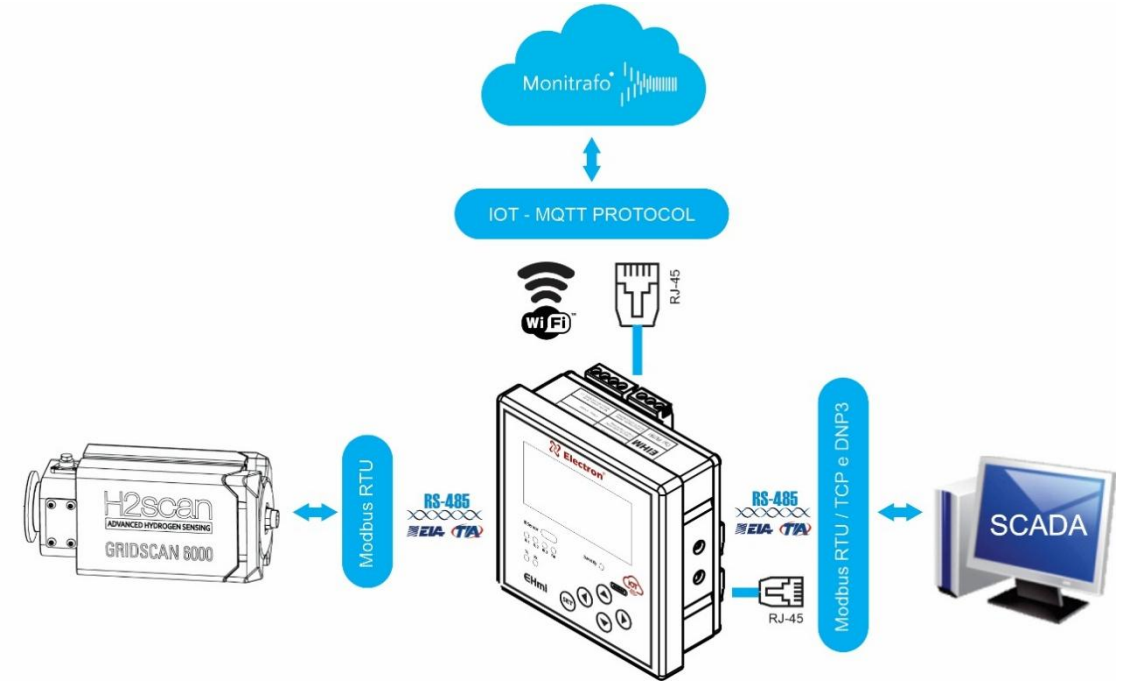


Fig 8 – Application Example

BENEFITS OF INTEGRATING WITH EHMI AND MONITRAFO

The **GRIDSCAN 6000**, combined with **EHMI - IoT** and the **MONITRAFO platform**, offers the most complete solution for **monitoring transformers and critical assets**. The integration of the systems allows **for greater predictability, operational efficiency, and cost reduction**, ensuring safety and performance in real time.

The **GRIDSCAN 6000** and **EHMI - IoT** form a robust and efficient ecosystem for **monitoring transformers and electrical assets**. With the integration of the **MONITRAFO** platform, users have access to a complete solution for **acquisition, processing, and analysis of operational data**, ensuring greater reliability and efficiency in asset management.

Monitored Parameters:

- **Hydrogen (H_2):** First dielectric fault gas, essential for internal overheat monitoring.
- **Humidity**: Critical monitoring of insulating oil degradation and prevention of internal shorts.
- **Pressure**: Indicates operational variations and can detect structural leaks.
- **Temperature**: Allows you to predict thermal failures and overloads.

EHMI uses **MQTT protocol** and integrates advanced tools such as **Artificial Intelligence, Machine Learning, Database, Programmable Functions, Automatic Calculations and Notifications**. In the event of a loss of connection, the data is stored locally and later sent to the server.

With the MONITRAFO platform, users can set up custom designs, track measurements in real-time, and access detailed reports of monitored quantities, triggers, alarms, and predictive maintenance. Monitoring can be done via **internet browser or MONITRAFO app**, available for Android and iOS.

When integrated with the **MONITRAFO** platform, EHMI - IOT offers a complete ecosystem for monitoring and managing electrical assets, significantly expanding its functionalities:

- **Efficient Monitoring:** Access to advanced monitoring, diagnosis, and fault prevention tools directly from the cloud, allowing flexibility and operation from anywhere with internet access.
- **Real-Time Alerts:** Immediate alerts via SMS, WhatsApp, and email ensure rapid response to critical events.
- **Reports with Artificial Intelligence:** Generation of detailed reports with accurate diagnoses, assisting in preventive maintenance and identifying potential problems before they become critical.
- **Interactive Dashboards:** Personalized visualization of projects through modes such as Dashboard, Overview and Map, facilitating the identification of active events and the efficient management of monitored assets.
- **Event Announcer:** Real-time notification to the entire team of substation incidents, promoting effective collaboration and ongoing equipment maintenance.
- **Maintenance Schedule:** Periodic maintenance recommendations generated by IEDs and artificial intelligence, ensuring the best performance and extending the useful life of sensors and electrical assets.
- **Team Communication:** Integration and facilitated communication between team members through notifications and chat on the platform, optimizing maintenance management and maintaining a history of actions.
- **API and Integrations:** Support for various programming languages and integration with ERP systems and IoT platforms, such as SAP, Oracle, Totvs, AWS, Google Cloud, Azure and IBM Watson, providing flexibility and versatility in meeting the specific needs of users.

CERTIFICATIONS AND COMPLIANCE

The **GRIDSCAN 6000** meets stringent international standards for electrical safety and electromagnetic compatibility, among others, according to the following standards:

- ✓ IEC 60068-2, IEC60529
- ✓ AT 55011, EN61000-4, AT 61326-1
- ✓ FCC Oart 15, IEC 61010
- ✓ IEC 60068-2-2 & EN 50155 Clause 13.4.4
- ✓ IEC 60068-2-11 & DIN EN ISO 12944
- ✓ IEC 60529 Clauses 13.4 & 13.6
- ✓ IEC 60529 Table 3 and Clause 14.2.8
- ✓ IEC 60068-2-6 Table C.2
- ✓ IEC 60068-2-64 Spectrum A.2, Category No. 2
- ✓ IEC 60068-2-27
- ✓ EN 61326-1:2013 (IEC 61326-1:2012)
- ✓ EN 55011 Emission Class A (2009)A1(2010) Group 1 Radiated Emissions
- ✓ CISPR Emission Class A 11 (2008)A1(2009)
- ✓ FCC Part 15/18 Emissions
- ✓ ICES-001/ICES-003 Emissions
- ✓ EN 61000-4-2:2009 (IEC 61000-4-2:2008)
- ✓ EN 61000-4-3:2007+A1:2008+A2:2011 (IEC 61000-4-3:2006+A1:2007+A2:2010)
- ✓ EN 61000-4-4:2013 (IEC 61000-4-4:2012)
- ✓ EN 61000-4-5:2014 (IEC 61000-4-5:2013)
- ✓ EN 61000-4-6:2014 (IEC 61000-4-6:2013)
- ✓ EN 61000-4-8:2010 (IEC 61000-4-8:2009)
- ✓ EN 61000-4-11:2010 (IEC 61000-4-11:2009)
- ✓ IEC 61010-1:2010, +A1:2016
- ✓ EN 61010-1:2010, +A1:2019
- ✓ IEC60028-2-30

SPECIFICATION FOR ORDER

Code: CJ-0085

Name: GRIDSCAN 6000 MONITORING KIT

Items Included in the Kit: 1 GRIDSCAN 6000 Sensor (Hydrogen, Temperature, Humidity & Pressure)
1 KF40 Adapter (clamp + threaded connection + O-ring
10 meters of RS485 4-wire connection cable with circular connector (external use).

Optional:

Code: PA-1161

Name: EHMI – HUMAN-MACHINE INTERFACE with IoT and Gateway for Protocol Conversion

WARRANTY TERM

The Electron GDSCAN 6000 has a warranty period of two years from the date of sale stated on the invoice, with coverage for any manufacturing defects that make it defective or unfit for its intended applications the it is intended for.

Disclaimer of Warranty

The warranty does not cover transportation expenses for technical assistance, freight and insurance for shipment of a product with evidence of defect or malfunction. The following events are also not covered: Natural wear and tear of parts due to continuous and frequent use, damage to the outside caused by falls or improper packaging; tampering, unauthorized repairs, or seal violations by non-authorized personnel not authorized by Electron and in disagreement with the instructions that are part of the technical description.

Loss of Warranty

The product will automatically lose its warranty when:

• The instructions for use and assembly contained in this manual and the installation procedures contained in the NBR 5410 Standard are not observed;

• Subjected to conditions outside the limits specified in the respective technical descriptions;

• Violated or repaired by a person other than Electron's technical team;

• The damage is caused by a fall or impact;

• Infiltration of water or any other liquid occurs;

• Overload occurs that causes degradation of the components and parts of the product.

Use of the warranty

To enjoy this warranty, the customer must send the product to Electron along with a copy of the purchase invoice properly packaged so that there is no damage in transport. For an emergency service, it is recommended to send as much information as possible, regarding the defect detected. This will be analyzed and subjected to full functional tests.

The analysis of the product and its eventual maintenance will only be carried out by the technical team at the headquarters of Electron do Brasil.