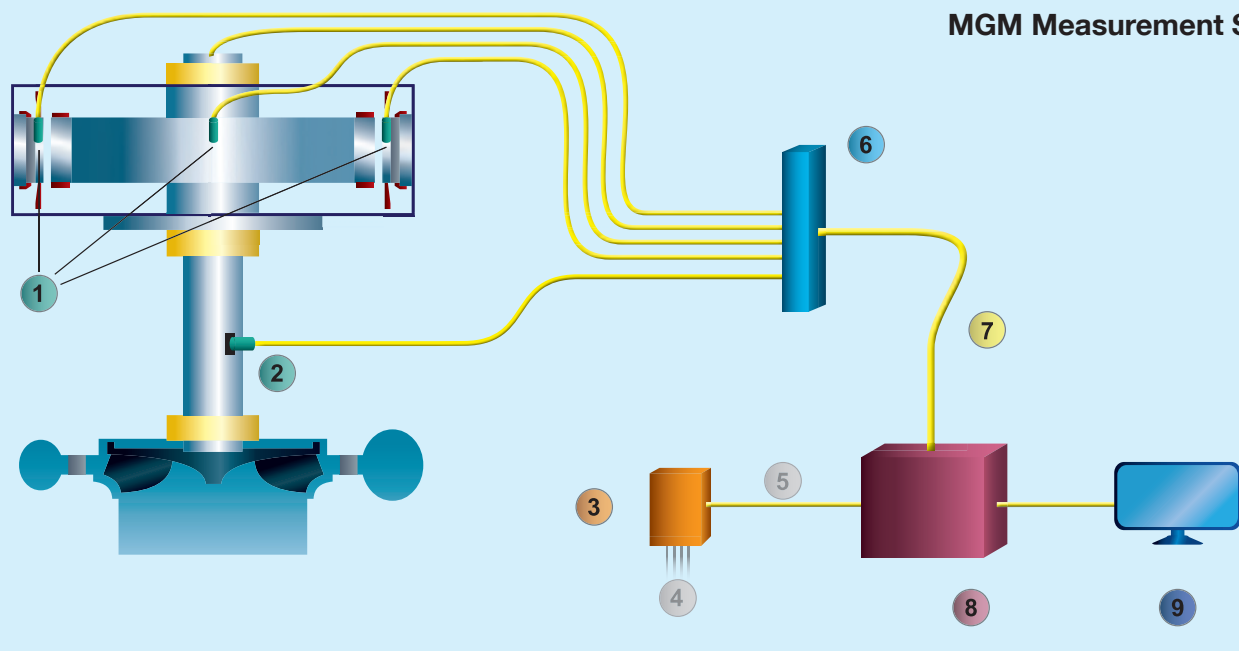


# DIA TECH MGM

## Machine gap monitoring module



MGM Measurement Scheme

- |   |                           |  |                      |     |                             |                          |                     |                         |
|---|---------------------------|--|----------------------|-----|-----------------------------|--------------------------|---------------------|-------------------------|
| 1   | 2                         | 3  | 4                    | 5   | 6                           | 7                        | 8                   | 9                       |
| Air gap sensors mounted on surface of stator bore | Phase Reference (Trigger) | SCADA (Supervisory Control and Data Acquisition) | Auxiliary Parameters | LAN | High-speed acquisition unit | High-speed data transfer | Monitoring Computer | Grafical User Interface |

**The purpose of DIA TECH MGM** is the early detection of changes in the gap behaviour of a rotating machine. It provides “ready for use” diagnostic information about the operating characteristics and health of the monitored components. If changes are detected, the diagnostic algorithms will try to identify the cause of the problem. DIA TECH MGM is designed to monitor the dynamic behaviour of a rotating structure (Rotor) within a flexible structure (Stator) such as

- Generator air gap monitoring for the early detection of changes
- Runner clearance monitoring for minimal tip clearance losses
- Radial bearing clearance monitoring for thermal displacements

### Acquisition of measured values

The measuring chain is a standard one from the sensor via conditioner to a dedicated processing unit. This processing unit – a high-speed analogue/digital converter (ADC) – samples and digitalizes the “raw” gap signals with max. 6000 Hz per channel. Special developed software runs on the ADC to prepare the raw signals for direct min-gap check. Relay outputs are available for mechanical protection if required.

### Processing of measured values

After additional pre-processing the final air gap results are transferred to a computer on a high-speed Ethernet connection, where the gap results are diagnostically evaluated for deviations and prepared for

extended visualisation. This visualisation provides all relevant charts and diagrams, which meet the interests of technical experts. DIA TECH MGM offers the online as well as historic displays of polar plots, time signals, bar charts, pole related diagrams and high resolution charts from transient recordings.

All calculated gap values as well as eccentricity and roundness are sent to the data management package DIA TECH CORE for long-term storage and visualisation.

By DIA TECH MGM discovered deviations messages (pre-warnings and warnings) will be generated, which are transferred to the message system of the DIA TECH GUI for indication. (GUI = Graphical User Interface)

# DIA TECH MGM

## Machine gap monitoring module

### Acquisition requirements:

#### Required hardware:

- Capacitive sensor systems as well as eddy current proximity probes incl. conditioner
- Phase reference sensor (Trigger or Keyphasor)

- High-speed A/D-conversion and processing unit

#### Auxiliary parameters for diagnosis

- Active power (preferably)
- Stator core and stator slots temperatures

### Main specification:

#### Number of measuring-points:

One (1) package of hardware and software is able to process 48 gap signals.

#### Pre-processing at front-end ADC:

- 6 kHz sampling pro sensor
- Low pass filter and averaging
- Limit monitoring (pre-warning, warning)
- Action upon limit violation: Record of up to (adjustable) 200 revolutions (e.g. 20 before warning and 180 after warning)
- Calculation of pole related values
- Acquisition (sampling) and record of raw data for rotor profile
- Temporary buffering (in case of disconnection between ADC and PC)

- Air gap archive (history)
- Bar chart

Providing of gap parameters:

- Min-Gap, Max-Gap, Average-Gap
- Roundness of Rotor & Stator
- X, Y coordinates of centers of Rotor & Stator
- Eccentricity

Display of "raw data" (= sampling) for:

- Rotor-Profile
- Snapshot

#### Limit monitoring (pre-warning, warning) upon

- Min gap
- Max gap
- Roundness
- Eccentricity

#### Processing at computer:

Providing of "Gap characteristic" (= signature):

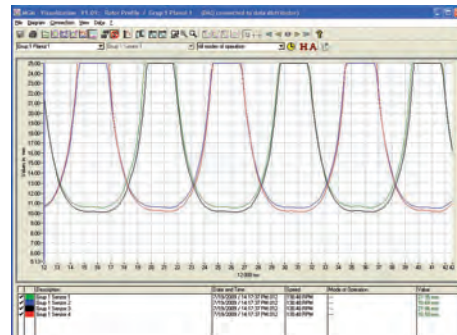
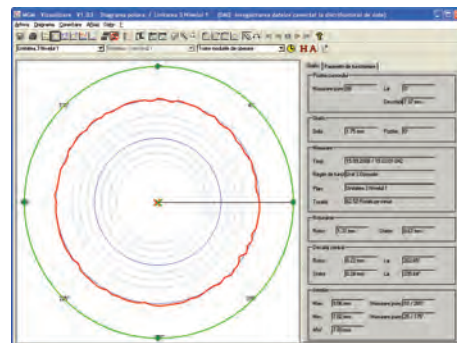
- Air gap-profile
- Pole diagram
- Polar diagram

#### System requirements:

DIA TECH MGM requires the data management software package DIA TECH CORE. All DIA TECH Modules are running on standard personal computers and a Windows®-based platform.

### Available DIA TECH Knowledge Modules:

- DIA TECH CAA-HS (Cooling air analysis – hotspot detection)
- DIA TECH CAA-O3 (Cooling air analysis – ozone diagnosis for surface partial discharge)
- DIA TECH CAV (Cavitation monitoring)
- DIA TECH IRD (Rotor pole temperature module based on infrared measurement)
- DIA TECH MFX (Magnetic flux monitoring)
- DIA TECH MGM (Machine gap monitoring module for air gap and turbine clearance)
- DIA TECH RTMP (Rotor winding temperature module based on calculation)
- DIA TECH SBS (Structure borne sound diagnosis for stator core vibration)
- DIA TECH ThM (Thermal diagnosis for stator core & winding and cooling circuit)
- DIA TECH CORE (Data management package with graphical user interface)
- DIA TECH TPOT (Turbine / pump operation time counter)



**DIA TECH is part of NEPTUN, the integrated common solution for secondary technology.**

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